



# Restoration Plan

City of North Bonneville  
Shoreline Management Plan Update

*City of North Bonneville, WA*  
June 24, 2015



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# 1 Introduction

This report supports the City of North Bonneville (City) Shoreline Master Program (SMP) update. The City's SMP is being updated to comply with the Washington State Shoreline Management Act (SMA) requirements (Revised Code of Washington [RWC] 90.58), and the state's shoreline guidelines (Washington Administrative Code [WAC] 173-26, Part III), which were adopted in 2003.

The SMP update process involved the following steps:

1. Reviewing and revising shoreline goals and policies;
2. Inventorying and analyzing shoreline conditions;
3. Determining shoreline environment designations (SEDs);
4. Assessing cumulative impacts of shoreline development; and
5. Preparing a restoration plan.

This report provides a plan for implementing restoration activities to offset functional losses caused by shoreline development under the current proposed revisions to the City's SMP. This work was funded in part through a grant from the Washington State Department of Ecology (Ecology).

## 1.1 Report Purpose

The SMA guidelines (WAC 173-26-201(2)(f)) require master programs to include goals, policies, and actions for restoration of impaired shoreline ecological functions. These master program provisions should be designed to achieve overall improvements in shoreline ecological functions over time, when compared to the status upon adoption of the master program.

## 1.2 Approach

When planning for restoration, Ecology's shoreline guidance requires that the following factors be considered (WAC 173-26-201(2)(f)):

1. Identify degraded areas, impaired ecological functions, and sites with potential for ecological restoration;
2. Establish overall goals and priorities for restoration of degraded areas and impaired ecological functions;
3. Identify existing and ongoing projects and programs that are currently being implemented, or are reasonably assured of being implemented (based on an evaluation of funding likely in the foreseeable future), which are designed to contribute to local restoration goals;
4. Identify additional projects and programs needed to achieve local restoration goals, and implementation strategies including identifying prospective funding sources for those projects and programs;

5. Identify timelines and benchmarks for implementing restoration projects and programs and achieving local restoration goals;
6. Provide for mechanisms or strategies to ensure that restoration projects and programs will be implemented according to plans and to appropriately review the effectiveness of the projects and programs in meeting the overall restoration goals.

This restoration plan uses these six considerations as framework for the restoration planning intended to offset the expected loss of function that will occur from site-specific mitigation and other incremental impacts sustained over time.

## 2 Shoreline Inventory Summary

The City of North Bonneville is located in the Columbia River Gorge and is situated on westerly portion of the Cascade Range. The City's shoreline jurisdiction includes all of Greenleaf Lake, the southern portions of Hamilton Creek and Greenleaf Creek and those portions of the Columbia River that are located within the city limits. The city shorelines of Hamilton Creek and the Columbia River are steep banked, little or no canopy and have been significantly modified with fill, riprap and transportation corridors by the Corps of Engineers during the second powerhouse construction for Bonneville Dam and the relocation of the city in the late 1970's. The southern portions of Greenleaf Lake are developed as single family residential and the existing BPA power substation and transmission lines. The northern shoreline of Greenleaf Lake is mostly undeveloped except for some single family residential and BPA transmission lines. The lake shorelines are mostly low bank with minimal canopy. Greenleaf Creek is partially developed as commercial recreation with steeper banks in some areas and aging canopy that extends landward approximately 50-100 feet on both banks. All creeks experience extreme high/low water flows.

### 2.1 Designated Shoreline Reaches

The city has designated its shoreline areas into five reaches that separate each shoreline into separate geographic locations that can better represent their designated environmental designations because of property ownership, current and planned uses, and environmental considerations.

#### 2.1.1 Reach 1- Lower Hamilton Creek

Reach 1 consists of the lower reach of Hamilton Creek below the Evergreen Bridge and the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Zone A, within the city limits. Two hundred feet landward of the western portion of Hamilton Creek is owned by either the City of North Bonneville and used and zoned as open space with a pathway system or the United States Fish & Wildlife maintained as a wildlife refuge. The eastern shoreline portion of this part of Hamilton Creek is made up of city owned open space along the entire shoreline, private owned residential development in the south and undeveloped Commercial zoned property to the north. Public access is limited to view only along the pathway system owned by the city. Steep slopes, extreme

seasonal high water and sensitive environmental areas limit the opportunity for public access on both banks of the creek. The northern part of FEMA FIRM Zone A is zoned Commercial Recreation and is owned and used as a public golf course. The southern majority is zoned federal ownership and is owned and maintained as a federal wildlife refuge.

### 2.1.2 Reach 2 – Greenleaf Lake

Reach 2 includes all of Greenleaf Lake and the associated water body of Carpenter Creek. The south lake shoreline is zoned as Mixed Use and with the exception of the BPA Substation and transmission lines is developed as residential including some private docks located on the shoreline. The north shore is partially developed as residential on the two ends (zoned Commercial Recreation and Single Family Residential respectively) with a large vacant shoreline that is zoned for commercial recreation. The city has a public boat launch and park on the northeast end of the lake. Commercial recreational development could provide additional public water-oriented use opportunities to the shoreline.

### 2.1.3 Reach 3 – Upper Hamilton Creek

Reach 3 consists of the upper reach of Hamilton Creek above the Evergreen Bridge extending north to the BPA transmission lines crossing the creek. There is private ownership on both shorelines with an existing RV park zoned Commercial Recreation and vacant Industrial/Business Park zoned property on the west bank. The east bank is undeveloped property zoned Commercial Recreation that allows residential, commercial recreation and planned unit development. Steep banks and sugar diking prevent direct public access in this reach. Public view areas could be developed as part of a residential, commercial recreation or industrial development.

### 2.1.4 Reach 4 – Greenleaf Creek

Reach 4 includes Greenleaf Creek from Greenleaf Lake upstream to the city limits. These shorelines are in private ownership and are zoned Commercial Recreation except for a small eastern shoreline portion zoned Single Family Residential north of the Greenleaf Creek Bridge. The shoreline has been partially developed as commercial recreation with the portions zoned Single Family Residential being completely developed as residential. Direct shorelines are left mostly undisturbed with no public access because of the sensitive environment.

### 2.1.5 Reach 5 – Columbia River

Reach 5 includes the portion of the Columbia within the city limits on the north bank above and below the Bonneville Dam. This shoreline is owned and regulated property of the United States of America. It has a completely altered shoreline with steep slopes, riprap and provides very limited public access to the shoreline. It is used by the United States Corps of Engineers as part of Bonneville Dam and for an in-lieu tribal fishing site.



## 2.2 Inventory and Analysis

The landscape characterization approach used in the Shoreline Inventory and Characterization Report (City of North Bonneville 2012) examines specific processes including the hydrology, sediment transport, water quality, and organic materials that form and maintain the landscape over a large geographic scale. These processes interact with landscape features to create the structure and function of aquatic resources (Stanley et al. 2005).

The analysis uses a coarse-grained approach for integrating landscape processes into shoreline management, restoration planning, and other land use planning efforts (Stanley et al. 2005). The purposes of the analysis are to highlight the relationship between key processes and aquatic resource functions and to describe the effects of land use on those key processes. This approach is not intended to quantify landscape processes and functions. Rather, the goal is to: 1) identify and map areas on the landscape important to processes that sustain shoreline resources; 2) determine their degree of alteration; and 3) identify the potential for protecting or restoring these areas.

### 2.2.1 Land Use and Physical Conditions

The land uses within the Lower Columbia Tributaries subbasin are predominantly rural in nature. North Bonneville is one of two incorporated areas in Skamania County. The large majority of the subbasin is forested. Approximately 80 percent of the County's land area is comprised of the Gifford Pinchot National Forest or the Mount St. Helens National Monument.

A significant amount of land within North Bonneville and is owned and/or controlled by the federal government including, but not limited to Bonneville Dam and the BPA transmission facilities, as well as Pierce Wildlife Refuge. The City also owns a substantial amount of land within the city limits, with 179 acres of open space, 12 acres used for municipal not counting roads and easements and 29 acres of parks. The Burlington Northern/Sante Fe Railroad, Williams Pipeline and state highway also run through the length of the City. All of the Columbia River as well as lower Hamilton Creek are either under federal control or are owned and designated open space by the City. Table 2-1 shows the acreage and percentage of shoreline jurisdiction by type of ownership.

Except for two vacant commercial lots, all of the lower Hamilton Creek shorelines are owned by the City as deed restricted open space or federal ownership. There are no structures within the 200 feet of designated shoreline. Land use is and will be maintained as open space on these shorelines. Major channel restoration related to fish enhancement has and will occur in this reach of Hamilton Creek. Ongoing maintenance of these projects is also likely.

Upper Hamilton Creek, Greenleaf Creek and a majority of Greenleaf Lake shorelines are privately owned. However, infrastructure easements and ownership utilize 7% of the Hamilton Creek and 40% of the Greenleaf Lake shorelines. Land use on Hamilton Creek above the bridges is non water-dependent industrial and an RV park, which is the only development within the designated shoreline on the west and undeveloped Commercial Recreation zoned land on the east. A majority of the vacant land in North Bonneville is on the north shore of Greenleaf Lake.

The primary land uses associated with the City’s shorelines are recreation, residential, and commercial uses. These uses are discussed in greater detail in the Shoreline Inventory and Analysis Characterization Report (City of North Bonneville 2012) for a detailed description of existing conditions.

Table 2-1. Summary of Land Ownership in the Shoreline Jurisdiction		
Land Ownership	Acres	Percent
Federal Government	298	53
State Government	0	0
Skamania County	4	1
Port of Skamania County	34	6
City of North Bonneville	70	12
Private	155	28
Total	561	100

Exhibits 1 – 3 in Appendix A show the shoreline jurisdiction, land ownership, and existing structures.

## 2.2.2 Biological Resources and Critical Areas

A number of fish and wildlife species use the shorelines in the Lower Columbia River Tributaries subbasin for habitat. These habitats occur in both the aquatic and terrestrial portions of the basin. This section describes some of the key habitats and the ecological functions they provide.

### 2.2.2.1 In-Stream and Riparian Habitat

The most basic functions of an aquatic area are the storage, purification, or transport of water. They also function as habitat for a large number of plants and animals. The Columbia River, its tributaries, and their associated wetlands support anadromous salmon and other aquatic life. Chinook salmon (*Oncorhynchus tshawytscha*), chum salmon (*Oncorhynchus keta*), coho salmon (*Oncorhynchus kisutch*), steelhead (*Oncorhynchus mykiss*), coastal cutthroat trout (*Oncorhynchus clarkii clarkia*), Pacific eulachon (*Thaleichthys pacificus*), Pacific lamprey (*Lampetra tridentata*) are documented to utilize the rivers and streams of WRIA 28 (LCFRB 2010, Wade 2001; WDFW 2011; NMFS 2010). According to the Lower Columbia Salmon Recovery and Fish and Wildlife Subbasin Plan (2010), bull trout (*Salvelinus confluentus*) are not present in the lower Columbia Tributaries subbasin.

Fall Chinook salmon start migrating in the Columbia River from early August or September and spawn in the mainstem of the Columbia River and its tributaries between mid-October and late November. Adult chum salmon enter the lower Columbia River

tributaries between mid-October and November, and spawning begins as early as November and may extend into January. Coho salmon and steelhead are known to utilize most of the major streams in WRIA 28 for spawning and rearing. Coho adults enter the Columbia River beginning in mid-September and continue through December, and tributary spawning extends from late October through March with a peak in October through December. Spawning for steelhead occurs between early March and early June (LCFRB 2010).

Within the subbasin, most stream channels are high gradient, and spawning habitat is limited to the areas in the lower reaches (LCFRB 2010). Natural flow regime in the subbasin has been altered at lower reaches by the construction of Bonneville Dam, railroad, and roadway. During summer, several Columbia River tributaries have been documented for low flows at the lower reaches, which could result in restricting fish passage and stranding juvenile fish (LCFRB 2010; NMFS 2011). Pool frequency in the Columbia River tributaries are generally limited within most of the reaches according to the stream surveys conducted by USFS from 1994 through 1998. Substrate is primarily gravel with cobbles and boulders. A large amount of fine sediments are also observed in some of the reaches that are adjacent to roadways (Wade 2001).

Riparian areas are the zones where aquatic and terrestrial ecosystems interact. Riparian vegetation provides habitat for many species of wildlife, and streamside or shoreline vegetation provides habitat functions for streams and fish, such as shade, bank stability, sediment/nutrient filtering, and organic nutrient input.

Riparian corridor continuity is particularly important in smaller headwater streams because smaller streams generally make up most of the stream length within a watershed, and the influence of riparian vegetation on some stream habitat functions is greater for small streams (Binford and Bucheneau 1993; Wenger 1999; Beschta et al. 1987). Such areas upstream of fish-bearing waters help determine water quality, the magnitude and timing of flows, stream temperature, sediment loads, nutrient inputs, and prey production in downstream waters.

Large woody debris (LWD) in streams influences coarse sediment storage, creates hydraulic heterogeneity, moderates flow disturbances, provides cover, and contributes to overall channel complexity. LWD traps and accumulates sediment, small woody debris, and other organic matter (Bilby 1981). The complex, submerged structure formed by LWD and entrapped smaller woody debris provides flow refugia and essential cover in which salmonids conceal themselves from predators and competitors and find profitable feeding positions, as inferred from observations under both natural and laboratory conditions (McMahon and Hartman 1989; Fausch 1984). The removal of riparian forest reduces woody debris in streams, which in turn leads to adverse changes in channel and habitat-forming processes (Heifetz et al. 1986; McDade et al. 1990; Van Sickle and Gregory 1990; Bilby and Ward 1991).

According to the Conservation Commission's Limiting Factor Analysis (LFA) Report (2001), riparian habitat along lower reaches of the streams in the project subbasin is considered poor or unknown. This is consistent with the results from the watershed process modeling in the subbasin plan, which rated the riparian habitat in the subbasin as moderately impaired (LCFRB 2010). LWD in the Lower Columbia River tributaries are relatively infrequent. Areas where LWD surveys have been conducted indicated that

LWD levels are low, especially in the lower reaches, and the near-term recruitment potential is also low because of the lack of woody vegetation along the riparian corridor (Wade 2001).

#### 2.2.2.2 Wetlands

The USACE (Federal Register 1982 and 1986) and the SMA define wetlands as “areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.”

Wetlands potentially perform a variety of unique physical, chemical, and biological functions which are beneficial for both the human and biological environment (NRC 1995; Brinson and Rheinhardt 1996). These functions include flood storage and retention, stream base flow maintenance and ground water support, improving water quality, shoreline protection, and biological support for fish and wildlife habitat (Null et al. 2000; Adamus et al. 1987; Hruby et al. 1999).

Existing wetlands in the subbasin are primarily associated with streams including the Columbia River and its tributaries. According to the NWI map, common wetlands found within the subbasin are palustrine and riverine wetlands (Cowardin et al. 1979).

#### 2.2.2.3 Terrestrial Habitat

Other habitat sources within the subbasin include terrestrial forests. The lower Columbia River Tributaries subbasin is located within the western hemlock forest zone of the Puget Trough province described in *Natural Vegetation of Oregon and Washington* (Franklin and Dyrness 1988). Western hemlock and western red cedar are the dominant upland forest species in this zone, although Douglas fir is also very common. Forests provide breeding, feeding, and migration areas for a wide variety of wildlife species including, but not limited to, black bear, deer, elk, coyote, and many rodents as well as a various species of amphibians and reptiles (Marriott et al. 2002). Within the subbasin, relatively undisturbed vegetation exists on the north side of Highway 14.

Many of the terrestrial species also rely on shorelines and their associated wetlands for breeding, rearing, foraging, and migration habitat. The lower Columbia River is one of the most important migratory corridors for shorebirds known as the Pacific Flyway, and many wildlife refuges are located along the Columbia River that provide feeding and resting areas for wintering waterfowl (Marriott et al. 2002).

The WDFW maintains a spatial database of PHS in the state of Washington. Priority habitats are those habitat types or elements with unique or significant value to a diverse assemblage of species. Priority species require protective measures for their population status, sensitivity to habitat alteration, and/or recreational, commercial, or tribal importance (WDFW 2011). Priority species include state endangered, threatened, sensitive, and candidate species; animal aggregations considered vulnerable; and those species of recreational, commercial, or tribal importance that are vulnerable.

Priority wildlife habitats mapped in the City and the adjacent areas include wetlands, riparian areas, oak woodlands, herbaceous bald, and talus slopes/cliffs. The PHS database also identifies priority species within the City and adjacent areas such as bald

eagle (*Haliaeetus leucocephalus*), great blue heron (*Ardea herodias*), peregrine falcon (*Falco peregrinus*), and western toad (*Bufo boreas*) (WDFW 2011).

## 3 Restoration Goals and Objectives

### 3.1 SMP Goals

In accordance with the State Shoreline Management Act (RCW 90.58) all relevant policy goals must be addressed in the planning policy of the SMP. Goals express the vision of the city. Policies identify more detailed steps that move towards achieving the goals. The following set of goals and policies provide the foundation and framework upon which the balance of the SMP is based.

#### **Goal – Economic Development**

Encourage economic development of water-dependent and/or water-related commercial facilities while assuring compatibility with the environmental and physical conditions of the designated shoreline.

#### **Goal – Public Access**

Increase public access to shoreline areas while protecting shoreline ecological functions, private property rights and providing for public safety. The public access element addresses the ability of the general public to reach, touch, and travel on the shorelines. It also includes the ability to view the water and shorelines from adjacent and distant locations.

#### **Goal – Recreation**

Provide passive and active water dependent and shoreline oriented recreational opportunities for city residents and maximize public recreational opportunities permitted in the shoreline areas.

#### **Goal - Circulation**

Provide safe, reasonable, and adequate transportation circulation systems with minimal impact on fragile or unique shoreline features and existing ecological systems, while contributing to the functional and visual enhancement of the shoreline.

#### **Goal – Shoreline Use**

Preserve and develop shorelines in a manner that optimizes the combined potential for economic development and the enjoyment and protection of natural resources while minimizing the threat to health, safety, and welfare posed by hazards, nuisances, incompatible land uses, and environmental degradation.

#### **Goal - Conservation**

Protect, preserve, and/or enhance shoreline resources for their ecological functions and values, and aesthetic and scenic qualities.

#### **Goal - Historic, Cultural, Scientific, and Education**

Preserve, protect, and restore buildings, sites or areas having significant historical, cultural, scientific, and/or educational value.

### **Goal – Flood Hazard Prevention**

Prevent and minimize flood damages, and the creation or expansion of flood hazards.

### **Goal – Critical Areas**

Manage designated critical areas (i.e., wetlands, frequently flooded areas, critical aquifer recharge areas, geological hazardous areas, fish and wildlife conservation areas and streams) to protect existing ecological functions and ecosystem-wide processes and where possible, restore degraded ecological functions and ecosystem-wide processes to ensure no net loss of ecological function.

## 3.2 Restoration Goals

Key restoration goals are based on existing management issues in shoreline reaches and include the following:

- Based on the available studies in the area, riparian habitat is reported to be limited in all the reaches. Areas with adequate riparian vegetation should be preserved as much as possible, and areas lacking riparian vegetation should be restored with native woody vegetation.
- Undeveloped areas along the shoreline should be preserved and protected through regulation, public outreach, and property acquisition.
- Best management practices should be required for future development in the shoreline jurisdiction.

## 4 City Plans and Ordinances

### 4.1 Comprehensive Plan

The North Bonneville Comprehensive Plan (NBCP) documents the City's vision for growth and development (City of North Bonneville 2013). The NBCP provides goals and policies that guide the City in creation and application of its land use regulations. The first goal of the plan directs the City to afford reasonable economic use of private properties consistent with regulations. The plan also provides guidance within the plan elements on land use, natural resources, open space, parks and recreation, public use and expansion among other elements. Development and use, while protecting private property rights, should expand shoreline opportunities but respect and protect valuable shoreline features.

### 4.2 Critical Areas Ordinance

The City's critical areas ordinance, included in NBMC Title 21, was updated in 2015 and establishes policies, regulations and land use controls to protect environmental sensitive areas including wetlands, critical aquifer recharge areas, frequently flooded areas, geologically hazardous areas, and fish and wildlife habitat conservation areas (City of North Bonneville 2015). The SMA requires that local governments adopt SMPs that protect critical areas within shoreline jurisdiction at a level that is at least equal to the



level of protection provided by the local critical areas ordinance for critical areas outside shoreline jurisdiction.

## 4.3 Zoning Code

The North Bonneville Municipal Code (NBMC) further defines the way in which the City's shorelines are managed (City of North Bonneville 2014). The City has created zoning districts that are consistent with the NBCP that are defined in NBMC Title 20, Zoning. Title 20 of the NBMC was last updated on May 13, 2014.

# 5 Potential Mitigation Opportunities

## 5.1 Reach 1

The Habitat Limiting Factors Report (2001) suggested protecting chum spawning areas in Hamilton and Hardy Creeks, and LCFRB describes both streams as one of the most productive populations for Chum salmon remaining in the Columbia basin (2010). As described above, restoration activities have been completed in 2011 by LCFEG. LCFEG was awarded a grant to restore a portion of the lower Hamilton Creek located immediately downstream from the railroad bridge. Native woody species were also planted along the channel to increase shade, help stabilize the stream bank, and promote recruitment of woody debris. Ongoing maintenance and monitoring for controlling non-native species such as Himalayan blackberry and red canary grass and expansion of the restoration efforts would be recommended in this area.

As part of the subbasin management plan, LCFRB developed specific habitat measures for streams in the subbasin (2010). Some of them are specific to Hardy and Hamilton creeks, and these identified measures include; 1). Restore floodplain function and channel migration processes in the lower reaches of the primary streams, and 2). Restore degraded water quality with an emphasis on stream temperature impairments.

## 5.2 Reach 2

There are no proposed restoration sites along the Greenleaf Lake. Because most properties within this reach are privately owned and occupied, opportunities for restoration are limited without property owner's involvement or property acquisition. Conservation or restoration activities, especially for oak woodlands areas, would be recommended through a community education and incentive program to inform property owners on ways to minimize impacts to fish and wildlife habitat areas or enhance the reach with native landscaping and invasive species removal. Conservation or restoration activities for in-stream habitat, riparian buffer, floodplain, and wetlands are also encouraged in this reach.

Protection and restoration of forested riparian areas and existing wetland habitat within the reach would also be recommended to minimize sedimentation and water quality concerns downstream. Protecting the existing wetlands in Reach 2 would help maintain summer base flow and flood storage as well as preserving habitat for wildlife.

It is possible that future development of areas zoned for Commercial Recreation and Residential uses could result in potential impacts to shoreline functions in this reach. The use of Best Management Practices buffer exchanges and enhancements as part of future development could reduce the potential for impacts to the shoreline.

As described above, the City has identified a potential site for a public fishing dock to be constructed in the future. The addition of a formal site for public fishing could reduce the use of other areas of the lake as informal fishing sites, thereby reducing potential impacts to other areas of the shoreline. Recognizing the special character of Greenleaf Lake, ongoing human intrusion within the natural environment could be managed through controlled public access and continued management of boat use at the lake.

### 5.3 Reach 3

Some of the conditions in this reach are largely caused by factors outside of the City's jurisdiction, which include upstream land use and alterations to hydrology. However, potential opportunities for restoration in reach 3 are still available within the City, which include, but are not limited to, restoring riparian buffer with native trees and shrubs and remove non-native species. Potential buffer plant species are limited due to the nature of the bank composition.

As well as Reach 1, restoration of floodplain functions and channel migration processes are recommended in Reach 2. The levee along the stream channel can be set back or removed to allow for channel migration and to improve connection between the stream channel and the downstream floodplain. Within this reach, floodplain restoration would not be feasible without also removing the existing stream restrictions such as the transportation bridges.

It is possible that future development of areas zoned for Commercial Recreation and Industrial uses could result in potential impacts to shoreline functions in this reach. The use of Best Management Practices as part of future development could reduce the potential for impacts to the shoreline.

### 5.4 Reach 4

Similar to Reach 2, most properties within the Greenleaf Creek reach are privately owned. Therefore, opportunities for restoration are limited in this reach without property owner's involvement or property acquisition. Conservation or restoration activities for in-stream habitat, riparian buffer, floodplain, and wetlands, would be recommended through a community education and incentive program to inform property owners on ways to minimize impacts to fish and wildlife habitat areas or enhance the reach with native landscaping and invasive species removal.

Protection and restoration of forested riparian areas and existing wetland habitat within the reach would also be recommended to minimize sedimentation and water quality concerns downstream. Protecting the existing wetlands in Reach 2 would help maintain summer base flow and flood storage as well as preserving habitat for wildlife.

Most of this reach is undeveloped with the only potential commercial recreation development on the north and south parts of the reach within the city. It is possible that future development of areas zoned for Commercial Recreation and Residential uses



could result in potential impacts to shoreline functions in this reach. The use of Best Management Practices as part of future development could reduce the potential for impacts to the shoreline.

## 5.5 Reach 5

As mentioned above, this reach is owned and managed by the USACE. Collaboration with the USACE would be required for any conservation or restoration activities in this reach. Currently, there are no known proposed restoration sites along this reach.

# 6 Strategies to Achieve Local Restoration Goals

Table 2 provides a summary of functions, the level of alterations, and restoration opportunities for each reach based on the reach assessment provided in the previous sections.



Table 6-1. Summary Assessment of Shoreline Functions

		Reach 1 - Lower Hamilton Creek and Floodplain		Reach 2 - Greenleaf Lake		Reach 3 - Upper Hamilton Creek		Reach 4 - Greenleaf Creek		Reach 5 - Columbia River	
	Features	Alteration	Restoration Opportunities	Alteration	Restoration Opportunities	Alteration	Restoration Opportunities	Alteration	Restoration Opportunities	Alteration	Restoration Opportunities
Physical Characteristics	<b>Stream Flow</b>	Impaired due to filling and town relocation as well as location of bridges	Enhance and maintain stream flow restoration projects  Coordinate with Pierce WR for any activities in Hardy Creek, Corps on federal properties	Channel disconnected from the Columbia River as a result of the construction of the Bonneville Dam	Protect and restore wetlands in this reach to maintain summer base flow	Construction of existing bridges and dikes has disconnected the channel from its migration zone.	Remove or alter bridges to improve connection between the stream channel and the downstream floodplain  Perform maintenance on channel and dikes as needed	Some accretion due to slides (upper reaches outside shoreline jurisdiction)	Maintain floodplain functions and protect and restore wetlands in this reach to maintain summer base flow	Impaired due to the construction/operation of the Bonneville Dam	Coordinate with USACE for any restoration activities in this reach
	<b>Floodplain</b>	Floodplain area and connectivity has been modified by construction of the Bonneville Dam and the filling for town relocation  Water levels are also controlled by the dam	Enhance and protect existing floodplain functions and channel migration process and protect and enhance remaining wetlands to help maintain flood storage  Coordinate with Pierce WR for any activities in Hardy Creek	Floodplain connectivity has been modified by the construction of the Bonneville Dam  Hamilton Creek channel migration can raise lake high water elevations and cause flooding	Protect and restore wetlands in this reach to maintain flood storage  Perform maintenance on lake outflow channel and Hamilton Creek channel as needed	This reach has been diked and disconnected from floodplain	Restore and protect floodplain function and channel migration process  Perform maintenance on channel and dikes as needed	Some commercial developments are located near the floodplain areas	Maintain floodplain functions and protect and restore wetlands in this reach to maintain flood storage	Floodplain connectivity has been modified by the construction of the Bonneville Dam	Coordinate with USACE for any restoration activities in this reach
	<b>Substrate and Sediment</b>	Current and historical accretion from erosion in upper reaches of creek  Fine sediments in Hardy Creek	Upgrade and widen transportation crossings upstream  Manage development to minimize impact to sediment supply process  Continue to remove excess bed materials in reach above bridges  Coordinate with Pierce WR for any activities in Hardy Creek, Corps on federal properties	Substrate appears to be functional in this reach  Hamilton Creek channel migration causes extensive accretion and choking at the lake outflow	Manage growth and development to maintain the current condition and minimize impact to sediment supply process  Perform maintenance on lake outflow channel and Hamilton Creek channel as needed	Accumulation of sediments and large bedloads have been issues in this reach	Manage growth and development to minimize impact to sediment supply process  Add Large Woody Debris  Perform maintenance on channel and dikes as needed	Substrate appears to be functional in this reach	Manage growth and development to maintain the current condition and minimize impact to sediment supply process	Substrates and sediment conditions in this reach are not listed as a limiting factor.	Coordinate with USACE for any restoration activities in this reach
	<b>Water Quality</b>	High temperature recorded in the lower reaches of Hamilton and Hardy creeks	Increase riparian shading  Coordinate with Pierce WR for any activities in Hardy Creek, Corps on federal properties	Water quality appears to be functional in this reach	Increase riparian shading to maintain the current condition and minimize impact	High temperature recorded in the lower reaches of Hamilton and Hardy creeks	Increase riparian shading	Water quality appears to be functional in this reach	Increase riparian shading to maintain the current condition and minimize impact	This reach is listed on the 303(d) list for temperature	Coordinate with USACE for any restoration activities in this reach

Biological Characteristics	<b>Riparian Habitat</b>	Riparian habitat is limited in this reach since the areas are dominated by native and non-native shrub species.  Limited but relatively good pool habitat and side channel habitat are present in this reach.	Plant native woody vegetation and control non-native species  Expand and maintain restoration efforts of off-channel habitat for Chum  Protect and restore wetlands to preserve habitat for wildlife  Coordinate with Pierce WR for any activities in Hardy Creek Corps on federal properties	Riparian condition is moderately impaired in this reach.	Plant native woody vegetation in the riparian corridor  Protect and restore wetlands in this reach to preserve habitat for wildlife  Control non-native species	Upper Hamilton Creek is considered to have functional riparian habitat	Plant and maintain native woody vegetation in the riparian corridor to maintain the current condition  Control non-native species	Greenleaf Creek is considered to have functional riparian habitat	Plant and maintain native woody vegetation in the riparian corridor to maintain and enhance the current condition  Control non-native species	Riparian habitat is limited in this reach	Coordinate with USACE for any restoration activities in this reach
	<b>Large Woody Debris</b>	Minimal woody recruitment is reported in this reach	Place and maintain stable woody debris in streams  Plant native woody vegetation in the riparian corridor  Coordinate with Pierce WR for any activities in Hardy Creek, Corps on federal properties	LWD level is reported to be low in this reach	Plant native woody vegetation in the riparian corridor	LWD level is reported to be low in this reach	Plant native woody vegetation in the riparian corridor	LWD level is reported to be low in this reach	Plant native woody vegetation in the riparian corridor	LWD is limited in this reach	Coordinate with USACE for any restoration activities in this reach
Land Use	<b>Shoreline Modifications and Public Access</b>	Extensive channel reduction and modification by the filling for town relocation  Residential use occurs in the shoreline jurisdiction / floodplain  Public access is limited but Heritage Trail provides viewing areas	Employ best management practices in future development  Consider safe public access opportunities  Coordinate with Pierce WR for any activities in Hardy Creek, Corps on federal properties	Private docks and potential for future commercial docks exist  Formal public access is limited to boat launch but Heritage Trail provides viewing areas	Employ best management practices in future development  Consider expanding formal public access with fishing dock	This reach has been filled and diked  Commercial and industrial uses near shoreline  Public access is limited except Heritage Trail viewpoint	Employ best management practices in future development  Perform maintenance on channel and dikes as needed  Consider safe public access opportunities	Commercial and residential uses near shoreline  Heritage Trail passes over creek near developed area	Employ best management practices in future development  Consider public access opportunities if determined not intrusive to critical environment	Extensive shoreline modifications  City does not have control over land use in this reach	Coordinate with USACE for any restoration activities in this reach

## 7 Proposed Implementation

The City will prioritize restoration efforts in Reaches 1 and 2, which provide the most opportunities to achieve meaningful restoration of shoreline function. Activities in Reach 1 will be coordinated with the Pierce National Wildlife Refuge and will include enhancing and maintaining stream flow restoration project, protecting and restoring wetlands, and adding large woody debris to the system. Priority activities in Reach 2 will focus on improved public access to limit human disturbance. Efforts in Reaches 3 and 4 will include canopy plantings and other vegetation enhancement as part of any new development within the shoreline jurisdiction.

Continued implementation of the City's zoning code, critical areas ordinance, and Shoreline Management Plan will effectively manage growth and development to minimize future impacts to all reaches. Mitigation requirements will be implemented for new projects constructed in the shoreline jurisdiction in order to offset potential impacts. Private property owner involvement in non-chemical shoreline landscape maintenance and vegetation enhancement will be encouraged. Cooperation with private property owners could produce some of the largest restoration return, without the need for additional funding.

### 7.1 Potential Funding Opportunities

Funding opportunities for restoration projects include both deferral and state grants and legislative funds administered by state agencies. There are also opportunities to partner with non-profit organizations that can help to secure grant funding and recruit volunteers. Several of these organizations and programs are described in the following sections.

#### 7.1.1 US Fish and Wildlife Service

##### **Habitat Conservation - Partners for Fish and Wildlife Program**

This program provides expert technical assistance and cost-share incentives to private landowners to restore fish and wildlife habitats. Any privately owned land is potentially eligible. After signing a cooperative agreement with a minimum duration of 10 years, the landowner works one-on-one with a local Service biologist to develop a project plan addressing the goals and objectives of the landowner and the Service to benefit fish and wildlife species on his/her land. The landowner is reimbursed after project completion, based on the cost-sharing formula in the agreement.

#### 7.1.2 Washington State Department of Ecology

##### **WA Coastal Protection Account**

This account is used to fund environmental, recreational and aesthetic restoration and enhancement projects. Funding is available to local governments, tribes, watershed planning units, nonprofits, and state agencies. Priority is given to projects that involve partnerships with local resources/ volunteers. Successful applications require the Department of Ecology to be a partner. Total available funding is \$200,000 for all projects. A match is not required but given points. Applications are accepted year round.

### 7.1.3 Washington State Recreation and Conservation Office

#### **Aquatic Lands Enhancement Account**

This grant supports the purchase, improvement, or protection of aquatic lands for public purposes, including improved accessibility. The grant is available to local governments, state agencies, and tribes. Applicants must provide at least 50% in matching resources. Projects must be consistent with the local shoreline master program and must be located on lands adjoining a water body that meets the definition of "navigable."

### 7.1.4 Lower Columbia Fish Recovery Board

#### **WA Salmon Recovery Funding Board Habitat Project Grant**

This grant is administered through the LCFRB and supports improvements in productivity, abundance, and/or distribution of a fish population. Special consideration is given to project benefiting Chum salmon. The minimum-matching share of non-SRFB funds is 15% for most projects. The minimum matching share required by the LCFRB for projects on federally owned land is 30%. Applications are accepted annually beginning in March.

## 7.2 Monitoring and Adaptive Management

In addition to project monitoring required for individual restoration and mitigation projects, the City will conduct system-wide monitoring of shoreline conditions and development activity. Future SMP updates will benefit from data collected by the monitoring activities. Monitoring will highlight where the City's restoration efforts are most successful and where they may need improvement prior to the next round of SMP updates. The following approach is proposed to provide an adaptive management approach to shoreline restoration:

**Benchmark 1:** Allocate staff resources and create funding plan in 2016

#### Monitoring Method:

- Review and evaluate City budget funds and possible in-kind funding resources that can be allocated to restoration projects to determine if existing funding is sufficient to support any of the mid-term and long-term projects.
- Obtain preliminary cost estimates for each restoration project.

#### Contingency:

- If the City cannot allocate internal financing for complete implementation of a restoration program, the City should begin allocating funds to be used as matching funds for grant based financing.

**Benchmark 2:** Determine proper grantor(s) for projects that will require outside funding.

#### Monitoring Method:

- Document the requirements of each grantor whose programs support the restoration project in question. There may be more than one source available for each project. Document the percentage of funding that the city will need to supply based upon

grant rules. Document whether in-kind contributions are acceptable and what percentage of City supplied funding these can represent.

**Benchmark 3:** Apply for funding by 2017.

Monitoring Method:

- Identify and order the projects that will be completed. Apply for restoration funding. In addition, for projects that no application is entered for, document why no action was made and how to ensure future action (e.g. lack of partners, staff unavailable, grantor's acceptance schedule, etc.).

**Benchmark 4:** Monitor and summarize success of restoration efforts by 2018.

Monitoring Method:

- Design and implement data collection. It is important to monitor the success of individual restoration activities so that subsequent restoration projects can be modified based on the particular successes and failures of each completed project. When applying for restoration project funding, the City may include funding for follow up monitoring in the funding application. Monitoring data can be used to direct maintenance activities and demonstrate that the City is following through on the grant-funded projects. In addition, it can ensure grantors that future grant funded restoration projects will have the benefit of lessons learned from past projects.
- Assess results of restoration efforts based on data collected.

Contingency:

- Document cause of any noncompliance with SMP/failure to implement. City will revise strategy based on current experience.

Given that specific projects are not currently identified for implementation, but are merely suggested due to current lack of funding, all restoration activities that are undertaken under this plan will be monitored and evaluated both for restoration achieved and for any future restoration needs as part of the next SMP update.

## 8 Conclusion

This plan provides programmatic and site-specific opportunities for restoring the City's shoreline ecological function, resulting in a net benefit compared to existing conditions. Site-specific restoration opportunities target projects with the greatest ecological benefit and potential for implementation.

Implementation of this plan would result in improvements to the following ecological features: stream flow, floodplain connectivity, substrate and sediment, water quality, riparian habitat, and large woody debris. Increased public access to shorelines will support improvements to ecological functions by reducing unauthorized access in sensitive areas. Future opportunities for restoration will continue to be explored by the City, and will be completed in coordination with this Restoration Plan and the overall SMP.

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Appendix A. Exhibits from Shoreline Inventory and Characterization Report

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