MEMORANDUM

To: EPA and Ecology
From: LDWG
Subject: August LDW shiner surfperch sampling
Date: 7/29/04

1.0 Introduction

This technical memo describes the methods and procedures for trawling and seining in the Lower Duwamish Waterway (LDW) from August 2 to 6, 2004 as part of the fish and crab tissue collection effort in support of the Phase 2 Remedial Investigation (RI) for the LDW. This memo contains only those Quality Assurance Project Plan (QAPP) elements that are directly pertinent to fish collection methods and specimen handling during the August sampling event. This event will occur before the approval date of the full fish and crab tissue collection QAPP (Windward 2004a) on September 3, 2004. The remainder of the fish and crab sampling will occur in September, following the approval of the full QAPP. Approval of this memo by EPA will be needed before August 2, 2004 for the August sampling event to occur.

The August sampling event is being conducted to increase the likelihood of collecting a sufficient number and spatial distribution of shiner surfperch in the LDW, based on a review of data on perch catch from Taylor Associates; see fish and crab tissue collection QAPP , (Windward 2004a) Appendix A. If sculpin (> 10 cm), English sole (>20 cm) starry flounder (> 20 cm), and/or rockfish (>30 cm) are captured as part of this effort they will be collected and archived. Quality assurance guidelines on chemical analyses of archived fish and methods and plans discussed in the fish and crab tissue QAPP, are applicable to all samples collected as part of this August event.

Section 2.0 of this memorandum addresses project management, Section 3.0 is a summary of collection permits, Section 4.0 addresses documents and records, Section 5.0 discusses data generation and acquisition methods, Section 6 discusses assessment and oversight, and Section 7 lists references cited in this memorandum. Much of this memorandum is a direct excerpt from the draft final fish and crab tissue QAPP (Windward 2004c) revised based on EPA written comments and on the July 15 meeting attended by EPA, NOAA, and LDWG.

2.0 Project Management

This section describes the overall management of the project. Elements addressed include project organization and key personnel, project scheduling, special training requirements and certification, and documentation and records.

2.1 PROJECT ORGANIZATION

The overall project organization and the individuals responsible for the various tasks required for the tissue sample collection and analysis are shown in Figure 2-1. Responsibilities of project team members, as well as laboratory project managers, are described in the following sections.

2.1.1 Project management

The Lower Duwamish Waterway Group (LDWG), EPA, and the Washington Department of Ecology (Ecology) will be involved in all aspects of this project, including discussion, review, and approval of this technical memorandum, and interpretation of the results of the investigation. EPA and Ecology will be represented by their task managers (TMs) for this QAPP, Nancy Harney, and Rick Huey, respectively. Allison Hiltner and Rick Huey are the overall project managers (PMs) for EPA and Ecology, respectively, for the Phase 2 RI.

Kathy Godtfredsen will serve as the Windward PM, responsible for overall project coordination and providing oversight on planning and coordination, work plans, all project deliverables, and performance of the administrative tasks needed to ensure timely and successful completion of the project. She will also be responsible for coordinating with LDWG, EPA, and Ecology on schedule, deliverables, and other administrative details. Dr. Godtfredsen can be reached as follows:

Kathy Godtfredsen
Windward Environmental LLC
200 W. Mercer St., Suite 401
Seattle, WA 98119
Telephone: 206.577.1283
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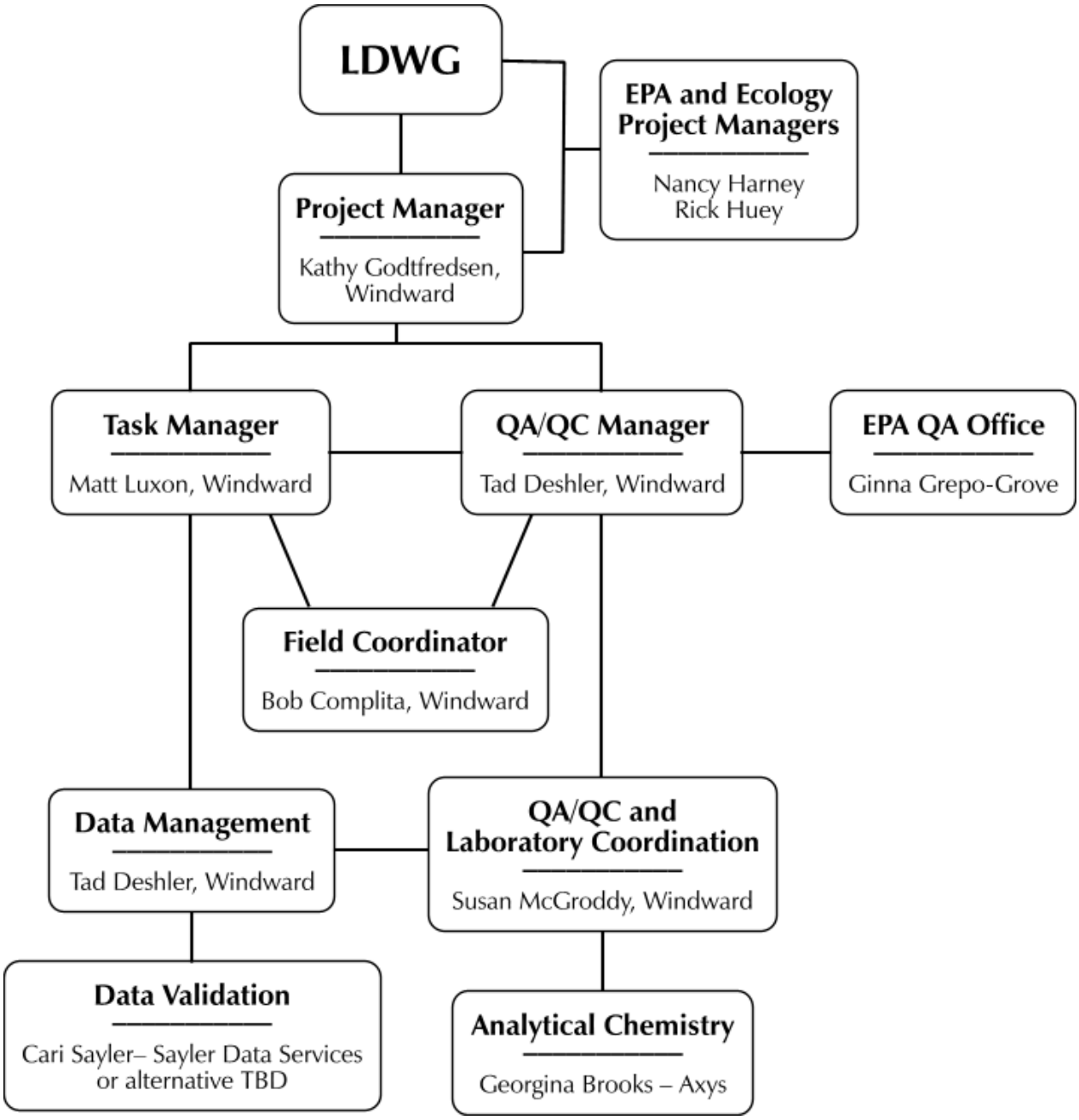

Figure 2-1. Project organization and team responsibilities

Note: Allison Hiltner is the EPA project manager for the Phase 2 RI; Nancy Harney is the EPA task manager for the fish and crab tissue QAPP and study.

Matt Luxon will serve as the Windward Task Manager (TM). The TM is responsible for project planning and coordination, production of work plans, production of project deliverables, and performance of the administrative tasks needed to ensure timely and successful completion of the project. The TM is responsible for communicating with the Windward PM on progress of project tasks and any deviations from this memorandum.

Significant deviations from this memorandum will be further reported to LDWG, EPA, and Ecology. Mr. Luxon can be reached as follows:

Matt Luxon
Windward Environmental LLC
200 W. Mercer St., Suite 401
Seattle, WA 98119
Telephone: 206.577.1293
Facsimile: 206.217.0089
Email: mattl@windwardenv.com

2.1.2 Field coordination

Bob Complita will serve as the Windward Field Coordinator (FC). The FC is responsible for managing the field sampling activities and general field and quality assurance/quality control (QA/QC) oversight. He will ensure that appropriate protocols for sample collection, preservation, and holding times are observed and will oversee delivery of environmental samples to the designated laboratories for chemical analyses. Deviations from this memorandum will be reported to the TM and PM for consultation. Significant deviations from the QAPP will be further reported to representatives of LDWG, EPA, and Ecology. Mr. Complita can be reached as follows:

Bob Complita
Windward Environmental LLC
200 W. Mercer St., Suite 401
Seattle, WA 98119
Telephone: 206.577.1297
Facsimile: 206.217.0089
Email: bobc@windwardenv.com

2.1.3 Trawl boat captain

Charlie Eaton will serve as the trawl boat captain. The trawl boat captain is responsible for operating the trawl boat and for decisions pertinent to the operation of the trawl. The trawl boat captain will work in close coordination with the FC to ensure that samples are collected in keeping with the methods and procedures presented in this memorandum. Mr. Eaton can be reached as follows:

Charles Eaton
Bio-Marine Enterprises
2717 3rd Ave N
Seattle, WA 98109
Telephone: 206.282.4945
Mobile: 206.714.1055
Email: cmeaton@msn.com

2.1.4 Beach seine operation

Taylor Associates will operate the beach seine. Jim Shannon is responsible for overseeing the beach seine crew and is responsible for decisions pertinent to beach seining. Taylor Associates will work in close coordination with the FC to ensure that samples are collected in keeping with the methods and procedures presented in this memorandum. Taylor Associates can be reached as follows:

Jim Shannon
Taylor Associates
7104 Greenwood Ave N
Seattle, WA 98103
Telephone: 206.267.1409
Mobile: 206.794.0095
Facsimile: 206.267.1401
Email: jim@taylorassoc.net

2.1.5 Quality assurance/quality control

Tad Deshler of Windward will oversee QA/QC for the project. As the QA/QC manager, he will oversee coordination of the field sampling and laboratory programs, and supervise data validation and project QA coordination, including coordination with the EPA QA officer, Ginna Grepo-Grove.

Mr. Deshler can be reached as follows:

Tad Deshler
Windward Environmental LLC
200 W. Mercer St., Suite 401
Seattle, WA 98119
Telephone: 206.577.1285
Facsimile: 206.217.0089
Email: tad@windwardenv.com

Ms. Grepo-Grove can be reached as follows:

Ginna Grepo-Grove
US Environmental Protection Agency, Region 10
1200 6th Avenue
Seattle, WA 98101
Telephone: 206.553.1632
Email: grepo-grove.gina@epa.gov

Susan McGroddy will serve as Windward's QA/QC coordinator for chemical analyses. Dr. McGroddy can be reached as follows:

Susan McGroddy
Windward Environmental LLC
200 W. Mercer St., Suite 401
Seattle, WA 98119
Telephone: 206.577.1292
Facsimile: 206.217.0089
Email: susanm@windwardenv.com

2.1.6 Laboratory project management

Susan McGroddy of Windward will serve as the laboratory coordinator for the analytical chemistry laboratory. Axys Analytical Services Ltd. (Axys) will archive the samples for potential future chemical analyses.

The laboratory PM at Axys can be reached as follows:

Georgina Brooks
Axys Analytical Services Ltd.
PO Box 2219
2045 Mills Road
Sidney, British Columbia V8L 3S8
Canada
Telephone: 250.656.0881
Facsimile: 250.656.4511
Email: gbrooks@axys.com

The laboratories will accomplish the following:

- adhere to the methods outlined in this technical memo
- adhere to documentation, custody, and sample logbook procedures

3.0 COLLECTION PERMITS

Three fish sampling permits are needed for the sampling described in this QAPP (Table 3-1). Permits are required by the Washington Department of Fish and Wildlife (WDFW) for any scientific collection of organisms and by the service agencies (National Marine Fisheries Service [NMFS] and US Fish and Wildlife Service [USFWS]) for incidental take of threatened fish species (i.e., chinook salmon and bull trout). The FC and the leader of each sampling team (i.e., trawl sampling, trap sampling, and beach seine sampling) will be in possession of a copy of each permit, as required by the permits. Copies of permits are attached to the fish and crab tissue QAPP.

Table 3-1. Permits required for sampling

PERMIT	CONTACT PERSON/ PERMIT HOLDER	PERMIT NUMBER
USFWS incidental take permit for threatened and endangered species (bull trout); required even though this species is not targeted for collection, because they may be caught incidentally in the sampling gear	Matthew Luxon, Windward Environmental	Threatened Species Permit TE088853-0
NMFS incidental take permit for threatened and endangered species (chinook salmon); required even though this species is not targeted for collection, because they may be caught incidentally in the sampling gear	George Blomberg, Environmental Management, Port of Seattle	Scientific Research Permit 1314
WDFW scientific collection permit	Matthew Luxon, Windward Environmental	Scientific Collection Permit 04-273a

NMFS – National Marine Fisheries Service

USFWS – US Fish and Wildlife Service

WDFW – Washington Department of Fish and Wildlife

4.0 DOCUMENTATION AND RECORDS

This section describes documentation and records needed for field activities and laboratory specimen archiving.

4.1 Field observations

All field activities will be recorded in a field logbook maintained by the FC. The field logbook will provide a description of all sampling activities, conferences associated with field sampling activities, sampling personnel, and weather conditions, plus a record of all modifications to the procedures and plans identified in this memorandum and the health and safety plan (Appendix A of the fish and crab tissue QAPP). The field logbook will consist of bound, numbered pages. All entries will be made in indelible ink. The field logbook is intended to provide sufficient data and observations to enable participants to reconstruct events that occurred during the sampling period.

The following field data collection sheets, included as Appendix B to the fish and crab tissue QAPP, will also be used to record pertinent information after sample collection:

- target fish and crab species tissue collection form
- non-target species collection form
- protocol modification form
- corrective action form

4.2 Laboratory records

Axys will be responsible for internal checks on sample handling.

5.0 Data Generation and Acquisition

This section describes the methods that will be used to collect, and process shiner surfperch from the LDW. Limited information on other target species is presented because they may be caught as by-catch, processed, and archived. Elements include sampling design, sampling methods, sample handling and custody requirements.

5.1 SAMPLING DESIGN

Four sampling areas have been selected that are centered on approximately RM 0.6, 2.0, 3.3, and 4.6, respectively. Each sampling area is approximately 0.8 mi in length. Area 1 extends from RM 0.2 to RM 1.0, Area 2 extends from RM 1.6 to RM 2.4, Area 3 extends from RM 2.9 to RM 3.7, and Area 4 extends from RM 4.2 to RM 5.0. Each of the first three sampling areas has been further divided into six subareas, three on the east and three on the west side of the dredged channel centerline (Figure 5-1, oversized figure) to ensure spatial representation of those areas and to collect discrete samples. Area 4 could only be subdivided into five subareas because of physical constraints.

5.1.1 Composite samples per area

As presented in the Phase 2 work plan (Windward 2004b), the goal of the collection effort is to collect and analyze six composite tissue samples of shiner surfperch from each of the four sampling areas, with one composite sample from each subarea.[1] Additional fish species targeted for chemical analyses will also be retained and archived if caught incidentally. Further rationale and sampling design for these species is presented in the fish and crab tissue QAPP to be finalized on September 3, 2004.

A minimum of five organisms per composite sample will be targeted for shiner surfperch. This target is based on the expected feasibility of collecting shiner surfperch in each area using a reasonable level of effort.

If possible without expanding the level of effort described in Section 5.2.2, greater numbers of perch than the target numbers will be collected for possible inclusion in each composite sample, up to a maximum of 20 individuals. For a given tissue type, the same number of perch will be included in all composite samples from all sampling areas to provide the most appropriate statistical calculation of 95th UCL using data from all sampling areas. Therefore, the number of organisms captured in areas of lower abundance will likely set the number of organisms composited at other sampling

[1] Trawling is only possible in four subareas in Area 4, and seining is only possible in five subareas. Thus, one or more of the subareas will likely have more than one composite sample. The subarea(s) with more than one composite sample will be determined based on the overall catch and other compositing considerations. Final compositing decisions will be made in consultation with EPA and Ecology.

locations. The final number of fish per composite will be depend on the overall catch and will be determined in consultation with EPA and Ecology.

Table 5-1. LDW tissue sampling design for perch

Species	Sample Type	Target Size[a] (cm)	Target # of Fish per Composite[b]	Target # of Fish per Sampling Area[b]	Total Number of Individuals	# of Composite Samples, by Area			
						1	2	3	4
Shiner surfperch[c]	whole body	≥ 8	5	30	120	6	6	6	6

NOTE: If a sufficient number of adult striped or pile perch are caught while sampling for other fish species, fillets from these fish will be composited in consultation with EPA and Ecology, and may be chemically analyzed. Perch caught during both August and September sampling events will be archived.

Area 1 centered at RM 0.6, Area 2 centered at RM 2.0, Area 3 centered at RM 3.3, Area 4 centered at RM 4.6

If caught, adult rockfish tissue will be archived for potential chemical analyses as presented in the rockfish technical memorandum (Windward 2004d). Also, if caught, Pacific staghorn sculpin (> 10 cm), English sole (> 20 cm), and starry flounder (> 20 cm) will also be archived. Crabs will be collected in September, but not in August.

[a] Total length

[b] Actual numbers of fish per composite sample and numbers of fish per sampling area will depend on the number of fish caught, as described in Section 5.1.1 for each species

[c] Fillets of shiner surfperch will not be analyzed because fish of this small size are not likely to be filleted prior to human consumption

5.2 Sampling Methods

Shiner surfperch, and other target species caught incidentally, will be collected from the LDW during the August sampling event using a high-rise otter trawl and beach seine. Selected methods, sample numbering, field processing methods, sample packaging, and decontamination procedures are discussed in this section.

There may be contingencies during field activities that require modification of the general procedures outlined below. Modification of procedures will be at the discretion of the FC after consultation with the Windward TM and PM, the boat captain, and the EPA or Ecology representative in the field, if applicable. LDWG, EPA, and Ecology will be consulted if significant deviations from the sampling design are required. All modifications will be recorded in the protocol modification form.

5.2.1 Sample identification

Unique alphanumeric identification (ID) numbers will be assigned to each individually wrapped fish specimen in the field, and recorded on the specimen fish tissue collection form. Organisms other than the targeted fish species will be recorded on the non-target fish tissue collection form, but no specimen ID will be assigned. The first three characters will be LDW to identify the project area. The next two characters will identify the specific tissue sampling area: T1, T2, T3, or T4. The next character will identify the specific sampling subarea: A, B, C, D, E, F. The next 5 characters will identify the collection method and effort number: TR or SN, representing trawl or beach seine,

respectively, followed by a 3-digit number representing the effort number (numbered sequentially over all areas) (e.g., the 15th trawl after the start of sampling would be TR015). The next two characters will identify the individual targeted fish species type: SS, PP, SP, PS, and ES representing shiner surfperch, pile perch, striped perch, Pacific staghorn sculpin, and English sole, respectively. Alternative target species, if they are collected, will be identified with RF and SF for rockfish and starry flounder, respectively. The final identifier will be numeric and indicate the sequential number of the specimen captured for a given tissue sampling area. As an example, the 11th shiner surfperch captured in Area 1, subarea C, in the 15th trawl would be identified as LDW-T1-C-TR015-SS-11. All relevant information for each individually wrapped and labeled target specimen, including specimen ID, total length, weight, gender (if it can be determined without dissection), external abnormalities, sample date, time, and location number will be recorded on the specimen fish tissue collection form (Appendix B of the fish and crab tissue QAPP) and included as an appendix in the final data report. Therefore, all pertinent data associated with each individual fish specimen can be tracked and will be used when assigning individual fish to composite samples, which will occur after all fish have been collected from both the August and September sampling events. Fish included in each composite will be recorded on a composite tracking form that can be found in the fish and crab tissue QAPP.

5.2.2 Shiner surfperch Collection methods

Shiner surfperch will be collected using both a high-rise otter trawl and beach seining. Trawling is an effective collection method because adult shiner surfperch prefer sandy bottoms that can be efficiently sampling using a trawl. Historical data show that shiner surfperch are commonly caught in LDW trawl surveys, although season-specific data were not available. Miller et al. (1975) reported that shiner surfperch were caught in trawls throughout the LDW. Miller et al. (1977) reported that 209 shiner surfperch were caught throughout the LDW and they occurred in 30 to 70% of trawl samples. PSAMP data from the vicinity of Kellogg Island show that shiner surfperch were found on all six dates that trawling took place, but not during all trawls (West 2001). When caught, catch numbers ranged from 2-28 shiner surfperch per trawl.

Beach seining will also be conducted as a means of collecting shiner perch from shallow water where trawling is infeasible. Monthly beach seining data show that adult shiner surfperch were generally present in shallow water in the LDW from May through August, but generally were absent in September. Taylor and Associates monthly catch data show that adult shiner surfperch were abundant in June and July, present on August 21st at both Kellogg Island and Turning Basin 3 stations, but were not present at any location on the September 26th sampling date (Shannon 2004). Weitkamp and Campbell (1980) reported that in the vicinity of Kellogg Island, mature adults (8-14 cm) were present in May and June, and young-of-the-year (YOY) fish (3.5-4.5 cm) were present in late July and August, but were absent from all seines in September.

Shiner surfperch will be collected by high-rise otter trawl and beach seine in August, as described in Sections 5.2.2.1 and 5.2.2.2, respectively. Beach seining will take place on August 2 and 3, 2004. Three stations in each sampling area will be seined one time each over the two days of sampling. After all stations have been visited once, if there is available time on the second day, sampling areas where the fewest fish were obtained will be revisited for an additional set. On the subsequent visit, the same sites or different sites within the sampling area may be visited based on availability of sites and best professional judgment of the FC in consultation with Taylor Associates personnel.

Trawling will take place from August 2 to 6, 2004. Priority will be placed on collecting a sufficient total number of shiner surfperch in subareas C and D of each area (5 fish per subarea) in Area 3, then on collecting a sufficient total number in each sampling area (30 fish per sampling area). On the first day, Areas 1 and 2 will be trawled (approximately 10 trawls per area with at least one trawl per sampling subarea). On the second day, Areas 3 and 4 will be trawled. If a sufficient number of shiner surfperch (i.e., 30 fish per area) are not caught in each area, particularly in subareas C and D in Area 3, on these first two days, these areas will be trawled first on days 3, 4, and 5. Additional sampling will then focus on subareas where relatively few shiner surfperch have been captured, in an attempt to keep the number of fish even among all sampling subareas. For any given subarea, the maximum daily effort will be five trawls. If the target number of shiner surfperch (30 fish per area) is obtained in all sampling areas in less than 5 days, trawling will continue up to 5 days total to increase the number of fish per composite sample (up to 20 fish per composite or 120 fish per area) if the number per composite sample for a single tissue type can be kept equal among all six composite samples in a sampling areas. Note that in Area 4, it is likely that only four subareas can be sampled by trawl and five areas can be sampled by beach seine. Thus, one or more of the subareas in Area 4 will likely have more than one composite sample. The compositing scheme for Area 4 will depend on the catch of perch in the area and will be determined in consultation with EPA and Ecology.

5.2.2.1 High-rise otter trawl

The trawling design is based on systematic sampling of the four sampling areas and their subareas. The expected maximum daily effort is approximately 20 trawls, depending on site conditions and number of fish processed (Eaton 2004). Trawling will be conducted using the vessel *R/V Kittiwake*, captained by Charlie Eaton of Bio-Marine Enterprises.

The high-rise otter trawl consists of a 25-ft (7.6-m) headrope and 29-ft (8.8-m) footline, side panels with 1.5 in. mesh which open to 5 ft at the wing tips, and 24-in. x 36-in. V-shaped galvanized steel trawl doors. The footline consists of 0.5-in. combination poly/wire with 5.33-oz seine leads interspersed with 2-in. rubber discs, and the headrope has eight 5-in. plastic floats. The 1.25-in. mesh codend also has a knotless nylon codend liner with 0.25-in. mesh.

Areas 1, 2, and 3 (Figure 3-1; oversized figure) were divided into six subareas (A-F), and Area 4 was divided into five subareas (A-E).[2] Area 4 was divided into five subareas because of its shape and the difficulty in sampling upstream of RM 4.8. Trawling upstream of RM 4.8 is not feasible because of a low footbridge at RM 4.8, and because underwater rocks, root masses, and other debris that occur throughout the area upstream of the bridge make trawling infeasible in this area (Eaton 2004). Beach seining is also difficult in this area because of fast water flow through this area and woody debris in the channel (Shannon 2004), but will be attempted in subarea 4E along the eastern shoreline around RM 4.9 as described in Section 5.2.2.2. Fyke nets are not proposed because they would likely capture returning Endangered Species Act-listed adult salmon, and thus Rob Clapp of the endangered species program at National Marine Fisheries Service advised against proposing the use of these nets (Clapp 2004).

At least one trawl will be conducted within each subarea, as described below. Each trawl line will be conducted within the bounding coordinates of the sampling subareas. Within each subarea, an attempt will be made to conduct all trawls outside of the shipping channel in order to capture fish using shallower habitats. Trawling will not be conducted in waters shallower than 6 ft deep (at the time of trawling), because the high-rise otter trawl is impractical in shallower areas (Eaton 2004). If one or more slips are present in a given subarea, at least one trawl will be conducted in each slip if feasible based on barge locations, etc. The specific trawl line and order in which the subareas will be sampled will be determined by the boat captain based on logistical considerations and the priorities discussed in Section 5.2.2. Subsequent trawls in each subarea may follow the first trawl line or a different trawl line at the discretion of the boat captain in consultation with the FC.

The trawl will be deployed to the bottom using a winch. When the trawl reaches the bottom, the "dog" of the winch will be set (stopping the release of cable from the winch) and the vessel will begin the trawl. The trawl will progress upstream. The trawl speed will remain constant at 2.5 knots. The spread of the trawl will be approximately 4.7 m, with a rise of approximately 1.5 m. When the vessel reaches the end of each trawl line, the dog of the winch will be released and the trawl will be hauled aboard, allowing the captured species to be processed. The date, time, and location of the trawl will be recorded on the fish tissue collection form (Appendix B of the fish and crab tissue QAPP) after each trawl is hauled out of the water.

Trawl start and end points will be recorded using a Trimble NT300D differential global positioning system (DGPS) with 1-2 m accuracy. When the trawl is deployed on the bottom, GPS and clock readings will be taken to mark the starting point of the trawl. Final GPS and clock readings will be made when net retrieval begins.

[2] Subarea E of Area 4 (the area upstream of the footbridge) will be sampled in September for Pacific staghorn sculpin and crabs using traps.

Trawling will be conducted from aboard the *R/V Kittiwake* using a live sampling technique, which will minimize the number of non-target species mortalities through species sorting and processing prioritization. Upon completion of an individual trawl, the catch will be hauled aboard and immediately emptied into a large plastic tub filled with running seawater. Field technicians will sort the catch by species and size into numerous smaller tubs, also containing running seawater. Target species will be separated from non-target species and processed as described in Section 5.2.4. Non-target species will be generally identified to species and their numbers estimated. In addition to shiner surfperch, suitably sized English sole, starry flounder, Pacific staghorn sculpin, pile perch, striped perch, or adult rockfish collected in the trawl will be processed and archived. For target species, any prey in the fish's mouth will be assumed to have been consumed in the trawl and will be removed from the fish's mouth before processing.

The order that sampling areas and subareas will be trawled over the course of the project and within a given day will be determined by both the FC and the trawl boat captain following the priorities presented in this section and in Section 5.2.2. Leaving this decision to the discretion of the field personnel maximizes their ability to respond to field conditions and exercise their professional judgment on fishing conditions. The trawl results will be reported each day to the TM and PM, who will provide input on priorities for the subsequent day's sampling effort.

5.2.2.2 Beach seine

Beach seining will also be used as a collection method for shiner surfperch. Jim Shannon of Taylor Associates will be responsible for beach seining. Beach seines will be deployed from shallow, low-gradient beaches within each sampling area. Potential beach seining locations identified by NOAA are shown in Figure 5-1 (Field et al. 1999). The particular sites sampled will be at the discretion of the FC in coordination with Taylor Associates personnel.

Three sites will be sampled in each sampling area; sites will be dispersed throughout the sampling area as much as is feasible based on suitable locations, except in Area 4. Based on an initial assessment of available seining sites, the following subareas will be targeted: 1B, 1D, and 1E; 3 sets in 2B; and 3A, 3D, and 3F. In Area 4, the first one to two sets will occur in 4E. If seining is feasible and fish are caught in these sets, the remaining sets will be conducted in subarea 4E (because trawling is not possible in this subarea). If no fish are collected or the net is getting caught in debris, the remaining sets in Area 4 will be conducted in subareas 4A, 4B, and 4D.

Beach seine sample locations will be recorded using a Magellan SporTrak GPS unit, upgraded to include the latest Wide Area Augmentation System (WAAS) technology, providing accuracy within 3 m. Coordinates will be taken at the starting location of each beach seine deployment. Locations of beach seining activities will also be identified by

reference to landmarks. Field technicians will note place names or approximate distances to nearby landmarks and photo-document the seining locations. The FC will ensure that specimens are collected within the specified tissue sampling areas (Figure 5-1; oversized figure). Washington State Plane coordinates North (NAD 83) will be used for the horizontal datum.

The standard beach seine will measure 37 m long and 3 m deep, with 6-mm mesh in the wings and 5-mm mesh in the center bag. The seine will be equipped with floats to minimize snagging of the lead line on submerged pilings, riprap, and other debris, and 30-m ropes to haul the net to shore. The beach seine will be cleaned of all debris before being deployed. The net will be deployed 30 m from shore and parallel to the beach using an outboard-powered boat and three or four field technicians. One or two technicians will stand on shore holding the 30-m rope attached to one end of the net until the reversing boat pulls the rope taut. Once the rope is taut, another technician will feed the net from the bow of the boat into the water as the skipper slowly motors in reverse to lay out all the net parallel to shore. The rope on the opposite end of the net will then be motored to shore, and the person who was in the bow of the boat deploying the net will jump ashore with the rope end to assist with retrieving the net. Teams of one or two technicians will then stand at each end of the net, approximately 40 m apart, to pull the net toward shore at a steady rate. When the net is approximately 10 m from shore, the two teams will move together until they are about 10 m apart for the final hauling of the net up onto the shore.

Prior to each beach seine deployment, the location, time of day, and weather conditions will be recorded. Upon beach seine retrieval, target species will be sorted from non-target species and retained in decontaminated bins with LDW water. In addition to shiner surfperch, suitably sized English sole, starry flounder, Pacific staghorn sculpin, pile perch, striped perch, or adult rockfish collected in beach seines will be processed and archived. For target species, any prey in the fish's mouth will be assumed to have been consumed in the seine and will be removed from the fish's mouth before processing.

5.2.3 Field sample processing

All species captured using the methods outlined above will be placed in decontaminated bins filled with LDW water. Target fish of similar size will be preferentially selected and sorted. Specimens of target species that do not meet size requirements will be counted, measured to the nearest 1 mm, and returned to the LDW. Specimens of non-target species will generally be identified to species and their numbers estimated. Special care will be taken to ensure that non-target organisms are returned to the LDW quickly, with minimal handling.

Individual fish of the selected target species will be rinsed in LDW water to remove any foreign material from the external surface. Large target fish will be killed using methods

outlined in EPA (2000), by a sharp blow to the base of the skull with a wooden club or metal rod. This club or rod will be used solely for the purpose of killing fish, and care will be taken to keep it reasonably clean to prevent contamination of the samples. Small fish will be killed by placing them on ice, as recommended by EPA (2000). Individual specimens of the target species will be grouped by species and general size class, and placed in clean holding trays to prevent contamination. All fish will be inspected carefully to ensure that their skin has not been damaged by the sampling equipment. The FC will discard specimens with broken skin. Each fish within the selected target species will be measured to determine total length (nearest mm) and weight (nearest 0.5 g). Fish may be weighed and measured in the field or in the Windward laboratory at the discretion of the FC.

If fish weights are to be measured in the field, fish will be weighed using a handheld scale suited for the weight of the species (Pesola® 100 g x 1 g, Pesola® 300 g x 2 g, and Pesola® 1000 g x 10 g). To be consistent with the convention used by most fisheries biologists in the United States, total length will be measured as the length from the anterior-most part of the fish to the tip of the longest caudal fin ray (when the lobes of the caudal fin are compressed dorsoventrally) (Anderson and Gutreuter 1983). Additional observations of fish collected will include the determination of gender when distinct visual differences are discernable between sexes (e.g., gravid females), as well as general observations of individual specimen health, such as any visible signs of morphological abnormalities, external lesions, parasites, or fin erosion. If time allows, photographs of external abnormalities will also be taken. If sampling conditions do not allow adequate time for sample processing in the field, individual specimens of the same species from a particular sampling area and gear deployment (i.e., a single trawl or trap) will be kept together in one large resealable plastic bag with the date, time, effort number, species, and collection method recorded on the outside in indelible ink. All other pertinent information will be traceable through the field notebook and collection forms (Appendix B of the fish and crab tissue QAPP). The bagged and iced fish will be transported in coolers to Windward for final processing. Fillets will be prepared in the laboratory, not in the field.

5.2.4 Field equipment

The items needed in the field for each sampling method are identified in Table 5-2. The FC will check that all equipment is included and in working order each day before sampling personnel go in the field. A rugged laptop computer complete with navigation software will accompany the FC at all times.

Table 5-2. Fish tissue collection field equipment

Necessary Field Equipment	Tissue Collection Method	
	High-Rise Otter Trawl	Beach Seine
QAPP	X	X
Key personnel contact information list	X	X
Field sample collection forms	X	X
Field notebooks (Rite in the Rain®)	X	X
Chain-of-custody forms	X	X
Pens, pencils, Sharpies	X	X
Tide tables	X	X
Study area maps	X	X
Fish identification guides	X	X
GPS (w/ extra batteries)	X	X
Digital camera	X	X
Cellular phone	X	X
Marine radio	X	X
Alconox® detergent	X	X
Distilled water	X	X
Garden sprayer (for distilled water)	X	X
Scrub brushes	X	X
Paper towels	X	X
Garbage bags	X	X
Buckets (5 and 2 gallon)	X	X
Coolers	X	X
Ice (wet and/or dry)	X	X
Heavy duty aluminum foil	X	X
Ziploc® freezer bags (quart and gallon size for individual fish)	X	X
Ziploc® freezer bags (larger size)	X	
Ziploc® sandwich bags (for individual sample labels)	X	X
Plastic bins for specimen sorting	X	X
Dip nets	X	X
Calipers	X	X
Measuring boards	X	X
Scales	X	X
Pike pole (for dislodging nets hung on underwater debris and trap retrieval)	X	X
High-rise otter trawl	X	
Beach seine		X
Powder-free nitrile exam gloves	X	X
Rubber work gloves	X	X

Necessary Field Equipment	Tissue Collection Method	
	High-Rise Otter Trawl	Beach Seine
Rubber boots	X	X
Raingear	X	X
Waders		X
Personal flotation devices	X	X
Hard hats	X	
Anchor		X
Head lamps	X	X
First aid kit	X	X
Duct tape	X	X
Cable ties	X	X

5.3 Sample Handling and Custody Requirements

This section describes how individual samples will be processed, labeled, tracked, stored, and transported to the laboratory for analysis. In addition, this section describes decontamination procedures, disposal of field generated waste, sample custody procedures, and shipping requirements. Sample custody is a critical aspect of environmental investigations. Sample possession and handling must be traceable from the time of sample collection, through laboratory and data analyses, to delivery of the sample results to the recipient.

5.3.1 Sample handling procedures

Fish processing will be conducted either in the field or at Windward. Field processing is described in Section 5.2.3. Fish from each sampling effort (i.e., a single trawl or a single beach seine set) will be kept separate from one another and processed one at a time to ensure that individual specimens are tracked properly. Each target species will be individually wrapped in heavy duty aluminum foil (shiny side out), enclosed in individual resealable plastic bags with an identification label (also enclosed in a resealable bag) (Appendix B, Form B-4 in the fish and crab tissue QAPP), and immediately stored in coolers with wet ice. Fish (e.g., sculpin) that have spines will be double-wrapped in heavy duty aluminum foil to minimize punctures in the aluminum foil or plastic bag. Prior to bagging, fish spines will be sheared as required to minimize punctures in the aluminum foil packaging (EPA 2000). If processing occurs at Windward, specimens transported to Windward will be unpacked from coolers, measured as described in Section 5.2.3.1, and weighed using an analytical scale accurate to 0.5 g. After each day's catch of fish is processed, those fish (unfrozen) will be shipped with ice packs to Axys. At the laboratory, a unique sample identifier will be assigned to each sample (using either project ID or laboratory ID), and all fish will be frozen individually. Fish will be held frozen until all fish have been collected and a final

compositing scheme has been determined in consultation with EPA and Ecology. The laboratory will ensure that a sample tracking record follows each sample through all stages of laboratory processing. The sample tracking record must contain, at a minimum, the name/initials of responsible individuals performing the analyses, dates of sample extraction/preparation and analyses, and the types of analyses being performed.

5.3.2 Decontamination procedures

Sources of extraneous tissue contamination include contamination from sampling gear, grease from ship winches or cables, spilled engine fuel (gasoline or diesel), engine exhaust, dust, ice chests, and ice used for cooling. All potential sources of contamination in the field will be identified by the FC and appropriate steps will be taken to minimize or eliminate contamination. For example, during retrieval of sampling gear, the boat will be positioned when feasible so that engine exhaust does not fall on the deck. Ice chests will be scrubbed clean with detergent and rinsed with distilled water after use in each sampling area to prevent potential cross-contamination. To avoid contamination from melting ice, samples will be placed in waterproof plastic bags (EPA 2000), and the crushed wet ice will be placed in separate plastic bags. Sampling equipment that has obviously been contaminated by oils, grease, diesel fuel, or gasoline will not be used, unless it can be thoroughly decontaminated using detergent and distilled water. All utensils or equipment that will be used directly in handling fish (e.g., fish measuring board or calipers) will be cleaned in the Windward laboratory prior to each sampling trip, and stored in aluminum foil until use (EPA 2000). Between sampling areas, the field collection team will clean each measurement device with Alconox® detergent, rinse it with ambient water, and wrap it in aluminum foil to prevent contamination. The high-rise otter trawl and beach seine will be manually cleaned of all visible debris and washed in LDW water during deployment, because these nets cannot be practically decontaminated using the same protocol as other sampling equipment due to their large size. However, all fish caught by trawl or beach seine will be placed for a few minutes in a decontaminated container with LDW water to rinse them before processing.

In summary, the following practices will be followed to minimize sample contamination:

- Caught fish will only be placed on clean surfaces, such as aluminum foil (dull side touching the fish)
- Ice chests will be scrubbed with Alconox® detergent and rinsed with deionized water prior to any sampling activities
- Samples will be placed in resealable, waterproof plastic bags to avoid contamination from melting ice

- Sampling equipment will be kept free from contaminants such as oils, grease and fuels

5.3.3 Field-generated waste disposal

Excess fish, generated equipment rinsates, and decontamination water will be returned to each sampling location after sampling is completed for that location. All disposable sampling materials and personal protective equipment used in sample processing, such as disposable coveralls, gloves, and paper towels, will be placed in heavyweight garbage bags or other appropriate containers. Disposable supplies will be removed from the site by sampling personnel and placed in a normal refuse container for disposal as solid waste.

5.3.4 Sample custody procedures

Samples are considered to be in custody if they are: 1) in the custodian's possession or view; 2) in a secured place (under lock) with restricted access; or 3) in a container and secured with an official seal(s) such that the sample cannot be reached without breaking the seal(s). Custody procedures will be used for all samples throughout the collection, transport, and analytical process, and for all data and data documentation whether in hard copy or electronic format. Custody procedures will be initiated during sample collection. A COC form will accompany samples to the analytical laboratory. Each person who has custody of the samples will sign the COC form and ensure that the samples are not left unattended unless properly secured. Minimum documentation of sample handling and custody will include:

- sample location, project name, and unique sample number
- sample collection date and time
- any special notations on sample characteristics or problems
- initials of the person collecting the sample
- date sample was sent to the laboratory
- shipping company name and waybill number

The FC will be responsible for all sample tracking and custody procedures for samples in the field. The FC will be responsible for final sample inventory and will maintain sample custody documentation. The FC will also complete COC forms prior to removing samples from the sampling area. At the end of each day, and prior to transfer, COC entries will be made for all samples. Information on the labels will be checked against sample log entries, and sample tracking forms and samples will be recounted. COC forms will accompany all samples. The COC forms will be signed at each point of transfer. Copies of all COC forms will be retained and included as appendices to

QA/QC reports and data reports. Tissue samples will be shipped in sealed coolers to Axys.

The laboratories will ensure that COC forms are properly signed upon receipt of the samples and will note questions or observations concerning sample integrity on the COC forms. The laboratories will contact the FC and Project QA/QC Coordinator immediately if discrepancies are discovered between the COC forms and the sample shipment upon receipt.

The laboratory will ensure that a sample-tracking record follows each sample through all stages of laboratory processing. The sample-tracking record must contain, at a minimum, the name/initials of individuals responsible for performing the analyses, dates of sample extraction/preparation and analyses, and the types of analyses being performed.

5.3.5 Shipping requirements

Samples will be shipped in coolers from Windward to Axys. Prior to shipping, sample containers will be wrapped in bubble wrap and securely packed inside a cooler with ice packs. The original signed COC forms will be placed in a sealable plastic bag, sealed, and taped to the inside lid of the cooler. Fiber tape will be wrapped completely around the cooler. On each side of the cooler a *This Side Up* arrow label will be attached; a *Handle with Care* label will be attached to the top of the cooler, and the cooler will be sealed with a custody seal in two locations.

The temperature inside the cooler(s) containing tissue samples will be checked upon receipt of the samples. The laboratories will specifically note any coolers that do not contain ice packs or that are not sufficiently cold (4° ± 2°C) upon receipt. All samples will be handled so as to prevent contamination or loss of any sample. Samples will be assigned a specific storage area within the laboratory, and individual fish will be kept frozen there until compositing instructions are received. The analytical laboratory will not dispose of the environmental samples for this project until notified in writing by the QA/QC coordinator.

5.4 DATA MANAGEMENT

All field data will be recorded on field forms, which will be checked for missing information by the FC at the end of each field day and amended. After sampling is completed, all data from field forms will be entered into a Microsoft Excel® spreadsheet. A QC check will be done to ensure that all data were properly transferred from the field forms to the spreadsheet. This spreadsheet will be kept on the Windward network drive, which is backed up daily. Field forms will be archived in the Windward library.

6.0 Assessment and Oversight

EPA, Ecology, or their designees may observe field activities during the sampling event. If situations arise where there is a significant inability to follow the approved sampling methods precisely, every effort will be made to consult with EPA and Ecology staff to resolve the issue.

The FC, or a designee, will be responsible for correcting equipment malfunctions throughout field sampling and for resolving situations in the field that may result in nonconformance or noncompliance with the QAPP. All corrective measures will be immediately documented in the field logbook, and protocol modification forms will be completed.

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1A
1B
1C
1D
1E
1F
2A
2B
2C
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2E
2F
3A
3B
3C
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3E
3F
4A
4B
4C
4D
4E
1st Ave S
West Marginal Way SW
East Marginal Way S
16th Ave S

Tissue sampling area
Potential beach seine area identified by NOAA
Navigation channel
Bathymetry < -2 ft. MLLW
Roads
River mile

Figure 5-1. Phase 2 perch tissue sampling areas

DRAFT

0 750 1,500 3,000 Feet
0 250 500 1,000 Meters

N

Wind Ward environmental LLC

Prepared by RAC 07/22/04 Map 1450

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