
Technical Memorandum
Habitat Project Opportunities
2012 CSO Control Program Review

August 2010



King County

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Acronyms

BMP	Best management practices
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CSO	combined sewer overflow
CSS	combined sewer system
EBDRP	Elliot Bay Duwamish Restoration Program
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
GIS	geographic information system
GSI	green storm water infrastructure
LDWG	Lower Duwamish Waterway Group
MTCA	Washington State Model Toxics Control Act
NOAA	National Oceanographic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
RI/FS	Remedial Investigation/ Feasibility Study
SPU	Seattle Public Utilities
WDOT	Washington State Department of Transportation
WRIA	Water Resource Inventory Area
WTD	King County Wastewater Treatment Division

1.0. INTRODUCTION

The purpose of this report is to summarize habitat-related programs and planned habitat projects that could occur in future within the 15 uncontrolled CSO basins being evaluated as part of the 2012 CSO Control Program Review. The information in this report will be used to inform the program review for schedule and scope implications and collaborative project opportunities. The information will also be useful to the specific CSO control projects as they transition from planning to design. This effort focused on the two geographical areas, the Lower Duwamish Waterway/Elliot Bay and the Ship Canal/Lake Union area.

1.1 Methodology for Inventory of Future Habitat Projects

King County reviewed reports and websites and conducted interviews to collect information relating to future habitat projects from 2010 to 2030. The information was sorted geographically for the Ship Canal and Lower Duwamish Waterway/Elliot Bay. Since some of the habitat projects are tied to continuing and evolving programs with many stakeholders, such as the Duwamish River Superfund Program, the report highlights the program and provides as much specificity as possible. It is the intent that the information collected here can be useful and provide the seeds for future investigation as CSO projects develop further into design in future years.

1.2 Study Area

The study area includes two zones where the uncontrolled CSO basins are located. These are the Lower Duwamish Waterway/Elliot Bay and the Ship Canal/Lake Union area. Figure 1-1 shows the location of all of the uncontrolled CSOs and Table 1-1 provides a breakdown of the CSOs located in the Lower Duwamish Waterway/Elliot Bay or the Ship Canal areas.

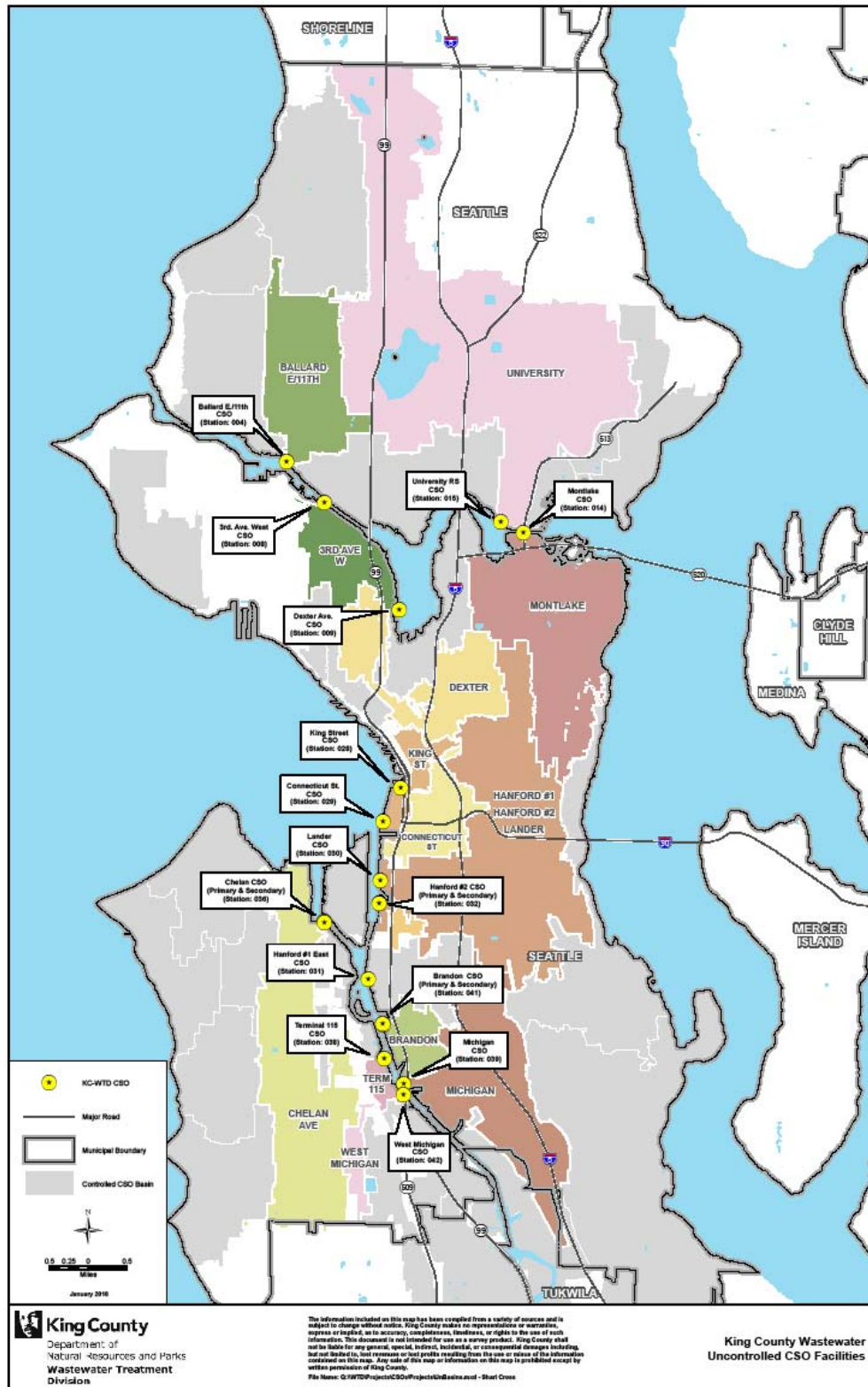


Figure 1-1. Location of Uncontrolled CSO Basins

Table 1-1. Location of Uncontrolled CSO Basins

DSN	Name of Uncontrolled CSO Basin	Lower Duwamish River/Elliot Bay	Ship Canal/Lake Union
028	King Street Regulator	x	
029	King Dome (Connecticut Street) Regulator	x	
030	Lander Street	x	
031	Hanford at Rainier (Hanford #1)	x	
032	Hanford #2	x	
036	Chelan Avenue Regulator	x	
038	Terminal 115 Overflow	x	
039	South Michigan Regulator	x	
041	Brandon Street Regulator	x	
042	West Michigan Regulator	x	
004	11th Avenue W		x
008	3rd Avenue NW		x
009	Dexter Avenue Regulator		x
014	Montlake Regulator		x
015	University Regulator		x

2.0. LOWER DUWAMISH WATERWAY/ ELLIOT BAY HABITAT INVENTORY

There are four major programs that could provide an opportunity for habitat restoration and could overlap with future CSO projects:

- Salmon Habitat Plan for WRIA 9
- Duwamish Superfund Cleanup
- Natural Resource Damage Assessment for the Lower Duwamish River
- Port Of Seattle's Lower Duwamish Habitat Program
- WDOT's Seawall Replacement

The following sections describe the background and status of each program and its associated projects and potential overlaps with uncontrolled CSO locations.

2.1 Salmon Habitat Plan for Water Resource Inventory Area 9 (WRIA 9)

2.1.1 Background and History

The Duwamish River is located in Water Resource Inventory Area 9. As part of salmon recovery planning under the Endangered Species Act, the local jurisdictions in the Green/Duwamish watershed developed a salmon recovery plan for WRIA 9. The habitat projects described in the Salmon Habitat Plan lists science-based projects, programs, and policies to protect and restore aquatic ecosystem health and salmon habitat in the Green/Duwamish and Central Puget Sound Watershed for the period 2006-2015. The actual plan is the local habitat-related chapter of the Puget Sound Salmon Recovery Plan (Shared Strategy for Puget Sound, January 2007). The shared strategy was developed by a coalition of salmon management interests including National Oceanographic and Atmospheric Administration (NOAA), U.S. Fish and Wildlife Service, Governor's Office, Puget Sound treaty tribes, state natural resources agencies, local governments, and key non-government organizations.

The watershed committee version of the plan which formed the basis of the shared strategy chapter was ratified by all 17 local governments in the watershed by January 2006 (Green/Duwamish and Central Puget Sound Watershed Water Resource Inventory Area 9 (WRIA 9) Steering Committee, August 2005). Implementation falls to the Shared Strategy's successor organization, the Puget Sound Partnership. Implementation is funding dependent and is ongoing.

2.1.2 Programs and Projects

The overall goal of the WRIA 9 Habitat Plan is to protect, rehabilitate and enhance habitat to support viable salmonid populations in response the Endangered Species Act listing of Chinook salmon and bull trout using an ecosystem approach.

The plan has three programs which include protecting and improving riparian vegetation, eliminating invasive vegetation, and developing a Transition Zone Habitat “Blueprint”. The “blueprint” for habitat restoration projects in the Duwamish Estuary transition zone is shown in Figure 2-1. The plan recommends using results from future studies and all other relevant information to further identify and prioritize restoration/rehabilitation projects, including those listed in the plan, for implementation. The “blueprint” could incorporate the latest science with information about willing land owners, economic considerations, and overall feasibility and effectiveness evaluations to identify the best locations for habitat restoration/ rehabilitation/ substitution projects. Periodic refinement of the “blueprint” should take into account any subsequent scientific findings on the nature and extent of the transition zone.

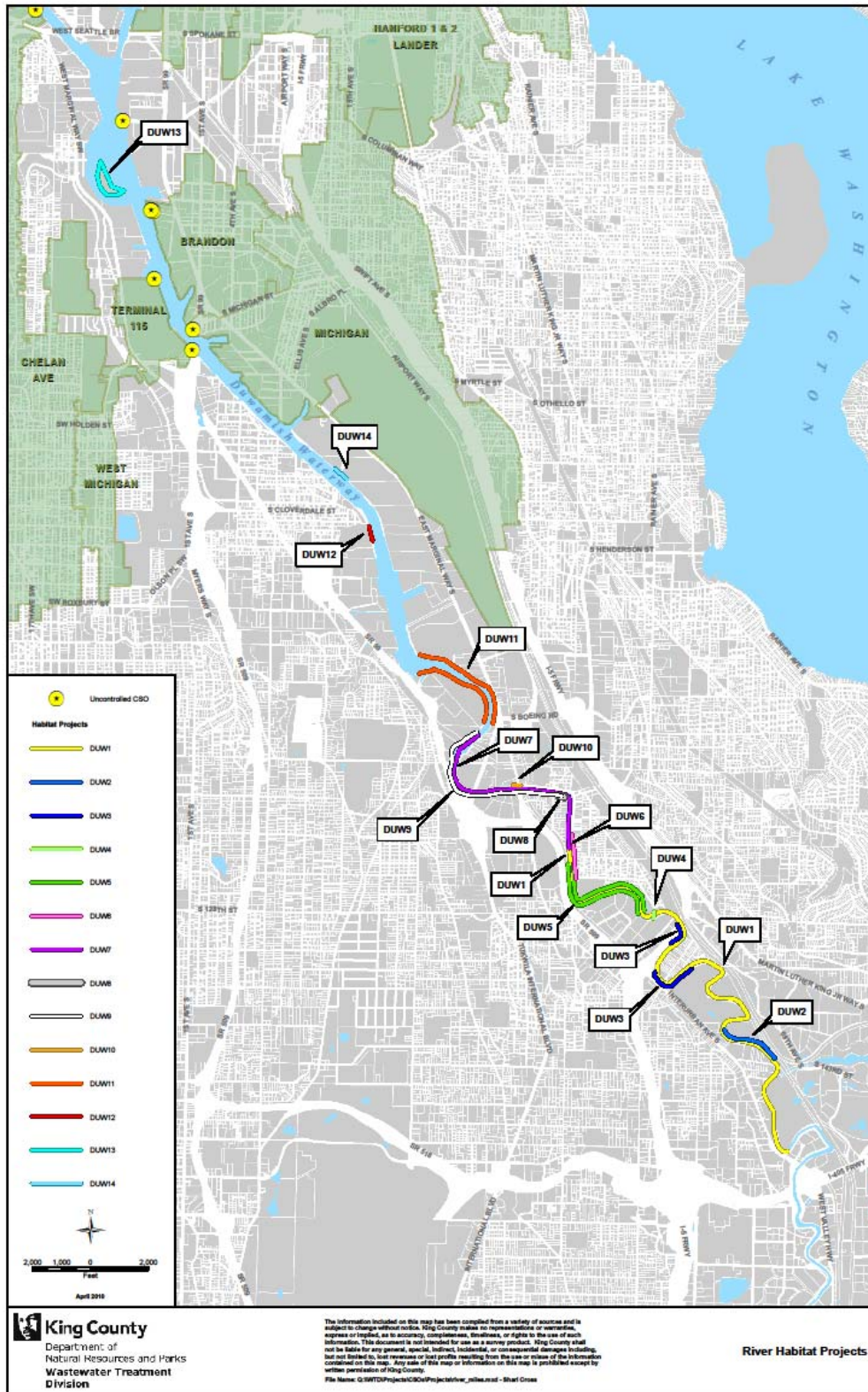


Figure 2-1. Transition Zone Habitat Blueprint (Shared Strategy for Puget Sound, January 2007)

Specifically, this blueprint will enlarge the Duwamish River estuarine transition zone habitat, restore intertidal mudflats (below RM 7), and channel edge habitats (upstream of RM 7) to create low velocity shallow water habitat and substitute lost slow water/shallow areas. The actions are focused at the mouth of the Duwamish to River Mile 1, between River Miles 2-5, and upstream of River Mile 5.5 and rehabilitate riparian areas in the entire Duwamish sub-watershed.

The 2005 plan identifies 13 project areas to enhance the quality and quantity of Chinook-rearing areas. Each project area identifies a geographic range for the restoration work ranging from 0.1 mile to several miles, depending upon the willingness of landowners. Each project area has some associated “habitat management strategies” rather than specific design details to guide the project development. Table 2.1 summarizes the project areas.

Table 2-1. Habitat Projects Identified in 2005 WRIA 9 Habitat Plan and 2007 Amendments to Plan

Project Area	River Mile Location	Project Description
DUW1	11.0-7.0 Both Banks	Shallow water Habitat creation (15 acres)
DUW2	10.3-9.9 right bank	Shallow water habitat creation & bank reshaping
DUW3	8.9-8.6, 8.4-8.2 left bank	Bank restoration and revetment setback
DUW4	8.0	Wastewater pipeline crossing retrofit
DUW5	7.9-7.1 both banks	Bank Restoration at 42nd Ave S
DUW6	7.2-6.9 right bank	Bank restoration and revetment setback at S. 115 St
DUW7	7.0-5.5 both banks	Shallow water habitat creation (20 acres)
DUW8	6.6 left bank	Riverton Creek habitat rehabilitation and fish passage
DUW9	6.6-5.5 left bank	Bank restoration and revetment setback
DUW10	6.3 right bank	Shallow water habitat rehabilitation at N Wind Weir
DUW11	5.4-4.7 both banks	Shallow water habitat creation (10 acres)
DUW12	3.8-3.7 left bank	Bank restoration and shallow water habitat creation at South Park
DUW13	1.4-1.2	Kellogg Island rehabilitation
DUW 14 (2007 project)	3.3 right bank	Sediment cleanup and habitat restoration (3.8 acres)

The plan was amended in 2007 and another Duwamish Project (DUW14) was added at Duwamish Slip 4. This project has more detail than the 2005 projects. This project will combine the cleanup of contaminated sediments with habitat restoration in the inner half of Slip 4. Slip 4 is a 3.8-acre “early action area” within the Lower Duwamish Waterway Superfund Site. The banks, partly-armored with bulkheads, will be excavated to remove contaminated soils and laid back to create 0.1 acre of new aquatic habitat and 0.3 acre of new riparian areas. Following

removal of contaminated sediments and bank soils, the sub tidal, intertidal, and bank areas will be capped with clean sand, gravel, rock, and large woody debris will be strategically placed. The City of Seattle has acquired the land, allowing conversion of land use emphasis from industrial/navigation to habitat. By eliminating deep berthing areas, the project will create new shallow sub tidal habitat (0.3 acre at -10 to -4 feet) and upper intertidal habitat (0.5 acre at +4 to +12 feet), with no net change in lower intertidal habitat (-4 to +4 feet). A concrete pier in Slip 4 will be demolished, removing over-water shading. Following the Superfund cleanup, emergent marsh and upland plants will be planted. The City of Seattle is the lead for this project and is partnering with King County and the Boeing Company.

2.1.3 Overlap with Uncontrolled Basins

Only one project identified in the WRIA 9 plan (DUW 13) at Kellogg Island is in the general area of King County's uncontrolled CSOs at Hanford #1 (Hanford at Rainier) and the Brandon Street Regulator. The rest of the project areas are significantly upstream of the other uncontrolled CSO basins.

2.2 Lower Duwamish Superfund Cleanup

2.2.1 Background and History

The Lower Duwamish Waterway is currently undergoing cleanup under the U.S. Environmental Protection Agency (EPA) Superfund program and the Washington Department of Ecology Model Toxics Control Act (MTCA) Program. The site includes a 5.5-mile portion of the Lower Duwamish River which flows into Elliott Bay, extending from the southern tip of Harbor Island to just south of the Upper Turning Basin.

In 2000, the City of Seattle, King County, the Port of Seattle, and the Boeing Company, working collectively as the Lower Duwamish Waterway Group (LDWG), agreed to conduct a remedial investigation/feasibility study (RI/FS) for the Lower Duwamish Waterway. The study was a voluntary action with oversight by the EPA and the Washington State Department of Ecology (Ecology).

The Lower Duwamish Waterway was formally listed as a Superfund site on September 13, 2001, and was formally listed as a Washington Model Toxics Control Act site in February 2002.

2.2.2 Programs and Projects

In early 2009, a draft Feasibility Study prepared by the LDWG was submitted to EPA and Ecology and released for public review. The draft Feasibility Study evaluated methods for cleaning up contaminated sediments in a 5-mile portion of the Lower Duwamish Waterway. The draft document was available for public review from April 29, 2009 to June 29, 2009, in parallel with review by EPA and Ecology. Over 550 written comments were received from individuals, businesses, and other organizations, and verbal comments were heard at community briefings. It is currently undergoing revision and a draft final feasibility study will be released for public review in October 2010 with a Cleanup Action Plan and Record of Decision by EPA in 2011.

The draft Feasibility Study evaluates the Lower Duwamish Waterway as a whole (i.e., on a waterway-wide basis), and includes the entire five miles of the Lower Duwamish Waterway (river mile 0 to river mile 5), starting just south of Harbor Island to just beyond the Upper Turning Basin at the Norfolk Area. The draft Feasibility Study presents an array of remedial alternatives for cleaning up contaminated sediments. The relative costs, benefits, and tradeoffs of the alternatives are evaluated according to the federal Comprehensive Environmental Response, Compensation, and Liability Act and the Washington State Model Toxics Control Act. This Feasibility Study will drive the cleanup actions and will also influence habitat restoration projects and programs in the Duwamish. All the parties involved are coordinating efforts as the Feasibility Study proceeds.

The Feasibility Study includes several general response actions that are applicable for remediating contaminated sediments in the Lower Duwamish. These include the following:

- Institutional controls, such as advisories not to eat resident seafood from the Lower Duwamish Waterway or restrictions on dredging or anchoring in certain areas.
- Monitored natural recovery that relies on natural processes to reduce concentrations of contaminated sediment.
- Enhanced natural recovery that uses a thin-layer placement of materials (e.g., sand) to enhance natural recovery processes.
- Both monitored natural recovery and enhanced natural recovery include monitoring to ensure that the recovery is progressing as expected.
- *Isolation capping* of contaminated sediments, typically using engineered layers of sand, gravel, or rock.
- *Physical removal* (e.g., dredging) of contaminated sediments.
- *Disposal* of dredged material both on- and off-site.

The remedial alternatives selected for evaluation in the Feasibility Study include various combinations of these general response actions. For each general response action, a number of different technologies and process options can be used. The draft Feasibility Study selects representative process options for evaluation, but other combinations of similar process options may be considered during the remedial design stage. Figure 2-2 shows the Lower Duwamish Study Area.

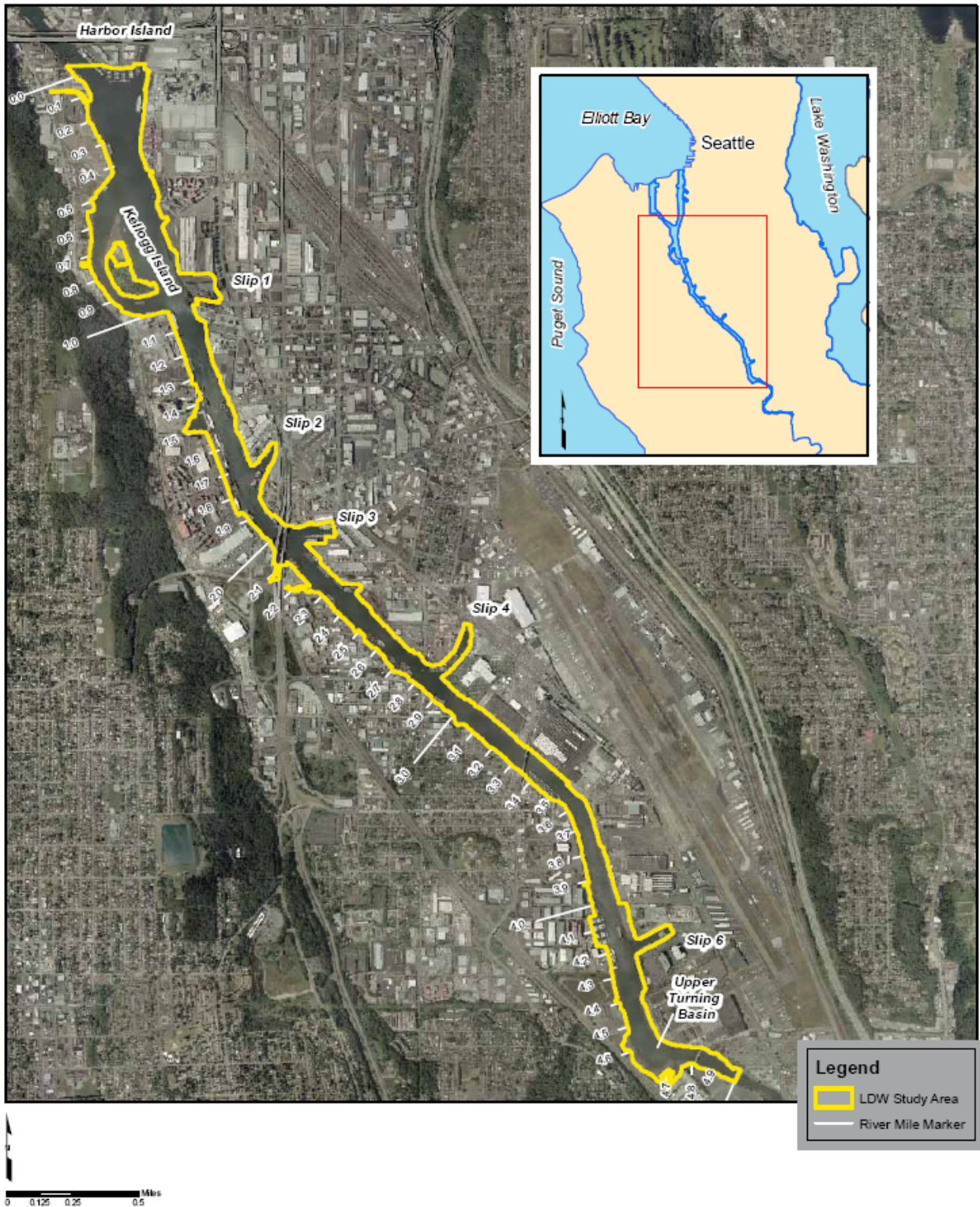


Figure 2-2. Lower Duwamish Super Fund Site (excepted from Draft Feasibility Study, Lower Duwamish Waterway, Figure ES-1. ENSR/AECOM. April 2009)

2.2.3 Potential Overlap with Uncontrolled CSO Basins

The potential exists for habitat projects or elements of habitat projects to be incorporated into the sediment cleanup projects that will be part of the final plan. As shown on Figure 2-3, there is geographic overlap with potential clean up actions being considered and King County's uncontrolled CSO locations. The orange and white areas on the figure indicate areas under consideration for some level of remediation. It is too early in the process to identify detailed actions at specific CSO locations, however, Table 2-2 summarizes the current alternatives. As CSO projects enter the pre-design phase, re-visiting the Lower Duwamish Superfund Plan will allow for further coordination. The timing of these actions is not known at this time although most are likely to be designed in the 2013-2018 timeframe with construction around 2018-1023.

Table 2-2. Summary of Site-wide Remedial Alternatives from Lower Duwamish Draft Feasibility Study

Uncontrolled CSO Locations	Comments	Proposed Actions/Concepts in Vicinity of CSO
031 Hanford at Rainier (#1)	Exceedances of Total PCBS	Early Action Area
038 Terminal 115	Potential Tribal clamming area; exceedances of chemicals other than PCBs	Located within larger area for dredging or excavation
039 Michigan Street Regulator	Exceedances of Total PCBS	Study area, no further action
041 Brandon Street Regulator	Exceedances of chemicals other than PCBs	Located at edge of dredge or excavation area
042 West Michigan Street Regulator	Potential Tribal clamming area	Study area, no further action

Parallel with and coordinated with the Superfund process, Ecology is leading a source control program to identify and control ongoing sources of chemical contamination in the areas that drain to the Lower Duwamish Waterway. The goal of this program is to identify and manage sources of chemicals impacting waterway sediments in coordination with sediment cleanups. As CSO projects evolve, this Ecology program may provide useful information for pre-design and design efforts.

The Source Control working group provides control action plans for areas of the river. These action plans document known and suspected contaminated sites, sources of contamination and other features such as groundwater sources in specific areas including the King County uncontrolled CSO basins.

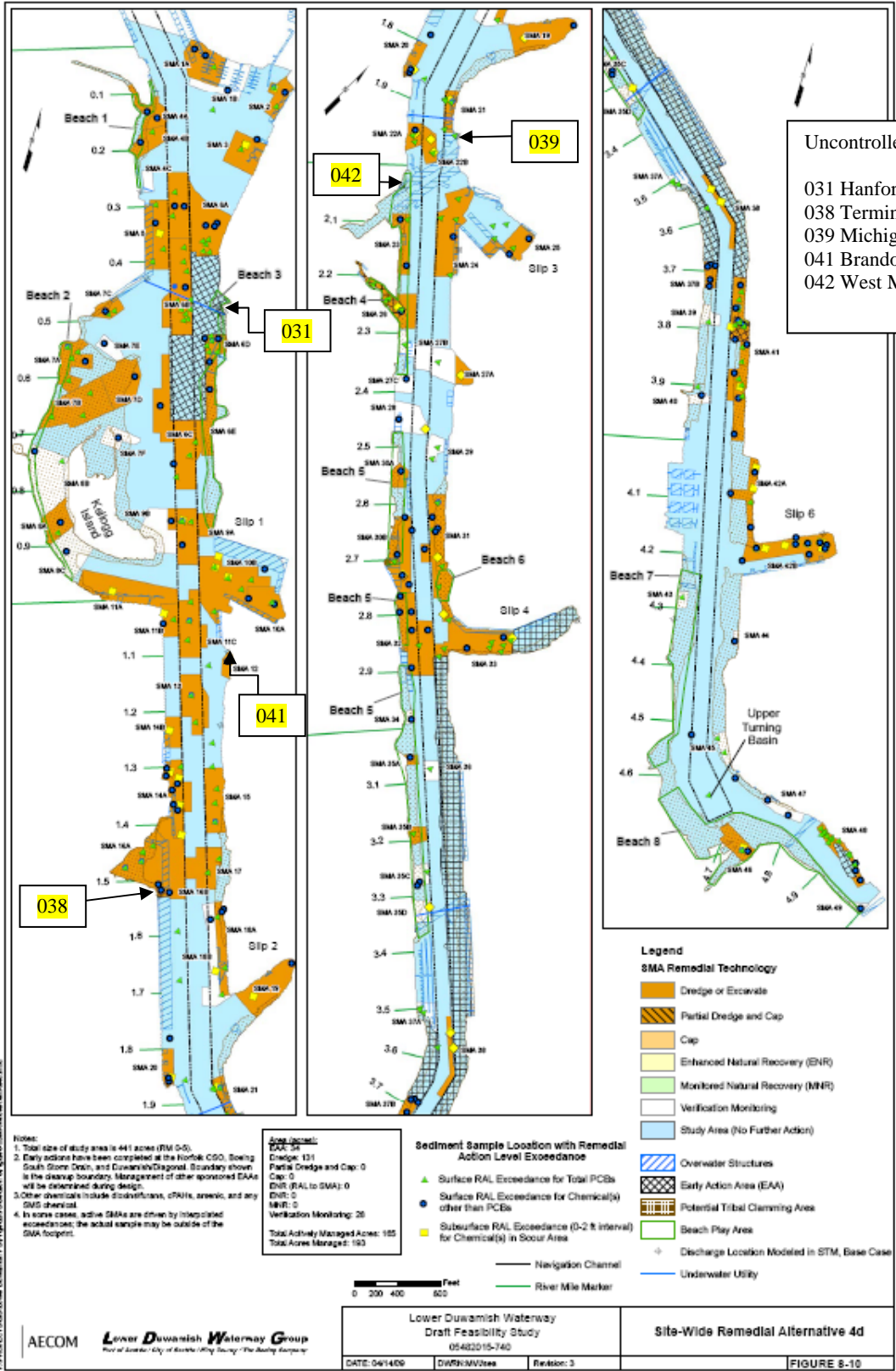


Figure 2-3. Lower Duwamish Waterway Potential Cleanup Alternatives (ENSR/AECOM, April 2009)

2.3 Natural Resource Damage Assessment for the Lower Duwamish River

2.3.1 Background and History

The National Oceanic and Atmospheric Administration (NOAA), the U.S. Department of Interior (DOI) and the U.S. Fish and Wildlife Service (FWS) are collectively leading the Natural Resource Damage Assessment (NRDA) for the Lower Duwamish River and Elliott Bay. These agencies are working with the Elliott Bay Trustee Council (Trustees) to develop the NRDA which determines the extent of injuries to natural resources, such as fish, shellfish, wildlife, sediments, and water quality, and the services they provide.

The Lower Duwamish Trustees include NOAA, DOI, FWS, Washington Department of Fish and Wildlife, Washington State Department of Ecology, Suquamish Tribe, and the Muckleshoot Indian Tribe. The Trustees are working within the existing Lower Duwamish Superfund process to recommend cleanup actions that will be protective in the long term and request long-term monitoring to track cleanup progress. NOAA and the other Trustees encourage coordination among EPA, responsible parties, and the Trustees to identify opportunities to incorporate restoration into the remedial actions to create efficiency and get to restoration in a timely manner.

2.3.2 Programs and Projects

NOAA is working with its Trustee partners to evaluate ecological risk, develop protective cleanup actions, and evaluate injury to natural resources. The Trustees released the Draft Restoration Plan and Programmatic Environmental Impact Statement (RP/PEIS) in May 2009 for public review and comment. The Draft RP/PEIS presents the types of restoration projects desired and outlines priority areas for restoration to recover natural resources lost or injured by the release of hazardous substances in the Lower Duwamish River.

Figure 2-4 shows the evaluation area included in the Draft RP/PEIS. The RP/PEIS also identifies and addresses environmental impacts that could result from construction and maintenance of selected types of restoration projects. The project area is basically the entire Lower Duwamish River and the plan does not identify specific projects. Rather, specific restoration actions will be identified through cooperative efforts and will vary by the site and the goal of the project. It is unclear when a final RP/PEIS is expected.



Figure 2-4. Map of NOAA's Natural Resource Damage Assessment for Elliott Bay and Lower Duwamish (NOAA, 2009)

Currently, development of the NRDA is in its second phase, Injury Assessment and Restoration Planning. Trustees have begun the process of assessing injury and restoration planning is underway through this process of developing the RP/PEIS. Once the restoration plan is finalized, restoration projects can be implemented as the Trustees reach settlements with responsible parties. Successful completion of these projects and subsequent release of potentially responsible party liability concludes the NRDA process.

Recently, as part of the Elliott Bay Restoration Program, Boeing and the Elliott Bay Trustee Council (comprised of NOAA, US Department of Interior, State of Washington, the Muckleshoot Indian Tribe and the Suquamish Tribe) reached an agreement that will result in the restoration of significant fish and bird habitat in the Lower Duwamish River along the Boeing Plant 2 shoreline. This negotiated settlement agreement was filed with the court on May 4, 2010. It resolves Boeing Corporation liability for injury to natural resources from releases of hazardous substances from Boeing properties along the Lower Duwamish River. The agreement includes two restoration projects (comprising 4.8 acres) creating habitat for out-migrating juvenile salmon, flatfish, crabs and shorebirds. Boeing also agreed to contribute to a long-term stewardship fund and repay almost \$2 million of the Trustee's natural resource costs. A work plan for the restoration is attached to the Consent Decree and can be found at <http://www.darrp.noaa.gov/northwest/elliott/index.html>.

2.3.3 Potential Overlap with Uncontrolled CSO Basins

The Trustees preferred alternative is the Integrated Habitat Restoration Approach. This approach is a comprehensive plan based on restoration of key habitats that, together, will benefit the range of different resources injured by releases of hazardous substances in the Lower Duwamish River. Restoration objectives, types of restoration desired, and priority areas to locate future restoration projects are defined in the plan.

Trustees established priority focus areas for restoration and put restoration in areas where habitat is scarce and essential for fish and wildlife in the Lower Duwamish River. They have identified a Habitat Focus Area (HFA1) for the whole Lower Duwamish River, including the mouths of freshwater tributaries that feed into the Duwamish River. The HFA1 includes the Lower Duwamish River extending from the northern tip of Harbor Island upstream to North Winds Weir (river mile 7.0) and including the east and west waterways. It delineates boundaries around important target habitat features and incorporates geographic boundaries, restoration site clusters, exposure to wave energy, location, maritime uses, land uses and development.

As CSO projects move ahead into pre-design, it is recommended that future WTD design teams consult with the Trustees on the NRDA process concerning the NRDA construction and mitigation opportunities. This consultation could result in collective, innovative habitat restoration efforts. Any restoration projects in the Habitat Focus Area (essentially, the entire Lower Duwamish) and its tributaries are subject to approval by the trustees, and must include permanently-wetted areas at appropriate elevations for use by trust resources.

Though specific projects are not identified, the geographic areas of interest and types of activities that the Trustees support are included here for information purposes for future projects. Geographic areas of interest include industrialized areas along both river banks to Elliott Bay and

habitats impacted by hazardous substance releases. Specific habitat types include near shore, marsh and mudflat, intertidal or shallow sub tidal habitats, or an integration of different habitats. Supported restoration actions include re-grading slopes to create elevations suitable for mudflats or intertidal marshes, and establishing upland vegetated buffers; re-creating off-channel habitats, such as side channels, through excavation; removing artificial debris, including creosote pilings, bank armoring, derelict vessels, and old piers and docks; planting adjacent uplands to provide riparian habitat appropriate for fish and wildlife, including willow whipping riprap armoring that cannot be removed; and removing invasive species and planting native species .

In June 2010, King County prepared four conceptual habitat restoration concepts in the Lower Duwamish for the NOAA effort (ESA/Adolfson, 2010). These projects were developed to assist in the calculation of credits that King County would owe to offset historical injuries to the Lower Duwamish Ecosystem. Though the projects are conceptual at this time and would be built by other parties in the future after NOAA settlement agreements are finalized, one of the restoration concepts is located at the Brandon CSO outfall. The concept, which involves 16.2 acres, includes the cove adjacent to the Brandon Street CSO outfall structure, the wider portion of the existing parking area, and the area near the existing high mudflats. The restoration would increase the intertidal area by 21,300 square feet, marsh habitat by 6,800 square feet, mudflat by 14,500 square feet, and riparian habitat by 15,400 square feet. Since the timing of this conceptual project is uncertain and assumes King County would contribute the land but others would build the habitat, this information is included to inform future design teams.

2.4 Port of Seattle Lower Duwamish Habitat Program

2.4.1 Background and History

The Lower Duwamish Restoration Plan developed by the Port of Seattle was adopted in July 2009. The plan provides an inventory of potential habitat restoration opportunities on Port of Seattle-owned property and guidance for future implementation efforts (Port of Seattle, July 2009). The intent of the 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 Port conducted a public involvement process to engage all stakeholders in formulating the plan for habitat restoration on Port property. Port-owned shoreline and aquatic areas along the Lower Duwamish River from the southern tip of Harbor Island to the turning basin near the south end of Boeing Field were discussed. Stakeholders included area businesses, community and environmental groups, Native American tribes, and key public agencies.

2.4.2 Programs and Projects

The Port of Seattle Lower Duwamish Habitat Restoration Plan is aimed at creating a long-range framework for investments on Port property along the shoreline of the river. The document is a master plan for the coexistence of natural habitat and the commerce that relies on the waterway

for navigation. The Habitat Restoration Plan focuses on restoration opportunities located on Port-owned shoreline and aquatic area property. It extends from Turning Basin Number 3 in the south to Harbor Island in the north. The Port anticipates the need for orderly implementation of habitat restoration projects in the Duwamish River to meet potential Superfund, Natural Resource Damage Assessment 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 objectives of the plan are 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 property and guidance for future implementation efforts. The intent of this plan is to develop a habitat restoration framework, demonstrating compatibility with existing and future marine industrial uses and activities in the lower Duwamish River. Figure 2-5 shows the area included in the plan.

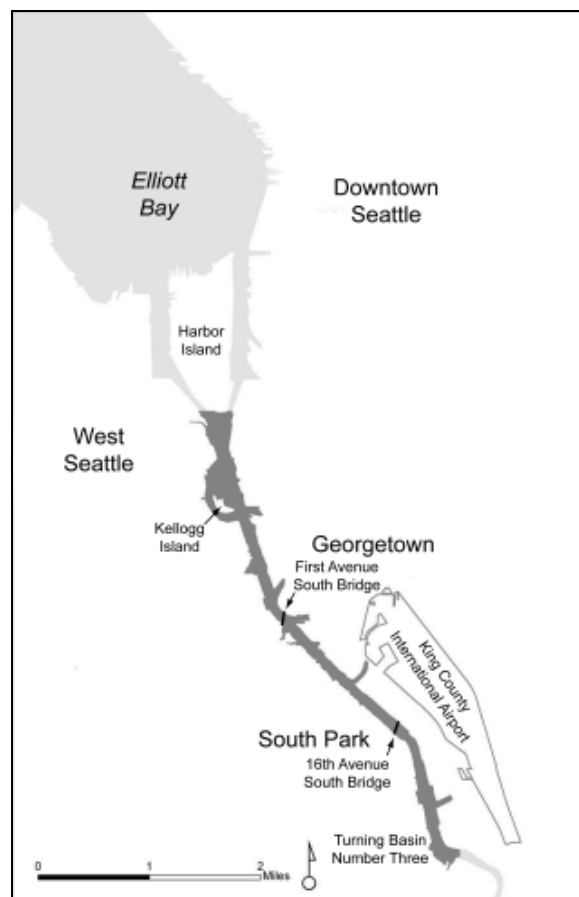


Figure 2-5. Port of Seattle Habitat Restoration Planning Area (Port of Seattle, July 2009)

The plan provides framework goals and policies to guide implementation of habitat restoration along the river. The three goals are as follows:

1. Involve affected stakeholders in habitat planning endeavors and build mutually beneficial partnerships for river stewardship.
2. Protect and foster water dependent businesses while working to restore habitat along the Duwamish River.
3. Ensure that habitat projects will be effective and enduring.

Each goal has related policies. The policies for Goal 3 are included below because they could have some bearing on future collaborative projects with the Port. The remaining policies can be found in the Port's plan (Port of Seattle, July 2009).

Policy 1: 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 2: 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 3: 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.

The plan also provides details about the restoration needs, constraints, and opportunities along each section of the river. Individual opportunities described in the plan 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.

The plan discusses several opportunities for collaboration on restoration projects that 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.

2.4.3 Potential Overlap with Uncontrolled CSO Basins

Three maps are included from the Port plan. The first map, Figure 2-6, shows an overview of Port-owned property and projects. The next two maps are close-ups of the areas where King County has uncontrolled CSOs and the restoration opportunities are identified in the Port plan. Table 2-3 summarizes the restoration opportunities by CSO outfall location.

Table 2-3. Proposed Actions/Concepts in Vicinity of King County Uncontrolled CSOs

Uncontrolled CSO Outfall Locations	Port of Seattle’s Proposed Actions/Concepts in Vicinity of King County’s Uncontrolled CSOs
031 Hanford at Rainier (#1)	<p><i>This CSO outfall is located between Port Projects 2 & 3</i></p> <p><u>Project 2 – Terminal 106, East Bank line, River Mile 0.1 to 0.4 – Corridor Habitat.</u> Potential restoration actions could include reshaping and reducing the bank line to create a fine-grain substrate bench along the length of the site. Existing riprap bank line could be re-shaped with variable slope to receive native riparian plantings, installed as bank line vegetation pockets and planting wells. Potential actions at this site could include approximately 1,350 linear feet of bank line enhancement.</p> <p><u>Project 3 – Terminal 108, East Bank line, River Mile 0.5 – Pocket Habitat.</u> 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 large woody debris incorporated into the emergent planting areas. A riparian vegetation buffer could be restored at the top of the bank. Potential actions at this site could cover approximately 750 linear feet of bank line alteration.</p>
038 Terminal 115	None identified.
039 Michigan Street Regulator	<p><u>Project 9 – North First Avenue South Bridge, East Shoreline, River Mile 2.0 – Corridor Habitat.</u></p> <p>Potential restoration actions could include excavation and re-grading of approximately 225 linear feet of existing riprap/rubble bank line. A fine-grain intertidal substrate bench could be constructed. The remaining portions of Port-owned bank line could be shaped at approximately 3:1 slope and portions of the slope could be planted with riparian vegetation.</p>
041 Brandon Street Regulator	None identified.
042 West Michigan	<u>Project 8 – Southwest Terminal 115, West Bank line, River Mile 2.0 – Hub</u>

Uncontrolled CSO Outfall Locations	Port of Seattle's Proposed Actions/Concepts in Vicinity of King County's Uncontrolled CSOs
Street Regulator	<p><u>Habitat.</u> 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 the Washington Department of Transportation (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 sub tidal aquatic area. An intertidal substrate suitable for emergent vegetation could be created. Side slopes also could be planted with native riparian vegetation and 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 location to approximately 4.5 acres if the adjacent public right-of-way is included. Restoration could include a 300- to 400-foot intertidal channel connection from the new restoration activities to the interior of the existing WDOT aquatic habitat restoration area.</p>

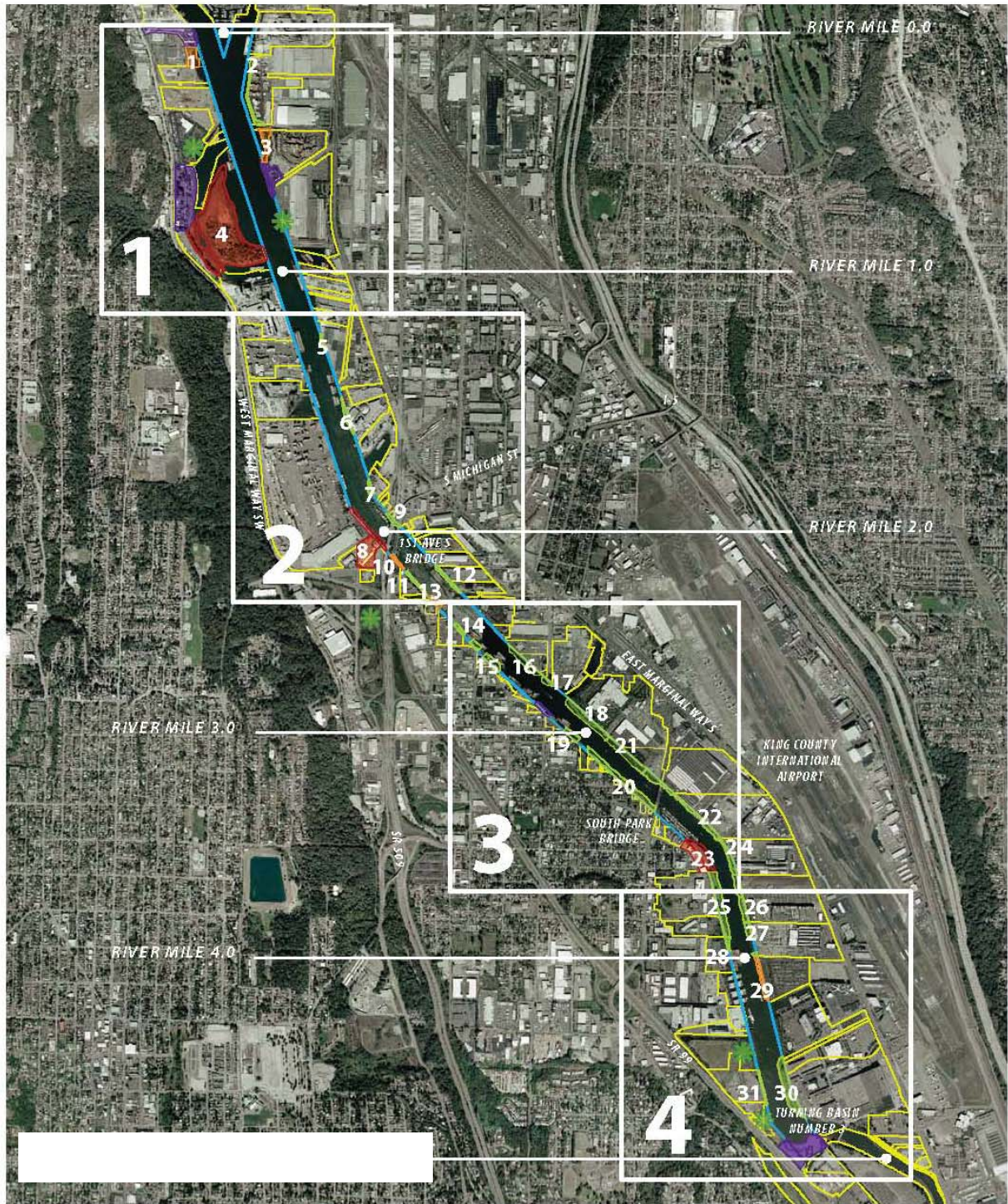


FIGURE 6. RESTORATION OPPORTUNITY SITE OVERVIEW

Figure 2-6. Restoration Opportunity Overview (Port of Seattle, 2009)

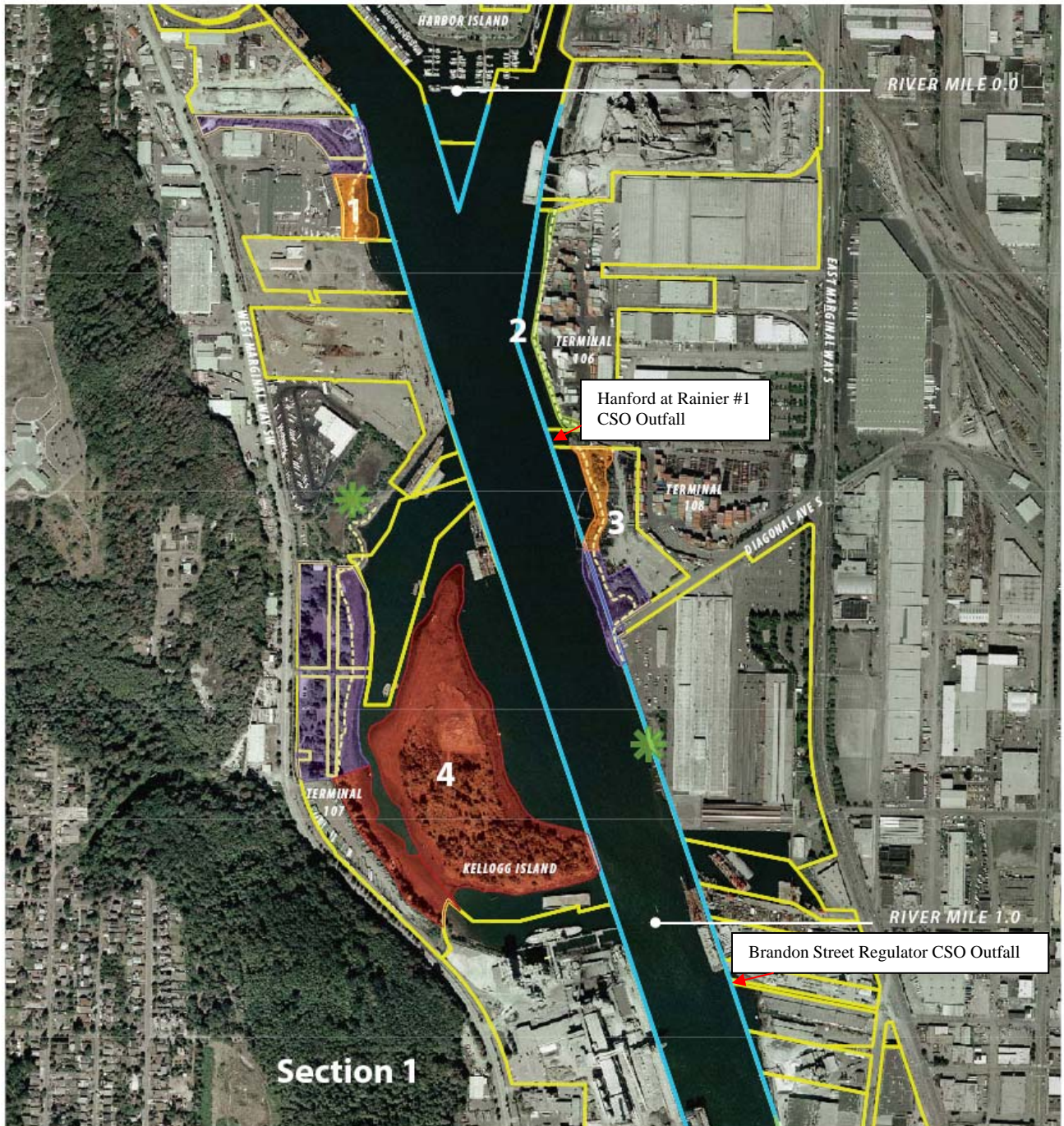


FIGURE 7. SECTION 1 RESTORATION OPPORTUNITY SITES

Figure 2-7. Section 1 Restoration Opportunities (Port of Seattle, 2009)

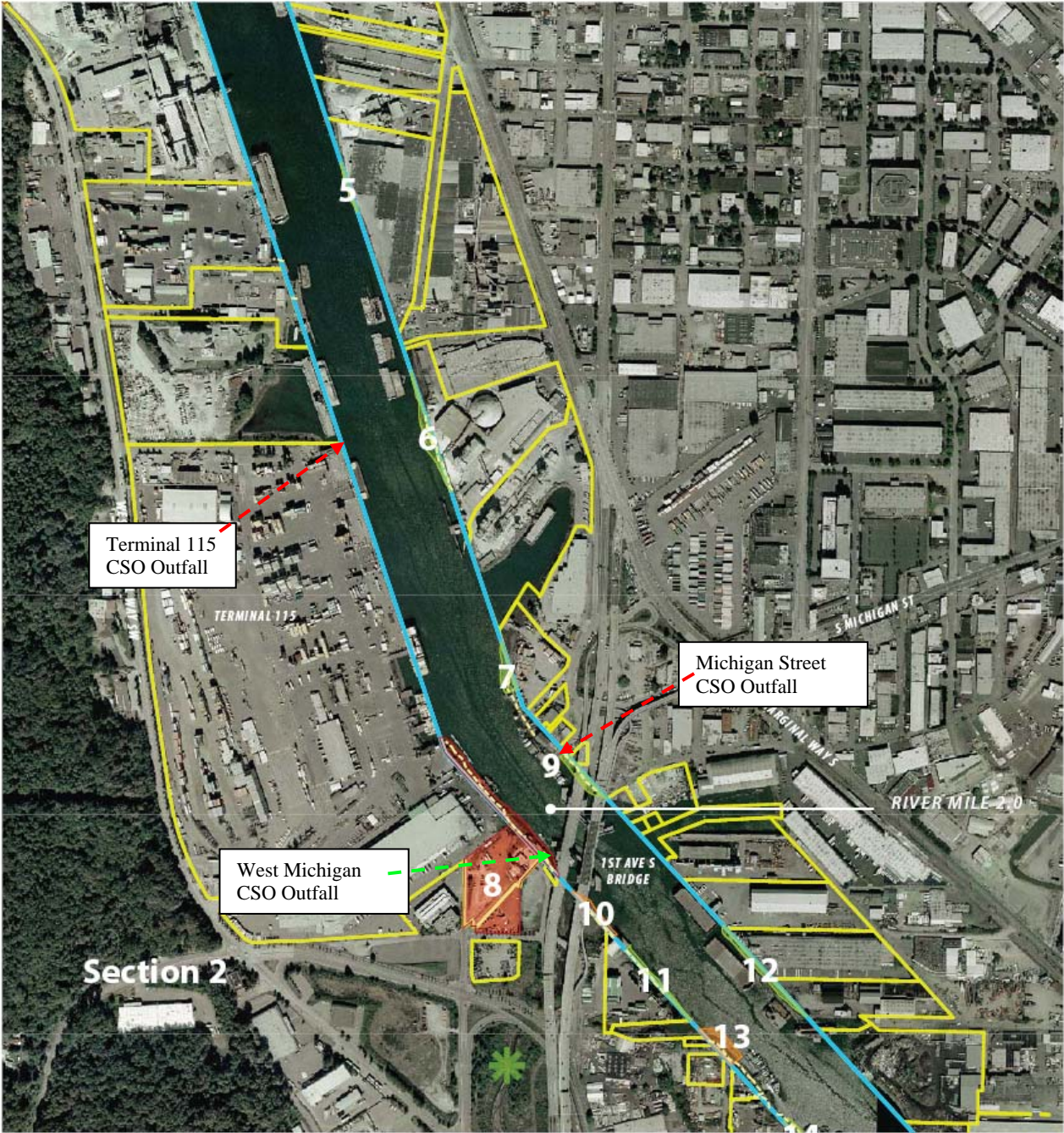


FIGURE 8. SECTION 2 RESTORATION OPPORTUNITY SITES

Figure 2-8. Restoration Opportunity Area 2 (Port of Seattle, 2009)

2.5 Elliot Bay Sea Wall Project

2.5.1 Background and History

The existing seawall protects Seattle's downtown waterfront from wind driven storm waves and the erosive tidal forces of Elliott Bay. Major utilities, Alaskan Way and SR 99, the ferry terminal, and rail lines are also supported by the seawall. The seawall was built between 1916 and 1934. It has deteriorated significantly over the last 90 years and does not meet current earthquake standards. The Elliot Bay Seawall Project is underway to replace the existing seawall.

The Elliott Bay Seawall Project is runs along the waterfront in downtown Seattle from South Washington Street to Broad Street, as shown in Figure 2.8. The Seattle Department of Transportation (SDOT) and U.S. Army Corps of Engineers (Corps) are studying alternatives to provide continued protection to the Seattle waterfront from the erosive forces of Puget Sound and to ensure the waterfront is safe for public uses. Seattle has requested assistance from the U.S. Corps of Engineers since the Corps will assist on projects water resource problems that are beyond the capabilities of local governments, due to financial constraints, lack of technical expertise or jurisdictional boundaries. The Corps is developing an Investigation Feasibility Study to determine its involvement in the project. In the meantime, an environmental analysis process is underway, and scoping is began in June 2010. The scoping period will ran from June 1 through July 19, 2010.

The seawall project design will be coordinated with the Central Waterfront Planning process, which is a larger process to plan improvements along Seattle's waterfront. It is a urban design framework which sets a direction for a future public and private development that will benefit everyone who lives, works and plays along the water's edge. It is not necessary to know the final plans for the waterfront redevelopment in order to move forward with the seawall project. The intent is to design a seawall that will accommodate and work with the range of Seattle waterfront design options.

2.5.2 Programs and Projects

Specific habitat projects and coordination opportunities will be developed as part of the environmental review process. The draft Environmental Impact Statement, expected to be complete late 2011, will have conceptual habitat projects identified based on the impacts of the seawall and coordination efforts. The first phase of the seawall construction, the southern end from Washington Street to Broad Street is anticipated to begin in late 2012-2013. Habitat opportunities around Pier 48 and possibly Coleman dock may be included in the seawall project. It is not known at this time.

2.5.3 Potential Overlap with Uncontrolled CSO Basins

Potential overlap with one uncontrolled CSO basin, King Street Regulator, may occur depending if the seawall is extended southward to include Pier 48 and if improvements or modifications are needed at the King Street outfall. The outfall is currently outside the area of the seawall project so an overlap does not exist with current project footprints but changes may occur over time. Release of the draft EIS in late 2011 for the seawall would be an appropriate time to determine any coordination opportunities.



Figure 2-8. Elliot Bay Seawall Project (Elliot Bay Seawall Subgroup Meeting #1 Presentation, July 20, 2010)

2.6 Summary of Lower Duwamish Waterway and Elliot Bay Projects

This section summarizes the potential projects described in chapter 2.

Table 2-4. Summary of Habitat Projects by Uncontrolled CSO Basin

DSN	Name of Uncontrolled CSO Basin	Area	Potential Overlap Habitat Programs/Projects	Lead Agency or Organization
028	King Street Regulator	Elliot Bay	Elliott Bay Seawall	SDOT
029	King Dome (Connecticut Street) Regulator	Elliott Bay	Elliott Bay Seawall	SDOT
030	Lander Street	Duwamish		
031	Hanford at Rainier (Hanford #1)	Duwamish	1) DUW 13 2) Early Action Area 3) Between two Port Projects (2&3)	1) WRIA 9 2) LDWG 3) Port of Seattle
032	Hanford #2	Duwamish		
036	Chelan Avenue Regulator	Duwamish		
038	Terminal 115 Overflow	Duwamish	Dredge or excavate	LDWG
039	South Michigan Regulator	Duwamish	1) Study area, no action 2) Port Habitat Project (9)	1) LDWG 2) Port of Seattle
041	Brandon Street Regulator	Duwamish	1) Edge of Dredge area 2) Potential Habitat Project	1) LDWG 2) NRDA
042	West Michigan Regulator	Duwamish	Study Area, no action Port Habitat Project (8)	1)LDWG 2) Port of Seattle

LDWG = Lower Duwamish Water Group/ Superfund Program

NRDA = NOAA Natural Resource Damage Assessment

WRIA 9 = Water Resource Inventory Area 9 Green Duwamish

3.0. SHIP CANAL INVENTORY

3.1 Background and History

One source of habitat projects and actions for the Ship Canal/Locks area is the Final WRIA 8 Chinook Salmon Conservation Plan. The plan recommends actions to restore and protect habitat that salmon need to survive in the Lake Washington/ Cedar/ Sammamish Watershed. Developed by a collaboration of citizens, scientists, community, business, and environmental groups, local elected officials, and public agency staff, the science-based plan has been ratified by 24 local governments.

Another source of potential projects is the 520 Bridge replacement implemented by Washington State Department of Transportation (WSDOT). The bridge replacement is broken into 4 separate projects- each with their own schedule, design and environmental review process. Specific habitat projects have not been identified at this early stage of the environmental review, however construction for the bridge replacement will be completed by 2014 which is likely before the University or Montlake CSO projects will be in pre-design.

3.2 Programs and Projects

Table 3-1 describes all the projects in the plan for the Ship Canal/Locks area. The website <http://hws.ekopsystem.us> has detailed information on each project, location and lead agency.

Table 3-1. Prioritization of Site-Specific Restoration Projects for the Ship Canal/Locks

Reach	Project	Description	Benefits to Chinook	Ease of Implementation
Ship Canal Locks	M204	Add/replace event entrainment	H	H
Ship Canal Locks	M206	Improve estuary conditions upstream of the Ballard Locks	H	M/L
Ship Canal Locks	M205	Locks: Construct a more natural, fairly wide and long channel at the Locks	H	L
Ship Canal Locks	M201	Further reduce lockage speed for large locks.	M	H
Ballard locks to start of Fremont Cut (Salmon Bay)	M209	Ballard Bridge Water Quality Improvements	M	M
Portage Bay	M216	Explore ways to reduce predation in Portage Bay	M	M

Reach	Project	Description	Benefits to Chinook	Ease of Implementation
Lake Union (Fremont Cut to University Bridge)	M212	South Wallingford Drainage Improvements	M/L	M
Fremont Cut to Portage Bay	M214	Remove North Lake Union In-Water Structures	M	M/L
Gasworks Park	M213	Bank Softening and Re-vegetation at Gasworks Park	M/L	L
University Bridge	M215	7th Ave Street End Park Creation and Shoreline Restoration	L	H
Ship Canal Locks	M202	Fish Ladder Improvements at Locks	L	H/M
Ballard locks to start of Fremont Cut (Salmon Bay)	M208	Ballard Bridge Shoreline Restoration	L	H/M
Fremont Cut	M211	99 Bridge Shoreline Restoration	L	M
Fremont Cut	M210	Demonstration Restoration Project at Fremont Bridge	L	M/L
Ship Canal Locks	M207	Explore needs/options for "Low Elevation" smolt passage at locks	?	L
Montlake Cut	M217	Explore options for deepening the Montlake Cut	?	L
Ship Canal Locks	M203	Add fishway lighting for the ladder	?	?

3.3 Potential Overlap with Uncontrolled CSO Basins

There are two projects listed in the WRIA 8 plan that overlap with uncontrolled CSO basins:

Project #1: Remove North Lake Union In-water Structures (WRIA 8 Project Number M214) - 2005-2015

The purpose of this project is to remove in-water structures and debris (sunken boats, refrigerators, shopping carts, etc.) to reduce habitat for bass and other predators from the Fremont Cut to the Montlake Cut. The project was started in July 2005 and will continue through 2015. The lead sponsor is the City of Seattle. Since the Seattle Department of Planning and Development often requires removal of debris associated with new over-water structures and bank work, CSO projects may be able to partner with this effort depending on the schedule of CSO work in the area. A map is shown in Figure 3-1.



Figure 3-1. WRIA 8 Project Number M214

*Project #2: Explore ways to reduce predation in Portage Bay (WRIA 8 Project Number M216)
2005-2015*

The purpose of this project is to reduce predation on juvenile chinook salmon in Portage Bay. It is a proposed project anticipated to occur between 2005 and 2015 and sponsored by the City of Seattle. Predation in Portage Bay is not well understood and further study should be conducted to evaluate the extent of predation in the area. This is not a capital project at this time but is a proposed study. It is included here for information because any future CSO projects in the University or Montlake basins may want to see the status of this work and partnering opportunities that may have evolved in the future. Figure 3-2 shows the study area.



Area of M216 Portage Bay Project

Figure 3-2. Area of M216 Portage Bay Project (WRIA 8 Project Number M216)

4.0. SUMMARY OF INVENTORY

There are numerous habitat plans and conceptual projects adjacent to the uncontrolled CSO basins. Table 4-1 summarizes the inventory of future projects. Due to the complexity of the Superfund and NOAA activities in the Duwamish, schedules for possible projects are unknown or uncertain. The information provided here does not appear to influence any of the work in the uncontrolled basins with the exception of Brandon Regulator. It would be useful to conduct CSO implementation activities in concert with or before any NOAA settlement related to habitat efforts so construction activities do not impact newly created restoration efforts. Lastly, this inventory may inform future CSO implementation activity teams by providing baseline habitat opportunity information.

Table 4-1. Summary of Habitat Projects by Uncontrolled CSO Basin

DSN	Name of Uncontrolled CSO Basin	Area	Potential Overlap Habitat Programs/Projects
028	King Street Regulator	D	
029	King Dome (Connecticut Street) Regulator	D	
030	Lander Street	D	
031	Hanford at Rainier (Hanford #1)	D	WRIA 9 (DUW 13) Early Action Area - LDWG Between two Port Projects (2&3)
032	Hanford #2	D	
036	Chelan Avenue Regulator	D	
038	Terminal 115 Overflow	D	Dredge or excavate - LDWG
039	South Michigan Regulator	D	Study area, no action - LDWG Port Habitat Project (9)
041	Brandon Street Regulator	D	Edge of Dredge area - LDWG Potential Habitat Project - NRDA
042	West Michigan Regulator	D	Study Area, no action - LDWG Port Habitat Project (8)
004	11th Avenue W	SC	
008	3rd Avenue NW	SC	WRIA 8 (M214)
009	Dexter Avenue Regulator	SC	WRIA 8 (M214)
014	Montlake Regulator	SC	WRIA 8 (M216)
015	University Regulator	SC	WRIA 8 (M216)

D = Duwamish River

LDWG = Lower Duwamish Water Group/ Superfund Program

NRDA = NOAA Natural Resource Damage Assessment

Port = Port of Seattle Habitat Plan

SC = Ship Canal/ Lake Union

WRIA 8 (project #)

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