Kodiak Tribes Seafood Consumption Assessment: Draft Final Report

February 2019

Sun'aq Tribe of Kodiak
Natural Resources Department
312 West Marine Way
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Draft Final Report

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and no official endorsements should be inferred.

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February 2019

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Forward by the Sun'aq Tribe of Kodiak Tribal Council Chair and Tribal Administrator

Sun'aq Tribe of Kodiak began its Seafood Consumption Assessment project with funding from the U.S. Environmental Protection Agency's Indian Environmental General Assistance Program. Mr. Rick Rowland, a previous Sun'aq Natural Resources Director, started planning the project following a traditional harvest survey of Tribal members in 2010 and 2011.

As staff documented the traditional harvest practices and local food systems in the Kodiak Archipelago, it became clear that Tribal members consumed seafood at rates far above national averages, and therefore, might be consuming toxins at greater levels than average American consumers of fish and related foods. Based on this understanding, and desire to explore health risks related to high seafood consumption by Alaska Native peoples, the Sun'aq Tribe of Kodiak initiated this study to accurately assess how much seafood Alutiiq/ Sugpiaq people of the Kodiak Archipelago currently eat.

Sun'aq Tribe of Kodiak is one of ten federally-recognized "Kodiak Tribes."[1] With slightly over 2,000 members, Sun'aq Tribe of Kodiak is the largest Alaska Native community in the Gulf of Alaska. Traditional homelands of the Tribe span a large portion of the Gulf. The Tribe is based in the city of Kodiak on Kodiak Island, 252 air-miles south of Anchorage. In its entirety, the Kodiak Archipelago's seven communities have 13,592 residents, 13.2% of whom are Alaska Native (U.S. Census Bureau 2016). Kodiak is the hub community for the area.

This project contributes to the Sun'aq Tribe of Kodiak's 2014 Strategic Plan to exercise "*sovereign rights over Tribally defined traditional use areas, including 1) oversight and management of natural resources, 2) practice and teaching of subsistence culture, and 3) support of Tribal economies.*" Sun'aq Tribe of Kodiak Resolution 2010-35 defines our traditional use area as extending "*from Cape Chiniak to Kekur Point along the Northeast coastline area of Kodiak Island; and over all the contiguous lands and waters, extending to the 200-mile international maritime bounding including the ocean floor*." The Tribe works to protect access to and use of customary and traditional subsistence resources for its members. Sun'aq Tribe of Kodiak promotes environmental stewardship that protects all Alutiiq traditional use resources and areas.

[1] The ten federally-recognized Tribes in the Kodiak Archipelago are: Native Village of Afognak; Native Village of Akhiok; Kaguyak Village; Native Village of Karluk; Native Village of Larsen Bay; Alutiiq Tribe of Old Harbor; Native Village of Ouzinkie; Native Village of Port Lions; Sun'aq Tribe of Kodiak; and Tangirnaq Native Village.

Alutiiq peoples depended on abundant marine resources first as traditional hunters and gatherers, and in more recent years, as commercial and subsistence gatherers. Archaeological evidence shows that Alutiiq peoples have lived throughout the Kodiak Archipelago for about 7,500 years. Recent excavations have unearthed evidence that ancestors of today's Alutiiq peoples were smoke-processing and storing seafood, maintaining seasonal village sites, and engaging in hunting and gathering lifestyles over 5,000 years ago (Steffian et al. 2006, Steffian et al. 2016a). During the American era of colonization, Kodiak experienced a boom in commercial fishing, which furthered the foundation on which the Archipelago's contemporary food economy is built.

Today, the Kodiak Archipelago is renowned for the quality of its marine resources and is the center of fishing activities within the Gulf of Alaska. Kodiak's fisheries are among the most diverse in North America, with residents participating in at least 27 different fisheries. Kodiak's commercial fishing industry is one of Alaska's oldest, dating to the early-1800s when the Russians built the first cannery at Karluk (Steffian et al. 2016b, Roppel 1986). Building on its fishing traditions, salmon are the mainstay of Kodiak's fisheries, with all 5 Pacific salmon species returning to Kodiak each year.

Given a nearly seven millennia history as the stewards of Kodiak Archipelago marine resources, Sun'aq Tribe of Kodiak continually seeks opportunities to ensure that traditional harvests and commercial fishing will continue for future generations. In collaboration with local Tribes and many others, Sun'aq Tribe of Kodiak designed and implemented this study to assess the types, amounts, and preparation methods of seafoods by members of Alutiiq Tribes of the Kodiak Archipelago. The following report describes this project, establishes current seafood consumption rates for Kodiak Tribes, and compares them with the national rates. It is hoped that the information provided here will serve as a basis for further environmental, water quality, and health assessments and protections.

Frank Peterson, Jr.
Tribal Council Chairman

Jeannine Marsh
Tribal Administrator

Sun'aq Tribe of Kodiak

Acknowledgements

This Kodiak Tribes Seafood Consumption Assessment documents the role of seafood in the diets of Alutiiq/Sugpiaq tribal members currently residing in the Kodiak Archipelago. This assessment does not address or attempt to document historical seafood use or heritage consumption rates. This work is intended to build the technical capacities of Kodiak Tribes to manage environmental protection programs and participate in regulatory processes. The Sun'aq Tribe of Kodiak is optimistic that this information will contribute to local, state, and federal measures that protect and improve the health of the Archipelago's seafood consumers, especially those who consume large quantities of seafood.

This project was designed and conducted by STK's Natural Resources Department in collaboration with other Kodiak Tribes and their environmental programs, including the Native Village of Larsen Bay, Alutiiq Tribe of Old Harbor, Native Village of Ouzinkie, and Native Village of Port Lions. Funding was provided through grants from the U.S. Environmental Protection Agency's Indian Environmental General Assistance Program and the U.S. Department of Interior's Bureau of Indian Affairs.

STK thanks the Tribal Councils, Tribal Presidents and Council Chairs, Tribal Administrators and staff from the participating communities. Without their collaboration and efforts, this project could not have happened. With much gratitude, STK also thanks the members of the Native Village of Larsen Bay, Alutiiq Tribe of Old Harbor, Native Village of Ouzinkie, Native Village of Port Lions, and the Sun'aq Tribe of Kodiak who served as survey respondents, patiently participated in interviews, and shared important aspects of their lives. Without their participation and stories, this report would not have been possible.

STK's Natural Resources Department developed a Quality Assurance Project Plan, including project design, statistical methodologies, and interview protocols, based largely on past studies of a similar nature. STK appreciates the important contributions the following studies made to our project:

- A Fish Consumption Survey of the Shoshone-Bannock Tribes (Polissar et al. 2015a, Polissar et al. 2015b);
- Assessment of Cook Inlet Tribes Subsistence Consumption (Merrill and Opheim 2013);
- A Fish Consumption Survey of the Umatilla, Nez Perce, Yakama and Warm Springs Tribes of the Columbia River Basin (CRITFC 1994);
- A Fish Consumption Survey of the Tulalip and Squaxin Island Tribes of the Puget Sound Region (Toy et al. 1996).

Katherine Brown (U.S. EPA), Lon Kissinger (U.S. EPA), Dr. Peter Holck (Holck Consulting), Dr. Nayak Polissar (The Mountain-Whisper-Light Statistics), Dr. Lei Guo (University of Alaska Fairbanks), Dr. Chris Long (U.S. NOAA-Kodiak Fisheries Research Center), and Dr. Glenn Chen and Patricia Petrivelli (U.S. DOI-BIA) provided vital technical support for this project. STK very much appreciates their assistance.

Sun'aq Tribe of Kodiak is pleased to acknowledge the following individuals who contributed to project design, assessment implementation, statistical analyses, and development of this report:

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The methodology for this assessment was externally peer-reviewed by the Scholar Ship under STK Contract No. EPA Sp. Proj. FY17. Sun'aq Tribe of Kodiak is grateful for the critical review and recommendations made by six anonymous peer reviewers of the draft report.

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Acronyms

AAPOR	American Association for Public Opinion Research
ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
AN/AI	Alaska Native/American Indian
ANKN	Alaska Native Knowledge Network
ANTHC	Alaska Native Tribal Health Consortium
ATSDR	Agency for Toxic Substances & Disease Registry
AWQC	Ambient Water Quality Criteria
BIA	United States Department of Interior Bureau of Indian Affairs
CI	Confidence Interval (statistical measure)
EPA	United States Environmental Protection Agency
FCR	Fish Consumption Rate
FFQ	Food Frequency Questionnaire
g	grams (metric weight)
g/d	grams/day
GED	General Educational Development
IGAP	Indian Environmental General Assistance Program
Km	kilometer (metric length)
LB	Native Village of Larsen Bay
LB+OH	Native Village of Larsen Bay and Alutiiq Tribe of Old Harbor
NCHS	National Center for Health Statistics
NCI	National Cancer Institute (methodology)
NEJAC	National Environmental Justice Advisory Council
NOAA	United States National Oceanic and Atmospheric Administration
OH	Alutiiq Tribe of Old Harbor
OZ	Native Village of Ouzinkie
oz	ounce (U.S. customary weight)
PL	Native Village of Port Lions
PL+OZ	Native Village of Port Lions and Native Village of Ouzinkie
PII	Personally Identifiable Information
STK	Sun'aq Tribe of Kodiak
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
SE	Standard Error (statistical measure)
USDA	United States Department of Agriculture
24HR	24-hour Dietary Recall

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Executive Summary

This study quantitatively assesses current seafood consumption by Alutiiq/ Sugpiaq people of the Kodiak Archipelago. It provides current seafood consumption rates for Kodiak Tribes, it does not address historical seafood usage or heritage consumption rates. The information here may be used by tribes, the state of Alaska, and other agencies and organizations in developing water quality standards, protection programs, and clean-up levels that protect the environment and health of the Alutiiq people, other Alaska Natives, and all Alaskan seafood consumers. This project builds tribes' capacities to manage environmental protection programs and to participate in regulatory processes. It was supported by grants from the U.S. Environmental Protection Agency and the U.S. Bureau of Indian Affairs, and through in-kind services provided by partnering tribal governments.

To establish current seafood consumption rates for Kodiak Tribes, STK designed a project and developed a Quality Assurance Project Plan based on other similar studies. Funding and time constraints necessitated selecting 5 of the 10 federally recognized tribes on the Archipelago to demographically and geographically represent Kodiak Tribes for the purposes of this assessment. The tribes partnering in this study were the Alutiiq Tribe of Old Harbor, Native Village of Larsen Bay, Native Village of Ouzinkie, Native Village of Port Lions, and Sun'aq Tribe of Kodiak. Surveys were conducted in each community between October and December 2015, and a total of 326 tribal members aged 18 and older were interviewed.

Interview protocols and survey questionnaires were designed to document the types and quantities of seafood consumed by respondents in the 24-hours prior to the interview, over the course of the previous year, and at special events during the previous year. Respondents were asked to provide information about the types and amounts of seafood they consumed, as well as how it was prepared (e.g. smoked, baked, boiled, fried, or stewed). Photo and model displays were used to depict standard serving sizes of commonly consumed species. Respondents were asked to report quantities consumed in multiples or fractions of the serving sizes displayed. Data collected in the 24-hour Dietary Recall included species consumed, preparation methods, and quantities consumed. Data collected in the Food Frequency Questionnaire included species

consumed, and for each species consumed, when it was considered in season, how often it was consumed in and out of season, how it was typically prepared, and quantities consumed.

Data from the 5 communities was pooled into 3 sub-populations based on demographic and geographic characteristics. Seafoods were divided into 3 categories and 8 species groups based on life habitats and seasonal variability (Hauser 2011). Seafood consumption rates, including mean, median, and percentiles, were calculated in grams per person per day (g/d) for seafood consumers in the population and each sub-population, for all seafood and various combinations of categories and groups, from both the 24-hour recall and Food Frequency Questionnaire.

Fish consumption rates and cancer risk levels are important factors used by federal, state and tribal regulators in calculating human health criteria that quantify risks associated with chemicals in water. These criteria are used to develop water quality standards required by the Clean Water Act for permitting discharges and for planning cleanups protective of human health. EPA estimated that the average American's rate of fish consumption was 6.5g/d in 1980 based on national data available at the time (EPA 1980). EPA has updated its estimates and recommendations for "default" fish consumption rates used in developing human health criteria for water quality standards twice since.

In 2000, EPA began recommending use of a minimum 17.5g/d fish consumption rate to adequately protect the general population of fish consumers and 142.4g/d for subsistence populations, based on analysis of USDA surveys (EPA 2000). In 2015, EPA increased the default fish consumption rate for the general population to 22.0 grams/day based on more recent data (U.S. EPA 2015a). Based in part on tribal surveys, the states of Oregon and Washington have utilized fish consumption rates of 175g/d in updating their human health criteria for water quality standards. The state of Alaska's human health criteria for state water quality standards are currently based on a fish consumption rate of 6.5g/d.

This assessment of Kodiak Tribes' seafood consumption documents significantly higher rates of fish consumption by Alutiiq people in the Kodiak Archipelago. Data from the 24-hour recall show respondents consuming a mean average of 267.3g/d of seafood, with the 90th percentile

consuming 465.9g/d. Data from the Food Frequency Questionnaire for the previous year show respondents consuming a mean average of 232.8g/d of seafood, with the 90th percentile consuming 528.3g/d. Both data sets show that typical members of Kodiak Tribes consume at least 35 times more seafood than the average American, consume at least 35 times more seafood Alaska's water quality standards assume, and that some members consume 80-100 times more. Salmon and other freshwater fish are consumed most frequently and most seafood is harvested locally.

Keywords: AI/AN, Alutiiq, Sugpiaq, Kodiak Island, Kodiak Tribes, Sun'aq, Larsen Bay, Ouzinkie, Port Lions, Old Harbor, Alaska, water quality standards, human health criteria, seafood, salmon, marine mammals, 24-hour recall, food frequency questionnaire, fish consumption rate, fish consumption survey, seafood consumption, dietary assessment.

Introduction

Located in southcentral Alaska, the 28-plus islands of the Kodiak Archipelago have been home to the Alutiiq/Sugpiaq[2] people and their ancestors for more than 7,500 years (Crowell 2001). This group of islands lie in the Gulf of Alaska, south of the main Alaska landmass, approximately 250 air miles (405 air kilometers) from Anchorage. They encompass a large geographic area of 5,363 square miles (13,890km^2). The Archipelago is approximately 177 miles (285km) long, from the Barren Islands in the north to the Chirikof and Semidi Islands in the south, and 67 miles (108 km) across. Throughout the islands, 40 small cirque glaciers fall away from the backbone of Kodiak Island's mountainous ridgelines, giving way to and feeding small freshwater streams. The islands are home to many species of marine mammals, freshwater and anadromous fishes, and marine vertebrates and invertebrates. Most of these wild species hold cultural significance to Alutiiq people.

For thousands of years, Alutiiq people have harvested, consumed, and shared a great variety of customary and traditional foods from the surrounding land, sea, rivers, and streams. Archaeological records show that the economies of the Kodiak Archipelago have been heavily reliant upon sea mammals and marine fishing for at least 5,000 years (Clark 1996). Socio-economics around fishing intensified about 4,000 years ago, with salmon and cod being harvested in great quantities (Steffian et al. 2015, 2016a, 2016b). In the centuries since, the importance of salmon fishing to local economies has continued to increase. By the late 1300's, Alutiiq people were harvesting and preserving enormous quantities of salmon to feed a growing population, fuel trade networks, and support a system based on the management of labor and the accumulation of wealth. These early harvesters were the ancestors of today's Kodiak Tribes (Clark 1996, Steffian et al. 2016b).

[2] Aleut was a term used by Russian traders to identify Alaska Native peoples throughout coastal Alaska. In Sugstun, the traditional language of the Kodiak Archipelago peoples, Aleut was pronounced Alutiiq. As the archipelago was colonized by Russian fur traders, this became the term used when referring to the traditional inhabitants of the area. In the Sugstun language, however, the peoples of the Kodiak Archipelago called themselves Sugpiaq, which translates to "real person". Today, all three terms, according to personal preference are used in reference to the southern coastal peoples of Alaska (Old Harbor Native Corporation 2016). For the remainder of this report, the term Alutiiq is used.

The Kodiak Archipelago is now home to an ethnically diverse population. According to the Alaska Department of Labor and Workforce Development (2016), the total population of the Kodiak Archipelago in 2010 was 13,592 people. The majority of these residents identified as Caucasian (61.5%), Asian or Pacific Islander (21%), Alaska Native and/or American Indian (16%), of Hispanic origin (7.3%), or as Black (1%). Most of Kodiak's Alaska Native/American Indian population are members of one of ten federally-recognized Alutiiq tribes who call the archipelago home, commonly called the Kodiak Tribes:

1. Alutiiq Tribe of Old Harbor,
2. Kaguyak Village,
3. Native Village of Afognak,
4. Native Village of Akhiok,
5. Native Village of Karluk,
6. Native Village of Larsen Bay,
7. Native Village of Ouzinkie,
8. Native Village of Port Lions,
9. Sun'aq Tribe of Kodiak, and the
10. Tangirnaq Native Village (aka Woody Island).

According to the Alaska Department of Fish and Game, up to 90% of a rural Alaskan's diet may consist of wild foods. Collectively, Kodiak Tribes are concerned that the wild foods they depend upon for spiritual and nutritional sustenance may be acquiring contaminants from the archipelago's terrestrial and marine waters. There is evidence that cultural populations and sub-populations may be exposed to more pollutants than others through seafood consumption (Miller et al. 2006, Welfinger-Smith et al. 2011, U.S. EPA 2014, McOliver et al. 2015). Assessments that consider health risks associated with pollutants are often based on national average seafood consumption habits and rates, and these rates may not be appropriate for inferring health risks at local levels. Due to higher rates of wild food consumption, rural Alaskans, Alaska Natives, and Alutiiq people of the Kodiak Archipelago may be disproportionately exposed to toxins in the environment.

Project Area

This project furthers the collective understanding about reliance on seafood, and high rates of seafood consumption by Alaska Natives/American Indians. This study assesses seafood consumption by Alutiiq people of the Kodiak Archipelago. Five of the ten federally recognized tribes in the Kodiak Archipelago– Kodiak, Old Harbor, Ouzinkie, Larsen Bay, and Port Lions (Map 1) were selected for this study based on logistical considerations and demographic (Table 1), economic (Table 2), and geographic representation. The average age of residents in these communities ranges from mid-30s to the mid-40s (U.S Census Bureau 2016).

The city of Kodiak is the present-day headquarters for the Sun'aq Tribe of Kodiak. Located on the northeastern shores of Kodiak Island, Kodiak is the largest community in the Archipelago, and the largest of the five communities surveyed. Kodiak has a major airport, a large commercial fishing port, and a regular state ferry system stop. It is a hub for travel and commerce between the villages on the Archipelago. Formerly occupied by the U.S. Navy, lands adjacent to the city are now home to the largest U.S. Coast Guard base. According to the most recent data available from the U.S. Census Bureau (2016), the city of Kodiak's population was 6,130 in 2010, with nearly 10% of the city's population identifying as primarily Alaska Native/American Indian (AN/AI).

The seven remaining villages in the Archipelago are considered isolated, accessible only by sea or small aircraft. The Native Village of Larsen Bay is located on the southwestern shores of Kodiak Island. Larsen Bay has the smallest population of the five communities surveyed, with 34 year round residents in 2010 (66% AN/AI). The Alutiiq Tribe of Old Harbor is located on the southeastern shores of Kodiak Island. Old Harbor has a larger population with 218 residents in 2010 (87% AN/AI). The Native Village of Ouzinkie is located north-northeast of Kodiak, on the western-most shore of Spruce Island. Ouzinkie's population was 161 in 2010 (80% AN/AI). The Native Village of Port Lions is located on the northern shores of Kodiak Island. Port Lions' population was 194 (59% AN/AI) (U.S. Census Bureau 2016).

Map 1: Map of Kodiak Island and the Alutiiq Traditional Homelands

Table 1: Demographic characteristics of study communities, 2010

	City of Kodiak	Old Harbor	Ouzinkie	Larsen Bay	Port Lions
Number of households	1,969	84	56	34	77
Estimated population	6,130	218	161	87	194
Mean household size	3.11	2.6	2.9	2.6	2.5
Median age	35.1	34.3	36.8	43.5	44.3
Percentage of population,	9.9%	87.6%	79.5%	66%	58.8%

Source: U.S. Census Bureau 2016

Employment and income in Kodiak Archipelago communities vary, especially between the city and villages (Table 2). According to the 2010 census data, the city of Kodiak had the highest percentage of employed adults (77.9%), the highest year round employment, and the second highest mean household income ($69,477) of the 5 communities studied. Larsen Bay had the lowest percentage of employed adults (50.0%), and despite many being employed year-round, the second lowest mean annual household income ($48,526). Ouzinkie had a low percentage of employed adults (54.3%) with a higher mean annual income ($52,370). Despite having a low employment rate (54.8%), Port Lions residents had the highest mean household income ($77,776). Old Harbor had the second highest employment (75.6%), the lowest year-round employment, and the lowest mean household income ($39,109) (U.S. Census Bureau 2016).

Table 2: Employment characteristics of study communities, 2010

	City of Kodiak	Old Harbor	Ouzinkie	Larsen Bay	Port Lions
Percentage of employed adults	77.9	75.6	54.3	50.0	54.8
Percentage of employed adults who were employed year-round	62.9	26.3	37.3	44.3	35.2
Mean household income (earned and other)	$69,477	$39,109	$52,370	$48,526	$77,776

Source: U.S. Census Bureau 2016

Participation in subsistence hunting, fishing, and gathering is high in all communities. The ADFG documented the significance of wild resources, including wild seafood harvests for the five study communities in 1993 and 1997[3] (Table 3). In all communities, at least 99% of households used wild resources, at least 90.5% harvested or attempted to harvest wild resources,

[3] These data are the most up-to-date publicly available state-collected household survey data (Davis 2015, pers. comm.).

and at least 92% received wild resources from others. There was some variation in the percentages of households who share wild resources. According to ADFG, approximately 91% of households in Ouzinkie and Port Lions shared wild resources with others. 83.8% of Kodiak, 79.1% of Old Harbor, and 72% of Larsen Bay households shared wild resources with others.

Table 3: Study communities, resource harvest and use characteristics, 1993 – 1997

	City of Kodiak[4]	**Old Harbor[5]**	**Ouzinkie[3]**	**Larsen Bay**	**Port Lions[3]**
Mean household harvest, per household, lbs and kg	458.9 lbs 208.15 kg	1,110.6 lb 503.8 kg	887.3 lb 402.5 kg	665.8 lbs 302.0 kg	979.6 lb 444.3 kg
Percentage of households using any resource	99	100	100	100	100
Percentage of households attempting to harvest any	90.5	100	100	96	100
Percentage of households harvesting any resource	87.6	100	100	92	100
Percentage of households receiving any resource	97.1	95.3	93.6	92	100
Percentage of households giving away any resource	83.8	79.1	91.5	72	91.1

Source: Alaska Department of Fish and Game, 2016. Community Subsistence Information System, Harvest Information for Community, Subsistence Division, Juneau AK.

National Seafood Consumption Rates

Using data from the 2003-2010 National Health and Nutrition Examination Surveys[6], EPA updated estimates for national seafood consumption rates in 2014. According to EPA's report, the mean usual seafood consumption rates for all Americans aged 21 years and older is 22.0 grams/person/day (raw weight, edible portion) (U.S. EPA 2015a)[7]. Males consumed an average of 20.6g/d whereas females consumed an average of 15.3g/d. Mexican American, Other Hispanic, and non-Hispanic White populations had nearly identical rates of seafood consumption at 16.6-16.7g/d, and the non-Hispanic Black population consumed slightly more at 19.6g/d. The

[4] Based on 1993 data.
[5] Based on 1993 data.
[6] On a two-year cycle, the National Health and Nutrition Examination Survey collects information on the health and nutritional status from a statistically representative sample of the U.S. population.
[7] The STK Seafood Assessment project collected seafood consumption rates from respondents aged 18 and over, which follows the methods of other studies administered by Tribes in Alaska and the Pacific Northwest of the United States.

"Other Race" population, which included AN/AIs, Pacific Islanders, and Asian, consumed nearly twice as much at 32.2g/d.

Seafood consumption also varied across regions of the U.S. The seafood consumption rate was highest in the Northeast region at 23.9g/d and lowest in the Midwest at 12.9g/d. People in coastal areas consumed 20.9 g/d and people in non-coastal areas consumed 15.9g/d. Adult residents of the Atlantic region consumed 24.5g/d while those in the Pacific region consumed 22.1g/d. The state of Alaska was included in the Pacific region, along with Hawaii and the coastal counties of California, Oregon, and Washington (U.S. EPA 2014).

Study Goal and Objectives

This study aimed to assess current seafood consumption by Alutiiq people of the Kodiak Archipelago. This study did not address or attempt to document historical seafood use or heritage consumption rates. The assessment documented consumption of all common seafood types in g/d for resident members of five of ten federally-recognized Kodiak Tribes. Normalized portion sizes and conversion tables were used to develop cooked-to-raw weight ratios for various seafood types. The five tribal communities were grouped into three representative subpopulations for statistical analyses.

The objectives of this study were to:

1. Build the technical capacities of Kodiak Tribes to manage environmental protection programs and participate in regulatory processes.
2. Estimate current seafood consumption rates for Kodiak Tribes, with emphasis on upper percentiles of consumption by adults.
3. Compare the Kodiak Tribes seafood consumption rates with the national seafood consumption rates estimated by EPA in 2014.

Methodology

This section describes the processes used to develop and conduct the Kodiak Tribes Seafood Consumption Assessment. The tools and parameters used to select sample populations, sizes, and respondent eligibility criteria are discussed. The development of survey protocols, hiring and training of interviewers, solicitation of respondents, and the conduct of interviews are detailed. The statistical methods used to analyze, evaluate and understand the data are explained. The independent peer review used to scrutinize the study and ensure its integrity is summarized.

Project Planning

STK designed this project to develop the technical capacities of Kodiak Tribes and to further partnerships between the tribes and with federal and state agencies. STK partnered with each participating tribe, their administrations, and their environmental programs to plan and conduct this project. EPA provided primary funding and technical support. Additional support was provided by the Seldovia Village Tribe, the Alaska Native Tribal Health Consortium, the National Oceanic and Atmospheric Administration, and the Bureau of Indian Affairs. Table 4 lists staff with major roles.

The STK assessment team included: Jeannine "JJ" Marsh, Kathy Drabek, Thomas Lance, Margaret "Peg" Owen, Rick Rowland, and Kate Schaberg. Kelly Krueger and Sean Hales assisted with research, communications, fieldwork, data management, analyses, and report writing. STK accounting staff provided financial and contract management.

Ms. Jeannine Marsh, Tribal Administrator, is responsible for the overall management of Tribal operations and supports the Tribal Council in its governance. She works with the Tribal Council to establish current and long-range goals and objectives; manages and directs STK staff towards primary objectives; and dispenses guidance, direction, and authorization to carry out plans consistent with established policies and procedures. Ms. Marsh supervises each of the STK department heads and their programs and projects.

Ms. Kathy Drabek served as the Project Manager and Principal Investigator. She oversaw the development of the workplan and QAPP, maintained the project schedule (Table 5), and coordinated implementation of the project from start-up through the preliminary draft report. In collaboration with each participating Tribal Council, she coordinated interviewers, facilitators, and surveys in each community. She oversaw interviewers and quality assurance/quality control (QA/QC). She served as the primary contact for the project until September 2016.

Mr. Thomas Lance is STK Natural Resources Department Director. Mr. Lance assisted with the study design, database/IT layout, technical research and writing, data analysis, mapping, and project management as necessary. Following submission of the preliminary draft report, he became the Project Manager and Principal Investigator in September 2016. He coordinated additional data analyses, peer review, development of the final report, publication and outreach.

Ms. Kate Schaberg served as STK Tribal Biologist from January 2015 - August 2015. She assisted Ms. Drabek with the early and mid-stage development of the workplan and QAPP.

Ms. Kelly Krueger is the current STK Tribal Biologist, and has experience in fisheries monitoring projects. Ms. Krueger assisted with late-stage development of the QAPP and final project implementation. She assisted with community collaboration, fieldwork, and editing the draft and final reports.

Ms. Margaret “Peg” Owen, Project Assistant, provided technical writing, editing, and information technology assistance to the Natural Resources Department staff. She assisted with initial drafts of the survey, formation of outreach materials, reference materials, and editing.

Mr. Sean Hales served as the Natural Resources Department Projects Assistant during the QAPP and preliminary draft report development. He was instrumental in editing, interviewing, and managing data. Mr. Hales worked with consulting statisticians to prepare and organize data. He also assisted with STK’s website development, and in communication and outreach.

Table 4: Kodiak Tribes Seafood Consumption Assessment project staff

Task	Name	Organization/Affiliation
Project Design	Rick Rowland Kathy Drabek Tom Lance Kelly Krueger Peg Owen Kate Schaberg	Sun'aq Tribe of Kodiak
	Katherine Brown Lon Kissinger	U.S. Environmental Protection Agency
Project Management	Kathy Drabek Tom Lance Jeannine Marsh	Sun'aq Tribe of Kodiak
Interviewers	Claudine Alokli Kathy Drabek Sean Hales Kelly Krueger Stevi Sison	Sun'aq Tribe of Kodiak
Community Facilitators	Lorna Maughan Liz Pennington Judy Ashouwak Dorinda Kewan Sean Brester	Native Village of Port Lions
	Frederick Shanagin Janell Shanagin	Native Village of Ouzinkie
	Katherine Alexanderoff Lepani Nadore Alex Shugak, Jr.	Alutiiq Tribe of Old Harbor
	Brandy Boskofsky Edward Hockmuth	Native Village of Larsen Bay
	Claudine Alokli Trisha Abston Cox	Sun'aq Tribe of Kodiak
Data Management and IT/ Web Support	Sean Hales Kelly Krueger Traci Marsh	Sun'aq Tribe of Kodiak
Statistical Analyses	Dr. Peter Holck	Holck Consulting
	Keith van den Broek Dr. Shubha Pandit	Terraqua Environmental Consulting
	Tom Lance	Sun'aq Tribe of Kodiak
Cartography	Jon Bonkoski	Ecotrust
Peer Review	Erica McCall Valentine	The Scholar Ship
Report Writing	Kathy Drabek Tom Lance	Sun'aq Tribe of Kodiak
	Katherine Brown	U.S. Environmental Protection Agency

Table 5: Kodiak Tribes Seafood Consumption Assessment project chronology

Date	Event/Activity
October 2014	• Commence Project
November- December 2014	• Conduct literature review • Conduct project outreach with Kodiak Tribes
January- February 2015	• Draft and submit work plan revisions to EPA
March- May 2015	• Draft and submit QAPP to EPA • Draft and submit budget revisions to EPA
June-August 2015	• Conduct project meetings with Kodiak Tribes • Draft and submit QAPP revisions to EPA
September 2015	• Conduct pilot testing in Kodiak and Old Harbor • QAPP approved by EPA
October – December 2015	• Hire and train tribal interviewers and facilitators in Kodiak • Conduct interviews in Kodiak
October 2015	• Hire and train facilitators in Port Lions • Conduct interviews in Port Lions
November 2015	• Hire and train facilitators in Ouzinkie and Old Harbor • Conduct interviews in Ouzinkie and Old Harbor
December 2015	• Hire and train facilitators in Larsen Bay • Conduct interviews in Larsen Bay
January-February 2016	• Complete data entry • Submit data to contract statisticians
March–August 2016	• Conduct data analysis • Prepare preliminary draft report
September 2016	• Review findings with Kodiak Tribes • Submit preliminary draft report to EPA and Tribes
October–December 2016	• Conduct peer review • Prepare draft report
January– March 2017	• Independent peer review by contractor • Prepare report revisions
April- September 2017	• Present findings to Kodiak Tribes • Develop draft final report • Submit draft final report to EPA
January- May 2018	• Present findings at Alaska Forum on the Environment • Review statistical analyses • Prepare report revisions
December- February 2019	• Develop final report • Submit final report to EPA and Tribes • Publish final report
March 2019	• Complete project

Ethical Principles for the Conduct of Research

This study was conducted in accordance with the National Academy of Science's Principles for the Conduct of Research in the Arctic (National Science Foundation Interagency Social Science Task Force 2012), the Alaska Federation of Natives in its Guidelines for Research (ANKN 2013), and the Alaska confidentiality statute (AS 16.05.815). Consistent with these principles, the STK Assessment Team met with each of the participating Kodiak Tribes' Tribal Council, President or Chair, and Tribal Administrator to obtain approval and support for this project. Each sovereign tribe determined independently that this study posed no risk to their members and agreed to participate voluntarily. Each tribe provided membership and contact information, interview space, and administrative and environmental program staff support.

The STK assessment team maintained communications with each tribe's Administrator throughout the project, and project briefings were provided to Councils on request. Outreach materials including a project summary and contact information were distributed widely to members in each community (see Appendix I). Summaries of the project and interview process were reviewed with, and signed consent forms were obtained from, each respondent prior to interview (See Appendix II). Strict protocols were followed to secure personally identifiable information and to maintain participant confidentiality. Copies of draft and final reports were provided to each tribe's Council.

Study Design

STK designed this project to assess seafood consumption by Alutiiq people of the Kodiak Archipelago, to establish current seafood consumption rates for Kodiak Tribes, and to compare those rates to national averages. The assessment included: a literature review, 24-hour dietary recall, and food frequency questionnaire.

Literature review

Literature review focused primarily on contemporary subsistence and fish consumption surveys in the Pacific Northwest. Special consideration was given to surveys with similar goals and objectives: Fish Consumption Survey of the Shoshone-Bannock Tribes Draft Report (Polissar et al. 2015); Assessment of Cook Inlet Tribes Subsistence Consumption (Merrill and Opheim

2013); Fish Consumption Survey of the Tulalip and Squaxin Island Tribes of the Puget Sound Region (Toy et al. 1996); and Fish Consumption Survey of the Umatilla, Nez Perce, Yakama and Warm Springs Tribes of the Columbia River Basin (CRITFC 1994). These surveys were critical to developing statistical methods, 24HR and FFQ surveys, and interview protocols for this assessment.

Additional topics researched and reviewed included:

1. Historical use and trends of seafood consumption among Kodiak Tribal communities;
2. Contemporary seafood harvest, use, and sharing in the Kodiak Archipelago;
3. Contemporary seafood harvest and use trends in Alaska; and
4. Seafood harvest, use and sharing networks.

The literature review assisted in understanding how EPA, states, and some tribes assess and use fish consumption rates. Fish consumption rates are considered in developing human health criteria and water quality standards because fish and shellfish are a potential route of exposure to environmental toxins (U.S. EPA 2016). Seafood consumption rates, harvest and use patterns are also used in the development of fish consumption advisories and cleanup plans. Studies of other AN/AI populations have documented seafood consumption at significantly higher rates than national averages, potentially increasing risk of exposure to environmental toxins.

Seafood consumption assessment

STK's interview protocol and FFQ were based heavily on those developed by the Shoshone-Bannock Tribes (Polissar et al. 2015) and Seldovia Village Tribe (Merrill and Opheim 2013). The 24HR was based on U.S. national dietary surveys (NCHS 2005). Both the 24HR and FFQ were designed to elicit information on the frequency, quantities, and patterns of consumption of various seafoods. Data collected included types and amounts of specific species consumed, seasonality of consumption and frequency of meals of each species, parts consumed, and methods used in cooking or preparing various types of seafood. The assessment also documented demographic information, cultural practices, and childbearing and breastfeeding information for women. The interview protocols are included in Appendix III.

Pilot testing

Before commencing the study, the STK assessment team conducted pilot tests with volunteer STK and Alutiiq Tribe of Old Harbor tribal members. Two interviews were conducted in each community to ensure that questions were properly formulated and clearly articulated, and that interviews could be completed in one hour. Refinements were made to survey protocols and assessment forms based on observations made by interviewers and feedback from respondents. The volunteer tribal members' participation was limited to the testing and refinement of the survey tools, their responses were not included in the assessment.

Sample size

Early study designs assumed larger numbers of eligible residents (N) in each community. As participating tribes provided membership rolls, less enrolled members were currently residing in communities than expected, and getting a sufficient sample size (n) of respondents from each was unlikely. The five communities were pooled into one population with three sub-populations. Stratifying by age and gender was considered but not conducted. Age or gender bias detected in analyses can be addressed with weighting factors.

Calculations for sample size or number of interviews needed assumed a log-normal distribution for each participating community (Figure 1). As in similar studies, a statistical precision level factor of 1.2 equaled ±10% and the standard deviation was set at 1.15.

Figure 1: Formula for sample size "n" necessary to meet statistical requirements based on log-normal population distribution. Derived from Toy et al.,1996.

Given:	**And:**
Formula to find n for a population with log-normal distribution Based on *Toy et al. 1996*	n = sample size required **N** = Eligible # Residents to Interview s = assumed sample std deviation as log value

$$\exp\left(1.96\frac{s}{\sqrt{n}}\sqrt{1-\frac{n}{N}}\right)=1.2 \quad \textbf{Then simplified as:} \quad \frac{1}{n}=\left(\frac{ln\ 1.2}{1.96*s}\right)^2+\frac{1}{N}$$

Where desired sample size provides approx. ± 20% precision on estimated means, and precision equals half-width of 95% C.I.
The "1.96" multiplier corresponds to a 95% C.I., and the ".2" in the "1.2" result defines the precision as equal to 20%.

Sample population

Tribes participating in this assessment were not randomly selected. Only five of ten federally recognized Kodiak Tribe could be included given budget and time constraints. The five tribes were selected based on: availability of staff, travel windows, resident enrollment numbers, and

demographic and geographic representation of Alutiiq tribal communities of the Kodiak Archipelago.

Data from Port Lions and Ouzinkie was pooled in one sub-population (PL+OZ). PL+OZ are located on the northern end of Kodiak Island and both have semi-frequent ferry service. Of the isolated village communities, they are located in closest proximity to the city of Kodiak. Data from Larsen Bay and Old Harbor was pooled into another subpopulation (LB+OH). LB+OH are located further away from the city, on the western and eastern sides of Kodiak Island respectively, with less frequent barge or ferry service and less access to commercial goods. STK was treated as a third sub-population (KOD). STK is headquartered in the city of Kodiak on the "road system" and has the largest resident membership of Kodiak Tribes.

Calculations for sample sizes or "n" or number of interviews needed for each sub-population is detailed in Figure 2. The 20% factor (in the "*n*"+20%) is the sum of participant non-response/ refusal rate estimated at 15%, plus a 5% buffer for unusable data. The 20% factor was based on the non-response rate and unusable data in Seldovia Village Tribes' assessment of Cook Inlet tribes (Merrill and Opheim 2013). 175.0

Figure 2: Calculating sample size or number of interviews needed "n" per subpopulation

	Eligible Residents				Total Adults to Interview
Village Tribe	**Pooled Group Size N**	***s***	**Solving for required sample size**	***n***	**No Shows and Data Errors** ***n*** + 20%
LB+OH (≥18yr)	175.0	1.15	*1/ ((ln* 1.2 / (1.96 x s)) ^2 +1/ N) =	88	**82**
PL+Oz (≥18yr)	166.0	1.15	*1/ ((ln* 1.2 / (1.96 x s)) ^2 +1/ N) =	80	**96**
Kodiak (≥18yr)	597.0	1.15	*1/ ((ln* 1.2 / (1.96 x s)) ^2 +1/ N) =	122	**146**

Eligible respondents

Each participating Tribal Council provided tribal membership and contact information to the STK assessment team. A secured database of eligible respondents in each tribal community was created based on the following criteria:

1. The candidate must be an enrolled member of the tribe.
2. The candidate must be eighteen years of age or older.
3. The candidate must be a "resident," defined for the purposes of this study as an individual presently residing in or near the community where the interview was taking place.

Tribal membership rolls for Old Harbor and Larsen Bay did not include current residency information. Port Lions' membership roll did not include age data. Lists of presumed eligible respondents from each sub-population (Kodiak, PL+OZ, LB+OH) were generated. No restrictions were placed on the number of respondents per household. Each eligible respondent was assigned a unique identification number. UINs were processed through a random number generator, and lists of eligible respondents in random order were created.

Attempts to contact eligible respondents by phone, confirm eligibility, invite participation, and set-up interviews were made in order from the top of each list. Those determined ineligible because they were not currently residing in the community, not over 18, or deceased, were removed from lists. For those unreachable by phone, community facilitators attempted to contact them in person at home. Attempts to contact other eligible respondents continued until sufficient numbers of interviews ("*n*"+20%) were scheduled for each sub-population.

Honorariums

Honorariums or payments were provided to each individual serving as a respondent and completing an interview. Payments were given as compensation for time and effort spent voluntarily participating in the assessment. Offering honorariums is known to increase participation in such projects. In Kodiak, Larsen Bay, Ouzinkie, and Port Lions, $20 was provided to each respondent. In Old Harbor, to ensure a sufficient number of interviews in a short time frame, honorariums were increased to $40.

Portion models

The U.S. Department of Agriculture recommends portion models representing foods "as consumed" (USDA 2016). The STK assessment team prepared and created life-sized color photographs of a variety of seafood preparations as commonly consumed by Alutiiq people of the Kodiak Archipelago. Visual aids used in the administration of interviews also included species

identification photographs, some life-sized rubber models, and a variety of serving bowls (Photos 2 through 14). Together these models reflected most of the actual species discussed, the part of the organism consumed (e.g. a fish fillet), the portion sizes or volumes consumed (e.g. ½ a filet or bowl), and the preparation methods (e.g. baked) most commonly used by tribal members.

Each model had a unique identification code. Respondents were asked to identify the amount of each seafood they typically consumed as prepared (i.e. cooked versus raw). For each species evaluated, interviewers recorded a corresponding model code and a serving size in multiples (1, 2, 3, etc.) and/or fractions (e.g. 0.25, 0.5, and 0.75) or of the portion depicted.

The “salmon fillet” photo display was used to represent a typical portion size for all species of salmon, and for other large fish with thick fillets, including steelhead and cod (Photo 1).

Photo 1: Salmon fillet, single serving.

The “halibut filet” photo display was used to represent a typical portion size for halibut, and for other large bottom fish with thick fillets, including flounder or sole (Photo 2).

Photo 2: Halibut fillet, single serving.

The “rockfish filet” photo display was used to represent a typical portion size for rockfish, and other fish with thin fillets including rainbow and Dolly Varden trout, pollock and sculpin (Photo 3).

Photo 3: Rockfish fillet, single serving.

The “crab legs” photo display was used to represent a typical portion size for golden king crab, and other species including red king crab and tanner crab (Photo 4).

Photo 4: Crab legs, single serving.

The “shrimp” photo display was used to represent shrimp and other species including prawns and squid (Photo 5). Respondents were asked to report portion sizes in multiples of a single shrimp.

Photo 5: Shrimp, typical serving.

The “mussels” photo display was used to represent a marine and freshwater mussels (Photo 6). Respondents were asked to report portion sizes in multiples of a single mussel.

Photo 6: Mussels, typical serving.

The “scallops” photo display was used to represent a typical portion size for scallops (Photo 6). Respondents were asked to report portion size in multiples of a single scallop.

Photo 7: Scallops, typical serving.

The “octopus” photo display was used to represent a typical portion size for octopus (Photo 8).

Photo 8: Octopus, single serving.

“Butter Clam” replica models were used to represent butter clams (Photo 9). Respondents were asked to report portion sizes in multiples of a single clam.

Photo 9: Butter clams, typical serving.

The “seal meat” photo display was used to represent a typical portion size for seal (Photo 10).

Photo 10: Seal meat, single serving.

The “salmon strips” photo display was used to represent a typical portion size for dried salmon, and any other species of dried fish (Photo 11).

Photo 11: Salmon strips, single serving.

“Canned salmon” in a standard home-canned half pint jar was used to represent any species of seafood that was canned or jarred (Photo 12).

Photo 12: Canned salmon, varied servings.

“Standard bowls” were used to represent composite dishes including soups, stews, chowders, and casseroles (Photo 13). Sizes were: 1cup (green), 2cups (red), and 4cups (blue).

Photo 13: Standard bowls, 3 serving sizes.

Raw weight calculations

Raw tissue weights needed for analyses (Table 6) were documented prior to cooking or preparing seafoods for photo displays, estimated for models based on established raw weights, or calculated from cooked weights and established percentages of moisture loss.

The STK assessment team documented the raw weight in grams (g) and percentage moisture loss for several common species including: salmon, halibut, rockfish, crab, scallops, seal, and octopus. Raw weights were measured on a scale and recorded before cooking. Cooked weights were measured and recorded after cooking. The following formula was used to calculate percent moisture loss:

$$\% \text{ Moisture loss} = 100\,(1 - \text{Cooked weight}/\text{Raw weight})$$

Table 6: Raw weight calculations for seafood preparations displayed

Model	Unit	Raw Weight of Portion (ounces)	Raw Weight of Portion (grams)
Salmon	1 fillet serving	8.00	227.0
Halibut	1 fillet serving	8.00	226.8
Rockfish	1 fillet serving	8.00	227.0
Crab	2 leg serving	4.98	141.4
Shrimp[8]	1 organism	1.55	44.0
Seal/Sea lion meat	1 patty serving	8.00	226.8
Scallops	1 organism	0.99	28.0
Octopus	1 plate serving	6.99	198.4
Clams[9]	1 organism	0.88	25.0
Mussels[8]	1 organism	0.35	10.0
Salmon strips	2 strip serving	4.59	130.2
Jar of salmon[8]	8 fluid ounce jar	10.66	302.4
Can of salmon or tuna[8]	1-5 fluid ounce can	6.67	189.0
Measuring bowls (soup, stew) [8]	1 cup	2.55	72.2

For halibut, the raw weight of the fillet was 226.8g. After baking, the cooked weight was 198.4g. Moisture loss was 12.6%. For rockfish, the raw weight of the fillet was 227.0g, the cooked weight after baking was 193.0g, and moisture loss was 14.9%. For salmon, the raw weight of the fillet was 227.0g, weight after baking was 184.2g, and moisture loss was 18.9%.

For crab, the weights of pre-cooked crab legs were measured on a scale, with shell on and shell off, before and after warming. (Note: all crab must be live-cooked, or killed and then immediately cooked, to result in edible meat). For the purposes of this assessment, “raw” crab denotes pre-cooked meat prior to warming as the “cooking” process. Crab bodies, tails, and viscera parts, were not considered. The modeled portion of crab contained 141.4g of “raw” and 113.0g of cooked and edible meat, and moisture loss was 20.1%.

For seal meat, the weights of a portion were measured on a scale before and after roasting. The seal meat weighed 226.8g raw and 200.0g cooked. Moisture loss was 11.8%. For octopus, the weights of tentacles were measured on a scale with skin and suckers removed, before and after sautéing. The modeled portion of octopus weighed 198.4g raw and 141.7g after cooking.

[8] Polissar et al. 2015a

Moisture loss was 28.6%. For scallops, the weights of single scallops were measured on a scale, before and after sautéing. The average scallop weighed 28.0g raw and 20.0g cooked. Moisture loss was 28.6%. The modeled portion of 6 scallops contained 168.0g of raw meat.

For mussels, clams, and shrimp, previously established values were used as raw weights for single organisms. The average wet weight of a single large adult mussel is 10.0g (de Jong 2016). The raw weight of the six mussel photo display was estimated to be 60.0g. The average wet weight of a single small-to-medium sized butter clam is 25.0g (Nickerson 1977). The raw weight of the six clam photo display was estimated to be 150.0g. The average raw weight of a single shrimp is 44.0g (Polissar, 2015a). The raw weight of the six shrimp photo display was estimated to be 264.0g.

Raw weights were estimated for seafood prepared by drying, smoking, frying, canning, or in stew, based on cooked or estimated weights and established percentages of moisture loss during cooking processes (Table 7). The STK assessment team used the following formula to estimate raw weights for these seafood preparations:

$$\text{Raw weight} = \frac{\text{Cooked Weight}}{1 - (\%\ \text{Moisture loss} / 100)}$$

Table 7: Seafood moisture loss due to cooking

Cooking / Preparation Method	Moisture Loss
Dried (i.e. salmon strips)	57%
Kippered	46%
Smoked, other than salmon	36%
Canned	25%
Cooked, dry heat (i.e. baked)	25%
Cooked, moist heat (i.e. soup)	21%
Smoked salmon	17%
Fried	12%
Raw	0%

Source: U.S. EPA 2014

For dried or smoked fish, salmon strips were weighed on a scale. The modeled portion of 2 salmon strips weighed 56.0g. Assuming 57% moisture loss from drying (EPA 2014), the STK assessment team estimated that the modeled portion contained 130.2g of raw fish.

For “jarred” or home-canned fish, one standard 8.0oz jar contains 226.8g of fish (Polissar et al. 2015a). For commercially-canned tuna or other fish, one standard 5.0oz can contains 141.7g of fish. Assuming 25% moisture loss from canning (EPA 2014), the STK assessment team estimated that home canning jars contained 302.4g of raw seafood, and that commercial cans contain 189.0g of raw seafood.

For soups, 1cup of fish soup contains 0.25cup or 57g of cooked fish and 72.2g of raw fish (Polissar et al. 2015a). The STK assessment team estimated that for soup, stew, and other composite dishes: 1cup bowls contained 72.2g of raw seafood; 2cup bowls contained 144.4g of raw seafood; and 4cup bowls contained 288.8g of raw seafood.

Interviewers and facilitators

Initially, the STK assessment team recruited tribal members in each community to serve as interviewers. Working with Tribal Councils, Tribal Administrators, and environmental program staff, positions were advertised by publishing vacancy announcements in local newspapers and tribal newsletters, and by posting on social media sites and bulletin boards around communities. Emails and telephone calls were made to tribal and community leaders to encourage applications.

Due to a low number of applicants overall, the STK assessment team decided to use STK project staff as interviewers, and tribal members or staff from each community as facilitators. While this increased the cost of interviews, use of a well-trained team of STK interviewers with the assistance community facilitators is believed to have improved interview consistency, survey data quality, and project participation.

Interviewer and facilitator training

Interviewers and facilitators participated in training conducted by the Project Manager. Interviewers and facilitators were briefed on project background and objectives, project scope, and study design. Copies of the Quality Assurance Project Plan and relevant sections of EPA Guidance for Conducting Fish and Wildlife Consumption surveys were provided and reviewed. Interviewers were trained on specific interview protocols and forms, and collection and treatment of personal information, 24HR and FFQ data. Interviewers were also instructed on the

importance of objectivity, appropriate tone and demeanor for interviews, and the use of the various photo and model displays and codes.

Each interviewer conducted at least one mock interview with a member of the STK assessment team acting as a respondent. Interviewers presented the introduction and forms, conducted complete interviews, collected 24HR, FFQ, and other data, and rated respondent reliability. Each mock interview was followed by de-briefing, data review, and discussion. Interviewers received instruction and practice presenting information and questions clearly and recording and coding data with display and response codes accurately. The "Training Plan for Interviewers" is included as Appendix VI.

Survey schedule

Surveys were conducted from October through December 2015 (see Table 9). Survey work began in Kodiak and continued in Kodiak in between village surveys because it was the largest sample population and did not require travel. The STK assessment team surveyed Sun'aq Tribe of Kodiak from October to December 2015. The team surveyed members of the Native Village Port Lions in October 2015, the Native Village of Ouzinkie and the Alutiiq Tribe of Old Harbor in November 2015, and the Native Village of Larsen Bay in December 2015.

Funding constraints prevented conducting interviews at various times of year. For each species consumed, information was gathered on whether or not consumption varied with season, and if it did, how many weeks or months the respondent considered "in season." For species where consumption varied, information on how often it was consumed, preparation methods, and portion sizes was gathered separately for "in season" and "not in season."

Table 8: Survey dates and locations

Date	Location
October 2015	• Port Lions
November 2015	• Ouzinkie • Old Harbor
December 2015	• Larsen Bay
October – December 2015	• Kodiak

Survey protocol

Interviewers and community facilitators attempted to contact each eligible respondent in the order listed. A script (Appendix IV) was used to introduce the project, confirm eligibility, and attempt to schedule interviews. Contact activity logs (Appendix V) were used to document basic information, including name, address, and interview location, and were stored securely.

Surveys were conducted in person by STK interviewers in each tribal community. Most interviews were conducted in tribal buildings or offices provided by the tribe's administration. Interviews were conducted in homes or other locations in some instances where necessary to get a respondent's participation.

Interviewer name, respond identification number, date, time and location were documented before each interview. Interviewers reviewed a project information sheet (Appendix I) and a consent form (Appendix II) with each respondent. Interviews were conducted according to scripted protocols (Appendix III) with respondents who agreed to participate and signed consent forms. Interviews lasted approximately one hour and included three parts: (1) administration of the 24HR; (2) administration of the FFQ; and (3) collection of other information on special events and ceremonies, seafood related activities, and demographics.

The 24HR gathered information on seafood preparation and consumption by respondents in the 24 hours prior to the interview, or on the most recent day they consumed seafood. Data collected included the day, each occasion (e.g., lunch or snack), species consumed, preparation or cooking method, portion size consumed, and whether it was harvested or obtained commercially.

The FFQ gathered information on seafood preparation and consumption by respondents throughout the year prior to interview, excluding special events (discussed later). Data on which species were consumed was collected first. For each species consumed, whether or not consumption varied seasonally, and if so, how many weeks or months were considered "in season" were noted. Additional data was then collected for each species, separately for "in season" and out if applicable, including most common cooking or preparation methods, and portion sizes typically consumed for each preparation.

Other information gathered included data on seafood consumption at special events and ceremonies, fishing related activities, changes in availability and consumption, breastfeeding, and demographics, and breastfeeding. This study characterized consumption rates for individual adults, not households, and for all seafood, locally-harvested and commercially obtained.

Quality assurance/quality control

Completeness and accuracy of survey data was verified during and after each interview. Each interview was observed by a designated QA/QC monitor, either the Project Manager or an STK assessment team member. The monitor observed the interview in progress to ensure protocols were implemented appropriately, questions were asked and answered clearly, and that data was recorded accurately. Few issues were observed, mostly in early interviews, and resolved on the spot with clarifications and/or instructions from the monitor. Monitors and interviewers had de-briefing reviews and discussions immediately following each interview. Final comments and/or corrections to coding were made as necessary. Monitors collected all logs, survey materials and forms, transported them to the STK office, and stored them in a locked fireproof filing cabinet.

The Project Assistant transcribed data from survey forms into Excel spreadsheets and an Access database stored on secure servers in the STK office. The Project Manager compared a random subset of transcriptions to survey forms to verify accuracy. Few transcription errors were noted and resolved by reviewing survey forms. The Project Assistant organized and reviewed data with the Project Manger before providing it to the contract statistician for analyses. Most missing or seemingly inconsistent values were verified or resolved by reviewing survey forms and/or asking the interviewer to confirm the value to best of their recollection. In very few instances, values that could not be verified or resolved were removed from the dataset during analysis.

Statistical Analysis

This section describes the statistical analyses used to evaluate 24HR, FFQ and other data.

Response rates

Membership rolls provided by each participating tribal administration were screened for eligible respondents. Eligibility to participate was determined by meeting three criteria: 18 years of age or older; enrolled membership in the participating tribe; and current residence in the community. Response rates were calculated per standard definitions of response rate (AAPOR 2011). The following formula was used to calculate the response rate (RR1):

$$RR1 = I / [(I + P) + (R + NC + O) + U]$$

where:

I = the number of complete interviews
P = The number of partial interviews
R = The numbers of refusals or break-offs
NC = The number of eligible non-contacts
O = The number of other eligible non-respondents
U = The number of non-respondents with unknown eligibility

Seafood consumers

1 eligible respondent who was contacted and indicated they did not eat seafood were counted as an eligible non-respondent. Respondents who were interviewed, and then indicated they did not eat seafood were treated as partial interviews. Most analyses conducted and results presented here are for seafood consumers only. Some respondents did not supply sufficient information in the 24HR or FFQ to determine their seafood consumption rates. Data insufficient to determine consumption rates were not included in those analyses. The number of respondents (n) varies accordingly in presentations of results.

Respondent reliability

After each interview's completion, interviewers rated the respondent's cooperation on a four-point scale (very good, good, fair, poor), and judged the respondent's reliability on a four-point sale (highly reliable, generally reliable, questionable, and unreliable). While ratings were subjective, they were helpful in ensuring quality data. Respondents who were ranked as

unreliable or uncooperative (poor) were considered partial interviews. Their data was not included in analyses.

Response bias

The STK assessment team contemplated the possibility that respondents could provide strategic answers throughout the interview. This was deemed unlikely and not feasible to determine. Respondents did not have access to survey protocols prior to interviews and all respondents were interviewed individually. The STK assessment team considered survey responses from respondents not ranked unreliable or uncooperative to be accurate.

No answer adjustments

"No answer" responses were reviewed and reconciled by weighting factors applied to data during analyses. If interviewers or statisticians determined that non-response to a survey question was random and not due to interviewer error, then original sampling weights were used without leading to any bias. When data were missing (i.e. "no answer" was recorded on the assessment sheet), no assumptions were made about what constituted a valid response. Sampling weights were only adjusted for "no answer" using information noted by the respondent and/or the interviewer.

Non-response adjustments

The weighting process normalized survey results across the entire sample population, based on statistically-predicted variables including assessment location, sex, and age. Sampling probability was used to adjust for the probability of being sampled from the tribal population. Non-responsiveness cannot be avoided in a survey, but the resulting bias can be reduced by adjusting the sampling weights (Polissar et al. 2015a). The non-response adjustment was used to adjust for potential bias due to differences among respondents and non-respondents. The respondent's sampling weight (W) was calculated as:

$$W = 1 / (F_S * P_R)$$

where Fs = the sampling fraction of stratum (x) and P_R = the probability of being a respondent in that stratum.

P_R was calculated using logistic regression models that predicted the likelihood of response versus non-response.

The same population characteristics were not all available for all strata. For example, age data was not available for Port Lions. Separate models were built using available population characteristics, with a linear and interaction configuration of the models for each of the strata (see Pandit et al. 2013). Location, age, and sex data were used for Kodiak, Larsen Bay, Ouzinkie, and Old Harbor, and only location and sex data were used for Port Lions. The general form of the model was:

$$\text{Log}[p/(1-p)] = ß+f(Ei)$$

where p was the probability of survey response, ß represented the intercept constant, and f(Ei) was a function comprised of each independent variable (Ei).

Among several models to choose from in these analyses, this model was selected based on the Hosmer-Lemeshow Goodness Fit Statistics (Hosmer and Lemeshow 2000). Bootstrapping resampling (1,000 samples) calculations were used to calculate replicate weights, and used to calculate the variance estimators (standard errors, confidence intervals, p-values, etc.).

Seafood categories and species groups

This study endeavored to assess current consumption of all seafoods by Alutiiq people of the Kodiak Archipelago. In effort to provide statistics of use for developing ambient water quality criteria, various seafoods were divided into 3 categories (salmon, marine mammals, and all other seafood), and classified into 8 species groups (Table 10).

Table 9: Seafood categories and species groups

Seafood Category	Description	
1	Salmon	Five species of Pacific salmon
2	Marine mammals	Sea lion, seal, sea otter, whale
3	Other species	All other species

Species Group	Description	Species in the Group
1	Shellfish & Invertebrates	Butter clams, clams, razor clams, Pacific littleneck clams, crab, lobster, mussels, octopus, squid, scallops, shrimp, chiton (*bidarki* and *uritaaq*), sea urchin, snails, heart cockle, oysters
2	Marine Mammals	Sea lion, seal, sea otter, whale
3	Salmon	Five species of Pacific salmon
4	Non-Salmon: Anadromous & Non-Anadromous Freshwater Fishes	Steelhead, rainbow trout, eulachon, Dolly Varden, tilapia, catfish
5	Near-bottom Marine Demersal	Flounder, sole, butterfish, eel, halibut
6	Long-lived Marine Pelagic	Sculpin, cod, lingcod, herring, mahi mahi, pollock
7	Mid-water Marine Demersal	Rockfish, tuna
8	Other	Dried fish strips, sushi, kelp

Mean, variance, and percentiles

Estimates of means, variances and percentiles were carried out using standard methods in the R survey package (Lumley 2004 and Lumley 2016). Specifically, the following survey design was used with the "survey" package in R for calculating mean, variance and percentile:

Design = svrepdesign (bootstrap, sampling weights, repweights, scale, rescale)

The R survey package also incorporates inferences when estimating percentages, means, variances, and percentiles in sub-populations. When estimating quantities in sub-populations, this methodology considers uncertainties in weights derived for specific sub-populations. Lumley (2016) describes this methodology in further detail.

Confidence intervals of each statistic of interest (e.g. means, percentiles, and regression coefficients) were calculated at 95% probability, approximated by the 2.5th and 97.5th percentiles of the sampling distribution (1,000 bootstrapping population) of that statistic. Some data represented sub-populations with so few respondents that statistics for the strata could not be produced. For example, when the standard deviation produced a "NA" calculation, that indicated there may have been 2 or fewer respondents with a consumption rate equal to or greater than the given percentile value.

Outliers

In most data sets, some data do not comply with the general behavior or model of the data. These data that are different or inconsistent with the rest of the data set are termed outliers. While outliers are prone to masking the excess spread of statistics, current practice in food surveys methods keeps them within data sets. Outliers were not recoded or removed during cleanup and analysis of the data. The data analysis and tables in the results section present the minimum and maximum reported consumption rates (which are the outliers), as well as the mean, and median, and percentiles, to understand the full range of seafood consumption rates.

Software

Statistical calculations were performed on R, versions 3.3.1 (R Development Core Team 2013). All statistical summaries of raw-weight food consumption were calculated using an R package "plyr" (Wickham 2016), and figures were created using a package "ggplot" (Wilkinson 2011). R survey package (Lumley 2004 and Lumley 2016) was used for weighted analyses.

Peer Review

Informal peer review was conducted by five southcentral Alaska tribal environmental programs from October-December 2016. An independent scholarly peer review of the draft report was conducted under contract by The Scholar Ship from January-March 2017.

Six individuals with expertise in one or more of the following areas were recruited to provide critical reviews of the draft report:

1. Statistical modeling of short term nutritional survey data to produce food consumption statistics;
2. Computation of food consumption statistics from survey data collected using a food frequency questionnaire approach;
3. Nutritional survey design and nutritional survey implementation; and
4. History of resource utilization by Alaska Native Tribes, expertise with Alaska Native Tribes and seafood/fisheries resources is desired.

While not an explicit criterion, the six individuals who served as peer reviewers also represented Alaska's public, private, and academic sectors. Their collective knowledge and understanding of Alaska Native subsistence food harvests, use, and practices provided a unique contextualization of the data presented. To reduce and/or eliminate reviewer bias, each of the reviewers were and remain anonymous to the STK assessment team.

Each reviewer was provided with the "Charge to Peer Reviewers" (Appendix VII). This document detailed the peer review process, provided an evaluation matrix, and encouraged reviewers to comment in the document. The evaluation matrix guided reviewers in considering the adequacy of the study design and data collection, appraising the methodology used to analyze data and derive statistics, and evaluating the appropriateness of the estimated seafood consumption rates and accompanying information.

Six anonymous peer reviews, including five matrices, notes, and 228 comments were provided to STK. Comments by all reviewers were a combination of notes and in line comments within the survey document. Five reviewers provided memorandums with references to the matrix. The number of comments made were, Charge One - 71 comments, Charge Two - 27 comments, Charge Three - 27 comments, and Charge Four - 30 comments.

Peer review evaluations and comments were considered and incorporated into draft final and final reports. Some peer review comments were rejected (or unresolved) because they were considered beyond or outside the scope of the project. This draft final report includes revisions responsive to tribal peer, scholarly peer, and EPA reviews and comments.

Results

Seafood consumption rates for Kodiak Tribes were determined based on 24HR and FFQ surveys of five of the ten federally recognized Alutiiq tribes of the Kodiak Archipelago. Five community strata were pooled to create one total sample population with three sub-populations: Larsen Bay and Old Harbor (LB+OH); Port Lions and Ouzinkie (PL+OZ); and Kodiak (KOD). Most analyses were conducted for seafood consumers only, and results are presented for the total sample population and each sub-population.

Population and Participation

Based on initial screening of tribal rolls for resident members 18 years of age or older, the total sample population was estimated to include 965 eligible respondents. Attempts were made to contact 943 individuals about participating in the assessment, to confirm eligibility and schedule interviews (Table 11). Based on contacts, 27 ineligible individuals were removed from and 12 eligible individuals were added to the final list of 950 eligible respondents.

335 individuals were confirmed eligible, agreed to participate, and were interviewed. Of completed interviews, 7 not pre-scheduled were considered not randomly selected. 2 individuals were rated unreliable and considered partial interviews. Data from these 9 interviews was excluded from the data set. The sample size for most analyses was 326.

Table 10: Eligible respondents and sample size, total population

Sub-population	Community	Eligible Respondents	Sample size needed	Attempted Contacts	Respondents Interviewed	Respondents Sample
LB+OH		175	82	168	92	84
	Larsen Bay	*40*		*39*	*20*	*19*
	Old Harbor	135		*129*	*72*	*65*
PL+OZ		175	82	175	97	96
	Port Lions	*78*		*78*	*52*	*52*
	Ouzinkie	97		*97*	45	*44*
KOD		600	122	600	146	146
Total		**950**	**286**	**943**	**335**	**326**

Participation and Response

The response rate RR1 for the total population sampled was 35.1%. The participation rate (interviewed/eligible) was 35.3% (Table 12). Of the sub-populations, PL+OZ had the highest percentage of eligible respondents participating (55.4%), and KOD had the lowest (24.3%).

Table 11: Participation by eligible respondents, total population

Sub-population	Community	Eligible Respondents	Respondents Interviewed	Eligible Not Participating	Participation Rate
LB+OH		175	92	83	52.6%
	Larsen Bay	*40*	*20*	*20*	*50.0%*
	Old Harbor	135	*72*	*63*	*53.3%*
PL+OZ		175	97	78	55.4%
	Port Lions	*78*	*52*	*26*	*66.7%*
	Ouzinkie	97	45	*52*	46.4%
KOD		600	146	454	24.3%
Total		**950**	**335**	**615**	**35.3%**

Non-participation

Non-participation (not interviewed/eligible) for the total population sampled was 64.7%. Individuals with an invalid or disconnected phone number were not deemed ineligible, but were considered a "no contact." Of the 615 individuals not participating, ~339 (55%) could not be contacted after 4 attempts, calling on the phone and/or knocking on their door (Table 13). 1 individual was contacted, did not eat seafood (due to allergies), and was not interviewed.

The refusal rate for the total population sampled was estimated to be 38.6% (Table 13). ~237 individuals refused to participate, with ~12% claiming to be out of town, ~ 4% providing a soft refusal, and ~2% giving a hard refusal (i.e. a stern 'no'). ~30 (6%) individuals agreed to interview but didn't show up, then couldn't be contacted. Estimates for the total population sampled are based on data from Kodiak, Larsen Bay, and Port Lions. Refusal vs. no contact could not be resolved for Ouzinkie or Old Harbor.

Table 12: Non-participation by eligible respondents, total population

Non-Participation Reason	Sub-total	Refusal	No Contact	Other	Percent of Non-Participation	*Estimate for Population
Refusal	193				**38.6%**	~237
Out of town		61			12.2%	
Soft refusal		18			3.6%	
Hard refusal		8			1.6%	
Other refusal		20			4.0%	
Missing reason		86			17.2%	
No Contact	276				**55.2%**	~339
Invalid number			50		10.0%	
Voicemail			35		7.0%	
Other no contact			15		3.0%	
Missing reason			176		35.2%	
Other	31				**6.2%**	~38
Appointment no show				30	6.0%	
Non-seafood consumer				1	0.2%	
Non-participation total	**500**				100%	**615**

**Estimates are based on data for KOD, LB and PL. Refusal vs. no contact data could not be resolved for OZ or OH.*

Factors that may affect participation

Participation varied with sex and age. For the total population sampled, eligible females participated at a higher rate (39.8%) than their male counterparts (31.1%) (Table 15).

Table 13: Gender of eligible respondents, total population

Subpopulation	Population % Male	% Eligible M Participating	Sample % Male	Population % F	% Eligible F Participating	Sample % Female
LB+OH	57.1%	52.0%	57.1%	42.9%	53.3%	42.9%
LB	*47.5%*	*42.1%*	*36.8%*	*52.5%*	*57.1%*	*63.2%*
OH	*60.0%*	*54.3%*	*63.1%*	*40.0%*	*51.9%*	*36.9%*
PL+OZ	52.0%	48.4%	44.8%	48.0%	63.1%	55.2%
PL	*51.3%*	*62.5%*	*48.1%*	*48.7%*	*71.1%*	*51.9%*
OZ	*52.6%*	*37.3%*	*40.9%*	*47.4%*	*56.5%*	*59.1%*
KOD	51.2%	18.9%	39.7%	48.8%	30.0%	60.3%
Total	**52.4%**	**31.1%**	**45.7%**	**47.6%**	**39.8%**	**54.3%**

The lowest participation was among 30-39 year olds (15.2%) and 40-49 year olds (15.5%) (Table 16). The highest participation was by 18-29 year olds (24.5%) and 50-59 year olds (23.3%), followed by 60+ year olds (21.2%). Port Lions did not have age data on tribal membership rolls. Age information for Port Lions was gathered from 52 respondents in interviews and estimated for 26 non-participants based on Census data.

Table 14: Age of eligible respondents, total population

Age Group	Eligible Respondents	% Population	Respondent Interviews	% Participation	Respondents Sample	% Sample
18-29	289	**30.4%**	82	**24.5%**	81	**24.8%**
30-39	164	**17.3%**	51	**15.2%**	44	**13.5%**
40-49	129	**13.6%**	52	**15.5%**	52	**16.0%**
50-59	164	**17.3%**	78	**23.3%**	77	**23.6%**
60+	204	**21.5%**	71	**21.2%**	71	**21.8%**
N			1	**0.3%**	1	**0.3%**
Total	950	100.0%	335	100.0%	326	100.0%

Demographic Characteristics

Diversity was high across the population sampled (Table 16). In addition to expected variations in gender and age distribution, other trends were noted. The majority of respondents lived in households within three or more people. Most had a high school diploma or a GED (73.6%), and many had an Associate's degree or higher (21.4%). There was relatively equal distribution among three annual household income categories: $16,000- $45,000 (30.3%), $46,000- $65,000 (20.5%), and $65,000 (32.7%).

Table 15: Gender and age of respondents, total sample population. Estimates are weighted.

Demographic	Characteristic	% or mean ± SD	Respondents
Gender	Male	50.9	153
	Female	49.1	173
		Total Respondents	*326*
Age	18-29 years	24.8	81
	30-39 years	14.5	44
	40-49 years	16.8	52
	50-59 years	23.0	77
	60+years	20.8	71
		Total Respondents	*325*

Table 16: Household size, education level, and income bracket of respondents, total sample population. Estimates are weighted.

Demographic	Characteristic	% or mean ± SD	Respondents
# in household	1	12.9	46
	2	31.3	101
	3-5	46.5	149
	5 or more	9.3	27
		Total Respondents	*323*
Highest level of education	Less than High	5.0	18
	High School GED	73.6	246
	Associates Degree+	21.4	56
		Total Respondents	*320*
Annual household income	<=15k	16.5	47
	16k-45k	30.3	80
	46k-65k	20.5	43
	65k+	32.7	65
		Total Respondents	*235*

Results- 24-hour Recall

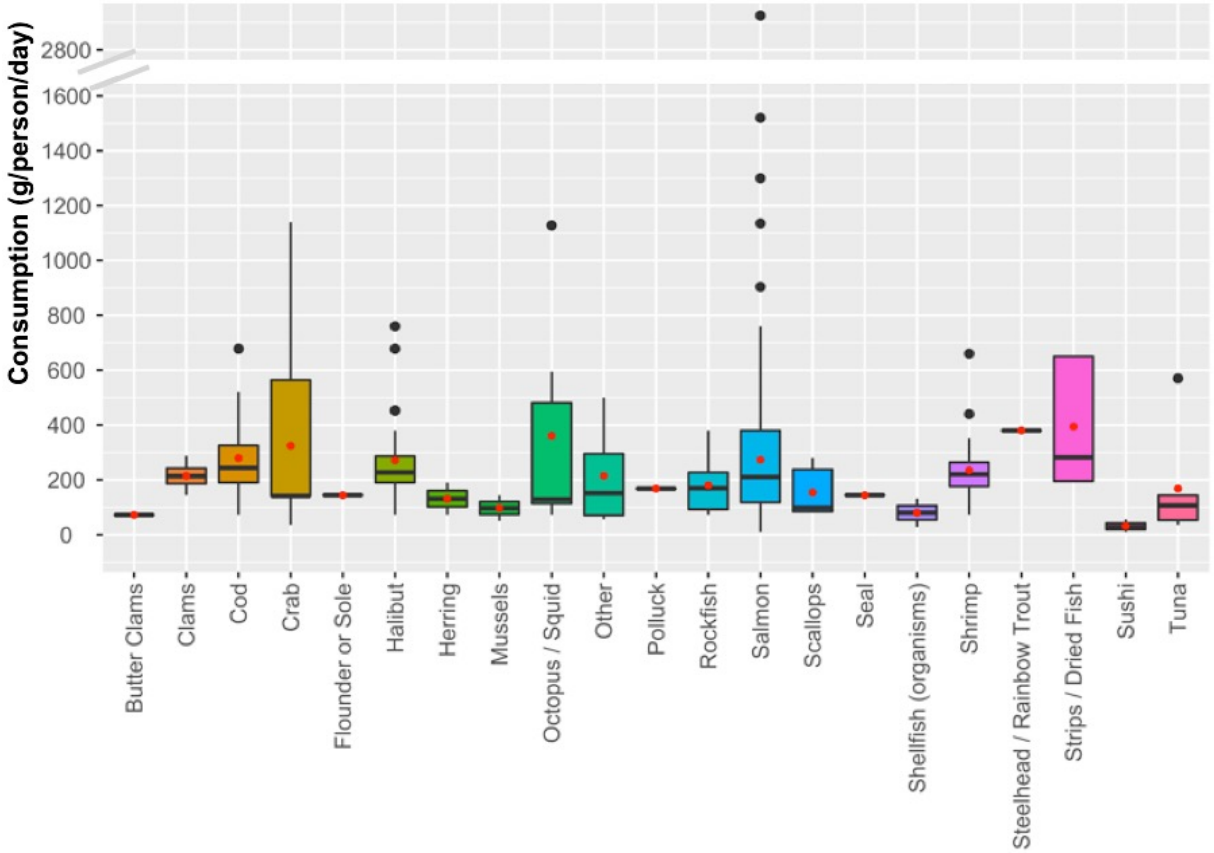
Surveys gathering 24HR, FFQ, and other data were conducted in each community between October and December 2015. The 24HR documented respondent consumption of a subset of commonly consumed seafood species on the most recent day seafood was consumed. The seasonal availability of wild, locally harvested seafoods was considered. The data presented here provide a "snapshot" of daily seafood consumption during winter months.

Seafood Consumption by Species, 24HR

Figure 3 shows the distribution and quantities of seafoods consumed by all respondents on the day reported. The results presented are consumption per person (g/d), for consumers of each species. Crab, octopus or squid, and dried fish were consumed in the largest quantities by weight during the 24HR period (Figure 3). Sushi, shellfish, and butter clams were consumed in the lowest quantities.

In box plots, the red dot within each box represents the mean (average). The central bar within each box represents the median. The boxes represent the "mid spread" or middle 50%, also known as the interquartile range (IQR). The boxes equal the difference between the 75th and 25th percentiles, or upper and lower quartiles (Q_3-Q_1). The whiskers above the Q_3 are the range of Q_3+1.5 x IQR. The whiskers below the Q_1 are the range of Q_1-1.5 x IQR. The points are outliers at least 1.5 times outside the distance of the interquartile range. Most distributions presented here are skewed to the right, with the means typically greater than the medians, being driven by a few high values.

Figure 3: Distribution of seafood consumption (g/d) by species for consumers, total sample population, 24HR



Seafood Consumption by Species Group, 24HR

Tables 18 through 21 show seafood consumption and estimated seafood consumption rates (g/d) for the total sample population and each sub-population based on 24HR data.

Overall, respondents consumed an average of 267.3g/d of seafood per person. When consumed, non-salmon anadromous and non-anadromous freshwater fishes (such as steelhead and trout), were consumed in the highest quantities (380.0g/d). Marine mammals (such as seal and sealion) and long-lived marine pelagic fish (such as sculpin and cod) were consumed in lower quantities, (144.0g/d and 149.9g/d respectively). The distribution of consumption rates is skewed to the right, with the mean in most categories being between 2.0 to 3.0 times more than the median for

all species groups. For marine mammals, the mean is nearly 4.0 times the median. For non-salmon freshwater fishes, the mean is 6.5 times the median.

For the KOD sub-population (n=172), respondents consumed and average of 260.0g/d of seafood (Table 19). Shellfish and other invertebrates were consumed in the largest quantities (414.7g/d). No respondents consumed marine mammals, non-salmon anadromous, or non-anadromous freshwater fish on the day reported.

For the LB+OH sub-population (n=85), respondents consumed an average of 304.3g/d of seafood (Table 20). At least 1 individual reported consuming seafood from each of the 8 species groups on the day reported. The "other" species group (including dried fish strips, sushi, and kelp), was consumed in the largest quantities, with 1 individual consuming 650.0 grams in the 24HR period. Salmon was consumed by 79% of respondents, with consumption averaging 348.2g/d.

For the PL+OZ sub-population (n=100), respondents consumed an average of 267.2g/d of seafood (Table 21). No respondents consumed marine mammals, non-salmon anadromous, or non-anadromous freshwater fish on the day reported. More than 1 respondent consumed seafood from the other 6 species groups. Near-bottom marine demersal fish were consumed in the highest quantities (427.8g/d). Seafoods in the other species category were consumed in the lowest quantities (79.9g/d).

Table 17: Mean and selected percentiles of seafood consumption rates (g/d), total sample population, 24HR. Estimates are weighted.

					Percentile (%)						
	Species Group	**n**	**mean**	**sd**	**min**	**25**	**median 50**	**75**	**90**	**95**	**max**
Total sample population	Near-bottom Marine Demersal	38	258.5	139.3	72.0	190.0	226.8	273.5	452.0	481.6	760.0
	Marine Mammals	1	144.0	--	144.0	144.0	144.0	144.0	144.0	144.0	144.0
	Mid-water Marine Pelagic	16	264.0	141.8	72.0	179.2	236.6	285.5	397.8	490.5	678.0
	Long-lived Marine Pelagic	13	149.9	145.2	36.0	58.3	72.0	154.6	304.4	397.3	570.0
	Non-Salmon: Anadromous & Non-Anadromous Freshwater	1	380.0	--	380.0	380.0	380.0	380.0	380.0	380.0	380.0
	Salmon	220	287.4	291.4	10.0	130.0	227.0	380.0	570.0	671.3	2925.0
	Shellfish & Invertebrates	57	369.9	356.5	28.0	144.0	247.0	288.0	882.6	1,153.1	1,355.0
	Other	11	284.7	223.1	10.0	81.3	203.1	359.3	596.2	650.0	650.0
	TOTAL or MEAN	357	**267.3**	216.2	94.0	163.4	**217.1**	283.1	**465.9**	546.0	932.8

Table 18: Mean and selected percentiles of seafood consumption rates (g/d), KOD sub-population, 24HR. Estimates are weighted.

					Percentile (%)						
Sub-population	**Species Group**	**n**	**mean**	**sd**	**min**	**25**	**median 50**	**75**	**90**	**95**	**max**
KOD	Near-bottom Marine Demersal	27	237.3	117.0	72.0	190.0	226.0	227.0	302.3	453.0	678.0
	Marine Mammals	--	--	--	--	--	--	--	--	--	--
	Mid-water Marine Pelagic	8	268.1	120.7	72.0	192.5	251.8	278.6	368.4	444.2	520.0
	Long-lived Marine Pelagic	7	109.4	113.4	36.0	44.7	71.6	85.4	166.2	273.1	380.0
	Non-Salmon: Anadromous & Non-Anadromous Freshwater	-	--	--	--	--	--	--	--	--	--
	Salmon	91	250.5	312.1	10.0	113.4	190.0	260.0	454.0	637.1	2925.0
	Shellfish & Invertebrates	31	414.7	392.8	70.0	152.0	262.9	316.8	1129.3	1,179.4	1,355.0
	Other	8	279.8	211.4	10.0	107.1	206.4	318.3	528.6	589.3	650.0
	TOTAL or MEAN	172	**260.0**	211.2	45.0	133.3	**201.4**	247.7	**491.5**	596.0	1,084.7

Table 19: Mean and selected percentiles of seafood consumption rates (g/d), LB+OH sub-population, 24HR. Estimates are weighted.

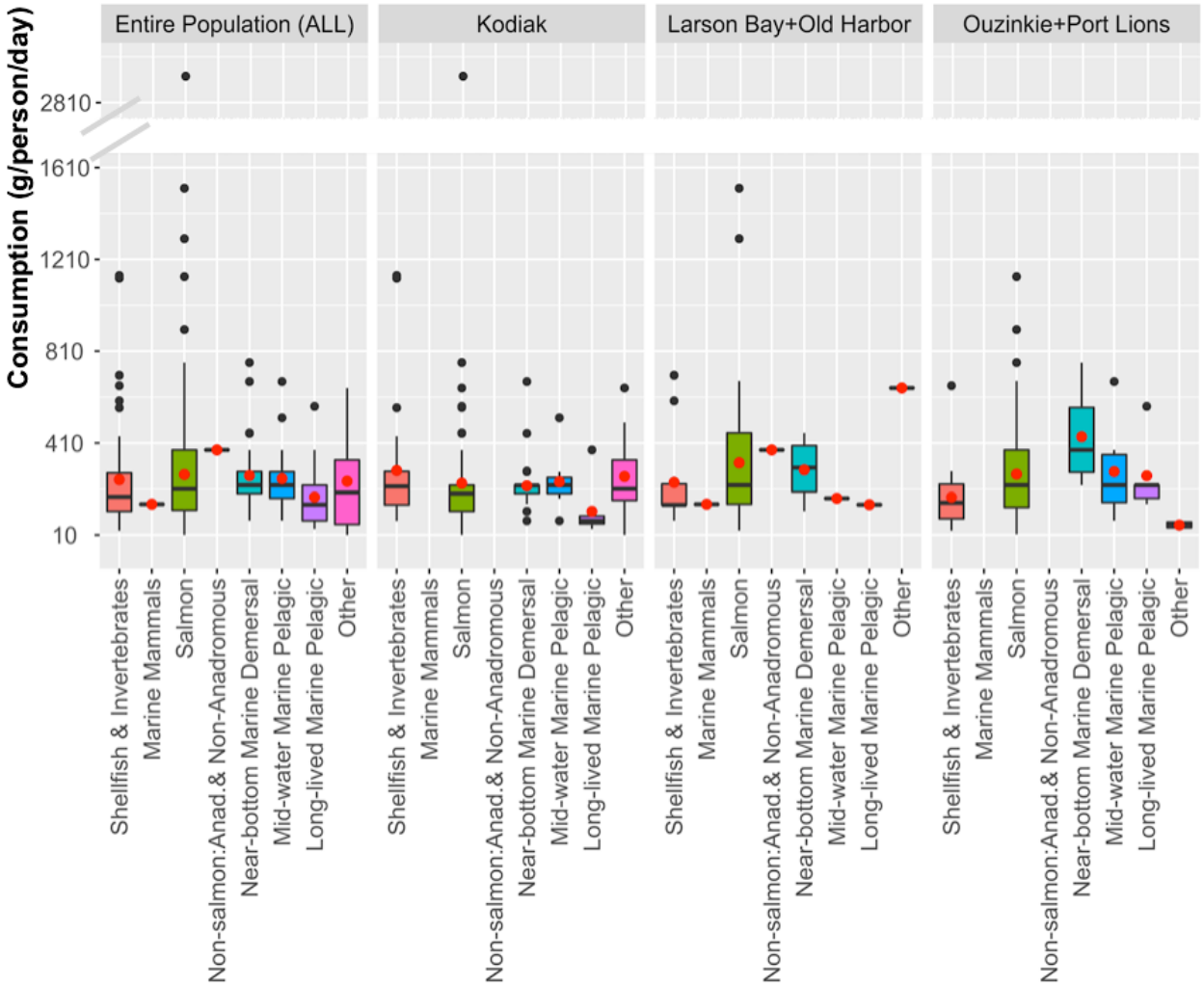
Sub-population	Species Group	n	mean	sd	Percentile (%) min	25	median 50	75	90	95	max
LB+OH	Near-bottom Marine Demersal	4	293.1	150.9	113.0	120.6	219.3	381.3	424.9	439.5	454.0
	Marine Mammals	1	144.0	--	144.0	144.0	144.0	144.0	144.0	144.0	144.0
	Mid-water Marine Pelagic	1	169.5	--	169.5	169.5	169.5	169.5	169.5	169.5	169.5
	Long-lived Marine Pelagic	1	142.0	--	142.0	142.0	142.0	142.0	142.0	142.0	142.0
	Non-Salmon: Anadromous & Non-Anadromous Freshwater	1	380.0	--	380.0	380.0	380.0	380.0	380.0	380.0	380.0
	Salmon	67	348.2	262.4	56.8	190.0	227.0	514.4	650.0	681.0	1520.0
	Shellfish & Invertebrates	9	307.4	234.3	72.0	141.0	178.9	417.2	622.5	663.8	705.0
	Other	1	650.0	--	650.0	650.0	650.0	650.0	650.0	650.0	650.0
	TOTAL or MEAN	85	**304.3**	215.9	215.9	242.1	**263.8**	349.8	**397.9**	408.7	520.6

Table 20: Mean and selected percentiles of seafood consumption rates (g/d) PL+OZ sub-population, 24HR. Estimates are weighted.

Subpopulation	Species Group	n	mean	sd	Percentile (%) min	25	median 50	75	90	95	max
PL+OZ	Near-bottom Marine Demersal	7	427.8	212.0	226.0	226.4	354.2	493.8	700.5	730.2	760.0
	Marine Mammals	--	--	--	--	--	--	--	--	--	--
	Mid-water Marine Pelagic	7	268.9	210.1	72.0	81.6	197.4	345.8	459.5	568.7	678.0
	Long-lived Marine Pelagic	5	283.6	186.5	144.0	148.8	202.4	227.0	430.8	500.4	570.0
	Non-Salmon: Anadromous & Non-Anadromous	--	--	--	--	--	--	--	--	--	--
	Salmon	62	335.7	236.9	13.0	144.0	288.0	434.3	646.9	760.0	1135.0
	Shellfish & Invertebrates	17	207.6	159.6	28.0	75.0	168.6	264.0	311.0	430.8	660.0
	Other	2	79.9	5.9	75.7	75.7	75.7	79.9	82.3	83.2	84.0
	TOTAL or MEAN	100	**267.2**	168.5	93.1	125.3	**214.4**	307.5	**438.5**	512.2	647.8

Figure 4 shows the distribution and quantities of seafoods consumed by species group on the day reported, for the total population and each sub-population. The results presented are the unweighted consumption (g/d) per person, for consumers of species in each group. When consumed, salmon and non-salmon anadromous and non-anadromous freshwater fishes (such as steelhead and trout), were consumed in the highest quantities (287.4g/d and 380.0g/d, respectively). Marine mammals (such as seal and sea lion) and long-lived marine pelagic fish (such as sculpin and cod) were consumed in lower quantities, (144.0g/d and 149.9g/d).

Figure 4: Distribution of seafood consumption (g/d) by species group for consumers, total sample population and sub-populations, 24HR. Unweighted estimates.



Salmon Consumption versus All Other Seafood Species, 24HR

Salmon are traditional food sources that have sustained Alutiiq peoples for thousands of years (Steffian et al. 2016a, Steffian et al. 2016b, Steffian et al. 2015). They are also an important cultural and economic component of Archipelago communities. Salmon are harvested seasonally but consumed year-round. They are preserved in a variety of ways including smoking, canning, freezing, and pickling (Williams et al. 2010).

To understand how salmon consumption compared with consumption of other seafood species on a winter day, all seafood was categorized as either salmon or non-salmon (Tables 22 through 25). The salmon category included all 5 species of Pacific salmon, and the non-salmon category included all seafood species other than salmon.

In the total sample population, more respondents consumed salmon than consumed other non-salmon seafood species (Table 22). However, salmon consumers did not consume higher quantities of salmon in terms of g/d than other non-salmon species. Overall, respondents consuming salmon consumed an average of 287.4g/d, and an average 351.8 3g/d of non-salmon seafood per person.

In the KOD sub-population, 91 individuals (52.9%) had consumed salmon on the day reported. 67 individuals (39.0%) had consumed other non-salmon seafood species (Table 23). Kodiak respondents consuming salmon consumed an average of 250.5g/d, and an average 366.6 g/d of non-salmon seafood per person.

In LB+OH and PL+OZ sub-populations, more respondents consumed salmon than consumed other non-salmon seafood species, and they consumed higher quantities of salmon. In LB+OH, 67 individuals (78.8%) had consumed an average of 348.2g/d of salmon per person in the 24HR period (Table 24). In PL+OZ, 62 individuals (62.0%) consumed and average of 335.7g/d of salmon per person (Table 25).

Table 21: Mean and selected percentiles of salmon and non-salmon species consumption rates (g/d) for salmon consumers, total sample population, 24HR. Estimates are weighted.

				Percentile (%)						
						median				
Total sample population	**Species Category**	**n**	**mean**	**min**	**25**	**50**	**75**	**90**	**95**	**max**
	Non-Salmon	118	351.8	28.0	160.8	227.0	446.0	822.1	986.9	1650.0
	Salmon	220	287.4	10.0	130.0	227.0	380.0	570.0	671.3	2925.0

Table 22: Mean and selected percentiles of salmon and non-salmon species consumption (g/d) for salmon consumers, KOD sub-population, 24HR. Estimates are weighted.

				Percentile %						
						median				
Sub-population	**Species Category**	**n**	**mean**	**min**	**25**	**50**	**75**	**90**	**95**	**max**
KOD	Non-Salmon	67	366.6	36.0	190.0	242.2	446.1	850.7	1112.0	1,650.0
	Salmon	91	250.5	10.0	113.4	190.0	260.0	454.0	637.1	2,925.0

Table 23: Mean and selected percentiles of salmon and non-salmon species consumption (g/d) for salmon consumers, LB+OH sub-population, 24HR. Estimates are weighted.

				Percentile %						
						median				
Sub-population	**Species Category**	**n**	**mean**	**min**	**25**	**50**	**75**	**90**	**95**	**max**
LB+OH	Non-Salmon	17	326.0	72.0	141.5	193.1	415.1	624.7	730.8	931.0
	Salmon	67	348.2	56.8	190.0	227.0	514.4	650.0	681.0	1,520.0

Table 24: Mean and selected percentiles of salmon and non-salmon species consumption (g/d) for salmon consumers, PL+OZ sub-population, 24HR. Estimates are weighted.

				Percentile %						
						median				
Sub-population	**Species Category**	**n**	**mean**	**min**	**25**	**50**	**75**	**90**	**95**	**max**
PL+OZ	Non-Salmon	34	296.4	28.0	139.7	227.0	365.0	556.8	685.1	1,356.0
	Salmon	62	335.7	13.0	144.0	288.0	434.3	646.9	760.0	1,135.0

Seafood Consumption by Demographic Characteristics, 24HR

The types and quantities of seafoods consumed varied with gender, age group, household size, education level, and income bracket. Seafood consumption for the total sample population, as reported for the 24HR period, based on demographic is presented in Table 26.

Males and females had similar overall seafood consumption rates. For the total sample population, male respondents consumed an average of 395.7g/d of seafood per person, and female respondents consumed an average of 321.1g/d per person. 40-49 year old respondents consumed the highest quantities of seafoods (512.3g/d). 18-29, 30-39, 50-59, and 60+ year olds had similar seafood consumption rates, averaging between 301.1g/d and 352.7g/d.

Seafood consumption varied little with household size. Average seafood consumption ranged from 341.1g/d per person in a household of 6+ to 374.5g/d in a household of 3 to 5. There was an inverse relationship between seafood consumption and education level. Respondents with less than a high school education consumed the highest quantities of seafoods (406.0g/d) per person. Individuals with a high school diploma or GED consumed an average of 376.1g/d of seafood, and those with an Associate's degree or higher consumed 286.3g/d.

Table 25: Mean and selected percentiles of seafood consumption rates (g/d) by demographic grouping, total sample population, 24HR. Estimates are weighted.

					Percentile (%)					
Demographic	**Characteristic**	**n**	**mean**	**SD**	**25**	**median 50**	**75**	**90**	**95**	**max**
Gender n= 296	Male	138	395.7	331.5	190.0	259.7	564.2	814.2	991.1	1,650.0
	Female	158	321.1	354.1	144.0	227.0	380.0	582.4	736.4	3,207.0
Age n= 295	18-29 years	72	301.1	216.2	142.1	227.0	421.1	650.0	681.0	931.0
	30-39 years	43	352.7	284.2	144.0	271.1	446.0	543.8	993.5	1,356.0
	40-49 years	49	512.3	613.4	180.5	227.0	591.6	1,489.4	1,598.9	3,207.0
	50-59 years	68	331.9	199.8	190.0	258.4	453.0	631.9	760.0	797.0
	60+years	63	336.6	295.1	136.7	227.0	409.8	688.8	999.2	1,241.5
# in Household	1	38	355.9	327.4	147.0	227.0	441.8	686.5	937.4	1,469.5
	2	93	343.2	252.7	169.5	240.6	473.7	650.0	829.4	1,520.0
	3-5	138	374.5	419.7	144.0	227.0	446.0	760.0	1,138.4	3,207.0
	6 or more	25	341.4	209.7	227.0	263.0	422.7	645.6	714.8	950.0
Highest Level of Education	Less than High	17	406.0	351.2	155.8	212.1	572.7	692.4	967.0	1,241.5
	High School/GED	225	376.1	371.2	190.0	245.0	484.7	760.0	905.8	3,207.0
	Associates Degree+	50	286.3	214.6	130.0	227.0	380.7	565.1	665.0	1,140.0
Annual Household Income	<15k	42	295.3	178.7	190.0	227.0	380.0	520.0	644.6	887.0
	16-45k	73	434.2	358.9	190.0	305.4	612.8	817.5	1,178.7	1,582.0
	46-65k	38	286.9	221.1	144.0	227.0	340.1	617.8	651.8	1,135.0
	65k+	61	366.4	312.9	190.0	260.0	481.2	636.8	865.6	1,650.0

Seafood Consumption by Meal Preparation Method, 24HR

Many factors influence what types and quantities of seafood are available and consumed, on a given day and over the course of a year. The amount of seafood consumed varies depending on how its prepared. Alutiiq people of the Kodiak Archipelago commonly consume seafood: baked, canned, pickled, deep fried, dried, smoked, grilled, pan fried, poached, boiled, raw, or in a soup or stew (Figure 5). Preparation methods may also vary seasonally. When seafood is available for harvest, it is more likely to be consumed fresh.

In the 24HR, respondents were asked about how seafoods consumed at each meal were prepared (Table 27). For the total sample population, respondents consumed seafood that was baked more often than seafood prepared by any other method. Individuals eating baked seafood (n=69) consumed an average of 261.1g of baked seafood per person per meal. When respondents consumed seafood that was poached or boiled, it was consumed in higher quantities. Individuals eating boiled seafood (n=19) consumed an average of 458.2g of boiled seafood.

Salmon was consumed most frequently and in the greatest quantities. The most common preparation method for salmon was smoked or dried (n=54). Baked, canned or pickled, and pan fried were other common meal preparations. Poached or boiled salmon was consumed in the greatest quantities. Individuals eating poached or boiled salmon consumed an average of 351.0g. Only 1 respondent reported consuming marine mammals in the 24HR period. The individual consumed 144.0g of marine mammal in a soup or stew.

For the other seafood category (all species except salmon and marine mammals), meals were prepared in many ways. The most common preparation for other species was deep fried (n=32), with individuals consuming an average of 345.5g per meal per person. When other species were poached or boiled (n=14), they were consumed in the greatest quantities. Individuals consuming other species poached or boiled consumed an average of 488.1g.

Figure 5: Mean seafood consumption (g) per meal by preparation method and seafood category, total sample population, 24HR. The bar is the mean ± SE.

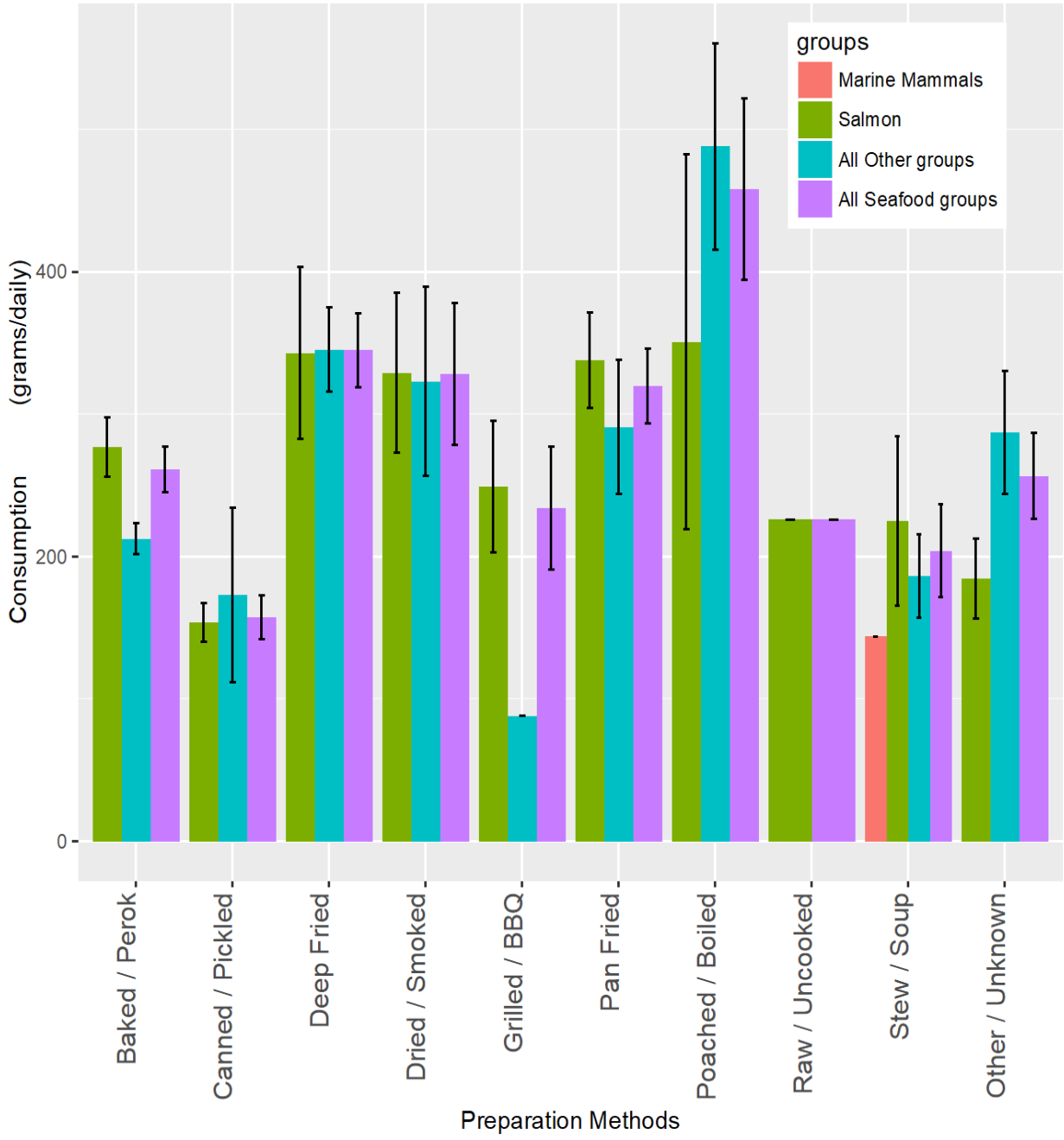


Table 26: Mean and selected percentiles of seafood consumption rates (g/d) by seafood category and preparation method, total sample population, 24HR. Estimates are weighted.

					Percentile (%)					
						median				
Seafood Category	**Preparation Method**	**n**	**mean**	**SD**	**25**	**50**	**75**	**90**	**95**	**max**
Marine mammals	Baked / Perok	--	--	--	--	--	--	--	--	--
	Canned / Pickled	--	--	--	--	--	--	--	--	--
	Deep Fried	--	--	--	--	--	--	--	--	--
	Dried / Smoked	--	--	--	--	--	--	--	--	--
	Grilled / BBQ	--	--	--	--	--	--	--	--	--
	Other / Unknown	--	--	--	--	--	--	--	--	--
	Pan Fried	--	--	--	--	--	--	--	--	--
	Poached / Boiled	--	--	--	--	--	--	--	--	--
	Raw / Uncooked	--	--	--	--	--	--	--	--	--
	Stew / Soup	1	144.0	N/A	144.0	144.0	144.0	144.0	144.0	144.0
Salmon	Baked / Perok	53	277.1	180.0	144.0	227.0	380.0	570.0	580.6	760.0
	Canned / Pickled	43	153.7	100.9	60.4	135.1	227.0	227.0	227.0	454.0
	Deep Fried	6	343.1	178.4	176.8	335.3	429.6	490.4	530.2	570.0
	Dried / Smoked	54	329.2	462.9	130.0	212.4	314.9	650.0	685.7	2,925.0
	Grilled / BBQ	7	249.3	129.2	190.0	190.0	210.1	316.8	443.4	570.0
	Other / Unknown	13	184.4	128.1	65.1	148.9	230.5	380.0	385.0	417.0
	Pan Fried	42	338.0	229.8	190.0	227.0	380.0	568.4	681.0	1,520.0
	Poached / Boiled	4	351.0	294.8	113.5	180.3	450.2	636.3	698.2	760.0
	Raw / Uncooked	1	226.0	N/A	226.0	226.0	226.0	226.0	226.0	226.0
	Stew / Soup	12	224.9	277.0	99.9	144.0	194.7	288.0	552.7	1,135.0
All seafood except salmon and marine mammals	Baked / Perok	16	212.3	51.9	190.0	226.4	227.0	227.0	253.6	380.0
	Canned / Pickled	9	173.2	203.3	45.8	70.6	144.8	412.2	502.5	594.0
	Deep Fried	32	345.5	220.1	190.0	227.0	452.0	550.2	646.0	1,356.0
	Dried / Smoked	7	323.1	190.4	195.0	235.8	260.0	602.0	650.0	650.0
	Grilled / BBQ	1	88.0	NA	88.0	88.0	88.0	88.0	88.0	88.0
	Other / Unknown	25	287.2	247.5	134.4	223.3	288.0	582.7	704.6	1,140.0
	Pan Fried	21	291.0	274.0	108.3	227.0	281.6	463.2	692.0	1,128.0
	Poached / Boiled	14	488.1	326.0	203.3	434.8	640.0	853.9	983.4	1,128.0
	Raw / Uncooked	--	--	--	--	--	--	--	--	--
	Stew / Soup	9	186.4	106.0	72.0	144.0	288.0	288.0	288.0	288.0

(Continued on page 57)

(Continued from page 56)

Seafood Category	Preparation Method	n	mean	SD	Percentile (%) 25	median 50	75	90	95	max
All Seafood Categories	Baked / Perok	69	261.1	160.4	144.0	227.0	380.0	454.0	570.0	760.0
	Canned / Pickled	52	157.3	123.2	56.8	113.5	227.0	227.0	454.0	594.0
	Deep Fried	38	345.2	212.3	190.0	241.0	452.0	570.0	623.2	1,356.0
	Dried / Smoked	61	328.3	431.8	130.0	227.0	287.4	650.0	650.0	2,925.0
	Grilled / BBQ	8	234.3	131.7	190.0	190.0	196.1	290.7	430.3	570.0
	Other / Unknown	38	256.8	222.2	113.0	205.4	288.0	418.5	653.3	1,140.0
	Pan Fried	63	319.8	246.5	190.0	227.0	380.0	565.0	691.2	1,520.0
	Poached / Boiled	18	458.2	316.5	170.6	417.4	639.3	830.4	943.2	1,128.0
	Raw / Uncooked	1	226.0	N/A	226.0	226.0	226.0	226.0	226.0	226.0
	Stew / Soup	22	204.1	204.1	72.0	144.0	288.0	288.0	288.0	1,135.0

Seafood Consumption at Specific Meals, 24HR

The consumption of different categories of seafood varied from meal to meal (Figure 6, Table 28). The highest quantities of all seafood were consumed at the dinner meal, and the lowest quantities of all seafood were consumed at breakfast. 151 respondents reported eating at least 1 type of seafood at dinner on the day reported, consuming an average of 309.3g per person per meal (Table 28).

Salmon was consumed most often during the each of the meals (breakfast, lunch, and dinner) and was also an important snack food. 86 respondents had salmon at dinner, consuming an average of 254.9g of salmon per person per meal. 36 respondents had salmon at lunch, consuming an average of 274.1g of salmon. 24 respondents having had salmon as a snack, consuming an average of 192.5g/d.

Consumption of other seafood (all species except salmon and marine mammals) was also important at dinner. 65 respondents had other seafood at dinner, consuming an average of 374.1g/d of other seafood per person per meal.

Figure 6: Mean seafood consumption (g/d) per meal by seafood category, total sample population, 24-hour recall. Estimates are weighted.

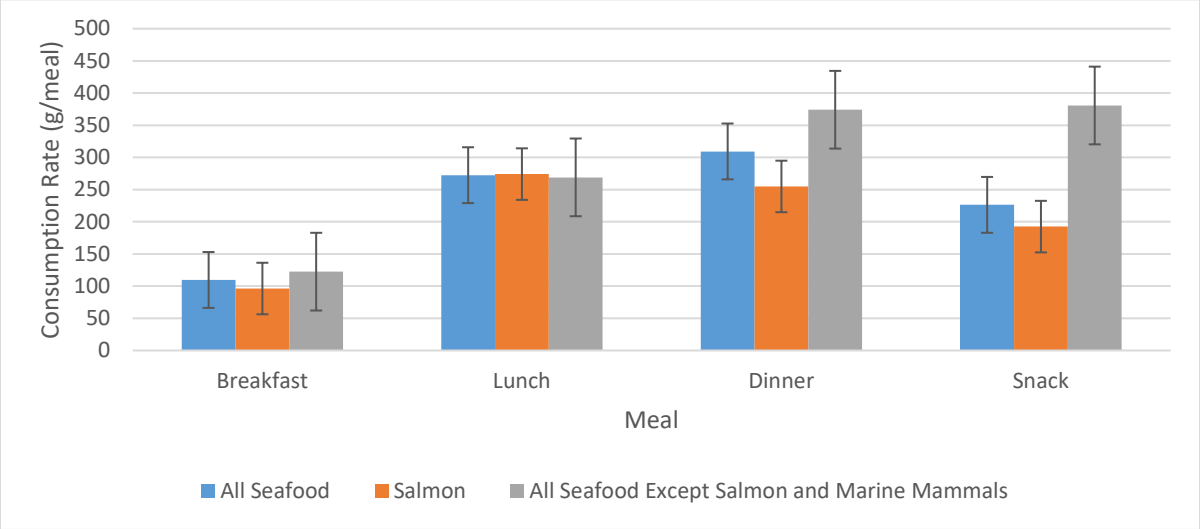


Table 27: Mean and selected percentiles of seafood consumption rates (g/d) per meal by seafood category, total sample population, 24HR. Estimates are weighted.

					Percentile (%)					
						median				
Category	**Meal**	**n**	**mean**	**SD**	**25**	**50**	**75**	**90**	**95**	**max**
Salmon	Breakfast	2	96.3	40.5	72.0	72.0	95.4	116.2	123.1	130.0
	Lunch	36	274.1	505.3	98.6	151.3	227.0	389.2	520.0	2,925.0
	Dinner	86	254.9	161.4	122.6	227.0	380.0	454.0	570.0	760.0
	Snack	24	192.5	162.9	57.1	176.1	231.5	260.0	503.3	760.0
All Seafood except Salmon	Breakfast	2	122.5	86.8	70.5	70.5	120.4	165.2	180.1	195.0
	Lunch	17	269.0	246.8	143.2	227.0	266.2	374.1	550.9	1,140.0
	Dinner	65	374.1	345.2	190.0	227.0	427.4	854.3	1,128.0	1,650.0
	Snack	5	380.7	205.2	178.9	262.9	453.6	575.5	612.8	650.0
All Seafood	Breakfast	4	109.6	57.7	70.5	71.6	119.5	164.4	179.7	195.0
	Lunch	53	272.4	432.2	113.0	205.3	244.9	432.4	520.0	2,925.0
	Dinner	151	309.3	267.5	144.0	227.0	380.0	570.0	846.6	1,650.0
	Snack	29	226.3	182.4	110.7	194.0	260.0	437.1	651.6	760.0

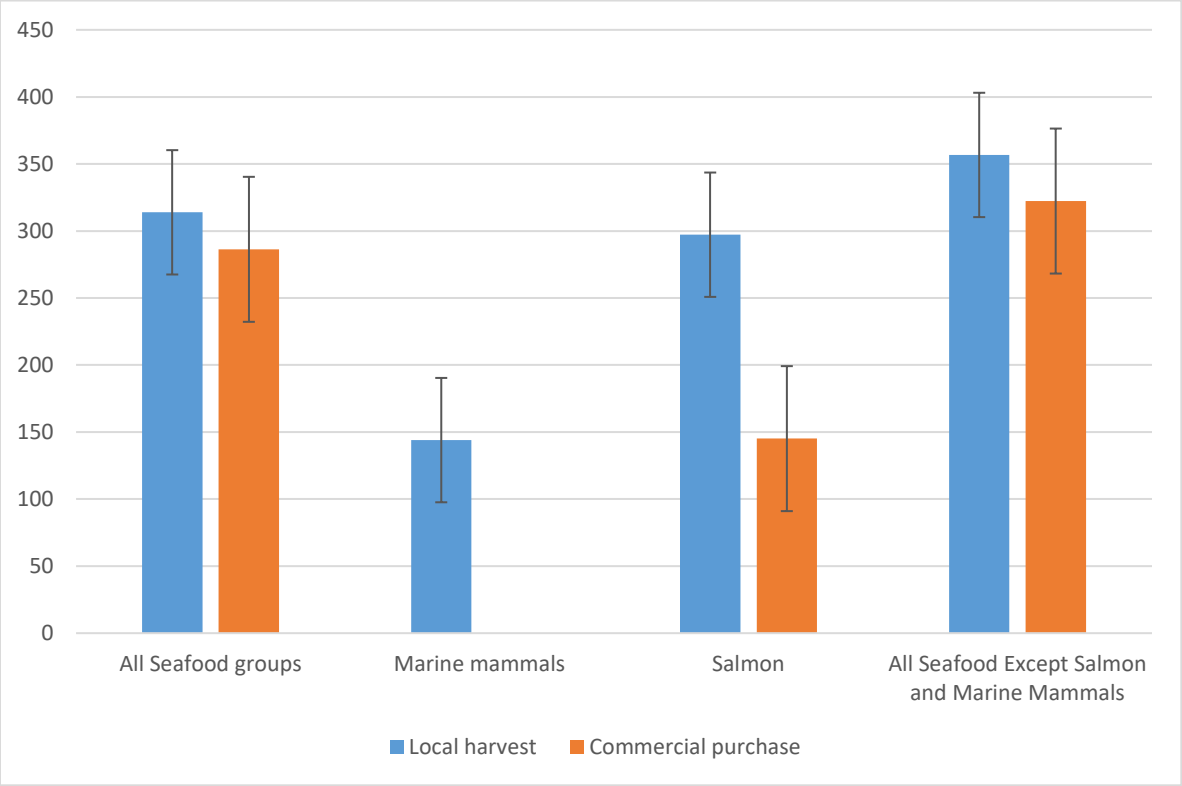
Origin of Seafood: Locally Harvested vs. Commercially Purchased, 24HR

Respondents consumed more seafood harvested locally than seafood purchased commercially (Table 29, Figure 7). Harvested locally means the respondent or someone they knew harvested the resource directly from the land, river, or sea. Commercial purchase means the seafood was purchased in a store, at a restaurant, or directly from a commercial fishing vessel. Seafood from the other seafood category (including all species except salmon and marine mammals) was most often harvested locally, and consumed at an average rate of 356.7g/d per person. No values are given for "commercial purchase" of marine mammals because they cannot be sold commercially.

Table 28: Mean and selected percentiles of seafood consumption rates (g/d) by seafood category and source, total sample population, 24HR. Estimates are weighted.

					Percentile (%)					
Category	**Source**	**n**	**mean**	**SD**	**25**	**median 50**	**75**	**90**	**95**	**max**
Marine mammals	Local harvest	1	144.0	NA	144.0	144.0	144.0	144.0	144.0	144.0
	Commercial purchase	--	--	--	--	--	--	--	--	--
Salmon	Local harvest	207	297.2	298.9	130.0	227.0	380.0	570.0	681.0	2,925.0
	Commercial purchase	10	145.1	75.8	63.9	141.2	190.0	227.0	227.0	227.0
All Seafood Except Salmon and Marine Mammals	Local harvest	74	356.7	329.9	175.3	227.0	441.9	848.3	915.7	1,650.0
	Commercial purchase	44	322.3	316.6	144.0	264.0	310.0	505.7	862.6	1,582.0
All Seafood groups	Local harvest	282	313.9	308.4	144.0	227.0	380.0	650.0	812.7	2,925.0
	Commercial purchase	54	286.3	292.9	144.0	227.0	284.4	451.3	575.9	1,582.0

Figure 7: Mean seafood consumption (g/d) by source and seafood category, total sample population, 24-hour recall. Estimates are weighted.



Results – Food Frequency Questionnaire

Surveys gathering 24HR, FFQ, and other data were conducted in each community between October and December 2015. The FFQ attempted to document respondent consumption of all commonly consumed seafood species over the course of the past year. The seasonal availability of wild, locally harvested seafoods was considered. For each species consumed, if consumption varied seasonally, the length of time respondents considered "in season" was recorded, and preparation and portion size data were collected for in season and out of season consumption. The data presented here represent average daily seafood consumption throughout the year.

Seafood Consumption by Species, FFQ

Figures 8 and 9 show the distribution and quantities of seafoods consumed by all respondents in the past year. The results presented are consumption (g/d) per person, for consumers of each species. Salmon and dried fish were consumed in the highest quantities by weight over the course of the year (Figure 8). Whale and eulachon (candlefish or hooligan) were consumed in the lowest quantities.

As seen in Figure 8, some individuals consumed very high quantities of some species (e.g, halibut and salmon). The scale required to display the outliers makes it difficult to read the box plot. Figure 9 presents the same data transformed into a Log 10(x) scale to illustrate the range of the distribution of data.

Using a common logarithm Base 10, if the weight consumed was 10g, after log transformation it would equal the value of "1" (e.g., log1010 = 1). If the weight consumed was 100g, the log10 value would be "2." The inverse log (or antilog) would be used to find the seafood weight consumed before conversion to Log10 scale (e.g., AntiLog("2") = 102 = 100g).

Figure 8: Distribution of seafood consumption (g/d) by species for consumers, total sample population, FFQ

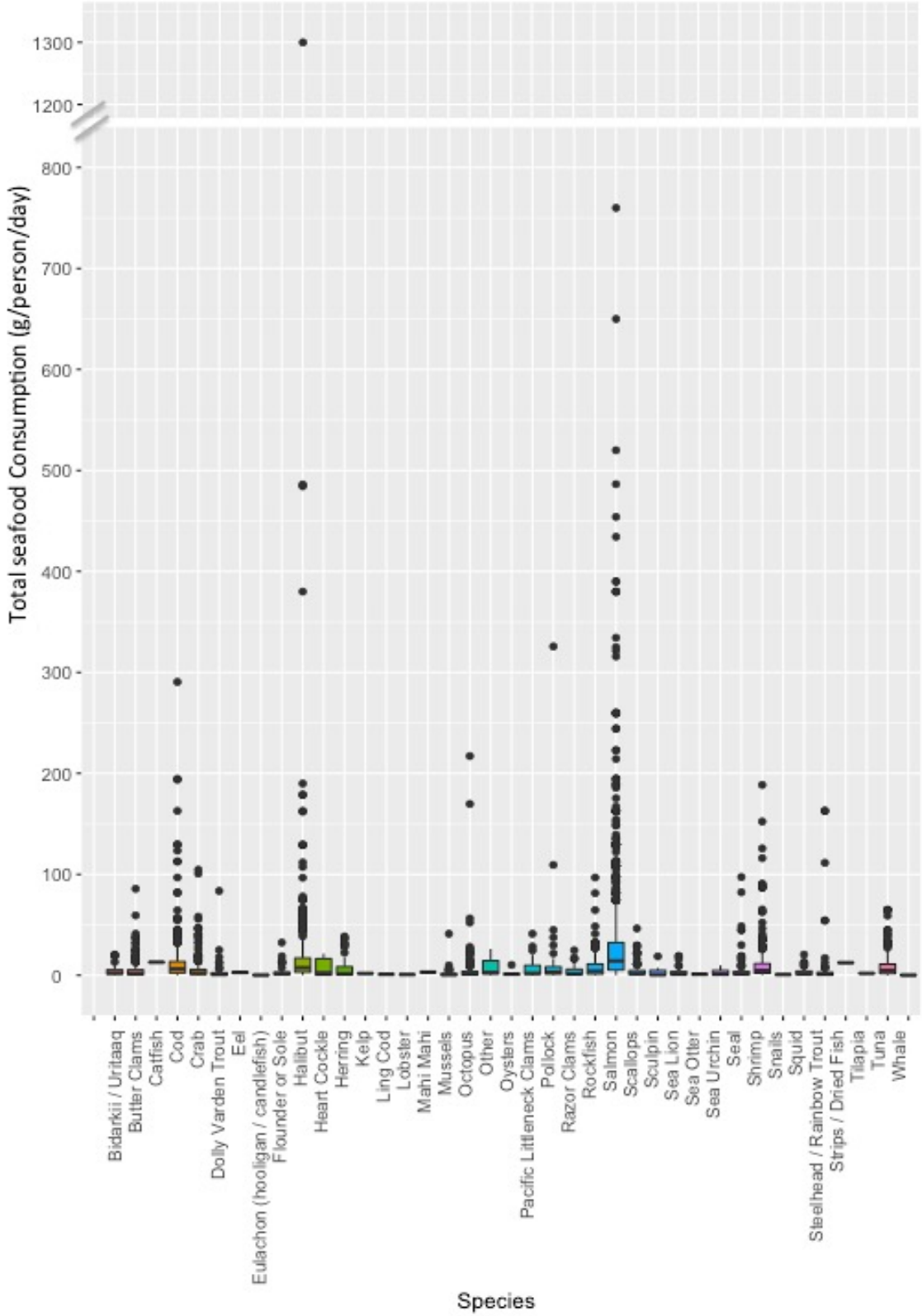
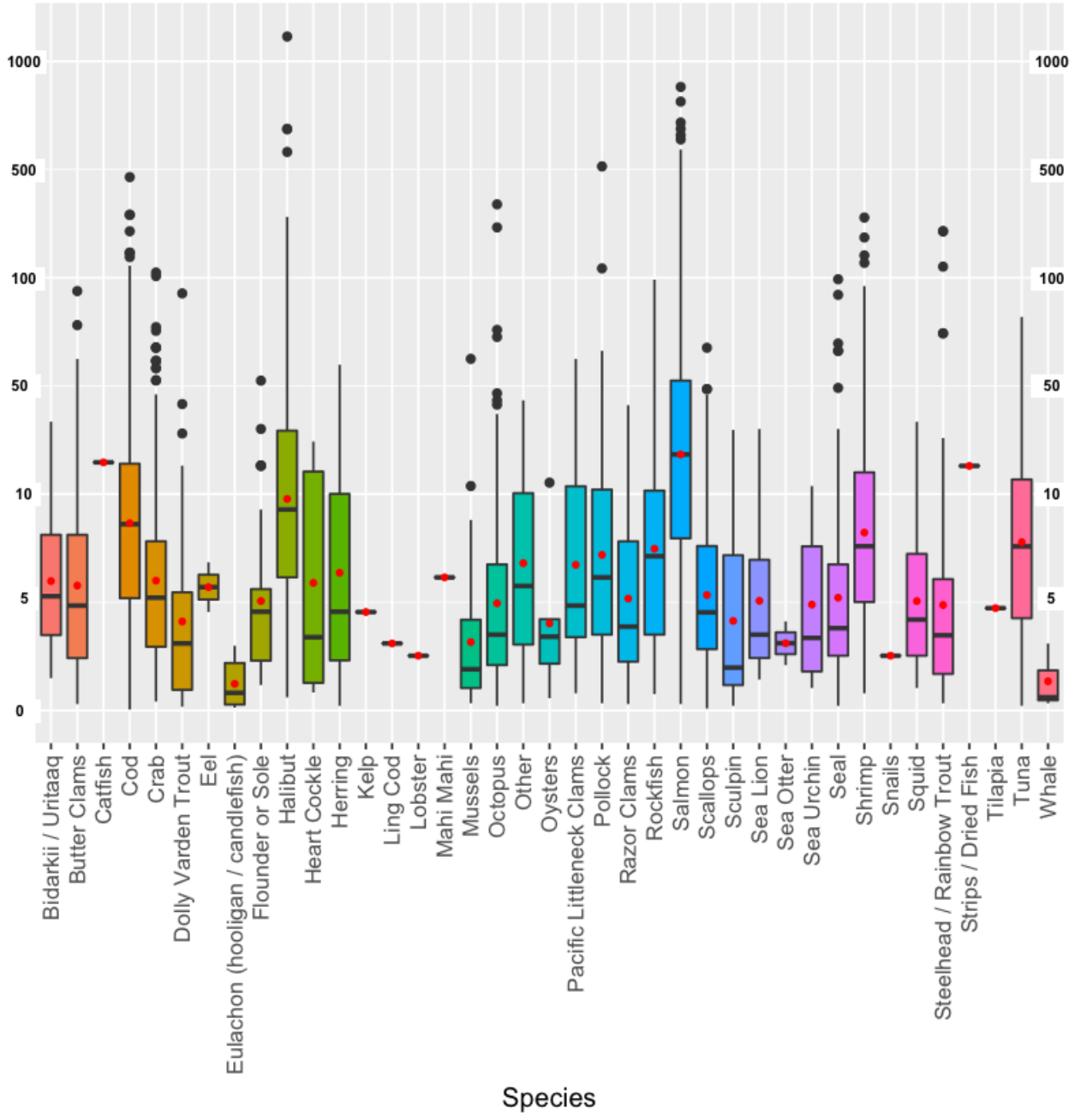


Figure 9: Distribution of seafood consumption (g/d) by species for consumers, total sample population, FFQ [Log10(x)].



Seafood Consumption and Portion Size, FFQ

Overall, the total sample population consumed at least 39 species of seafood in a range of daily portion sizes over the course of the previous year (Table 30). Salmon was consumed in the greatest quantities for all sub-populations. The average daily portion size for salmon consumers was 32.75g per person per day (Figure 8 and Table 30). This portion size was consistent across sub-populations.

For the KOD sub-population, pollock was consumed in the second largest quantities (19.95g) per person per day, and eulachon was consumed in the smallest quantities (0.26g). For the PL+OZ sub-population, halibut was consumed in the second highest quantities (15.87g), and heart cockle was consumed in the lowest (0.34g). For the LB+OH sub-population, the daily portion size of halibut was nearly twice that of the daily portion size of halibut in KOD or PL+OZ. For LB+OH, steelhead and rainbow trout were consumed in the second largest quantities (28.63g) per person per day, and whale was consumed in the least (0.12g).

Table 29: Mean seafood daily portion (g), total sample population and sub-populations, FFQ. Unweighted estimates.

Species	Total Sample Population	KOD	PL+OZ	LB+OH
Bidarkii / Uritaaq	3.66	3.86	3.12	5.01
Butter Clams	5.68	4.26	2.27	8.79
Catfish	13.01	13.01	--	--
Cod	13.41	14.83	9.54	15.38
Crab	6.20	4.21	5.87	10.36
Dolly Varden	4.09	6.01	1.50	3.63
Eel	2.85	2.85	--	--
Eulachon	0.37	0.26	0.70	--
Flounder or Sole	4.01	5.17	1.06	3.15
Halibut	18.78	14.20	15.87	29.57
Heart Cockle	7.48	8.59	0.34	10.76
Herring	7.34	7.87	9.51	3.39
Kelp	1.85	1.85	--	--
Ling Cod	1.04	--	--	1.04
Lobster	0.79	0.79	--	--
Mahi	3.12	--	3.12	--
Mussels	2.08	1.39	1.44	6.06

Octopus	6.69	3.09	2.60	14.72
Other	9.65	--	--	9.65
Oysters	2.52	1.06	0.59	10.29
Pacific Littleneck Clams	7.31	6.82	10.37	6.74
Pollock	11.93	19.95	3.75	3.57
Razor Clams	4.14	3.17	3.16	7.25
Rockfish	9.26	8.09	9.74	11.46
Salmon	32.75	29.40	29.96	41.65
Scallops	3.97	4.16	3.36	4.59
Sculpin	3.56	0.59	4.87	0.31
Sea Lion	3.64	1.09	0.79	4.94
Sea Otter	1.10	1.10	--	--
Sea Urchin	3.26	3.49	2.31	4.96
Seal	5.36	4.89	1.62	7.33
Shrimp	11.30	13.00	11.10	6.02
Snails	0.79	--	0.79	--
Squid	2.87	3.23	2.47	2.76
Steelhead / Rainbow Trout	9.56	2.33	6.18	28.63
Strips / Dried Fish	12.49	--	12.49	--
Tilapia	1.97	1.97	--	--
Tuna	9.39	8.75	9.69	10.59
Whale	0.42	1.04	--	0.12

Seafood Consumption by Species Group, FFQ

Figure 10 shows the distribution and quantities of seafoods consumed by species group over the course of the previous year, for the total population and each sub-population. The results presented are the unweighted consumption (g/d) per person, for consumers of species in each group. When consumed, salmon and near-bottom marine demersal fishes (such as halibut and flounder), were consumed in the highest quantities. Marine mammals (such as seal and sealion) and non-salmon anadromous and non-anadromous freshwater fishes (such as steelhead and trout) were consumed in the lowest quantities.

As seen in Figure 10, some individuals consumed very high quantities of some species (e.g, salmon and halibut). Researchers did not consider these data points unreliable. Rather, some individuals just consume much more of particular species than others. Figure 11 presents the same data transformed into a Log 10(x) scale.

Figure 10: Distribution of seafood consumption (g/d) by species group for consumers, total sample population and sub-populations, FFQ. Unweighted estimates.

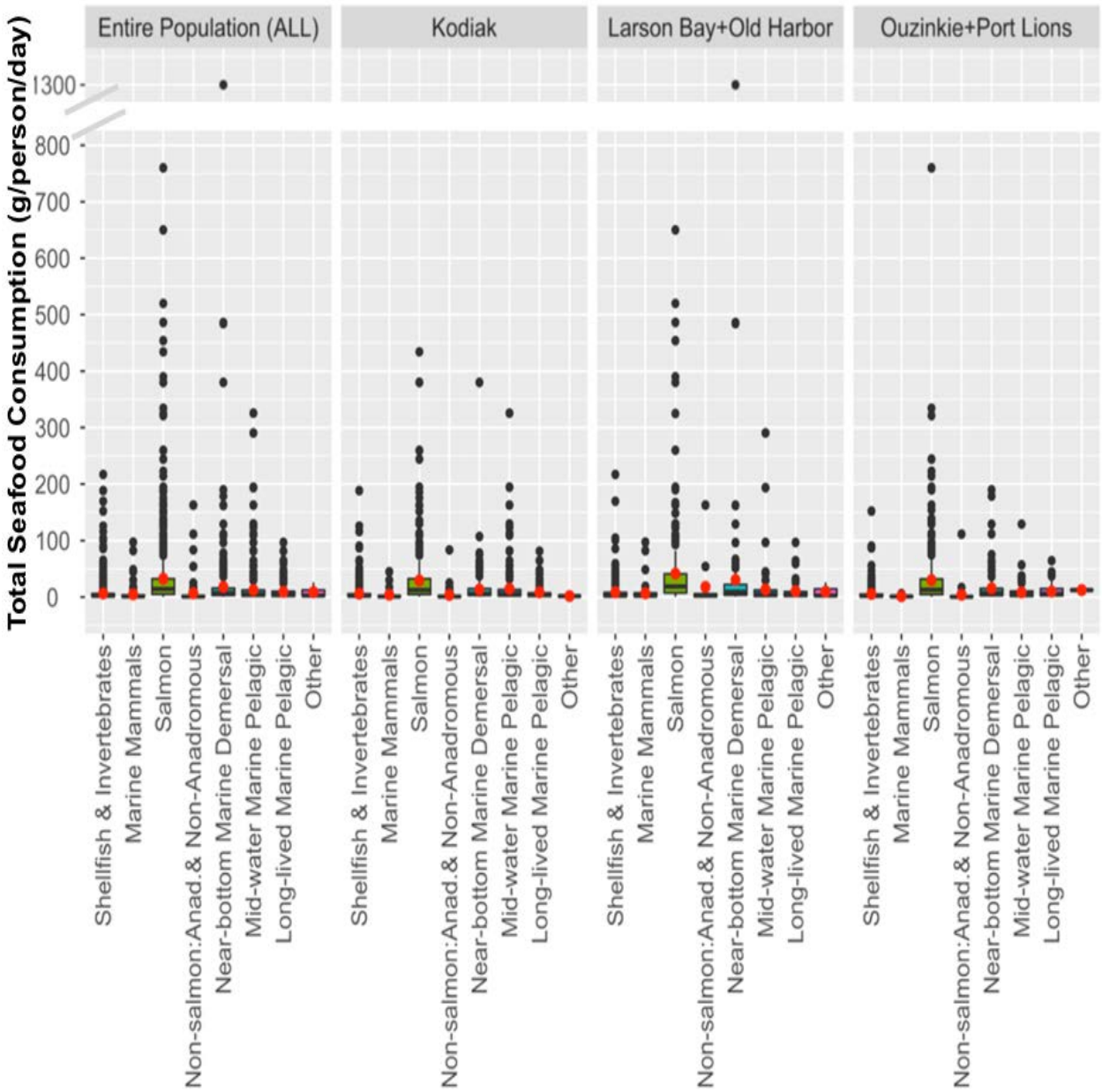


Figure 11: Distribution of seafood consumption (g/d) by species group for consumers, total sample population and sub-populations, FFQ, [Log10(x)].

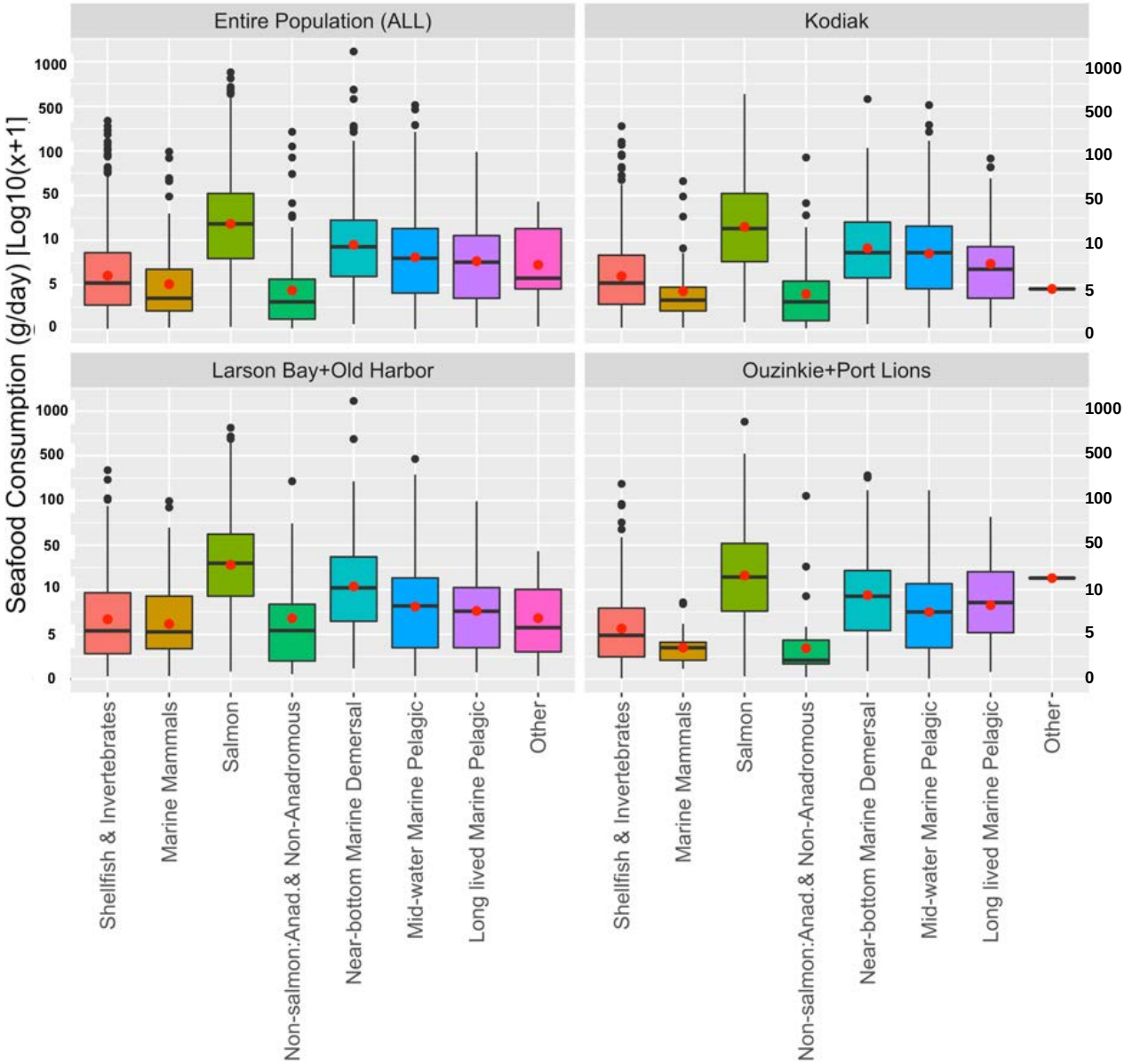


Table 30 shows the distribution of estimated seafood consumption rates (g/d) per person by seafood category (salmon, marine mammals, all species except salmon and marine mammals, and all seafood) for the total sample population and each sub-population based on FFQ data.

Overall, respondents consumed an average of 232.8g/d of seafood per person. When consumed, salmon was consumed in the highest quantities (125.4g/d), with confidence intervals ranging

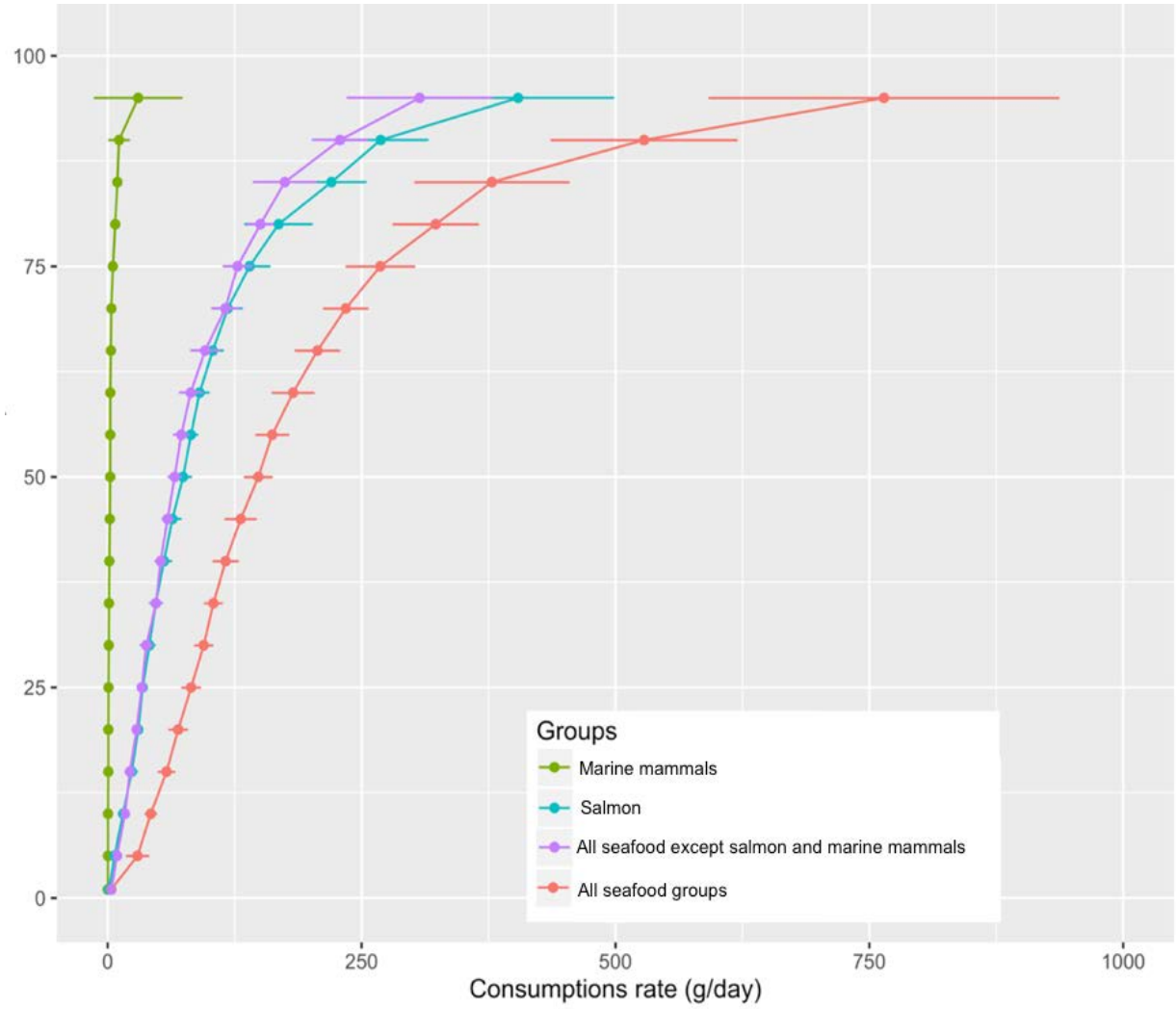
from 140.3g/d to 110.4g/d). Marine mammals were consumed in the lowest quantities (8.2g/d), with confidence intervals ranging from 11.8g/d to 4.5g/d. All other species were consumed in patterns similar to salmon and marine mammals, at a mean consumption rate of 107.1g/d, with confidence intervals ranging from 120.5g/d to 93.7g/d. The distribution of consumption rates is skewed to the right, with mean consumption rates are almost twice the median.

Figure 12 shows the cumulative distribution of estimated consumption rates for each seafood category. Along the vertical axis, percentiles are spaced every 5 percent from the 5th to the 95th percentile. The points are the original consumption rate estimates. The horizontal bar at each point represents the confidence intervals of the estimate at 95% probability. The estimates are weighted.

Table 30: Mean and selected percentiles of seafood consumption (g/d) by seafood category with 95% confidence intervals, total sample population, FFQ. Estimates are weighted.

Seafood category	Confidence Interval	n	mean	SD	Percentiles (%) min	25	median 50	75	90	95	max
			8.2	**21.1**	**0.05**	**0.8**	**2.4**	**5.1**	**11.2**	**29.9**	**130.9**
Marine Mammals	*95% CI (upper)*	**107**	*11.8*			*1.0*	*2.7*	*7.2*	*21.8*	*73.5*	*147.1*
	95% CI (lower)		*4.5*			*0.6*	*2.1*	*3.0*	*0.6*	*0.0*	*114.7*
			125.4	**164.2**	**1.01**	**34.5**	**74.2**	**139.6**	**268.8**	**404.2**	**1,194.9**
Salmon	*95% CI (upper)*	**325**	*140.3*			*38.1*	*82.7*	*159.4*	*317.1*	*500.2*	*1,339.9*
	95% CI (lower)		*110.4*			*30.8*	*65.8*	*119.8*	*220.4*	*308.1*	*1,049.9*
			107.1	***134.9***	***0.22***	**33.6**	**65.9**	**127.8**	**228.7**	**307.1**	**1,491.3**
All Other Species	*95% CI (upper)*	***320***	*120.5*			*37.5*	*72.7*	*142.2*	*256.1*	*378.8*	*1,821.7*
	95% CI (lower)		*93.7*			*29.7*	*59.1*	*113.4*	*201.3*	*235.5*	*1,161.0*
All Seafood		**326**	**232.8**	**262.1**	**2.14**	**82.1**	**148.3**	**268.4**	**528.3**	**764.4**	**1,929.9**

Figure 12: Estimated cumulative distribution of seafood consumption rates (g/d), total sample population, FFQ. Estimates are weighted. Horizontal bars represent 95% confidence intervals.



Salmon Consumption versus All Other Seafood Species, FFQ

In the total sample population, all but 1 respondent consumed salmon throughout the year. To further understand how salmon consumption compared with consumption of other seafood species, all seafood was categorized as either salmon or non-salmon (Table 32). Respondents consuming salmon consumed an average of 125.4g/d per person, and an average 107.1g/d of non-salmon seafood.

Table 31: Mean and selected percentiles of salmon and non-salmon species consumption rates (g/d) for salmon consumers, total sample population, 24HR. Estimates are weighted.

				Percentile (%)						
Category	**n**	**mean**	**SD**	**min**	**25**	**median 50**	**75**	**90**	**95**	**max**
All species except salmon	320	107.1	527.0	0.22	33.6	65.9	127.8	228.7	307.1	1,491.3
Salmon	325	125.4	418.2	1.01	34.5	74.2	139.6	268.8	404.2	1,194.9

Seafood Consumption by Demographic Characteristics, FFQ

The quantities of seafoods consumed varied with gender, household size, education level, and income. Seafood consumption for the total sample population by demographic based on FFQ data is presented in Table 33.

Males and females seafood consumption over the previous year differed, with females consuming an average of 121.6g/d more than their male counterparts. For the total sample population, female respondents consumed an average of 292.4g/d of seafood per person, and males consumed an average of 170.8g/d. Seafood consumption increased with household size. Individuals living alone consumed an average of 226.2g/d of seafood per person. Households with 3 to 5 individuals consumed 240.8g/d, and households of 6 or more consumed 254.6g/d.

Seafood consumption increased with education level. Respondents with less than a high school education consumed an average of 229.0g/d of seafood per person. Individuals with a high school diploma or GED consumed an average 235.2g/d of seafood, and those with an Associate's degree or higher consumed 240.1g/d.

Seafood consumption was similar for respondents with annual household incomes of less than $15,000 up to $65,000, averaging 217.9g/d per person. Respondents with household incomes above $65,000 consumed an average of 259.3g/d. There was very little variation in seafood consumption between age ranges.

Species Consumption by Demographic Characteristics, FFQ

The types of seafoods consumed varied with gender, age, household size, education level, and income. Tables 34-36 present consumption for the total sample population by seafood category and demographic.

For respondents consuming marine mammals (n= 107), females consumed more (11.7g/d) than their male counterparts (3.5g/d) (Table 34). Respondents living in households of 3-5 individuals consumed higher quantities (11.9g/d) than any other household size, and those with a high school diploma or GED consumed more than any other education level (10.1g/d).

Individuals with annual household incomes less than $15,000 or more than $65,000 consumed significantly more marine mammals than respondents with middle income ranges. Individuals in the 18-29 and 40-49 year old age brackets consumed an average of 14.0g/d, while consumption in other age brackets ranged from 2.8g/d to 5.2g/d.

For respondents consuming salmon (n=325), females consumed more (158.5g/d) than their male counterparts (90.8g/d) (Table 35). 40-49 year old respondents consumed considerably more than other age groups (178.2g/d). Individuals living in households of 6 or more consumed higher quantities than any other household size (162.0g/d). Individuals with household incomes greater than $65,000 consumed more salmon (150.4g/d) than those in lower income brackets (97.7g/d - 121.4g/d).

For individuals consuming other species except marine mammals and salmon (n=320), females consumed higher quantities (131.2g/d) than males (81.8g/d). 40-49 year old respondents consumed significantly more other species (13.9g/d) than other age ranges. Respondents with $45,000-$65,000 in annual household income consumed more than those in other income brackets. Consumption of other species varied little with household size or education level.

Table 32: Mean and selected percentiles of seafood consumption (g/d) by demographic groupings, total sample population, FFQ. Estimates are weighted.

					Percentile (%)					
						median				
Demographic Parameters	**Demographic Characteristic**	**n**	**mean**	**SD**	**25**	**50**	**75**	**90**	**95**	**max**
Gender	Male	173	170.8	211.9	68.0	**108.1**	196.5	335.5	513.2	1,847.0
	Female	153	292.4	291.1	108.6	**182.9**	362.3	652.3	911.3	1,929.9
Age	18-29 years	81	204.4	238.6	77.7	**140.5**	246.4	388.2	484.5	1,847.0
	30-39 years	44	217.0	283.3	89.8	**149.0**	195.3	278.6	1,033.2	1,350.2
	40-49 years	52	318.9	321.3	95.8	**186.6**	409.3	775.9	1,075.2	1,365.7
	50-59 years	77	216.0	203.8	56.0	**154.4**	281.4	525.5	618.4	912.6
	60+years	71	226.8	272.2	82.8	**124.6**	274.3	585.5	629.9	1,929.9
# in household	1	46	226.2	226.2	82.2	**146.1**	275.3	498.9	583.7	1,365.7
	2	101	219.6	226.3	72.0	**132.4**	263.4	566.4	706.3	1,241.1
	3-5	149	240.8	291.0	88.7	**148.4**	252.4	513.4	830.6	1,929.9
	6 or more	27	254.6	289.0	71.1	**160.7**	342.9	555.0	931.9	1,107.8
Highest Level of Education	Less than High	18	229.0	202.0	100.8	**157.7**	223.9	591.3	608.4	620.1
	High School GED	246	235.2	268.9	76.1	**147.4**	251.0	533.2	766.6	1,847.0
	Associates Degree+	56	240.1	259.3	94.3	**157.3**	305.0	370.4	663.2	1,929.9
Annual Household Income	<15k	47	217.4	252.2	61.7	**108.6**	220.3	546.3	673.0	1,112.5
	16-45k	80	213.9	239.3	74.2	**131.0**	237.7	499.5	611.6	1,160.9
	46-65k	43	216.4	200.4	79.7	**129.6**	273.5	495.7	605.7	849.3
	65k+	65	259.3	282.4	87.4	**173.8**	320.1	531.5	784.8	1,929.9

Table 33: Mean and selected percentiles of marine mammal consumption (g/d) for consumers by demographic grouping, total sample population, FFQ. Estimates are weighted.

					Percentile (%)					
						median				
Demographic	**Characteristics**	**n**	**mean**	**SD**	**25**	**50**	**75**	**90**	**95**	**max**
Gender	Male	51	3.5	9.6	0.6	1.2	2.5	7.4	10.4	76.0
	Female	56	11.7	26.2	1.0	2.8	7.5	29.9	75.6	130.9
Age	18-29 years	22	14.0	32.6	1.1	2.8	6.5	25.2	90.8	130.9
	30-39 years	15	5.2	6.6	0.3	2.7	6.1	9.7	19.6	24.3
	40-49 years	20	14.1	29.6	0.7	2.0	8.6	30.6	59.7	107.2
	50-59 years	25	2.8	3.5	0.7	1.4	2.7	7.7	11.2	12.6
	60+years	25	3.4	5.4	0.6	2.4	2.9	7.4	8.4	29.9
# in Household	1	16	4.8	7.1	0.7	2.5	3.4	9.4	12.6	31.6
	2	35	4.6	11.8	0.6	1.5	2.5	9.0	11.0	76.0
	3-5	48	11.9	29.0	0.8	2.5	6.3	15.3	99.2	130.9
	6 or more	8	7.6	11.8	0.6	1.5	5.6	17.7	23.8	29.9
Highest Level of Education	Less than High	10	6.0	8.3	2.2	3.1	5.1	8.1	17.8	29.9
	High School GED	80	10.1	24.4	0.8	2.5	7.4	19.8	59.6	130.9
	Associates Degree+	16	2.1	2.0	0.4	1.2	2.7	5.3	5.8	6.2
Annual Household Income	<15k	17	10.0	23.2	1.0	2.6	8.5	11.6	27.4	97.3
	16-45k	37	7.0	20.9	0.9	2.5	3.4	10.4	19.3	130.9
	46-65k	9	3.1	2.5	1.3	1.9	3.7	5.1	7.2	9.5
	65k+	20	11.3	27.9	0.3	1.0	4.3	21.1	51.5	107.2

Table 34: Mean and selected percentiles of salmon consumption (g/d) for consumers by demographic grouping, total sample population, FFQ. Estimates are weighted.

					Percentile (%)					
						median				
Demographic	**Characteristic**	**n**	**mean**	**SD**	**25**	**50**	**75**	**90**	**95**	**max**
Gender	Male	172	90.8	117.7	28.4	**56.3**	104.0	191.7	274.2	943.0
	Female	153	158.5	193.4	45.3	**90.3**	197.0	351.6	544.8	1,194.9
Age	18-29 years	81	109.3	140.2	36.5	**62.8**	102.0	255.0	352.0	851.2
	30-39 years	44	110.1	150.9	28.6	**77.6**	125.7	189.3	337.6	797.5
	40-49 years	52	178.2	217.7	46.3	**88.0**	201.5	408.4	586.1	1,080.7
	50-59 years	76	121.5	146.5	27.4	**67.2**	146.6	259.5	383.6	737.3
	60+years	71	116.3	164.5	32.7	**65.7**	128.1	265.1	317.8	1,194.9
# in household	1	46	113.2	155.7	37.4	**72.6**	107.9	222.2	313.6	1,080.7
	2	100	132.9	170.5	32.5	**69.1**	163.4	269.3	513.4	943.0
	3-5	149	117.7	149.2	34.2	**70.6**	133.1	266.6	357.4	1,194.9
	6 or more	27	162.0	226.0	42.4	**83.7**	131.2	398.1	657.7	912.7
Highest Level of Education	Less than High	18	113.7	101.2	46.6	**80.5**	112.0	286.9	304.6	319.9
	High	245	129.5	167.1	34.1	**75.9**	145.9	302.4	459.7	1,080.7
	Associates	56	120.8	171.2	40.5	**72.6**	128.9	243.8	341.9	1,194.9
Annual Household Income	<15k	47	121.4	161.0	30.2	**53.8**	139.8	314.3	425.3	851.2
	16-45k	80	104.1	99.4	32.5	**63.7**	142.4	248.3	332.7	404.3
	46-65k	43	97.7	110.4	30.3	**51.5**	106.5	268.1	346.3	596.1
	65k+	64	150.4	206.1	41.0	**83.4**	151.0	260.0	569.6	1,194.9

Table 35: Mean and selected percentiles of other species except salmon and marine mammal consumption (g/d) for consumers by demographic grouping, total sample population, FFQ. Estimates are weighted.

					Percentile (%)					
						median				
Demographic	**Characteristic**	**n**	**mean**	**SD**	**25**	**50**	**75**	**90**	**95**	**max**
Gender	Male	169	81.8	128.1	27.4	51.5	92.3	151.1	248.0	1,491.3
	Female	151	131.2	137.3	45.2	82.9	164.9	247.8	378.0	822.2
Age	18-29 years	79	93.8	148.3	33.6	61.3	114.9	157.9	233.9	1,491.3
	30-39 years	43	106.7	150.3	32.5	69.0	106.2	163.7	497.5	817.0
	40-49 years	51	136.9	158.0	53.3	81.6	171.5	263.3	326.4	822.2
	50-59 years	76	97.3	88.1	28.8	70.2	140.4	195.2	246.1	399.8
	60+years	70	110.6	130.2	33.5	55.2	144.8	263.3	317.4	735.0
# in household	1	45	113.2	108.5	30.0	72.9	156.5	243.5	295.9	553.7
	2	97	90.3	84.4	28.9	57.0	124.5	201.2	296.3	396.7
	3-5	148	120.1	170.9	39.0	68.2	123.8	233.6	483.2	1,491.3
	6 or more	27	90.3	93.5	21.9	61.1	114.1	173.7	233.6	480.2
Highest Level of Education	Less than High	55	112.4	106.2	30.4	70.7	138.5	292.4	301.8	307.3
	High School GED	241	105.1	142.4	32.3	62.2	124.1	226.4	311.0	1,491.3
	Associates Degree+	18	121.1	117.5	53.5	78.7	149.8	241.8	286.8	735.0
Annual Household Income	<15k	45	96.1	125.5	21.7	51.0	111.3	198.6	357.4	553.7
	16-45k	80	106.8	161.1	26.8	57.8	95.0	239.4	303.2	822.2
	46-65k	42	121.4	113.5	47.5	78.4	150.5	256.6	359.5	491.9
	65k+	64	109.2	99.2	48.6	72.5	145.5	226.8	264.7	735.0

Seafood Consumption by Meal Preparation Method, FFQ

The FFQ gathered information about all seafood species consumed over the course of the year. For each species consumed, respondents were asked to select ways it was commonly prepared (in season and out) from a list. The list included: baked/broiled, fried/sautéed, smoked/dried, canned/jarred, soup/stew, and other. Respondents also reported portion size in multiples or fractions of serving sizes displayed.

Figure 13 and Table 37 show average seafood consumption (g/d) by seafood category and preparation method for the year. For the total sample population, respondents consumed seafood baked more often than seafood prepared by any other method. Individuals eating baked seafood (n=318) consumed an average of 70.77g/d per person of baked seafood daily.

Salmon that was baked was consumed by the most respondents (n=299) at an average of 47.61g/d per person. Other seafood species (except marine mammals and salmon) were frequently prepared by poaching, but consumed in the highest quantity when fried or sautéed (37.98g/d). Marine mammal meat was consumed in the greatest quantity when fried or sautéed (13.3g/d), but most respondents ate it in soup or stew. No one consumed canned or jarred marine mammal.

Figure 13: Mean seafood consumption (g/d) by preparation method and seafood category, total sample population, FFQ. The bar is the mean ± SE.

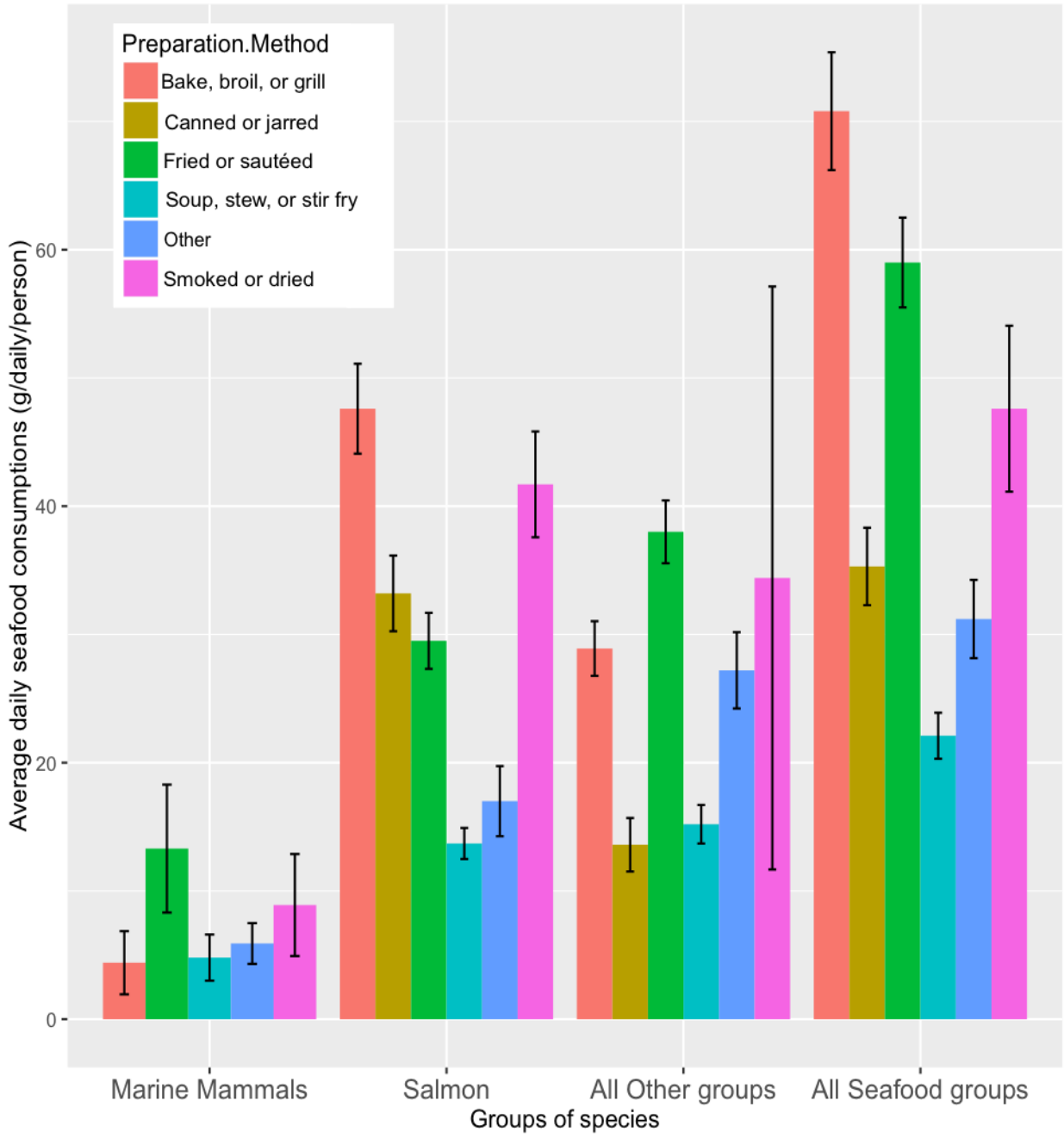


Table 36: Mean and selected percentiles of seafood consumption (g/d) by category and preparation method, total sample population, FFQ. Estimates are weighted.

					Percentile (%)					
						median				
Seafood Category	**Preparation Method**	**n**	**mean**	**SD**	**25**	**50**	**75**	**90**	**95**	**max**
Marine mammals	Bake, broil, or grill	19	4.35	10.73	0.31	1.24	2.05	7.13	14.62	48.64
	Canned or jarred	--	--	--	--	--	--	--	--	--
	Fried or sautéed	8	13.30	17.31	0.62	3.48	18.85	34.53	39.72	44.90
	Soup, stew, or stir fry	44	4.83	12.34	0.67	1.58	3.82	7.88	10.30	82.29
	Smoked or dried	4	8.90	9.20	0.81	2.62	9.73	14.34	15.87	17.41
	Other / Unknown	64	5.93	14.16	0.73	1.67	3.11	9.87	34.43	97.29
Salmon	Bake, broil, or grill	299	47.61	74.00	12.53	25.05	54.29	108.57	162.86	760.00
	Canned or jarred	194	33.16	49.87	7.46	14.97	36.15	64.86	129.71	454.00
	Fried or sautéed	238	29.50	39.31	7.48	14.97	31.52	63.03	111.26	259.43
	Soup, stew, or stir fry	189	13.75	24.28	2.37	8.58	15.03	28.59	44.09	244.29
	Smoked or dried	233	41.74	74.78	5.70	16.24	38.92	111.72	148.57	650.00
	Other / Unknown	58	17.04	26.63	1.85	5.55	18.96	54.07	58.78	162.86
All seafood except salmon and marine mammals	Bake, broil, or grill	262	28.90	39.64	6.75	17.85	37.63	64.86	83.02	380.00
	Canned or jarred	153	13.61	29.41	1.28	4.75	14.97	32.65	44.90	259.43
	Fried or sautéed	306	37.98	50.35	9.30	21.75	48.02	88.13	126.15	583.77
	Soup, stew, or stir fry	198	15.19	26.82	2.37	7.12	16.15	37.42	53.41	275.65
	Smoked or dried	53	34.42	157.20	0.67	3.99	16.84	33.70	63.72	1,300.00
	Other / Unknown	283	27.18	57.46	3.73	9.79	22.25	63.79	114.91	515.33
All seafood	Bake, broil, or grill	318	70.77	96.24	18.24	39.08	83.42	155.63	217.83	760.00
	Canned or jarred	242	35.27	56.97	6.92	16.21	40.79	70.01	116.95	454.00
	Fried or sautéed	316	59.00	74.30	16.41	34.84	72.02	130.40	226.71	713.48
	Soup, stew, or stir fry	262	22.10	38.89	2.62	10.26	23.73	52.56	73.78	465.54
	Smoked or dried	244	47.55	105.86	5.19	15.84	53.98	113.18	169.26	1,342.86
	Other / Unknown	288	31.18	60.05	4.65	11.52	25.72	83.87	132.46	515.33

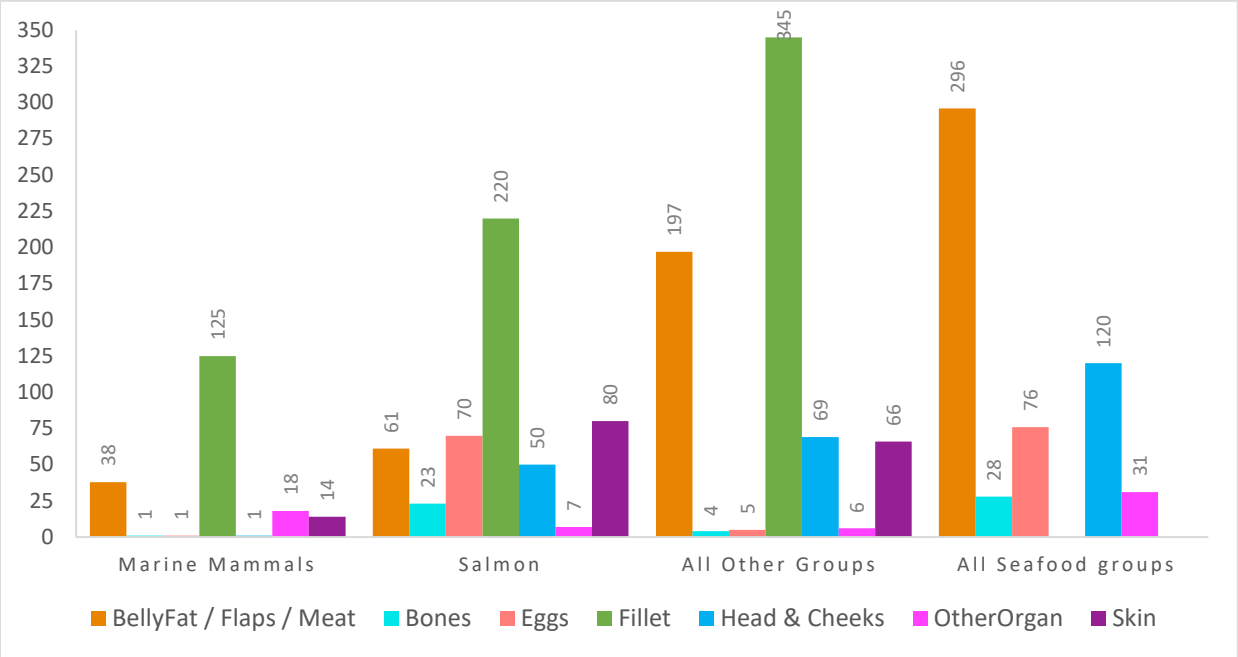
Results- Other Information

Seafood Consumption of Parts or Cuts

Respondents consumed many different parts or cuts of seafood (Figure 14). Fish fillets were consumed most frequently. The next most frequently consumed portions were the belly fat, flaps or flippers, and other meat (n=296). Head and cheeks from any variety of seafood species (n=120) were third.

For marine mammals, respondents consumed belly fat, flaps or flippers, and meat most often (n=38). Some respondents used the bones, eggs, or the head and cheeks of the animal, and others reported using organs or other parts. For salmon, fillets were consumed by most respondents (n=220), as were belly fat and meat (n=61), bones (n=23), eggs (n=70), head and cheeks (n=50), skin (n=80), and other organs (n=7). For other seafood species (except salmon and marine mammals) respondents consumed fillets (n=345) and belly fat, flaps or flippers, and other meat (n=197) most often.

Figure 14: Frequency of seafood portions or cuts consumed by seafood category for consumers, totals sample population.



Seafood Consumption at Special Events

The third part of the survey collected other information, including information about seafood consumption at special events such as potlatches, potlucks, and other community gatherings. Respondents were asked a series of questions about the frequency of special events, and consumption of a subset of common seafood species. The data gathered could not be easily combined with FFQ data. Given time and funding constraints, it was not included in analyses.

Seafood Consumption by Women who Breastfed

Female respondents who had given birth were asked a series of questions about breastfeeding, including how many months the breastfed their children. Figure 15 shows the distribution of breastfeeding rates for the total sample population. lt suggests an increase in the number of months women breastfed their children over the past twenty years.

Figure 15: Distribution of breastfeeding rates among females, total sample population, 1955-2014.

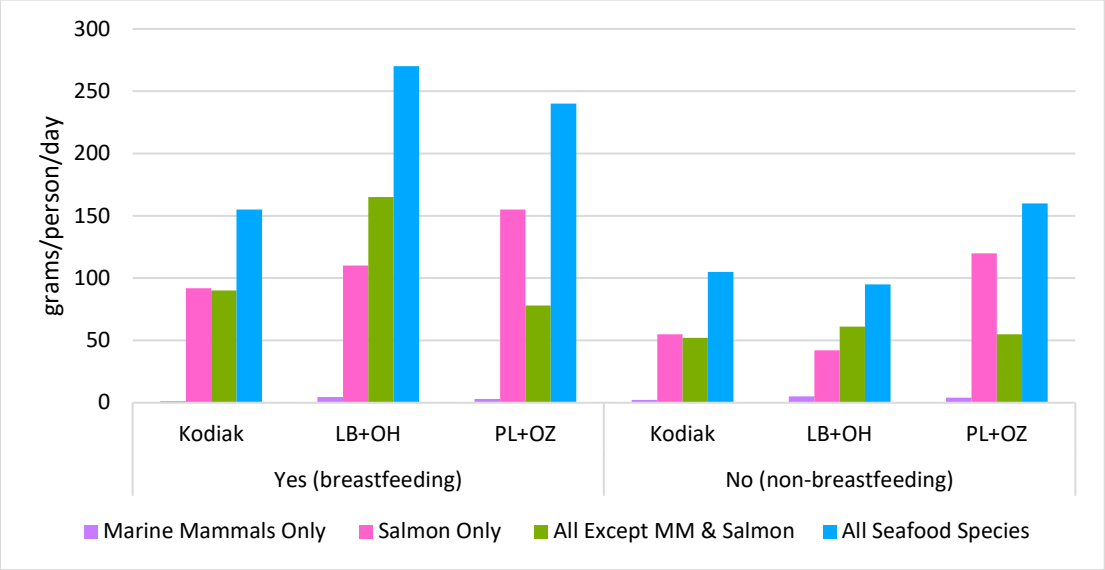
Seafood consumption rates of women who breastfed were compared with women who didn't by seafood category. Respondents were not asked what they consumed while breastfeeding, only if they had breastfed. The rate of seafood consumption for women who breastfed was assumed using an average of g/d per person from the FFQ data. The weighted results are presented in Table 39 and the non-weighted results are provided in Figure 16.

Women who breastfed their children consumed more seafood, but consumption varied across sub-populations. Salmon consumption by breastfeeding women in PL+OZ was relatively high compared to other sub-populations. In LB+OH, women who breastfed consumed more g/d of other seafood species.

Table 37: Mean and selected percentiles of seafood consumption (g/d) for breastfeeding and non-breast feeding women by category, total sample population, FFQ. Estimates are weighted.

				Percentile (%)					
Breastfed ?	**n**	**grams/day consumed**	**SD**	**25**	**median 50**	**75**	**90**	**95**	**max**
Marine Mammals									
No	10	2.2	1.9	0.7	1.6	2.6	3.1	4.8	7.5
Yes	40	2.5	3.5	0.6	1.2	2.5	5.2	10.0	19.0
Salmon									
No	60	67.4	78.8	29.6	46.7	77.6	160.9	234.7	506.3
Yes	108	102.5	132.7	42.8	74.1	112.3	191.7	350.1	943.0
All other species except marine mammals and salmon									
No	58	54.8	56.3	35.2	47.1	62.4	99.7	152.6	291.9
Yes	107	96.8	152.5	49.5	54.2	107.9	161.5	278.0	1,491.3
All seafood species									
No	61	118.6	106.8	65.8	85.3	147.1	283.3	334.9	568.1
Yes	108	199.0	248.2	93.6	129.1	208.3	365.1	530.4	1,847.0

Figure 16: Mean seafood consumption rates (g/d) for breastfeeding and non-breastfeeding women, total sample population, based on FFQ assessment results.



Changes in Seafood Consumption Over Time and Reasons

Most respondents had access to fishing gear or a boat (87.4%) (Table 39). A slight majority (55.9%) noted no change in how often they fished, gathered, or harvested seafood, and maintaining the same consumption patterns (52.7%). For respondents who note a change in their fishing or harvesting frequency (44.1%), that change occurred within the past 5 years (72.1%).

72.4% reported the reason for the change was a decrease in seafood consumption. 25.1% reported the reason for the change was an increase in fish consumption. 1.2% reported the reason for the change was movement from sport to subsistence fishing regulations. A subsistence fisher may participate in fewer fishing activities to harvest a quantity previously gathered under sport fishing regulations.

Regarding changes in access to harvest areas over time, respondents were nearly split on whether or not they had experienced a change. For respondents who did experience a change in access (43.5%), 79.6% noted a decrease in access over the course of the last 5 years. When asked about changes in seafood consumption over time, slight majority noted a decrease in seafood consumption over the last 5 years (47.9%).

Table 38: Changes in Seafood Consumption over Time. Estimates are weighted

Access to fishing gear or boat?

Had access to fishing gear or boat	No access to fishing gear or boat
87.4%	12.6%

Changes in fishing or seafood harvesting frequency?

Yes	No
44.1%	55.9%

Change in fishing or seafood gathering frequency?

Decreased Consumption of Seafood	Increased Consumption of Seafood	Maintain Same Consumption Patterns
0.2%	47.1%	52.7%

Timeframe of changes to frequency of fishing or seafood gathering?

<5 years	1960s or earlier	1980s	1990s	2000s
72.7%	0.6%	1.2%	4.8%	20.7%

Reason for change in fishing or seafood gathering frequency?

Change from sport fishing to subsistence fishing	Decreased Consumption of Seafood	Increased Consumption of Seafood
1.2%	72.4%	25.1%

Change in access to fishing or seafood gathering areas?

Yes	No
43.5%	56.5%

Increase or decrease in access to fishing or seafood gathering areas?

Decreased access to fishing or seafood gathering areas	Increase access to fishing or seafood gathering areas
79.6%	20.4%

Timeframe of change in access to fishing or seafood gathering areas?

<5 years	1960s or earlier	1980s	1990s	2000s
50.3%	0.8%	5.1%	10.6%	33.2%

Change in the overall seafood consumption over time?

Yes	No
40.9%	59.1%

Increase or decrease in seafood consumption over time?

Decrease	Increase	Other	Varies by Species
57.1%	40.1%	1.9%	0.9%

Timeframe of change in seafood consumption?

<5 yrs	1980s	1990s	2000s
47.9%	7.6%	8.6%	35.8%

Cultural Importance of Seafood

The great majority of respondents stated that seafood was very important to their personal heritage and culture (96.6%) and their Tribe's heritage and culture (96.3%) (Table 40).

Table 39: Cultural Importance of Seafood. Estimates are weighted

Importance level of seafood to personal culture and heritage?		
Seafood is very important to personal culture and heritage	**Seafood is somewhat important to personal culture and heritage**	**Seafood is not important to personal culture and heritage**
96.6%	2.8%	0.7%

Importance of seafood to Tribe's culture and heritage?		
Seafood is very important to the Tribe's culture and heritage	**Seafood is somewhat important to the Tribe's culture and heritage**	**Seafood is not important to the Tribe's culture and heritage**
96.3%	2.9%	0.8%

Assessment Location (Office versus In-home)

To evaluate the potential influence of location on survey responses, seafood consumption rates for respondents interviewed in a Tribal office or building and at home were compared. The difference between the mean seafood consumption rates for in-home interviews and those conducted in a Tribal office or building was not statistically significant (67.1g/d) (Table 41). Polissar et al. (2015a) found no statistically significant differences between the reported fish consumption rates from those who were interviewed in their homes versus another location.

Table 40: Mean rate of seafood consumption (g/d) by assessment location and seafood category, FFQ. Unweighted estimates

Seafood Category	Assessment Location	n	mean	median	SD
Marine Mammals	Home	16	11.0	3.4	19.8
	Tribal office	91	7.4	2.5	20.18
Salmon	Home	31	198.3	82.1	274.0
	Tribal office	294	120.8	74.3	152.19
All Species Except Marine Mammals and Salmon	Home	30	94.0	67.0	78.30
	Tribal Office	290	106.9	61.4	148.91
All Seafood Species	Home	31	294.9	140.9	330.5
	Tribal Office	295	227.8	148.0	264.9

Reliability and Cooperation of Respondents

Tables 42 presents interviewers' assessments of respondent reliability and cooperation. The interviewers found the respondents to be highly reliable (92.6%) and very cooperative (94.8%). Those who were ranked as "highly reliable" were confident in and did not waiver in providing responses throughout surveys. Very few respondents provided questionable responses (0.9%) or were deemed uncooperative (1.8%). Respondents who provided questionable responses or were deem uncooperative were removed from the sample and their data was not included in analyses.

Table 41: Interviewers Assessments of Respondent Reliability and Cooperation

Reliability of respondents throughout the assessment process?

Questionable	Generally Reliable	Highly Reliable
0.9%	6.4%	92.6%

Cooperation level of respondents throughout the assessment process?.

Fair	Good	Very Good
1.8%	3.4%	94.8%

Discussion

The 24HR and FFQ methodologies provided quantitative retrospective assessments of current seafood consumption by 5 of the 10 federally recognized Alutiiq Tribes of the Kodiak Archipelago- Sun'aq Tribe of Kodiak, the Native Village of Larsen Bay, the Native Village of Ouzinkie, the Alutiiq Tribe of Old Harbor, and the Native Village of Port Lions. Two different estimates of seafood consumption rates for Kodiak Tribes are provided.

One set of estimated seafood consumption rates is based on 24HR documenting seafood consumed by respondents in the 24 hours prior to the interview. Data collected in the 24HR included meals at which seafoods were consumed, species and portion sizes, and how it was prepared. Analysis of the 24HR data yielded estimates of daily seafood consumption in grams/day/person for the total sample population and each sub-population (Kodiak, LB+OH, PL+OZ). The types and amounts of seafoods consumed at each meal calculated in grams/meal/person were also evaluated. Means and percentiles for 24HR seafood consumption rate distributions are presented.

The other set of seafood consumption rates is based on FFQ, documenting seafood consumed by respondents over the course of the year prior to the interview. Data collected in the FFQ included the species consumed, whether or not consumption varied seasonally, length of season, frequency of consumption, preparation methods, and portion sizes, in season and out. Analysis of the FFQ data yielded estimates of seafood consumption in grams/day/person for the total sample population and each sub-population. Means and percentiles for FFQ seafood consumption rate distributions are provided.

The seafood consumption rates here are based on a relatively low response rate (35.1%) from the tribal communities participating in the project. The low response rate was remedied by weighting factors applied to the data during analyses. The weighting process normalizes the results across the population, based upon statistically-predicted variables such as respondent age, gender, and assessment location.

The 24HR and FFQ both documented very high seafood consumption rates for Kodiak Tribes. Based on the 24HR data, respondents consumed an average of 359.0g/d of seafood per person. Respondents consumed an average of 232.8g/d based on the FFQ (Table 56). These consumption rates are similar to the Suquamish Tribe from the Kitsap Peninsula and Bainbridge and Blake Islands of northwest Washington, and higher than any other current consumption rates documented for tribes in the Pacific Northwest using FFQ.

The 24HR and FFQ produced statistically different results. The observed mean seafood consumption rates based on the 24HR were higher than the rates based on the FFQ assessment, for the total sample population and the three subpopulations (Table 43).

Table 42: Mean and confidence intervals of seafood consumption rates (g/d), total sample population and 3 subpopulations, 24HR and FFQ. Estimates are weighted.

Type	Population	n	mean	sd	lower CI	upper CI
24HR rates	Total Sample Population	296	359.0	344.3	323.2	394.9
	KOD	134	352.8	378.1	294.7	411.0
	LB+OH	74	389.6	283.0	336.9	442.5
	PL+OZ	88	352.4	269.0	313.4	391.4
FFQ rates	Total Sample Population	326	232.8	262.1	208.4	257.3
	KOD	146	217.9	229.9	186.3	249.6
	LB+OH	84	293.7	375.9	230.5	357.0
	PL+OZ	96	225.4	226.5	195.5	255.4

Seasonal variability may explain some differences in the 24HR and FFQ results, with surveys conducted in winter months. Seafood consumption rates can be closely tied to seasonal availability of locally-harvested resources, known as the seasonal round. The differences between the mean and percentiles for 24HR and FFQ seafood consumption rates suggest it is highly unlikely the differences are due to chance. Memory could explain some of differences in reported consumption rates. Respondents may recall what they ate in the last 24 hours more clearly and readily than over the past year. .

It would be tempting to conclude that the seafood consumption rate reported in the 24-hour recall methods is "…more accurate than the reported FFQ consumption frequencies, because the 24-

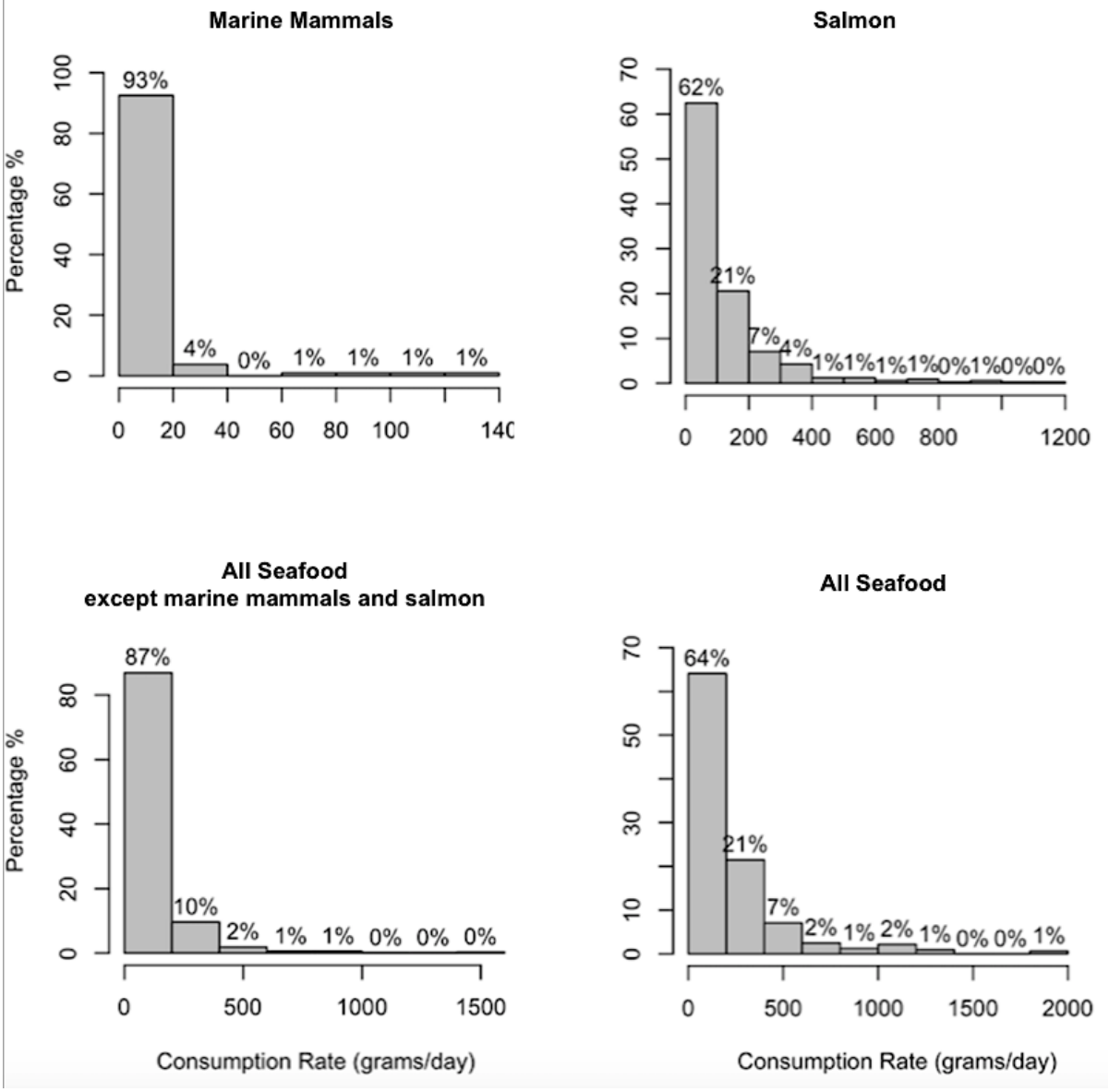
recall requires less use of memory and interpretation than the FFQ method" (Polissar et al. 2015b). However, the utilization of standardized food models in both the 24HR and FFQ minimized respondent error in reporting portion sizes, so the differences cannot be adequately explained by memory alone. Further analysis of the data and/or additional assessments utilizing paired methods may explain the differences in the 24-hour recall and FFQ assessment results.

Food consumption rates are a theoretical quantity, since they are estimated using statistical analyses (U.S. EPA 2014). Food consumption rates can change over time and vary from person-to-person. As such, the highest level of variability in food consumption rates is related to time. The cognitive effort required for an individual to remember their seafood consumption over the past year (365 days) may lead to inaccuracies, especially for similar food groups. There is no assessment methodology without errors, and attention to specific seafood groupings and species is a critical issue in every assessment (e.g., 24HR, FFQ, and food diaries).

For a population, or given individual, seafood consumption rates depend on the timeframe assessed. The 24HR method offers advantages in approximating seafood consumption. However, the 24HR cannot account for the seasonal variability of wild food resources. For AN/AI populations, and others who are highly reliant upon wild resources for sustenance, the seasonal variability of the resources will directly affect food consumption rates. For this reason, the comparative analysis between the two methods does not necessarily prove inaccuracy within the results. It does emphasize the complexity and high level of variability within the locally-harvested food systems of the Kodiak Archipelago.

Figure 16 shows the distribution patterns of seafood consumption rates for all respondents, which are not normally distributed, based on the FFQ data. Skewness to the right was evident in each of the 4 analyses; marine mammals, salmon, all seafood except marine mammals and salmon, and all seafood species. Sixty-four percent of the respondents consumed about 150g/d of seafood per person, but approximately 1% of respondents consumed nearly 2,000g/d. Although a relatively small number of respondents were very high seafood consumers, their consumption amounts drive the overall averages toward the higher consumption ranges. A small number of respondents also consumed very high amounts of seafood during the 24HR period.

Figure 17: Histogram of the total seafood consumption rate (g/d) for consumers, total sample population, FFQ.



Comparison of Kodiak Tribes Seafood Consumption Rates with US and Other AN/AI Surveys

The Kodiak Tribes' seafood consumption rates compared to other AN/AI tribes and the general U.S. population are presented in Table 44. The Pacific Northwest Tribes in the table are more culturally and geographically similar to the Kodiak tribes than to other subpopulations within the

U.S. The results presented were derived utilizing FFQ methods, also used by the U.S. EPA to determine national fish consumption rates. The criteria used to screen respondents were similar to those in this study, with participants required to be 18 years old, live in the area where assessments were conducted, and be seafood/fish consumers. The criteria used in national surveys was different –including consumers and non-consumers of fish, and requiring participants to be 21 years old.

Only 1 Pacific Northwest tribe, the Suquamish Tribe, reported fish consumption rates similar to Kodiak seafood consumption rates. The estimated seafood consumption rates for Kodiak Tribes, based on the FFQ were:

- ~1.5 times greater than those of the Shoshone-Bannock Tribes;
- ~2 times greater than those of the Nez Perce Tribe;
- ~2.5 times greater than the Cook Inlet Tribes
- ~2.5 times greater than the Tulalip and Squaxin Island Tribes;
- ~3.5 times greater than the Columbia River Tribes;
- ~10 times the fish consumption rate for the U.S. population.

Table 43: Distribution of fish consumption rates (g/d) for AN/AI Tribes in Northwest U.S. (FFQ) and the U.S. general population (NCI).

			Percentiles (%)		
Population	**n**	**mean**	**median 50**	**90**	**95**
Kodiak Tribes[9] (all seafood)	326	**232.8**	148.3	528.3	764.4
Suquamish Tribe[10]	92	**213.9**	132.1	489.0	796.9
Shoshone-Bannock Tribes[10]	226	**158.5**	74.6	392.5	603.4
Kodiak Tribes[11](salmon only)	325	**125.4**	74.2	268.8	404.2
Nez Perce Tribe[10]	451	**123.4**	70.5	270.1	437.4
Cook Inlet Tribes[12]	76	**98.4**	46.5	n/a	247.1
Tulalip Tribes[10]	73	**82.2**	44.5	193.4	267.6
Squaxin Island Tribe[10]	117	**83.7**	44.5	205.8	280.2
Columbia River Tribes[10]	464	**63.2**	40.5	130.0	194.0
USA[13]	16,363	**23.8**	17.6	52.8	68.1

[9] Estimates derived from this assessment.
[10] Polissar et al. 2015b
[11] Estimates derived from this assessment, salmon only.
[12] Merrill and Opheim 2013
[13] U.S. EPA 2014

Interview Protocol Strengths and Weaknesses

While the 24HR and FFQ methods are often used in assessing food consumption frequencies and portion size information over a specific timeframe, these tools are critiqued for vagueness and low validity (Brown 2006, Ralph et al. 2011). Despite their limitations, the 24HR and FFQ were the only practical methods to assess the seafood consumption rates for the Alutiiq people of the Kodiak Archipelago. The large geo-spatial scale of the project and limited funding prevented the use of more precise and intensive methods such as NCI and weighted food diaries. The methods utilized in this study elucidated specific frequencies and portion sizes from respondents, which addresses, to the best of our ability at this time, assessment validity.

Lessons Learned, Next Steps

The support, partnership, and assistance provided by the Tribal Councils of Kodiak Tribes involved was absolutely necessary to this project's success. The Tribal Councils, their administrators, and staff were instrumental in identifying and contacting potential respondents within each sub-population. The tribes also provided venues for interviewer trainings and assessments, and sometimes food and shelter for the STK assessment team.

The support, partnership, and assistance provided by outside experts was critical to moving this project beyond being a figurative desire first expressed over 8 years ago. The expertise of scientists and statisticians were instrumental from project start to finish. The design and development of rigorous, statistically-sound interview protocols provided the strong foundation on which this assessment was conducted.

Feedback from the STK assessment team included the need for more time to secure primary project-related points of contact in each community, between approval of the QAPP and the start of fieldwork. In the communities where more time allowed for this, the fieldwork was much smoother and the samples more quickly obtained.

Like the Shoshone-Bannock Tribe's, this project benefited greatly from hiring tribal members in each community. However, hiring individuals inexperienced in survey methods challenged the

STK assessment team. Additional STK staff members were required to coordinate fieldwork, logistics and conduct interviews. Since these were part-time temporary positions, finding the right combination of interest and availability was difficult.

Locally-hired facilitators made it much easier to contact eligible respondents. In Old Harbor, a facilitator went door-to-door with members of the STK assessment team to ask tribal members to participate. Most agreed to participate because the facilitator vouched for the interviewer's credibility and the importance of the assessment. In Old Harbor, the STK assessment team still struggled to find enough respondents for a statistically valid sample, so the honorarium was increased from the original rate. Once word got around, the sampling goal was met quickly.

The in-person interview protocols were a strength of this assessment. In conducting the surveys in a face-to-face setting, with the use of two-dimensional photo and three-dimensional model displays, interviewers were able to facilitate and ensure completeness and accuracy of responses. If a clarification on a question was necessary, the interviewer could have a discussion with the respondent.

Fieldwork in each community was met with some challenges. The greatest challenge was the lack of up-to-date tribal membership rolls that included current residency and contact information. Most tribes did not have this information, which made finding the appropriate sample size of respondents difficult. To reach the sampling goals in each community, the STK assessment team and locally-hired facilitators spent countless hours updating enrollment lists and tracking down potential respondents.

Despite fieldwork commencing soon after approval of the QAPP, much time had passed since initially securing community support for the project. Some planning and scheduling logistics were overlooked, and potential efficiencies were lost while conducting fieldwork.

Travel logistics also brought challenges. Weather delays were a large hindrance in conducting the assessment in remote communities of the Kodiak Archipelago. Due to the seasonal winter

storms, the STK assessment team experienced several flight cancellations preventing them from reaching the villages to conduct fieldwork, or from returning home to Kodiak.

Weather-related challenges also deterred participation because potential respondents did not wish to venture out into the weather, or they lacked safe transportation for winter roads. Allowing interviews to occur in either the Tribal offices or in the respondents' homes (as was the case for a small portion of the assessments) alleviated some of this obstacle.

The seasonal timing of the assessment slowed the process of gaining adequate sample sizes in some communities. A portion of the assessment was conducted during hunting season, an activity many Tribal members participate in, and during the annual Alaska Federation of Natives annual convention. The AFN convention is the largest annual gathering of any Native peoples in the United States. Each year, the AFN convention attracts between 4,000-5,000 attendees, many whom need to travel great distances across the state of Alaska. Since the convention is hosted in either Fairbanks or Anchorage, those who attended from Kodiak were gone for a week or longer.

Further analyses could compare the results of the Kodiak Island Tribes Seafood Consumption Assessment results with other existing data sets, such as the ADFG systematic household survey data. At present, the ADFG systematic household surveys collect harvest and use data, in which household consumption rates are assumed, for all Alaska residents (Alaska Native and non-Native, alike). To calculate the average seafood consumption rate of an AI/AN individual, the household use rates would first need to be reduced to individual use rates. Since the publically available data sets on CSIS are an aggregate of the entire population, extrapolating the AN/AI data cannot be done without a release from ADFG. A partnership with ADFG to extrapolate the AN/AI data from the pooled sample could reveal a substantial dataset.

Further analysis could also evaluate the 24HR and FFQ data against the demographic data collected. Understanding the importance of seafoods to individuals and their households would conceptualize and add depth top the assertion that the AN/AI seafood consumption rates are much higher than national averages.

Conclusions

Overall participation rates were relatively low, but high in 2 of the 3 subpopulations, with more than 50% of eligible respondents participating. A statistically proportionate distribution of community demographics (gender, age, household size, household income, and education level) was represented in the assessment. Interviews conducted in a Tribal office or building provided statistically similar results to assessments conducted in respondents' homes.

Kodiak Tribes consume seafood at very high rates, many-fold higher than tribes in the Pacific Northwest and 10 times the rate of the U.S. population. Seafood consumption varied little with gender or household size. Seafood consumption varied more with age, level of education, and household income according to both the 24HR and FFQ methods.

Salmon are an important food, in terms of frequency of consumption and consumption rates, for the population. In addition to salmon, other non-salmon freshwater fishes are important food sources for the sub-populations of LB+OH and PL+OZ, according to the 24HR data.

Seafood is consumed at all meals, with more consumed at dinner than any other meal. Baking and poaching or boiling are the 2 most frequently used cooking methods. When seafood is prepared in these ways, it is consumed in the greatest quantities (g/d) per person, according to 24HR and FFQ data.

Other findings included:

- Salmon was consumed most frequently and in the greatest quantities, according to 24HR data.
- Locally-harvested seafood was consumed slightly more than seafood purchased commercially. Wild-harvested salmon was consumed at a much higher rate than salmon purchased in a store or restaurant.
- Most respondents did not note a change in fishing frequency over time. For some, a decrease in fish consumption over the past 5 years influenced their fishing activities.
- Some respondents noted a decrease in access to fishing and harvesting areas over the past 5 years.
- Alutiiq people of the Kodiak Archipelago are no doubt opportunistic harvesters and consumers due to seafood availability, weather, location, gear accessibility, commercial fishing activities, state/federal regulations, etc.
- The great majority of respondents stated that seafood was very important to their personal heritage and culture.
- For women who have given birth, the women who were breastfeeding or had breastfed their children had higher seafood consumption rates, on average, than those whom had not breastfed a child.
- Analyses to determine the frequency and rate of seafood consumption revealed abnormal distribution patterns, with a few respondents reporting unusually high levels of seafood consumption.

The STK assessment team believes the data sets resulting from this investigation are sound despite results from the 24HR and FFQ methods not being comparable. Further analysis of existing data and investigations into the seasonal variability of local resources are warranted.

Establishing the cultural and economic values of salmon and other seafoods could help strengthen regional stewardship policies and programs, as well as ensuring that all residents subsisting from Gulf of Alaska's resources will continue to thrive.

Quyanaa (thank you)!

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Appendix I: Kodiak Island Tribe Seafood Consumption Assessment Project Information Sheet

Project Information Sheet

The following is a copy of the Kodiak Island Tribe Seafood Consumption Assessment Project Briefing that was provided to the participating Tribal Councils and each project informant:

This assessment attempts to determine an accurate Kodiak Island Tribal member's consumption rate of seafood. Your participation in this project is greatly appreciated as we seek the real numbers that reflect how villages and the City of Kodiak Tribal members consume these foods and compare how such an analysis looks next to the national averages.

The Sun'aq Tribe of Kodiak undertook this project because little information exists regarding consumption rates of seafood by Kodiak Archipelago Tribal members and the daily rate of seafood consumption for Kodiak Tribal members is believed to be dramatically higher than the rates currently recommended by the Environmental Protection Agency (EPA) and utilized by the Alaska Department of Environmental Conservation (ADEC) in Alaska to establish water quality standards.

If there are any further questions you have about the assessment, feel free to contact the Natural Resource Department at 907.486.4449, or email kddrabek@sunaq.org and we will do our best to respond quickly.

Appendix II: Kodiak Island Tribe Seafood Consumption Assessment Project Respondent Informed Consent Form

Kodiak Island Subsistence Seafood Assessment Consent Form

I understand that I am being asked to participate in an assessment/questionnaire activity, which will be conducted in-person, that will help the Tribes of Sun'aq, Old Harbor, Larsen Bay, Port Lions and Ouzinkie gather information about the actual rates of seafood consumption by Tribal members, what species are regularly eaten, and how seafood meals are prepared and cooked.

I have been read a confidentiality statement by the interviewer and have been given general information about the project and the types of questions I can expect to answer about myself. I understand that any information I provide will be kept confidential, used only for the purposes of this study, and will not be used in any way that can identify me. All survey/questionnaire response, notes will be kept in a secured environment.

I understand that my participation in this project is completely voluntary and that I am free to decline to participate, without consequence, at any time prior to or at any point during the interview. Should I decide to participate, I understand that any information I have provided to the interviewer will be destroyed.

I have read the information above. By signing below and returning this form, I am consenting to participate in this assessment/questionnaire project.

_____	_____	_____
Participant's Name	Signature	Date

Appendix III: Kodiak Island Tribe Seafood Consumption Assessment Project Interview Protocols

As respondents arrived to the in-person interview, each were assigned sequential ID number. This was recorded on everyone's assessment form as the interviews were being conducted. At the start the interview, the interviewer verbally provided the respondent with the project briefing. Then, after asking the respondent if s/he had any questions before proceeding, the interviewer followed the assessment tool below. Words that were to be spoken by the interviewer are bolded throughout the assessment tool. As the respondent provided answers, the interviewer wrote, checked, and/or circled the responses accordingly.

1.0 INTERVIEW INTRODUCTION

Basic information about the interview (e.g., location) will be recorded by the interviewer prior to the in-person interview. The interviewer will then provide a brief introduction to the respondent about the project. Words to be spoken by the interviewer are identified in bold. Answers are written, checked, and/or circled, as indicated. As Interviewees arrive, they are given sequential ID numbers.

1.1 Administrative Information

General administrative information will be completed by the interviewer at the time of the interview, but prior to questioning the respondent.

1.1.1 Interviewer Identification

1. Interviewer Name _____

2. Interviewer ID: _____

1.1.2 Respondent Identification

3. Questionnaire/Respondent ID: _____

1.1.3 Interview Date, Time, and Location

4. Date: _____/_____/_____(mm/dd/yyyy)

5. Day (of the week): _____

6. Start time: _____ AM / PM *(circle)*

7. City, State: _____

8. Location/Venue (check):
   _____ Home _____ Central Location
   _____Tribal Office _____ Other (coffee shop, etc.)

1.2 Introduction to Interview

To begin the in-person interview, the interviewer will introduce the purpose of the assessment and provide a brief overview of its structure.

"Hello, my name is _____, and we're conducting an assessment on behalf of the Sun'aq Tribe of Kodiak. We appreciate your willingness to participate in our seafood consumption assessment. The assessment is endorsed by ___*village name*_____.

The information you provide as part of this assessment will help us understand the rates of seafood consumption, how the seafood is prepared, and the species or types of seafood regularly eaten by members of the _____ Tribe. Your information, plus the information of other Tribal members, will help us protect our environment and promote the health of our Tribal members and families.

We do not intend to collect ANY culturally-sensitive information during this interview. The information that you provide during this interview is confidential. Your responses to the questions will be combined with those of others so that your answers cannot be identified. In the meantime, if you have any questions, here is an information and contact sheet for you to keep. (Provide Information Sheet – Appendix B)

This interview will take about an hour. The questionnaire has 3 parts. In the first part, I will ask you to tell me how much seafood you ate yesterday. The second part focuses on the past 12 months: the types of seafood you ate, how often you ate it, where you got it, and how it was prepared, as well as fishing activities and special events. Finally, in the third part, I will ask you for some general information about yourself.

Your participation in this study is voluntary and you may withdraw at any time without any consequence to you. If at any time during the interview, you do not know an answer or do not feel comfortable answering a question, we can skip to the next question. You are free to not answer any of the questions.

To begin with, I'm going to ask you to sign a consent form (Appendix C). By signing the consent form, you will be granting permission for me to conduct the interview.

If you would like to view the survey questions as we go along, please turn to Tab 5 (navy blue).

May we start the interview now?"

2.0 FOOD CONSUMPTION

The first part of the in-person interview is a 24-hour dietary recall. Words to be spoken by the interviewer are identified in bold. Each question will be asked in numeric order. Photographic and portion model displays will be available for use during questioning.

2.1 24 Hour Dietary Recall

9. **"The first questions are about your seafood consumption yesterday. Please think about what you ate yesterday. If not yesterday, when (within the last year) was the last time you ate seafood? I am going to ask you about EACH time you ate seafood on that day. That includes meals, snacks, eating at home, eating at a friend's or relative's house or a purchase somewhere. It includes eating seafood anywhere or at any time and in any amount. Did you eat any seafood?"**

   Mark Table A-3 with response
   If NO or other, skip to next Section (4.0).

9a. "**Please think about the first time you ate seafood on the day in question. Think about all meals and snacks, including seafood and marine mammals within dishes such as soups or perok. Include seafood bought from a store, from a restaurant, or caught by you or someone else. About what time was that?"**(Enter description, occasion number and approximate time in Table A-3).

10. **"Please turn to Tab 1 (red). What type or types of seafood did you eat?"** (Refer to species list and enter species type in Table A-3; see Appendix D, Table B-1 for list of species list).

10a. **"Please turn to Tab 2 (yellow). How was the** *(species type mentioned)* **prepared or cooked?** (Unprompted, check box in Table A-3 and see Preparation Methods list).

10b. **"Please look at the display models, or turn to Tab 3 (green). How much of the** *(species type mentioned)* **did you eat?** (See quantity displays according to species type; enter portion size in fractions or multiples and model numbers according to Table A-3a, refer).

10c. **"Where did the** *(species type mentioned)* **come from? Was it from a restaurant or store? Or was it caught by you or someone else?**

10d. "**Did you eat any other seafood species at that time** *(time mentioned)***?"**
   Enter response in Table A-3

   If YES, repeat Question #10-10d above.
   If NO, continue to next Question #11.

11. **"Did you eat any other seafood on the day in question? If so, about what time was that?** (Enter the time in Table A-3).

    If YES, repeat Question #9a-10d above for up to 6 eating occasions.
    If NO, repeat Question #11 for all eating occasions yesterday.
    If "Did not eat fish rest of day," skip ahead to next section, Question #12.

12. "**Was the amount of seafood you ate then more, less, or about the same as usual?"** (Circle response at bottom of Table A3)

13. "**Are you currently on any kind of diet, either to lose weight or for some other reason?"** (Circle response at bottom of Table A3)

Table A3: 24-Hr Recall: Types, Quantities, Methods, and Sources of Seafood Eaten on the day in question

Fish Consumption on day in question? (Circle one) Y N					
Occasion # & Description[1]		Species Type[2]	Portion Size / Quantity *See Displays (enter display #)*	Preparation / Cooking Method *Check box*	Source *Check box*
1		Species 1:	Salmon fillets _____Strips: _____ Rockfish fillets: _____ Soup bowls: _____ Halibut fillets _____Jarred:_____ Shellfish (organisms): _____ Seal meat/Sea lion:_____	☐ Pan Fried ☐ Stew, Soup ☐ Deep Fried ☐ Canned, Pickled ☐ Poached/ Boiled ☐ Raw / Uncooked ☐ Baked (including Perok) ☐ Grilled/Barbecued ☐ Dried/ Smoked ☐ Other, Unknown	☐ Store/Restaurant ☐ Caught
		Species 2:	Salmon fillets _____ Strips: _____ Rockfish fillets: _____ Soup bowls: _____ Halibut fillets _____ Jarred:_____ Shellfish (organisms): _____ Seal meat/Sea lion:_____	☐ Pan Fried ☐ Stew, Soup ☐ Deep Fried ☐ Canned, Pickled ☐ Poached/ Boiled ☐ Raw / Uncooked ☐ Baked (including Perok) ☐ Grilled/Barbecued ☐ Dried/ Smoked ☐ Other, Unknown	☐ Store/Restaurant ☐ Caught
		Species 3:	Salmon fillets _____ Strips: _____ Rockfish fillets: _____ Soup bowls: _____ Halibut fillets _____ Jarred:_____ Shellfish (organisms): _____ Seal meat/Sea lion:_____	☐ Pan Fried ☐ Stew, Soup ☐ Deep Fried ☐ Canned, Pickled ☐ Poached/ Boiled ☐ Raw / Uncooked ☐ Baked (including Perok) ☐ Grilled/Barbecued ☐ Dried/ Smoked ☐ Other, Unknown	☐ Store/Restaurant ☐ Caught
2		Species 1:	Salmon fillets _____ Strips: _____ Rockfish fillets: _____ Soup bowls: _____ Halibut fillets _____ Jarred:_____ Shellfish (organisms): _____ Seal meat/Sea lion:_____	☐ Pan Fried ☐ Stew, Soup ☐ Deep Fried ☐ Canned, Pickled ☐ Poached/ Boiled ☐ Raw / Uncooked ☐ Baked (including Perok) ☐ Grilled/Barbecued ☐ Dried/ Smoked ☐ Other, Unknown	☐ Store/Restaurant ☐ Caught
		Species 2:	Salmon fillets _____ Strips: _____ Rockfish fillets: _____ Soup bowls: _____ Halibut fillets _____ Jarred:_____ Shellfish (organisms): _____ Seal meat/Sea lion:_____	☐ Pan Fried ☐ Stew, Soup ☐ Deep Fried ☐ Canned, Pickled ☐ Poached/ Boiled ☐ Raw / Uncooked ☐ Baked (including Perok) ☐ Grilled/Barbecued ☐ Dried/ Smoked ☐ Other, Unknown	☐ Store/Restaurant ☐ Caught
		Species 3:	Salmon fillets _____ Strips: _____ Rockfish fillets: _____ Soup bowls: _____ Halibut fillets _____ Jarred:_____ Shellfish (organisms): _____ Seal meat/Sea lion:_____	☐ Pan Fried ☐ Stew, Soup ☐ Deep Fried ☐ Canned, Pickled ☐ Poached/ Boiled ☐ Raw / Uncooked ☐ Baked (including Perok) ☐ Grilled/Barbecued ☐ Dried/ Smoked ☐ Other, Unknown	☐ Store/Restaurant ☐ Caught

3		Species 1:	Salmon fillets _____ Strips: _____ Rockfish fillets: _____ Soup bowls: _____ Halibut fillets _____ Jarred:_____ Shellfish (organisms): _____ Seal meat/Sea lion:_____	☐ Pan Fried ☐ Deep Fried ☐ Poached/ Boiled ☐ Baked (including Perok) ☐ Dried/ Smoked	☐ Stew, Soup ☐ Canned, Pickled ☐ Raw / Uncooked ☐ Grilled/Barbecued ☐ Other, Unknown	☐ Store/Restaurant ☐ Caught
		Species 2:	Salmon fillets _____ Strips: _____ Rockfish fillets: _____ Soup bowls: _____ Halibut fillets _____ Jarred:_____ Shellfish (organisms): _____ Seal meat/Sea lion:_____	☐ Pan Fried ☐ Deep Fried ☐ Poached/ Boiled ☐ Baked (including Perok) ☐ Dried/ Smoked	☐ Stew, Soup ☐ Canned, Pickled ☐ Raw / Uncooked ☐ Grilled/Barbecued ☐ Other, Unknown	☐ Store/Restaurant ☐ Caught
		Species 3:	Salmon fillets _____ Strips: _____ Rockfish fillets: _____ Soup bowls: _____ Halibut fillets _____ Jarred:_____ Shellfish (organisms): _____ Seal meat/Sea lion:_____	☐ Pan Fried ☐ Deep Fried ☐ Poached/ Boiled ☐ Baked (including Perok) ☐ Dried/ Smoked	☐ Stew, Soup ☐ Canned, Pickled ☐ Raw / Uncooked ☐ Grilled/Barbecued ☐ Other, Unknown	☐ Store/Restaurant ☐ Caught
4		Species 1:	Salmon fillets _____ Strips: _____ Rockfish fillets: _____ Soup bowls: _____ Halibut fillets _____ Jarred:_____ Shellfish (organisms): _____ Seal meat/Sea lion:_____	☐ Pan Fried ☐ Deep Fried ☐ Poached/ Boiled ☐ Baked (including Perok) ☐ Dried/ Smoked	☐ Stew, Soup ☐ Canned, Pickled ☐ Raw / Uncooked ☐ Grilled/Barbecued ☐ Other, Unknown	☐ Store/Restaurant ☐ Caught
		Species 2:	Salmon fillets _____ Strips: _____ Rockfish fillets: _____ Soup bowls: _____ Halibut fillets _____ Jarred:_____ Shellfish (organisms): _____ Seal meat/Sea lion:_____	☐ Pan Fried ☐ Deep Fried ☐ Poached/ Boiled ☐ Baked (including Perok) ☐ Dried/ Smoked	☐ Stew, Soup ☐ Canned, Pickled ☐ Raw / Uncooked ☐ Grilled/Barbecued ☐ Other, Unknown	☐ Store/Restaurant ☐ Caught
		Species 3:	Salmon fillets _____ Strips: _____ Rockfish fillets: _____ Soup bowls: _____ Halibut fillets _____ Jarred:_____ Shellfish (organisms): _____ Seal meat/Sea lion:_____	☐ Pan Fried ☐ Deep Fried ☐ Poached/ Boiled ☐ Baked (including Perok) ☐ Dried/ Smoked	☐ Stew, Soup ☐ Canned, Pickled ☐ Raw / Uncooked ☐ Grilled/Barbecued ☐ Other, Unknown	☐ Store/Restaurant ☐ Caught
5		Species 1:	Salmon fillets _____ Strips: _____ Rockfish fillets: _____ Soup bowls: _____ Halibut fillets _____ Jarred:_____ Shellfish (organisms): _____ Seal meat:_____	☐ Pan Fried ☐ Deep Fried ☐ Poached/ Boiled ☐ Baked (including Perok) ☐ Dried/ Smoked	☐ Stew, Soup ☐ Canned, Pickled ☐ Raw / Uncooked ☐ Grilled/Barbecued ☐ Other, Unknown	☐ Store/Restaurant ☐ Caught
		Species 2:	Salmon fillets _____ Strips: _____ Rockfish fillets: _____ Soup bowls: _____ Halibut fillets _____ Jarred:_____ Shellfish (organisms): _____ Seal meat/Sea lion:_____	☐ Pan Fried ☐ Deep Fried ☐ Poached/ Boiled ☐ Baked (including Perok) ☐ Dried/ Smoked	☐ Stew, Soup ☐ Canned, Pickled ☐ Raw / Uncooked ☐ Grilled/Barbecued ☐ Other, Unknown	☐ Store/Restaurant ☐ Caught

		Species 3:	Salmon fillets _____ Strips: _____ Rockfish fillets: _____ Soup bowls: _____ Halibut fillets _____ Jarred:_____ Shellfish (organisms): _____ Seal meat/Sea lion:_____	☐ Pan Fried ☐ Deep Fried ☐ Poached/ Boiled ☐ Baked (including Perok) ☐ Dried/ Smoked	☐ Stew, Soup ☐ Canned, Pickled ☐ Raw / Uncooked ☐ Grilled/Barbecued ☐ Other, Unknown	☐ Store/Restaurant ☐ Caught
6		Species 1:	Salmon fillets _____ Strips: _____ Rockfish fillets: _____ Soup bowls: _____ Halibut fillets _____ Jarred:_____ Shellfish (organisms): _____ Seal meat/Sea lion:_____	☐ Pan Fried ☐ Deep Fried ☐ Poached/ Boiled ☐ Baked (including Perok) ☐ Dried/ Smoked	☐ Stew, Soup ☐ Canned, Pickled ☐ Raw / Uncooked ☐ Grilled/Barbecued ☐ Other, Unknown	☐ Store/Restaurant ☐ Caught
		Species 2:	Salmon fillets _____ Strips: _____ Rockfish fillets: _____ Soup bowls: _____ Halibut fillets _____ Jarred:_____ Shellfish (organisms): _____ Seal meat/Sea lion:_____	☐ Pan Fried ☐ Deep Fried ☐ Poached/ Boiled ☐ Baked (including Perok) ☐ Dried/ Smoked	☐ Stew, Soup ☐ Canned, Pickled ☐ Raw / Uncooked ☐ Grilled/Barbecued ☐ Other, Unknown	☐ Store/Restaurant ☐ Caught
		Species 3:	Salmon fillets _____ Strips: _____ Rockfish fillets: _____ Soup bowls: _____ Halibut fillets _____ Jarred:_____ Shellfish (organisms): _____ Seal meat/Sea lion:_____	☐ Pan Fried ☐ Deep Fried ☐ Poached/ Boiled ☐ Baked (including Perok) ☐ Dried/ Smoked	☐ Stew, Soup ☐ Canned, Pickled ☐ Raw / Uncooked ☐ Grilled/Barbecued ☐ Other, Unknown	☐ Store/Restaurant ☐ Caught
Amount of Fish Eaten Yesterday as Compared to Usual (circle one):			More than usual	Less Than usual	About the same	
Currently on a diet (circle one):			Yes	No	Prefer not to answer	

Table A-3A Portion Model Displays: Description and Use

Display Type[1]	Display Numbers	Display Description	What Display Represents	How Respondents Report Portion Size	Associated Mass of Real Fish
Bowls	B1	Empty plastic bowls (1cup, 2cups and 4cups) with different colored lids	Containers to hold fish soup, stew, or composite dishes	Identify multiples and/or fractions of a cup in 0.25 increments	1 cup of soup is estimated to contain 0.25cup or 2oz (57g) cooked fish/ 2.5oz (72g) raw fish
Clams	C1	Physical replicas of 6 67mm butter clams	Clams	Identify number of organisms	One 67 mm butter clam contains 0.9oz (25g) of raw edible tissue
Crab	CR1	Color photograph of plate with 10oz portion of cooked crab	Crab	Identify multiples and/or fractions of the display size in 0.25 increments	One portion contains 4.0oz (113g) of cooked edible crab/ 5.0oz (141g) raw meat
Halibut	H1	Color photograph of plate with 7oz portion of cooked halibut	Cooked halibut or other fish with thick fillets	Identify multiples and/or fractions of the display size in 0.25 increments	One portion is 7.0oz (198g) of baked fish/ 8.0oz (227g) raw fish
	H2	Physical replica of 3oz halibut fillet			One portion is 3.0oz (85g) of baked fish/ 4.0oz (113g) raw fish
Jarred	J1	Color photograph of canning jar with 8oz of cooked salmon	Fish or other seafood in a can or jar	Identify multiples and/or fractions of a canning jar in 0.25 increments	Canning jar contains 8.0oz (227g) of cooked seafood/ 10.7oz (302g) raw fish
Mussels	M1	Color photograph of plate with 6 half shell mussels	Mussels	Identify number of organisms	1 mussel contains 0.4oz (10g) of raw edible tissue
Octopus & Squid	O1	Color photograph of plate with 5oz portion of cooked octopus	Cooked octopus tentacle (skinned w/o suction cups)	Identify multiples and/or fractions of the display size in 0.25 increments	One portion is 5.0oz (142g) of fried meat pieces/ 7.0oz (198g) raw edible tissue
Rockfish	R1	Color photograph of plate with 6.8oz portion of cooked rockfish	Cooked rockfish or other fish species with thin fillets	Identify multiples and/or fractions of the display size in 0.25 increments	One portion is 6.8oz (193g) of baked fish/ 8.0oz (227g) raw fish
	R2	Physical replica of 3oz rockfish fillet			One portion is 3.0oz (85g) of baked fish/ 4.0oz (113g) raw fish
Salmon	S1	Color photograph of plate with 6.5oz portion of cooked salmon	Cooked salmon and other fish species with thick fillets	Identify multiples and/or fractions of the display size in 0.25 increments	One portion is 6.5oz (184g) of cooked fish/ 8.0oz (227g) raw fish
	S2	Physical replica of 5oz salmon fillet			One portion is 5.0oz (142g) of cooked fish/ 6.7oz (190g) raw fish
Scallops	SC1	Color photograph of plate with 6 scallops	Cooked Scallops	Identify number of organisms	1 scallop contains 1.0oz (28g) of raw edible tissue
Seal Meat/Sea Lion	SM1	Color photograph of plate with 5.5oz portion of cooked seal meat	Seal meat and other marine mammals	Identify multiples and/or fractions of the display size in 0.25 increments	One portion is 5.5oz (156g) of cooked meat/ 8.0oz (227g) raw meat
Shrimp	SH1	Color photograph of plate with 6 shrimp	Cooked Shrimp (w/o heads)	Identify number of organisms	1 shrimp contains 1.6oz (44g) of raw edible tissue
Strips/Dried Fish	ST1	Color photograph of plate with 2.0oz portion smoked salmon strips	Dried pieces of salmon and other fish species	Identify multiples and/or fractions of the display size in 0.25 increments	2 strips contains 2.0oz (56g) of dried fish, 4.6oz (130g) raw fish
Sushi	SU1	Physical replica of sushi roll piece	Sushi	Identify number of pieces	1 sushi roll piece contains 1.0oz (28g) of raw seafood

Notes: " = inches, g = grams, oz. = ounces

1. Display numbers are written in permanent marker on every model display, as well as contact information for Project Manager.
2. Because enzymatic processes liquefy crab flesh shortly after the animal dies or is killed, crab meat is never stored or consumed in its "raw" form - it is cooked. The "raw" crab and shrimp values are for pre-cooked flesh, "cooked" values are after warming.

The second part of the in-person interview is a food frequency questionnaire (FFQ) based on the past year (12 months), and includes questions on dietary patterns and related activities that may affect seafood consumption.

2.2 Food Frequency Questionnaire

"The next questions are about other seafood you have eaten (and activities involving fish) over the past year."

2.2.1 Species, Frequency, Quantities

14. "**Did you eat fish or other seafood in the past year? That includes fish, shellfish, seal or sea lion. Think about all meals and snacks that include seafood with dishes, alone or within dishes such as soups and perok. Include seafood bought from a store, from a restaurant, or caught by you or someone else. Did you eat seafood in the past year?"**

    If YES, Circle Y at the top of Table A-4 and continue to Question #15.
    If NO, ask **"Please consider ANY amount of seafood you may have eaten in the past year."**If still NO, thank them (skip to Section 4.2, Interview End).

    "Now let's talk more about the kinds of seafood you eat. These are about your regular eating habits throughout the year. Please do not include information about what you eat at special events or ceremonies; we will talk about that later. "

15. **"Please turn to Tab 1 (red) Survey Species List. In the past year, which of the following species did you eat?**

    Mark all species consumed before going on to Question 16.

16. "**Do you eat more of** (Species X) **when it is in season or about the same throughout the year?"**

    If consumption is different in season, place a check in Table A-4, 3rd column
    If consumption is the same year round, skip to Question 18.

17. "**How long would you say a season is when you eat** *(Species X)***?"**
    Record length of the season in weeks or months in column 4 of Table A-4.

18. **"Please turn to Tab 2 (yellow) Preparation Methods List. What are the ways you most commonly prepare** *(Species X)* **when it is (in season)?"**

Record all the methods identified by checking in columns 5a-6f in Table A-4.

18a. **"How many times do you eat** *(Preparation Method (Species X))* **in a typical week or month when** *(Species X)* **is in season?"**

Record times eaten per week or month in columns 5a-6fin Table A-4.

18b. **"Please look at the displays in front of you, or turn to Tab 3 (green) Single Serving Photos. When you** *(Preparation Method) (Species X)* **what is a typical portion size you eat when** *(Species X)* **is in season?"**

Enter portion size as fractions or multiples of and model number into columns 5a-6f in Table A-4. Repeat for each marked "in season" checked entry on A-4

18c. **"Please turn to Tab 2 (yellow) Preparation Methods List. What are the ways you most commonly prepare** *(Species X)* **when it is out of season?"**

Record all the method identified by checking the column 5a-6f in Table A-4.

18d. **"How many times do you eat (***Preparation Method) (Species X)* **in a typical week or month when** *(Species X)* **is out of season?"**

Record times eaten per week or month in columns 5-10 a2in Table A-4.

18e. **"Please turn to Tab 3 (green) Single Serving Photos. When you** *(Preparation Method) (Species X)* **what is a typical portion size you eat when** *(Species X)* **is out of season?"**

Enter portion size as fractions or multiples of and model number into columns 5-10b in Table A-4.Repeat for each marked "out-of-season" checked entry on A-4

19. **"Are there any other seafood, shellfish, or marine mammal species that you ate in the past year that we have not mentioned here?**"

If respondent states an additional species, enter answer in the Other section found at the bottom of Table A-4 and repeat questions #18a through 18f, as appropriate, for this new species.

Table A-4. FFQ: Types, Frequency, and Quantity of Species Eaten in Past Year

Fish Consumption in the past 12 months? (Circle one): Y N

1 Fish Species[1]	2 Check if eaten	3 Check If Different In Season vs. Out	4 Length of period In Season	5 Consumption of Top Preparation Methods When Fish Are In Season[1]												6 Consumption of Top Preparation Methods When Fish Are Out of Season If consumption is the same year round, leave blank.											
				5a Bake/Broil/ Grill		5b Smoke/Dry		5c Canned/ Jarred		5d Fried/ Sautéed		5e In Soup/Stew/ Stir-fry		5f Other		6a Bake/Broil/ Grill		6b Smoke/Dry		6c Canned/ Jarred		6d Fried/ Sautéed		6e In Soup/Stew/ Stir-fry		6f Other	
				Method / Times	Portion/ Model # 2	Method / Times	Portion/ Model # 2	Method / Times	Portion/ Model # 2	Method / Times	Portion/ Model # 2	Method / Times	Portion/ Model # 2	Method / Times	Portion/ Model # 2	Method / Times	Portion/ Model # 2	Method / Times	Portion/ Model # 2	Method / Times	Portion/	Method / Times	Portion/ Model # 2	Method / Times	Portion/	Method / Times	Portion/ Model # 2
ANADROMOUS & FRESHWATER FISH																											
Salmon			W M Y	W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y	
Steelhead/Rainbow Trout			W M Y	W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y	
Dolly Varden Trout			W M Y	W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y	
Eulachon(hooligan /candlefish)			W M Y	W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y	
MARINE – PELAGIC FISH																											
Cod			W M Y	W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y	
Rockfish			W M Y	W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y	
Pollock			W M Y	W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y	
Herring			W M Y	W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y	
Tuna			W M Y	W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y	
MARINE – DEMERSAL FISH																											
Halibut			W M Y	W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y	
Sculpin			W M Y	W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y	

1 Fish Species[1]	2 Check if eaten	3 Check If Different In Season vs. Out	4 Length of period In Season	5 Consumption of Top Preparation Methods When Fish Are In Season[1]												6 Consumption of Top Preparation Methods When Fish Are Out of Season If consumption is the same year round, leave blank.											
				5a Bake/Broil/ Grill		5b Smoke/Dry		5c Canned/ Jarred		5d Fried/ Sautéed		5e In Soup/Stew/ Stir-fry		5f Other		6a Bake/Broil/ Grill		6b Smoke/Dry		6c Canned/ Jarred		6d Fried/ Sautéed		6e In Soup/Stew/ Stir-fry		6f Other	
				Method / Times	Portion/ Model # 2	Method / Times	Portion/ Model # 2	Method / Times	Portion/ Model # 2	Method / Times	Portion/ Model # 2	Method / Times	Portion/ Model # 2	Method / Times	Portion/ Model # 2	Method / Times	Portion/ Model # 2	Method / Times	Portion/ Model # 2	Method / Times	Portion/ Model # 2	Method / Times	Portion/ Model # 2	Method / Times	Portion/ Model # 2	Method / Times	Portion/ Model # 2
Flounder or Sole			W M Y	W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y	
SHELLFISH & OTHER INVERTEBRATES																											
Razor Clams			W M Y	W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y	
Butter Clams			W M Y	W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y	
Pacific littleneck Clam			W M Y	W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y	
Heart Cockle			W M Y	W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y	
Mussels			W M Y	W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y	
Scallops			W M Y	W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y	
Crab			W M Y	W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y	
Shrimp			W M Y	W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y	
Octopus			W M Y	W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y	
Squid			W M Y	W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y	
MARINE MAMMALS & OTHER																											
Sea Lion			W M Y	W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y	
Seal			W M Y	W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y	
Other (Specify)			W M Y	W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y		W M Y	

1. Fish consumption "in season" is based on respondents perception or experience related to harvest and assumed higher consumption (compared to the rest of the year); biological seasons (e.g., fish runs) will be evaluated during data analysis and do not have to correspond to the duration of seasons noted by the respondent.
2. A description of the portion displays is provided in Table A3A.

2.2.2 Parts of Fish Consumed, Sources/Special Events & Gatherings, and Sources

"The next questions are about the parts of fish you eat, methods of preparation, and sources (where acquired) according to species. Those groups are 1) salmon, 2) cod, 3) halibut, 4) crab 5) clams, and 6) seal and sea lion." Complete Table A-5a for the following questions.

20. "**When you eat ___*(species)*_____, of the parts indicated in Table A-5a, state what percent of time you eat any of them."**

    ASK question for 1) salmon, 2) cod, 3) halibut, 4) crab, 5) clams, and 6) seal and sea lion. Record answers in percent (including zero) or leave blank if that species type is not consumed at all. Complete Table A-5a.

21. "**Thinking about where the fish comes from that you eat, what percent of the time do you get *(species)* from the following sources? Your answers should total 100%.**"

    Bought from a store (grocery or market) or a restaurant?
    Caught locally?

    ASK question for 1) salmon, 2) cod, 3) halibut, 4) crab, 5) clams, and 6) seal sea lion. Complete Table A-5a.

"I will now ask questions related to your fish consumption during special events and gatherings, including ceremonies or other community events." Complete the rest of Table A-5b for the following questions.

22. **"In the past year, how many special events and gatherings did you attend (either per week, month or year)?"** (Enter number and circle one unit)

    If zero, skip to next section (3.3), Question #26.

23. **"Please turn to Tab 4 (light blue). Of the following species (salmon, cod, halibut, crab, clams, and seal/sea lion), which have you consumed at these special events/ gatherings?"**

    (Circle Y or N answer in Table A-5b, Leave blank if they don't know or prefer not to answer).

    If YES continue to next question
    If NO or other, skip to next section (3.3), Question #26.

24. **"What was your typical portion size of (*Species X*) at the special events and gatherings?"** Enter portion size and model number chosen in Table A-5b.

ASK question for:
1) salmon,
2) cod,
3) halibut,
4) crab
5) clams
6) seal/sea lion.

Complete Table A-5b. (See portion models.)

25. "**At what percent of the special events and gatherings did you eat *(species)*?**"

ASK question for:
1) salmon,
2) cod,
3) halibut,
4) crab,
5) clams,
6) seal/sea lion.

Complete Table A-5a.

Table A-5a Fish Parts Eaten & Sources

Species:	Salmon	Cod	Halibut	Crab	Clams	Seal/Sea Lion
Percent of Time Typically Eat:						
Fillet						
Skin						
Head & cheeks						
Eggs						
Bones						
Belly fat, flaps, meat						
Other Organs						
Percent of Time Typically Obtained (total 100%):						
From a store or restaurant						
Caught Locally						
Other:						
Don't know						

Table A-5b Special Events & Gatherings

Special Events & Gatherings						
In the past year, number of gatherings you attended (Enter number and circle unit)				Wk	Mo	Yr
Species	**Salmon**	**Cod**	**Halibut**	**Crab**	**Clams**	**Seal / Sea Lion**
Consumed at gatherings? (circle)	Yes No	Yes No	Yes No	Yes No	Yes No	Yes No
Typical Portion size *(enter Portion & Model # – see Table A-3a for list)*						
Percent of time eat fish at gatherings	%	%	%	%	%	%

2.3 Fishing Activities

"I am now going to ask you some questions about fishing."

26. "**Over the past year, did you take part in any fishing-related activities?**" (Check)

_____ Yes _____ No _____ Prefer not to answer (skip to next section).

If YES, continue to question 27.
If NO, ask **"Why not"**? (Check and skip to Section 3.4, Question #31)

___Fish advisories
___Pollution
___Other environmental concerns

___Not enough fish available to catch
___Limited access to fishing areas
___Used to access to boat/fishing gear, not anymore

___Too far from fishing areas
___Too busy, no time
___ No longer custom, prefer other activities

___Prefer other foods
___Don't know how to fish
___Prefer not to answer
___Other _____

27. "**Now I'm going to ask you the approximate number of times you went fishing (for fish and shellfish) each month over the past year, starting in October 2014. How many times did you go fishing during each of the following months?"** (List and enter value for each)

_____ Times in October
_____ Times in November
_____ Times in December
_____ Times in January
_____ Times in February
_____ Times in March
_____ Times in April

_____ Times in May
_____ Times in June
_____ Times in July
_____ Times in August
_____ Times in September
_____ Times in October

28. "**What percent of the seafood that you harvested did you keep for you and your household, what percent did you give/distribute to others outside your household, and what percent did you sell (your answers should total 100%)?**"

_____ Percent Kept
_____ Percent given to others
_____ Percent Sold

100% Total

29. "**Do you own or have access to fishing gear or a boat?**" (Check)

_____ Yes

_____ No

_____ Prefer not to answer

2.4 Changes in Seafood Consumption

"I am now going to ask you questions about changes in seafood consumption and availability. We do not intend to collect ANY culturally-sensitive information."

30. "**Has there been a change over time in your seafood consumption?**" (Check)

_____ Yes _____ No _____ Don't know / Prefer not to answer

If YES, continue to next question.
If NO or other, skip to Question #32.

31a. "**Would you say your consumption of fish and other seafood has increased or decreased?"** (Check)

_____ Increased consumption _____ Decreased consumption

_____ Other change (e.g., available species)_____

31b. "**When did it change?"**

_____ Within past 5 years

_____ In the 2000s (or 5 to 15 years ago)

_____ In the 1990s (or 15 to 25 years ago)

_____ In the 1980s (or 25 to 35 years ago)

_____ In the 1970s (or 35-45 years ago)

_____ In the 1960s or earlier (more than 45 years ago)

31c. "**Would you say it changed for any of the following reasons?"**

_____ Fish or other seafood availability

_____ Changes in seasons or regulations

_____ Changes in quality

_____ Concerns about contamination

_____ Other

31. "**In the past, how important was seafood to your Tribe's heritage and culture?**"

_____ Very important

_____ Somewhat important

_____ Not important

_____ Don't know/ Prefer not to answer

33. "**Currently, how important is seafood to your Tribe's heritage and culture?**"

_____ Very important

_____ Somewhat important

_____ Not important

_____ Don't know/ Prefer not to answer

34. "**Has there been a change in your access to fishing over time?**" (Check)

_____ Yes _____ No _____ Don't know / Prefer not to answer

If YES, continue to next question.
If NO or other, skip to Question #35.

34a. "**Would you say you have more access or less now?"** (Check)

_____ More access to fishing _____ Less access to fishing

34b. "**When did it change?"**

_____ Within past 5 years

_____ In the 2000s (or 5 to 15 years ago)

_____ In the 1990s (or 15 to 25 years ago)

_____ In the 1980s (or 25 to 35 years ago)

_____ In the 1970s (or 35-45 years ago)

_____ In the 1960s or earlier (more than 45 years ago)

34c. "**Why did it change?"**

_____

_____

_____

35. "**Has there been a change in how often you fish (for you or others)?**" (Check)

_____ Yes

_____ No

_____ Don't know / Prefer not to answer

If YES, continue to next question.
If NO or other, skip to Question #36.

35a. "**How has it changed most recently?"** (Check)

_____ Increased frequency _____ Decreased frequency

_____ Other change _____

_____

35b. "**When did it change?"**

_____ Within past 5 years

_____ In the 2000s (or 5 to 15 years ago)

_____ In the 1990s (or 15 to 25 years ago)

_____ In the 1980s (or 25 to 35 years ago)

_____ In the 1970s (or 35-45 years ago)

_____ In the 1960s or earlier (more than 45 years ago)

35c. "**Why did it change?"**

_____ Changes in access to a boat

_____ Changes in seasons

_____ Changes in regulations

_____ Changes in health

_____ Other change _____

_____

36. "**Compared to your seafood consumption now, how much/how frequently would you like to consume seafood in the future?**" (Check)

_____ Increase consumption

_____ Decrease consumption

_____ Maintain same consumption

_____ Don't know / Prefer not to answer

If INCREASED, continue to next question.
If DECREASED or other (maintained or don't know), skip to next section.

37. "**Which of the following would make you want to eat more seafood?**"

_____ Less contamination

_____ Other environmental concerns

_____ Access to boat/fishing gear

_____ More availability to fishing opportunities

_____ Other _____

_____

3.0 GENERAL INFORMATION

The third and final part of the in-person interview involves collecting general information from the respondent and recording final administrative data.

3.1 Respondent Information

Respondents will be asked demographic questions as well as (for female respondents) questions related to breastfeeding history.

"This is the final part of the interview. I have a few general questions and then we will be done. These include reporting your height and weight, which will help us to calculate and check seafood consumption rates, and reporting education and income ranges, which will help us determine seafood consumption rates for various population groups."

38. Gender (check):

    _____ Male

    _____ Female

39. **"What is your age?"** _____ (years)

40. **"What is your height?"** _____ feet _____ inches

41. **"How much do you weigh?"** _____ pounds

42. "**How many people live in your household, including yourself?**" _____

43. "**Do you prepare the food in your household?**"

    _____ Yes

    _____ No

44. "**Is anyone else in your household participating in this survey?**" (Check)

    _____ Yes

    _____ No

    _____ Prefer not to answer

45. "**What is the highest level of education that you've completed?**" (Check)

_____Elementary School

_____Middle School

_____High School / GED

_____Associates Degree

_____Bachelor's Degree

_____Master's Degree

_____Doctorate

_____Prefer not to answer

46. "**What is your approximate household income per year?**" (List all options below, except "prefer not to say" and check)

_____ $15,000 or less

_____ More than $15,000 up to $25,000

_____ More than $25,000 up to $35,000

_____ More than $35,000 up to $45,000

_____ More than $45,000 up to $55,000

_____ More than $55,000 up to $65,000

_____ More than $65,000

_____ Prefer not to answer

The following questions are for female respondents only; if male, skip to next section.

47. "**Have you ever given birth?** (Check)

    _____ Yes _____ No _____ Prefer not to answer

    If YES, continue to next question.
    Otherwise, skip to next section.

48. "**When did you most recently give birth? _____/_____** (MM, YYYY)

49. "**Was this baby ever breastfed or fed breast milk**? (Check)

    _____ Yes _____ No _____ Prefer not to answer

    If YES, continue to next question.
    Otherwise, skip to next section.

50. "**If the youngest child is no longer breastfeeding, at what age did you stop feeding breast milk to this child?"** (Provide in months or check other option)

    _____ Stopped at _____ (months old)

    _____ Still breastfeeding

    _____ Prefer not to answer

    _____ Not applicable (not biological mother, etc.)

3.2 Interview End

Upon completing the interview, the interviewer will offer appreciation and complete the remaining administrative information, including signing a consent form.

"This concludes the interview. If any of your answers included culturally-sensitive information, please tell me."

_____ Yes, included culturally sensitive information

_____ No culturally sensitive information included

_____ Don't know / Prefer not to answer

If YES, this questionnaire will be reviewed by the appropriate Tribal official for that village and culturally sensitive information may be edited or redacted prior to further analysis and review.

"Thank you SO very much for your time and cooperation today. Your participation will contribute significantly to the overall success of this assessment and help protect the health of our Tribe."

Complete information below.

Record interview end time and calculate interview length.

51. End time: _____ AM / PM (circle)

52. Length of interview: _____ (hours and/or minutes)

53. Was the interview conducted in private or were others present? (Check)

    _____ In private

    _____ Others were present

3.3 Post-Interview

Following the interview, the interviewer will assess and record the respondent's level of participation and the interviewer will acknowledge that he/she recorded the information truthfully and to the best of his/her ability by signing the following guarantee of authenticity.

3.3.1 Interview Quality

54. Respondents cooperation: (Check)

_____ Very good
_____ Good
_____ Fair
_____ Poor

55. Respondent's reliability: (Check)

_____ Highly reliable
_____ Generally reliable
_____ Questionable
_____ Unreliable

Notes / Reasons for opinions:

_____
_____
_____

56. Note any topics or specific questions that appeared confusing or particularly challenging for the respondent to answer.

_____
_____
_____
_____
_____
_____

3.3.2 Interviewer Guarantee of Authenticity

57. I, _____ (printed name of interviewer) hereby affirm that the answers recorded on this questionnaire reflect a complete and accurate accounting of my interview with the respondent.

_____
Signature of Interviewer

_____
Date

_____
Initials of Quality Assurance Monitor

Appendix IV: Script Used to Schedule Interviews

1. **Hello, I'm calling on behalf of the ____(name of Tribe and Department_____. May I please speak with ____(name of potential participant)____?** (Enter contact information into Interviewer Contact Activity Log). (See Appendix IV for "Interview Scheduling Contact Activity Log".)

   If YES and potential participant is speaking, or when the potential participant comes to the telephone, continue to Question #2.

   If NO, probe if s/he lives there and, if so, ask, "**When is the best time to reach her/him?**" (Record on Interview Scheduling Contact Activity Log.) "**Okay, thank you for your time. Good bye.**"

   If NO, not living there, ask "**What is the best way to reach her/him?**" (Record new contact information on the Interview Scheduling Contact Activity Log.) "**Okay, thank you for your time. Good bye.**"

2. "**Hello, my name is the ____(your name)_____.** Reintroduce Tribe, if necessary. **We are conducting an assessment to determine the seafood consumption rates within your Tribe. The assessment is endorsed and supported by the ____(name local Tribal Council/other_____. Your information, plus the information of other Tribal members, will help us protect our environment and promote the health of our Tribal members and families. You are free not to answer any of the questions. The scheduled assessment will take 45-60 minutes and for participating there will be a stipend of $20 per interview as compensation for your time. Are you willing to schedule this now?**

   If YES, "**Thank you for agreeing to participate".** (Check box below and continue to Question #3).

   If NO, or I NEED TO THINK ABOUT THIS, ask "When is a good time to call back?" (Record on Interview Scheduling Contact Activity Log). "**Okay, thank you for your time. Good bye.**"

3. "**Do you eat seafood? is the only question I will ask you today."**

   If NO, do not make an appointment for the interview.

4. "**The information that you provide will remain strictly confidential and it will help to protect the health of our Tribe. We will conduct an in-person interview in a convenient location. Your participation is very important. If you do agree to participate, you may withdraw at any time and there would be no consequence for**

you. May we meet with you for the assessment interview? (Record Y or N on Interview Scheduling Contact Activity Log.)
If YES, "**Great, thank you for your willingness to participate in this important assessment. Let's schedule a time and place. We have Tribal interviewers available to meet 7 days a week from 8:00 AM until 7:00 PM. Which day in the next week works best for you?**" IF don't know, schedule a call-back time to set an interview. Record on Interview Scheduling Contact Activity Log and skip to Question #5.

If NO, "**I understand. This assessment is very important. We don't have to do it immediately as we have several days to schedule it. I'd like to call you back at a later date. We want to make sure that we represent the whole tribe.**"
If ACCEPT or SOFT REFUSAL, schedule re-call and skip to #5.
If HARD REFUSAL, "**Okay, thank you for your time today. Good bye.**"

5. "**Finally, for the assessment, we need to note the general location of where you live. The address we have listed for your residence is ____(state address listed on contact sheet)_____. Is that correct?**"

If NO, "**Can you please provide your correct RESIDENCE address (or if you don't know the zip code, the community name?**"

Enter the correct address on the Interview Scheduling Contact Activity Log.

This concludes our interview scheduling. Thank you very much for your cooperation. We appreciate your time today. We will see you at (enter time and date scheduled). Good bye."

Appendix V: Interview Scheduling Contact Activity Log & Disposition Codes for Respondent Contact

Interview Scheduling Contact Activity Log

Respondent Name:							Respondent ID#:	
Respondent Gender:								
Respondent Telephone Number (*strike out incorrect numbers; record new):*								
When Called					**Who Contacted**		**Results (of call & questions)**	
Attempt	Date	Day	Time	Circle	Caller Name	Caller ID	Codes	Notes
1				AM PM				
2				AM PM				
3				AM PM				
4				AM PM				

Schedule in-person interview? (circle, enter): YES / NO (If NO, enter call back time at top of form)

Location of interview: (At central location, such as Tribal offices or in home?)

Date:_____(mm/dd/yyyy) **Day:**_____ **Time:**_____ am/pm **Location:**_____.

Address verified: :

:

Disposition Codes for Respondent Contact

01	Completed interview
02	Mid-termination
03	Hard Refusal
04	Invalid number: out of service, disconnected, busy
05	No answer
06	Busy signal
07	Answering machine
08	Appointment set
09	Language barrier: non-English
10	Impairment: hearing, mental health, other
11	Deceased respondent
12	Other (Please Specify)
13	Soft Refusal
14	Email attempt
15	Acquaintance / family lookup
16	Online lookup
17	Household visit

Appendix VI: Kodiak Tribes Seafood Consumption Assessment Project Training Plan for Interviewers

Training Plan for Interviewers

The purpose of the Interviewer is to travel to the various villages and conduct interviews with tribal members.

Trainer and Point of Contact: Project Investigator

Necessary Needs and Skills

- The ability to work without supervision and possibly long hours.
- Legible writing skills.
- Ability to speak with potential respondents in a natural, friendly and yet business-like manner.
- Preference will be given to tribal members or staff members with familiarity to the QAPP and subsistence culture in general.

Training Materials

- Copy of the QAPP, including the questionnaire form, confidentiality statement and consent form.
- EPA Guidance for Conducting Fish and Wildlife Consumption Surveys: *http://water.epa.gov/scitech/swguidance/fishshellfish/techguidance/upload/1999_11_05_fish_fishguid.pdf*.
  Read only: **Section 2,** Survey Objectives and Information Needs, pages 2-1 through 2-9, **Section 3**, Survey Approaches and Selection Criteria, items 3.2 Types of Surveys, 3.2.4 **Section 4**, Personal Interview through 4.8.5, as these selections deal with only the Personal Interview
- Interview binder as a follow along guide for the interviewee.

Training Steps and Methods

1. A series of pilot interviews will be held in the Sun'aq offices to familiarize the Interviewers with the questionnaire and how it flows. Each interviewer will act as the Interviewer, Interviewee, and Quality Assurance Monitor, to better understand all the roles within the assessment.
2. After each pilot interview, a debriefing will occur, and revisions will be made, if necessary.

Appendix VII: Kodiak Tribes Seafood Consumption Assessment

Charge to Peer Reviewers

REVIEWER EXPERTISE FOR SPECIFIC CHARGES:

Charges 1-4: All of the following areas must be a documented area of expertise of at least one reviewer:

a) Nutritional survey design, but expertise on fish consumption surveys will be adequate.

b) Survey implementation.

c) Statistical approaches needed to develop fish/seafood consumption rates from survey data, including use of stratification, weighting, methods for calculation of confidence intervals from survey data, analysis of food frequency data, and development of current fish consumption rates from short term dietary recall data. (The National Cancer Institute method (NCI) was not used in the Kodiak study).

CHARGES:

Charge 1: Review methodology and comment on the appropriateness of methodology elements used to derive quantitative estimates of current fish consumption rates (FCR)s. Specific items to be reviewed include:

a) The appropriateness of food frequency questionnaire to develop FCR estimates
b) Selection of a representative sample.
c) Estimation of numbers of interviews required.
d) The use of personal interviews to collect data.
e) The use of tribal interviewers.
f) The quality and comprehensiveness of tribal interviewer training.
g) The survey instrument.
h) The models used to quantify portion sizes and images used to identify species.
i) Procedures for securing personally identifiable information.
j) Procedures for guaranteeing accurate transcription of data.
k) Procedures for guaranteeing the security of data.
l) Assess impact of publicity efforts (radio, newspaper, bulk mailing, etc.)
m) Assess impact of honorarium incentives provided to survey participants

Charge 1 supporting materials:

S1: Survey design document.
S2: Photos of portion model types.
S3: Photos of species images.
S4: Interviewer training manual/materials.

Charge 2: Review adequacy and appropriateness of survey element implementation to estimate current FCRs. Specific elements to review include:

a) Selection of a representative sample.
b) Biases present in collection of data.
c) Data recording accuracy.
d) Data transcription accuracy.

Charge 2 supporting materials: Survey reports.

Charge 3: Review adequacy and appropriateness of data analysis used to develop current FCRs. Specific elements to review include:

a) Actual approaches used to implement computation of FCRs based on food frequency questionnaires.
b) Factors considered in analysis.
c) Assumptions made in analysis.
d) Use of statistical weighting.
e) Presentation of and methods for estimating uncertainty of estimates.

Charge 3 supporting materials: Survey reports. Any statistical routines used for analysis.

Charge 4: Review adequacy and appropriateness of estimated current FCRs and accompanying information. Specific elements to review include:

a) Clarity, accuracy, and adequacy of figures and graphs depicting various aspects of current fish consumption.
b) Identification of assumptions made in the analysis and the impacts of those assumptions, including quantification of those impacts where possible.
c) Completeness in identification and description of potential biases, and, where possible, direction and magnitude of bias.
d) Completeness in identification and description of uncertainties, and where possible the direction and magnitude of uncertainty.

Charge 4 supporting materials: Survey reports.

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