Port of Seattle

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DUWAMISH

LOWER DUWAMISH RIVER HABITAT RESTORATION PLAN

AN INVENTORY OF PORT OF SEATTLE PROPERTIES

FINAL DRAFT. JANUARY 13, 2009

PREPARED BY

Seaport Planning Group

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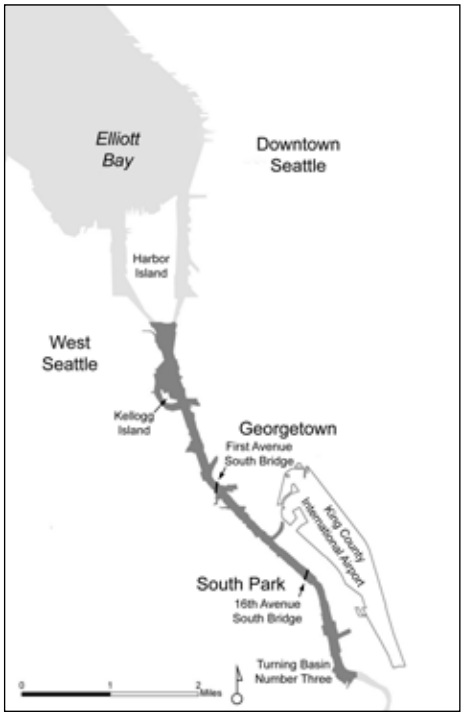

Project area map: Lower Duwamish Restoration Plan area extends from Turning Basin Number 3 in the south to Harbor Island in the north

1 Introduction

The objective of the Lower Duwamish River Habitat Restoration Plan is to evaluate estuarine restoration opportunities in the Duwamish Waterway and to prepare a planning framework for shoreline and aquatic area restoration coincident with continuing marine commerce and industrial use in the Duwamish Waterway. The plan provides an inventory of potential habitat restoration opportunities on Port of Seattle-owned property and guidance for future implementation efforts. The intent of this Restoration Plan is to develop a habitat restoration framework, demonstrating compatibility with existing and future marine industrial uses and activities in the lower Duwamish River.

The downstream reach of the river, extending five miles from Turning Basin Number Three to south Elliott Bay, at the south end of Harbor Island, is referred to as the Duwamish Waterway, historically known as Commercial Waterway Number One. The term Duwamish Waterway refers to its navigability for deep draft ships, which has been a defining trait since the river was straightened and dredged in 1911. Today the Waterway maintains a rich mix of different types of water-dependent industrial uses and plays an important role to nearby residents and to tribal treaty fishing.

The river also provides a sense of place and is a key feature of the environmental setting for the neighborhoods located along its banks, particularly South Park and Georgetown.

A major issue that is presently facing Duwamish Waterway stakeholders is the resolution of the federal Superfund process. The entire Waterway was designated as a Superfund site in 2001. As one of its primary motivations for creating this plan, the Port of Seattle believes that the Superfund process can be resolved without diminishing the vitality of maritime industry on the Waterway.

Development of the Lower Duwamish Habitat Plan began in March 2008 by gathering data and information from a variety of sources, including the City of Seattle, the Department of Ecology and local area businesses and community groups. Port-owned properties and other properties located adjacent to Commercial Waterway Number 1 were mapped to identify existing business and development patterns. From this, the Waterway was divided into four sections, as shown in Figure 1. A discussion of different river mile numbering systems is included in the References section:

North – from south Harbor Island upstream to approximately river mile 1.3,

North Central – from river mile 1.3 upstream past the First Avenue Bridge corridor to river mile 2.5,

South Central – from river mile 2.5 upstream past the 16th Avenue (South Park) Bridge to river mile 3.8, at Terminal 117 in the south, and

South – from Terminal 117 south to Turning Basin Number 3, river mile 4.7.

During a series of public meetings and workshops (described in greater detail below) restoration needs, opportunities and constraints were identified within each section of the Waterway. The resulting set of 31 proposed habitat projects reflects a total of approximately 70 acres of new habitat. This translates to approximately 30,000 lineal feet of river shoreline.

Purpose and Need

The Lower Duwamish Restoration Plan identifies objectives and opportunities for habitat restoration on Port-owned properties along the river.

Port Ownership and Leadership

The Port's vision is to become the cleanest, greenest, most energy efficient Port in the nation. As a major landowner in the Lower Duwamish River, the Port seeks to sustain and enhance both the natural environment and the water dependent businesses located in this area. In addition to owning 212 acres of landward properties adjacent to the Waterway, the Port of Seattle is the successor to Commercial Waterway District Number 1, which acquired a 500-foot-wide swath of property to create the Waterway beginning in 1911. This former Waterway District property now constitutes much of the bed of the Waterway as well as numerous narrow "ribbon parcels" of land adjacent to the water (Figure 1). These ribbon parcels cover more than 30 additional acres. The Port's ability to make use of these properties allows the Port to facilitate habitat restoration efforts at various sites along the Lower Duwamish River. This Plan identifies potential restoration sites on various Port properties along the Waterway and discusses areas for collaboration with adjacent property owners. The restoration projects identified in this plan were developed with public input, a review of surrounding conditions and existing public policy. However, it is recognized that such conditions can change in the future with implications for the priority level or viability of each of these projects.

Estuary environments like the Lower Duwamish River play a unique role in the natural systems of a watershed. Because of the Puget Sound regional salmon recovery effort, a great deal of research has been conducted on ecosystems within the Green/Duwamish watershed and the Duwamish River occupies a link in the chain of habitats. A thorough discussion of the role of estuarian habitat can be found in the report, "Habitat Limiting Factors and Reconnaissance Assessment Report - Green/Duwamish and Central Puget Sound Watersheds (WRIA9 and Vashon Island)," (Kerwin and Johnson, 2000).

Note: *Multiple river mile systems that have been used for the Lower Duwamish River. This plan utilizes a system that assigns River Mile 0.0 as the southern tip of Harbor Island and continues upstream. This system is currently used in all Lower Duwamish River Superfund-related studies. Another system that is currently in use is promulgated by the United States Army Corps of Engineers. That system initiates the numbering in the West Waterway of Harbor Island resulting in the south tip of Harbor Island falling at river mile 0.7.*

Existing Habitat Restoration Projects

The Port of Seattle has implemented significant environmental restoration, cleanup and habitat enhancement projects as part of its capital improvement programs and ongoing operations and management of Port facilities. Hundreds of thousands of tons of historically contaminated soil and sediments from upland locations and marine waters have been removed by the Port as part of development projects. The Port has constructed fish and wildlife habitat restoration at seven sites in the Lower Duwamish River totaling approximately 3.5 acres. These areas have served as important testing grounds for restoration techniques and will provide good models for future restoration efforts. Restoration efforts at both Terminal-105 and Diagonal Avenue South, illustrate methods for restoring habitat pockets – small habitats that provide refuge and feeding areas for wildlife. Restoration efforts at Terminal 107 and Turning Basin Number 3 illustrate methods for restoring large habitat hubs – large habitat areas supporting a diversity of species. Each project also has elements that illustrate methods for restoring habitat corridors – narrow stretches of habitat that ensure connectivity between habitat areas. Habitat typologies are described further in Chapter 3. Each of these projects is described in greater detail below.

Future fish and wildlife habitat restoration in the Duwamish Waterway will benefit from coordination and partnership agreements between local, state, and federal participants. Past habitat restoration work on port property at Terminal 105, Terminal 107, and Turning Basin Number Three has been instigated with policy and funding assistance from the Army Corps of Engineers, U.S. Fish and Wildlife Service, and U.S. Environmental Protection Agency. Previous habitat demonstration restoration projects at these sites, in collaboration with federal agencies, led the way for subsequent substantial aquatic habitat improvements and, in each case, provided opportunities for citizen participation in work to establish and sustain marsh and riparian vegetation. Locations throughout the Duwamish Waterway, particularly at habitat "hub" and "pocket" sites described in the present plan, are candidates for similar and expanded collaborative future restoration actions. Several opportunities for collaboration may involve the City of Seattle and the Port. Such cooperative work would also benefit from including citizens and community groups as project partners and co-stewards.

TERMINAL 105

The Terminal 105 restoration project was constructed in 1995 at approximately river mile 0.0. The aim of the project was to test how a restored estuarine habitat could be configured to fit industrial shoreline areas, without impeding important waterway access. The side channel intertidal habitat area is oriented perpendicular to the shoreline to provide essential environmental attributes without foreclosing industrial access to adjacent shoreline areas. Approximately 9,400 cubic yards of previously placed fill were removed to create a 0.6 acre intertidal channel approximately 1,300 feet in length. During construction, an underground fuel tank and a buried vault filled with paint cans and solvent wastes was discovered and removed. Following grading, the restoration site received 0.3 acres of native riparian trees and shrubs and more than 1,100 marsh plants. All site vegetation work was accomplished by community participants. The restoration project is illustrated at low tide in the photo above. Note the extent of tidal influence indicated by the wetted bank line. The site is inundated twice daily by tidal water about five feet in depth. Today the site provides 210 feet of shoreline, a fishing pier, picnic tables and shelter and a launch for hand-carried boats.

Existing restoration at terminal 105

DIAGONAL AVENUE SOUTH PUBLIC ACCESS/ TERMINAL 108

Located at river mile 0.6, the Terminal 108 site consists of approximately 1.2 acres of combined public shoreline access and intertidal fish and wildlife habitat. The Port excavated approximately 0.6 acres of existing filled upland area in 1988 to create a 0.4 acre intertidal habitat restoration site, surrounded with approximately 0.2 acres of native riparian vegetation. This restoration project served as compensation for construction of a new container cargo pier in the East Waterway. The restored intertidal mud/sand substrate and emergent and riparian vegetation at Terminal 108 offset the disruption of approximately 0.4 acres of low intertidal and shallow subtidal industrial bulkhead area in the East Waterway. The restored site produces seven to nine times more invertebrate food prey items, essential to juvenile migratory fish, than the site altered by the cargo pier construction. In addition, the restored fish and wildlife habitat area is surrounded by public use improvements, allowing citizens to benefit from the restored riparian area, which replaced a formerly paved industrial area.

Existing restoration at terminal 108

TERMINAL 107

Located along the west margin of one of the two historic discharge channels for the Duwamish River, the Terminal 107 site represents one of the least disturbed shoreline areas in the present Duwamish Waterway. Completed in 2000, the Port improved approximately 7.2 acres of upland area by removing previous industrial, commercial and residential structures, including 4,500 tons of concrete debris. The Port also constructed 0.3 acres of intertidal habitat at a former auto wrecking yard located on the south margin of the site through removal of 5,500 tons of fill. Approximately 20,000 square feet of marsh area was also restored, demonstrating successful establishment of marsh vegetation in an aquatic area that was formerly absent of emergent vegetation. Currently the Terminal 107 public shoreline access site includes approximately 1,100 linear feet of shoreline and 1,400 linear feet of pathways, with shoreline viewing areas. The north end of the terminal is adjacent to a 1.8 acre habitat restoration area, Herring's House, which was constructed in 2001 by the City of Seattle.

Existing restoration at terminal 107

PORTLAND STREET

The Port constructed 17,000 square feet of public shoreline access northeast of the South Portland Street/ Eighth Avenue South intersection in the summer of 2008. The site included approximately 345 linear feet of eroding, rubble-filled bank line prior to regrading. The finished site includes an upland public use area with seating, tables and steps to the water line. Upland improvements are complemented by marsh vegetation, native riparian vegetation and large woody debris, demonstrating application of non-structural shoreline stabilization techniques. The downstream, (north) end of the recently completed Eight Avenue/South Park public shoreline access site includes additional opportunity

for fish and wildlife habitat restoration. The port is working with the Seattle Department of Transportation and Seattle Public Utilities, using funds provided by the Washington Department of Transportation, to plan and design approximately 9000 square feet of marsh and riparian restoration area. This restoration opportunity combines public right-of-way in South Riverside Drive with port-owned bank line and would provide important fish and wildlife habitat as well as a landscape complement to the upstream, adjacent existing public shoreline use area.

Existing restoration at Portland Street

TURNING BASIN NUMBER 3

Restoration of aquatic habitat functions at Turning Basin Number 3 began with a 0.4-acre demonstration site in 1996 and continued with a 1.6-acre habitat compensation project in 1999. The first step in restoring the habitat was to remove derelict vessels that had been abandoned at the upstream end of the navigation channel over a period of decades. The later project included excavation of 33,000 tons of industrial fill to create intertidal mud/sand flat and emergent plantings in former upland area. Approximately 0.3 acres of native riparian vegetation and approximately 0.4 acres of emergent plants were installed. The entire site planting was accomplished by volunteers, students and job trainees. Initial marsh plantings disappeared entirely within six weeks of installation, due to feeding by Canada geese. When replanted it was necessary to fence the new plantings to prevent grazing until the plantings were established. Intertidal marsh plantings and native riparian shrubs and trees were well developed at the restoration site three years following completion of excavation and grading. Note the fence structures in the intertidal area. Once mature, the marsh plants will withstand waterfowl predation.

It is important to note that Turning Basin Number Three has also received important fish and wildlife habitat restoration work in recent years sponsored by federal agencies, natural resource trustees, King County, and the City of Seattle. Hamm Creek formerly discharged to the Duwamish Waterway through a piped storm drain outfall, near river mile 4.5. In 2000, Federal agencies and resource trustees, in partnership with King County and the City of Seattle, created an open stream corridor to re-route Hamm Creek to the northwest margin of Turning Basin Number Three, creating approximately seven acres of fresh water stream channel, surrounded by dense native riparian vegetation plantings. In 2005, federal agencies and trustees accomplished approximately one acre of habitat restoration at the southwest corner of the turning basin, including removal of a creosote piling dock and derelict structures and installing approximately 15,000 square feet of marsh and riparian vegetation. In 2007, the City of Seattle added to the restored area in the southwest corner of Turning Basin Number Three, successfully removing approximately 0.4 acres of previously placed fill and stabilizing approximately 400 linear feet of bank line with large woody debris and riparian plantings, complemented by removal of invasive plants in approximately 2.1 acres adjacent to the shoreline site, and replanting the cleared area with native vegetation to establish an upland buffer area.

Existing Restoration at turning basin number 3

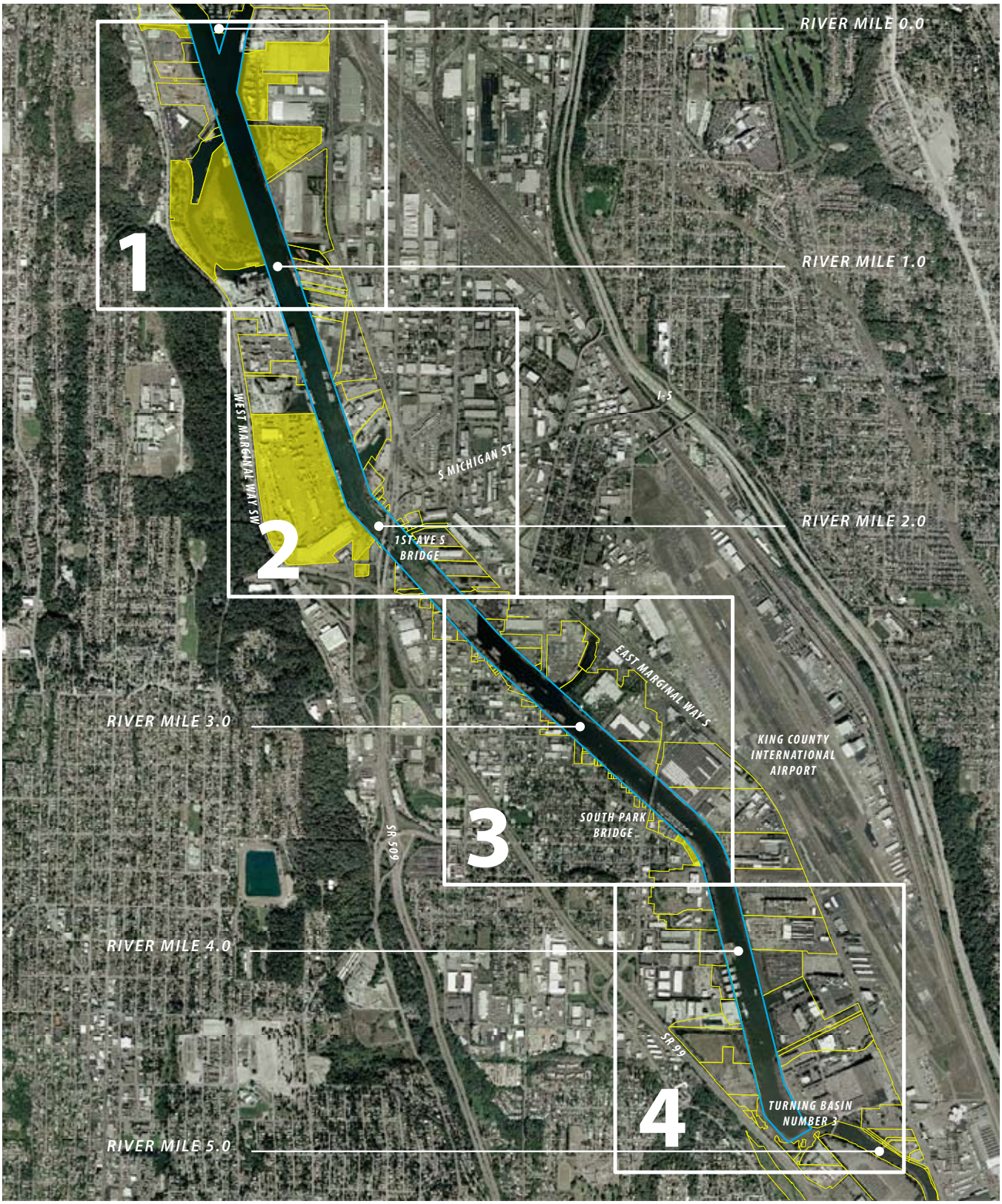

FIGURE 1. THE ENTIRE PROJECT AREA SUBDIVIDED INTO FOUR WATERWAY SECTIONS

Federal Law Context

Water dependent business are vital to a healthy regional economy

The Lower Duwamish River has been subject to contamination from a wide variety of sources, including industrial activities, sewage discharges and stormwater runoff. As stated earlier, in 2001 the Waterway was added to the Environmental Protection Agency (EPA) list of Superfund cleanup sites. Superfund cleanups involve multiple steps to identify and address risks to human health and the environment from chemical contamination, culminating in site remediation by either liable parties or EPA.

In addition to the cleanup of contamination, the Superfund law establishes liability for damages to natural resources. This portion of the Superfund program is implemented by the Natural Resource Trustees, which for the Lower Duwamish River include the National Oceanic and Atmospheric Administration (NOAA), the U.S. Fish and Wildlife Service, Washington State Department of Ecology, Washington Department of Fish and Wildlife, Suquamish Tribe of Indians and the Muckleshoot Indian Tribe. The Trustees are empowered to assess the extent of natural resource damages (NRD) and bring claims against responsible parties to recover for those damages. For the Duwamish, the Trustees will pursue settlements giving responsible parties the option of carrying out restoration projects themselves, or negotiating a cash-out settlement.

The Trustees are developing a Draft Restoration Plan and Programmatic Environmental Impact Statement (Draft RP/PEIS) before a full assessment of the natural resources injuries and determination of liability has been made. The Final RP/PEIS will provide a framework for guiding the selection of restoration projects for NRDA settlements according to priorities the Trustees have established.

In addition to the likelihood that estuarine habitat restoration would be needed for NRD purposes, habitat restoration capability is often needed as mitigation for development projects affecting aquatic resources. Existing local, state and federal plans and decision-making requirements stipulate the need for compensation of aquatic resources lost or adversely affected by marine facility and industrial development.

The Port anticipates the need for orderly implementation of habitat restoration projects in the Duwamish River, meeting potential Superfund, NRD and development project mitigation needs. As a public entity, with ownership of substantial shoreline and aquatic area in the Duwamish Waterway, the Port has prepared this plan as an aid in future habitat restoration. The habitat policies and site inventory presented in the plan will assist the Port in balancing key elements of its primary mission, providing marine industrial infrastructure and improving environmental conditions. The plan will also benefit city, state and federal agencies, trustees, marine industrial uses and private industrial development sponsors by providing potential restoration actions for use in future determinations.

This plan has been prepared to assist future decision-making and determinations. This plan inventories Port-owned habitat restoration potential and is intended as a forward-looking planning resource. The plan will aid agency and industry participants and citizen interests, in evaluating the context of habitat restoration in the Duwamish River and to formulate a more comprehensive approach to habitat restoration. The plan notes the potential for connecting numerous restoration actions at a variety of scales, with the goal of achieving greater river habitat quality and continuity.

Currently the remediation (cleanup) plan for the Duwamish Waterway is still being developed. While it is expected that the Waterway cleanup will generally adhere to the preferred sequence of remediation followed by restoration, it is not too early to begin planning for restoration and the Trustees are not adverse to settling potential future NRD claims and implementing restoration projects prior to completion of the final Duwamish site cleanup. In fact, the large number of river stakeholders and their varying degree of resources suggests that there is a benefit to confronting the planning issues associated with habitat restoration early.

Natural History

The Duwamish River is the name of the lower 12 miles (19 km) of Washington State's Green-Duwamish River System. The Green River mainstem is one of the most hydrologically altered large river systems in the Puget Sound ecosystem. In 1900 this entire estuary consisted of intertidal mud and sand flats, estuarine marsh, forested wetland and meandering shallow river channel (see Figure 2). The historic estuary included approximately 1,450 acres of intertidal sand and mud substrate, nearly 1,300 acres of intertidal marsh and approximately 1,450 acres of tidal swamp (or forested wetland). In addition, the meandering river channel included approximately 17 miles of riparian environment and estuarine floodplain. The combined intertidal and estuarine floodplain habitat area was approximately 5,300 acres. Figure 3 illustrates the extent of intertidal area in south Elliott Bay prior to large scale industrial development. Note piling supported rail lines and vehicle access to the west portion of south Elliott Bay.

A combination of historic events has dramatically affected the hydrology of the Duwamish/Green River basin. Foremost among these events were the diversion of the White River in 1906 into the Puyallup River for flood control purposes, followed in 1916 by diversion of the Cedar/Black River into Lake Washington to facilitate navigation through the Ship Canal. As a result of these alterations, approximately 70 percent of the historic watershed was diverted out of the Duwamish/Green River basin and over 90 percent of the historic floodplain was isolated from the river ecosystem by flood control structures (Kerwin and Nelson 2000). Only eight percent of the former stream spawning habitat is available to migratory fish. Estimates of historical population size of Chinook salmon put the maximum run size at approximately 37,000. In contrast, current mean natural origin run-size estimates vary between 11,200 and 14,700 (WRIA 9 Steering Committee, 2005).

In addition to these major events, the Green/Duwamish estuary has been largely eliminated over time with the growth of the City of Seattle and associated waterfront development activities. The clearing of mature forest vegetation over large areas of the watershed and increasing amounts of impervious and compacted or hardened surfaces has reduced the infiltration capacity of the landscape, thereby increasing runoff rates and the magnitude and frequency of peak flows in the tributary streams. Figure 4 combines the present urban industrial shoreline, with conditions recorded in 1854. Former intertidal and estuarine floodplain areas are identified by the dark green shading.

Over 97 percent of the historic estuary area has been filled, armored, or dredged and now the Lower Duwamish River is a highly industrial area with few natural habitat features (Kerwin and Nelson 2000). The

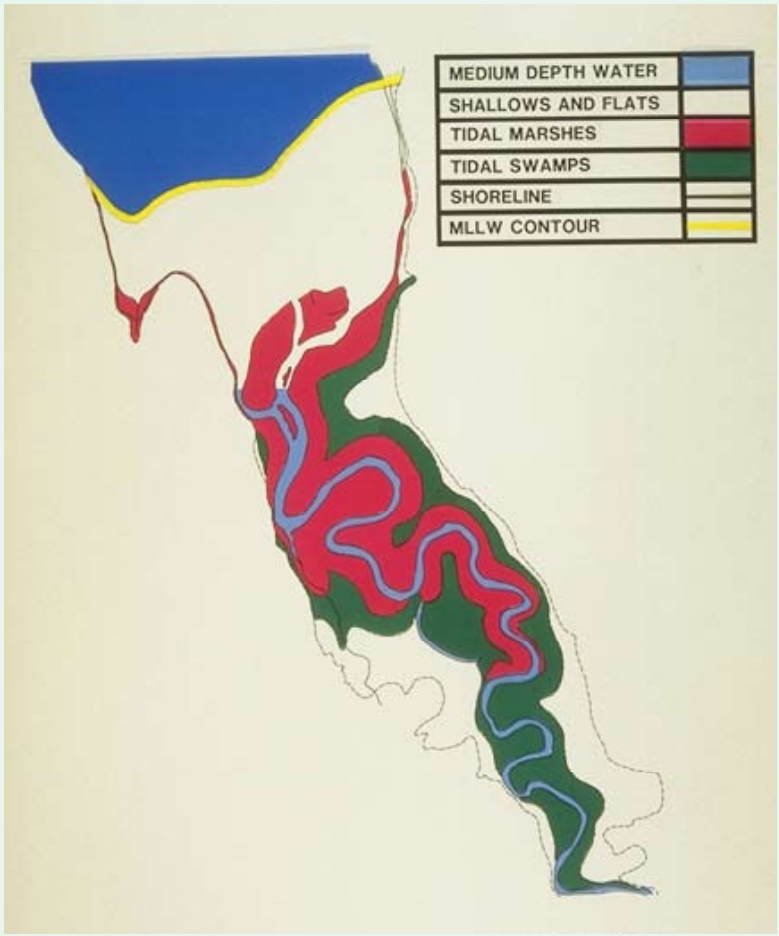

FIGURE 2. DUWAMISH RIVER ESTUARY, 1854

present industrial landscape represents a 97 percent reduction in intertidal sand/mud substrate and marsh area. In addition, forested wetland is entirely absent. A system of linear, deep navigation channels has replaced the former shallow, complex river channel.

The Green River basin is inhabited by three federally listed species of salmonids: 1) Chinook salmon of the Puget Sound Evolutionary Significant Unit (ESU), (Reaffirmed as Threatened, U.S. Federal Register, 28 June 2005), 2) bull trout of the Coastal-Puget Sound Distinct Population Segment (DPS), (threatened, U.S. Federal Register, 1 November 1999) and 3) steelhead of the Puget Sound DPS (U.S. Federal Register, 11 May 2007). Puget Sound-Strait of Georgia coho salmon also occur in the basin and are listed as a Species of Concern (U.S. Federal Register, 15 April 2004), indicating that they are under less active consideration for formal listing. An ESU of Pacific salmon is considered to be a distinct population segment (DPS) and thus a "species" under the Endangered Species Act. The Green River basin also contains formally designated critical habitat for Puget Sound Chinook salmon and Coastal-Puget Sound bull trout. Critical habitat for Chinook salmon includes the Upper, Middle and Lower Green River Subwatersheds (Watershed Codes 17110013, i-iii) of the Puget Sound ESU (U.S. Federal Register, 2 September 2005) and critical habitat for bull trout of the Coastal-Puget Sound.

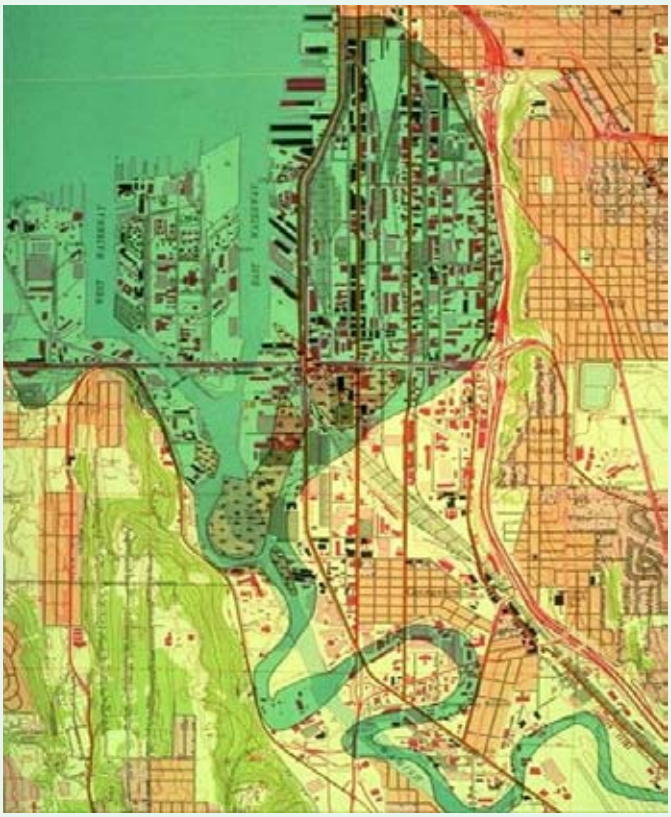

FIGURE 4. JUXTAPOSES THE PAST AND PRESENT SHORELINE TO DEPICT HOW THE WATERWAY HAS CHANGED OVER TIME

FIGURES 3 (L) AND 5 (R). DEPICT A WESTERLY PERSPECTIVE OF THE SPOKANE STREET CORRIDOR IN 1898 AND 1998

Water Dependent Business Protection

The Lower Duwamish River is a vital home to industry and manufacturing as well as being important for fishing, recreation and wildlife habitat. Seattle's Duwamish River valley industrial district provides between 75,000 and 80,000 industrial sector jobs. Since water dependent businesses are vital to our region's economy, a key tenet of this plan is the coexistence of natural habitat and commerce that relies on the Waterway for navigation. It is hoped that this Plan lays a foundation for building mutually beneficial partnerships for river stewardship. The Port's focus in creating this plan has been on crafting a long range framework for investments on Port property that are aimed at keeping our community and environment healthy while supporting our vital working waterfront.Public Involvement

Existing mudflat and container operations at Terminal 108 east shoreline

Public Involvement

The Port of Seattle launched a public involvement process for this plan in March 2008 to engage all stakeholders including area businesses, community and environmental groups, Native American tribes and key public agencies. The public involvement process began with the mailing of a project factsheet to property owners and interested parties in the area. A series of meetings with stakeholders including area businesses also began in March and continued throughout the entire process.

The project's first Open House was held on April 29, 2008 to introduce the planning process to the community at large. On June 26, 2008 the Port led a Duwamish River Lunch Tour to help interested parties learn more about industry and habitat on the Duwamish River. This was followed by three public workshops held in July where interested parties came together to discuss different restoration typologies and to identify key restoration opportunity sites. Meeting notes from the workshops are contained in Appendix 2. Interested parties included residents from the South Park and Georgetown neighborhoods, local scientists, representatives from the Duwamish River Cleanup Coalition (DRCC), People for Puget Sound, Environmental Coalition of South Seattle, King County, the City of Seattle and the National Oceanic and Atmospheric Administration (NOAA).

The first workshop focused on the overall vision of the Plan, as well as on identifying the strengths, weaknesses and opportunities for restoration within each section of the river. The second workshop focused more specifically on habitat typologies. Design ideas for each habitat typology including large habitat hubs, small habitat pockets and habitat corridors, were discussed in the context of specific sites. The third and final workshop included discussion of potential implementation scenarios.

Removal of invasive vines at turning basin number 3 restoration area 2002

Port sponsored Duwamish River lunch tour

After the first draft of the Habitat Restoration Plan was released on October 29, 2008, a second open house was held to get feedback on the draft plan. An environmental review of the plan , pursuant to the Washington State Environmental Policy Act, was concluded on January 7, 2009. Throughout the process the public has been encouraged to give input either by mail or email in conjunction with the project website.

Organization of the Plan

Chapter 1 provides background information about the history of the Duwamish River including its natural history and the history of industrial development along the shoreline and existing restoration. It also discusses the purpose of the plan; and how the plan was developed including public involvement processes.

Chapter 2 provides framework goals and policies to guide implementation of habitat restoration along the river.

Chapter 3 describes habitats that occur within the different shoreline zones such as riparian buffers, marshes and mudflats. It also describes different habitat restoration typologies including habitat hubs, habitat pockets and habitat corridors.

Chapter 4 provides details about the restoration needs, constraints and opportunities along each section of the river.

Chapter 5 discusses potential implementation scenarios, opportunities for public and private coordination, monitoring and tracking, key recommendations and next steps.

Volunteers working at Turning Basin number 3 in 2002

Other Lower Duwamish River Planning Efforts

Today, there are a number of projects underway to clean up the Waterway while ensuring it continues to serve as the industrial heart of Seattle. The Superfund process, including both remediation and NRD aspects, is one of the major drivers for cleanup and restoration efforts, although numerous additional efforts are underway. It should be noted that these are the major investigations and planning projects rather than a complete list of all entities playing a role in the cleanup effort.

LOWER DUWAMISH RIVER REMEDIAL INVESTIGATION / FEASIBILITY STUDY

This major investigation is a joint initiative of four entities with liability for historic contamination: The Port of Seattle, City of Seattle, King County and the Boeing Company, collectively the "Lower Duwamish Waterway Group." As a component of the Superfund process, the "Remedial Investigation/Feasibility Study" (RI/FS) is being carried out for the site under Environmental Protection Agency's and the Department of Ecology's oversight and direction. The Remedial Investigation component of the study involves identifying the nature and extent of site contamination and assessing the risks associated with that contamination. The Feasibility Study component of the RI/FS presents and evaluates cleanup options. Once the RI/FS is complete, a Proposed Plan for the final site cleanup is issued by the agencies. The Proposed Plan is subject to public comment and is then followed by a final cleanup decision. That decision is then implemented by responsible parties under legal settlement agreements or agency orders. The Proposed Plan is expected to be available for public review and comment in late 2010.

One outcome of the process to date has been the identification of seven locations with pronounced contamination issues warranting remedial action prior to establishment of the river-wide cleanup plan. These areas are termed "Early Action Areas." Preparation of the Remedial Investigation / Feasibility Study is being done with oversight by the U.S. Environmental Protection Agency and the Washington State Dept. of Ecology.

LOWER DUWAMISH RIVER DRAFT RESTORATION PLAN AND PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

This project is being carried out by the Lower Duwamish River Natural Resource Trustees with the National Oceanic and Atmospheric Administration (NOAA) in a lead role. It involves a process to identify the general types of restoration projects that will be used to compensate for natural resource damage. The plan will also consider the unique characteristics of different segments of the river and how they inform the restoration strategy. The draft plan is expected to be completed by the end of 2008 or beginning of 2009.

DUWAMISH VALLEY VISIONING PROJECT

This project is being led by the Duwamish River Cleanup Coalition with outreach to Duwamish valley residents, workers, industrial leaders and recreational visitors. The project is a comprehensive, community-based future visioning project, engaging people who live work or visit the Duwamish Valley through workshops, mapping and interviews. The project aims to compile the community's ideas, concerns and visions of the future Duwamish Valley into a comprehensive 'future map,' which will be presented to local, state and federal agencies responsible for the Superfund cleanup and other stakeholders. The Duwamish River Cleanup Coalition is a Community Advisory Group as sanctioned by the Environmental Protection Agency. The project is expected to be completed in the fall of 2008.

CITY OF SEATTLE AND CITY OF TUKWILA SHORELINE MASTER PROGRAM UPDATES

Shoreline Master Programs establish policies and regulations that govern development and uses on and adjoining shorelines. An overarching objective of the program updates will be natural resource protection with the adopted standard of preventing any net loss of environmental function. A component of the updates will be a restoration plan that identifies specific habitat restoration opportunities along the Lower Duwamish River. The updates are scheduled to be completed by December 2009.

WRIA 9 SALMON HABITAT RECOVERY

This project is a cooperative effort between 15 cities (including Seattle, Tukwila and Tacoma) and King County. The geographic focus is the entire Green/Duwamish and Central Puget Sound Watershed stretching from southern King County to West Point in Seattle. This watershed is also known as Water Resource Inventory Area 9 (WRIA 9). In response to the listing of Chinook salmon under the Endangered Species Act in 1999, local governments worked with the Port of Seattle, the local King Conservation District, federal and state agencies, businesses, and environmental groups to draft a Salmon Habitat Plan for the watershed. Completed in 2005, the Salmon Habitat Plan was subsequently folded into the overall Puget Sound Salmon Recovery Plan, approved by the federal government in 2007. The plan proposes a mix of voluntary habitat restoration projects, habitat protection, and programs to be implemented during 2006-2015. While focused on the needs of salmon, the plan seeks to improve the entire aquatic ecosystem of the watershed. A key part of the plan is restoration of "transition zone" habitat in the Duwamish, which has a mix of fresh and salt water and plays a role in the rearing of young salmon.

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Restoration Policy Guidance

The Lower Duwamish River Habitat Restoration Plan serves as an inventory of habitat restoration opportunities on Port-owned properties at the project, section and site-specific scales. This chapter addresses a few aspects of habitat planning where guiding goals and policies apply.

General Habitat Planning

Goal: Involve affected stakeholders in habitat planning endeavors and build mutually beneficial partnerships for river stewardship.

Policy: All restoration planning and design should be coordinated with tribal treaty fishing stakeholders. In general, habitat restoration can be expected to improve conditions for the Duwamish River fisheries. With regard to net fishing practices, most projects will improve access. However, some measures, such as installation of large woody debris, could have negative impacts on access. For this reason, tribal treaty fishing interests should be considered in the design of habitat projects.

Policy: Opportunities for collaboration with water-dependent businesses should be actively sought. In particular, when a restoration project in a Port-owned ribbon property is being designed, the input of surrounding businesses or other surrounding property owners should be sought and considered.

Policy: Explore opportunities for habitat restoration collaboration with other public agencies, area residents, and community groups.

Policy: While public access will be impractical in many Port ribbon properties, it should be considered as a component of the habitat projects on the larger sites. Public access to the shoreline along with interpretive signage has the potential to build community stewardship of a site.

Goal: Ensure that habitat projects will be effective and enduring.

Policy: The design of new habitat projects should include structural erosion control measures when necessary to ensure the ecological value of the restored habitat and/or to protect adjacent infrastructure.

Policy: Habitat planning should follow the adaptive management doctrine developed by the WRIA 9 Plan to respond to improved scientific understanding of the Duwamish estuary as well as "lessons learned" from current and future habitat restoration projects in this and other Puget Sound estuaries. A potentially changing condition that is receiving increasing attention is sea level rise. In a case where the Port is not implementing habitat projects on Port land it should pursue mechanisms to ensure that the implementing entity adheres to the adaptive management doctrine.

Policy: Habitat restoration projects should be designed to facilitate cost-effective maintenance. The Port should establish procedures for the ongoing maintenance of habitat projects. In a case where the Port is not implementing habitat projects on Port land, it should pursue mechanisms to ensure that the implementing entity adheres to the maintenance procedures.

Port Staff describes the goals of the Plan to community stakeholders

Turning Basin number 3 habitat hub

Working Waterfront

The Lower Duwamish River is a vital home to industry and manufacturing. It provides water access to the Duwamish industrial area from Elliott Bay and is a vital component of the industrial harbor. While working to protect and enhance water quality and wildlife habitat, the Port of Seattle must also work to sustain industrialized activity in the Lower Duwamish, operate its facilities as efficiently as possible and continue to build needed facilities to serve our local economy. Ecological value, costs and benefits, community input and the constraints of a working river must all be balanced in the Plan.

Goal: Protect and foster water dependent businesses while working to restore habitat along the Duwamish River.

Policy: Existing and potential sites for water-dependent activities should be identified and preserved.

Policy: Where new habitat projects are constructed adjacent to cargo terminals, their design must maintain lines of sight needed for the terminal's security plan.

Policy: Sites which impose significant constraints from current or expected future water dependent business operations should be avoided.

Policy: Safe navigation and docking for ships at existing and potential future water-dependent business sites should be preserved while working to restore habitat.

Policy: In coordination with water-dependent businesses, habitat-friendly alternatives for piers and shoreline armoring should be considered where shoreline modifications are needed for water dependent activities.

Policy: Under the Washington State Shoreline Management Act, a habitat project that involves a landward shift in the ordinary high water mark will result in the regulated shoreline zone extending further inland. The Port should work with upland property owners in identifying the consequences of this law, when it applies on a specific site.

Tub boats are a common sight on the Duwamish

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3

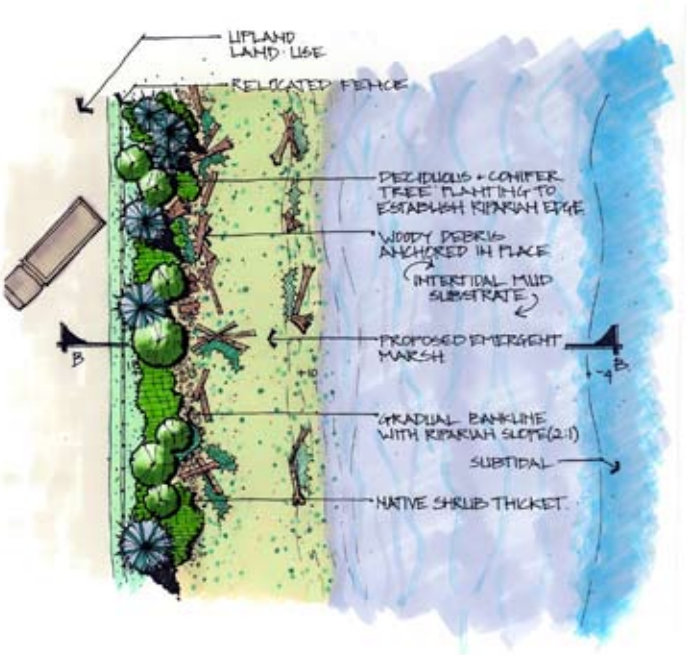
Habitat Restoration Typologies

Restoration of different types of habitat could occur on different Port-owned properties along the Lower Duwamish Waterway. This chapter provides descriptions of habitats that occur within the different shoreline zones such as riparian buffers, marshes and mudflats. It also describes different habitat restoration typologies that differ in terms of their size, shape and function, including habitat hubs, habitat pockets and habitat corridors.

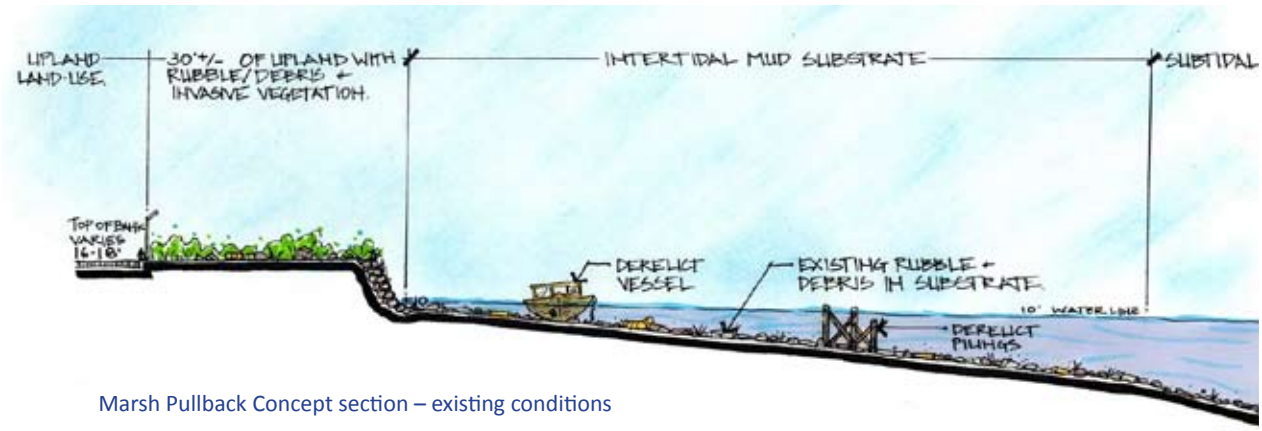
Shoreline Zones and Habitats

The river shoreline is made up of different shoreline zones that contain plants and animals that reflect the moisture continuum from the upland down to the river channel. Upland areas, adjacent to the waterway are considered part of the riparian zone. Lower in elevation is the intertidal zone, which experiences different levels of inundation depending on the tides. The subtidal zone is continuously inundated by water.

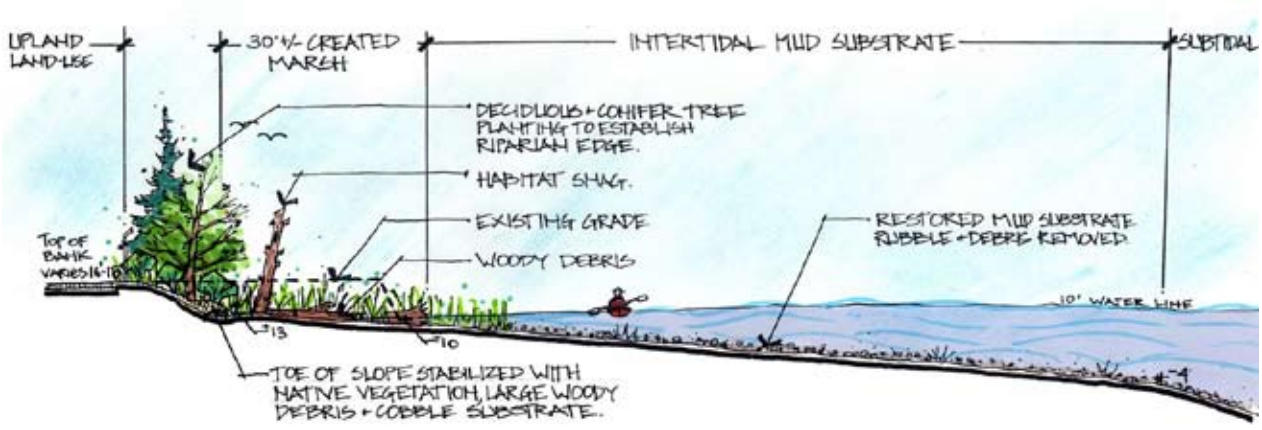
Mudflat, marsh and riparian habitats, each occur within a different shoreline zone. Understanding where the different shoreline zones exist along the waterway is therefore important for identifying the types of habitat restoration possible within each opportunity site. Information regarding the characteristics of and methods for restoring these habitats is based on the experience of the environmental staff of the Port as well as consultation with representatives of the Lower Duwamish River Natural Resource Trustees (Hoff, 2008).



Marsh Pullback Concept Plan View



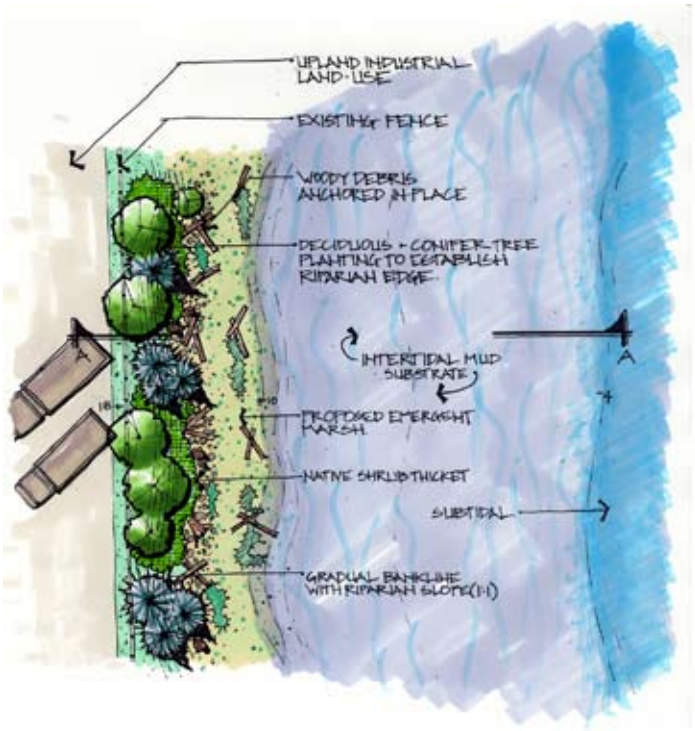
Marsh Pullback Concept section – existing conditions



Marsh Pullback Concept Section – Potential Restored Condition

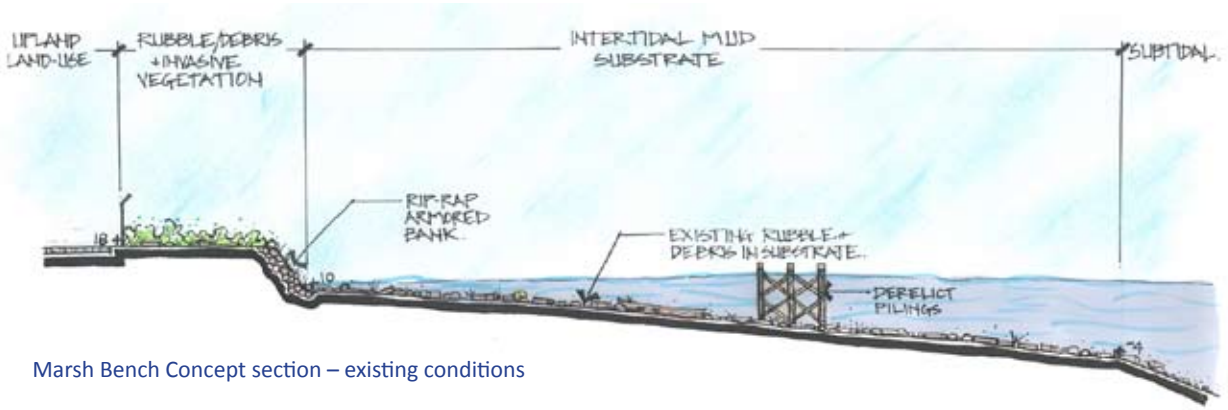
Marshes

Marshes are a type of wetland, which is subject to frequent or continual inundation, and are characterized by emergent soft-stemmed vegetation adapted to saturated soil conditions. Marsh vegetation and microorganisms that use excess nutrients for growth, such as nitrogen and phosphorus, are very important to preserving the quality of surface waters (EPA, 2008). Marsh vegetation is also a key component of an estuarine food web. Productivity in the marsh habitat influences the structure and abundance of the epibenthic and benthic communities.[1] Marshes also serve as refuge and foraging habitat for salmonids and

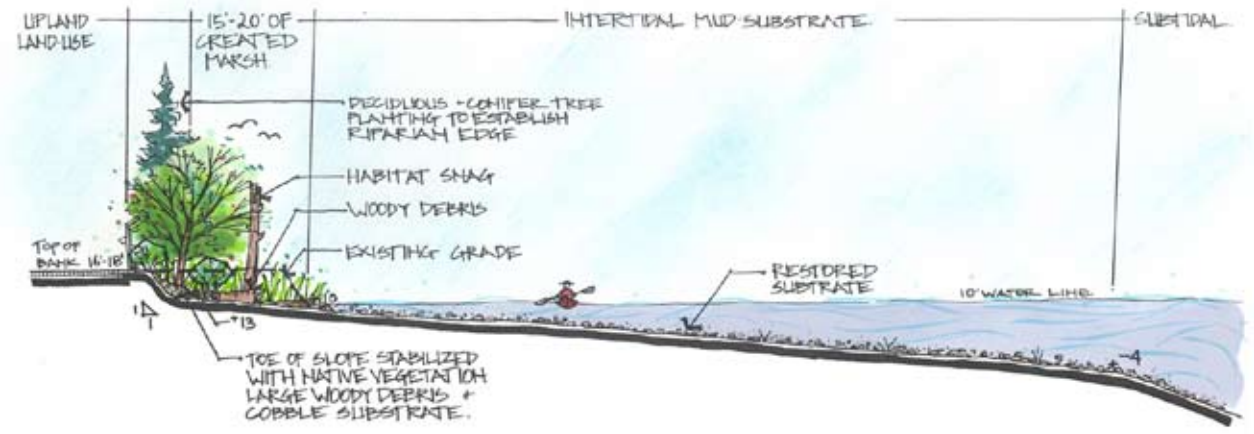


Marsh Bench Concept Plan View

1. Benthic communities are made up of organisms which live on, in, or near marine sedimentary environments. Epifauna live upon the seafloor or upon bottom objects; the so-called infauna live within the sediments of the seafloor. The main food sources for benthos are plankton and organic runoff from land. The depth of water, temperature and salinity, and type of local substrate all affect what benthos is present. Where light reaches the bottom benthic photosynthesizing diatoms are a significant food source. Filter feeders, such as sponges and pelecypods, dominate hard, sandy bottoms. Deposit eaters, such as polychaete worms, populate softer bottoms. Fish, starfish, snails, cephalopods, and crustaceans are important predators and scavengers. Benthic organisms, such as sea stars, oysters, clams, sea cucumbers, brittle stars and sea anemones, play an important role as a food source for fish and humans (Britannica, 2008).



Marsh Bench Concept section – existing conditions



Marsh Bench Concept Section – Potential Restored Condition

other wildlife species. Marshes experience regular tidal inundation and include low marshes which are vegetated with aquatic vascular plants, and high marshes, which are vegetated with aquatic vascular plants and terrestrial plants.

Marsh habitat could be constructed in both the main channel and side channels off the Duwamish River. Side channel habitat is more protected from disturbances such as boat wakes than habitats in the main channel and therefore provides better refuge for juvenile salmon. Main channel marshes would be constructed by excavating and re-grading the existing banks to create the appropriate elevation and a lower gradient slope. Side channels could be enhanced by excavating tributaries to create a more natural marsh elevation, reconfiguring the channels to increase sinuosity, and planting dense communities of native species. Restored side channels should be designed to retain water during low tides. Invasive species can be discouraged through the proper dense planting of native species following construction of the restored channels.

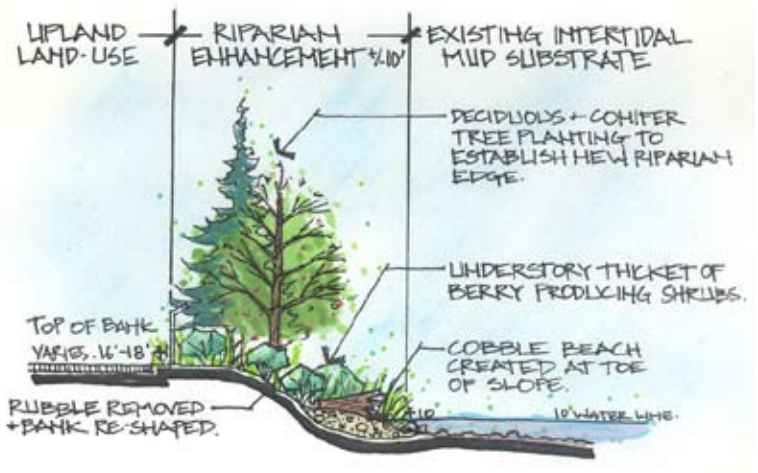
Marshes can be divided into two types, high marsh and low marsh, based on their elevation and related degree of tidal influence. High marsh communities contain shrubs, in addition to a variety of herbaceous species. Low marsh vegetation communities are dominated by herbaceous species. Dense marsh vegetation supports inputs of insects and other organic matter to the river, as well as terrestrial wildlife habitat. The viability of restored marsh habitat is partially dependent on its size and width. Restored marshes will have increased ecological value if they contain well-vegetated riparian buffers, high and low marsh habitat, and mudflats. Greater value can also be provided when restored marshes are positioned adjacent to existing functioning marsh habitat.

Riparian Buffers

Vegetated riparian buffers dampen noise, filter stormwater runoff, and stabilize the shoreline thereby preventing erosion. They also provide an indirect source of food for fish and waterfowl by creating habitat for insects that fall into the water. Trees within the riparian zone provide shade and nesting habitat for birds.

Riparian buffers are found along the Lower Duwamish River, but are reduced, degraded, or absent in many areas. Riparian habitats in the project area contain a mixture of scrub/shrub vegetation and trees, such as willows and Sitka spruce (water tolerant species) and upland species such as Douglas firs and hemlocks. Non-native species, such as Himalayan blackberry and reed canary grass, are common. Vegetated buffers provide additional benefit when they contain healthy communities of native species and are located adjacent to marshes, mudflats, or creek mouths. Planting buffers adjacent to marshes increases the ability of a larger variety of species to use both habitats, such as birds that perch in the trees and bushes and those that forage in the intertidal area. The width of a restored buffer is very important and influences the integrity of the habitat and its ability to support wildlife. Larger buffers provide greater ecological benefits. Restoring riparian buffers could involve removing invasive species, removing bank armoring and debris, potentially regarding the bank to a more natural slope, planting and maintaining native vegetation, locating large woody debris, and enhancing substrate.

Restored marsh at Turning Basin #3

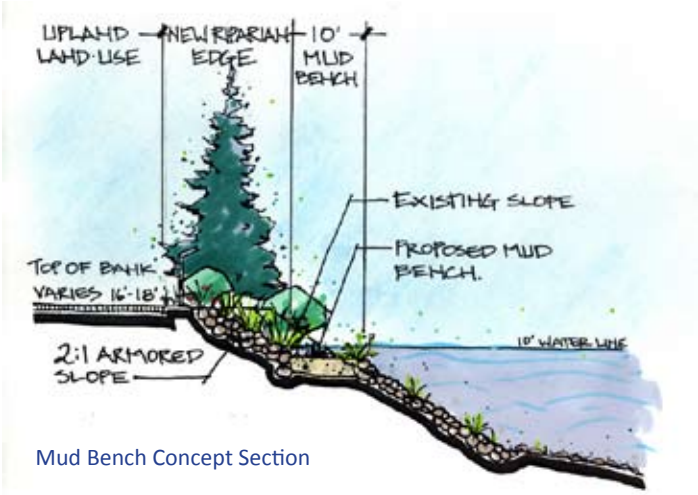


Riparian Enhancement Concept Section

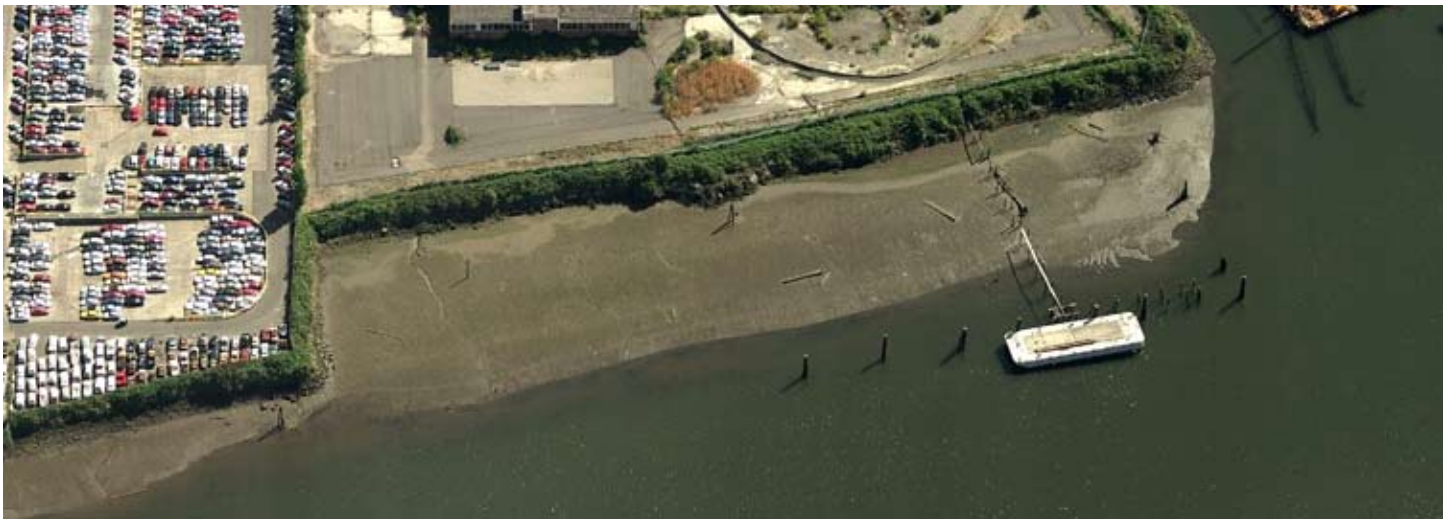
Mudflats

Mudflats form when mud is deposited by tides or rivers and are typically found in sheltered areas such as bays and estuaries. They support benthic and epibenthic communities that are important sources of food for birds and fish, including juvenile Chinook salmon. Low elevation mudflats are especially important for salmonids. Where possible, mudflats should be constructed to border existing or restored marsh or vegetated buffers. Appropriate substrate may need to be added and any derelict vessels, trash, or rubble located within the intertidal mudflat range would be removed.

Because of the navigational use of the river, most mudflat restoration projects would involve excavation of the existing bank to create the appropriate tidal elevations. Where appropriate elevations already exist, less extensive bank cutting and regrading would be needed. In some locations a combination of bank cutting and filling in lower elevations would be needed to achieve the required mudflat elevations.



Mud Bench Concept Section



Existing mudflat at (River Mile 4.2)

Typologies

Typologies are classes of habitat that have characteristics or traits in common, such as size or configuration. They help to differentiate the different forms of habitat and restoration projects needed along the waterway. Habitat restoration typologies used in this Plan include Hubs, Pockets, and Corridors. Each of these represents a different size and/or shape of potential restoration project. These three typologies are useful for describing existing types of habitat features as well as for serving as models for future restoration projects along the waterway.

Within hubs, pockets and corridors, restoration efforts could take place within the shallow subtidal, the intertidal and/or the riparian zone. Restoration of the major shoreline zones could occur to different extents. For instance, within a Hub, restoration of the intertidal zone could include extensive restoration of tidal marshes and mudflats, and restoration of the riparian zone could extend far upland. In contrast, within a Corridor where there are constraints with existing development, restoration of the intertidal zone would include smaller improvements to slope and vegetation, and restoration of the riparian zone may be more narrowly focused along the shoreline edge.

Hubs

Hubs are large, well established habitats that tend to have a greater degree of long-term variability and stability than smaller habitats. Greater variability and stability increase the ability of the overall system to withstand and recover from disturbances (resistance and resilience). Although most potential restoration sites within the Lower Duwamish are too small to be considered true hubs by most ecologists, Kellogg Island and Turning Basin Number 3 likely serve in many ways as habitat Hubs in the Lower Duwamish due to their large size. These two sites, enhanced and expanded, could serve as habitat anchors, providing fish and other wildlife with abundant and diverse refuge and feeding areas.

Kellogg Island (above) and Turning Basin #3 (right) are existing habitat hubs that could be expanded and enhanced

Pockets

Pockets are small habitats. Although they provide habitat for fewer species and are less resistant to disturbances than larger ones, pockets still provide important habitat areas for wildlife and contribute to habitat continuity. Pockets are typically created at side channels, where the water has a chance to slow down and pool and where marsh vegetation or mudflats can be formed. Pools provide space, cover, and nutrition to fish as well as a place for fish to seek shelter during storms and other catastrophic events (Spence et al. 1996). Side channel mudflats also provide important resting areas for juvenile salmonids.

Corridors

Corridors are primarily linear features that provide narrow strips of habitat. They are rich in food sources and/or cover and form important routes between Hubs, Pockets, and other types of habitat as well as critical links between sources of species and restored habitats. Examples include narrow strips of sedge marshes along river banks, channels from deep areas to marsh flats, and bands of eelgrass and kelp. This typology applies best to the typical "ribbon" properties owned by the Port within Commercial Waterway Number 1.

Restored pocket habitat at Terminal 105

Restored marsh at Terminal 107 (River Mile 1.0)

Terminal 105 Intertidal restoration area and Public Shoreline Access Site Diagram

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4

Restoration Constraints & Opportunities

The Lower Duwamish Habitat Restoration Plan focuses on restoration opportunities located on Port-owned shoreline and aquatic area property. This section describes existing industrial development/use and estuarine habitat conditions in each of the four waterway sections, along with evaluation of potential shoreline and aquatic habitat restoration actions. Constraints, particularly the shoreline facility and operational needs of water-dependent commercial and industrial uses, are also described, along with potential restoration opportunities at Port-owned waterway sites.

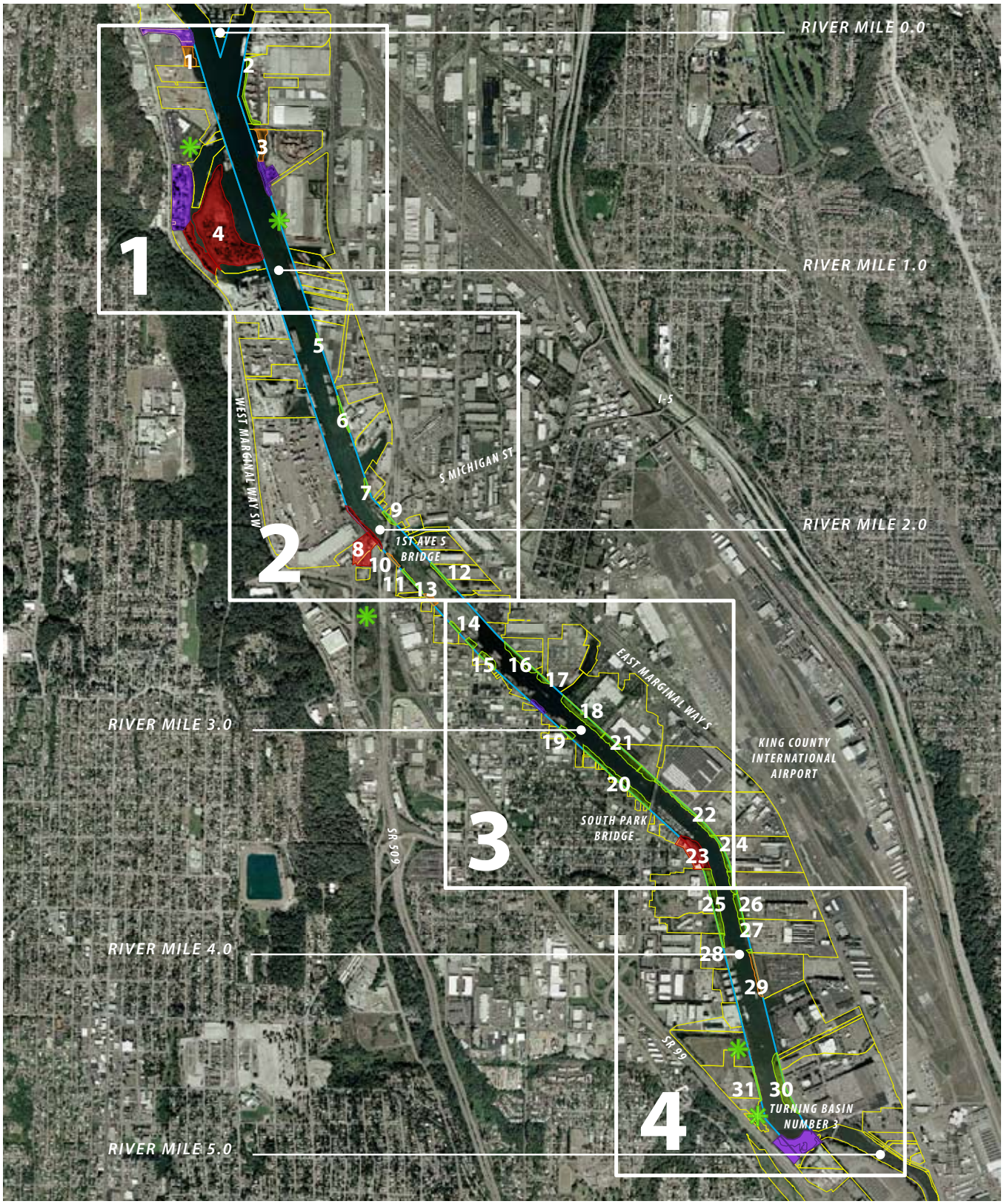


FIGURE 6. RESTORATION OPPORTUNITY SITE OVERVIEW

Individual opportunities described in this section outline the scope of potential restoration actions that could be constructed at particular sites, based on existing industrial use conditions and habitat features. Each of the habitat restoration opportunities are presented as a planning/concept design and apply to Port-owned shoreline and aquatic area property only. Subsequent site-specific design for particular sites will require detailed survey information, civil engineering/geo-technical analysis and additional biological analysis. In addition, all potential shoreline and aquatic area restoration sites will require soil and sediment contamination investigations. Soil and sediment characterization is essential in light of Superfund coordination and decision-making needs in the Duwamish Waterway. These site-specific evaluations, combined with habitat objectives identified for the location, will determine the dimension and extent of particular restoration actions.

Terminal 107, public shoreline access/habitat restoration site, illustrating native riparian vegetation (River Mile 1.0)

Project-Wide Overview

Strengths

Two large habitat hubs, Kellogg Island/Terminal 107 and Turning Basin Number 3, as well as several past restoration successes at Terminals 105, 107 and 108 and Portland Street, provide a strong framework for future habitat restoration efforts along the Lower Duwamish River. The two habitat hubs provide a diverse array of ecological niches and thereby support a diversity of species. Their large size also improves their resistance and resilience to disturbances leading to overall ecosystem longevity.

Artificially hardened and eroded bank at east side slip (River Mile 1.8)

Constraints

Docks, piers, armoring and other modifications to the shoreline for water-dependent activities may constrain restoration opportunities in certain areas of the waterway. Limited "ribbon parcel" width, especially within Sections 1 and 2 of the waterway could also constrain the amount of corridor restoration possible in those areas.

Opportunities

Despite constraints, at least 31 viable restoration opportunities have been identified along the waterway on the Port of Seattle's "ribbon" and terminal properties (Figure 6). The overall emphasis of the Plan is on maximizing the potential for restoring mudflats, marshes and riparian buffers on "ribbon parcels" and underutilized terminal areas.

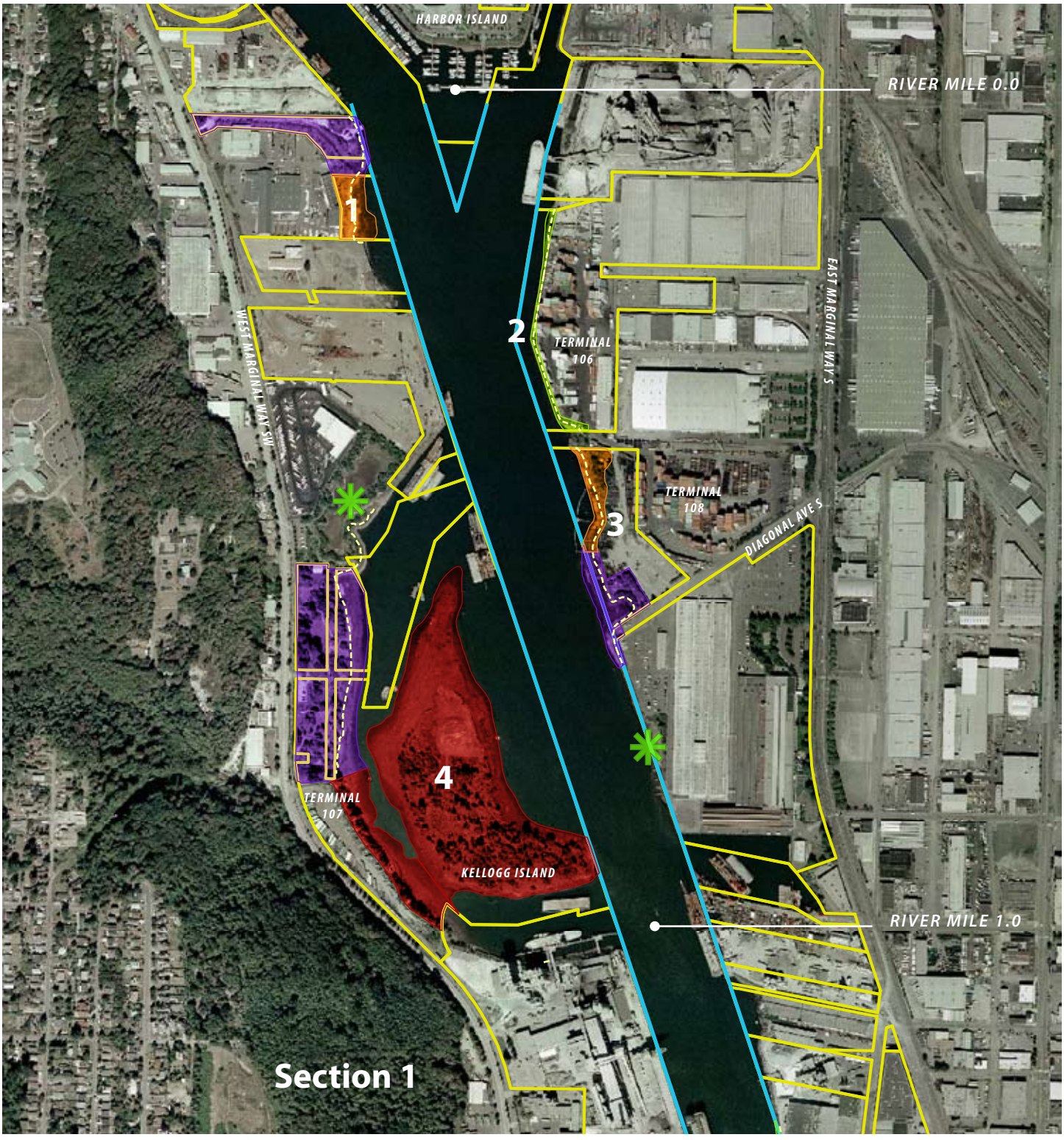


FIGURE 7. SECTION 1 RESTORATION OPPORTUNITY SITES

Section 1, North:

Harbor Island to Alaska Marine Lines

Strengths

Section 1 currently has the highest quality of habitat along the river. Kellogg Island, Terminal 107, Terminal 105 and Terminal 108, along with the presence of natural shoreline banks and shallow intertidal areas provide a key habitat hub at the northern project limit with refuge and feeding areas for a diversity of species.

Constraints

Heavy shipping activities requiring shoreline armoring and deep subtidal and intertidal channels and limited "ribbon parcel" width constrain opportunities for connectivity along some shoreline areas. Specifically, heavy shippers at Terminal 106, LaFarge and Alaska Marine Lines require shoreline armoring to enable ships to dock and load and unload containers and raw bulk materials.

Opportunities Overview

- Section one has fewer opportunities than the other sections because the large amount of habitat presently found here more closely emulates the continuity of habitat that originally existed in the river.
- Build on past restoration success in an area with extensive Port properties.
- Expand and enhance existing habitat hub and pocket sites
- Create new habitat corridors between Sections 1 and 2
- Coordinate restoration planning to restore habitat connections to estuary

Restoration opportunities in Section 1 include creation of a habitat pocket at Terminal 105 (Project 1), creation of a habitat corridor along Terminal 106 (Project 2), expansion of the Diagonal Avenue South/Terminal 108 habitat pocket (Project 3) and enhancement of the Kellogg Island/Terminal 107 hub (Project 4). See Figure 7 and project descriptions below.

Terminal 107, public shoreline access/habitat restoration site (River Mile 1.0)

Large scale water-dependent, marine industrial pier facility (River Mile 1.0)

Opportunity Details

This section contains descriptions of existing conditions and potential restorative actions that could be implemented at each of the currently identified restoration opportunity sites within Section 1. Numbered projects correspond to opportunities on Port property. More detailed notes of existing conditions and potential restoration actions at each site are provided in Appendix 1.

Project 1 – Terminal 105, West Bank line, River Mile 0.1 – Pocket Habitat

This area currently has an unobstructed low slope and fine grained intertidal and shallow subtidal aquatic areas. Emergent and riparian vegetation are absent. Potential restoration actions could include excavation of the top-of-bank to reduce bank line elevation to approximately 10 to plus 12 feet above MLLW, extension of intertidal area approximately 50 to 80 feet west and construction of a berm at west margin of site.

Derelict structures, rubble and metal slag materials could also be removed from existing intertidal area and the re-shaped and graded area could be planted with emergent vegetation. A 15-foot wide riparian buffer/berm at the west margin could also be planted. Existing Cottonwoods at the north end of the site could remain as a buffer between the site and the off-channel intertidal habitat site, adjacent to north. Potential actions at this site could cover approximately 350 linear feet of bank line restoration.

Project 2 – Terminal 106, East Bank line, River Mile 0.1 to 0.4 – Corridor Habitat

Currently this area does not have a fine grained, low slope intertidal area and riparian vegetation is absent. Potential restoration actions could include reshaping and reducing the bank line to create a fine grain substrate bench along the length of the site, with an elevation ranging from approximately zero to plus two feet MLLW. The bank line landward of plus two feet MLLW could be sloped at 1:1 between plus two and plus 12 feet MLLW, serving as a stable armored shoreline. Existing riprap bank line between plus 12 and 18 feet MLLW could be re-shaped with variable slope between 2:1 and 3:1 to receive native riparian plantings, installed as bank line vegetation pockets and planting wells. A native riparian strip could also be planted at the new top-of-bank profile. Potential actions at this site could include approximately 1,350 linear feet of bank line enhancement.

Project 3 – Terminal 108, East Bank line, River Mile 0.5 – Pocket Habitat

This area currently has a moderate, unobstructed intertidal substrate; however no emergent vegetation is present. Erosion is active in this bank line area, despite existing riparian vegetation. Potential restoration actions could include reshaping and reducing the bank line to create an intertidal, marsh planting bench along the length of the site with an elevation ranging from approximately plus10 to 12 feet MLLW. Large woody debris could also be incorporated into the emergent planting areas. The bank line upslope of the marsh planting bench, with a slope between 3:1 and 4:1, could be planted with native riparian vegetation. A riparian vegetation buffer could be restored at the top-of-bank. Potential actions at this site could cover approximately 750 linear feet of bank line alteration.

Project 4 – Terminal 107, Kellogg Island, West Bank line, River Mile 1.0 – Hub Habitat

Currently the portion of the Duwamish Waterway adjacent to this site includes substantial exposed intertidal and shallow subtidal mud/sand substrate. Marsh vegetation was formerly abundant, but exists only in small pockets at present.

Potential restoration actions could include restoration of intertidal conditions in approximately 11.5 to 12 acres of the site. Previously placed dredged materials could be removed to expose sediments to tidal influence, between 10.5 and 13 feet MLLW. Emergent vegetation could also be installed throughout. Restoration actions could leave portions of the existing berm located at the east margin of the site in place to protect restored marsh areas from vessel-wake erosion. Large woody debris could be placed throughout the perimeter of the site as

Existing inter-tidal mud/sand substrate and marsh vegetation, Kellogg Island (River Mile 1.0)

an additional substrate stabilization measure. Intertidal restoration at Kellogg Island could be guided by data describing site elevations and conditions prior to use as a dredged material disposal site. Removal of dredged sediments from the site may require excavation below 10.5 feet MLLW in some locations, due to the compression of underlying native sediments. Emergent and riparian plantings at the site could make the greatest possible use of the re-exposed native sediments. However, placement of additional fine grained sediments may be required to obtain appropriate elevations following removal of stock-piled dredged materials.

South Kellogg Island, illustrating existing dredged material site, with shoreline vegetation established at upper edge of dredged material deposit. Note barge moorage dolphins in adjacent sub-tidal area (River Mile 1.0)

Terminal 108, riprap bank line, illustrating potential marsh and riparian vegetation pocket restoration site (River Mile 0.5)

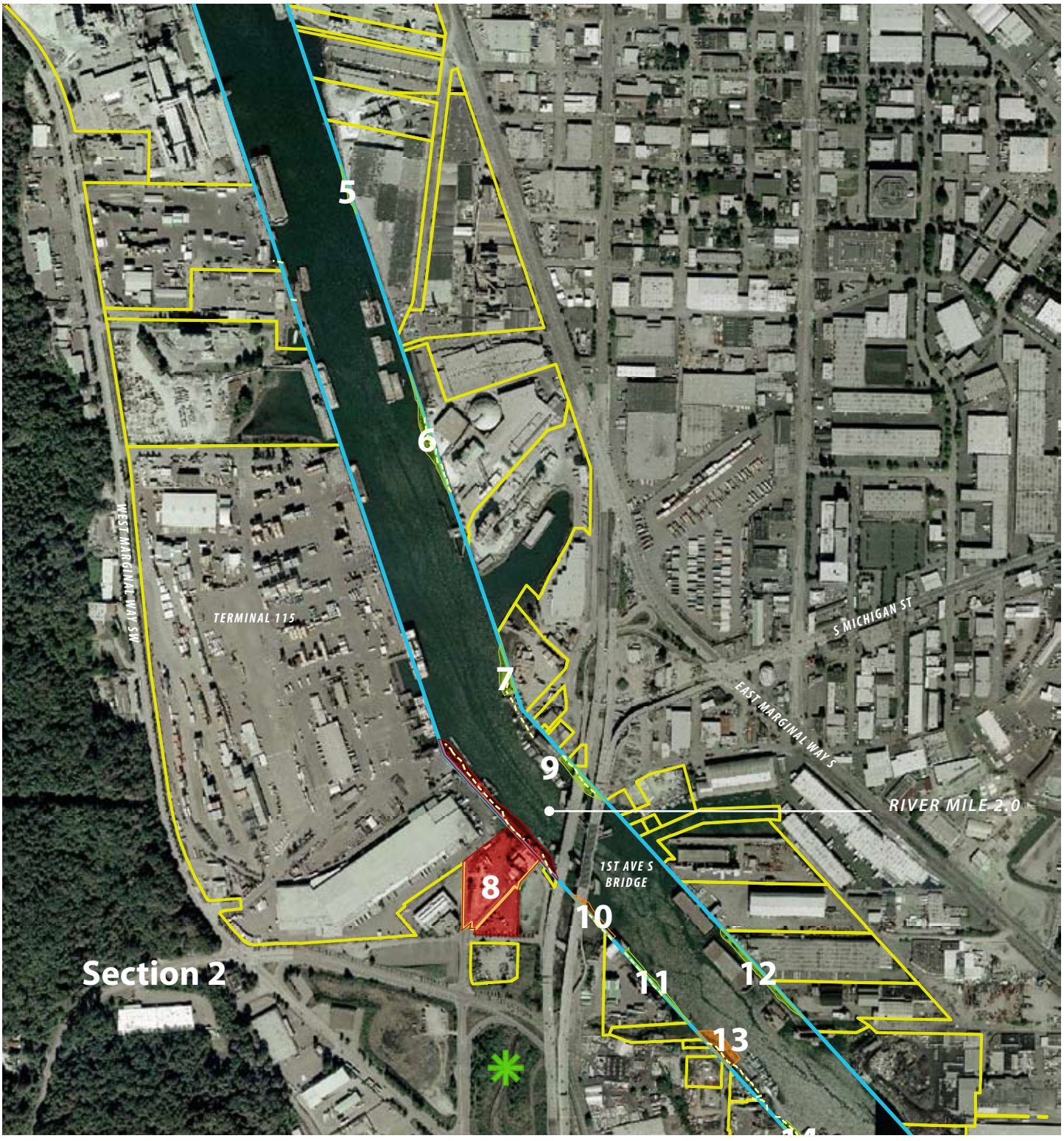


FIGURE 8. SECTION 2 RESTORATION OPPORTUNITY SITES

Section 2, North/Central:

Alaska Marine Lines to Boyer Towing

Strengths

Section 2 has less existing habitat than other sections of the river on which to build. Yet, remnants of historic oxbows and small inlets near the 1st Avenue Bridge and Glacier Marine, as well as a few natural shoreline banks and shallow intertidal areas, provide some habitat potential.

Constraints

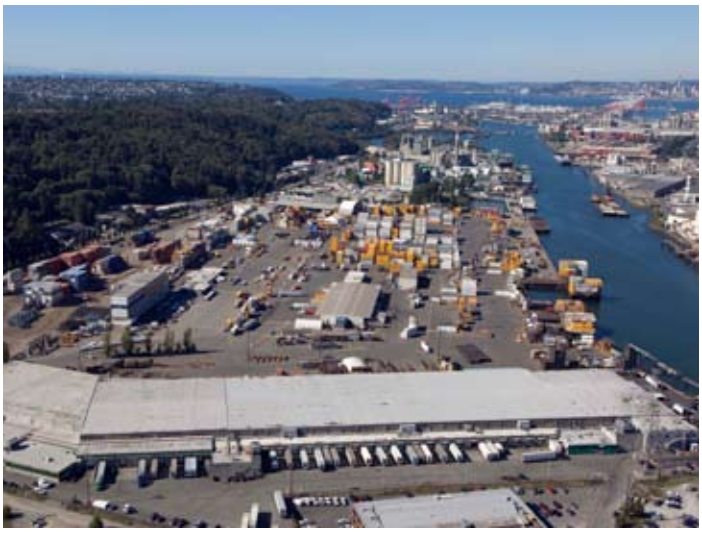
Heavy shippers, common and contract carrier and marine construction activities in this section requiring shoreline hardening and piers for loading and unloading operations, constrain restoration opportunities along some shoreline areas.

Opportunities Overview

- Create new habitat pockets in an active water-dependent business area with minimal existing habitat and significant constraints.
- Provide corridors between higher quality habitat upstream and downstream.

Restoration opportunities in Section 2 could include the creation of a habitat hub at Terminal 115 (Project 8) and the creation of habitat pockets under and around the 1st Avenue Bridge (Projects 10 and 11). Collaboration with Northwestern Glass Company, BPB Gypsum, Hale's Construction, Douglas Management, Bunge Foods and Boyer Towing could be coordinated for the creation of habitat pockets and corridors in and around Port ribbon parcels near these businesses (Projects 5, 6, 7, 11, 12 and 13 respectively). Coordination with the City of Seattle and the Washington State Department of Transportation on restoration in and around the "ribbon parcel" adjacent to the 1st Avenue Bridge, could also greatly further restoration goals (Projects 8 and 10). See Figure 8 and project descriptions below.

West bank line, First Avenue South Bridge, illustrating substantial habitat restoration opportunity, including partnership with City of Seattle (River Mile 2.1)



Terminal 115, marine industrial use site. Habitat restoration potential at this and similar marine industrial sites is proposed for areas not needed for water-dependent use (River Mile 1.9)

First Avenue South Bridge, illustrating potential restoration area between top-of-bank and floating moorage (River Mile 2.0)

Opportunity Details

This section contains descriptions of existing conditions and potential restorative actions that could be implemented at each of the currently identified restoration opportunity sites within Section 2. Numbered projects correspond to opportunities on Port property. Unnumbered projects discuss opportunities for restoration on other properties. More detailed notes of existing conditions and potential restoration actions at each site are provided in Appendix 1.

Project 5 – Northwestern Glass Company, East Bank line, River Mile 1.3 – Corridor Habitat

This area currently has a substantial unobstructed intertidal substrate. However, no emergent or riparian vegetation is present. The site is also narrow, with limited Port-owned bank line available for improvement. Potential restoration actions could include removal of rubble, debris and derelict creosote piling from Port-owned aquatic and bank line areas. Approximately 250 to 275 linear feet of large woody debris conditions in the intertidal area could be established at plus10 to 12 feet MLLW. Riparian vegetation planting pockets and ledges in Port-owned bank line area could also be installed above plus 12 feet MLLW.

Project 6 – British Plaster Board, East Bank line, River Mile 1.6 – Corridor Habitat

Currently this area has an unobstructed intertidal substrate with a small amount of marsh vegetation in an exposed native substrate. However, there is limited riparian vegetation present and the site is narrow, with limited Port-owned bank line available for improvement. Potential restoration actions could include removal of rubble and debris from Port-owned aquatic and bank line area and excavation and re-shaping of approximately 175 linear feet of existing bank line to create an intertidal bench at plus 10 to 12 feet MLLW. Marsh vegetation and large woody debris could be installed to expand existing bulrush area in this location. Riparian vegetation, as planting pockets and ledges in remaining portions of Port-owned bank line area could also be installed above plus 12 feet MLLW.

Illustrating existing non-water dependent industrial shoreline use, with potential for placement of native riparian vegetation and large woody debris as a partnership opportunity (River Mile 1.4)

Project 7 – Southwest corner Slip Two, East Bank line, River Mile 1.9 – Corridor Habitat

Currently this area has a small area of unobstructed moderate intertidal and shallow subtidal fine grained, low slope substrate. However, no riparian or marsh vegetation is present. Potential restoration actions could include excavation and regrading of approximately 125 linear feet of existing riprap/rubble bank line and construction of a fine grain intertidal substrate bench, at an elevation of approximately 10 to 12 feet above MLLW. The bench could be suitable for placement of emergent vegetation and large woody debris. Remaining portions of the Port-owned bank line landward of plus 12 feet MLLW, could be shaped at approximately 3:1 slope and planted with riparian vegetation.

Project 8 – Southwest Terminal 115, West Bank line, River Mile 2.0 – Hub Habitat

The portion of Duwamish Waterway adjacent to this site includes minimal exposed intertidal substrate and no riparian or marsh vegetation is present. This reach of waterway is occupied by numerous in-water and over-water structures, including the First Avenue South bridge crossings. A fish and wildlife habitat restoration channel constructed by WDOT is present at the south landfall of the First Avenue South Bridge, which connects to an emergent vegetation area.

Potential restoration actions could include removal of existing in-water and over-water structures to re-expose approximately 320 linear feet of intertidal and shallow subtidal aquatic area. An intertidal substrate suitable for emergent vegetation (elevation plus 10 feet to 12 feet MLLW) could be created by excavating landward from existing plus 10 feet MLLW elevation. The side margins of the excavation area includes a 3:1 slope, beginning at 12 feet MLLW, which could allow the new top-of-bank in the interior of the excavated restoration area to match the surrounding upland elevations between 20-24 feet MLLW. Side slopes could also be planted with native riparian vegetation band, 18 to 36 feet in width. The toe of riparian slope and side slopes of excavated intertidal area could be stabilized with large woody debris. The intertidal and riparian habitat restoration area includes up to 3.2 acres, with the potential to expand the restoration site

to approximately 4.5 acres if the adjacent public right-of-way is included. In addition, restoration at this site could include an intertidal channel connection to the interior of the existing WDOT aquatic habitat restoration area. The installation of a 300 to 400 feet long intertidal channel connection between the proposed restoration site and the existing WDOT site could benefit both areas.

Project 9 – North First Avenue South Bridge, East Shoreline, River Mile 2.0 – Corridor Habitat

This site currently has a small area of unobstructed intertidal and shallow subtidal substrate. The upper and intertidal bank line contains a fine grained, low slope substrate. However, no riparian or marsh vegetation is present. Potential restoration actions could include excavation and regrading of approximately 225 linear feet of existing riprap/rubble bank line. A fine grain intertidal substrate bench could be constructed at an elevation of approximately zero to two feet above MLLW could. The remaining portions of Port-owned bank line landward of plus two feet MLLW, could be shaped at approximately 3:1 slope and portions of the slope above 12 feet MLLW could be planted with riparian vegetation.

Project 10 – North First Avenue South Bridge, West Shoreline, River Mile 2.1 – Corridor Habitat

Currently, this site has a moderate area of unobstructed intertidal and shallow subtidal substrate. The upper and intertidal bank line consists of riprap and rubble, with an unstable and eroding intertidal slope. No riparian or marsh vegetation is present. Potential restoration actions could include excavation and regrading of approximately 75 linear feet of an existing riprap/rubble bank line to form a 3:1 slope bank line suitable for placement of native riparian vegetation. A top-of-bank berm could also be installed to eliminate surface water flow over top-of-bank and large woody debris, at an elevation of approximately eight to 12 MLLW, could be installed as toe-of-slope stabilization measure. Large woody debris could extend approximately 100 feet north along the Port-owned waterway boundary, across high intertidal portions of previously constructed WDOT restoration site. Approximately 175 linear feet of improvement is available at this site.

Existing recreational boat moorage, east bank line, First Avenue South Bridge (River Mile 2.0)

Project 11 – South First Avenue South Bridge, West Shoreline, River Mile 2.2 – Corridor Habitat

This site currently has a moderate area of unobstructed intertidal and shallow subtidal substrate. Upper and intertidal bank line consists of riprap and debris and no substantial riparian vegetation or marsh vegetation is present. Potential restoration actions could include re-shaping and reducing the bank line to create a 400 foot long, intertidal, fine grain substrate, at an elevation of approximately plus 10 to 12 feet MLLW. This could run parallel and landward of the existing barge moorage dolphins. The upper intertidal bench could be planted with emergent vegetation. The slope landward of the marsh planting area could receive large woody debris and riparian vegetation arranged in slope pockets. Approximately 400 linear feet of improvement is available at this site.

Project 12 – Cold Storage Warehouse/Industrial Upland Site, East Shoreline, River Mile 2.3 – Corridor Habitat

Currently, this site has a moderate area of unobstructed intertidal and shallow subtidal substrate. The upper and intertidal bank line consists of riprap and no substantial riparian or marsh vegetation is present. The Port-owned bank line area is narrow. Potential restoration actions could include excavation of the bank line to reduce slope and removal of any rubble or debris present. The bank line could be sloped to the maximum extent possible within the Port-owned area between 12 to 19 feet MLLW to create a riparian planting area as a graded bench or pocket plantings. Large woody debris could be installed at lower margin of riparian planting area, between 12 and 14 feet MLLW. Approximately 600 linear feet of bank line improvement is available at this site.

Project 13 – South Orchard Street/Second Avenue South, West Shoreline, River Mile 2.3 – Pocket Habitat

The site currently has a substantial area of unobstructed intertidal and shallow subtidal substrate. The upper and intertidal bank line consists of rubble and debris and no substantial riparian vegetation or marsh vegetation is present. The Port-owned bank line area includes the existing upland as well as the bank line and the aquatic area. Potential restoration actions could include excavation of the bank line and removal of rubble and derelict materials. The top-of-bank could be reshaped landward approximately 25 feet and a fine grain intertidal substrate area could also be created at an elevation of 10 to 13 feet MLLW for use as emergent vegetation planting area.

A 2:1 sloped shoreline with riparian vegetation extending up-slope from 13 feet MLLW to a mounded berm could be constructed at plus 13 feet to 15 feet MLLW for use as a riparian planting area. Large woody debris could also be installed along the bank line at 12 to 13 feet MLLW. Approximately 175 linear feet of site bank line is available for improvement at this site. Port-owned bank line property at this site represents substantial pocket habitat restoration potential. Efficient use of this site will benefit from collaboration with the City of Seattle relating to maintenance of and potential reconfiguration of existing right-of-way adjacent to the northeast intersection of South Orchard Street and Second Avenue South.

Side Channel Restoration

The Port is supportive of collaboration with adjacent property owners on restoration of the existing side channel at river mile 2.4 near Orchard Street and the 1st Avenue S Bridge to create high-functioning habitat pockets. Project 13 is located at the southeast corner of the existing side channel noted here. The side channel, approximately 525 feet long and including approximately 0.9 acres of inter-tidal sand/mud substrate, includes Port property in the approximately 160 feet wide inter-tidal area where the side channel joins with the Duwamish Waterway. Future clean-up and restoration in this area would provide significant fish and wildlife habitat attributes. Restoration at this site would require project coordination and partnership between the Port, private property owners, and, potentially, the City of Seattle, if the margins of adjacent public right-of-way areas were included in a potential restoration action.

Existing side channel, intertidal pocket, west shoreline, (River Mile 2.4). This area is located between projects 11 and 13. IT illustrates a potential restoration opportunity involving private property owners and the Port.

Restoration opportunity for habitat corridor adjacent to James Hardie Gypsum

Illustrating potential habitat restoration noted in Site 11 and Site 12 descriptions.
Note fishing net at center left, indicating active treaty tribe fishing access in Duwamish Waterway

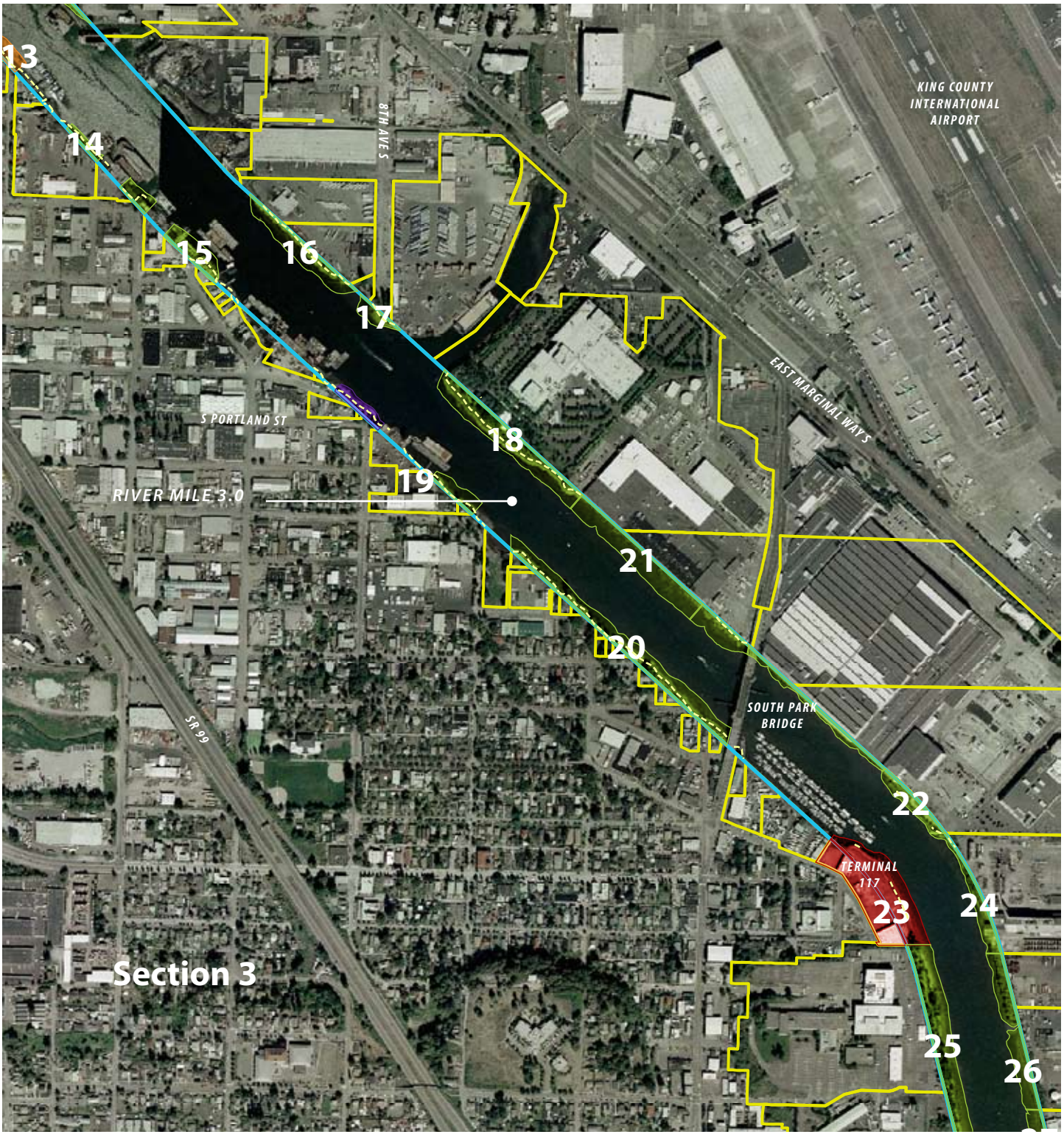


FIGURE 9. SECTION 3 RESTORATION OPPORTUNITY SITES

Section 3, South/Central:

Boyer Towing to Terminal 117

Strengths

Section 3, has a few habitat pockets and some shallow intertidal areas, including an existing restoration site at Portland Street. Immediately north and south of the South Park Bridge, the left bank has less shoreline hardening and more natural shoreline than other areas in this section. Active residents from the nearby Georgetown and South Park neighborhoods afford greater opportunity for partnership, coordination, synergy and stewardship.

Constraints

Marine construction activities and barge mooring and loading requiring some shoreline hardening and piers for business operations, constrain restoration opportunities to some extent. Relatively smaller parcel sizes resulting in a variety of ownerships may make coordination more challenging. However, much of the shoreline in this section is bordered by non-water dependent and residential uses.

Opportunities Overview

- Enhance and create new habitat pockets and corridors in a community context.
- Take advantage of shallow intertidal areas to create mudflat and marsh habitats.
- Provide corridors between higher quality habitat upstream and downstream.
- Successful habitat restoration will require close coordination with state and federal clean-up managers and property owners, particularly Boeing, to ensure effective soil and sediment clean-up, complemented by restoration actions along the east shoreline.

Restoration opportunities in Section 3 exist along several shorelines adjacent to businesses, residences and public shoreline street ends. Opportunities include the creation of habitat corridors along the shorelines adjacent to the South Park neighborhood (Project 20), 8th Avenue South near Georgetown (Project 17) and the Boeing Public Access Site (Project 18), and the creation of a habitat hub at Terminal 117 (Project 23). Partnerships with adjacent businesses, including tug and barge operators, could be coordinated, to create habitat corridors in and around Port-owned ribbon parcels (Projects 14, 15, 16, 19, 21, 22 and 24). See Figure 9 and project descriptions below.

Existing Duwamish Waterway Park, illustrating continuing community effort to improve shoreline access and shoreline habitat (River Mile 3.1)

South Park Marina, illustrating over-water coverage (River Mile 3.5)

Duwamish Waterway in area of Eighth Avenue South (River Mile 2.9)

Opportunity Details

This section contains descriptions of existing conditions and potential restorative actions that could be implemented at each of the currently identified restoration opportunity sites within Section 3. Numbered projects correspond to opportunities on Port property. Unnumbered projects discuss opportunities for restoration on other properties. More detailed notes of existing conditions and potential restoration actions at each site are provided in Appendix 1.

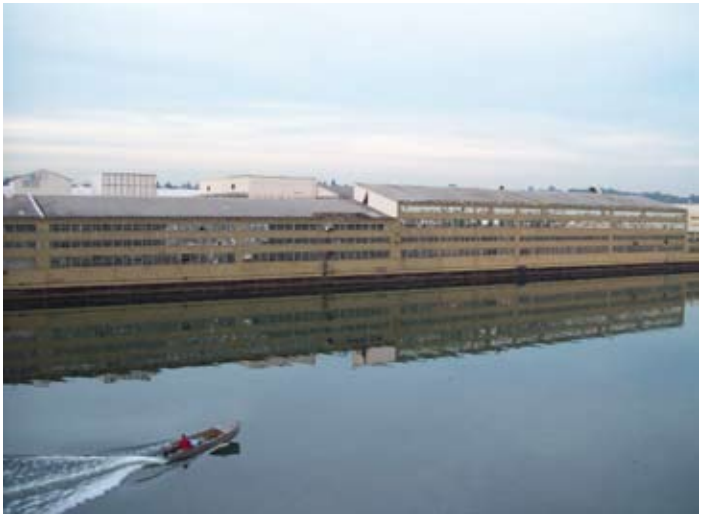
Project 14 – North Portion Existing Barge Cargo Facility, West Shoreline, River Mile 2.5 – Corridor Habitat

Currently, this site has a moderate area of unobstructed intertidal and shallow subtidal substrate. The upper and intertidal bank line consists of riprap and rubble and no substantial riparian vegetation or marsh vegetation is present. The Port-owned area includes the existing upland as well as the bank line and the aquatic area. Potential restoration actions could include excavation of the bank line and removal of rubble and derelict materials. The top-of-bank could be reshaped landward approximately 15 feet and a fine grain intertidal substrate at an elevation of plus 10 to 13 feet MLLW, could be created for use as an emergent vegetation planting area. A 2:1 sloped shoreline with riparian vegetation extending up-slope from 13 feet MLLW to top-of-bank could be constructed for a riparian planting area. Large woody debris could also be installed along the bank line at 12 to 13 feet MLLW. Approximately 200 linear feet of bank line is available for improvement at this site.

Project 15 – South Fontanelle Street/Fifth Avenue South Upstream Along Derelict Industrial Bank line, West Shoreline, River Mile 2.6 – Corridor Habitat

This site currently has a substantial area of intertidal and shallow subtidal substrate, without any permanent structures. The upper and intertidal bank line consists of rubble, concrete block bulkhead and equipment and structures. No substantial riparian or marsh vegetation is present. The Port-owned area includes the existing upland as well as the bank line and the aquatic area. Potential restoration actions could include excavation of the bank line area in Port ownership and removal of rubble and derelict materials. The top-of-bank could be re-shaped landward to match upland elevation, moving the bank line landward approximately 20 to 30 feet. A fine grain intertidal substrate at an elevation of 10 to 13 feet MLLW could be constructed for use as emergent vegetation planting area. A 2:1 slope shoreline with riparian vegetation extending up-slope from 13 feet MLLW to the top-of-bank elevation could be constructed for use as riparian planting area. Large woody debris could also be installed along the bank line at 12 to 13 feet MLLW. Approximately 450 linear feet of site bank line is available for improvement at this site.

Illustrating South Park neighborhood/street-end restoration potential (River Mile 3.3)



Illustrating industrial building edge of waterway and potential for partnership restoration action with Boeing (River Mile 3.5)

Project 16 – South Othello Street to Eighth Avenue South, East Shoreline, River Mile 2.7 – Corridor Habitat

Currently this site has a substantial intertidal and shallow subtidal substrate and no permanent structures. The aquatic area is generally clear of industrial debris and relic materials. However, the upper and intertidal bank line consists of rubble and industrial fill material. No substantial riparian vegetation or marsh vegetation is present. Potential restoration actions could include excavation of the bank line area in Port ownership and removal of rubble and industrial fill. Displacement of the top-of-bank landward five to 20 feet could also occur depending on ownership. A low bank riparian vegetation area five to 15 feet in width at an elevation of 13 feet MLLW to top-of-bank could be created and large woody debris could be placed between 13 and 14 feet MLLW. Landward, the 2:1 to 3:1 slope could receive native riparian vegetation and a top-of-slope berm to prevent surface water flow over the bank line. Approximately 700 linear feet of bank line is available for improvement at this site.

Project 17 – Southwest corner, Eighth Avenue South, East Shoreline, River Mile 2.8 – Corridor Habitat

This site currently has comparatively abrupt intertidal and shallow subtidal slopes, with a rocky/cobble substrate. No over water structures are present and no riparian or marsh vegetation is present. Potential restoration actions could include excavating and regrading of the Port-owned bank line and narrow upland strip to remove rubble and re-shape the profile. Native riparian vegetation could be planted from 13 feet to 20 feet MLLW. The top-of-bank could be moved landward approximately five to 10 feet. Riparian vegetation could provide a native shoreline feature at the northwest corner of Slip 4. Approximately 100 linear feet of bank line is available for improvement at this site.

upper photograph: Existing rubble and industrial fill shoreline edge at Eighth Avenue South

Illustrating potential habitat restoration at Project 22 site, with the potential for substantial expanded habitat in partnership with upland property owner (River Mile 3.5)

Existing Georgetown Eighth Avenue South street-end, illustrating potential partnership restoration opportunity with City of Seattle (River Mile 2.8)

Project 18 – Southwest Corner, Slip 4 and Adjacent Upstream Bank line, East Shoreline, River Mile 3.0 – Corridor Habitat

Currently this site has a uniform riprap bank line, with no over water structures. The riprap slope extends landward from a substantial exposed intertidal and shallow subtidal aquatic area. Riparian vegetation exists 10 to 15 feet landward of the top-of-bank. However, no riparian vegetation is present in the shoreline slope areas. Marsh vegetation is also not present. Potential restoration actions could include excavation of the bank line to remove portions of riprap and to regrade and reshape the Port-owned bank line profile landward approximately 40 feet. An intertidal fine grain substrate could be constructed at an elevation of plus 10 to 13 feet MLLW for use as an emergent vegetation area. Riparian vegetation could be established from an elevation of plus 13 feet to 20 feet MLLW. Large woody debris could be restored throughout at an elevation of 12 to 13 feet MLLW. Approximately 1050 linear feet of bank line is available for improvement at this site.

Project 19 – South Chicago Street to South Kenyon Street, West Shoreline, River Mile 3.0 – Corridor Habitat

This site currently has an irregular rubble bank line, with no over-water structures. The rubble slope ends at the landward margin of a substantial exposed intertidal and shallow subtidal aquatic area. No riparian or marsh vegetation is present. Potential restoration actions could include regrading the Port-owned bank line and narrow upland strip, removal of rubble and establishing the top-of-bank at approximately 10 to 15 feet landward. An intertidal fine grain substrate bench could be constructed at an elevation of plus 10 to 13 feet MLLW for use as an emergent vegetation area. Riparian vegetation could be established from an elevation of plus 13 feet to 19 feet MLLW and large woody debris could be installed at plus 12 to 13 feet MLLW. Approximately 475 linear feet of bank line is available for improvement at this site.

Project 20 – South Park Neighborhood Street ends: South Kenyon Street, South Elmgrove Street, South Southern Street and South Rose Street, West Shoreline, River Mile 3.2 – Corridor Habitat

Currently this site has an irregular rubble bank line, which changes in character among different privately owned parcels and public street-ends. No over-water structures are present. The rubble slope ends at the landward margin of a substantial exposed intertidal and shallow subtidal aquatic area. No riparian or marsh vegetation is present.

Potential restoration actions could include regrading of the Port-owned bank line and narrow upland strip and removal of rubble to establish the top-of-bank approximately 10 to 15 feet landward. The dimensions and shape of the bank line could be irregular, consistent with the existing residential structures and street end availability. An intertidal fine grain substrate bench could be constructed, variable in width, at an elevation of plus 10 to 13 feet MLLW, for use as emergent vegetation area. Riparian vegetation could be established from an elevation of plus 13 feet to 16 feet MLLW and large woody debris could be installed at plus 12 to 13 feet MLLW. Public access could be included to restored shoreline in street end areas. Approximately 850 linear feet of bank line is available for improvement at this site.

Project 21 – Industrial Structure (Plant 2) North of South Park Bridge, East Shoreline, River Mile 3.2 – Corridor Habitat

Currently the margin of this site consists of a piling supported industrial building. Intertidal conditions extend beneath the structure and over water coverage extends east of Port ownership area. However, no over water structures are present in Port-owned aquatic area. Substantial intertidal and shallow subtidal exposed sand/mud substrate is present. However, no riparian or marsh vegetation is present. Potential restoration actions could include installation of continuous large woody debris in the Port-owned aquatic area, placed between plus two and four feet MLLW. Large woody debris serves as intertidal enhancement and protects adjacent upland structure from vessel wake energy. Approximately 900 linear feet of exposed sand/mud substrate is available for improvement at this site.

Illustrating present bank line conditions at River Mile 3.5, east bank line (refer to Project 22)

Project 22 A – Industrial Bank line, South Portion of Plant 2 and South of South Park Bridge, East Shoreline, River Mile 3.5 – Corridor Habitat

The margin of this site currently consists of a piling supported industrial building. Intertidal conditions extend beneath the structure and over-water coverage extends east of Port ownership area. However, no over-water structures present, in Port-owned aquatic area. Substantial intertidal and shallow subtidal exposed sand/mud substrate is present. However, no riparian or marsh vegetation is present. Potential restoration actions could include installation of continuous large woody debris, placed between plus two and four feet MLLW. Large woody debris serves as intertidal enhancement and protects adjacent upland structure from vessel wake energy. Approximately 1,100 linear feet of exposed sand/mud substrate is available for improvement at this site.

Project 22 B – South of South Portion, Plant 2, East Shoreline, River Mile 3.5 – Corridor Habitat

Currently this site has a riprap and rubble bank line, with no over-water structures present. A narrow band of exposed intertidal substrate is present, between plus six and zero feet MLLW. No riparian or marsh vegetation present at this site or in adjacent areas of east bank line. Potential restoration actions could include regrading the Port-owned bank line and narrow upland strip and removal of riprap and rubble to establish the top-of-bank approximately 20 to 25 feet land ward. A bench could be constructed at an elevation of approximately plus 10 to 13 feet MLLW for use as an emergent vegetation area. Riparian vegetation could be established between an elevation of plus 13 feet to 18 feet MLLW. Large woody debris could also be installed at plus 12 to 13 feet MLLW as a slope protection measure. Approximately 275 linear feet of bank line is available for improvement at this site.

Project Site 18, illustrating existing vegetated top-of-bank. Note active Treaty fishing access at right margin of image

East bank line of waterway, including Eighth Avenue South street end, illustrating corridor and habitat pocket restoration potential in partnership with City of Seattle (River Mile 2.8)

Project 23 – Terminal 117, West Shoreline, River Mile 3.7 – Hub Habitat

The intertidal area at this site currently includes a moderate slope and an exposed medium grain substrate at the west margin of the Duwamish Waterway channel. The portion of the Duwamish Waterway adjacent to this site includes a substantial exposed intertidal substrate. However, the area does not include any significant marsh or riparian vegetation. Potential restoration actions could include removal of existing buildings and the wood crib bulkhead. Excavation of the existing filled upland area landward from approximately nine feet MLLW could expose approximately 2.5 acres of intertidal area. A re-graded site would include approximately 0.7 acres of unvegetated mud/sand substrate at plus nine feet to 10.5 feet MLLW and approximately 1.8 acres suitable for establishing marsh vegetation at plus 10.5 to 12 feet MLLW. This restoration site could also include approximately 0.45 acres of riparian shoreline planting, between plus 12 feet MLLW and the new top-of-bank. Approximately 750 linear feet of bank line is available for improvement at this site.

Project 24 – Industrial Bank line (Jorgensen Forge), East shoreline, River Mile 3.7 – Corridor Habitat

This site has a vertical intertidal bank line and no over-water structures. A substantial band of exposed intertidal substrate is present between plus 10 and 0.0 feet MLLW. No riparian or marsh vegetation is present at this site or in adjacent areas of the east bank line. Potential restoration actions could include regrading the Port-owned bank line and narrow upland strip and removal of vertical bulkhead and top-of-bank structures to establish the top-of-bank approximately 40 feet land ward. A bench could be constructed at an elevation of approximately plus 10 to 13 feet MLLW for use as emergent vegetation area. Riparian vegetation could be established from an elevation of plus 13 feet to 20 feet MLLW. Large woody debris could be established at plus 10 to 13 feet MLLW as a slope transition structure and for shoreline protection. Approximately 650 linear feet of bank line is available for improvement at this site.

Illustrating Terminal 117 restoration potential (River Mile 3.7)

Expanded Habitat at 8th Avenue South

The Port is supportive of collaboration with the City of Seattle and the Georgetown neighborhood in their planning for improvements at the 8th Avenue Street end / Gateway Park, which has included planning for some degree of habitat restoration.

Expanded corridor Habitat along Riverfront Revival Planning Area

The Port is supportive of collaboration with residents of the South Park neighborhood on restoration of the Port-owned ribbon parcel along the Riverfront Revival planning area. Numerous public comments focused on the potential to use existing concept plans created as a citizen-led planning effort as a guide to larger scale use of publicly-owned Port property and County right-of-way. Coordinated planning and design in this reach of Section 3 will provide substantial habitat benefits (river mile 3.7-3.8).

Coordination with Boeing property and Superfund remediation

During preparation of the present plan, numerous comments identified the potential for combining Port-owned area along the east shoreline of the waterway with future Superfund clean-up and upland property ownership are, including Boeing properties. Restoration along the east shoreline of the waterway, river mile 3.0 through 3.5, would require close coordination between state and federal agencies, natural resource trustees, the Port and adjacent property owners.

Collaboration with Stakeholders at Terminal 117

The Port will continue to work with the Duwamish River Cleanup Coalition, the South Park Neighborhood Association, and other stakeholders on the cleanup and planning for habitat restoration and public access at terminal 117.

Illustrating South Park neighborhood/street-end restoration potential, Riverfront Revival Site (River Mile 3.3)

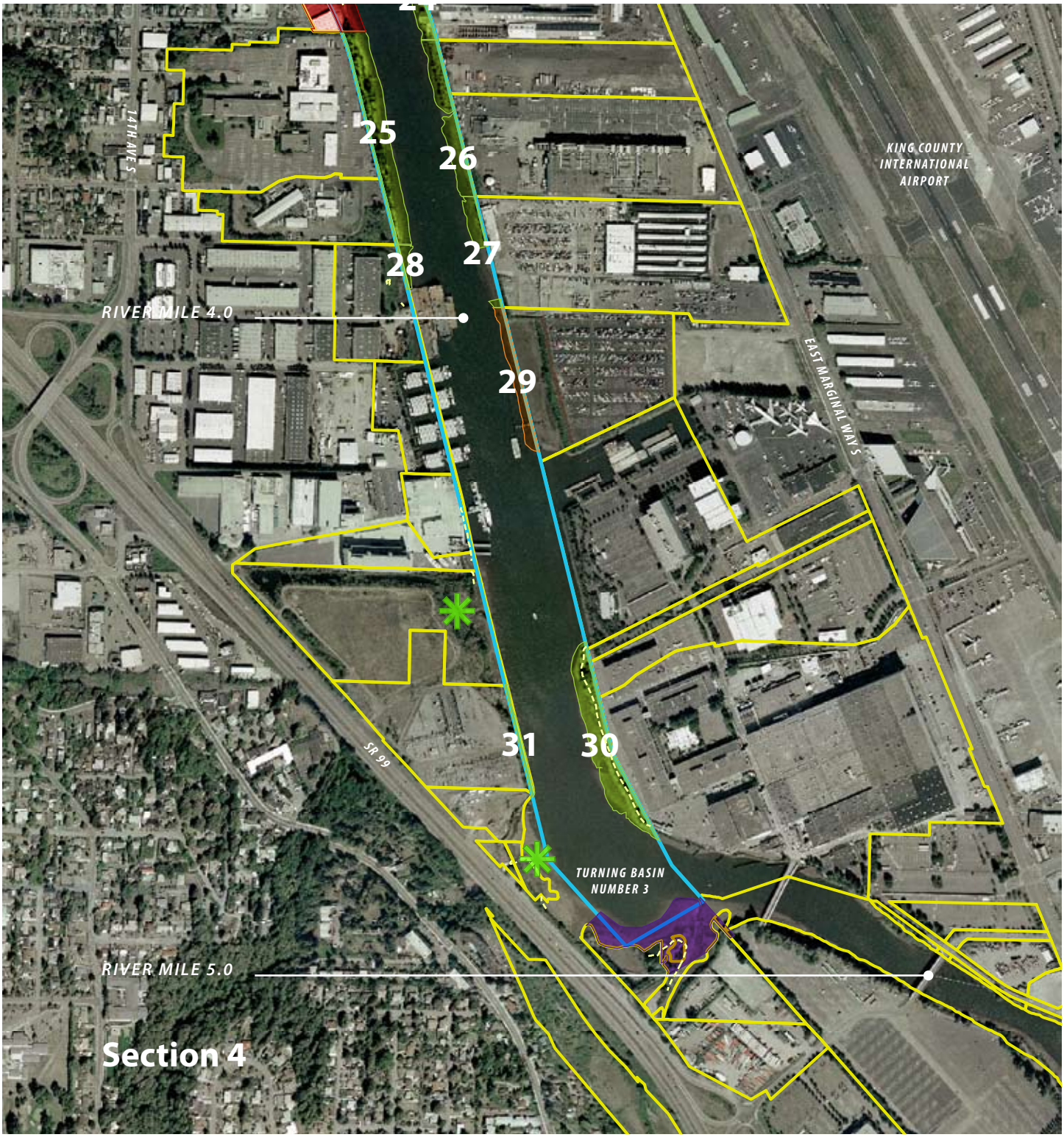


FIGURE 10. SECTION 4 RESTORATION OPPORTUNITY SITES

Section 4, South

Terminal 117 to Turning Basin Number 3

Strengths

The habitat hub at Turning Basin Number3 and sediment and freshwater inputs from upstream, along with some natural shoreline banks, upland vegetation and shallow intertidal areas, provide important habitat for fish and wildlife in Section 4. Previous restoration efforts at Turning Basing Number3 provide a strong foundation on which to do further enhancement.

Constraints

Section 4 has the fewest constraints from water-dependent businesses. Yet, some marina and shipyard activities in this section, requiring shoreline hardening and piers for business operations, constrain restoration opportunities in some areas.

Opportunities Overview

- Build on previous efforts by creating new pockets and expanding corridors on non-water dependent sites.
- Non-water dependent businesses equal significant restoration opportunities.
- Expand shallow and slow water areas to enlarge estuarine transition zone habitat.
- Provide connectivity to a major habitat hub opportunity.

Several opportunities for corridor creation exist in Section 4 within Port-owned "ribbon parcels" located adjacent to non-water dependent businesses (Projects 26-29 and 31), along with opportunities for additional hub enhancement at Turning Basin Number 3 (Project 30). See Figure 10 and project descriptions below.

Illustrating successful establishment of marsh vegetation at Turning Basin Number Three restoration site (River Mile 4.6)

Existing marine industrial use, west shoreline (River Mile 4.4)

Illustrating rubble, industrial fill shoreline, east bank, (River Mile 3.8)

Opportunity Details:

This section contains descriptions of existing conditions and potential restorative actions that could be implemented at each of the currently identified restoration opportunity sites within Section 3. Numbered projects correspond to opportunities on Port property. Unnumbered projects discuss opportunities for restoration on other properties. More detailed notes of existing conditions and potential restoration actions at each site are provided in Appendix 1.

Project 25 – Research Facility Campus, West Shoreline, River Mile 3.8 – Corridor Habitat

This site currently has a vertical, unstabilized upper bank line, with no over-water structures present. An intertidal area exists below approximately plus 12 feet MLLW without riprap or other protection. A substantial band of exposed intertidal substrate is present between plus 10 and 0.0 feet MLLW. Riparian vegetation exists at top-of-bank and some recruitment of woody debris takes place as a result of bank line erosion. No marsh vegetation is present. Potential restoration actions could include regrading the vertical portion of the Port-owned upper bank line and shifting the bank line landward approximately 15 feet. Regrading the riparian slope at 2:1 and planting with vegetation. The new lower slope could be prepared for emergent vegetation at an elevation of 10 to 13 feet MLLW. A continuous margin of large woody debris could be installed between 13 and 14 feet MLLW at the base of the newly contoured slope. Approximately 600 linear feet of bank line is available for improvement at this site.

Project 26 – Upland Industrial Facility (Boeing/Thompson), East Shoreline, River Mile 3.8 – Corridor Habitat

Currently this site has a vertical intertidal bank line, with no over-water structures present. A substantial band of exposed intertidal substrate is present between plus four and zero feet MLLW. No riparian or marsh vegetation is present at this site or in adjacent areas of the east bank line. Potential restoration actions could include placement of continuous large woody debris between plus two and four feet MLLW within the Port-owned aquatic area. Large woody debris could serve as an intertidal enhancement and could protect adjacent upland structure from vessel wake energy. Approximately 375 linear feet of exposed sand/mud substrate is available for improvement at this site.

Project 27 – Upland Industrial Facility (Merrill Creek Holdings), East Shoreline, River Mile 3.9 – Corridor Habitat

This site currently has a vertical intertidal bank line, with no over-water structures present. A substantial band of exposed intertidal substrate is present, between plus four and 0.0 feet MLLW. No riparian or marsh vegetation is present at this site or in adjacent areas of the east bank line. Potential restoration actions could include placement of continuous large woody debris between plus two and four feet MLLW within the Port-owned aquatic area. Large woody debris could serve as an intertidal enhancement and could protect adjacent upland structure from vessel wake energy. Approximately 375 linear feet of exposed sand/mud substrate is available for improvement at this site.

Project 28 – Sea King Industrial Park, West Shoreline, River Mile 4.0 – Corridor Habitat

Currently this site has a riprap and rubble bank line, with no over-water structures present. A narrow band of exposed intertidal substrate is present, between plus 10 and 0.0 feet MLLW. A small amount of marsh vegetation is present north of the site, outside of Port ownership. Potential restoration actions could include reshaping the Port-owned bank line to create a 2:1 stable slope. The bank line could receive native riparian vegetation and large woody debris could be installed at the waterward margin of the slope, between plus 10 and 13 feet MLLW, as a bank line stabilization measure. Approximately 275 linear feet of bank line is available for improvement at this site.

Project 29 – Former Industrial Site and Barge Moorage (Container Properties), East Shoreline, River Mile 4.1 – Intertidal Habitat

This site consists entirely of existing intertidal exposed sand/mud substrate at the east margin of the navigation channel. Intertidal conditions extend approximately 150 feet east in private ownership. Substantial tide flat area exists at this site. However, no riparian or marsh vegetation is present. Potential restoration actions could include placement of continuous large woody debris within Port-owned aquatic area between plus two and four feet MLLW. Large woody debris could serve as intertidal enhancement and could provide slack water and off-channel habitat. Approximately 800 linear feet of exposed sand/mud substrate is available for improvement at this site.

Project 30 – Boeing Facility Campus and Industrial Park, East Shoreline, River Mile 4.6 – Corridor Habitat

Currently this site has a riprap bank line, with no over-water structures present. A substantial band of exposed intertidal substrate is present, between plus 10 and zero feet MLLW. No marsh vegetation and limited riparian features are present. Potential restoration actions could include excavation of 650 linear feet in two locations to create a 2:1 slope between 10 feet and 22 feet MLLW, moving the top-of-bank up to 15 feet landward, consistent with property ownership. An approximately 10-foot wide and 650-foot long emergent planting bench could be created at an elevation of plus 10 to 13 feet MLLW. The area up-slope of the emergent planting area, spanning an additional 400 linear feet of shoreline, could receive riparian vegetation. Approximately 1,050 linear feet of bank line is available for improvement at this site.

Project 31 – Seattle City Light Substation, West Shoreline, River Mile 4.6 – Corridor Habitat

This site currently has a riprap bank line, with no over-water structures present. Little exposed intertidal substrate is present between plus 10 and zero feet MLLW. No marsh vegetation and limited riparian features are present. Potential restoration actions could include reshaping of the lower intertidal riprap slope to include a fine grain substrate bench at an elevation of plus 10 to 13 feet MLLW, which is five to 10 feet in width and suitable for placing emergent vegetation. The area below plus 10 MLLW could remain as a riprap slope. The area in Port control above plus 13 feet MLLW could receive riparian vegetation. Approximately 625 linear feet of bank line is available for improvement.

Collaboration opportunities, west Turning Basin Number Three

Restoration occurring within the Port ribbon parcel could be complementary to any potential restoration efforts on the adjacent City Light parcel through collaborative efforts.

Dredging at Turning Basin Number Three

The Port believes that it is important that the area of Turning Basin Number Three continue to function as a sediment collection basin, aiding maintenance of downstream navigation uses. Coordination of maintenance dredging needs and potential fish and wildlife habitat improvements requires participation by local, state, federal and natural resource trustee representatives.

Illustrating shoreline and aquatic area restoration potential at west bank line, Turning Basin Number Three, (River Mile 4.6)

Existing creosote timber bulkhead, east bank line (River Mile 3.8)

Illustrating potential marsh and riparian restoration site at east turning basin bank line (River Mile 4.6)

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5

Implementation Discussion

The Lower Duwamish Habitat Restoration Plan identifies and describes potential habitat restoration opportunities that exist at a vetted inventory of sites. The Plan also contains policy guidance and examples of applicable restoration typologies. This chapter contains some discussion of how implementation of the projects might move forward including linkages to progress on related Duwamish River cleanup projects.

Implementation Scenarios

While the product of this report is primarily an inventory of Port-owned sites available for habitat projects, there are some plausible implementation concepts apparent at this time. First, new waterfront construction projects usually require habitat enhancement and/or restoration as part of the permit approval process. This is commonly known as project mitigation. Second, as discussed in Chapter 1 at some future time, the Natural Resource Trustees are likely to follow up on the Draft Restoration Plan and Programmatic Environmental Impact Statement by pursuing settlements with liable parties involving new habitat construction.

The Restoration Plan and Programmatic Environmental Impact Statement will provide direction on habitat emphasis and construction priorities. The approach of this plan has been to inventory all Port-owned sites where restoration is thought to be currently feasible and would not unreasonably interfere with other river users, most importantly water-dependent businesses. The Port would need to determine programmatic and/or case specific requirements and compensation in a scenario of other parties using Port land for their habitat projects. The terms of such transactions are at this time unknown and are beyond the scope of this plan.

Coordination with Other Governments and Property Owners

Several opportunities for collaboration on restoration projects exist along the Waterway, both with public and private entities. Most notable are opportunities for collaboration with owners of properties adjacent to the Port's "ribbon parcels." In many cases the landward side of a ribbon property corresponds to the high water mark, resulting in the Port being able to restore intertidal habitats, whereas the adjacent property owners would have greater ability to restore the corresponding riparian habitats.

The potential conceptual projects and opportunities described in this Plan are limited to those projects which could be undertaken on Port owned properties that are currently thought to be available for restoration. Furthermore, the emphasis of this Plan is on those upland, intertidal and shallow subtidal portions of the Commercial Waterway N. 1 parcel, with intertidal areas being the most critical. Coordination efforts to date have thus focused on those stakeholders who would be most impacted by future restoration projects in the identified project opportunity areas, with the greatest emphasis on water dependent businesses immediately adjacent to the properties in question.

As part of the public involvement effort for this Plan, the Port conducted outreach to community groups, public agencies, citizens, property owners, businesses and other stakeholders in the project area. A series of public open houses and workshops were held to coordinate with stakeholders. In addition, the Port targeted water dependent businesses in a series of meetings. Follow-up contact included a project mailer that described and mapped specific potential habitat restoration sites. Revisions to potential opportunity sites were made based on the input received. The Port will continue to coordinate with adjacent businesses during future habitat design and implementation efforts. These efforts will include seeking specific feedback as proposed designs are developed and providing updates to adjacent property owners and the public on the progress of implementation.

Monitoring and Tracking Recommendations

The Port currently conducts monitoring at existing restoration sites. As restoration efforts are expanded within the Lower Duwamish River the Port is supportive of the notion of adaptive management as developed by the WRIA 9 Plan. This will allow the Port to respond to improve scientific understanding of the Duwamish estuary as well as "lessons learned" from current and future habitat restoration projects in this and other Puget Sound estuaries. By sharing the restoration challenges and successes of this initiative, the broader public can learn from the Port's efforts and this data can be used to coordinate and improve future habitat restoration and enhancement efforts. In a case where the Port is not implementing habitat projects on Port land it will consider the use of mechanisms that ensure that the implementing entity adheres to the adaptive management doctrine.

Recommendations & Next Steps

The Port will continue to provide input on the Lower Duwamish River Draft Restoration Plan and Programmatic Environmental Impact Statement, including input on project prioritization criteria. The Port will continue to address historic contamination at Terminal 117, which has been identified as an Early Action Area. Two upland removal actions have already occurred on the site. A separate study is being performed to identify a final removal action for the sediment, bank upland and adjacent streets.

On a parallel track, the Port will continue to participate in the Lower Duwamish Waterway Group (LDWG) on the Lower Duwamish River Remedial Investigation / Feasibility Study. This project is a study of the extent of contaminants in the river and the risks to humans and the environment. The LDWG includes the City of Seattle, King County, the Port of Seattle and the Boeing Company, with oversight from the U.S. Environmental Protection Agency and Washington

Volunteer efforts will be an important component of project implementation

State Department of Ecology. Habitat restoration planning for one of the Lower Duwamish Waterway early action sites (T117) is ongoing and will include extensive community outreach. In addition to these core efforts, the Port will continue to participate as a stakeholder, property owner and affected agency in City of Seattle's Shoreline Master Program update, as well as Duwamish Valley Visioning Project, a grassroots community planning effort led by the Duwamish River Cleanup Coalition.

The Port of Seattle's efforts for habitat restoration planning extend outside of the Duwamish waterway. The Seaport Shoreline Plan was adopted by the Port Commission in December 2007. It includes the designation of three future habitat restoration sites in the Harbor Island area. These are as follows: the shoreline area at the southern end of Terminal 25, the tip of Slip 27, and the shoreline adjacent to the mooring dolphins at Pier 34.

The overall Duwamish River cleanup and restoration effort has the potential to transform the Lower Duwamish River. The Port believes that proactive planning is necessary to prepare for the changes to come. The Port hopes that The Lower Duwamish River Habitat Restoration Plan will provide initial leadership and guidance for future implementation efforts. Specifically, this plan will create a long-range framework for investments on Port property that lie along the shoreline of the river. The intent of this plan will be to provide for the coexistence of natural habitat and the commerce that relies on the waterway for navigation, in a way that emphasizes community values and stakeholder coordination. This Plan is a necessary early step in the habitat restoration process for Port owned shoreline sites in the Lower Duwamish River and additional coordination, prioritization, design and other implementation efforts will be needed to realize the opportunities identified.

FIGURE 11. POTENTIAL HABITAT PROJECTS IN HARBOR ISLAND AREA

Chinook Salmon (Image: http://www.flickr.com/photos/nylffn/1333167157)

Blue Heron on Duwamish River

Osprey nest box, in place at Terminal 18, East Waterway
Note: Five active Osprey nests are present in Duwamish Waterway

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Appendix 1

Duwamish Restoration Notes

Site Number One: Terminal 105, west bank line, River Mile 0.1

Habitat Restoration Opportunity: pocket habitat

Planning Area: One

Ownership: POS upland and aquatic area

Existing Conditions:

- ***Bank line slope and configuration:*** Bank line is un-stabilized, eroding margin of previous un-armored fill area, upper south bank line includes remains of former small boat shipway, slope approximately 8:1. Top-of-bank approximately 14 to 15 feet MLLW.
- ***Existing bank line vegetation:*** Small number deciduous trees at north portion of site, nearly continuous Scott's broom and other non-native shrubs and low vegetation throughout site, with small amount non-native beach grass.
- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal slope approximately 8:1, sand/mud substrate. Ledges of pre-development organic marsh are exposed in limited areas of in inter-tidal shoreline. No marsh vegetation and little algal growth.
- ***Existing shallow sub-tidal conditions:*** Adjacent sub-tidal area includes un obstructed west margin of Duwamish navigation channel, slope approximately 8:1 to 5:1. No substantial algal growth.
- ***Existing structures***: Existing upland undeveloped, with light industrial fabrication and warehouse uses adjacent to west, including paved/drained heavy truck/vehicle use area, site storm water outfall at south margin of site. Note: substantial relic creosote piling and rubble, including sandblast grit and slag, remaining from former small boat yard and shipway.

Habitat Statement: Area has existing, unobstructed low slope, fine-grained inter-tidal and shallow sub-tidal aquatic area. Emergent and riparian vegetation are absent.

Potential Restoration Actions: Establish emergent vegetation, improve riparian vegetation: Approximately 350 linear feet bank line restoration. Excavate top-of-bank to reduce bank line elevation to approximately ten to 12 feet above MLLW, extending inter-tidal area approximately 50 to 80 feet west, constructing berm at west margin of site. Removal derelict structures, rubble, and metal slag materials from existing inter-tidal area. Plant re-shaped and graded area with emergent vegetation planting site, plant 15 feet wide riparian buffer/berm at west margin. Note: Cottonwood growth at north end of site to remain as buffer between site and off-channel inter-tidal habitat site adjacent to north.

Site Number Two: Terminal 106, east bank line, River Mile 0.1-0.4

Habitat Restoration Opportunity: corridor habitat

Planning Area: One

Ownership: POS upland and aquatic area

Existing Conditions:

- ***Bank line slope and configuration:*** Bank line is structurally stabilized, including 1.75:1 heavy riprap slope. Top-of-bank approximately 18 feet MLLW.
- ***Existing bank line vegetation:*** Slope is largely vacant of vegetation, with only small number low growing invasive plants present.
- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal slope approximately 1.75:1, similar to upper-bank line, with constructed riprap slope extending from inter-tidal elevations to sub-tidal area of Turning Basin Number One, approximately 20-25 feet below MLLW. No marsh vegetation and little algal growth.

- ***Existing shallow sub-tidal conditions:*** Adjacent sub-tidal area includes east margin of Duwamish navigation channel and Turning Basin Number One, slope approximately 5:1. Sub-tidal conditions include heavy riprap slope and minus 20-25 feet MLLW sand/mud substrate in adjacent turning basin. No substantial algal growth.

- ***Existing structures:*** Active marine-related uses and activities in upland area. No existing or former dock, in-water structures present. Upland area used for marine cargo container servicing/maintenance/marshalling, including paved yard area, with heavy truck and equipment use. Site storm water discharges present.

Habitat Statement: Area has no existing fine-grained, low slope inter-tidal area and riparian vegetation absent.

Potential Restoration Actions: Approximately 1350 linear feet bank-line alteration. Reshape and reduce bank line to create 40 feet wide inter-tidal, fine-grain substrate bench along length of site, elevation approximately 0.0 to plus two feet MLLW. Bank line above plus two feet MLLW sloped at 1:1 between plus two and plus 12 feet MLLW, ensuring erosion resistant upper inter-tidal shoreline. Bank line between plus 12 and 18 feet MLLW re-shaped with variable slope, approximately 2:1 and 3:1, to receive native riparian plantings, installed as bank line vegetation pockets and planting wells. Establish native riparian at new top-of-bank profile.

Site Number Three: Terminal 108, east bank line, River Mile 0.5

Habitat Restoration Opportunity: pocket habitat

Planning Area: One

Ownership: POS upland and aquatic area

Existing Conditions:

- ***Bank line slope and configuration:*** Bank line is variable with structurally stabilized 2:1 slope above approximately 10 to 11 feet MLLW and lower inter-tidal slope between 3:1 and 5:1. Top-of-bank between 18 and 22 feet MLLW.

- ***Existing bank line vegetation:*** Approximately 350 linear existing top-of-bank includes combination of native and invasive trees and shrubs. Note: Area has not been managed or planted, all vegetation present as in-fill from adjacent locations. Center 300 feet of bank-line is absent of riparian vegetation, while south 100 feet has received past riparian plantings.

- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal slope approximately 2:1 riprap, extending from approximately 10 to 11 feet MLLW to plus 16 to 18 feet MLLW. Lower inter-tidal slope, below approximately 10 to 11 feet MLLW, approximately 3:1 to 5:1, includes imported fill and localized areas of exposed native substrate. No marsh vegetation present and little algal growth.

- ***Existing shallow sub-tidal conditions:*** Adjacent sub-tidal area slopes to east margin of Duwamish navigation channel. No substantial algal growth.

- ***Existing structures:*** Active marine-related uses and activities in upland area. South portion of adjacent upland includes pavement and storm drainage system, while north portion is unpaved. Existing skeleton pier present, approximately 350 linear feet, with associated moorage dolphins. Moorage in-active at present. Moorage includes only minimal over-water obstruction/coverage.

Habitat Statement: Area has moderate, un-obstructed inter-tidal substrate. No emergent vegetation present, however, and riparian vegetation can be expanded. Erosion is active in this bank line area.

Potential Restoration Actions: Approximately 750 linear feet linear feet bank-line alteration. Reshape and reduce bank line to create 20 feet wide inter-tidal, marsh planting bench along length of site, elevation approximately 10 to 12 feet MLLW. Incorporate large woody debris in emergent planting areas. Bank line upslope of marsh planting bench sloped between 3:1 and 4:1 to receive native riparian vegetation. Top-of-bank receives ten feet wide native riparian vegetation buffer.

Site Number Four: Terminal 107, Kellogg Island, west bank line, River Mile 1.0

Habitat Restoration Opportunity: Hub habitat site

Planning Area: One

Ownership: POS upland and aquatic area.

Existing Conditions:

- ***Bank line slope and configuration:*** Bank line consists of disintegrating, forty year-old berm installed as perimeter enclosure at Kellogg Island. Berm placed as containment structure for receiving

dredged sediments from Duwamish Waterway. Bank line berm has slumped and breached in numerous locations, allowing for tidal flooding, elevations above plus 11 feet MLLW. Remaining berm is abrupt 1:1 to vertical slope, with invasive vegetation. No riprap present.

- ***Existing inter-tidal substrate and vegetation:*** Kellogg Island includes approximately 1.2 acres, with approximately 4.3 acres between 11 to 13 feet MLLW and approximately 7.9 acres between 13 and 30-45 feet above MLLW. Area 11 to 13 feet above MLLW includes native and invasive marsh vegetation and riparian vegetation. Area above approximately 13 feet MLLW includes native and invasive upland vegetation. Area water-ward of existing berm includes native inter-tidal mud/sand substrate, with slope conditions approximately 10:1 throughout.

- ***Existing shallow sub-tidal conditions:*** Shallow sub-tidal area consists of exposed mud-sand substrate throughout, with east portions of site sloping at approximately 5:1 to 3:1 to adjacent Duwamish Waterway channel.

- ***Existing structures:*** No over-water or upland structures present. Site has been used in past decades to receive dredged sediments from the Duwamish Waterway. Note: Existing approximately 12.2 acre site was formerly inter-tidal marsh area. Entire site has been bermed and filled, with up to two feet over-burden of dredged material covering north 35 percent of site and 10 to 30 feet dredged sediments present in south 70 percent of site. Dredged material has compressed native sediments. In addition, dredged materials previously placed at the site include contaminated sediments.

Habitat Statement: Adjacent portion of Duwamish Waterway includes substantial existing exposed inter-tidal and shallow sub-tidal mud/sand substrate. Marsh vegetation was formerly abundant and is present in small pockets at present.

Potential Restoration Actions: Restore inter-tidal conditions in 11.5 to 12 acres at site. Remove previously placed dredged materials, re-exposing sediments to tidal influence, between 10.5 and 13 feet MLLW. Install emergent vegetation throughout. Restoration could leave portions of existing berm at east margin of site in place to protect restored marsh areas from vessel-wake erosion. Large woody debris could be placed throughout perimeter of site as additional substrate stabilization measure.

Inter-tidal restoration at Kellogg Island could be guided by data describing site elevations and conditions prior to use as a dredged material disposal site. Removal of dredged sediments from site may require excavation below 10.5 feet MLLW in some locations, due to compression of underlying native sediments. Emergent and riparian plantings at site could make greatest possible use of re-exposed native sediments, however, placement of additional fine-grained sediments at site may be required to obtain appropriate elevations following removal of stock-piled dredged materials.

Site Number Five: Northwestern Glass Company, east bank line, River Mile 1.3

Habitat Restoration Opportunity: corridor habitat

Planning Area: One

Ownership: POS aquatic and bank line area, with top-of-bank and upland in private ownership

Existing Conditions:

- ***Bank line slope and configuration:*** Bank line is uniform low riprap and rubble slope, variable in section 1:1 to 3:1. Top-of-bank approximately 16.5 to 17 feet MLLW.

- ***Existing bank line vegetation:*** No substantial riparian vegetation present. Top-of-bank includes non-native shrubs.

- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal slope approximately 1:1 to 3:1 riprap and rubble, extending from top-of-bank to approximately six to eight feet MLLW. Narrow band exposed native sand/mud sediment between toe of riprap slope and at east margin of Duwamish navigation channel, with approximately 40 to 50 feet exposed mid and low inter-tidal substrate present, slope approximately 5:1 to 10:1. No marsh vegetation present and little algal growth.

- ***Existing shallow sub-tidal conditions:*** Moderate approximate 5:1 adjacent sub-tidal area to east margin of Duwamish navigation channel. No substantial algal growth.

- ***Existing structures:*** No active marine-related uses and activities in upland area. Upland area includes industrial warehouse, truck access, and parking.

Habitat Statement: Area has substantial, un-obstructed inter-tidal substrate. No emergent or riparian vegetation present. Site is narrow, with limited port-owned bank line available for improvement.

Potential Restoration Actions: Remove rubble, debris, and derelict creosote piling from port-owned aquatic and bank line area. Establish approximately 250 to 275 linear feet large-woody debris conditions in inter-tidal area plus 10 to 12 feet MLLLW. Install riparian vegetation planting pockets and ledges in port-owned bank-line area above plus 12 feet MLLW.

Site Number Six: British Plaster Board, east bank line, River Mile 1.6

Habitat Restoration Opportunity: corridor habitat

Planning Area: Two

Ownership: POS aquatic and bank line area, with top-of-bank and upland in private ownership

Existing Conditions:

- ***Bank line slope and configuration:*** Top-of-bank approximately 16 to 18 feet MLLW. Industrial upland development immediately land-ward of bank line. Entire shoreline consists of heavy riprap and rubble slope, generally 1.75:1 and 2:1 slope. Riprap has slumped in areas, creating irregular bank profile.

- ***Existing bank line vegetation:*** Riparian vegetation present as thicket and shrubs, with no trees.

- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal slope approximately 1.75:1 to 2:1 riprap and rubble, extending from top-of-bank to approximately four feet MLLW. Note: narrow band of marsh vegetation present in north portion of site, in exposed native sediment layer, in horizontal terrace in exposed riprap slope. Little algal growth.

- ***Existing shallow sub-tidal conditions:*** Adjacent sub-tidal area slopes to east margin of Duwamish navigation channel. Narrow shoulder exposed native sand/mud sediment between toe of riprap slope and east margin of Duwamish navigation channel, with approximately 20 feet wide exposed mid and low inter-tidal substrate present, slope approximately 5:1 to 10:1. No substantial algal growth.

- ***Existing structures:*** Active marine bulk cargo transshipment at south margin of site, including skeleton dock and deep draft moorage. Upland area used for heavy vehicle access serving adjacent manufacturing/warehouse uses.

Habitat Statement: Area includes un-obstructed inter-tidal substrate. Limited riparian vegetation present, with small amount of marsh vegetation in exposed native substrate. Site is narrow, with limited port-owned bank line available for improvement.

Potential Restoration Actions: Remove rubble and debris from port-owned aquatic and bank line area. Excavate and re-shape approximately 175 linear feet of existing bank line, creating inter-tidal bench plus 10 to 12 feet MLLLW. Install marsh vegetation and large woody debris (expanding existing bulrush area in this location). Install riparian vegetation as planting pockets and ledges in remaining portions of port-owned bank-line area above plus 12 feet MLLW.

Site Number Seven: Southwest corner Slip Two, east bank line, River Mile 1.9

Habitat Restoration Opportunity: corridor habitat

Planning Area: Two

Ownership: POS bank line area, with adjacent upland area in private and public ownership

Existing Conditions:

- ***Bank line slope and configuration:*** Top-of-bank approximately 16 to 19 feet MLLW. Industrial upland development area extends to top-of-bank throughout site. Bank line consists of continuous riprap and rubble, with variable slope and irregular condition, approximately 2:1 to 3:1 slope.

- ***Existing bank line vegetation:*** No riparian vegetation present. Site bank line includes invasive plants.

- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal slope approximately 2:1 to 3:1 riprap, extending from top-of-bank to approximately 10.0 feet MLLW. No marsh or algal growth present. Mid and lower inter-tidal area consists of exposed crushed rock/aggregate substrate, resulting from release of bulk construction materials during barge/upland transfer operations. Area between 10 feet and 0.0 MLLW approximately 10:1 slope. No dock or over-

water structures present.

- ***Existing shallow sub-tidal conditions:*** Adjacent shallow sub-tidal area includes sloping crushed rock/aggregate substrate, with some sand/mud to east margin of Duwamish navigation channel.

- ***Existing structures:*** Adjacent sites to north and south includes marine industrial shoreline and upland uses and activities. Over-water creosote piling supported dock structures, active and derelict, with timber crib bulkheads. South portion of adjacent site includes recreational boat moorage. Upland portion of site includes barge cargo transshipment and marshalling, with heavy vehicle use.

Habitat Statement: Area includes small area of un-obstructed inter-tidal substrate. No riparian or marsh vegetation present. Site includes moderate inter-tidal and shallow sub-tidal fine-grained, low slope substrate.

Potential Restoration Actions: Excavate and re-grade approximately 125 linear feet existing riprap/rubble bank line. Construct approximately 20 feet wide, fine-grain inter-tidal substrate bench, elevation approximately ten to 12 feet above MLLW, suitable for placement of emergent vegetation and large woody debris. Remaining portions of port-owned bank line land-ward of plus 12 feet MLLW, shaped at approximately 3:1 slope and planted with riparian vegetation.

Site Number Eight: Southwest Terminal 115, west bank line, River Mile 2.0

Habitat Restoration Opportunity: Hub habitat site

Planning Area: Two

Ownership: POS bank line area, including adjacent port-owned and City of Seattle right-of-way in upland area

Existing Conditions:

- ***Bank line slope and configuration:*** Site is downstream of First Avenue South Bridge, adjacent to south margin of Terminal 115. Top-of-bank 15 to 18 feet MLLW, with riprap, rubble, and creosote bulkhead structures present. Bank line slope variable, 3:1 to nearly vertical. Toe of slope emerges at narrow margin mud/sand substrate, approximately five feet MLLW.

- ***Existing bank line vegetation:*** No functional riparian or marsh vegetation present along existing 320 linear feet, port-owned bank line.

- ***Existing inter-tidal substrate and vegetation:*** Upper inter-tidal bank line consists of rubble and riprap, with abrupt constructed slopes. Inter-tidal area below approximately five feet MLLW includes mud/sand substrate in limited areas, adjoining adjacent west slope of Duwamish Waterway channel (slopes approximately 3:1).

- ***Existing shallow sub-tidal conditions:*** Shallow sub-tidal area represents west side-slope of Duwamish Waterway channel. Side slope is approximately 3:1.

- ***Existing structures:*** Existing derelict creosote dock structure present, approximately 3000 square feet, with adjacent moorage floats. Shore land and adjacent upland area includes paved equipment storage and approximately 5300 combined square feet existing wood-frame buildings.

Habitat Statement: Adjacent portion of Duwamish Waterway includes minimal exposed inter-tidal substrate, with no riparian or marsh vegetation present. This reach of waterway occupied by numerous in-water and over-water structures, including First Avenue South bridge crossings. Note: Fish and wildlife habitat restoration channel is present at south landfall of First Avenue South Bridge (WDOT constructed site, including connection to emergent vegetation area.

Potential Restoration Actions: Remove existing in-water and over-water structures, re-exposing approximately 320 linear feet inter-tidal and shallow sub-tidal aquatic area. Excavate landward from existing plus ten feet MLLW elevation to create inter-tidal substrate suitable for emergent vegetation (elevation plus ten feet to 12 feet MLLW). Side margins of excavation area includes 3:1 slope, beginning at 12 feet MLLW, allowing for new top-of-bank in interior of excavated restoration area to match surrounding upland elevations between 20-24 feet MLLW. Side slopes planted with native riparian vegetation band, 18 to 36 feet in width. Toe of riparian slope and side slopes of excavated inter-tidal area stabilized with large woody debris.

Note: Inter-tidal and riparian habitat restoration area includes up to 3.2 acres, with the potential to expand restoration site to approximately 4.5 acres if adjacent public right-of-way is included. In addition, restoration at this site may include inter-tidal channel connection to interior of existing WDOT aquatic habitat restoration area. Installation of 300 to 400 feet long inter-tidal channel connection proposed restoration site with existing WDOT side could

benefit both areas.

Site Number Nine: North First Avenue South Bridge, east shoreline, River Mile 2.0

Habitat Restoration Opportunity: Corridor habitat

Planning Area: Two

Ownership: POS bank line area

Existing Conditions:

- ***Bank line slope and configuration:*** Top-of-bank approximately 20 to 22 feet MLLW. Industrial upland development area extends to top-of-bank north of site. Bank line consists of continuous riprap and rubble, with variable slope and irregular condition, approximately 2:1 slope. Note site extends under north end of parallel First Avenue South bridges. Shoreline also includes large city CSO and water supply pipe line crossing of Duwamish Waterway.

- ***Existing bank line vegetation:*** No riparian vegetation present. Site bank line includes invasive plants.

- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal slope approximately 2:1 to 3:1 riprap, extending from top-of-bank to approximately 10.0 feet MLLW. No marsh or algal growth present. Mid and lower inter-tidal area, from approximately plus 10 feet to 0.0 (MLLW) consists of exposed rubble, debris, and moderate area of fine-grained substrate, approximately 5:1 slope.

- ***Existing shallow sub-tidal conditions:*** Adjacent shallow sub-tidal area includes approximate 5:1 to 10:1 slope sand/mud substrate, extending from 0.0 to minus 10 to 15 feet MLLW.

- ***Existing structures:*** Adjacent site to north includes marine industrial shoreline and upland uses and activities. North half of site includes covered recreational boat moorages, with connecting floating walkways. Moorage structures approximately 60 feet water-ward of 0.0 contour. South portion of site includes storm water and water supply pipeline infrastructure, with above-grade First Avenue South bridge structures.

Habitat Statement: Site includes small area of un-obstructed inter-tidal and shallow sub-tidal substrate. Upper and inter-tidal bank-line contains fine-grained, low-slope substrate. No riparian or marsh vegetation present.

Potential Restoration Actions: Excavate and re-grade approximately 225 linear feet existing riprap/rubble bank line. Construct approximately 15 feet wide, fine-grain inter-tidal substrate bench, elevation approximately 0.0 to two feet above MLLW, suitable for placement of fine-grain inter-tidal substrate. Remaining portions of port-owned bank line land-ward of plus two feet MLLW, shaped at approximately 3:1 slope. Portions of slope above 12 feet MLLW planted with riparian vegetation.

Site Number Ten: North First Avenue South Bridge, west shoreline, River Mile 2.1

Habitat Restoration Opportunity: Corridor habitat

Planning Area: Two

Ownership: POS bank line area

Existing Conditions:

- ***Bank line slope and configuration:*** Top-of-bank approximately 17 to 19 feet MLLW. Industrial upland development area extends to top-of-bank throughout site. Bank line consists of continuous riprap, rubble, and wood crib bulkhead structures, with variable slope and irregular condition, approximately 1:1 to 2:1 slope, extending from top-of-bank to approximately 0.0 to minus two feet MLLW. Note: north portion of site adjacent to recent aquatic area restoration completed by Washington Department of Transportation, 1998, during construction of second First Avenue Bridge crossing.

- ***Existing bank line vegetation:*** No riparian vegetation present. Bank line is unstable and eroding at toe. Site bank line includes invasive plants.

- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal slope approximately 1:1 to 2:1 riprap, extending from top-of-bank to approximately 0.0 to minus two feet MLLW. No marsh or algal growth present. Mid and lower inter-tidal area, from approximately 0.0 (MLLW) consists of exposed mud/sand substrate with moderate amount debris and derelict creosote piling stubs. Inter-tidal slope approximately 4:1 to 5:1.

- ***Existing shallow sub-tidal conditions:*** Adjacent shallow sub-tidal area includes approximate 5:1

to 10:1 slope sand/mud substrate, extending from minus 10 to west margin of Duwamish navigation channel.

- ***Existing structures:*** Adjacent site to south includes upland area used for barge cargo transshipment and equipment storage. Concrete piling supported barge dock (approximately 100 feet by 60) and steel moorage dolphins at site.

Habitat Statement: Area includes moderate area of un-obstructed inter-tidal and shallow sub-tidal substrate. Upper and inter-tidal bank-line consist of riprap and rubble, with unstable, eroding inter-tidal slope. No riparian or marsh vegetation present.

Potential Restoration Actions: Approximately 175 linear feet of site improvement area available. Excavate and re-grade approximately 75 linear feet existing riprap/rubble bank line to form 3:1 slope bank line suitable for placement of native riparian vegetation. Include top-of-bank berm to eliminate surface water flow over top-of-bank. Install large woody debris, elevation approximately eight to 12 MLLW as toe-of-slope stabilization measure. Large woody debris extends approximately 100 feet north along port-owned waterway boundary, across high inter-tidal portions of previously constructed WDOT restoration site.

Site Number Eleven: South First Avenue South Bridge, west shoreline, River Mile 2.2

Habitat Restoration Opportunity: Corridor habitat

Planning Area: Two

Ownership: POS bank line area

Existing Conditions:

- ***Bank line slope and configuration:*** Top-of-bank approximately 20 to 21 feet MLLW. Industrial upland development area extends to top-of-bank throughout site. Bank line consists of continuous riprap, rubble, and wood crib bulkhead structures, with variable slope and irregular condition, approximately 1:1 to 2:1 slope, extending from top-of-bank to approximately 0.0 to minus two feet MLLW. Bank line is stable.

- ***Existing bank line vegetation:*** No riparian vegetation present, however, several trees occupy inactive areas at top-of-bank (no substantial woody vegetation).

- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal slope approximately 1:1 to 2:1 riprap, extending from top-of-bank to approximately 0.0 to minus two feet MLLW. No marsh or algal growth present. Mid and lower inter-tidal area, from approximately 0.0 (MLLW) to minus ten feet MLLW consists of 30 to 40 feet wide exposed mud/sand substrate, moderate slope, approximately 4:1 to 5:1. Some industrial debris and derelict creosote piling present.

- ***Existing shallow sub-tidal conditions:*** Adjacent shallow sub-tidal area, extending from minus 10 feet MLLW to west margin of Duwamish navigation channel, is used as barge moorage.

- ***Existing structures:*** Adjacent site to north includes upland area used for barge cargo transshipment and equipment storage. Concrete piling supported barge dock (approximately 100 feet by 60). Steel moorage dolphins present in sub-tidal area adjacent to site shoreline.

Habitat Statement: Site includes moderate area of un-obstructed inter-tidal and shallow sub-tidal substrate. Upper and inter-tidal bank-line consists of riprap and debris. No substantial riparian vegetation present. No marsh vegetation present.

Potential Restoration Actions: Approximately 400 linear feet of site bank line proposed for improvement. Port-owned bank line area could be re-shaped and reduced to create 10-12 feet wide, 400 feet long, inter-tidal, fine-grain substrate along length of site, elevation approximately plus ten to 12 feet MLLW, parallel and landward of existing barge moorage dolphins. Upper inter-tidal bench could be planted with emergent vegetation. Slope landward of marsh planting area could receive large woody debris and riparian vegetation arranged in slope pockets.

Site Number Twelve: Cold storage warehouse/ industrial upland site, east shoreline, River Mile 2.3

Habitat Restoration Opportunity: Corridor habitat

Planning Area: Three

Ownership: POS bank line area

Existing Conditions:

- ***Bank line slope and configuration:*** Top-of-bank approximately 18 to 19 feet MLLW. Privately held industrial upland development area extends to

top-of-bank throughout site. Bank line consists of continuous riprap and rubble, with pavement to top-of-bank at north one-half of site. South half of site is unpaved. Bank line is stable.

- ***Existing bank line vegetation:*** Minimal riparian vegetation present, however, with limited amount of top-of-bank vegetation present as planted landscaping at north half of site. Several trees occupy top-of-bank at south half of site.

- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal slope approximately 1:1 to 2:1 riprap, extending from top-of-bank to approximately eight feet MLLW. No marsh or algal growth present. Mid and lower inter-tidal area, from approximately eight feet (MLLW) to minus ten feet MLLW consists of 30 to 40 feet wide exposed mud/sand substrate, moderate slope, approximately 4:1 to 6:1. Some industrial debris and derelict creosote piling present. Note: heavy mooring dolphins present in sub-tidal area.

- ***Existing shallow sub-tidal conditions:*** Adjacent shallow sub-tidal area, extending from minus 10 feet MLLW to east margin of Duwamish navigation, channel is used as barge moorage.

- ***Existing structures:*** Upland area includes warehouse and industrial production buildings and structures. No dock or shoreline structures present. Creosote and steel moorage dolphins present in sub-tidal area adjacent to site shoreline in active use as barge and floating equipment moorage.

Habitat Statement: Site includes moderate area of un-obstructed inter-tidal and shallow sub-tidal substrate. Upper and inter-tidal bank-line consists of riprap. No substantial riparian vegetation present. No marsh vegetation present.

Potential Restoration Actions: Approximately 600 linear feet of site bank line proposed for improvement. Port-owned bank line area is narrow. Excavate bank line to reduce slope, removing any rubble or debris present. Slope bank line to maximum extent possible within port-owned area to create riparian planting area as graded bench or pocket plantings, between 12 to 19 feet MLLW. Large woody debris installed as lower margin of riparian planting area, between 12 and 14 feet MLLW.

Site Number Thirteen: South Orchard Street/ Second Avenue South, west shoreline, River Mile 2.3

Habitat Restoration Opportunity: Pocket habitat

Planning Area: Three

Ownership: POS bank line area

Existing Conditions:

- ***Bank line slope and configuration:*** Top-of-bank approximately 14 to 15 feet MLLW. Privately held upland/marina at south margin, with north portion of site abutting public right-of-way. Bank line consists of continuous rubble and debris. Bank line is stable.

- ***Existing bank line vegetation:*** Minimal vegetation present, consisting of invasive plants and vines. No woody vegetation present.

- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal slope approximately 1:1 to 2:1 rubble, with some riprap, extending from top-of-bank to approximately eight feet MLLW. No marsh or algal growth present. Mid and lower inter-tidal area, from approximately eight feet (MLLW) to minus five feet MLLW includes exposed mud/sand substrate, up to 70 feet in width, with moderate slope, approximately 6:1 to 8:1. Some industrial debris and derelict creosote piling present. Note: several mooring dolphins present in sub-tidal area.

- ***Existing shallow sub-tidal conditions:*** Adjacent shallow sub-tidal area, extending from minus 10 feet MLLW to west margin of Duwamish navigation.

- ***Existing structures:*** Upland area absent of structures or improvements. Several derelict concrete foundations present. No dock or shoreline structures present. Creosote and steel moorage dolphins present in sub-tidal area adjacent to site shoreline, with in-frequent moorage use. Note: site includes numerous stored metal structures and equipment in top-of-bank area.

Habitat Statement: Site includes substantial area of un-obstructed inter-tidal and shallow sub-tidal substrate. Upper and inter-tidal bank-line consists of rubble and debris. No substantial riparian vegetation present. No marsh vegetation present.

Potential Restoration Actions: Approximately 175 linear feet of site bank line proposed for improvement. Port-

owned bank line area includes existing upland as well as bank line and aquatic area. Excavate bank line, removing rubble and derelict materials. Top-of-bank re-shaped land-ward approximately 25 feet, creating fine-grain inter-tidal substrate approximately 15 to 20 feet wide, elevation ten to 13 feet MLLW, for use as emergent vegetation planting area. Construct 2:1 slope shoreline with riparian vegetation extending up-slope from 13 feet MLLW to mounded berm at plus 13 feet to 15 feet MLLW, for use as riparian planting area. Installation of large woody debris along bank line at 12 to 13 feet MLLW.

Site Number Fourteen: North portion existing barge cargo facility, west shoreline, River Mile 2.5

Habitat Restoration Opportunity: Corridor habitat

Planning Area: Three

Ownership: POS bank line area

Existing Conditions:

- ***Bank line slope and configuration:*** Top-of-bank approximately 15 to 18 feet MLLW. Privately owned upland barge cargo facility, with barge moorage at south end of site, including approximately 80 feet by 120 feet dock structure, fitted with barge loading ramps. Upland area partially paved. Shoreline consists of riprap and rubble stabilization. Toe of bank line extends to approximately six feet MLLW. Bank line is stable.

- ***Existing bank line vegetation:*** Minimal vegetation present, consisting of invasive plant/vine thicket. No substantial woody vegetation present.

- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal slope approximately 1:1 to 2:1 riprap and rubble, with some riprap, extending from top-of-bank to approximately six feet MLLW. No marsh or algal growth present. Mid and lower inter-tidal area, from approximately six feet (MLLW) to minus five feet MLLW includes exposed mud/sand substrate, up to 40 feet in width, with moderate slope, approximately 4:1 to 6:1. Some industrial debris and derelict creosote piling present. Note: several mooring dolphins present in sub-tidal area.

- ***Existing shallow sub-tidal conditions:*** Adjacent shallow sub-tidal area, extending from minus 10 feet MLLW to west margin of Duwamish navigation.

- ***Existing structures:*** Upland area includes structures and cargo transfer improvements. Barge cargo transfer dock present at south margin of site, with moorage dolphins present adjacent to site, frequently used for barge marshalling. Over-water coverage present at existing cargo dock only.

Habitat Statement: Site includes moderate area of un-obstructed inter-tidal and shallow sub-tidal substrate. Upper and inter-tidal bank-line consists of riprap and rubble. No substantial riparian vegetation present. No marsh vegetation present.

Potential Restoration Actions: Approximately 200 linear feet of site bank line proposed for improvement. Port-owned area includes existing upland as well as bank line and aquatic area. Excavate bank line, removing rubble and derelict materials. Top-of-bank re-shaped land-ward approximately 15 feet, creating fine-grain inter-tidal substrate approximately 15 feet wide, elevation ten to 13 feet MLLW, for use as emergent vegetation planting area. Construct 2:1 slope shoreline with riparian vegetation extending up-slope from 13 feet MLLW to top-of-bank, for use as riparian planting area. Installation of large woody debris along bank line at 12 to 13 feet MLLW.

Site Number Fifteen: South Fontanelle Street/Fifth Avenue South, extending upstream along derelict industrial bank line area, west shoreline. River Mile 2.6

Habitat Restoration Opportunity: Corridor habitat

Planning Area: Three

Ownership: POS bank line area

Existing Conditions:

- ***Bank line slope and configuration:*** Top-of-bank approximately 14 to 15 feet MLLW. Privately held upland industrial use area, with barge moorage at south end of site. Upland area includes partial pavement and unimproved surface. Shoreline consists of rubble and concrete block stabilization. Toe of bank line extends to approximately six feet MLLW. Abundant industrial equipment, debris, and derelict barges/barge equipment at bank line.

- ***Existing bank line vegetation:*** Vegetation generally absent. Some invasive plants at north end of shoreline.

- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal slope consists of vertical concrete block bulkhead structures, approximately 1:1 to 2:1 rubble bank line, and derelict barges and industrial equipment. Inter-tidal area includes substantial amount of spilled bulk construction materials, concrete rubble and wood/metal debris. No marsh or algal growth present. Note: mid and lower inter-tidal area, from approximately six feet (MLLW) to minus five feet MLLW present as exposed substrate, between 80 to 100 feet wide, with slope 8:1 to 10:1.

- ***Existing shallow sub-tidal conditions:*** Adjacent shallow sub-tidal area, extending from minus 10 feet MLLW to west margin of Duwamish navigation. Note: shallow sub-tidal area includes abundant industrial/marine debris.

- ***Existing structures:*** Upland area includes numerous structures and industrial uses and activities. Personnel and light equipment transfer ramp at south half of site, connecting to barge platform. No moorage dolphins. Over-water coverage present at industrial equipment dock adjacent to south.

Habitat Statement: Site includes substantial area of inter-tidal and shallow sub-tidal substrate, without permanent structures. Abundant debris and derelict equipment obstructs aquatic area, however. Upper and inter-tidal bank-line consists of rubble, concrete block bulkhead, and derelict equipment/structures. No substantial riparian vegetation present. No marsh vegetation present.

Potential Restoration Actions: Approximately 450 linear feet of site bank line proposed for improvement. Port-owned area includes existing upland as well as bank line and aquatic area. Excavate bank line area in port ownership, removing rubble and derelict materials. Top-of-bank re-shaped land-ward to match upland elevation, moving bank line land-ward approximately 10 to 30 feet, depending on ownership with respect to filled upland area. Construct fine-grain inter-tidal substrate approximately 15 feet wide, elevation ten to 13 feet MLLW, for use as emergent vegetation planting area. Construct 2:1 slope shoreline with riparian vegetation extending up-slope from 13 feet MLLW to top-of-bank elevation for use as riparian planting area. Installation of large woody debris along bank line at 12 to 13 feet MLLW.

Site Number Sixteen: South Othello Street to Eighth Avenue South, east shoreline. River Mile 2.6

Habitat Restoration Opportunity: Corridor habitat

Planning Area: Three

Ownership: POS bank line area

Existing Conditions:

- ***Bank line slope and configuration:*** Top-of-bank approximately 16 to 18 feet MLLW. Privately held upland industrial use area in place at top-of-bank throughout site, including paved/drained vehicle use area. Shoreline consists of rubble and metal slag in place as riprap. Toe of bank line extends to approximately eight feet MLLW.

- ***Existing bank line vegetation:*** Vegetation generally absent. Some invasive plants at north end of shoreline, with several small trees and vine thicket at south end. Note: upland use area and top-of-bank separated by 10 to 15 feet wide vacant area.

- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal slope consists of rubble and industrial fill shoreline with abrupt 1:1 or nearly vertical slope. No riparian vegetation present. No marsh or algal growth present. Substantial inter-tidal area present extending water-ward from toe of rubble bank line. Approximately 30 to 100 feet wide inter-tidal sand/mud substrate extends from approximately eight feet MLLW to 0.0 feet MLLW, slope 10:1 to 12:1 Several derelict creosote moorage dolphins and individual piling present in inter-tidal area. No over-water structures or coverage present.

- ***Existing shallow sub-tidal conditions:*** Adjacent shallow sub-tidal area, extending from minus 10 feet MLLW to east margin of Duwamish navigation. Note: no over-water coverage adjacent to site, with continuous moderate slope sub-tidal, approximately 5:1 to adjoining sand/mud inter-tidal area.

- ***Existing structures:*** Upland area includes warehouse and heavy vehicle maintenance structures. Adjacent upland site in use as heavy truck maintenance, parking, and dispatch operation. No upland uses and activities linked with adjacent navigation channel access. Several moorage piling and dolphins present. Structures

un-used at present, however.

Habitat Statement: Site includes substantial inter-tidal and shallow sub-tidal substrate, without permanent structures. Aquatic area generally clear of industrial debris or relic materials. Upper and inter-tidal bank-line consists of rubble and industrial fill material. No substantial riparian vegetation present. No marsh vegetation present.

Potential Restoration Actions: Approximately 700 linear feet of site bank line proposed for improvement. Port-owned area, including existing upland, bank line, and aquatic area proposed for excavation and re-grading. Excavate bank line area in port ownership, removing rubble and industrial fill. Displace top-of-bank land-ward five to 20 feet, depending on ownership. Create low bank riparian vegetation area five to 15 feet in with, elevation 13 feet MLLW to top-of-bank. Large woody debris placed between 13 and 14 feet MLLW. Land-ward 2:1 to 3:1 slope receives native riparian vegetation, with top-of-slope berm to prevent surface water flow over bank line.

Site Number Seventeen: Southwest corner, Eighth Avenue South, east shoreline. River Mile 2.8

Habitat Restoration Opportunity: Corridor habitat

Planning Area: Three

Ownership: POS bank line area

Existing Conditions:

- ***Bank line slope and configuration:*** Top-of-bank approximately 18 to 20 feet MLLW. Port-owned bank line adjacent to privately operated barge cargo dock and cargo transfer site. Existing shoreline includes rubble, metal slag, metal and timber debris, and riprap slope adjacent to cargo dock at northwest margin Slip 4. Toe of bank line extends to approximately 10 feet MLLW.

- ***Existing bank line vegetation:*** Vegetation generally absent, with only invasive plants. Note: Eighth Avenue South street-end includes substantial top-of-bank vegetation, placed during past 15 years as modest shoreline restoration site. Present site includes bank line south of street-end.

- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal slope consists of rubble, industrial fill, and riprap, slope 1:1 to 2:1. No riparian vegetation present. No marsh or algal growth present. Inter-tidal area present as rubble/riprap slope above 10 feet MLLW, and slope approximately 4:1 extending water-ward from 10 feet MLLW approximately 30-35 feet to 0.0. No over-water structures or coverage present. Exposed inter-tidal area is industrial fill and riprap debris.

- ***Existing shallow sub-tidal conditions:*** Adjacent shallow sub-tidal area, extending from minus 10 feet MLLW to east margin of Duwamish navigation, is 3:1 to 4:1 slope. No over-water coverage adjacent to this site, moorage dolphins present, however.

- ***Existing structures:*** Upland area includes marine cargo dock extending along north margin of Slip 4 and to southeast corner of present site. Upland area includes pavement/drainage as heavy vehicle and cargo use area. Note: all cargo transfer at Slip 4 margin, with over-bank activity at Duwamish Waterway margin.

Habitat Statement: Site includes comparatively abrupt inter-tidal and shallow sub-tidal slopes, with rocky/cobble substrate. No over-water structures present. No riparian or marsh vegetation present.

Potential Restoration Actions: Approximately 100 linear feet of site bank line proposed for improvement. Port-owned bank line and narrow upland strip could be re-sloped. Excavate bank line to remove rubble and re-shape profile 13 feet to 20 feet MLLW to receive native riparian vegetation. Top-of-bank moved land-ward approximately five to ten feet. Riparian vegetation provides native shoreline feature at northwest corner Slip 4.

Site Number Eighteen: Southwest corner, Slip 4 and adjacent up-stream bank line, east shoreline. River Mile 3.0

Habitat Restoration Opportunity: Corridor habitat

Planning Area: Three

Ownership: POS bank line area

Existing Conditions:

- ***Bank line slope and configuration:*** Top-of-bank approximately 18 to 20 feet MLLW. Port-owned bank line and top-of-bank upland adjacent to privately owned upland. Existing shoreline consists of constructed, uniform riprap 2:1 slope, with toe of riprap approximately six feet MLLW.

- ***Existing bank line vegetation:*** Vegetation

present at top-of-bank, included native riparian and landscape vegetation placed as element of previous upland development. Note: riparian vegetation at top-of-bank only, with exposed riprap slope in all water-ward slope areas.

- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal slope includes 2:1 heavy riprap slope. No marsh or algal growth present. Inter-tidal area at toe of riprap slope includes exposed sand/mud substrate, with limited portions of native sediment present. Inter-tidal and shallow sub-tidal substrate extends 30 to 40 feet water-ward from toe of riprap to 0.0 MLLW, 9:1 to 10.1 slope. No over-water structures or coverage present. Inter-tidal area clear of debris.

- ***Existing shallow sub-tidal conditions:*** Adjacent shallow sub-tidal area, extending from minus 10 feet MLLW to east margin of Duwamish navigation, is 3:1 to 4:1 slope. No over-water coverage adjacent to this site, with single moorage dolphin at downstream margin.

- ***Existing structures:*** Upland area includes industrial building, surrounded by landscaped parking and employee use area. Landscaping at top-of-bank includes riparian vegetation. Note: surface water control structures in existing upland area include exposed drainage collection swales/retention features, discharging over top-of-bank.

Habitat Statement: Site includes uniform riprap bank line, with no over-water structures present. Riprap slope extends landward from substantial exposed inter-tidal and shallow sub-tidal aquatic area. Riparian vegetation in place ten to 15 feet land-ward of top-of-bank. No riparian present in shoreline slope areas. No marsh vegetation present.

Potential Restoration Actions: Approximately 1050 linear feet of site bank line proposed for improvement. Port-owned bank line and narrow upland strip could be re-sloped. Excavate bank line to remove portions of riprap slope and re-shape profile land-ward approximately 40 feet. Construct inter-tidal fine-grain substrate bench (approximately 30 feet wide, elevation plus ten to 13 feet MLLW) for use as emergent vegetation area. Establish riparian vegetation from elevation plus 13 feet to 20 feet MLLW. Install large woody debris throughout, elevation 12 to 13 feet MLLW.

Site Number Nineteen: South Chicago Street to South Kenyon Street, west shoreline. River Mile 3.0

Habitat Restoration Opportunity: Corridor habitat

Planning Area: Three

Ownership: POS bank line area

Existing Conditions:

- ***Bank line slope and configuration:*** Top-of-bank approximately 18 to 19 feet MLLW. Port-owned bank line and narrow top-of-bank upland adjacent to privately owned upland. Existing shoreline consists of concrete rubble, industrial materials used as riprap, and debris at approximately 1:1 slope, with some areas approaching vertical. Toe of slope extends to approximately plus ten feet MLLW.

- ***Existing bank line vegetation:*** Limited vegetation present at top-of-bank, generally invasive plants and vine thicket.

- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal slope includes 1:1 irregular rubble slope. No marsh or algal growth present. Inter-tidal area at toe of riprap slope includes exposed sand/mud substrate. Inter-tidal and shallow sub-tidal substrate extends up to 60 feet water-ward from toe of riprap to 0.0 MLLW, 9:1 to 10.1 slope. No over-water structures or coverage present. Inter-tidal area includes industrial debris. Moorage dolphins serving dock at north end of site in active use.

- ***Existing shallow sub-tidal conditions:*** Adjacent shallow sub-tidal area, extending from minus 10 feet MLLW to west margin of Duwamish navigation, is 3:1 to 4:1 slope. No over-water coverage adjacent to this site in form of dock structure, however, moorage dolphins at sub-tidal margin of site.

- ***Existing structures:*** Upland area includes industrial building, approximately 130 feet long, 60 feet wide concrete dock, and paved upland area. Existing dock, located north of site, used for cargo transfer. Upland area includes bulk cargo and equipment storage. Site also used as metal re-cycling yard.

Habitat Statement: Site includes irregular rubble bank line, with no over-water structures present. Rubble slope ends at land-ward margin of substantial exposed inter-tidal and shallow sub-tidal aquatic area. No riparian or marsh vegetation present.

Potential Restoration Actions: Approximately 475 linear feet of site bank line proposed for improvement. Port-owned bank line and narrow upland strip re-sloped, removing rubble, and establishing top-of-bank approximately 10 to 15 feet land ward. Construct inter-tidal fine-grain substrate bench (approximately 10 feet wide, elevation plus ten to 13 feet MLLW) for use as emergent vegetation area. Establish riparian vegetation from elevation plus 13 feet to 19 feet MLLW. Install large woody debris plus 12 to 13 feet MLLW.

Site Number Twenty: South Park Neighborhood—street ends: South Kenyon Street, South Elmgrove Street, South Southern Street, and South Rose Street, west shoreline. River Mile 3.2

Habitat Restoration Opportunity: Corridor habitat

Planning Area: Three

Ownership: POS bank line area

Existing Conditions:

- ***Bank line slope and configuration:*** Top-of-bank approximately 16 feet MLLW. Port-owned bank line and narrow top-of-bank upland adjacent to privately owned residential lots and public right-of-way street-ends. Existing shoreline consists of concrete rubble, other riprap-like rubble, and debris at approximately 1:1 slope, with some areas approaching vertical. Toe of slope extends to approximately plus eight to ten feet MLLW.

- ***Existing bank line vegetation:*** Limited vegetation present at top-of-bank as landscape vegetation and invasive plants/vine thickets.

- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal slope includes irregular, abrupt rubble slope. No marsh or algal growth present. Inter-tidal area at toe of riprap slope includes substantial exposed sand/mud substrate. Inter-tidal and shallow sub-tidal substrate extends up to 60 feet water-ward from toe of rubble slope to 0.0 MLLW, 9:1 to 10.1 slope. No over-water structures or coverage present. No cargo or active marine uses present.

- ***Existing shallow sub-tidal conditions:*** Adjacent shallow sub-tidal area, extending from minus 10 feet MLLW to west margin of Duwamish navigation, is 3:1 to 4:1 slope. No over-water coverage adjacent to this site.

- ***Existing structures:*** Upland area includes residential uses, open yard, and right-of-way street-ends.

Habitat Statement: Site includes irregular rubble bank line, changing in character among private parcels and street-ends. No over-water structures present. Rubble slope ends at land-ward margin of substantial exposed inter-tidal and shallow sub-tidal aquatic area. No riparian or marsh vegetation present.

Potential Restoration Actions: Approximately 850 linear feet of site bank line proposed for improvement. Port-owned bank line and narrow upland ownership re-sloped, removing rubble, and establishing top-of-bank approximately 10 to 15 feet land-ward. Dimensions and shape of bank line could be irregular, consistent with existing residential structures and street-end availability. Construct inter-tidal fine-grain substrate bench, variable in width, elevation plus ten to 13 feet MLLW, for use as emergent vegetation area. Establish riparian vegetation from elevation plus 13 feet to 16 feet MLLW. Install large woody debris plus 12 to 13 feet MLLW. Include public access to restored shoreline in street-end areas.

Site Number Twenty-one: Industrial Structure (Plant 2) north of South Park Bridge, east shoreline. River Mile 3.2

Habitat Restoration Opportunity: Corridor habitat

Planning Area: Three

Ownership: POS aquatic area

Existing Conditions:

- ***Bank line slope and configuration:*** Top-of-bank occupied by existing piling supported industrial building. Building west margin co-linear with waterway boundary. Piling supported building margin at approximately plus 4 to 6 feet MLLW.

- ***Existing bank line vegetation:*** Top-of-bank present as west margin of existing piling supported industrial structure. No vegetation present.

- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal are consists of sand/mud substrate along east shoreline of waterway. Exposed inter-tidal substrate is low slope, with exposed tide flat conditions, approximately 70 to 90 feet between plus four to six feet MLLW and 0.0 MLLW, slope eight to ten percent. No marsh or algal growth present. Inter-tidal is free of riprap or other

debris. Several timber dolphin structures present, however, no moorage use of area is evident. No cargo or active marine uses present.

- ***Existing shallow sub-tidal conditions:*** Adjacent shallow sub-tidal area, extending from minus 10 feet MLLW to east margin of Duwamish navigation, is approximately 5:1 slope. No over-water coverage adjacent to this site.

- ***Existing structures:*** Upland area includes continuous industrial building edge, piling supported.

Habitat Statement: Site margin consists of piling supported industrial building. Note: inter-tidal conditions extend beneath structure, with over-water coverage east of port ownership area. No over-water structures present, in port-owned aquatic area, however. Substantial inter-tidal and shallow sub-tidal exposed sand/mud substrate present. No riparian or marsh vegetation present.

Potential Restoration Actions: Approximately 900 linear feet exposed sand/mud substrate proposed for improvement. Port-owned aquatic area receives continuous large woody debris, placed between plus two and four feet MLLW. Large woody debris serves as inter-tidal enhancement and protects adjacent upland structure from vessel wake energy.

Site Number Twenty-two (A): Industrial bank line, south portion of Plant 2 and south of South Park Bridge, east shoreline. River Mile 3.5

Habitat Restoration Opportunity: Corridor habitat

Planning Area: Four

Ownership: POS aquatic are only

Existing Conditions:

- ***Bank line slope and configuration:*** Top-of-bank occupied by existing piling supported industrial building. Building west margin co-linear with waterway boundary. Piling supported building margin at approximately plus 2 feet MLLW.

- ***Existing bank line vegetation:*** Top-of-bank present as west margin of existing piling supported industrial structure. No vegetation present.

- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal are consists of sand/mud substrate along east shoreline of waterway. Exposed inter-tidal substrate is low slope, with exposed tide flat conditions, approximately 50 to 60 feet between plus two feet MLLW and 0.0 MLLW, slope five percent. No marsh or algal growth present. Inter-tidal is free of riprap or other debris. No moorage use or active marine uses present.

- ***Existing shallow sub-tidal conditions:*** Adjacent shallow sub-tidal area, extending from minus 0.0 feet MLLW to east margin of Duwamish navigation, is approximately 5:1 to 8:1 slope. No over-water coverage adjacent to this site.

- ***Existing structures:*** Upland area includes continuous industrial building edge, piling supported.

Habitat Statement: Site margin consists of piling supported industrial building. Note: inter-tidal conditions extend beneath structure, with over-water coverage east of port ownership area. No over-water structures present, in port-owned aquatic area, however. Substantial inter-tidal and shallow sub-tidal exposed sand/mud substrate present. No riparian or marsh vegetation present.

Potential Restoration Actions: Approximately 1100 linear feet exposed sand/mud substrate proposed for improvement. Port-owned aquatic area receives continuous large woody debris, placed between plus two and four feet MLLW. Large woody debris serves as inter-tidal enhancement and protects adjacent upland structure from vessel wake energy.

Site Number Twenty-two (B): South of south portion, Plant 2, south of South Park Bridge, west shoreline. River Mile 3.5

Habitat Restoration Opportunity: Corridor habitat site

Planning Area: four

Ownership: POS bank line area

Existing Conditions:

- ***Bank line slope and configuration:*** Top-of-bank approximately 16 to 18 feet MLLW. Port-owned bank line and narrow top-of-bank upland adjacent to privately owned upland. Existing shoreline consists of riprap and concrete rubble, exposed slope, at approximately 1:1. Toe of slope extends to approximately plus six feet MLLW.

- ***Existing bank line vegetation:*** Limited vegetation present at top-of-bank, generally invasive plants and vine thicket.

- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal slope includes 1:1 irregular riprap and rubble slope. No marsh or algal growth present. Inter-tidal area at toe of riprap slope includes narrow band exposed sand/mud substrate, less than 20 feet, slope 5:1.

- ***Existing shallow sub-tidal conditions:*** Adjacent shallow sub-tidal area, extending from 0.0 feet MLLW to east margin of Duwamish navigation, is 3:1 to 4:1 slope.

- ***Existing structures:*** Upland area includes adjacent industrial buildings, however, top-of-bank and immediate upland area has no structures present. Pavement is irregular land-ward of top-of-bank.

Habitat Statement: Site includes riprap and rubble bank line, with no over-water structures present. Narrow band of exposed inter-tidal substrate present, between plus six and 0.0 feet MLLW. No riparian or marsh vegetation present at this site or in adjacent areas of east bank line.

Potential Restoration Actions: Approximately 275 linear feet of site bank line proposed for improvement. Port-owned bank line and narrow upland strip re-sloped, removing riprap and rubble, and establishing top-of-bank approximately 20 to 25 feet land ward. Construct bench at approximately plus ten to 13 feet MLLW, ten feet wide, for use as emergent vegetation area. Establish riparian vegetation from elevation plus 13 feet to 18 feet MLLW. Install large woody debris plus 12 to 13 feet MLLW as slope protection measure.

Site Number Twenty-three: Terminal 117, west shoreline. River Mile 3.7

Habitat Restoration Opportunity: Hub habitat

Planning Area: four

Ownership: POS bank line area

Existing Conditions:

- ***Bank line slope and configuration:*** Top-of-bank approximately 15 to 18 feet MLLW. Entire bank line consists of past industrial fill activities and includes areas of riprap, concrete rubble, creosote timber bulkhead, and eroded bank. Area between top-of-bank and approximately 11 to 11.5 feet MLLW is nearly vertical in profile. Wood crib bulkhead is vertical, top elevation approximately nine feet MLLW and toe of bulkhead approximately four to 4.5 feet MLLW.

- ***Existing bank line vegetation:*** No riparian or marsh vegetation present at site. Top-of-bank includes invasive plants and vines.

- ***Existing inter-tidal substrate and vegetation:*** Exposed inter-tidal substrate consists of rubble material, derived from eroding bank line areas. Area water-ward of bulkhead is cobble and sand substrate. Mud/sand substrate present below approximately plus four feet MLLW, slope 4:1 to 5:1, extending to west margin Duwamish Waterway channel. No marsh or substantial algal vegetation present.

- ***Existing shallow sub-tidal conditions:*** Sub-tidal conditions include approximately 3:1 side slope of Duwamish Waterway channel.

- ***Existing structures:*** No dock or pier structures present, with approximately 750 linear feet exposed shoreline. Approximately five feet wide un-paved top-of-bank area present, with remaining area of site consisting of impervious surface. Two steel-frame warehouse buildings present totaling approximately 19,500 square feet. A third, wood-framed, storage building is present, approximately 2600 square feet.

Habitat Statement: Inter-tidal area at site includes moderate slope, exposed medium grain substrate, at west margin of Duwamish Waterway channel. This portion of the Duwamish Waterway includes substantial adjacent exposed inter-tidal substrate. Area does not include significant marsh or riparian vegetation.

Potential Restoration Actions: Approximately 750 linear feet of site bank line proposed for improvement. Remove existing buildings and wood crib bulkhead and excavate existing filled upland area land-ward from approximately nine feet MLLW to expose approximately 2.5 acres inter-tidal area. Re-graded site could include approximately 0.7 acres un-vegetated mud/sand substrate (plus nine feet to 10.5 feet MLLW) and approximately 1.8 acres suitable for establishing marsh vegetation (plus 10.5 to 12 feet MLLW). Restoration site could include approximately 0.45 acres riparian shoreline planting, between plus 12 feet MLLW and new top-of-bank.

Adjacent Upland "Terminal 117" Parcel: It will be essential for agency and natural resource trustee participants, the City of Seattle, and the port to collaborate in planning and design of effective site cleanup and aquatic habitat restoration at Terminal 117.

Site Number Twenty-four: Industrial bank line (Jorgensen Forge), east shoreline. River Mile 3.7

Habitat Restoration Opportunity: Corridor habitat

Planning Area: four

Ownership: POS bank line area

Existing Conditions:

- ***Bank line slope and configuration:*** Top-of-bank approximately 20 to 24 feet MLLW. Port-owned bank line and narrow top-of-bank upland adjacent to privately owned upland. Existing shoreline consists of vertical steel and treated timber bulkhead, top-of-bank includes industrial building and heavy industrial uses and activities. Toe of bulkhead extends to approximately plus ten feet MLLW.

- ***Existing bank line vegetation:*** No shoreline vegetation, limited amounts of invasive plants and vine thicket.

- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal slope includes vertical bulkhead surface. Area water-ward of ten feet MLLW includes substantial band sand/mud substrate, up to 60 feet between ten feet MLLW and 0.0 MLLW, slope 10:1.

- ***Existing shallow sub-tidal conditions:*** Adjacent shallow sub-tidal area, extending from 0.0 feet MLLW to east margin of Duwamish navigation, is 3:1 to 4:1 slope.

- ***Existing structures:*** Upland area includes adjacent industrial buildings, placed in port ownership bank line. Pavement is irregular land-ward of top-of-bank. No active cargo or marine uses present.

Habitat Statement: Site includes vertical inter-tidal bank line, with no over-water structures present. Substantial band of exposed inter-tidal substrate present, between plus ten and 0.0 feet MLLW. No riparian or marsh vegetation present at this site or in adjacent areas of east bank line.

Potential Restoration Actions: Approximately 650 linear feet of site bank line proposed for improvement. Port-owned bank line and narrow upland strip re-sloped, removing vertical bulkhead and top-of-bank structures, establishing top-of-bank approximately 40 feet land ward. Construct bench at approximately plus ten to 13 feet MLLW, ten feet wide, for use as emergent vegetation area. Establish riparian vegetation from elevation plus 13 feet to 20 feet MLLW. Install large woody debris plus 10 to 13 feet MLLW as slope transition structure as for shoreline protection.

Site Number Twenty-five: Research facility campus, west shoreline. River Mile 3.8

Habitat Restoration Opportunity: Corridor habitat

Planning Area: four

Ownership: POS bank line area

Existing Conditions:

- ***Bank line slope and configuration:*** Top-of-bank is variable, approximately 20 to 24 feet MLLW. Port-owned bank line and narrow top-of-bank upland adjacent to privately owned upland. Top-of-bank is vacant, with landscaped open space. Bank line is abrupt, consisting of dense un-stabilized industrial fill. No riprap present and small amounts of rubble evident at water-ward edge of slope, approximately plus ten feet MLLW

- ***Existing bank line vegetation:*** Upland and top-of-bank includes landscape use area, serving as open space for adjacent facility. Cottonwood and alder growth present at top-of-bank.

- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal slope includes abrupt dense fill slope. Ten to 14 feet nearly vertical slope subject to erosion. Area water-ward of ten feet MLLW includes substantial cobble and sand/mud substrate, up to 60 feet in width between ten feet MLLW and 0.0 MLLW, slope 10:1.

- ***Existing shallow sub-tidal conditions:*** Adjacent shallow sub-tidal area, extending from 0.0 feet MLLW to west margin of Duwamish navigation, is 3:1 to 4:1 slope.

- ***Existing structures:*** Upland area includes adjacent buildings, paved parking, and top-of-bank landscaping, with pathway and seating. No active cargo or marine uses present.

Habitat Statement: Site includes vertical, un-stabilized upper bank line, with no over-water structures present. Inter-tidal area below approximately plus 12 feet MLLW is without riprap or other protection. Substantial band of exposed inter-tidal substrate present, between plus ten and 0.0 feet MLLW. Riparian vegetation at top-of-bank and some recruitment of woody debris takes place as result of bank line erosion. No marsh vegetation present at site.

Potential Restoration Actions: Approximately 600 linear feet of site bank line proposed for improvement. Port-owned bank line and upland strip re-sloped, re-grading vertical portion of upper bank line and shifting bank line land-ward approximately 15 feet. Riparian slope at 2:1 installed and planted. New lower slope prepared for ten feet wide band emergent vegetation, elevation ten to 13 feet MLLW. Continuous margin of large woody debris installed between 13 and 14 feet MLLW at base of newly contoured slope.

Site Number Twenty-six: Upland industrial facility (Boeing/Thompson), east shoreline. River Mile 3.8

Habitat Restoration Opportunity: Corridor habitat

Planning Area: four

Ownership: POS bank line area

Existing Conditions:

- ***Bank line slope and configuration:*** Top-of-bank generally uniform due to bulkhead structure. Port-owned bank line and very narrow top-of-bank upland adjacent to privately owned upland. Existing shoreline consists of combined steel and treated timber bulkhead, top-of-bank includes industrial buildings, pavement, equipment storage, and parking. Toe of bulkhead extends to approximately plus four feet MLLW.

- ***Existing bank line vegetation:*** No shoreline vegetation, limited amounts of invasive plants and vine thicket.

- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal slope includes vertical bulkhead surface. Area water-ward of four feet MLLW includes substantial band sand/mud substrate, up to 80 feet between ten feet MLLW and 0.0 MLLW, slope 10:1 to 12:1.

- ***Existing shallow sub-tidal conditions:*** Adjacent shallow sub-tidal area, extending from 0.0 feet MLLW to east margin of Duwamish navigation, is 3:1 to 4:1 slope.

- ***Existing structures:*** Upland area includes adjacent industrial buildings, with limited top-of-bank ownership. Pavement and structures throughout upland area. No active cargo or marine uses present.

Habitat Statement: Site includes vertical inter-tidal bank line, with no over-water structures present. Substantial band of exposed inter-tidal substrate present, between plus four and 0.0 feet MLLW. No riparian or marsh vegetation present at this site or in adjacent areas of east bank line.

Potential Restoration Actions: Approximately 375 linear feet exposed sand/mud substrate proposed for improvement. Port-owned aquatic area receives continuous large woody debris, placed between plus two and four feet MLLW. Large woody debris serves as inter-tidal enhancement and protects adjacent upland structure from vessel wake energy.

Site Number Twenty-seven: Upland industrial facility, east shoreline. River Mile 4.3

Habitat Restoration Opportunity: Corridor habitat

Planning Area: four

Ownership: POS bank line area

Existing Conditions:

- ***Bank line slope and configuration:*** Top-of-bank generally uniform due to vertical bulkhead structure. Port-owned bank line and very narrow top-of-bank upland area adjacent to privately owned upland. Existing shoreline consists of combined steel and treated timber bulkhead, top-of-bank includes industrial buildings, pavement, equipment storage, and parking. Toe of bulkhead extends to approximately plus four feet MLLW.

- ***Existing bank line vegetation:*** No shoreline vegetation, limited amounts of invasive plants and vine thicket.

- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal slope includes vertical bulkhead surface. Aquatic area water-ward of four feet MLLW includes substantial band sand/mud substrate, up to 80 feet in width, between plus four feet MLLW and 0.0 MLLW, slope 10:1 to 12:1.

- ***Existing shallow sub-tidal conditions:*** Adjacent shallow sub-tidal area, extending from 0.0 feet MLLW to east margin of Duwamish navigation channel, is 3:1 to 4:1 slope.

- ***Existing structures:*** Upland area includes adjacent industrial buildings, with limited public top-of-bank ownership. Pavement and structures throughout upland area. No active cargo or marine

uses present.

Habitat Statement: Site includes vertical inter-tidal bank line, with no over-water structures present. Substantial band of exposed inter-tidal substrate present, between plus four and 0.0 feet MLLW. No riparian or marsh vegetation present at this site or in adjacent areas of east bank line.

Potential Restoration Actions: Improve approximately 325 linear feet exposed sand/mud substrate at north portion of site. Port-owned aquatic area at toe of existing bulkhead structure receives continuous large woody debris, placed between plus two and four feet MLLW. Large woody debris serves as inter-tidal enhancement and protects adjacent upland structure from vessel wake energy.

Site Number Twenty-eight: Sea King Industrial Park, west shoreline. River Mile 4.0

Habitat Restoration Opportunity: Corridor habitat

Planning Area: four

Ownership: POS bank line area

Existing Conditions:

- ***Bank line slope and configuration:*** Top-of-bank approximately 20 feet MLLW. Port-owned bank line adjacent to privately owned upland. Existing shoreline consists of riprap and rubble, exposed slope, at approximately 1:1. Toe of slope extends to approximately plus ten feet MLLW.

- ***Existing bank line vegetation:*** Limited vegetation present at top-of-bank, generally invasive plants and vine thicket.

- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal slope includes 1:1 irregular riprap and rubble slope. No marsh or algal growth present. Inter-tidal area at toe of riprap slope includes modest band exposed sand/mud substrate, approximately 40 feet, slope 4:1.

- ***Existing shallow sub-tidal conditions:*** Adjacent shallow sub-tidal area, extending from 0.0 feet MLLW to west margin of Duwamish navigation, is 3:1 to 4:1 slope.

- ***Existing structures:*** Upland area includes adjacent industrial buildings, however, top-of-bank and immediate upland area includes storm water retention pond and over-flow weir. No pavement.

Habitat Statement: Site includes riprap and rubble bank line, with no over-water structures present. Narrow band of exposed inter-tidal substrate present, between plus ten and 0.0 feet MLLW. Small amount marsh vegetation present north of site, outside port ownership.

Potential Restoration Actions: Approximately 275 linear feet of site bank line proposed for improvement. Port-owned bank line re-shaped to create 2:1 stable slope. Bank line receives native riparian vegetation. Water-ward margin of slope, between plus ten and 13 feet MLLW, receives large woody debris as bank line stabilization measure.

Site Number Twenty-nine: Former industrial site and barge moorage (Container Properties), east shoreline. River Mile 4.1

Habitat Restoration Opportunity: Corridor habitat

Planning Area: Four

Ownership: POS aquatic area

Existing Conditions:

- ***Bank line slope and configuration:*** Top-of-bank occupied by fill upland area. Port ownership consists of existing inter-tidal area, no upland present.

- ***Existing bank line vegetation:*** No upland vegetation present.

- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal area consists of sand/mud substrate along east shoreline of waterway. Exposed inter-tidal substrate is low slope, with exposed tide flat conditions. Area in port ownership includes 20-40 feet at east margin of navigation channel slope. Tide flat area in private ownership includes approximately 130 to 150 additional width tide flat. Elevation 0.0 to plus ten feet.

- ***Existing shallow sub-tidal conditions:*** Adjacent shallow sub-tidal area, extending from plus two feet MLLW to east margin of Duwamish navigation, is approximately 5:1 slope. Over-water coverage at site consists of derelict timber skeleton pier, previously uses for bulk liquid cargo transfer.

- ***Existing structures:*** Upland area in adjacent upland area. Port ownership is up to 150 feet water-ward of bank line

Habitat Statement: Site consists entirely of existing inter-tidal exposed sand/mud substrate at east margin of navigation channel. Note: inter-tidal conditions extend approximately 150 feet east in private ownership. Substantial tide flat area at site. No riparian or marsh vegetation present.

Potential Restoration Actions: Approximately 800 linear feet exposed sand/mud substrate proposed for improvement. Port-owned aquatic area receives continuous large woody debris, placed between plus two and four feet MLLW. Large woody debris serves as inter-tidal enhancement, providing slack water, off-channel habitat.

Site Number Thirty: Boeing facility campus and industrial park, east shoreline. River Mile 4.6

Habitat Restoration Opportunity: Corridor habitat

Planning Area: four

Ownership: POS bank line area

Existing Conditions:

- ***Bank line slope and configuration:*** Top-of-bank approximately 21 to 22 feet MLLW. Port-owned bank line and top-of-bank adjacent to privately owned upland. Existing shoreline consists of exposed riprap, exposed slope, at approximately 1:1. Toe of slope extends to approximately plus ten feet MLLW.
- ***Existing bank line vegetation:*** Limited vegetation present at top-of-bank, generally invasive plants/ vine thicket, with some deciduous trees.
- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal slope includes 1:1 riprap slope. No marsh or algal growth present. Inter-tidal area at toe of riprap slope includes substantial band exposed sand/mud substrate, approximately 80 feet, slope 5:1 to 6:1.
- ***Existing shallow sub-tidal conditions:*** Adjacent shallow sub-tidal area, extending from 0.0 feet MLLW to west margin of Duwamish navigation channel and turning basin.
- ***Existing structures:*** Upland area includes adjacent industrial buildings. Top-of-bank and immediate upland area paved/drained upland.

Habitat Statement: Site includes riprap bank line, with no over-water structures present. Substantial band of exposed inter-tidal substrate present, between plus ten and 0.0 feet MLLW. No marsh vegetation and limited riparian features present.

Potential Restoration Actions: Approximately 1050 linear feet of site bank line proposed for improvement. Excavate total of 650 linear feet in two locations, creating 2:1 slope between ten feet and 22 feet MLLW, moving top-of-bank up to 15 feet land-ward, consistent with ownership. Create approximately 650 linear feet, ten feet, emergent planting bench, plus ten to 13 feet MLLW. Area up-slope of emergent planting area and additional 400 linear feet of shoreline receives riparian vegetation.

Site Number Thirty-one: Seattle City Light substation, west shoreline. River Mile 4.6

Habitat Restoration Opportunity: Corridor habitat

Planning Area: four

Ownership: POS bank line area

Existing Conditions:

- ***Bank line slope and configuration:*** Narrow top-of-bank margin, approximately 18 feet MLLW. Port-owned bank line adjacent to substation upland use area. Existing shoreline consists of exposed riprap slope, at approximately 1:1. Toe of slope extends to approximately plus two to four feet MLLW.
- ***Existing bank line vegetation:*** Limited vegetation present at top-of-bank, generally invasive plants/ vine thicket, with several large woody trees.
- ***Existing inter-tidal substrate and vegetation:*** Existing inter-tidal slope includes 1:1 riprap slope. No marsh or algal growth present. Inter-tidal area at toe of riprap slope includes little exposed sand/ mud substrate.
- ***Existing shallow sub-tidal conditions:*** Adjacent shallow sub-tidal area, extending from 0.0 feet MLLW to west margin of Duwamish navigation channel and turning basin.
- ***Existing structures:*** No adjacent upland area in port ownership. Upland site includes adjacent industrial site—substation use. Top-of-bank and immediate upland area unpaved.

Habitat Statement: Site includes riprap bank line, with no over-water structures present. Little exposed inter-tidal substrate present, between plus ten and 0.0 feet MLLW. No marsh vegetation and limited riparian features present.

Potential Restoration Actions: Approximately 625 linear feet of site bank line proposed for improvement. Re-shape lower inter-tidal riprap slope to include fine-grain substrate bench, elevation plus ten to 13 feet MLLW, five to ten feet in width, suitable for placing emergent vegetation. Area below plus ten MLLW remains as riprap slope. Area in port control above plus 13 feet MLLW receives riparian vegetation.

Appendix 2

Workshop Meeting Notes

Note: The Port conducted a series of three planning workshops in an effort to encourage collaborative public involvement. The workshops were structured to each examine different aspects of planning for habitat projects on Port-owned land. References in the following notes to potential projects on land not owned by the Port are included for completeness of the record. However, it is not the intent of the Port to direct habitat planning for any land not owned by the Port.

Workshop #1 – Meeting Notes

Restoration Plan Framework, Objectives and Opportunities

South Park Neighborhood Center

July 10, 2008

I. General comments

- Projects in restoration plan should reflect the priorities that will be established through the Lower Duwamish River Natural Resource Trustees/NOM process to ensure they are eligible for resource damage credits.
- Priorities include: marsh/ intertidal and shallow subtidal habitats, with salmon being the species of greatest concern.
- Enhancements for salmon often provide benefits for other fish and wildlife
- Kellogg Island provides good habitat currently and has been the site-of lots of research
- Focus should be on areas further upstream on the Lower Duwamish where there is less habitat
- Stormwater treatment ponds on public and private sites that discharge to the LDK represent an important opportunity (e.g. WSDOT cloverleaf)
- Opportunities on Port property near future Bluefield sites should be pursued and represent an important partnership potential
- Opportunities on Port property near other public-and private sites also important
- The top of the topographic break (often the constructed top of banks is a key feature at both the site and reach scale
- How you treat the top of bank will drive the type and distribution of created habitat and the related cost and impact to properties.
- Upland habitat provides important inputs and benefits for the River and should not be discounted.
- Upland habitat enhancement can be an important and cost effective strategy in locations, particularly where this habitat is lacking.
- The presence and distribution of different types of habitat should be considered when deciding what to do at a particular site

II. Mapping Exercise Input

a. Section # 1

- Corridor bank treatment along vacant portion of Terminal #108
- Upland enhancement of Kellogg Island
- Creation of enhanced large pocket or hub at Kellogg Island, particularly north tip and low tide crossing near SW corner
- Daylight of Puget Creek and related pocket on Port property and private party enhancement opportunity
- Corridor enhancement potential, but issues with fill/ on active portion of Port property north of LaFarge
- Private enhancement potential on LaFarge shoreline west and north of active terminal

b. Section #2

- Port and public pocket and corridor opportunities at and north of 1st Ave. So Bridge near small marina
- Pocket enhancement opportunities on private sites in old oxbow inlets NE of Hale's construction and near Glacier Marine Services
- Corridor enhancements at Terminal 115
- Corridor and pocket enhancement opportunities at early action site north of Boyer Towing
- Enhancement opportunities in historic marsh, related drainage and in constructed storm ponds near WSDOT cloverleaf and ROW lands

c. Cal Section #3

- Corridor enhancements on Port property and opportunities for private partnership near Boeing Plan 2 and related public access site
- Corridor, pocket Port and private partnership opportunities at and north of Slip #4 (Crowley and Puget Sound Truck Lines)
- Potential for green corridor extending north of the head of slip #4 on private and public lands south of Georgetown
- Corridor enhancements on Port-property near Hurlen
- South Park enhancements, including pockets and corridors on Port property Duwamish River Revival site and private partnership opportunities

d. Section #4

- Extensive corridor enhancement opportunities on Port lands adjacent to non-water dependent uses on right bank
- Corridors and pockets at Terminal 1 17 and south on non-water dependent sites on left bank on Port property and on Boeing property
- Private opportunity at Boeing South Park
- Private opportunity for stormwater pond enhancement on SeaKing site Potential private pocket between Delta and Marina
- Private pocket at head of old oxbow inlet at Museum of Flight site Extensive opportunities at Turning Basin #3/ including south of City Light substation, Port properties and public and private sites

III. Site Specific Locations for Future Study

- Terminal 117 (subject of ongoing related effort)
- Turning Basin #3
- 8th Aver S. Georgetown Site
- Duwamish River Revival Site in South Park
- Boeing Public Access Site (potential reconfiguration)
- Other sites with Bluefield nexus

Workshop #2 – Meeting Notes

Habitat Project Opportunities

Georgetown Ballroom

July 16, 2008

I. Public Comments on Opportunities, Needs and Constraints Discussion

a. Section #1 (Harbor Island to Alaska Marine Lines)

- Are there ways we can connect the habitats around Kellogg Island to upland habitats in adjacent green belt?
- West Marginal Way a major barrier to connecting habitats
- Focus should be on connecting surface waters
- For example, provide a surface connection and enhancement of Puget Creek as a corridor to connect

b. Section #2 (Alaska Marine Lines to Hurlen Construction)

- Importance of area near SR 509 Bridge and WSDOT interchange
- Limited existing habitat in this area
- Extensive water dependent uses in this reach
- Old oxbows are key features and potential enhancement sites

c. Section #3 (Hurlen Construction to 16th Ave. South)

- Importance of creating and enhancing connections to communities of South Park and Georgetown in this reach
- Designs should incorporate public access where possible
- Designs should incorporate interpretive opportunities
- South Park is located along river for length of community
- Although Georgetown residential area is separated from the river by East Marginal Way South and industrial properties, the community values its proximity and existing opportunities to access the river
- Additional and enhanced access desired by Georgetown residents
- Importance of 8th Ave. S. and Boeing public access sites
- Public access improves stewardship and creates connection to communit[v]

d. Section #4 (16th Ave. South to Turning Basin)

- Importance of this area as a ecological transition zone (physiological change and juvenile salmon)
- Shallow benches are important in this area, more are needed and some already exist
- Some participants felt that projects in this area offered the "biggest bang for the buck" and that projects in this reach should be prioritized
- Extensive non-water dependent properties in this area represent significant opportunities for restoration and that should be reflected in the priorities

II. Focus Sites Design Exercise: Public Comment Summary

a. 8th Ave. South Site

- The Port, Bluefield, City (also including SDOT) all have an interest in what happens at this site and this represents an opportunity for partnership
- At 2.5 acres this site is one of the largest single sites in the estuary
- Site is a key access point for viewing the river and habitat
- Central feature of the site is a pump station for an old steam plant, but many of the opportunities are adjacent
- Idea is to pull back, reconfigure and soften existing bank to expand intertidal area and upland planting area and perhaps create off channel area as well
- Substantial enhancement would require public and private partnerships
- Paths near shoreline should be integrated (e.g. downstream on Puget Sound Truck Lines site)
- Desire to retain the knoll area as a view area and regrade the area east of it
- "Wild card" idea to create a off channel slough area north on in 8th Ave Ave. S. ROW
- Is it possible to pull shoreline in beyond pump house?
- Others thought that this site was a good viewpoint and might be important as a future are for a viewpoint, kiosk
- Habitat enhancement at this site mush follow remediation efforts
- Large plume of contaminants in subtidal area
- Some workshop participants felt it would be a benefit to reintroduce some fresh surface waters to the River through this site through enhanced bioswales in the ROW and on adjacent sites
- One constraint is quality of fill debris on steeper banks

b. Boeing Public Access Site

- Pull back bank create planting bench at a minimum
- Plant emergent vegetation
- Private partnership would yield a broader restoration, perhaps create marsh
- Knoll at northwest corner important
- Public access needs better signage, entrance and connectivity to community
- Opportunity to connect existing surface swales on the site

c. Turning Basin #3

- This site offers a big bang for the buck
- Combine corridor opportunities with off channel habitat
- Expand existing large habitat patch
- Site is important for thermal refuge, intertidal

habitat and sediment collection
- Site is problematic for public access to location of West Marginal Way and utilities along left bank and controlled access on right bank
- Desire to provide bike path connections but "pinch point" along West Marginal Way makes this tough (location of sewer line as well)
- Extensive bank and corridor enhancement opportunities along right bank adjacent to Boeing Development Center
- Also opportunities for stormwater enhancements on right bank
- Previous enhancements along left bank serve as a good model
- Muckleshoot Tribe has important fishing and direct land ownership rights/interests in this area
- Existing Seattle City Light substation use on left bank is a major constraint to any real bank re-alignment there
- Some participants advocated a "wild card" idea to move turning basin to area near Delta Marine and let the current basin silt in – the Port does not support this, has advocated and contracted for dredging this area in the past and has significant concerns about this
- Turning Basin #3 serves both a navigation and sediment collection function and prevents clean sediments from co-mingling with dirty sediments downstream

III. Other Comments

- Request for more information about areas where dredging is allowed and planned and what areas are recognized berths
- Request for bathymetric data that shows subtidal areas on site plans and river maps
- Comment that street ends are extensively used, including use by a range of groups, e.g. new arrivals, ethnic groups, etc.
- Comment regarding the importance of the Duwamish Tribal Cultural Center and finding related opportunities

Workshop #3 – Meeting Notes

Establishing Priorities and Crafting Implementation Strategies

South Park Neighborhood Center

July 24, 2008

I. Participant Comments on Project Recap and Report Outline Ideas

- Desire to see something different than and in addition to the "green dots" used in the working project maps that only indicate project location. Participant understands that this project won't include actual designs at individual sites, but wants more detail to respond to about what will occur at these sites.

- Desire to see the bathymetric data before this meeting – opinion of one individual was expressed that we may need another meeting after we get this data to refine project opportunities.

- Please show existing habitat in addition to the potential new projects so we have some context.

- Maps in the report should show more information – the more info the better.

- Additional discussion occurred about different maps for different purposes and the practical extent of displaying information on a map, i.e. "busy" maps.

- Be clear about whether you are proposing habitat enhancement or creation at any give site.

- Questions from the group about future ownership of restoration sites within the Commercial Waterway and what terms, conditions or easements would be used to protect these areas in perpetuity.

- Lots of questions and comments were expressed about the details and unknowns of the Superfund / NRDA relationship and process, including whether the Port would sell credits to other parties or only use the habitat sites to address its own liability. The answers to these questions are unknown at this time.

- The Port is waiting for direction from The Trustees on potential liability and will determine how potential habitat projects identified along the Duwamish relate

to resolution of Port and third party liability at that time.

II. Comments on Prioritization Concepts, Framework, Criteria and Evaluation

- Comment by workshop participant that the key concepts presented in the talking points document Restoration Project Prioritization Ideas appear to be "on the mark".
- Unrelated public comment was made that restoration on existing Port of Seattle terminal sites could be used to help address the limited habitat restoration opportunities available elsewhere in Section #2.
- Comment was made that the group may have been able to identify more opportunities in Section #2 if they had the bathymetric data.
- Comment by Port staff that the primary purpose of this Plan is to ID opportunities on "ribbon parcels" and it is not clear at what detail we will evaluate opportunities on non-Port sites.
- Participant comment that prioritization criteria should value restoration sites which are permanent, durable and sustainable.
- Comment from Trustees that the prioritization criteria should reflect the priorities that are emerging from that process, including an emphasis on marsh, intertidal and shallow subtidal habitats, with salmon being the species of greatest concern.
- Additional comments from the group about prioritizing marsh and mudflat habitats and rating projects with the highest "value" through existing methodologies.
- A meeting participant expressed the opinion that the restoration plan should establish a goal of 30% of the linear bank line of the river within each river section be restored. A comment was made that this was similar to, but less than, related planning goals of other agencies.
- Questions were raised about the scientific validity and applicability of this goal to the project area.

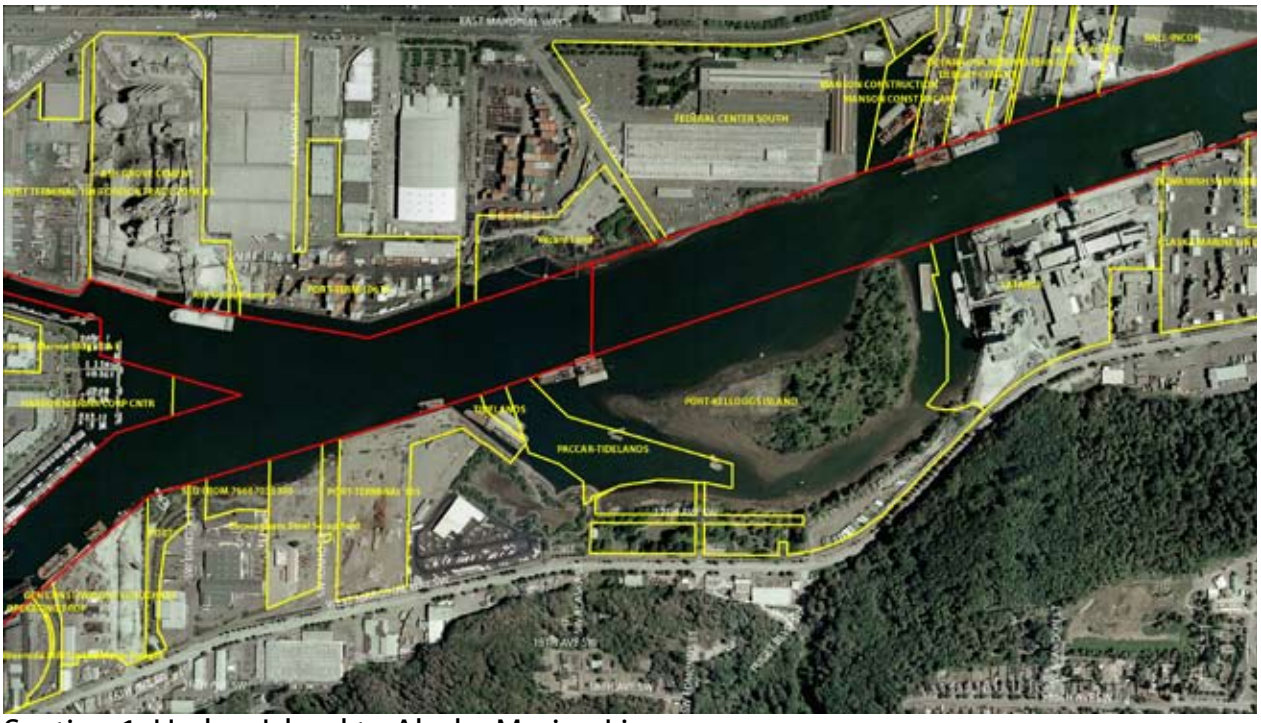
III. Comments on Implementation Discussion

- Questions and discussion about the relationship of the Lower Duwamish Habitat Restoration Plan to other Port plans, e.g. Port Shoreline Plan
- Questions about what if there is not enough area in the Lower Duwamish or resulting habitat values are not sufficient to address resource damage through restoration. No clear answers at this time, but the opinion that "restoration of all available sites will likely be needed to address damage" was expressed by a couple meeting participants.
- Additional discussion about how transactions will occur and whether the Port would provide land for restoration by other liable parties or otherwise assist with small business transactions. No clear answers at this time.
- A representative of a marine construction business stated that in previous meetings with the Port, they had expressed openness to the possibility that Port-owned ribbon parcels might be used to restore habitat to address private party liability.
- A comment was expressed that the project area should include Harbor Island and perhaps extend into Elliot Bay.
- A question was asked whether the Plan would point to future acquisitions (no).

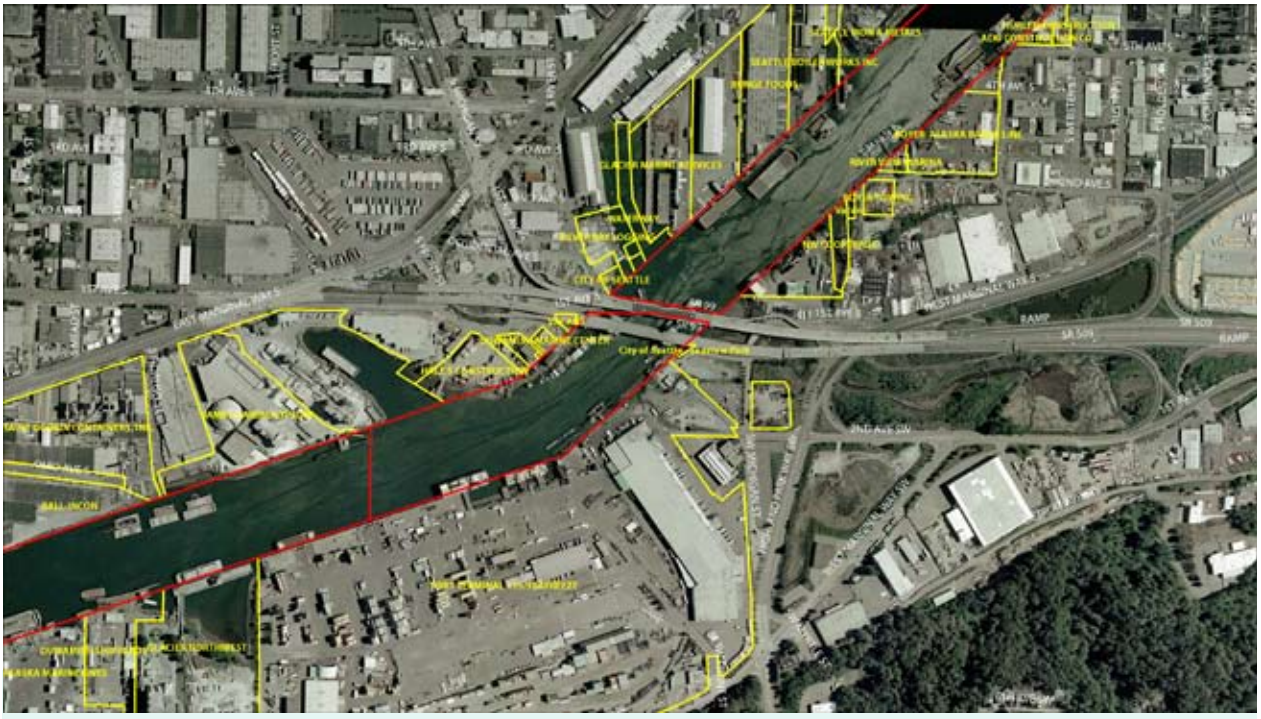
IV. Other Comments

- Request for bathymetric data showing subtidal areas on site plans and maps
- Comment regarding the importance of the Duwamish Tribal Cultural Center and finding related opportunities to support this key stakeholder

Appendix 3 Adjacent Parcel Ownership Maps



Section 1: Harbor Island to Alaska Marine Lines



Section 2: Alaska Marine Lines to Hurlen Construction

Commercial Waterway No. 1

Adjacent Parcels

Source Data: Information displayed may include data from one or more of the following: King County, Aerials Express.

Disclaimer: The information shown on this map is for planning purposes only. AHBL and the Port of Seattle make no warranties, real or implied, as to the accuracy of this information.

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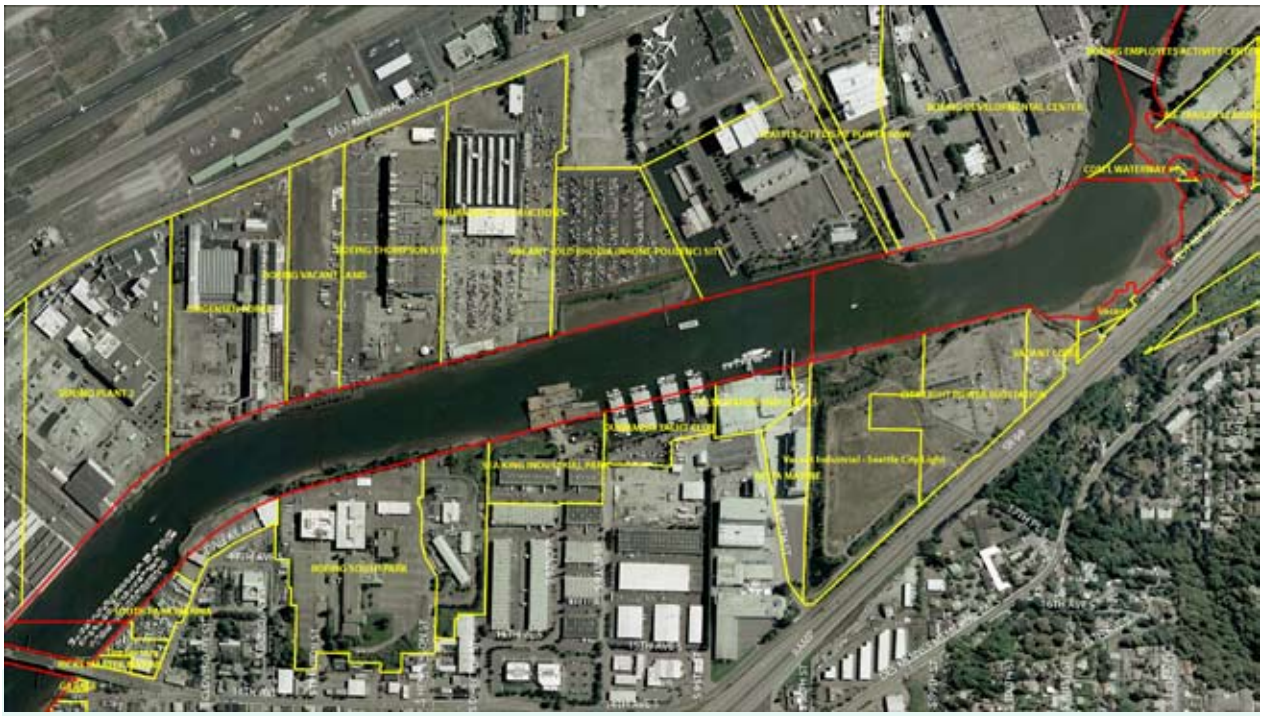
1 INCH EQUALS 300 FEET

Section 3: Hurlen Construction to 16th Avenue South



Section 4: 16th Avenue South to Turning Basin

Commercial Waterway No. 1

Adjacent Parcels

Source Data: Information displayed may include data from one or more of the following: King County, Aerials Express.

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1 INCH EQUALS 300 FEET

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