

Lower Duwamish Waterway Group

Port of Seattle / City of Seattle / King County / The Boeing Company

Lower Duwamish Waterway Remedial Investigation

TECHNICAL MEMORANDUM: RESULTS FROM SURVEY OF POTENTIAL HUMAN ACCESS LOCATIONS ON THE LOWER DUWAMISH WATERWAY

FINAL

Prepared for

The US Environmental Protection Agency
Region 10
Seattle, WA

The Washington State Department of Ecology
Northwest Regional Office
Bellevue, WA

March 30, 2005

Prepared by:  WindWard
environmental LLC

200 West Mercer Street, Suite 401 ♦ Seattle, Washington ♦ 98119

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Acronyms

Acronym	Definition
CSO	combined sewer overflow
DRCC	Duwamish River Cleanup Coalition
Ecology	Washington State Department of Ecology
ECOSS	Environmental Coalition of South Seattle
EPA	US Environmental Protection Agency
LDW	Lower Duwamish Waterway
LDWG	Lower Duwamish Waterway Group
QAPP	Quality Assurance Project Plan
RI	Remedial Investigation
RM	river mile
Windward	Windward Environmental LLC

1.0 Introduction

This technical memorandum summarizes the results of the identification of potential human access locations to the Lower Duwamish Waterway (LDW) shoreline. The survey was conducted on July 6, 19, and 20, 2004, based on the methods described in the technical memorandum, *Survey Methods for Identifying Potential Human Access Locations to the Lower Duwamish Waterway Shoreline* (Windward 2004c). This qualitative reconnaissance survey was designed to obtain information needed to better understand locations where people may come into contact with the intertidal sediments.

Survey data presented in this report were collected as part of the Phase 2 Remedial Investigation (RI) for the LDW (Windward 2004a). The primary purpose of the survey is to identify LDW intertidal sediments that humans could come into direct contact with during the collection of seafood or other activities on the LDW. The information derived from this survey will be used to inform the selection of intertidal sediment sampling locations in the surface sediment Quality Assurance Project Plan (QAPP). A secondary purpose of this survey was to observe human activity that might result in humans having direct contact with LDW sediments.

It should be noted that this survey was not meant to comprehensively document human use of the LDW and hence should not be used to make conclusive statements about human use of the LDW. That would have required a much higher level of effort involving observations at different times over multiple days. In addition, this survey focused mainly on public access. Only a limited effort was made to document the extent of employee or resident access on private properties. The survey, as conducted, is sufficient to identify the major potential routes of direct sediment exposure (e.g., beach play, restoration site activities, occupational exposure, and exposures during the collection of seafood). Further, the survey is sufficient to identify intertidal sediments where it is most likely for individuals to have direct contact with sediments. The development of exposure assumptions for the direct contact exposure pathway will occur during the Phase 2 human health risk assessment. The Lower Duwamish Waterway Group (LDWG) whose members include the City of Seattle, King County, the Port of Seattle, and The Boeing Company, the US Environmental Protection Agency (EPA), and the Washington State Department of Ecology (Ecology) will continue to collect information to further refine development of direct contact sediment exposure pathways for the Phase 2 human health risk assessment. For example, estimates of the amount of dermal contact and incidental ingestion of sediments during clam digging have not yet been determined.

This memo is organized into the following sections:

- ◆ Section 2 - Methods
- ◆ Section 3 - Results
- ◆ Section 4 - References

2.0 Methods

This section provides a brief description of the methods used to assess potential human access locations to the LDW shoreline. The purpose for the qualitative reconnaissance survey of the LDW shoreline is to provide a comprehensive inventory of intertidal areas (both public and private) where people may have access to the LDW and could potentially come into contact with intertidal sediments. The survey was conducted in two parts: by land (July 6) and by water (July 19-20).

2.1 METHODS FOR OBSERVING HUMAN ACCESS LOCATIONS FROM LAND

On July 6, 2004, Windward Environmental (Windward) conducted a survey as described in the human access survey methods technical memorandum (Windward 2004c). The survey, conducted during a low tide cycle, covered intertidal areas in the LDW from river mile¹ (RM) 0 to RM 5.0. Windward personnel present on this survey included Tad Deshler and Angelita Rodriguez. Allison Hiltner and Lon Kissinger from the EPA provided oversight. Other participants included John Beal (I'M A PAL Foundation) and Heather Trim (Duwamish River Cleanup Coalition). Both John and Heather provided additional information about human activities they have observed on other occasions at specific locations along the LDW.

Aerial photographs, street maps, and a map of potential human access locations prepared by Public Health Seattle & King County² (Figure A-1 in Appendix A) were utilized as reference materials during the survey. The route for the land survey began at the Diagonal Avenue South public shoreline access point on the eastern side of the LDW shoreline (RM 0.5) and ended at the Terminal 105 park (RM 0) on the western side. See Figures 3-1a through 3-1d for these locations and other locations listed in Section 2 (oversized figures located following the main text of this document). The survey was conducted during low tide by car and foot, which differed from the original plan to use bicycles. The identified human access locations were characterized

¹ River mile (RM) designations are referenced to the southern end of Harbor Island (RM 0)

² An undated map titled Duwamish Waterway Access Points - Harbor Island to South Turning Basin created and supplied by the Public Health of Seattle and King County and used only as a general guide for the Duwamish Waterway. The labeling of access points on this map is unrelated to the results of the field surveys described in this document.

by site accessibility, shoreline characteristics, and evidence of human use. Shoreline access survey field forms were completed and digital photographs were taken to document each site. Each site was initially numbered in the order it was surveyed, but renamed with an alphanumeric code (e.g., E1) with the first letter representing the eastern or western side of the LDW.

2.2 METHODS FOR OBSERVING HUMAN ACCESS LOCATIONS FROM WATER

Windward conducted the water portion of the human access location survey by boat on July 19 and 20, 2004, according to methods described in Windward (2004c). On this day, survey participants included Tad Deshler (note taker), Angelita Rodriquez (cameraperson), Lon Kissinger (EPA), John Beal (I'M A PAL Foundation), BJ Cummings (Duwamish River Cleanup Coalition [DRCC]), Marcia Henning (Community Outreach Educator with the Washington Department of Health), and Wendy Livezy (enforcement officer from the Washington Department of Fish and Wildlife). The route for the July 19, 2004 survey began at the South Park Marina, RM 3.4 on the western side of the LDW shoreline, covered the eastern side downstream from RM 4.5 to RM 0 and ended upstream at Terminal 117, RM 3.5 on the western side of the LDW. The survey was conducted during low tide by boat following the main channel and excluded Slips 1, 2, 3, 4, and 6 because the water depths were too low for the survey boat.

The slips, and other areas that were not accessible during the July 19, 2004 survey, were surveyed via kayaks on July 20, 2004. Angelita Rodriquez (Windward), BJ Cummings (Duwamish River Cleanup Coalition), Allison Hiltner (EPA), and Lon Kissinger (EPA) were present for the kayak survey. The route for the kayak survey began at Turning Basin 3 Park, RM 4.7 on the western side of the LDW shoreline, continued upstream to the Norfolk combined sewer overflow (CSO) area at approximately RM 5.0, and finished at Kellogg Island RM 0.6-0.9. The main points of interest for the kayak survey were the South Park Marina, Delta Marine, Norfolk CSO area; Slips 1, 2, 3, 4, and 6; Terminal 115 hand boat launch at RM 1.5 west; Kellogg Island; Duwamish Yacht Club; and a residential property at RM 2.6 west. These were inaccessible areas that could not be reached by the boat on July 19, 2004.

Digital photographs were taken and the areas were recorded by a digital video camera. In particular, activities of people using the LDW during the survey (e.g., the presence of kayakers, individuals along the shore, etc.) and the presence of items (e.g., recreational water craft, water toys, chairs, benches) along the shore that indicated human use were recorded.

2.3 DEVIATIONS FROM THE METHODS TECHNICAL MEMORANDUM

On July 6, 2004, not all the participating members for the upland portion of the survey had a bike to ride. Therefore, the survey was conducted only by car and foot. Distance

between access points on the LDW's eastern bank precluded doing the entire survey by foot and using car transportation facilitated timely completion of the survey. The bicycles were included in the study design simply to improve on the speed allowed by walking. There were no areas that could have been accessible via bicycle that were not accessible by car or foot, so this deviation had no effect on the survey results.

Two potential access points, C1, Klickitat Avenue SW street end, and C2, Harbor Island Marina Port of Seattle public access (Figure 3-1a), were surveyed a week after the initial survey because a stopped train had blocked the entrance to both areas the day of the survey (July 6, 2004).

A hand-held Global Positioning System (GPS) unit was not used to georeference access points because the aerial photographs and street maps were sufficient to accurately record the surveyed locations. In addition, intertidal elevations were not measured because this information was not necessary to adequately characterize the access locations. Instead, the relative slope of the intertidal area (i.e., steep, shallow) was recorded on the field forms.

2.4 DATA GATHERING METHODS FOR QUESTIONNAIRES

Windward created a public access questionnaire asking LDW land owners the following two questions:

- ◆ What degree of access by the public, if any, is allowed on their property adjacent to the shoreline?
- ◆ How often do employees come in contact with intertidal sediments, either as part of their work or during breaks?

This questionnaire was sent via certified return-receipt mail to a list of LDW land owners, both businesses and residences, which was generated from a database of tax parcel data compiled by the King County Assessor's Office. This database consists of the current parcel owners' addresses on record, which may be different than the parcel address if: 1) the owner or company headquarters are located at a different location, or 2) the parcel has changed hands recently.

As specified in the methods memorandum, EPA contacted local tribes (i.e., Muckleshoot, Suquamish, and Duwamish) so they could provide input on use frequency and duration at specific human access sites. The following questions were posed, in an email, to the tribes:

- ◆ How often and where do tribal members use the LDW (e.g., fishing from shore, swimming, habitat restoration, and shellfish harvesting)?
- ◆ How do tribal members come into contact with sediments?
- ◆ Are there tribal cultural events that take place on the LDW? When and where do they occur?

- ◆ What long-term plans and/or goals, if any, does your tribe have for the LDW shoreline?
- ◆ Is there any environmental education and research being conducted by your tribe on the LDW?

3.0 Results

This section provides a summary of the survey results and is divided into three subsections: environmental conditions (Section 3.1), questionnaire results (Section 3.2), and field survey results (Section 3.3).

3.1 ENVIRONMENTAL CONDITIONS

Weather on July 6, 2004 was cloudy, humid, with light rain and temperatures near 70° F. Weather on July 19 and 20, 2004 was overcast with sun breaks and temperatures in the 70s to 80s. Weather did not disrupt observations at any time. Actual tidal elevations during the survey are shown in Table 3-1.

Table 3-1. Daily tidal heights (ft) for the LDW at Harbor Island during the human access survey

DATE	START TIME	END TIME	LOW TIDE (TIME)	HIGH TIDE (TIME)	LOW TIDE (TIME)	HIGH TIDE (TIME)
7.6.2004	10:15	17:00	6.1 (2:57)	9.4 (7:41)	-1.1 (14:34)	12.5 (21:58)
7.19.2004	9:15	12:40	7.0 (1:16)	9.5 (5:42)	-1.4 (12:55)	11.9 (20:23)
7.20.2004	10:32	14:30	6.4 (1:55)	9.3 (6:28)	-0.9 (13:30)	11.9 (8:48)

Source: NOAA (2004)

3.2 HUMAN ACCESS AND TRIBAL QUESTIONNAIRE RESULTS

The human access questionnaire was mailed to 57 businesses or residences established on the LDW shoreline, as identified by the King County Assessor's Office tax parcel database. In addition, LDWG members were asked similar questions for parcels they owned that were not included in the original mailing. In general, the responders stated that there was no access to the LDW by the public on their properties (Question 1) and none of their employees come into contact with the intertidal sediments (Question 2). The remaining businesses or residences either did not respond to the questionnaire or the questionnaire was returned as undeliverable by the Post Office. Table 3-2 is the mailing list for the human access questionnaire. A summary of the responses to the human access questionnaire is presented in Table 3-3. Table 3-3 also notes the recipients that did not respond and those that did not receive the survey. In addition, Figures 3-1a through 3-1d show the recipients of the questionnaires according to the following three categories: 1) the property owners that received and responded to the

questionnaire, 2) the property owners that received the questionnaire but did not respond, and 3) the property owners that did not receive the questionnaire that was mailed to them. Some tax parcels, shown without shading on Figures 3-1a through 3-1d, do not fit into any of these three categories. Human access at these properties was documented during the survey or from previous observations by survey participants.

Although the questionnaires were distributed to homeowners as well as businesses, the questions focused on public access to the property and employee contact with the intertidal sediments. They did not specifically address the residential use or frequency of activity on the LDW shoreline. In addition, many of the questionnaires sent to residences were not received; therefore the information about residential use of the waterfront was captured during the land and motorboat surveys or from a subsequent interview conducted by DRCC.

BJ Cummings (DRCC) interviewed Lisa de Alva, a resident of the residential shoreline on S Riverside Drive (south of W14 on Figure 3-1b) on September 17, 2004. Lisa reported that she and her neighbors (there are four directly on the river and two across the road) use the shore for both hand and motor boat launch, birding, swimming, walking and picnicking. While there is no public access, the residents, their families and friends all access and use the river. In addition, the entire shore is accessible from land (Cummings 2004b).

Table 3-2. Mailing list for the human access questionnaire

TAXPAYER/ OWNER	ADDRESS	RIVER MILE	NEAREST PUBLIC ACCESS LOCATION
Terminal 103, Port of Seattle	3838 W Marginal Way SW	0.0 W	Duwamish Public Access Park at Terminal 105
Ash Grove Cement West Inc	3801 E Marginal Way S	0.0 E	North of the Diagonal Avenue Public Shoreline Access Area
Terminal 104, Port of Seattle	3685 Duwamish S	0-0.1 E	Across from Port of Seattle Access Park at Harbor Island Marina
Terminal 106 West, Port of Seattle	44 S Nevada St	0.2-0.4 E	North of the Diagonal Avenue Public Shoreline Access Area
Lipsett Co LLC	4100 W Marginal Way SW	0.2 W	Adjacent to Terminal 105 Park
General Recycling of Washington	4260 W Marginal Way SW	0.2-0.4 W	South of Terminal 105 Park
Terminal 108, Port of Seattle	4601 Diagonal Ave S	0.4-0.7 E	North of the Diagonal Avenue Public Shoreline Access Area
Lafarge	5400 W Marginal Way SW	1.0-1.2 W	South of Herring's House Park
King County, Snopac	5053 E Marginal Way S	1.0 E	South of Diagonal Ave S public access park
King County, Manson Construction Company	5209 E Marginal Way S	1.0-1.1 E	South of Diagonal Ave S public access park
King County, Lehigh Cement Company	5225 E Marginal Way S	1.1 E	South of Diagonal Ave S public access park

TAXPAYER/ OWNER	ADDRESS	RIVER MILE	NEAREST PUBLIC ACCESS LOCATION
King County, Ocean Construction	5225 E Marginal Way S	1.2-1.4 E	South of Diagonal Ave S public access park
Duwamish Shipyards, Inc.	5658 W Marginal Way SW	1.3 W	South of Herring's House Park
Alaska Marine Lines, Inc.	5600 W Marginal Way SW	1.3 W	South of Herring's House Park
Saint-Gobain Containers	5801 E Marginal Way S	1.3 E	South of Diagonal Ave S public access park
Glacier Northwest	5906 W Marginal Way SW	1.3 W	South of Herring's House Park
Terminal 115, Port of Seattle	6020-6730 W Marginal Way SW	1.5-2.0 W	Underneath the 1st Ave S bridge
BPB Gypsum Inc	5931 E Marginal Way S	1.6 E	North of the 1st Avenue Bridge Motorboat Launch
Glacier NW (Longview Fibre is tenant)	5901 E Marginal Way S	1.7 E	North of the 1st Avenue Bridge Motorboat Launch
Lone Star Investors L P	6335 1 st Ave S	1.8 E	North of the 1st Avenue Bridge Motorboat Launch
James D. Gilmur	6365 1 st Ave S	1.8 -1.9 E	North of the 1st Avenue Bridge Motorboat Launch
Robert S. Burgess	6361 1 st Ave S	1.8 E	North of the 1st Avenue Bridge Motorboat Launch
SCS Holding LLC	303 S River St	2.1 E	Adjacent to the 1st Avenue S Bridge Motorboat Launch
Swan Bay Holdings Inc.	7100 2nd Ave SW	2.1 W	South of Viewpoint Park
Fox Avenue LLC	6701 Fox Ave S	2.1-2.2 E	Adjacent to 1st Avenue S Motorboat Launch
Herman & Jacqueline Trotsky	7152 1 st Ave S	2.2 W	Adjacent to Viewpoint Park area
Gemo/William P. Guimont	6901 Fox Ave S	2.3 E	South of the 1st Avenue Bridge Motorboat Launch
Frederick J Hopkins	500 S Myrtle St	2.3 E	North of S Othello street end
Shalmar Group	601 S Myrtle St	2.3 E	North of S Othello street end
Kirsten Halvorsen	7200 2nd Ave S	2.3 W	2nd Avenue S street end
Boyer Towing Inc.	170 S Orchard St	2.3-2.4 W	Adjacent to the 2nd Avenue S street end
Shalmar Group	620 S Othello St	2.4-2.5 E	Adjacent to S Othello street end
Merle Steinman	7410 5 th Ave S	2.5 W	Adjacent to S Fontanelle St and 5th Avenue S street end
Thomas Hurlen	523 S Riverside Dr	2.6 W	Adjacent to S Fontanelle St and 5th Avenue S street end
Lisa De Alba	604 S Riverside Dr	2.6 W	S Fontanelle Street and 5th Avenue S street end
King County	640 S Riverside Dr	2.7 W	S Portland street end
Myrna Triplett	636 S Riverside Dr	2.7 W	S Portland street end
Harald L. Hurlen	620 S Riverside Dr	2.7 W	South of S Fontanelle St and 5th Avenue S street end

TAXPAYER/ OWNER	ADDRESS	RIVER MILE	NEAREST PUBLIC ACCESS LOCATION
Crowley Marine Services Inc	2401 4 th Ave	2.8 E	Adjacent to the Boeing Plant 2 Public Access
Billie Macksene Lukas	740 S Holden St	2.8 W	North of the Duwamish Waterway Park
R & A Properties LLC	7303 8 th Ave S	2.5-2.7 E	North of Slip 4
Emerald Services, Inc.	7400 8 th Ave S	2.8 E	North of Slip 4
Silver Bay Logging	1135 S Webster St	2.9 W	Duwamish Waterway Park
Elm Grove/Unity Electric Construction	1024 S Elmgrove St	3.0 W	S Elmgrove street end
William Carriel	850 S Kenyon St	3.0 W	North of the Duwamish Waterway Park
Robert S. and Dagmar R. Cronn	1046 S Elmgrove St	3.1 W	S Southern street end
The Boeing Company	7343 E Marginal Way S	2.9-3.5 E	Slip 4 public access
Daniel A Slemko	1217 S Southern St	3.2 W	S Southern street end
John D Marden	1202 S Southern St	3.2 W	S Southern street end
Kaler Wise	8108 12th Ave S	3.2 W	S Southern street end
MC Elward Halvorsen	1212 S Southern St	3.2 W	S Southern street end
South Park Marina	1239 S Rose St	3.4 W	Between Terminal 117 and the 14th Ave S Bridge
The Boeing Company	7343 E Marginal Way S	3.7-3.9 E	Slip 4 public access
Kenworth Motors	8801 E Marginal Way S	4.0 E	South of Boeing Plant 2 Public Access
George McElroy & Assoc Inc	1619 S 92nd Pl	4.0 W	Hamm Creek /Seattle City Light North
Duwamish Yacht Club	1801 S 93rd St	4.1 W	North of Hamm Creek /Seattle City Light
Container Properties LLC	9229 E Marginal Way S	4.0-4.2 E	North of pedestrian bridge at RM 4.8
Delta Marine	1835 S 96th St	4.2 W	Adjacent to Hamm Creek City Light N
The Boeing Company	9725 E Marginal Way S	4.2-5.4 E	Pedestrian bridge at RM 4.8
Freemont Associates	10108 W Marginal Pl S	4.7-4.8 W	Adjacent to pedestrian bridge at RM 4.8

Two federally recognized tribes, the Suquamish and the Muckleshoot, utilize the LDW. The Duwamish Tribe also conducts a number of activities along the LDW.³

³ Both the Muckleshoot Indian Tribe and the Suquamish Indian Tribe were parties to *United States v. Washington*, 384 F. Supp. 312(1974), also known as the "Boldt Decision", later affirmed by the U.S. Supreme Court in *Washington v. Washington State Commercial Passenger Fishing Vessel Association*, 443 U.S. 658 (1979). This decision established that these Tribes have "usual and accustomed" (U&A) places, waters, and resources reserved in their Treaties that include the Lower Duwamish Waterway Superfund study area and they have treaty rights that include 50% of the fish taken from those treaty-protected waters. The Duwamish Tribe is not recognized by the United States as eligible to receive services from the U.S. Bureau of Indian Affairs (BIA), and is not included on the list of federally recognized tribes prepared by BIA in accordance with the Federally-Recognized Indian Tribe List Act of 1994, 25 U.S.C. §479a. Consequently, the Duwamish Tribe was not a party to the Boldt Decision and has no federally-recognized U&A.

Responses to the questions listed in Section 2.4 were received from the Suquamish and Duwamish Tribes. Although the Muckleshoot Tribe did not formally respond to EPA's request for information, it is well known that the Muckleshoot Tribe sets gill nets for salmon throughout the LDW and that the Muckleshoot Tribe's base of operations is south of the First Avenue Bridge on the eastern bank of the LDW near Slip 3.

The Duwamish Tribe's responses were provided by BJ Cummings as the result of an interview between BJ Cummings and James Rasmussen of the Duwamish Tribal Council (Cummings 2004c). The Suquamish Tribe's responses were provided to EPA via e-mail (O'Sullivan 2004).

1. How often and where do tribal members use the LDW?

Duwamish Tribe: Primarily at Herring's House Park (RM 0.4 - 0.5 west) and Terminal 107 (RM 0.6 - 0.7 west). The tribe has purchased property directly across the road for a new office and future longhouse. The tribe holds gatherings nearly monthly at Terminal 107, and a tribal canoe group uses the LDW twice a month, often launching at Herring's House and Terminal 107. The children's dance group practices at Terminal 107 and many of the children go down to play by the river. Tribal members have worked to restore habitat at Herring's House Park, Terminal 107, and Hamm Creek (RM 4.3 west).

Suquamish Tribe: Annually, Suquamish Tribal members fish within the LDW for salmon. Fishing typically begins in August extending through December each year. The tribe regulates fishers to the area downstream of the Spokane St. Bridge.⁴

2. How do tribal members come into contact with sediments?

Duwamish Tribe: Canoeing, restoring habitat, and at cultural events (especially the kids).

Suquamish Tribe: During annual netfishing activities, fishers' gear often comes in contact with sediments. Net gear may be returned to the boat with sediment residue, potentially exposing fishers.⁵

3. Are there tribal cultural events that take place on the LDW? When and where do they occur?

Duwamish Tribe: A large annual cultural event is held at Terminal 107 every year, and monthly gatherings have been held recently. The dance group practices there and the canoe group launches there. The tribe is building a Longhouse and Cultural Center

⁴ This area is downstream of the LDW Superfund study area, which ends at the south end of Harbor Island.

⁵ As noted above, the Suquamish Tribe's fishing activities occur downstream of the Superfund study area; however, the Muckleshoot Tribe does engage in netfishing within the Superfund study area and may, therefore, have similar potential for exposure.

directly across the road from Terminal 107 and Herring's House Park. The Terminal 107 shoreline is a significant cultural and archeological site for the Duwamish Tribe.

Suquamish Tribe: Presently, there are no cultural events sponsored by the Suquamish Tribe on the LDW; however, this area has spiritual significance to tribal members. Many Tribal members have had personal experiences on the LDW.

4. *What long-term plans and/or goals, if any, does your tribe have for the LDW shoreline?*

Duwamish Tribe: The Longhouse and Cultural Center will have many activities along the river, including canoeing and educational programs for children. The tribe also expects to be involved in additional restoration activities on the river, and plans to eventually harvest fish and shellfish from the river, especially around Terminal 107 and Kellogg Island.

Suquamish Tribe: The LDW is part of the Suquamish Tribe's U&A fishing area. The Suquamish Tribe is interested in habitat improvement and the exercising of treaty rights.

3.3 FIELD SURVEY RESULTS

LDW shoreline locations accessible to the public from the land were identified by site ID number, as shown in Table 3-3 (located at the end of the document) and Figures 3-1a through 3-1d. The two access locations at the southern end of Harbor Island were identified as C1 and C2 (C for central). Access locations on the eastern side of the LDW were identified using an E prefix (for east), followed by consecutive numbers from 1 at the northern end of the study area to 7 at the southern end of the study area. Access locations on the western side of the LDW were identified using a W prefix (for west), followed by consecutive numbers from 1 at the southern end of the study area to 18 at the northern end of the study area. The numbering sequence (i.e., north to south on the eastern side of the LDW, then south to north on the western side of the LDW) reflects the route taken during the survey.

Additional human use areas were identified during the water portion of the survey, but were not given site IDs because of the difficulty in deciding what constitutes a "site" in a waterway that is generally accessible to anybody in a boat. Field notes recorded during the water survey are summarized in Table 3-3, in the text below, and in Figures 3-1a through 3-1d.

Twenty-seven sites were identified as potential human access locations during the upland portion of the survey (Table 3-3). A field form was completed at each site; the forms are reproduced in Appendix A. Photographs were also taken at each site (see Appendix B). Photographs can be viewed at:

http://www.ldwg.org/Assets/Tech_memos/Human_use/humuse_album.htm.

Refer to Appendix B for photographs 1-87 and captions (Table B-1).

Many large industrial facilities occupy the eastern shoreline of the LDW, particularly at RM 2.0-2.5 and RM 3.0-4.5. Consequently, only seven sites (E1 to E7) accessible to the public from land were identified on the eastern shoreline (Table 3-3). There are more publicly-owned lands on the western side of the LDW; RM 1.0-2.0 is the only large area that is inaccessible to the public. Eighteen sites (W1 to W18) accessible to the public from land were identified on the western side of the LDW (Table 3-3). Two sites (C1 and C2) accessible to the public from land were identified at the southern end of Harbor Island (Table 3-3). The majority of the potential human access locations identified during the land portion of the survey consisted of King County or City of Seattle public access areas and parks, and street ends. Table 3-3 and Figures 3-1a to 3-1d identify potential human uses based on the field survey and on past observations by survey participants at each numbered site. Sediment access via the upland is classified into three categories: easy public access, difficult public access, and employee or member only access. Shoreline areas not designated as any of the above categories are either not accessible by land or the access is unknown. No attempt was made during this survey to identify the frequency of such activities. All the surveys via land, motorboat, or kayak were conducted on weekdays, and thus missed any evening and weekend activity on the river. In addition, this report assumes that all waterfront homeowners are able to access the shoreline from their properties.

Observations of work-related sediment contact, either during the field survey or previously observed by DRCC members or John Beal, were noted during the survey. Delta Marine, Boeing/Slip 4 (south shore), and Puget Sound Truck Lines (operating on the R & A Properties parcel at RM 2.6 E) are specific locations where DRCC has observed workers on intertidal sediments. Other access areas are noted below and in Figures 3-1a through Figure 3-1d.

The motorboat portion of the survey was conducted on July 19, 2004. Because of the relatively low tide during this survey (see Table 3-1), the route traveled by the boat generally excluded the intertidal and shallow subtidal areas of the LDW, such as the slips and upstream of Turning Basin 3, RM 4.7. The boat survey was intended to supplement the land survey by identifying areas that were accessible by water that were not accessible from the land. A secondary purpose of the motorboat survey was also to observe human activity or evidence thereof that might result in sediment exposure. In addition, because the upland survey conducted on July 6, 2004 did not attempt to gain access to private property, potential areas where employees could access shoreline sediments were noted during the boat survey. The results of the July 19, 2004 survey are summarized in Table 3-3 by location. Field notes from the July 19, 2004 survey are also noted in Figures 3-1a through 3-1d. Photographs can be viewed at:

http://www.ldwg.org/Assets/Tech_memos/Human_use/humuse_album.htm.

Refer to Appendix B for photograph captions (Table B-1) and photograph locations.

The objective of the kayak survey conducted on July 20, 2004 was to assess potential human access locations at the shallower areas that could not be observed by motorboat on July 19, 2004. A secondary purpose of the kayak survey was also to observe human activity or evidence thereof that might result in sediment exposure. The results of the July 20, 2004 survey are summarized in Table 3-3 by location. Field notes from the July 20, 2004 survey are also noted in Figures 3-1a through 3-1d.

Photographs can be viewed at:

http://www.ldwg.org/Assets/Tech_memos/Human_use/humuse_album.htm.

Refer to Appendix B for photographs 88-120 and captions (Table B-1) and photograph locations.

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Oversize Maps and Tables

Table 3.3 Summary of responses to the human access questionnaire and identified potential human access locations accessible by land or water

TAXPAYER OR SITE#	RIVER MILE	AREA	QUESTION 1 ^a RESPONSE	QUESTION 2 ^b RESPONSE	SITE ACCESSIBILITY ^c	SHORELINE CHARACTERISTICS	HUMAN USE ^d	SURVEY OBSERVATIONS ^e /Comments
C1	North of Harbor Island Marina	Klickitat Avenue SW street end	na		Easy shoreline access	Shallow, riprap	Fishing ^d (JB), walking (JB) ^e	Located north of Harbor Island Marina. Ample parking and easy access to continuous riprap shoreline underneath the freeway bridge.
C2	0.0	Port of Seattle Public Access Park at Harbor Island Marina Dock A and B	None	Employees do not come in contact with intertidal sediments.	Easy shoreline access	Shallow to steep, riprap, rocky, path	Walking, motorboat launch	Path between Dock A and B leads from the parking lot to the LDW shoreline. Docks are restricted to employee and member access via locked gates. Several private slips around the corner from the main part of Harbor Island Marina. The railroad bridge at the mouth of the West Waterway is a common fishing area (JB).
Terminal 104, Port of Seattle	0.0 – 0.1 E	East of Port of Seattle Public Access Park at Harbor Island Marina	None	Employees do not come in contact with intertidal sediments.	Unknown	Riprap	None identified	Full-service warehouse, foreign trade zone. The property is made to accommodate large ships.
Terminal 103 Port of Seattle	0.0 – 0.1 W	Near Duwamish Public Access Park at Terminal 105	None	Employees do not come in contact with intertidal sediments.	No employee shoreline access	Riprap	None identified	Property is fenced from the upland side. May be a small gate providing access near the Puget Creek outfall.
Port of Seattle, Terminal 105, W18	0.1 W	Duwamish Public Access Park at Terminal 105 Park	None	Employees do not come in contact with intertidal sediments.	Easy shoreline access	Mud, picnic tables, pier	Crabbing (JB), picnicking, hand boat launch, fishing ^f (JB), habitat restoration, mussel harvesting (MH)	Positioned between businesses along West Marginal Way. It is a grassy park with picnic tables and a large fishing pier. This Port of Seattle Coastal America restoration site contains an intertidal side-channel slough excavated almost to West Marginal Way and planted by volunteers. The slough receives local runoff from West Marginal Way. A hand boat-launch area is located at the south end of the park along the riprap bank. A path leads south across the mouth of the slough to the adjacent mudflat. Lon Kissinger and Marcia Henning observed individuals crabbing at T-105 in summer 2003. During the motorboat survey, Marcia Henning noted she had previously observed mussel harvesting.
Lipsett Co LLC	0.2 W	Adjacent to Terminal 105 Park	No response to the questionnaire was received.		No employee shoreline access	Mud, riprap	None identified	The property is fenced from the upland side.

TAXPAYER OR SITE#	RIVER MILE	AREA	QUESTION 1 ^a RESPONSE	QUESTION 2 ^b RESPONSE	SITE ACCESSIBILITY ^c	SHORELINE CHARACTERISTICS	HUMAN USE ^d	SURVEY OBSERVATIONS ^e /Comments
General Recycling of Washington	0.2 – 0.4 W	South of Terminal 105 Park	No response to the questionnaire was received.		No employee shoreline access	Mud, riprap	None identified	The property is fenced from the upland side and two large barges block access from the water.
Ash Grove Cement West Inc	0.0 – 0.2 E	North of the Diagonal Avenue Public Shoreline Access Area	None	Never	Unknown	Riprap	None identified	Facility is not fenced to prevent employees from accessing the shoreline though the bank is quite steep.
Terminal 106 West, Port of Seattle	0.2 – 0.4 E	North of the Diagonal Avenue Public Shoreline Access Area	None	Employees do not come in contact with intertidal sediments.	Unknown	Riprap	None identified	Industrial waterfront property.
Terminal 108, Port of Seattle	0.4 – 0.7 E	North of the Diagonal Avenue Public Shoreline Access Area	Property is fenced at southern end adjacent to the Diagonal Ave public shoreline access area, but the public can get around the fence easily.	As part of their normal duties, employees do not come into contact with intertidal sediments.	Easy shoreline access	Mud, riprap	None identified	Property is fenced next to the shoreline, but a small gate offers easy shoreline access by employees.
E1	0.7 E	Diagonal Avenue Public Shoreline Access Area	na		Easy shoreline access	Riprap, sand, benches, picnic tables, litter	Kayak launch point (BJ), fishing ^f (JB), crabbing (JB), swimming (JB), picnicking, walking (BJ), birding (BJ), restoration activities	Adjacent to US Army Corps of Engineers facility, Federal Center South Building. Sandy mudflat to the north. Litter included fireworks, beer cans, and razor blades. A transient was encountered at the north end of the park, coming from beyond the trail closed sign. Lon Kissinger and Marcia Henning noted an individual swimming in this area in summer 2003.

TAXPAYER OR SITE#	RIVER MILE	AREA	QUESTION 1 ^a RESPONSE	QUESTION 2 ^b RESPONSE	SITE ACCESSIBILITY ^c	SHORELINE CHARACTERISTICS	HUMAN USE ^d	SURVEY OBSERVATIONS ^e /Comments
Port of Seattle, W17	0.4 – 0.7 W	Port of Seattle Duwamish Public Access Park at Terminal 107 and Herring's House Park	Public access	Employees do not come in contact with intertidal sediments.	Park shoreline access, steps leading to shore, kayak boat launch	Mud, riprap, rocky, marsh, path	Kayak launch point (BJ), swimming and bird watching (JB), fishing ^g (JB), walking, picnicking, restoration activities (BJ)	Two adjacent parks located off West Marginal Way on Port and City of Seattle properties. They have a large parking lot, a kayak boat launch and a well-maintained park trail bordered with historical signs, picnic tables, and benches. The southern end of park has a set of stairs leading to the LDW shoreline covered with large woody debris and riprap. There is also a restoration area at the southern end at the historical mouth of old Puget Creek. Another restoration area at the northern end is fenced to deter geese from destroying vegetated area.
Kellogg Island	0.5 – 0.9 W	Near Port of Seattle Duwamish Public Access Park at Terminal 107 and Herring's House Park	na		Public access only by water	Mud, marsh, riprap	Kayak haul-out (BJ)	Accessible on all sides via kayak or other small boat. BJ Cummings has observed kayakers using the island as a haul-out location.
Slip 1	0.9 E	Slip 1	na		Difficult shoreline access	Dock	None identified	Includes a dock that leads from upland properties on East Marginal Way to the intertidal sediments allowing the only good point of access to the LDW shoreline in that area. Employees from both sides of the slip were noted on piers that did not allow access to the intertidal sediments.
King County	1.0 – 1.4 E	Adjacent to Slip 1	No public access	No employee access	Unknown	Riprap	None identified	This stretch of King County properties consists of a vacant property available for lease (RM 1.0 E), SnoPac facility (RM 1.0 E), Manson Construction Company (RM 1.0 – 1.1 E), Lehigh Cement Company (RM 1.1 E) and Ocean Construction (RM 1.2-1.4 E).
Lafarge	0.9 – 1.2 W	South of Herring's House Park	Questionnaire returned by US Post Office as undeliverable.		No employee shoreline access	Riprap, mud	None identified	Private property with a steep bulkhead, tugs and barges tied up a majority of the time.
Alaska Marine Lines, Inc.	1.3 W	South of Herring's House Park	None. We are a marine facility and have tight security requirements.	Never. Property is paved with dock covering intertidal areas.	No employee shoreline access	Riprap	None identified	Private property with a steep bulkhead, tugs and barges tied up a majority of the time.

TAXPAYER OR SITE#	RIVER MILE	AREA	QUESTION 1 ^a RESPONSE	QUESTION 2 ^b RESPONSE	SITE ACCESSIBILITY ^c	SHORELINE CHARACTERISTICS	HUMAN USE ^d	SURVEY OBSERVATIONS ^e /Comments
Duwamish Shipyards, Inc.	1.3 W	South Herring's House Park	None	Employees do not come in contact with intertidal sediments.	No employee shoreline access	Dock, riprap	None identified	Located on a dock with an old boat ramp and a rail launch adjacent to the property. BJ Cummings stated she has not observed any use of the rail launch in the last 10 years.
Saint-Gobain Containers	1.4 E	South of Diagonal Ave S public access park	Questionnaire returned by US Post Office as undeliverable.		No employee shoreline access	Riprap, mud	None identified	Glass making facility.
Glacier Northwest	1.4 W	South of Herring's House Park	No public access anywhere in the immediate area.	No contact by any employee.	Employee shoreline access	Hand-boat launch, mud, riprap	None identified	Property includes a designated hand-boat launch site (according to Figure 3-2), but this area is private property with strictly employee access. There is no access from the completely fenced Port of Seattle property located southwest of Glacier NW. A skiff was observed on the shoreline.
BPB Gypsum Inc	1.6 E	North of the 1st Avenue Bridge motorboat launch	Access to the property by the public is controlled by a guard/log system and access to the shoreline from the property is physically blocked by dense vegetation, steep banks, and other physical barriers. Members of the public would not be allowed on the shoreline area.	Employees do not come in contact with intertidal sediments as a part of their work and would not be allowed to enter the shoreline area. There is no shoreline access location on the property.	Difficult shoreline access	Riprap, mud, steep bank	None identified	No fencing to prevent employees from accessing the shoreline via a steep bank.
Terminal 115, Port of Seattle	1.5 – 2.0 W	Underneath the 1st Ave S bridge	None	Never as part of normal work duties.	Employee shoreline access	Riprap, mud	Fishing ^g (JB)	Fish processing facility (SeaFreeze) is located north of the bridge with unrestricted shoreline access to employees. John Beal stated he previously observed fishing downstream of the SeaFreeze facility.

TAXPAYER OR SITE#	RIVER MILE	AREA	QUESTION 1 ^a RESPONSE	QUESTION 2 ^b RESPONSE	SITE ACCESSIBILITY ^c	SHORELINE CHARACTERISTICS	HUMAN USE ^d	SURVEY OBSERVATIONS ^e /Comments
Glacier NW (Longview Fibre is tenant)	1.7 E	Slip 2	No public access anywhere in the immediate area. Longview Fibre does not own any property that fronts on the river.	No contact by any employee.	Employee shoreline access	Steep, riprap	None identified	Signs observed during the survey indicated "caution of shallow water", "no diving", and "no lifeguard on duty."
Lone Star Investors LP	1.8 E	Slip 2	For safety reasons, the public is not allowed on our facilities. Any persons visiting the site who are not employees (vendors, clients, contractors etc.) are required to check in at our office and are escorted on the site by company personnel.	As part of their normal duties, employees do not come into contact with intertidal sediments.	Employee shoreline access	Steep, riprap, mud	None identified	A picnic table was observed on the property above the shoreline. Signs observed during the survey indicated "caution of shallow water", "no diving", and "no lifeguard on duty."
James D. Gilmur	1.8 – 1.9 E	North of the 1st Avenue South Bridge motorboat launch	None	None	No employee shoreline access	Steep, mud	None identified	Industrial waterfront property situated between Slip 2 and the 1st Avenue South bridge. Several private slips were observed at the southern end of the property.
Robert S. Burgess	1.8 E	North of the 1st Avenue Bridge motorboat launch	None	None	No employee shoreline access	Steep, mud	None identified	Industrial waterfront property located south of Slip 2.
W16	2.0 – 2.1 W	Port of Seattle Terminal 115 Viewpoint Park Public Access underneath the 1 st Avenue South Bridge	na		Easy shoreline access	Shallow, sand, mud, riprap, path, bench	Fishing ^f (JB), crabbing (JB), digging for clams (JB)	Stream restoration work has been done by Washington Department of Transportation to the large highway runoff system of marsh and tidal ponds, which drains into the LDW at this site.

TAXPAYER OR SITE#	RIVER MILE	AREA	QUESTION 1 ^a RESPONSE	QUESTION 2 ^b RESPONSE	SITE ACCESSIBILITY ^c	SHORELINE CHARACTERISTICS	HUMAN USE ^d	SURVEY OBSERVATIONS ^e /Comments
E2	2.0 E	1st Avenue South Bridge motorboat launch	na		Easy shoreline access	Shallow, riprap, sand, litter	Fishing ^d (JB), crabbing (JB), motor and hand boat launch	Adjacent to the Muckleshoot Tribe's pier to the south and Seattle Department of Transportation to the north. John Beal noted fishing occurs from the bridge and underneath the bridge from the shore.
Muckleshoot Indian Tribe	2.1 E	Slip 3 and adjacent to 1st Avenue South Bridge motorboat launch	No response to the questionnaire was received.		Tribal member shoreline access	Dock, riprap	Fishing ^g (WL)	No established path to the steep riprap shoreline.
SCS Holding LLC	2.1 E	Slip 3 and near 1st Avenue South Bridge motorboat launch	None	Never	Difficult shoreline access	Dock, riprap	Fishing ^g (WL)	Located on top of a dock. A portion of the shoreline in the slip is unfenced, but no established path to the steep riprap shoreline.
Fox Avenue LLC	2.1 – 2.2 E	Slip 3 and south of 1st Avenue Bridge motorboat launch	No response to the questionnaire was received.		Difficult shoreline access	Dock, riprap	Fishing ^g (WL)	Located on top of a dock. A portion of the shoreline in the slip is unfenced, but no established path to the steep riprap shoreline.
Swan Bay Holdings Inc.	2.1 W	South of Viewpoint Park	No response to the questionnaire was received.		Employee shoreline access	Mud, riprap	None identified	Property has unrestricted employee access to the shoreline.
W15	2.2 W	2nd Avenue S street end	na		Easy shoreline access	Shallow, riprap, sand, benches, path, litter	Picnicking, fishing ^g (JB)	There is an established path to the LDW shoreline through the site and it is adjacent to a small marina. It offers continuous easy access to the shoreline littered with tires and debris. Angelita Rodriguez witnessed people picnicking in this area during a previous visit.
Gemo/ William P. Guimont	2.2 E	South of the 1st Avenue Bridge Motorboat Launch	No response to the questionnaire was received.		Difficult shoreline access	Mud, riprap	None identified	Located along a steep riprap bank.
Herman & Jacqueline Trotsky	2.2 W	Adjacent to Viewpoint Park area	No response to the questionnaire was received.		Employee shoreline access	Mud, riprap	None identified	Shallow bank.
Boyer Towing Inc.	2.3 – 2.4 W	Adjacent to the 2nd Avenue S street end	No response to the questionnaire was received.		Employee shoreline access	Mud, riprap, dock	None identified	Shallow bank.

TAXPAYER OR SITE#	RIVER MILE	AREA	QUESTION 1 ^a RESPONSE	QUESTION 2 ^b RESPONSE	SITE ACCESSIBILITY ^c	SHORELINE CHARACTERISTICS	HUMAN USE ^d	SURVEY OBSERVATIONS ^e /Comments
Frederick J Hopkins	2.3 E	North of S Othello street end	Not any	Never	Difficult shoreline access	Mud, riprap	None identified	Located along a steep riprap bank.
Shalmar Group	2.4 E	South of Slip 3	Questionnaire returned by US Post Office as undeliverable.		No employee shoreline access	Riprap, dock	Fishing ^f (MH)	Property is fenced and has a dock. An old unused loading pier is fenced off with barbed wire. Wendy Livezy and Marcia Henning have previously observed fishing activity at this location. A skiff and fishing nets were photographed on the steep riprap bank. North of this area an employee was observed eating near the shoreline.
Kirsten Halvorsen	2.3 W	2nd Avenue S street end	Questionnaire returned by US Post Office as undeliverable.		Employee shoreline access	Mud, shallow	None identified	This property has a dock and a shallow bank.
Shalmar Group	2.5 E	Adjacent to S Othello street end	No response to the questionnaire was received.		No employee shoreline access	Riprap	None identified	Property is fenced.
E3	2.5 E	S Othello street end	na		Difficult shoreline access	Steep, riprap, litter	Fishing ^f (JB)	Litter included crates filled with books, water bottles, and cans.
R & A Properties LLC	2.5 - 2.7 E	North of Slip 4	Questionnaire returned by US Post Office as undeliverable.		Employee shoreline access	Riprap, mud	None identified	No fencing.
W14	2.5 W	S Fontanelle Street and 5th Avenue S street end	na		Difficult shoreline access	Steep, riprap	Fishing ^g (JB)	Property is for sale; positioned between businesses and barges with very difficult access to the steep eroded and littered shoreline. One point of access is at the north end of the vacant property. Another access point is from the top of concrete blocks that are 6 ft tall. John Beal previously observed fishing from barges. Several homes in the vicinity of this property have easy shoreline access with a low gradient bank. One home has a small dock and kayak according to DRCC.
Merle Steinman	2.5 W	Adjacent to S Fontanelle St and 5th Avenue S street end	No response to the questionnaire was received.		Residential shoreline access	Riprap, mud	Fishing ^g (JB)	This property has a littered shoreline and barges on the waterfront. John Beal reported fishing off barges.
Thomas Hurlen	2.6 W	Adjacent to S Fontanelle St and 5th Avenue S street end	No response to the questionnaire was received.		Residential shoreline access	Riprap, mud	Fishing ^g (JB)	This property has a littered shoreline and barges on the waterfront. John Beal reported fishing off barges.

TAXPAYER OR SITE#	RIVER MILE	AREA	QUESTION 1 ^a RESPONSE	QUESTION 2 ^b RESPONSE	SITE ACCESSIBILITY ^c	SHORELINE CHARACTERISTICS	HUMAN USE ^d	SURVEY OBSERVATIONS ^e /Comments
Lisa De Alva	2.6 W	S Fontanelle Street and 5th Avenue S street end	Questionnaire returned by US Post Office as undeliverable.		Residential shoreline access	Mud, shallow	Hand and motorboat launch (BJ), birding (BJ), swimming (BJ), walking (BJ), picnicking (BJ)	Property has a ramp that leads from house to a dock and the LDW shoreline. The resident and six neighbors in the vicinity use the shore for both hand and motor boat launch, birding, swimming, walking and picnicking.
Harald L. Hurlen	2.6 – 2.7 W	South of S Fontanelle St and 5th Avenue S street end	No response to the questionnaire was received.		Residential shoreline access	Mud, riprap	Hand and motorboat launch (BJ), birding (BJ), swimming (BJ), walking (BJ), picnicking (BJ)	Neighbor to Lisa De Alva's residence.
Myrna Triplett	2.7 W	S Portland street end	Questionnaire returned by US Post Office as undeliverable.		Residential shoreline access	Mud, riprap	Hand and motorboat launch (BJ), birding (BJ), swimming (BJ), walking (BJ), picnicking (BJ)	Neighbor to Lisa De Alva's residence.
E4	2.7 E	8th Avenue South street end	na		Easy shoreline access	Steep, riprap, sand, mud, bench, litter	Kayak launch point (BJ), fishing (JB), swimming (JB), picnicking (BJ), restoration activities (BJ)	Also known as Gateway North. I'M A PAL Foundation is the steward of this park and they are working to secure funding for public signage to designate this area as a public park.
Crowley Marine Services Inc	2.8 E	Adjacent to the Boeing Plant 2 Public Access	No response to the questionnaire was received.		Employee shoreline access	Riprap, mud	None identified	Within Slip 4; the southern portion of the property has a dock over a riprap shoreline.
Emerald Services, Inc.	2.8 E	Adjacent to the Boeing Plant 2 Public Access	Questionnaire returned by US Post Office as undeliverable.		No employee shoreline access	Riprap, mud	None identified	Within Slip 4; easily accessed by kayak. The head of the slip is fenced. The Boeing property to the south of the slip is unfenced adjacent to the slip.

TAXPAYER OR SITE#	RIVER MILE	AREA	QUESTION 1 ^a RESPONSE	QUESTION 2 ^b RESPONSE	SITE ACCESSIBILITY ^c	SHORELINE CHARACTERISTICS	HUMAN USE ^d	SURVEY OBSERVATIONS ^e /Comments
Billie Macksene Lukas	2.8 W	North Portland street end park	No response to the questionnaire was received.		No employee shoreline access	Riprap, mud	None identified	Fenced business located adjacent to the South Portland street end park.
King County, W13	2.8 W	South Portland street end park	Public access	No employee access; not a place of business.	Easy park shoreline access	Shallow, riprap, mud, litter, benches	Walking (JB), picnicking, fishing ^f (JB), swimming (JB), restoration activities (BJ)	Grassy area with a bench on the bank and an eroded riverbank on the southern portion of the park. A shore view sign is posted on the property. Litter included fireworks, beer bottles, cans, and cigarette butts. Inflatable raft and an individual observed sleeping on bank during motorboat survey.
Silver Bay Logging	2.9 W	North of Duwamish Waterway Park	Questionnaire returned by US Post Office as undeliverable.		Employee shoreline access	Riprap, mud	None identified	Property is unfenced.
E5	2.9 E	Slip 4 public access	na		Difficult shoreline access	Steep, riprap, gravel, benches, path	Kayak launch point (BJ), walking (JB)	Well-maintained 150-yard trail from parking area adjacent to Boeing facility leading to gravel path bordering southern side of Slip 4. Riprap shoreline is steep in places and most of bank is covered with thick vegetation making access to the shoreline difficult. One section of trail open to Slip 4 could be used as a kayak launch area, but it is a 300-yard walk from parking area. According to DRCC, Boeing employees and/or contractors have been seen accessing the south intertidal riprap shoreline of Slip 4.

TAXPAYER OR SITE#	RIVER MILE	AREA	QUESTION 1 ^a RESPONSE	QUESTION 2 ^b RESPONSE	SITE ACCESSIBILITY ^c	SHORELINE CHARACTERISTICS	HUMAN USE ^d	SURVEY OBSERVATIONS ^e /Comments
The Boeing Company	2.9 – 3.5 E	Slip 4 public access and south of Slip 4 public access	There is a public trail along the outer portion of Slip 4 and extending south along the LDW for approximately 200 ft. Although access to the sediments at the northern end of Plant 2 could be negotiated with some difficulty, the shoreline there is vegetated and riprapped. The public access there is primarily intended for walking and viewing, and not for accessing the shoreline.	Other than infrequent sediment investigation work directly related to remediation projects, there is no reason for Boeing employees to come in contact with intertidal sediments.	Employee shoreline access	Mud, riprap	Fishing ^f (JB)	A trail by the LDW was observed on property that was not observed during the land portion of the survey.
William Carriel	3.0 W	North of the Duwamish Waterway Park	None	Never	Residential shoreline access	Mud, riprap, shallow	None identified	Residence adjacent to the Duwamish Waterway Park.
W12	3.0 W	Duwamish Waterway Park	na		Easy park shoreline access	Shallow, sandy beach, riprap, mud, benches, picnic tables	Fishing ^g (JB), swimming (JB), bird watching (JB), walking (JB), picnicking (BJ), kayak launch point (BJ)	Located adjacent to small businesses and residences. Most attractive intertidal area in the LDW with respect to human access. Firework remnants indicated evidence of human use. Salmon habitat restoration activities may occur on residential properties in this area. The Environmental Coalition of South Seattle (ECOSS) is the lead organizer for the South Park/Duwamish Habitat Revival Project, which will remove riprap, expose sediment and create sloughs that will extend into the residential properties and improve the habitat for the salmon. Currently, the progress of the project is dependent on the monetary success of its fundraising phase.

TAXPAYER OR SITE#	RIVER MILE	AREA	QUESTION 1 ^a RESPONSE	QUESTION 2 ^b RESPONSE	SITE ACCESSIBILITY ^c	SHORELINE CHARACTERISTICS	HUMAN USE ^d	SURVEY OBSERVATIONS ^e /Comments
King County	3.0 W	Adjacent to Duwamish Waterway Park	None	No employee access; not a place of business.	Easy shoreline access	Mud, riprap, shallow	None identified	Small business parcel situated between Duwamish Waterway Park and residential property.
Elmgrove/Unity Electric Construction	3.0 W	S Elmgrove street end	Questionnaire returned by US Post Office as undeliverable.		Employee shoreline access	Mud, riprap, shallow	None identified	Business adjacent to Duwamish Waterway Park.
Robert S. and Dagmar R. Cronn	3.1 W	South Elmgrove Street and 12th Avenue street end	Questionnaire returned by US Post Office as undeliverable.		Easy shoreline access	Mud, riprap, shallow	Residential use	Residential property; LDW shoreline is part of the yard.
W11	3.1 W	South Elmgrove Street and 12th Avenue street end	na		Easy shoreline access	Steep, mud, riprap, litter	Fishing ^g (JB), walking (JB)	Between several private residences with access to LDW shoreline during low tide. Accessible shoreline in continuous band from the street ends at 12 th Avenue S and South Elmgrove Street to the South Park bridge shoreline. Salmon habitat restoration activities are likely to occur on residential properties in this area. Waterfront homes in the area include the LDW shoreline as part of their yards.
Kaler Wise	3.2 W	S Southern street end	Questionnaire returned by US Post Office as undeliverable.		Easy shoreline access	Mud, riprap, shallow	Residential use	See notes for W11
John D Marden	3.2 W	S Southern street end	No response to the questionnaire was received.		Easy shoreline access	Mud, riprap, shallow	Residential use	See notes for W11
MC Elward Halvorsen	3.2 W	S Southern street end	Questionnaire returned by US Post Office as undeliverable.		Easy shoreline access	Mud, riprap, shallow	Residential use	See notes for W11
W10	3.2 W	South Southern street end	na		Easy shoreline access	Shallow, riprap, mud, rock boat ramp, dock	Fishing ^f (JB), motorboat launch, walking (JB)	Adjacent to homes, with a dock and rock boat ramp.
Daniel A Slemko	3.2 W	South Southern street end	No response to the questionnaire was received.		Easy shoreline access	Mud, riprap, shallow	Residential use	See notes for W11
W9	3.3W	South Rose street end	na		Easy shoreline access	Shallow, riprap, mud, boat ramp, path	Fishing ^f (JB), walking (JB)	Situated within a residential area with an established path along the LDW shoreline that leads south to the South Park bridge. DRCC noted that restoration activities are planned for this area. See notes for W11.

TAXPAYER OR SITE#	RIVER MILE	AREA	QUESTION 1 ^a RESPONSE	QUESTION 2 ^b RESPONSE	SITE ACCESSIBILITY ^c	SHORELINE CHARACTERISTICS	HUMAN USE ^d	SURVEY OBSERVATIONS ^e /Comments
W8	3.3 W	14th Avenue South street end	na		Easy shoreline access	Shallow, riprap, mud, litter, benches	Salmon fishing ^f (JB), walking (JB)	Located north of the South Park bridge in a residential area and connects to the South Park Marina boat ramp. There are makeshift benches that are used for viewing along the LDW, but there is not an established path leading to the shoreline. Litter included beer bottles and cans. Shoreline is easily accessible from 14th Avenue street end and via adjacent shoreline. DRCC noted that restoration activities are planned for this area. See notes for W11.
South Park Marina	3.4 – 3.5 W	Between Terminal 117 and the South Park bridge	I moor 152 boats. Access is by key for boat owners only.	Never	Employee shoreline access	Mud, motor and hand boat ramp	Boat cleaning (BJ)	Securely fenced private property with strictly member and employee access.
W7	3.4 W	South Park bridge	na		Easy shoreline access	Shallow, riprap, mud, boat ramp, parking	Fishing ^f (JB), walking (JB)	Adjacent to South Park Marina boat ramp and near homes and businesses. Fencing around the parking area underneath the bridge that was apparently recently installed.
Port of Seattle, W6	3.6 W	Terminal 117	None	Employees do not come in contact with intertidal sediments.	Difficult shoreline access	Steep, mud	None identified	Designated with a private property sign and fenced both around the property and northern and southern ends of the shoreline. Fence around property includes gate which was open during survey and is apparently always open during business hours to allow Port of Seattle tenants to access the site. Located adjacent to homes between Boeing Company property and South Park Marina. There was a low orange construction barrier placed at the edge of the paved area across the middle section of the site. No established paths were noted during the survey; however, according to BJ Cummings, there is a trail along the length of the property between Sea-King facility (RM 3.9 W) and Port of Seattle, T-117 (RM 3.5 W).
Jorgensen Forge Corp.	3.6 – 3.7 E	North of Slip 6	na		Employee shoreline access	Mud	None identified	Kenworth Motor Corporation, Jorgensen Forge Corporation, and Boeing Company (RM 3.4-4.0 E) business properties have strictly limited employee

TAXPAYER OR SITE#	RIVER MILE	AREA	QUESTION 1 ^a RESPONSE	QUESTION 2 ^b RESPONSE	SITE ACCESSIBILITY ^c	SHORELINE CHARACTERISTICS	HUMAN USE ^d	SURVEY OBSERVATIONS ^e /Comments
The Boeing Company	3.7 – 3.9 E	North of Slip 6	No public access	Other than infrequent sediment investigation work directly related to remediation projects, there is no reason for Boeing employees to come in contact with intertidal sediments.	Employee shoreline access	Mud, riprap	None identified	access to the few intertidal mudflat areas present.
Kenworth Motors	3.9 E	North of Slip 6	None	Never	Employee shoreline access	Mud, riprap	None identified	
The Boeing Company	3.7 – 3.9 W	South of Terminal 117	No public access	Other than infrequent sediment investigation work directly related to remediation projects, there is no reason for Boeing employees to come in contact with intertidal sediments.	Employee shoreline access	Mud, riprap	None identified	Continuous stretch of unfenced property that offers access to the shoreline.
George McElroy & Assoc Inc	4.0 W	Hamm Creek/Seattle City Light North	Questionnaire returned by US Post Office as undeliverable.		Difficult shoreline access	Mud, riprap, dock	None identified	Business property adjacent to the Duwamish Yacht Club with a dock and a steep bank.
Duwamish Yacht Club	4.1 W	North of Hamm Creek/Seattle City Light North	General public is not allowed on facility adjacent to shoreline.	Never	Employee shoreline access	Mud, riprap	Boat cleaning (BJ)	BJ Cummings noted the potential for occupational exposure to occur for the divers that clean the bottom of the boats moored at the yacht club.

TAXPAYER OR SITE#	RIVER MILE	AREA	QUESTION 1 ^a RESPONSE	QUESTION 2 ^b RESPONSE	SITE ACCESSIBILITY ^c	SHORELINE CHARACTERISTICS	HUMAN USE ^d	SURVEY OBSERVATIONS ^e /Comments
Container Properties LLC	4.0 – 4.2 E	North of pedestrian bridge at RM 4.8	No response to the questionnaire was received.		Employee shoreline access	Steep, vegetation, riprap	Kayak haul out (BJ)	A majority of the area is secured with fencing, with a break on the northern end that offers difficult access from the steep, heavily vegetated bank to the riprap shoreline. BJ Cummings noted the beach on the eastern bank of the LDW downstream of Slip 6 at RM 4.1 E is used for kayak pullouts although access to the beach from the shore is poor.
Delta Marine	4.2 W	Adjacent to Hamm Creek/Seattle City Light North	No response to the questionnaire was received.		Employee shoreline access	Dock, mud, riprap	Boat cleaning (BJ)	John Beal stated that the boat being worked on by employees during the boat survey had been in the sediment the previous day. BJ Cummings noted the potential for occupational exposure to occur at Delta Marine when employees do wall repair adjacent to the intertidal sediment.
W5	4.3 W	Hamm Creek/Seattle City Light North	na		Easy shoreline access	Shallow, mud, marsh, litter	Fishing ^f (JB), walking (JB), bird watching (JB), habitat restoration (JB)	Designated with a private property sign and no motor vehicles are allowed access. The property is fenced both north and south of the mouth of Hamm Creek. A 150-yd path leads from the parking lot to the LDW. Access to the shoreline is difficult from the upland area due to the fencing. Litter included beer bottles and cigarettes. Several dog walkers observed during the survey. There is a second trail to the shoreline at this site beginning at Seattle City Light fence line according to BJ Cummings. BJ Cummings notes that approximately 90 volunteer and paid restoration workers worked on the site in October 2004. During John Beal's tours of the site, people have accessed the intertidal sediment through a break in the fence.
The Boeing Company	4.2 – 4.8 E	Pedestrian bridge at RM 4.8	The Boeing Developmental Center is under strictly controlled access for security reasons and public access is not allowed.	Other than infrequent sediment investigation work directly related to remediation projects, there is no reason for Boeing employees to come in contact with intertidal sediments.	Employee shoreline access	Mud, riprap	Fishing ^f	A majority of this property is fenced and has a steep vegetated bank that does not offer easy access to the shoreline.

TAXPAYER OR SITE#	RIVER MILE	AREA	QUESTION 1 ^a RESPONSE	QUESTION 2 ^b RESPONSE	SITE ACCESSIBILITY ^c	SHORELINE CHARACTERISTICS	HUMAN USE ^d	SURVEY OBSERVATIONS ^e /Comments
Seattle City Light Right of Way	4.4 E	North of S 112th Street mitigation site	It is located between private property and access is likely limited.		Limited employee shoreline access	Riprap	None identified	A narrow strip of property with a steep bank.
Seattle City Light, Duwamish Substation, W4	4.4 – 4.6 W	South of Hamm Creek/Seattle City Light North	None	Employees do not come in contact with sediments	Easy shoreline access	Steep, mud, riprap, litter	Fishing ^g (JB),	Located between Hamm Creek/Seattle City Light North and a fenced Muckleshoot Tribe restoration site on West Marginal Way South. Apparently a common dumping ground based on bags of trash and bread strewn about the property. One established rough path leads from the steep bank to intertidal area of riprap and mud. Hamm Creek tributary enters the slough area at the shoreline. Wendy Livezey previously observed fishing activity. BJ Cummings observed two fishermen fishing and cooking on August 11, 2004. There is also a trail leading from the road along the Seattle City Light fenceline to this site.
Muckleshoot Tribe	4.6 W	South of Hamm Creek/Seattle City Light North	na		No employee shoreline access	Riprap	Fishing ^f (JB), mussel harvesting (BJ)	The area is fenced and locked and does not allow access to the shoreline from the pier at the edge of the property. BJ Cummings and DRCC have received reports of people mussel harvesting from the pilings at the area, formerly known as the Kenco Marine Services. John Beal observed Muckleshoot tribal members fishing from the dock at Kenco Marine.
Port of Seattle, W3	4.7 W	Port of Seattle South Turning Basin 3 Public Access Park	Park is accessible to the public	Not a place of business.	Easy shoreline access	Steep, riprap, sand, bench, path, litter	Fishing ^g (JB), kayak launch point (BJ), bird watching (JB), habitat restoration (BJ)	Port of Seattle Coastal America restoration site and public access park adjacent to Freemont Associates. Intertidal area is a very large mudflat at the southern end of the property that abuts the Boeing parking lot and bridge crossing at site W2. The path that leads from the parking lot to the shoreline is used for kayak launching. There is a muddy path through marsh to the shoreline. Litter included used condoms, toilet paper, and clothes. BJ Cummings noted this site is accessed and used frequently by restoration workers.

TAXPAYER OR SITE#	RIVER MILE	AREA	QUESTION 1 ^a RESPONSE	QUESTION 2 ^b RESPONSE	SITE ACCESSIBILITY ^c	SHORELINE CHARACTERISTICS	HUMAN USE ^d	SURVEY OBSERVATIONS ^e /Comments
The Boeing Company, E6	4.8 – 5.0 E	Norfolk East	The shoreline along the Oxbow parking lot on the western side of the LDW is open, and members of the public are known to fish there during salmon runs. The anglers tend to stand on rocks or other level features along the shoreline, however, and have little contact with the muddy sediments at that location.	Other than infrequent sediment investigation work directly related to remediation projects, there is no reason for Boeing employees to come in contact with intertidal sediments.	Difficult shoreline access	Steep, riprap, sand, benches, bridge	Fishing ^f (JB), walking, jogging	This area has a covered walkway on Boeing property, and is fenced, which blocks a majority of the access to the shoreline. A small portion of the pathway is unfenced, but thick vegetation acts as a natural barrier to deter access. No public parking is available. River bank is steep with riprap overlying sand in the intertidal area. Walkers were observed using the walkway and the benches next to it during the survey. John Beal noted that people access shoreline at low tide and climb on the abandoned barge next to the walkway to catch the fish that rest underneath the barge. The kayak survey generally found access near the Norfolk CSO to be difficult because the area is fenced and surrounded by vegetation.
Boeing Company, W2	4.8 – 5.1 W	Norfolk West			Difficult shoreline access	Steep, riprap, sand, path, litter	Fishing ^f (JB), running, walking, kayaking (BJ), biking	On Boeing private property adjacent to a large parking lot. A path for walking and jogging follows the steep riprap bank, which is unfenced but there is no easy access to the shoreline. No public parking is available. Walkers and runners were observed using the path during the survey. Bridges over the LDW at the northern and southern ends of this site link it with Norfolk East (E6). The kayak survey team discovered a well-established trail leading to the LDW and also observed a CSO sign intended to dissuade people from using the LDW during discharges. Wendy Livezy previously observed salmon snaggers downstream of the bridge at RM 5.0.
Freemont Associates	4.7 – 4.8 W	Adjacent to pedestrian bridge at RM 4.8	No response to the questionnaire was received.		Easy shoreline access	Mud	Fishing ^f (JB), running, walking, kayaking (BJ), biking	Industrial waterfront property located between Turning Basin 3 and Norfolk West.
Seattle City Light Right of Way	5.6 W	North of Cecil B. Moses Park	It is located between private property and access is likely limited.		Limited employee shoreline access	Riprap	None identified	A small parcel of land with a steep bank.
Seattle City Light Right of Way	5.6 E	North of S 112th Street mitigation site	It is located between private property and access is likely limited.		Limited employee shoreline access	Riprap, mud	None identified	A small parcel of land with a steep bank.

TAXPAYER OR SITE#	RIVER MILE	AREA	QUESTION 1 ^a RESPONSE	QUESTION 2 ^b RESPONSE	SITE ACCESSIBILITY ^c	SHORELINE CHARACTERISTICS	HUMAN USE ^d	SURVEY OBSERVATIONS ^e /Comments
King County, E7	5.7 E	S 112th Street mitigation site	Public access is possible.	Not a place of business.	Easy shoreline access	Steep, mud, algae, litter	Fishing ^f (JB), walking (JB), habitat restoration	Also known as Mitigation Site 1 and North Winds Weir Site. Approximately two acres in size. Fenced at the southern end of the property with an entrance and signage designating the area as a restoration site. The intertidal area is a steep vegetated bank with established paths to the LDW and an algae-covered mudflat. There is access to the shoreline through the brush. Human footprints were present in the sediment. Additional restoration work at this site is planned to restore the shoreline and to develop a park.
King, County W1	5.7 W	Cecil B. Moses Park	Public access is possible.	Not a place of business.	Difficult shoreline access	Mud, tires, slough restoration area, path, litter	Fishing ^f (JB), walking, habitat restoration (JB)	Park not designed for shoreline access. It is always locked and fenced at the north end of the property to eliminate car access. Green River Trail runs along the West Marginal Way park boundary to invite use by runners, walkers and bikers. A pedestrian bridge over the Duwamish River links E7 to W1. A man-made slough has been created in the northeastern part of the park as a restoration project. Joggers were observed during the survey.

na A public questionnaire was not sent to the location therefore the questions are not applicable.

^a Public access questionnaire, question 1: What degree of access by the public, if any, is allowed on their property adjacent to the shoreline?

^b Public access questionnaire, question 2: How often do employees come in contact with intertidal sediments, either as part of their work or during breaks?

^c Refers to accessibility to intertidal sediments from upland. Easy refers to a path, a shallow slope, park, or public access area. Difficult refers to a steep slope, fenced or other barriers to access. Unknown means that the potential for shoreline access was not addressed by Windward.

^d Human uses were either observed during the survey, observed by survey participants on previous occasions, or inferred by the presence of picnic tables or paths. The survey participants who noted human uses on previous occasions are identified in parentheses (JB = John Beal, BJ = BJ Cummings, MH = Marcia Henning). Walking refers to paths located above mean higher high water. Some access locations may support walking within the intertidal zone, but no permanent paths within that zone were observed.

^e Includes upland, motorboat, and kayak survey observations.

^f Fishing activity observed from the shoreline or off the street end usually at low tide.

^g Fishing activity observed to be primarily by boat.

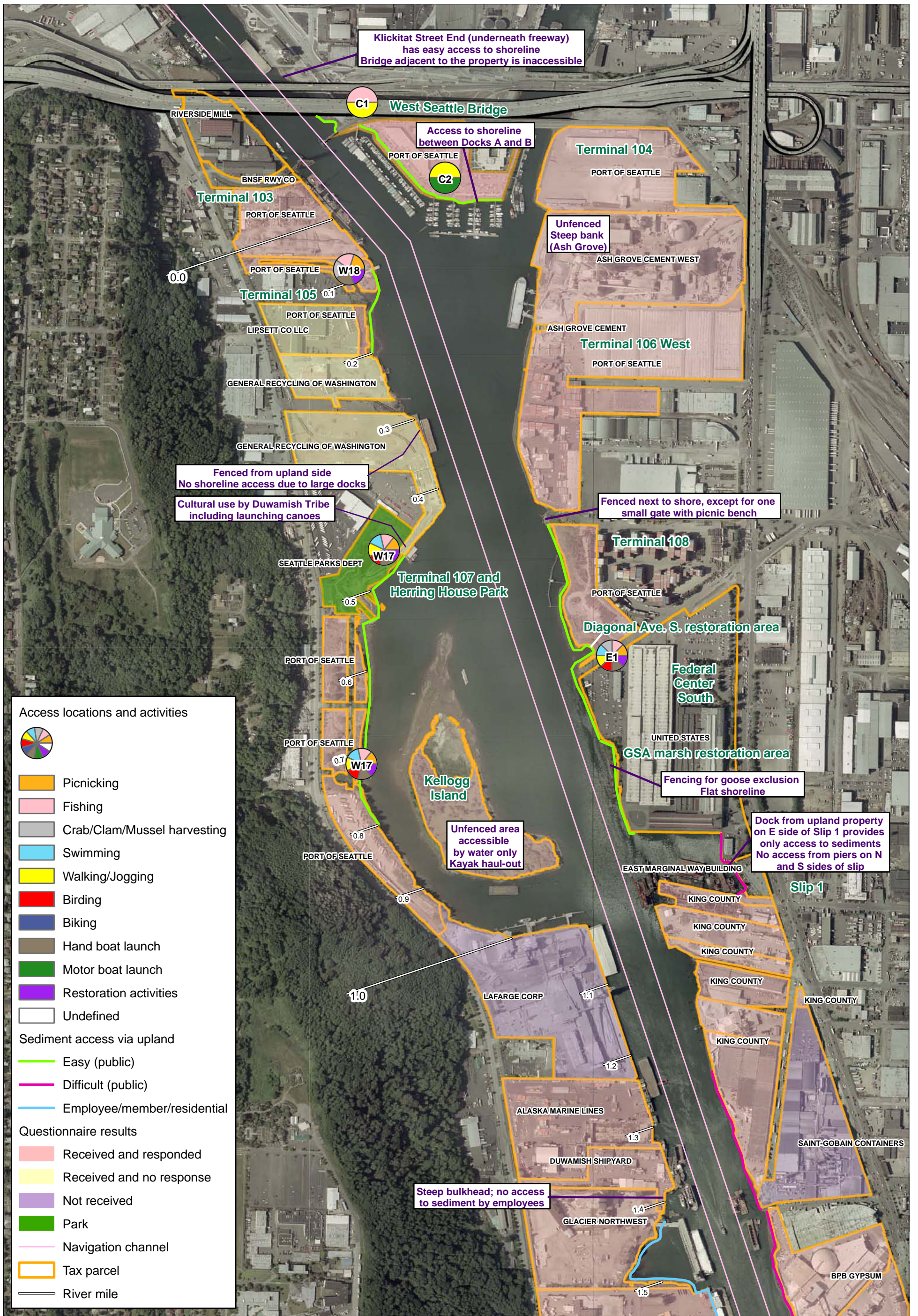
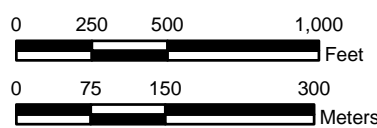


Figure 3-1a. LDW access locations, accessible shorelines, and activities (RM 0.0-1.4) based on survey or past observations made by survey participants

Disclaimer: This survey was not comprehensive due to private property access issues.



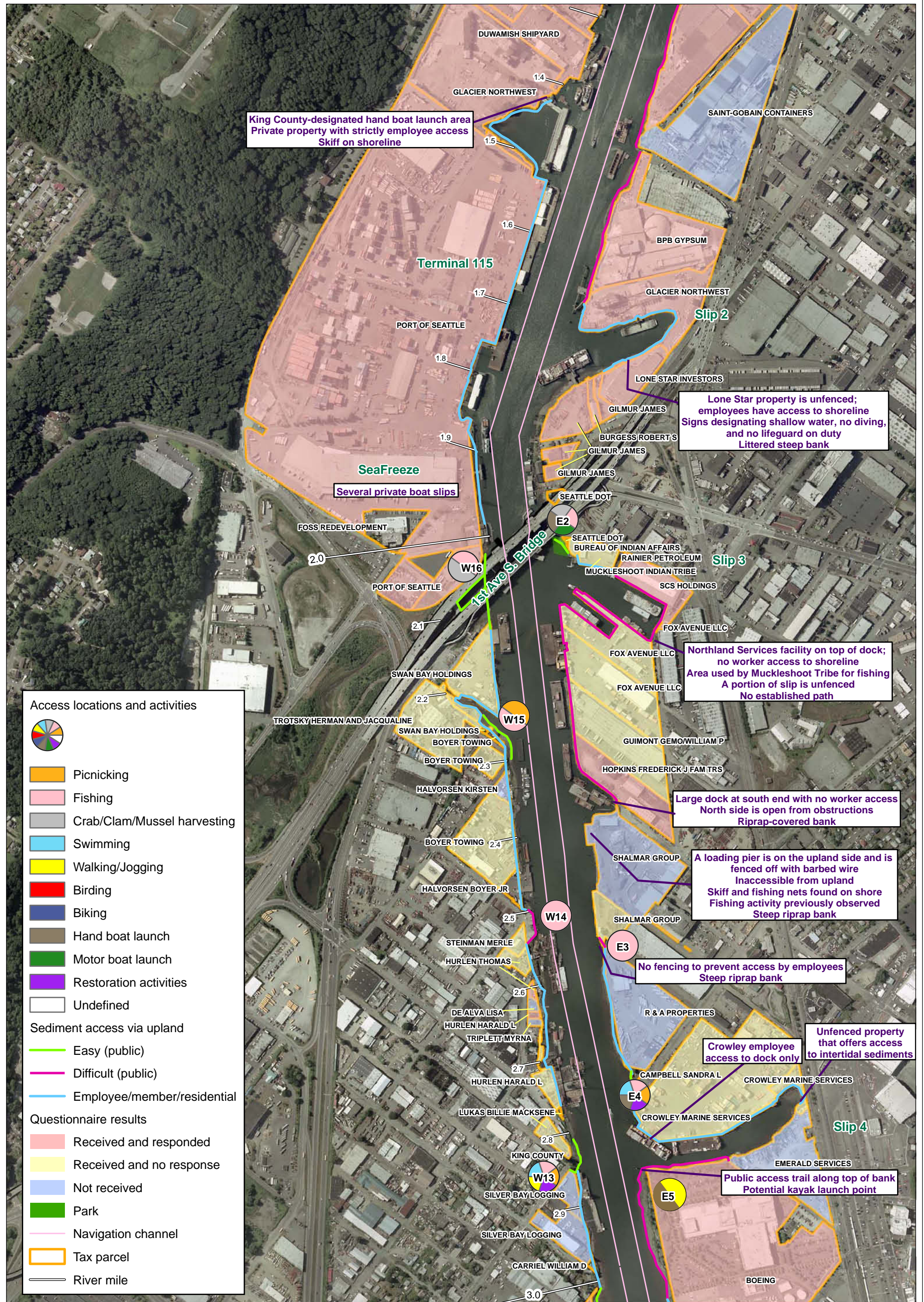


Figure 3-1b. LDW access locations, accessible shorelines, and activities (RM 1.4-3.0) based on survey or past observations made by survey participants

Disclaimer: This survey was not comprehensive due to private property access issues.



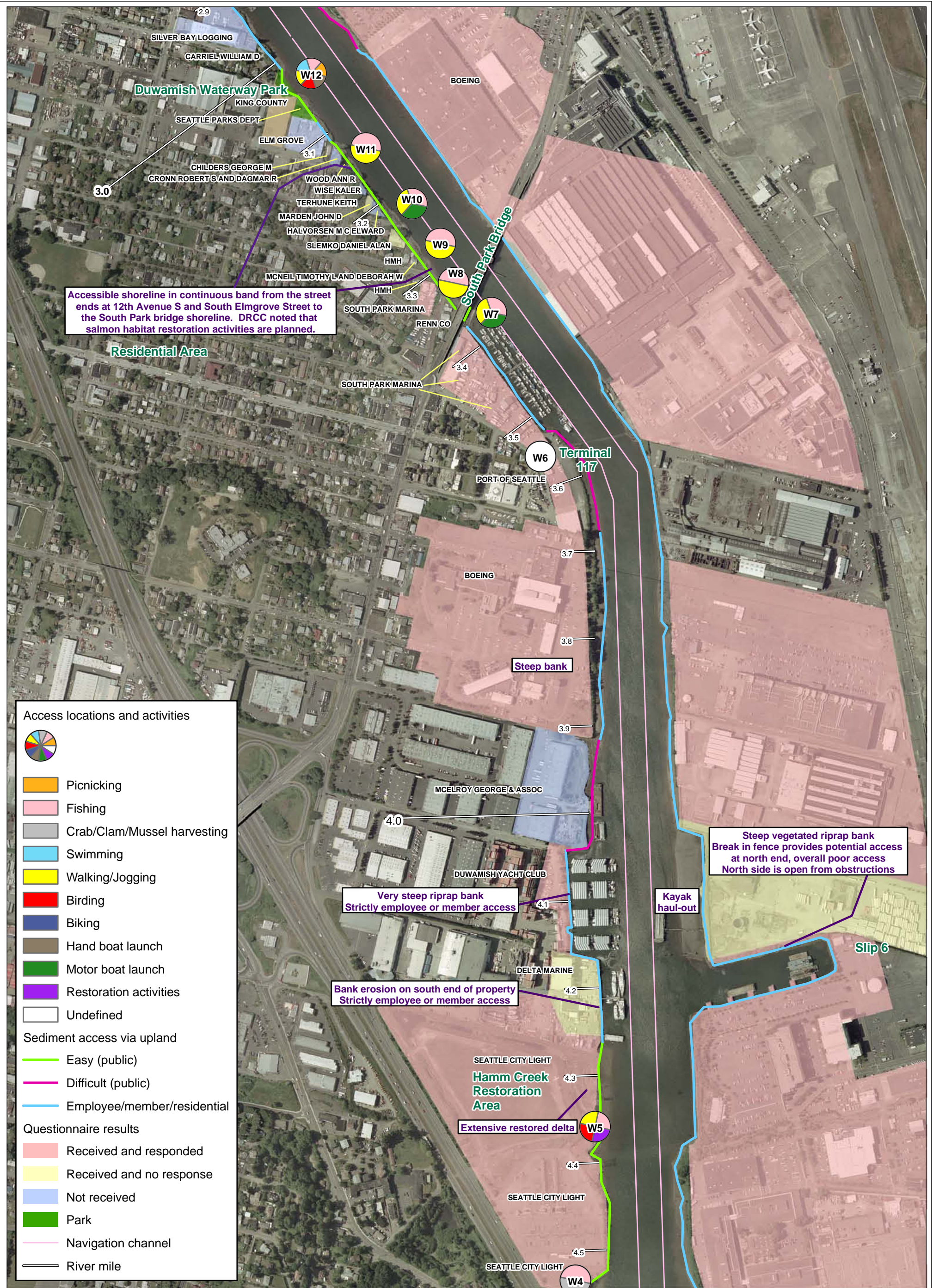
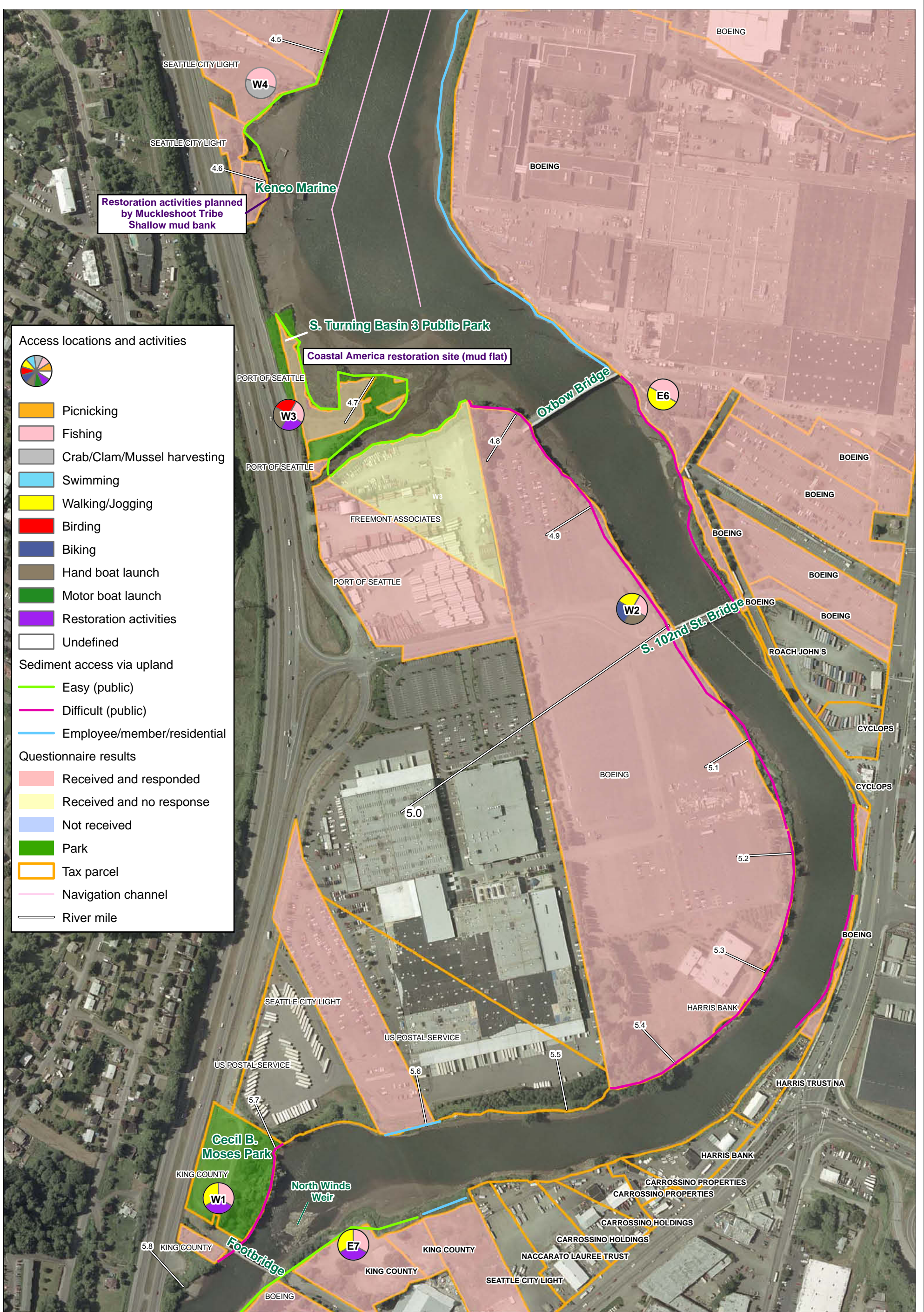


Figure 3-1c. LDW access locations, accessible shorelines, and activities (RM 3.0-4.5) based on survey or past observations made by survey participants

Disclaimer: This survey was not comprehensive due to private property access issues.





Access locations and activities

- Access location
- Picnicking
- Fishing
- Crab/Clam/Mussel harvesting
- Swimming
- Walking/Jogging
- Birding
- Biking
- Hand boat launch
- Motor boat launch
- Restoration activities
- Undefined

Sediment access via upland

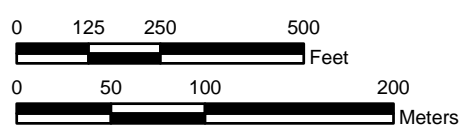
- Easy (public)
- Difficult (public)
- Employee/member/residential

Questionnaire results

- Received and responded
- Received and no response
- Not received
- Park
- Tax parcel
- Navigation channel
- River mile

Figure 3-1d. LDW access locations, accessible shorelines, and activities (RM 4.5-5.8) based on survey or past observations made by survey participants

Disclaimer: This survey was not comprehensive due to private property access issues.



Prepared by STS 12/14/04, updated 02/04/05, 03/31/05 Map 1498

Appendix A. Land Survey Forms and Public Health of Seattle and King County map

(Separate PDF)

Appendix B. LDW Shoreline Access Survey Photos

Photographs can be viewed in a thumbnail album at the following location:
http://www.ldwg.org/Assets/Tech_memos/Human_use/humuse_album.htm.

Table B-1. Descriptive index for LDW shoreline access survey photo album

SITE ID #	AREA	RIVER MILE	PHOTO #	CAPTION
E1	Port of Seattle Diagonal Avenue South Public Access park at T-108 and Diagonal Ave. S. street end	0.5-0.7	1	Slough area at north end of park
			2	View toward the north of the riprap bank and sandy shoreline
			3	Benches for viewing on the south end of site
			4	Combined sewer overflow (CSO) warning sign
			5	Trail closed sign at the north end
			6	The trail that extends beyond the closed trail sign
			7	View toward the north of the sandy shoreline and vegetated bank
E2	1st Avenue S Bridge Motorboat Launch	2.0	8	Concrete boat ramp underneath the S 1st Avenue Bridge
			9	View toward the north of the riprap, litter, and vegetated bank
E3	S Othello Street end	2.5	10	View toward the south of the steep riprap bank and pipe at the end of Othello Street
E4	8th Avenue S street end park	2.7	11	View toward the south of the vegetated shoreline
			12	Park bench at the top of the steep bank of the S 8th Avenue street end park
			13	View of the shoreline at the north end of the park
E5	Boeing Plant 2 Public Access	2.8-2.9	14	Potential kayak launch area at the Boeing Plant 2 Public Access site
			15	View from the mouth of Slip 4 looking back towards the head of the slip
E6	Norfolk East	4.8-5.1	16	Fish rest underneath this abandoned barge at Norfolk East and fishermen access it via the shoreline and fish for salmon
			17	View toward the north of the shoreline from the bridge at 102nd Street underneath the covered walkway
			18	South view of the muddy shoreline from the pedestrian bridge
E7	S 112th St Mitigation Site 1	5.7	19	North Winds Weir created by the US Army Corps of Engineers
			20	Mitigation Site 1 shoreline vegetated with rushes and grasses
			21	Sandy shoreline next to the Duwamish River vegetated with algae and Cecil B. Moses Park to the West
W1	Cecil B. Moses Park	5.7	22	View of the Duwamish River from the mitigation area at Cecil B. Moses Park
			23	Man-made slough created for mitigation
			24	Shoreline view toward the north from the mitigation area at Cecil B. Moses Park

SITE ID #	AREA	RIVER MILE	PHOTO #	CAPTION
W2	Norfolk West	4.8-5.1	25	Riprap shoreline and riparian corridor next to the bike and pedestrian path
			26	Riprap shoreline view with an abandoned floating dock south of the 102nd Street bridge, which is next to the Boeing parking lot
			27	The muddy shoreline from the pedestrian bridge and the Boeing parking lot in the distance
W3	Port of Seattle public access park at Turning Basin #3	4.7	28	View of Turning Basin 3 from the pedestrian bridge
			29	View toward the north of the Duwamish River and the fencing that keeps the geese out of the revegetated shoreline at Turning Basin 3
			30	Mudflat that lies north of the mouth of Hamm Creek
			31	An active part of Hamm Creek that drains into slough area at the south end of the Turning Basin 3 site
W4	South of Hamm Creek/Seattle City Light North	4.6	32	A tributary of Hamm Creek that flows underneath an old dock into the Duwamish River and south of Hamm Creek/Seattle City Light North restoration area
			33	The accessible shoreline adjacent to a fenced area owned by the Muckleshoot Tribe
W5	Hamm Creek/Seattle City Light North	4.3	34	Pedestrian path at the Hamm Creek Restoration Area
			35	A scare-away bird line, a World Conservation Shoreline method used on the shoreline at the southern end of the property
			36	The fencing around specific plant species is used to protect the restoration efforts along Hamm Creek
			37	View of Hamm Creek and adjacent businesses
	South Park Marina	3.4	38	View of South Park Marina securely fenced along the steep riprap bank at the south end of the property
			39	View of South Park Marina securely fenced along the steep riprap bank at the north end of the property
W6	Terminal 117	3.6	40	Shoreline access at the north end of the T117 property
			41	Shoreline access at the south end of the T117 property
W7	14th Avenue S Bridge	3.4	42	The intertidal zone located adjacent to the South Park Marina boat ramp and below the 14th Avenue South bridge
			43	View of rocky shoreline underneath the 14th Avenue South bridge
W8	14th Avenue S street end	3.3	44	Makeshift benches for viewing and evidence of localized litter at the 14th Avenue South street end public access site
			45	View of shallow riprap shoreline adjacent to the 14th Avenue South bridge

SITE ID #	AREA	RIVER MILE	PHOTO #	CAPTION
W9	S Rose street end	3.2	46	Street end access site at Rose Street just north of 14th Avenue South that has a path along the shoreline that leads to the South Park bridge
			47	View of the accessible riprap shoreline on the western side of the LDW and Boeing Plant 2 on the eastern side of the LDW
W10	S Southern street end	3.2	48	Street end access site in a residential area to the riprap covered shoreline at South Southern Street
W11	S Elmgrove St & 12th Avenue S street end	3.1	49	Extensive accessible shoreline during low tide that connects from north to south, the 12th Avenue South and South Elmgrove Street shoreline to South Park bridge intertidal zone, respectively
			50	Riprap covered shoreline at the intersection of 12th Avenue South and South Elmgrove Street
W12	Duwamish Waterway Park	3.0	51	Duwamish Waterway Park sandy shoreline located at the northern end of the property, where people swim
			52	View of the sandy beach at Duwamish Waterway Park
W13	S Portland street end park	2.8	53	View of the shoreline at the S Portland street end park with riprap and localized litter and businesses adjacent to the property
			54	Exposed eroded river bank on the south end of South Portland street end park
W14	S Fontanelle St & 5th Avenue S street end	2.5	55	View of steep riprap covered shoreline with difficult access at the 5th Avenue South and South Fontanelle street end property that is for sale
			56	View of steep eroded and littered shoreline in close proximity to barges and businesses
			57	Another difficult access point on the north end of the property at the top of concrete blocks
W15	2nd Avenue S street end	2.2	58	Littered shallow shoreline at the north end of the 2nd Avenue South street end
			59	Easy southern shoreline access point at the 2nd Avenue South street end
			60	Continued accessible shoreline at the 2nd Avenue South street end that is littered with tires and debris adjacent to a small marina
W16	Port of Seattle T-115 Viewpoint Park	2.0-2.1	61	Marsh and tidal ponds draining into the LDW underneath the 1st Avenue South bridge
			62	View of easy sandy bank access to the shoreline underneath the 1st Avenue South bridge
			63	View toward the north of the sandy shoreline underneath the 1st Avenue South bridge
			64	Evidence of bank stabilization and highway runoff marsh and tidal ponds restoration at a Washington Department of Transportation mitigation site underneath the 1st Avenue South bridge
			65	View from Viewpoint Park of the shoreline and Puget Creek underneath the 1st Avenue South bridge

SITE ID #	AREA	RIVER MILE	PHOTO #	CAPTION
W17	Port of Seattle Duwamish public access park at Terminal 107 and Herring's House Park	0.4-0.7	66	View toward the south of the Herring's House Park's extensive shoreline covered with large woody debris and riprap that is accessible by steps
			67	View of the well-maintained Herring's House Park trail bordered with historical signs that chronicles the early settlement along the Duwamish River
			68	A kayak launch at Herring's House Park
			69	A restoration site at the northern end of the park that is fenced off to deter the geese from destroying it
			70	View of the continuous accessible shoreline of large woody debris and riprap
			71	Northern point of Herring's House Park that leads to a bank of riprap and a sandy shoreline
			72	Restored slough at the north part of the park with revegetated banks
W18	Port of Seattle Duwamish Public Access Park at Terminal 105	0.1	73	View toward the east of Harbor Island Marina and Ash Grove Cement from the pier at the Terminal 105 Park viewpoint
			74	View of the riprap bank and accessible shoreline at the southern end of Terminal 105 Park
C1	Klickitat Avenue SW street End	North of Harbor Island Marina	75	Klickitat Ave SW street end access underneath freeway bridge
			76	Rocky littered shoreline
			77	Shallow gradient to the rocky shoreline
			78	View of eroded accessible shoreline
			79	Ineffective old fencing adjacent to the shoreline and parking area underneath the freeway bridge
			80	Steep riprap bank
			81	"Private property" sign posted and "keep off" warning
C2	Port of Seattle Public Access Park at Harbor Island Marina Dock A and B	0.0	82	Well-established path to LDW below Dock B at Harbor Island Marina
			83	Trail that begins next to Dock B
			84	Accessible shoreline below Dock A at Harbor Island Marina
			85	Trail that begins next to Dock A
			86	Private access to Dock C at Harbor Island Marina
			87	Steep rocky shoreline between Dock C and Dock D at Harbor Island Marina
	Kellogg Island	0.6-0.9	88	View of Kellogg Island
	Slip 1	1.0	89	Employees sitting on dock owned by US Army Corps of Engineers to the north of Slip 1
			90	Employee working on dock to the south of Slip 1
			91-93	The only good access in Slip 1 to the LDW shoreline from a dock on East Marginal Way
	Duwamish Shipyard	1.3	94	Discolored water discharging from two outfall pipes due to a pump switch failure at the Duwamish Shipyard

SITE ID #	AREA	RIVER MILE	PHOTO #	CAPTION
			95	Old loading dock adjacent to Duwamish Shipyard
	Terminal 115 Public Hand Boat Launch	1.4	96	Public hand boat launching ramp on Lone Star Northwest Inc. cement plant property
			97	Unknown creek entering LDW south of Lone Star Northwest Inc. property
	Slip 2	1.7	98	View of steep riprap unfenced shoreline on Lone Star Northwest Inc. property in Slip 2
			99-100	Littered unfenced shoreline in Slip 2
			101	Shallow water warning signs
	Slip 3	2.1	102	Adjacent to Silver Bay Logging property with strictly employee access and a portion of area fenced in Slip 3
			103	Muckleshoot boat dock adjacent to 1st Ave S boat ramp
	Myrtle Street	2.4	104	Barbed wire fenced fishing pier at 500 S Myrtle Street
			105	Skiff on steep riprap shoreline adjacent to pier
	Residential Property	2.6	106	(Lisa de Alva) Residential property with a ramp that leads from her house to the dock and shoreline
	Slip 4	2.8	107	Two storm drains at head of Slip 4
			108	Fenced vegetated shoreline
			109	CSO and littered shoreline
			110	Storm drain and unfenced Pacific Terminals property
			111	Accessible shoreline on Pacific Terminals property in Slip 4
	Slip 6	4.2	112	A break in the fence offers potential access to the steep riprap shoreline
			113	Active outfall pipe adjacent to Rhone-Poulenc property
			114-117	Views of the adjacent riprap shoreline and fenced businesses
	Port of Seattle public access park at Turning Basin #3	4.7	118	View of Turning Basin 3 Park
	Norfolk East	4.8-5.1	119	CSO outfall at Norfolk East
			120	Vegetated and fenced bank above the CSO

Appendix C. Field Notes

(Separate PDF)