
PORTLAND HARBOR 2011 BASELINE SMALLMOUTH BASS TISSUE STUDY FIELD SAMPLING REPORT

WILLAMETTE RIVER
PORTLAND, OREGON

Prepared for
U.S. ENVIRONMENTAL PROTECTION AGENCY
U.S. ARMY CORPS OF ENGINEERS
CITY OF PORTLAND

June 2012

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TABLE OF CONTENTS

INTRODUCTION.....	1
CHRONOLOGY OF FIELD OPERATIONS	2
SMALLMOUTH BASS SAMPLING LOCATIONS AND POSITIONING	2
SAMPLE COLLECTION METHODS	3
SAMPLE IDENTIFICATION SCHEME.....	4
FIELD DECONTAMINATION PROCEDURES	4
FIELD DOCUMENTATION.....	4
SAMPLE HANDLING, STORAGE, TRANSPORT, AND CUSTODY.....	5
FISH SCALE PROCESSING PROCEDURES.....	5
SUMMARY	6
REFERENCES.....	6

LIST OF FIGURES

Figure 1	Vicinity Map
Figure 2	Smallmouth Bass Sampling Locations Overview
Figures 3A-M	Smallmouth Bass Sampling Locations – Detail Maps
Figure 4	Fish Measurements and Scale Sampling Area

LIST OF TABLES

Table 1	Sampling Schedule
Table 2	Sampling Station Locations
Table 3	Sample Summary

LIST OF APPENDICES

Appendix A	Field Logbooks
Appendix B	Field Forms
Appendix C	Representative Photos

LIST OF ACRONYMS

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
City	City of Portland, Bureau of Environmental Services
CLP	Contract Laboratory Program
COC	chain-of-custody
EPA	U.S. Environmental Protection Agency
FS	feasibility study
FSR	field sampling report
GPS	differential global positioning system
GSI	GSI Water Solutions, Inc.
ID	identification
LWG	Lower Willamette Group
NAD83	North American Datum from 1983
OBPC	Oregon Bass and Panfish Club
OSU	Oregon State University
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
RI	remedial investigation
RI/FS	remedial investigation and feasibility study
RM	river mile
RMB	river mile bank
SAP	sampling and analysis plan
SVOC	semivolatile organic compound
SWCA	SWCA Environmental Consultants, Inc.
TBF	The Bass Federation of Oregon
USACE	U.S. Army Corps of Engineers

INTRODUCTION

This field sampling report (FSR) summarizes the sample collection and handling activities associated with the Portland Harbor 2011 Baseline Smallmouth Bass Tissue Study. Field sampling activities were conducted from mid-September 2011 to mid-October 2011. The fish tissue data were collected for the U.S. Environmental Protection Agency (EPA) as part of the Portland Harbor Remedial Investigation and Feasibility Study (RI/FS) and in conformance with the National Contingency Plan. The City of Portland (City) provided assistance at EPA's request.

Portland Harbor, which encompasses the downstream portion of the Willamette River in Portland, Oregon (Figure 1), was designated as a Superfund site in 2000 under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). EPA, other federal agencies, state agencies, and tribal governments are providing oversight of the RI and FS being conducted by the Lower Willamette Group (LWG) pursuant to an Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study (EPA, 2001).

The draft final RI report documents concentrations of polychlorinated biphenyls (PCBs), dioxins/furans, pesticides, polycyclic aromatic hydrocarbon (PAHs), semivolatile organic compounds (SVOCs), and other contaminants in river sediment, surface water, and biota (Integral et al., 2011). The LWG conducted several studies of contaminants in fish and shellfish tissue, primarily in 2002 and 2007. The resulting data were used to prepare or develop the human health and ecological risk assessments, conceptual site model, bioaccumulation model, preliminary remediation goals for tissue consumption, and remedial action objectives. Remedial alternatives were developed and evaluated in the draft FS with the goal of reducing tissue concentrations through sediment remediation (AnchorQEA et al., 2012). The bioaccumulation model developed by the LWG was used to support the draft FS (Windward, 2009).

The Portland Harbor 2011 Baseline Smallmouth Bass Tissue Study was designed to provide an up-to-date baseline of PCBs, SVOCs, PAHs, and pesticides in smallmouth bass. EPA will use the updated baseline data as a point of comparison to future contaminant concentrations measured in smallmouth bass during and following remedy implementation. Smallmouth bass were selected over other fish species because of their significance in the human health and ecological risk assessments and because of their relatively small home range (generally within 1 river mile [RM]), which provides a useful metric for assessing sediment concentrations on a more localized spatial scale. Smallmouth bass within Portland Harbor also contain relatively high concentrations of PCBs as compared with other fish species.

The approach and procedures for the Portland Harbor 2011 Baseline Smallmouth Bass Tissue Study are detailed in the sampling and analysis plan (SAP) prepared by GSI Water Solutions, Inc. (GSI; GSI, 2011). This FSR is intended to describe field activities and identify deviations from the procedures presented in the SAP. Laboratory methodology, analytical results, quality assurance/quality control procedures, and data validation and

data management will be documented in a separate Data Report prepared Tetra Tech under contract to EPA.

This FSR was prepared by GSI, under contract to the City. Additional field sampling and logistical support was provided by EPA, U.S. Army Corps of Engineers (USACE), SWCA Environmental Consultants (SWCA) working as a subconsultant to GSI, and Tetra Tech working as a contractor to EPA. Boat operation and angling assistance during fish collection were provided by the Oregon Bass & Panfish Club (OBPC) and The Bass Federation of Oregon (TBF), as described in the SAP.

CHRONOLOGY OF FIELD OPERATIONS

The Portland Harbor 2011 Baseline Smallmouth Bass Tissue Study sampling began on September 12, 2011, and was completed by October 8, 2011. Table 1 summarizes the field schedule for sample collection. During the sampling, 191 hours were spent on-the-water by the two fishing vessels. In addition to sample collection, fish scales were processed in the field laboratory before sample shipment on September 29 and October 11, 2011 (as discussed in a subsequent section). In general, one scientist and one or two anglers were onboard each vessel during fish collection. The field scientist(s) is noted in Table 1.

SMALLMOUTH BASS SAMPLING LOCATIONS AND POSITIONING

The SAP identified a total of 137 smallmouth bass sample locations spaced at least every 0.2 RM on the east and west banks of the Portland Harbor (RM 1.9 to RM 11.8) as well as several samples collected for reference from RM 1 (downstream), Multnomah Channel (MC; downstream), and RM 16 (upstream). The goal at all “Target” sampling locations identified in the SAP was to collect smallmouth bass ranging from 225 to 355 millimeters in length (approximately 9 to 14 inches long). Following submission of the SAP, the EPA and USACE requested that five additional smallmouth bass samples be collected for reference between RM 16W and RM 17W. All samples that were successfully collected at these proposed sample locations are shown as ‘Target’ samples in the FSR figures and tables.

In addition to the ‘Target’ samples described above, the USACE requested that additional samples be collected at productive fishing locations to conduct a lifecycle analysis, which would include age-dating as well as chemical analysis on a wider range of smallmouth bass sizes. To distinguish these ‘Lifecycle’ fish from those collected at ‘Target’ locations, different symbology is used in the FSR figures and the sample purpose is noted in the FSR tables.

While angling was attempted multiple times at each proposed sampling location, smallmouth bass were successfully collected at or near 68 of the 137 proposed stations

(approximately 50 percent success rate). In addition to these ‘Target’ samples, 14 smallmouth bass were collected for the ‘Lifecycle’ analysis discussed previously. Figure 2 is an overview map showing the actual sampling locations in relation to the sampling locations proposed in the SAP. Figures 3A through 3M show the sampling locations and sample identification codes on the basis of 1 RM.

Station positioning was accomplished using a handheld Trimble GeoXT global positioning system (GPS) with a North American Datum of 1983 (NAD83), Oregon State Plane North Zone, international feet coordinate system. Sample coordinates were recorded on field forms and saved in GPS units. Electronic files were uploaded from the GPS units using the Trimble TerraSync software and post-processed to minimize and/or eliminate location errors resulting from satellite positioning and atmospheric conditions. The post-processed coordinates are accurate to +/- 1 meter and are included in Table 2 for reference.

SAMPLE COLLECTION METHODS

Angling was conducted using a rod and reel with monofilament line (6 to 12-pound test). Smallmouth bass were caught using earthworms, plastic worms, spinner baits, jigs, crank baits, and a variety of lures. Various rigging techniques were employed with live and plastic bait on the standard spinning reel (e.g., weighted hooks, drop shot, split shot, bobber and sinker, etc.) to fish multiple water depths, and casting reels were used to deploy crank baits in relatively shallow water (<10 feet). Electric trolling motors were used to maneuver the bass fishing boats quietly throughout the fishing areas.

Once caught, fish were handled using nitrile gloves, unhooked, and measured by placing them on a measuring platform contained within a large plastic bin. The total length of a fish was measured from the front of the jaw, which is most anterior to the end of the longest caudal ray when the rays are squeezed together, but excluding the caudal filaments, to the end of the tail (Figure 4). Fish of either sex that measured between 225 to 355 millimeters (approximately 9 to 14 inches) were euthanized and roughly weighed using a handheld scale before being wrapped in aluminum foil, labeled, and placed inside two re-sealable plastic bags before being transferred to a cooler with ice, as described in the SAP. In general, fish not meeting the length requirement were returned to the river. However, after several attempts were made to collect a sample within the target size range, the project manager approved retaining slightly oversized (up to 370 mm) fish at 5 of the 68 successful ‘Target’ locations. Field measurements including sample identification (ID), length, weight, and the water depth (approximated from the vessel’s depth finder) for the ‘Target’ smallmouth bass samples are presented in Table 3.

Smallmouth bass collected for the ‘Lifecycle’ analysis were handled in the same manner as the ‘Target’ fish, but were not restrained to the size class outlined in the SAP. The length of the 14 ‘Lifecycle’ specimens ranged from 197 to 455 mm, with a median length of 340 mm. Field measurements for the ‘Lifecycle’ fish are presented in Table 4.

SAMPLE IDENTIFICATION SCHEME

The unique sample ID scheme is consistent with that described in the SAP and adheres to the following format: EPA1-SBRMB-XX, where:

- EPA1 = client and project phase
- SB = smallmouth bass
- RMB = river mile bank (east or west). Note that RMB is replaced by the code 'MC' for Multnomah Channel and 'SIL' for Swan Island Lagoon.
- XX = individual specimen numeration (from 01 to 10)

Successful 'Target' samples were assigned the sample ID of the closest planned sample station. Additional 'Lifecycle' samples were assigned the next sequential sample ID for the area (RMB) in which they were collected.

FIELD DECONTAMINATION PROCEDURES

To reduce the need for equipment decontamination, one of two techniques were employed to avoid direct contact between the field equipment and the fish samples. The field scientist either placed a heavy duty clear plastic liner on top of the measuring board into the fish handling bin or placed the fish directly into a plastic bag (without contacting field equipment) before placement into the fish handling bin. The plastic liner or plastic bag was replaced between samples and the fish handling bin, measuring board, and scale were decontaminated on an as-needed basis (when inadvertent contact with the fish specimen occurred), as outlined in the SAP.

All disposable materials used in sample collection and processing, such as plastic liners, plastic bags, paper towels, and nitrile gloves, were placed in heavyweight garbage bags before disposal as municipal waste.

FIELD DOCUMENTATION

Rite in the Rain[®] field logbooks and forms were used to document field sampling activities, as specified in the SAP. Copies of the field logbooks and Specimen Tally and Location Forms are provided in Appendices A and B, respectively. Several representative photos of fish sampling activities are included in Appendix C.

SAMPLE HANDLING, STORAGE, TRANSPORT, AND CUSTODY

Once measured and packaged onboard the vessel, samples were immediately placed into a cooler containing wet ice to preserve the samples while in the field. At the end of each day, samples were transferred from the coolers to a chest freezer maintained in the field laboratory, where they were stored until shipment.

Samples collected during the 2011 Baseline Smallmouth Bass Tissue Study were tracked from the time of sample collection through laboratory and data analysis using a combination of EPA-specific and standard chain-of-custody (COC) and sample shipping/transfer procedures. A COC form was prepared for all samples before shipment to the laboratories. The COC forms for the 'Target' samples were prepared by an EPA contractor to ensure that the forms were consistent with the Contract Laboratory Program (CLP) handling and shipping requirements. The CLP COCs were verified by the Field Director and the original sample labels were carefully replaced with the required CLP labels before sample shipment. The COC and labeling protocols for the 'Lifecycle' samples were consistent with those specified in the SAP.

Samples were packed in coolers with double-bagged ice to maintain a temperature of approximately 4°C. A temperature blank was added to each cooler, and the associated COC forms were placed into a re-sealable bag and taped on the inside lid of each cooler. The coolers were sealed with shipping tape, and three EPA-certified custody seals were affixed to each cooler. 'Target' samples were shipped by FedEx on September 19, 2011, and October 11, 2011, for next-day delivery to the EPA headquarters KAP laboratory in The Woodlands, Texas. All of the 'Lifecycle' samples were shipped by FedEx to the Engineer Research and Development Center in Vicksburg, Mississippi, on October 11, 2011. Scales from the 'Target' fish also were shipped via FedEx on October 11, 2011, and were sent to Dr. Brian Sidlauskas at Oregon State University (OSU) (see next section).

Completed COCs will be included with the laboratory reports in the Data Report, which will be prepared by Tetra Tech.

FISH SCALE PROCESSING PROCEDURES

In conjunction with the 'Lifecycle' analysis proposed by the USACE, the agency requested that fish scales be collected from all smallmouth bass specimens and submitted to Dr. Brian Sidlauskas at OSU for age-dating.

At the direction and oversight of a SWCA biologist, fish scale processing was conducted on all 'Target' specimens on September 29, 2011, and October 11, 2011, before sample shipment. To facilitate scale removal, the frozen fish were carefully unwrapped and handled using clean nitrile gloves, and the sample area was heated using an electric hair dryer. The mucous was cleaned off as much as possible using forceps (decontaminated with alconox and water between samples) and paper towels before scale removal.

Approximately 20 scales were removed from below the lateral line on the left side of each fish (Figure 4). Individual scales were laid flat on a piece of Rite in the Rain[®] paper that was folded and placed in a coin envelope. Photos of the scale removal and packaging are provided in Appendix C. The coin envelopes were labeled with the sample ID and sample date. Field measurements, such as fish length and weight, were intentionally not included on the labels to maintain anonymity and not bias the age-dating analysis.

After fish scales were removed, the fish were carefully re-packaged and prepared for shipment (as discussed above).

SUMMARY

Field sampling activities were conducted in general accordance with the procedures outlined in the SAP. During the sampling, 68 smallmouth bass, ranging from 240 to 370 mm (approximately 9.4 to 14.6 inches) in length, were caught from the 'Target' locations proposed in the SAP.

Deviations from the SAP were largely a result of requests by EPA and USACE following submission of the SAP. The most significant deviation was the addition of 14 smallmouth bass, ranging in length from 197 to 455 mm, which were submitted to the Engineer Research and Development Center for 'Lifecycle' analysis, including age-dating and chemical analysis.

Laboratory procedures and results will be discussed in the Data Report, which will be prepared by Tetra Tech.

REFERENCES

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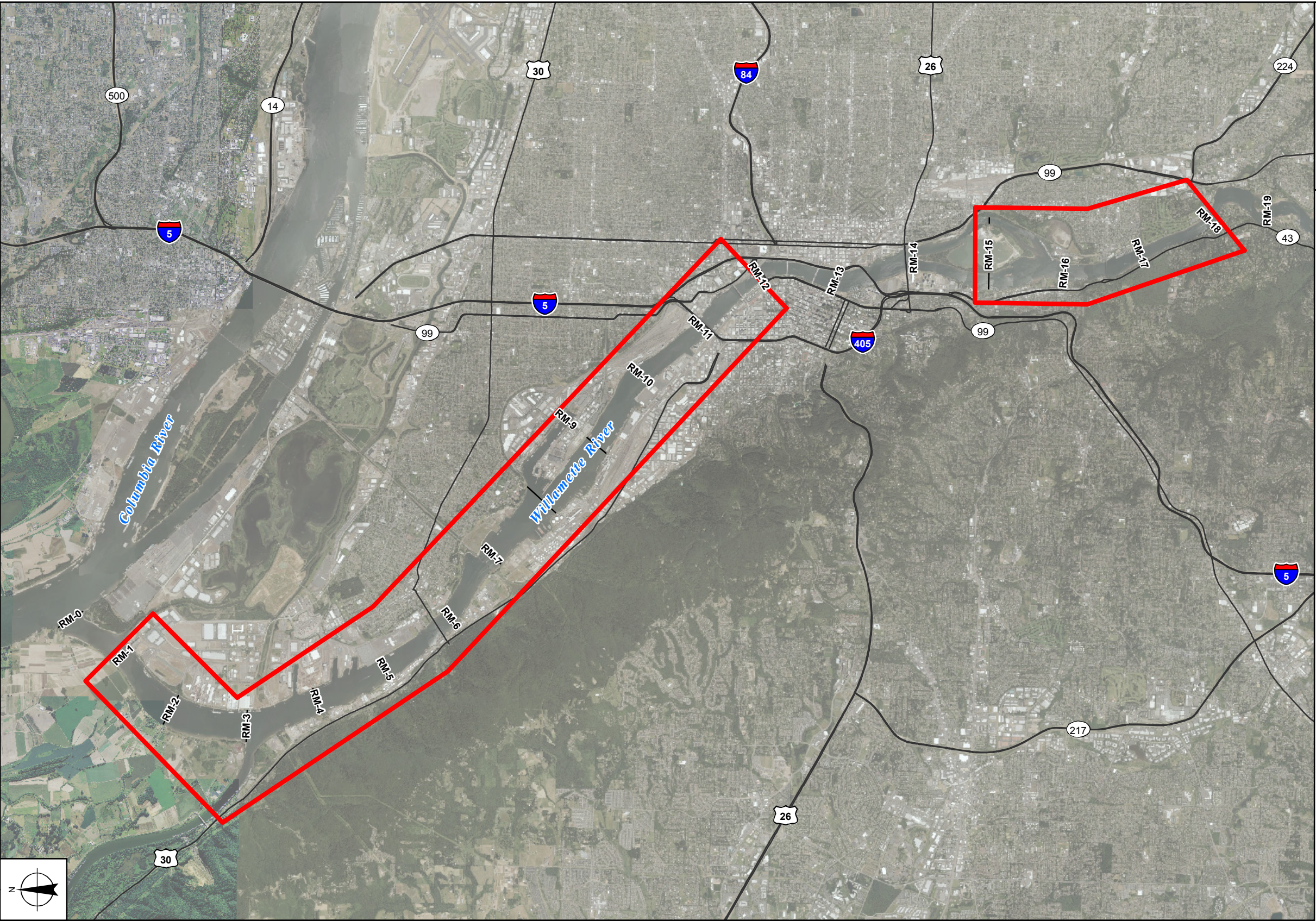





FIGURE 1

Vicinity Map

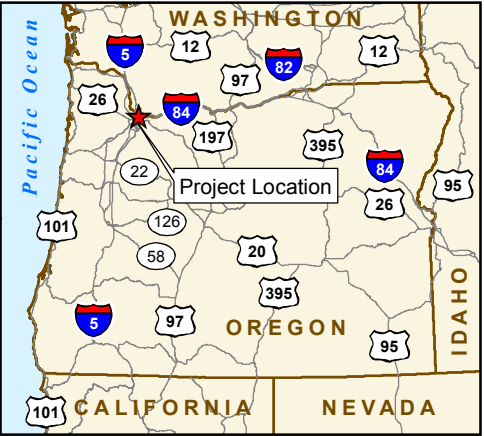
Portland Harbor 2011 Baseline
Smallmouth Bass Tissue Study
Field Sampling Report

Willamette River
Portland, Oregon

LEGEND

-  Study Area
-  River Mile (RM)
-  Freeway or Highway

Regional Inset Map



MAP NOTES:
Projection: Oregon State Plane North
Datum: North American Datum of 1983
Date: December 1, 2011
1. The locations of all features shown are approximate.

3,500 0 3,500 7,000
1 inch = 7,000 feet





FIGURE 2

Sample Locations Overview

Portland Harbor 2011 Baseline
Smallmouth Bass Tissue Study
Field Sampling Report

Willamette River
Portland, Oregon

LEGEND

x Proposed Smallmouth Bass Sample
Locations

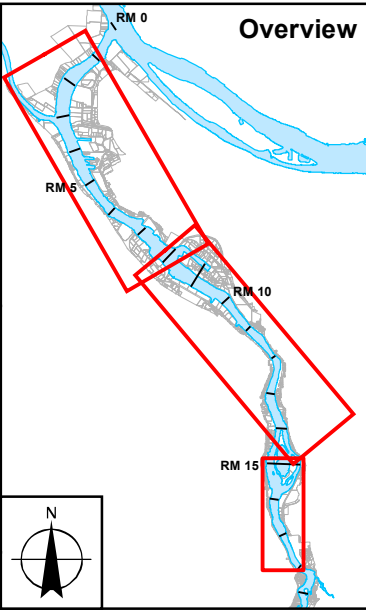
Actual Smallmouth Bass Sample Locations

Yellow dot Target

Green circle Lifecycle

All Other Data

Line River Mile



MAP NOTES:
Projection: Oregon State Plane North
Datum: North American Datum of 1983
Date: December 1, 2011
1. The locations of all features shown are approximate.
2. RM = River Mile

1,400 0 1,400 2,800
1 inch = 2,800 feet





FIGURE 3A

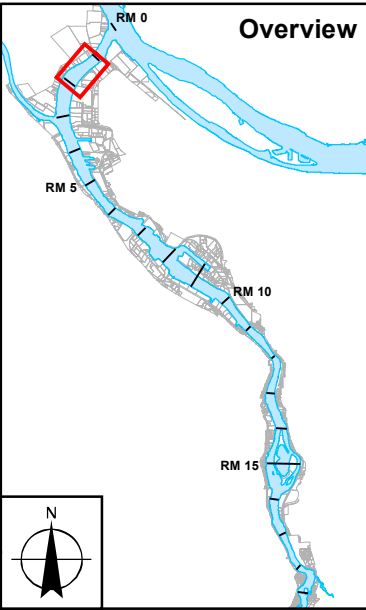
Sample Locations
RM 1 to RM 2

Portland Harbor 2011 Baseline
Smallmouth Bass Tissue Study
Field Sampling Report

Willamette River
Portland, Oregon

LEGEND

- × Proposed Smallmouth Bass Sample Locations
- Actual Smallmouth Bass Sample Locations
 - Target
 - Lifecycle
- All Other Data
 - River Mile
 - - - River Mile Tenth



MAP NOTES:
Projection: Oregon State Plane North
Datum: North American Datum of 1983
Date: December 1, 2011
1. The locations of all features shown are approximate.
2. RM = River Mile

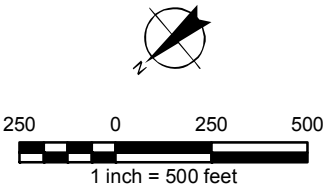




FIGURE 3B

Sample Locations
RM 2 to RM 3

Portland Harbor 2011 Baseline
Smallmouth Bass Tissue Study
Field Sampling Report

Willamette River
Portland, Oregon

LEGEND

× Proposed Smallmouth Bass Sample
Locations

Actual Smallmouth Bass Sample Locations

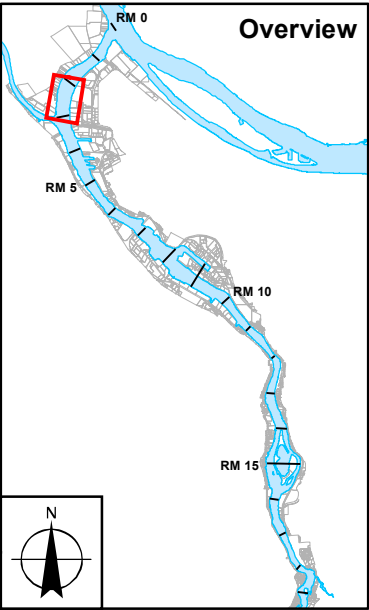
● Target

○ Lifecycle

All Other Data

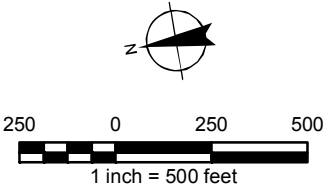
— River Mile

- - - - - River Mile Tenth



MAP NOTES:

Projection: Oregon State Plane North
Datum: North American Datum of 1983
Date: December 1, 2011
1. The locations of all features shown are approximate.
2. RM = River Mile



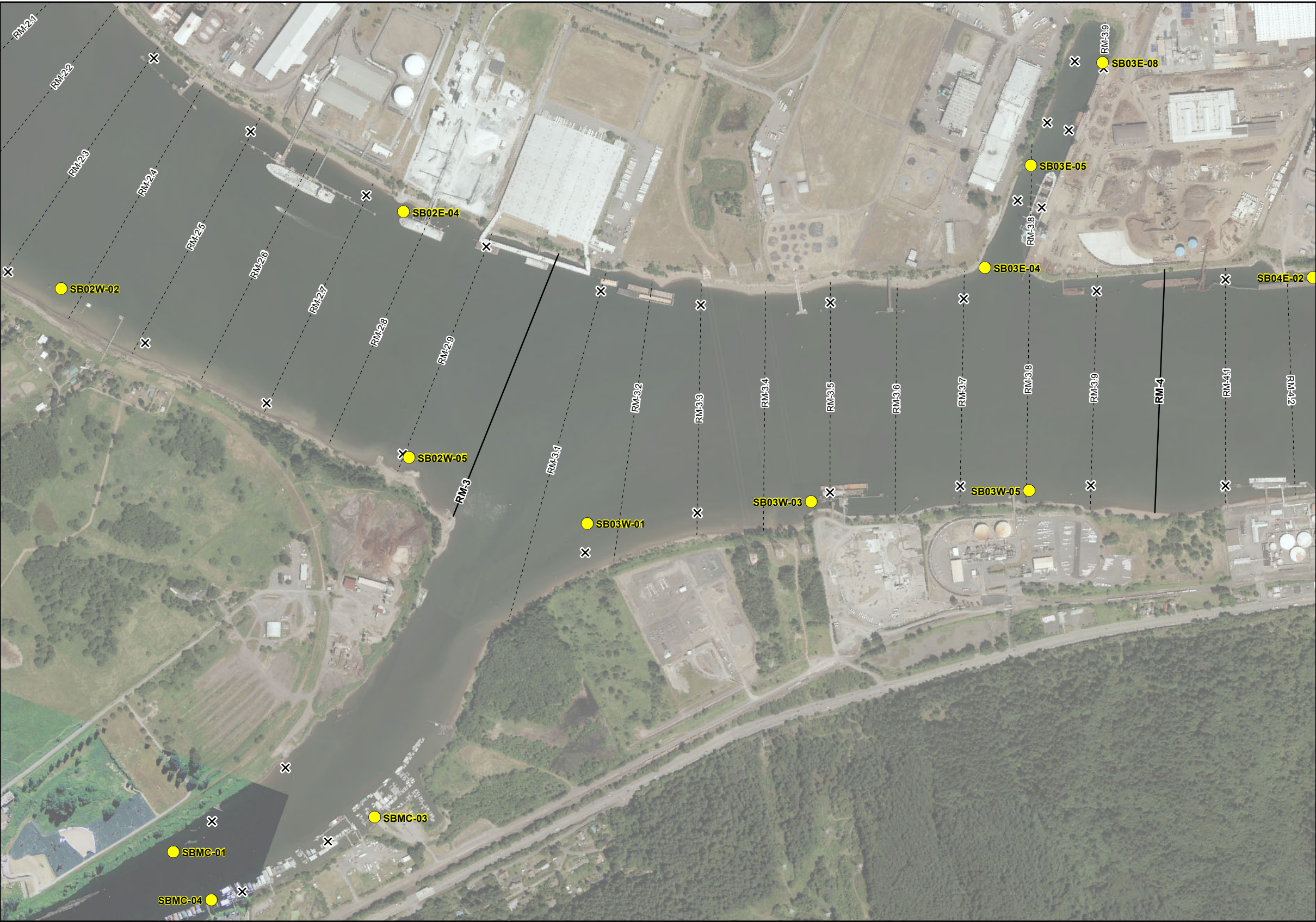


FIGURE 3C

Sample Locations
RM 3 to RM 4 & Multnomah Channel

Portland Harbor 2011 Baseline
Smallmouth Bass Tissue Study
Field Sampling Report

Willamette River
Portland, Oregon

LEGEND

× Proposed Smallmouth Bass Sample Locations

Actual Smallmouth Bass Sample Locations

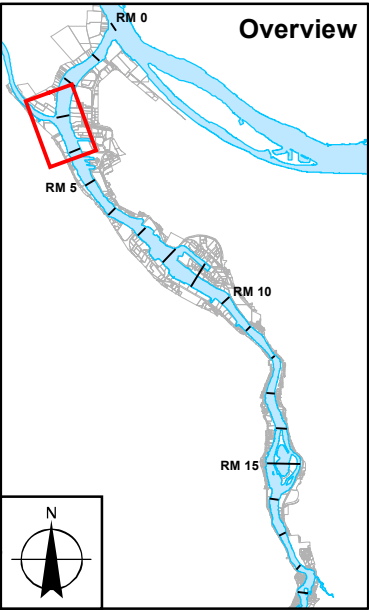
● Target

○ Lifecycle

All Other Data

— River Mile

----- River Mile Tenth



MAP NOTES:
Projection: Oregon State Plane North
Datum: North American Datum of 1983
Date: December 1, 2011
1. The locations of all features shown are approximate.
2. RM = River Mile

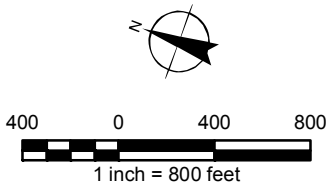




FIGURE 3D

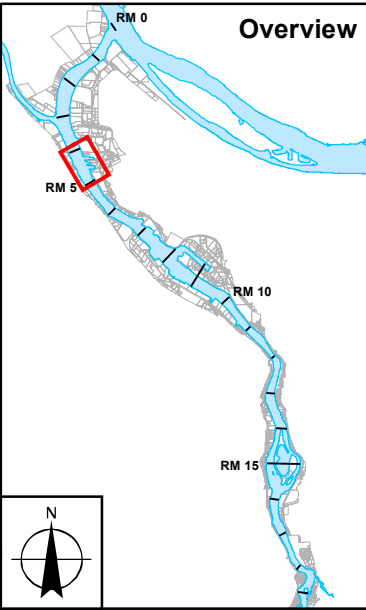
Sample Locations
RM 4 to RM 5

Portland Harbor 2011 Baseline
Smallmouth Bass Tissue Study
Field Sampling Report

Willamette River
Portland, Oregon

LEGEND

- Proposed Smallmouth Bass Sample Locations
- Actual Smallmouth Bass Sample Locations
 - Target
 - Lifecycle
- All Other Data
 - River Mile
 - River Mile Tenth



MAP NOTES:

Projection: Oregon State Plane North
Datum: North American Datum of 1983
Date: December 1, 2011

1. The locations of all features shown are approximate.
2. RM = River Mile

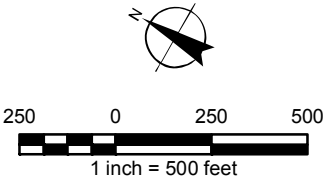




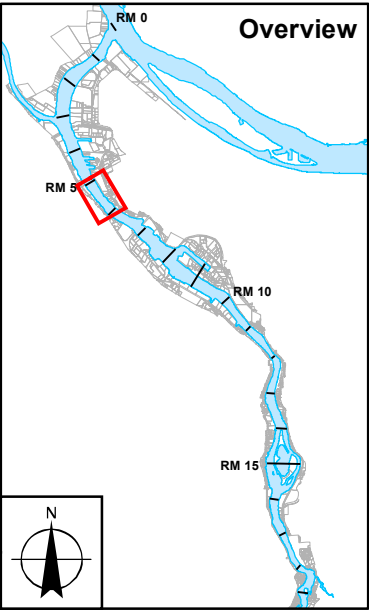
FIGURE 3E

Sample Locations
RM 5 to RM 6

Portland Harbor 2011 Baseline
Smallmouth Bass Tissue Study
Field Sampling Report

Willamette River
Portland, Oregon

- LEGEND**
- × Proposed Smallmouth Bass Sample Locations
 - Actual Smallmouth Bass Sample Locations**
 - Target
 - Lifecycle
 - All Other Data**
 - River Mile
 - - - River Mile Tenth



MAP NOTES:
Projection: Oregon State Plane North
Datum: North American Datum of 1983
Date: December 1, 2011
1. The locations of all features shown are approximate.
2. RM = River Mile

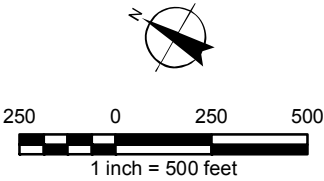


FIGURE 3F

Sample Locations
RM 6 to RM 7

Portland Harbor 2011 Baseline
Smallmouth Bass Tissue Study
Field Sampling Report

Willamette River
Portland, Oregon

LEGEND

× Proposed Smallmouth Bass Sample Locations

Actual Smallmouth Bass Sample Locations

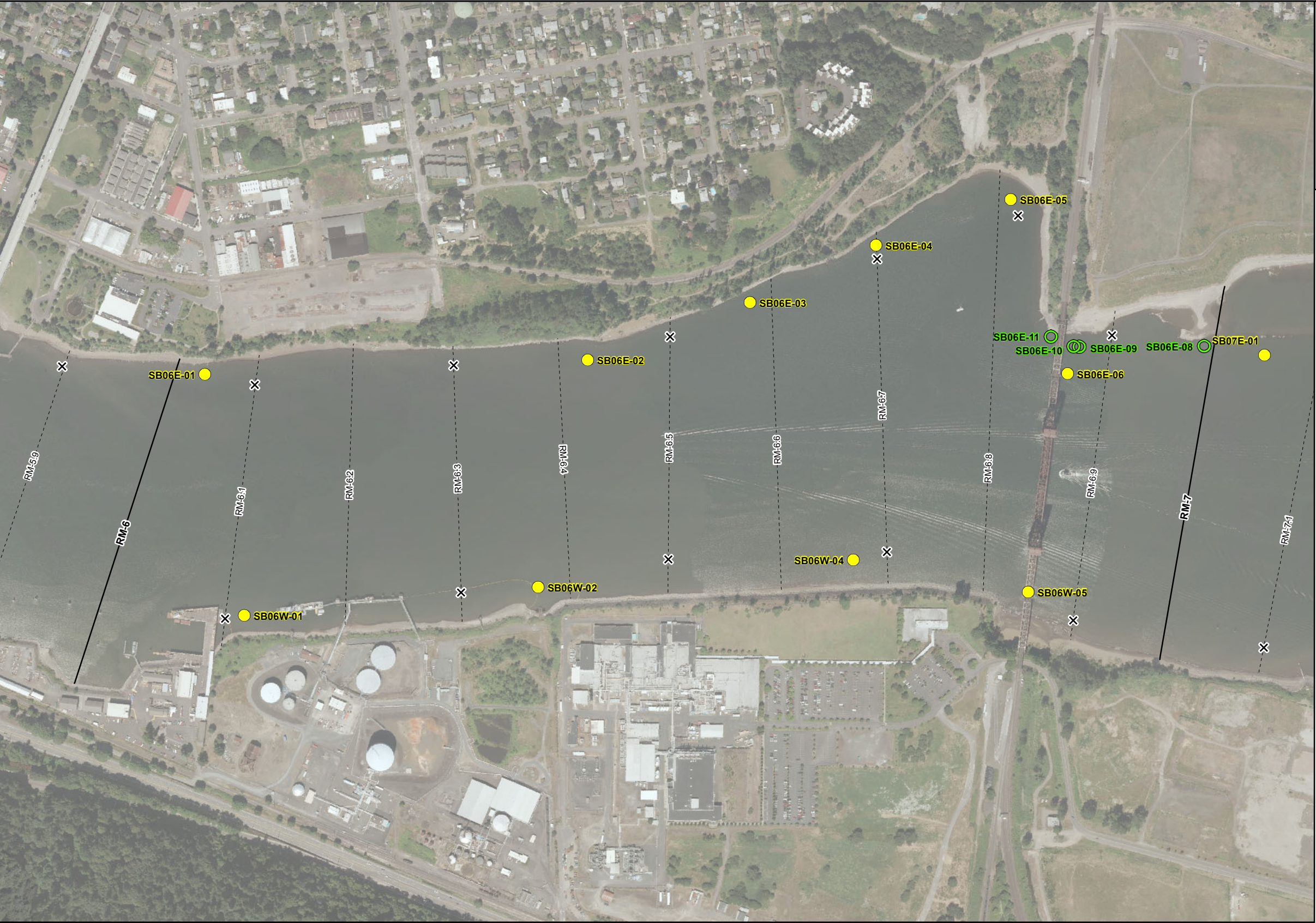
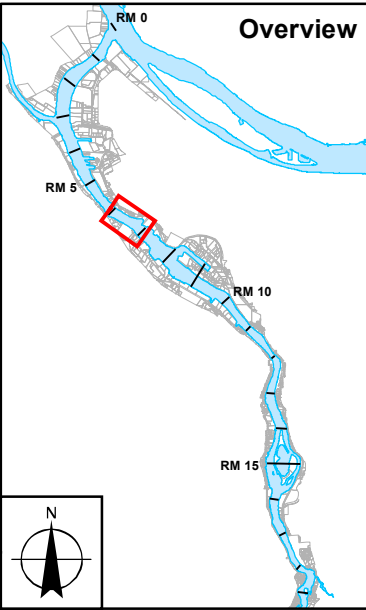
● Target

○ Lifecycle

All Other Data

— River Mile

- - - - - River Mile Tenth



MAP NOTES:

Projection: Oregon State Plane North
Datum: North American Datum of 1983
Date: December 1, 2011
1. The locations of all features shown are approximate.
2. RM = River Mile

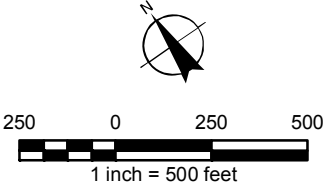




FIGURE 3G

Sample Locations
RM 7 to RM 8

Portland Harbor 2011 Baseline
Smallmouth Bass Tissue Study
Field Sampling Report

Willamette River
Portland, Oregon

LEGEND

X Proposed Smallmouth Bass Sample
Locations

Actual Smallmouth Bass Sample Locations

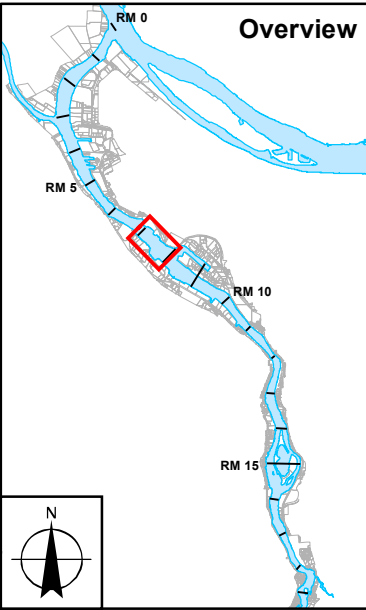
Yellow dot Target

Green circle Lifecycle

All Other Data

Solid line River Mile

Dashed line River Mile Tenth



MAP NOTES:

Projection: Oregon State Plane North
Datum: North American Datum of 1983
Date: December 1, 2011
1. The locations of all features shown are approximate.
2. RM = River Mile

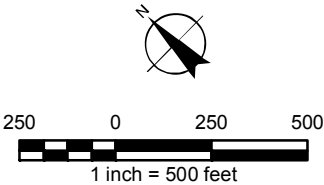
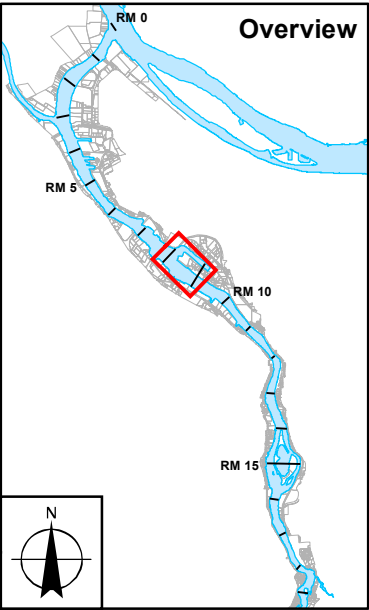
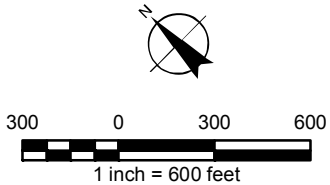


FIGURE 3H
Sample Locations
RM 8 to RM 9 & Swan Island Lagoon
Portland Harbor 2011 Baseline
Smallmouth Bass Tissue Study
Field Sampling Report
Willamette River
Portland, Oregon

- LEGEND**
- × Proposed Smallmouth Bass Sample Locations
 - Actual Smallmouth Bass Sample Locations**
 - Target
 - Lifecycle
 - All Other Data**
 - River Mile
 - - - River Mile Tenth



MAP NOTES:
Projection: Oregon State Plane North
Datum: North American Datum of 1983
Date: December 1, 2011
1. The locations of all features shown are approximate.
2. RM = River Mile





MAP NOTES:
Projection: Oregon State Plane North
Datum: North American Datum of 1983
Date: December 1, 2011
1. The locations of all features shown are approximate.
2. RM = River Mile

FIGURE 3I

**Sample Locations
RM 9 to RM 10**

**Portland Harbor 2011 Baseline
Smallmouth Bass Tissue Study
Field Sampling Report**

Willamette River
Portland, Oregon

LEGEND

- × Proposed Smallmouth Bass Sample Locations
- Actual Smallmouth Bass Sample Locations**
 - Target
 - Lifecycle
- All Other Data**
 - River Mile
 - - - River Mile Tenth

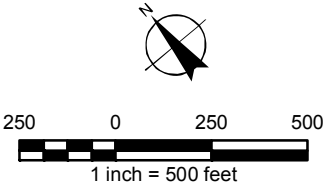
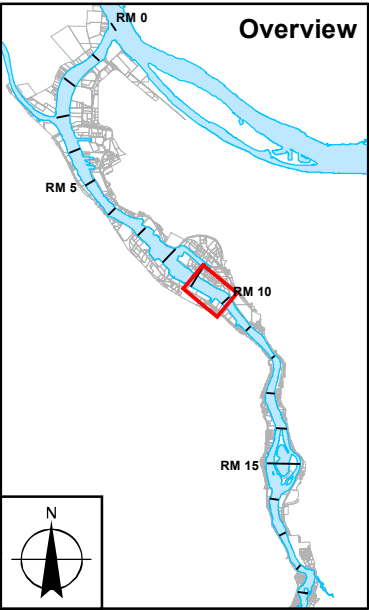


FIGURE 3J

Sample Locations
RM 10 to RM 11

Portland Harbor 2011 Baseline
Smallmouth Bass Tissue Study
Field Sampling Report

Willamette River
Portland, Oregon

LEGEND

× Proposed Smallmouth Bass Sample Locations

Actual Smallmouth Bass Sample Locations

● Target

○ Lifecycle

All Other Data

— River Mile

- - - - - River Mile Tenth



MAP NOTES:
Projection: Oregon State Plane North
Datum: North American Datum of 1983
Date: December 1, 2011
1. The locations of all features shown are approximate.
2. RM = River Mile

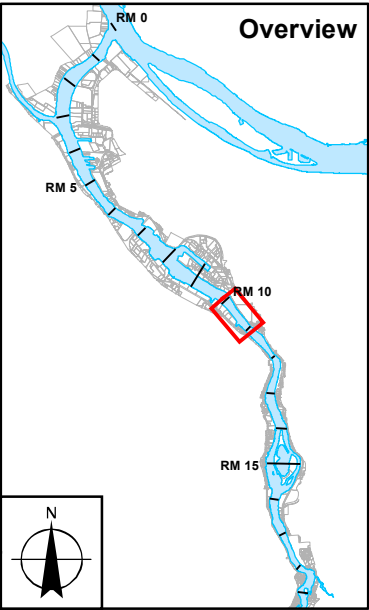
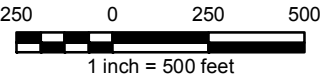


FIGURE 3K

Sample Locations
RM 11 to RM 12

Portland Harbor 2011 Baseline
Smallmouth Bass Tissue Study
Field Sampling Report

Willamette River
Portland, Oregon

LEGEND

× Proposed Smallmouth Bass Sample
Locations

Actual Smallmouth Bass Sample Locations

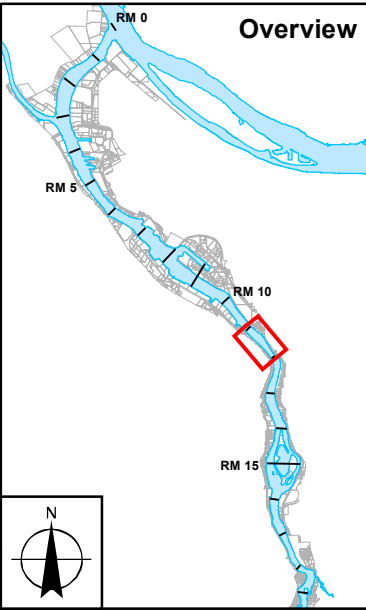
● Target

○ Lifecycle

All Other Data

— River Mile

- - - - - River Mile Tenth



MAP NOTES:
Projection: Oregon State Plane North
Datum: North American Datum of 1983
Date: December 1, 2011
1. The locations of all features shown are approximate.
2. RM = River Mile

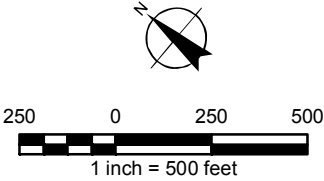




FIGURE 3L

Sample Locations
RM 15 to RM 16

Portland Harbor 2011 Baseline
Smallmouth Bass Tissue Study
Field Sampling Report

Willamette River
Portland, Oregon

LEGEND

× Proposed Smallmouth Bass Sample Locations

Actual Smallmouth Bass Sample Locations

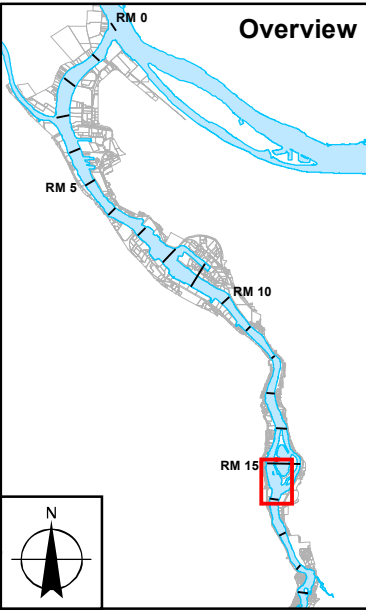
● Target

○ Lifecycle

All Other Data

— River Mile

- - - - - River Mile Tenth



MAP NOTES:

Projection: Oregon State Plane North
Datum: North American Datum of 1983
Date: December 1, 2011
1. The locations of all features shown are approximate.
2. RM = River Mile

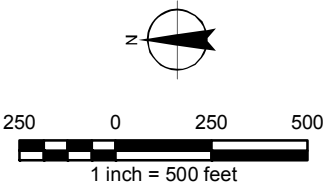




FIGURE 3M

Sample Locations
RM 16.5 to RM 17.5

Portland Harbor 2011 Baseline
Smallmouth Bass Tissue Study
Field Sampling Report

Willamette River
Portland, Oregon

LEGEND

× Proposed Smallmouth Bass Sample Locations

Actual Smallmouth Bass Sample Locations

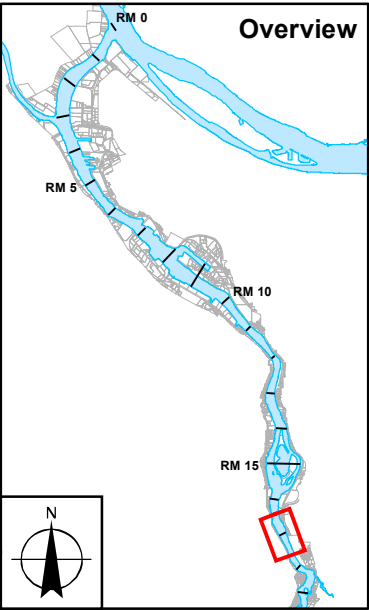
● Target

○ Lifecycle

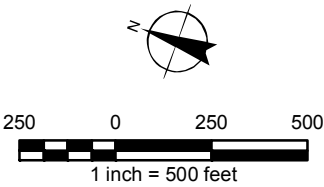
All Other Data

— River Mile

- - - - - River Mile Tenth



MAP NOTES:
Projection: Oregon State Plane North
Datum: North American Datum of 1983
Date: December 1, 2011
1. The locations of all features shown are approximate.
2. RM = River Mile



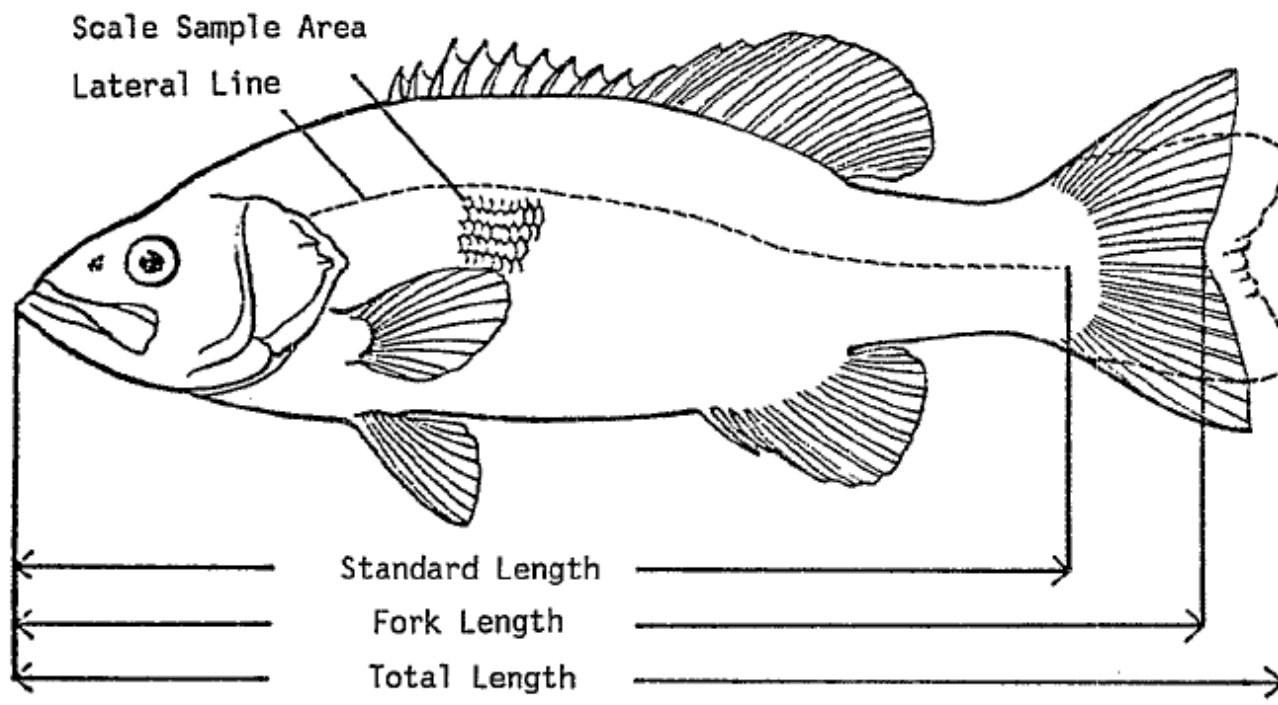


FIGURE 4

**Fish Measurement and
Scale Sampling Areas**

Portland Harbor 2011 Baseline
Smallmouth Bass Tissue Study
Field Sampling Report

NOTE:
Modified from Langler (1956)

Table 1: Field Schedule*2011 Portland Harbor Baseline Smallmouth Bass Tissue Study*

Day	Oregon Bass & Panfish Club Vessel		Bass Federation of Oregon Vessel	
	Number of Hours On- Water	Field Scientist(s)	Number of Hours On- Water	Field Scientist(s)
Monday, September 12, 2011	8:43	EC	--	--
Tuesday, September 13, 2011	8:50	EC	--	--
Wednesday, September 14, 2011	8:00	EC	--	--
Thursday, September 15, 2011	6:45	EC	4:20	KP/EC
Friday, September 16, 2011	8:30	EC	6:30	KP
Saturday, September 17, 2011	--	--	--	--
Sunday, September 18, 2011	--	--	--	--
Monday, September 19, 2011	8:30	EC	4:10	KP
Tuesday, September 20, 2011	8:20	EC	4:30	KP
Wednesday, September 21, 2011	8:00	EC	--	--
Thursday, September 22, 2011	9:10	EC	--	--
Friday, September 23, 2011	5:55	EC	4:45	KP
Saturday, September 24, 2011	--	--	--	--
Sunday, September 25, 2011	--	--	--	--
Monday, September 26, 2011	6:20	EC	3:15	KP
Tuesday, September 27, 2011	7:20	EC	3:00	KP
Wednesday, September 28, 2011	8:10	EC	--	--
Thursday, September 29, 2011	3:00	EC	3:30	KP/RF
Friday, September 30, 2011	7:10	EC	--	--
Saturday, October 01, 2011	--	--	--	--
Sunday, October 02, 2011	5:45	EC	--	--
Monday, October 03, 2011	9:00	EC	4:00	KP
Tuesday, October 04, 2011	--	--	3:00	KP/RF
Wednesday, October 05, 2011	--	--	--	--
Thursday, October 06, 2011	--	--	4:00	KP/RF
Friday, October 07, 2011	9:30	KP	--	--
Saturday, October 08, 2011	9:00	KP	--	--
Total Hours	146		45	

EC = Erin Carroll (GSI)

KP = Kevin Parrett (GSI)

RF = Ryan French (SWCA)

Table 2: Sample Locations*2011 Portland Harbor Baseline Smallmouth Bass Tissue Study*

Location	Sample ID (EPA1-)	Collection Date	Sample Purpose	Easting (NAD83)	Northing (NAD83)
RM2E	SB02E-01	9/22/2011	Target	7617559.5870	724490.8171
	SB02E-04	9/15/2011	Target	7616831.9168	721677.8505
RM2W	SB02W-02	9/16/2011	Target	7615381.2888	723941.6522
	SB02W-05	9/16/2011	Target	7615077.7717	720994.6204
RM3E	SB03E-04	9/15/2011	Target	7617951.5436	717347.3249
	SB03E-05	9/20/2011	Target	7618807.7333	717284.6256
	SB03E-08	9/22/2011	Target	7619736.8935	717037.2854
RM3W	SB03W-01	9/16/2011	Target	7615068.6544	719538.6133
	SB03W-03	9/16/2011	Target	7615813.7848	717984.5561
	SB03W-05	9/16/2011	Target	7616463.1741	716444.7617
MC	SBMC-01	9/15/2011	Target	7611620.6892	721658.7832
	SBMC-03	9/15/2011	Target	7612397.2282	720301.7512
	SBMC-04	9/15/2011	Target	7611374.3123	721259.7402
RM4E	SB04E-02	9/29/2011	Target	7618740.3626	714962.8020
	SB04E-06	9/29/2011	Target	7618995.0805	714296.5253
	SB04E-08	9/14/2011	Target	7620447.4535	713407.5043
	SB04E-10	9/14/2011	Target	7619734.6972	712843.0509
RM4W	SB04W-02	9/16/2011	Target	7617350.9321	714289.1719
RM5E	SB05E-01	9/14/2011	Target	7620479.9472	711431.5204
	SB05E-02	10/3/2011	Target	7621025.9515	710385.5935
	SB05E-03	10/3/2011	Target	7621611.1795	709354.4934
	SB05E-04	10/6/2011	Target	7622425.6789	708300.1288
RM5W	SB05W-02	10/2/2011	Target	7620011.5042	709612.5127
	SB05W-03	9/28/2011	Target	7620605.9674	708796.5154
	SB05W-04	9/22/2011	Lifecycle	7621193.7511	708165.8562
RM6E	SB06E-01	9/12/2011	Target	7623765.1730	707139.9929
	SB06E-02	10/3/2011	Target	7625302.7482	706147.4378
	SB06E-03	9/12/2011	Target	7626095.4709	705927.5462
	SB06E-04	9/21/2011	Target	7626744.2407	705806.6349
	SB06E-05	9/12/2011	Target	7627396.9465	705617.3686
	SB06E-06	9/16/2011	Target	7627142.7577	704779.2220
	SB06E-08	10/8/2011	Lifecycle	7627751.0048	704513.7004
	SB06E-09	10/8/2011	Lifecycle	7627261.8801	704853.8424
	SB06E-10	10/8/2011	Lifecycle	7627239.7773	704870.1191
	SB06E-11	10/8/2011	Lifecycle	7627178.5231	704970.9609
RM6W	SB06W-01	10/7/2011	Target	7623259.7390	706089.1385
	SB06W-02	9/21/2011	Target	7624486.3170	705395.1558
	SB06W-04	10/6/2011	Target	7625793.9513	704637.7654
	SB06W-05	9/20/2011	Target	7626390.2578	704033.1639

Table 2: Sample Locations*2011 Portland Harbor Baseline Smallmouth Bass Tissue Study*

Location	Sample ID (EPA1-)	Collection Date	Sample Purpose	Easting (NAD83)	Northing (NAD83)
RM7E	SB07E-01	9/22/2011	Target	7627963.1834	704313.4497
	SB07E-02	9/12/2011	Target	7629007.5720	703478.0664
	SB07E-04	10/3/2011	Target	7630501.7604	702199.7767
	SB07E-05	10/3/2011	Target	7631760.2932	701577.0326
	SB07E-06	10/3/2011	Target	7631349.4996	701694.0680
RM8E	SB08E-01	9/19/2011	Target	7632509.7734	701744.1795
	SB08E-04	9/12/2011	Target	7633809.8748	698774.8865
RM8W	SB08W-01	9/27/2011	Target	7630437.2081	699436.5357
	SB08W-05	9/27/2011	Target	7633514.5928	696771.2835
	SB08W-06	10/7/2011	Lifecycle	7630400.5316	699535.9693
SIL	SBSIL-01	9/21/2011	Target	7633413.0652	701868.4090
RM9E	SB09E-04	9/13/2011	Target	7638082.5826	695670.2471
	SB09E-05	9/28/2011	Target	7639620.3431	694926.9917
RM9W	SB09W-03	9/19/2011	Target	7636621.4442	694872.3983
RM10E	SB10E-01	9/13/2011	Target	7640156.5257	694052.8473
	SB10E-03	9/13/2011	Target	7641370.1634	692238.8199
	SB10E-04	9/28/2011	Target	7641543.9453	692043.6338
	SB10E-06	9/28/2011	Lifecycle	7640465.8526	693421.9495
RM11E	SB11E-01	9/19/2011	Target	7643282.6779	690004.2714
	SB11E-02	9/13/2011	Target	7644492.4098	689157.4272
	SB11E-03	9/13/2011	Target	7645051.2669	688194.8416
	SB11E-04	9/13/2011	Target	7645545.6549	687339.7093
	SB11E-05	9/13/2011	Target	7646028.5524	686729.8025
	SB11E-06	9/13/2011	Target	7644188.9814	689349.8960
	SB11E-07	9/19/2011	Lifecycle	7643279.6427	690016.3478
	SB11E-08	10/7/2011	Lifecycle	7644062.9295	689439.2818
	SB11E-09	10/7/2011	Lifecycle	7643687.4064	689713.2152
	SB11E-10	10/7/2011	Lifecycle	7643305.4448	689983.1343
RM11W	SB11W-04	9/16/2011	Target	7644463.1731	687488.7531
	SB11W-05	9/28/2011	Target	7645552.1395	686305.2547
	SB11W-06	9/16/2011	Lifecycle	7645637.3541	686200.0404
	SB11W-07	9/28/2011	Lifecycle	7643703.1530	688248.8439
	SB11W-08	9/28/2011	Lifecycle	7642440.5451	689464.8130
RM15E	SB15E-01	9/26/2011	Target	7646308.0338	668795.0119
	SB15E-02	9/23/2011	Target	7647151.9207	668742.9954
	SB15E-03	9/23/2011	Target	7646369.0729	668317.7888
	SB15E-04	9/26/2011	Target	7646307.1184	668494.3107
	SB15E-05	9/26/2011	Target	7647121.2253	667554.4248
RM16W	SB16W-01	9/26/2011	Target	7646073.9461	662735.8685
	SB16W-02	9/26/2011	Target	7646177.9411	662992.9936

Table 2: Sample Locations*2011 Portland Harbor Baseline Smallmouth Bass Tissue Study*

Location	Sample ID (EPA1-	Collection Date	Sample Purpose	Easting (NAD83)	Northing (NAD83)
RM17W	SB17W-01	9/26/2011	Target	7648317.5271	657983.1762
	SB17W-02	9/26/2011	Target	7648171.4210	658470.3637
	SB17W-03	9/26/2011	Target	7647825.1467	659142.0138

Table 3: Target Smallmouth Bass Sample Details*2011 Portland Harbor Baseline Smallmouth Bass Tissue Study*

Location	Sample ID (EPA1-)	Collection Date	Collection Time	Sampler Initials	Sample Length (mm)*	Sample Weight (g)	Approximate Depth to Mudline (ft)
MC	SBMC-01	9/15/2011	19:15	KP & EC	330	370	6
	SBMC-03	9/15/2011	19:50	KP & EC	310	340	5
	SBMC-04	9/15/2011	19:25	KP & EC	280	280	8
RM2E	SB02E-01	9/22/2011	8:28	EC	338	540	5
	SB02E-04	9/15/2011	10:11	EC	247	170	15
RM2W	SB02W-02	9/16/2011	17:00	KP	290	260	6
	SB02W-05	9/16/2011	16:25	KP	280	310	7
RM3E	SB03E-04	9/15/2011	7:24	EC	308	340	7
	SB03E-05	9/20/2011	7:52	EC	294	370	9
	SB03E-08	9/22/2011	15:50	EC	250	260	5
RM3W	SB03W-01	9/16/2011	16:05	KP	320	450	10
	SB03W-03	9/16/2011	15:30	KP	260	230	10
	SB03W-05	9/16/2011	14:25	KP	240	140	10
RM4E	SB04E-02	9/29/2011	18:34	KP	300	310	12
	SB04E-06	9/29/2011	17:10	KP	305	370	17
	SB04E-08	9/14/2011	10:22	EC	348	540	11
	SB04E-10	9/14/2011	9:22	EC	250	200	9
RM4W	SB04W-02	9/16/2011	13:56	KP	320	480	4
RM5E	SB05E-01	9/14/2011	8:29	EC	312	400	3
	SB05E-04	10/6/2011	18:10	KP	325	450	5
RM5W	SB05E-02	10/3/2011	9:54	EC	332	480	8
	SB05E-03	10/3/2011	9:32	EC	300	340	5
	SB05W-02	10/2/2011	12:50	EC	367	790	12
	SB05W-03	9/28/2011	15:11	EC	260	230	10
RM6E	SB06E-01	9/12/2011	8:00	EC	290	310	15
	SB06E-02	10/3/2011	17:30	KP	370	450	20
	SB06E-03	9/12/2011	9:40	EC	302	370	8
	SB06E-04	9/21/2011	11:42	EC	330	480	20
	SB06E-05	9/12/2011	10:50	EC	313	340	6
	SB06E-06	9/16/2011	14:25	EC	271	280	4
RM6W	SB06W-01	10/7/2011	8:20	KP	370	600	5
	SB06W-02	9/21/2011	12:00	EC	365	620	8
	SB06W-04	10/6/2011	16:45	KP	250	260	17
	SB06W-05	9/20/2011	15:10	EC	267	260	8
RM7E	SB07E-01	9/22/2011	18:00	KP	250	170	15
	SB07E-02	9/12/2011	12:58	EC	355	570	18
	SB07E-04	10/3/2011	16:15	KP	265	310	16
	SB07E-05	10/3/2011	15:30	KP	260	200	18
	SB07E-06	10/3/2011	15:42	KP	325	480	18
RM8E	SB08E-01	9/19/2011	18:20	KP	350	540	10

Table 3: Target Smallmouth Bass Sample Details*2011 Portland Harbor Baseline Smallmouth Bass Tissue Study*

Location	Sample ID (EPA1-)	Collection Date	Collection Time	Sampler Initials	Sample Length (mm)*	Sample Weight (g)	Approximate Depth to Mudline (ft)
RM10E	SB08E-04	9/12/2011	15:05	EC	244	200	10
RM8W	SB08W-01	9/27/2011	11:33	EC	367	680	7
	SB08W-05	9/27/2011	10:00	EC	243	170	18
SIL	SBSIL-01	9/21/2011	7:05	EC	338	570	10
RM9E	SB09E-04	9/13/2011	12:13	EC	320	450	27
	SB09E-05	9/28/2011	14:13	EC	295	340	20
RM9W	SB09W-03	9/19/2011	9:25	EC	338	480	3
RM10E	SB10E-01	9/13/2011	11:11	EC	310	400	26
	SB10E-03	9/13/2011	9:42	EC	324	430	13
	SB10E-04	9/28/2011	12:57	EC	279	280	8
RM11E	SB11E-01	9/19/2011	7:10	EC	343	570	14
	SB11E-02	9/13/2011	8:03	EC	295	370	24
	SB11E-03	9/13/2011	7:40	EC	327	510	28
	SB11E-04	9/13/2011	7:20	EC	296	400	12
	SB11E-05	9/13/2011	7:10	EC	303	400	4
	SB11E-06	9/13/2011	8:25	EC	316	430	8
RM11W	SB11W-04	9/16/2011	8:35	EC	310	340	12
	SB11W-05	9/28/2011	8:22	EC	244	170	19
RM15E	SB15E-01	9/26/2011	16:33	KP	275	260	10
	SB15E-02	9/23/2011	18:20	KP	250	230	15
	SB15E-03	9/23/2011	16:35	KP	310	370	35
	SB15E-04	9/26/2011	16:45	KP	325	480	17
	SB15E-05	9/26/2011	16:55	KP	355	680	15
RM16W	SB16W-01	9/26/2011	19:08	KP	315	400	18
	SB16W-02	9/26/2011	19:15	KP	280	280	15
RM17W	SB17W-01	9/26/2011	17:25	KP	245	170	23
	SB17W-02	9/26/2011	18:26	KP	320	340	25
	SB17W-03	9/26/2011	18:40	KP	300	340	18

*Target Weight Range = 225mm - 355mm; Several slightly oversized samples (up to 370 mm) were retained for whole body analysis due to numerous unsuccessful attempts to attain smallmouth bass samples within the target range.

Table 4: Lifecycle Smallmouth Bass Sample Details*2011 Portland Harbor Baseline Smallmouth Bass Tissue Study*

Location Grouping	Sample ID (EPA1-	Collection Date	Collection Time	Sampler Initials	Sample Length (mm)	Sample Weight (g)	Approximate Depth to Mudline (ft)
RM5W	SB05W-04	9/22/2011	12:01	EC	391	790	18
RM6E	SB06E-08	10/8/2011	14:40	KP	320	570	8
	SB06E-09	10/8/2011	15:49	KP	320	570	20
	SB06E-10	10/8/2011	16:10	KP	390	1000	20
	SB06E-11	10/8/2011	16:15	KP	265	310	20
RM8W	SB08W-06	10/7/2011	16:50	KP	310	310	10
RM10E	SB10E-06	9/28/2011	13:50	EC	197	85	25
RM11E	SB11E-07	9/19/2011	7:05	EC	420	1000	16
	SB11E-08	10/7/2011	12:00	KP	315	340	10
	SB11E-09	10/7/2011	12:36	KP	420	740	23
	SB11E-10	10/7/2011	13:30	KP	360	620	18
RM11W	SB11W-06	9/16/2011	7:14	EC	455	1400	8
	SB11W-07	9/28/2011	9:20	EC	210	85	19
	SB11W-08	9/28/2011	10:12	EC	392	710	13

APPENDIX A FIELD LOGBOOKS

FIELD SAMPLING REPORT

PORTLAND HARBOR 2011 BASELINE SMALLMOUTH BASS TISSUE STUDY

WILLAMETTE RIVER
PORTLAND, OREGON

JUNE 2012

Prepared for:

U.S. ENVIRONMENTAL PROTECTION AGENCY
U.S. ARMY CORPS OF ENGINEERS
CITY OF PORTLAND

Prepared By:



"Rite in the Rain"
ALL-WEATHER WRITING PAPER



Name Erin Carroll

Address 55 SW Yamhill St.
Suite 400, Portland, OR 97203

Phone 503 927 4553

Project 2011 Smallmouth Bass
Sampling

"Rite in the Rain" - a unique all-weather writing surface created to shed water and to enhance the written image. Makes it possible to write sharp, legible field data in any kind of weather.

a product of

J. L. DARLING CORPORATION
TACOMA, WA 98424-1017 USA
www.RiteintheRain.com

[illegible]

KL 1

"Rite in the Rain"

9/12/11

location (SB06E-3). Took reading but then realized that GPS didn't record it. Approximate reading taken from GPS device

Tides for 9/12

H 6:56 am pro tides.com
L 3:50 pm willamette
H 7:25 pm River
Portland, OR

10:15 10 ft, ~~68.0°F~~ 68.8°F
249.16 ft from 06E-04
527 ft from 06E-05 &
→ moved back closer to SB06E-04

10:30 moving on around cove

10:40 Caught a small mouth but too small to keep

10:50 Caught SB06E-5 in Willamette Cove. Very close to target.

Tried SB06E-6 and SB07E-1 w/ no luck.

- 12:20 went back to boat dock for lunch & bathroom

EC2

9/12/11

12:40 Back @ SB07E-02

Depth 20 ft, 70.3°F

12:58 Caught SB07E-2 close to target

13:10 moved on to SB07E-3

14:45 Reached Swan Island (SB08E-01) & moved to (SB08E-04)

SB08E-02 } Fisherman said it's
too deep to try this spot
50-60 ft. behind these are
in the Swan Island ship slips

15:05 Caught SB08E-04

Moved down to SB08E-05 &
Kept moving South.

15:43 Stopped fishing @ RM 9E,
will resume here tomorrow.

9/12/11 Eric Cull

EC3

Alto in the Rain

9/13/11

6:30 Bill & Mike pick Erin up
6:40 Launch boat
7:05 Started Fishing @ SB11E-05
water temp = 68.8°F

depth = 39.9 ft

7:10 Caught SB11E-05
7:20 Caught SB11E-04
7:40 Caught SB11E-03
7:50 Started fishing from OF43
towards Glacier Dock

8:03 - Caught SB11E-02 near OF43
- Trying to catch a trophy fish
in this area

8:25 Caught another fish near
SB11E-02 actual target. I

SB11E-06 EC Kept it & called it
~~SB11E-02 Dup~~ so that we
could get back onto our
target locations spacing.

- SB11E-04, -03, and -02 were all
upstream of target

8:35 Started fishing SB11E-01 but
due to Ross Island Tug boats
had to move location to under
the ~~street~~^{GC} bridge.

EC4

Freemont

9/13/11

8:52 moving on to SB10E-05
because both fisherman got
no bites at SB11E-01

9:16 moving on to SB10E-04, no bites
near SB10E-05 either

- weather today is cooler & overcast
ambient temp ~ 61°

9:17 water temp = 68.5°, depth = 20 ft
Distance from 10E-04 = 345 ft

10E-05 ~ 682 ft.

→ moved to target

9:40 Moved down near SB10E-03

9:42 Caught fish SB10E-03

→ moved down to SB08E-02

11:11 Caught fish at SB10E-01
moved to SB09E-05

11:54 Moving on to SB09E-04

Sandy beach between
two points is shallow & thought
to be non-productive

12:13 Caught SB09E-04

13-15: tried again on SB09E-01, SB08E-05
SB08E-01, SB07E-05, SB06E-06

ECS

Return the line

9/13/11

Deputy Harper 503 988 6788

- Called non-emergency police about a potentially stolen kayak on a homeless boat

15:30 Stopped fishing heading back to ramp.

Erin Curren
9/13/11

EC6

9/14/11

6:30 Bill & Mike picked Erin up. we got \$20 worth of gas for boat & headed to Cathedral Park.

7:00 Leaving boat ramp to start at SBOSE-03 & work North along the east bank.

- cool temperatures and overcast today
- water temp = 67.8°

7:20 Mike caught a Small bass (not a keeper)
- using a tiny brush hog bait
Bill's fishing w/ a dead ringer & then trying out different crank baits.

7:40 moving on to SBOSE-02 & fished entire bank to Rm-S.

8:29 Caught SBOSE-01. Moved to the other side of the Toyota dock & started w/ a Gary Yama moto

9:22 Caught SBO4E-10 & moved into SBO4E-09/-10 area.

9:31 Caught & released a warmouth
Also a couple small perch and a carp

10:08 Moved from SBO4E-09 to SBO4E-08

EC 7

Let's in the Rain

9/14/11

~~10:22~~ EC

10:22 Caught SBOYE-08
went back to Cathedral Park
for bathroom

10:55 Back on SBOYE-09 again.

11:13 Moving on to SBOYE-07
Fished along the bay & point &
got nothing.

11:45 Moving to SBOYE-06 by
the edge of the warehouse.

12:07 moved to back of T4

13:44 Moved from SBOYE-02 to SBOYE-01

15:00 Packed up to go back to
boat ramp and call it today.

Erin Carroll
9/14/11

EC8

9/15/11

6:30 Mike & Bill Pick Erin up

7:00 Leaving boat ramp

overcast 61° outside, no wind

7:05 Start fishing S. edge of International

Slip between SBOBE-10 & -11

- water temp = 68°F

7:24 Caught SBOZE-04, moving up

N. bank of Int. Slip

9:00 Caught a largemouth bass
w/ sores. Took pictures &
released

9:20 Moving on to SBOZE-03

Skipped SBOZE-02 & -01
due to USACE exercises
and barges

9:40 - Started fishing SBOZE-05
toward -04

10:11 Caught SBOZE-04

Hook was deep in his throat
so we had to use pliers to
dig it out before processing.

11:48 - finished East bank down
to RA w/ no luck. Spent over
an hour trying to catch
a fish at OSM.

EC9 - moving across to West Bank

9/15/11

Fished up west bank from Rm 2-3
 & ~~most~~^{EC} confluence of Mult. Channel
 & Willamette. No bass caught.

Tried SBMC-02 & SBMC-03 but
 water is too shallow. we
 may not be able to get points
 on S. side of Mult. Channel due
 to Marina's.

13:25 Started fishing at SB03W-01

13:45 Packed up & headed back to
 boat ramp Erin will go
 fishing with Kevin &
 Ed this afternoon/evening.

Erin called
 9/15/11

EC10

9/16/11

7:00 Bill & Mike picked Erin up
 @ 6:30 & we launched from
 Cathedral Park at 7am.

overcast & cool (55°) today.
 Water temp is 66.9°

7:14 Caught an oversized SMB from
 SB11W-05 & kept it with the
 name SB11W-06, tried for a
 same size fish in this
 area ~~but~~^{EC} without much luck and
 moved toward SB11W-04.

8:35 Caught SB11W-04 at North edge
 of Albers Mill Dock

310mm, 12 oz, ~12 ft to mudline

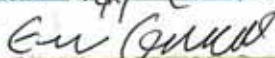
Between 8:35 and 14:00 we
 worked the ~~east~~^{west EC} bank from
 Rm 11.6W to Rm 8.4W.

14:00 Headed to the east bank
 of the railroad bridge by
 M & B and caught SB06E-06
 by bridge footing. @ 14:25

SB06E - 271mm, 10 oz, caught in
 40 ft of water at a depth
 of about 4 ft (by bridge
 footing).

EC11 15:30 called it a day *Erin called*

9/19/11

- 6:30 Bill & Mike picked up Erin
6:45 on water, headed up to
fill gaps in RMILE area
7:05 Caught oversize bass at location
of planned RMILE-01, kept it
& called SB11E-01
420mm, 21b 5oz
690019.18, 7643273.25
7:10 Caught SB11E-01
343mm, 11b 4oz
690007.29, 7643276.99
Caught at virtually the same
spot but in slightly
shallower water. ^{3rd caught on}
7:38 water Temp = 64.5° ^{wolly gum}
overcast 58° ambient
9:25 Caught SB09W-03
338mm, 11b. 1oz
694847.40, 7636611.71
11:18 moved from RM 8SW to fish
7.5W to 6.5W. Also tried
Willamette Cove & in front of
Cathedral Park before calling
it a day @ 15:15.
EC 12 En 

9/20/11

- 6:30 Bill & Mike picked Erin
up & we went to Safeway
to get ice.
Clear skies & 51° this morning
w/ no wind
water temp = 65.6° @ 7:07
7:07 Started fishing International Slip
7:52 Caught SB03E-05 in int. slip
294mm, 13oz, ~8.5ft to mudline
717289.23, 7618806.46
Caught w/ a 4" dead ringer
15:10 Caught SB06W-05
267mm, 9oz, ~8ft
70401883, 7626339.26
under w. end of railroad
bridge. Caught by Erin
15:25 Calling it a day.



EC 13

Act in the Rain

9/21/11

6:30 Bill & Mike pick Erin up
on water by Tam, beautiful
sunrise. 61°, no wind partial
clouds.

7:05 Caught SBSIL-01 in Swan Island
Lagoon. 338 mm, 1 lb. 4 oz,
701876.48, 7633407.92
water temp = 66.4°

11:42 Caught SB06E-04 in
Willamette Cove.
330 mm, 17 oz, ~20 ft water
705804.99, 7626735.68

9:TEC

12:00 Caught SB06W-02
~~off~~ ^{EC} 365 mm, 22 oz, ~8 ft
705389.19, 7624476.81

Today we had tried fishing
Swan Island, Arkema, Willamette
Cove, & the bank of Triangle
Park.

15:00 Called it a day on the water.

EC14 Erin Cull

9/22/11

Warm day, high of 80°
little to no wind

6:45 Bill & Mike picked Erin up
7:00 on water, headed down to
OSM

8:28 Caught SB02E-01
338 mm, 19 oz, ~5 ft water
724494.89, 7617556.82

Caught on a 'rebel deep we are'
crawfish crank.

9:40 Moved from OSM area (RM 2.7)
to International Slip.

12:01 Caught SB05W-03 ^{off} ~~EC~~ ^{renamed as per} oversized fish
but Kevin said to go ahead
& keep it & try to catch a
regular sample size fish too.
391 mm, 28 oz, ~18 ft water
708164.91, 7621187.88

15:50 Caught SB03E-08 in International
Slip: 260 mm, 9 oz, ~5 ft
717033.63, 7619728.40

Prior to Int. Slip, we also
tried to fish the downriver
reference stations & OSM
again.

16:10 Entered water at Cathedral Park

EC14 Erin Cull

"Let it in the Rain"

9/23/11

- 6:45 Bill & Mike pick Erin up
7:05 on water @ Cathedral Park
Weather is clear, no wind, ambient
temp 15.60°, water temp 65.2°
7:15 Started fishing at OSM (Rm 2.6E)
7:22 caught a nice sized (~13 inch) largemouth & released it.
7:30 - 8:30 Fished bank of OSM
8:30 Started trying to fill gaps
between OSM & International
Slip.
9-12:50 fished International Slip & bank
to T4 (including slip 3 of T4)
13:00 Called it a day. Unfortunately
the fishing was really slow
today & we caught no bass.

Erin Cunniff

EC15

9/26/11

- 10:30am Bill, Mike, & Erin launch
from Cathedral Park &
head to OSM.
Was raining hard this morning but
it had stopped raining by the
time we got on the river.
Overcast, 67°F ambient
water temp = 64.9°F
12:20 Heading from OSM area up to
International Slip Area
14:11 Started fishing the west bank off
Siltronic. water temp = 64.2°F
- Throughout the day so far we
caught 5 largemouth bass
& a couple perch, but no
smallmouth so far.
15:40 Headed to Swan Island lagoon
winds have picked up to
almost 20 mph
16:50 Called it a day w/ no smallmouth
bass specimens

Erin Cunniff

EC16

Return the Reel

9/27/11

7:40 Bill & Mike ACK Erin up
on water at 8am.

Weather today is overcast
58°. Water temp = 64.2°

Headed to Balch Creek Cove
and then down to Gunderson.

10:00 Caught SB08W-05 off N. End
of Gunderson dry rails.

243 mm, 6 oz, ~18 ft

(caught at surface)

696770.32, 763353.02

11:17 EC

11:33 Caught SB08W-01

367 mm, 1 lb 8 oz, ~7 ft

699430.65, 7630436.44

13:10 In Willbridge Terminal Fishing
near the maintenance dredging
operation. at Chevron.

I took some photos of them
going down, filling the clam shell
& re-releasing it back
into the water. A boat w/ a
couple Arcadis consultants
came up & told us we couldn't

EC17

9/27/11

take photos of fish in the Homeland
Security area & Mike & them

had an argument. Then a couple
Chevron people came out on the
dock & asked what we were doing.

We told them we were fishing for EPA &
the City & that they could call Chip
Humphrey for permit info. Then they said
OK and good luck. By that time the
barge left & the clam shell stopped
& Arcadis boat left. We continued
fishing downstream.

15:20 Out of the water for the day.

Two fish total. Not as many
other species (perch, crappie, etc.)
today.

Chip

EC18

"Return to the River"

9/28/11

7:45 Bill & Mike pick Erin up
8:00 Launch at Cathedral Park
& head up river to RM11.9W

8:22 Caught SB11W-05 in same
location as the oversize fish

SB11W-06 (last week)

SB11W-05 244mm, 602, ~19 ft

686306.87, 764552.68

Weather today is overcast,
foggy, & cool ~58° w/ some
wind. Water temp = 63.6°F

9:20 Caught an undersized bass
& Kevin said to keep it for

USACE/EPA's age-dating analysis.

SB11W-09 210mm, 302, ~19 ft

688252.20, 764305.52

10:12 Caught an oversize fish

SB11W-08 under the west
side of the Fremont Bridge.

Although the fish was large
it hardly fought & it looked
pretty old & sickly when we
got it in the boat.
discolored eyes (like cataracts),
bulge in stomach, sore on lips,

EC19

9/28/11 (cont.)

We kept for age-dating analysis
at USACE lab. Guessing fish was
about to die anyways.

SB11W-08, 392mm, 11b. 902, ~13 ft

684490.82, 7642450.71

12:57 Caught a keeper between SB10E-03
and -04. Although it was
closer to SB10E-03, I called it
SB10E-04 because we already
had caught SB10E-03.

SB10E-04 279mm, 1002, ~8 ft

692046.86, 7641546.29

13:50 Caught SB10E-06, 197mm, 302,

644496.32, 7640465.25

Kept this undersize fish for
age-dating analysis

14:13 Caught SB09E-05

295mm, 1202, ~20 ft

694929.77, 76393618.84

Pretty close to target

EC20

Return the fish

9/28/11 (continued)

15:11 Caught SBOSW-03

260mm, 8oz, ~10 ft

708793.75, 7620605.97

~~a~~ ^{Down Stream of} ~~Approximate~~ ^{of} ~~by~~ ^{same} location as

oversize fish last week.

Caught oversize bass right after
this keeper but released it due to
size.

16:10 Done fishing for the day.

Jim Connell

EC 21

9/29/2011

9:00 - 15:45 Erin, Kevin, & Ryan
picked fish scales & packaged
fish for shipment to
EPA

16:00 Erin, Bill, & Mike launch
from Cathedral Park.

(Kevin, Ryan, & Ed launch from
Swan Island)

18:15 Started ^{EC} switching fishing
back of international
Slip by Schnitzer. (Had fished
OSM until this time)

About 18:30 we started
moving across the backside
of the slip. As we approached
the upstream end we noticed
a discoloration (green) of
the water about 18:35. we
went closer and found that the
outfall at Schnitzer was
releasing a bright green liquid
(that looked like antifreeze).
I took several photos &
videos. Bill called the
BES hotline & 9-11 to report

EC 22

Return the River

9/29/2011

the incident. A lot of the back portion of the Slip was bright green by this point in time. A boat from Schnitzer came into the Slip about 18:45 and laid some bouys across the middle portion of the dock but did not come to the back or appear to take notice of or respond to the release. Bill & Mike also said they saw a security truck drive by (on land). We left Slip at 19:00 & called it a day because Bill wanted to go home to call coast guard & follow up w/ BES. Kevin, Ed, & Ryan kept fishing TY.

Erin Carroll

EC 23

9/30/2011

7:40 Bill & Mike PCK Erin up

8:00 Launch boat at Cathedral Park & headed to Fireboat dock cove. water temp = 63.4°, partly cloudy Skies w/ sun & ambient temp of 55°, predicted high today is 74°

Between 8:00 and 15:00 we tried fishing Balch Creek Cove, Gunderson, Swan Island, WP/ Triangle Park Bank, Aricoma, & Cathedral Park. Apart from a couple bass that we lost near Siltronic, we didn't even get many bites.

15:10 Exited water & called it a day with no fish

Erin Carroll

EC 24

Write in the Rain

10/2/2011

8:15 Bill & Mike pick Erin up

8:25 in water at Cathedral Park

Headed down to fish TY.

Cool overcast morning, rained last night.

11:00 Finished fishing TY & International

Slip & came across to Rm 4.4w

The plan is to fish upstream & try to fill in holes on west bank.

12:50 Caught SBOSW-02

367mm (slightly oversize)

1 lb. 12 oz, ~12 ft

709611.17, 7620011.07

14:10 Called it a day

Jim Carroll

EC25

10/3/11

7:40 Bill & Mike pick Erin up

8:00 on water at Cathedral Park

Overcast, rainy day 56°
water temp = 61.8°F

9:32 Caught SBOSE-03

300mm, 12 oz, ~5 ft

709354.06, 7621607.65

9:54 Caught SBOSE-02

332mm, 17 oz, ~8 ft

710385.13, 7621020.88

10:00 moving down to OSM

11:00 Tried to pick up fourth reference point in MC. & then went to try Int. Slip around 11:30

12:00 - 13:30 Tried to fill in points on east bank & Arkema

13:30 - 16:45 Fished ~~to~~ east bank tried to fill in gaps upstream of Swan Island and on up bank.

17:00 out of water.

Erin's last day on water
Kenn & Ed were starting to fish.

EC26 *Jim Carroll*

"Rite in the Rain"

10/11/11

8:00 Ryan comes to field lab (Erin's garage to begin fish scaling). Kevin shows up at 8:30 & helps us package the 'Age/Gut/Filet' samples.

10:00 Had to re-label fish SBOSW02 based on date and time stamp as the label incorrectly said SBOSW03.

10:10 Fish SB0E-04 appeared to have injury in target scale removal area on left side of body. Ryan collected scales ~~on lower~~ from slightly lower/posterior portion of left body (to avoid new growth) and from the correct position on the right side of the body. Both sets will be provided to OSU.

EC 27

10/11/11 (cont.)

12:30 Relinquished two coolers to FedEx for shipment to the EPA KAP laboratory [Earlier Kevin brought USACE coolers to GSI office for shipment to Karl's lab.]

14:00 GSI arranged shipment of fish scales to Brian Sidlauskas at OSU as per Karl Gustavson's request.

Brought field materials back to office

End of project.

Erin Caldwell

EC 28

Write in the Rain

Portland Harbor
2011 Bass Study



"Rite in the Rain"
ALL-WEATHER
JOURNAL
No. 393

Field
Notebook #2
K. Parrett

CONTENTS

PAGE REFERENCE DATE

(1)

Tue Sept 15, 2011

4:00 PM Kevin Parrott & Erin Carroll
Meet Ed Chin (Bass Federation)
at SI Lagoon boat ramp

4:30 PM Begin West of St Johns
(1630) Bridge - South
west bank

19:15 caught SBMCØ1
330 mm, 13 oz

Northway 721663.11

eastway 7611618.30

GPS label incorrectly listed
as 000 MCØ4

6 ft wtr

19:25 caught SBMCØ4
280 mm, 10 oz

721262.18 Northway

761372.60 eastway

19:50 caught SBMCØ3
310 mm, 12 oz

720302.86 Northway Est
to mud

7612393.12 eastway
Plot in the Rain

②

Fri Sept 16, 2011

11300 Kevin Parrett & Ed Chin
begin fishing at St Bridge
west bank

1356 Caught SB04W02
320 mm / 17 oz
714305.63-N 4ft deep
7617341.97-E

1425 Caught SB03W05
240 mm / 5 oz 5ft deep
716448.69-N
7616459.61-E

1530 Caught SB03W03
268 mm / 8 oz 10ft wtr
717984.43-N
7615808.89-E

1605 Caught SB03W01
320 mm / 16 oz
719542.63-N 10ft
761506.20-E

③

1625 caught SB02W05
280 mm / 11 oz
7ft wtr
721011.50-N
7615075.98-E

1700 Caught SB02W02
290 mm / 9 oz
9ft wtr

723944.85-N
7615377.86-E

1730 off wtr

Ed Chin plans for next wk:
M, Wed, Thu, Fri afternoons
4 pm Monday SE dock

9/16/11



Return the favor

Monday Sept 19, 2011

1620 Kevin Parrett & Ed Chin
begin fishing SI Lagoon

1820 Caught SB08-01
350 mm 9 oz
10 ft wtr

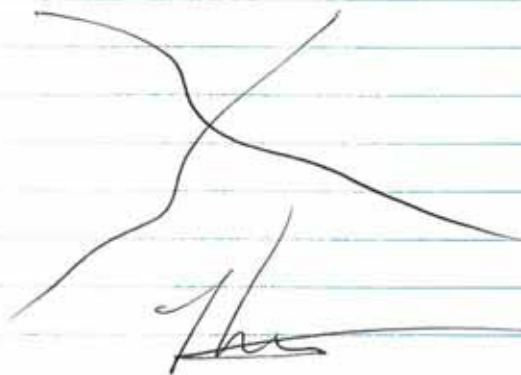
701753.74-N

KP ~~763253~~

7632509.40-E

2030 KP

1030 Finish @ Ramp



Thu Sept 22, 2011

1600 meet Ed Chin at
SI boat Ramp - Kevin
Parrett

1800 Caught SB07E01
245 mm / 6 oz
15 ft wtr

704316.23-N

7627957.60-E

12 2030 KP

1030 Finish @ Ramp



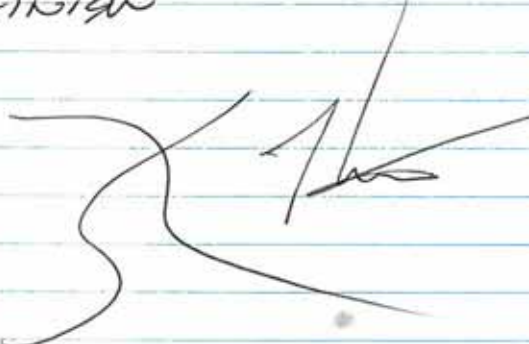
⑥ Fri Sept 23, 2011

1400 Kevin Parrett
W/ Ed Chins & Andy Lacey
@ Willamette Park

1635 Caught SB15E-03
310 mm 13 oz 35 ft wtr
668322.19-N
668745.30-E

1820 SB15E-02 - Caught
250 mm 8 oz 15 ft wtr
668745.30-N
7647146.11-E

1845 finish



⑦ Monday, Sept 26, 2011

1600 Kevin Parrett
W/ Ed Chins at
Willamette Park

1633 Caught SB15E-01
275 mm 9 oz 10 ft wtr
668799.22-N 7646303.15-E

1645 Caught SB15E-04
325 mm 17 oz 17 ft
668497.88-N 764630664-E

1655 Caught SB15E-05
355 mm 24 oz 15 ft
667559.65-N 7647115.48-E

1725 Caught SB17W-01
245 mm 6 oz 23 ft
657987.75-N 764830.68-E

1826 Caught SB17W-02
320 mm 12 oz 25 ft
658472.74-N 7648166.79-E

⑧

Sept 26, 2011 (cont)

1840 Caught SB17W-03

300 mm 12oz 18 ft wtr

659143.56-N 7647819.15-E

wt might be wrong

1908 Caught SB16W-01

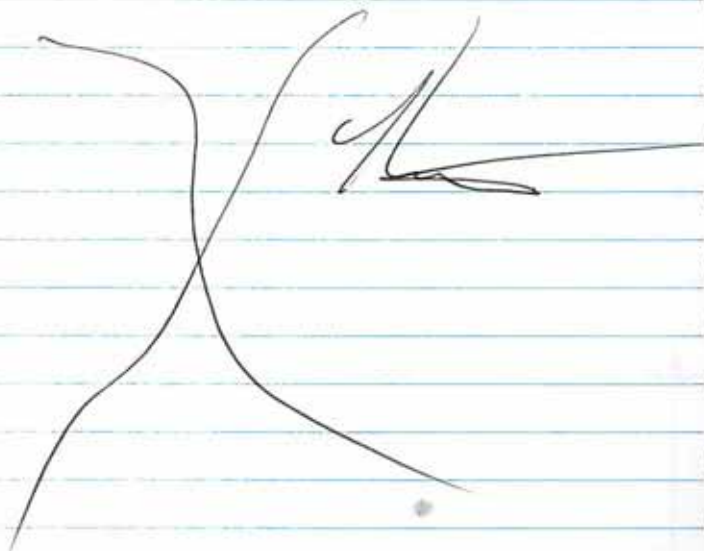
315 mm 14oz 18 ft

662734.87-N 7646065.67-E

1915 Caught SB16W-02

280 mm 10oz 15 ft

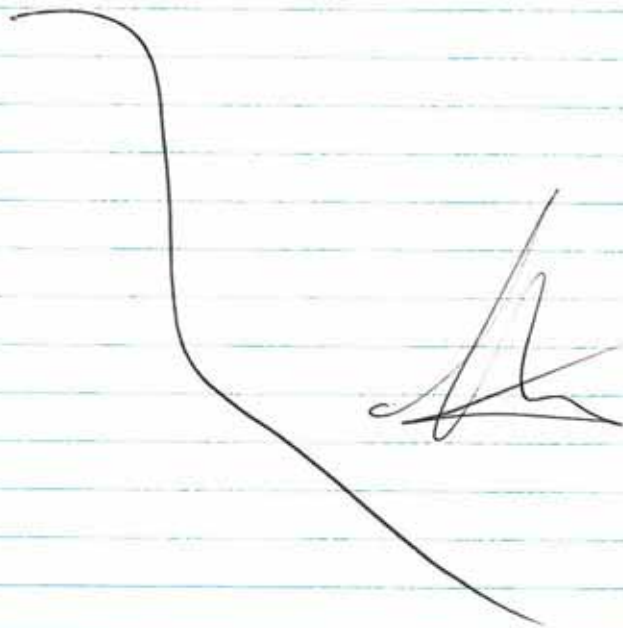
662996.02-N 7646173.90-E



⑨

Tuesday Sept 27, 2011

Kevin Perrett

1600 1 wtrg Ed Chin @
SI Lagoon ramp1900 Return to dock
- no fish -

(10)

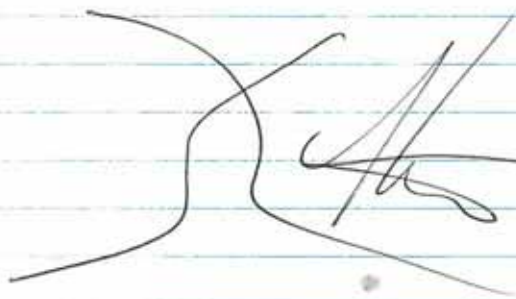
Thu Sept 29, 2011

16:00 Kevin Parrett, Ryan French
Ed Chin met at
SI boat dock

1710 Caught SB04E-06
305 mm 1302 17ft wtr
714300.39-N 761890.19-E

1834 Caught SB04E-02
300 mm 1102 12ft
714950.74-N 7618745.29-E

19:30 Return to dock



Monday Oct 3, 2011 (11)

15:00 K Parrett meet Ed Chin
② SI Lagoon boat ramp

1530 Caught SB07E-05
260 mm 702 18ft wtr
701578.23-N 7631759.98-E

1542 Caught SB07E-06
325 mm 1702 18ft wtr
701695.23-N 7631349.09-E

1615 Caught SB07E-04
265 mm 1102 16ft wtr
702199.72-N 7630503.02-E

1730 Caught SB06E-02
370 mm 1602 20ft wtr
70450.05-N 7625297.96-E

1900 Finish @ dock



Return to the Rain

(12)

Tuesday Oct 4, 2011

1600 K Parrett, Ryan, French,
Ed Chin meet SI dock

1900 Return to SI dock
— no fish —



(13)

Thursday Oct 6, 2011

1500 K Parrett, R French,
Ed Chin meet
SI boat ramp

1645 Caught SB06W-04
250 mm 250 g oz 17 ft wtr
704639.93-N 7625792.00-E

1810 Caught SB05E-04
325 mm 16 oz 5 ft wtr
708299.10-W 7622424.17-E

1900 Return to SI dock



(14)

Friday Oct 7, 2011

8:00 Kevin Parrett met
Bill Egan and Mike
at Cathedral Park
Boat Ramp

820 Caught SB06W-01
370 mm 21oz 5 ft wtr
706089.95-N 7623259.75-E

1200 Caught SB11E-08
315 mm 12oz 10 ft wtr
X 689440.97-N age analysis
7644050.55-E

1236 Caught SB11E-09
420 mm 26oz 23' wtr
689712.23-N age analysis
7643689.94-E

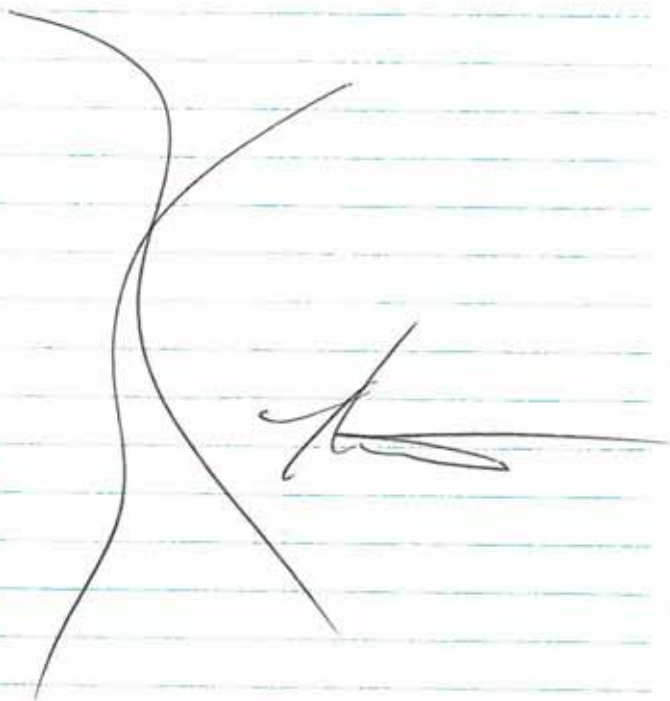
1330 Caught SB11E-10
360 mm 22oz 18' wtr
689960.77-N age
7643318.86-E analysis

(15)

Friday Oct 7, 2011 (cont)

1650 Caught SB08W-06
310 mm 11oz 10 ft wtr
699538.64-N
7630399.27-E

1730 Return to Boat Ramp



①⑥ Saturday Oct 8, 2011

800 Kevin Parrott met
Bill Egan and Mike
@ Cathedral Park
Boat Ramp

1440 Caught SB06E-08
320 mm 20 oz 8 ft wtr
704515.52-N [logged as]
7627751.08-E [SB07E-07]

1549 Caught SB06E-09
320 mm 20 oz 20 ft wtr
704856.69-N
7627262.96-E

1610 Caught SB06E-10
390 mm 36 oz 20 ft wtr
704874.68-N scale
7627238.72-E may
1615 Caught SB06E-11 18 not be
working properly



①⑦ Saturday Oct 8, 2011 (cont)

1615 Caught SB06E-11
265 mm 11 oz 20 ft wtr
704959.28-N
7627183.57-E
wt may be wrong
Scale appears to be reading
incorrectly. May have
water damage.

1700 Return to Boat Ramp



APPENDIX B FIELD FORMS

FIELD SAMPLING REPORT

PORTLAND HARBOR 2011 BASELINE SMALLMOUTH BASS TISSUE STUDY

WILLAMETTE RIVER
PORTLAND, OREGON

JUNE 2012

Prepared for:

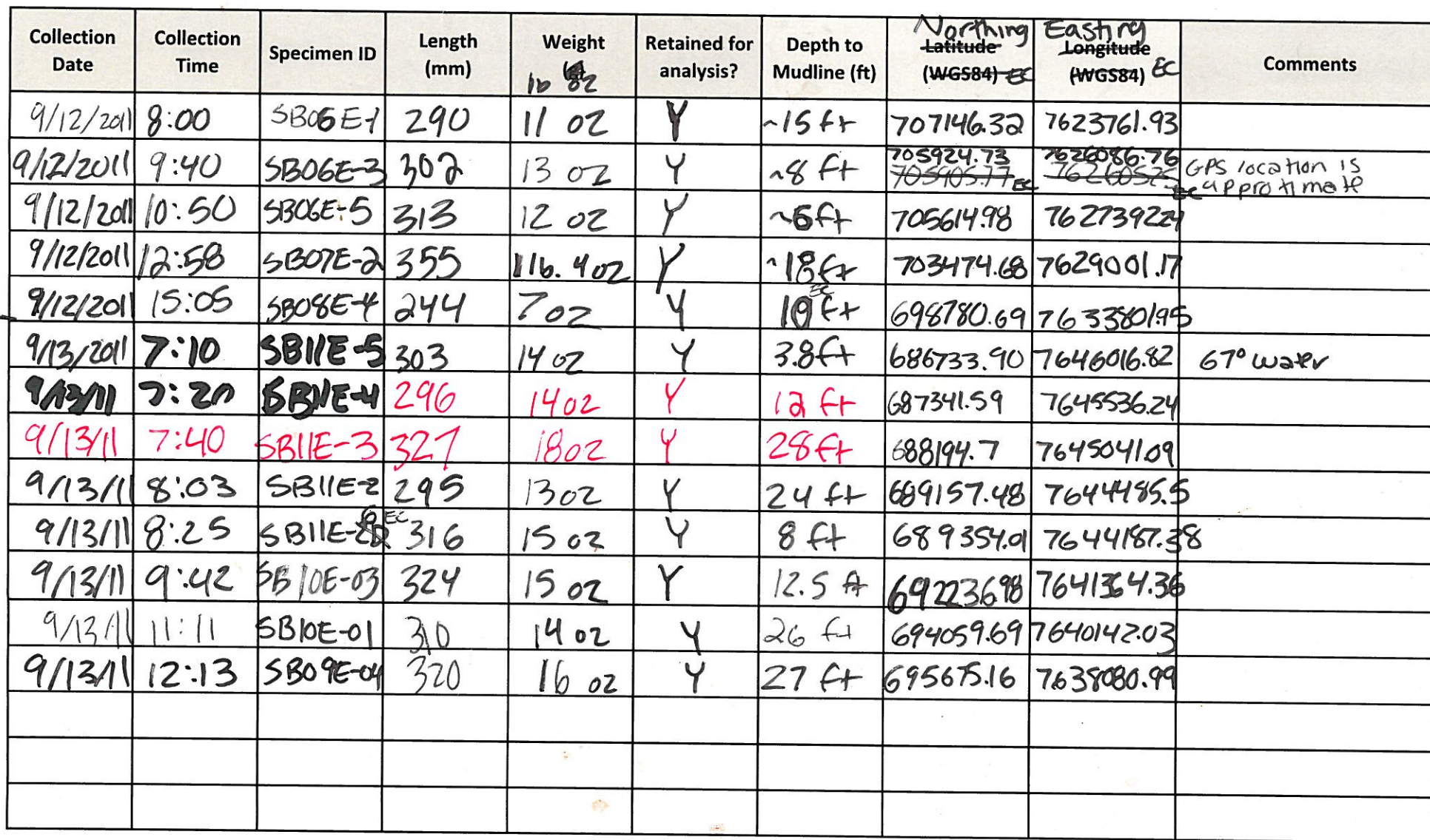
U.S. ENVIRONMENTAL PROTECTION AGENCY
U.S. ARMY CORPS OF ENGINEERS
CITY OF PORTLAND

Prepared By:



Project Name: Portland Harbor 2011 Baseline Smallmouth Bass Tissue Study

Fishing Technique: Rod and Reel



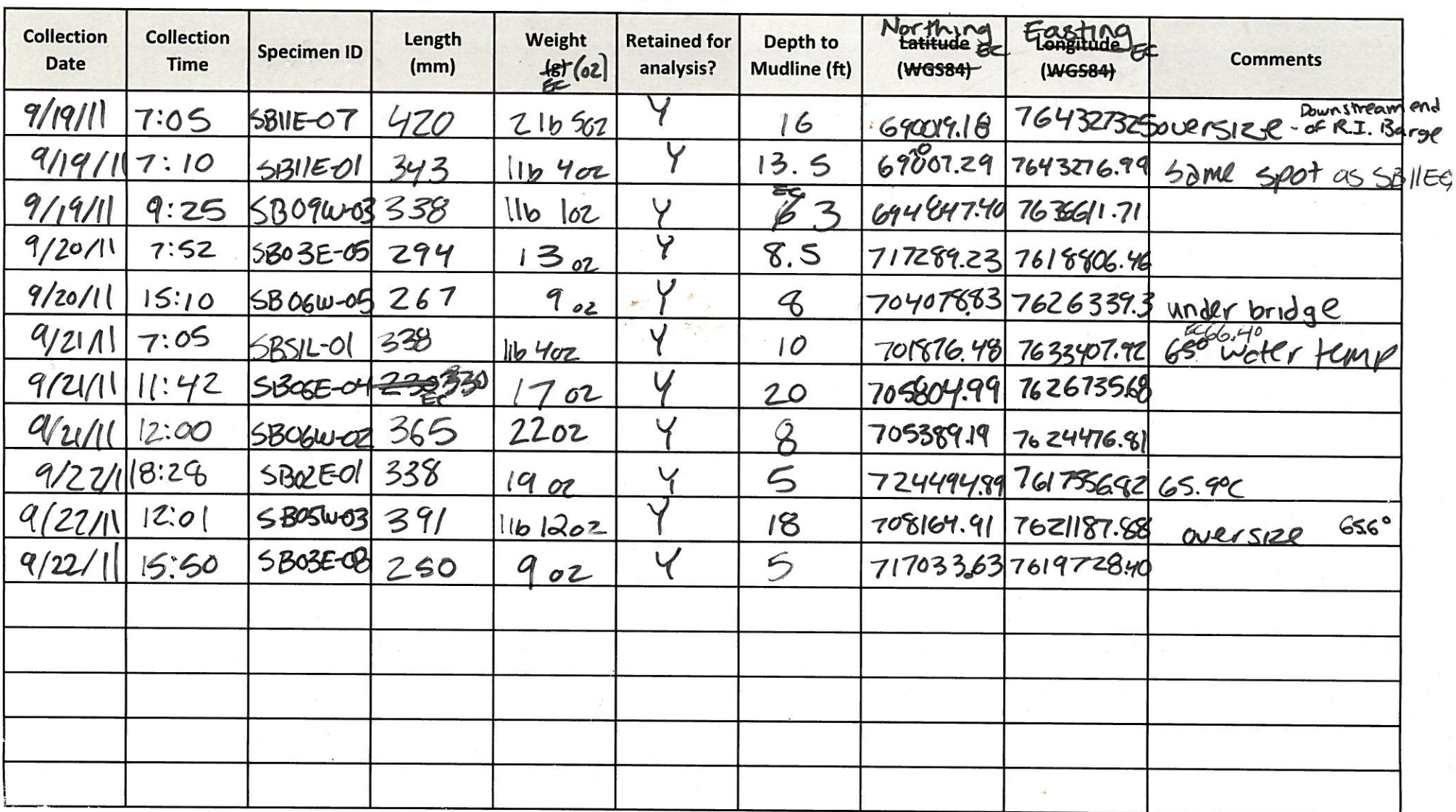
Project Name: Portland Harbor 2011 Baseline Smallmouth Bass Tissue Study

Fishing Technique: Rod and Reel

[illegible]

Project Name: Portland Harbor 2011 Baseline Smallmouth Bass Tissue Study

Fishing Technique: Rod and Reel



Project Name: Portland Harbor 2011 Baseline Smallmouth Bass Tissue Study

Erin Carroll EC

Fishing Technique: Rod and Reel

[illegible]

Specimen Tally and Location Form

Project Name: Portland Harbor 2011 Baseline Smallmouth Bass Tissue Study

Field Crew Initials: Erin Carroll (EC)

Fishing Technique: Rod and Reel

[illegible]

Project Name: Portland Harbor 2011 Baseline Smallmouth Bass Tissue Study

Kevin Parrell Erin Correll

Fishing Technique: Rod and Reel



Collection Date	Collection Time	Specimen ID	Length (mm)	Weight (g)	Retained for analysis?	Depth to Mudline (ft)	Latitude (WGS84)	Longitude (WGS84)	Comments
9/15/11	19:15	SBMCO1	330	13	Y	6	721663.11	7611618.30	SBMCO4 on GPS
9/15/11	19:25	SBMCO4	280	10	Y	8	721262.18	7611372.60	X from bat ramp
9/15/11	19:50	SBMCO3	310	12	Y	5	720302.86	7612393.12	By boat ramp
9/16/11	1356	SB04W02	320	17	Y	4	714305.63	7617341.97	
9/16/11	14:25	SB03W05	240	5	Y	10	716448.69	7616459.61	
9/16/11	1530	SB03W03	260	8	Y	10	717984.43	7615808.89	
9/16/11	1605	SB03W01	320	16	Y	10	719542.63	7615066.20	
9/16/11	1625	SB02W05	280	11	Y	7	721011.58	7615075.98	
9/16/11	1700	SB02W02	290	9	Y	6	723944.85	7615377.86	

Specimen Tally and Location Form

Project Name: Portland Harbor 2011 Baseline Smallmouth Bass Tissue Study

Field Crew Initials: Kevin Parrett

Fishing Technique: Rod and Reel



Collection Date	Collection Time	Specimen ID	Length (mm)	Weight (g)	Retained for analysis?	Depth to Mudline (ft)	Northing Latitude (WGS84)	Eastings Longitude (WGS84)	Comments
9/19/11	1820	SB08E01	350	9	Y	10	701753.74	763255.74	7632509.40E
9/22/11	1800	SB07E01	245	6	Y	15	704816.23	7627957.60	
9/23/11	1635	SB15E03	310	13	Y	35	668322.19	7646365.06	legged under yesterday's file
9/23/11	1820	SB15E02	250	8	Y	15	668745.30	7647146.11	
9/24/11	1633	SB15E-01	275	9	Y	10	668799.22	7646303.03	7646303.15
	1645	SB15E-04	325	17	Y	17	668497.88	7646301.64	
	1655	SB15E-05	355	24	Y	15	667559.65	7647115.48	
	1725	SB17W-01	245	6	Y	23	657987.75	7648310.68	
	1826	SB17W-02	320	12	Y	25 40	658472.74	764812.7	7648166.79
	1840	SB17W-03	300	12	Y	18	659143.56	7647819.58	wt off ?
	1908	SB16W-01	315	14	Y	18	662734.87	7646065.67	
✓	1915	SB16W-02	280	10	Y	20 15	662996.02	7646173.90	

Specimen Tally and Location Form

Project Name: Portland Harbor 2011 Baseline Smallmouth Bass Tissue Study

Field Crew Initials:

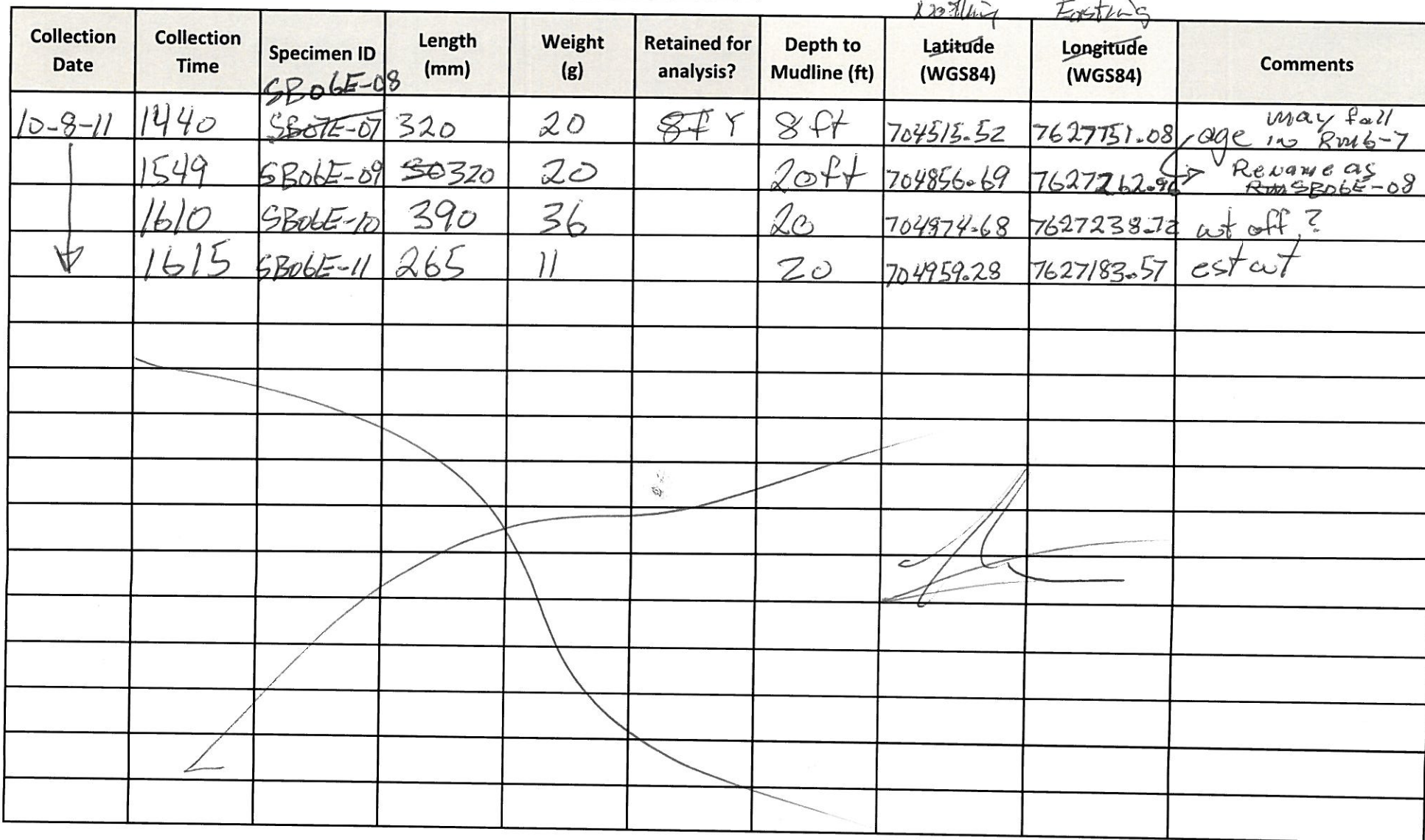
Fishing Technique: Rod and Reel



Collection Date	Collection Time	Specimen ID	Length (mm)	Weight (g)	Retained for analysis?	Depth to Mudline (ft)	^{Northing} Latitude (WGS84)	^{Easting} Longitude (WGS84)	Comments
9-29-11	1710	SB04E-06	305	13	Y	17 ft	714300.39	7618990.19	
9-29-11	1834	SB04E-02	300	11	Y	12 ft	714950.74	7618745.29	
<hr/>									
10-3-11	1530	SB07E-05	260	7		18 ft	701578.23	7631759.98	(age date)
	1542	SB07E-06	325	17		18 ft	701695.23	7631349.09	Target of 7E-05
	1615	SB07E-04	265	11		16	702199.72	7630503.02	
✓	1730	SB06E-02	370	16		20	706150.05	7625297.96	slightly over
<hr/>									
10-6-11	1645	SB06W-04	250	9		17	704639.93	7625792.00	
" "	1810	SB05E-04	325	16		5	708299.10	7622424.17	
<hr/>									
10-7-11	820	SB06W-02	370	21		5	706089.95	7623259.76	slightly large
	1200	SB11E-08	315	12		10	689440.97	7644050.55	Extra for fillet
	1236	SB11E-09	420	26		23	689712.23	7643689.94	Extra for " "
	1330	SB11E-10	360	22		18	689960.77	7643318.86	Extra " "
✓	1650	SB08W-06	310	11		10	699538.27	7630399.27	" "

Project Name: Portland Harbor 2011 Baseline Smallmouth Bass Tissue Study

Fishing Technique: Rod and Reel



APPENDIX C REPRESENTATIVE PHOTOS

FIELD SAMPLING REPORT

PORTLAND HARBOR 2011 BASELINE SMALLMOUTH BASS TISSUE STUDY

WILLAMETTE RIVER
PORTLAND, OREGON

JUNE 2012

Prepared for:
U.S. ENVIRONMENTAL PROTECTION AGENCY
U.S. ARMY CORPS OF ENGINEERS
CITY OF PORTLAND

Prepared By:





Smallmouth bass specimen on measuring board

2011 Portland Harbor Baseline Smallmouth Bass Tissue Study
Appendix C – Representative Photos



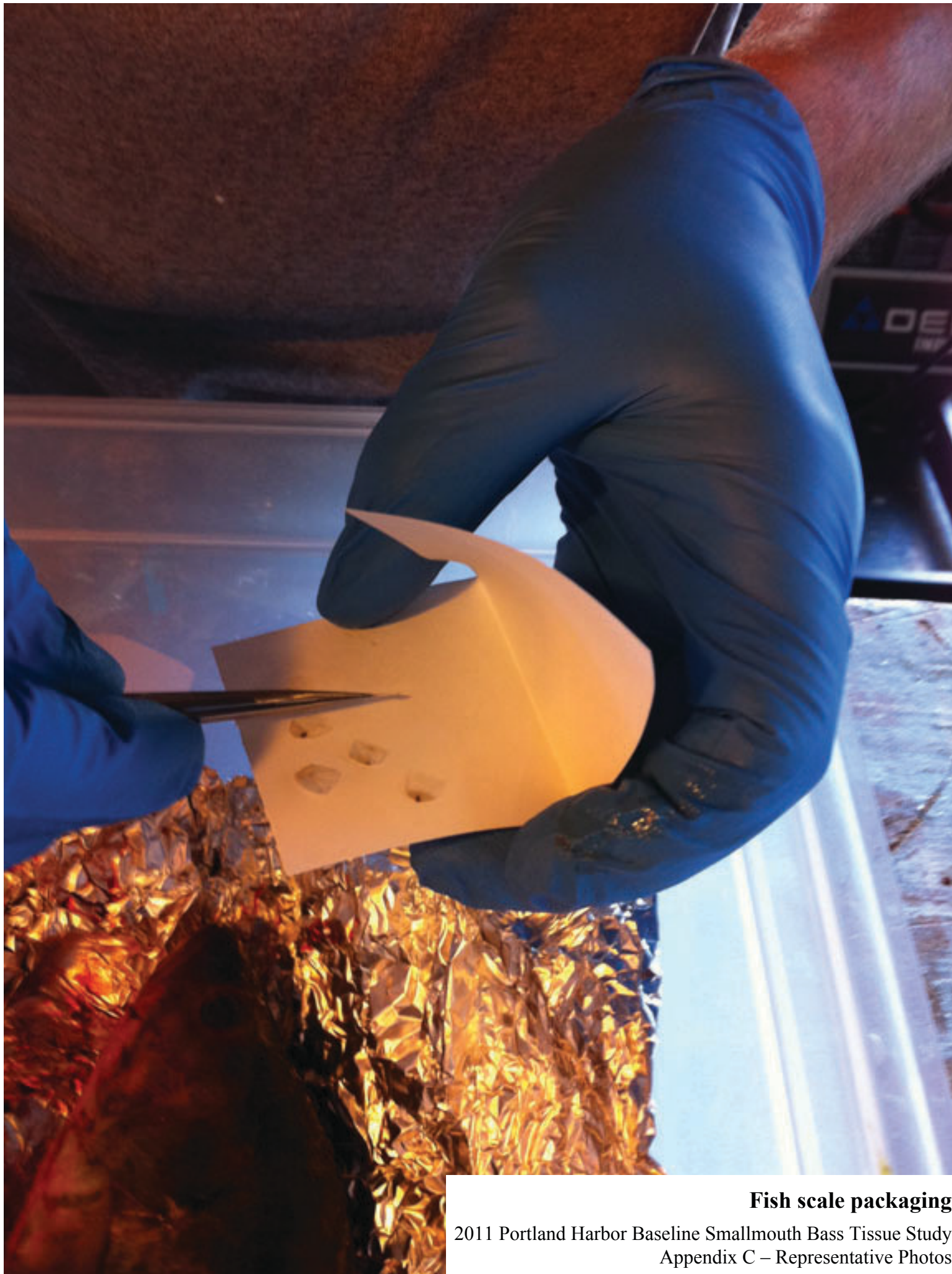
Packaged smallmouth bass specimen

2011 Portland Harbor Baseline Smallmouth Bass Tissue Study
Appendix C – Representative Photos



Fish scale removal

2011 Portland Harbor Baseline Smallmouth Bass Tissue Study
Appendix C – Representative Photos



Fish scale packaging

2011 Portland Harbor Baseline Smallmouth Bass Tissue Study
Appendix C – Representative Photos



Fish specimen ready for shipment to EPA headquarters

2011 Portland Harbor Baseline Smallmouth Bass Tissue Study
Appendix C – Representative Photos



Rod and reel angling

2011 Portland Harbor Baseline Smallmouth Bass Tissue Study
Appendix C – Representative Photos



EPA oversight

2011 Portland Harbor Baseline Smallmouth Bass Tissue Study
Appendix C – Representative Photos