Lower Duwamish Waterway Group

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

LOWER DUWAMISH WATERWAY FISHERS STUDY DATA REPORT

FINAL

Prepared for:

The US Environmental Protection Agency
Region 10
Seattle, WA

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

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Acronyms

Acronym	Definition
AOC	Administrative Order on Consent
DOH	Washington State Department of Health
DRCC	Duwamish River Cleanup Coalition
Ecology	Washington State Department of Ecology
ECOSS	Environmental Coalition of South Seattle
EJ	Environmental Justice
EPA	US Environmental Protection Agency
IC	institutional control
LDW	Lower Duwamish Waterway
LDWG	Lower Duwamish Waterway Group
Port	Port of Seattle
Public Health	Public Health – Seattle & King County
RM	river mile
SCL	Seattle City Light
T-105	Terminal 105
T-107	Terminal 107
T-18	Terminal 18
TAG	Technical Advisory Group
WDFW	Washington State Department of Fish and Wildlife
Windward	Windward Environmental LLC

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Executive Summary

This report presents the results of the fishers study conducted for the Lower Duwamish Waterway (LDW) Superfund site. The site is a 5-mile stretch of the Duwamish River that flows into Elliott Bay in Seattle, Washington. The waterway is flanked by industrial corridors, as well as the South Park and Georgetown neighborhoods. The site was added to the US Environmental Protection Agency's (EPA's) National Priorities List in 2001.

A century of heavy industrial use has left the waterway contaminated with chemicals from many sources: industries along its banks, stormwater pipes, and runoff from upland activities, streets, and roads. Contamination in the river sediments includes polychlorinated biphenyls (PCBs), dioxin/furans, carcinogenic polycyclic aromatic hydrocarbons and arsenic. Many of the chemicals stay in the environment for a long time and some are present at unsafe levels in resident fish and shellfish. Because of certain contaminants, state and local health departments advise the public not to eat any resident crab, shellfish, or bottom-feeding fish (e.g., flounder and English sole) from the LDW. Salmon are excluded from the "Do Not Eat" fish consumption advisory because they spend a short period of time in the waterway. However, even with the existing fish consumption advisory in place, people continue to catch and consume resident fish and shellfish from the LDW.

The fishers study was conducted to gather information from people who either harvest or consume resident seafood, or who may assist in understanding aspects of LDW resident seafood consumption. The EPA and Washington State Department of Ecology (Ecology) are currently working to clean up the waterway and control ongoing sources of contaminants. Part of EPA's cleanup includes the use of Institutional Controls (ICs) specific to resident fish and shellfish consumption. ICs are administrative and legal tools intended to minimize the potential for human exposure to contaminants by limiting resource use and influencing behavior. A common IC used for contaminants in fish is to implement a fish consumption advisory recommending a limit to or avoidance of eating certain species of seafood. This study is the first step toward developing effective and appropriate LDW fish consumption ICs.

The study, conducted using a multi-party collaborative process that incorporated multiple methods, included a year-long on-river survey along with post-survey key informant interviews. The objective of the fishers study was to gather information from people who either harvest or consume seafood from the LDW, or who may assist in understanding aspects of the consumption of resident seafood from the LDW. Key questions investigated in the study were:

- How is the LDW currently being used for the collection and consumption of seafood, particularly resident seafood?

- What is currently known by the community about the risk of consuming seafood from the LDW? What are the perceived benefits of consuming seafood from the LDW?

The study obtained information related to how the Duwamish is being used for seafood collection (i.e., who, when, where), what benefits are related to its use, what is done with the catch (e.g., preparation, sharing), and risk perceptions held by the diverse community that fishes the Duwamish and consumes the catch. In addition, information was collected regarding how the community is currently being informed of risks associated with the consumption of resident seafood species (e.g., perch, crab), preferred communication strategies and approaches, as well as options and practices that can be provided to help people avoid consumption of resident fish and shellfish from the LDW.

Communities with Environmental Justice (EJ) characteristics (based on income, race, color, and national origin) can face disproportionate impacts from the contaminants in fish. Therefore, consideration of EJ characteristics was integral throughout the study. For example, the Environmental Coalition of South Seattle (ECOSS), a local, community-based, nonprofit organization, interviewed 54 people to aid in designing the survey, completed 403 surveys as part of the year-long on-river survey, and interviewed 22 fishers and consumers as part of 11 key informant interviews. Quarterly meetings, which were open to the community, were held to discuss the results as they were gathered. Input on study design and implementation was highly valued, and came from a wide range of parties, including EPA, Ecology, Public Health – Seattle & King County (Public Health), Washington State Department of Health (DOH), and Duwamish River Cleanup Coalition (DRCC)/ Technical Advisory Group (TAG). The design documents and results from the survey are posted on www.ldwg.org.

Information from the on-river surveys and key informant interviews was used to answer the key study questions. Key findings of the fishers study included the following:

From the on-river survey data:

- Of the 328 fishers surveyed (i.e., excluding the repeat survey takers to avoid double-counting), 255 said that they fished only for salmon and 69 reported fishing for resident species (some of these fishers also fished for salmon).[1]
- Fishers on the Duwamish are diverse. During the survey, fishers identified themselves as representing more than 25 different ethnicities. The most common ethnicities included Asian (most commonly Cambodian/Khmer,

[1] The fisher study was not designed to quantify the overall number of fishers using the LDW nor the number of fishers targeting resident versus non-resident fish. The study was dependent on self-reported fishing patterns (i.e., the surveyor did not note or count fish and shellfish in fisher catch bucket) on specific days and at specific locations and times-of-day throughout a 1-year period.

Vietnamese, and Chinese), Pacific Islander (most commonly Filipino and Samoan), and Caucasian. Fishers who reported catching resident seafood most commonly reported ethnicities as Vietnamese, Cambodian, Filipino, Latino, multi-racial, and Caucasian. At least 25% of the Asian, Pacific Islander, and multi-racial fishers who were surveyed reported catching resident species.

- Of the fishers who reported catching resident species, 59% reported that they ate their catch and 55% reported that they shared their catch with others. These data suggest that some ethnic groups (e.g., Asian and Pacific Islander fishers) might be more likely to eat or share their catch than Caucasian fishers.
- Data from the study also suggest a relationship between preferred language and frequency of reporting catching resident seafood. The languages reported by fishers as their preferred language fit into three main categories: English, English and an alternate language, and non-English languages. In general, fishers who preferred non-English languages were more likely to report catching resident seafood.
- The primary reasons fishers reported fishing was for fun, recreation, or social interaction. A secondary reported benefit was providing fish to eat.
- The Duwamish was generally viewed by fishers as a good location for fishing both because it is a good spot to fish and because it is a close and convenient location. Fishers encountered during the survey reported coming from a variety of locations throughout the greater Seattle area. South/West Seattle and areas to the south of Seattle were the most common.
- Fishers were most frequently encountered during the survey at Spokane Street Bridge. Other locations where fishers were encountered more frequently were the Rapids/North Winds Weir and the Hamm Creek Restoration Area during the survey. Fishers who reported catching resident species were encountered at Spokane Street Bridge, the Terminal105 (T-105) fishing pier, the Terminal107 (T-107) public access area, the Diagonal Ave South street end, and Gateway Park South.
- Approximately half of the fishers who were surveyed reported that they had heard something about how eating seafood caught from the Duwamish could affect people's health. These fishers reported hearing that some/all seafood from the river is unsafe to eat, that the river/fish is contaminated or polluted, or something about the fish advisory.

From the key informant interviews:

- Key informants reported that fish is considered a healthy food (healthier than meat) and wild-caught fish is seen as fresher than store-bought fish.
- Fish from the Duwamish are typically consumed by the family and occasionally shared with friends or neighbors. Most catches are not large enough to give

away or sell. Fish are cleaned to remove slime, dirt and scales. Seafood is prepared in many different ways, depending on traditions, family preference, and the type of fish. Thorough cooking and deep frying are thought to render fish safe to eat in all cases. While the fishers may be primarily males, females appear to be the primary preparers of fish.

- Fishers appear to evaluate risk using empirical evidence (i.e., smell or physical appearance of water, visual inspection of fish, experience of sickness after eating fish, or through information from others). Unseen chemical risks did not appear to be well understood.
- Discussions in the key informant interviews suggest that some fishers did not understand the information on the fish advisory.
- Lack of time or transportation present greater barriers to fishing than the cost of equipment and license or the lack of knowledge about other fishing locations.
- Attempts to increase risk awareness without connecting that information to local knowledge, attitudes, and practices are unlikely to result in behavioral change. Rather than asking "Why don't fishers follow advisories?" the question should be reframed as "How can ICs better meet the needs of the fishers?"
- Effective risk communication (including providing healthy options for continuing to fish and incorporate fish into diets) should respect fisher perspectives, build on existing models to help fishers to understand unseen risk, and integrate this information into local knowledge and lifestyles. Because of the diversity of fishers and preparers, it is recommended that future health promotion strategies and IC tools recognize the collective and individual risk perceptions of the different fisher groups.
- Preferred information sources varied among fishers, indicating that a variety of methods will be needed to communicate information. Fishers who participated in this study pointed out the importance of the sharing of information among fishers and word-of-mouth communication. Determining culturally appropriate and trusted sources of information will be important when considering health promotion strategies, including outreach and education.
- It will important for all future efforts developing health promotion strategies and IC tools to take into account the social and physical benefits of fishing on the Duwamish. These efforts will need to provide adequate information regarding alternatives for fishers to achieve the benefits that were identified as specific to the Duwamish.
- Building relationships with Duwamish fishers and including the fishers in the development of effective and appropriate ICs will be important in the development of ICs related to seafood consumption and other health promotion strategies.

After the fishers study is complete, an IC plan for LDW seafood consumption will be developed and implemented.

1 Introduction

This document presents the results of the Lower Duwamish Waterway (LDW) fishers study carried out by the Lower Duwamish Waterway Group (LDWG) in accordance with the first amendment of the Administrative Order on Consent (AOC) (EPA and Ecology 2013) and as described in the work plan (Windward 2013), implementation plan (Windward 2014, 2015a), and key informant interview memorandum (Windward 2015b).

EPA's Final Record of Decision (EPA 2014) for the Lower Duwamish Waterway Superfund Cleanup relies, in part on Institutional Controls (ICs) to ensure adequate protection of seafood consumers. ICs are administrative and legal tools intended to minimize the potential for human exposure to contaminants by limiting resource use and influencing behavior. For example, providing notification to local communities that residual contamination remains at the site is a type of IC.

A Government Accountability Office report (US GAO 2005) recommended that EPA ensure that the ICs applied at Superfund sites be effective and appropriate during the time they are needed, suggesting that EPA review IC recommendations, methodologies, and guidance documents. A current LDW IC is the existing Washington State Department of Health's fish advisory, which recommends salmon as the safer alternative, and no consumption of resident fish and shellfish. However, people continue to consume resident fish and shellfish from the LDW.

A report on fish consumption prepared by the National Environmental Justice (EJ) Advisory Council (NEJAC 2002) notes that informational campaigns such as fish advisories, which are focused on restricting or influencing behaviors, assume that there are accessible substitute food sources for the fish consumers, and that changing behavior is appropriate. The Council noted that for communities with EJ characteristics, those assumptions often do not apply. Because the LDW fish-consuming community displays EJ characteristics, developing appropriate ICs to adequately protect their health will require considering their unique needs in order to ensure that the ICs are effective and appropriate.

The fishers study, performed by LDWG under the AOC (EPA and Ecology 2000) with EPA and Ecology, is designed to provide information that will help develop more effective and appropriate seafood consumption ICs associated with EPA's LDW Superfund Cleanup. The objective of the fishers study is to gather information from people who either harvest or consume seafood from the LDW or who may assist in understanding aspects of the consumption of resident seafood from the LDW. Key questions being investigated in the study are:

- How is the LDW currently being used for the collection and consumption of seafood, particularly resident seafood?

- What is currently known by the community about the risk of consuming seafood from the LDW? What are the perceived benefits of consuming seafood from the LDW?

To develop effective and appropriate ICs, discussion regarding the perceived risks associated with the consumption of LDW resident seafood needs to include the perceived benefits. Therefore, the survey also collected some qualitative information on the perceived benefits of fishing in the LDW. Improving the understanding of seafood consumers' current beliefs in both is necessary to develop effective and culturally appropriate ICs.

Although information gathered through this study is intended to inform the development and improve the effectiveness and appropriateness of ICs related to the consumption of LDW resident seafood, any measures to be implemented during or following the fishers study are outside the scope of this project. The information found within this report will be used to develop effective and appropriate ICs for the LDW. It is important to also note that this study was not intended to generate quantitative fish consumption rates, quantify the total number of people consuming resident fish and shellfish from the LDW, or to further risk communication/outreach measures beyond those already in place.

This data report presents an overview of the fishers study (Section 2), the methods used to conduct the study (Section 3), the study results (Section 4), and a discussion of the results (Section 5). Next steps are discussed in Section 6.

2 Project Overview

This section presents an overview of the fisher study tasks, schedule, and key questions. Parties involved in implementing the tasks are also discussed.

2.1 TASKS AND PARTICIPATION

The major tasks of the fishers study are illustrated in Figure 2-1. These tasks are discussed in detail in the work plan (Windward 2013) and are further addressed in Section 3 of this document.

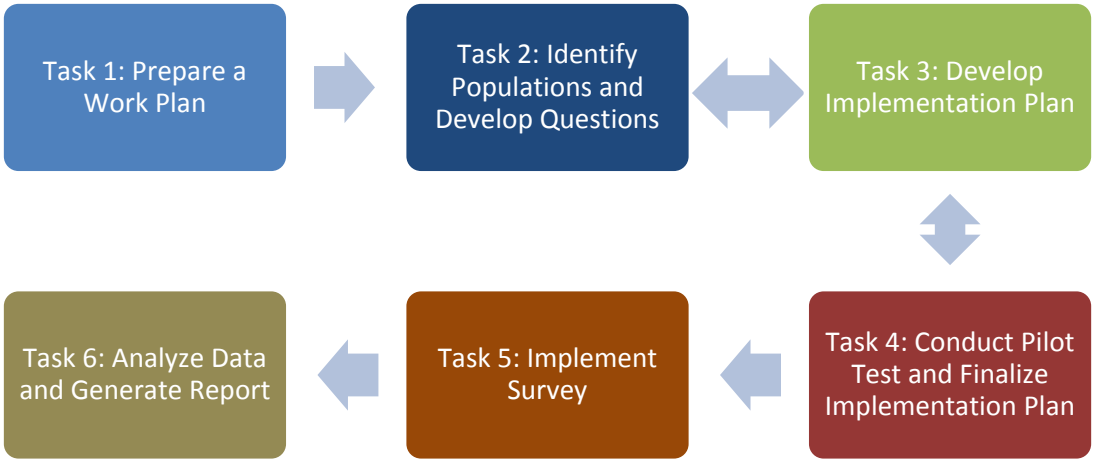


Figure 2-1.Tasks for the LDW fishers study

The fishers study was conducted following a collaborative process involving many parties. The roles and responsibilities of the various participants are described in detail in the work plan (Windward 2013) and implementation plan (Windward 2014, 2015a). In brief, under the oversight of EPA and Ecology, LDWG and its contractors (Windward Environmental LLC [Windward] and Environmental Coalition of South Seattle [ECOSS]) conducted the fishers study. Public Health – Seattle and King County (Public Health) and the Washington State Department of Health (DOH) provided support and advice throughout the study, and Public Health played a key role in the qualitative portion of the study (i.e., the key informant interviews; see Section 3.3).

ECOSS, who played a key role in the fisher study, is a local, community-based non-profit organization located in South Park. ECOSS outreach staff have worked for many years to design engagement strategies and to connect and educate communities on environmental issues. The team has built trusting relationships that allow for unparalleled access to these hard-to-reach communities, and currently has the capacity to engage the community in 21 different languages.

In addition to public health advisors, community representatives were also involved throughout the fishers study,[2] providing insight into their communities with the intent to maximize the representation of the various community groups that are members of the Duwamish fishers study community.[3] Community representatives included individuals identified by ECOSS or by other community members, as well as ECOSS staff. In addition, the Duwamish River Cleanup Coalition [DRCC]/Technical Advisory Group [TAG]) reviewed fishers study documents and actively participated in fisher study meetings throughout the project. EPA provided the Tribes regular updates over the course of the fishers study.

2.2 PROJECT MILESTONES

Figure 2-2 presents an overview of the fishers study project milestones. These milestones included the following:

- Finalizing the work plan in September 2013
- Interviewing 54 community members to obtain input for the survey, conducting a pilot test of survey questions, training interviewers, and finalizing the implementation plan in 2014
- Conducting the year-long on-river survey from October 2014 to September 2015
- Conducting the key informant interviews in 2015/2016
- Interviewing ECOSS staff to better understand their key takeaways from the survey, and preparing this data report in 2016

In addition, a fact sheet will be published that summarizes the results of the study. EPA, in collaboration with Public Health agencies, will be discussing these results at community meeting(s) in early 2017.

[2] The level of involvement varied by individual.

[3] The Duwamish fishers study community includes individuals who harvest, prepare, or consume Duwamish resident seafood. Details on how community members were involved in the study are provided in Section 3.4.

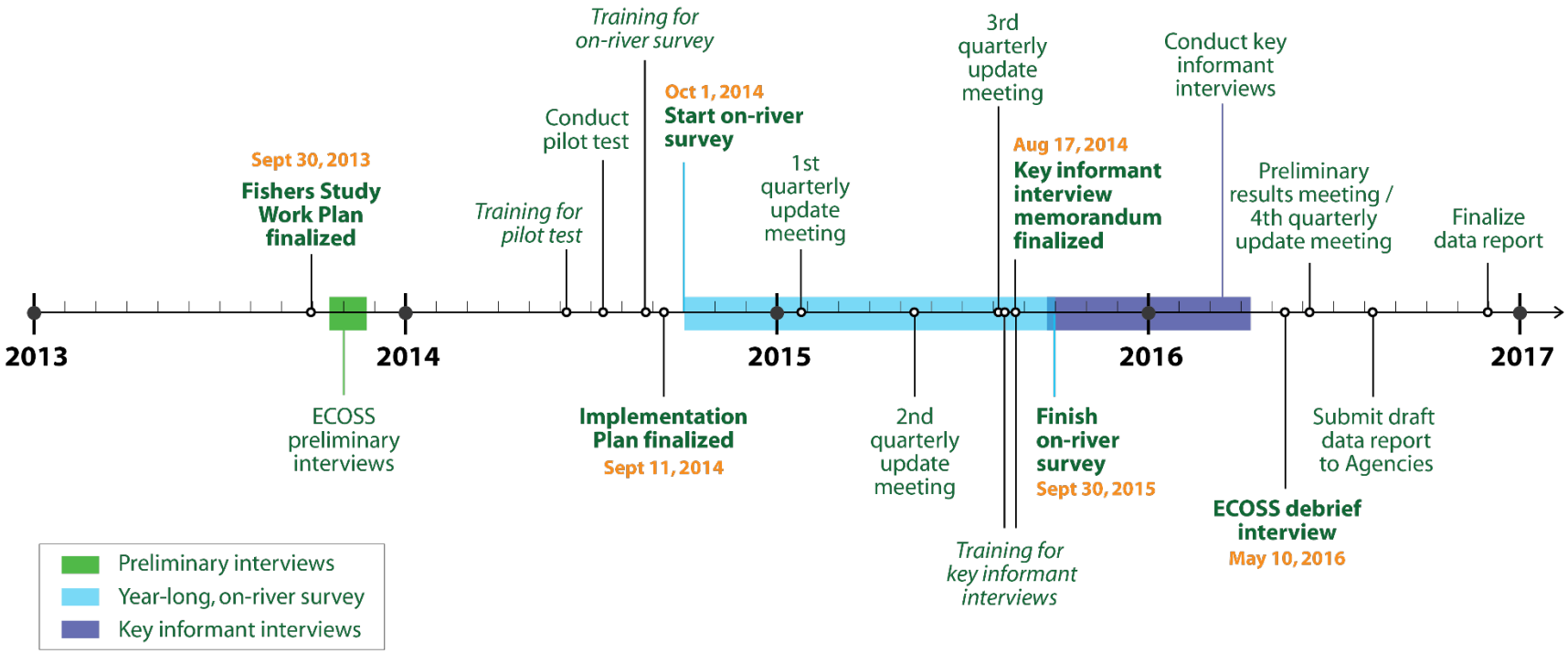


Figure 2-2. Project milestones timeline

2.3 KEY QUESTIONS

LDWG, EPA, and Ecology implemented this fisher study because additional information was needed to better understand who fishes and consumes LDW resident seafood for the purposes of developing effective and appropriate ICs related to seafood consumption in order to improve the health promotion strategies (including outreach and education) within the fishing community. This information was needed because the site remedial investigation determined that the greatest health risks associated with the LDW Superfund site were from consumption of resident seafood.

The key questions that were investigated in the fishers study are presented in Figure 2-3. These questions can be divided into two parts. Part 1 questions focused on understanding how the Duwamish was used for the collection and consumption of seafood, with an emphasis on the collection and consumption of resident species. Part 2 questions focused on beliefs, perceptions, and the understanding of risks from and benefits to fishing within the Duwamish. The study used a design that incorporated multiple methods to answer these questions.

Part 1 Questions	**How is the Duwamish currently being used for the collection and consumption of seafood, particularly resident seafood?** Who is fishing on the river? Where? When? What is being caught, and what is being done with the catch? Who is preparing and eating the seafood? How is it being prepared?
Part 2 Questions	**What are the perceived benefits of consuming seafood from the Duwamish? What is currently known by the community about the risk of consuming seafood from the Duwamish?** What are the perceived benefits and obstacles to fishing on the Duwamish? How do people understand risk? What are the perceptions/cultural models of risk among the groups that fish for and consume Duwamish seafood? If people are continuing to fish, why? Do the various fisher groups know about the seafood consumption advisories and risks? How are they currently getting this information? What are their preferred information sources?

Figure 2-3. Key questions investigated in the fishers study

To understand the focus of this study, it is important to understand that resident species of the Duwamish are fish and shellfish that spend all or most of their lives within the waterway (e.g., clams, crabs, and fish such as perch and English sole). These species are different from other species, such as salmon, that pass through the Duwamish as juveniles and returning adults. Salmon spend most of their lives in the Puget Sound or Pacific Ocean. The fishers study focused on the collection and consumption of resident species that spend large portions of their lives in the Duwamish; these species are more exposed to and accumulate contamination from the Duwamish, and thus, their consumption represents a direct risk to seafood consumers associated with contamination in the Duwamish.

Part 1 and Part 2 questions (Figure 2-3) were asked in a variety of ways to people who fish in the Duwamish or consume fish collected from the Duwamish, as discussed in Section 3.

3 Methods

This section presents the methods used to conduct the fishers study, including an overview of the study design (Section 3.1), the on-river survey methods (Section 3.2), methods for the key informant interviews (Section 3.3), and methods for community involvement (Section 3.4).

3.1 Study Design and Overview

As stated in Section 2.1, the development of the fishers study involved a collaborative approach with input from numerous parties. This input was taken into account throughout the process, and helped shape the 2013 work plan (Windward 2013), the development of the implementation plan (Windward 2014, 2015a), and the interpretation of the results.

The fishers study used a mixed-methods approach. Mixed methods research involves collecting, analyzing, and integrating quantitative and qualitative approaches to address a research problem. In many cases, combining these methods provides a better understanding of the research questions than relying on either of these methods alone. Mixed-methods research offsets the weaknesses inherent in each method. Looking at the research questions from different perspectives allows for a more complete and accurate understanding of the phenomena being examined. The fishers study combined a quantitative survey with key informant interviews. These methods differ, but also complement each other, in the following ways:

- Quantitative surveys, such as the fishers study on-river survey, use structured data collection techniques to ask closed-ended questions. Surveys are useful in measuring the frequency of actions, views, or behaviors. The results from quantitative research can be generalized across the population. This requires large sample sizes that are representative of the population of interest. Using statistical methods, where appropriate, it is possible to make broad comparisons among sub-groups in the population. However, surveys cannot delve more deeply into motivations, perceptions, or experiences that are not already understood to some extent so that closed ended questions can be constructed.
- Qualitative research methods, such as the fishers study key informant interviews, use unstructured or semi-structured data collection techniques such as focus groups or individual interviews. The purpose of qualitative research is to gather rich descriptions and explanations of the how people experience, act on, and think about themselves or their world. The information gained from qualitative research is used to develop insights and deeper understanding of topics of interest. The results from qualitative research cannot be used to generalize to a population, but the results can be used to understand how those

surveyed may experience the issue. Qualitative studies can produce unexpected insights into previously unknown or poorly understood phenomena.

More information regarding which study questions were answered by the on-river survey versus the key informant interviews is presented in Section 4.2 (see Table 4-4).

3.2 ON-RIVER SURVEY

This section presents the methods used to conduct the on-river survey, including a summary of how the survey was developed (Section 3.2.1), the survey methodology (Section 3.2.2), and an overview of the business outreach effort (Section 3.2.3).

3.2.1 Summary of survey development

The on-river survey was developed based on available information from past local studies and studies conducted in other areas, the LDW human access survey, and preliminary interviews of community members conducted by ECOSS. This information is summarized as follows, and is presented in more detail in the implementation plan (Windward 2014, 2015a):

- **Seattle-area/Duwamish fish consumption studies** – The study and survey design was informed by past studies of fish consumption in the Seattle-area or the Duwamish, including the *Asian and Pacific Islander seafood consumption study in King County, Washington* (EPA 1999), the *King County Combined Sewer Overflow Water Quality Assessment for the Duwamish River and Elliott Bay* (King County 1999), and the 2010 survey conducted by Public Health to evaluate LDW fisher awareness of fish advisories (Barry 2013).
- **Other fishers studies** – Survey question development and organization was informed by the Palos Verdes (California) shelf survey (EPA and FCEC 2013), as well as question banks from Public Health that were based on a review of additional studies from the East Coast and Midwest.
- **LDW human access survey** – Access points were summarized in the 2004 LDW human access survey, which also included information regarding the ease of public access at each location. Information pertaining to the locations of fish advisory signs was also included in this survey.
- **ECOSS pre-survey interviews** – Survey design and implementation was based on 54 pre-survey interviews conducted by ECOSS with community representatives in October and November 2013. This information was used to develop the strategy for survey locations, to select the languages used in the survey, and to determine best practices for approaching fishers along the Duwamish. Other key recommendations from these interviews included keeping the survey short, using concise and non-academic language, and using photos to help fishers identify what species they caught. Additional details

regarding the lessons learned from these interviews are documented in Section 3 of the implementation plan (Windward 2014, 2015a).

Using the above resources, a draft survey questionnaire was developed and then further refined based on the results of the pilot test that was conducted in July 2014. Pilot test participants and surveyors provided feedback, which was incorporated into the survey design prior to finalizing the implementation plan in September 2014 and starting the survey in October 2014.

3.2.2 Survey questionnaire

The draft survey questions were designed to address the project objectives and associated key questions, and were developed based on previous surveys, information gained through the ECOSS pre-survey interviews with community representatives, and input from EPA, Ecology, ECOSS, LDWG, DRCC/TAG, and public health advisors from DOH and Public Health. These draft survey questions were used in the pilot test, and were then further refined for use in the year-long survey based on feedback from the ECOSS surveyors and the pilot study participants. This process was described in detail in Sections 4 and 5 of the study implementation plan (Windward 2014, 2015a).

The final survey questionnaire included a total of 26 questions, 5 of which were optional. The survey form included a page for the ECOSS surveyor to document information regarding when and where the survey was conducted, as well as the age range and gender of the respondent. Following an introduction, during which the surveyor introduced themselves, described the project, provided an assurance of confidentiality, and described the incentive for participation, the surveyor asked questions about the following subjects:

- Species targeted for fishing
- Fishing habits (not asked of fishers who reported targeting only salmon)
- Purpose of fishing (not asked of fishers who reported targeting only salmon)
- Pollution awareness
- Current and preferred information sources
- Demographic information (e.g., home neighborhood location, ethnicity, and preferred language)
- Open-ended questions intended to get more information about fishers' perceptions about the safety of seafood from the Duwamish, the benefits of fishing, and their preferred information sources.

The final survey questionnaire is included in Appendix A. The survey was intended to be administered verbally in a fisher's preferred language by the ECOSS surveyors, but a written version of the survey was also created in six languages that could be

self-administered by fishers (as discussed further in Section 3.2.3). In addition to the survey form, ECOSS surveyors had a species identification card (see Appendix A) to facilitate the administration of the survey and help fishers identify the names of target species.

Another important component of the survey questionnaire was that to ensure compliance with EPA's human subjects policies, fishers were not asked for any information that would allow them to be personally identified. If fishers were interested in receiving information about the survey, contact information was recorded by the surveyors in a separate notebook so that this information could not be connected with a fisher's survey responses.

3.2.3 Survey methods

General guidelines were developed for when and where the survey was conducted, the structure of survey days (e.g., days of the week, times of day), survey languages, and other physical/environmental considerations. The survey guidelines were intended to be flexible to allow for information obtained during the survey and other key factors (e.g., tides, weather) to be considered when scheduling the survey days. Any substantive changes to the survey design required EPA/Ecology approval. The primary guidelines included the following:

- **Tiered approach to survey locations** – Based on the available information regarding fishing frequency at various locations on the Duwamish, a tiered approach was developed to ensure popular locations were visited more frequently.
- **Seasonality** – Due to the expected higher frequency of fishing during warmer months (which overlap to some extent with salmon runs in the Duwamish), more survey time was planned during summer months (i.e., June to September) than during non-summer months (i.e., October to May). This allocation of resources ensured that more effort was expended during the times of the year when more fishers were likely to be present.
- **Staffing** – Each survey day was staffed by two people for safety reasons and to provide more language capabilities (typically English and at least one other language) on a given survey day.

In addition to these guidelines, another important factor in the design of the survey was the consideration of the ethnic diversity of the fishers on the Duwamish and the environmental justice characteristics of the communities. The relationships that ECOSS has with these communities were critical in understanding how best to design and administer the survey to maximize participation, and then to interpret the results.

The subsections that follow present the methods used to conduct the on-river survey and allocate the on-river survey days.

3.2.3.1 Survey locations and seasonality

Locations included as survey locations in the on-river survey were identified based on the available information regarding fishing frequency, which included input from ECOSS staff with knowledge of fishing on the Duwamish, the 54 pre-survey interviews conducted by ECOSS,[4] information from past surveys of fishers on the Duwamish,[5] as well as information about locations that are publicly accessible or where fish advisory signs are present. Similarly, the decision to have more frequent survey days during the summer months (as compared with the rest of the year) was based on ECOSS staff knowledge about fishing preferences and the timing of specific fishing seasons, ECOSS pre-survey interviews, and information from past surveys of fishers on the Duwamish.

Locations where available information indicated that fishing was most frequent (i.e., at the Spokane Street Bridge and the Terminal 105 [T-105] fishing pier) were identified as Tier 1 locations (Table 3-1; Map 3-1). These locations were visited more often than Tier 2 locations. A Washington State Department of Fish and Wildlife (WDFW) game warden familiar with fishing enforcement activities in this area noted that the two Tier 1 locations are the only places where game wardens commonly see individuals with resident fish (Chandler 2014). Tier 2 locations included other locations where fish advisory signs were posted, locations noted by a WDFW game warden as being popular fishing locations (in general), and locations where past studies have reported fishing activities. For the purpose of visiting these locations during the fishers study, the Tier 2 locations (which were visited less frequently than the Tier 1 locations) were divided into three groups based on their geographic locations (Table 3-1 and Map 3-1). Because there were too many Tier 2 locations to be visited on a single survey day, dividing these locations into groups was done to help ensure that all locations would be visited approximately the same number of times. No attempts were made to survey fishers observed in boats because of logistical issues; observations of people fishing from boats were recorded in the field notes kept by ECOSS staff.

[4] See Appendix C for more information about these pre-survey interviews.

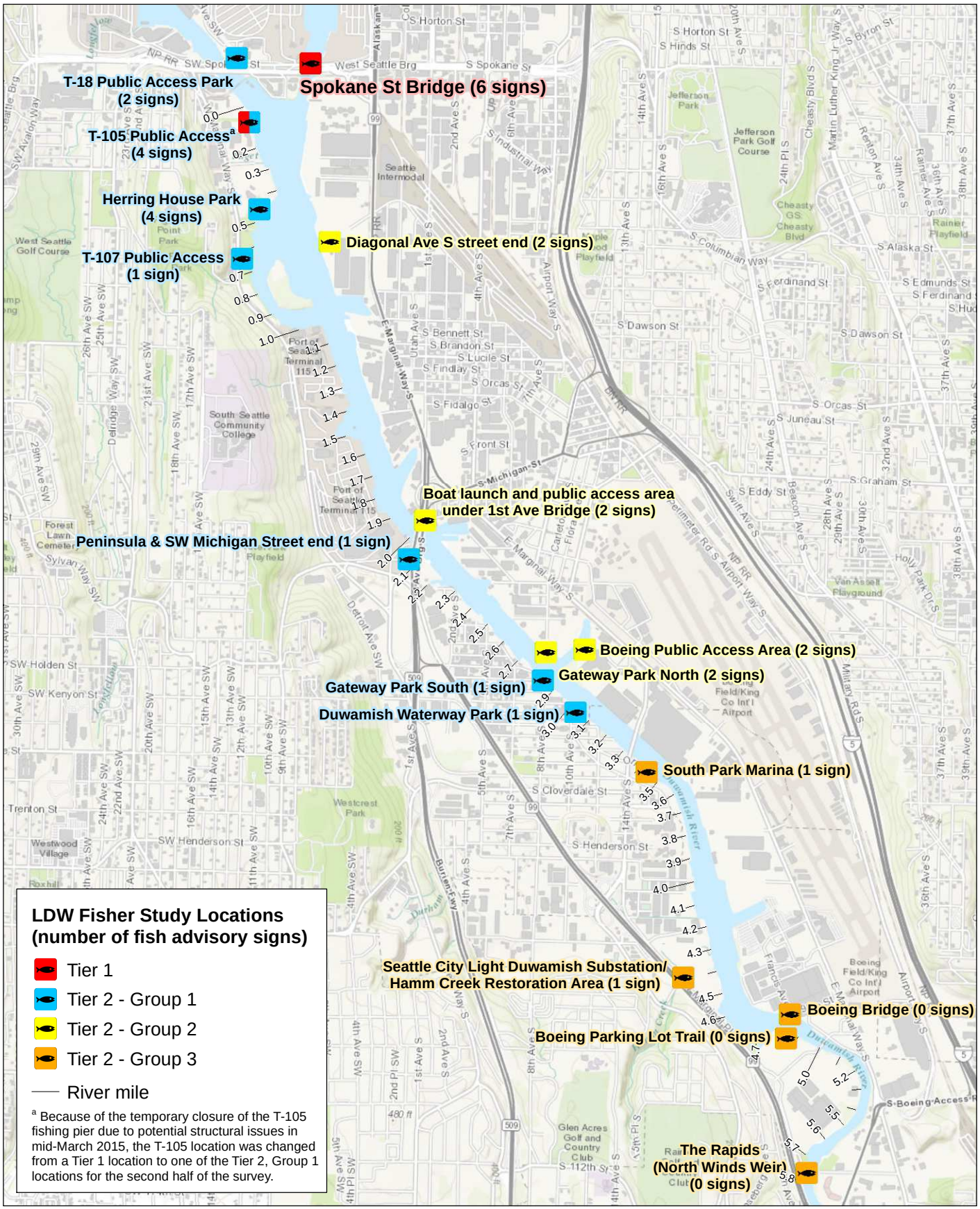
[5] Past surveys of fishers on the Duwamish that were used to inform survey locations included the *King County Combined Sewer Overflow Water Quality Assessment for the Duwamish River and Elliott Bay* (King County 1999) and the 2010 survey conducted by Public Health to evaluate LDW fisher awareness of fish advisories (Barry 2013).

Table 3-1. Survey locations

Tier (Group Where Applicable)	No. of Locations	Locations
Tier 1	2	• Spokane Street Bridge • T-105 public fishing pier (*October to March*)[a]
Tier 2 (Group 1)	6	• T-18 public access park • Herring House Park • T-107 public access area • Peninsula and Southwest Michigan (street end) • Gateway Park South • Duwamish Waterway Park • T-105 public access area (*March to September*)
Tier 2 (Group 2)	4	• Diagonal Avenue South (street end) • Boat launch and public access area under the 1st Avenue South Bridge • Gateway Park North • Boeing public access area
Tier 2 (Group 3)	5	• South Park Marina • SCL Duwamish Substation/Hamm Creek restoration area • Boeing Bridge • Boeing parking lot area • The Rapids (North Winds Weir)

[a] T-105 was closed to fishing in March 2015 due to structural concerns.

RM – river mile
SCL – Seattle City Light
T-105 – Terminal 105
T-107 – Terminal 107
T-18 – Terminal 18


T-18 Public Access Park
(2 signs)
Spokane St Bridge (6 signs)
T-105 Public Access[a]
(4 signs)
Herring House Park
(4 signs)
Diagonal Ave S street end (2 signs)
T-107 Public Access
(1 sign)
Boat launch and public access area
under 1st Ave Bridge (2 signs)
Peninsula & SW Michigan Street end (1 sign)
Boeing Public Access Area (2 signs)
Gateway Park North (2 signs)
Gateway Park South (1 sign)
Duwamish Waterway Park (1 sign)
South Park Marina (1 sign)
Seattle City Light Duwamish Substation/
Hamm Creek Restoration Area (1 sign)
Boeing Bridge (0 signs)
Boeing Parking Lot Trail (0 signs)
The Rapids
(North Winds Weir)
(0 signs)
LDW Fisher Study Locations
(number of fish advisory signs)
Tier 1
Tier 2 - Group 1
Tier 2 - Group 2
Tier 2 - Group 3
River mile
[a] Because of the temporary closure of the T-105 fishing pier due to potential structural issues in mid-March 2015, the T-105 location was changed from a Tier 1 location to one of the Tier 2, Group 1 locations for the second half of the survey.
N
0 0.25 0.5 Miles
0 0.5 1 Kilometers
Windward environmental LLC
Map 3-1. Fisher Study survey locations
FINAL
Prepared by craigh, 6/29/2016; W:\Projects\00-08-06_Duwamish_Rl\data\GIS\Fisher Study\Data Report\Map 3-1 5787 Survey locations.mxd

In March 2015 (i.e., during the course of the survey), the Port of Seattle (Port) identified potential structural issues with the T-105 fishing pier and potential safety concerns with regard to pier use. Therefore, the pier was temporarily closed (eliminating public access) pending further structural evaluation and possible repairs. The rest of the T-105 shoreline public access area remained open. As a result, the following changes were made to the study design following EPA/Ecology approval:

- **March to May** – For the remainder of the non-summer months, planned visits to T-105 were replaced with visits to the Spokane Street Bridge, resulting in six visits per month to the Spokane Street Bridge instead of the previously planned four visits.
- **June to September** – For the summer months, the T-105 area (along the shoreline) was added to Group 1 of the Tier 2 locations.

Each survey day consisted of an approximately four- to five-hour shift completed by at least two ECOSS surveyors. Survey days followed one of three formats:

- **Tier 1 and Tier 2 day** – On these survey days, surveyors spent approximately two hours at the selected Tier 1 location and visited the locations in one of the Tier 2 groups (Map 3-1). Surveyors visited each Tier 1 and Tier 2 location in a given group, checked for fishers, and then moved on if no fishers were present. If fishers were present, the surveyor approached them about taking the survey and then departed from the location once they had finished talking with any fishers they encountered (i.e., additional time was not spent waiting at the Tier 2 locations to see if other fishers would arrive).
- **Tier 1 tent day** – On these survey days, ECOSS set up a tent at the selected Tier 1 location (i.e., Spokane Street Bridge or T-105) and staffed the tent for approximately four hours. All tent days were scheduled on weekends and included free coffee and information. The tent was intended to allow surveyors to establish a presence at the location in order to encourage fishers to feel more comfortable taking the survey.
- **Double Tier 2 group day** – After the closure of the T-105 fishing pier, surveyors spent some survey days during the summer months visiting all of the Tier 2 locations in two of the Tier 2 groups. No Tier 1 locations were visited on these days.

As planned, a total of 96 survey days were completed over the course of the survey: 12 survey days per month during the summer months (June through September) and 6 survey days per month during the non-summer months (October through May) (Table 3-2). The Spokane Street Bridge was visited on 70 survey days (11 visits were tent days), the T-105 fishing pier was visited on 11 survey days (2 visits were tent days), and the Tier 2 groups were each visited on 33 survey days.

Table 3-2. Summary of survey visits by location

Time Period	Number of Surveys Days Location was Visited					Total Survey Days
	Tier 1 Locations		Tier 2 Locations			
	Spokane Street Bridge	T-105 Public Fishing Pier[a]	Group 1	Group 2	Group 3	
Non-summer months (Oct.–May)	38 (3 tent days)	11 (2 tent days)	14	15	14	48
Summer months (June–Sept.)	32 (8 tent days)	0	19	18	19	48
Total	**70 (11 tent days)**	**11 (2 tent days)**	**33**	**33**	**33**	**96**

[a] As discussed in Section 3.2, due to the temporary closure of the T-105 fishing pier no visits were planned to T-105 as a Tier 1 location during the summer months (i.e., during the remainder of the survey), and the level of effort during the remainder of the non-summer months was revised. After the closure, T-105 was visited as part of visits to the Tier 2, Group 1 locations.

T-105 – Terminal 105

3.2.3.2 Days of the week and times of day

In addition to varying the survey locations that were visited on each survey day, days of the week and times of the day were also varied based on input from ECOSS from their pre-survey interviews with the fishing community and their knowledge of the river and based on information from past studies of Duwamish fishers. Visits to survey locations were varied over the course of the survey to ensure that all locations were visited on weekdays (Monday through Thursday), Fridays (particularly afternoon/evening), and weekend days (Saturday and Sunday) in an effort to account for the various times that fishers might visit the river. As planned, weekdays accounted for 33% of survey days, Fridays accounted for 17% of survey days, and weekends accounted for the remaining 50% of survey days (Table 3-3). Times of day were also varied, such that the various locations were visited on different days of the week and at different times of day.

Table 3-3. Guidelines for survey timing and completed level of effort

Day of the Week	Count of Survey Visits				
	Number of Visits		Time of Day[a]		
	Per Month	Total	Morning	Midday	Evening
Non-summer months (October through May)					
Monday–Thursday	2	16 (over 8 months)	6	5	5
Friday	1	8 (over 8 months)	-	1	7
Saturday and Sunday	3	24 (over 8 months)	9	7	8
Summer months (June through September)					
Monday–Thursday	4	16 (over 4 months)	6	5	5
Friday	2	8 (over 4 months)	-	-	8
Saturday and Sunday	6	24 (over 4 months)	10	6	8

[a] For safety reasons, surveys were scheduled for daylight hours only (i.e., from dawn to dusk), so the timing of the morning and evening survey days varied over the course of the on-river survey depending on the season.

Based on input from ECOSS and their knowledge of fishing preferences, mornings, midday, and evenings were targeted based on fisher preferences (e.g., fish often are more active at dawn and dusk) and times when fishers might visit the river (e.g., on their lunch break or before/after work). No specific definition of morning, midday, or evening were determined because these times varied over the course of the survey depending on the season and the consideration of the safety of the ECOSS surveyors (surveyors were only out on the river during the hours from dawn to dusk). Because the survey was administered as daylight was available, it is possible that fishers active outside of daylight hours were missed during survey administration.

3.2.3.3 Languages and method of survey administration

Available information from past studies indicated that Duwamish fishers represent various ethnicities. The available information, including information gained during the 54 pre-survey interviews conducted by ECOSS, was used to identify languages that were likely to be encountered on the Duwamish so the appropriate languages would be represented. Table 3-4 presents a summary of the language capacity of the ECOSS surveyors by survey day. In addition to English (which all surveyors spoke), the various ECOSS surveyors who participated in the on-river survey spoke Chinese, Hmong, Lao, Mienh, Khmer, Korean, Spanish, or Vietnamese.

Table 3-4. Summary of survey language capacities

Time Period	Count of Survey Days by Language						
	English	Chinese	Hmong/ Lao/Mienh	Khmer	Korean	Spanish	Vietnamese
Non-summer months (Oct.–May)	48	11	20	31	5	17	14
Summer months (June–Sept.)	48	11	0[a]	34	16	15	20
Total	**96**	**22**	**20**	**65**	**21**	**32**	**34**
Percent of Total	**100%**	**23%**	**21%**	**68%**	**22%**	**33%**	**35%**

[a] Due to unplanned staffing changes at ECOSS, no Hmong/Lao/Mienh speakers were available after the second quarter of the survey.

Although verbal administration of the survey was the preferred survey administration method, self-administered versions of the survey were available in English, Korean, simplified Chinese, Spanish, Tagalog, and Vietnamese so that a fisher could self-administer the survey if a common language was not available on a given survey day or if the fisher did not want to take the survey verbally. Based on feedback from ECOSS staff and on information from the ECOSS pre-survey interviews, self-administered surveys were not developed for some languages (e.g., Hmong and Mienh) because fishers encountered on the river who speak those languages would likely prefer to participate in the survey orally and often are not literate in those languages (in part because written versions of the Hmong and Mienh languages are relatively new). If demand for self-administered surveys in other languages arose over the course of the survey, a process was in place for additional translations to be done.

With regard to survey administration, ECOSS generally attempted to talk to all fishers who were present at a given location. However, this was not possible in all cases, for the following reasons:

- Sometimes fishers left the location when ECOSS surveyors arrived.
- When the behavior of fishers clearly indicated that they were not interested in talking to ECOSS (e.g., continuing to move to locations farthest from ECOSS surveyors).
- When too many fishers were present at a given location for ECOSS surveyors to successfully talk to everyone (this occurred only during salmon fishing season).

Because talking with fishers fishing for resident species was the priority for this study, when a large number of fishers were present, ECOSS surveyors generally attempted to approach any fishers who appeared to be fishing for non-salmon species or who appeared to be part of their community in order to build trust and increase the likelihood of talking to fishers with whom they would share a common language.

3.2.3.4 Consideration of environmental justice characteristics

The consideration of EJ characteristics related to race, color, income level, and national origin (EPA 2016) that are displayed by fishers along the Duwamish was another key consideration in developing the survey design and questionnaire. The importance of considering this type of information has been highlighted in various studies of urban fishers (e.g., Beehler et al. 2003, 2001; Dawson et al. 2008) and is discussed in a report prepared by NEJAC on fish consumption and environmental justice (NEJAC 2002). In general, because EJ communities may face disproportionate exposure to contaminants in fish, meaningful involvement by the affected community is needed to address health risks. Thus, the fact that many fishers along the Duwamish display EJ characteristics was considered early in the study design process by ECOSS staff, many of whom are members of these communities and thus are uniquely able to understand how these characteristics could influence participation in the survey. The following describes the key ways that EJ characteristics were considered in the survey design and administration:

- Use respectful and effective ways to approach fishers (e.g., sharing a common language). This is described in more detail below in Section 3.2.3.5.
- Provide incentives for participation that show respect for taking fishers' time while participating in the survey.
- Use an approach and survey questions that did not make fishers feel that they were being judged for their seafood consumption practices (e.g., consuming resident seafood).

After the completion of the study, ECOSS staff brainstormed a list of the key factors that contributed to the success of the fishers study (Section 5.4); many of these factors were related to the ways that ECOSS considered the EJ characteristics of the community.

3.2.3.5 Survey administration approach

ECOSS staff, as well as participants in pre-survey interviews and the pilot test, emphasized that several aspects of the approach for administering the survey were critical to its success. Most importantly, ECOSS surveyors were to: 1) use a friendly and conversational approach when first talking to fishers, 2) introduce themselves to the fisher, 3) quickly explain the purpose of the study, 4) assure the fisher of the confidentiality of the survey, and 5) inform the fisher that they would receive a $10 store card (e.g., Walmart or Fred Meyer) upon completion of the survey. These steps were all intended to build trust between the ECOSS surveyor and the fisher.

In addition, ECOSS surveyors were to reassure fishers that they were not game wardens or other officials who were there to enforce fishing regulations. Therefore, care was taken to ensure that ECOSS surveyors were not dressed like game wardens (or other government officials), and they did not approach fishers carrying a clipboard or other official-looking gear. Another important aspect of survey administration was that ECOSS surveyors spoke the languages and were from the communities of many of the fishers who were encountered along the Duwamish.

3.2.3.6 Record keeping

During the on-river survey, ECOSS surveyors filled out a variety of field forms. Daily field log and location data forms were used to record information regarding the surveyor crew, day of the week, weather, tides, and locations visited on the survey day. These forms also included information on the condition of the advisory signs, number of fishers observed, location arrival/departure times, and other general notes. The survey form was used to provide demographic information and survey responses, and the survey decline form was used to document information about fishers who declined to take the survey. Information from these forms was entered into the fishers study database. Personal information (e.g., the names of the fishers who were surveyed) was not recorded on the survey form to ensure that such information remained anonymous. Forms regarding the distribution of store cards were also administered during the survey (e.g., fishers signed their initials indicating receipt of store card). In addition, all survey forms were kept in a locked cabinet to ensure that all information collected from the study was secure.

3.2.3.7 Surveyor training

All surveyors were trained by a social scientist prior to conducting the pilot test (June 2014) and again prior to the survey (August 2014). These trainings included the following components:

- General orientation to the fishers study, objectives of the on-river survey, and survey organization/design
- Detailed survey orientation and discussion of survey skip patterns[6]
- Survey administration methods
- Record keeping of survey responses and required field forms
- Qualitative survey techniques (to ensure that surveyors were prepared to administer the optional, open-ended questions at the end of the survey)

In addition, the training for both the pilot study and the year-long survey included practice administering the survey, recording responses (including consideration of how best to record responses when responses were given in multiple languages), and filling out field forms.

3.2.4 Business outreach effort

As described in Section 6.3 of the implementation plan (Windward 2014, 2015a), in addition to conducting the survey of fishers on the Duwamish, ECOSS staff visited businesses along the Duwamish to determine if employees fished from private business properties that otherwise had limited access to the Duwamish. Businesses contacted as part of this effort included contacts provided by LDWG parties for their properties/tenants and ECOSS' contacts at businesses along the Duwamish. A total of 30 businesses along the Duwamish waterfront were contacted.

When arriving at a business, ECOSS surveyors were generally only able to talk to reception, security, or gatekeeper personnel, and were thus not always able to directly engage employees. Although ECOSS surveyors provided copies of the survey (in English), information about the survey, and information about the incentives for participation (a $10 card, as was done for the on-river surveys) to the personnel that they talked with, it is unknown how much of this information was passed along to employees. In the one instance where ECOSS was able to directly talk with employees, two surveys were eventually completed by employees at this business. In an effort to get more surveys completed, ECOSS surveyors visited or called contacts at each business two to three times.

Because the businesses were the gatekeepers, if no surveys were conducted at a given business, it was generally difficult to determine the reason. Possible explanations for no surveys at a given business included 1) there were no people who fished at the business, 2) fishers at the business were not interested in taking the survey, or 3) the contact at the business simply did not know whether people at the business were

[6] A skip pattern is a question (or several question) associated with a conditional response to an earlier question, meaning that certain questions in the survey are only applicable to some survey respondents.

fishing. The log of businesses contacted as part of this effort is provided in Appendix B.

3.3 KEY INFORMANT INTERVIEWS

The second primary component of the fishers study involved key informant interviews. These interviews were conducted to enable in-depth discussions with Duwamish fishers and people who prepare or consume seafood from the Duwamish. The topics covered were:

- Topic 1 – Benefits of and obstacles to fishing in general and on the Duwamish
- Topic 2 – How fishers determine the risks of eating resident seafood from the Duwamish
- Topic 3 – Patterns of distribution and consumption of resident seafood
- Topic 4 – How fishers and seafood consumers get information about fishing on the Duwamish, as well as ideas for alternative means of accessing this information
- Topic 5 – Specific options/practices that can be provided to help people avoid consumption of resident seafood from the Duwamish

Note that the questions specific to the fifth topic area were incorporated into the other key topics. The key informant interviews augmented information gathered throughout the on-river survey and lent insight into motivations, thoughts, feelings, attitudes, and experiences about fishing the Duwamish.

3.3.1 Summary of interview development

A semi-structured interview guide was developed to shape the interview process, facilitate obtaining relevant information, and ensure that respondent priorities and experiences were explored through follow-up questions. The field guide,[7] which was a simplified version of the interview guide for use by the interviewers during the key informant interviews, is included in Appendix A; the original interview guide (with the full list of questions) was presented as Attachment 1 of the key informant interview memorandum (Windward 2015b).

The questions in the interview guide were developed based on the scope of the fishers study, as well as previous studies of fisher perceptions of the benefits and risks of fishing in contaminated waters (Beehler et al. 2003, 2001; Dawson et al. 2008). These questions were modified and made more site-specific through a collaborative process involving discussions with EPA/Ecology, public health advisors, DRCC, and ECOSS.

[7] In the field guide, some of the questions were highlighted. These highlights were added to place additional emphasis on certain questions to ensure that they were asked, per EPA request.

As noted above, the interview guide was divided into the four topic areas. Under each topic, a "grand tour" question[8] was provided to introduce the main subject. A series of follow-up questions gave suggestions or options for follow up. Interviewers were not required to ask each question or to use the specific wording in the question. Instead, they received training on how to use the follow-up questions to encourage a productive discussion on the main topic.

Interviewers were trained in qualitative interview techniques during two four-hour training sessions that occurred one week apart. During this training, they pilot tested the interview guide with each other. To practice interviewing in languages other than English, the interviewers used a sight translation method[9] to translate the interview "on the fly." In these cases, the two-member interview team—who were both linguistically competent in the target language—discussed and agreed upon the phrasing that worked best.

3.3.2 Interview procedures

In-depth interviews were conducted by ECOSS with Duwamish fishers and consumers who, based on the on-river survey results (Table 3-5), represented the principle ethnic groups found to be fishing on the Duwamish for resident species. The interview teams included two ECOSS staff members who shared a common language with the respondents so that the interview could be conducted in the language that was most comfortable for the participants. Each team consisted of an interviewer and a note taker. The note taker recorded relevant context, reminded the interviewer of any important subjects not covered, and asked additional follow-up questions when appropriate. Interviews were audio recorded and transcribed by the interview team shortly after the interview. In cases where the interview was conducted in a language other than English, the interview team provided a written translation of the audio recording in English. Both team members checked the translation to ensure the transcribed and translated documents were accurate.

[8] A grand tour question is an open-ended question that introduces a general topic and encourages the respondent to describe, in detail, what they might know on a given subject. The question often begins with: "Tell me about [topic]." The approach was developed by Spradley (1979).

[9] A sight translation is done by silently reading a document and simultaneously verbally translating it into the target language.

Table 3-5. Summary of ethnicities/races of individuals who reported catching resident species during the on-river survey and those targeted for key informant interviews

Ethnicity/Race	Information from On-river Survey		Targeted for Key Informant Interviews	No. of Key Informant Interviews (No. of Participants)
	Count of Fishers Who Reported Catching Resident Species from the Duwamish	Count of Fishers Who Reported Eating the Resident Species they Catch from the Duwamish		
Asian				
Vietnamese	15	9	✓	4 (4)
Cambodian/Khmer	7	6	✓	2 (5)
Chinese	3	3	✓	
Other Asian groups	5	3	✓	2 (9)
Pacific Islander				
Filipino	8	5	✓	1 (1)
Other Pacific Islander	3	2		
European				
Romanian	1	0		
Mediterranean	1	1		
Other				
American Indian/ Alaskan Native	2	0	✓	
Black/African American	2	1	✓	2 (2)
Latino	6	5	✓	1 (1)
Multi-racial	8	5		
White/Caucasian	7	1	✓	
Homeless	unknown	unknown	✓	

Note: Counts are for first-time respondents only to avoid double-counting fishers.

Interviews were conducted at a location chosen by the respondent(s), generally in either a community center or the respondent's home. Group interviews involving up to three participants were encouraged, and thus some respondents brought family or friends to the interview. Consequently, interviews were conducted with as few as one respondent and as many as five. Each interview began with an explanation of the purpose of the fishers study and how the information would be used to help Duwamish fishers. After providing assurances of confidentiality, the interviewer asked for and recorded informed consent. Interviews lasted about 45 minutes to 1 hour. Respondents were given an opportunity to add additional information and ask questions. At the end of the interview, each participant was given a $30 store card (e.g., Walmart or Fred Meyer); participants were informed of this incentive during recruitment to help encourage participation.

3.3.3 Recruitment

The recruitment of participants for the key informant interviews was conducted by ECOSS as described in the key informant interview memorandum (Windward 2015b). The preferred criteria for being a key informant was to currently be collecting or consuming resident seafood from the Duwamish. Individuals who used to do these activities in the past were also included as key informants if current fishers or consumers could not be identified for a target ethnicity/race.

ECOSS utilized the following methods to identify key informants from the communities identified in Table 3-5:

- Reached out to ECOSS contacts (e.g., from initial ECOSS interviews) who said they would be willing to participate further in the fishers study
- Reached out to ECOSS' existing contacts in the community
- Visited community centers or attended community events
- Reached out to potential key informant contacts obtained by ECOSS from individuals fishing along the Duwamish during the on-river survey
- Contacted people recommended by ECOSS contacts or by sponsors of different surveys conducted in these communities by other organizations
- Identified individuals using a "snowball" technique (i.e., using current contacts to identify additional key informants); this may have included inviting key informants to bring friends/family who consumed/prepared Duwamish seafood to their interview and learning about additional contacts during the key informant interviews

One of the primary challenges encountered when recruiting key informants was the relatively small pool of individuals identifiable by ECOSS who reported fishing for and consuming resident species along the Duwamish (most people contacted by ECOSS said that they were only fishing for or consuming salmon). In addition, while ECOSS had numerous ties to some communities (e.g., Vietnamese and Cambodian), other communities were harder to contact, or ECOSS did not have existing connections with these groups (e.g., the homeless and Filipino communities).

3.3.4 Determination of saturation

One way to determine when to discontinue conducting key informant interviews is to decide if the interviews have reached saturation. Saturation occurs when no new substantive information is emerging from the interviews.

For the purposes of the fisher study, saturation was determined using two different strategies. First, the principle social researcher reviewed the 11 transcripts and concluded that further interviews were not likely to produce significantly new insights or information. At this point, the second social researcher independently read all

transcripts and similarly concluded that she was also hearing similar stories repeated in the data. A third study team member who was familiar with the on-river survey results also read all 11 transcripts and concurred that data saturation had likely occurred.

The second method for determining whether saturation had been reached was to see if there were similar themes that appeared in both the key informant interviews and the responses to the on-river survey. It appeared that the general themes from the key informant interviews were similar to those from the on-river survey, which gave the researchers confidence that continuing to conduct additional interviews would be unlikely to reveal any new and substantive information. Although the objective of the key informant interviews was not to generalize or statistically compare racial/ethnic groups, saturation was considered for these groups. The key informant interviews did not appear to reveal major differences among these groups (Chu 2016; Godtfredsen 2016).

3.3.5 Analysis

Transcribed interviews were entered into a Microsoft Excel® spreadsheet to aid in coding and sorting. A team of two experienced social scientists worked together, sharing tasks and insights and providing a check on each other's work. The analytic approach used was that of "thematic analysis." Thematic analysis is an approach to qualitative research that begins with applying codes to data, and then examining the coded output for recurring themes.

Themes are different than codes. A theme is a phrase, sentence, or short paragraph that organizes coded material into a meaningful cluster that describes or interprets what units of coded data mean in terms of the research question. Themes are described in detail and examined for recurring, overlapping, or related patterns that are connected to the research questions at hand. Codes are labels given to a particular piece of data.

Study data are analyzed to derive themes, such as commonalities or differences across subgroups within the study. According to Bazeley (2013), "The term 'theme' is best used to describe an integrating, relational statement derived from the data that identifies both content and meaning." For example, in the key informant interviews, a code was *benefits of fishing*. This code included sub-codes such as *having fun, socializing, family time*, and *getting fresh food*. Continuing with this example, one of the themes derived from looking at these codes and subcodes is that *fishing in the Duwamish is an important leisure activity*. The themes that emerge may provide unexpected insights into previously unknown or poorly understood phenomena.

In summary, data analysis was an iterative process that consisted of the following basic steps:

- Carefully reading, re-reading, and reflecting on individual transcripts to build a sense of the whole
- Writing analytic notes, fleeting ideas, insights, and possible connections or themes as the process moved from description to abstraction
- Constructing a provisional set of codes based on study questions and re-coding to include other codes that (possibly) emerged from the data
- Exploring storyline or narrative, contrasts, and similarities
- Constructing themes by working out relationships between codes and categories of codes
- Writing up descriptions of themes and categories as these related to the purpose of the inquiry

3.4 COMMUNITY INVOLVEMENT

Another important component of the fishers study was the inclusion of community involvement throughout the process. Community input was solicited in developing the study/survey design, making revisions to the survey questionnaire, and implementing the study. A description of these aspects of community involvement, as well as the role of ECOSS as community representatives, is discussed below and presented in detail in Appendix C.

3.4.1 Development of survey design

Community involvement in the development of the survey design primarily relied on the ECOSS pre-survey interviews, which were conducted in October and November of 2013. As part of this effort, which is summarized in detail in Section 3 of the implementation plan (Windward 2014, 2015a), ECOSS solicited feedback on the study design from a total of 54 individuals, who covered a wide variety of ethnic/race and community groups, which are summarized in Appendix C. These interviews were conducted by ECOSS in the preferred language of the individual community member, relying on their established connections and trust with these communities to help ensure that sufficient feedback was received. Feedback on the survey design was provided on topics including fishing locations, suggestions for approaching fishers, survey languages, incentives for participation, barriers to survey participation, and risk perception. The feedback received from these individuals was a key component in the design of the study, as described in Section 3.1.

3.4.2 Revisions to the survey questionnaire

Community involvement in revising the fishers study questionnaire primarily came from the participation of community members in the pilot test conducted in July 2014. A total of 10 individuals took part in the pilot test, during which they served as test subjects for the administration of the survey, and provided feedback on the survey

questionnaire after they had completed it. Feedback received from the pilot test participants and the ECOSS surveyors was incorporated into the questionnaire prior to beginning the on-river survey.

Recruitment of pilot study participants was done by ECOSS and involved reaching out to ECOSS contacts and to LDW fishers who participated in the ECOSS pre-survey interviews. The goals for participant recruitment, in order of priority, were as follows:

- Include one participant from each of the 10 priority language groups (i.e., Vietnamese, Mienh, Hmong, Lao, Khmer, Spanish, simplified Chinese, Korean, Tagalog, and English) anticipated in the survey.
- Include as many fishers as possible (at least half of the participants) because the actual survey will take place in the field with fishers.
- Represent, to the extent possible, different age groups (i.e., under 30 years, 30 to 50 years, older than 50 years) and both genders.

Most of these participation goals were met. Participants included members from all target language groups, eight fishers, one woman and nine men, and individuals from a variety of age groups. Groups represented by the pilot test participants are documented in Appendix C.

3.4.3 Continued involvement during the study

During the pre-survey interviews, ECOSS asked participants about their interest in and willingness to continue to provide input on the development of the study, provide input on the interpretation of the results, or to stay informed throughout the study. The following options were available for continued participation:

- **Email list** – A total of 18 community members requested email notifications when documents were posted on the web (www.ldwg.org), or when meetings that community representative might attend would be held.
- **Review documents** – A total of 3 community members said they might be willing to review and comment on study documents (posted online), including the implementation plan, quarterly updates, data report, and final factsheet.
- **Attend meeting** – A total of 7 community members said they might be willing to attend a project meeting (or receive a phone call from ECOSS staff) to discuss any of the documents listed above or the preliminary results of the study.

Community members who expressed interest in the above options over the course of the fishers study were added to the above three lists. As requested by community members, project updates were distributed by email, project documents were provided for review, and invitations to meetings were extended. These activities are recorded in the community involvement log (Appendix C).

3.4.4 Role of ECOSS as community representatives

In addition to administering the on-river survey and conducting the key informant interviews, ECOSS staff served as community representatives. The expertise of the ECOSS staff as members of the affected community was critical to the development of the fishers study (both the on-river survey and the key informant interviews), as well as to the interpretation of the study results. The following summarizes the ways that ECOSS staff were involved in developing the study and helping to understand the study results:

- **Pre-survey interviews** – ECOSS staff conducted and reviewed feedback from the pre-survey interviews, and used this information to help guide the development of the survey design and questionnaire.
- **Survey design** – ECOSS staff knowledge regarding the fisher community was one of the primary sources of information used to develop the survey design.
- **Pilot test** – ECOSS staff administered the pilot tests, provided comments on their experiences administering the draft survey, and helped to highlight the key aspects of the survey questionnaire and approach that needed to be revised.
- **Community meetings** – ECOSS staff attended all community project meetings to provide input and insight on the survey progress and results.
- **On-river surveys** – As part of their role as the on-river surveyors, ECOSS staff provided feedback on their experience as surveyors and included notes on the survey forms as needed regarding each survey.
- **Key informant interviews** – ECOSS staff conducted all key informant interviews, developed summarized transcripts for each interview, and provided feedback on these interviews to the project social scientists. In addition, at the end of the key informant interview process, project social scientists held a meeting with all ECOSS surveyors to get their feedback on the important lessons learned from the key informant interviews (and also incorporated information from the on-river surveys).
- **Interpretation of results** – ECOSS staff were involved in discussions regarding the results (e.g., at the final key informant interview with ECOSS staff) and provided input to and reviewed the draft data report.

4 Results

This section presents the results of the fisher study. It provides a summary of the combined results of the on-river survey and key informant interviews organized by key question. A summary of the results from each survey question is provided in Appendix D.

4.1 Surveys Completed and Key Informant Interview Participants

A summary of the surveys completed during the on-river survey, as well as the people interviewed as part of the key informant interviews, is provided in this section.

4.1.1 On-river survey

Over the course of the survey from October 1, 2014, to September 30, 2015, ECOSS surveyors completed a total of 400 surveys (Table 4-1). In addition, surveys were completed by three individuals at businesses who reported fishing on the Duwamish. Therefore, a total of 403 surveys were completed. ECOSS talked to an additional 379 fishers[10] on the river who declined to take the survey. The demographics (e.g., age and gender) of the on-river survey participants and that of the fishers who declined to take the survey (when available) are described in detail in Section 4.2.1.1.

Table 4-1. Summary of survey statistics

Survey Statistic	Value
Total surveys conducted	
Surveys conducted during on-river survey (includes repeats (i.e., fishers who took the survey more than once))	400
Surveys conducted as part of business outreach	3
Total surveys conducted (includes repeats)	403
Total surveys conducted (not including repeats)	328
On-river survey overview	
Surveys conducted (includes repeats)	400
Fishers declining to take survey (includes repeats)	379
Total fishers approached (includes repeats)	779
Response rate	51%
Primary reasons for declines during on-river survey	
Not interested	83 (22%)
No time	254 (67%)
No common language	38 (10%)

[10] For the 379 fishers who declined to take the survey, it is not known how many of these individuals had either taken the survey before or who had previously declined to take the survey.

It is notable that ECOSS achieved a response rate of 51% during the on-river survey. Of the 779 fishers that ECOSS approached, 400 of these fishers (some of whom were repeat survey takers[11]) agreed to take the survey. During the year-long survey, the majority of the surveys were administered verbally (95% of the total). Of the 21 surveys that were self-administered, 2 were completed in Chinese, 7 in English, 1 in English/Vietnamese, 2 in Khmer, 3 in Spanish, and 6 in Vietnamese.

The majority (~90%) of the 379 fishers who declined to take the survey indicated that they either were not interested or did not have time (Table 4-1). The remaining 10% of the declines were due to the lack of a common language. The languages specified for these fishers by the ECOSS surveyors are shown in Table 4-2. Although self-administered surveys were available for most of these languages (i.e., Chinese, English, Korean, Spanish, Tagalog, and Vietnamese), it is important to recognize that not all fishers were willing to take the time to complete a self-administered survey, and others may not have been literate in the self-administer languages. The lack of a common language in these cases did not result in the exclusion of an entire ethnic group during the survey; for all of the languages available for the self-administered surveys, at least one survey was successfully conducted with another fisher who spoke that language (Table 4-2).

Table 4-2. Declined surveys when no common language was available

Language	Count of Declines	Self-Administered Survey Available	Notes Regarding Surveyed Fishers of these Ethnicities
Chinese	3	✓	14 fishers who were surveyed indicated Chinese as their ethnicity (5 of which reported catching resident species)
English[a]	5	✓	na
Korean	1	✓	5 fishers who were surveyed indicated Korean as their ethnicity (1 of which reported catching resident species)
Lao	1		9 fishers who were surveyed indicated Lao as their ethnicity (1 of which reported catching resident species)
Russian	7		2 fishers who were surveyed indicated Russian as their ethnicity (0 of which reported catching resident species)
Spanish (Latino)	4	✓	40 fishers who were surveyed indicated Latino as their ethnicity (6 of which reported catching resident species)
Tagalog (Filipino)	4	✓	22 fishers who were surveyed indicated Tagalog/Filipino as their ethnicity (8 of which reported catching resident species)
Vietnamese	10	✓	40 fishers who were surveyed indicated Vietnamese as their ethnicity (15 of which reported catching resident species)

[a] All surveyors spoke English, and thus it is likely that these respondents either would have preferred a different language or simply were not interested in taking the survey.

na – not applicable

[11] In addition to asking fishers if they had taken the survey previously, information was gathered in an attempt to link repeat survey takers (i.e., the fisher's first initial and last fourth digits of their telephone number). Efforts to link fishers using this information was largely unsuccessful, as is discussed in Section 5.3.1.

4.1.2 Key informant interviews

Using the methods outlined in Section 3.3.3, ECOSS recruited a total of 22 participants, who were interviewed as part of 11 key informant interviews. The demographics of the participants are summarized below and presented in more detail in Table 4-3:

- **Ethnicities** – Vietnamese (4 interviews/4 participants), Mienh (2 interviews/9 participants), Black/African American (2 interviews/2 participants), Cambodian (2 interviews/5 participants), Filipino (1 interview/1 participant who was the wife of one of the Black/African American interviewees), and Latino (1 interview/1 participant).
- **Gender** – 12 women and 10 men.
- **Fishers vs. non-fishers** – 16 participants were fishers and 6 were preparers/consumers only (all who were preparers/consumers only were women); at the time of the interview, two fishers (Cambodian and Black/African American) said that they no longer fished for resident seafood.
- **Resident seafood consumers** – With the exception of three people, all participants consumed resident fish collected from the Duwamish.[12] Consumers of resident seafood included one African American, one Filipino, five Cambodian, eight Mienh, one Latina and four Vietnamese participants.
- **Age groups –** 3 individuals were 18 to 30 years of age, 11 were 30 to 60 years of age, and 8 were age 61 or older.

[12] Of the three people who did not consume resident fish from the Duwamish, one Cambodian woman said that she had consumed resident fish only once and the other two (African American male and Mienh female) only consumed salmon from the Duwamish.

Table 4-3. Key informant interview demographics

Ethnicity	Participants and Relationship	Gender	Age Group	Fishes?			Consumes Resident Fish?	Shares Catch?	Receives Fish from Others?
				In General	Resident Fish?	Salmon?			
Black/African American	P1	male	31–60	yes	no	yes	only salmon	family, neighbors	
P1: Black/African American, P2: Filipina	P1: husband	male	61+	yes	yes	yes	yes	family	trades species with neighbors
	P2: wife	female	31–60	yes	yes	yes	yes	mother sells to co-workers	
Cambodian	P1: friend	male	31–60	yes	yes	yes	yes	only family members	
	P2: friend	male	61+	yes	yes	yes	yes	only family members	
	P3: friend	male	31–60	yes	yes	yes	yes	unclear	
Cambodian	P1: friend	male	31–60	yes	only once	yes	yes	no	
	P2: friend	female	31–60	no	-	-	only once	-	nephew
Mienh	P1: daughter	female	18–30	no	-	-	only salmon	-	from family
	P2: wife	female	61+	no	-	-	yes	-	from family
	P3: husband	male	61+	yes	yes	yes	yes	only family members	
	P4: daughter	female	31–60	no	-	-	yes	-	from family, sometimes shares with friends, coworkers
	P5: daughter	female	31–60	yes	yes	unclear	yes		
Mienh	P1: wife	female	61+	yes	yes	yes	yes	only family members	
	P2: husband	male	61+	yes	yes	yes	yes	only family members	
	P3: other family	male	18–30	yes	yes	yes	yes	no	
	P4: daughter	female	18–30	no	-	-	yes	-	from aunt, family
Latina	P1	female	31–60	yes	yes	yes	yes	only family members	
Vietnamese	P1	male	61+	yes	yes	yes	yes	friends and family	other Duwamish fishers
Vietnamese	P1	female	31–60	yes	yes	yes	yes	with daughter	
Vietnamese	P1	female	31–60	no	-	-	yes	-	neighbor
Vietnamese	P1	female	61+	yes	yes	yes	yes	no	

P – participant

4.2 RESPONSES TO KEY QUESTIONS

Rather than presenting the results of the on-river survey (semi-quantitative data) and the key informant interviews (qualitative information) separately, they are presented together as an integrated response to the key study questions in order to facilitate the future use of these data in informing effective and appropriate ICs. Although it is useful to consider these results together, it is important to recognize that they are not connected – the behaviors and frequencies from the on-river survey data are not directly related to the insights into thoughts, feelings, and motivations from the key informant interviews.

Confidence intervals were calculated in some cases to help assess the certainty of results presented in this section. However, although over 400 surveys were conducted, sample sizes were often relatively small once the data were parsed out among the various groups (particularly when looking only at fishers who reported catching resident seafood),[13] and thus confidence intervals were only calculated when sufficient data were available. This information is presented in the applicable places throughout Section 4. Information on the calculation of these confidence intervals is presented in Appendix D.

By design, there was considerable overlap in the coverage of the key questions in the two study components in order to best address the questions. Table 4-4 presents the key questions, indicates how a question was covered in the fishers study, and provides reference to the results subsection where that question is discussed.

Table 4-4. Coverage of key questions

Question	Fishers Study Coverage		Results Subsection
	On-river Survey	Key Informant Interviews[a]	
Part 1: How is the Duwamish currently being used for the collection and consumption of seafood, particularly resident seafood?			
1a) Who is fishing on the river? Where? When?	X		Section 4.2.1.1
1b) What is being caught, and what is being done with the catch?	X	X	Section 4.2.1.2
1c) Who is preparing and eating the seafood?		X	Section 4.2.1.3
1d) How is it being prepared?		X	
Part 2: What are the perceived benefits of consuming seafood from the Duwamish? What is currently known by the community about the risk of consuming seafood from the Duwamish?			
2a) What are the perceived benefits and obstacles of fishing on the Duwamish?	X	X	Section 4.2.2.1

[13] Being able to evaluate statistical differences in the survey results by ethnic groups or other groupings was not an objective of the fishers study. Neither the on-river survey data nor the key informant interview data alone should be relied upon to provide definitive conclusions regarding differences across ethnic groups or other groups (e.g., preferred language or age). However, together they provide useful information that will be helpful in future outreach efforts.

Question	Fishers Study Coverage		Results Subsection
	On-river Survey	Key Informant Interviews[a]	
2b) How do people understand risk? What are the perceptions/cultural models of risk among the groups that fish for and consume Duwamish seafood?	X	X	Section 4.2.2.2
2c) If people are continuing to fish, why?	X	X	Section 4.2.2.3
2d) Do the various fisher groups know about the seafood consumption advisories and risks?	X	X	Section 4.2.2.4
2e) How are they currently getting this information? What are their preferred information sources?	X	X	Section 4.2.2.5
Key informant interview topics[b]			
Topic 1: Perceived benefits of fishing on the Duwamish		X	Section 4.2.2.1
Topic 2: Perceived safety/risk of eating resident seafood from the Duwamish		X	Section 4.2.2.2
Topic 3: Preparation methods, sharing/distribution, and consumption of resident seafood from the Duwamish		X	Section 4.2.1.2 and 4.2.1.3
Topic 4: Awareness of advisories and cleanup and effective ways of communicating this type of information		X	Section 4.2.2.4 and 4.2.2.5
Topic 5: Specific option/practices which can be provided to help people avoid consumption of resident seafood from the LDW		X	Section 4.2.2.3 and 4.2.2.1

[a] Includes information from the ECOSS debrief interview.

[b] Results are not organized by key informant interview topic because these topics overlap with the questions listed under parts 1 and 2 in this table; the topics are listed separately here to clearly show where information obtained from these topics is incorporated in the report.

ECOSS – Environmental Coalition of South Seattle

4.2.1 Part 1: How is the Duwamish currently being used for the collection and consumption of seafood, particularly resident seafood?

4.2.1.1 Question 1a: Who is fishing on the river? Where? When?

The questions of who is fishing on the Duwamish, where, and when were primarily answered as part of the on-river survey, which collected demographic information as well as tallied the locations and survey times of all fishers surveyed (see Appendix D for a summary of information from fishers who declined to take the survey).

Who is fishing on the river?

Demographic information for the surveyed Duwamish fishers (and when available, information for those declining to take the survey)—including gender, age, ethnicity, preferred language, and home location—was gathered during the on-river survey. Below is a brief overview of the demographic information, followed by more detail in the subsequent sections.

- **Gender** – The majority of fishers encountered on the Duwamish over the course of the on-river survey were men (86%); only 14% were women. This breakdown was similar between fishers who reported catching only salmon and those who reported catching resident seafood.

- **Age –** The largest group of people fishing on the Duwamish was between the ages of 30 and 50 (49%); 34% of fishers surveyed were aged 18 to 30, and 15% were over the age of 50. The age breakdown for fishers who reported fishing for resident seafood was slightly older (35% over the age of 50) than the age breakdown for fishers who reported catching only salmon.
- **Ethnicities –** Fishers encountered on the Duwamish during the survey identified themselves as representing more than 20 different ethnicities, including numerous Asian and Pacific Islander groups,[14] several European groups, Blacks/African Americans, American Indians/Alaskan Natives, Latinos, Caucasian, and people of mixed ethnicity. Because of the small numbers of fishers encountered for many ethnicities, ethnicities were grouped into broader categories for the purposes of data presentation (see discussion of ethnicities below).
- **Preferred language –** The majority of fishers indicated that English was their preferred language (69%), or indicated that both English and a non-English language were their preferred languages (11%). For the 20% who indicated only a non-English language as their preferred language, the most common languages were Vietnamese, Spanish, and Khmer.
- **Home location –** Fishers encountered on the Duwamish reported coming from a variety of locations throughout the greater Seattle area. South/West Seattle and areas to the south of Seattle were the most common locations.

Age and Gender

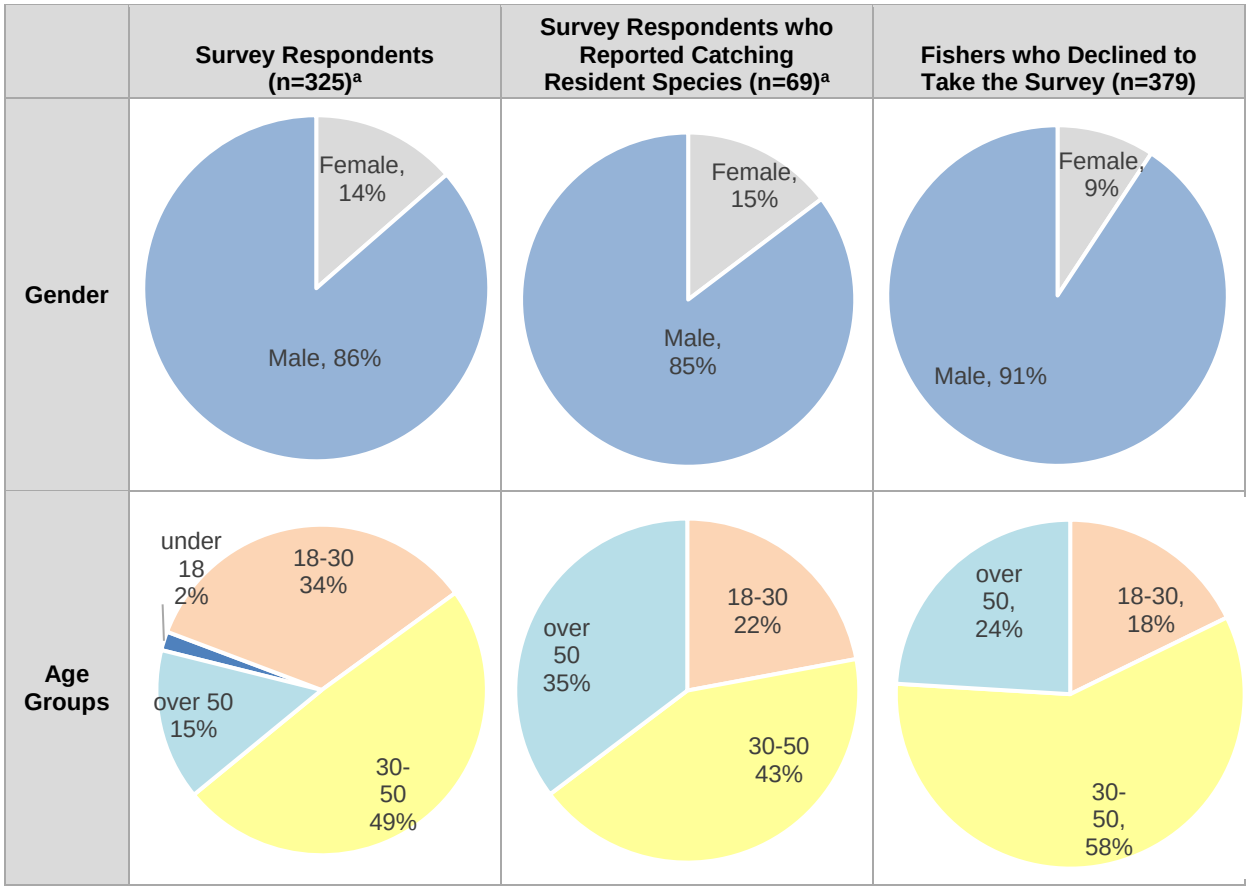
Most of the fishers on the Duwamish during the on-river survey were males between 30 and 50 years old (Figure 4-1). Although the demographic information collected[15] was similar among all fishers, fishers who reported fishing for resident species, as a group, were slightly older than fishers who reported that they were only targeting salmon. Similarly, fishers who declined to take the survey were older, as a group, than the general fisher population (Figure 4-1).

Outreach efforts about fish consumption often target fishers catching the fish. Because it is also useful to note the percentage of fishers surveyed who were women of child-bearing age for public health implications, excluding repeat survey takers, approximately 83% of fishers surveyed were women and men between the ages of 18 and 50 (this percentage was 65% for fishers who reported fishing for resident seafood). However, it is important to recognize that this percentage of fishers likely does not

[14] Asian ethnicities that were reported during the survey included Burmese, Cambodian/Khmer, Cham, Chinese, Hmong, Japanese, Korean, Lao, Mienh, Nepali, Thai, and Vietnamese. Pacific Islander ethnicities reported during the survey included Fijian, Filipino, Hawaiian, Indonesian, Samoan, and Tongan. Details are presented in Appendix D.

[15] Note that fishers were not asked their age as part of the survey, but rather the ECOSS surveyors estimated the ages of fishers who took the survey (as well as those who declined) on each form.

correlate with the percentage of women of child-bearing age who could be consuming resident seafood. Additional information about gender and fish consumption/preparation is provided in Sections 4.1.2 (key informant interviews) and 4.2.1.3 (Questions 1c and 1d: Who is preparing and eating the seafood? How is catch being prepared?).



Note: Survey respondents who had taken the survey before were excluded in this figure to avoid double counting. The number of fishers who declined to take the survey more than once is not known; thus, all demographic information for fishers who declined to take the survey was included.

Figure 4-1. Age and gender information for first-time survey respondents

Ethnicity

Fishers surveyed along the Duwamish represented over 25 different ethnicities (Table 4-5). Because of the small numbers of fishers encountered for many of these ethnicities, ethnic groups were developed for the purposes of data presentation. Thus, while it is recognized that some ethnicities within these ethnic groups may have distinct attributes, the number of surveys conducted with these groups was generally too small to describe these differences. The complete list of fisher ethnicities and the ethnic groups are shown in Table 4-5.

Table 4-5. Summary of reported fisher ethnicities

Ethnic Group	Reported Ethnicity	All Fishers (n = 328)	Fishers who Reported Catching Resident Seafood (n = 69)
Asian	Asian	1	0
	Burmese	2	0
	Cambodian/Khmer	26	7
	Cham	1	0
	Chinese	14	3
	Hmong	3	1
	Japanese	1	0
	Korean	5	1
	Lao	9	1
	Mienh	2	1
	Nepali	3	0
	Thai	2	1
	Vietnamese	40	15
European (East)	Bosnian	1	0
	Poland	1	0
	Romanian	1	1
	Russian	2	0
	Ukrainian	2	0
European (West)	Mediterranean	1	1
Pacific Islander	Fijian	1	0
	Filipino	22	8
	Hawaiian	1	0
	Indonesian	1	0
	Other Pacific Islander	3	2
	Samoan	12	1
	Tongan	1	0
American Indian/ Alaskan Native		6	2
Black/African American		19	2
Latino		40	6
Multi-racial		21	8
White/Caucasian		81	7
No answer		3	1
Overall Total		**328**	**69**

Note: Data associated with repeat survey takers were excluded from this table to avoid double counting.

Figure 4-2 presents a summary of the ethnic groups reported by fishers who were surveyed, and indicates if fishers reported fishing only for salmon or for resident seafood.[16] In relative order, the most frequently surveyed ethnic groups were Asian

[16] Fishers who reported catching resident species could also catch salmon.

(primarily Vietnamese and Cambodian), White/Caucasian, Latino, and Pacific Islander fishers.

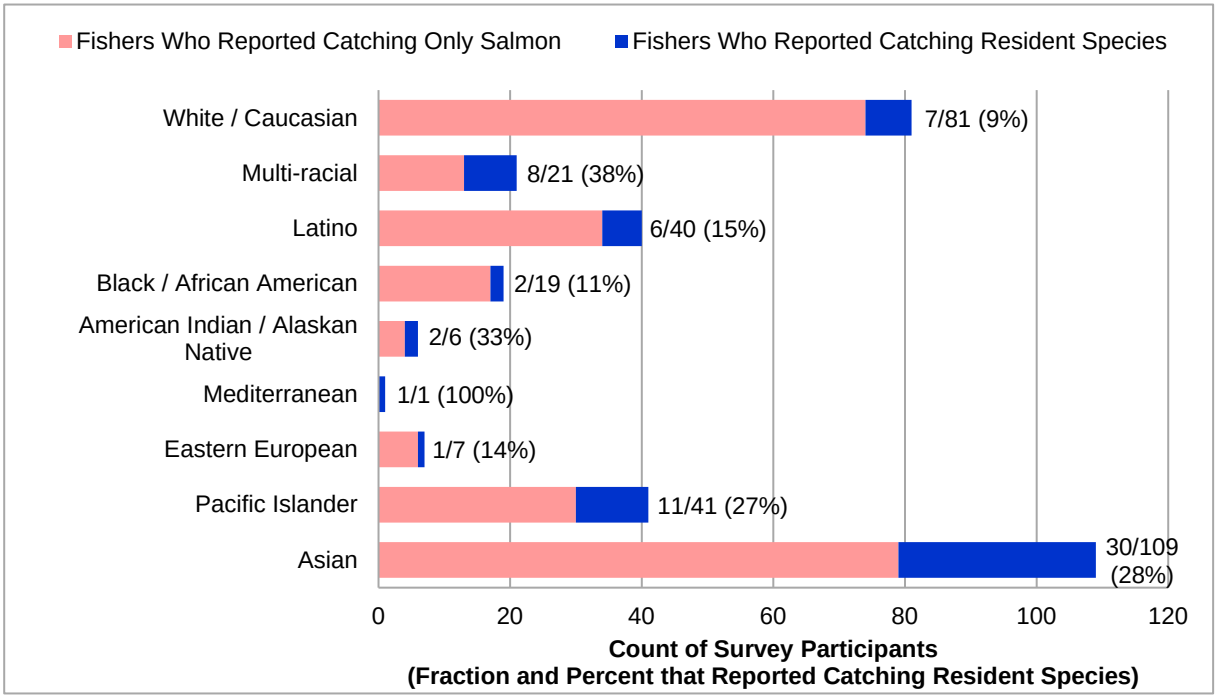


Figure 4-2. Summary of ethnicities and fraction that fish for resident species

At least 25% of Asian, Pacific Islander, and multi-racial fishers surveyed reported catching resident species.[17] Lower percentages (i.e., 15% or less) of Caucasian, Latino, and Black/African American fishers reported fishing for resident species. Note that relatively few American Indian[18]/Alaskan Native, Mediterranean, and Eastern European fishers were encountered, and thus results for these groups are uncertain due to the small sample size.

Based on a statistical analysis of the percentages of each ethnic group shown in Figure 4-2, confidence intervals indicate that samples sizes are too small to statistically distinguish results in most cases. However, this analysis did indicate that the percent of Caucasian fishers that catch resident species was significantly lower than that of both Asian and multi-racial fishers (see Appendix D for details).

Survey Language and Preferred Language

Table 4-6 presents a summary of the preferred languages reported by fishers in response to the on-river survey, and the languages used to administer the survey. A total of six languages were used to administer the survey (either verbally or using the

[17] As shown in Table 4-5, Asian and Pacific Islander fishers who reported catching resident species were primarily Cambodian, Vietnamese, or Filipino.

[18] At their request, Muckleshoot and Suquamish tribal members that use the Duwamish to fish for salmon (primarily from boats) were not targeted or surveyed as part of the fishers study.

self-administered version of the survey): English, Chinese, Khmer, Mienh, Spanish, Tagalog, and Vietnamese. The languages reported by fishers as their preferred language were much more variable, and fit into three main categories: English, English and an alternate language, and non-English languages. In general, fishers who preferred English (with or without an alternate language) were less likely to report catching resident species as compared with fishers who preferred a non-English language (16–17% and 37% of these groups reported catching resident species, respectively). Similar to the statistical results noted above, the percent of fishers who reported catching resident seafood was found to be statistically significant (i.e., lower) for those who said their preferred language was English as compared to those who said that their preferred language was a non-English language (see Appendix D for details). A similar pattern was observed based on survey language. Fishers who took the survey in a non-English language appeared to be even more likely to report catching resident species (about 50% of these fishers reported catching resident species).

Table 4-6. Summary of preferred languages reported by fishers and languages used during on-river survey administration

Language	Preferred Language		Survey Language	
	All fishers (n=328)	Fishers Who Reported Catching Resident Species (n=69)	All fishers (n=328)	Fishers Who Reported Catching Resident Species (n=69)
English				
English	225	38	290	52
English or Other Language				
English/Bosnian	1	-	-	-
English/Burmese	1	-	-	-
English/Chinese	5	1	-	-
English/Hmong	2	-	-	-
English/Khmer	7	3	-	-
English/Korean	1	-	-	-
English/Lao/Khmer/Thai	1	-	-	-
English/Lao/Thai	2	-	-	-
English/Nepali	2	-	-	-
English/Russian/Romanian	1	-	-	-
English/Spanish	3	-	-	-
English/Tagalog	4	1	-	-
English/Thai	2	1	-	-
English/Tongan	1	-	-	-
English/Vietnamese	4	-	3[a]	-
Non-English Language				
Chinese	4	2	2	2
Hmong	1	1	-	-
Khmer	7	3	11	4

Language	Preferred Language		Survey Language	
	All fishers (n=328)	Fishers Who Reported Catching Resident Species (n=69)	All fishers (n=328)	Fishers Who Reported Catching Resident Species (n=69)
Korean	1	-	-	-
Lao or Lao/Mienh or Mienh	4	-	2	1
Nepali	1	-	-	-
Russian	1	-	-	-
Samoan	1	-	-	-
Spanish	19	3	9	-
Tagalog	3	2	-	-
Tongan	1	-	-	-
Vietnamese	22	13	11	10
No answer	1	1	-	-
Totals (percent of language group who reported catching resident species)				
English	**225**	**38 (17%)**	**290**	**52 (18%)**
English or other language	**37**	**6 (16%)**	**3**	**0 (0%)**
Non-English language	**65**	**24 (37%)**	**35**	**17 (49%)**

Note: Table includes only first-time respondents to avoid double-counting fishers who took the survey more than once.

[a] These three surveys were administered in a combination of English and Vietnamese.

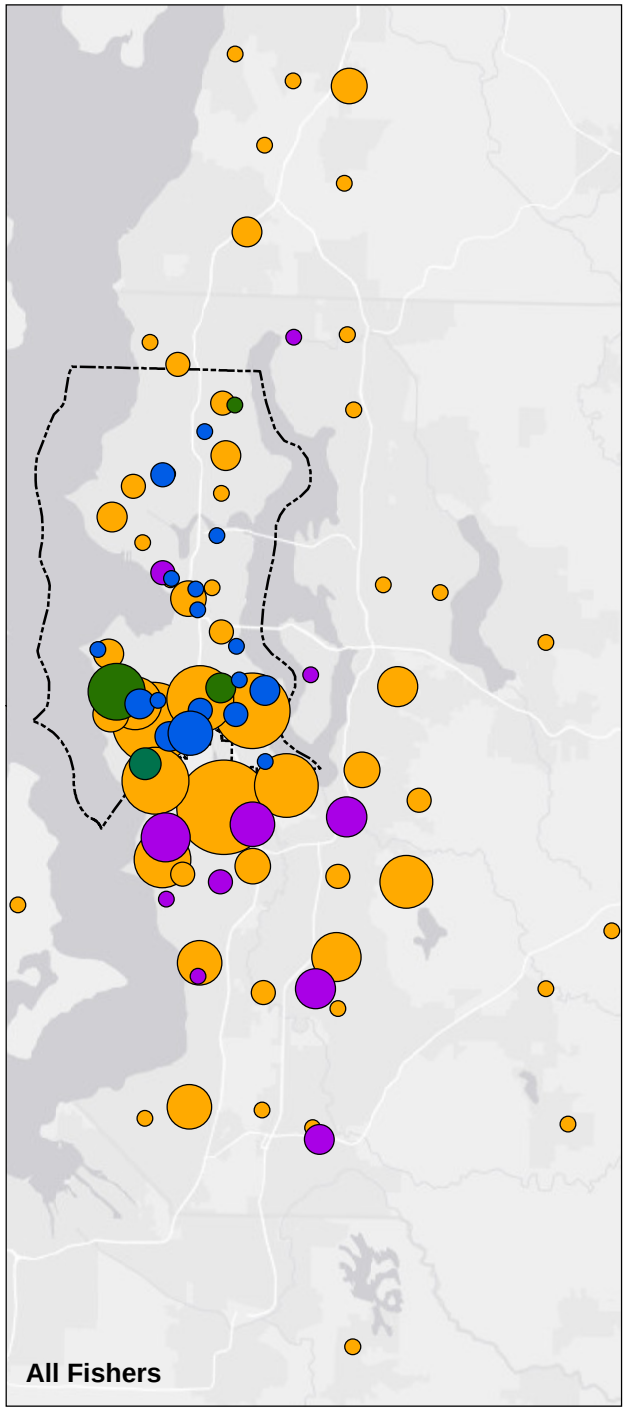
Home Neighborhood Location

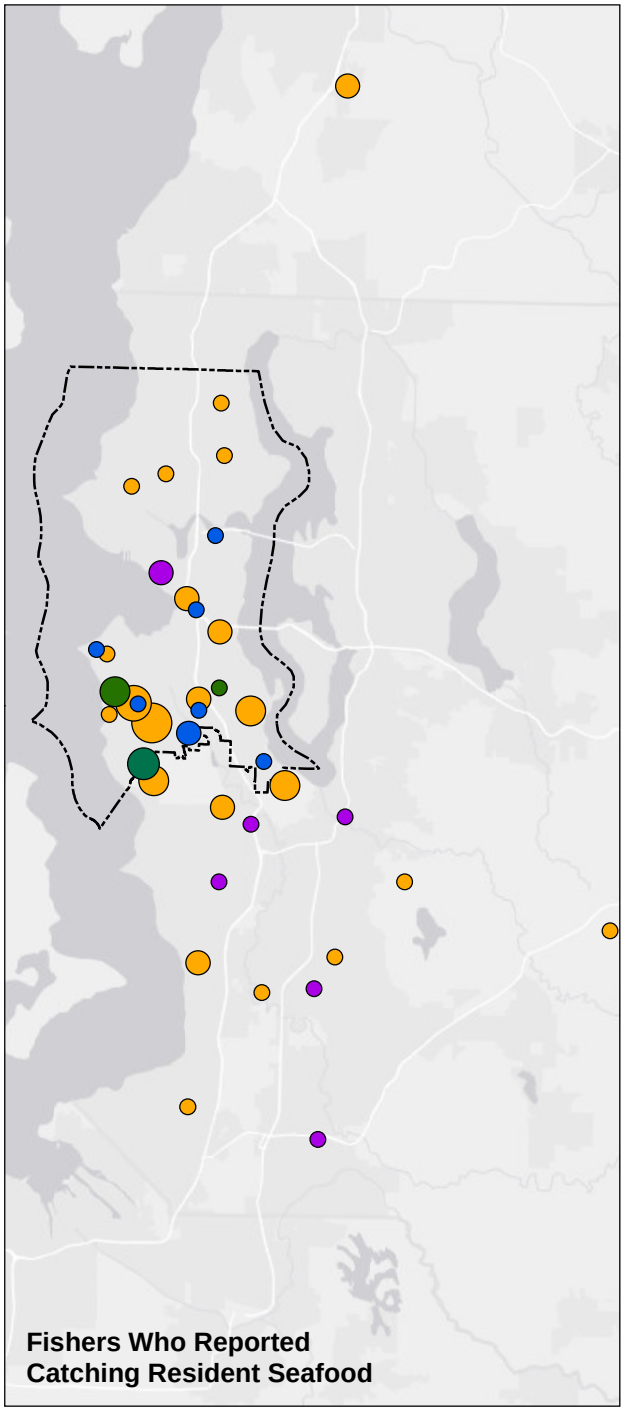
The on-river study also collected information about where the fisher lived at the time of the survey (by the home city, neighborhood, or zip code). The majority (approximately 75%) of fishers, both fishers who reported catching only salmon and those who reported fishing for resident seafood, were from South/West Seattle or areas south of the Seattle city limit (Map 4-1). On average, the home location of both fishers who reported catching salmon and those who reported catching resident species was approximately 10 miles from the Duwamish; the weighted standard deviation was higher for fishers who reported targeting resident species (33 miles) as compared with those targeting salmon (18 miles) meaning that fishers who reported targeting resident species came from a wider area.[19] The maximum distance traveled for both groups was for one fisher who reported a home location that was approximately 260 miles from the Duwamish River. It should be noted that fishers who were from further away were not asked whether they came to the Duwamish specifically to fish, or whether there were other reasons (e.g., work or visiting friends/family) that brought them to the Duwamish area.

Fishers on the Duwamish are people of various ethnic groups who come to fish on the Duwamish from many areas (Map 4-2). The preferred language of Duwamish fishers

[19] The average distance from a fishers' home location (e.g., neighborhood not specific house address) to the Duwamish River was calculated as a weighted average of the straight-line distance from a fishers' home to the Spokane Street Bridge.

was also assessed based on home location (Map 4-3). The percentage of fishers who indicated a non-English language as their preferred language was higher for fishers who reported catching resident species, particularly among fishers from the West/South Seattle area. Among fishers from that home location area, approximately one-half of fishers who reported fishing for resident species indicated a non-English language as their preferred language.





Number of Respondents

1

5

10

Level of Geography

- Small Neighborhood
- Large Neighborhood
- City
- Zip Code
- Seattle City Boundary

Note: Repeat survey takers were excluded to avoid double-counting.

N

0 5 10 Miles

0 4.5 9 Kilometers

Scale is the same for each map frame

Map 4-1. Home neighborhood locations for all fishers and for fishers who reported fishing for resident seafood

FINAL

Windward environmental LLC

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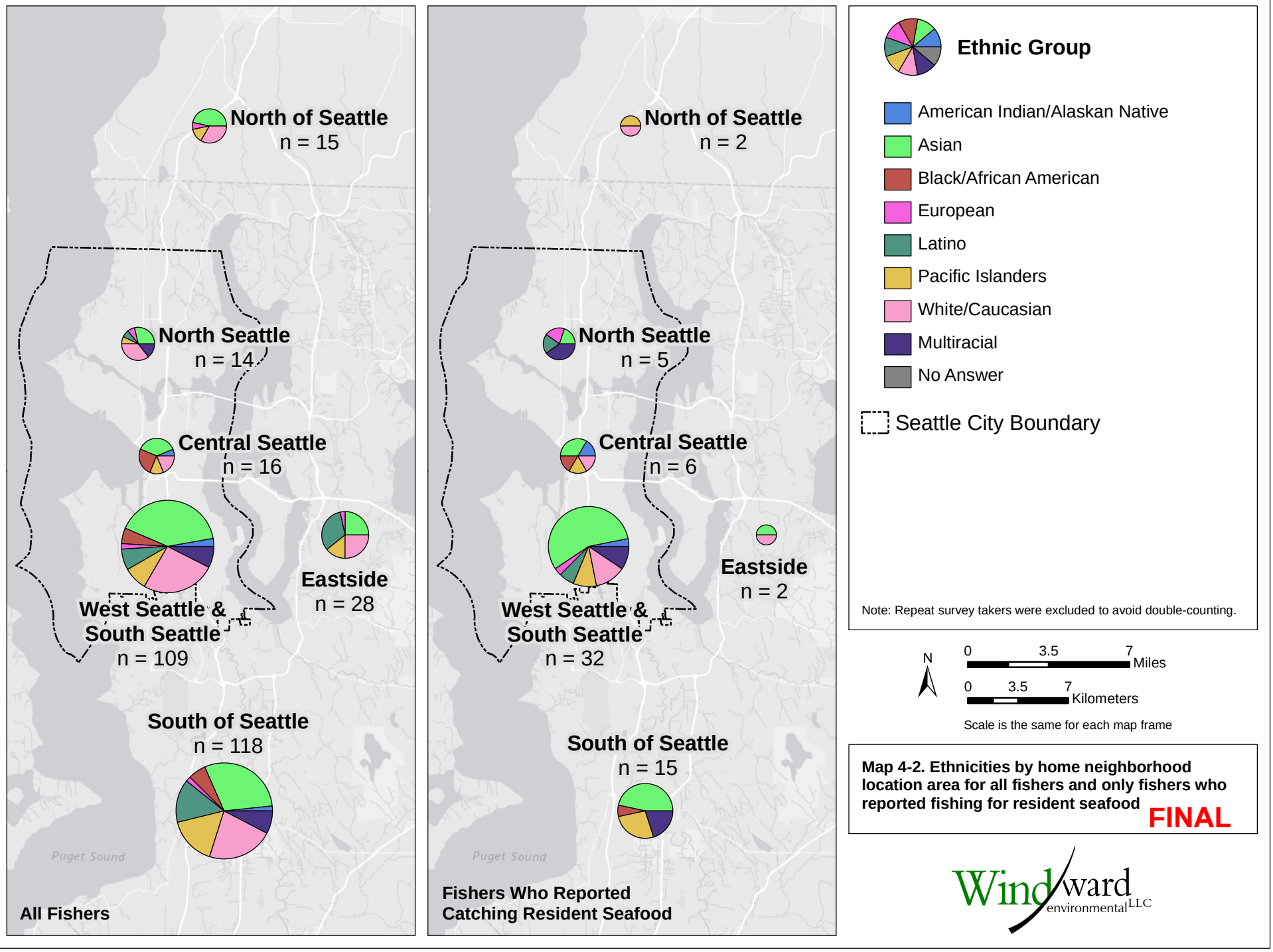

Map 4-2. Ethnicities by home neighborhood location area for all fishers and only fishers who reported fishing for resident seafood

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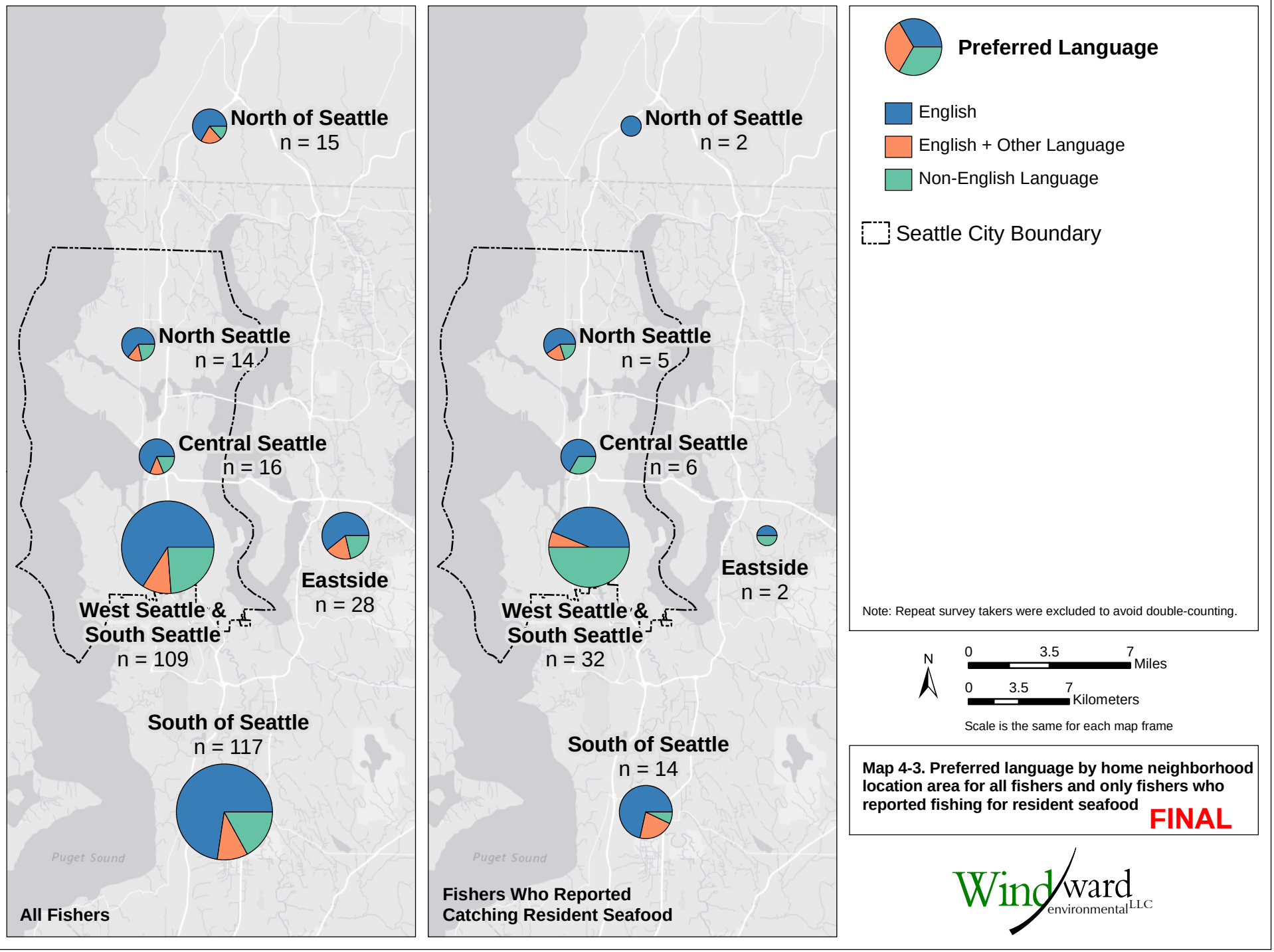

Map 4-3. Preferred language by home neighborhood location area for all fishers and only fishers who reported fishing for resident seafood

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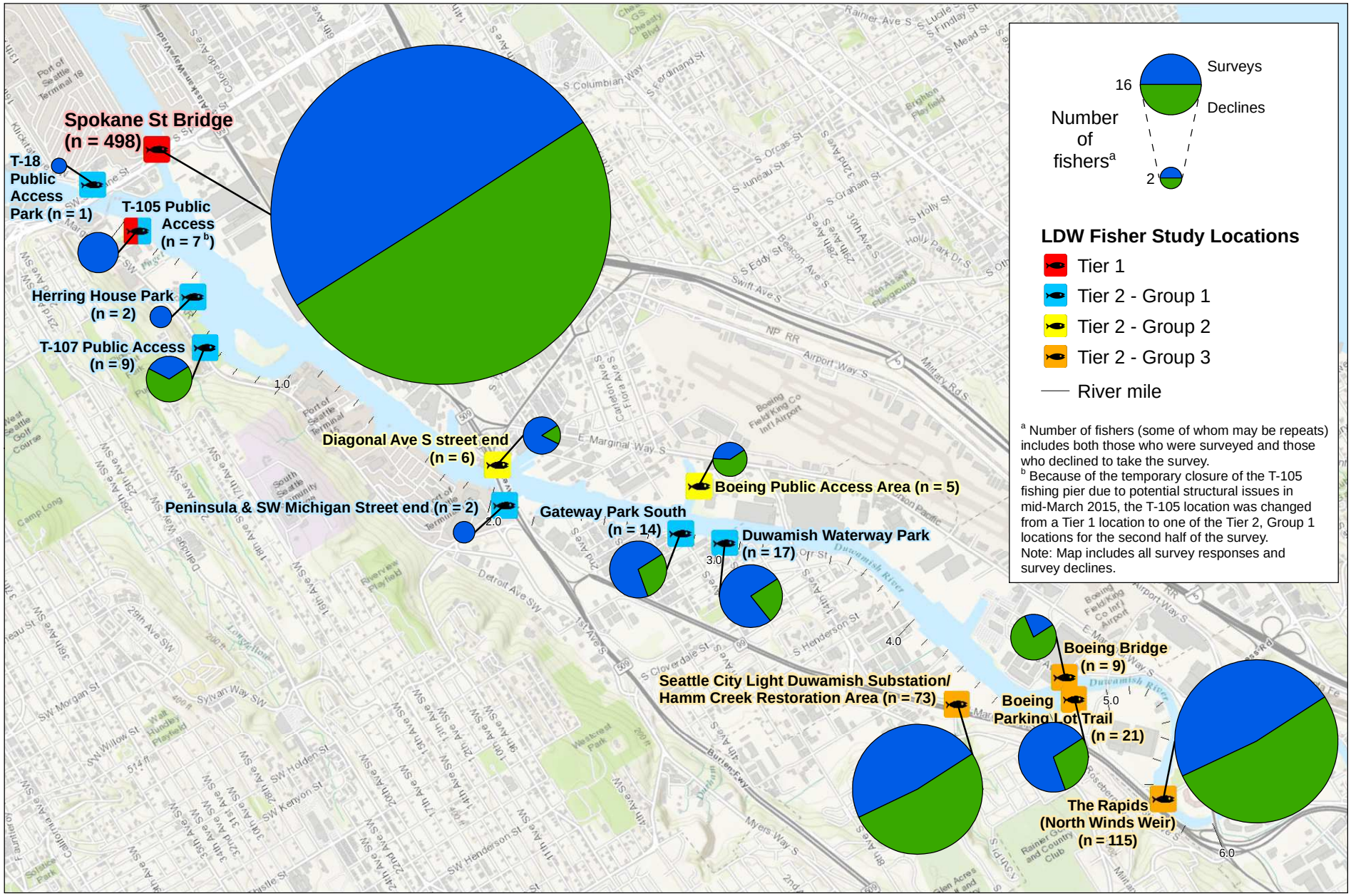
Where were people encountered on the river?

Fishers were encountered at 15 of the 17 survey locations included in the fishers study (Map 3-1), meaning that either at least one survey was completed or one fisher declined to take the survey at each of these 15 locations. As shown on Map 4-4, the majority of fishers were encountered at the Spokane Street Bridge, which is known to be a popular fishing destination, particularly for salmon. Several Tier 2 locations were also relatively popular; more than 50 fishers were surveyed or declined to be surveyed at both the Rapids/North Winds Weir and the Hamm Creek Restoration Area.

At the Spokane Street Bridge, about 81% of the fishers encountered reported that they were fishing for only salmon, while 19% reported that they were fishing for resident species (in addition to salmon in some cases) (Map 4-5).[20] This map also shows that fishers at several of the popular upstream locations reported fishing for only salmon; this may in part be because of habitat limitations (i.e., these locations are predominantly freshwater where many of the reportedly targeted resident species do not reside because they are marine species). Fishing locations were also examined by preferred language category (Map 4-6). English was the primary preferred language reported at all fishing locations. In general, the breakdown of fishers by preferred language category was relatively similar at locations with at least 10 completed surveys.

[20] These percentages are based on self-reported information (i.e., a survey rather than direct observation). Therefore, there is some uncertainty in quantifying fishing for salmon vs. non-salmon. Nevertheless, this type of information is useful in obtaining a general understanding of the fishing population (see Section 5.2.1).



Windward environmental LLC

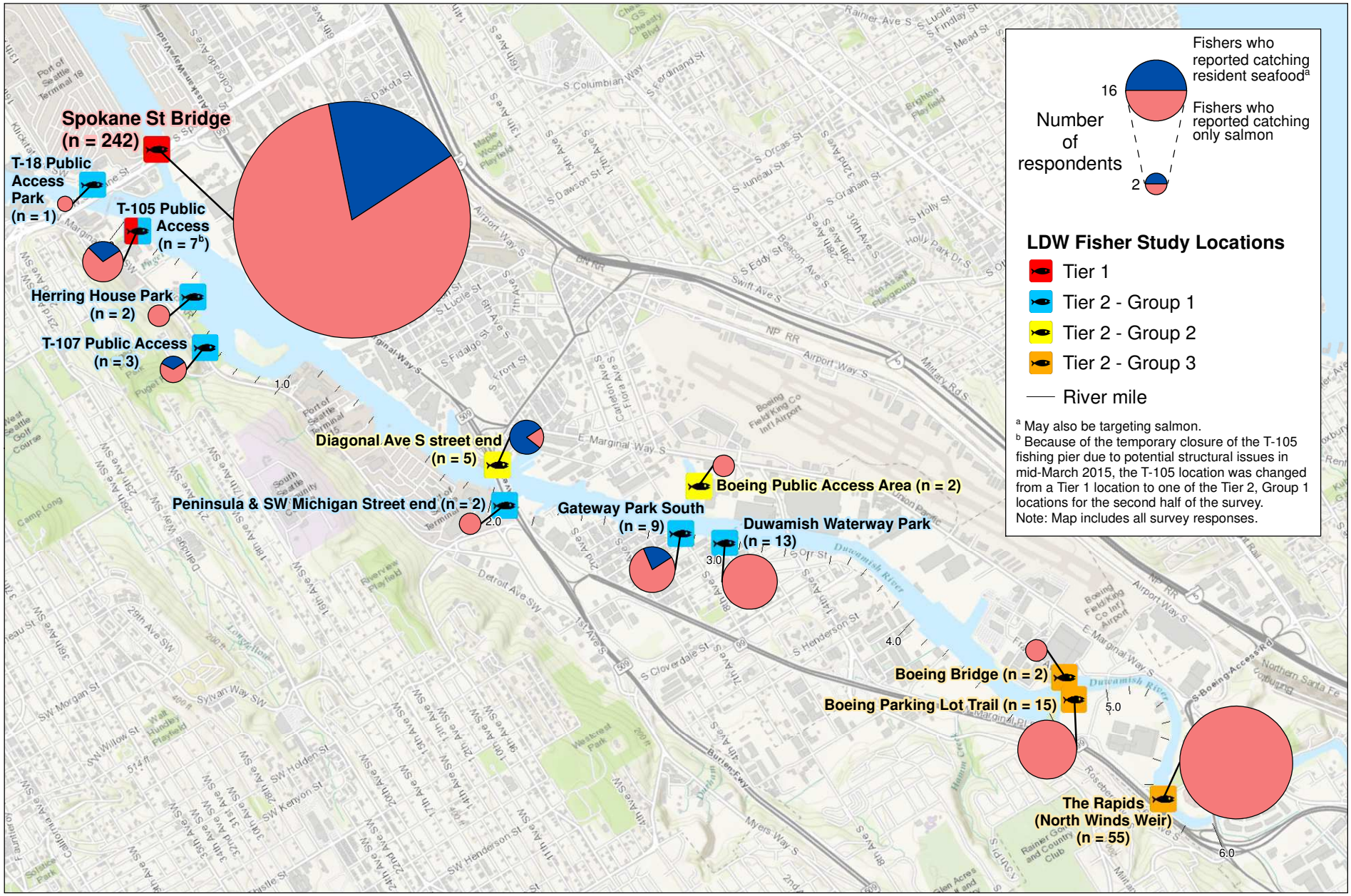
0 0.5 1 Miles

0 0.5 1 Kilometers

Map 4-4. Summary of surveys conducted and declines by survey location

FINAL

Prepared by lindam, 10/11/2016, \\rsatcompany\Projects\00-08-06_Duwamish_R\data\GIS\Fisher Study\Data Report\Map 4-4 6385 Survey locations by survey v decline All.mxd



Windward environmental LLC

0 0.5 1 Miles

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Map 4-5. Species that fishers reported fishing for on that day by location

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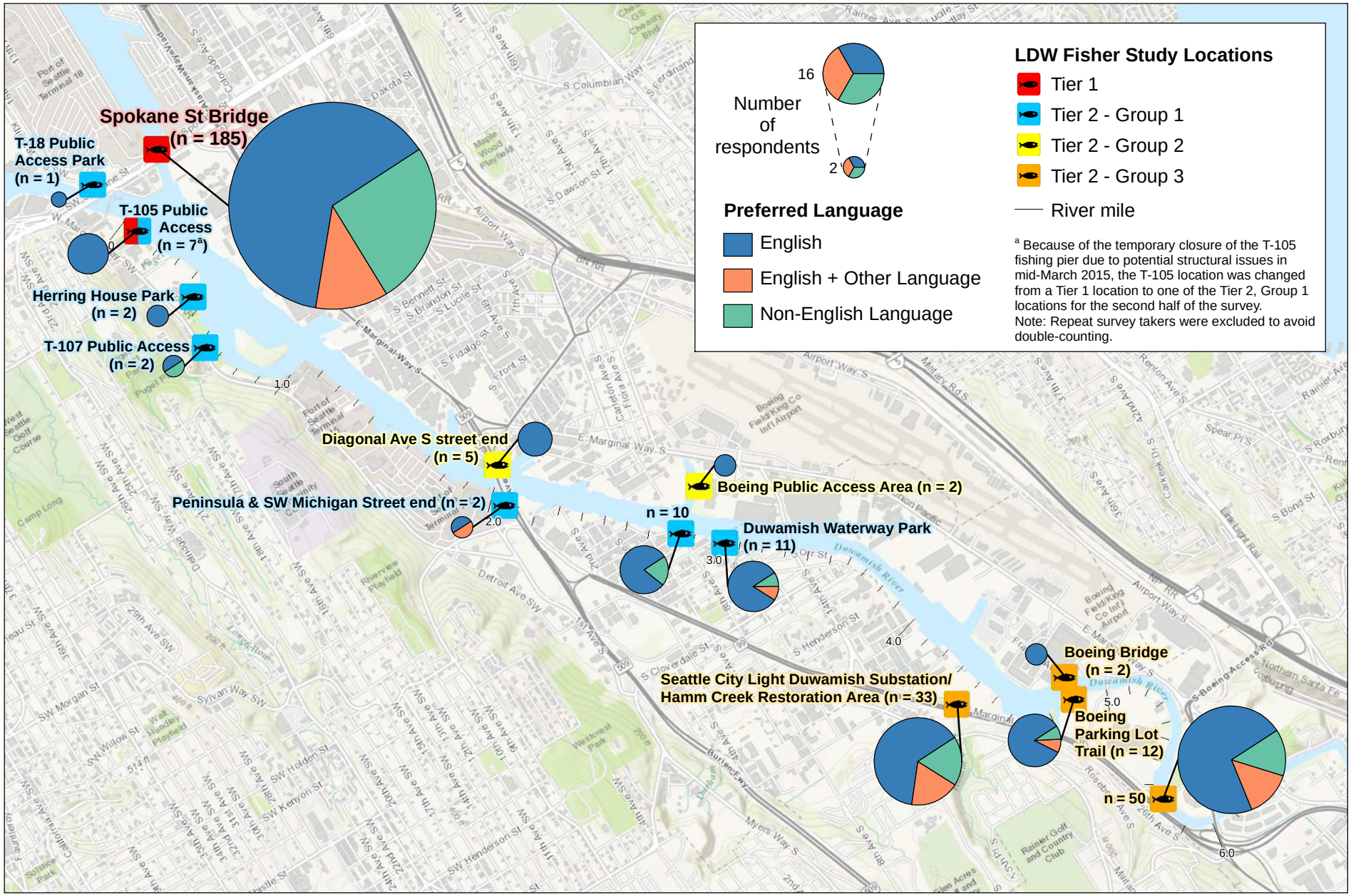

Windward environmental LLC

0 0.5 1 Miles

0 0.5 1 Kilometers

Map 4-6. Summary of preferred language by survey location

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When are people fishing on the river?

The frequency with which fishers were encountered on the Duwamish varied greatly by season (Figure 4-3). Of the 400 on-surveys completed, most were completed within the fourth quarter (July to September), followed by the first quarter (October to December), the third quarter (April to June), and the second quarter (January to March). The relative prevalence of fishers encountered during the fourth quarter was in part influenced by the pink salmon run, which was open the last week of August and during September and is known to be popular with fishers. Fishing regulations also allowed for salmon fishing in the Duwamish (chum, coho, and steelhead) from the start of the survey (October 1) through January 31, although salmon runs were not necessarily occurring during that entire time period.

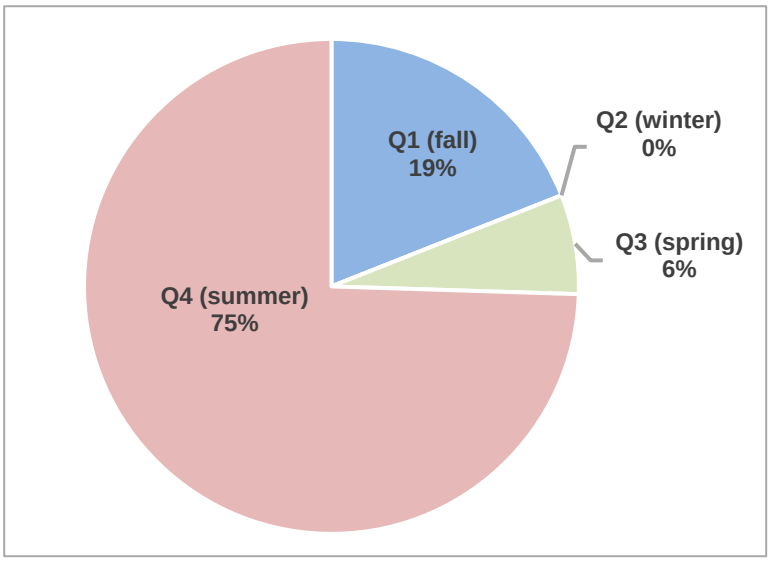


Figure 4-3. Number of surveys completed per season

The seasonality of the numbers of fishers who declined to take the survey followed a similar pattern, further reinforcing the times of year when fishing on the Duwamish is most common (Figure 4-4). The majority of fishers during the first and fourth quarters of the survey (i.e., October to December and July to September, respectively) reported fishing only for salmon (Figure 4-5). Although relatively few fishers were encountered during the third quarter of the survey, nearly all reported catching resident species (salmon season was not open during this time).

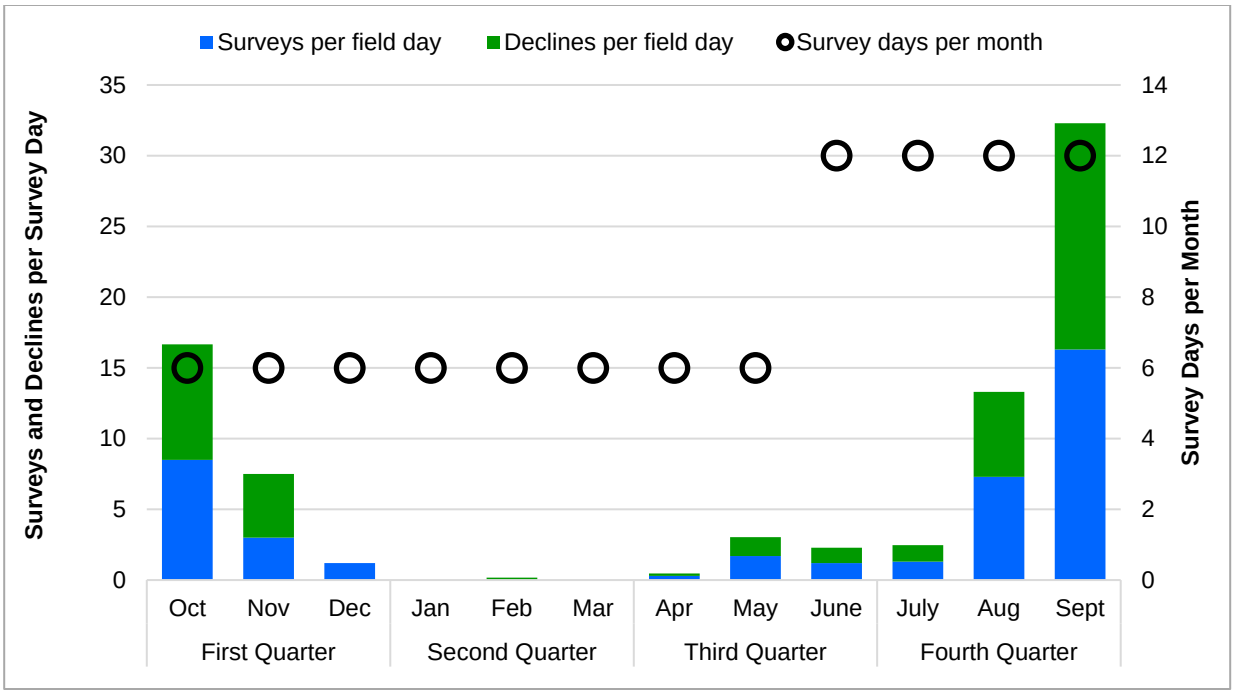
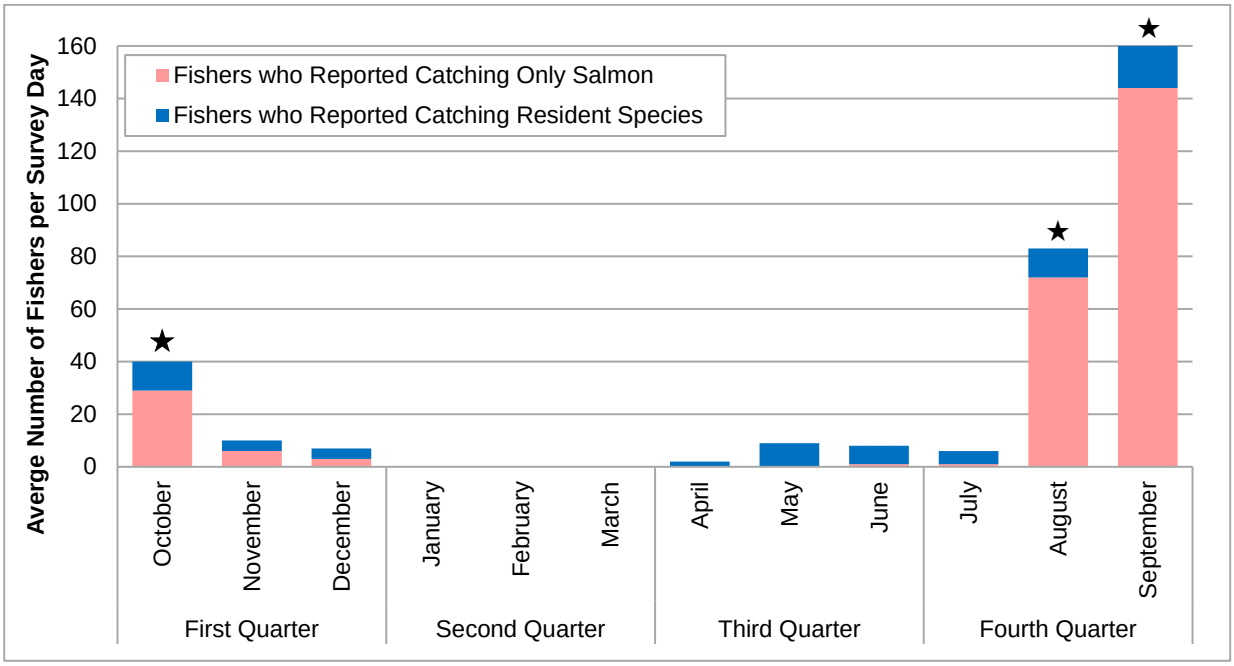


Figure 4-4. Daily average number of surveys conducted and declines by month

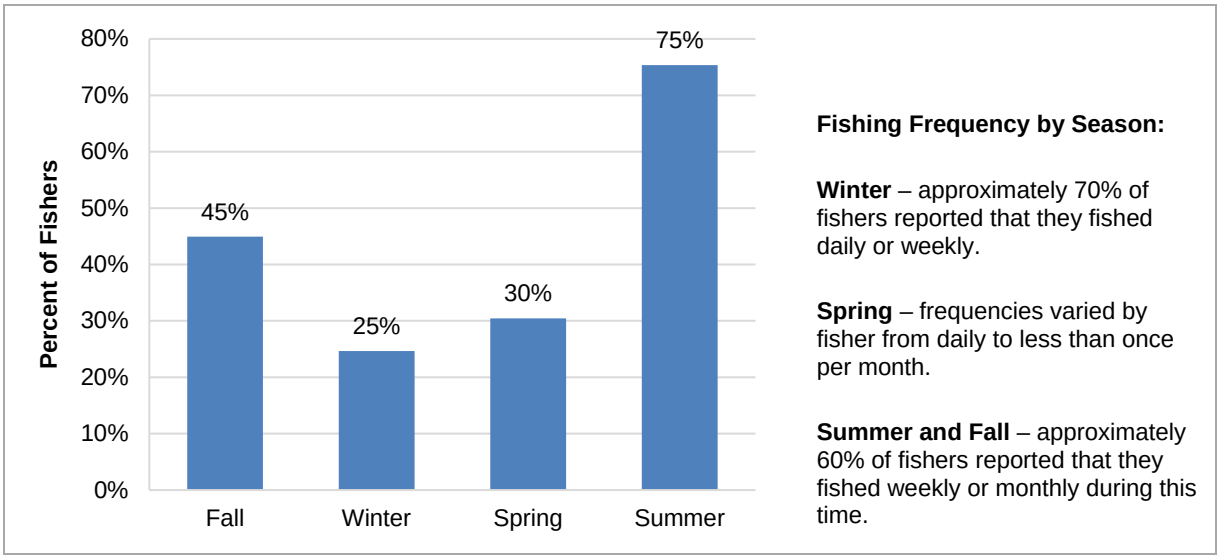


Note: Figure includes first-time respondents only. Fishers who did not provide a response to the question regarding what species they were fishing for (to determine whether they fished for resident species or only salmon) are excluded from this figure, and thus the totals do not match the totals in Figure 4-4.

★ – Indicates that salmon season was open on the Duwamish during this month.

Figure 4-5. Daily average number of fishers who reported catching only salmon and fishers who reported catching resident species by month

When asked when they fished on the Duwamish, fishers reported fishing most in the fall and summer, consistent with patterns observed during the survey (Figure 4-6). The main difference was that although fishers reported fishing during the winter, no fishers were observed fishing during the survey in January, February, or March, except for one fisher who declined to take the survey during that time. Figure 4-6 also provides a brief summary of the fishing frequency information provided by fishers as part of the survey; the frequency information did not always match what was observed in the field. For example, fishers who reported fishing during the winter said that they fished either daily or weekly, whereas only one fisher was observed during the winter months.



Note: Responses are for resident-species fishers only; repeat survey takers were excluded to avoid double counting.

Figure 4-6. Percent of fishers who reported fishing in each season

4.2.1.2 Question 1b: What is being caught, and what is being done with the catch?

As part of the on-river survey, fishers were asked "What are you fishing for today?" and "What have you caught from this river over the last few years?" In response, the majority of fishers (78%, or 255 out of 325 first-time survey respondents) surveyed were fishing for only salmon and had fished for only salmon over the past few years (Figure 4-7).[21] Of the remaining 69 people, 49 reported catching both salmon and one or more resident species, and 20 reported fishing only for resident species. The most frequently caught resident species, based on fisher responses, included perch, bait

[21] These percentages are based on self-reported information (i.e., a survey rather than direct observation). Therefore, there is some uncertainty in quantifying fishing for salmon vs. non-salmon. Nevertheless, this type of information is useful in obtaining a general understanding of the fishing population (see Section 5.2.1).

fish/small fish, flounder/sole, crab, rockfish, and herring (Figure 4-7). Information regarding catch results by ethnic group and preferred language group is presented in Appendix D.

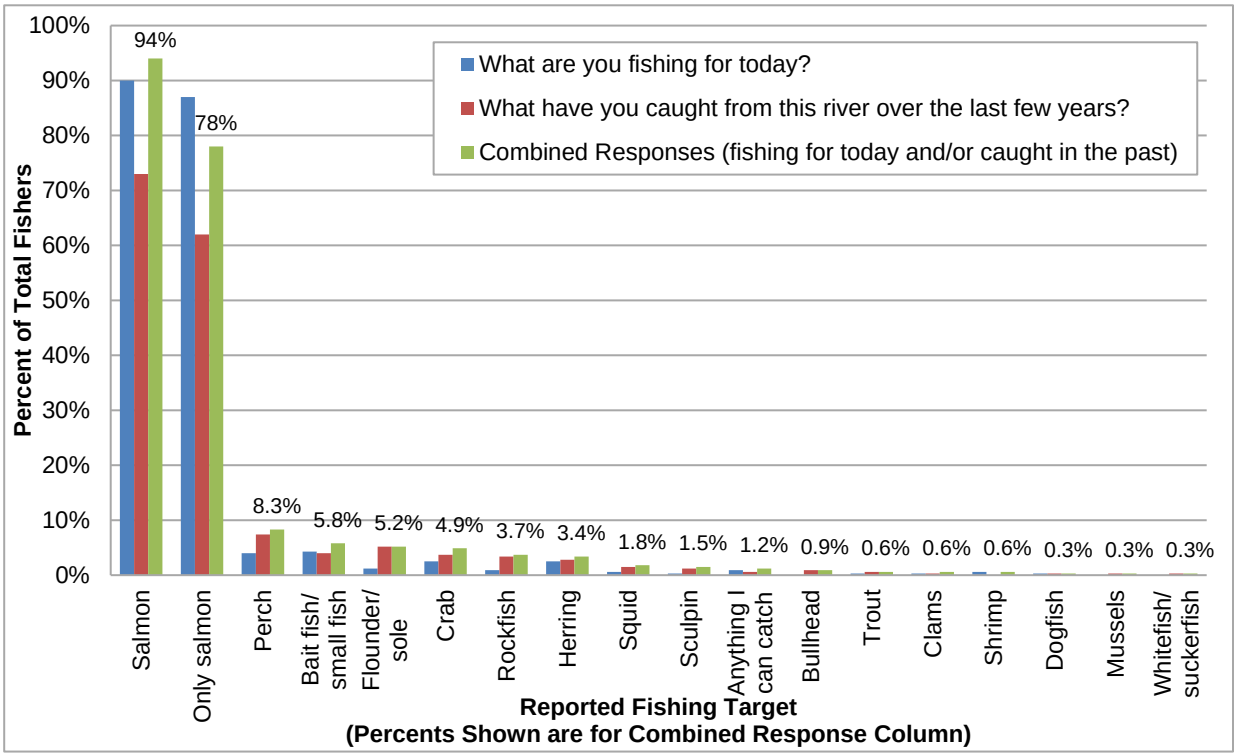


Figure 4-7. Summary of reported catch

Note: Data presented in this figure are for first-time respondents only. More detailed information is presented in Appendix D. Trout were not counted as a resident species for the purposes of this study.

For respondents to the on-river survey who reported catching resident species, several follow-up questions were asked regarding what they did with their catch. Of these fishers, 59% reported that they ate their catch and 55% reported that they shared their catch with others. Of the fishers who shared their catch, 84% shared their catch primarily with family and 63% shared with friends.

The data were assessed to determine if there are differences in catch-sharing behavior among different ethnicities, although the sample size for each group was generally quite small ($n < 5$) (Figure 4-8). The data suggested that some ethnic groups (e.g., Asian and Pacific Islander fishers) might be more likely to eat or share their catch than are Caucasian fishers. In addition, fishers whose preferred language is English appeared to be less likely to eat or share their catch than are fishers whose preferred language is a non-English language or both English and a non-English language (Figure 4-9). However, due to the small sample sizes for the ethnic groups (Figure 4-8), confidence intervals were not calculated for these data. Confidence intervals were calculated for the data presented in Figure 4-9, the confidence intervals for the data overlapped (i.e., the groups were determined not to be significantly different).

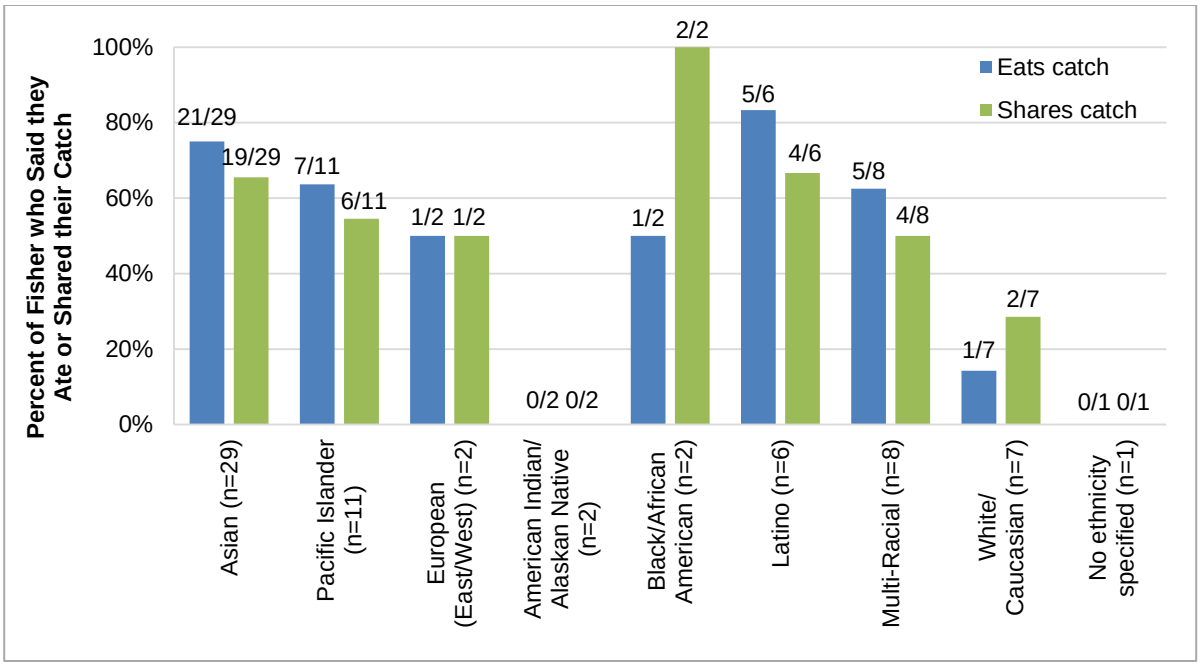


Figure 4-8. Fishers by ethnicity who reported that they eat or share the resident seafood that they catch from the Duwamish

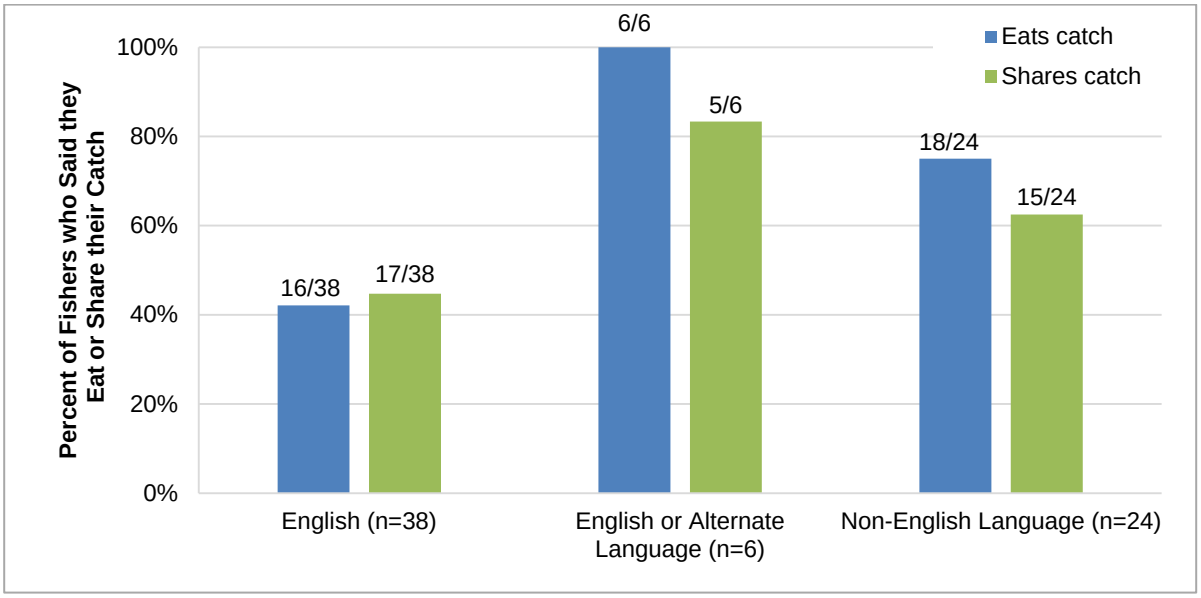


Figure 4-9. Fishers by preferred language who reported that they eat or share the resident seafood that they catch from the Duwamish

Sharing of catch was also discussed in the key informant interviews, which although not directly connected to the on-river survey data, provide additional useful information. Fishers noted three types of activities: sharing fish, trading fish, and selling fish. For fishers who share their fish, sharing primarily occurs with other fishers by the river, with extended family/friends, or as part of a home-cooked meal.

On the river, fishers sometimes share their catch with another fisher who did not catch anything that day. For example, one Vietnamese fisher said, "Fisher[s] who knows me, give their fish on the days that I wasn't catching anything."

Sharing of fish also occurs with close family and friends. Those who were interviewed often talked about giving away extra fish to family and friends. This usually only happens when the fisher has enough extra fish to share. A Mienh fisher commented, "Sometimes I get big catch, I share with my family – my kids, sisters, aunt, and my mother-in-law," while a Cambodian fisher noted, "Fish I caught in the Duwamish is for food of my family, and usually it is just enough for my family, not for selling or sharing with others." Much of the sharing occurs with friends and family over a meal. Fishers discussed how they would cook the fish and share the meal with those they cared about. A Cambodian fisher described, "I remember one time when I caught a big fish, I was so excited I called my wife to boil water and wait! It was fun!"

Some fishers also trade their Duwamish catch, although it is unclear how common this is. They may trade fish in order to get more variety or to offset the costs of fishing. For example, a Black/African American fisher commented that, "We have friends and we exchange salmon, sometimes they are tired of salmon. We change salmon for tuna" and that, "[She] gives a fish [in exchange] for the gas because she knows that gas is expensive."

Some fishers could sell their catch, but the key informants indicated that this does not happen often, primarily because fishers generally do not catch enough fish from the Duwamish to warrant selling. One Cambodian male said, "I did not sell to anyone. I usually don't give to others. I only fish enough for myself." If the fisher does sell part or all of their catch, the fish generally have been caught at another location where fishing is more productive, such as the Columbia River, Snake River, or other locations in Idaho or Oregon.

When fishers talked about sharing, trading, or selling their catch, a couple of fishers noted that they had concerns about the safety of the fish they were giving to others. Two fishers said that they did not feel comfortable selling or sharing their catch due to concerns about the healthfulness of the seafood. Example quotes included the following:

> Cambodian male: "I usually know that fish they caught were from far away, not from local. They are from Yakima, Shelton, Oregon, Idaho, and Snake River. Those areas are very far and it takes at least three to four hours' drive. Those fish are healthy because the water quality is good."
>
> Vietnamese male: "I normally give away salmon because it is safer than other fishes on the advisory board [to give] to family and friends. I do not want to give away other fishes because I am afraid I might make other people sick. I don't want that to happen. That's a great liability. That's why I mostly eat what I caught (perches)."

4.2.1.3 Questions 1c and 1d: Who is preparing and eating the seafood? How is the catch being prepared?

Most of the preparation information was gathered as part of the key informant interviews, which although not directly connected to the on-river survey data, provide additional useful information. In general, women appear to be the primary preparers of fish; however, some men also participate in the cooking. Fish are typically consumed by the family (as well as friends), which includes children, parents, and grandparents.

According to the interviews, fish are prepared in many different ways, depending on traditions, culture, and the type of fish. Preparation appears to occur in two phases: cleaning the fish and cooking the fish.

First, the preparer cleans the fish, which is sometimes done at the river after the fish has been caught, and other times is done after the fisher has returned home. Proper cleaning was noted to remove any "fishy smell," visual sign of "slime," or "dirty stuff," as well as prevent spoilage and improve taste. Fishers and preparers have definite practices they follow as part of their set of fishing skills. Cleaning fish involves removing the gills and scales (and sometimes the head or skin) and taking out the intestines. Scrubbing is done with warm water, vinegar, lemon juice, and salt. Shellfish are soaked in water to remove sand and shells are scrubbed.

Second, the fish is cooked, and again methods vary by person and the species being prepared. Common methods include deep frying, steaming, boiling, baking, stir frying, and smoking. For example, a Black/African American fisher who believes that salmon begin to deteriorate once they enter freshwater noted that,

> "If we catch some inside the river most of them go to the smoker. We smoke salmon or cook it entirely. We sometimes even cook the salmon after we smoke it. The other thing Mom does is we take all the collars, bellies and the bones she makes this ginger, soy sauce, sake stew, cooks it down, throw it on some rice. Pretty good."

During the key informant interviews, a few fishers and preparers said that they use certain methods to clean and cook the fish as a way to protect themselves from germs or other types of contamination. For example, a Cambodian participant commented "By the way, I cooked them as deep fried with very hot oil. Deep fried means that over cooked. Usually hot oil can kill all kinds of germs and anything else." In order to avoid high cholesterol, two fishers (Vietnamese and Cambodian) avoid eating "the greasy parts" and the hepatopancreas of crab. For most fishers and preparers, methods used to make seafood safe to eat aim to reduce spoilage and remove germs, bacteria, or other unwanted items from the seafood.

A few fishers and consumers who participated in the key informant interviews said that they take some action to avoid exposure to chemical contamination in the fish they eat. For example, a Mienh consumer said "Well, you always hear that the skin has a lot of mercury or something like that so I try to avoid the skin, but it also looks gross to me." In addition to cooking methods, some noted that they only eat salmon or "fish that swim through" the river. One fisher who was aware of fish advisories said "I have limit myself eating less of certain fishes like perches and bottom fishes." A Latina fisher took the precaution of only fishing upstream on the Duwamish "away from the industries." One Black/African American fisher remarked that "There is level of, is it, mercury, in a lot of different fish." However, his family continues to "eat a lot of seafood [because] how healthy is anything we eat? I don't know."

4.2.2 Part 2: What are the benefits of fishing in the Duwamish? What is currently known by the community about the risks of consuming seafood collected from the Duwamish?

4.2.2.1 Question 2a: What are the perceived benefits and obstacles of fishing on the Duwamish?

Benefits of and obstacles to fishing on the Duwamish, as well as information provided by fishers about the impact of a closed Duwamish (i.e., their feelings and alternatives if they could not fish on the Duwamish), are discussed in this section.

Benefits

As part of the on-river survey, fishers who reported catching resident species were asked "Why do you like to fish?" and "What are the reasons you come to this spot to fish?"[22] In response, 88% of the resident-species fishers said that they like to fish for fun or recreation (e.g., it is a hobby or a family tradition). Another common (30%) reason reported was that fishing was a source of food or fresh fish. With regard to why people come to the Duwamish to fish, the primary reasons offered were location characteristics that made it a good place to fish (55% of fishers) or the convenience of the location (39% of fishers).

Similarly, in the key informant interviews, fishers reported benefiting from fishing in several ways. When talking about fishing in general, every fisher described fishing as an enjoyable leisure-time activity, as well as a good way to get outdoors and relieve stress. Many fishers reported that they enjoyed the activity in and of itself, even if they did not catch much. Several example quotes that help to illustrate these points are provided below.

> Cambodian male: "For me, fishing is important … a way to enjoy time outdoor, able to watch the waterway and to ease stress after days of working."

[22] Fishers often provided multiple responses to these questions, and thus the percentages discussed in this section generally do not add up to 100%.

> Mienh male: "I usually go like early in the morning on a sunny day … Fishing is very important to me, but I do it for the fun of it and for my hobby."
>
> Vietnamese female: "I go fishing for fun and I am happy that I would catch one or two fish. If not, then I am not sad. So it's not important [to catch anything]."
>
> Latina female: "I fish for salmon, herring and whatever bites the bait. I go fishing to be next to the river and relax, and be by nature."

Fishing brings secondary benefits as well. A Cambodian fisher pointed out that in addition to having fun, bringing home fresh food is a benefit: "Fishing is also a hobby and money saving, too." Mienh fishers and their family members, in particular, stressed the benefit of "free" food. "It's important because we like to eat and my family likes to eat [fish] so we don't have to pay for it, good to get free food [laughs]." A Black/African American fisher argued that harvesting seafood is not free at all, an opinion expressed by several fishers. "Don't believe that food is free. You have to buy fishing gear, fishing poles, lines and lures, hooks, weights. Then you have to get in your car, get gas and food. Not free in the slightest bit." In addition to any cost benefits, some fishers indicated that seafood that has been caught in the wild is seen as superior to what can be bought in the store. A Cambodian male said that "It's important because it is fresh from the water and it is different than getting from the store which has been frozen in the freezer for too long." Similarly, a Mienh male said "…it is also fresh from the river so that taste much better than the frozen fish from the store."

For many of the fishers interviewed, some of the enjoyment in fishing comes from being with other people. One Cambodian male said "I don't like to go fishing alone because I need friends to speak with. Sometimes we have fun of competition on who can catch more fishes." Similarly, a Vietnamese female said "I go with my friends to fish and it's fun. But I would never go by myself. It's sad and [there is] no one to talk to." Social relationships are also formed around interactions involving reciprocity. Rides are shared, information passed along about good places to fish, and catches are shared if one fisher has had more luck than others on a particular day.

For some, the social benefits include spending time with family. A Latina woman said "It's nice to take my kids. My son is going through a rebellious phase, so taking him calms him down. And he doesn't fight with my husband as much. So it's me and him chatting peacefully. And he likes it. I think it's something important for our family." This feeling was expressed by a Mienh woman as well, who said "It's a good way for friends or family gathering. It's a good bonding experience."

Fishers generally return to favorite fishing locations and build relationships on the water. These relationships, which can traverse ethnic lines, are based on an enjoyment of fishing and the skill the fisher acquires over time. One Black/African American male stated the following:

> "I know that especially for the older guys that I have known for a long time, there is a sense of community. None of us have each other's phone numbers but we share the same spots for every year. [It] is a running rule that if you catch the first King salmon of the day you bring doughnuts the next day. I think it's the Filipino doughnut rule or something like that."

Finally, fishing benefits those who consume the catch because fish is perceived as a healthful food. This topic was addressed by 17 of the 22 respondents, and as shown in Table 4-7, the example quotes demonstrate the consistency of this view across ethnic groups.

Table 4-7. Quotes on the health benefits of eating fish

Ethnicity	Quotes
Cambodian	"Actually I listened to my doctor recommendation that fish meat is better than red meat." "Fish is good to eat for people with diabetes too because diabetics are limited in eating red meat." "I reduce eating meat as pork, beef, and chickens. I know fish meat helps reduce the high cholesterol." "Fish fats help with memory and is good for brains."
Vietnamese	"I eat fish for health benefits." "I love to eat fish because it has less fat. It is easier for the digestion." "I really like fish because it's healthy and it is important to me that the fish is fresh."
Latino	"Fish is healthy because it has less fat than beef or chicken. Fish is better."
Mienh	"We just think that eating fish is healthy. It's not that much fat compared to other meats." "I agree that eating fish is healthy and it's not that much fat." "I think it helps me with my high blood pressure diet compared to other stuff." "I feel the same, too. I try to eat less meat, plus fish tastes good, too." "I think that fish has less fat and so it does not make me as fat when I eat it." "It definitely has less fats, I just love fish, and I think fish is very healthy because it is more natural." "Well, if you compare chicken versus fish, you definitely feel much lighter when you eat fish than chicken or beef." "It makes my body feel lighter when I eat fish, better digestion."
Black/African American	"Fish is better for health than meat."

Obstacles

Fishing provides many benefits, but there are obstacles to going fishing as well. The fishers interviewed mentioned at least five reasons they might not get to fish as much as they might like, as follows:

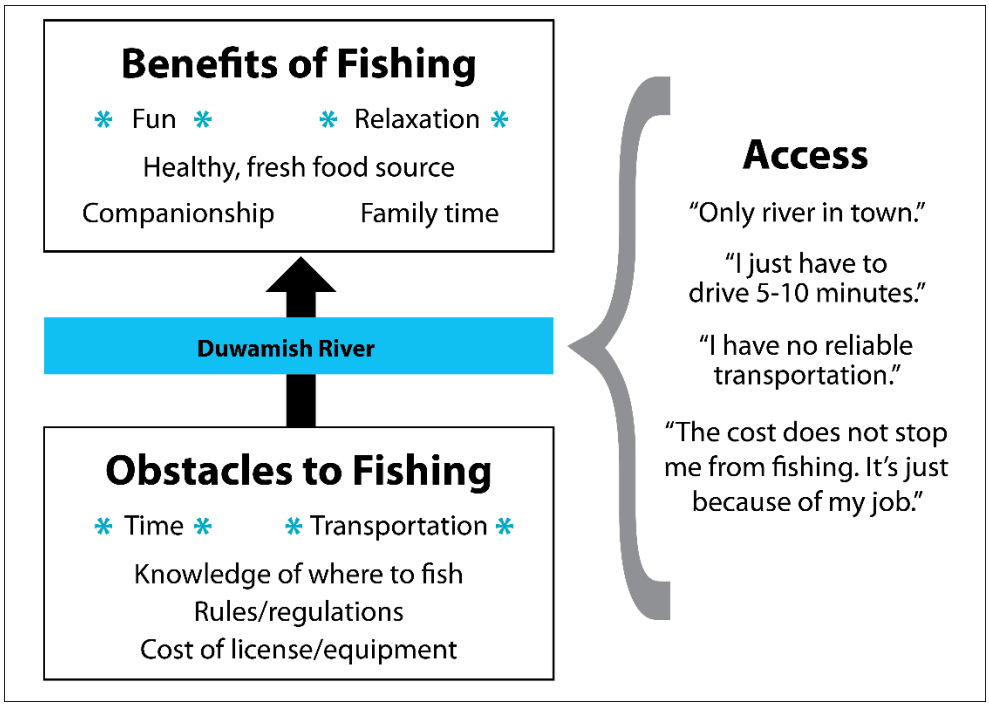
- **Time –** About one-half of the fishers mentioned work and family obligations as reasons they did not get to fish as often as they would like. Available time

limited how far from home people could travel to fish; they accessed faraway rivers and lakes only occasionally, when the time to get there was available.

- **Transportation –** Some fishers did not have reliable transportation or did not drive themselves, so they were dependent on others to go fishing. One fisher noted that public transportation was not an option because of all the equipment and supplies needed to go fishing.
- **No knowledge of other places to fish –** Some fishers were aware that other fishers travelled to more distant locations but did not know where those locations were or how to get there.
- **Regulations such as limits, seasons, and Tribal rights –** Some fishers expressed frustration with fishing rules and regulations that they found too restrictive and confusing, and that were always changing. One Cambodian fisher complained, "I stop fishing for perches because there is limit to only 15 per catch. They are too small and too little amount." A Black/African American fisher noted that "They keep changing the rules and I think that is not right." He complained, "They don't give us a chance to fish there [Spokane Bridge]. Like this year, they really changed. They usually don't [let tribal fishermen] put the nets up before they open the season, but this year they let them put up the nets [out] before the season. Well, you can do it, but it causes a problem with the fish. It spooks the fish and they don't want to bite."
- **Cost of equipment and license –** Some fishers noted that fishing involves many expenses, such as the costs associated with gear, bait, licenses, transportation, and food. Conflicting information was provided regarding the cost of fishing equipment and licenses as an obstacle for fishing on the Duwamish. Many fishers said that the cost of fishing was offset by the fish obtained for food, while other fishers said that the cost of fishing might exceed the cost of buying fish in the store, but felt it was worth the expense to engage in a valued pastime. A Cambodian woman explained, "I have to spend money for buying gas, foods for my kids. I do not do it for myself, but I do it for my kids as a family activity and my two kids like to fish a lot. As a matter of fact, I spent the money to buy those such as fishing pole, baits, and lines." None of the fishers thought that the cost of buying a fishing license was unaffordable. A Vietnamese fisher explained, "License fee covers a lot of fishes such as perch and salmon." He went on to say that if he lost his license, "fishing is my favorite sport and I don't mind buying another license." A Mienh female consumer said "actually, the license is good for a year and we can save money [by] not go[ing] to the store and spend that amount on the license and get that free fish from the river."

Overall, time and transportation were stated as the two main obstacles to fishing. Based on the key informant interviews, it appears that many fishers using the

Duwamish live within a reasonable driving distance and one fisher said that he was able to ride a bicycle to get there. With limited time, being relatively close to the river opens greater opportunities to fish. Figure 4-10 presents a summary of the benefits of and obstacles to fishing that were discussed, and presents a summary of access considerations.



Note: The primary benefits and obstacles are indicated with blue asterisks.

Figure 4-10. Importance of the Duwamish to fishers

Impact of a Closed Duwamish

When asked how they would react if they heard that the Duwamish was closed and that its seafood was not safe to eat, the fishers' responses were emotional: "sad," "disappointed," "awful," "devastated," and "would be bored." Many fishers shared sentiments such as that expressed by this Cambodian fisher:

> "I would feel disappointed and unhappy. I don't want to fish somewhere else that is too far. Other people might have to go other places further away. Sometimes, they might stay home. They might think that they do not have time and if they have to go further places it would cost them more money and spend more gas. However, they might also feel disappointed as well since they cannot fish this place which is closer to their homes. As you may be aware, whenever the season is open, the place is packed of fishermen along the shore. Frankly, they would feel disappointed."

One Mienh fisher pointed out that the closure of the Duwamish would force a fisher to look for other places to fish in order to continue in his or her role as a family provider: "Well, if they can't fish there they can't bring anything like provide food for their family. But I think they will try to find another way to fish at a different location because it's essential for them to bring food home."

Another Mienh fisher spoke about the mental strain of not being able to fish: "Yes, so if I don't go fishing as much, then I would have more stress because I would stay home and I don't have nothing to accompany myself. So when I go, it gets my mind out of thinking, and it frees my mind. I think that maybe it's the same as everyone hoping to catch some fish, when we go fishing."

Other Fishing Locations

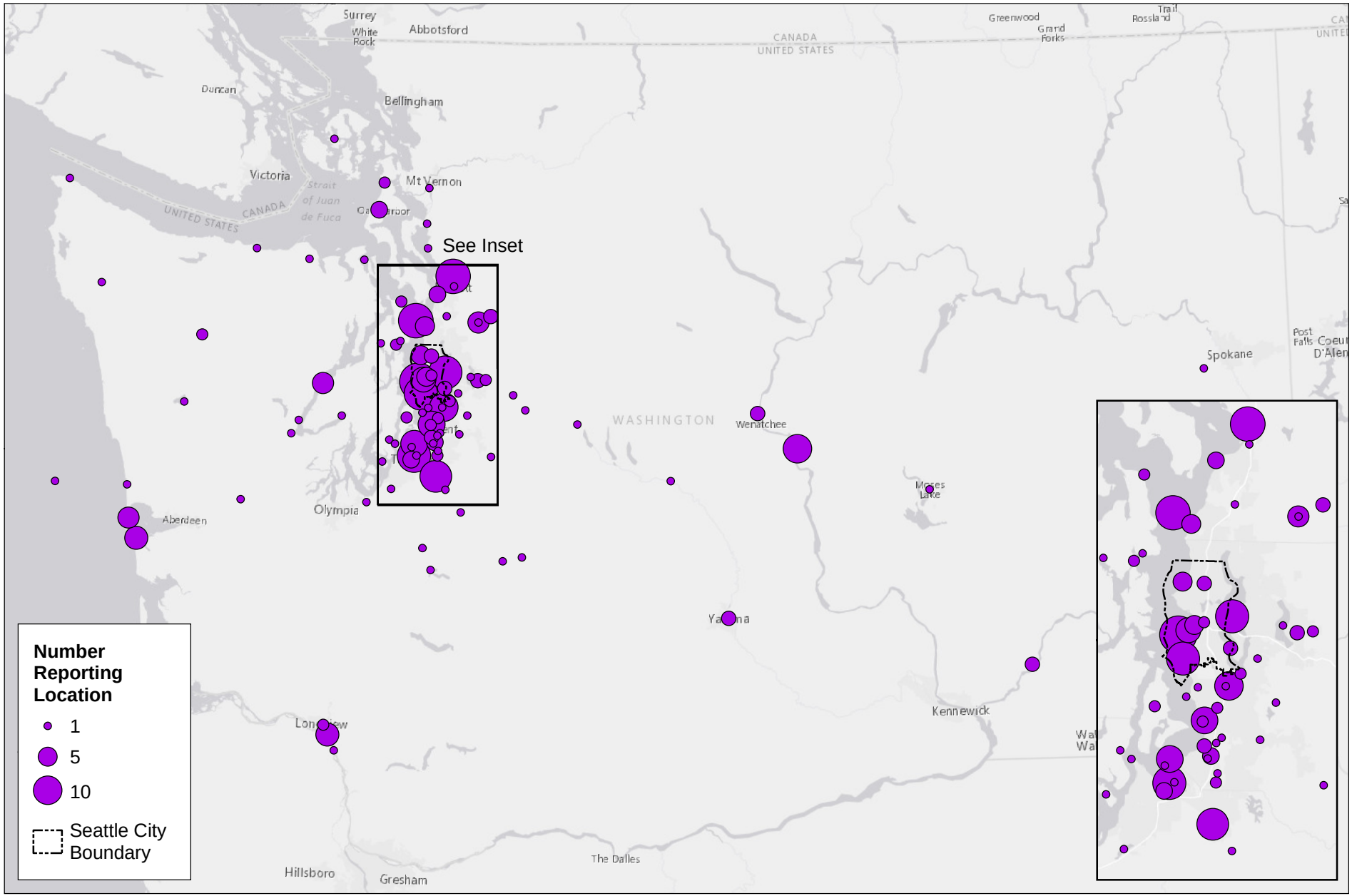
Based on the results of the on-river survey, approximately 67% of fishers (both those who reported fishing only for salmon and those who reported catching resident seafood) reported that they also fish at locations other than the Duwamish. Based on the survey data, fishers whose preferred language was English or English and an alternate language appear to be more likely to say they also fished elsewhere (70%) than fishers whose preferred language was a non-English language (50%).

Some of those fishers who reported fishing elsewhere provided information regarding where else they fished. Popular locations included:

- **Locations within the City of Seattle –** Seacrest Park pier (Alki), Green River, Lake Washington, and Lincoln Park beach
- **Locations outside of the City of Seattle, but within King County –** Des Moines Marina pier and Lake Washington
- **Other Locations –** Columbia River, Dash Point State Park pier, Puyallup River, Snohomish River, and other locations around Puget Sound

As shown on Map 4-7, the other popular fishing locations are generally located in the greater Puget Sound area, although some fishers reported traveling to more distant fishing locations throughout Washington State, such as the Washington Coast or Eastern Washington.

Among those fishers who did not fish elsewhere, the majority (approximately 80%) were from areas relatively close to the Duwamish (i.e., South/West Seattle or from just south of Seattle).



Windward environmental LLC

N

0 25 50 Miles

0 25 50 Kilometers

Map 4-7. Summary of other places that people reported fishing

FINAL

Prepared by craigh, 6/29/2016; W:\Projects\00-08-06_Duwamish_R\data\GIS\Fisher Study\Data Report\Map 4-7 6382 All first-timer other fishing locations.mxd

4.2.2.2 Question 2b: How do people understand risk? What are the perceptions/cultural models of risk among the groups that fish for and consume Duwamish seafood?

The way that fishers perceive risk was explored as part of the key informant interviews. Fishers used a variety of methods to determine whether they considered seafood safe to eat, including the following:

- **Personal assessment of water quality** – Fishers said that they could determine whether river water was polluted by smell, color, turbidity, and degree of movement. Fishers who had immigrated to this country compared water in the Duwamish to water in their home countries, and by that standard, judged the river here to be clean.
- **Visual inspection of fish** – Many of the fishers in the key informant interviews who caught resident species said that they believe that a visual inspection can reveal if a fish is unhealthful to eat. These fishers look for clues—such as dark color, the presence of worms in the fish tissue, or whether the fish species lives on the bottom of the river—to determine the safety of the fish to eat.
- **Experience of sickness** – Few fishers had ever become or heard of someone who had become sick after eating seafood caught from the Duwamish, and this lack of acute effects appeared to indicate to the fishers that the seafood is safe to continue eating. In addition, many fishers know other individuals who have been eating fish from the river for a long time with no ill effects, further strengthening their conclusion that the seafood must be safe to eat.
- **Information from others** – Fishers also based their conclusion that seafood from the Duwamish is safe to eat on information from other fishers or other people in their communities (or lack of information indicating a cause for concern). In addition, some fishers seemed to believe that because there were fish advisories, rather than outright bans, the fish are safe to continue eating.

Together, the methods that fishers use to evaluate the safety of the food that they are consuming leads to the conclusion that seafood from the Duwamish is safe to eat. Another perspective mentioned during the key informant interviews was that due to the serious challenges some fishers had faced in their home countries, such as lack of food and personal safety, they may view the potential contamination of seafood and the possible long-term effects differently.

4.2.2.3 Question 2c: If people are continuing to fish, why?

As explained in responses to Question 2b, fishers in the key informant interviews described how they use empirical evidence (e.g., water quality, visual inspection, sickness) to determine if fish are safe to eat. Fishers in the key informant interviews stated that using this manner of perceiving risk, they could know if a fish was safe to eat (e.g., if it looked or smelled bad, they would throw it back). Fishers also stated that

they could ensure that the fish was safe to eat through proper cleaning and preparation techniques (as described in response to Question 1d).

Although some fishers interviewed during the key informant interviews indicated some awareness of the fact that the Duwamish is contaminated or polluted, this generally did not prevent them from continuing to fish. While some fishers noted that they would only eat certain species of fish—such as salmon, which do not live in the Duwamish year-round—or limit their consumption to only a small amount of seafood, other fishers did not appear to connect contamination in the river with the safety of the fish to eat. For example, a Vietnamese fisher explained that:

> "The advisory board say salmon is safer to eat maybe less polluted/chemical. [But] all the fish I caught looks normal, I don't see any differences. There are some chemicals in the river that makes it unsafe to eat and I don't know what they are—business along the river pollutes. Maybe trash in the river makes it unsafe to eat the fish too. I ate the fish from the Duwamish River and I don't feel sick like stomach ache or throwing up."

Thus, even some awareness of fish advisories or contamination of the Duwamish did not prevent many of the fishers who were interviewed from continuing to catch resident species. However, several of the fishers interviewed in the key informant interviews explained that they no longer eat resident fish, although the rationale among these fishers differed:

> Cambodian fisher: "I stop fishing for perches because there is limited to only 15 per catch. They are too small and too little amount; it is not because of the unhealthy warning. […] Sometimes, bullheads or sculpins bite on my hooks and I put them back in the water. I don't like them. They look ugly and they are meatless. I let them go back, it is not because they are not healthy, but due to they are meatless."
>
> Black/African American fisher (who works at a business along the Duwamish): "I know that the Duwamish River somewhere from the Boeing plant and the air field, from there all the way to the mouth of the river is probably polluted, extremely polluted. I think they are working on a project to clean it up but it has been polluted for long time. It is probably really hazardous to eat fish that live in the water year round. […] In fact I don't eat anything out of Elliott Bay right there anymore, other than the salmon coming back."

These quotes help to illustrate different reasons why some fishers do not fish for resident species from the Duwamish.

4.2.2.4 Question 2d: Do the various fisher groups know about the seafood consumption advisories and risks?

As part of the on-river survey, fishers were asked whether they had heard anything about how eating seafood caught from the Duwamish could affect people's health. Overall, 43% of fishers indicated that "yes," they had heard something to that effect. The data suggests that Asian, Pacific Islander, Black/African American, and Latino fishers might be less likely to have heard about the fish advisories than fishers from other ethnic groups (Figure 4-11). A statistical evaluation of these data indicate that of the groups with at least 10 fishers, only the Asian and White/Caucasian ethnic/racial groups can be considered statistically different based on their confidence intervals (see Appendix D). Similarly, the data suggest that fishers who indicated English as their preferred language might be more likely to have heard something related to health concerns (48% said yes) than fishers whose preferred language was a non-English language or English and a non-English language (approximately 30% said yes). Calculated confidence intervals overlapped for all three of these groups. However, if a lower confidence level was used (e.g., 90% instead of 95%), it is likely that these results would be statistically significant.

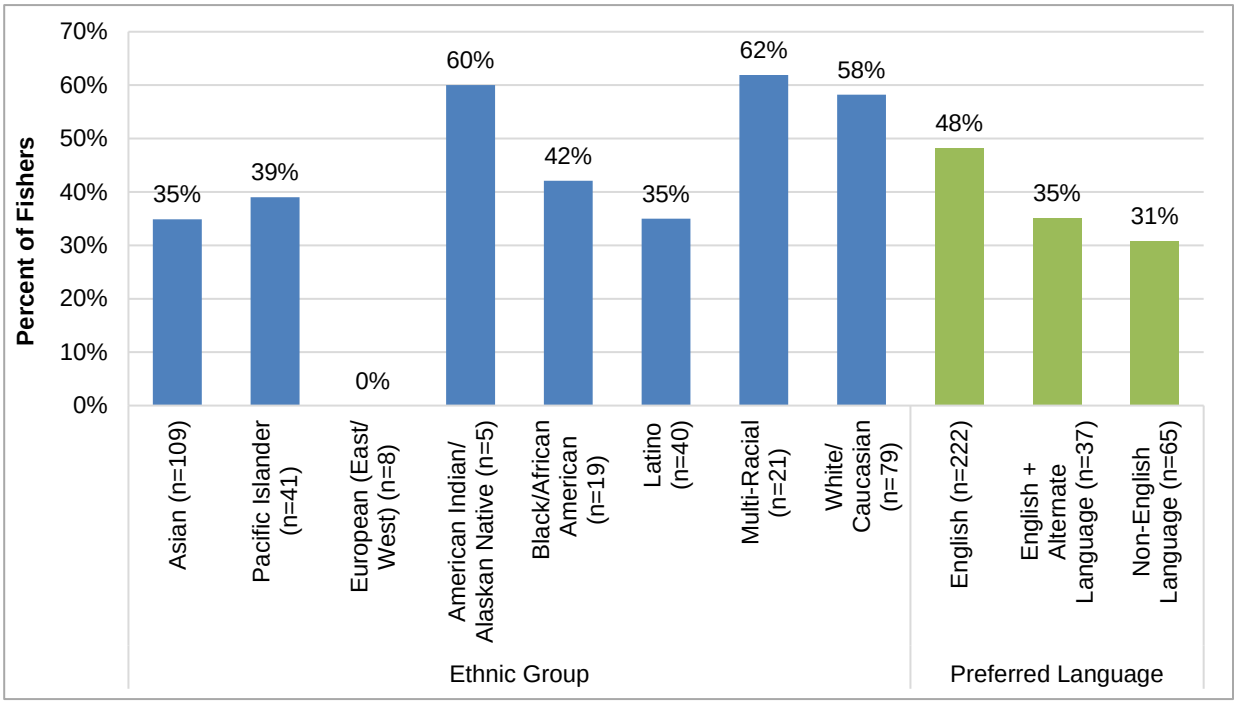


Figure 4-11. Percent of fishers (by ethnic group and preferred language) who indicated that they had heard something about how eating seafood caught from the Duwamish might affect people's health

For fishers who responded that "yes," they had heard something, their responses fell into three categories, as shown in Table 4-8. This information is reported both by reported catch and by preferred language category.

Table 4-8. Summary of information reported regarding how eating seafood caught from the Duwamish might affect people's health

Response	Information Known by Fishers who Reported that They had Heard Something about how Eating Seafood Caught from the Duwamish might Affect People's Health							
	Percent by Reported Catch		Percent by Preferred Language Category					
			English		English + Alternate Language		Non-English Language	
	Fishers Who Reported Catching Only Salmon (n = 143)	Fishers Who Reported Catching Resident Species (n = 33)	All Fishers (n = 110)	Fishers Who Reported Catching Resident Species (n = 19)	All Fishers (n = 13)	Fishers Who Reported Catching Resident Species (n = 5)	All Fishers (n = 20)	Fishers Who Reported Catching Resident Species (n = 9)
Some or all seafood from the river is unsafe to eat	72%	55%	65%	47%	69%	20%	85%	89%
The river (or fish) is contaminated/ polluted	45%	52%	49%	58%	38%	60%	40%	33%
Something about the fish advisory	24%	21%	24%	11%	31%	60%	15%	22%

As shown by the percentages reported for fishers who reported catching only salmon and fishers who reported catching resident species, the awareness for these two groups appears to be similar. Sample sizes were relatively small for fishers whose preferred language was a non-English language or English and a non-English language, and thus there is uncertainty in drawing conclusions about fisher knowledge for these groups.

Discussions in the key informant interviews provided similar results. Fishers suggested that in general, they think that the fish advisories are a good idea and appreciate the attempt to inform people about what is safe to eat and what is not. However, many do not understand the information on the advisories. Mienh and Vietnamese fishers, in particular, pointed out that many people in their communities are not literate in their native language or in English. They suggested that the use of more pictures on the advisory signs, perhaps with a large "NO" next to pictures of certain types of fish, could help overcome this language barrier. Two fishers (Cambodian and Black/African American) said that they had read the advisories but incorrectly interpreted the message. One fisher thought that the signs told fishers what species they could or could not catch, and another fisher thought the purpose was to prevent people from fishing in posted areas in order to protect salmon runs.

4.2.2.5 Question 2e: How are they currently getting this information and what are their preferences for information sources?

Fishers surveyed during the on-river survey were asked about their current and preferred sources of information. As shown in Figure 4-12, a wide variety of current and preferred information sources were reported by fishers – ranging from signs posted at fishing locations to media sources (non-Internet and Internet) to word of mouth or talking with friends/family.[23]

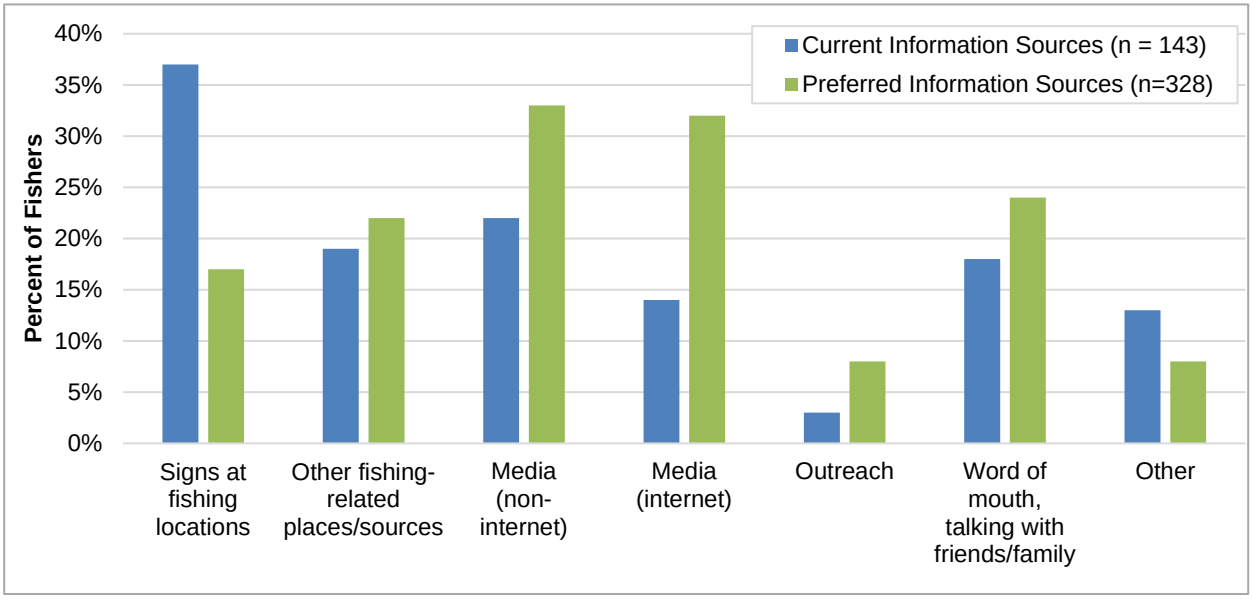


Figure 4-12. Current and preferred information sources

In addition, preferred information sources appear to vary by preferred language (Figure 4-13), both for all fishers and for those who reported catching only resident seafood. Although the results suggest that there are some differences in preferred sources across language groups, these data again highlight the fact that there are a wide variety of preferred information sources for all groups of fishers. Information broken down by ethnic groups is presented in Appendix D (see Tables 19 and 20). While it is possible that there are differences in preferred information sources by ethnicity and race, the available sample sizes were relatively small once the data were parsed out among the various groups, meaning that these differences could not be statistically evaluated.

[23]Confidence intervals were not calculated for these data because understanding the statistical difference across these information sources was not important in understanding the key message from these data (i.e., that there is a wide variety of current and preferred methods).

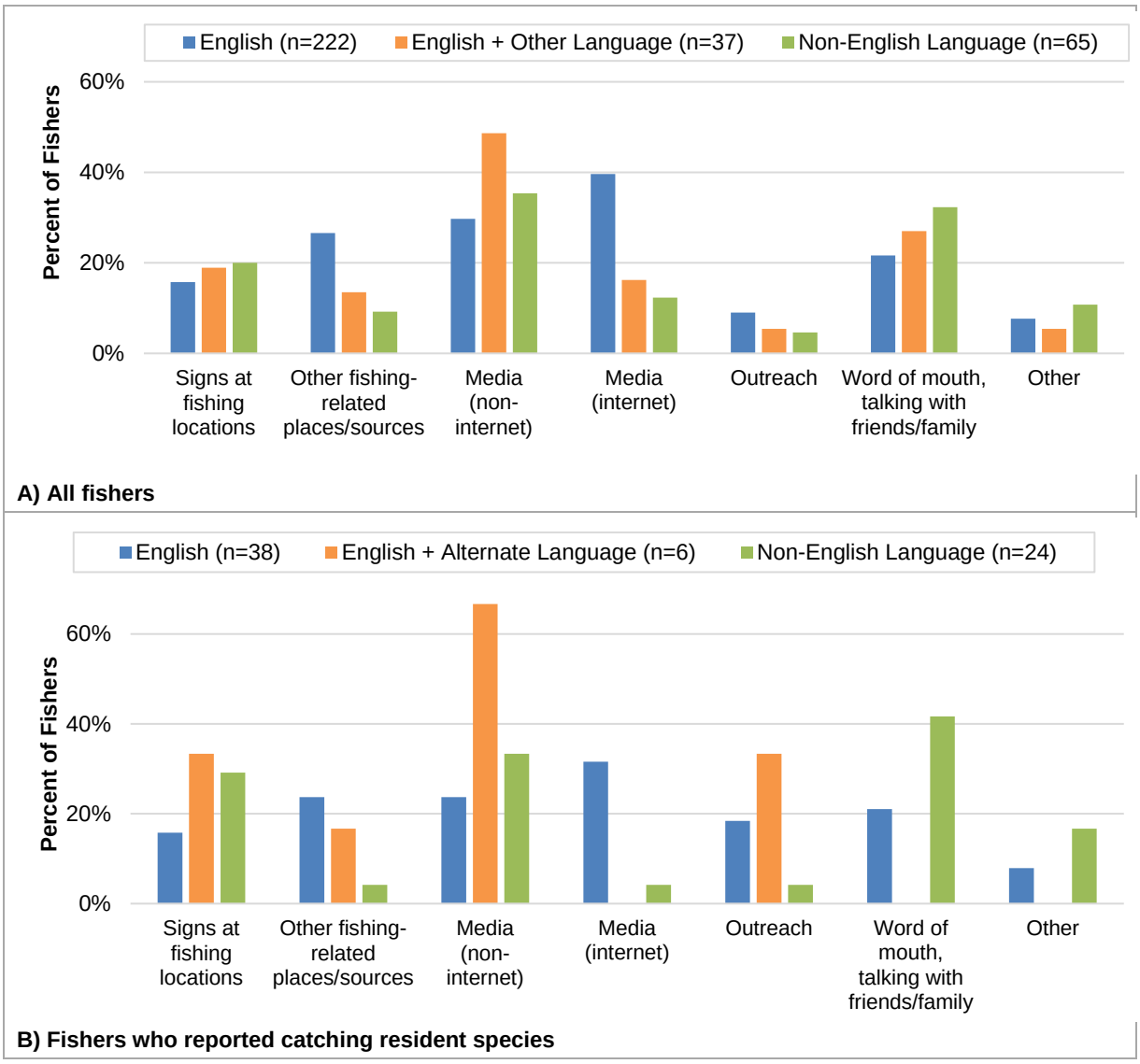


Figure 4-13. Preferred sources of information by preferred language category for all fishers and for fishers who reported catching resident species

Respondents in the key informant interviews expressed similar preferences when asked about their preferred information sources. Fishers and consumers from Vietnam and Cambodia said they trusted information provided by the "government," although it is not clear which authority or department they may have been referring to. Several example quotes highlight this trust:

> Cambodian male fisher: "In my view, for this survey I like to say thanks to our government who is thinking about people's health. In return we want to have information regarding what fish we can eat and what fish we cannot. I believe that our government would do everything necessary to keep our people safe."

> Cambodian female consumer: "We trusted the official when they post the signs of closure or warnings there must be the reasons why they do it. We trust the government officials that they do concern about people's health."
>
> Vietnamese female fisher: "But if the government tells us not to eat it, then we don't eat it."
>
> Vietnamese female fisher: "Well, the water quality is good or bad depends on the government allowing us to fish or not fish there. If there's any contamination or pollution, someone would warn the public about the water quality and suggest what not to eat due to the water quality in certain area so the public would know to avoid fishing there."

Key informants from other ethnic groups did not express similar sentiments regarding trusting the government, and thus it is unknown the extent to which these views are shared by people of other ethnicities.

5 Discussion

A great deal of information was collected as part of the fisher study that will be useful in informing effective and appropriate ICs. This section discusses this information in the context of addressing key questions regarding fishing in the Duwamish, and its importance in providing for the development of effective tools for fish consumers to make safe fish consumption choices.

This section was primarily written by the team's social scientists and was reviewed by other members of the project team and by ECOSS staff. The information presented herein are grounded in a holistic view of the information that emerged from the results of both the on-river survey and the key informant interviews. These results were reviewed by both ECOSS staff and social scientists in order to achieve the study objectives and answer the key research questions explored in the study:

- How is the LDW currently being used for the collection and consumption of seafood, particularly resident seafood?
- What is currently known by the community about the risks of consuming seafood from the LDW? What are the perceived benefits of consuming seafood from the LDW?

In addition, this section discusses limitations of this study, and potential positive and negative impacts that could occur through the participation in the study or from the results of the study.

5.1 Discussion of Fishers Study Results as They Relate to Lessons for Future Efforts

The fishers study sought to identify who is collecting and consuming seafood from the Duwamish, to learn what is known and understood about the risk of consuming resident species, and to gain insight into more effective strategies to address ongoing consumption of resident fish and shellfish. By providing a better understanding of how fishers identify and comprehend risk, this study will contribute information that can be used to protect the health of seafood consumers, while preserving the ability of fishers to pursue an activity that they consider to be important.

Note that it was beyond the scope of this study to address the question of the relative degree to which any particular factor has or may shape an individual fisher's perception of risk. Furthermore, this study was not designed to determine why some fishers fail to perceive risk or lack knowledge regarding the causation of risk. Instead, the study highlights the fact that fishers perceive risk and causation, albeit within an explanatory model that derives from their experience of the physical world.

This section presents a discussion of the study results as they relate to future efforts to develop tools to address ongoing fish consumption of resident fish and shellfish.

These topics and the applicable study questions from Section 4 (see Table 4-4) are summarized as follows:

- Key characteristics of Duwamish fishers (Questions 1a, 1b, 1c, 1d, 2a)
- Perceived benefits of and obstacles to fishing (Questions 1b, 1d, 2a)
- Knowledge of seafood advisories and perception of risks (Questions 2b, 2c, 2d)
- Fishing alternatives (Question 2a)
- Current status of risk communication (Question 2d)
- Communication methods (Questions 2e)
- Duwamish fisher culture (Questions 1a, 1c)

5.1.1 Key characteristics of Duwamish fishers who reported fishing for resident seafood

The on-river survey and the key informant interviews indicate that a variety of individuals fish on the Duwamish. As discussed in Section 4.2.1.1, fishers are primarily male between the ages of 18 and 30, and represent more than 25 different racial/ethnic groups (18 different groups were reported for fishers who reported fishing for resident species). For fishers who reported catching resident seafood, the most commonly reported ethnicities were Vietnamese, Cambodian, Filipino, Latino, multi-racial, and Caucasian. The majority of the fishers prefer English as their primary language; however, nearly 35% of fishers who reported catching resident seafood prefer a language other than English. While the fishers may be primarily males, females appear to be the primary preparers of fish. Because of the diversity of fishers and preparers, it is recommended that future communication strategies and ICs tools recognize the collective and individual risk perceptions of the different fisher groups, as discussed further in Section 6.2.

5.1.2 Perceived benefits of and obstacles to fishing

Based on the result of the on-river survey, it appears that many Duwamish fishers who fish for resident species have immigrated to the United States from countries where fishing is an important part of providing food for their families. Information from both the on-river surveys and the key informant interviews identified several reasons for fishing the Duwamish. Fishing was described as an important activity that provides opportunities to enjoy nature, relax, and socialize with family and other fishers, as well as fresh fish to eat.

Fishing has cultural importance with respect to preparing and eating seafood, and allowing fishers to identify as providers. Information from the on-river survey and key informant interviews indicates that fishers both eat their catch themselves and share their catch with others. Based on the available survey data, it appears that eating and sharing the catch is most likely to occur among fishers who were not Caucasian

(Figure 4-8), although insufficient data (i.e., small sample size for each group) were available from the on-river survey to evaluate whether this result was statistically significant. Sharing seems to happen most among family and friends. The activity of sharing a meal, often prepared using methods that are traditional to the family or culture, may be seen as a social gathering and a way to develop connections with family and friends.

There are several characteristics of the Duwamish that make it a prime location for fishers. The Duwamish is important to this population of fishers and fish consumers because it provides access to fishing opportunities that might not otherwise be as available. About 70% of fishers who reported catching resident species in the on-river survey live fairly close to the Duwamish (i.e., in South/West Seattle or just south of Seattle), making the Duwamish an important fishing location for those who have limited time. In addition, it is possible that some fishers may use the Duwamish because of its proximity to their place of work, since there are a large number of businesses in the general area of the Duwamish.

In the key informant interviews, fishers indicated that time and transportation were the primary obstacles to fishing; costs of a fishing license, equipment, and supplies were less important obstacles. It will be important for the future efforts developing communication, ICs, and any other tools to take into account the social and physical benefits of fishing on the Duwamish. These efforts will need to provide adequate information regarding alternatives for fishers to achieve the benefits that were identified as specific to the Duwamish.

5.1.3 Knowledge of seafood advisories and perceptions of risk

More than half of the fishers surveyed during the on-river survey who reported fishing for resident species said that they have heard that some seafood from the Duwamish may be unsafe to eat (Section 4.2.2.4), yet of these fishers, almost two-thirds reported eating the resident fish and shellfish that they caught. A possible explanation for this apparent contradiction is that the fishers' understanding of risk is based on a model that prioritizes their experiences and sensory perception, rather than a scientific concept of risk as a statistical relationship between exposure and outcome. As described in Section 4.2.2.2, the key informant interview participants described how they use water quality, visual indicators (e.g., fish cleanliness), the experience of sickness, and information from others to determine whether the seafood they catch are safe to eat.

During the key informant interviews, some fishers mentioned the presence of industry along the river, and said that they wondered what impact this had on the cleanliness of the water and health of the seafood living there. However, fishers often did not make the connection between contaminated water or sediment and contaminated fish. Traditional scientific risk assessment considers unseen contaminants in the environment and bioaccumulation of toxins in seafood. Based on the results of the

fishers study, it appears that many fishers may not share this perspective when assessing risk. Thus, despite the fact that the fishers wondered about the impact of oil, trash, and chemicals in the river, they generally concluded that fishing was safe since they had no empirical evidence (i.e., personal experiences or sensory evidence) leading them to think otherwise. Understanding the difference between the ways that fishers evaluate risks and the risk assessment perspective is one key result of the fishers study with regard to future communication efforts (see Section 5.1.6).

5.1.4 Fishing alternatives

In their responses to the on-river survey and key informant interviews, fishers discussed the impact that being unable to fish on the Duwamish would have on them. Many fishers indicated that they would feel sad and disappointed, highlighting the connection that these fishers have with the river. Economics and income were also an overarching theme in discussing the impacts of not being able to fish on the Duwamish. Some individuals said they would fish less or would eat less fish because they would not have the means to go farther away to fish and could not afford to buy fish in the store. Others named various places as acceptable fishing location alternatives or said they would simply buy more fish in the store if they could not fish as often.

It is important to recognize that these discussions did not differentiate between closing the Duwamish to all fishing (i.e., there would be no open WDFW fishing seasons) versus closing it for only resident species (i.e., fishing for salmon would still be permitted). Overall, limiting fishing on the Duwamish would have the greatest impact on those who do not have the money, time, or transportation to go to an alternate fishing location.

5.1.5 Awareness of current fish consumption advisories

Based on the results of the on-river survey, approximately 50% of fishers who reported fishing for resident species said that they have heard that seafood from the Duwamish may be unsafe to eat, and 23% of fishers surveyed said that they have heard something about the fish advisories. However, many fishers are continuing to fish, indicating that these messages may not be well understood.

Key informant interview participants indicated that the current advisory signs are often not well understood by people, and are sometimes misinterpreted. While it is possible that some fishers who understood the advisories have modified their behavior and are no longer fishing along the Duwamish, the fact that only 23% of fishers said that they had heard something about the fish advisories is noteworthy, as it indicates that current information sources may not be effective in communicating this information. In turn, this may mean that many fishers and fish consumers may be unaware of the risks associated with eating contaminated seafood.

5.1.6 Communication methods

Attempts to increase risk awareness without connecting that information to local knowledge, attitudes, and practices is unlikely to result in behavioral change. Rather than asking "Why don't fishers follow advisories?" the question should be re-framed as "How can ICs better meet the needs of fishers?" For example, ICs that focus on risk communication (including providing healthful options for continuing to fish and incorporate fish into diets) should respect fisher perspectives, build on existing models to help fishers understand unseen risk (i.e., in ways that are more consistent with how fishers appear to understand risk), and integrate this information into local knowledge and lifestyles.

Fishers who participated in this study pointed out the importance of the sharing of information among fishers and word-of-mouth communication. Participants provided mixed information about their level of trust in and comfort with government sources. This highlights the importance of determining culturally appropriate and trusted sources of information when considering health promotion[24] strategies (including outreach and education).

Building relationships with Duwamish fishers (such as those being built by ECOSS as part of the community involvement activities in this study) and including these fishers in the development of effective and appropriate ICs will be important in the development of 1) ICs related to seafood consumption, 2) appropriate outreach messages, 3) effective health promotion strategies (including providing healthful options for continuing to fish and incorporate fish into diets), and 4) other tools to address the ongoing risk.

5.1.7 Duwamish fisher culture

Information gained from the on-river survey and the key informant interviews provides insight into Duwamish fisher culture. This concept of a culture of Duwamish fishers was not an expected outcome of this study, but rather a theme that emerged as the results of the study were interpreted. Understanding this fisher culture is critical to developing ICs related to seafood consumption, effective health promotion strategies (including outreach and education), and other tools because culture provides information about perspectives, values, beliefs, and behaviors shared by group members. A culture extends beyond the individuals interviewed, so cultural information allows for an extrapolation beyond the interview data itself. In the case of Duwamish fishers, culture involves what fishing means to them, group expectations

[24] Health promotion is the process of enabling people to increase control over and improve their health. It covers a wide range of social and environmental interventions that are designed to benefit and protect individual people's health and quality of life by addressing and preventing the root causes of ill health.

about what fishers should do, and how group knowledge is preserved and transmitted.

In general, the fisher culture creates a social identity and influences social interactions such as sharing of catch, communal consumption of fish, and sharing of traditions, such as learning how to fish (Figure 5-1). Although some cultural details may differ by ethnicity, the broad aspects of Duwamish fisher culture are shared by fishers across the various ethnicities and result in more commonalities than differences (i.e., comments from fishers of different cultures are often hard to distinguish). Experiences in how the fishers learned to fish and how they compare fishing in their home countries to fishing in the United States help to explain why this shared Duwamish fisher culture exists, which could be important in providing health promotion (including outreach and education) to these communities.

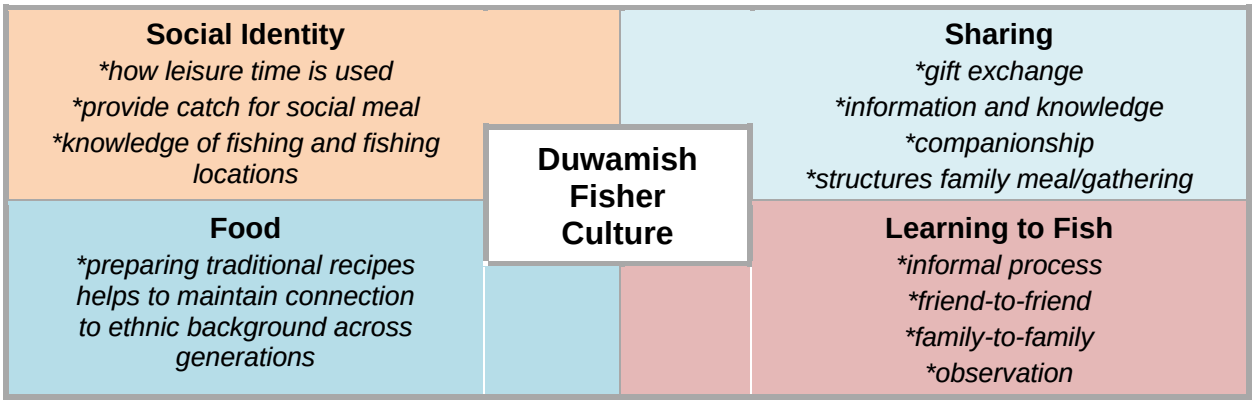


Figure 5-1.Duwamish fisher culture

Almost all individuals interviewed as part of the key informant interviews came from other countries: most were from countries in Southeast Asia and one woman was from Mexico. Only two respondents had grown up in the United States: one Black/African American had lived in the Midwest and the other Black/African American is from the Seattle area. Despite growing up in different parts of the world with different ways of life, this group of Duwamish fishers could be said to have participated in an experience of fishing that includes shared practices, beliefs, and knowledge. All learned to fish through observation and person-to-person transmission of the skills and knowledge needed to fish successfully. Many fishers described learning to fish from family members or friends, such as a Cambodian fisher who said "I learned since I was a child. I learned from mom, dad, relatives and friends. I learned since I was in Cambodia." Such informal learning passes on knowledge of a way of life, whether to a child learning from adults in the family or to an adult learning from a friend here in the United States.

Several fishers who participated in the key informant interviews discussed how fishing in the United States is different than in their home country. Although this was

not the case for all fishers, fishing changed for some when they moved to the United States to include a recreational component.

As fishers have participated in a shared activity, sharing in other ways has become an aspect of the Duwamish fisher culture. Fishing provides a special food that can be prepared in traditional ways, helping to maintain ethnic identity across generations. As highlighted by the ways that fishers learn to fish and how the activity of fishing is viewed, fishing helps to reinforce the social role and personal identity of the fisher, both of which are important in effective health promotion (including outreach and education regarding providing healthful options for continuing to harvest and consume fish).

5.2 STUDY LIMITATIONS AND CAVEATS

5.2.1 On-river survey

As with any survey that relies on self-reported information, it is important to recognize that the accuracy of the reported information is uncertain. In the fishers study, for example, fishers reported practices (e.g., when they fished) that were inconsistent with information collected as part of the survey. In addition, ECOSS surveyors noted that on some occasions, an individual who reported fishing for only salmon the first time they were interviewed later said that they were also fishing for resident species. Although precautions were made to ensure that ECOSS surveyors did not look or act like game wardens (based on feedback from ECOSS's pre-survey interviews and the pilot test of the survey), some fishers may have initially been concerned that ECOSS surveyors were there to enforce fishing regulations. Thus, the answers that these fishers provided regarding what species they were targeting may have been influenced by concern about possible repercussions (e.g., fines) associated with fishing for species that may not have been in season or were not legal to catch; they may have later revised their response when they realized that the ECOSS surveyors were not there to enforce fishing regulations. It is also possible that fishers provided answers that they believed were in line with what ECOSS wanted to hear (i.e., that they were only fishing for salmon). It is important to recognize that although some minor reporting bias likely exists, self-reported information such as that gathered as part of the on-river survey (and that is commonly used in this type of survey) is generally helpful and important in understanding the fishing population.

In an attempt to better understand this potential reporting bias, an effort was made to use the information gathered as part of the survey to link repeat survey takers (i.e., the fisher's first initial and last fourth digits of their telephone number were collected). This effort was largely unsuccessful; it was generally not possible to match up survey participants. The surveys that could be linked were evaluated to see whether fishers who initially reported fishing only for salmon later revised their responses and said that they also fished for resident species. As reported by the ECOSS surveyors, the limited information from the matched surveys supported the information from the

ECOSS surveyors that this happened in a few cases, but that most fishers did not appear to revise their responses. This supports the idea that the bias due to self-reported information is relatively low. In addition, information from some fisher groups may have been under-represented in the study (i.e., the sampled population may differ from the entire fishing population). This study was not designed to estimate the total number of fishers on the Duwamish; it is not possible to know how accurately the sample of the population that was surveyed represents the whole Duwamish fisher population. The on-river survey portion of the fishers study was not intended to be a truly quantitative survey, but rather a semi-quantitative survey. Thus, because the objective of the study was to collect better information to inform effective and appropriate ICs (not to calculate fisher population statistics), an inability to estimate the total number of fishers should not be viewed as a weakness of the study. In addition, based on the methods used to cover a variety of locations, seasons, and languages, the subset of fishers surveyed as part of the on-river survey can be assumed to be reasonably representative of the overall fisher population. However, despite the robust survey design described in Section 3, there is some uncertainty regarding this assumption because the year-long survey was conducted an average of 1.5 days per week during the non-summer months and 3 days per week during the summer months and surveyors were not present 24 hours a day.

Another source of potential bias is the fact that about one-half of the fishers that ECOSS approached were not willing to take the survey. The actual number of fishers who declined is not known because there was no way to track how many fishers declined multiple times. While the demographics of the declining population appear to be generally similar to the fishers who took the survey (Figure 4-1), it is not possible to know how the fishers who declined to take the survey would have responded to the survey questions. In addition, as noted previously, fishers who understood the advisory and no longer fish on the Duwamish may not have been surveyed as part of this effort.

5.2.2 Business outreach effort

There are several important limitations for the business outreach effort, which was described in Section 3.2.4. The primary limitation was the inability of ECOSS staff to talk directly with employees at each business. At all but one of the businesses surveyed, ECOSS surveyors were able to talk with only reception, security, or "gatekeeper" personnel, meaning that they were not able to directly engage with employees. In the one instance when ECOSS surveyors were able to talk directly with employees, the effort resulted in the completion of two surveys.

Another important limitation of this effort was that when no surveys were conducted, it was generally not possible to determine whether this meant that 1) there were no people who fished at the business, 2) fishers at the business were not interested in taking the survey, or 3) the contact at the business simply did not know whether people at the business were fishers.

Other limitations of this effort include both the timing of the effort (outreach was conducted in December, when employees may not have been working or may have been busier than usual due to the holidays) and the general approach of this effort, which required employees to take time away from work or their breaks to complete the survey. Another factor that should be noted is that not all businesses along the Duwamish have a viable fishing area (e.g., dock or other place to fish), meaning that employees at these businesses would be unlikely to fish from their place of work.

5.2.3 Key informant interviews

There are several limitations to note when interpreting the results of the key informant interviews. First, it is possible that the interviewees may have been hesitant to tell their stories due to concern over getting in trouble or unfamiliarity with the interview process. Several precautions were taken to limit this possibility. Interviews were conducted in the interviewees' preferred language, held at a location selected by the interviewees (often their homes or a nearby community center), and facilitated by interviewers from a trusted community organization (i.e., ECOSS). Second, due to the descriptive nature of the key informant interview responses, the results should not be applied to the general population as a whole. Rather, the results can only be used to tell the stories of the individuals who were interviewed. Third, it is possible that some information shared in the interviews could have been misinterpreted. To help minimize this concern, ECOSS interviewers completed thorough training on how to conduct the interviews, and the social scientists who analyzed the data have extensive training in qualitative research. Despite this, there is always a possibility for bias and misunderstandings.

5.3 POTENTIAL IMPACTS OF STUDY

5.3.1 Potential positive impacts

There are several positive impacts that could have resulted from participation in the study. First, participation in the study may have increased the sense of community and culture that has developed around the Duwamish. Second, participants may have gained new knowledge about the risks of fishing on the Duwamish. Third, the questions asked in the on-river survey or key informant interviews may have prompted the participants to seek out additional information about the risks of fishing on the Duwamish, which could have increased the participants' knowledge of risks and perhaps motivated them to engage in safer fishing and fish consumption behaviors. And finally, participants in the study received a modest incentive that may have provided the participant with a small financial benefit.

There are also several positive impacts that could have resulted from the study as a whole. The primary benefit is that because this process solicited input from Duwamish fishers, the ICs that will ultimately be developed are more likely to focus on the needs of Duwamish fishers and thus should be more effective. Another positive impact from

the study is the relationships that have been built among government agencies and the community on this issue. This dialog and these relationships have created a positive foundation from which to work in the next steps of IC development. And lastly, the success of the fishers study in engaging fishers, many of whom display environmental justice characteristics, will be beneficial both because it has helped foster relationships with this community and because it has provided critical information to guide future efforts to develop effective and appropriate ICs.

5.3.2 Potential negative impacts

There are two types of potential negative impacts that may occur in association with a study like the fishers study: 1) impacts as a result of participating in the study, and 2) impacts based on the results of the study. Such negative impacts are unintended potential consequences of the study on the community.

As a result of participating in the study (either the on-river survey or the key informant interviews), it is possible that participants could be viewed negatively in their community. The on-river survey was conducted in a public place, meaning that participants could be publicly viewed as participating, although no feedback regarding this potential negative impact was received by ECOSS. This may have social implications for the participant. In addition, although participants received a store card in compensation, they had to give up their time in order to participate in the on-river survey and the key informant interviews. This took time away from their other activities. It is also possible that participation in the study could have caused undue concern or alarm in the participants. Education related to the risks of consuming resident species from the Duwamish was separated from the survey in order to reduce the bias in responses. However, responses for repeat survey takers who had requested information after completing the survey may have been impacted.

Results from the study could have negative impacts on the fisher community as well. First, concern over the safety of consuming contaminated fish from the Duwamish may cause the community reduce their intake of fish (a healthful food) if they don't have or are not aware of another sources of fish, and instead switch to a less healthful dietary option or eat less fish. Second, the results from the study may alter aspects of fisher culture. Fishing on the Duwamish is associated with social interaction, leisure activity, enjoying nature, and obtaining healthful food. It is possible that the results of the study could alter the ability of fishers to engage in these activities, which in turn would diminish the enjoyment as well as the social value obtained from these activities. Third, the results from the study may cause fishers to fish elsewhere, which could impact the fisher culture in other areas and could negatively affect the Duwamish fisher culture.

5.4 KEY FACTORS TO SUCCESS OF FISHERS STUDY

After the conclusion of the on-river survey, ECOSS staff discussed the factors that they considered key to the effort's success. Such factors improved the staff's ability to achieve a high response rate during the on-river survey (51% as discussed in Section 4.1.1), and improved their ability to engage with the fisher community. Key factors included:

- **Respecting fishers' time –** Providing incentives for participation (e.g., $10 store card) and keeping the survey short (generally took about 10 minutes to complete) showed respect for fishers' time.
- **Surveyors that reflect the community** – Surveys were conducted by ECOSS staff, who are part of the community that they interviewed and with whom they share a common language.
- **Considering the survey from the perspective of fishers** – ECOSS staff worked to develop a method for approaching fishers that took into account the perspective of the fishers, such as considering how to make sure surveyors did not look like game wardens (e.g., no badges or clipboards).
- **Building trust** – ECOSS staff worked to build trust with fishers over time, which included starting with a casual conversation, not asking for a fishing license, not asking for personal information, and being out on the river repeatedly so that fishers would recognize ECOSS staff.
- **Keeping the survey simple** – ECOSS staff worked to remove jargon and other language that might not be understood by fishers from the survey questionnaire in both the English version and the translations.

It will also be useful to note that many of these key factors identified by ECOSS reflect the ways in which the study design took into account the environmental justice characteristics of the fisher community. As has been observed in many other urban fishing populations (NEJAC 2002), this is critical to the success of future work with fishers along the Duwamish.

6 Next Steps

The next steps of the fishers study, as well as the next steps in seafood consumption-related IC development that will occur following the fishers study, are described in this section.

6.1 FISHERS STUDY

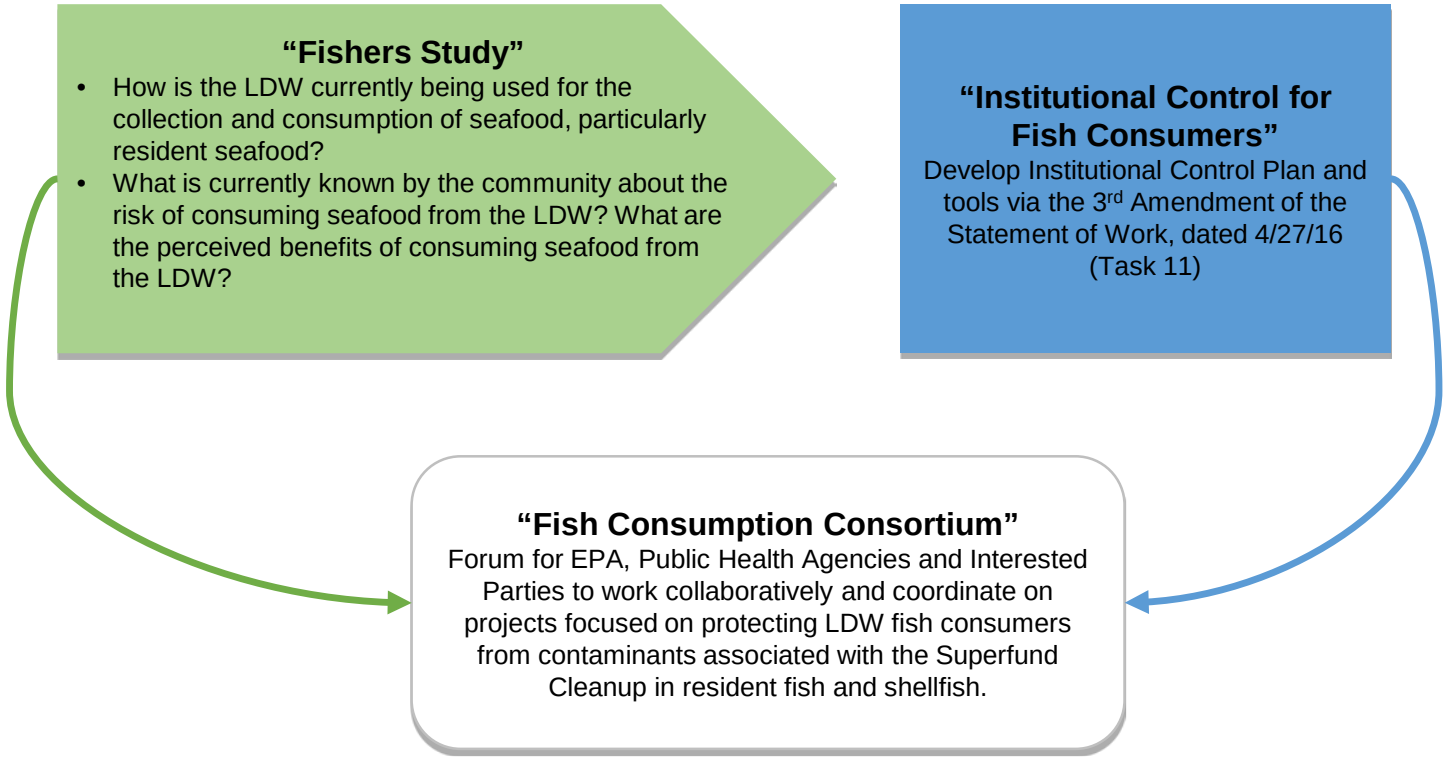
The final steps in the fisher study are as follows:

- EPA will finalize a fact sheet that summarizes the major findings of the study and translate this fact sheet into multiple languages.
- LDWG will post the final data report online and notify interested community members of its availability.

Meetings with community members and/or groups to discuss the results of the fishers study will be conducted by EPA in collaboration with Public Health agencies in early 2017 after the finalization of the data report. This will be done as a separate meeting, or EPA/Public Health representatives will visit existing neighborhood meetings to discuss the results.

6.2 SEAFOOD CONSUMPTION-RELATED IC DEVELOPMENT AND OUTREACH

As summarized in Figure 6-1, the results of this study will be used to further develop effective and appropriate ICs related to seafood consumption for the LDW, as well as to inform health promotion efforts (including outreach and education).



Note: Figure provided by EPA.

Figure 6-1. Fisher study context

ICs for resident seafood consumption will be developed using a community-based, participatory approach for the LDW, and tailored to the affected community. These ICs will be important during and following cleanup activities in the waterway. Activities to support the development and implementation of these ICs will likely include:

- Creating a planning group responsible for developing and implementing a plan for ICs
- Determining incentives for participation in the planning groups by community members
- Pilot testing of potential IC tools, such as outreach campaigns
- Assessing the results of pilot tests and revising the IC plan
- Assessing the IC plan's success and recommendations for future ICs on the LDW

Based on the results of the study, successful IC efforts should include outreach to fishers and people in the community that prepare and consume resident fish (but are not fishers themselves). As was done by ECOSS as part of the effort to recruit participants for the pre-study interviews and key informant interviews, a variety of outreach efforts will be needed across the different communities. As described in Section 5.4, these efforts should consider the factors that were key to the success of the fishers study, including respecting fishers' time (i.e., keeping the time required for participation short and providing incentives), consider the efforts from the perspective of fishers, and rely on community contacts and building trust with fishers.

Effective and appropriate ICs should respect fisher perspectives, build on existing models to help fishers to understand unseen risk, and integrate this information into local knowledge and lifestyles. A variety of IC tools will be needed to promote healthy and culturally appropriate alternative practices that will reach the diverse Duwamish fishing community. Thus, in addition to health promotion (including outreach and education) at locations on the river, outreach should occur in trusted community spaces, at community events, and through relationships developed with fishers and their family members.

6.3 ADDITIONAL OUTREACH EFFORTS OUTSIDE OF THE SUPERFUND PROCESS

In addition to work being conducted as part of the Superfund cleanup process, other outreach efforts related to Duwamish fishers are being conducted in parallel. For example, grants distributed by the City of Seattle have provided funds for outreach work by other parties, such as ECOSS and Just Health Action. These critical outreach activities include focus groups, community-driven engagement and education activities, and the development of culturally appropriate outreach and education materials.

7 References

Barry M. 2013. Personal communication (telephone conversation with Nancy Judd, Windward, regarding data from unpublished Duwamish River angler awareness of fish advisory survey). Public Health-Seattle & King County, Seattle, WA. May 20, 2013.

Bazeley P. 2013. Qualitative Data Analysis. Practical Strategies. SAGE Publications Ltd.

Beehler GP, McGuinness BM, Vena JE. 2001. Polluted fish, sources of knowledge, and the perception of risk: contextualizing African American anglers' sport fishing practices. Human Organiz 60(3):288-297.

Beehler GP, McGuinness BM, Vena JE. 2003. Characterizing Latino anglers' environmental risk perceptions, sport fish consumption, and advisory awareness. Med Anthro Quart 17(1):99-116.

Chandler K. 2014. Personal communication (phone call to Suzanne Replinger, Windward, regarding game warden enforcement of fishing regulations along the LDW). Washington State Department of Fish and Wildlife, Seattle, WA. January 29, 2014.

Chu R. 2016. Personal communication (email from R. Chu, EPA, to LDWG regarding EPA's acceptance of LDWG's proposal). US Environmental Protection Agency. April 1, 2016.

Dawson J, Sheeshka J, Cole DC, Kraft D, Waugh A. 2008. Fishers weigh in: benefits and risks of eating Great Lakes fish from the consumer's perspective. Agric Hum Values 25:349-364.

EPA. 1999. Asian and Pacific Islander seafood consumption study in King County, Washington. Exposure information obtained through a community-centered approach. Study results and education outreach. EPA 910/R-99-003. Office of Environmental Assessment, Risk Evaluation Unit, US Environmental Protection Agency Region 10, Seattle, WA.

EPA, Ecology. 2013. First amendment to the Administrative Order on Consent, Comprehensive Environmental Response, Compensation and Liability Act and Washington State Model Toxics Control Act, U.S. EPA docket no. CERCLA 10-2001-0055 and Ecology docket no. 00TCPNR-1895: Scope of work (SOW) for Lower Duwamish fish consumption patterns study. March 19, 2013. US Environmental Protection Agency Region 10, Seattle, Washington; Toxics Cleanup Program, State of Washington Department of Ecology, Olympia, WA.

EPA. 2014. Record of Decision. Lower Duwamish Waterway Superfund Site. US Environmental Protection Agency.

EPA. 2016. Environmental justice [online]. US Environmental Protection Agency, Washington, DC. Updated March 29, 2016. Available from: https://www.epa.gov/environmentaljustice/learn-about-environmental-justice.

EPA, Ecology. 2000. Administrative order on consent for remedial investigation/feasibility study, Lower Duwamish Waterway; Port of Seattle, King County, City of Seattle, The Boeing Company, respondents. US EPA docket no. CERCLA-10-2001-0055; Ecology docket no. 00TCPNR-1895. US Environmental Protection Agency, Region 10, Seattle, WA; State of Washington Department of Ecology, Olympia, WA.

EPA, FCEC. 2013. Monitoring survey/FCEC angler outreach/July 2013. US Environmental Protection Agency and Fish Contamination Education Collaborative, Seattle, WA.

Godtfredsen K. 2016. Personal communication (email from K. Godtfredsen, Windward, to R. Chu and L. Kissinger, EPA, regarding response to EPA questions for the LDW Fishers Study). Windward Environmental LLC, Seattle, WA. March 23, 2016.

King County. 1999. King County combined sewer overflow water quality assessment for the Duwamish River and Elliott Bay. Vol 1, Appendix B2, B3, & B4: human health, wildlife, and aquatic life risk assessments. King County Department of Natural Resources, Seattle, WA.

NEJAC. 2002. Fish consumption and environmental justice: a report developed from the National Environmental Justice Advisory Council Meeting of December 3-6, 2001. National Environmental Justice Advisory Council, a federal advisory committee to the US Environmental Protection Agency, Washington, DC.

Spradley JP. 1979. The Ethnographic Interview. Wadsworth, Belmont, CA.

US GAO. 2005. Hazardous waste sites. Improved effectiveness of conrols at sites could better protect the public. United States Government Accountability Office, Washington, DC.

Windward. 2013. Lower Duwamish Waterway fishers study work plan. Final. Windward Environmental LLC, Seattle, WA.

Windward. 2014. Lower Duwamish Waterway fishers study implementation plan. Final. Windward Environmental LLC, Seattle, WA.

Windward. 2015a. Lower Duwamish Waterway fishers study implementation plan. Revised final with redline to changes made during the first quarter of the active study. Windward Environmental LLC, Seattle, WA.

Windward. 2015b. Lower Duwamish Waterway fishers study key informant interview plan. Windward Environmental LLC, Seattle, WA.

APPENDIX A. ON-RIVER SURVEY AND KEY INFORMANT INTERVIEW MATERIALS

CONTENTS

- On-River Survey Form (verbal version)
- Species Identification Card for use with survey
- Key Informant Interview Field Tool

Form # _____ [office use only]

LDW Fishers Study: Survey Questions (Verbal Version)

For ECOSS staff to fill out after respondent has completed the survey

A. **ECOSS staff name** _____

B. **Location** _____

C. **Date** _____

D. **Time** _____

E. **Language used** _____

F. **Gender of respondent** _____

G. **Estimated age of respondent** *(multiple-choice ranges)*

Under 18 years _____ **18 to 30 years** _____

30 to 50 years _____ **50 years or older** _____

H. **Number of fishers in group with respondent** _____

I. Additional notes from survey:

Did the survey appear to be understandable and comfortable to use? (suggestions for changes to survey questions or directions)

Cultural context notes that could help interviewer better understand answers

Notes for future interviews (e.g., potential questions for interviews, suggestions for format)

Other observations:

Form # _____ [office use only]

SURVEY QUESTIONS (VERBAL VERSION)

Hi, my name is _____. I'm with ECOSS, a local environmental organization. We are talking to fishers about catching fish and shellfish from the Duwamish River. If you can help me with a few questions, which should take about 10 to 15 minutes, I can offer you a $10 card. I am interested in your experience as a fisher and there are no right or wrong answers. The information will be shared with federal and state agencies that are responsible for protecting this river and the health of people who are fishing from it. This survey is geared towards protecting the health of people who are fishing. We are not involved with the state Fish and Wildlife agency and I will not ask any questions about fishing licenses or limits on what you can catch. I won't ask to see what you have caught today.

The questionnaire form that we complete today will not be marked in any way that will identify you personally. I will not ask for your name or address.

You don't have to answer any questions that you don't want to, and you can stop the survey at any time. If you would like to speak to someone in charge of this survey, I can provide you with contact information [provide card with contact information as appropriate].

Do you have any questions about taking this survey?
[RECORD ANY QUESTIONS and ANSWER QUESTIONS ABOUT THE SURVEY. ANY QUESTIONS ABOUT THE RIVER/HEALTH/SEAFOOD CONSUMPTION SHOULD BE ANSWERED AT THE END.]

Yes [RECORD QUESTION] _____

No

1. Have I answered all your questions about participating in the survey and may I begin asking my questions? [CIRCLE ANSWER]

Yes

No [END SURVEY and THANK FOR THEIR TIME]

2. Have you participated in this survey before?

Yes [READ TO RESPONDENT] → You may take the survey again and I can give you another $10 card. This time the survey will be much shorter. [GO TO PAGE 8]

No / Don't know.

3. What are you fishing for today? Can you show me on this picture sheet?
[RECORD ANSWERS IN TABLE, BELOW, THEN ASK Q4]

4. What have you caught from this river over the last few years?
[RECORD ANSWERS IN TABLE, BELOW, THEN ASK Q5]

[RECORD ANSWERS TO Q3 AND Q4 HERE. DO NOT READ]:

	Q3 [today] [CHECK ALL THAT ARE MENTIONED]	Q4 [in past] [CHECK ALL THAT ARE MENTIONED]
Salmon		
***** IF ONLY FISHING FOR SALMON, SKIP TO Q13 *****		
Flounder/Sole		
Rockfish		
Sculpin		
Perch		
Bait fish/small fish		
Dogfish		
Big Skate		
Whitefish/suckerfish		
Crab		
Clams		
Mussels		
Squid		
Shrimp		
Anything I can catch		
Other [RECORD]:		
No answer		

[READ]: These next few questions are only about seafood you catch other than salmon.

5. Do you eat your catch from this river? [CIRCLE ANSWER]

Yes [SKIP TO Q7] Don't know/No answer

No

6. What are the reasons you don't eat your catch? [CIRCLE ANSWERS. DO NOT READ.]

Fish only for fun Fish advisory

Use for bait Pollution/cleanliness of fish

Other [RECORD]:_____ Don't know/No answer

7. Do you share your catch from this river with others? [CIRCLE ANSWER.]

Yes [ASK Q8]
Don't know/No answer [SKIP TO Q9]
No [SKIP TO Q9]

8. Who would that be? Family, friends, neighbors, or someone else? [CIRCLE ANSWERS.]

Friends
Family
Neighbors
Other_____

9. Why do you like to fish? [CIRCLE ANSWERS. DO NOT READ.]

Getting food or fresh fish
Social activity (time with family/friends)
Time alone (relaxation)
Traditions, something my family does
Recreation/for fun
Free food
Don't know/No answer
Other reason/s [RECORD]:
_____

10. What are the reasons you come to this spot to fish? [CIRCLE ANSWERS. DO NOT READ.]

Fishing is good here
It's close to where I live or work
I like this setting
It is easy to get here
Tradition, cultural practices
Only place I know to fish
Safe and friendly location
Don't know/No answer
Other reason/s [RECORD]:_____

11. In which seasons do you fish or collect seafood other than salmon from this river? The seasons are winter, spring, summer and fall.

[CIRCLE THE SEASONS IN TABLE BELOW, THEN ASK Q12]

Winter	Spring	Summer	Fall
daily	daily	daily	daily
weekly	weekly	weekly	weekly
monthly	monthly	monthly	monthly
less than once a month	less than once a month	less than once a month	less than once a month

No answer [SKIP TO Q13]

12. In [insert season**], about how often do you fish in this river? Would it be daily, weekly, monthly, or less than once a month?**

[REPEAT FOR EACH SEASON IN WHICH RESPONDENT FISHES. IF ASKED, SPECIFY THIS IS OVER THE PAST SEVERAL YEARS. CIRCLE ANSWERS IN TABLE ABOVE.]

13. Are there areas other than this river where you fish for species other than salmon or collect shellfish? [CIRCLE ANSWER]

Yes No answer

No

[IF LOCATION IS GIVEN, RECORD HERE]: _____

[IF FREQUENCY IS GIVEN, RECORD HERE]: _____

14. Have you seen or heard anything related to how eating seafood caught from this river might affect people's health? [CIRCLE ANSWER.]

Yes No answer → [SKIP TO Q17]

No → [SKIP TO Q17]

15. What have you heard or seen?
[CIRCLE ANSWERS. DO NOT READ.]

Seafood caught here are okay Do not eat certain kinds of seafood

Salmon are the best choice Fish are a healthy food

Do not eat anything from this river Fish advisory

River is polluted

Other [RECORD]: _____

Don't know/No answer → [SKIP TO Q17]

16. Where did you see or hear this information?
[SHOW TABLE TO PARTICIPANT. RECORD EACH SOURCE MENTIONED IN TABLE BELOW, THEN ASK Q16; NOTE SPECIFICS IF PROVIDED]

17. What are your preferred sources of getting information?
[SHOW TABLE TO PARTICIPANT. RECORD EACH SOURCE MENTIONED IN TABLE BELOW, THEN ASK Q17; NOTE SPECIFICS IF PROVIDED]

		Q16	Q17
Friends/family	Word of mouth, talking with friends or family		
Media	Newspaper(s); specify name: _____		
	TV station(s); specify name: _____		
	Radio station(s); specify name: _____		
	Internet or social media (such as Facebook)		
Places in the community	Community or senior center:_____		
	Community event/gathering:_____		
	Place of worship		
	Health clinic, nurse or doctor		
	School: _____		
Fishing-related sources	Signs posted at fishing locations		
	Bait and tackle shops		
	Location where fishing license was purchased		
	WDFW Fishing Pamphlet Regulations and/or website		
Letters or flyers distributed in the community			
Information from Public Health Department			
No answer			
Other [RECORD]:			

18. What would be your preferred language for this information? [CIRCLE ANSWERS]

English	Hmong	Khmer (Cambodian)	Korean
Lao	Chinese	Mienh	Spanish
Tagalog	Vietnamese	Thai	No answer

Other [RECORD]: _____

19. We would like to better understand the communities who fish in the Duwamish River. Could you please tell us what you consider your ethnicity or race? [CIRCLE ALL MENTIONED]

American Indian/Alaskan Native	Bhutanese	Black/African American
Bosnian	Burmese	Cambodian/Khmer
Chinese	Ethiopian	Eritrean
Filipino	Hmong	Indian
Japanese	Korean	Lao
Latino	Mienh	Mongolian
Russian	Samoan	Somali
Thai	Vietnamese	White/Caucasian

Other [RECORD]:_____

20. Would you mind sharing the name of the neighborhood where you live or your home zip code?

Zip code [RECORD]:_____

Neighborhood [RECORD]:_____

No answer

21. We'll be out conducting this survey for a year. We may run into you again out here, and you could take a shorter version of the survey and receive a card again. Could you please provide the first letter of your first name and the last 4 digits of your phone number. This is just to help us know whether you have taken the survey before but will not allow us to identify you personally.

First Initial: _____ Last 4 digits of phone number: _____

No answer

How are you doing on time? I have a couple more questions that I'd like to ask you if you are willing, or we can stop here.

Participant has more time	[PROCEED WITH Q22]
Participant would like to stop survey	[PROCEED WITH Q26]

22. How do you know if the seafood you catch is safe to eat? [RECORD RESPONSES BELOW.]

23. Are some types of seafood from this river safer to eat than others? [IF YES, ASK WHICH ONES. RECORD ANSWERS BELOW]

24. People like to fish for many reasons and they benefit from fishing in many ways. For some people the benefit might be catching food to eat. For others it is something relaxing and fun to do. Can you tell me more about the benefits you get from fishing here? [RECORD ANSWERS BELOW]

25. As a follow up to one of our earlier questions, how can we best get information to you about eating seafood from this river? [RECORD ANSWERS BELOW]

26. This is the end of the survey, unless you have any questions or have anything more you wish to share? [RECORD ANSWERS BELOW]

Thank you very much for your help. This concludes our survey. Here is your $10 card. I just need you to initial this form indicating that you received this card.
[HAVE PARTICIPANT INITIAL $10 CARD TRACKING FORM.GO TO PAGE 11.]

--- PAGE 8-10 ---
SHORT SURVEY FOR FISHERS WHO HAVE TAKEN SURVEY BEFORE

S1. What are you fishing for today? Can you show me on this picture sheet?
[RECORD RESPONSES IN TABLE, BELOW, THEN ASK S2]

S2. What have you caught from this river over the last few years?
[RECORD RESPONSES IN TABLE, BELOW, THEN ASK S3]

[RECORD RESPONSES TO Q3 AND Q4 HERE. DO NOT READ]:

	S1 [today] [CHECK ALL THAT ARE MENTIONED]	S2 [in past] [CHECK ALL THAT ARE MENTIONED]
Salmon		
*****IF ONLY FISHING FOR SALMON, SKIP TO S8*****		
Flounder/Sole		
Rockfish		
Sculpin		
Perch		
Bait fish/small fish		
Dogfish		
Big Skate		
Whitefish/suckerfish		
Crab		
Clams		
Mussels		
Squid		
Shrimp		
Anything I can catch		
Other [RECORD]:		
No answer		

READ: These next few questions are only about seafood you catch other than salmon.

S3. Do you eat your catch from this river? [CIRCLE RESPONSE]

Yes [SKIP TO S5] Don't know/No answer

No

S4. What are the reasons you don't eat your catch? [CIRCLE ANSWERS. DO NOT READ.]

Fish only for fun	Fish advisory
Use for bait	Pollution/cleanliness of fish
Other [RECORD]:_____	Don't know/No answer

S5. Do you share your catch from this river with others? [CIRCLE ANSWER.]

Yes [ASK S6]	Don't know/No answer [SKIP TO S7]
No [SKIP TO S7]	

S6. Who would that be? Family, friends, neighbors, or someone else? [CIRCLE ANSWER.]

Friends	Family
Neighbors	Other_____

S7. What are the reasons you come to this spot to fish? [CIRCLE ANSWERS. DO NOT READ.]

Fishing is good here	It's close to where I live or work
I like this setting	It is easy to get here
Tradition, cultural practices	Only place I know to fish
Safe and friendly location	Don't know/No answer
Other reason/s [RECORD]:_____	

S8. We would like to better understand where people who fish in the Duwamish River live. Would you mind sharing the name of the neighborhood where you live or your home zip code?

Zip code [RECORD]:_____

Neighborhood [RECORD]:_____

No answer

S9. We'll be out conducting this survey for a year. We may run into you again out here, and you could take a shorter version of the survey and receive a card again. Could you please provide the first letter of your first name and the last 4 digits of your phone number. This is just to help us know whether you have taken the survey before but will not allow us to identify you personally.

First Initial: _____ Last 4 digits of phone number: _____

No answer

How are you doing on time? I have a couple more questions that I'd like to ask you if you are willing, or we can stop here.

Participant has more time	[PROCEED WITH S10]
Participant would like to stop survey	[PROCEED WITH S14]

S10. How do you know if the seafood you catch is safe to eat? [RECORD ANSWERS BELOW.]

S11. Are some types of seafood from this river safer to eat than others? [IF YES, ASK WHICH ONES. RECORD ANSWERS BELOW]

S12. People like to fish for many reasons and they benefit from fishing in many ways. For some people the benefit might be catching food to eat. For others it is something relaxing and fun to do. Can you tell me more about the benefits you get from fishing here? [RECORD ANSWERS BELOW]

S13. As a follow up to one of our earlier questions, how can we best get information to you about eating seafood from this river? [RECORD ANSWERS BELOW]

S14. This is the end of the survey, unless you have any questions or have anything more you wish to share? [RECORD COMMENTS/QUESTIONS BELOW]

Thank you very much for your help. This concludes our survey. Here is your $10 card. I just need you to initial this form indicating that you received this card. [HAVE PARTICIPANT INITIAL $10 CARD TRACKING FORM. FILL OUT INTERVIEWER QUESTIONS ON FRONT PAGE.]

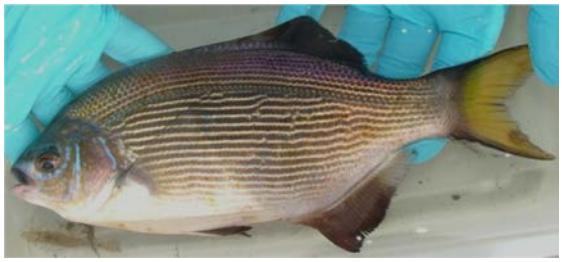
Resident Fish

Flatfish / Flounder / Sole

Rockfish

Sculpin (Bullhead/Cabazon/Greenling)

Perch



(e.g., Shiner perch, pile perch, striped perch)

Dogfish

Bait fish / other small fish

(e.g., herring or smelt)

Big Skate

Whitefish (Suckerfish)

Salmon (Non-Resident Fish)

(e.g., Chinook / King, Pink, Chum, Coho, Sockeye, Steelhead)

Non-Fish Species

Crabs

(e.g., Dungeness, Slender or Red Rock)

Clams

(e.g., Eastern softshell, cockles)

Mussels

Squid

Handout #2 Field Tool

Topic 1: Perceived benefits (and obstacles) of fishing on the Duwamish (and in general)		
First, I would like to talk about how a person like you might benefit from fishing. Let's say that someone wanted to know what is good, and what is not so good, about fishing. What would you tell them?		
Key Information	√	**Suggestions for Follow-up (in your own words)**
<u>Benefits of fishing</u> Leisure Social Identity/ tradition Food source Other <u>Obstacles</u> Equipment Bait Time Transportation License Other		• Describe what a good day of fishing is like. What might make a day of fishing not so good? • How important is it to you to be able to go fishing? • What do you need to be able to fish? What do you do if you don't have these? • How often do you fish? What keeps you from going fishing more often? • Some people fish to get "free" food. For you, how important is fishing as a way to get free food? • Some people fish to get healthy food. Do you agree? What makes fish a healthy food? • Compared to other foods you eat? • Besides getting fish to eat, what else do you get from fishing? • Where do you fish most often? Where else? Why do you go to these places? How do you get there? • What do you hope to catch in these places? Why do you prefer to catch these? Do you catch anything else? • <u>OR</u> Why do you only fish on the Duwamish? What do you hope to catch and why? What do you catch?
Comparison to the Duwamish * As place to fish * As source of food		• How does fishing on the Duwamish compare to the other places you fish? What do you prefer? • If you couldn't fish from the Duwamish where would you fish instead? How would you feel about that? What might other fishers you know do if they could not fish from the Duwamish?
Fishing as cultural tradition		• How and when did you learn to fish and who taught you? How did you feel about this? • (if learned as a child) Who did you usually go fishing with when you were young? • Who do you usually go fishing with now? <u>OR</u> Why do you like to fish alone? • Who in your community goes fishing (young/old, men/women, US born/immigrants, etc.)? • How often do they go fishing? • In what ways is fishing important to other people in your community?

Handout #2 Field Tool

Topic 2: Perceived safety/risk of eating resident seafood from the Duwamish		
Now I'd like to know about the safety of eating fish from this river. How safe to eat are the fish and other seafood that live in the Duwamish? *Please remember we are not talking about salmon, squid or herring. These do not live their whole life in the Duwamish.*		
Key Information	√	**Suggestions for Follow-up (in your own words)**
Perceptions of fish safety		• How do you know it's safe to eat fish, crabs and clams from the Duwamish? OR What makes it unsafe to eat fish, crabs and clams from the Duwamish? • What fish or seafood you catch from the Duwamish do you not eat? What is the reason you don't eat these? What do you do with these? • Are there any kinds of seafood you do not try to catch because they are unsafe to eat? • In general, are some fish or seafood safer to eat than others? Why?
Determining safety		• How do you know if a fish, clam or crab is safe to eat? • What could be the cause of an unsafe or unhealthy fish or seafood? • Does this happen in the Duwamish? • What are the reasons that fish from the Duwamish might be unsafe to eat?
Affect of eating contaminated seafood		• What might happen if someone ate unsafe or unhealthy seafood? o Have you heard of this happening? Tell me about this. o Are some people more likely to be harmed by eating unsafe or unhealthy seafood? Who? o How might their health be harmed?
Duwamish water quality		• What does it mean to say that water is polluted? What causes pollution? • What does it mean to say that water is unsafe or unhealthy? What is the cause of this? • How can you tell if water quality is good or not? • How good is the quality of water in this river? How can you tell this? • How does this compare with other places you have fished? • How does water quality affect the health of fish that live there?

Handout #2 Field Tool

Topic 3: Preparation methods, sharing/distribution, and consumption of resident seafood from the Duwamish		
1) Now I'd like to ask what is done with the fish and seafood from the Duwamish River? I'd like to hear from fishers, who eats the fish you catch. 2) And those of you who don't fish, I'd like to hear what you do with fish you are given by others. Please remember we are not talking about salmon, squid or herring. These do not live in the Duwamish.		
Key Information	**√**	**Suggestions for Follow-up (in your own words)**
<u>Distribution</u> * Where does it go * Who eats * How often * What kind		• What do you do with the fish you catch in the Duwamish? • Who eats what you catch? How often? Who else? • Who do you give fish to? • Who buys your fish? • How often do others give you fish? When you are given fish, do you know if it is from the Duwamish? What do you usually do with it? • [if this has not been answered already] What kinds of seafood do you catch in (or have been given from) the Duwamish and eat?
Preparation and consumption		• How do you clean your fish and prepare it for cooking? What about clams? Crab? • How might you clean seafood if you thought it was unhealthy or contaminated? • Are there any parts of the fish, crabs or clams that you do not eat? Why? • Who cooks the fish you catch or are given? • What are some of the ways you cook fish, clams and crab that you catch or are given?
Role of fisher in the community		• Sometimes it is important to catch seafood in order to share with others. Who in your community relies on you to provide fish?
Ways to obtain seafood		• Why do you like to eat fish? How important is seafood in your diet? • Where else do you get seafood? How much and how often do you buy fish in the store? • How does this compare to fish you or someone has caught? • How would you get fish to eat if you couldn't fish from the Duwamish? How difficult would this be? Would you eat less fish?

Handout #2 Field Tool

Topic 4: Awareness of advisories and cleanup and effective ways of communicating this type of information		
I would like to finish this interview by asking what you may have heard about pollution in the Duwamish and about eating fish from this river. I'd like to learn how to get information to you and others who eat seafood from the Duwamish about ways to protect your health. What have you heard about pollution in this river?		
Key Information	√	**Suggestions for Follow-up (in your own words)**
Knowledge of cleanup		• What have you heard about plans to clean up the Duwamish? What do you think will happen? • Do you know if the cleanup has started and how long it will take? • How do you think fishing in the Duwamish will be affected during and after the cleanup? • What have you heard from other fishers? • What information would you like to get about the safety of eating seafood from the Duwamish?
Knowledge of fish contamination		• What have you heard about how pollution in the Duwamish affects seafood? • What have you seen or heard information about eating seafood from the Duwamish? • Where have you seen or heard this information? • How have you used this information?
Information sources and awareness of advisories		• What do you think of the fish advisory signs posted at fishing sites along the river? How have you used this information? What would make the signs better? • What might be a better way to get out this information other than with these signs? • Who would you most trust to give information concerning your health and about the safety of eating seafood from this river?
Fishing alternatives		• If you heard that seafood from the Duwamish was no longer safe to eat, what would you do? o Is there anything else you would do? o How would you continue to get fresh fish? o How would you feel about this? What difference would this make to you?

APPENDIX B. BUSINESS OUTREACH LOG

Table 1. Business outreach log

Contacting Party Information		Business Name (Address; all in Seattle, WA)	Contact Attempt			Fishing Activities Reported? (yes/no)	Questions for Businesses			Notes
Party	Name of Contacting Individual		Dates Attempted	Contact Method	Attempt Successful? (yes/no)		Type of Fishing Activity	Date Survey Conducted	Count of Surveys Conducted	
ECOSS	Kevin	Alaska Logistics (327 S Kenyon St.)	12/2; 12/15	in person	yes	no	-	-	-	Not sure if employees fish on the Duwamish, but will ask and if anyone does she will give them the survey and contact Kelvin once completed.
ECOSS	Ruben	Ardagh Group (5801 E Marginal Way S)	12/8; 12/15	in person	yes	no	-	-	-	Left survey on the front desk with note saying to contact Ruben if anyone does fish in the Duwamish River or has completed the survey.
ECOSS	Kevin	Arisol (~520 S Webster St.)	12/2; 12/15	in person	no	no	-	-	-	Could not find location.
ECOSS	Kevin	Berg Equipment & Scaffolding (2328 Harbor Ave SW)	12/14; 12/22	in person	yes	no	-	-	-	
ECOSS	Kevin	Boyer Logistics (7318 4th Ave S)	12/2; 12/15	in person	yes	no	-	-	-	Left survey with staff and will forward to contact; if he knows whether anyone fishes on the Duwamish, he will give the survey to the employee and contact Kelvin once completed.
ECOSS	Hung	Cedar Grove (7343 E Marginal Way S)	12/8; 12/15; 12/16	in person	yes	yes	fishing (salmon)	12/16/2015	1	12/8: He says he will circulate the survey to staff via email. If anyone fills it out, he will contact or email Hung. 12/16: Picked up one completed survey.
ECOSS	Kevin	Con Global (1 S Idaho St.)	12/8; 12/15	in person	yes	no	-	-	-	
ECOSS	Kevin	Delta Marine (1608 S 96th St.)	12/2; 12/15	in person	yes	no	-	-	-	Talked with the staff at the driver check-in office, who says she will ask if employees fish in Duwamish, will provide them with the survey, and once it is completed will contact Kelvin.
ECOSS	Kevin	Duwamish Yacht Club (1801 S 93rd St.)	12/2; 12/15	in person	no	no	-	-	-	Need an entry code to go in the Yacht Club; location not accessible.
ECOSS	Kevin	Ferguson (4100 W Marginal Way SW)	12/14; 12/22	in person	yes	no	-	-	-	
ECOSS	Kevin	Global Diving & Salvage (3840 W Marginal Way SW)	12/14; 12/22	in person	yes	no	-	-	-	
ECOSS	Kevin	Gray Line of Seattle (4500 W Marginal Way SW)	12/14; 12/22	in person	yes	no	-	-	-	
ECOSS	Kevin	Harbor Island Marina (1001 SW Klickitat Way)	12/8; 12/15	in person	yes	no	-	-	-	Talked to one of the businesses in the Harbor Island suite; they say no one here fishes in this river, just people. People just use this area as a place to keep their boats.
ECOSS	Kevin	Island Tug & Barge (3546 W Marginal Way SW)	12/14; 12/22	in person	no	no	-	-	-	Was not able to access business.
ECOSS	Kevin	Ja Jack & Sons (5427 Ohio Ave S)	12/8; 12/15	in person	yes	no	-	-	-	Left survey with staff; will talk about the fisher study, ask employees if anyone here fishes, and contact Ruben if surveys are completed.
ECOSS	Sophorn	Kapstone (5901 E Marginal Way S)	12/8; 12/15	in person	yes	no	-	-	-	Left survey with staff who will forward to an EHS. If he knows of fishers, he will give the survey to the employees and will contact Ruben once completed.
ECOSS	Kevin	Lehigh Cement/Lehigh Cadman (5225 E Marginal Way S)	12/8; 12/15	in person	yes	no	-	-	-	Left survey on contact's desk; his co-worker will talk to him about the fish survey. If anyone fills it out, he will notify Ruben.
ECOSS	Kevin; Kelvin	Manson Construction (5209 E Marginal Way S)	12/8;12/30	in person/ phone	yes	no	-	-	-	Left survey with the office staff; talked to him about the fisher study, he will notify Ruben if anyone fills out the survey. None of his employees fish on the Duwamish, but some do fish elsewhere offshore and in Alaska recreationally.
ECOSS	Kevin	Muckleshoot Seafood Products (111 S River St.)	12/8; 12/15	in person	yes	no	-	-	-	No one was there.
ECOSS	Kelvin	Pacific Pile & Marine (700 S Riverside Dr.)	12/2; 12/15	in person	yes	no	-	-	-	Gave survey to front desk staff, who will share on the bulletin board. If employees do fish in the Duwamish, she will give them the survey and contact Kelvin once completed.
ECOSS	Kevin	Pacific Pride (fuel) (1617 SW Lander St)	12/8; 12/15	in person	no	no	-	-	-	No one was at the fueling station.
ECOSS	Kevin	Recology/Cleanscape (4401 E Marginal Way S)	12/8; 12/15	in person	yes	no	-	-	-	
ECOSS	Ruben	Samson Tug & Barge (6361 1st Avenue S)	12/8; 12/15; 12/22	in person	yes	yes	fishing (salmon)	12/22/2015	2	12/8: Contact says he used to fish here and is willing to take the survey; he will contact Hung once completed. 12/15: Went back to check in with contact, but he was not in the office on that day. 12/22: Picked up two completed surveys.
ECOSS	Kevin	SeaTac Marine (6701 Fox Ave S)	12/8; 12/15	in person	yes	no	-	-	-	

Contacting Party Information		Business Name (Address; all in Seattle, WA)	Contact Attempt			Fishing Activities Reported? (yes/no)	Questions for Businesses			Notes
Party	Name of Contacting Individual		Dates Attempted	Contact Method	Attempt Successful? (yes/no)		Type of Fishing Activity	Date Survey Conducted	Count of Surveys Conducted	
ECOSS	Kevin	Seattle Boiler Works (500 S Myrtle St)	12/8; 12/15	in person	yes	no	-	-	-	Talked to office staff, who says she will circulate the survey for any office employees who fish here. She will notify Kelvin if anyone fills out the survey.
ECOSS	Kevin	Seattle Bulk Shipping (3233 16th Ave SW)	12/8; 12/15	in person	yes	no	-	-	-	Talked about the fisher study; left survey with the office.
ECOSS	Kevin	South Park Marina (8604 Dallas Ave S)	12/2; 12/15	in person	yes	no	-	-	-	He says not a lot of fishers fish during this season; he will help us find fishers and give them the survey to fill out. Will contact Kelvin once completed
ECOSS	Kevin	United Motor Freight (3800 W Marginal Way SW)	12/14;12/22	in person	yes	no	-	-	-	He say no one fishes on the Duwamish River.
ECOSS	Kevin	United Site Services (1024 S Elmgrove St.)	12/2; 12/15	in person	yes	no	-	-	-	Contact doesn't think anyone fishes here, but will ask and if there is, she will give them the survey and contact Kelvin once completed.
ECOSS	Kevin	Vigor Shipyards (1700-2338 16th Ave SW)	12/8; 12/15	in person	yes	no	-	-	-	Talk to the Environmental Safety Specialist; he will ask if any employees fish and will contact Hung if surveys are filled or anyone fishes here.
ECOSS	Kevin	WelTech/Duwamish Metal Fab (16 S Michigan St)	12/8; 12/15	in person	yes	no	-	-	-	No one was in office. Left survey on contact's desk and left note about the fisher study; asked him to contact Kelvin if anyone fills out the survey.

ECOSS – Environmental Coalition of South Seattle

APPENDIX C. COMMUNITY INVOLVEMENT LOG AND SUMMARY OF ECOSS PRE-SURVEY INTERVIEW RESPONSES

CONTENTS

- Community Involvement Log (Table 1)
- Summary of responses of community members interviewed as the ECOSS pre-survey interviews (Table 2)

Table 1. Community involvement log

Date	Contact Method	Initiation of Contact	Fishers Study Team Member	No. of Community Members Involved	Language Used	Ethnic Group(s)	Community Group(s) Represented	Rationale for Contacting Specific Community Members	Topic	Notes (Resolution/Follow-up/ Feedback Received/ Additional Information)	Status
Pre-study involvement (input into study design):											
10/17/2013	in person	ECOSS	Stephen	1	English	Filipino	former Department of Neighborhoods Community Coordinator	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
10/18/2013	in person	ECOSS	Stephen	1	English	Hmong	WSU-Refugee Farm Program	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
10/19/2013	in person	ECOSS	Stephen	1	English	Mien	Southeast Asian fishing community	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
10/20/2013	in person	ECOSS	Tawn	1	English	not reported	fisher	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
10/25/2013	in person	ECOSS	Tawn	1	Mien	Mien	Mien elder	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
10/25/2013	in person	ECOSS	Tawn	1	not reported	Lao, Mien	church leader, fisher	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
10/23/2013	in person	ECOSS	Sophorn	1	Khmer	Khmer	community member	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
10/23/2013	in person	ECOSS	Sophorn	1	Khmer	Khmer	Khmer community coordinator	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
10/24/2013	in person	ECOSS	Sophorn	1	English	Bosnian	Refugee Federation	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
10/24/2013	in person	ECOSS	Sophorn	1	English	Khmer	community member	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
10/24/2013	in person	ECOSS	Sophorn	1	English/ Khmer	Khmer Cham	community member	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
10/25/2013	in person	ECOSS	Sophorn	1	English	Bhutanese	Bhutanese Community Resource Center	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
10/31/2013	in person	ECOSS	Ruben	1	Spanish	Latino	South Park Information and Resource Center	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
10/29/2013	in person	ECOSS	Tawn	1	English	Japanese	community member	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
10/28/2013	in person	ECOSS	Tawn	1	Mien	Mien	community member	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
10/30/2013	in person	ECOSS	Tawn	1	Mien	Lao/Mien	fisher	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/4/2013	in person	ECOSS	John L.	1	English	not reported	homeless community, fisher	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/4/2013	in person	ECOSS	John L.	1	English	not reported	homeless community, fisher	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/4/2013	in person	ECOSS	John L.	1	English	not reported	homeless community, fisher	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/6/2013	in person	ECOSS	Tawn	1	English	Korean	fisher	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/4/2013	in person	ECOSS	Tawn	1	English	not reported	fisher	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/12/2013	in person	ECOSS	Tawn	1	Mien	Mien	fisher	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated

Date	Contact Method	Initiation of Contact	Fishers Study Team Member	No. of Community Members Involved	Language Used	Ethnic Group(s)	Community Group(s) Represented	Rationale for Contacting Specific Community Members	Topic	Notes (Resolution/Follow-up/ Feedback Received/ Additional Information)	Status
11/7/2013	in person	ECOSS	Tawn	1	English	Filipino	fisher	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/5/2013	in person	ECOSS	Tawn	1	English	Vietnamese and Chinese	community members	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/8/2013	in person	ECOSS	Hung	1	English	Latino	community member	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/6/2013	in person	ECOSS	Ruben	1	Spanish	Latino	South Park ELLAS Program	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/6/2013	in person	ECOSS	Osman	1	Somali	Somali	Al Noor Masjid (local mosque)	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/8/2013	in person	ECOSS	Hung	1	Vietnamese	Vietnamese	community member	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/10/2013	in person	ECOSS	Hung	1	Vietnamese	Vietnamese	Vietnamese Catholic Church	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/22/2013	in person	ECOSS	Stephen	1	English	not reported	Providence South Park Food Bank	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/21/2013	in person	ECOSS	Tawn	1	Vietnamese	Vietnamese	fisher	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/20/2013	in person	ECOSS	Tawn	1	English	Latino	fisher	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/19/2013	in person	ECOSS	Tawn	1	English	Vietnamese/ Indian	fisher	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/19/2013	in person	ECOSS	Ruben	1	Spanish	Latino	Consejo	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/20/2013	in person	ECOSS	Hung	1	Vietnamese	Vietnamese	fisher	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/1/2013	in person	ECOSS	Osman	1	English	Korean	community member	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/13/2013	in person	ECOSS	Tawn	2	Mien	Hmong and Mien	fisher	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/13/2013	in person	ECOSS	Tawn	2	Mien and Lao	Lao and Mien	fisher	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/13/2013	in person	ECOSS	Tawn	2	Mien and Lao	Mien	fisher	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/13/2013	in person	ECOSS	Tawn	2	Mien	Mien	fisher	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/13/2013	in person	ECOSS	Tigist	1	Amharic	Ethiopian	Ethiopian Community Center	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/12/2013	in person	ECOSS	Tigist	1	Amharic	Ethiopian	Horn of Africa Services	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
10/27/2013	in person	ECOSS	Tigist	1	Amharic	Ethiopian	community member	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/15/2013	in person	ECOSS	Tawn	1	Lao	Lao, Thai	fisher	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/15/2013	in person	ECOSS	Tawn	1	Hmong	Hmong	fisher	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/15/2013	in person	ECOSS	Tawn	1	Lao	Chinese	fisher	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/25/2013	in person	ECOSS	Ruben	1	English	not reported	South Park	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated

Date	Contact Method	Initiation of Contact	Fishers Study Team Member	No. of Community Members Involved	Language Used	Ethnic Group(s)	Community Group(s) Represented	Rationale for Contacting Specific Community Members	Topic	Notes (Resolution/Follow-up/ Feedback Received/ Additional Information)	Status
11/22/2013	in person	ECOSS	Elizabeth	1	English	Vietnamese	Vietnamese community liaison	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/25/2013	in person	ECOSS	Elizabeth	1	English	Latino	Sea Mar	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/18/2013	in person	ECOSS	Osman	1	Somali	Somali	Somali Masjid MLK	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/19/2013	in person	ECOSS	Osman	1	Somali	Somali	community member	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/20/2013	in person	ECOSS	Kevin B	1	English	not reported	South Park Neighborhood Association	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
11/22/2013	in person	ECOSS	Stephen	1	English	Samoan	White Center community	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
Not reported	in person	ECOSS	Elizabeth	1	English	not reported	DRCC	ECOSS contact	ECOSS pre-survey interview	various suggestions for study design + questionnaire (see Section 3 of the IP)	incorporated
5/21/2014	email	Windward	Suzanne	2	English	not reported, Mienh	Duwamish fisher, Mienh community member	expressed interest in reviewing project documents	invitation to review draft IP	none	completed
May 2014	phone	ECOSS	Stephen	1	English	not reported	Washington State Commission on Asian American Affairs	expressed interest in reviewing project documents	invitation to review draft IP	none	completed
Involvement in pilot test:											
7/15/2014	in person	ECOSS	Tawn	1	English (self-administered)	Samoan	community member	ECOSS contact	participation in pilot study	various suggestions to improve survey questionnaire (see Section 5 of the IP)	incorporated
7/11/2014	in person	ECOSS	Tawn	1	English	Hmong	community member	ECOSS contact	participation in pilot study	various suggestions to improve survey questionnaire (see Section 5 of the IP)	incorporated
7/11/2014	in person	ECOSS	Sophorn	1	Khmer	Khmer	community member	ECOSS contact	participation in pilot study	various suggestions to improve survey questionnaire (see Section 5 of the IP)	incorporated
7/11/2014	in person	ECOSS	Tawn	1	Lao	Lao	community member	ECOSS contact	participation in pilot study	various suggestions to improve survey questionnaire (see Section 5 of the IP)	incorporated
7/9/2014	in person	ECOSS	Tawn	1	Mienh	Mienh	community member	ECOSS contact	participation in pilot study	various suggestions to improve survey questionnaire (see Section 5 of the IP)	incorporated
7/15/2014	in person	ECOSS	Jin	1	Korean	Korean	community member	ECOSS contact	participation in pilot study	various suggestions to improve survey questionnaire (see Section 5 of the IP)	incorporated
7/7/2014	in person	ECOSS	Kelvin	1	Chinese	Chinese	community member	ECOSS contact	participation in pilot study	various suggestions to improve survey questionnaire (see Section 5 of the IP)	incorporated
7/7/2014	in person	ECOSS	Ruben	1	Spanish	Spanish	community member	ECOSS contact	participation in pilot study	various suggestions to improve survey questionnaire (see Section 5 of the IP)	incorporated
7/10/2014	in person	ECOSS	Tawn	1	Tagalog (self-administered)	Tagalog	community member	ECOSS contact	participation in pilot study	various suggestions to improve survey questionnaire (see Section 5 of the IP)	incorporated
7/10/2014	in person	ECOSS	Hung	1	Vietnamese	Vietnamese	community member	ECOSS contact	participation in pilot study	various suggestions to improve survey questionnaire (see Section 5 of the IP)	incorporated
Involvement during fishers study:											
Jan. 2015	various (in person, phone, or email)	ECOSS, Windward	Stephen, Suzanne	13	English (mostly)	various (not reported)	various[a]	expressed interest in attending community meetings	invitation to first quarterly update meeting (1/292015)	none	completed
2/27/2015	email	ECOSS	Socorro	25	English	various (not reported)	various[b]	expressed interest in receiving email updates	first quarter fishers study update	none	completed
April/May 2015	various (in person, phone, or email)	ECOSS, Windward	Stephen, Suzanne	16	English (mostly)	various (not reported)	various[c]	expressed interest in attending community meetings	invitation to second quarterly update meeting (5/11/2015)	none	completed

Date	Contact Method	Initiation of Contact	Fishers Study Team Member	No. of Community Members Involved	Language Used	Ethnic Group(s)	Community Group(s) Represented	Rationale for Contacting Specific Community Members	Topic	Notes (Resolution/Follow-up/ Feedback Received/ Additional Information)	Status
5/6/2015	email	ECOSS	Socorro	25	English	various (not reported)	various[b]	expressed interest in receiving email updates	second quarter fishers study update	none	completed
July 2015	various (in person, phone, or email)	ECOSS, Windward	Stephen, Suzanne	16	English (mostly)	various (not reported)	various[c]	expressed interest in attending community meetings	invitation to third quarterly update meeting (8/32015)	none	completed
8/12/2015	email	ECOSS	Socorro	27	English	various (not reported)	various[b]	expressed interest in receiving email updates	third quarter fishers study update	none	completed
May 2016	various (in person, phone, or email)	ECOSS, Windward	Stephen, Suzanne	17	English (mostly)	various (not reported)	various[c]	expressed interest in attending community meetings	invitation to preliminary results and final quarterly update meeting (6/22016)	none	completed
7/1/2016	email	ECOSS	Stephen	27	English	various	various	expressed interest in receiving email updates	preliminary results and fourth quarter study update	TBD	email sent

Note: This log does not capture the involvement of ECOSS staff as community representatives.

[a] Community groups represented included Filipino community leader, WSU Refugee Farm Program, South Park Neighborhood Association, South Park community member, DRCC, Just Health Action, Puget Soundkeeper Alliance, Mienh Tukwila Church, and Duwamish fishers.

[b] Community groups represented included Filipino community leader, Washington State Commission on Asian American Affairs, WSU Refugee Farm Program, South Park Information and Resource Center, Mienh Tukwila Church, UW researcher, Duwamish fishers, South Park Neighborhood Association, Hmong community leader, Khmer community, Khmer Cham community, DRCC, South Park community, Latino community, Mienh community, South Park ELLAS Program, Latino community, Just Health Action, ICHS, and Puget Soundkeeper Alliance.

[c] Community groups represented included Filipino community leader, WSU Refugee Farm Program, South Park Neighborhood Association, South Park community member, Mienh Tukwila Church, Duwamish fishers, DRCC, Just Health Action, Puget Soundkeeper Alliance, ICHS, and DRCC

[d] These community involvement efforts are still to come during the fisher study process.

DRCC – Duwamish River Cleanup Coalition
ECOSS – Environmental Coalition of South Seattle
ICHS – International Community Health Services
IP – implementation plan
MLK – Martin Luther King
TBD – to be determined
UW – University of Washington
WSU – Washington State University

Table 2. Summary of responses of community members interviewed as the ECOSS pre-survey interviews

ECOSS Staff Member (inter-viewer)	Interview Date	Language in which Interview Was Conducted	Ethnic Group	Groups Represented	*Q1: Do you fish, crab, or clam on the Duwamish River?	*Q2: Approaching Fishers on the Water	Q3: Language Capabilities/Translation	Q4: Incentives to Participate	Q4a: Why People Fish	Q5: Behaviors that Would Create Barriers to Participation	*Q6: Risk Perceptions	*Q7: Ideas to Contact Others Who Eat Fish or Crab from Duwamish but Do Not Catch It	Q8: Additional Information	*Q9: Staying Involved in the Study[a]	*Q10: Helping with the Pilot[a]
Stephen	10/17/2013	English	Filipino	Former Department of Neighborhoods Community Coordinator	No, but people from the community do still fish for salmon.	Don't look like the game department.	Most read English. Tagalog and Ilocano most common languages.	Gift cards are a good incentive.	Did not discuss.	Not having bi-lingual staff, looking like a game warden.	Does not eat fish from the Duwamish.	Catholic Churches, Filipino Community Center, International District Drop-in Center, Beacon Hill United Methodist Church	What is going to be done with this information?	Yes, let me know how I can help.	Yes. Provided several community contacts.
Stephen	10/18/2013	English	Hmong	WSU-Refugee Farm Program	Yes, but have not in 5 years. Used to fish for salmon at Spokane St and Squid. Lots of Asians fish for herring, squid and sea perch.	No problem with approach.	Most like to get information orally, not a lot of people read Hmong. Younger folks prefer information in English.	Gift cards are good	Food and fun	Did not discuss	People do not know the fish is hazardous, would be skeptical because it looks clean.	Hmong Churches, people come together and trade goods.	Did not discuss	Yes, let me know how I can help.	Yes. Obtained contact information.
Stephen	10/19/2013	English	Mien	Southeast Asian fishing community	Yes, mostly in Zone 2. Fish daily when the season is open. Catch perch, salmon, squid, crab, dogfish, rays, whitefish/suckers.	Have someone that speaks the language. Don't ask too many questions unless the fisherman knows you. Fishing as well would help. Do not ask to look in bucket. Be friendly. Call elders "uncle." Show respect.	Most people speak Mien, Lao and Thai.	Yes, having incentive will help. Raffle tickets for fishing equipment. Discounted fishing license.	Food and fun	Looking like the game warden. No incentives. No time while fishing.	Lots of Mien still fishing and eating from the Duwamish. If it does not look polluted or sick then we eat it.	People exchange vegetables for fish and other things at the Mien church in Tukwila and at the Lao Senior Club. P-patches in Seattle.	Did not discuss	Yes, let me know how I can help.	Yes. Obtained contact information.
Tawn	10/20/2013	English	Not reported	Fisher	Yes, in Zones 1, 10 and 11. Usually fish on Thursday, Friday, and Saturday.	Set up a booth and give out free gift, coffee, gift cards. Approach using a polite gesture.	I would prefer to fill out a survey on my own. It would be faster.	Raffle for fishing gear	Hang out with friends, feed family, the thrill of fighting fish	Making the survey to long. Asking to many questions that sounds like the game warden.	See the signs about the pollution, so I am aware.	Internet	Can people get sick from the river?	Yes, please email.	Yes. Obtained contact information.
Tawn	10/25/2013	Mien	Mien	Mien Elder	Not anymore, just come with family. My family shares fish with me.	Say hello and tell people you are not cops.	Prefers Mien, translation would be helpful. Duwamish also known as Snakehead, Green Water, Spokane Bridge.	Cash or a raffle	Eat fresh fish, free. I cook fish for my whole family.	Looking like someone from the government. Asking too many questions. Asking more than once will be annoying.	Knowing more about the pollution is good for the kids. I'm old it doesn't matter.	Television, mail	Tawn is only source of information.	Did not discuss	Did not discuss
Tawn	10/25/2013	Not reported	Lao, Mien	Church Leader, Fisher	Yes, Areas 1, 2, 10, 11. I fish daily for flat fish, bullhead, and flounder.	I would think that the person might be undercover game warden. Approach and start a conversation first.	Need to speak the language, translated survey would help.	Gift card for fishing gear, Wal-Mart is cheap and has fishing gear.	It's food, get away from wife. I prepare deep fried, in soup, baked and sushi.	Not being friendly and looking like the government.	Instead of fishing warning signs use media.	By word of mouth	What can we do to help?	Yes	Yes. Obtained contact information.
Sophorn	10/23/2013	Khmer	Khmer	Community member	No, I mostly fish the Skagit and Snake Rivers.	Don't look like the game department. Be respectful. Cambodians bow to say hello.	Khmer is preferred. Oral survey preferred.	Like the gift cards.	Leisure. To sell and earn extra money. Some people lack the resources to buy from the store.	Being rude when approaching people fishing. Keep the survey short. People will be tired of talking if approached many times.	If they know of the risks they will be concerned.	People prefer to listen to the news. TV, Radio, DVD. You should talk to elderly people at Temple or Khmer Community about fish they eat or share.	No additional questions	Yes contact me.	Did not ask
Sophorn	10/23/2013	Khmer	Khmer	Khmer Community Coordinator	No	The approach sounds good. You may need people who speak multiple languages.	Important to speak first language.	In the community gift cards are a good way to compensate people for their time.	For pleasure. Cultural practice.	Be respectful.	People usually trust information from the Health Department.	I have no idea. My family only buys fish from the store	When does the clean-up take place	You can email me or set a time to meet.	Yes

ECOSS Staff Member (inter-viewer)	Interview Date	Language in which Interview Was Conducted	Ethnic Group	Groups Represented	*Q1: Do you fish, crab, or clam on the Duwamish River?	*Q2: Approaching Fishers on the Water	Q3: Language Capabilities/Translation	Q4: Incentives to Participate	Q4a: Why People Fish	Q5: Behaviors that Would Create Barriers to Participation	*Q6: Risk Perceptions	*Q7: Ideas to Contact Others Who Eat Fish or Crab from Duwamish but Do Not Catch It	Q8: Additional Information	*Q9: Staying Involved in the Study[a]	*Q10: Helping with the Pilot[a]
Sophorn	10/24/2013	English	Bosnian	Refugee Federation	No. My community usually buys fish from the store.	Have a trusted person from their community approach them.	Extremely important to have outreach in person language. Yes a translated survey would be helpful.	Fred Meyer Gift Cards are good.	Yes people will share this information if asked.	Looking like the government. Do not ask to check people bucket.	I think people will be happy to learn how eating Duwamish seafood affects their health.	I do not know where the seafood I eat is from when I am a guest.	People may feel that it is governments job the environment friendly and healthy for all residences. They might ask why the government does not do a good job.	Yes, please contact me.	Yes. Obtained contact information.
Sophorn	10/24/2013	English	Khmer	Community member	No. But I know others that do.	Explain to people the purpose of the survey.	Important to speak first language. Many people in the community cannot read own language.	Gift cards are good. Include Wal-Mart.	Part of culture	Make the survey short	Most of my people might not be aware of risks. Having a trusted resource could be a real benefit.	No	None	Website and email would be my preferred method for staying in the loop.	Yes
Sophorn	10/24/2013	English/ Khmer	Khmer Cham	Community member	No, But I know others that do. Some share the catch and some sell it as well.	This approach is affective because you will get to speak with the fishers. Lots of retired people fish during the week. You reach them at a bait shop.	Important to conduct survey in primary language. Leave behind an English version as well. River is also known as Renton River, Boeing River, River on First Ave, Tukwila River, South Park River, Alki River.	Gift cards are good.	People fish for sport. They like to consume fish because it is healthier then meat. To share with family and friends.	Not respecting people and their time	People are not aware of health risks.	I am not sure how.	What are the side effects of living around the river?	Yes, please contact me.	Yes. Obtained contact information.
Sophorn	10/25/2013	English	Bhutanese	Bhutanese Community Resource Center	No	Teams of two for safety. Give them on info we are asking these questions. Be culturally sensitive. Go on weekends and evenings.	Very important to be done in first language.	Gift cards at Asian markets would be good.	Family activity and to share with friends and family.	May or not be negative to look like surveyor is from the government. Keep the survey short.	I don't know	Did not ask	What will affect the people during the clean-up?	Keep informed through the ECOSS staff.	I will take the survey
Ruben	10/31/13 4pm	Spanish	Latino	South Park Info and Resource Center	No, but I will ask around. I have heard that homeless people are fishing. Might find fishers at food bank, concord elementary, Stock Box, Red Apple grocery.	Have concern about being part of a study. Used as a research subject.	Very important to be done in first language. River also known as El Rio.	Gift cards to QFC, Grocery Outlet, fishing stores	Recreation and family activity.	Follow-up is important to make people feel included.	People don't read the warning signs. Make sure you tell people they will not get in trouble for fishing on the river.	Have community anchor places. Have the survey available at with key community members.	Why are they gathering the info? Where are the results?	Yes	Yes. Obtained contact information for other community contacts.
Tawn	10/29/13 3:30pm	English	Japanese	Community member	Yes, Areas 2, 11, 12. Fish for squid and salmon.	You can reach others on the piers.	Not asked	Wal-Mart Gift cards preferred	Eat fresh fish, free. Get away from kids. Like to fry and grill seafood.	Not being friendly and looking like the government. Don't ask to look in bucket just ask if they have had any luck today. Shorter is better	Getting a letter from Game Department about risks would keep us at ease.	Did not ask	What is contaminating the fish?	No, I need to ask my husband.	Did not ask
Tawn	10/28/2013	Mien	Mien	Community member	Yes, Areas 1, 2, 11, 12. I catch and share my seafood.	I would be concerned that they are undercover game wardens. I fish 6am daily. Can find people on piers, shore and at fish market.	Yes it would be helpful to have translated version. I would prefer to be asked the question. The river is also known as Snakehead and Spokane Bridge.	Food always draws people in.	Eat and feed family.	Whether or not people would answer questions depends on the person. Lately I have been catching flounder, flat fish and wolf eel. Do not ask people for license or ID.	Getting info to people by word of mouth or at a gathering would be best.	Did not ask	Did not ask	Did not ask	Did not ask

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Tawn	10/30/2013	Mien	Lao/Mien	Fisher	Yes, Areas 1, 2, 3, 6, 10, 12. Both catch and share my seafood.	I fish 3-4 times per week from morning - noon. No problem with approach. We have license.	Did not ask	Gift cards are good	Like to catch catfish, carp, perch crab.	Did not ask	I worry about contamination. Best way to reach is by word of mouth because I cannot read or use internet.	Not at the moment	None	Please keep informed in person.	Did not ask
John	11/4/2013	English	Not reported	Homeless Community, Fisher	Yes, Spokane Street Bridge.	Hang out for awhile so we recognize you. Mostly fish at night. We live in encampments and do not want you coming there.	Ask the questions, don't record, just take notes.	Credit at bait shops. Cash	Source of food.	The homeless need to recognize you. Some are not friendly to outsiders. Bad to look like police or if police have been around recently.	The signs are enough	Maybe Nickelville	Why do you need to know this info? What is the government going to about the problem?	Maybe	Maybe
John	11/4/2013	English	Not reported	Homeless Community, Fisher	Yes, mostly salmon.	Just look normal. Get someone to introduce you.	Important if not from USA	Cards are fine, Safeway is good.	No answer	Looking suspicious. Looking in bucket. Keep the survey short.	Real Change might be a good way to reach community.	No	What will happen if I eat the bad fish or crab?	No	No
John	11/4/2013	English	Not reported	Homeless Community, Fisher	Yes, at Spokane Street Bridge. Don't eat crab just salmon. But will eat other fish if needed. Fish when the tides are right usually in the morning or evening.	Don't look like enforcement. Do not ask questions about where or how they make money. Reassure about confidentiality.	Probably helpful to have translated surveys, but pictures would be better.	Cash would be better then gift cards but anything is appreciated.	Seeing friends, food. Holding fishing territory. I eat what I catch and share with other campers that have shared with me in the past.	Don't start by saying you are with King County. Use shorter form. Don't keep asking the same questions.	My friend know not to eat the crab. Word is spreading among fishers and at shops.	You would have to get fishers to openly share information about their network. That is hard to do.	What is the side effect of eating the fish? Why am I not sick yet?	Did not ask	Did not ask
Tawn	11/6/13 10am	English	Korean	Fisher	Yes, mostly Zones 1, 2, 9, 11 and at Spokane St. Bridge.	Don't look like warden. I probably would not have spoken to you if you looked like an official. Set up a BBQ or table to attract people to take survey.	Let people have the choice to fill out the survey themselves. Really would not want to be bothered when actively fishing.	Gift bags with fishing tackle. Food. Gift cards	Fisherman like to talk about fishing and what they catch.	Send folks that look like fisherman. I spoke with you today because you seemed friendly. I would not want to take this much time away from fishing again. If you like the warden half the people that are not fishing legally will leave.	Out of time, did not ask	Did not ask	Did not ask	Did not ask	No, once was enough
Tawn	11/4/13 3pm	English	Not reported	Fisher	Yes, in Area 1.	Be friendly. Reach people on Piers and Pike Place.	Did not ask	Raffle and booth	Eat and relax with friends.	Don't ask too many questions. Don't repeat questions. Don't ask for license.	Letter and TV would be good ways to get people info.	None	No	You can contact me directly.	You can contact directly
Tawn	11/12/2013	Mien	Mien	Fisher	Yes Area 1. I usually fish daily	I have no problem with your described approach. I have a license.	It is important that the surveyor speaks my language. I cannot read Mien only spoken.	No response	Have fun, relax, enjoy the day and catch fish when they are biting.	Did not ask	Yes, the risks of eating fish from the Duwamish concerns me. Word of mouth is the best way to get Mien information	Did not ask	Did not ask	No	No
Tawn	11/7/2013	English	Filipino	Fisher	Yes, Areas 1, 2, 4. Mostly in the evenings and after work is when I fish.	I would be curious why you're asking questions. Ask fishers if they "are having any luck?"	English is fine.	Universal gift cards, hold an event	Eat fresh and time for ourselves.	Did not ask	I see more warning signs and it scares me. If it short and to the point you could approach people more than once.	Fish markets in Chinatown	No response	No	No
Tawn	11/5/2013	English	Vietnamese & Chinese	Community members	We do not fish there but we eat crab and squid that people	Did not ask	It would not be helpful for us to have translated versions of the survey. Having	Cash food card	Food, store for the future. I cook them in soup,	Be friendly and do not look the government.	I like to get information from friends and television.	No, ideas	Did not ask	No	No

ECOSS Staff Member (inter-viewer)	Interview Date	Language in which Interview Was Conducted	Ethnic Group	Groups Represented	*Q1: Do you fish, crab, or clam on the Duwamish River?	*Q2: Approaching Fishers on the Water	Q3: Language Capabilities/Translation	Q4: Incentives to Participate	Q4a: Why People Fish	Q5: Behaviors that Would Create Barriers to Participation	*Q6: Risk Perceptions	*Q7: Ideas to Contact Others Who Eat Fish or Crab from Duwamish but Do Not Catch It	Q8: Additional Information	*Q9: Staying Involved in the Study[a]	*Q10: Helping with the Pilot[a]
					have caught from there.		interpretation would be helpful.		clay pot, fried and grilled.						
Hung	11/8/2013	English	Latino	Community member	No.	Important not to look like government worker. Wear casual clothing and be clear about why we are doing surveys. Go in Spring/summer and salmon season.	Important to have someone that speaks people first language and have surveys translated. I would prefer to have the questions asked orally.	South Park Business gift cards.	Affordable food, for fun, could be cultural. I think people will share why they fish if approached correctly.	Asking personnel questions. Being to forceful. Have a short survey version if folks have already taken it once.	Orally is the best way to get people information. Speak their language and record the interview to keep the time spent shorter.	Food bank	Safety and health questions. What will be done with the information?	Yes	Yes
Ruben	11/6/2013	Spanish	Latino	South Park ELLAS Program	No	Where clear name tags or ID. Be kind/respectful. Approach slowly and say your name.	Ideally, survey can be completed in multiple languages but not absolutely needed. Having language capacity can build trust.	Gift cards for Dollar Store, Stock Box, Subway, Red Apple	Cheap/free. Feeling like they are self- reliant	Respect, keep the survey short. Don't scare them with pollution issue.	Don't scare them. Phrase the questions in a non-threatening way. Health risk question should be at the end of the survey.	Canvas, find out where people live	Who are you with? What will you do with the information? Safety questions?	Yes	Yes. Provided contact info.
Osman	11/6/2013	Somali	Somali	Al noor Masjid (Local Mosque)	No. We eat fish but I do not know where it comes from. I would approach members of my community at the mosques or the Somali Community Center.	First identify yourself and let them know that you have a gift for them.	Having someone who speaks my language would be good.	Did not ask	Did not ask	Did not ask	First we would want to know more about the Duwamish because we eat fish but do not know where it is from. I good way to reach us is through the local Somali TV channel.	You could reach people through the Mosque on Fridays. Talk with the Imam	Did not ask	Out of time	Out of time
Hung	11/8/2013	Vietnamese	Vietnamese	Community member	No	I like the approach described. I would approach the fisherman that look friendly engage in chit-chat and then ask if they will take the survey.	Extremely important to have outreach in person language. It makes people more comfortable to have a native speaker.	Instead of gift card maybe offer fishing gear.	Enjoy eating fresh catch and hobby.	Approaching people who do not have a license.	People might get info from the warning signs posted along the river. But many will disregard them. Posting information in the Vietnamese newspaper. Let participants know that you also fish and enjoy eating your catch, so they won't feel like they are being judged.	No	Do you have any fishing tips?	Yes, email me.	Yes
Hung	11/10/2013	Vietnamese	Vietnamese	Vietnamese Catholic Church	I do not fish but people share their catch from the Duwamish with me.	Be a fisherman yourself and be friendly.	Very important to speak the fishers language. Keep the survey short and have a lot of pictures.	Gift cards to Bartells, Albertson.	To kill time, get food, enjoy nature.	If the person is Vietnamese I'll feel comfortable if not they will have to speak very slowly and be respectful.	Vietnamese usually think that as long as the fish is fresh and alive it is safe to eat.	I will ask my wife.	Make sure to let them know that the survey is for research purpose and not to be used to stop them from fishing on the Duwamish.	Will ask wife	Yes
Stephen	11/22/2013	English	Not reported	Providence South Park Food Bank	No	Do not look like a surveyor.	Yes, very important to have Southeast Asian language capacity	Gift cards are generous.	Family tradition. For food. I do not think a lot of our client's fish for subsistence.	Looking like an official would scare away our undocumented community members.	I do not think folks are aware. We have provided information at the food bank in the past.	Posters at the food bank would be good. Places	Why you are asking question? What will change?	Yes	Yes
Tawn	11/21/2013	Vietnamese	Vietnamese	Fisher	Yes, Areas 1, 2, 12.	I might think that the surveyors are undercover wardens.	Did not ask	Did not ask	Eat free fish. Time away from kids.	Wait a few minutes then approach. Keep the survey short. Ask what they have been catching lately	I am very concerned. You could pass out flyers.	Go to community events	Did not ask	Maybe	Maybe
Tawn	11/20/2013	English	Latino	Fisher	Yes, Area 1, 2, 4, 10.	Depends on the location whether or not I would	Very important to have multiple	No response	Reason to get out of the house.	Not respecting people's space.	I am going to eat it anyway. It would be ok to	Farmer Markets	None	No	No

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						want to be approached. Tell folks about the prizes.	languages. Yes a translated version would be helpful. River is also known as Spokane Bridge or West Seattle.		Food survival. Make fish tacos, soup, stir fry.	Looking like the government would be negative. Better to ask people what they have been catching lately. Do not ask for license.	approach more than once.				
Tawn	11/19/2013	English	Vietnamese /Indian	Fisher	Yes, Area 1, 3, 7, 11.	Morning and evenings are best. Announce who you are and do not look like a cop.	Would be helpful to have translated version.	Big 5 gift cards. Also an information table would be good.	For survival. I fish all of my life from generation to generation.	Not being respectful. Looking like the government. Make the questions short.	I am very concerned. I don't want to get sick. Get information out by involving the community in the movement.	No answer	Out of time	Out of time	Out of time
Ruben	11/19/2013	Spanish	Latino	Consejo	No	People might be reluctant to a talk with strangers. Use people from the neighborhood and people that look like them to conduct the survey.	Very important, more open to share info in own language.	Gift cards to bait shops. Have a sign that says free gift cards.	Subsistence.	Being too aggressive. Build trust show interest in their activity. If you approach them they might think you have a hidden agenda.	Put up more bilingual signs at water access points. Do not gather contact info from participants.	Perhaps you could reach them at markets that sell super cheap seafood.	Is it safe to eat? What chemicals are in the fish?	Yes, by email.	Yes, I have provided some contacts.
Hung	11/20/2013	Vietnamese	Vietnamese	Fisher	Yes, Spokane Street Bridge. Fish for squid, salmon, clams, crab. Share my catch with family.	Mostly fish from September to January.	Yes, I prefer information Vietnamese.	Did not ask	For fun.	I was fined once for $1500 by game warden.	Did not ask	No	None	No	No
Osman	11/1/2013	English	Korean	Community member	No. But a lot of older Korean people do. They fish for squid at night.	Give free stuff. Access people at Korean grocery stores.	Good to have a Korean speaker but most speak English.	Out of time	Out of time	Out of time	Out of time	Out of time	Out of time	Out of time	Yes
Tawn	11/13/2013	Mien	Hmong and Mien (two interviewees)	Fisher	Yes, Areas 1, 2, 3; 3 days a week from May-August.	Yes, because not all game wardens wear uniforms. Other venue to meet people would be at the Filipino Community Center "Market."	Very important.	Did not discuss	Fish to relieve stress, spend time with fish. Yes we would be willing to share information on how we prepare the fish.	Keep survey short and do not look like the government.	Internet, mail, newsletter, flyers are some ways to reach people.	Filipino Community Center gatherings on Fridays	Did not discuss	Yes, I have provided my email.	Yes
Tawn	11/13/2013	Mien and Lao	Lao and Mien (two interviewees)	Fisher	Yes, Areas 3, 12. Both catch and share the catch. Fish once a week.	Concerned they are game wardens. Other venues to meet people would be where old folks gather.	Yes	Wal-Mart Gift cards preferred	Family time, thrill. Yes we would be willing to share info about how we cook the fish.	Keep it simple with time and to the point.	Word of mouth and information from young people is valued.	Inform fishermen	Did not discuss	Yes, I will be willing to be interviewed again in mien.	Yes
Tawn	11/13/2013	Mien and Lao	Mien (two interviewees)	Fisher	Yes, Areas 1, 2. Fish daily when open. Mostly in the evening and warmer months.	Inform people that you are not an official. Other venue to meet people would be at the Filipino Community Center "Market."	Very Important.	No response	To eat and for fun.	Approach directly and keep it short.	Speak to people when they are fishing. I am concerned about the risk.	Senior centers	No response	Yes	Yes
Tawn	11/13/2013	Mien	Mien (two interviewees)	Fisher	Yes, Area 5.	Not worried because we have license.	Prefer oral survey in Mien.	No response	Crave for fish. Fun and to relax.	Approach directly and keep it short. Don't look in bucket.	Yes I am scared. People would like to get information. Call and tell friends about the risks.	Church, Filipino Community Center	No response	Yes, in person.	Yes
Tigist	11/13/2013	Amharic	Ethiopian	Ethiopian Community Center	No. I don't fish or eat fish from the Duwamish that I know of.	People might not trust you. Use people from the community and the language they understand.	Very important.	Did not cover	To eat fresh fish. We eat a lot of fish during Lent. I don't think people will want to share information.	Not building trust first.	I don't think people know about the Duwamish River or contamination issues in my community.	Most people don't know where the fish comes from only care about the price.	People will want to know what the levels of contamination in the river are.	Yes, send information to the Ethiopian Community Center	Yes

ECOSS Staff Member (inter-viewer)	Interview Date	Language in which Interview Was Conducted	Ethnic Group	Groups Represented	*Q1: Do you fish, crab, or clam on the Duwamish River?	*Q2: Approaching Fishers on the Water	Q3: Language Capabilities/Translation	Q4: Incentives to Participate	Q4a: Why People Fish	Q5: Behaviors that Would Create Barriers to Participation	*Q6: Risk Perceptions	*Q7: Ideas to Contact Others Who Eat Fish or Crab from Duwamish but Do Not Catch It	Q8: Additional Information	*Q9: Staying Involved in the Study[a]	*Q10: Helping with the Pilot[a]
Tigist	11/12/2013	Amharic	Ethiopian	Horn of Africa Services	No. I don't know anyone who fishes or crabs.	No concern with approach described.	Some may need translation.	Safeway cards are good.	Yes people will share this information if asked.	Looking like the government	You can reach people at church and via ethnic paper.	No response	Would like more information on the river and clean-up.	Yes, I have provided my email and phone number	Yes
Tigist	10/27/2013	Amharic	Ethiopian	Community member	No. I don't know where people from my community fish.	I am not sure if you will find any Ethiopians fishing	Very important because I do not speak English. And some from my community cannot read.	This is ok. But add Wal-Mart.	I am sure they will share info if they are fisherman.	Refugee and immigrant people are afraid of the government.	I have never heard anything risky about the Duwamish. Most people get information by presentation or at community gathering.	Cannot help	I am not an expert but I think all people are interested in health	You can contact me through Tigist.	Maybe
Tawn	11/15/2013	Lao	Lao, Thai	Fisher	Yes, I catch and share fish. Areas 1, 5, 9, 8, 12	No worries about approach. I am fishing three times a week depending on the tide when.	Fill out on own. It is faster	Did not cover	I am a fisherman so I fish.	Looking like government. Approach people directly. Don't ask for license	No. I am not worried. I will pass the word around.	Did not ask	Did not ask	Did not ask	Did not ask
Tawn	11/15/2013	Hmong	Hmong	Fisher	Yes, I catch and share fish. Areas 1, 2, 4, 3.	No, I have license.	Important to survey in Hmong. I cannot read the language; only speak.	Did not ask	To eat and fun. Yes people will share information on why they fish.	Did not get to this question	Yes because I don't want to get sick.	Did not get to this question	Did not get to this question	Yes	Yes
Tawn	11/15/2013	Lao	Chinese	Fisher	Yes, I fish in all Areas of the Duwamish. Daily.	I am fishing daily.	It is important for communication	Did not cover	Eat, fresh air, get away from kids	Did not get to this question	I do not worry because that is how I survive.	Did not get to this question	Did not get to this question	Did not get to this question	Did not get to this question
Ruben	11/25/2013	English	Not reported	South Park	No.	People are drinking by the river you should go out in teams.	Somewhat important. Yes have a translated survey.	Stock box, Coffee gift cards	Some catching to sell. People overfishing would be hesitant to talk.	Use a shorter version if people already have taken it.	Did not get to this question	Did not get to this question	What is being done to clean the river? Timeline? What kinds of fish are safe to eat?	Yes	Yes, I will look into others that may be interested.
Elizabeth	11/22/2013	English	Vietnamese	Vietnamese Community Liaison	No, but friends do fish. I do not eat fish because I know about the toxics in the river.	The approach sounds good. Summer is a good time to find fishers. Other venues to reach people; Concord Elementary and I organize meetings.	For elders, it will be important to speak the language.	Did not get to this question	For fun and past time	Vietnamese people are easy going. Elders are more likely to go to meetings	Explain the purpose of the survey and what will be done with the information. Follow thru with any results. Keep them informed or they will not participate again.	Organize a meeting. Concord Elementary. Meeting in people's homes	What can the government help them with if they have health problems related to contamination?	Yes	Yes, I have provided some contacts.
Elizabeth	11/25/2013	English	Latino	Sea Mar	No, I do not fish. Many Latinos sport fish in Mexico.	Limit the survey to ten questions and five minutes. Give them the facts.	Yes, very important.	Did not get to this question	Did not get to this question	Did not get to this question	Empower people through information to make decisions and take action. We can help get the word out via the Sea-Mar Radio station. And the clinics	Radio. Sea Mar clinics	Did not get to this question	Yes, very interested	Yes
Osman	11/18/2013	Somali	Somali	Somali Masjid MLK	No. I heard of one Somali that was fishing. I will try to get his contact info.	Be friendly and where a staff shirt or hat. Gift cards are a good idea.	Yes, important.	Did not get to this question	Did not get to this question	Did not get to this question	Did not get to this question	Community awareness and education.	Did not get to this question	Yes, in person meeting	Yes
Osman	11/19/2013	Somali	Somali	Community member	No. My community does not fish. But we eat fish from grocery store.	My community is very friendly. Greet them and show them your ID. They will not turn down gift card if offered.	Did not get to this question	Did not get to this question	Did not get to this question	Did not get to this question	Yes people would be concerned if they were buying fish from the river. You can reach them through the ethnic paper or at the Masjid	Did not get to this question	Out of time	Out of time	Out of time
Kevin	11/20/2013	English	Not reported	South Park Neighborhood Association	No, but I live on the edge of Area 6/7. Some neighbors buy fish directly from Tribal fishing boats.	No concerns. Be aware of active drug users near access points. Lots of people fishing during Pink season	Important to have different languages in the field where possible.	Yes, gift cards or other incentives are important, or an expectation in some cases	Did not get to this question	Did not get to this question	Did not get to this question	Provided three other community contacts	Did not get to this question	Yes	Yes, provided contacts.

ECOSS Staff Member (inter-viewer)	Interview Date	Language in which Interview Was Conducted	Ethnic Group	Groups Represented	*Q1: Do you fish, crab, or clam on the Duwamish River?	*Q2: Approaching Fishers on the Water	Q3: Language Capabilities/Translation	Q4: Incentives to Participate	Q4a: Why People Fish	Q5: Behaviors that Would Create Barriers to Participation	*Q6: Risk Perceptions	*Q7: Ideas to Contact Others Who Eat Fish or Crab from Duwamish but Do Not Catch It	Q8: Additional Information	*Q9: Staying Involved in the Study[a]	*Q10: Helping with the Pilot[a]
Stephen	11/22/2013	English	Samoan	White Center Community	No. But I know Samoans do fish there. I will ask around for the pilot.	No concerns with approach. Can you let people fill it out on their own?	Yes very important. Samoans are pretty fluent but others are not. Elders go to the Filipino CC on 2nd and 4th Fridays.	Gift cards.	People love fresh seafood and eat a lot of it. Samoans like to eat raw fish and use the entire fish.	Did not get to this question	People are not getting information regarding risks. They would get health information from the doctor.	Filipino CC	What is the risk?	Yes	Yes, email is best.
Elizabeth	Not reported	English	Not reported	DRCC	No. But we know people that do.	One concern. In order to get robust data set-other locations can be very productive like local food banks and people that participated in recent focus groups. Build relationship with fishers and use young people as surveyors if possible. Keep it short.	Very important. Survey probably should be verbal; some folks are not literate.	Give them fishing gear or visa card not tied to one specific store. Gift cards to gas stations.	What I do for fun, exercise, relax, food. Cultural reason will be harder to capture. We have gotten a better response to this question when not at the river.	Avoid looking like an official and do not carry a clipboard. Don't ask to see catch.	DRCC has a problem with this part of the project. It seems to pre-determine that trying to make advisories more effective is what we should be doing. There are health problems associated both with fishing and not fishing. We should also be considering alternatives.	In some communities it's more obvious that food is being shared. And people don't know where the fish is coming from. Finding key informants within the communities will be key	Why do you need to know this info? What are you going to do with it? How long will it take to answer the survey?	Yes. Provided contact suggestions for key informant survey and tribal fisherman not associated with Muckle-shoot or Suquamish.	Yes

Note: Asterisk identifies questions that were of higher priority if the entire interview could not be completed.

[a] An additional follow-up was conducted to determine specific ways that participants were interested in staying involved in the study (i.e., to provide more information than was collected in response to Q9 and Q10).

APPENDIX D. ON-RIVER SURVEY DATA TABLES

The first six tables in this appendix (Tables 1 through 6) present data related to survey administration and survey declines. Tables 7 through 28 present data summarizing the responses to the on-river survey questions.[1] When applicable, responses are summarized by ethnic groups and preferred languages.

In addition, Tables 29 to 31 present confidence intervals (CIs) where additional statistical analyses were conducted. CIs were calculated using a 95% level of confidence to determine whether two proportions could be determined to be statistically significant. These CIs were calculated using the Clopper-Pearson exact method, binom.test in R (version 3.3.1 – 2016-06-21). When CIs are found not to overlap, this indicates that the two proportions in question are significantly different ($p < 0.05$). When CIs do overlap, this does not necessarily mean that these CIs are not statistically different, just that they are not significantly different at that level of confidence (i.e., 95% for this evaluation).

[1] A summary table for survey question 21, which asked fishers to provide their first initial and last four digits of their phone number, is not provided in this appendix. The intent of this question was to track repeat survey takers, but the information collected for this question was determined to be less useful than hoped.

List of Tables

Table 1. Overview of surveys conducted by month

Statistic	First Quarter				Second Quarter				Third Quarter				Fourth Quarter				Overall Total
	Oct.	Nov.	Dec.	Total	Jan.	Feb.	Mar.	Total	Apr.	May	June	Total	July	Aug.	Sept.	Total	
Total number of surveys conducted	51	18	7	**76**	0	0	0	**0**	2	10	14	**26**	16	87	195	**298**	**400**
Surveys per field day	8.5	3.0	1.2	**4.2**	0	0	0	**0**	0.3	1.7	1.2	**1.1**	1.3	7.3	16.3	**8.3**	**4.2**
No. of surveys by location:																	
Spokane St. Bridge	43	14	5	**62**	0	0	0	**0**	2	10	13	**25**	13	21	127	**161**	**248**
T-105	2	0	1	**3**	0	0	0	**0**	0	0	0	**0**	0	0	4	**4**	**7**
Tier 2 locations	6	4	1	**11**	0	0	0	**0**	0	0	1	**1**	3	66	64	**133**	**146**
No. unsuccessful survey attempts	49	28	0	**77**	0	1	0	**1**	1	8	13	**22**	14	72	193	**279**	**379**
Total survey attempts (surveys + declines)	100	46	7	**153**	0	1	0	**1**	3	18	27	**48**	30	159	388	**577**	**779**
Success rate	51%	40%	100%	**50%**	na	0%	na	**0%**	67%	58%	52%	**54%**	53%	55%	50%	**52%**	**51%**

Notes: As part of the business outreach effort, 3 additional surveys were conducted for a total of 403 surveys. A total of 78 survey takers reported that they had taken the survey before (i.e., 328 unique surveys were conducted).

na – not applicable

T-105 – Terminal 105

Table 2. Locations where surveys were administered

Location	All Surveys				Repeat Survey-takers Excluded			
	All Fishers (n = 400)		Fishers who Reported Catching Resident Seafood (n = 95)		All Fishers (n = 328)		Fishers who Reported Catching Resident Seafood (n = 69)	
	Count	Percent of Total	Count	Percent of Total	Count	Percent of Total	Count	Percent of Total
Tier 1 (1.1): Spokane St Bridge	248	62	74	78	186	57	49	71
Tier 1 (1.2) / Tier 2 (2.1z): T-105 Public Fishing Pier	7	1.8	3	3.2	7	2.1	3	4.3
Tier 2 (2.1a): T-18 Public Access Park	1	0.2	-	-	1	0.3	-	-
Tier 2 (2.1b): Herring House Park	2	0.5	-	-	2	0.6	-	-
Tier 2 (2.1c): T-107 Public Access	3	0.8	3	3.2	2	0.6	2	2.9
Tier 2 (2.1d): Peninsula & SW Michigan St end	2	0.5	1	1.1	2	0.6	1	1.4
Tier 2 (2.1e): Gateway Park South	10	2.5	2	2.1	10	3.1	2	2.9
Tier 2 (2.1f): Duwamish Waterway Park	13	3.2	1	1.1	11	3.4	1	1.4
Tier 2 (2.2b): Boat launch and public access area under 1st Avenue Bridge	5	1.2	3	3.2	5	1.5	3	4.3
Tier 2 (2.2c): Boeing Public Access Area	2	0.5	-	-	2	0.6	-	-
Tier 2 (2.3b): SCL Duwamish Substation/Hamm Creek Restoration Area	35	8.8	2	2.1	33	10	2	2.9
Tier 2 (2.3c): Boeing Bridge	2	0.5	1	1.1	2	0.6	1	1.4
Tier 2 (2.3d): Boeing Parking Lot Trail	15	3.8	-	-	12	3.7	-	-
Tier 2 (2.3e): The Rapids (North Winds Weir)	55	14	5	5.3	50	15	5	7.2

SCL – Seattle City Light
T-105 – Terminal 105
T-107 – Terminal 107
T-18 – Terminal 18

Table 3. Language used for survey administration

Language	All Surveys				Repeat Survey-Takers Excluded			
	All Fishers (n = 400)		Fishers who Reported Catching Resident Seafood (n = 95)		All Fishers (n = 328)		Fishers who Reported Catching Resident Seafood (n = 69)	
	Count	Percent of Total	Count	Percent of Total	Count	Percent of Total	Count	Percent of Total
English	344	86	66	69	290	89	52	75
Tagalog	1	0.2	1	1.1	-	-	-	-
Chinese	3	0.8	3	3.2	2	0.6	2	2.9
Vietnamese	25	6.2	20	21	14	4.3	10	14
Khmer (Cambodian)	19	4.8	5	5.3	11	3.4	4	5.8
Mienh	3	0.8	1	1.1	2	0.6	1	1.4
Spanish	9	2.2	-	-	9	2.8	-	-

Table 4. Gender and age of survey respondents

Gender or Age Category	All Surveys				Repeat Survey-Takers Excluded			
	All Fishers (n = 400)		Fishers who Reported Catching Resident Seafood (n = 95)		All Fishers (n = 328)		Fishers who Reported Catching Resident Seafood (n = 69)	
	Count	Percent of Total	Count	Percent of Total	Count	Percent of Total	Count	Percent of Total
Gender								
Female	53	13.2	17	18	44	14	10	14
Male	346	86	77	82	280	86	58	83
Age category								
Under 18	6	1.5	-	-	6	1.8	-	-
18 to 30 years	120	30	17	18	111	34	15	21
30 to 50 years	204	51	38	40	160	49	30	43
Over 50 years	70	17	40	42	48	15	24	34

Table 5. Locations of declined surveys

Location	All Declines (n = 379)	
	Count	Percent of Total
Tier 1 (1.1): Spokane St. Bridge	250	66
Tier 2 (2.1c): T-107 Public Access	6	1.6
Tier 2 (2.1e): Gateway Park South	4	1.1
Tier 2 (2.1f): Duwamish Waterway Park	4	1.1
Tier 2 (2.2b): Boat launch and public access area under 1st Avenue Bridge	1	0.3
Tier 2 (2.2c): Boeing Public Access Area	3	0.8
Tier 2 (2.3b): SCL Duwamish Substation/Hamm Creek Restoration Area	38	10
Tier 2 (2.3c): Boeing Bridge	7	1.8
Tier 2 (2.3d): Boeing Parking Lot Trail	6	1.6
Tier 2 (2.3e): The Rapids (North Winds Weir)	60	16

SCL – Seattle City Light
T-107 – Terminal 107

Table 6. Demographic information for fishers who declined to take the survey

Category	All Declines (n = 379)	
	Count	Percent of Total
Gender		
Female	31	9.3
Male	303	91
Age Category		
18 to 30 years	65	18
30 to 50 years	213	58
Over 50 years	88	24
Preferred Language		
Asian	1	0.3
Chinese	4	1.1
English	230	61
English/Vietnamese	4	1.1
Khmer	3	0.8
Korean	1	0.3
Lao	2	0.5
Russian	7	1.8
Spanish	8	2.1
Tagalog	8	2.1
Thai	1	0.3
Vietnamese	50	13

Note: Age and language information is based on the judgement of ECOSS surveyors. In cases where gender, age, or preferred language data were not recorded, this information is not included in this table, and thus the sums do not add up to the total of 379 fishers who declined to take the survey.

ECOSS – Environmental Coalition of South Seattle

Table 7. Survey Q3 – What are you fishing for today?

Response	Total	Percent of Total (n = 328)	Count by Ethnic Group								Count by Preferred Language		
			Asian	Pacific Islander	East/ West European	American Indian/ Alaskan Native	Black/ African American	Latino	Multi-racial	White/ Caucasian	English	English + Other Language	Non-English Language
Salmon	294	90	92	36	7	5	19	37	18	77	211	34	48
Anything I can catch	3	0.9					1		2		3		
Small fish	14	4	8	2	1	1			2		4	1	9
Bottom fish (catch and release)	1	0.3							1		1		
Clams	1	0.3								1	1		
Crab	5	2	1	1	1			1		1	4	1	
Dogfish	1	0.3							1		1		
Flounder/sole	4	1	2				1	1			3		1
Herring	8	2	4	3					1		1	1	6
Perch	13	4	7					3	2	1	4	1	8
Rockfish	3	0.9					1	1	1		3		
Sculpin	1	0.3					1				1		
Shrimp	2	0.6	1							1	2		
Squid	2	0.6	1					1			2		
Trout	1	0.3		1							1		
Not fishing today	2	0.6	1							1	1	1	
For enjoyment	1	0.3		1							1		
Yes	1	0.3						1					1
No answer	1	0.3		1							1		

Note: Data associated with repeat survey takers were excluded from this table to avoid double counting. In some cases, ethnicity or preferred language information was not provided by the survey respondent, meaning that the totals presented in this table may not match the sum of surveys conducted across ethnic groups or preferred languages.

Table 8. Survey Q4 – What have you caught from this river over the last few years?

Response	Total	Percent of Total (n = 328)	Count by Ethnic Group								Count by Preferred Language		
			Asian	Pacific Islander	East/ West European	American Indian/ Alaskan Native	Black/ African American	Latino	Multi-racial	White/ Caucasian	English	English + Other Language	Non-English Language
Salmon	240	73	73	32	7	4	16	25	18	64	170	29	40
Anything I can catch	2	0.6		1					1		2		
Bait fish/small fish	13	4	8	3			1		1		4	2	7
Bullhead	3	0.9	1	1						1	3		
Cannot remember (caught some fish other than salmon, but did not keep them)	1	0.3	1										1
Clams	1	0.3		1							1		
Crab	12	4	4	1			1	2	2	2	9	1	1
Dogfish	1	0.3							1		1		
Flounder/sole	17	5	7	3			1	1	4		11	1	5
Herring	9	3	6	2					1		2	1	5
Mussels	1	0.3		1							1		
Perch	24	7	12	2		1	1	3	4	1	14	3	7
Pink salmon	2	0.6		1					1		1	1	
Rockfish	11	3	5					2	3	1	7	1	3
Sculpin	4	1	1						1	2	4		
Squid	5	2	1	1	1			1		1	4	1	
Trout	2	0.6		1					1		2		
Whitefish/suckerfish	1	0.3	1								1		
First year fishing here	4	1					1	1		2	4		
First time fishing at this location/LDW	20	6	7	2	1	1	1	5	1	1	14	2	4
Second time fishing at this location/LDW	2	0.6		1						1	2		
Does not live here	3	0.9	3								3		
Nothing	21	6	7	3						10	16	3	2
Yes	1	0.3						1					1
No answer	13	4	5	1				6		1	4	1	8

Note: Data associated with repeat survey takers were excluded from this table to avoid double counting. In some cases, ethnicity or preferred language information was not provided by the survey respondent, meaning that the totals presented in this table may not match the sum of surveys conducted across ethnic groups or preferred languages.

LDW – Lower Duwamish Waterway

Table 9. Survey Q5 – Do you eat your catch from this river?

Response	Total	Percent of Total (n = 69)	Count by Ethnic Group								Count by Preferred Language		
			Asian	Pacific Islander	East/ West European	American Indian/ Alaskan Native	Black/ African American	Latino	Multi-racial	White/ Caucasian	English	English + Other Language	Non-English Language
Yes	41	59%	21	7	1		1	5	5	1	16	6	18
No	26	38%	7	4	1	2	1	1	3	6	22		4
No answer	2	3%	2										2

Note: Data associated with repeat survey takers were excluded from this table to avoid double counting. Because this question was specific to resident-species fishers, responses were limited to only those survey participants who reported catching resident seafood. In some cases, ethnicity or preferred language information was not provided by the survey respondent, meaning that the totals presented in this table may not match the sum of surveys conducted across ethnic groups or preferred languages.

Table 10. Survey Q6 – What are the reasons you don't eat your catch?

Response	Total	Percent of Total (n = 26)	Count of Responses by Ethnic Group									Count by Preferred Language		
			Asian	Pacific Islander	East/West European	American Indian/ Alaskan Native	Black/ African American	Latino	Multi-racial	White/ Caucasian	No answer	English	English + Other Language	Non-English Language
Characteristics of the fish	**5**	**19**	**1**	**2**		**1**				**1**		**4**	**1**	
Depends on health of each fish. In general, fish from Duwamish look darker than fish from other places.	1	-				1						1		
Fish too small to eat	3	-		2						1		3		
Fish doesn't look tasty	1	-	1										1	
Fish only for fun/recreation	**8**	**31**	**4**	**1**		**1**	**1**	**1**				**6**	**2**	
Fish only for fun	7	-	3	1		1	1	1				5	2	
Sport	1	-	1									1		
Knowledge of pollution, contamination, or fish advisory	**8**	**31**	**2**	**1**		**1**			**1**	**2**	**1**	**7**	**1**	
Pollution/cleanliness of fish	7	-	1	1		1			1	2	1	7		
Fish advisory	1	-							1			1		
Heard from others not to eat resident fish	1	-	1										1	
Caught by accident/never caught	**3**	**12**	**1**		**1**						**1**	**3**		
Caught by accident	3	-	1		1						1	3		
Never caught anything	1	-		1										
Other responses	**5**	**19**	**1**	**1**					**1**	**2**		**5**		
Use for bait	4	-	1	1					1	1		4		
Vegetarian	1	-								1		1		
No answer	**2**	**na**							**1**	**1**		**2**		

Note: Data associated with repeat survey takers were excluded from this table to avoid double counting. Because this question was specific to resident-species fishers, responses were limited to only those survey participants who reported catching resident seafood. In some cases, ethnicity or preferred language information was not provided by the survey respondent, meaning that the totals presented in this table may not match the sum of surveys conducted across ethnic groups or preferred languages. In addition, because respondents often provided more than one response to this survey question, sums presented in this table may not add up to the total number of fishers surveyed.

Table 11. Survey Q7 and Q8 – Do you share your catch from this river with others? [If so] Who would that be? Family, friends, neighbors, or someone else?

Response	Total	Percent of Total (n = 69)	Count by Ethnic Group								Count by Preferred Language		
			Asian	Pacific Islander	East/West European	American Indian/ Alaskan Native	Black/ African American	Latino	Multi-Racial	White/ Caucasian	English	English + Other Language	Non-English Language
Do you share your catch from this river with others?													
Yes	38	55	19	6	1		2	4	4	2	17	5	15
No	30	43	10	5	1	2		2	4	5	21	1	8
No answer	1	1	1										1
[If so] Who would that be?													
Church	1	3[a]							1		1		
Family	32	84[a]	16	5	1		2	4	4		14	3	14
Friends	24	63[a]	12	3	1		1	2	3	2	12	4	7
Neighbors	7	18[a]	3	2				1	1		3	1	3
Other	1	3[a]						1			1		

Note: Data associated with repeat survey takers were excluded from this table to avoid double counting. Because this question was specific to resident-species fishers, responses were limited to only those survey participants who reported catching resident seafood. In some cases, ethnicity or preferred language information was not provided by the survey respondent, meaning that the totals presented in this table may not match the sum of surveys conducted across ethnic groups or preferred languages.

[a] Percent of total is based on a total of 38 respondents who reported sharing their catch.

Table 12. Survey Q9 – Why do you like to fish?

Response	Total	Percent of Total (n = 69)	Count by Ethnic Group								Count by Preferred Language		
			Asian	Pacific Islander	East/West European	American Indian/ Alaskan Native	Black/ African American	Latino	Multi-Racial	White/ Caucasian	English	English + Other Language	Non-English Language
Fun/recreation/hobby/tradition	**61**	**88**	**25**	**10**	**2**	**2**		**5**	**8**	**7**	**35**	**5**	**20**
Good for body	1	-	1									1	
Has been fishing for 50 years	1	-							1		1		
Hobby	1	-	1									1	
Retired, has nothing to do	2	-	1						1			2	
Recreation/for fun	42	-	20	4	2	2		1	7	5	25	2	14
Social activity (time with family/friends)	13	-	4	2	1			3	1	2	7	1	5
Sport	2	-	1					1			1		1
Time alone (relaxation)	11	-	6	3				0	2		6	2	2
Time on the boat	1	-								1	1		
Traditions, something my family does	5	-	1	2				2			3	1	1
Source of food/fresh fish	**21**	**30**	**9**	**2**	**2**	**1**	**2**	**1**	**1**	**2**	**11**	**2**	**8**
Free food	6	-			1	1	1	1		1	6		
Getting food or fresh fish	14	-	8	1			2	1	1	1	6	1	7
Fish availability	1	-			1						1		
Fish is expensive in the store	1	-	1										1
Herring is rich in Vitamin C	1	-	1										1
To catch fish	1	-		1								1	
Free source of bait	**1**	**1**								**1**	**1**		
Free fish for bait	1	-								1	1		
Other	**2**	**3**						**1**	**1**		**1**		
He is a Pisces (astrological sign) so he fishes	1	-						1			1		
Since he paid for a license he wants to take advance of it	1	-	1										

Note: Data associated with repeat survey takers were excluded from this table to avoid double counting. Because this question was specific to resident-species fishers, responses were limited to only those survey participants who reported catching resident seafood. In some cases, ethnicity or preferred language information was not provided by the survey respondent, meaning that the totals presented in this table may not match the sum of surveys conducted across ethnic groups or preferred languages. In addition, because respondents often provided more than one response to this survey question, sums presented in this table may not add up to the total number of fishers surveyed.

Table 13. Survey Q10 – What are the reasons you come to this spot to fish?

Response	Total	Percent of Total (n=69)	Count by Ethnic Group								Count by Preferred Language		
			Asian	Pacific Islander	East/West European	American Indian/ Alaskan Native	Black/ African American	Latino	Multi-Racial	White/ Caucasian	English	English + Other Language	Non-English Language
Characteristics of location/good place to fish	**38**	**55**	**18**	**6**	**2**	**1**	**1**	**2**	**4**	**4**	**22**	**4**	**12**
Fishing is good here	18	-	7	2	2	1	1	1	2	2	13	3	2
Good place for getting bait	2	-							1	1	2		
I like this setting	10	-	7	1				1	1		5		5
Not crowded	2	-		1					1		1	1	
Only place I know to fish	3	-	3										3
Safe and friendly location	4	-	1	1		1				1	2	1	1
This spot has salmon, you can see them returning	1	-		1							1		
This spot is easy to stand and fish	1	-	1										1
You can see there are fish here in the water.	1	-							1		1		
Convenience of location	**30**	**39**	**14**	**4**		**2**	**1**	**3**	**4**	**2**	**16**	**3**	**10**
It is easy to get here	14	-	7	1		2	1	2	1		5	2	6
It is close to where I live or work	21	-	8	4		1	1	2	3	2	13	1	7
It is close and a cool place to fish, even on hot days	1	-							1				1
Heard about location from others	**6**	**9**	**3**	**2**				**1**			**2**		**4**
Found out from co-worker	1	-		1							1		
Kid and husband come to fish here for salmon	1	-						1					1
My friends told me that fishing here is easy	1	-	1										1
My friend took me here	1	-	1										1
See other people fishing	2	-	1	1							1		1
Other	**5**	**7**		**2**	**1**					**1**	**5**		
First time here	1	-		1							1		
For fun	2	-		1	1						2		
For salmon	2	-								1	2		

Note: Data associated with repeat survey takers were excluded from this table to avoid double counting. Because this question was specific to resident-species fishers, responses were limited to only those survey participants who reported catching resident seafood. In some cases, ethnicity or preferred language information was not provided by the survey respondent, meaning that the totals presented in this table may not match the sum of surveys conducted across ethnic groups or preferred languages. In addition, because respondents often provided more than one response to this survey question, sums presented in this table may not add up to the total number of fishers surveyed.

Table 14. Survey Q11 and Q12 – In which season do you fish or collect seafood other than salmon from this river? And how often during this season do you fish in this river (daily, weekly, monthly, or less than monthly)?

Season and Frequency	Total	Percent of Total (n = 69)	Count by Ethnic Group								Count by Preferred Language		
			Asian	Pacific Islander	East/West European	American Indian/ Alaskan Native	Black/ African American	Latino	Multi-Racial	White/ Caucasian	English	English + Other Language	Non-English Language
Winter	**17**	**25**	**7**	**1**		**1**	**2**	**1**	**4**	**1**	**12**	**2**	**3**
Daily	5	-	2				1	1	1		4		1
Weekly	7	-	4						2	1	4	2	1
Monthly	2	-	1				1				1		
Less than once a month	2	-		1		1					2		
Spring	**21**	**30**	**10**	**1**			**1**	**2**	**5**	**2**	**12**	**4**	**5**
Daily	4	-						1	3		4		
Weekly	4	-	4								1	3	
Monthly	6	-	3	1			1			1	3	1	2
Less than once a month	4	-	1					1	1	1	3		1
Summer	**52**	**75**	**24**	**7**	**1**	**1**	**2**	**4**	**7**	**5**	**26**	**6**	**19**
Daily	8	-	3					1	3	1	5		3
Weekly	17	-	8	4	1		1	1		2	9	4	3
Monthly	16	-	7	3			1	2	2	1	7	1	8
Less than once a month	7	-	3			1			1	1	4	1	2
Fall	**31**	**45**	**14**	**5**			**2**	**2**	**5**	**3**	**17**	**5**	**9**
Daily	7	-	2				1	1	2	1	5	1	1
Weekly	9	-	4	2				1	1	1	5	2	2
Monthly	10	-	5	2			1		1	1	5	1	4
Less than once a month	4	-	2	1					1		2	1	1
No answer	**4**	**na**		**2**	**1**	**1**					**4**		

Note: Data associated with repeat survey takers were excluded from this table to avoid double counting. Because this question was specific to resident-species fishers, responses were limited to only those survey participants who reported catching resident seafood. In some cases, ethnicity or preferred language information was not provided by the survey respondent, meaning that the totals presented in this table may not match the sum of surveys conducted across ethnic groups or preferred languages.

Table 15. Survey Q13 (part 1) – Are there areas other than this river where you fish for species other than salmon or collect shellfish?

Response	Total	Percent of Total	Count by Ethnic Group								Count by Preferred Language		
			Asian	Pacific Islander	East/ West European	American Indian/ Alaskan Native	Black/ African American	Latino	Multi-racial	White/ Caucasian	English	English + Other Language	Non-English Language
All fishers (n = 328)													
Yes	215	66	60	34	5	4	15	22	14	59	157	26	31
No	108	33	47	7	2	2	4	18	7	20	65	11	32
No answer	5	2	2		1					2	3		2
Fishers who reported catching resident species (n = 69)													
Yes	46	67	15	11		1	1	4	7	6	30	5	10
No	21	30	14		1	1	1	2	1	1	7	1	13
No answer	2	3	1		1						1		1

Note: Data associated with repeat survey takers were excluded from this table to avoid double counting. In some cases, ethnicity or preferred language information was not provided by the survey respondent, meaning that the totals presented in this table may not match the sum of surveys conducted across ethnic groups or preferred languages.

Table 16. Survey Q13 (part 2) – [If you do fish in other areas] Where would that be?

Other Fishing Locations	All fishers (n=328)		Fishers who reported catching resident species (n=69)	
	Count	Percent of Total	Count	Percent of Total
112th Bridge	1	0.3		
Alaska	2	0.6	1	1.4
Alki Beach	16	4.9	7	10.1
American Lake	1	0.3		
Angle Lake	2	0.6	1	1.4
Any location with water	3	0.9	1	1.4
Aurora Lake	1	0.3		
Beaver Lake	2	0.6		
Belfair state park	1	0.3	1	1.4
Boren Lake	1	0.3		
Browns Point	1	0.3	1	1.4
Burien	1	0.3		
Cale	1	0.3	1	1.4
Canada / Victoria	1	0.3		
Carbon River	1	0.3		
Cedar River	2	0.6		
Columbia River	9	2.7	2	2.9
Cook Creek	1	0.3	1	1.4
Copalis	1	0.3		
Cowlitz River	7	2.1		
Dash Point	9	2.7	1	1.4
Deception Pass	2	0.6		
Des Moines	8	2.4		
Des Moines marina	3	0.9	2	2.9
did not want to say	1	0.3	1	1.4
Downtown Seattle	2	0.6		
Eastern Washington	3	0.9		
Edmonds	4	1.2	3	4.3
Elliott Bay	5	1.5	2	2.9
Everett	1	0.3		
Federal Way	1	0.3		
Finnwick marina	1	0.3		
Fishing Dock	1	0.3	1	1.4
Five Mile Lake	2	0.6	1	1.4
Forks	1	0.3		
Fox Island	1	0.3	1	1.4
Geneva lake	1	0.3		
Gig Harbor	1	0.3		
Green Lake	3	0.9		
Green River	10	3.0		
Hood Canal	6	1.8	1	1.4
Hood Sport	1	0.3		
Hood Sport Hatchery	1	0.3		

Other Fishing Locations	All fishers (n=328)		Fishers who reported catching resident species (n=69)	
	Count	Percent of Total	Count	Percent of Total
Idaho	1	0.3	1	1.4
Indianola	1	0.3		
Kalama River	1	0.3	1	1.4
Kayak Point	1	0.3		
Lake Desire	1	0.3		
Lake Fenwick	1	0.3	1	1.4
Lake Lodge	1	0.3		
Lake Sammamish	1	0.3		
Lake Washington	13	4.0	2	2.9
Lakes	1	0.3	1	1.4
Lincoln Park	13	4.0	3	4.3
Longview	2	0.6	2	2.9
Marine Area 8.1	1	0.3		
Marine Area 8.2	1	0.3		
Marine Area 9	3	0.9	1	1.4
Marine Area 10	2	0.6	1	1.4
Marine Area 11	3	0.9	1	1.4
Martha Lake	1	0.3		
Mason County	1	0.3	1	1.4
Meridian Lake	1	0.3		
Monroe	3	0.9		
Moses Lake	1	0.3		
Mount Rainier	1	0.3		
Mukilteo	4	1.2		
Neah Bay	1	0.3	1	1.4
Nine Lake	1	0.3		
Nisqually River	2	0.6	1	1.4
Ocean	1	0.3		
Ocean Shores	6	1.8	3	4.3
Olympic Peninsula	1	0.3		
Other Rivers	1	0.3		
Penninsula	1	0.3	1	1.4
Pier 66	1	0.3		
Pier 86	2	0.6	1	1.4
Pierce County	1	0.3		
Pine Lake	3	0.9		
Point Defiance	1	0.3		
Point No Point	2	0.6		
Pointview	1	0.3	1	1.4
Port Angeles	1	0.3		
Port of Tacoma	1	0.3		
Port Townsend	1	0.3		
Poulsbo	1	0.3	1	1.4
Puget Sound	12	3.7		

Other Fishing Locations	All fishers (n=328)		Fishers who reported catching resident species (n=69)	
	Count	Percent of Total	Count	Percent of Total
Puget Sound off Vashon Island	1	0.3		
Puyallup	12	3.7		
Puyallup River	12	3.7	1	1.4
Quinault	1	0.3		
Redondo	3	0.9	1	1.4
River Bend	1	0.3		
salmon	1	0.3	1	1.4
San Juan Islands	1	0.3		
Seacrest	6	1.8	1	1.4
Seacrest Park	2	0.6	2	2.9
Sequim	1	0.3	1	1.4
Seward Park	2	0.6		
Shilshole/Golden Gardens	5	1.5	3	4.3
Silver Lake	1	0.3		
Skagit River	1	0.3		
Skykomish River	6	1.8	1	1.4
Snake River	3	0.9	1	1.4
Snohomish River	14	4.3	2	2.9
Snoqualmie River	2	0.6	1	1.4
Spokane Bridge	2	0.6		
Spring Lake	1	0.3		
Star Lake	1	0.3		
Steel Lake	4	1.2	1	1.4
Stillaguamish River	1	0.3	0	0.0
Suquamish	2	0.6	1	1.4
Tacoma	2	0.6		
Teanaway River	1	0.3		
The canal	1	0.3		
Three Tree Point	1	0.3		
Trout-Fish Lake	1	0.3		
Tukwila	1	0.3		
Vancouver BC	1	0.3		
Vashon Island	2	0.6	1	1.4
Wenatchee River	3	0.9	1	1.4
Westport	7	2.1	1	1.4
Whidbey Island	4	1.2		
Yakima	2	0.6	1	1.4
Yakima River	1	0.3		

Note: Data associated with repeat survey takers were excluded from this table to avoid double counting.

Table 17. Survey Q14 – Have you seen or heard anything related to how eating seafood caught from this river might affect people's health?

Response	Total	Percent of Total	Count by Ethnic Group								Count by Preferred Language		
			Asian	Pacific Islander	East/West European	American Indian/ Alaskan Native	Black/ African American	Latino	Multi-Racial	White/ Caucasian	English	English + Other Language	Non-English Language
All fishers (n = 328)													
Yes	143	44	38	16		4	8	14	13	48	110	13	20
No	185	56	71	25	8	2	11	26	8	33	115	24	45
Resident fishers only (n = 69)													
Yes	33	48	14	3		1		3	6	5	19	5	9
No	36	52	16	8	2	1	2	3	2	2	19	1	15

Note: Data associated with repeat survey takers were excluded from this table to avoid double counting. In some cases, ethnicity or preferred language information was not provided by the survey respondent, meaning that the totals presented in this table may not match the sum of surveys conducted across ethnic groups or preferred languages.

Table 18. Survey Q15 – What have you seen or heard?

Response	Total	Percent of Total	Count by Ethnic Group								Count by Preferred Language		
			Asian	Pacific Islander	East/West European	American Indian/ Alaskan Native	Black/ African American	Latino	Multi-Racial	White/ Caucasian	English	English + Other Language	Non-English Language
All fishers (n = 143)													
Clean-up is complete	1	1		1							1		
Contamination/pollution of river or fish	67	47	24	7		3	3	1	8	20	54	5	8
Fish advisory	33	23	10	1			3	3	2	13	26	4	3
Fish are a healthful choice	1	1	1								1		
Fishing regulations	2	1	1							1	1	1	
Never seen people get sick	1	1								1	1		
Some/all seafood from river are unsafe	97	68	25	12		3	4	11	9	32	71	9	17
Works for the city	1	1								1	1		
Resident fishers only (n = 33)													
Clean-up is complete	1	3		1							1		
Contamination/pollution of river or fish	17	52	6	1		1			4	4	11	3	3
Fish advisory	7	21	5					1	1		2	3	2
Fishing regulations	1	3	1									1	
Some/all seafood from river are unsafe	18	55	9	2		1		2	2	1	9	1	8

Note: Data associated with repeat survey takers were excluded from this table to avoid double counting. Question asked only of those people who responded “yes” to Q14. In some cases, ethnicity or preferred language information was not provided by the survey respondent, meaning that the totals presented in this table may not match the sum of surveys conducted across ethnic groups or preferred languages. In addition, because respondents often provided more than one response to this survey question, values presented in this table may not to add up to the total number of fishers surveyed.

Table 19. Survey Q16 – Where did you see or hear this information?

Response	All fishers (n = 143)													Resident Fishers Only (n = 33)											
			Count by Ethnic Group								Count by Preferred Language					Count by Ethnic Group								Count by Preferred Language		
	Total	Percent of Total	Asian	Pacific Islander	East/West European	American Indian/ Alaskan Native	Black/ African American	Latino	Multi-Racial	White/ Caucasian	English	English + Other Language	Non-English Language	Total	Percent of Total	Asian	Pacific Islander	East/West European	American Indian/ Alaskan Native	Black/ African American	Latino	Multi-Racial	White/ Caucasian	English	English + Other Language	Non-English Language
Signs at fishing locations	**52**	**37**	**14**	**3**		**2**	**4**	**4**	**4**	**20**	**38**	**7**	**7**	**9**	**27**	**5**			**1**			**2**		**4**	**3**	**2**
Signs posted at fishing locations	52		14	3		2	4	4	4	20	38	7	7	9		5			1			2		4	3	2
Other fishing-related places/sources	**27**	**19**	**6**	**1**		**4**		**3**	**1**	**12**	**22**	**2**	**3**	**6**	**18**	**2**			**1**			**1**	**2**	**5**	**1**	
Location where fishing license was purchased	5		1					3		1	1	1	3	1		1									1	
Bait and tackle shops	3		1			1				1	2	1		2		1							1	1	1	
WDFW fishing pamphlet regulations	24		6	1		3		1	1	12	21	2	1	6		2			1			1	2	5	1	
Media (non-internet)	**31**	**22**	**12**	**1**		**1**	**1**	**3**	**4**	**9**	**25**	**5**	**1**	**9**	**27**	**4**			**1**		**1**	**2**	**1**	**6**	**3**	
Newspaper	11		3	1		1	1	1	1	3	9	1	1	3		2			1					2	1	
TV	19		10					1	3	5	14	5		7		3					1	2	1	4	3	
Radio	5		1					1		3	5			0												
Media (internet)	**20**	**14**	**4**	**6**				**1**	**2**	**7**	**19**		**1**	**4**	**12**	**1**	**1**					**1**	**1**	**4**		
Internet or social media (e.g., Facebook)	20		4	6				1	2	7	19		1	4		1	1					1	1	4		
Outreach	**5**	**3**	**1**	**1**		**1**		**1**		**1**	**5**			**3**	**9**		**1**				**1**		**1**	**3**		
ECOSS survey staff	2			1				1			2			2			1				1			2		
Letters or flyers distributed in the community	3		1			1				1	3			1									1	1		
Places in community	**6**	**4**	**1**			**1**		**1**		**3**	**4**		**2**	**1**	**3**	**1**											**1**
Community event/gathering	2		1			1					1		1	1		1											1
Community meeting center	1									1	1			0													
School	1										1			0													
Health clinic, nurse or doctor	2							1		1	1		1	0													
Word of mouth, talking with friends/family	**25**	**18**	**8**	**6**		**1**	**1**	**2**		**6**	**16**	**1**	**8**	**10**	**30**	**5**	**1**		**1**		**1**		**1**	**5**		**5**

Response	All fishers (n = 143)													Resident Fishers Only (n = 33)											
			Count by Ethnic Group								Count by Preferred Language					Count by Ethnic Group								Count by Preferred Language		
	Total	Percent of Total	Asian	Pacific Islander	East/West European	American Indian/ Alaskan Native	Black/ African American	Latino	Multi-Racial	White/ Caucasian	English	English + Other Language	Non-English Language	Total	Percent of Total	Asian	Pacific Islander	East/West European	American Indian/ Alaskan Native	Black/ African American	Latino	Multi-Racial	White/ Caucasian	English	English + Other Language	Non-English Language
Government sources (police/ranger)	**2**	**1**	**1**								**1**		**1**	**2**	**6**	**1**								**1**		**1**
Long-time residents familiar with issues	**5**	**4**						**2**	**2**	**1**	**4**		**1**	**2**	**6**							**1**	**1**	**2**		
Other	**5**	**4**	**1**				**1**	**1**	**1**	**1**	**4**		**1**	**0**	**0**											
Boeing	1		1								1			0												
Work	1									1	1			0												
Documentary/biology teacher	1								1		1			0												
It is obvious based on look of river / area	1						1				1			0												
Posters/boards	1							1					1	0												

Note: Data associated with repeat survey takers were excluded from this table to avoid double counting. Question asked only of those people who responded “yes” to Q14. In some cases, ethnicity or preferred language information was not provided by the survey respondent, meaning that the totals presented in this table may not match the sum of surveys conducted across ethnic groups or preferred languages. In addition, because respondents often provided more than one response to this survey question, sums presented in this table may not to add up to the total number of fishers surveyed.

ECOSS – Environmental Coalition of South Seattle

WDFW – Washington State Department of Fish and Wildlife

Table 20. Survey Q17 – What are your preferred sources of getting information?

Response	All fishers (n = 328)													Resident Fishers Only (n = 69)											
			Count by Ethnic Group								Count by Preferred Language					Count by Ethnic Group								Count by Preferred Language		
	Total	Percent of Total	Asian	Pacific Islander	East/West European	American Indian/ Alaskan Native	Black/ African American	Latino	Multi-racial	White/ Caucasian	English	English + Other Language	Non-English Language	Total	Percent of Total	Asian	Pacific Islander	East/West European	American Indian/ Alaskan Native	Black/ African American	Latino	Multi-Racial	White/ Caucasian	English	English + Other Language	Non-English Language
Signs at fishing locations	**55**	**17**	**20**	**3**		**1**	**5**	**5**	**5**	**13**	**35**	**7**	**13**	**15**	**22**	**8**	**2**		**1**	**1**	**1**	**1**		**6**	**2**	**7**
Signs posted at fishing locations	55		20	3		1	5	5	5	13	35	7	13	15		8	2		1	1	1	1		6	2	7
More signs	1							1			1			1							1					
Big signs (like sewage)	1									1	1															
Other fishing-related places/sources	**70**	**22**	**18**	**10**	**2**	**4**	**2**	**7**	**6**	**20**	**59**	**5**	**6**	**11**	**16**	**2**	**3**	**1**	**2**		**1**	**1**	**1**	**9**	**1**	**1**
Location where fishing license was purchased	11		3	1				4	1	2	6	2	3	2		1					1			1	1	
Bait and tackle shops	5		3	1			1				3	1	1	2		1	1							1	1	
WDFW fishing pamphlet regulations	58		14	9	2	4	1	4	4	19	51	4	3	9		2	2	1	2			1	1	7	1	1
Sporting goods (store)	1								1		1															
Fishing community	1						1				1															
PSA	1									1	1															
Government sources	**5**	**2**	**1**	**1**						**2**	**5**			**2**	**3**		**1**							**2**		
Information from Public Health	4		1	1						1	4			2			1							2		
King County website, publicly available documents	1									1	1															
Media (non-internet)	**107**	**33**	**42**	**14**	**4**	**1**	**7**	**15**	**9**	**15**	**66**	**18**	**23**	**21**	**30**	**11**	**4**	**1**	**1**			**2**	**2**	**9**	**4**	**8**
Newspaper	45		22	2	1	1	6	4	5	4	25	11	8	13		10	1		1			1		4	4	5
TV	80		33	13	3		3	13	4	11	49	11	20	16		8	3	1				2	2	7	2	7
Radio	16		3	2	1		3	5	1	1	13	2	1	1		1									1	
Local news/library	1		1								1															

Response	All fishers (n = 328)													Resident Fishers Only (n = 69)											
			Count by Ethnic Group								Count by Preferred Language					Count by Ethnic Group								Count by Preferred Language		
	Total	Percent of Total	Asian	Pacific Islander	East/West European	American Indian/ Alaskan Native	Black/ African American	Latino	Multi-racial	White/ Caucasian	English	English + Other Language	Non-English Language	Total	Percent of Total	Asian	Pacific Islander	East/West European	American Indian/ Alaskan Native	Black/ African American	Latino	Multi-Racial	White/ Caucasian	English	English + Other Language	Non-English Language
Video	1		1								1														
Media (internet)	**103**	**32**	**31**	**17**	**1**	**2**	**4**	**13**	**7**	**28**	**88**	**6**	**8**	**14**	**20**	**5**	**4**		**1**		**2**	**2**		**12**		**1**
Internet or social media (e.g., Facebook)	103		31	17	1	2	4	13	7	28	88	6	8	14		5	4		1		2	2		12		1
Outreach	**25**	**8**	**8**	**6**	**1**				**5**	**5**	**20**	**2**	**3**	**10**	**14**	**3**	**3**	**1**				**2**	**1**	**7**	**2**	**1**
Outreach (e.g., ECOSS)	8		4	4							5		3	2		1	1							1		1
Letters or flyers distributed in the community	8		2						4	2	8			4		1						2	1	4		
Email	7		2	1	1					3	6	1		3		1	1	1						2	1	
Come and deliver information at fishing sites	1			1								1		1			1								1	
Anything written, flyers	1								1		1															
Places in community	**14**	**4**	**6**	**1**			**2**	**1**	**2**	**2**	**8**	**1**	**5**	**4**	**6**	**3**						**1**		**1**		**3**
Community event/gathering	6		4	1						1	3	1	2	2		2										2
Community or senior center	4		2	1						1	2		2	1		1										1
School	3		1	1					1		2	1		1								1		1		
Put info in college newsletter	1								1		1			1								1		1		
Health clinic, nurse, or doctor	3						2	1			2		1													
Place of worship	2			1					1		2															
Word of mouth, talking with friends/family	**79**	**24**	**28**	**10**	**2**	**2**	**6**	**9**	**4**	**17**	**48**	**10**	**21**	**18**	**26**	**10**	**2**		**1**	**1**	**2**	**1**	**1**	**8**		**10**
Word of mouth, talking with friends or family	78		27	10	2	2	6	9	4	17	47	10	21	18		10	2		1	1	2	1	1	8		10

Response	All fishers (n = 328)													Resident Fishers Only (n = 69)											
			Count by Ethnic Group								Count by Preferred Language					Count by Ethnic Group								Count by Preferred Language		
	Total	Percent of Total	Asian	Pacific Islander	East/West European	American Indian/ Alaskan Native	Black/ African American	Latino	Multi-racial	White/ Caucasian	English	English + Other Language	Non-English Language	Total	Percent of Total	Asian	Pacific Islander	East/West European	American Indian/ Alaskan Native	Black/ African American	Latino	Multi-Racial	White/ Caucasian	English	English + Other Language	Non-English Language
Grew up in South Park School, where people fish	1		1							1	1														
Other	**7**	**2**	**3**					**1**		**3**	**4**	**1**	**2**	**1**	**1**	**1**										**1**
Books	1									1	1															
Duwamish Tribe	1							1			1															
I know self-knowledge	1		1										1	1		1										1
Phone hotline	1		1										1													
Work at news source	1									1	1															
I don't understand English but my kids do and they will let me know if there is any info related to fishing.	1		1									1														
Not sure	1									1	1															

Note: Data associated with repeat survey takers were excluded from this table to avoid double counting. In some cases, ethnicity or preferred language information was not provided by the survey respondent, meaning that the totals presented in this table may not match the sum of surveys conducted across ethnic groups or preferred languages. In addition, because respondents often provided more than one response to this survey question, sums presented in this table may not to add up to the total number of fishers surveyed.

ECOSS – Environmental Coalition of South Seattle

PSA – Puget Sound Angler

WDFW – Washington State Department of Fish and Wildlife

Table 21. Survey Q18 – What would be your preferred language for this information?

Language	Preferred Language	
	All fishers (n = 328)	Fishers Who Reported Catching Resident Species (n = 69)
English		
English	225	38
English or other language		
English/Bosnian	1	-
English/Burmese	1	-
English/Chinese	5	1
English/Hmong	2	-
English/Khmer	7	3
English/Korean	1	-
English/Lao/Khmer/Thai	1	-
English/Lao/Thai	2	-
English/Nepali	2	-
English/Russian/Romanian	1	-
English/Spanish	3	-
English/Tagalog	4	1
English/Thai	2	1
English/Tongan	1	-
English/Vietnamese	4	-
Non-English language		
Chinese	4	2
Hmong	1	1
Khmer	7	3
Korean	1	-
Lao or Lao/Mienh or Mienh	4	-
Nepali	1	-
Russian	1	-
Samoan	1	-
Spanish	19	3
Tagalog	3	2
Tongan	1	-
Vietnamese	22	13
English	**225**	**38 (17%)**
English or other language	**37**	**6 (16%)**
Non-English language	**65**	**24 (37%)**

Note: Data associated with repeat survey takers were excluded from this table to avoid double counting.

Table 22. Survey Q19 – Could you tell us what you consider your ethnicity or race?

Ethnic Group	Ethnicity	All Fishers (n = 328)	Fishers who Reported Catching Resident Seafood (n = 69)
Asian	Asian	1	-
	Burmese	2	-
	Cambodian/Khmer	26	7
	Cham	1	-
	Chinese	14	3
	Hmong	3	1
	Japanese	1	-
	Korean	5	1
	Lao	9	1
	Mienh	2	1
	Nepali	3	-
	Thai	2	1
	Vietnamese	40	15
European (East)	Bosnian	1	-
	Poland	1	-
	Romanian	1	1
	Russian	2	-
	Ukrainian	2	-
European (West)	Mediterranean	1	1
Pacific Islander	Fijian	1	-
	Filipino	22	8
	Hawaiian	1	-
	Indonesian	1	-
	Other Pacific Islander	3	2
	Samoan	12	1
	Tongan	1	-
Other Groups	American Indian/ Alaskan Native	6	2
	Black/African American	19	2
	Latino	40	6
	Multi-racial	21	8
	White/Caucasian	81	7
No answer		3	1
Total: Asian Populations		**109**	**30**
Total: Pacific Islanders		**41**	**11**
Overall Total		**328**	**69**

Note: Data associated with repeat survey takers were excluded from this table to avoid double counting.

Table 23. Survey Q20 – Would you mind sharing the name of the neighborhood where you live or your home zip code?

Home Location Area	Count of Fishers		Included Areas		
	All Fishers (n=328)	Fishers who Reported Catching Resident Species (n=69)	Zip Codes	Neighborhoods	Cities
North of Seattle	15	2	98012, 98036, 98087, 98133, 98177, 98204, 98208, 98275		Kenmore
North Seattle	14	5	98103, 98105, 98107, 98115, 98125	Lake City, Maple Leaf, Phinney Ridge	
Central Seattle	16	6	98104, 98119, 98121, 98122, 98199	Belltown, First Hill, International District, Montlake	Seattle
West and South Seattle	109	32	98106, 98108, 98116, 98118, 98126, 98136, 98144, 98178	Beacon Hill, West Seattle, Alki, Columbia City, Georgetown, High Point, Highland Park, Holly Park, Mount Baker, Rainier Beach, Riverview, Seward Park, South Park	
South of Seattle	118	15	98001, 98002, 98003, 98023, 98030, 98031, 98032, 98055, 98146, 98148, 98166, 98168, 98188, 98198, 98328, 98338, 98387, 98391	White Center	Auburn, Burien, Des Moines, Kent, Normandy Park, Renton, SeaTac, Tukwila
Eastside	28	2	98005, 98006, 98008, 98010, 98011, 98025, 98034, 98038, 98056, 98058, 98059, 98075		Mercer Island
Other	4	1	83843, 98070, 98278		

Note: Data associated with repeat survey takers were excluded from this table to avoid double counting.

Table 24. Survey Q22 – How do you know if the seafood you catch is safe to eat?

Summary of Responses to Question 22	
Salmon-only Fishers	**Fishers who Reported Catching Resident Species**
• Based on the information I learned from my community, they say seafood here are safe to eat. The reason is for fun - not mainly to catch fish. • Because I catch here every year. Fish come from Alaska. • Because salmon is a bigger fish, so safe to eat. • Because salmon only come once every year, so fish is not bad to eat because they stay only a short time (in river). • Because the fish I caught here, especially salmon, are good—it tastes sweet. • Friends • He doesn't know. He doesn't eat what he catches while fishing (lets fish go). • He reads the posters/he doesn't know (we realized that the posters are normally always there). • I don't know what to answer, but everything that I caught here is safe to eat, especially salmon. • I don't know. Eat salmon from here - no problem. • I don't really know; from previous experiences when I caught salmon, there were no harmful effects. • I eat a lot of fish around here. There is no problem with this fish. • I guess. I hope it is safe fish to eat especially (because) I only do (eat) salmon because they migrate from a different place. • I have been fishing here up to 15 years. I think the fish—salmon—here are safe to eat. Not the small fish or fish that live here. • I have heard the salmon come all the way from Alaska; when they don't live here as resident fish, they are safer to eat • If the meat is red, that means the fish is fresh and healthy. • If the scales look bad, then it is not safe to eat. • If there are signs (as in features on how fish looks). • I'm not sure whether it is safe or not, but I like to take salmon because salmon are bigger fish. • If it looks fresh, especially salmon when I fish earlier in the season, it is usually fresh. • Look at color of fish's eye and skin. • Look at meat and scale to see how healthy the fish is.	• Because salmon coming from the ocean. Not the bottom fish. Salmon doesn't stay here long. • By looking at it, looks puss-like and gooey. • Don't know • Don't know • Don't know • Fishing game • From research on the Internet • Heard from other people • I don't [know if seafood is safe]. • I don't know. • I don't know/I have no idea. When I catch fish, I cook and eat. • I don't know. • I don't know. You don't know anything until 30 years later. Now I don't feel anything (any effect from eating fish). • I know if I see the fish is fresh and I clean it well and cook it well (I like to fry it). • I know if seafood is safe to eat because the Internet said so about certain food is safe to eat. • I know it from news TV telling me which fish to eat that is not harmful to health, and specifically from friends telling me which is better for health and which is harmful to health. • I know that seafood here is safe because I have been coming and fishing here for 25 years. I eat all those I caught and I have no problem, no health problem. I have a 6-year-old grandson and he eats too. • I only fish for perch and crab. I don't fish for other kind; perch and crab is safe to eat. • If it is a fish that I know, it's safe to eat. If I don't recognize the fish, it might not be safe. • If it looks, smells, or tastes funny, throw away. • If it's alive when caught, it's safe to eat. • if it's alive, it's good to eat. • If the fish is swimming, and visually looks okay, no discoloration, or stains on

Summary of Responses to Question 22	
Salmon-only Fishers	**Fishers who Reported Catching Resident Species**
• Never heard about people getting sick from eating the seafood that were caught here. • No worms • Open and season it's ok to fish. • Read before I go to catch the species, to know which one is safe to eat. • Salmon aren't resident fish, so safe to eat. • Salmon only. Come through/pass by, but they don't live here. • Seeing other people fishing • Smell and color of the meat • The color of the meat • TV news and newspaper • Veins are blue • Website explains about information.	the fish. • It is safe to eat. • It's alive. • It's safe to eat the meat, I always discard fish head and intestines. • Looks fresh • Only bottom fishes are not good to eat. • Salmon are safe to eat, I know because salmon don't live here and plus the posted signs say so. • Salmon seafood • Seeing other people fishing here. Others think the seafood caught from here is good to eat. • Something we know from the news or from the TV or media that talk about seafood [that] are not healthy to eat. • Take it home, cook it, and wait. Information is available. There should be signs that say what you can't eat from this river. A lot of food in the supermarket is worse than what could be in this fish [fish from this river]. • Usually people tell me that fish are good to eat or not. (Meaning that if the fish is not good to eat there should be warnings in the news.)

Note: Each bullet represents a response from a different survey respondent.

Table 25. Survey Q23 – Are some types of seafood from this river safer to eat than others?

Summary of Responses to Question 23	
Salmon-only Fishers	**Fishers who Reported Catching Resident Species**
• Chum and other kinds of salmon. • I am not sure any kind of fish would be good and safe to eat. • I am not sure. Anything/any fish that I caught from this river is good, especially the salmon. • I don't know. • I don't know. • I don't know. • I don't know, they are the same to me. They live here in the same river. • I don't understand the question. • I have no idea. • I think depends on where you fish. If you fish in place where it has a lot of oil spill and polluted the river, it is not safe. • I'm not sure. All I know is that salmon is safe to eat because salmon are big. • No • No • No. I don't believe it. • Not sure • Nothing is safer. • Salmon • Salmon • Salmon • Salmon—said on advisory board • Salmon and whitefish • Salmon are better. Avoid crab, perch, herring. • Salmon are safer; macro species (i.e., large fish) are safer. • Salmon are the safest. • Salmon because they are not resident fish. • Salmon only • Salmon safer than others. • They [salmon] come from the ocean. The fish from this river or live in this river is not safe.	• All is safe to eat, I think. I've only been able to catch herring. • Bottom feeders are not safe to eat. • Crab and bottom fishes are not good. • Due to heavy traffic of boats on Duwamish he waits until rain flushes out the oil in the river before fishing [so that] seafood is safer to eat. • Fish is safer than crab, clams, snail, and shrimp. • Fish is safer to eat, especially salmon, but I love to eat bottom fish. • Herring are safer to eat than others. • I don't know. • I don't know. • I don't know. • I don't know. • I don't know. • I don't know. • I don't know. • I don't know. • I don't know much about bottom fish. • I don't know. I don't hear anything from anybody. • I don't know. I only catch salmon. People only catch salmon from here. Are there any other species [that are safe] to catch from here? • I would assume so. • No • No • None, chop it up and check. • Not sure • Salmon • Salmon • Salmon • Salmon • Salmon—they only pass through here. • Salmon and rock crabs and herrings are better choices.

Summary of Responses to Question 23	
Salmon-only Fishers	**Fishers who Reported Catching Resident Species**
• They come from the same water, fish are all the same. • Yes—crab is safer to eat. • Yes—salmon • Yes, only salmon. Safer to eat than others. • Yes, the salmon. The fish that live here got polluted by the oil.	• Salmon are better. • Salmon are better. Don't eat bottom fish. • Salmon is safer to eat than other fish. • Salmon only

Note: Each bullet represents a response from a different survey respondent.

Table 26. Survey Q24 – Can you tell me more about the benefits you get from fishing here?

Summary of Responses to Question 24	
Salmon-Only Fishers	**Fishers who Reported Catching Resident Species**
• A little of both (relaxing/fun and getting food to eat) • Better health, eating (good source of food), fun, fresh air • Escape • Exercise, fun, and sporting; beside catching fish to eat • Feed family and don't want to sit at home • Food to eat, plus recreation, relaxing, pick berries to eat • For fun • For fun • For fun, as a distraction • Free dinner • I fish because I want fish - salmon. I like fish. • I fish for fun. • I fish for sport. One of my hobbies. • I fish here for fun, plus getting fish to eat. • I fish to catch the fish to eat. • I fish to get food for eating • I like to fish to catch them for foods and relaxing too. • I like to gather my own food. Relax time to keep me from trouble. • Just have fun • My mom likes to fish and I like to accompany her to make her happy. • Pass the time • Recreation • Relax • Relax and relieve stress • Relax, fun to do • Relaxing and catch my own foods, especially salmon • Relaxing, but caught nothing • Relaxing, fun, and exercise • Relaxing, fun, catching fish	• Bait • Enjoy fishing • Food and relaxing fun • Food to eat • Food to eat, relaxing, social life • For fun and relaxing • Fun and away from house • Fun to do • Fun, food, relaxing • Fun, healing body and exercise, and get food to eat • Hobby • Hungry • I fish for fun, and getting fish to eat. • I only fish for fun and food, there's no other benefit. • I'm just fishing mainly for fun. • No • No other benefits • No other benefits • Recreation • Relax, catch fish to eat. I need to relax my brain from work. • Relax, fresh air, exercise • Relaxing • Relaxing • Relaxing and also get fish to eat • Relaxing and eat salmon only • Relaxing and for fun and like to eat fresh fish • Relaxing and fun • Relaxing fun • Relaxing, family time. Do something with family and feed family if we caught anything. • Relaxing, fresh and clear my mind. Meeting friends and increase peace in the environment.

Summary of Responses to Question 24	
Salmon-Only Fishers	**Fishers who Reported Catching Resident Species**
• Relaxing, good exercise, good scenery • Relaxing, spending time • Sport • Sport and relaxing • Sport, hobby, take fish for food • To get food to eat	• Relaxing, kill the time, get fish for family holiday, to bring food home so no need to go to grocery store to shop • She is excited when the fish bites - "Fish on!" • Sport fishing, I love to be on a boat, love to fish, to give food away. • Survive • There is no other benefits but to get food and have fun doing it.

Note: Each bullet represents a response from a different survey respondent.

Table 27. Survey Q25 – As a follow-up to one of our earlier questions, how can we best get information to you about eating seafood from this river?

Summary of Responses to Question 25	
Salmon-only Fishers	**Fishers who Reported Catching Resident Species**
• Any kind of information that can be found, such as advertising post, TV, newspaper, and radio station where can be heard. • Cambodian • Community market, senior club • Did not understand • Email • Email • Email • English • Fish and wildlife pamphlet • Flyers, Internet • Flyers, Internet, newspaper (sport edition) • I don't know. • I would like to use Internet. So I would love to follow the info about this if it is available via Internet. • If we distribute more information about the health of the fish from the river, he'd like to receive information (provided email). • Internet, King 5 News • Internet, TV • Internet, wildlife books they sell at fishing store • Mail it, newspaper, signs, flyers • More signs posted in Cambodian (Khmer) • Newspaper • newspaper (*Seattle Times*) • Online, newspaper, King 5 News, etc. • Pamphlets • Post signs • Radio • *Seattle Weekly* has a lot of good info. • Signs posted in this area	• Advisory sign, video • Bigger sign post • Email • Email/phone • Email • Family, word of mouth • Flyer • Flyer • Having signs posted along the shore via rangers and police. • I don't get out much, all information I rely on friends and family. • I don't know. • I don't speak English, all information I hear is from friends and family. • I only trust things I hear from friends and family. • Internet • Internet or flyers. • Internet, newsletter, Facebook • It's best to have these information at community gatherings. • Local news • Mandarin newspaper • News, TV, word of mouth • Newsletter • Newspaper • Newspaper (*Seattle Times*) • Outreach contact • Outreach, flyers • Pamphlet and [Fish &] Wildlife website • Publicity, study • Publish it, advertise it through TV and/or radio, or a sign at the boat launch • Put more signs around this area with multiple languages and graphics on

Summary of Responses to Question 25	
Salmon-only Fishers	**Fishers who Reported Catching Resident Species**
• Tackle shops • The news, TV KOMO 4 and letting people know, hand out like the flyers around the City of Seattle • The sign, poster, newspaper • Through the advisory. • TV news, news station • TV, Newspaper, Internet • Website	sign. • Senior Center • Sign • Through the senior gatherings at South Park • TV • TV news—Channel 6 • Web

Note: Each bullet represents a response from a different survey respondent.

Table 28. Survey Q26 – This is the end of the survey, unless you have any questions or have anything more you wish to share?

Summary of Responses	
Salmon-only Fishers	**Fishers who Reported Catching Resident Species**
• Are you representing any community group? • Data entry note: Respondent answered some of the questions that were intended to be skipped for salmon-only fishers. Indicated that he only fishes during fall, and that he goes to this location because it is close to work. • Don't eat shellfish. • Glad that we [ECOSS] are out here. • In response to Q14, noted that "This water runs and turns to the Sound and feeds the mountain." • In response to Q14, noted that he had heard generally (about only eating certain types of seafood), but not about this river in particular. • In response to Q16, noted school was Peninsula College of Port Angeles. • In response to Q17, said "Carlton Market." • In response to Q18, noted that participant also speaks Vietnamese. • In response to Q3, noted coho salmon. In response to Q4, noted pink and coho salmon. • In response to Q3/Q4, noted pink salmon. • In response to Q3/Q4, noted pink salmon. • In response to Q3/Q4, noted pink salmon. • This is supposed to be a public access area. People access here for sightseeing—many kids are coming here too, but there is no public restroom. They should put a public restroom here. • What can I do for you to clean up from this river so that people can work and fish? The motor pollution is out of hand. Pollution in the water will hurt everybody.	• Can I use the card at any Safeway? (ECOSS informed that yes, they could.) • Clean the river. • I fish for fun, I'm retired so I have nothing to do, I come here to enjoy the ocean breeze. In response to Q15, wrote that "I don't eat fish very often." • In relation to Q17, noted that the respondent thought that pollution on the river wasn't well documented and was speculation. He thought it needed to be better documented. • In response to Q14, noted "We have been catching crab here for 20 yrs. I cook for 20 min." • In response to Q15, noted that he doesn't care about polluted fish. He's hungry and fish is good (homeless). • In response to Q4, noted that fished for flounder/sole and perch a long time ago. • In response to Q5, noted that would eat what she catches, but has never caught anything here. • In response to Q8, noted that shares fish with friends as bait. In response to Q11/Q12, noted that this was her first time fishing at this location. • Need portable restroom at this location. • No • No • None. (At Q16, participant wrote "My eyes are tired.") • None. In response to Q15, noted "I only go fishing occasionally." • Not to eat anything except salmon! • Participant would like to know fishing season/rules.

Note: Each bullet represents a response from a different survey respondent.

Table 29. Calculation of confidence intervals for the percent of fishers who reported catching resident species as compared with those who reported catching salmon

Race / Ethnicity or Preferred Language Group	Count Who Reported Catching Resident Species (Percent of Total)	Count Who Reported Catching only Salmon	Total Fishers Surveyed	95% Confidence Interval Around Percent of Fishers Who Reported Catching Resident Species	
				Lower Bound	Upper Bound
Race/Ethnic Groups					
Asian (all)	30 (28%)	79	109	19%	37%
Khmer	7 (27%)	19	26	16%	48%
Vietnamese	15 (38%)	25	40	23%	54%
Other Asian groups	8 (19%)	35	43	8%	33%
Pacific Islander (all)	11 (27%)	30	41	14%	43%
Filipino	8 (36%)	14	22	17%	59%
Other Pacific Islanders	3 (16%)	16	19	3%	40%
European	3 (38%)	5	8	9%	76%
American Indian / Alaskan Native	2 (33%)	4	6	4%	78%
Black / African American	2 (11%)	17	19	1%	33%
Latino	6 (15%)	34	40	6%	30%
Multi-Racial	8 (38%)	13	21	18%	62%
White / Caucasian	7 (9%)	74	81	4%	17%
Broad Race/Ethnic Groups					
Asian and Pacific Islanders	41 (27%)	109	150	20%	35%
All other fishers	28 (16%)	147	175	11%	22%
Preferred language category					
English only	38 (17%)	187	225	12%	22%
English + Other Language	6 (16%)	31	37	6%	32%
Non-English Language	24 (37%)	41	65	25%	50%

Note: 95% Confidence interval for proportion of fishers who catch resident species. Confidence intervals were calculated using Clopper-Pearson exact method, binom.test() in R (version 3.3.1 – 2016-06-21).

Table 30. Calculation of confidence intervals for the percent of fishers who indicated that they had heard something about how eating seafood caught from the Duwamish might affect people's health

Race / Ethnicity or Preferred Language Group	Count Who Answered "Yes" They had Heard Something	Count Who Answered "No" They had Not Heard Anything	Total Fishers Surveyed	95% Confidence Interval Around Percent of Fishers Who Answered Yes	
				Lower Bound	Upper Bound
Race/Ethnic Groups					
Asian (all)	38 (35%)	71	109	26%	45%
Pacific Islander (all)	16 (39%)	25	41	24%	55%
European	0 (0%)	8	8	0%	37%
American Indian / Alaskan Native	3 (60%)	2	5	15%	95%
Black / African American	8 (42%)	11	19	20%	67%
Latino	14 (35%)	26	40	21%	52%
Multi-Racial	13 (62%)	8	21	38%	82%
White / Caucasian	46 (58%)	33	79	47%	69%
Preferred language category					
English only	107	115	222	41%	55%
English + Other Language	13	24	37	20%	53%
Non-English Language	20	45	65	20%	43%

Note: 95% Confidence interval for the proportion of fishers who answered yes. Confidence intervals were calculated using Clopper-Pearson exact method, binom.test() in R (version 3.3.1 – 2016-06-21).

Table 31. Calculation of confidence intervals for the percent of fishers who eat or share the resident species they catch by preferred language group

Race / Ethnicity or Preferred Language Group	Count Who Answered "Yes"	Count Who Answered "No"	Total Fishers Surveyed	95% Confidence Interval Around Percent of Fishers Who Answered Yes	
				Lower Bound	Upper Bound
Fishers reported eating catch?					
English only	16 (42%)	22	38	26%	59%
English + Other Language	6 (100%)	0	6	54%	100%
Non-English Language	18 (75%)	6	24	53%	90%
Fishers reported sharing catch?					
English only	17 (45%)	21	38	29%	62%
English + Other Language	5 (83%)	1	6	36%	100%
Non-English Language	15 (63%)	9	24	41%	81%

Note: 95% Confidence interval for the proportion of fishers who answered yes. Confidence intervals were calculated using Clopper-Pearson exact method, binom.test() in R (version 3.3.1 – 2016-06-21).