Appendix B
Restoration Plan
April 2012

City of Tumwater

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Cover photograph: Deschutes River, Site 130 by City of Tumwater Public Works

Chapter 1
Introduction

1.1 Background

For cities containing any shorelines with impaired ecological functions, Shoreline Master Programs shall include goals, policies, and actions for restoration of such impaired ecological functions (WAC 173-26- 186(8)(c). Specific goals and actions for restoration, as well as existing policies and programs contributing to restoration, shall be identified in an implementable document with a scientifically based prioritization framework. This document is intended to be supportive of planning efforts and is expected to be updated and amended as existing conditions, scientific data, lead entities and funding sources develop and evolve.

Restoration is defined under the shoreline guidelines as *"reestablishment or upgrading of impaired ecological shoreline processes or functions."* While restoration is intended to achieve overall improvements in shoreline ecological functions over time, it is important to note that that is in reference to the ecological status (baseline) upon adoption of the master program, and does not imply returning shoreline areas to aboriginal or pre-European settlement conditions.

Restoration Plans must consider and address the following subjects (WAC 173-26-201(2)(f)):

- Identify degraded areas, impaired ecological functions, and sites with potential for ecological restoration;
- Establish overall goals and priorities for restoration of degraded areas and impaired ecological functions;
- Identify existing and ongoing projects and programs 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;
- Identify additional projects and programs needed to achieve local restoration goals, and implementation strategies including identifying prospective funding sources for those projects and programs;
- Identify timelines and benchmarks for implementing restoration projects and programs and achieving local restoration goals;
- 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.

1.2 No Net Loss of Shoreline Ecological Functions

The concept of no net loss of shoreline ecological functions is rooted in the Act and in the goals, policies, and governing principles of the state's shoreline guidelines. The Act 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."* According to the governing principles of the guidelines (WAC 173-26-186), protection of shoreline ecological functions are accomplished through the following:

- Meaningful understanding of current shoreline ecological conditions
- Regulations and mitigation standards that ensure that permitted developments do not cause net loss of ecological functions
- Regulations that ensure exempt developments 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
- Incentives and voluntary measures designed to restore and protect ecological functions

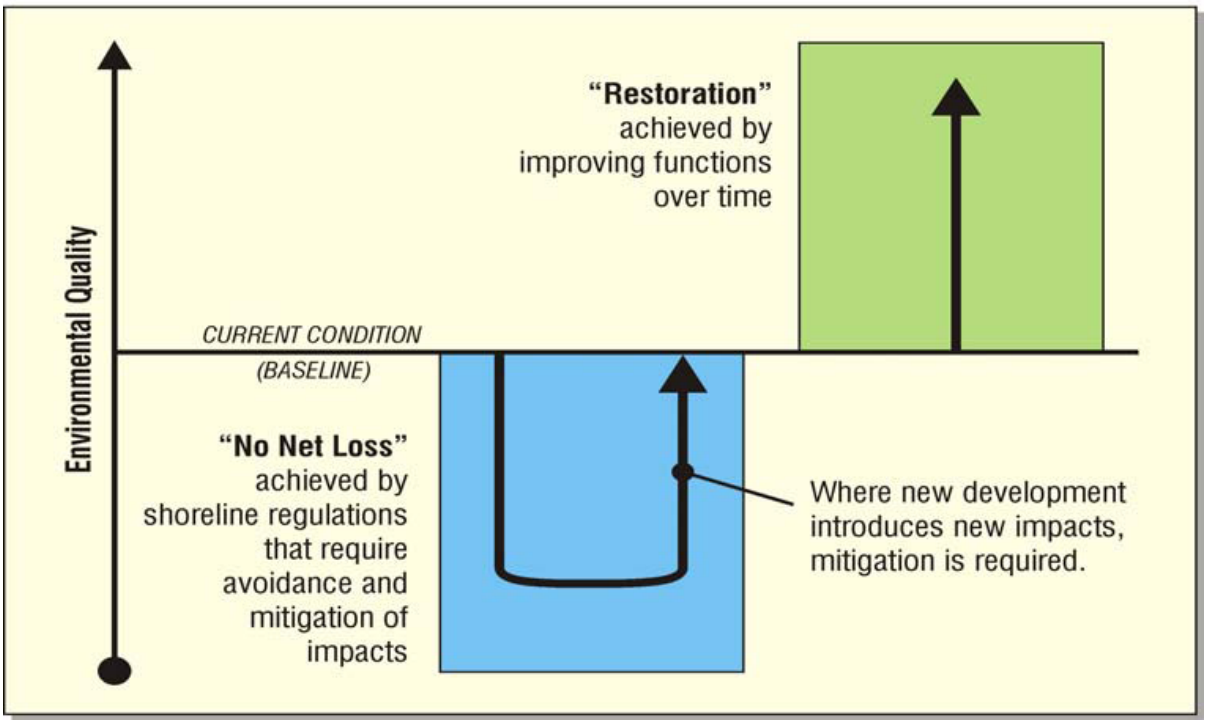
It is not enough to simply prevent further loss of ecological functions, master programs provisions should also be designed to *"…achieve overall improvements in shoreline ecological functions over time when compared to the status upon adoption of the master program."* The desire to improve functions over time provides the basis for restoration planning and creates a distinction between mitigation and restoration in the context of the Shoreline Master Program.

Under the Act, applicants for shoreline permits must fully mitigate new impacts caused by their proposed development. However, applicants are not required to restore past ecosystem damages as a condition of permit approval. Permit applicants will not be required to implement the restoration measures identified in this plan as mitigation for project impacts, but they may elect to implement elements of this plan as mitigation for shoreline development if appropriate.

The chart below (Figure 1) shows the distinction between mitigation and restoration as it is applied through the Shoreline Master Program process.

Figure 1: Mitigation versus Restoration in Shoreline Master Programs.
(Source: Department of Ecology)

Two Distinct Objectives:
No-Net Loss of Shoreline Ecological Functions
and Restoration Over Time



1.3 Methods and Sources of Information

Restoration Plan goals and priorities are built upon the identification of degraded areas, impaired ecological functions, and sites with potential for ecological restoration identified in the Shoreline Inventory and Analysis (Phase 1). Existing and on-going projects were obtained from the groups and jurisdictions active in shoreline preservation and restoration in the region. Additional projects and programs were identified at the planning level where a comparison of existing and ongoing projects to the findings of Phase 1 indicated that additional actions would be necessary to meet local restoration goals.

Chapter 2
Shorelines and Potential Restoration Areas

2.1 Shorelines

Table 1 lists the shorelines identified in the Shoreline Inventory for Tumwater and the Urban Growth Area (UGA), classified into functional systems.

Table 1: SMA Shorelines and Functional Systems for Tumwater and UGA

Type	Area	System
Marine Waters		
None		
Rivers/Streams		
Black Lake Drainage Ditch	Tumwater & UGA	Deschutes River System (Also links Black Lake and Capitol Lake)
Deschutes River	Tumwater & UGA	Deschutes River System
Percival Creek	Tumwater	Deschutes River System (Also links Black Lake and Capitol Lake)
Lakes		
Barnes Lake	Tumwater	Freshwater Lake
Black Lake	UGA	Black Lake/Capitol Lake (linked by Black Lake Drainage Ditch and Percival Creek) Note: Also hydrologically linked to WRIA 23 – Upper Chehalis
Capitol Lake	Tumwater	Black Lake/Capitol Lake (linked by Black Lake Drainage Ditch and Percival Creek)
Lake Susan and Munn Lake	UGA	Freshwater Lakes
Trosper Lake	Tumwater & UGA	Freshwater Lake

2.2 Potential Restoration Areas

This section provides an overview of areas with potential for restoration at both the ecosystem and reach scale as determined in the Lacey, Olympia, and Tumwater Shoreline Analysis and Characterization Report. A number of shoreline restoration projects and programs are currently underway or are in the planning stages in Tumwater. These projects have been initiated by various private, regional, state and federal entities, resulting in several successful shoreline restoration and enhancement projects. Chapter 5 provides a summary of these projects and programs.

A. Freshwater Ecosystem Scale Processes and Restoration Potential

Ecosystem-wide processes that create, maintain, or affect the City's shoreline functions were characterized using an adapted version of the five-step approach to understanding and analyzing watershed processes described in *Protecting Aquatic Ecosystems: A Guide for Puget Sound Planners to Understand Watershed Processes* (Stanley et al, 2005), and presented in Chapter 3 of the Lacey, Olympia, and Tumwater Shoreline Analysis and Characterization Report.

The analysis specifically looked at hydrologic processes in two ways: 1) where the important areas are, and 2) how they have been altered over time. The two results are then taken together to suggest areas where protection or restoration of ecosystem process would be the most effective and appropriate at the watershed scale. While the analysis was specifically focused on hydrologic processes, the parameters used are fairly general landscape-level measures that can be used as a general proxy for overall level of functioning.

Important areas include: 1) rain on snow areas; 2) surface storage (historic depressional wetlands) and floodplains; 3) recharge areas; 4) storage capacity areas; and 5) discharge areas.

The types of alterations that the framework considered are: 1) forest clearing; 2) filling of depressional wetlands; 3) channelization of streams; 4) road presence and density; and 5) impervious surface. The framework develops a High, Medium 1, Medium 2, or Low score for both importance and alteration for each sub-basin within a study area. The scores for both importance and alteration are then taken together to develop an overall ranking of appropriate actions.

Figure 2 shows how the combined importance and alteration rankings are used to prioritize where development, protection and restoration could occur in the watershed to target a net gain in ecosystem functioning. Areas providing a high level of important watershed processes and having a high level of degradation or alteration would be most suitable for "Restoration." Areas providing a low level of watershed processes and are highly altered would be most suitable for "Development." Finally, those areas with high level of providing important watershed processes and with low alteration are designated most suitable for "Protection." In the middle of the matrix, areas are denoted Protection/Restoration, as either method may be more appropriate. Please note, however, that this analysis should not be interpreted to indicate the only action that is appropriate in any given basin. The resolution of this analysis is limited by the resolution of the supporting datasets, and can only identify high-level trends in the landscape.

When the matrix is applied to the sub-basins within the study area, a map illustrating the overall rankings can be produced (Figure 3).

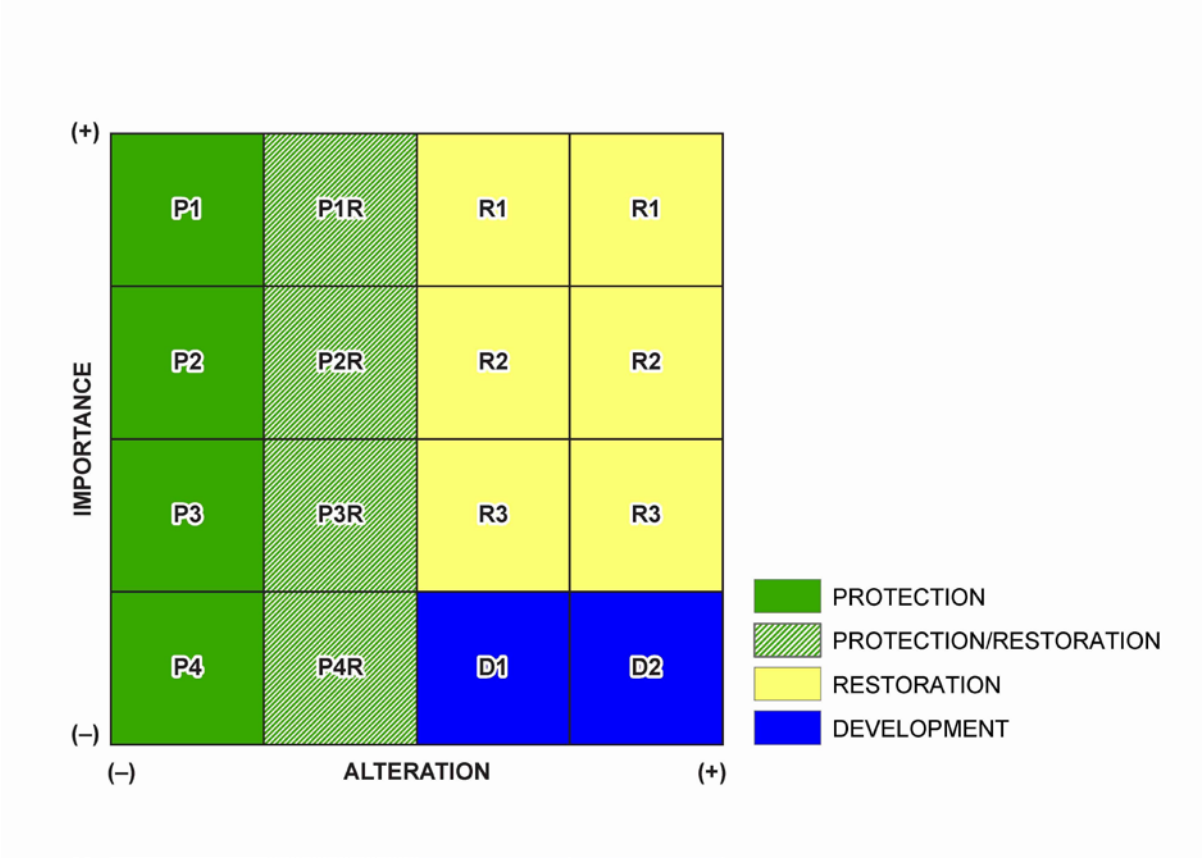


Figure 2: Conceptual view of the landscape analysis framework

Figure 3 (map T-3 of the Characterization Report) identifies the highest restoration potential within Tumwater along the Deschutes River and within the urban core of the study area. Clearly, wholesale restoration of the area is difficult or impossible to achieve, given current infrastructure. However, the restoration of key aquatic areas within the urban area can provide important corridors and connections between the upper watershed and the marine nearshore. The remainder of the study area is located within the Protection/Restoration area.

Protection-only areas are identified outside of the growth area and are limited to a sub-basin in the upper Deschutes basin and three small sub-basins along the marine nearshore. This is generally because many important areas at the ecosystem scale, such as rain or snow and surface storage areas, do not occur within the urban core.

Please note that there are no "Development" subbasins, since there are no "Low" importance areas identified in the Thurston study area. The Protection/Restoration category was applied more broadly.

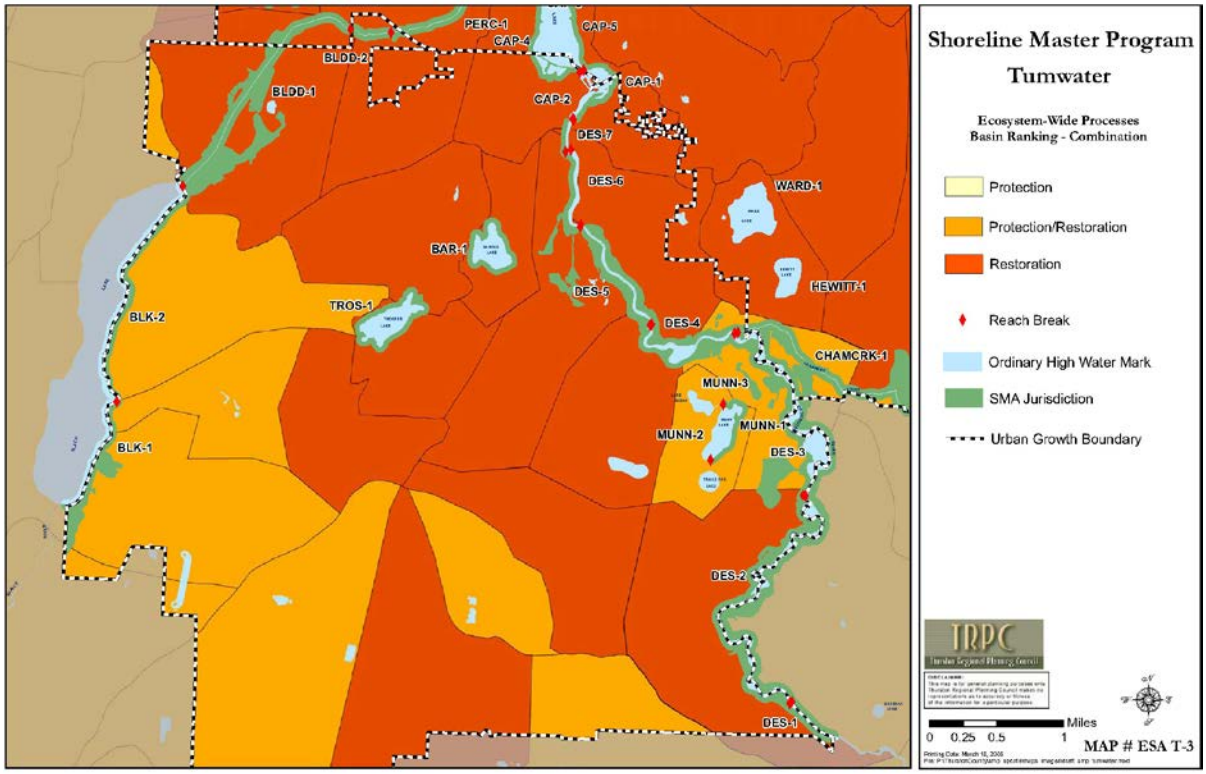


Figure 3: Combined basin ranking for Tumwater

B. Issues and Restoration Opportunities at the Reach Scale

The following tables, summary of key management issues and restoration opportunities were developed as part of Chapter 5 of the Lacey, Olympia, and Tumwater Shoreline Analysis and Characterization Report, (ESA Adolfson), prepared as part of the Shoreline Master Program update. The tables have been refined from the original analysis and characterization report and provide a summary of shoreline functions, levels of alteration, and restoration opportunities for the following shoreline reach systems within the study area:

- Deschutes River System - Deschutes River, Percival Creek, and Black Lake Ditch
- Black Lake and Capitol Lake – both drain into the Puget Sound and are connected by Black Lake Ditch and Percival Creek
- Other Freshwater Lakes (Barnes, Trosper, Munn, Susan)

1. Deschutes River System

This section summarizes the status of the Deschutes River Shoreline based upon the inventory information, and describes the shoreline functions, the level of alteration compared to historical condition, and the restoration opportunities to improve shoreline conditions (Table 2). The Deschutes River system also

includes Percival Creek, and Black Lake Ditch as all important contributors to the river system and its health.

Table 2: Assessment of Deschutes River System Shoreline Functions

Process: Function	Level of Alteration	Potential Protection and Restoration Measures and Opportunities
Habitat: Estuarine habitat; subtidal and intertidal mudflats and salt marshes provide transition habitat between fresh and salt water environments	**High** Physical modifications to the Deschutes river delta have changed the spatial mixing of fresh and salt water, as well as the mouth of Percival Creek. Construction of Capitol Lake has altered the river's estuary. Changes in flow regime due to upstream diversion and regulation, and changing land uses have modified timing and quantities of freshwater flows.	**Moderate to Low** The scope of the physical modifications to the system is significant enough to preclude straightforward restoration measures. Restoration projects to restore the Deschutes River estuary are being considered and have the potential to increase the area over which the fresh to salt water transition occurs.
Hydrology: Channel and floodplain connection	**Moderate to High** The installation of dams and construction of Capitol Lake within the river's main channel has significantly reduced connections between the channel and the floodplain within Olympia and lower Tumwater. Upstream of Tumwater Falls, the channel and floodplain are relatively better connected and floodplains remain undeveloped, or developed with low intensity open space.	**Low** At the lowest part of the watershed and with the presence of the Port of Olympia, the potential for significant re-connection of channel and floodplain in Olympia is limited. Percival Creek enters into a canyon at its confluence with the Black Lake Drainage Ditch, and flow is relatively confined.
Hydrology: Summer low flows	**High** Upstream land uses and development have resulted in less water flowing in the Deschutes and its tributaries during the summer low-flow periods.	**Moderate** The Cities of Tumwater and Olympia, Washington State Department of Ecology and Thurston County partnered to complete the TMDL study on the Deschutes. Regional solutions to the low flow problem are also required.
Hydrology: Flood flow retention	**Moderate** As noted above, channel-floodplain interaction is modified in some areas, which has the potential to reduce flood flow retention. However, some areas of natural connection to the river floodplain exist.	**Low** The urban core's position at the lowest part of the watershed limits the potential to provide significant flood storage. Tumwater could partner with Olympia, regional watershed entities and Lewis County to address the flood storage issue. Programs to remove dikes and other development could help enhance flood flow retention.

Process: Function	Level of Alteration	Potential Protection and Restoration Measures and Opportunities
Sediment Generation and Transport: Upland sediment generation.	**Moderate to High** Fine sediment loading to Capitol Lake has increased due to build-up and wash-off from urban and industrial land uses. Sediment which historically was washed into the Budd Inlet at the river mouth is now captured in Capitol Lake, negatively affecting water quality and habitat.	**Moderate** Implementation and retrofit of water quality BMPs to the existing stormwater system can reduce fine sediment loading. Consideration of restoration of the Deschutes River Estuary or other options.
Water Quality: Wetland removal of pollutants through sedimentation and adsorption.	**High** Reduction in wetland area and channel-floodplain connection has reduced water contact time of water with soil. This lowers the potential for filtering and cycling of pollutants.	**Moderate** Encouraging the restoration of riverine and other wetlands within the contributing basin can increase water contact time with soil.
Water Quality: Delivery, movement, and loss or removal of nutrients, pathogens, and toxicants; storage of phosphorus and removal of nitrogen and toxins through sedimentation and adsorption.	**High** The delivery, transport, and disposition of nutrients, pathogens, and toxins have been significantly altered from the pre-disturbance condition. Upland sources of these pollutants have increased significantly as a result of urban and industrial land uses within and near the shoreline. Potential storage has decreased through wetland loss and installation of impervious surfaces. The development of the TDML for the Deschutes River has highlighted potential sources of point-source pollution and flow reduction.	**Moderate** Significant source control and remediation efforts are currently underway to remove and avoid pollutant discharge to the riverine environment. Restoration of riverine/estuarine wetlands can improve the system's ability to provide long-term storage of these pollutants.
Habitat: Shoreline habitat for wildlife; vegetation provides structure for invertebrates, birds, amphibians, reptiles, and mammals.	**Moderate** Native riparian vegetation has been removed during past river management projects. However, some sections of the river retain the natural riparian vegetation. Percival Creek and the Black Lake Drainage Ditch serve as a corridor linking Black Lake to Capitol Lake.	**Moderate** Replanting and enhancement of riparian buffers and associated wetlands can increase habitat values for wildlife.

Process: Function	Level of Alteration	Potential Protection and Restoration Measures and Opportunities
Habitat: Source and delivery of LWD (Large Woody Debris).	**High** Removal of mature trees from riparian areas, and removal from upstream bridges has significantly reduced the source of LWD to the Deschutes River.	**Moderate** The potential to re-introduce LWD, either through planting or placement exists.

a. Key Management Issues

The key management issues for the Deschutes River system include the following:

- Reduction in wetland area in the basin has reduced water contact time with soil. This lowers the potential for filtering and reduces the removal of pollutants.
- Nutrient, pathogen and toxin loading is significantly altered from the pre-disturbance condition. Sources of these pollutants are both point discharges (i.e., stormwater outfalls) and non-point discharges Urban and industrial land uses have increased the sources of these pollutants, thereby worsening water quality in the Deschutes River, Capitol Lake, and Budd Inlet.
- Alteration to shorelines during urban development has reduced the extent of wetland and riparian habitat.
- Sediments from the Deschutes River settle in Capitol Lake and are unable to feed the estuary in Budd Inlet.

b. Restoration Opportunities for the Deschutes River System

A Total Maximum Daily Load (TMDL) study is being undertaken by Ecology, Thurston County, and the Cities of Olympia and Tumwater. As part of the Capitol Lake Adaptive Management Plan (CLAMP), restoration of the Deschutes River Estuary was one alternative considered. In addition, opportunities for restoration in the Deschutes River may be identified and coordinated with Budd Inlet restoration planning efforts such as the Budd Inlet Restoration Partnership.

The Deschutes River/Capitol Lake/Budd Inlet system is classified as an impaired water body under Section 303d of the federal Clean Water Act. In response, the Washington State Department of Ecology (Ecology) initiated technical evaluations in 2003 to determine the main sources of pollution and to determine how much water quality needs to be improved to keep the watershed healthy.

This involves setting TMDLs for contaminants of concern, including nutrients, fecal bacteria, temperature, dissolved oxygen, and fine sediment.

The technical evaluations set the stage for the development of a cleanup plan and related public review process. Once the cleanup is approved by the Environmental Protection Agency, provisions within the plan will be binding. City staff is actively participating in Ecology's TMDL process, along with staff from other regional jurisdictions.

2. Black and Capitol Lake Systems

This section summarizes the status of the Black and Capitol Lake Shorelines based upon the inventory information, and describes the shoreline functions, the level of alteration compared to historical condition, and the restoration opportunities to improve shoreline conditions (Table 3). Both Black and Capitol Lake drain to Budd Inlet. Black Lake is connected to Capitol Lake via the Black Lake Drainage Ditch and Percival Creek system, and is also hydrologically linked to WRIA 23 – Upper Chehalis. Capitol Lake connects to Budd Inlet via the control structure.

Table 3: Assessment of the Black and Capitol Lake Systems Shoreline Functions in Tumwater and the UGA

Process: Function	Level of Alteration	Potential Protection and Restoration Measures and Opportunities
Hydrology: Hydroperiod.	**High** Black Lake's drainage pattern has been altered with the installation of the Black Lake drainage ditch. Capitol Lake represents a highly altered form of the original Deschutes Estuary with the installation of a berm and tide gate system.	**Low to Moderate** Restoration of the Deschutes Estuary is possible; feasibility was considered as part of the Capitol Lake Adaptive Management Plan (CLAMP) process. It is not likely that the Black Lake Drainage Ditch and the associated alternation to drainage patterns in Black Lake will be removed or reversed.
Hydrology: Flood flow retention.	**Low** Black Lake provides water storage during the winter. Capitol Lake, while highly altered, is too low in the system to provide flood flow retention.	**Moderate** Focus on preserving flood flow retention provided by Black Lake, and by limiting hydromodification of the area draining to the lake.
Sediment Generation and Transport: Sediment Retention.	**Moderate to High** Black Lake likely receives elevated fine sediment loading as land cover alterations have occurred throughout much of the contributing area. Capitol Lake now retains a significant proportion of the sediments delivered by the Deschutes River and Percival Creek.	**Moderate to High** Implementation and retrofit of water quality BMPs to the existing stormwater system can reduce fine sediment loading. Restoration of the Deschutes Estuary is being considered.

Process: Function	Level of Alteration	Potential Protection and Restoration Measures and Opportunities
Water Quality: Wetland removal of pollutants through sedimentation and adsorption.	**High** Reduction in wetland area and channel-floodplain connection has reduced water contact time of water with soil. This lowers the potential for filtering and cycling of pollutants.	**Moderate to High** Encouraging the restoration of riverine and other wetlands within the contributing basin can increase water contact time with soil.
Water Quality: Delivery, movement, and loss or removal of nutrients, pathogens, and toxicants; storage of phosphorus and removal of nitrogen and toxins through sedimentation and adsorption.	**High** The delivery, transport, and disposition of nutrients, pathogens, and toxins have been significantly altered from the pre-disturbance condition. Upland sources of these pollutants have increased significantly as a result of urban and industrial land uses within and near the shoreline.	**Moderate** Restoration of riverine/estuarine wetlands can improve the system's ability to provide long-term storage of these pollutants. Within the urban core, retrofit of stormwater conveyances and impervious surfaces from which metals, oils, nutrients, etc. build up and wash off can improve water quality.
Habitat: Shoreline habitat for wildlife; vegetation provides structure for invertebrates, birds, amphibians, reptiles, and mammals.	**Moderate** Native riparian vegetation has been removed. There are portions of both lakes that are currently forested, and are under some level of public or private protection.	**Moderate** Replanting and enhancement of riparian buffers and associated wetlands can increase habitat values for wildlife.
Habitat: Source and delivery of LWD.	**High** Removal of mature trees from riparian areas, and removal from upstream bridges has significantly reduced the source of LWD to both lakes.	**Moderate** The potential to re-introduce LWD, either through planting or placement exists.

a. Key Management Issues

The key management issues for Black and Capitol Lakes are:

- The Deschutes River Estuary has been highly altered, eliminating the river delta and typical estuarine processes in this area.
- Overall water quality is a concern for both lakes. Increased loading due to land cover conversion and associated uses has resulted in sedimentation and growth of invasive aquatic plants and algae. Phosphorus loading and temperatures are key parameters.
- Habitat is impaired as typical riparian habitat has been removed from significant portions of both lake systems.

b. Restoration Opportunities for Black and Capitol Lakes

- CLAMP considered several restoration approaches for Capitol Lake, including significant changes to the current berm/tide gates.
- Take corrective action to improve water quality in the contributing basin, specifically to control pollutants and sediment transport from urban runoff.
- Protect and restore riparian habitat wherever feasible.
- Preserve and restore lacustrine wetlands to enhance habitat and protect water quality.

3. Freshwater Lake Systems

This section summarizes the general status of the freshwater lakes in the study area based upon the inventory information, and describes the shoreline functions, the level of alteration compared to historical conditions, and the restoration opportunities to improve shoreline conditions. These lakes are addressed as an ensemble because of the underlying similarities in geomorphic condition, surrounding land use, and restoration potential. Certainly they will have some site-specific issues, but data to establish these issues for each lake are lacking. Please note that this section does not address Capitol or Black Lakes, which are addressed in the previous section.

Table 4: Assessment of Freshwater Lake Shoreline Functions in Tumwater and the UGA

Process: Function	Level of Alteration	Potential Protection and Restoration Measures and Opportunities
Hydrology: Groundwater recharge.	**Low** Overall lake water levels have not been significantly altered, thereby allowing typical volumes of groundwater discharge.	**Low** Low levels of opportunity for quantity of recharge, as far as lake levels. Efforts should focus on protecting water quality to be recharged. Reducing impervious surfaces can also help with recharge.
Hydrology: Flood flow retention.	**Low** As noted above, lake volumes and water levels are generally similar to pre-disturbance conditions.	**Low** Modifying lakes for flood flow retention does not appear to be warranted here.
Sediment Generation and Transport: Upland sediment generation.	**Moderate to High** Anthropogenic fine sediment loading to the lakes has increased as a result of build-up and wash off of sediments from impervious surfaces.	**Moderate** Implementation and retrofit of water quality BMPs to the existing stormwater system can reduce fine sediment loading.
Water Quality: Lake trophic status; overall water quality.	**High** The delivery, transport, and deposition of nutrients, pathogens, and toxins have been significantly altered from the pre-disturbance condition. Upland sources of these pollutants have increased significantly as a result of urban and industrial land uses within and near the shoreline. Potential storage has decreased through wetland loss and installation of impervious surfaces. The presence of relatively high permeability surficial geology deposits can increase the potential for upland land uses to influence lake water quality.	**High** Implementation of source control measures throughout the contributing basin can reduce loading to lake systems. Stormwater systems can be retrofitted to provide treatment or enhanced treatment. Restoration of lacustrine fringe and depressional wetlands can improve the system's ability to provide long-term storage of these pollutants. The addition of riparian vegetation as outlined below can also help address temperature and runoff issues related to water quality.

Process: Function	Level of Alteration	Potential Protection and Restoration Measures and Opportunities
Habitat: Lake riparian vegetation community.	**Moderate to High** Development and infrastructure around lakes in Tumwater have removed or altered some of the forest that had surrounded these lakes. However, areas of riparian and wetland vegetation have been maintained to a higher degree and these lakes are relatively less modified than many lakes in the urbanized areas of Thurston County.	**Moderate** There are opportunities to restore and enhance lake riparian areas throughout the study area, but the extent of these areas is typically limited. In addition to providing habitat, lake riparian vegetation can also positively affect water quality.

a. Key Management Issues

The key management issues for freshwater lakes in the study area include:

- Loss of riparian forest surrounding the lake shore.
- Reduction in wetland area in the basin has reduced water contact time with soil. This lowers the potential for filtering and removal of pollutants.
- The sources and pathways for upland sediments, excess nutrients, pathogens and toxins are significantly altered from the pre-disturbance condition. Increased sediment and nutrient loading can significantly modify the trophic status of lakes.

b. Restoration Opportunities for Freshwater Lakes

There are several programmatic restoration opportunities that can be implemented to improve the overall ecological functioning of the freshwater lakes in the study area.

- Restore and/or enhance riparian forests surrounding the lake shore.
- Restore and/or enhance lacustrine fringe or depressional wetlands surrounding the lake.
- Implement source control and/or stormwater treatment retrofitting throughout the contributing basin to improve water quality.
- Where it does exist, consider replacing artificial bank strengthening (e.g., bulkheads) with soft- or no-armor solutions.

Chapter 3
Restoration Goals and Policies

3.1 Goals

Restoration goals are located in Section 4.6 of the City of Tumwater Shoreline Master Program, and are listed below.

A. Improve impaired shoreline ecological functions and/or processes through voluntary programs and actions that are consistent with this Program.

B. Provide support to restoration work by various organizations by identifying shoreline restoration priorities, and by organizing information on available funding sources for restoration opportunities.

C. Target restoration and enhancement towards improving habitat requirements of priority and/or locally important wildlife species.

D. Require improvement of impaired shoreline ecological functions and/or processes to mitigate impacts from new development.

3.2 Policies

Restoration policies are located in Section 6.11 of the City of Tumwater Shoreline Master Program, and are listed below.

General Policies

A. Encourage and facilitate cooperative restoration and enhancement programs between local, state and federal public agencies, tribes, non-profit organizations and landowners to protect shorelines with impaired ecological functions and/or processes.

B. Ensure that restoration and enhancement are consistent with the biological recovery goals for early Chinook, bull trout populations and other species and/or populations for which a recovery plan is available.

C. Integrate restoration and enhancement with other parallel natural resource management efforts such as the *WRIA 13 Salmonid Recovery Plan*, ***Puget Sound Salmon Recovery Plan*****,** and the *City of Tumwater Comprehensive Plan*.

D. Prioritize restoration actions and stand-alone projects in the following order:

1. Reduce sediment and nutrient input to streams and rivers and associated impacts;
2. Improve water quality;

3. Improve riparian areas and degraded/former wetlands to restore functions;
4. Replant and monitor native vegetation and disturbed areas, riparian zones and wetlands;
5. Improve fish passage;
6. Mitigate peak flows and associated impacts caused by high stormwater runoff volume;
7. Remove obsolete shoreline modifications;
8. Restore connectivity between stream/river channels, floodplains and hyporheic zones; and
9. Restore natural channel-forming geomorphologic processes;

E. Recognize that restoration and/or enhancement may result from:

1. Encouraging non-impacted areas to remain impact-free;
2. Mitigation of impacts from new development; and
3. Adoption of vegetation conservation areas which are based upon shoreline ecological functions and processes.

Beach Restoration and Enhancement Policies

F. Beach restoration and enhancement is a preferred way to protect an existing single-family residence or to maintain access to an authorized shoreline use, rather than hard shoreline stabilization structures such as bulkheads, landfills, levees, dikes, groins or jetties.

G. Design and construct beach enhancement projects so that they will not degrade aquatic habitats, water quality and flood holding capacity.

H. Encourage self-maintaining designs over those which depend upon regular maintenance.

I. Require supplementary beach nourishment where structural stabilization is likely to reduce existing beach materials at or downdrift from the project site.

J. Limit the waterward extent of beach enhancement to that which is necessary to achieve the intended results.

K. Encourage the use of dredged materials for beach restoration and enhancement projects when it has suitable organic and physical properties.

Chapter 4
Restoration Priorities

4.1 Priority 1 - Improve Water Quality and Natural Sediment Transportation Processes

As a key ecological process, the movement of sediment into, through, and out of shoreline ecosystems influences shoreline morphology, hydrologic and hydraulic characteristics, ability of surface and groundwater to interact, and the type and extent of aquatic habitat. In rivers, channel migration is a natural process, and is essential for the transfer of nutrients between the channel and floodplain, as well as an on-going source for streambed gravels.

Changes in land-use, including a reduction in tree canopy cover, development, and road construction or widening, have generally accelerated production of fine sediment, especially as runoff volumes and peak flows are increased. Increased flows increase channel erosion and channel destabilization. Increases in fine sediment loading can adversely impact aquatic habitat by filling in the spaces of gravel beds and reducing the exchange of water and oxygen. Fine sediment also transports nutrients, metals, and other pollutants, and is closely linked to water quality. The construction of the dam that created Capitol Lake has also greatly impacted sediment transportation from the Deschutes River and Percival Creek. A significant portion of the sediments delivered by each is retained in Capitol Lake, rather than having emptied into the previously existing Deschutes Estuary.

Water quality is the end result of the interaction of water with biota, soils, and urban and rural land uses, and infrastructure. As water moves through an ecosystem, it has the opportunity to cycle mineral and organic constituents that can affect water quality. The longer water is able to contact soil and vegetation, the more cycling can occur. Longer water contact times typically occur in low gradient areas in the landscape, such as riverine and wetland systems, while filling, paving, and channelization reduce water contact times.

The water quality of lakes is highly dependent and sensitive to changes in nutrient loading, which can lead to algal blooms, changes in dissolved oxygen levels, etc. Water temperatures are higher in urban areas where riparian vegetation is lacking and urban runoff is a primary water source. Impervious surfaces and stormwater conveyance infrastructure, which can bypass natural hydrologic pathways that include infiltration and percolation through soils, can negatively impact water quality by allowing for the build-up of metals, oils, grease, nutrients, and bacteria to be washed off and into water systems during storm events.

A watershed assessment of Coho survival determined several factors were critical to restoring Coho habitat and increasing survival rates, one of which is the reduction of fine sediment rates in the Deschutes River. Implementation and retrofit of water quality best management practices (BMPs) to existing and future stormwater systems can reduce fine sediment loading.

Existing restoration projects 1 through 9 listed in Section 5.2, Table 6 address water quality and/or sediment transport for Barnes Lake, Black Lake Drainage Ditch, Capital Lake, Percival Creek and the Deschutes River. Additional projects 1 through 8, 10 through 12, 15 and 19 identified in Chapter 6 also address this priority.

4.2 Priority 2 - Restore and Improve Vegetation in Riparian and Wetland Areas to Support Wildlife Habitat

Intact nearshore habitat is essential for salmon, as it offers refuge, rest and feeding opportunities for juveniles before they embark on their ocean migrations. Shoreline modifications, such as armoring, prevent natural beach formation, which in turn limits habitat available for prey species favored by salmon.

Improved riparian vegetation can address multiple objectives, including providing important shoreline habitat for wildlife, improve water quality, and reduce sediment and pollutant delivery. Riparian vegetation is also the key source of large woody debris (LWD) and organic materials.

LWD significantly influences the form and ecological function of river and lake ecosystems. In a natural system, LWD by way of logs or trees that have fallen into a river, stream or lake, provides organic material to aquatic ecosystems and is considered a principal factor in forming stream structure and associated habitat characteristics (e.g., pools and riffles). Riparian vegetation and LWD provide habitat in the form of nesting, perching, and roosting as well as thermal protection, nutrients, and sources of food (terrestrial insects) to a variety of fish and wildlife species.

Trees help protect shorelines by protecting water and soil resources. Healthy trees can reduce the amount of runoff and pollutants in creeks, ponds and other receiving waters. The leaves, branch surfaces, and trunk bark intercept and store rainfall, thereby reducing runoff volumes and delaying the onset of peak flows. Tree root growth and decomposition increase the capacity and rate of soil infiltration by rainfall and reduce overland flow. Lastly, tree canopies reduce soil erosion by diminishing the impact of raindrops on barren surfaces (CUFR 2003). Trees are also a valuable source of LWD, which provides organic material and habitat for shorelines.

Existing restoration projects 2 through 9 listed in Section 5.2, Table 6 address vegetation restoration and/or enhancement for the Black Lake Drainage Ditch, Percival Creek and the Deschutes River. Additional projects 1, 2, 6, 9, 10, 11, 13, 14, 15 and 18 identified in Chapter 6 also address this priority.

4.3 Priority 3 – Improve Fish Passage

Expanding available fish habitat and spawning opportunities for fish is a high priority. Perhaps the most frequently encountered fish passage barriers are culverts that are improperly designed, installed, or maintained, and channel alterations that result in impassable conditions (Haring & Konovsky 1999).

Additional projects 15, 16 and 17 identified in Chapter 6 address this priority for Percival Creek.

4.4 Priority 4 - Public Education and Involvement

Public education and involvement is a high priority for the City. Public Education and involvement is particularly important when targeting areas directly affected by residential development.

With implementation of relatively simple and effective lifestyle changes, individual property owners can have an immense impact on the health of shorelines. Additionally, education and volunteer programs that encourage involvement in long-term planning and implementation can foster an investment from property owners and neighborhood groups that are directly affected by degraded streams, lakes, and shorelines.

Existing restoration projects 2 through 8 listed in Section 5.2, Table 6 address public education and involvement for the Black Lake Drainage Ditch, Percival Creek and the Deschutes River.

4.5 Priority 5 - Support and Participate in Regional and Multi-Jurisdictional Restoration Efforts

Technical and scientific data and prioritization frameworks can provide direction to multiple organizations seeking a shared framework towards which to allocate efforts. Existing restoration projects 5 and 9 listed in Section 5.2, Table 6 address specific regional and multi-jurisdictional restoration projects for Percival Creek and the Deschutes River. Additional projects 2, 9, 16, 17 and 18 identified in Chapter 6 also address this priority. Table 5 in Chapter 5 identifies many of the government and non-profit groups active in shoreline restoration.

Chapter 5
Existing Restoration Partners and Programs

5.1 Partners

The City of Tumwater works with Thurston County on restoration activities throughout the study area through a variety of different programs and departments. In addition there are many other government and non-profit groups active in North Thurston County. Many are listed in the table below.

Table 5: Groups Active in Shoreline Restoration in Northern Thurston County

Group	Description	Restoration Activities
Stream Team Thurston County, Lacey, Olympia and Tumwater	Stream Team is a program for citizens interested in protecting and enhancing water resources in Thurston County watersheds. The program is jointly coordinated by Thurston County and the cities of Lacey, Olympia, and Tumwater.	Education Volunteer stream vegetation plantings and water quality monitoring Salmon steward training Storm drain marking Habitat Restoration
Stormwater Utilities Thurston County, Lacey Olympia and Tumwater	Stormwater utility departments in all four jurisdictions' work to reduce stormwater pollution from urban runoff.	Stormwater utility departments design and build projects to reduce flooding, pollution and erosion caused by stormwater runoff Projects may involve replacing failing drywells and catch basins (storm drains), building stormwater ponds, installing "infiltration galleries," or installing separating devices that remove pollutants. Stormwater utilities also manage NPDES permits and are involved in education and outreach.
Parks Departments Thurston County, Lacey, Olympia and Tumwater and State	Parks departments in all local jurisdictions, in addition to the State, own and manage waterfront property.	Restoring native vegetation and shorelines along park properties. General environmental cleanup.

Group	Description	Restoration Activities
LOTT Alliance Lacey, Olympia, Tumwater and Thurston County	The LOTT Alliance is a partnership between Lacey, Olympia, Tumwater, and Thurston County to provide wastewater management and reclaimed water production services for the urbanized area of north Thurston County.	LOTT invests in capital projects, to help preserve and protect public health, the environment, and water resources. Invests in water conservation, water quality and habitat improvement projects in the Deschutes River watershed, including Budd Inlet, as compensation for being allowed to increase wintertime discharges from the treatment plant to Budd Inlet. An example of this is the Gull Harbor Estuary. LOTT recently purchased a portion of the former brewery site located in the Deschutes River Valley. LOTT has discussed the possibility of conducting riparian restoration activities for the portion of the site west of the railroad tracks and adjacent to the Deschutes River.
Squaxin Island Tribe	The Squaxin Island Tribe is a historic steward and a conscientious co-manager and protector of natural resources, working in cooperation with numerous federal, state and county government agencies and organizations.	The tribe participates in natural resources enhancement and protection programs with other groups and agencies to ensure that today's decisions provide for a healthy future.
Nisqually Indian Tribe	The Nisqually Indian Tribe operates as a "Self-Governance" Tribe and utilizes resources from its Tribal economic enterprises as well as Federal program dollars. Their mission of their salmon recovery program is to protect, restore, and enhance the treaty-protected resources of the Nisqually Indian Tribe.	Salmon Recovery: • Plan for the recovery of all Nisqually salmon • Restore salmon habitat • Study Nisqually salmon, salmon habitat; monitor effectiveness of actions • Teach people about salmon habitat (Stream Stewards) • Involve people in protecting and restoring salmon habitat (Stream Stewards)
Thurston Conservation District	The Thurston Conservation District promotes voluntary stewardship among private landowners in Thurston County. Conservation Districts (CDs) are legal subdivisions of state government that administer programs to conserve natural resources.	Conducts, oversees and participates in various restoration projects throughout Thurston County. Works to restore ‘riparian habitats’ (any habitats near water) since these areas are crucial for the health of all wildlife, especially ‘salmonids’ (salmon and trout). Also involved with agricultural assessments, education and outreach.

Group	Description	Restoration Activities
Port of Olympia	The Port of Olympia is a major landowner of shoreline property in Budd Inlet.	Contaminant cleanup in Budd Inlet and upland properties: • Cascade Pole • Dioxin cleanup in Budd Inlet (shipping berths) • East Bay Redevelopment site
Budd Inlet Restoration Partnership	The Cities of Olympia and Tumwater, Port of Olympia, Thurston County, LOTT Alliance, and Washington State University Thurston County Extension formed a partnership to develop an action plan for Budd Inlet restoration.	The first phase of the Action Plan is complete, which included: • an inventory/assessment of major current efforts related to Budd Inlet restoration; • summary of partner interests, needs and goals relative to Budd Inlet; • a community forum to solicit concerns and priorities; • identification of potential opportunities to work together; and • a project description and organizational frameworks for the next phase. Phase II was completed in 2011 and included: • creation of a database of habitat restoration projects in Budd Inlet; • an integrated map of Budd Inlet potential options for mitigation; • potential options for mitigation; and • potential partnership models and structures.
Salmon Recovery Funding Board	Created in 1999 by the Washington State Legislature, the Salmon Recovery Funding Board (SRFB) provides grant funds to protect or restore salmon habitat and assist related activities. It works closely with local watershed groups known as lead entities. The board is composed of five citizens appointed by the Governor and five state agency directors.	The Salmon Recovery Funding Board 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. SRFB has helped finance over 900 projects.

Group	Description	Restoration Activities
South Puget Sound Salmon Enhancement Group	The South Puget Sound Salmon Enhancement Group (SPSSEG) is a 501(c)(3) non-profit organization committed to protecting and restoring salmon populations and aquatic habitat with an emphasis on ecosystem function through scientifically informed projects, community education, and volunteer involvement. Part of their mission is to seek out and work in cooperation with other organizations to help plan, fund, carry out, and monitor fishery enhancement and habitat restoration projects.	Habitat Improvement: • Engineered Log Jams (ELJs) • Bulkhead Removal • Riparian Plantings Fish Passage: • Culvert Removal • Other Barrier Removals
Puget Sound Partnership	The Puget Sound Partnership is a community effort of citizens, governments, tribes, scientists, and businesses working together to restore and protect Puget Sound.	Their Action Agenda will prioritize cleanup and improvement projects, coordinate federal, state, local, tribal, and private resources, and make sure that everyone is working cooperatively.
Capital Land Trust	Non-profit Land Trust	The Capital Land Trust conserves important wildlife habitat and natural areas by accepting donations of conservation easements and gifts of land, or by working with partners to purchase lands. Since 1989, Capitol Land Trust has been instrumental in permanently conserving 2,957 acres in Mason, Grays Harbor and Thurston Counties.
Nisqually Land Trust	Non-profit Land Trust	Since 1989, the Nisqually Land Trust has acquired, for permanent protection, nearly 1,700 acres of superior wildlife habitat--from threatened old-growth forest near the Nisqually River's source to critical salmon habitat near its delta.
Barnes Lake Management District	Citizen steering committee appointed by Tumwater City Council	• Management of aquatic plants and noxious weed prevention & eradication • A limnological study of the lake, including water quality, wildlife, and habitat assessments • Environmental education • Recreation planning • Habitat management

5.2 Existing Projects

Table 6: Existing Restoration Projects

Note: projects are not listed in order of priority

	Shoreline	Jurisdiction/Group	Project Description	Restored Processes & Functions
1	**Barnes Lake**	Barnes Lake Management District	Management of aquatic plants and noxious weed prevention and eradication.	Enhances overall water quality and improves recreational access.
2	**Black Lake Ditch**	New Market Skills Center classes	Reed canary grass removal, protective plant caging.	Enhances habitat for wildlife; vegetation provides structure for invertebrates, birds, amphibians, reptiles, and mammals. Invasive (nonnative) plant species removal allows growth of native vegetation that supports other native species.
3	**Percival Creek**	Tumwater Stream Team/Tumwater Old Town Center youths, Olympia High School	Weeding, invasive control, native shrub planting.	Revegetation with native plantings helps promote flood flow retention, provides erosion control and storage of phosphorus and nitrogen while providing habitat for wildlife and a potential source of LWD. Weeding allows growth of native vegetation that supports other native species. See invasive plant removal under Project 2.
4	**Percival Creek**	Tumwater Stream Team (upcoming habitat study)	Ongoing plant maintenance, tree planting, invasive removal.	See revegetation discussion under Project 3 and habitat enhancement and invasive plant removal under Project 2.
5	**Percival Creek**	Thurston Conservation District, City of Tumwater	Partnered on riparian restoration project downstream from Sapp Rd.	Healthy riparian areas help with flood flow retention, erosion control, removal of phosphorus and nitrogen, and provide shoreline habitat for wildlife.
6	**Deschutes River**	City of Tumwater Parks and Recreation	Restoration of eight acres of wetland, and creation of one-half acre of wetland, as mitigation for development at Pioneer Park. Wetland monitoring will occur at the site for several years.	Wetlands generally promote flood flow retention, the removal of pollutants/sediment through sedimentation and adsorption, and mitigation of upland sediment generation. They also help with groundwater recharge and low summer flows while providing shoreline habitat for wildlife such as invertebrates, birds, amphibians, reptiles, and mammals.

7	**Deschutes River**	Tumwater Stream Team	Native shrub planting, weeding around native plants. Sites 40 - 120 of the 1993 Deschutes River Riparian Habitat Plan	See discussion of revegetation and weeding under Project 3.
8	**Deschutes River**	City of Tumwater	Bankside erosion control at Site 130 of the 1993 Deschutes River Riparian Habitat Plan. Logs were used to stabilize the bank, and fill, riprap and erosion control fabric were placed behind the logs.	Erosion control assists in flood flow retention and promotes water quality by reducing removal of nutrients, pathogens, and toxicants from the riparian area.
9	**Deschutes River**	City of Tumwater, Olympia, Thurston County, Ecology	Total Maximum Daily Load (TMDL) Study	Setting TMDL allocations for contaminants; developing cleanup plan.

Figure 4: Deschutes River Site 130 before and after restoration photographs. (Source: City of Tumwater Public Works)

Chapter 6
Additional Projects and Programs

Table 7: Additional Restoration Projects

Notes: 1 - Projects are not listed in order of priority

2 – Typical grant funding sources for projects are the Centenial Cleanwater Fund, State Revolving Loan Fund, Public Works Trust Fund and other grant funding and loan sources as available

	Shoreline	Implementation Schedule	Jurisdiction/Group and Funding Source	Planned Project Description	Restored Processes & Functions
1	**Barnes Lake**	2012	Barnes Lake Management District(LMD) Funding Source: LMD Funds	A limnological study of the lake, including water quality, wildlife, and habitat assessment. Also, continued management of aquatic plants and noxious weed prevention and eradication.	Plant management enhances overall water quality. Studies may yield methods of further improving water quality and wildlife habitat.
2	**Deschutes River**	2012 – 2014	City of Tumwater Parks & Recreation, Natural Resources Conservation Service/Puget Sound Restoration Group Funding Source: Grant(s)	In response to bank erosion during flooding in 2008, this project involves river bank stabilization using large woody debris, native plantings and reestablishing a trail that ran through the riparian corridor prior to 2008 flooding event.	Revegetation with native plantings helps promote flood flow retention, provides erosion control and provides storage of phosphorus and nitrogen while providing habitat for wildlife and a potential future source of large woody debris. Bank stabilization provides erosion control.
3	**Deschutes River**	2012 – 2014	City of Tumwater Public Works Funding Source: Grant(s)	Design and construction of a stormwater detention and treatment facility at “M” Street.	Stormwater treatment facilities generally promote flood flow retention, the removal of pollutants/sediment through sedimentation and adsorption, and mitigation of upland sediment generation.

	Shoreline	Implementation Schedule	Jurisdiction/Group and Funding Source	Planned Project Description	Restored Processes & Functions
4	**Deschutes River**	2012 – 2013	City of Tumwater Public Works Funding Source: Grants and City Stormwater Fund	Drainage improvements for stormwater runoff along Summerset Hill Drive	Project will improve water quality.
5	**Deschutes River**	2012 – 2013	City of Tumwater Public Works Funding Source: Grants and City Stormwater Fund	E Street Outfall Improvement. Water quality treatment and detention of stormwater runoff along Capitol Blvd will be improved. Existing outfall will be retrofitted into constructed wetland.	Project will improve water quality.
6	**Deschutes River**	2012 – 2014	City of Tumwater Public Works Funding Source: Grants and City Stormwater Fund	Construction of Tumwater Valley Regional Facility for treatment and detention of discharge from three major outfalls: M Street Basin, Littlerock/2nd Ave., and Linwood Ave. Project includes wetland mitigation and slow discharge to Deschutes River.	Project will improve water quality, aquatic life and habitat.

	Shoreline	Implementation Schedule	Jurisdiction/Group and Funding Source	Planned Project Description	Restored Processes & Functions
7	**Deschutes River**	2012 – 2014	City of Tumwater Public Works Funding Source: Grants and City Stormwater Fund	Cleveland Avenue Outfall Improvement. Water quality treatment and detention of stormwater runoff along Cleveland Avenue will be improved. Existing outfall will be retrofitted into constructed wetland.	Project will improve water quality.
8	**Deschutes River**	2016 – 2020	City of Tumwater Public Works Funding Source: Grant(s)	Construction of stormwater monitoring facilities at outfalls along Swamp Lake, Tumwater Valley Regional Facility and E Street. Stormwater quantity, velocity and quality will be measured.	Results of study may lead to the identification of measures to improve water quality and shoreline habitat.
9	**Deschutes River**	2012 – 2015	Thurston Conservation District, Olympia Tumwater Foundation Funding Source: Grant(s)	Invasive plant removal and riparian restoration project at Tumwater Falls Park.	Enhances shoreline habitat for wildlife.
10	**Deschutes River**	2012 – 2018	LOTT Funding Source: Grant(s);	Riparian restoration on the former brewery site west of the railroad tracks and adjacent to the Deschutes River.	Project will improve water quality, aquatic life and habitat
11	**Deschutes River**	2013–2018	City of Tumwater Public Works Funding Source: Grant(s)	Remove ivy, protect and restore native vegetation in Desoto Canyon.	Project will improve water quality by improving natural filtration of Tumwater Hill stormwater drainage.

	Shoreline	Implementation Schedule	Jurisdiction/Group and Funding Source	Planned Project Description	Restored Processes & Functions
12	**Deschutes River**	2013 – 2018	City of Tumwater Public Works Funding Source: Grant(s)	Review and/or develop nutrient management plans for City facilities within riparian corridor areas for the management, application and disposal of nutrient sources such as fertilizers and pesticides.	Project will improve water quality by reducing nutrient loading.
13	**Deschutes River and Percival Creek**	2012	City of Tumwater Public Works Funding Source: Grant(s)	Review 1993 Deschutes River Riparian Habitat Plan to determine condition of completed site restoration projects and needed follow–up actions. Plan identifies 23 restoration sites.	Enhances shoreline habitat for wildlife.
14	**Percival Creek**	2013 – 2018	City of Tumwater Public Works Funding Source: Grant(s)	Develop program and coordinate with property owners to add large and key pieces of large woody debris.	Enhances shoreline habitat for wildlife
15	**Percival Creek**	2013 – 2018	City of Tumwater Public Works Funding Source: Grant(s)	Upgrades to regional stormwater system.	Improving fish passage allows fish, especially salmonids, better access to shoreline habitat. Project will also reduce upland sediment generation, improve water quality by removing nutrients, pathogens and toxicants from the environment, and will improve shoreline habitat for wildlife.

	Shoreline	Implementation Schedule	Jurisdiction/Group and Funding Source	Planned Project Description	Restored Processes & Functions
16	**Percival Creek**	2018	City of Tumwater Public Works, Thurston County Funding Source: Grant(s)	Coordinate with Thurston County on improving fish passage to Trosper Lake	Improving fish passage allows fish, especially salmonids, better access to shoreline habitat.
17	**Percival Creek**	2018	City of Tumwater Public Works, South Puget Sound Salmon Enhancement Group, Washington State Department of Fish and Wildlife Funding Source: Grant(s)	Replacement of culvert at Sapp Road which has become a fish barrier.	Improving culverts provides better access to shoreline habitat for fish, including salmonids.
18	**Capitol Lake**	2012 – 2015	Capitol Land Trust Funding Source: Conservation Futures Program	Purchase and restoration of property adjacent to Old Brewhouse.	This project will enhance shoreline habitat for wildlife.
19	**Capitol Lake**	2012 – 2013	City of Tumwater Parks and Recreation Funding Source: City of Tumwater Capital Facilities Plan	Improvements to storm drainage, including new installation, around Tumwater Historical Park as part of an overall project to replace the existing irrigation system.	Enhanced water quality by removal of nutrients, pathogens and toxicants for treatment.

Chapter 7
Other Restoration Opportunities

The Shoreline Master Program provides for restoration opportunities along developed shoreline parcels as redevelopment occurs. The idea is to slowly replace lawns and turf along shorelines with native vegetation as shoreline properties develop or redevelop.

The Program incorporates the following City of Tumwater critical areas regulations: Geologically Hazardous Areas, Wetland Protection Standards, Fish and Wildlife Habitat Protection and the Floodplain Overlay. Once the Program is formally adopted, all these regulations will be administered through the Program for critical areas located within shoreline jurisdiction.

Critical area buffers apply to all shorelines regulated by the Program. Buffers are established on a case-by-case basis and are based on a critical area report prepared by a qualified professional. The City's existing wetland and riparian habitat regulations establish buffer widths based on the wetland category, stream type, and other considerations such as wetland or riparian habitat function and the proposed use. Lakes are subject to habitat buffer requirements that do not set a minimum standard, so the Program has set forth the following minimum buffer widths by shoreline environment designation. These minimum buffer widths may be increased based on a habitat protection plan as required by the City's Fish and Wildlife Habitat Protection Standards set forth in Chapter 16.32 TMC.

Urban Intensity	50 Feet
Shoreline Residential	50 Feet
Urban Conservancy	75 Feet
Natural	100 Feet

Critical area buffers are considered vegetation conservation areas in the Program and must be preserved to the maximum extent possible.

TMC 16.32, Fish and Wildlife Habitat Protection, helps to facilitate restoration along lakes and streams by offering a reasonable reduction in buffer widths where riparian areas have been degraded in exchange for functional restoration.

Chapter 8
Metrics and Ongoing Monitoring

Some of the potential metrics to measure progress in restoring ecological function and processes are listed below:

Table 8 - Potential Metrics and Monitoring

Metric	Monitoring	Status
Water quality	Thurston County Water Resources	Ongoing
Fisheries	Various	Ongoing
Storm flows	USGS monitoring stations	Ongoing
Lake shoreline armoring	None noted	Baseline evaluation should be done
Docks and Piers	Shoreline Master Program Inventory	Updated in 2008
Impervious Surfaces by Basin	Thurston Regional Planning Council	Last update in 2000
Forest Cover	Thurston Regional Planning Council	1985-2000
Wetland Ratings and Functions	None noted	Baseline evaluation should be done
Wetland Acreage	Shoreline Master Program Inventory	Updated in 2008
Contamination sites/cleanup status	State Department of Ecology	Ongoing

Chapter 9
Timelines, Benchmarks and Strategies for Effectiveness

In the context of the Shoreline Master Program update, restoration planning is a long-term effort. Shoreline Master Program 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 Shoreline Master Program by which to evaluate the effectiveness of restoration planning or actions. Nonetheless, the legislature has provided an overall timeframe for future amendments to the Shoreline Master Program. 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 Tumwater updates its Shorline Master Program, the City is required to review, and amend if necessary, its Shoreline Master Program once every eight 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, and policies and priorities;
- 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 Shoreline Master Program restoration planning element to reflect changes in priorities or objectives.

The City could also develop performance criteria for monitoring shoreline restoration and mitigation projects and seek partners to carry out the monitoring. A GIS-based database to document and track projects could be developed as well. This would assist in future evaluations (once every eight years) of the Shoreline Master Program in terms of meeting restoration and "no-net-loss" goals.

Chapter 10
Summary

The Restoration Plan is designed to meet the requirements for restoration planning outlined in the Department of Ecology Guidelines. A Restoration Plan is not a regulatory document or a set of regulatory requirements. This plan is meant to be used as a resource for shoreline restoration planning for Tumwater. Restoration efforts are ongoing and may change. This Plan shows specific projects that were planned at the time of the Plan's development.

Chapter 11
Resources Used in Developing this Plan

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