

Technical Report

San Francisco Bay Seafood Consumption Report

This study was conducted by
Environmental Health Investigators Branch (EHIB)
of the California Department of Health Services
Impact Assessment Incorporated



Acknowledgments

Environmental Health Investigations Branch, California Department of Health Services

Diana M. Lee, Research Scientist
Alyce Ujihara, Research Scientist
Daniel Smith, Chief, Exposure & Molecular Epidemiology Section
Martha Harnly, Research Scientist
Christine Arnesen, Chief, Community Relations Section
Bob McLaughlin, Associate Information Systems Analyst
Ceciley Wilder, Office Technician

Impact Assessment, Incorporated

Ian Walker, Community Relations Coordinator
Gloria Cardona, Field Coordinator
Debbie Goldberg, Research Specialist
Lauren Wohl, Graphic Artist
Sheila Albanes, Field Interviewer
Courtney Albrecht, Field Interviewer
Yoko Chavez, Field Interviewer
Jeffrey Chu, Field Interviewer
Quy Dao, Field Interviewer
Melissa Hardy, Field Interviewer
Angel Lai, Field Interviewer
Jeene Nghiem, Field Interviewer
Javier Nunton-Lino, Field Interviewer
Cong Pham, Field Interviewer
Ellen Pinson-Rose, Field Interviewer
Adrienne Yang, Field Interviewer

San Francisco Estuary Institute

Rainer Hoenicke, Project Manager
Michael May, Assistant Environmental Scientist
Patricia Chambers, Graphic Designer

This report is the product of the efforts of many people. The Seafood Consumption Task Force guided this study through its many challenging phases, and its members' contributions are gratefully acknowledged. We greatly appreciate the numerous comments and suggestions from many reviewers and the efforts by key Regional Monitoring Program participants in helping develop communication tools to disseminate important study results.

SFEI. 2000. San Francisco Bay Seafood Consumption Study. San Francisco Estuary Institute, Richmond, CA.

TABLE OF CONTENTS

Section Title	Page Number
I. Background/Goals	8
A. Overview.	8
B. Study Area.	8
C. Study Justification.	8
D. Goals and Objectives of the San Francisco Bay Seafood Consumption Study.	10
E. Previous and Ongoing Studies and Outreach Activities.	10
II. Study Design, Implementation, and Management	12
A. Study Administration and Staff.	12
B. Sampling Plan.	13
1. Survey Method	13
2. Sample Size Estimate	13
3. Allocation of Sampling Effort	15
4. Site Selection	16
5. Sampling Days and Times	16
C. Survey Instruments	18
1. Questionnaire	18
2. Fish Pictures	18
3. Fish Fillet Model	19
4. Census Form	19
5. Site Summary Form	19
6. Survey Incentives	19
7. Survey Tools	19
D. Field Survey Methods.	20
E. Field Activities Summary.	21
III. Data Management, Quality Assurance and Control, and Data Analysis	21
A. Data Management.	21
B. Verification of Interviews by Phone.	21
C. Quality Assurance (QA) and Quality Control (QC) Measures.	22
D. Data Analysis	22
1. Avidity Bias	22
2. Calculation of Fish Consumption Rate	23
3. Shape of the Consumption Rate Distribution	24
4. Statistical Methods	24
IV. Results	25
A. Sampling Success	25
B. Decliners	28
C. Angler Characteristics	29
1. Ethnicity	32
2. Language Spoken During Interview	32
3. Income	33

TABLE OF CONTENTS (Cont'd.)

4. Education	34
5. Gender	34
6. Age Structure	35
7. Season of Interview	35
8. Years Eating Bay Fish	36
9. Fish Fate	36
10. Household Members Who Eat Bay Fish	36
11. Who Prepares or Cooks SF Bay Fish	37
D. Fish Consumption Characteristics	37
1. Bay Fish Consumption Rates	38
2. Differences among Demographic Subgroups	43
3. Highly Exposed Consumers	44
4. How Decliners May Affect Consumption Rates	49
5. Commonly Consumed Species	51
6. Fish Parts Consumed and Fish Preparation Practices	53
7. Consumption of Fish Caught from Outside SF Bay and Commercial Sources	57
8. Shellfish Consumption	60
E. Health Advisory Questions	60
1. Awareness of San Francisco Health Advisory	61
2. Comprehension of Health Advisory	63
3. Awareness and Comprehension of Advisory and Consumption Rates	63
4. Behavioral Changes in Fish Eating Habits	64
5. How Anglers Prefer to Receive Information about Fish	66
6. Discussion Groups	67
V. Discussion and Conclusions	67
A. Sampling Success and Angler Characteristics	68
B. Fish Consumption Rates	69
1. Consumption Rates Among Recent Consumers	69
2. Consumption Rates Among Consumers	71
3. Per Angler Consumption Rates	72
4. Influence of the Portion Size Model	72
5. Avidity Bias Adjustment	72
C. Consumption Rate Differences Among Ethnic Groups	73
D. Interpretation of Above Advisory Consumers	74
E. Consumption Patterns	75
F. Consumption of Fish From Other Sources	75
G. Health Advisory	76
H. Highly Exposed Populations	77
I. Study Strengths and Limitations	78
VI. Recommendations	80
A. Recommendations for Outreach and Education Activities	80
B. Recommendations for Community Involvement	82
C. Recommendations for Further Study	82
VII. References	83

List of Appendices

Appendix A	1994 Interim Health Advisory for the San Francisco Bay
Appendix B	Education and Outreach Taskforce on Fish Consumption and Fish Contamination Issues
Appendix C	San Francisco Seafood Consumption Study Advisory Task Force and Reviewers
Appendix D	Sample Design, Site Selection, and Sampling Schedule
Appendix E	Questionnaire (English and Spanish)
Appendix F	Survey Tools
Appendix G	Field Interviewer Training Manual
Appendix H	Field Activities Summary
Appendix I	Coding for Text Entries
Appendix J	Defining Consumers and Derivation of Consumption Rates
Appendix K	Data Tables for Section IV. Results
Appendix L	Health Advisory Discussion Groups

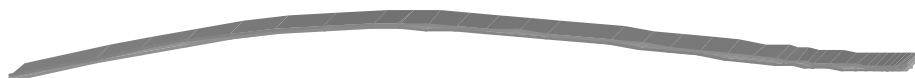
List of Tables

Table 1.	Target Number of Interviews and Interviewer Hours by Fishing Mode	15
Table 2.	Sampling Success by Mode	26
Table 3.	Meal Frequency for Recent Consumers Based on Four Week Recall	39
Table 4.	Consumption Rates in Grams/Day (g/d) for Recent Consumers Based on Four Week Recall	41
Table 5.	Consumption Rates in Grams/Day (g/d) for Consumers Based on Four Week and 12 Month Recall	41
Table 6.	Consumption Rates in Grams/Day (g/d) for Respondents Based on Four Week and 12 Month Recall	42
Table 7.	Consumption of Fish from Outside SF Bay and Commercial Sources among Recent Consumers of SF Bay Fish (n=465, adjusted)	59
Table 8.	Comparison of Decliners among San Francisco Bay Seafood Consumption Study, Santa Monica Bay Study and Save the Bay Study	68
Table 9.	Comparison of Ethnic Groups among Respondents for San Francisco Bay Seafood Consumption Study, Santa Monica Bay Study and Save the Bay Study	69
Table 10.	Comparison of Consumption Rates (g/d) for San Francisco Bay Seafood Consumption Study, Santa Monica Bay Study and Save the Bay Study	70
Table 11.	Comparison of Geometric Mean Consumption Rates (g/d) by Ethnicity (unadjusted) for San Francisco Bay Seafood Consumption Study and Santa Monica Bay Study	73
Table 12.	Minimum Sample Sizes Needed for Detection Consumption Rate Differences between Two Groups of San Francisco Bay Anglers	74
Table 13.	Comparison of Sport Fish and Total Fish Consumption Rates (g/d, unadjusted) Between San Francisco Bay Recent Consumers and Michigan Anglers	76
Table 14.	Comparison of Awareness to Health Advisories among Respondents of the San Francisco Bay Seafood Consumption Study, Save the Bay Study, OEHHA Study and Santa Monica Bay Study	76
Table 15.	Comparison of Sources of Health Advisories Information among Respondents of San Francisco Bay Seafood Consumption Study, Save the Bay Study and OEHHA Study	77

List of Figures

Figure 1	Map of Study Area	9	Figure 27	Geometric Mean Consumption Rate by Ethnicity (Including Asian Subgroups) among Recent Consumers	45
Figure 2	Confidence Limits Around Estimated Frequencies	14	Figure 28	Anglers Consuming Above and Below the Advisory	46
Figure 3	Map of Sampling Sites	17	Figure 29	Demographic Characteristics of Anglers Consuming Above and Below the Advisory	47
Figure 4	Outcome of Attempted Angler Interviews ...	27	Figure 30	Percentage of Anglers Consuming Above Advisory Recommendations	48
Figure 5	Proportion of Interviews by Fishing Mode	27	Figure 31	Demographic Characteristics of Anglers with Consumption Rate in the Top 5% (>32 g/d) and bottom 95%	50
Figure 6	Reason for Declining Interview	28	Figure 32	Consumers of White Croaker, Leopard Shark, and Striped Bass by Demographic Factors ...	52
Figure 7	Ethnicity of Interviewed Anglers and Observed Ethnicity of Anglers Declining Interview	28	Figure 33	San Francisco Bay Fish Species Consumed by Anglers with Recent Fish Consumption	53
Figure 8	Proportion of Interviews by Ethnicity	29	Figure 34	Demographic Characteristics of Recent Consumers of Halibut and Jacksmelt	54
Figure 9	Demographic Comparison of Study Respondents with Bay Area Population	30	Figure 35	Fish Parts Consumed and Fish Preparation Practices among Consumers	55
Figure 10	Comparison of Ethnicity Among Recent Consumers, Consumers, and Respondents ...	30	Figure 36	Demographic Characteristics of Consumers of Striped Bass Skin, Cooking Juices, and Raw	56-58
Figure 11	Ethnicity of Consumers by Fishing Mode ...	31	Figure 37	Consumption of Fish Caught Outside of SF Bay by Recent Consumers of SF Bay Fish ...	59
Figure 12	Fishing Mode of Consumers by Ethnicity ...	32	Figure 38	Consumption of Fish from Stores or Restaurants by Recent Consumers of SF Bay Fish	60
Figure 13	Household Income of Consumers by Fishing Mode	33	Figure 39	Demographic Characteristics of Recent Consumers of Crab	61
Figure 14	Household Income of Consumers by Ethnicity	33	Figure 40	Awareness of Health Advisory by Demographic Characteristics	62
Figure 15	Education of Consumers by Fishing Mode ..	34	Figure 41	Comprehension of Health Advisory among Consumers with Awareness of Advisory	62
Figure 16	Education of Consumers by Ethnicity	34	Figure 42	Geometric Mean Consumption Rate of Recent Consumers and Their Awareness of Health Advisory	64
Figure 17	Age of Consumers by Fishing Mode	35	Figure 43	Health Advisory Awareness of Above and Below Advisory Consumers	65
Figure 18	Season of Interview among Consumers by Fishing Mode	35	Figure 44	Anglers' Behavior Changes in Response to Health Advisory	65
Figure 19	Season of Interview among Consumers by Ethnicity	36	Figure 45	Percentage of Fish Consumers Who Changed Their Behavior Due to Advisory	66
Figure 20	Fish Consumption by Other Household Members of Consumers	37	Figure 46	Preferred Methods for Receiving Fish Information	67
Figure 21	Portion Size Responses of Anglers with Fish Consumption	38			
Figure 22	Portion Size among Consumers	39			
Figure 23	Consumption Rate among Anglers, Based on a 4-Week Recall	40			
Figure 24	Geometric Mean Meal Frequency by Ethnicity (Major Groups) among Recent Consumers	43			
Figure 25	Geometric Mean Meal Frequency by Ethnicity (Including Asian Subgroups) among Recent Consumers	44			
Figure 26	Geometric Mean Consumption Rate by Ethnicity (Major Groups) among Recent Consumers	45			

San Francisco Bay Seafood Consumption Study



I. Background/Goals

A. Overview

Elevated levels of mercury and organochlorine compounds in fish from San Francisco Bay have raised public concern regarding potential health risks to those who catch and consume fish from the Bay. In response to this concern, the Regional Monitoring Program for Trace Substances (RMP) decided to conduct a comprehensive Seafood Consumption Study of people who catch and consume fish and shellfish from the Bay. The San Francisco Estuary Institute (SFEI), which administers the RMP, contracted with the Environmental Health Investigations Branch (EHIB) of the California Department of Health Services and Impact Assessment, Inc. to conduct this study. Information gathered through the study will be used to assess anglers' exposures to chemicals from eating Bay fish and to identify highly exposed populations. Additionally, the findings will provide information for improving outreach and education to different segments of the fishing population and for guiding contaminant studies to monitor fish that people consume.

B. Study Area

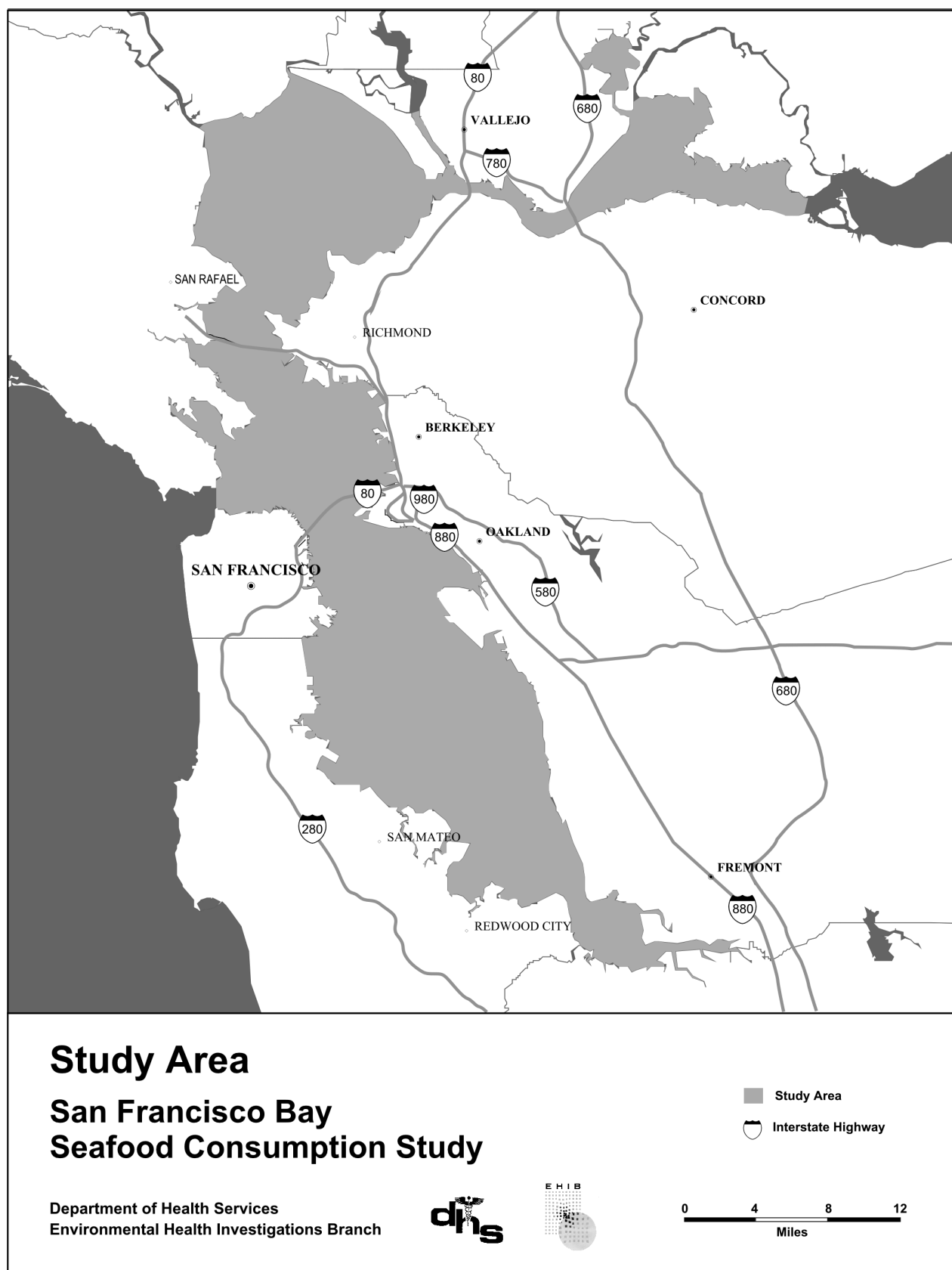
San Francisco Bay (SF Bay) is an important recreational fishing area in California. The Bay covers 478 square miles (marine and estuarine waters) and the nine counties bordering the Bay support a population of over six million (ABAG 2000, CDOF 2000). The study area was defined to include the San Francisco Bay within the Golden Gate Bridge, including San Pablo Bay in the north (see Figure 1). To the east, the study area included the Carquinez Straits and Suisun Bay to Chipps Island (near the city of Pittsburg).

C. Study Justification

Nationwide, there is increasing analytical evidence and growing public concern that fish and shellfish caught and consumed by anglers may contain chemical contaminants that pose health risks (USEPA 1998). To quantify these risks, contaminant levels in fish and the consumption patterns of the fishing population must be understood. To date the Santa Monica Bay Study (Allen *et al.* 1996, SCCWRP/ MBC 1994) of a Los Angeles area population has provided the best available data set for estimating consumption of sport fish in a California population (Gassel 1997). However, the United States Environmental Protection Agency (USEPA 1998) recommends using or collecting data on regional consumption patterns and population characteristics in order to estimate exposure for the local population(s) of concern. Although several studies have begun to characterize levels of contaminants known to pose health risks in Bay fish (SFEI 1999, SFRWQCB 1995), information that describes the consumption patterns of Bay anglers has been more limited and mostly focused on selected populations (Karras 1998, Ujihara 1997, Wong *et al.* 1997, Cohen 1995, EHIB 1994). Consumption patterns include the quantity of fish consumed over time, the species and the parts of the fish consumed, and the preparation and cooking methods used.

Furthermore, little is known about the demographic characteristics of the people who eat Bay fish and how well they understand health advisories for SF Bay fish. Demographic information is needed so that health advisories on fish may be communicated appropriately and effectively. Gathering both consumption and demographic information from people fishing in San Francisco Bay will enable outreach and educational efforts to target populations facing the highest health risks. Because comprehensive data on fish consumption patterns of SF Bay anglers did not exist, we undertook this study to provide this information.

Figure 1. Study Area



D. Goals and Objectives of the San Francisco Bay Seafood Consumption Study

Goals:

1. To gather quantitative data that can be used to characterize exposures of the general fishing population of San Francisco Bay to chemical contaminants from consumption of Bay-caught fish and shellfish
2. To identify highly exposed fish and shellfish consuming sub-populations
3. To gather information needed to develop educational messages for targeted sub-populations

Objectives:

1. Develop estimates of exposure assessment parameters (fish and shellfish consumption, frequency, duration of exposure, and portion size) for San Francisco Bay anglers
2. Characterize pier, boat, and shore fishing populations by age, sex, income, ethnic composition, education, mode of fishing, and consumption rates
3. Characterize consumption of fish tissues other than muscle, such as skin and organs, and preparation/cooking methods
4. Determine which species are most commonly consumed; assess frequency of consumption of white croaker, striped bass, and leopard shark
5. Characterize what people do with the fish they catch and the shellfish they harvest (e.g., release it, eat it themselves, share it with family or friends, etc.)
6. Characterize seasonal variation in consumption and demographics
7. Characterize frequency of consumption of fish from stores and markets, and of fish and shellfish obtained from fishing outside of San Francisco Bay (including freshwater and marine locations)
8. Assess awareness of current health advisories and changes in behavior as a result of awareness (e.g., decreased consumption)
9. Identify how people currently are informed about advisories and their preferred mechanisms for obtaining information
10. Identify anglers' reasons for catching and consuming fish and shellfish
11. Determine whether anglers think the term "sportfish" refers to the fish they catch from San Francisco Bay

E. Previous and Ongoing Studies and Outreach Activities

In 1994, the San Francisco Bay Regional Water Quality Control Board (Regional Board) conducted a pilot study to determine the levels of chemicals found in fish commonly caught in San Francisco Bay (SFBRWQCB 1995). Over 100 chemicals were measured, but only six (mercury, polychlorinated biphenyls (PCBs), dioxins, dieldrin, chlordane, and DDT) were found in concentrations of potential health concern to people who regularly consume fish from the Bay. Of the eight species of fish sampled, white croaker, commonly referred to as kingfish, had the highest concentrations of organochlorines, while shark and striped bass had the highest concentrations of mercury.

In 1997, the Regional Board and the RMP conducted a follow-up contaminant study of SF Bay fish. The results of this study indicated that persistent toxic chemicals (mercury, PCBs, and other organochlorine compounds) in SF Bay fish remain at levels of human health concern (SFEI 1999). In 1999 the Regional Board and the RMP decided to incorporate monitoring bioaccumulative contaminants in fish tissue into the status and trends monitoring component of the RMP on a three-year cycle. The RMP and the Regional Board are planning additional projects to: 1) develop food web and mass balance models, 2) identify and quantify sources and loadings of mercury and PCBs, and 3) develop implementation plans for the reduction of mercury and PCBs (SFEI 2000).

In response to the results of the Regional Board's 1994 pilot study, the Office of Environmental Health Hazard Assessment (OEHHA) within the California Environmental Protection Agency issued an interim health advisory for SF Bay in 1994 (OEHHA 1994). This advisory replaced an earlier advisory issued in 1972 for SF Bay and the Delta region that recommended limits on striped bass consumption due to mercury contamination. The 1994 interim advisory recommends that adults limit their consumption of most species of fish caught from SF Bay to no more than two meals per month. Pregnant and breastfeeding women, women who may become pregnant, and children under six years of age are advised to eat no more than one meal per month. The health advisory recommends that meal size should be adjusted according to body weight, with roughly 1 ounce of fish per 20 pounds of body weight. Thus, meal size for an adult weighing 154 pounds (70 kg) is considered to be an 8-ounce portion prior to cooking (see Appendix A for the full advisory).

Limited data characterizing fishing populations and their consumption patterns exist for the San Francisco Bay Area. A few small surveys have gathered consumption and demographic data on selected populations at fishing piers or shores (Karras 1998, Ujihara 1997, Wong *et al.* 1997, Cohen 1995, EHIB 1994). A household-based survey of Laotians in Contra Costa County also found that the majority of households had members who fished in the Bay (Chiang 1998). The surveys conducted by Save San Francisco Bay Association and Communities for a Better Environment (Karras 1998, Wong *et al.* 1997, Cohen 1995) suggested that health risks from consumption of San Francisco Bay fish may be quite high for certain populations. Additionally they highlighted the need for expanded outreach and education to certain populations. However, the restricted scope of these surveys limits their usefulness for characterizing exposures of the overall fish-consuming population in SF Bay.

A 1991-92 survey, commonly referred to as the Santa Monica Bay Study, provided detailed consumption data for the population fishing in the marine waters of the Los Angeles area, namely the Santa Monica Bay, Palos Verdes Peninsula, and Los Angeles/Long Beach Harbor areas (Allen *et al.* 1996, SCCWRP/MBC 1994). OEHHA has recommended using the distribution of consumption rates derived from the Santa Monica Bay Study as default values for California fishing populations when local consumption data are not available (Gassel 1997). However, due to differences in the types of fish commonly caught, the ethnic composition of the population, and other factors, the Santa Monica Bay Study results may not accurately characterize the SF Bay fishing population.

An ongoing survey, the Marine Recreational Fishery Statistics Survey (MRFSS), which in California is implemented by the Pacific States Marine Fisheries Commission for the National Marine Fisheries Service, covers a broad range of fishing activity and focuses on the species and quantity of fish caught by sport anglers. No consumption data are collected and only limited demographic information is obtained for the fishing population (NOAA/PSMFC 1997, Karpov *et al.* 1995).

With respect to outreach and education activities, in 1993, OEHHA originally convened the Education and Outreach Task Force on Fish Consumption and Fish Contamination Issues. The task force was initiated in response to concerns raised by environmental and community groups about the

lack of accessible information to anglers on health advisories in SF Bay. In particular, concerns focused on the lack of posted signs, lower literacy educational materials, and education and outreach materials in languages other than English. In 1997, EHIB assumed responsibility for coordinating the Education and Outreach Task Force on Fish Consumption and Fish Contamination Issues. The Task Force members currently include individuals representing environmental and community groups, and local, county, and state agencies (see Appendix B). A variety of educational activities has been conducted by Task Force members, including presentations to adult groups taking English as a second language classes, fish cleaning and cooking demonstrations, creating displays for community fairs, and development and distribution of signs, informational brochures, and postcards with health advisory information available in multiple languages. In particular, Save San Francisco Bay Association's Seafood Consumption Information Project conducted extensive outreach and education activities prior to the implementation of the SF Bay Seafood Consumption Study (Wong *et al.* 1997). OEHHA has also translated the SF Bay advisory into Chinese, Vietnamese, Korean, Cambodian, and Spanish, and developed other educational materials. In 1995, OEHHA staff conducted a survey to assess sign effectiveness and angler awareness at Berkeley Pier (Russell *et al.* 1997). To date, Task Force members have arranged for signs publicizing the health advisory to be posted at 21 fishing sites.

II. Study Design, Implementation, and Management

A. Study Administration and Staff

The RMP formed a Seafood Consumption Advisory Task Force to provide technical support and to review all aspects of the study. The Task Force originated as a subgroup of the RMP's Fish Contamination Committee that provided technical support for designing and implementing fish sampling and contamination studies. Extensive efforts were made to expand the Task Force's membership to include all interested parties in the planning of the study, such as angler groups, environmental organizations, and community groups. Unfortunately, time and resource constraints limited the full participation of some of these groups. Members of the Task Force included representatives from federal, state, and local governmental agencies, academic institutions, environmental organizations, fishing groups, and industry groups (see Appendix C).

Project staff and Task Force members expended considerable time and effort to develop a study design that would allow for the study objectives to be met and also allow for the study to be carried out within the allocated budgetary resources. Project staff reviewed materials available from the United States Environmental Protection Agency (USEPA 1992), the American Fisheries Society (Pollock 1994), and methods and information available from other angler studies. These mainly included studies of SF Bay anglers (Ujihara 1997, Wong *et al.* 1997), the MRFS Survey (NOAA/PSMFC 1997), and the Santa Monica Bay Study (SCCWRP/MBC 1994). Project staff also consulted with recognized experts in areas such as biostatistics, survey design, questionnaire development, and fisheries management. During the study design phase (October 1997 through June 1998), Task Force members reviewed all study protocols and materials developed by project staff.

During the study implementation and data collection phase (July 1998 through June 1999), project staff provided progress reports and preliminary data to Task Force members on a regular basis. From July 1999 through December 2000 (data analysis and report generation phase), Task Force members also reviewed data analysis methods and drafts of this report.

The study was primarily conducted under the direction of staff within the Environmental Health Investigations Branch (EHIB) of the California Department of Health Services. None of the state staff were supported with contract funds. Contract funds were used to support a community relations coordinator (10% FTE), a graphic artist (5% FTE), a team of interviewers, and a half-time field coordinator. A research specialist conducted data analysis after all field data collection activities were completed.

Ten field interviewers were hired beginning in May 1998. They included five Spanish-speaking field interviewers, two Vietnamese-speaking interviewers, and two Chinese (Cantonese and Mandarin) speaking interviewers. One solely English-speaking interviewer had previous experience interviewing party boat anglers and was hired to conduct interviews of party boat anglers. The RMP also allocated a staff person who was solely English speaking to serve as a back-up interviewer when none of the regular interviewer staff were available.

Orientation and training of field interviewers occurred during May and June 1998 and included visits to all sampling sites. Interviewers practiced administering the questionnaire initially with project staff and in the field at sites not included in the sampling plan.

B. Sampling Plan

In order to derive exposure estimates applicable to the overall population of SF Bay anglers, we developed a sampling plan that would allow us to interview a representative sample of all anglers fishing in SF Bay. The key elements of our sampling plan are described below. A more detailed description is also provided in Appendix D.

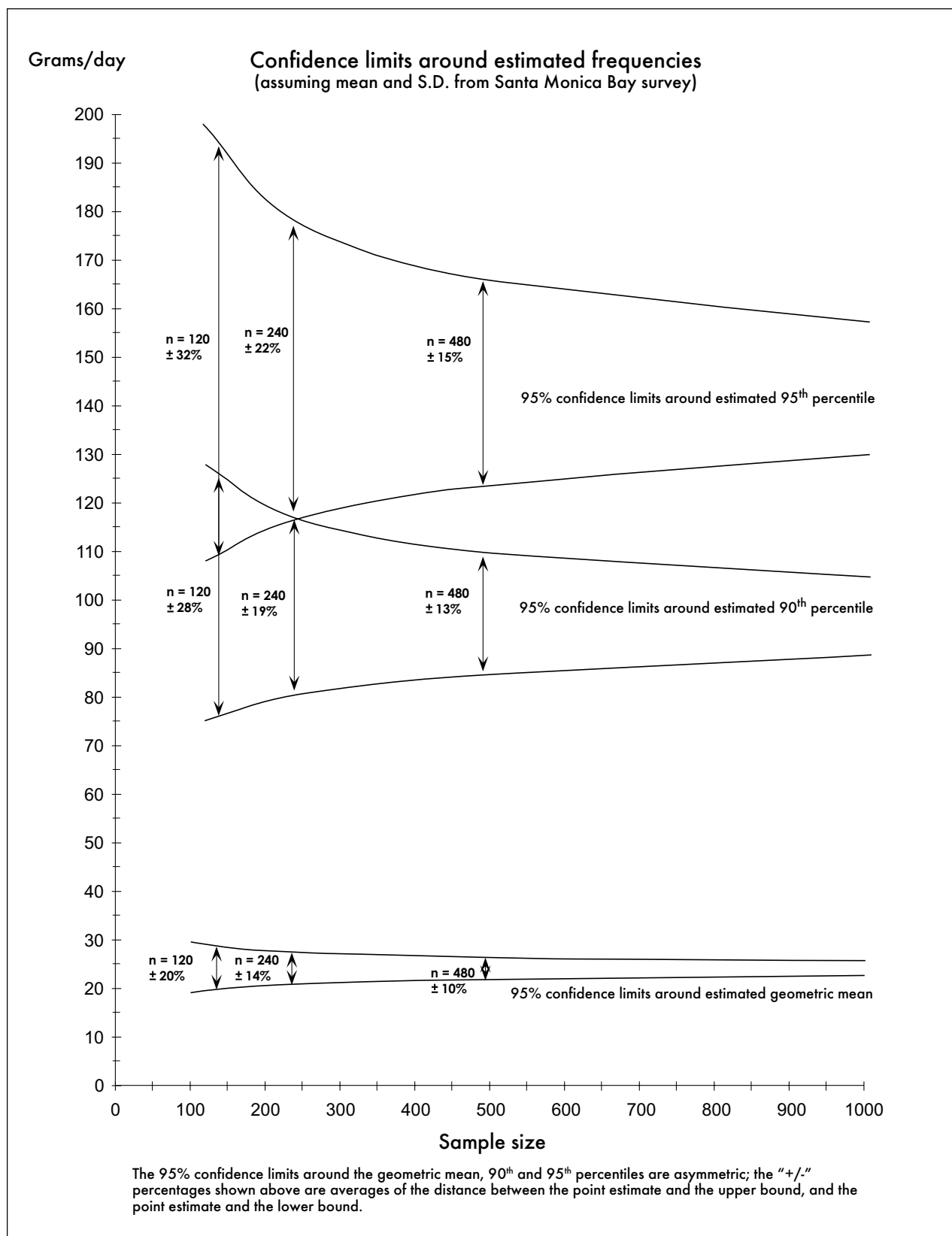
1. Survey Method

We chose on-site personal interviews as the survey method to gather fish consumption and demographic information from anglers. These interviews were conducted over a twelve-month period (July 1998 through June 1999) at selected fishing sites throughout SF Bay. Off-site methods such as mail and phone surveys were not selected because in California, no comprehensive list of anglers from fishing licenses or other sources was available when this study was being planned. Even if such a list had been available, it would not be complete for SF Bay anglers because fishing licenses are not required for fishing at public piers in California (CDFG 2000). A significant amount of fishing activity occurs on public piers in SF Bay, and the proportion of pier anglers with licenses is not known. Additionally, on-site personal interviews conducted by bilingual interviewers would enhance participation of respondents who may have difficulty understanding written questionnaires due to cultural or language barriers or low literacy. Finally, because of the importance of estimating consumption rate, we chose to use a physical model of a fish fillet in order to elicit information about the quantity of fish typically eaten by the angler. The use of the fillet model required personal interviews.

2. Sample Size Estimate

We set a sample size target based on the minimum number of interviews needed to estimate a reasonably precise mean consumption rate. The consumption rate was derived from the subset of anglers who consumed fish caught from SF Bay in the four weeks prior to the interview — a group we refer to as “recent consumers.” In choosing a four-week time period, we sought to maximize the time period over which a consumption rate estimate could be made while minimizing recall bias. In addition, to date the Santa Monica Bay Study (SCCWRP/MBC 1994) has provided the best estimates of fish consumption rates from a California population. This study also used a four-week recall to estimate consumption rate. By using a similar method to define consumption rate, we could compare rates derived from both studies.

Figure 2. Confidence Limits



We used consumption rate data from the Santa Monica Bay Study to estimate a target sample size for this study. Using the mean and standard deviation from the Santa Monica Bay Study, we calculated confidence limits around a geometric mean and upper percentiles (90th and 95th) for different sample sizes (Hahn and Meeker 1991). Figure 2 shows that for a sample size of $n = 480$, the 95% confidence limits average $\pm 10\%$ around a geometric mean. At $n = 480$, the 95% confidence limits around the 90th and 95th percentiles are slightly larger ($\pm 13-15\%$). As can be expected, the width of the confidence limits decreases as the sample size increases. Figure 2 also shows that as the sample size increases beyond $n = 480$, little increase in precision of the consumption rate estimate is gained. We considered a 95% confidence limit of $\pm 10-15\%$ to be reasonable and thus selected $n = 480$, or $n \sim 500$, as our target sample size for the group of recent consumers.

Based on our target number for recent consumers, we then estimated the number of anglers we would need to approach to obtain completed interviews of 500 recent consumers. Based on information from the Santa Monica Bay Study and two small shore-based angler surveys conducted in SF Bay (Ujihara 1997, Wong *et al.* 1997), we estimated that 25% of attempted interviews with anglers would yield interviews of recent consumers. Thus, we would need to attempt about 2000 interviews to reach our goal of interviews of 500 recent consumers.

We did not plan the study to obtain sample sizes of subgroups that would be large enough to show consumption rate differences between subgroups, such as ethnic groups. To be able to detect statistically significant differences in consumption rates between subgroups, consumption rate differences or the subgroup size would need to be relatively large. Based on data from the Santa Monica Bay Study, we estimated that a subgroup of 50 or more would be needed to detect a two-fold difference in consumption rates, or a subgroup of 100 or more would be needed to detect a 1.5 fold difference.

3. Allocation of Sampling Effort

The two key elements of our sampling plan were: (1) the sample would reflect the relative amount of fishing activity among fishing modes and other factors, and (2) the study expenses would not exceed our budgetary resources. We developed target numbers of interview attempts for each of three fishing modes based on the relative proportion of fishing activity for each mode within SF Bay. The three modes were defined as shore-based (which included pier and beach and bank sites), private boat, and party boat. Using fishing pressure estimates developed by the MRFSS (Roper 1997), we estimated about 62% of SF Bay fishing activities were conducted from shore-based sites, 28% from private boats, and 10% from party boats.

We also estimated the field interviewer hours available to conduct interviews and allocated these to the three modes. Budgetary limitations resulted in a reduction from our original target of 2000 interview attempts to 1774. Table 1 shows the targeted number of interviews for each of the three modes. These estimates reflected what we expected to achieve given the relative amount of fishing activity among the modes and our budgetary resources.

Table 1. Target Number of Interviews and Interviewer Hours by Fishing Mode

	Mode			
	Shore-Based ^a	Private Boat	Party Boat	Total
Targeted No. of Interviews	1151	407	216	1774
Projected No. of Interviewer Hours	1042	510	162	1714

^ashore-based sites include pier, and beach and bank sites

4. Site Selection

The list of fishing sites used in the study was primarily drawn from the Marine Recreational Fisheries Statistics Survey (MRFSS) site list (Roper 1997). The 1997 MRFSS site list for SF Bay identified 47 shored-based sites, 24 sites with private boat access, and 8 with party boat access. We also consulted with Task Force members, staff from the California Department of Fish and Game, and other sources to assist with identifying fishing sites.

For shore-based sites, we selected public piers with the highest fishing activity. To reach our target sample size and stay within our budgetary resources, most sites with low fishing activity were excluded from the sampling plan. There was consensus among the Task Force members and external reviewers of the study design that this would not unduly bias the sampling results (see Appendix D). In general, low-activity areas were included only if they were adjacent to a high-activity site and could feasibly be surveyed at the same time. For example, we included beach or bank areas with low activity next to a busy fishing pier.

For the final site combination of shore-based sites, we selected 14 public piers with adjacent beach or bank areas to be sampled once each month. Interviewers were instructed to interview all anglers present at shore-based sites. Thus, the relative amount of fishing activity at a site was reflected in the number of interviews attempted at that site over time (i.e., the one year sampling period). The sites were grouped into pairs based on geographic proximity and site pairs were sampled on the same day. Two sites were specifically included to improve geographic coverage. The Martinez Pier was added because it is located in the Carquinez Straits area, which is not included in the MRFSS. Also, Dumbarton Bridge was added to replace the San Mateo Bridge pier site. The San Mateo Bridge pier site is one of the most heavily used sites in the Bay but was closed during the duration of the survey. The 14 selected shore-based sites sampled in the survey are shown in Figure 3.

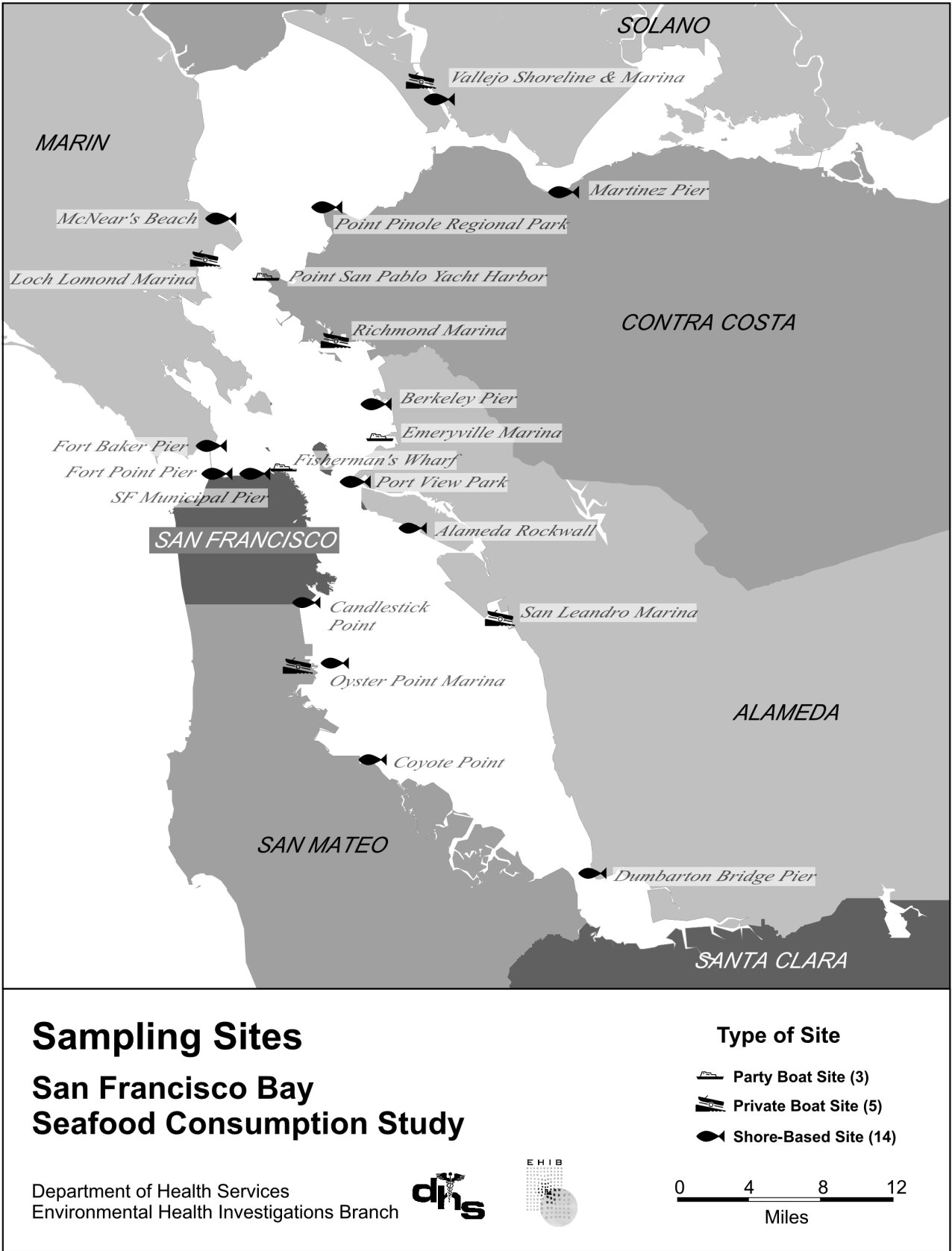
For private boat sites, we selected five boat launch sites with the highest fishing activity. As shown in Figure 3, the five sites provided reasonable geographic distribution of the Bay. We assigned an interview shift that was proportional to the relative amount of fishing activity at each selected site. Thus, interviewers had longer shifts at the more active sites and times. Interviewers attempted to interview all anglers using the site during their shift. In order to conserve on resources, we chose not to sample at one site, San Leandro Marina, on weekdays because this site had very low weekday activity.

For party boats, we examined data collected by the California Department of Fish and Game on party boat activities (CDFG 1998). These data showed that party boat activities within SF Bay were heaviest during warm weather months (from May to August) and lightest in January and December. Based on our estimate of available field interviewer resources, we allocated 18 party boat sampling trips by assigning three sampling trips per month for the busiest months and fewer sampling trips for less busy months.

5. Sampling Days and Times

Another key element of the sampling plan was to randomly select sampling days for shore-based and private boat sites. Because of the difficulty in scheduling more than one interview team per day, sampling days for both shore-based sites and private boat sites were selected without replacement from the same pool. Thus, only one type of site, either shore-based or private boat, could be sampled on a given day. Half the sites each month were designated for weekday sampling and the other half designated for weekend sampling. Weekday/weekend designations alternated every month. Sampling days were re-

Figure 3. Sampling Sites



scheduled if MRFSS staff planned to survey at the same site and day in order to avoid the possibility that anglers would be interviewed for both surveys on the same day.

To ensure coverage of the sampling day, shore-based sites were assigned morning or afternoon shifts. For safety reasons, we assigned sampling times only during daylight hours for both shore-based and private boat sites. In order to maximize coverage of daylight hours, shifts at shore-based sites began earlier and ended later during the longer summer months.

For private boats, sampling times were always in the afternoon to maximize the likelihood of interviewers intercepting anglers returning from their fishing trip. Although interviewers attempted to interview all private boat anglers during their shift, not just those returning, we believed anglers returning from their fishing trip would be more willing to be interviewed than those leaving on a trip.

For party boats, because we had to rely on the party boat captains to allow the interviewer access to their boats, we did not attempt to randomly select sampling days.

C. Survey Instruments

1. Questionnaire

The survey questionnaire was designed to gather information needed to address the specific objectives listed in Section I.D. The questionnaire included questions on ethnicity, income, education, age, fishing frequency, amount of fish eaten, types of fish eaten, preparation and cooking methods, others in the household who eat Bay fish, and awareness and knowledge of the state health advisory. (See Appendix E for a copy of the final questionnaire.) Trained interviewers personally administered the questionnaire to anglers at selected sites. The questionnaire was created using Teleform, Version 5.4, an automatic forms processing software, which allowed us to optically scan the data on the paper questionnaires to create an electronic data base (Teleform 1998). In order to facilitate administration and data entry, the questions mainly followed a partially closed-end question format, with discrete response categories, and an “other” category as needed for a write-in response. Initial drafts were prepared and submitted to the Task Force for review beginning in January 1998.

We also held a discussion group in March 1998 with five individuals (one African American male, one Chinese male, one Hispanic male, one Caucasian male, and one African American female) who fished frequently to solicit input and recommendations for the questionnaire. These individuals were recruited through notices distributed to fishing and community organizations. Field interviewers field-tested the questionnaire at sites not included in the sampling plan in May and June 1998. Revisions primarily served to improve clarity of questions, minimize response biases, maximize recall, and reduce interview time. Final forms were printed with unique identification numbers on water-resistant paper.

A Spanish translation of the questionnaire was also created. No separate interview tools were created for Vietnamese or Chinese interviews, but the interviewers practiced with each other and with other native-speaking individuals and agreed upon consistent terms and phrases to use. If an interview was conducted using the Spanish translated form, the responses were later copied onto a form created with Teleform (English only) to allow for optical scanning. Both the English and Spanish versions were turned in and reviewed by the field coordinator (who was also Spanish literate) prior to scanning.

2. Fish Pictures

For questions about specific fish species, interviewers showed respondents color pictures of 13 species of fish and three types of shellfish during the interview to help them identify the specific SF Bay fish they consumed. Pictures were obtained primarily from the California Department of Fish and Game. We selected the 13 most frequently caught species in the SF Bay using data from the MRFSS. The pictured

species are identified in Appendix F. Consumption practices for white croaker, leopard shark, and striped bass were of particular interest due to the higher levels of contaminants found in these species (organochlorine compounds in white croaker, and mercury in leopard shark and striped bass).

3. Fish Fillet Model

For the question on portion size, interviewers showed a cast plastic model of an 8-ounce raw fish fillet to help the respondent estimate the amount of fish consumed at one time. The respondent was asked “When you eat fish from anywhere (the Bay, other places, stores, restaurants), is the amount that you eat about this size, more or less?” Further probing by the interviewer took place as necessary to determine the respondent’s usual portion size.

4. Census Form

At shore-based sites only, interviewers conducted a census of all anglers with fishing poles present at the beginning of the survey shift. Site code, mode, date, and start time were recorded, as well as the numbers of anglers who appeared over 18 years of age and less than 18 years of age.

5. Site Summary Form

Interviewers recorded site code, start and end time for each site, and total number of interview attempts per site on this form for each sampling day.

6. Survey Incentives

In order to promote participation by anglers and to prevent repeat interviews of anglers, a unique survey logo was created and imprinted on clipboards, binders, and name badges, hats, and vests worn by all field interviewers. Also as an incentive for participating, all respondents were given a key chain with a tape measure imprinted with the logo at the conclusion of the interview.

As an incentive for providing information that would allow us to contact them in the future for follow-up activities, respondents were also invited to enter a monthly drawing, making them eligible to receive a \$20 gift certificate. They were also asked whether they would like information about the results of the survey sent to them and whether they could be contacted further.

7. Survey Tools

All field interviewers were provided with the following materials:

- Field Interviewer Training Manual
- Name badge, hat and vest with survey logo
- Site maps and directions
- Clipboards with survey logo
- Survey questionnaires
- Census and site summary forms
- Binder with map of San Francisco Bay and pictures of 13 species of fish and three species of shellfish commonly caught from the Bay
- Plastic model of an 8-ounce portion of raw fish fillet
- Health advisories (SF Bay specific health advisory and general fishing advisory available in six different languages)

- Key chain with tape measures imprinted with survey logo

Pictures of some of the above listed survey tools are included in Appendix F.

D. Field Survey Methods

Field survey methods are fully documented in the Field Interviewer Training Manual (see Appendix G) and are summarized briefly here.

For pier and beach and bank sites, the field coordinator assigned two interviewers to visit a site in pairs. Occasionally a third interviewer was assigned as needed. Attempts were made to match assignments with anticipated language requirements (e.g., Chinese speaking interviewers for San Francisco sites). The protocol required interviewers to conduct a census at the start of the shift and attempt to interview all anglers present at a site. If no anglers were present upon arrival, interviewers were required to stay on-site for one hour before leaving. Interviewers surveyed anglers in a sequential fashion. For example, interviewers worked one side of a pier at a time. If new arrivals appeared in areas where they had already interviewed, interviewers surveyed them only if they could keep track of all new arrivals (possible in relatively contained areas) in order to avoid selective interviewing.

For private boat sites, two interviewers were assigned to stay at a designated boat launch site for a preset number of hours. Interviewers screened boat anglers for whether or not they had been fishing or planned to go fishing and their designated fishing location. Only those who reported fishing or planning to fish at least half of their time in the Bay were interviewed.

At the conclusion of all pier, beach and bank, and private boat interviews, the interviewer read a summary of the health advisory for SF Bay and asked the respondent if he or she wanted to receive written information on the health advisory, which was available in six different languages.

For interviewing party boat anglers, the designated field interviewer contacted party boat captains who fish predominantly in SF Bay and had previously indicated their willingness to allow an interviewer to ride their boats. If the captain planned to fish in SF Bay, space was available, and the captain was willing, the interviewer accompanied the boat on the fishing trip. On the party boat survey form (see Appendix F), the interviewer recorded the marina from which the boat left, the boat name, and target species. If the captain took the boat outside the Bay during the trip, the interviewer also recorded the approximate amount of fishing activity that occurred outside SF Bay. While on board, the interviewer attempted to interview all anglers on the trip. Health advisory questions and information were excluded from interviews with party boat anglers in order to improve cooperation from party boat captains.

A revised protocol was implemented in April 1999 as party boat captains became less willing to let interviewers board their boats. Interviewers were assigned to interview party boat anglers after they exited the party boat. Determination of whether the boat planned to go inside or outside the Bay and the estimated time of return was made prior to sending interviewers out. Only party boats fishing in SF Bay at least some of the trip were included. Interviewers attempted to interview all exiting anglers who were at least 18 years old. Questions and information about health advisories were omitted from the interview.

If problems arose during a shift, field interviewers contacted the field coordinator. A cell phone was provided to the interviewers for this purpose. For example, interviewers contacted the field coordinator when an additional interviewer was needed because a site was particularly busy, or when a shift had to be terminated due to bad weather. Interviewers reviewed all questionnaires used for interviews they had conducted for completeness and clarity at the end of their shift.

E. Field Activities Summary

At the conclusion of each sampling shift, the interviewer completed the Site Summary Form and returned the form and completed interview forms to the field coordinator. The field coordinator created a monthly summary of field activities. Appendix H contains copies of the monthly summaries as well as a 12-month summary.

We completed 89 days of field surveying at shore-based sites, and 59 survey days at private boat sites. There were 47 weekday days and 42 weekend/holiday days at shore-based sites, and 28 weekday days and 31 weekend/holiday days at private boat sites. As documented in the field summaries, about a fifth of all shore-based and private boat sampling days needed to be rescheduled. Reasons for rescheduling included bad weather, conflict with a MRFSS sampling day, inability of interviewers to complete a site, or unavailability of interviewers. Rescheduled sampling days were conducted as close to the original sampling day as possible and were on the same day type (weekend or weekday).

For party boats, we originally scheduled 18 party boat sampling days. Because we had limited access to party boat anglers, we made 22 total attempts to board a party boat and 10 attempts to interview party boat anglers as they exited the boat. We were able to conduct interviews for about a third of all party boat attempts. Party boat interviews were conducted with anglers on boats departing from Pt. San Pablo Yacht Harbor, Emeryville Marina, and San Francisco Fisherman's Wharf. Party boats were mainly sampled on weekend days.

III. Data Management, Quality Assurance and Control, and Data Analysis

A. Data Management

As interviewers returned completed survey questionnaires, the field coordinator manually reviewed and corrected them as needed. Using Teleform, trained staff scanned the forms and visually reviewed each scanned page of the survey instrument. Categorical responses were optically read and coded. All handwritten entries (e.g., numbers and text) were visually reviewed and manually corrected as needed. After all pages were verified, the data was committed to a Microsoft Access database. Since each survey form was uniquely numbered, duplicate entries could be easily identified. Text entries were manually coded into predefined categories (see Appendix I). Separate Access data base files were created for each month of data collection and converted to a data file compatible with SAS version 7 (SAS 1998). After confirming that data integrity had been maintained, monthly data sets were merged to form the full data set. Data editing and data analyses using SAS were performed on the full data set.

B. Verification of Interviews by Phone

In order for us to independently verify that the interviews actually took place, we attempted to contact by phone a subset of persons interviewed. When interviewed in the field, respondents were asked if a supervisor could contact them. Of persons agreeing to be contacted (approximately half of all respondents), we attempted to contact 94 respondents (7% of all respondents). These respondents were chosen randomly. We were able to reach 67 respondents (71% of those we tried to reach and 5% of all respondents) after making up to three attempts. All 67 confirmed that they had been interviewed at the stated day and place. No attempt was made to verify their responses to the interview.

C. Quality Assurance (QA) and Quality Control (QC) Measures

A variety of QA/QC measures were incorporated in order to minimize measurement errors or other biases.

QA procedures put into place prior to data collection included:

- Obtaining review and input on all study materials and protocols by Seafood Consumption Study Advisory Task Force members
- Field testing of survey instrument
- Thorough training of interviewers in all aspects of survey administration
- Incorporating visual cues and tools to maximize recall during the interview

QC measures undertaken throughout the data collection phase included:

- Self-review of all forms completed by interviewer at end of shift
- On-site field audits of interviewing activities by the field coordinator or other project staff on 49 sampling days (31% of all sampling days).
- Manual review of all completed survey questionnaires by field coordinator for completeness and correct coding
- Regular verbal and written feedback to interviewers individually as needed
- Scheduled group meetings to provide periodic updates and to review procedures
- Phone calls to 5% of all respondents to verify that the interviews did take place
- Data review and editing to detect inadmissible and out-of-range values
- Inclusion of redundant questions worded differently to check consistency of answers

D. Data Analysis

1. Avidity Bias

How frequently anglers go fishing (i.e., their avidity) can vary widely among anglers. Some may fish daily while others may fish only once per year. In on-site surveys such as this study, how often an angler goes fishing determines how likely he or she will be included in the survey. Generally, avid anglers will be over represented in the sample and infrequent anglers will be under represented. Several authors have described this bias, called avidity bias (ATES/OEHHA 2000, Ossiander 1999, USEPA 1997, Pollock 1994, Price 1994, Thomson 1991).

Avidity bias presents a concern when an angler's avidity is correlated with important parameters that are being studied, such as consumption rate. If no correlation exists, there is no bias and data adjustments will not change the results. However, if correlation exists, the sample will not accurately reflect the overall angler population. Because one of the main goals of the study is to characterize exposures of the general population of San Francisco Bay anglers, adjusting for avidity bias allows for the results to more closely reflect this general population.

In this study, sample data were adjusted for avidity bias by weighting the respondents in proportion to the inverse of their sampling probability. This type of adjustment is a common and standard practice in the field of survey sampling (Stuart *et al.* 1976, Snedecor and Cochran 1989)). To estimate sampling

probability, we used the angler's fishing frequency, i.e., the number of times the angler reported fishing in the four week prior to the interview.

The fishing frequency response was used to adjust consumption rates of recent consumers (anglers who reported consuming SF Bay fish in the four weeks prior to the interview, see Appendix J), as well as other consumption rate variables such as meal frequency and portion size. Consumption rates based on consumption in the 12-month period prior to the interview could not be adjusted for avidity bias because information on fishing frequency over the same time period was not obtained. We also adjusted categorical variables such as mode, ethnicity and income for avidity bias. For these variables, the avidity bias adjustment was applied to the overall proportions of the variable subgroups.

In the equation below, we describe how the avidity bias adjustment was applied to an estimate of a mean consumption rate:

$$\text{Weighted mean, } c_w = \frac{\sum j^{w_i x_i}}{\sum j^{w_i}} \text{ (SAS 1988)}$$

The weighting factor, w , is the inverse of the angler's fishing frequency, and x is the angler's consumption rate. The angler's fishing frequency value was increased by one to include the trip during which the interview took place. Thus, an angler who did not fish in the 4 weeks prior to the interview would have a fishing frequency of 1 (zero fishing trips in the last 4 weeks plus one trip when interviewed). The weighting factor used for an angler who had a fishing frequency of 1 would be 1/1, or 1 in the equation above. Also, we limited the maximum fishing frequency value to 28 times (1 time per day over the last 4 weeks). Thus, anglers who reported fishing 27 or more times in the last 4 weeks were recorded as having fishing frequencies of 28. The weighting factor used for an angler with a fishing frequency of 28 would be 1/28 in the equation above.

The avidity bias adjustment does not change an individual angler's consumption rate. The adjustment increases or decreases the weight given to anglers' responses in the aggregated sample based on their fishing frequency. For example, the adjustment reduces the contribution of avid angler's consumption to the total consumption rate to compensate for oversampling this group.

Adjusting for avidity bias may introduce additional error by using one random variate (fishing frequency) to adjust another (consumption). However, to the extent that higher consumers are actually oversampled in a survey (which cannot be determined from the data themselves), sampling theory tells us that reweighted estimates should be more accurate than unweighted ones (Snedecor and Cochran 1989). Note that, as with all sampling efforts, the true population averages remain unknown. The reported 95% confidence intervals reflect the magnitude of the uncertainty, and the true population values are expected to lie somewhere within those intervals.

Because not all variables could be adjusted, results that have been adjusted for avidity bias are described as "adjusted" in this report. However, the tables in Appendix K include both the adjusted and unadjusted data, where appropriate.

2. Calculation of Fish Consumption Rate

Consumption rate was determined by multiplying the respondent's reported portion size by meal frequency, and converting to grams per day. Portion size (in ounces) refers to the amount of fish eaten at one time. Respondents were shown a cast plastic model, representing an 8-ounce raw fish fillet. They were then asked if the model represented the amount they ate at one time, regardless of its source (SF Bay, outside SF Bay, store or restaurants). Respondents could report a portion size amount equal to the

8-ounce model, a fraction of the model (e.g., one half, one third, etc.), or a multiple of the model (e.g., two times, three times, etc.). Respondents were asked the portion size question only one time during the survey. This single response was used to estimate all fish consumption rates used in this study. Meal frequency refers to the number of times the respondent consumed fish over a specified time period. We asked about meal frequency of SF Bay fish for two different time periods to derive two different consumption rates. First, we asked respondents for the number of times they ate specific species of SF Bay fish in the four weeks prior to being interviewed; we then summed these answers for the specific species to give the total number of times the respondent ate SF Bay fish. Second, in a single question we asked respondents for the total number of times they consumed SF Bay fish in the last 12 months. Appendix J contains a more detailed discussion of how consumption rates were derived for this study.

Although we also asked respondents to report meal frequency for three types of shellfish, due to resource constraints, no portion size was obtained for shellfish. Therefore, we could not derive consumption rates for SF Bay shellfish.

Descriptive statistics for consumption rates are presented in Section IV.D, including arithmetic and geometric means, standard deviations, minimum and maximum values, and 50th (median), 90th, and 95th percentile values. Appendix K contains tables displaying more complete percentile distributions, from the 10th to 95th percentile.

3. Shape of the Consumption Rate Distribution

The procedures used to provide confidence intervals around estimates of population means, and to conduct statistical tests of consumption differences between subgroups, assume that the population distribution follows the so-called “normal,” or Gaussian, distribution. Previous studies have reported that fish consumption rates tend to be lognormally distributed (Hill 1995, Hill and Lee 1995, Murray and Burmaster 1994, Ruffle *et al.* 1994). We examined the mean, median, standard deviation, skewness, kurtosis, histograms, and normal quantile plots of consumption rates derived for SF Bay anglers (recent consumers). As will be further discussed in Section IV.D.1, we found the unadjusted median and geometric means to be identical (about 16 grams/day), and the unadjusted arithmetic mean to be about 28 g/day. The extreme skewness of the distribution produced an arithmetic mean falling near the 72nd percentile, rather than near the median (50th percentile) as in a normal distribution. Citing an arithmetic mean from a non-normal sample not only conveys a misleading “mean” value, but attempting to estimate a population’s arithmetic mean from a non-normal population produces confidence intervals that are far below their stated accuracy. As expected from this analysis and the previously cited experience of others, the logarithmic transformation, common in biological and medical applications (Armitage and Berry 1987), produced a more normal distribution. Thus, we primarily refer to geometric means and medians for describing measures of central tendency (USEPA 1996, Sokal and Rohlf, 1981). The geometric mean is obtained from the mean of the log transformed values, back transformed to their original units. Further discussion on the shape of the consumption rate distributions can be found in Appendix J. More detailed information about consumption rates is also presented in Section IV.D.1.

4. Statistical Methods

The type of statistical test used in the data analysis is dependent on the type of variable being examined. For categorical variables we performed chi-square tests to measure the associations of different angler characteristics such as fishing mode and ethnicity. We used the Mantel-Haenszel chi-square statistic to test for trends in demographic variables representing ordered categories, such as income, education, and

age. In all chi-square analyses, we excluded missing, don't know, and refused to answer responses. Chi-square tests could only be performed on data unadjusted for avidity bias. Thus, discussion of statistical significance of chi-square results applies only to the unadjusted data. Also, chi-square tests could not be performed on some categorical responses where the possible responses were not mutually exclusive.

Because consumption rates were lognormally distributed, we used geometric means and 95% confidence intervals to compare among different groups. We considered two groups with non-overlapping confidence intervals to be significantly different. Consumption rate differences were also tested non-parametrically by the Wilcoxon signed rank test as an alternative way of dealing with non-normally distributed consumption rate data.

Statistical analyses were performed with SAS software, version 7 (SAS 1998).

IV. Results

The information presented in this section of the report serves to address the goals and objectives defined for the overall study (Section I.D). We have attempted to keep tabular data to a minimum in this section, relying more on figures and graphs for illustration. More extensive tabular data are included in Appendix K. Figures and tables that appear in the text are numbered sequentially. Tables that appear in Appendix K are prefaced by an upper case K, for example, Table K1.

For clarity, the following terms, which we use in this report, are defined:

- *Mode* refers to the type of fishing site where anglers were interviewed. Modes included in the study were: 1) public piers, 2) beach and bank sites, 3) private boat launch sites, and 4) party boat sites. Shore-based sites refer to pier sites and beach and bank sites.
- *Decliners* refer to anglers who declined to be interviewed.
- *Respondents* refer to anglers who agreed to be interviewed. This group includes both consumers and non-consumers of SF Bay fish.
- *Consumers* are anglers who report consuming fish caught from SF Bay (no time period specified). This group also includes a small number of anglers who reported fishing for the first time in the Bay and who planned to consume their catch. Further description of how consumers are defined is included in Appendix J.
- *Recent consumers* are defined as anglers who reported consuming fish caught from SF Bay in the four weeks prior to the date they were interviewed. Recent consumers are a subset of consumers. Further description of how recent consumers are defined is included in Appendix J.
- For presenting information on ethnic groups, we refer to the following major ethnic groups: *Black/African American, Latino/Hispanic, Caucasian, Asian, and Other* (which included Russians, Middle Easterners and individuals of unspecified mixed ethnicity). Included in the Asian group are anglers who are *Filipino, Chinese, Vietnamese, Pacific Islander, and Other Asian* (which included Japanese, Southeast Asian other than Vietnamese, Korean, and mixed Asian). Additional tables and figures are also provided which delineate the Asian subgroups separately.

A. Sampling Success

As shown in Table 2, we attempted 1,868 interviews, 5% more than we had originally targeted. Of the 1,868 attempted interviews, 130 anglers had previously been interviewed and were not reinterviewed.

Table 2. Sampling Success by Mode

	Total		Mode							
			Piers		Beach and Bank		Private Boats		Party Boats	
	N	%	n	%	n	%	n	%	n	%
Target Attempts ¹	1774		1151 ²				407		216	
Actual Attempts	1868		1052		136		557		123	
Interviewed Before ³	130		69		9		41		11	
Net Attempts ⁴	1738	100	983	100	127	100	516	100	112	100
Interviewed (Respondents) ⁵	1331	77	695	71	99	78	433	84	104	93
Decliners	407	23	288	29	28	22	83	16	8	7

	Total		Mode							
			Piers		Beach and Bank		Private Boats		Party Boats	
	n	%	n	%	n	%	n	%	n	%
Interviewed (Respondents) ⁵	1331	100	695	100	99	100	433	100	104	100
Consumers of SF Bay Fish ⁶	1152	87	583	84	81	82	390	90	98	94
Non-Consumers of SF Bay Fish ⁷	179	13	112	16	18	18	43	10	6	6

	Total		Mode							
			Piers		Beach and Bank		Private Boats		Party Boats	
	n	%	n	%	n	%	n	%	n	%
Consumers ⁶	1152	100	583	100	81	100	390	100	98	100
Recent Consumers of SF Bay Fish ⁸	537	47	277	48	39	48	181	46	40	41
Non-Recent Consumers ⁹	615	53	306	52	42	52	209	54	58	59

	Total		Mode							
			Piers		Beach and Bank		Private Boats		Party Boats	
	n	%	n	%	n	%	n	%	n	%
Recent Consumers of SF Bay Fish ⁸	537	100	277	100	39	100	181	100	40	100
Recent Consumers with Defined Consumption Rate ¹⁰	501	93	255	92	37	95	172	95	37	93

¹ Target Attempts—as defined in the original sampling plan reflect the relative amount of fishing activity by mode within SF Bay.

² Number refers to total target attempts for shore-based sites, which included pier and beach and bank sites.

³ Interviewed before includes anglers who initially agreed to be interviewed but were later identified to have been previously interviewed. Interviews with these individuals were subsequently terminated.

⁴ Net Attempt equals actual total attempts (1868) minus interviewed before (130).

⁵ Respondents refer to anglers who agreed to be interviewed and who had not been previously interviewed for this study.

⁶ Consumers are anglers who report consuming fish caught from SF Bay.

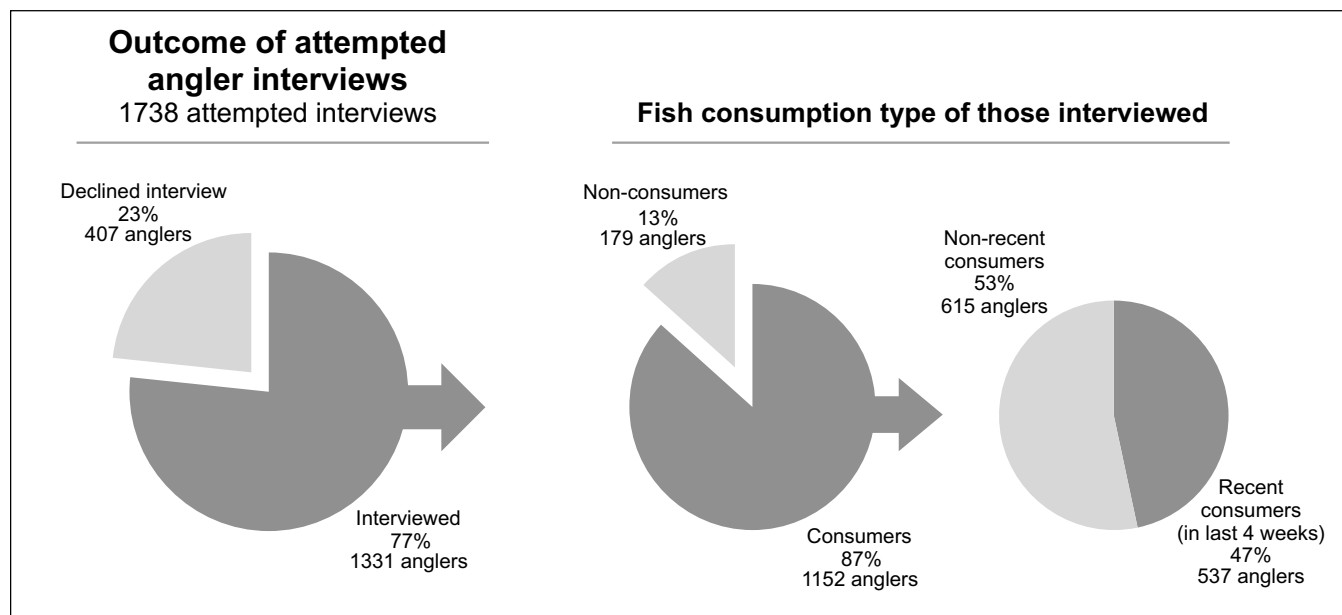
⁷ Non-consumers are defined as anglers who reported they do not consume fish caught from SF Bay.

⁸ Recent consumers are defined as anglers who report consuming fish caught from SF Bay in the four weeks prior to the date they were interviewed. Recent consumers are a subset of the overall consumer group.

⁹ Non-recent consumers are consumers of SF Bay fish who did not consume any in the four weeks prior to the interview.

¹⁰ Recent consumers with defined consumption rate indicated a portion size and a frequency of consumption within the last four weeks.

Figure 4



Anglers approached but found to be previously interviewed by this study not included (130 anglers). Not adjusted for avidity bias.

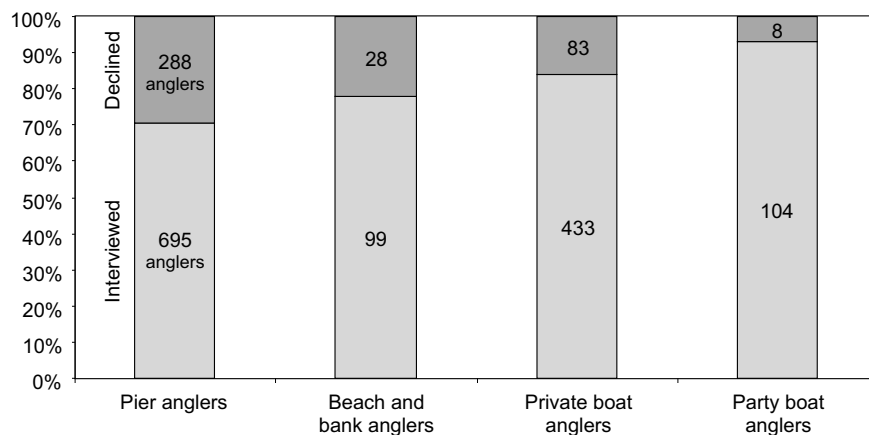
Figure 4 also shows that of those eligible to be interviewed ($n = 1738$), 77% agreed to be interviewed, a group we refer to as respondents. Consumers of SF Bay fish represented 87% of respondents.

An important indicator of sampling success was the total number of interviews achieved with recent consumers. As described in Section II.B., based mainly on data from the SMB study, we determined a sample size of 500 recent consumers would be needed to derive a reasonably precise mean consumption rate (i.e., 95% confidence interval of $\pm 10\%$ around the geometric mean consumption rate and 95% confidence interval of $\pm 15\%$ around upper percentiles). We identified 537 recent consumers (see Figure 4 and Table 2). However, only 501 of these individuals provided adequate information for deriving a consumption rate based on a four week recall period, which still allowed us to meet our defined target.

Although consumption rate results will be discussed in later sections of this report, the precision of

Figure 5

Proportion of interviews by fishing mode



Not adjusted for avidity bias.

the geometric mean consumption rate in this study was $\pm 9\%$ for the 501 recent consumers. This level of precision was within our target range. The confidence interval of $\pm 28\%$ around the upper percentiles was wider than our target range (see Figure 2).

Our sampling plan (see Section II.B.) also identified target numbers of attempted interviews by mode, that were based on an estimate of the relative amount of fishing activity in SF Bay by mode. Table 2 and

Figure 5 show sampling results by four modes, pier, beach and bank, private boat, and party boat. (Separate codes assigned to (1) pier and, (2) beach and bank sites allowed for differentiation among the shore-based sites.) Proportionately, we had slightly less shore-based attempted interviews, more private boat attempts, and less party boat attempts than originally targeted. The resistance we encountered from party boat captains, which restricted our access to party boat anglers, accounted for our inability to reach our target for party boat interviews. As shown in Figure 5, we experienced greater cooperation among private and party boat anglers, as compared to pier and beach and bank anglers. Of pier and beach and bank anglers, 72% agreed to be interviewed, as compared to 84% of private boat anglers and 93% of party boat anglers.

B. Decliners

Twenty-three percent of anglers declined to be interviewed (see Table 2). Among the 407 individuals who declined to be interviewed, language problems and lack of time or interest were cited as the main reasons for declining (see Figure 6). Pier anglers were the most likely to decline an interview; they most commonly cited language problems as the reason (see Table K1). Among private boat anglers, no time was the main reason for declining to be interviewed.

Interviewers recorded observed ethnicity for 88% of anglers declining to participate. As shown in Figure 7, half of those declining were of Asian ethnicity (Chinese, Vietnamese, Filipino, Southeast Asian, Korean, and unknown Asian), whereas Asians represented one third of anglers who participated

Figure 6

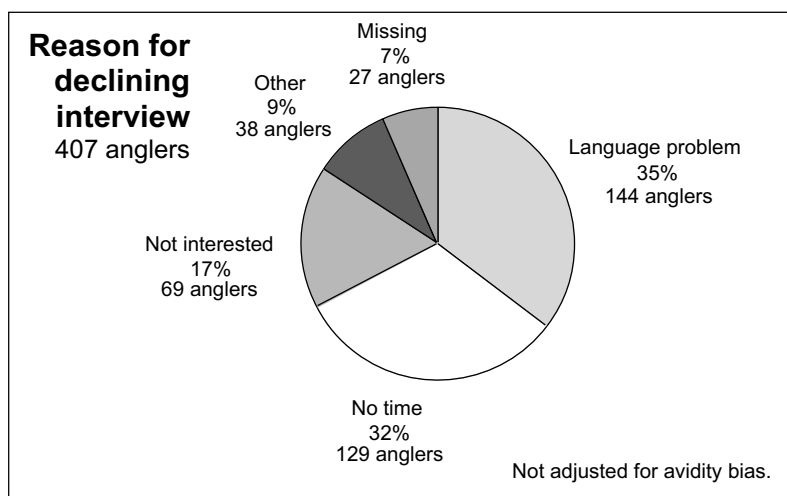


Figure 7

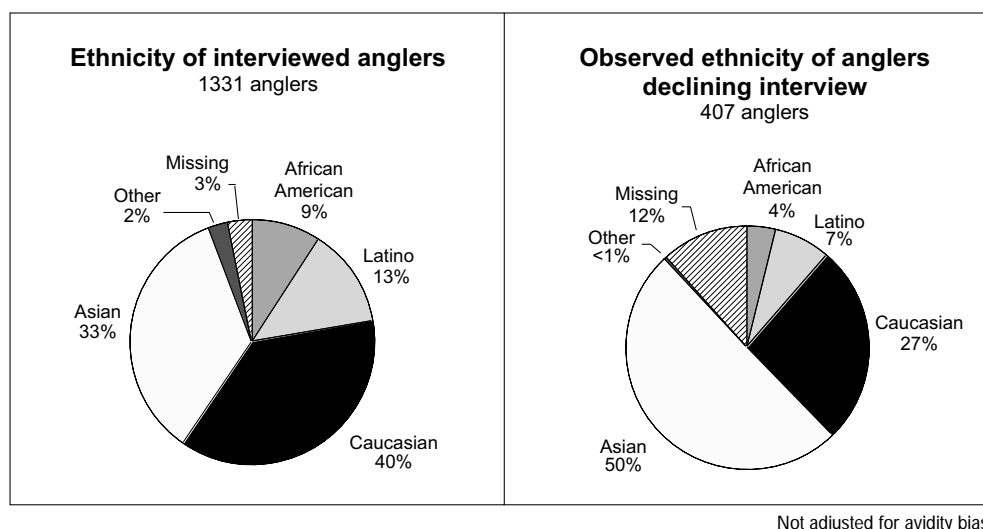
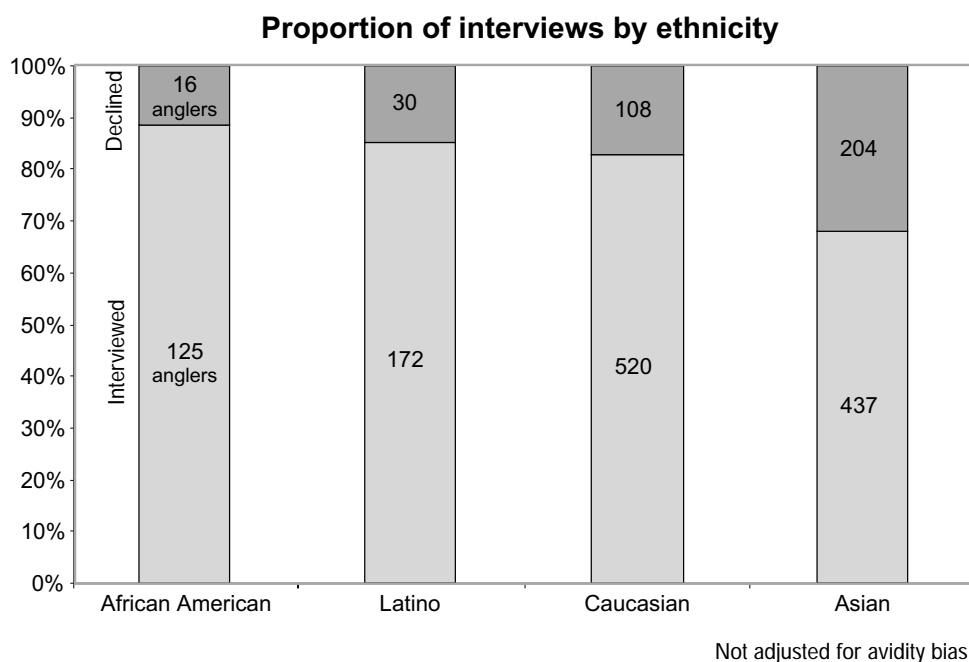


Figure 8



in the survey. Figure 8 also shows that compared to other ethnic groups, a higher proportion of Asians declined to be interviewed. Generally, higher proportions of non-Caucasian ethnic groups were represented among pier and beach and bank anglers who declined to be interviewed than among private boat and party boat anglers who declined (see Table K1).

Interviewers were only able to note observed language spoken for 71% of decliners (see Table K1). Among those observed to be Vietnamese, Chinese, or Other Asian, language problems were noted as the most likely reason for declining (see Table K2). Interviewers generally encountered more languages other than English being spoken by pier and beach and bank anglers as compared to private and party boat anglers.

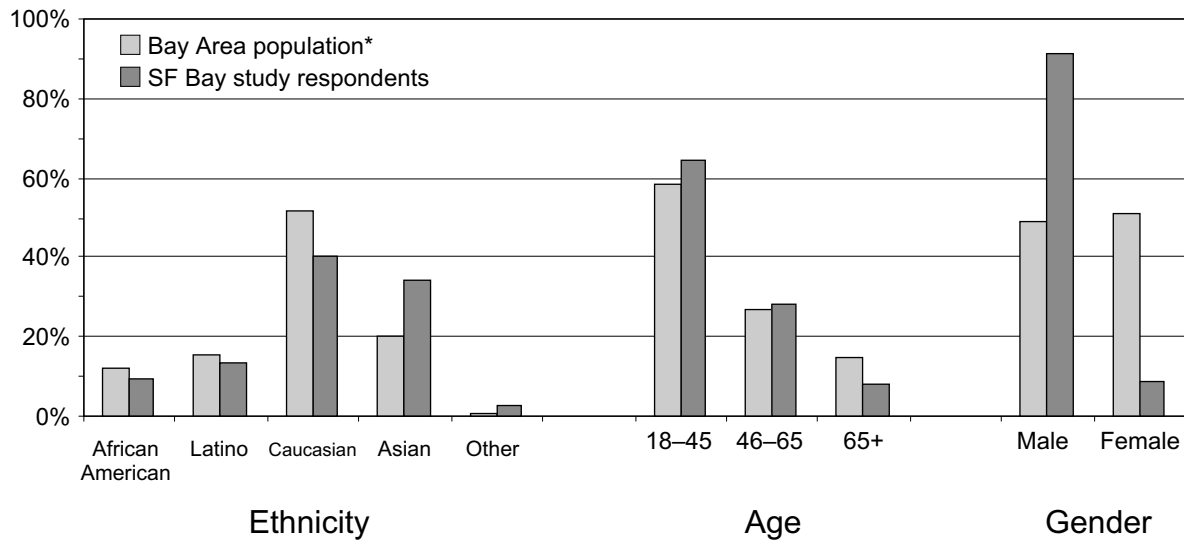
C. Angler Characteristics

One of the primary objectives of this study was to describe demographic characteristics of anglers who consume SF Bay fish. We present information regarding ethnicity, income, education, gender, and age for consumers of SF Bay fish by mode in this section. Information about the number of years consumers have been eating Bay fish, what they usually do with Bay fish, seasonal differences, household members consuming SF Bay fish, and household members who prepare or cook SF Bay fish is also included. Tables in Appendix K usually contain information for respondents, consumers, and recent consumers. The three groups are not mutually exclusive (e.g., 47% of consumers were recent consumers and 87% of respondents were consumers). The demographic characteristics of respondents, consumers, and recent consumers were largely similar. The tables in Appendix K also display data both unadjusted and adjusted for avidity bias. With respect to demographic characteristics, the overall proportions were largely unaffected by the avidity bias adjustment. The percentages given in the text below generally refer to adjusted values unless noted.

Figure 9 compares demographic variables for respondents and the aggregated population in the six Bay Area counties where the study was conducted. As shown, the study population was younger, had a

Figure 9

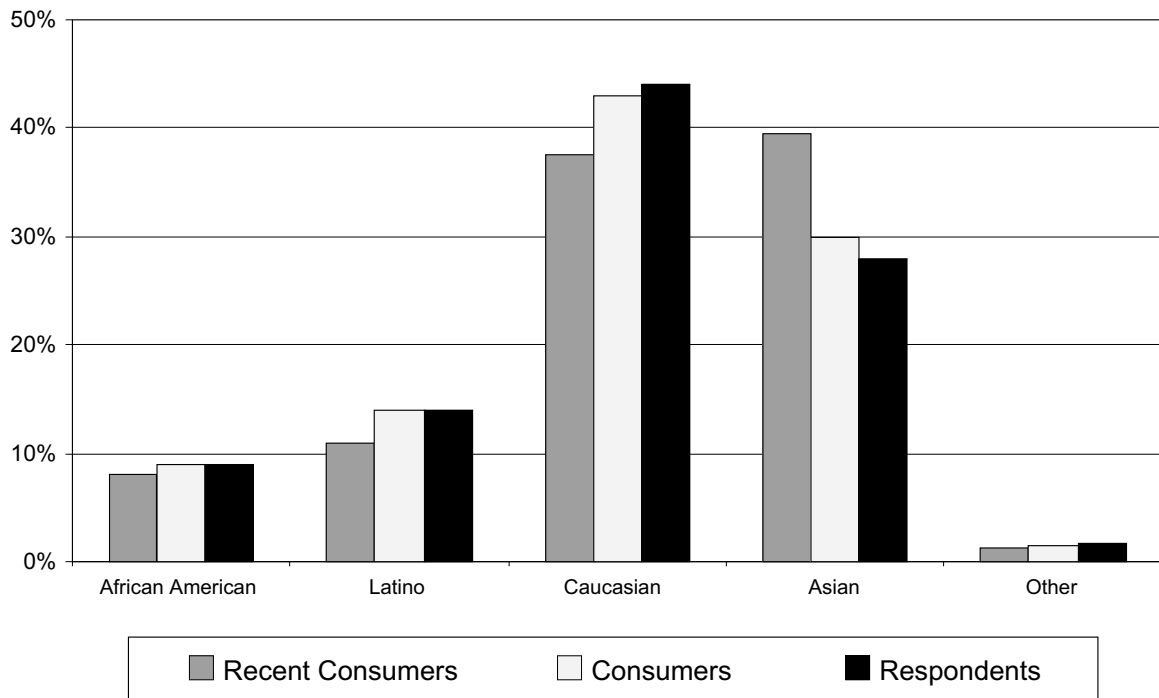
Demographic comparison of study respondents with Bay Area population



* Based on 1998 census data for the six Bay Area counties (Marin, Alameda, Contra Costa, San Francisco, Solano, and San Mateo) where the study was conducted. Not adjusted for avidity bias.

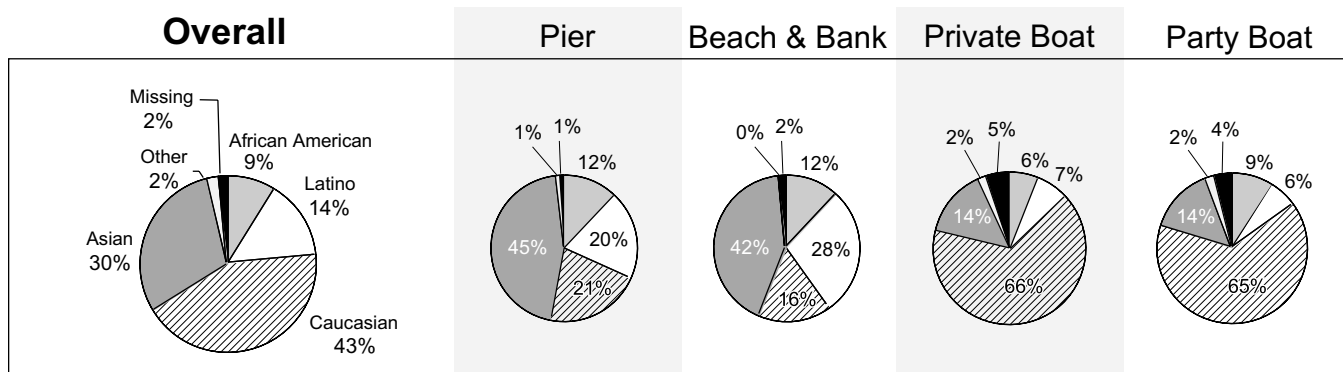
Figure 10

Comparison of ethnicity among recent consumers, consumers, and respondents



Adjusted for avidity bias.

Figure 11

Ethnicity of consumers by fishing mode

Anglers that reported no Bay fish consumption excluded. Adjusted for avidity bias.

higher proportion of males and Asians, and a lower proportion of African Americans, Latinos, Caucasians, and females, as compared to overall Bay Area demographics.

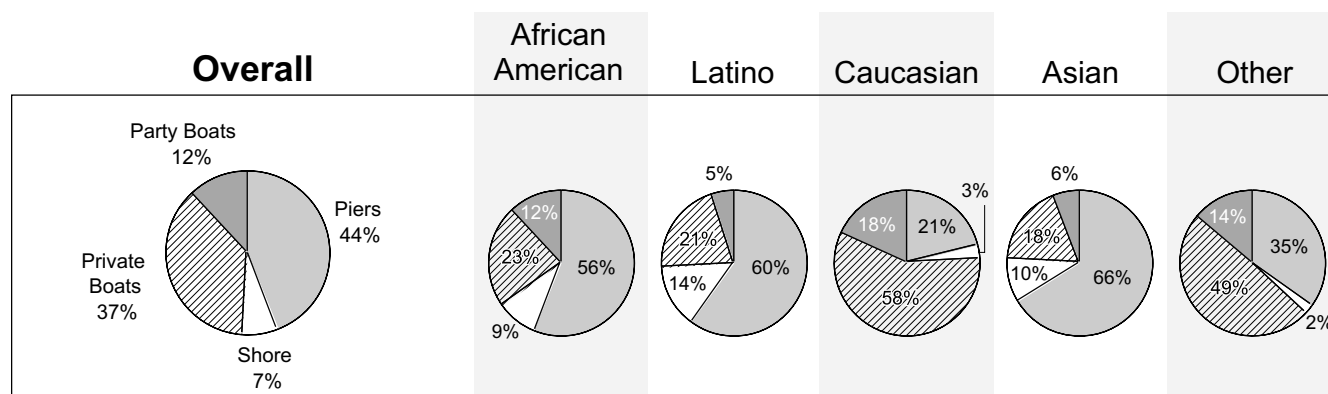
Figures 10 through 20 present specific demographic information for consumers of SF Bay fish. Caucasians comprised the largest group of anglers who consumed Bay fish, followed by Asians, Latinos, and African Americans. Overall, more than half of the anglers consuming fish from SF Bay were non-Caucasian. Among recent consumers, Asians comprised the largest group, followed by Caucasians, Latinos, and African Americans. The overall fishing population was predominately male.

For all demographic characteristics except age and gender, we found differences by mode for consumers of SF Bay fish. Shore-based anglers tended to be non-Caucasian, whereas boat anglers were predominately Caucasian. Asians were the largest group fishing from piers and beach and bank sites, with Filipinos comprising the largest Asian group. A higher proportion of shore-based anglers reported household incomes less than \$20,000/year, and also had lower education levels than boat anglers. Although the majority of interviews were conducted in English, 8% (106, unadjusted) were conducted in a language other than English and a much higher proportion of non-English interviews were conducted at piers and beach and bank modes compared to private and party boat modes.

Seasonal differences by mode were evident; the highest number of interviews for all modes was conducted during the summer months. Although 41% of consumers have been consuming SF Bay fish five years or less, about a fourth have been consuming Bay fish more than 20 years. A larger proportion of Caucasians and African Americans consumed Bay fish over the longest time period compared to other groups, while a majority of Latinos and Asians had consumed Bay fish five years or less. Ninety percent of consumers reported that they usually eat the fish they catch from SF Bay. Slightly less than half of all consumers reported they also give fish or shellfish they have caught to family or friends. Nearly one half (46%) of consumers reported that women of childbearing age (18-45 years) and 12% of consumers reported that children under six in their households ate SF Bay fish. About two thirds of consumers usually prepare or cook the fish they catch from the Bay themselves.

More specific information on angler characteristics is provided below and in tables found in Appendix K.

Figure 12

Fishing mode of consumers by ethnicity

Anglers that reported no Bay fish consumption excluded. Adjusted for avidity bias.

1. Ethnicity

As shown in Figure 10 and Table K3, ethnic differences can be noted among respondents, consumers, and recent consumers. Overall, 55% of consumers were non-Caucasian, with Caucasians representing 43% of all consumers. For recent consumers, the proportion of non-Caucasians rises to 60%, with Asians surpassing Caucasians as the largest group.

Asian subgroups are also shown separately for consumers and recent consumers in Tables K4A and K4B. Caucasians represented the largest proportion of consumers, followed by Latinos, Filipinos, African Americans, Vietnamese, Other Asian, Chinese, Pacific Islander, and Other. Among recent consumers, Caucasians were followed by Vietnamese, Filipinos, Latinos, African Americans, Other Asians, Chinese, Pacific Islanders, and Other.

As shown in Figures 11 and 12 and Tables K3-K5, there were ethnic group differences by fishing mode. Among consumers, Caucasians were the dominant group fishing from private boats and party boats, whereas Asians comprised the largest group fishing from piers and beach and banks.

Table K6 shows ethnic differences by each site for respondents. For shore-based sites, Caucasians were the dominant group at Martinez Shoreline Park. Over 50% (unadjusted) of the respondents interviewed at Fort Point Pier, Point Pinole Shoreline Park, Alameda Rockwall, Candlestick Point Recreation Area, Coyote Point, and San Francisco Municipal Pier were Asian, with Filipinos representing the largest Asian subgroup (see Table K7). McNear's Beach had the highest number of Latinos; 35% (unadjusted) of interviews at this site were conducted with Latinos. African Americans were the dominant group at Port View Park. Caucasians were the largest ethnic group of all private boat and party boat sites. The proportion of Asians using Richmond Marina and Oyster Point Marina was higher compared to other private boat sites. Vallejo Marina and Oyster Point Marina had the highest proportion of Filipino private boat anglers while San Leandro Marina had the highest proportion of Vietnamese.

2. Language Spoken During Interview

The majority (87%) of all interviews with consumers were conducted in English (see Table K8). The proportion of non-English interviews conducted at piers and beach and bank sites was four times higher than at private boat sites. At McNear's Beach, Pt. Pinole Shoreline Park, San Francisco Muni Pier, and Coyote Point, over 20% of the interviews were conducted in a language other than English (see Table K9).

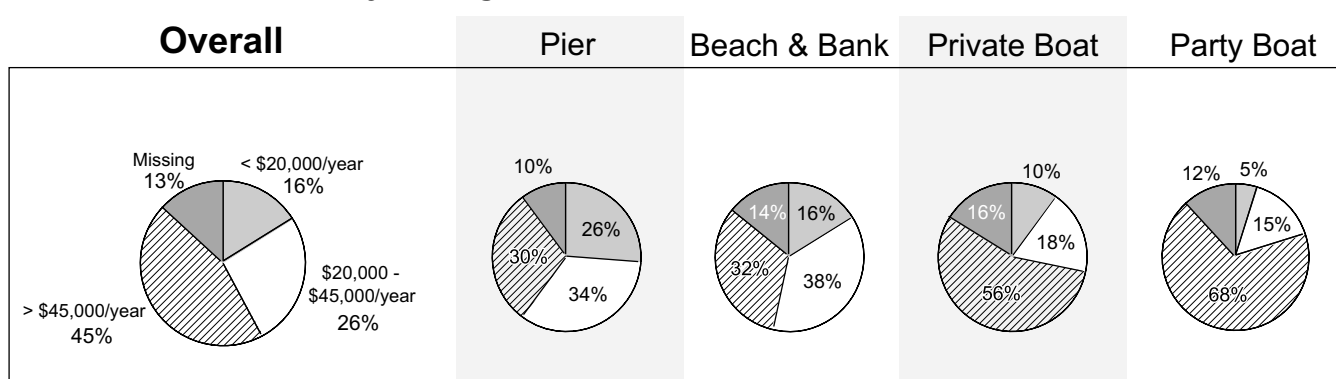
3. Income

To determine income, we asked respondents if their total household income was greater than \$20,000/year. For those who indicated yes, we then asked if their household income exceeded \$45,000/year.

Of all the demographic information gathered, we had the highest proportion of missing information for income (see Figure 13 and Table K10). Income information was missing for 13% of consumers as compared to 4% to 7% for the other demographic characteristics. Overall, 45% of consumers reported a total household income greater than \$45,000/year (see Figure 13). The proportion of boat anglers reporting household incomes greater than \$45,000/year was nearly two times the proportion of shore-based anglers.

Figure 13

Income of consumers by fishing mode

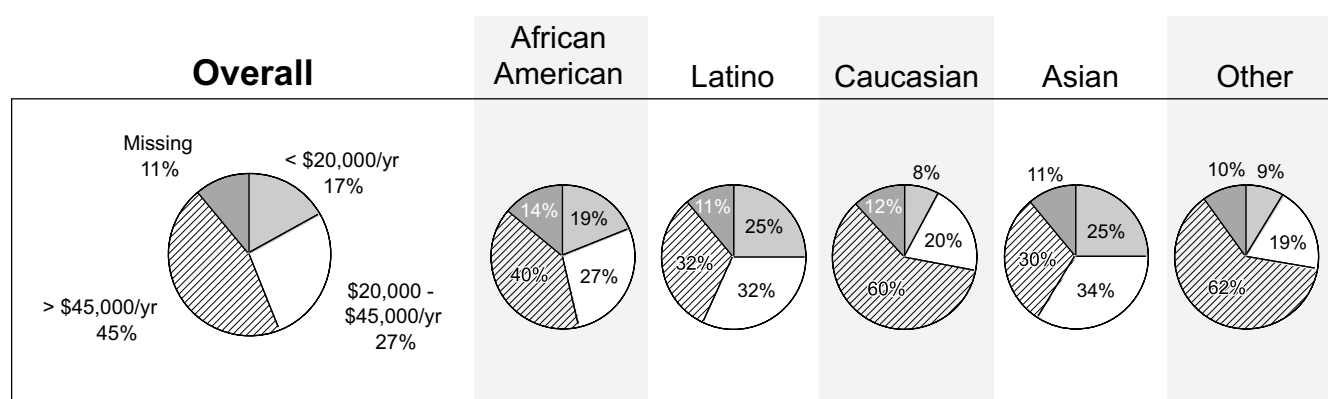


Anglers that reported no Bay fish consumption excluded. Adjusted for avidity bias.

Figure 14 and Table K11 show ethnicity by income for consumers. Within non-Caucasian groups a higher proportion reported annual household incomes less than \$20,000 compared to Caucasians.

Figure 14

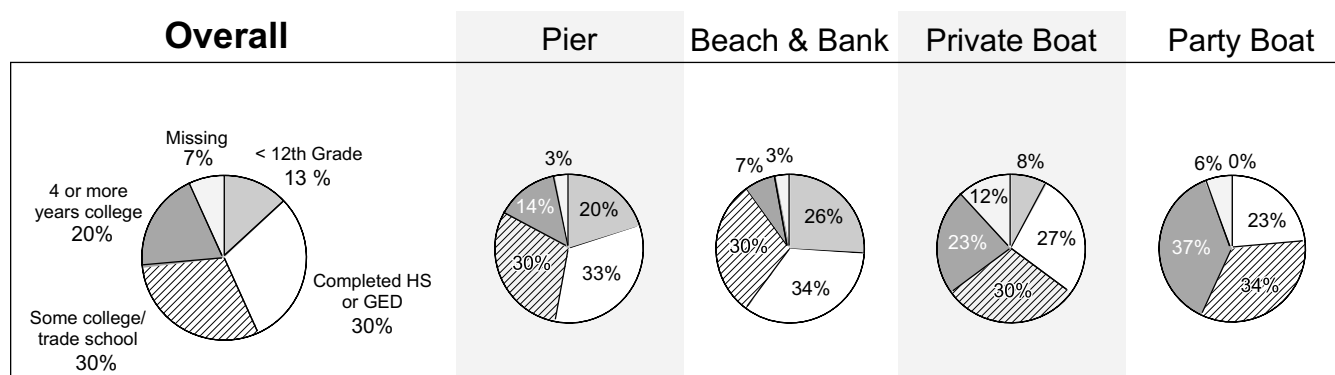
Income of consumers by ethnicity



"Overall" values differ from previous graphic due to exclusion of anglers missing ethnicity data. Anglers that reported no Bay fish consumption excluded. Adjusted for avidity bias.

Figure 15

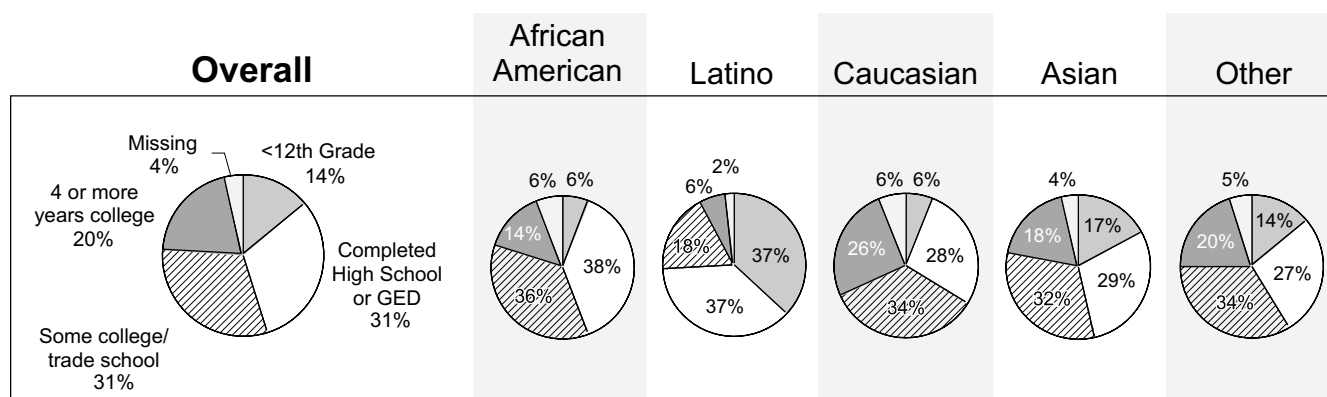
Education of consumers by fishing mode



Anglers that reported no Bay fish consumption excluded. Adjusted for avidity bias.

Figure 16

Education of consumers by ethnicity



"Overall" values differ from previous graphic due to exclusion of anglers missing education data. Anglers that reported no Bay fish consumption excluded. Adjusted for avidity bias.

4. Education

Education is usually highly correlated with income (Liberatos *et al.* 1988). Information on education was missing for only 7% of consumers. Among consumers, 50% reported some college level education or higher. Similar to income, there were differences in level of education by mode. A higher proportion of party boat and private boat consumers reported higher education levels than pier and beach and bank anglers (see Figure 15 and Table K12).

Education levels also varied by ethnicity, as shown in Figure 16 and Tables K13A and K13B. Among the different groups, 74% of Latino and 66% of Vietnamese consumers reported high school level or less. More than half of all the other groups reported some college level education or higher.

5. Gender

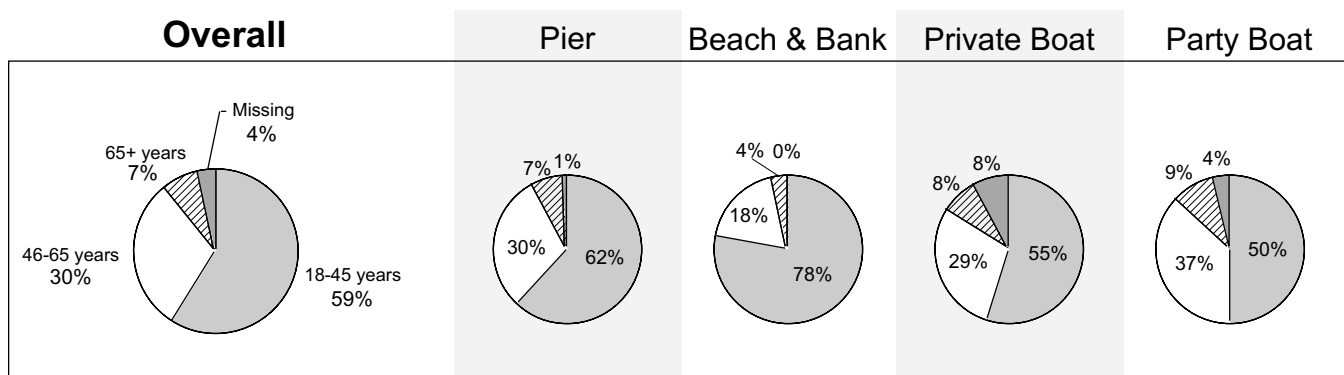
As shown in Table K14, 86% of all consumers were male. Differences by mode were not apparent.

6. Age Structure

Although interviewers recorded the number of anglers who appeared to be less than 18 years of age during the census at shore-based sites, these individuals were not included in the survey. About 20% of all anglers counted in the census at shore-based sites were observed to be younger than 18 years of age (see Appendix H).

Figure 17

Age of consumers by fishing mode



Anglers that reported no Bay fish consumption excluded. Adjusted for avidity bias.

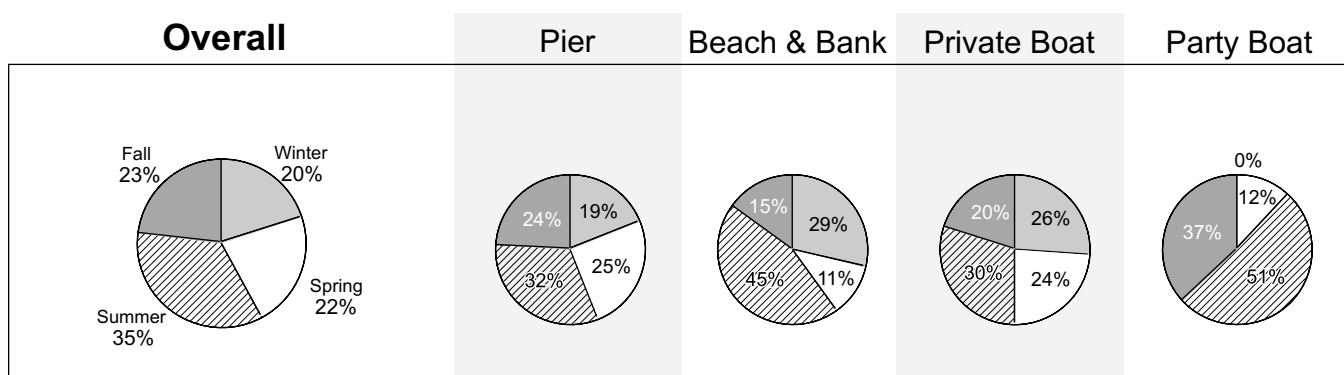
As shown in Figure 17 and Tables K15 and K16, 89% of all consumers fell within the 18 and 65 year range. Fifty-five percent of all female consumers were of child bearing age (18-45 years). A higher proportion of party boat anglers was in the age range above 46 years, as compared to anglers fishing from the other modes. More consumers over 65 years of age fished on weekdays than on weekends, in contrast to those less than 65 years of age (see Table K17).

7. Season of Interview

To define seasons, summer included all interviews conducted from July through September, fall included October through December, winter included January through March, and spring included April through June. Overall, the highest number of interviews was conducted during the summer due to the higher level of fishing activity (see Figure 18 and Table K18). Summer was also the dominant season within all

Figure 18

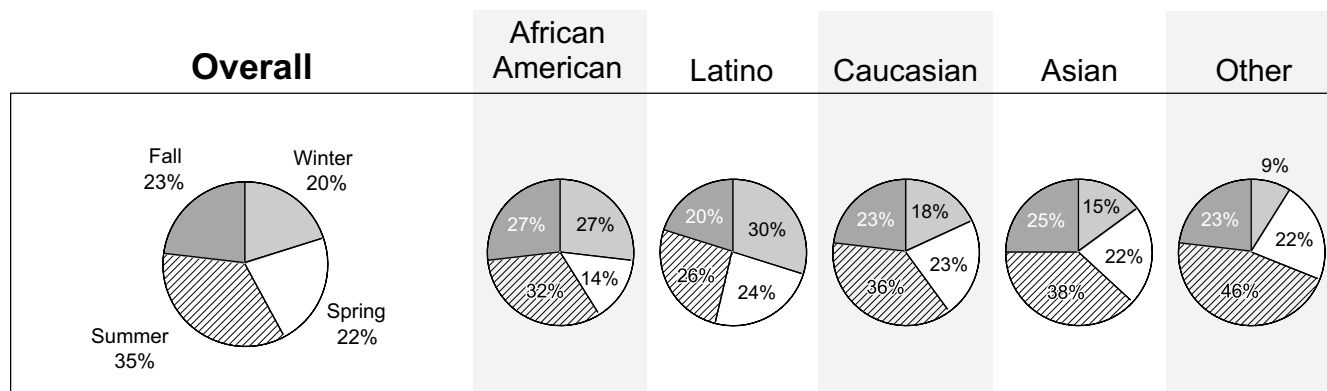
Season interviewed among consumers by fishing mode



Anglers that reported no Bay fish consumption excluded. Adjusted for avidity bias.

Figure 19

Season interviewed among consumers by ethnicity



Anglers that reported no Bay fish consumption excluded. Adjusted for avidity bias.

modes and ethnic groups (see Figure 19), except for Latinos, Chinese and Pacific Islanders. More Latinos were interviewed during the winter, and more Chinese and Pacific Islanders were interviewed during the spring than other seasons (adjusted percentages, Table K19).

8. Years Eating Bay Fish

As shown in Table K20, 41% of all consumers have been consuming SF Bay fish 5 years or less and 27% have been consuming it for greater than 20 years. Among ethnic groups, Caucasians and African-American consumers reported eating Bay fish over a longer time period as compared to Latinos and Asians. Over 50% of Vietnamese, Chinese, Filipino, Pacific Islander, and Latino consumers reported consumption of Bay fish for five years or less compared to 25% of Caucasian consumers.

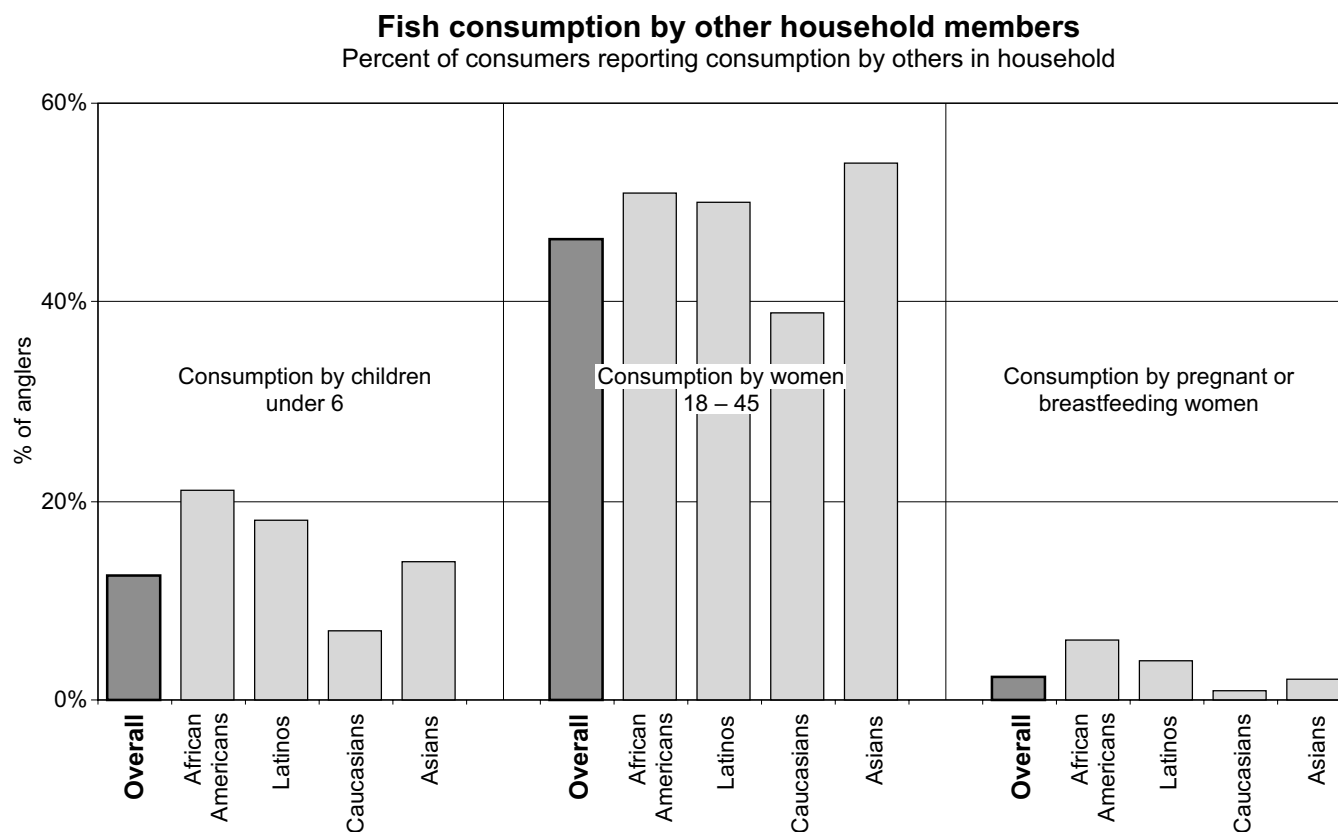
9. Fish Fate

Respondents were queried as to what they usually did with the fish or shellfish they caught from the Bay. The two most common responses were “eat it” or “give it to family or friend” (Table K21, unadjusted values). For consumers, most reported they usually ate the fish or shellfish they caught from SF Bay. A little less than half indicated they also give fish or shellfish to family or friends. As expected, non-consumers reported eating Bay fish much less frequently but gave it to family or friends. Responses to this question were not used to define whether the angler was a consumer or not (see Appendix J).

10. Household Members Who Eat Bay Fish

Because pregnant and breastfeeding women, women who are of childbearing age, and young children face increased risks from eating Bay fish, we asked respondents who else in their household eats Bay fish. As shown in Figure 20 and Table K22 (unadjusted values), only 2% of consumers reported pregnant or breastfeeding women in their household who ate SF Bay fish. However, 46% of consumers reported that women of childbearing age (18-45 years) in their household ate Bay fish, and 13% reported that children younger than six years of age ate Bay fish. By mode, consumers fishing at piers or beach and bank sites reported a higher proportion of pregnant women, women of childbearing age, and young children than consumers fishing from boats. Although non-consumers reported they do not consume SF Bay fish, many non-consumers reported women of childbearing age and young children in their households do consume Bay fish (see Table K22).

Figure 20



Anglers reporting no fish consumption not included. Not adjusted for avidity bias.

Comparing by ethnic group (see Table K23, unadjusted), about half of Asian, Latino, and African American consumers reported women of childbearing age in their household ate Bay fish. About a fifth of African Americans reported children under the age of six, compared to 7% of Caucasians.

11. Who Prepares or Cooks SF Bay Fish

We also asked respondents who in their household usually prepares or cooks the fish they catch and eat from the Bay. The majority of consumers (64%, unadjusted) reported they usually prepare or cook the fish they catch themselves and about one-fourth reported that their spouse usually prepares or cooks their catch (see Table K24). About a third of Latinos and Asians also reported spouse as the person who usually prepares or cooks Bay fish (see Table K25).

D. Fish Consumption Characteristics

As described in Section I.D., the primary goals of the study were to gather information for characterizing anglers' exposures to chemicals from eating Bay fish and to use that information to identify highly exposed subpopulations. In this section, we describe how much Bay fish anglers eat, and use consumption information to identify highly exposed groups. Next, we describe which species of SF Bay fish anglers consume, what parts are consumed, and how fish are prepared. In addition, consistent with the

specific study objectives, we quantified consumption of fish from sources other than SF Bay. We also quantified how frequently anglers ate three types of Bay shellfish (crabs, clams, mussels).

In general, the fish consumption data presented in the figures in this section have been adjusted for avidity bias, when this adjustment could be made (see Section III.D.1 for further discussion of avidity bias). The data tables in Appendix K, however, provide both unadjusted and adjusted data, as well as more detailed descriptions of anglers' responses.

1. Bay Fish Consumption Rates

To describe how much Bay fish anglers eat, we estimated fish consumption rates based on the amount of fish consumed over a given time period. As discussed in Section III.D.2, consumption rates were derived by multiplying two variables, portion size and meal frequency, and converting to grams per day (g/d). The portion size question was asked only once during the interview and was used to calculate all fish consumption rates in this study. However, we asked anglers to report meal frequency for two different time periods. The primary time period used was a four-week recall. We asked anglers how many times they ate Bay fish in the four weeks prior to being interviewed. When multiplied by portion size, we derived a consumption rate for the four-week recall period. Although less reliable than the four week recall, we also asked anglers to report the number of times they ate Bay fish in the past 12 months. When multiplied by portion size, a consumption rate over the 12-month recall period was derived.

In the following sections we describe portion size, meal frequency, and consumption rate responses. Consumption rates are described primarily for two populations, consumers and recent consumers. Consumers are anglers who eat Bay fish. Recent consumers are a subset of consumers who reported consuming Bay fish in the last four weeks. More detailed definitions of consumers and recent consumers can be found in Appendix J. We also derived "per angler" consumption rates, based on all respondents, to allow for comparisons with other studies.

a. Portion Size

Portion size responses characterize the amount of fish anglers reported consuming at one time. Figure 21 shows how consumers of Bay fish responded to the portion size question. In general, anglers gave portion size responses in multiples or fractions of the fish fillet model. Just over half (54%, adjusted) of consumers reported that the 8-ounce model was equal to the amount they eat at one time. Portion size responses of respondents and recent consumers were similar to consumers. Table K26 shows portion size responses for recent consumers, consumers, and respondents for common responses. Figure 22 shows the portion size responses among consumers as a distribution. Similar to Figure 21, responses are grouped around 8 ounces, (one model) 4 ounces (one half the model), 12 ounces and 16 ounces (one and a half and two times the model). The overall mean (adjusted) portion size for consumers was 7.7 ounces

Figure 21

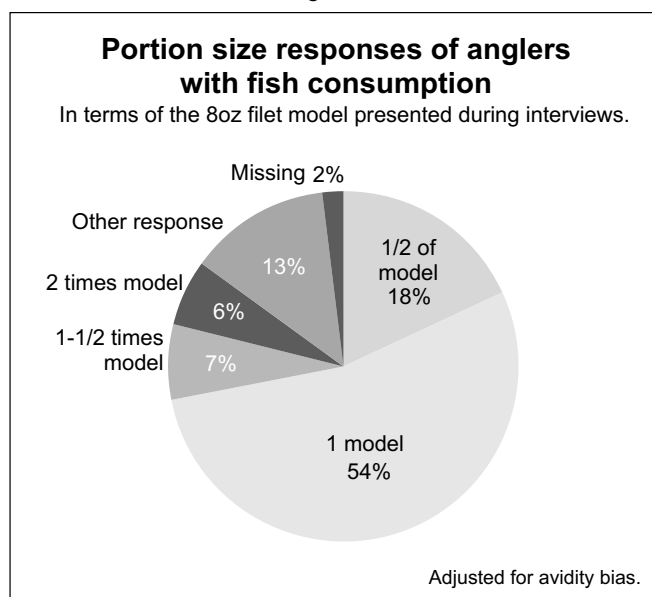
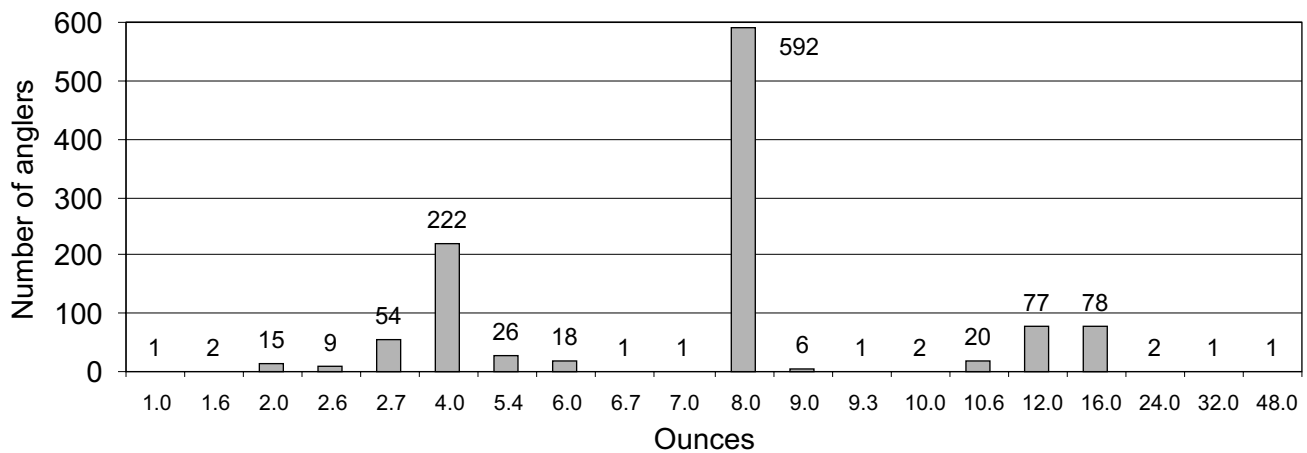


Figure 22

Portion size among consumers

Not adjusted for avidity bias.

(217 grams), slightly less than the 8-ounce model. Tables K27a and K27b show the full distribution of portion size responses for consumers and recent consumers.

b. Meal Frequency among Recent Consumers

Meal frequency describes the number of times that anglers reported consuming Bay fish over a specified time period. In this section, we describe meal frequency responses for recent consumers based on a four-week recall. Table 3 summarizes meal frequency for recent consumers, both unadjusted and adjusted for avidity bias. The adjusted geometric mean meal frequency was slightly lower than the unadjusted meal frequency, although the medians were the same (two times in the last four weeks). Table K28 provides the complete meal frequency distribution (from the 10th to 95th percentile) for recent consumers.

Table 3. Meal Frequency for Recent Consumers Based On Four Week Recall

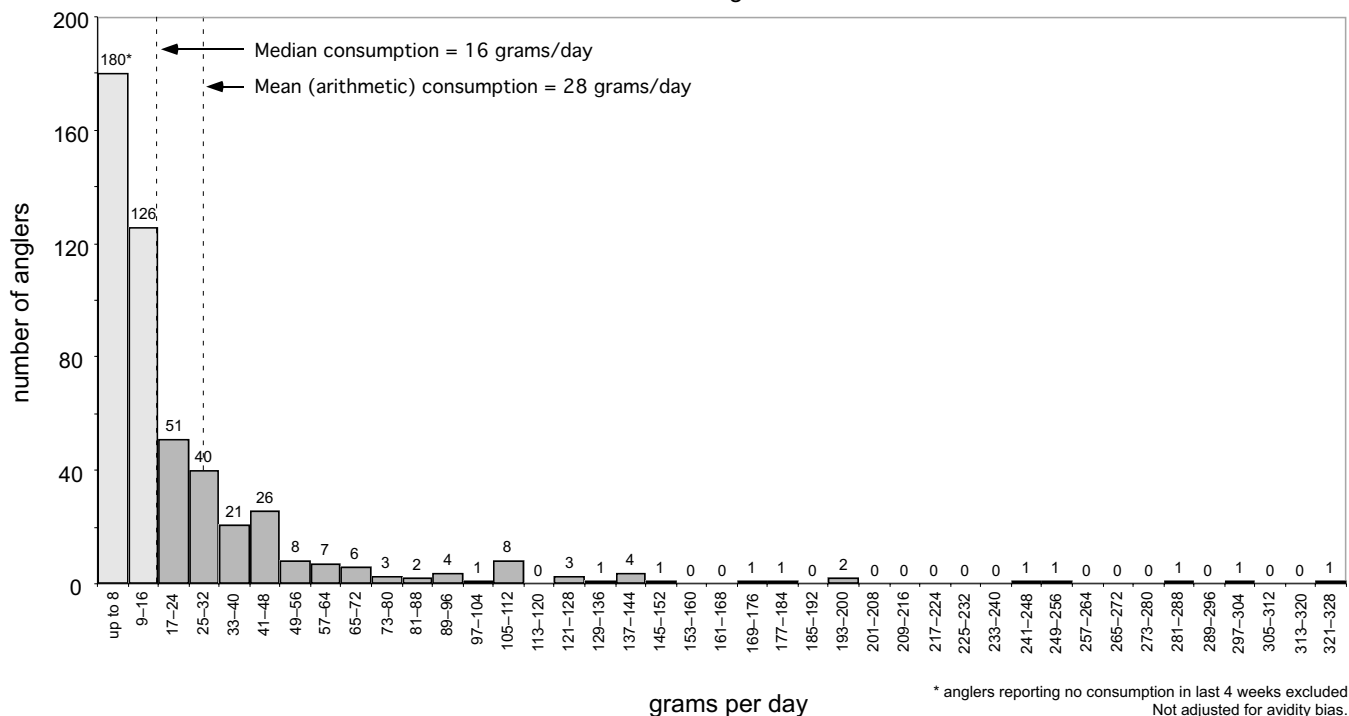
Number of Times Bay Fish Was Consumed in the Last Four Weeks	Recent Consumers (Unadjusted for Avidity Bias) n=512 ^a	Recent Consumers (Adjusted for Avidity Bias) n=473 ^{a,b}
Mean (Standard Deviation)	3.5 (4.3)	2.9 (3.4)
Minimum Value	1	1
Maximum Value	32	32
Geometric Mean	2.4	2.0
Median (50 th Percentile)	2	2
90 th Percentile	7	6
95 th Percentile	11	8

^a For 25 recent consumers, meal frequency information was missing.

^b For an additional 39 anglers, fishing frequency was not reported. Thus, meal frequency could not be adjusted for avidity bias. See Section III.D.1 for further discussion of avidity bias.

Figure 23

Consumption rate among anglers, based on a 4-week recall*
501 anglers



Although we identified 537 recent consumers in our sample, meal frequency information was missing for 25 recent consumers. Thus meal frequency could only be derived for a slightly smaller group of recent consumers ($n = 512$). In addition, not all recent consumers provided information on fishing frequency, which was needed to adjust for avidity bias. Thus, meal frequency (adjusted) was derived from 473 recent consumers ($n = 473$).

c. Consumption Rates among Recent Consumers

By multiplying portion size by meal frequency responses, we derived consumption rates for recent consumers. Figure 23 shows the consumption rate distribution for recent consumers using the raw (untransformed) data. The raw data show a skewed distribution that required a log transformation. (Further discussion of the shape of the consumption rate distribution can be found in Appendix J.)

In Table 4 we provide a summary of the consumption rate distribution for data unadjusted and adjusted for avidity bias. Table K29 displays the complete consumption rate distribution (from 10th to 95th percentile) for recent consumers. Similar to the meal frequency results in Table 3, consumption rate results could only be provided for a slightly smaller subset of recent consumers because information needed to estimate consumption rate or adjust for avidity bias was missing.

Tables 4 and K29 show the geometric mean to be much closer to the median value, whereas the arithmetic mean falls near the 70th percentile of the full distribution for both adjusted and unadjusted data. Median consumption rates for recent consumers were 16.0 g/d for both unadjusted and adjusted data. This amount is equal to consuming two eight-ounce meals over a four-week (28 day) period. Adjusting the data for avidity bias resulted in only a slight lowering of the arithmetic and geometric means.

The values reported in Table 4 represent overall consumption rates of recent consumers that apply across fishing modes. In the sampling plan, as discussed in Section II.B.3, we set sampling targets that were weighted by the relative amount of fishing activity in each mode. As discussed in Section IV.A, our estimate of the relative proportions by mode in the sample of anglers we interviewed was slightly different than our targets. However, re-weighting the sample proportions by mode to reflect these differences did not change the consumption rate estimates in Table 4 (see Appendix J for further discussion).

Table 4. Consumption Rates in Grams/Day (g/d) for Recent Consumers Based On Four Week Recall

Consumption Rate (g/d)	Recent Consumers (Unadjusted for Avidity Bias) N=501 ^a	Recent Consumers (Adjusted for Avidity Bias) N=465 ^{a,b}
Mean (Standard Deviation)	28.1 (39.6)	23.0 (32.0)
Minimum Value	2.0	2.0
Maximum Value	324.0	324.0
Geometric Mean	16.5	14.0
Median (50 th Percentile)	16.0	16.0
90 th Percentile	56.0	48.0
95 th Percentile	108.0	80.0

^a For 36 recent consumers, there was insufficient information for deriving a consumption rate

^b For an additional 36 recent consumers, fishing frequency was not reported. Thus, their consumption rate could not be adjusted for avidity bias.

d. Consumption Rates among Consumers

In order to gain a better understanding of the larger population of anglers who consume Bay fish, we present in this section consumption rate results for all consumers of Bay fish. We estimated consumption rates for consumers based on both a four-week and a 12-month recall. Table 5 shows values that characterize consumption rates for consumers of Bay fish for these two recall periods.

Table 5. Consumption Rates in Grams/Day (g/d) for Consumers Based on Four Week and 12 Month Recall

Consumption Rate (g/d)	Four Week Recall (adjusted for avidity bias) N=1080 ^a	12 Month Recall (unadjusted for avidity bias ^b) N=1019 ^c
Mean (Standard Deviation)	6.3 (19.6)	11.0 (35.7)
Geometric Mean	0.0	1.2
Minimum Value	0.0	0.0
Maximum Value	324.0	638
Median (50 th Percentile)	0.0	2.5
90 th Percentile	16.0	22.1
95 th Percentile	32.0	44.2

^a For 36 anglers, there was insufficient information for deriving a consumption rate. For an additional 36 anglers, fishing frequency was not reported. Thus, their consumption rate could not be adjusted for avidity bias. See Section III.D.1 for further discussion of avidity bias.

^b Twelve month recall data could not be adjusted for avidity bias.

^c Consumption rate data for 133 respondents (12%) was missing.

Consumption rates based on a four-week recall have been adjusted for avidity bias (the full distribution and unadjusted data can be found in Table K30a). Because about half of consumers (53%) did not consume any fish in the four weeks prior to being interviewed (i.e., their consumption rate in the last four weeks was zero), the geometric mean and median are zero.

Most consumers reported some consumption of Bay fish in the last 12 months. However, as noted by USEPA (1998), the accuracy of a survey respondent's recall decreases as the time period over which the recall is made increases. Thus, the consumption rate results based on the 12-month recall may be less reliable than the responses based on a four-week recall. Among consumers who reported consumption of Bay fish in the last 12 months, 14% (n=142) said that the number of times they had eaten fish was zero. Because zero was a valid response, these zero values were included in the calculation of the consumption rate values in Table 5. Missing values, however, were excluded. The median consumption rate for consumers was 2.5 g/d. This amount is equal to consuming about one 8-ounce portion every three months. The consumption rate based on a 12-month recall period could not be adjusted for avidity bias because we did not ask anglers how frequently they fished in the past 12 months. The full distribution can be found in Table K30b.

e. Per Angler Consumption Rates

Some angler studies report per angler consumption rates that are based on all survey respondents including non-consumers (i.e., anglers who do not eat any fish). In Table 6 we present per angler consumption rates based on both four-week and 12-month recall periods so that comparisons to other studies can be made. These estimates include a significant number of anglers who reported consumption rates of zero. In fact, similar to results presented in the previous section, the majority of consumers and respondents based on a four-week recall had consumption rates of zero; thus the median is zero. Also, as noted in the previous section, consumption rates based on a 12-month recall may be less reliable than those based

Table 6. Consumption Rates in Grams/Day for Respondents Based on a Four Week and 12 Month Recall

Consumption Rate (g/d)	Four Week Recall (adjusted for avidity bias) N=1259 ^a	12 Month Recall (unadjusted for avidity bias ^b) N=1198 ^c
Mean (Standard Deviation)	5.3 (18.2)	9.3 (33.1)
Geometric Mean	0.0	0.4
Minimum Value	0.0	0.0
Maximum Value	324.0	638
Median (50 th Percentile)	0.0	1.8
90 th Percentile	16.0	18.4
95 th Percentile	24.0	36.8

^aFor 36 anglers, there was insufficient information for deriving a consumption rate. For an additional 36 anglers, fishing frequency was not reported. Thus, their consumption rate could not be adjusted for avidity bias. See Section III.D.1 for further discussion of avidity bias.

^b Twelve-month recall data could not be adjusted for avidity bias.

^cConsumption rate data for 133 consumers (10%) was missing; non-consumers were assigned a consumption rate of zero.

on a four-week recall. The median consumption rate of 1.8 g/d based on a 12-month recall is equivalent to consuming about one eight-ounce portion every four months. The full distribution of these consumption rates for respondents can be found in Tables K31a and K31b.

2. Differences Among Demographic Subgroups

In addition to estimating overall fish consumption rates for anglers who consume SF Bay fish, another primary goal of the study was to identify highly exposed subpopulations. One way to identify a highly exposed subpopulation is to compare consumption rate variables (i.e., portion size, meal frequency, and consumption rates) within demographic subgroups and look for differences among these subgroups.

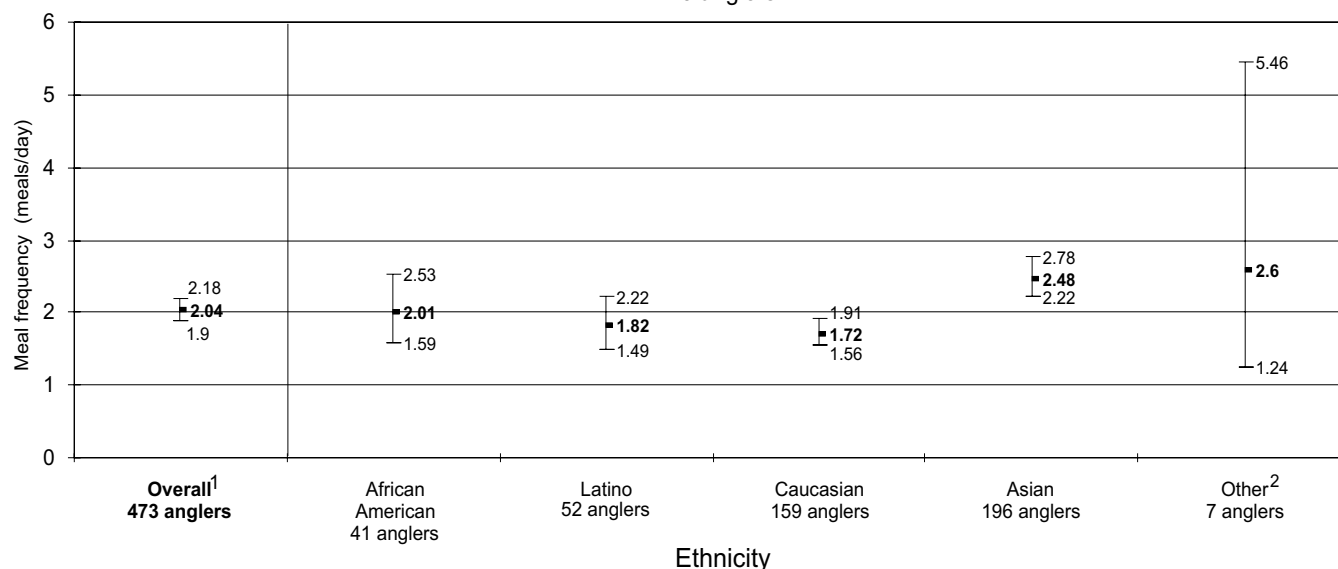
When we compared the arithmetic mean (adjusted) portion sizes among consumers of Bay fish, we found differences for ethnicity, season interviewed, and gender (see Table K32). Among ethnic groups, African Americans reported the largest portion size (9.0 ounces); their portion size was significantly larger than Caucasians and Asians. Asians reported the smallest portion size (6.7 ounces). Their portion size was significantly smaller than Latinos and Caucasians, as well as African Americans. Portion sizes differed by season of interview, with larger portion sizes reported during the fall (8.1 ounces) than the spring (6.6 ounces). Also, female anglers reported a smaller portion size (6.6 ounces) than male anglers (7.8 ounces).

For meal frequency and consumption rates in this study we compared the geometric means (adjusted). Comparisons of meal frequency based on a four-week recall for recent consumers showed no differences among demographic subgroups except among ethnic groups (see Table K33). Figure 24 shows adjusted geometric mean meal frequencies with 95% confidence intervals by major ethnic groups. Asians had a higher meal frequency (2.5 times in the last four weeks) than Caucasians (1.7 times). As shown by the non-overlapping confidence intervals, these differences were statistically significant. Among Asian subgroups, shown in Figure 25, Filipinos had the highest meal frequency (3.1 times). The

Figure 24

Geometric mean meal frequency by ethnicity (major groups) among recent consumers

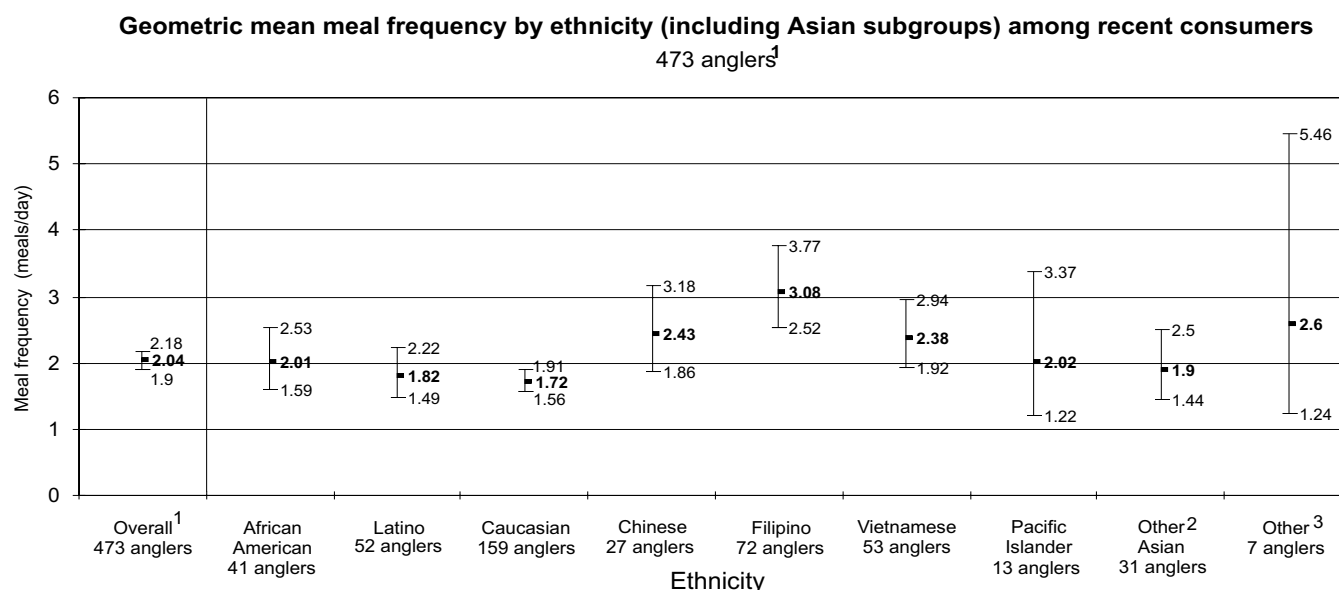
473 anglers¹



¹ Ethnicity was missing for 18 Recent Consumers.

² "Other" includes Russian, Middle Eastern, and individuals of unspecified mixed ethnicity.

Figure 25



Adjusted for avidity bias. Error bars represent 95% confidence intervals.

¹ Ethnicity was missing for 18 Recent Consumers.

² "Other Asian" includes Korean, Japanese, Southeast Asian (either than Vietnamese), and individuals of mixed Asian or unspecified Asian ethnicity.

³ "Other" includes Russian, Middle Eastern, and individuals of unspecified mixed ethnicity.

complete distribution of meal frequency responses by demographic factors can be found in Tables K34a and K34b.

Comparisons of consumption rates among subgroups of recent consumers showed differences for ethnicity but not for other demographic characteristics (see Table K35). Figure 26 shows adjusted geometric mean consumption rates by major ethnic groups. The geometric mean consumption rates for African Americans were roughly 50% higher than Caucasians, the ethnic group with the lowest consumption rate. Figure 27 includes Asian subgroups. Filipinos also had consumption rates approximately 50% higher than Caucasians. These differences were statistically significant. Pacific Islanders and anglers whose ethnicity was described as "Other" (Russian, Middle Easterners, and individuals of unspecified mixed ethnicity) had the highest consumption rates of all ethnic groups, approximately double the rate for Caucasians. However, anglers in these two groups were very small in number (Pacific Islanders, $n=12$ and Other, $n=7$), and differences in the geometric means between these two groups and Caucasians were not significant. Tables K36a and K36b describe the geometric mean and full distribution of consumption rates among recent consumers by demographic variables for unadjusted and adjusted data.

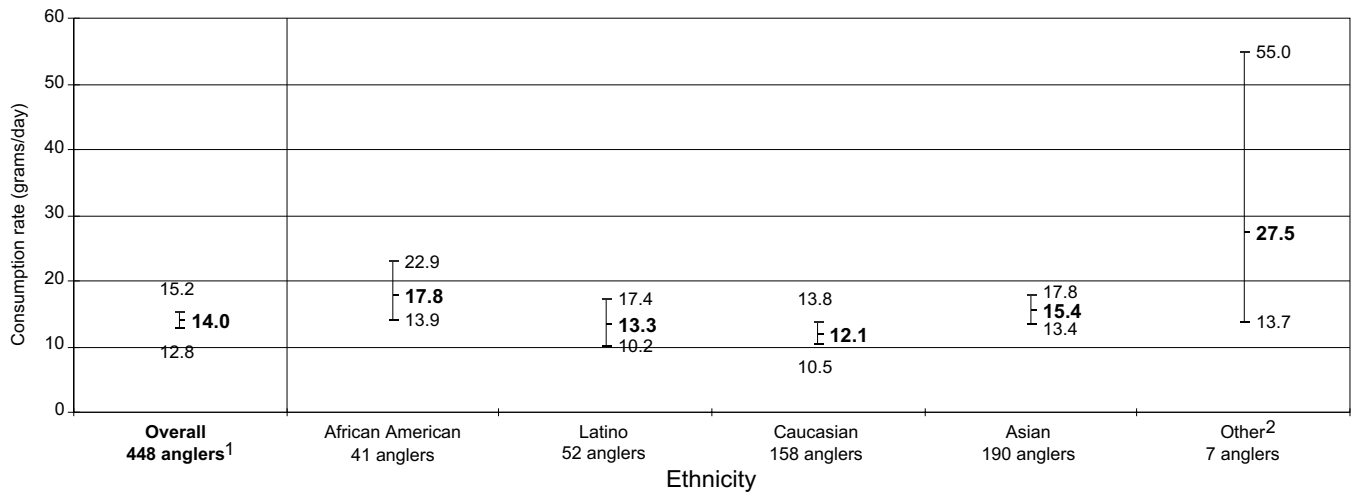
Because consumption rate data were not normally distributed, we also used a non-parametric test, the Wilcoxon signed rank test, to compare consumption rates within demographic variables. Using this test, ethnicity showed significant differences ($p<0.05$) between subgroups with consumption rate. No statistically significant differences with consumption rates existed based on mode, income, education, age, gender, or season of interview.

3. Highly Exposed Consumers

As discussed in the previous section, one way to identify highly exposed subpopulations is to compare consumption rate variables among subgroups and look for differences. In this section, we discuss another way to identify highly exposed anglers by describing the demographic characteristics of the group of anglers with the highest consumption rates. We characterize two highly exposed groups, those who eat

Figure 26

Geometric mean consumption rate by ethnicity (major groups) among recent consumers
448 anglers



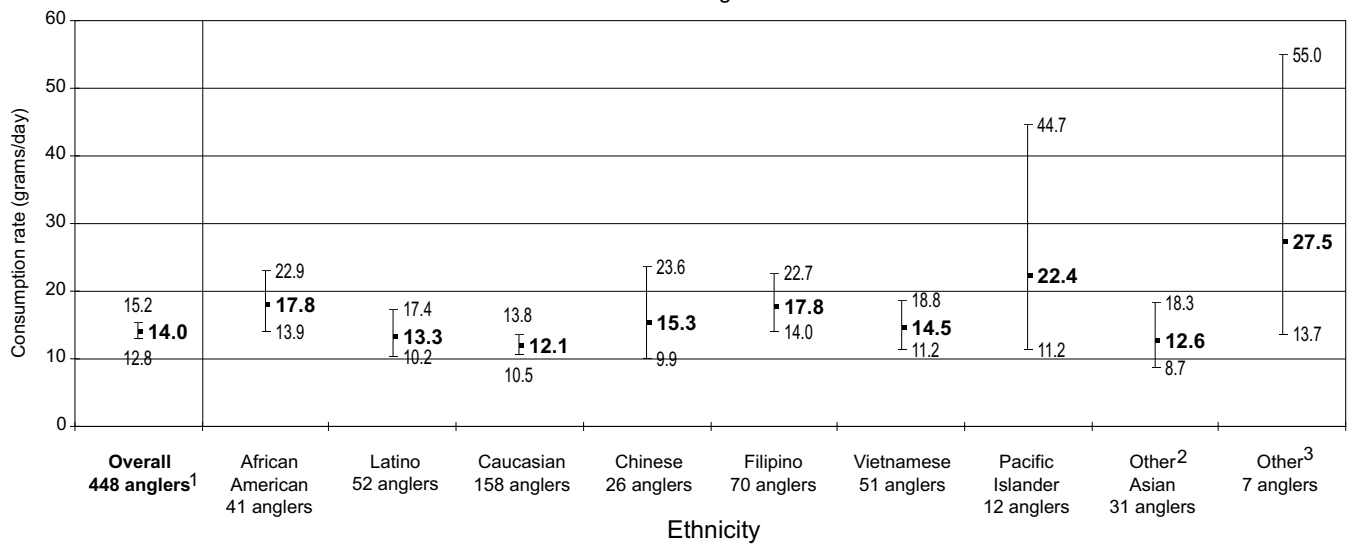
Adjusted for avidity bias. Error bars represent 95% confidence intervals.

1 "Overall" excludes 17 recent consumers with missing ethnicity data.

2 "Other" includes Russian, Middle Eastern, and individuals of unspecified mixed ethnicity.

Figure 27

Geometric mean consumption rate by ethnicity (including Asian subgroups) among recent consumers
448 anglers



Adjusted for avidity bias. Error bars represent 95% confidence intervals.

1 "Overall" excludes 17 recent consumers with missing ethnicity data.

2 "Other Asian" includes Korean, Japanese, Southeast Asian (other than Vietnamese), and individuals of mixed Asian or unspecified Asian ethnicity.

3 "Other" includes Russian, Middle Eastern, and individuals of unspecified mixed ethnicity.

above health advisory levels, and those whose overall consumption rate is above the 95% percentile. These highly exposed groups are then compared to consumers of Bay fish who are below these levels.

a. "Above Advisory" Consumers

Anglers who consume Bay fish above levels recommended by the health advisory for SF Bay can be considered a highly exposed group. The health advisory recommends that anglers limit their consumption of most species of Bay fish to no more than two meals per month, with meal size adjusted for body weight. (See Appendix A for full text of the health advisory). We defined "above advisory" consumers as those who reported consuming greater than 16 ounces (two 8-ounce meals) of advisory species in the four weeks prior to being interviewed. (Sixteen ounces consumed within a four-week period is equal to 16 g/d.) Above advisory consumers differ from anglers whose overall consumption rate is greater than 16 g/d because some commonly consumed species, such as jacksmelt and salmon, are not included in the health advisory.

In order to see how the above advisory consumers are different from other consumers of Bay fish, we compared them to consumers who did not surpass the health advisory level. We call this group the "below advisory" group. We find in Figure 28 that 9% of consumers (adjusted; 15%, unadjusted, see Table K37a) reported consuming above advisory levels (greater than 16g/day) in the four weeks prior to being interviewed. Looking only at meal frequency, we also find that 9% (adjusted; 16%, unadjusted) of consumers reported consuming greater than 2 meals of advisory fish within a four week period. Based on consumption rates, for the 9% above advisory consumers, Figure 28 also shows how far above the advisory recommendations these anglers are consuming. For example, 41% of above advisory consumers are consuming between two to four times (32 g/day to 64 g/day) above the advisory level. Only 1% are consuming 16 times (256 g/day) or more above the advisory level.

We also examined the demographic differences between the above and below advisory groups in two ways. In Figure 29, we compare how the demographic profile of above advisory consumers differs from below advisory consumers. Among fishing modes, we found that private boat anglers represented a smaller proportion of the above advisory consumers when compared to the below advisory consumers. Among ethnic groups, Asians represented a larger proportion among the above advisory group when compared to the below advisory group, whereas Caucasians represented a smaller proportion among the above advisory consumers. Within income and education levels, differences between the above and

Figure 28

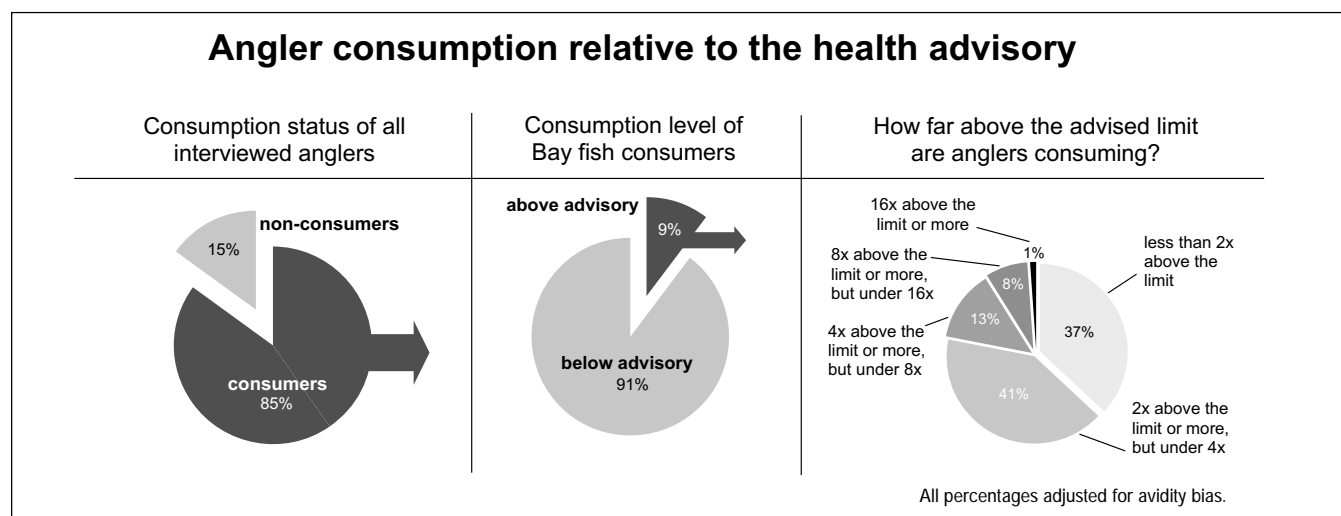
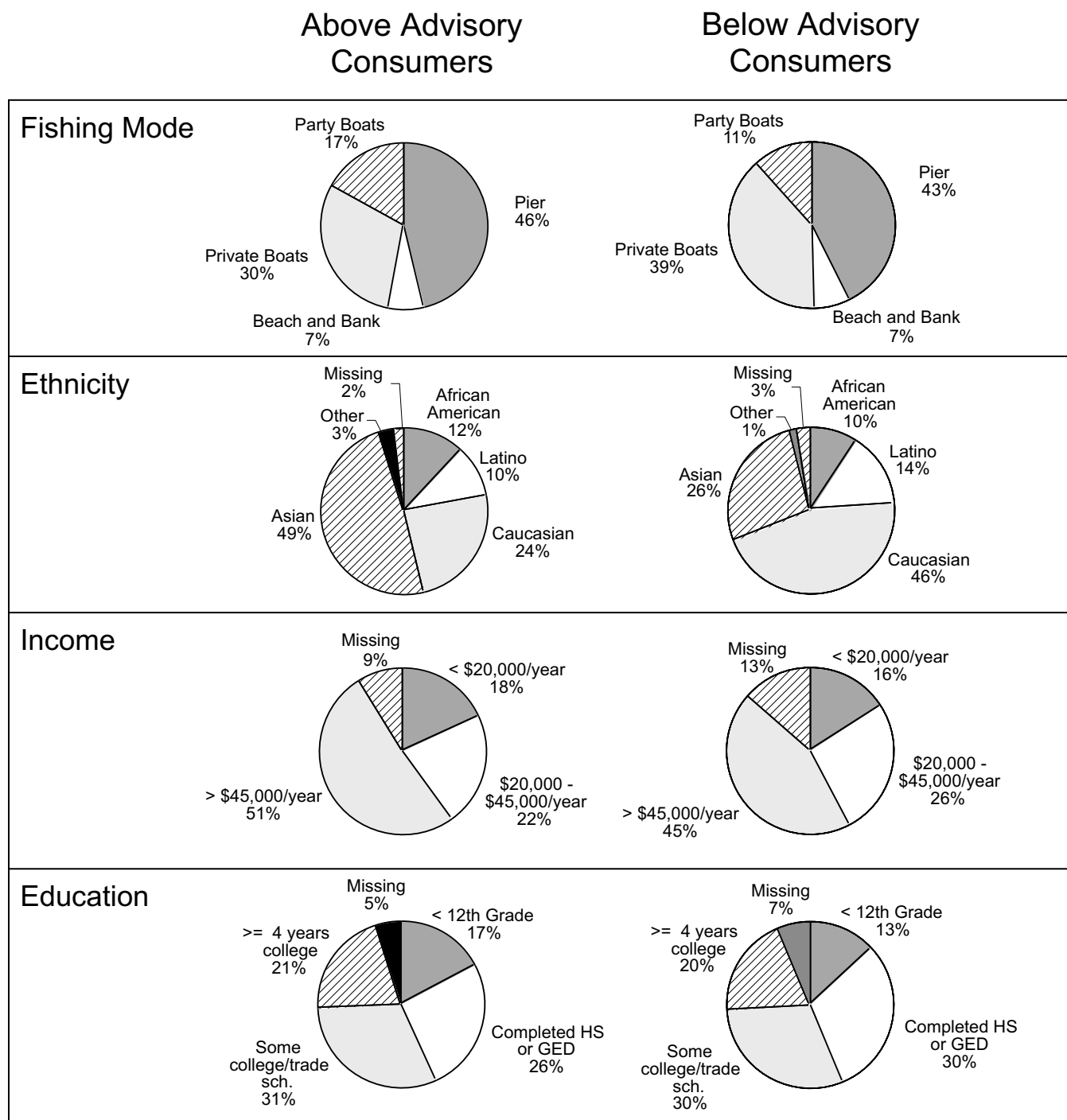


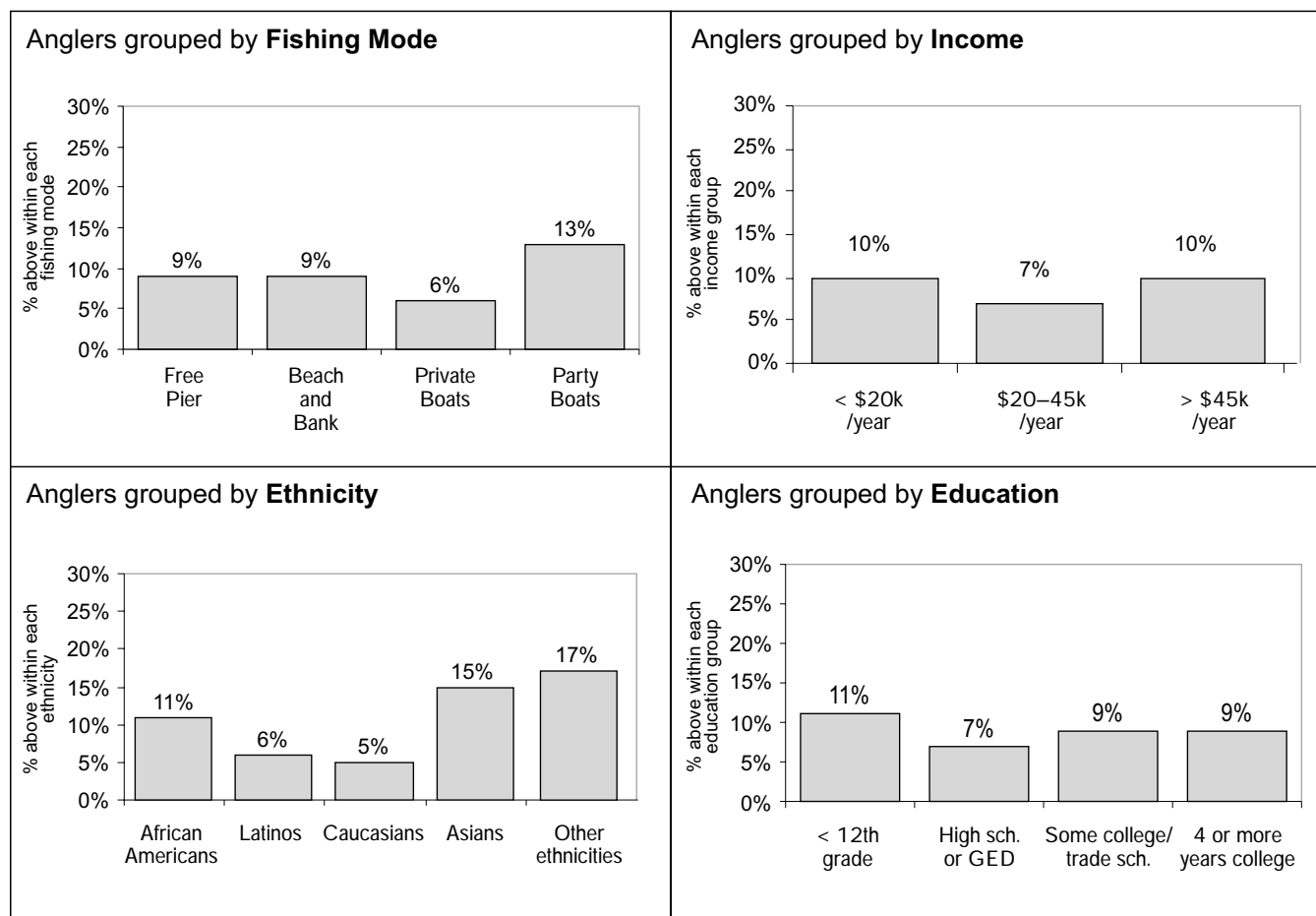
Figure 29
**Demographic characteristics of anglers consuming
 above and below the advisory**



All percentages adjusted for avidity bias.

Figure 30

Percentage of anglers consuming above advisory recommendations Anglers with Bay fish consumption



Anglers with no fish consumption excluded from percentage calculations. All percentages adjusted for avidity bias.

below advisory group were small. Tables K37a and K37b compare the above advisory groups to the below advisory group for these and other demographic variables. We also show these same data presented in a different way. Figure 30 compares the proportion of above advisory consumers within demographic subgroups. For example, within ethnic groups, Asians were three times more likely to be in the above advisory group than Caucasians (see Table K37b).

It is important to note that the health advisory is more restrictive for women who are pregnant, planning to become pregnant, or nursing, and for small children. For these groups, the health advisory recommends that consumption of Bay fish be limited to no more than one time per month. We did not interview any children, and we did not determine whether the women we interviewed were pregnant, planning to become pregnant or nursing. However, as discussed previously and shown in Table K35, consumption rates for female anglers did not differ from consumption rates for males. Thus, if consumption rates for pregnant women, women planning to become pregnant, and nursing women are similar to women we interviewed, then a much higher proportion of these women will exceed a more restrictive health advisory.

b. Consumers above the 95th Percentile

Because risk assessors often use upper percentiles of a distribution to characterize high end exposures, in Figure 31 we characterized the consumers of Bay fish whose consumption rate was among the top five percent of consumers (i.e, above the 95th percentile). We compared this group, who consumed greater than 32 g/day (adjusted), to consumers of Bay fish whose consumption rate was at or below the 95th percentile.

Figure 31 also compares these two groups by demographic variables. Similar to the above advisory consumers discussed in the previous section, we found that a larger proportion of the top five percent of consumers were Asian and a smaller proportion were Caucasian, when compared to the remaining 95% of consumers. However, unlike the above advisory consumers, a larger proportion of the top five percent group reported the highest income level (>\$45,000 per year) than the comparison group. Differences by mode and education were small. Table K38 compares the top five percent to the remaining 95% of consumers for these and other demographic variables.

4. How Decliners May Affect Consumption Rates

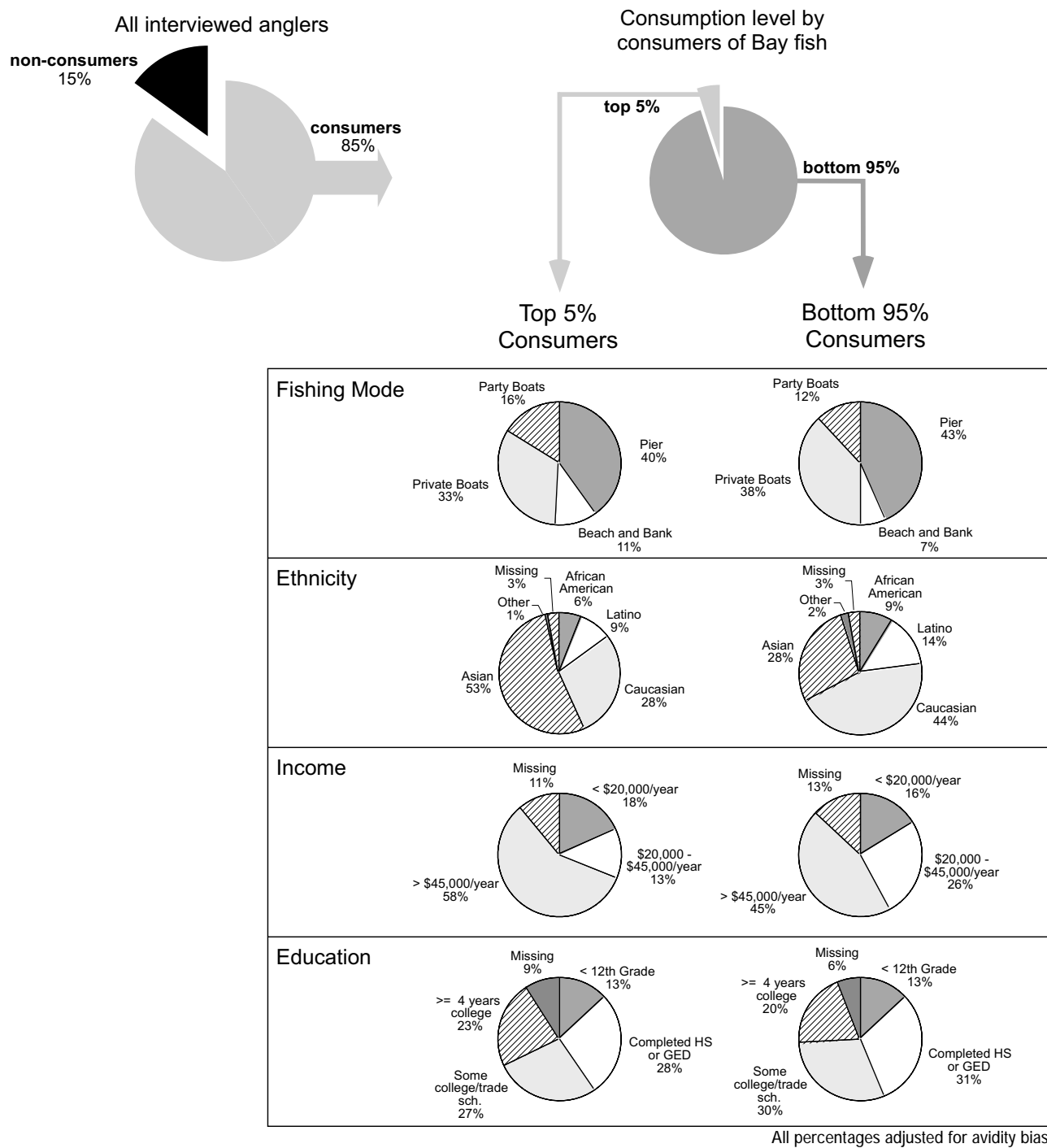
Anglers who declined to be interviewed for this study represented 23% (n=407) of net attempted interviews (see Section IV.B, Figure 4 and Table 2). Although the decline rate for this study was lower than similar studies (Wong *et al.*1997, SCCWRP/MBC 1994), lacking data on nearly one fourth of the sample may have introduced some bias. By recording observed ethnicity for anglers who declined to be interviewed, we were able to show that the ethnic profile of those who chose not to participate in the study (i.e., decliners) differed from anglers who agreed to be interviewed (Tables K1c and K3c). Decliners, for example, had a higher proportion of Asians than anglers who were interviewed. In addition, for about a third of decliners, we recorded language problems as the reason the angler declined to be interviewed. These anglers could be comprised of recent immigrants who may be less aware of health advisories and thus have higher consumption rates than the angler population as a whole.

We evaluated how consumption rates of recent consumers (based on a four-week recall) may have been influenced by the decliners. As a worst-case scenario, to ensure that we do not underestimate the influence decliners may have had on overall consumption rates, we assumed that all decliners had recent consumption (in the last four weeks) of Bay fish. (More likely, decliners included non-consumers or consumers who had not eaten Bay fish recently, as in the interviewed population). Furthermore, because ethnicity was the only demographic variable that showed a significant influence on consumption rate, we adjusted our sample to account for ethnic differences between the decliners and interviewed anglers. We did this by assuming that decliners of a certain ethnic group had the same consumption rate as recent consumers we interviewed in the same ethnic group. We found that consumption rates of recent consumers with decliners included were virtually identical to the consumption rates of recent consumers without decliners.

It is also plausible that decliners have consumption rates that are lower than anglers who were interviewed. For example, they may have declined to be interviewed because they consume very little Bay fish or do not eat Bay fish at all. If decliners have low consumption rates, the consumption rates presented in Section IV.D.1 may be biased upwards. Although any bias associated with anglers who declined to be interviewed is not quantifiable, our analysis using reasonable assumptions about this group revealed that the 23% of anglers from whom we could not directly obtain consumption data are not very likely to influence our overall derived consumption estimates.

Figure 31

Demographic characteristics of anglers with consumption rate in the top 5% (above 32 grams/day) and bottom 95%



5. Commonly Consumed Species

One of the study objectives was to determine which species of SF Bay fish were most commonly consumed by anglers. We determined the most commonly consumed species in two ways. First, for the three species of greatest health concern in SF Bay white croaker, leopard shark, and striped bass, we asked whether anglers, in general, consumed these species. Second, we asked anglers whether they had had recent consumption (in the last four weeks) of any SF Bay fish species, including these three species. Data reported in this section could not be adjusted for avidity bias, thus results are unadjusted.

a. Consumption of White Croaker, Leopard Shark, and Striped Bass

For three species of SF Bay fish—white croaker, leopard shark, and striped bass—interviewers asked respondents the general question, “Do you eat this fish?” When asking about these three species, the interviewer showed the respondent color photos of these fish (see Appendix F). Among consumers of Bay fish, about three fourths reported that, in general, they ate striped bass while much smaller proportions (28% and 20%, respectively) reported that they ate white croaker and leopard shark (see Figure 32).

We also looked at the demographic variables that describe consumers of these three species. For consumers who said they eat white croaker, there were statistically significant differences within mode, ethnicity, income, and education (see Figure 32 and Table K39). For example, a much higher proportion of consumers who fish from piers and beach and bank sites, reported that they eat white croaker, compared to boat anglers. Among ethnic groups, 46% of Asians eat white croaker compared to only 10% of Caucasians. The proportion of consumers who reported the lowest income level (<\$20,000) were twice as likely to consume white croaker than consumers reporting the highest income level (>\$45,000). A similar pattern was found for level of education.

For consumers of leopard shark, there were statistically significant differences within ethnicity (when Asian subgroups were included), income, and education (see Figure 32 and Table K39). A higher proportion of Vietnamese and Chinese reported consuming leopard shark compared to other ethnic groups. As with white croaker, consumers at the lowest income and educational levels had a higher proportion of leopard shark consumers than consumers at the highest income and educational levels.

Because such a high proportion of consumers eat striped bass, there were no statistically significant differences by mode, ethnicity, income and education, for consumers of this species (see Figure 32 and Table K39).

b. Commonly Consumed SF Bay Fish Species

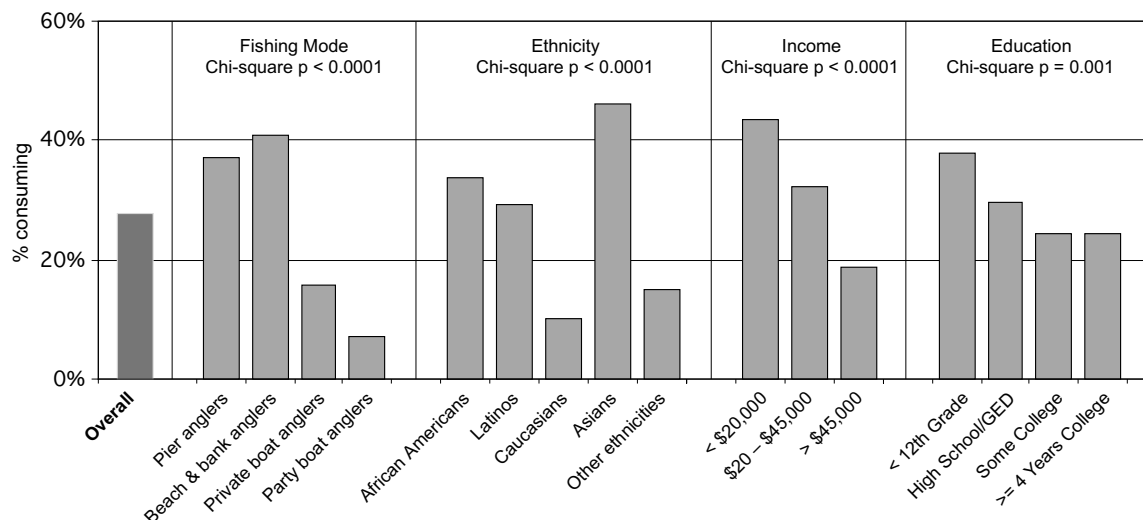
In addition to asking respondents if they, in general, eat white croaker, leopard shark, or striped bass, respondents were also asked if they had consumed any SF Bay fish species in the last four weeks. The interviewers showed respondents color pictures of 16 fish species and three types of Bay shellfish. Shellfish consumption is described in a later section (Section IV.D.8). Interviewers then asked respondents about recent consumption of other fish species for which pictures were not available.

Figure 33 shows the 14 most commonly consumed fish species among recent consumers during the twelve-month survey period. Striped bass was the most commonly consumed fish species, with slightly over half of recent consumers reporting they consumed striped bass in the last four weeks. We excluded fish species reported by less than 1% of recent consumers. Interviewers showed anglers pictures of all species in Figure 33 except salmon.

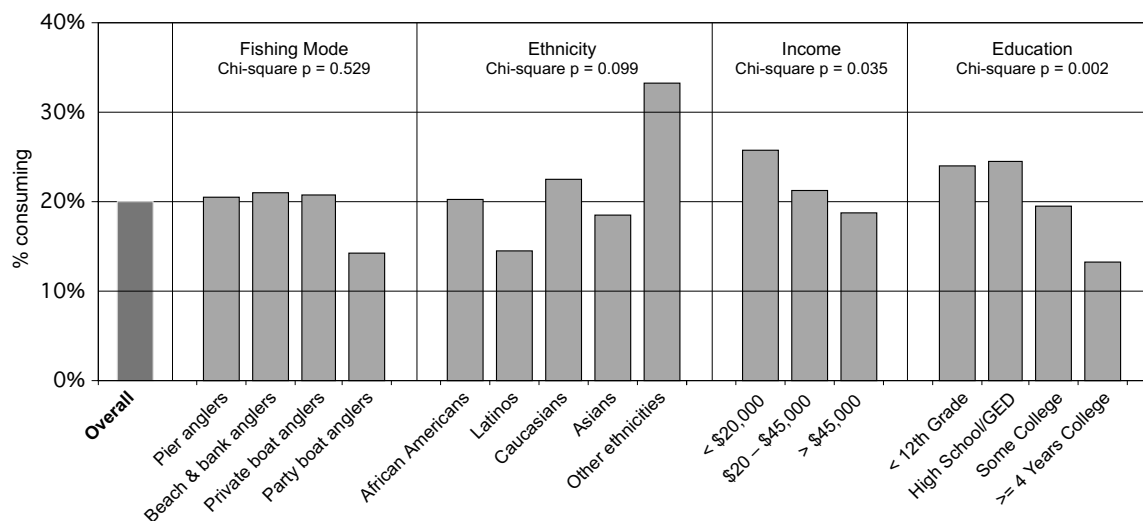
In Figure 34, we compared the demographic variables that characterize the anglers who had recent consumption of two species, halibut and jacksmelt. These two species were the second and third most

Figure 32

Consumption of white croaker



Consumption of leopard shark



Consumption of striped bass

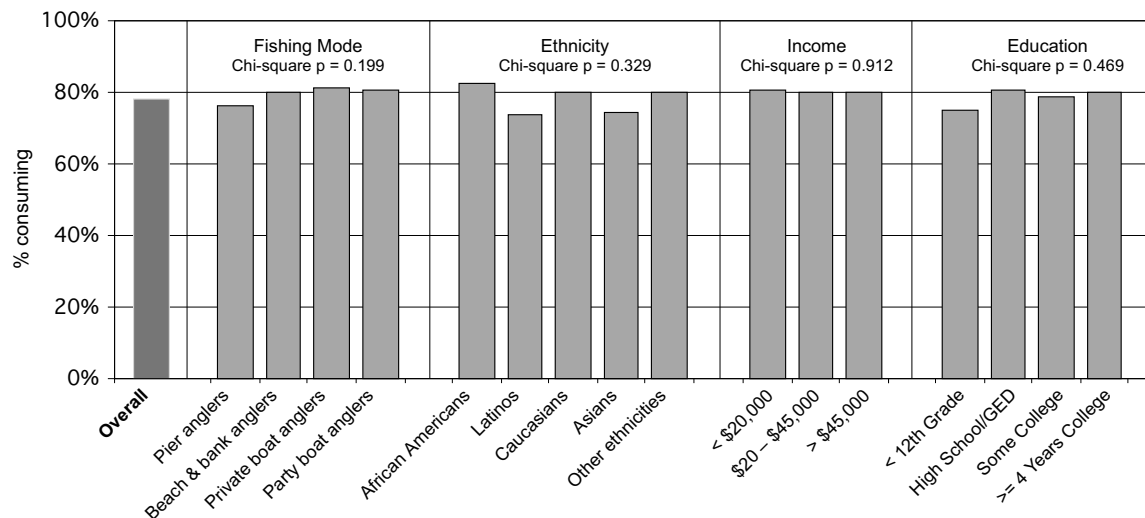
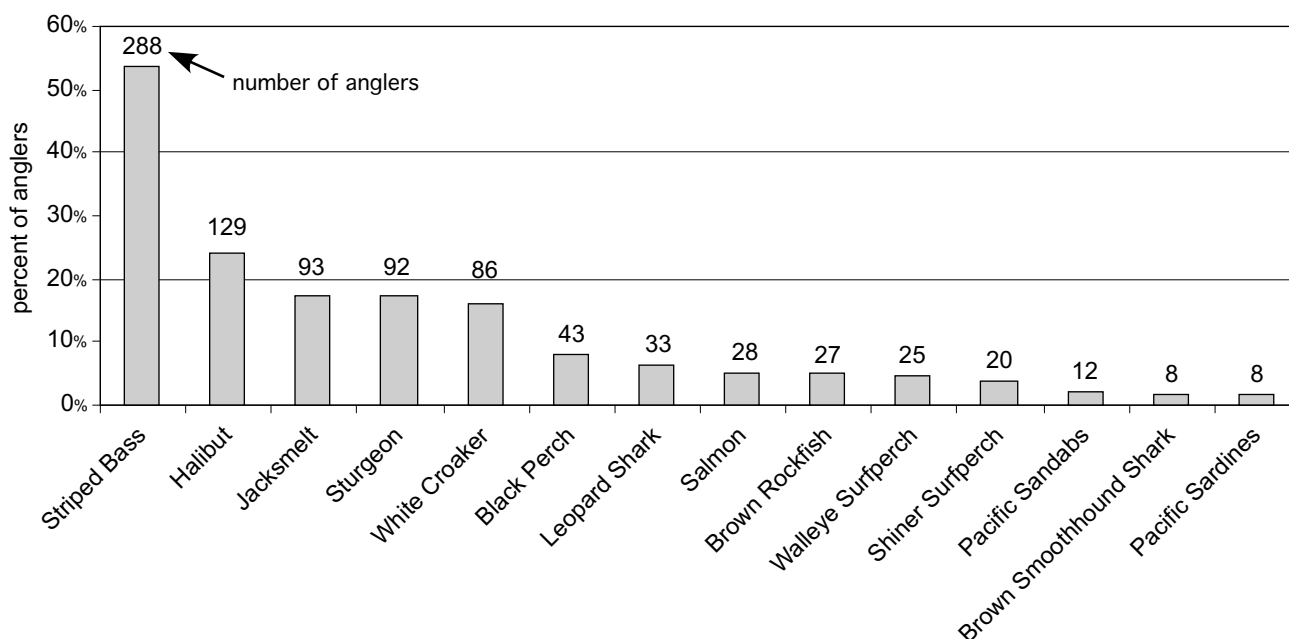


Figure 33

Bay fish species consumed by anglers with recent fish consumption
537 anglers



Anglers reporting no consumption in last 4 weeks not included. Not adjusted for avidity bias.

commonly consumed species (in the last four weeks) after striped bass. We do not present demographic factors that characterize recent consumers of striped bass because there were no significant differences within these factors except for season of interview (Table K40). We found statistically significant differences within mode, ethnicity, and income for both halibut and jacksmelt (see Figure 34). For example, among fishing modes, a much higher proportion of party boat anglers had recent consumption of halibut compared to shore-based anglers. In contrast, a higher proportion of shore-based anglers (especially beach and bank anglers) had recent consumption of jacksmelt compared to boat anglers.

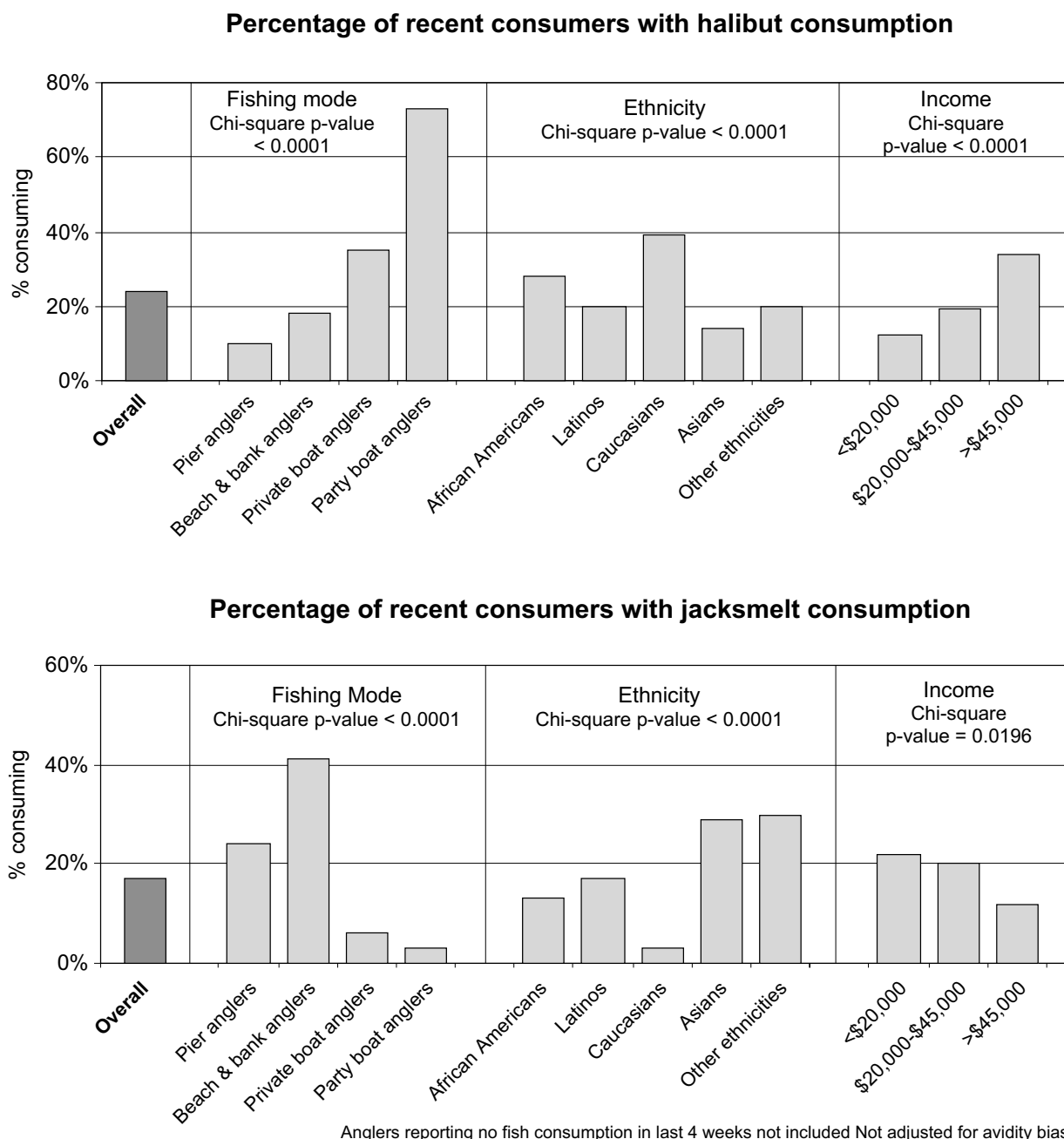
Caucasians were more than two times as likely to have consumed halibut than Asians, although Asians were almost ten times as likely to have consumed jacksmelt than Caucasians. For recent consumers of halibut, the proportion in the highest income level was nearly three times that in the lowest income level. For recent consumers of jacksmelt, the proportion in the lowest income levels was nearly twice the highest income level.

Comparison of demographic factors among recent consumers of the top seven fish species (striped bass, halibut, jacksmelt, sturgeon, white croaker, surfperch, and leopard shark) can be found in Table K40.

6. Fish Parts Consumed and Fish Preparation Practices

Because the parts of the fish consumed and the preparation and cooking methods used will influence an angler's exposure to chemicals in contaminated fish, another objective of the study was to characterize these consumption methods for three SF Bay species: white croaker, leopard shark, and striped bass. This information will help identify populations that are likely to be more exposed to chemical contaminants because of their consumption practices.

Figure 34

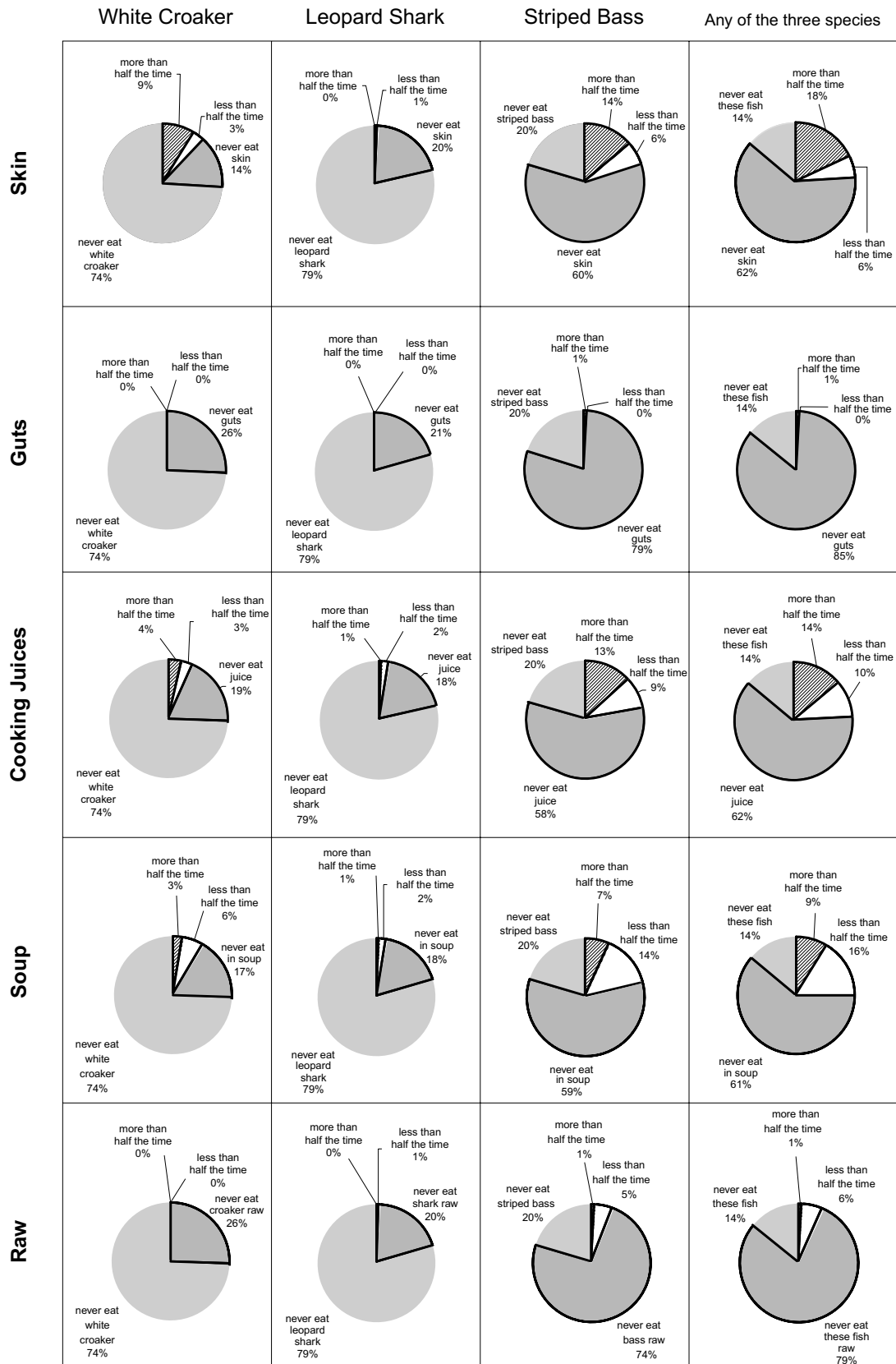


Anglers were asked about each of the three species independently. Anglers first had to report that they, in general, ate one of the three species before they were asked about their consumption methods for that species. Specifically, interviewers asked anglers how often they ate: (1) the skin, (2) the guts, (3) the cooking juices or drippings, (4) the species in soup, (5) the species raw. In answering these questions, respondents indicated whether they followed the consumption practice more than half the time, less than half the time, or never.

The data on fish parts consumed and fish preparation methods used by anglers is summarized for the three species in Figure 35 and Table K41. Overall, we found that the majority of consumers of Bay fish never reported any of these five consumption practices for the three species. Only about one fourth

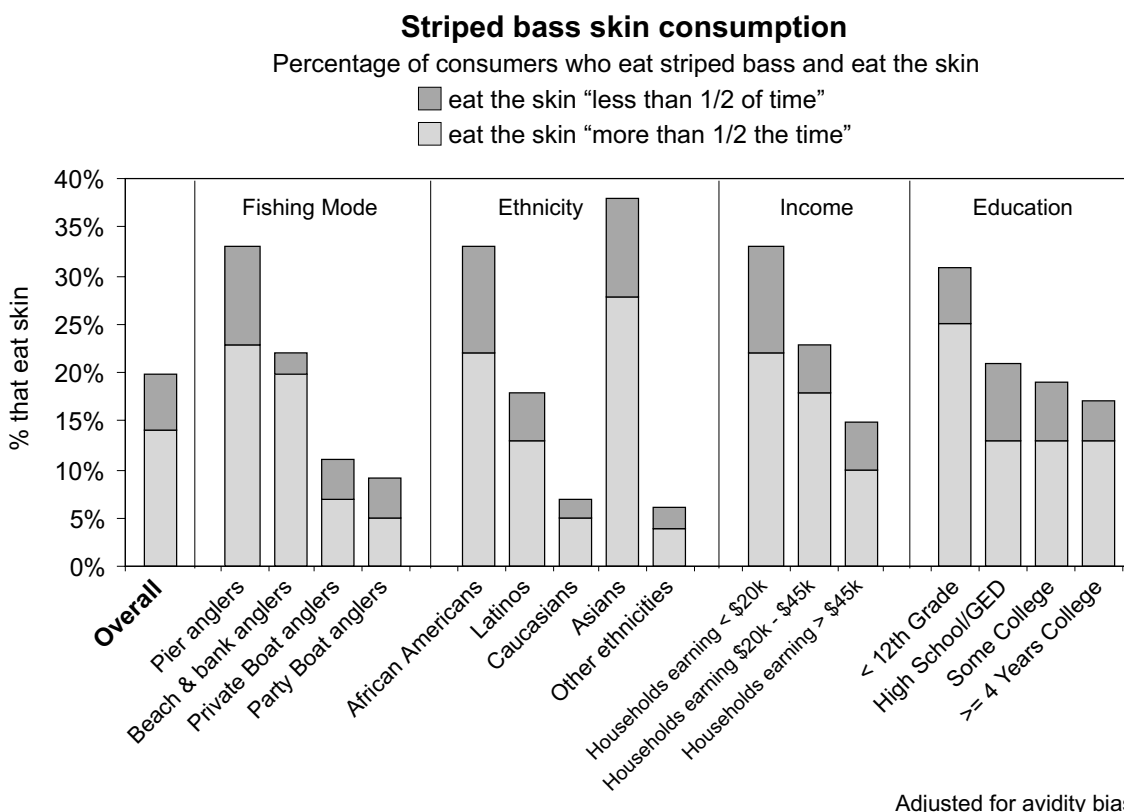
Figure 35

Fish parts consumed and fish preparation practices among consumers



Adjusted for avidity bias.

Figure 36a



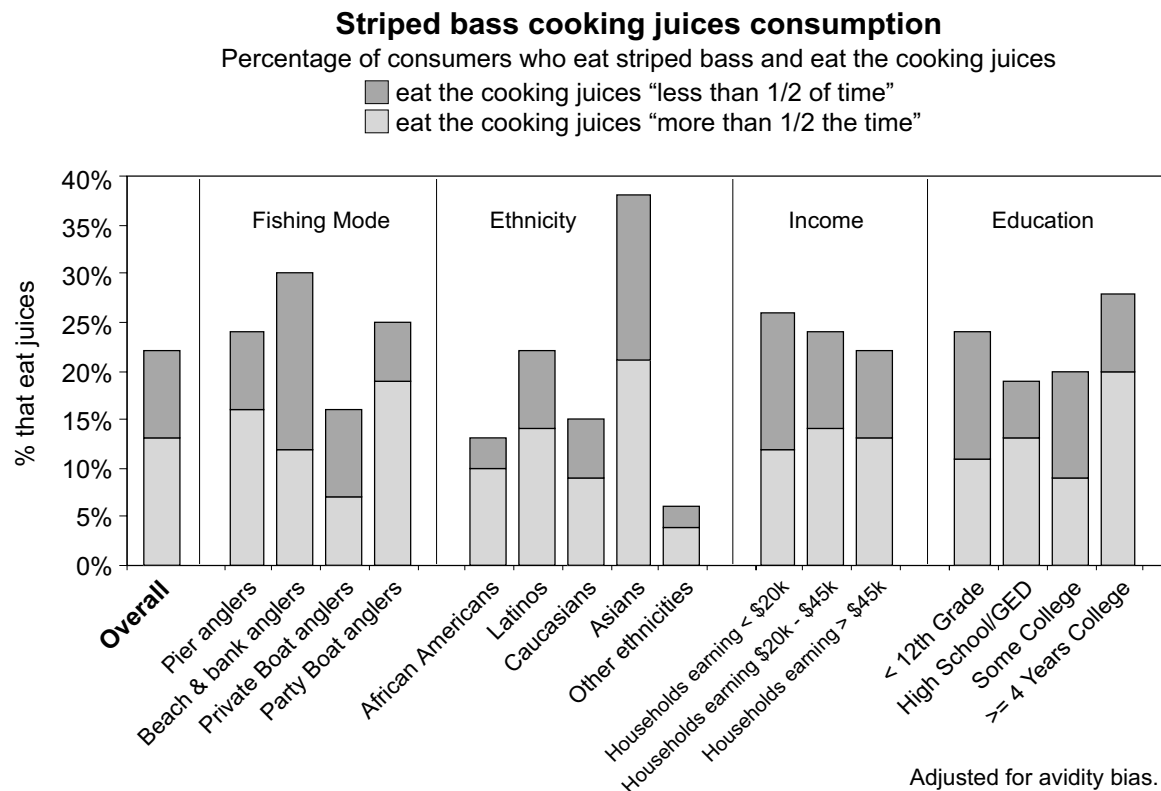
of consumers reported that they ever ate skin, cooking juices, or ate soup made from at least one of these species. Only 1% of consumers reported consumption of guts for any of the three species and only 7% reported raw consumption.

Consumers of Bay fish more frequently reported consumption of striped bass skin, guts, etc., compared to the other two species. This was due largely to the fact that a much higher percentage of consumers ate striped bass than other species (see Figure 35). However, when consumers who did not eat these species were excluded, the proportions changed. For example, among consumers of white croaker, nearly half ate white croaker skin whereas only one fourth of striped bass consumers ate striped bass skin. About one in three consumers of white croaker ate this species in soup. In comparison, only one in five striped bass consumers ate this species in soup. About one fourth of striped bass and white croaker consumers ate the cooking juices of these species at least some of the time. Raw consumption was still highest among striped bass consumers, compared to other species. These consumption methods among leopard shark consumers were uniformly lower than the other two species.

Further analysis of consumption of striped bass skin, cooking juices, and consumption of this species raw by demographic factors is presented in Figures 36a-36c. We chose to present more detailed analysis of consumption practices for striped bass because the majority of anglers in all demographic groups consumed this species, thus consumption methods were not skewed by who did or did not eat this species.

Among consumers who ate striped bass skin, shore-based anglers were twice as likely as boat anglers to eat skin of this species at least some of the time. African American and Asians were four to five times as likely as Caucasians to eat skin at least some of the time. Also, the proportion of anglers

Figure 36b



who ate striped bass skin was highest at low income and education levels. Among consumers who ate cooking juices of striped bass, private boat anglers were less likely to consume cooking juices of striped bass than anglers of other fishing modes. Asians were nearly three times as likely as Caucasians and African Americans to consume cooking juices at least some of the time. Differences by income and education were relatively small.

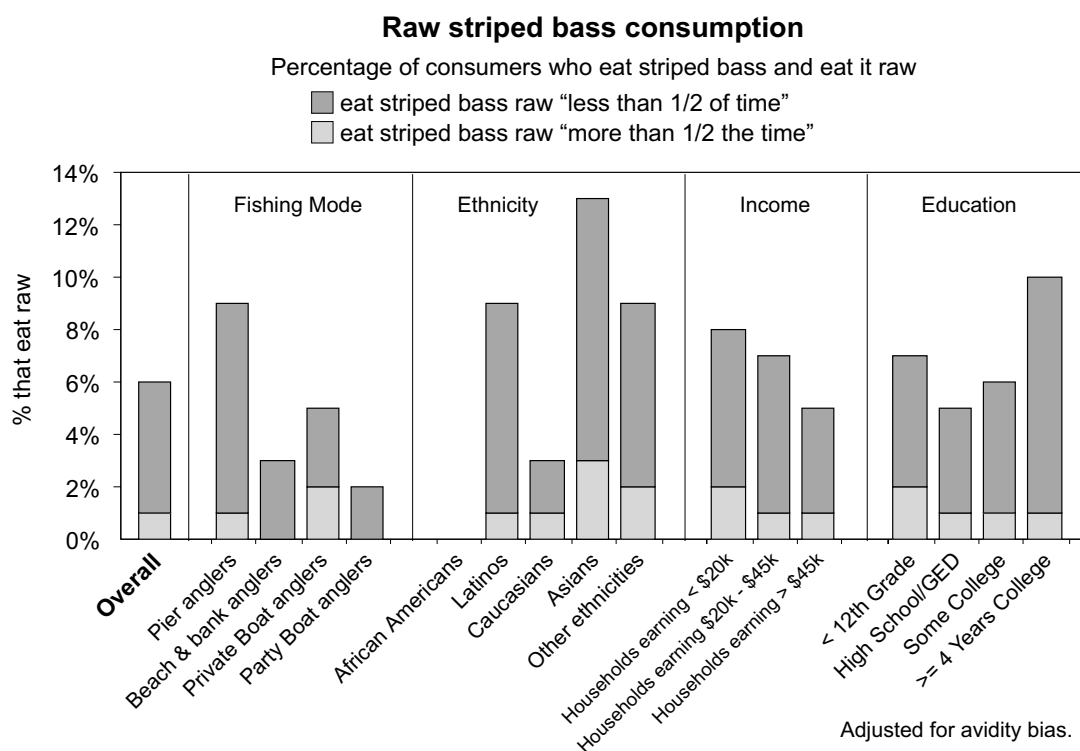
Although raw consumption of striped bass was relatively uncommon among consumers of this species (6%), pier anglers and Asians were more likely to report raw consumption than other modes and ethnic groups (see Table K42e). Tables K42a-K42e summarizes the five consumption methods for striped bass by mode, ethnicity, income, and education.

In contrast to the population that consumes striped bass, the population consuming white croaker differed markedly from the overall consumer group (see Figure 32 and Table K39). Consumption methods for consumers of white croaker for some demographic factors are presented in Tables K43a-K43e. No further analysis of leopard shark was conducted because few anglers reported any of these consumption patterns for this species.

7. Consumption of Fish Caught from Outside SF Bay and Commercial Sources

Although the primary purpose of this study was to characterize anglers' consumption of fish from SF Bay, we also characterized consumption of fish from two other sources: (1) fish caught from areas outside SF Bay, including the ocean and freshwater rivers and lakes, and (2) fish from commercial sources (i.e., fish purchased from stores or restaurants). We only asked respondents whether they had recent consumption (in the last four weeks) of fish from these sources. We found, in Figure 37, that one

Figure 36c

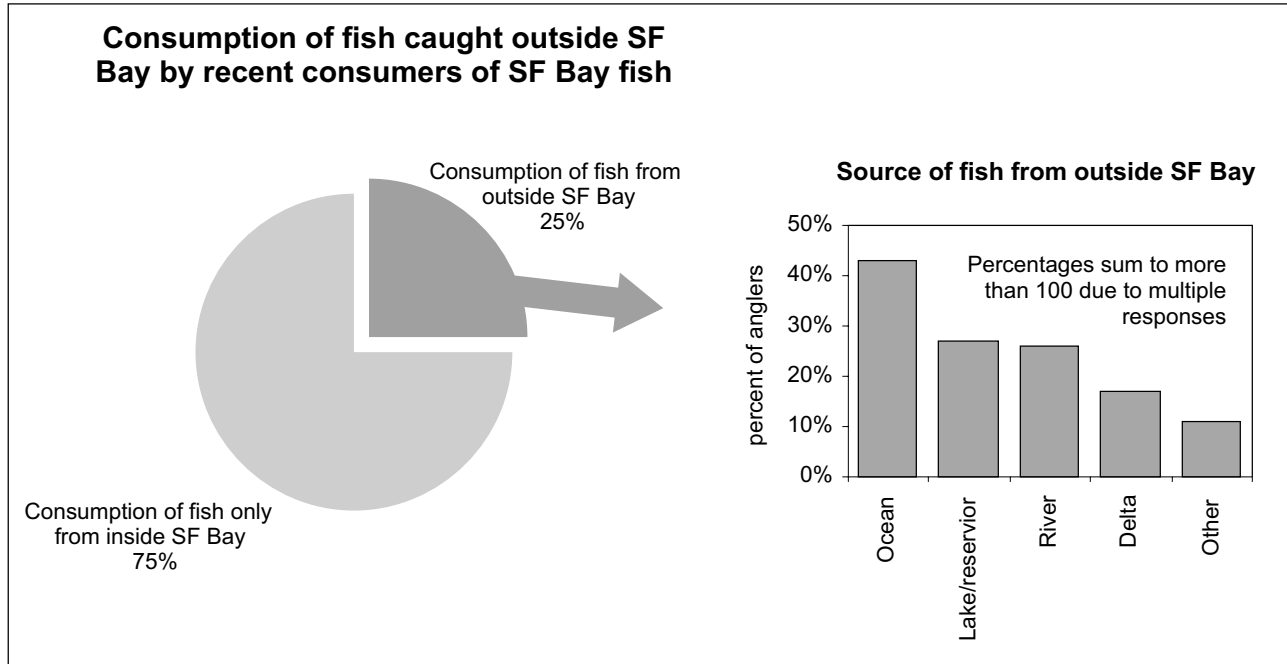


fourth of recent consumers of SF Bay fish also reported eating fish caught from areas outside of SF Bay in the four weeks prior to the interview, with the ocean being the area most often reported. In Figure 38, we show that half of recent consumers reported consumption of fish from a store or restaurant. The proportion of anglers reporting recent consumption from areas outside SF Bay and from commercial sources was very similar for two other groups, respondents and consumers (see Table K44).

In Table 7, we show how consumption rates for recent consumers of SF Bay fish increase when fish from other sources is included. The first column of Table 7 shows consumption rates of SF Bay fish only. The second column of Table 7 shows consumption rates that include all sport fish (fish from SF Bay plus fish from outside SF Bay). Consumption rates shown in the first two columns (SF Bay fish and all sport fish only) are very similar because relatively few recent consumers of SF Bay fish also had consumption of fish from outside SF Bay. The median consumption rates do not change when outside SF Bay fish is added; it remains at 16.0 g/d. The geometric mean value, however, rises slightly from 14.0 g/d to 17.1 g/d (adjusted).

The third column of Table 7 describes consumption rates that include all fish, which is the sum of fish from SF Bay, outside SF Bay, and from commercial sources. The median consumption rate that included all fish is 24.0 g/d (adjusted), equivalent to three eight-ounce meals per month. This amount is 50% higher than consumption rates for SF Bay fish only. The full distribution of consumption rates among respondents, consumers, and recent consumers, both unadjusted and adjusted, is shown in Tables K45a and K45b.

Figure 37



Adjusted for avidity bias.

Table 7. Consumption of Fish From Outside SF Bay and Commercial Sources among Recent Consumers of SF Bay Fish (n=465, adjusted)

	Fish From SF Bay Only (g/d)	All Sport Fish (Fish From SF Bay and Outside SF Bay) (g/d)	All Fish (Fish from SF Bay, Outside SF Bay, and Commercial Sources) (g/d)
Mean (Standard Deviation)	23.0 (32.0)	27.9 (35.6)	43.4 (76.0)
Minimum Value	2.0	2.0	2.0
Maximum Value	324.0	324.0	848.0
Geometric Mean	14.0	17.1	26.0
Median (50 th Percentile)	16.0	16.0	24.0
90 th Percentile	48.0	56.0	80.0
95 th Percentile	80.0	96.0	128.0

^a For 36 recent consumers, there was insufficient information for deriving a consumption rate. For an additional 36 recent consumers, fishing frequently was not reported. Thus, their consumption rate could not be adjusted for avidity bias.

8. Shellfish Consumption

Interviewers asked respondents about their consumption, in the last four weeks, of three types of shellfish from SF Bay: crabs, clams, and mussels. Consumption rates for shellfish could not be derived because no portion size question on shellfish was included in the survey. Only meal frequency, the number of times shellfish was eaten in the last four weeks, was recorded. In addition, these shellfish consumption data do not characterize the population of shellfish consumers in SF Bay.

These data reflect the population of anglers who also had recent consumption of shellfish. Due to resource constraints, persons who were gathering shellfish but were not fishing were not interviewed. For example, many people deploy crab pots from piers in SF Bay. These persons were not interviewed unless they were also fishing at the time they were approached by the interviewer.

Overall, only a small percentage (6%) of consumers of Bay fish also had recent consumption of Bay shellfish. Among shellfish types, anglers reporting recent consumption of crab were far more numerous than those who consumed mussels or clams (see Table K46). The proportion of crab consumers differed among the respondents, consumers, recent consumers, and above advisory consumers. The proportion of crab consumers was twice as high (16%) among above advisory consumers than consumers of SF Bay fish (6%).

In Figure 39 and Table K47 we describe some of the demographic characteristics of consumers of Bay fish who also had recent consumption of crab. By mode, the highest proportion of crab consumers fished on piers. The proportion of crab consumers among Asians (especially Vietnamese) and African American was higher than other ethnic groups. Also, anglers with lower income and education levels were more likely to have consumed crab, and anglers interviewed during the summer or fall were more likely to have consumed crab than those interviewed during the winter or spring.

The median (adjusted) meal frequency for crab and all shellfish (sum of crab, clams, and mussels) was one time in the last four weeks for consumers of Bay fish (see Table K48).

E. Health Advisory Questions

In this section, we assess anglers' awareness and comprehension of the health advisory, and determine whether awareness and/or comprehension influenced anglers' fish consumption behavior. We also identify ways anglers preferred to receive health advisory information. Questions concerning the health advisory were not asked of party boat anglers, thus, the findings reflect only responses from shore-based and private boat anglers. Because the health advisory provides guidance that may have influenced an angler's decision to consume fish caught from the San Francisco Bay, we present information in this section for both consumers and non-consumers as noted. (The health advisory for SF Bay can be found in Appendix A.) Values adjusted for avidity bias are presented unless otherwise noted. Tables presenting

Figure 38

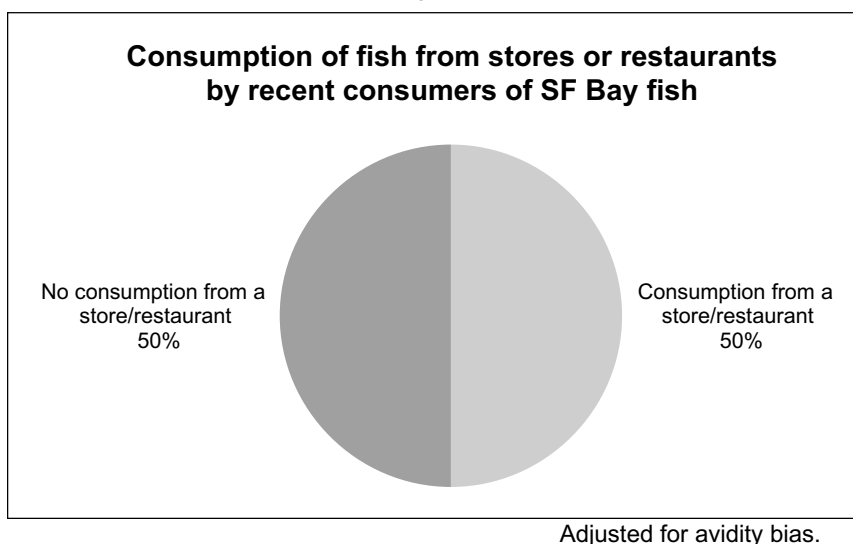
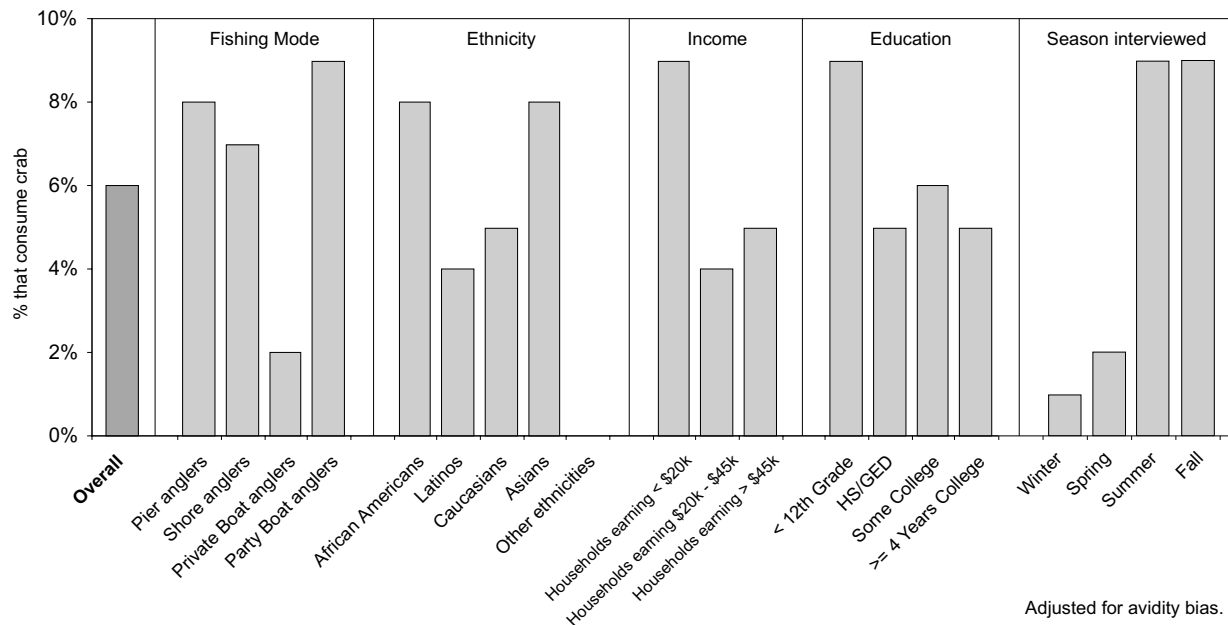


Figure 39

Percentage of consumers with recent crab consumption



data (adjusted and unadjusted for avidity bias) for respondents, consumers and non-consumers are provided in Appendix K.

1. Awareness of San Francisco Health Advisory

To determine anglers' awareness and comprehension of the health advisory we asked a two-part question. In the first part, we asked anglers "Have you heard or seen any information or health advisories about eating fish from the Bay?" For those who responded yes, we assessed the angler's comprehension of the advisory by asking them "What did the information say about fish from the Bay?" Verbal responses to the latter portion of the question were written down. These responses were later reviewed and manually coded (see Appendix I for coding categories for text responses). Responses to the first part of the question are reported in this section and responses to the second part are reported in the following section.

For the first part of the question, as shown in Figure 40, 60% of consumers reported awareness of an advisory. As shown in Table K49, 62% of non-consumers similarly reported awareness of an advisory. We found differences in reported awareness of a health advisory among consumers by demographic characteristics (Figure 40 and Table K49). For example, Latino and Asian consumers were less likely to report an awareness of the health advisory compared to African Americans and Caucasians. The proportion of consumers who were aware of health advisories also increased nearly 50% from the lowest income level (less than \$20,000 per year) to the highest income level (greater than \$45,000 per year). A similar trend was observed for education level.

The proportion of consumers reporting awareness of the advisory also increased with the length of time they had been fishing in the Bay (see Figure 40 and Table K49). Less than half of the consumers with less than a year's experience fishing in SF Bay reported awareness of the advisory, compared to over three fourths of consumers with 30+ years experience.

Figure 40

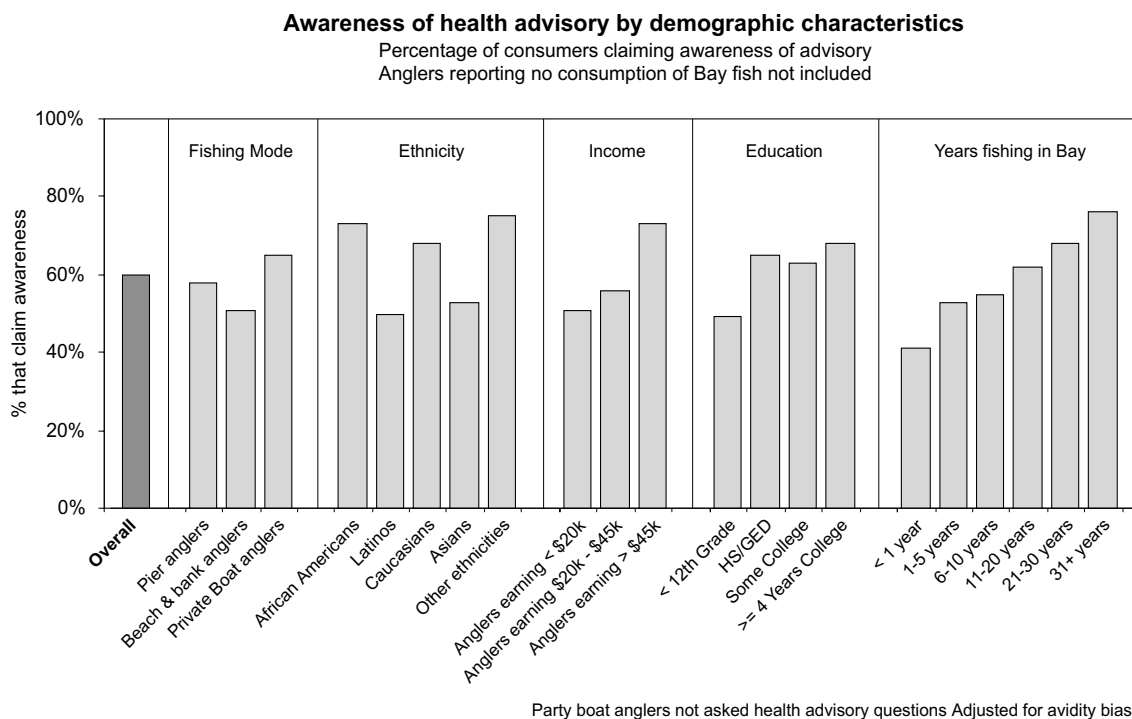
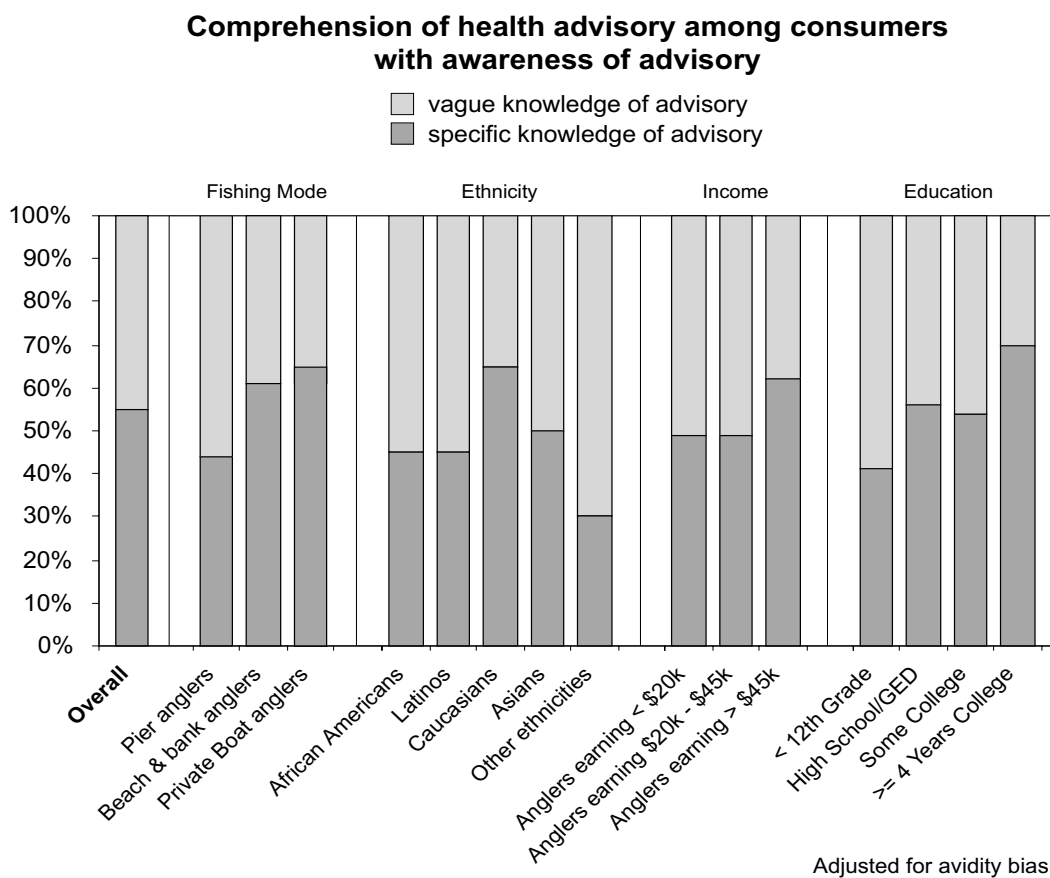


Figure 41



2. Comprehension of Health Advisory

We assessed comprehension or understanding of the health advisory only among respondents who indicated an awareness of the advisory (see Figure 41 and Table K50). We categorized their responses in one of two ways: (1) anglers who described a specific health protective measure, such as eating less fish or preparing and cooking fish in safer ways (“specific knowledge”), or (2) anglers who reported a general awareness about fish or water being contaminated (“vague knowledge”). Anglers who described specific health protective measures had better comprehension or understanding of the advisory than anglers who indicated only vague knowledge. Of consumers who reported awareness of an advisory, 55% reported a specific health protective measure.

Similar to our findings regarding awareness in the previous section, we found differences in comprehension by mode, ethnicity, income, and education (see Figure 41). Among consumers, a higher proportion of beach and bank and private boat anglers reported health protective recommendations compared to pier anglers (see Table K50). By ethnicity, a lower proportion of Filipinos, African Americans, and Latinos reported specific health protective measures compared to Caucasian and Chinese consumers (see Table K51). The proportion of consumers reporting specific health protective recommendations also increased with income and education levels (see Tables K52 and K53).

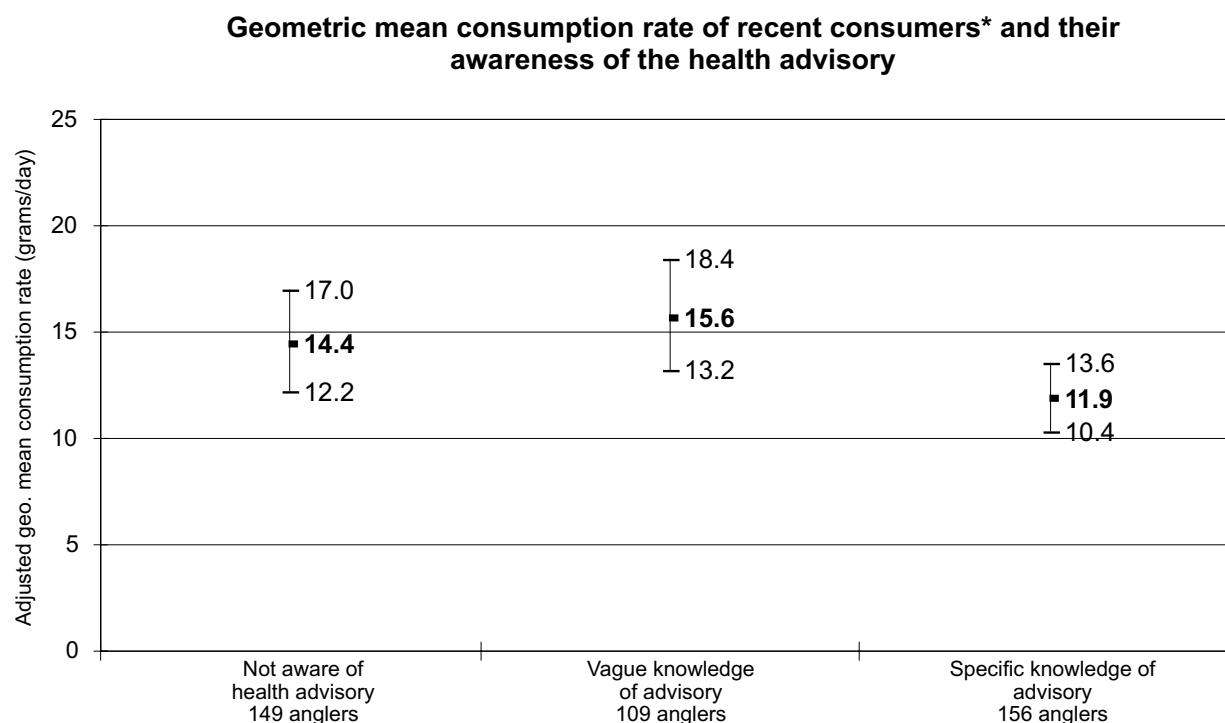
In addition to determining whether anglers understood specific health protective measures, we also looked at whether any anglers recalled the consumption recommendations from the SF Bay advisory to eat no more than two meals per month. We found that only 35 (6%) consumers who were aware of the health advisory reported the two meals per month recommendation. However, it should be noted that interviewers only recorded responses and did not prompt respondents or question their responses.

3. Awareness and Comprehension of Advisory and Consumption Rates

We also examined how awareness and comprehension of the health advisory were related to consumption rates among recent consumers (consumers who had consumed Bay fish in the four weeks prior to the interview). Firstly, we compared adjusted consumption rates for three groups of recent consumers: (1) recent consumers who indicated they were not aware of an advisory for the SF Bay, (2) recent consumers who reported awareness that fish or water is contaminated (“vague knowledge”), and (3) recent consumers who reported health protective measures. Although differences between these three groups were not statistically significant, anglers who showed specific knowledge of health protective measures had the lowest consumption rates (see Figure 42). Anglers who reported only vague knowledge had the highest consumption rate. The consumption rate for anglers who reported no awareness of health advisories fell between these two groups.

Secondly, we compared awareness and comprehension of the health advisory between two groups of consumers: (1) those who consumed above advisory levels (see Section IV.D.3.a), and (2) those who consumed below advisory levels (see Figure 43 and Table K54). We found the proportion unaware of the health advisory was similar for anglers consuming above and below the health advisory. However, above advisory consumers had a higher proportion of anglers with vague knowledge and the below advisory consumers had a higher proportion of anglers with specific knowledge. In other words, consumers who consumed above advisory limits demonstrated a poorer understanding of health advisories, and those who consumed below advisory limits showed a better understanding of advisories.

Figure 42



* Party boat anglers were excluded because they were not asked any health advisory questions.
 Error bars indicate 95% confidence intervals.
 Adjusted for avidity bias.

4. Behavioral Changes in Fish Eating Habits

We also assessed changes in fish consumption habits among anglers who reported that they were aware of an advisory. If anglers reported awareness of health advisories, they were asked if the information did or did not cause a change in their fish-eating habits. Next, if anglers reported changing their fish-eating habits, they were asked how they changed their habits. If they reported that they had not changed their fish eating habits, they were asked why not. The anglers' verbal responses were written down and later reviewed and manually coded (see Appendix I for coding categories for text responses). Anglers who adopted a behavioral change reported they either: (1) engaged in protective measures (i.e., prepared and cooked fish using safer methods); (2) stopped eating Bay fish entirely, or (3) ate only uncontaminated fish. Anglers who reported no change in behavior reported they either: (1) already consumed below the limit, (2) believed contamination did not pose a health problem, or (3) did not elaborate on why. (For the group reporting no behavior change, we did not attempt to verify whether their responses to this question matched their responses to other survey questions, for example, whether their consumption rate was actually below the advisory level.)

Of the consumers who indicated awareness of the advisory, 37% said they had changed their consumption habits (Figure 44). Out of this group, 71% reported to have engaged in health protective measures since hearing the advisory, and 16% reported they had stopped eating Bay fish entirely (see Figure 44 and Table K55). Consumers who said they had not changed their habits represented about one-third of all consumers who indicated being aware of a health advisory. Among this group, 60% said

Figure 43

Health advisory awareness of above and below advisory consumers

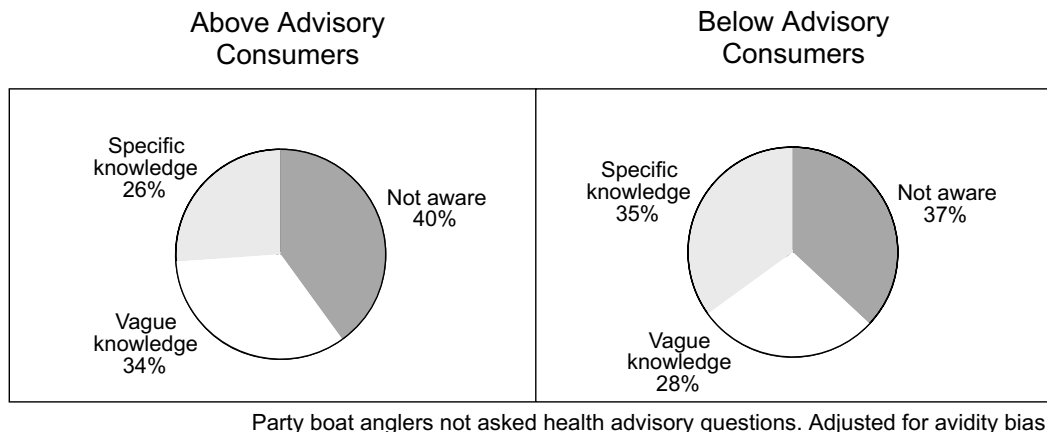


Figure 44

Anglers' behavior changes in response to health advisory

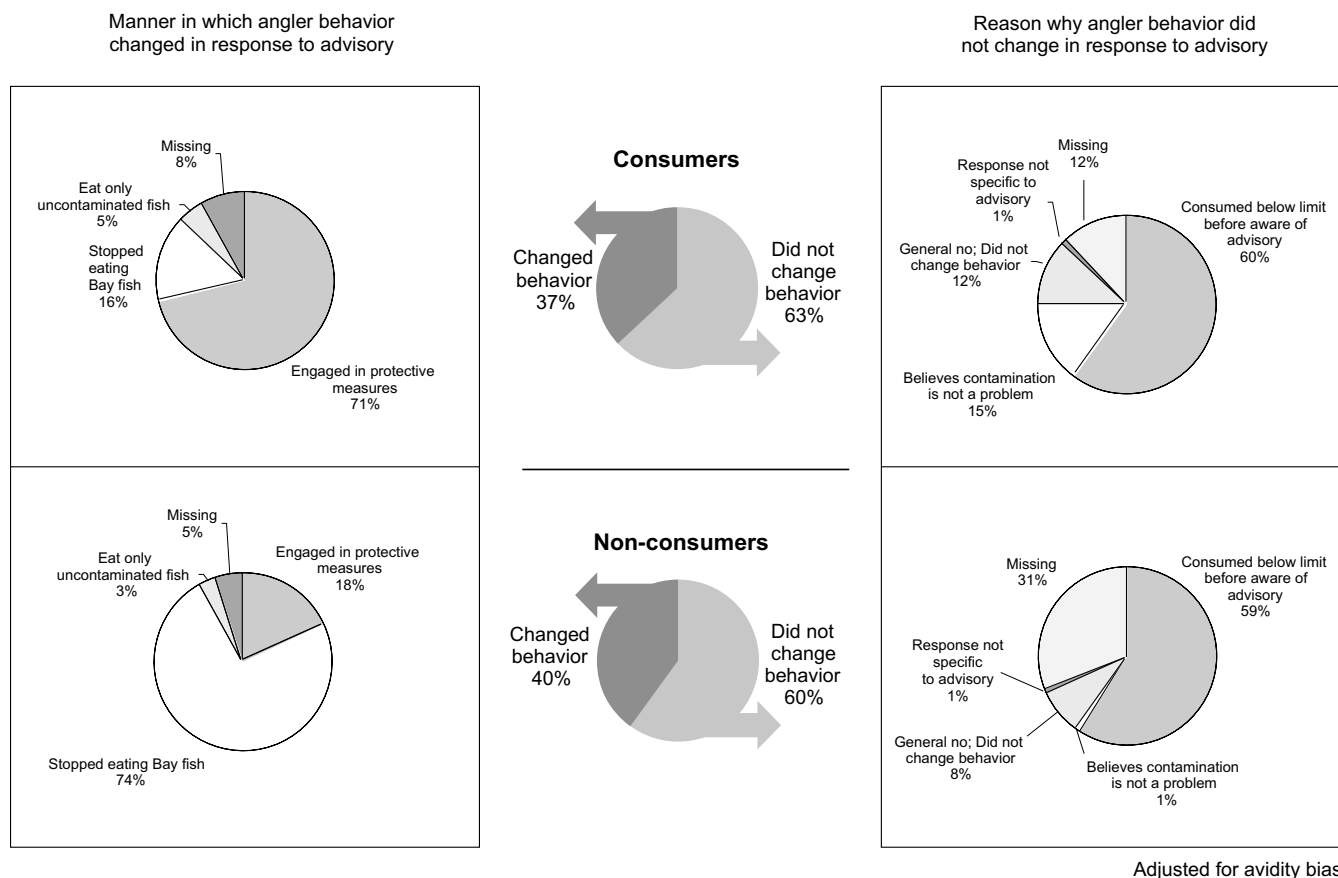
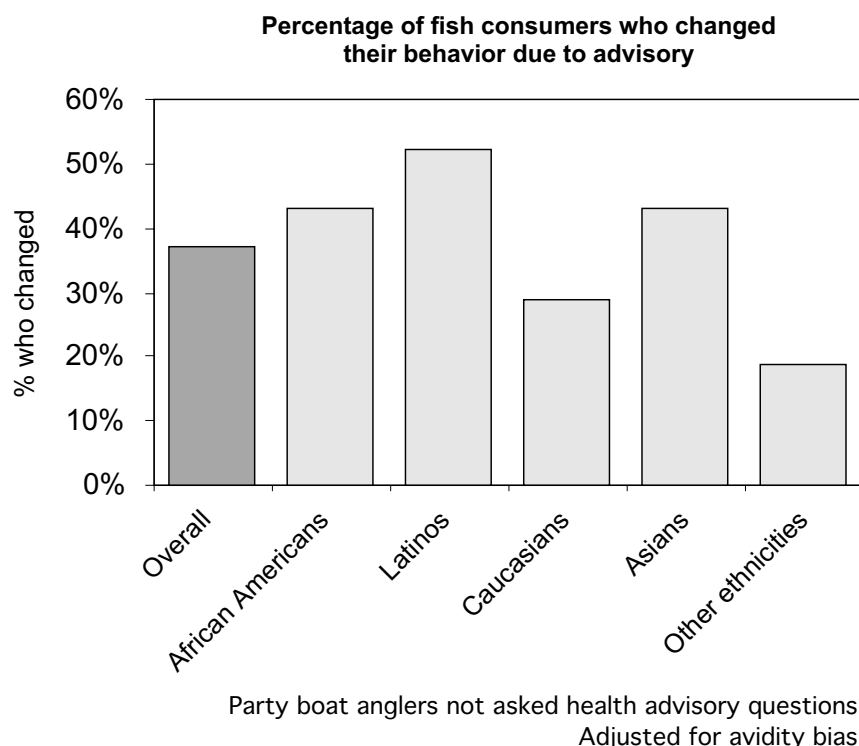


Figure 45



they already consumed below the advisory limits (as they understood it) prior to learning of the advisory, and 15% said that fish contamination was not a health problem.

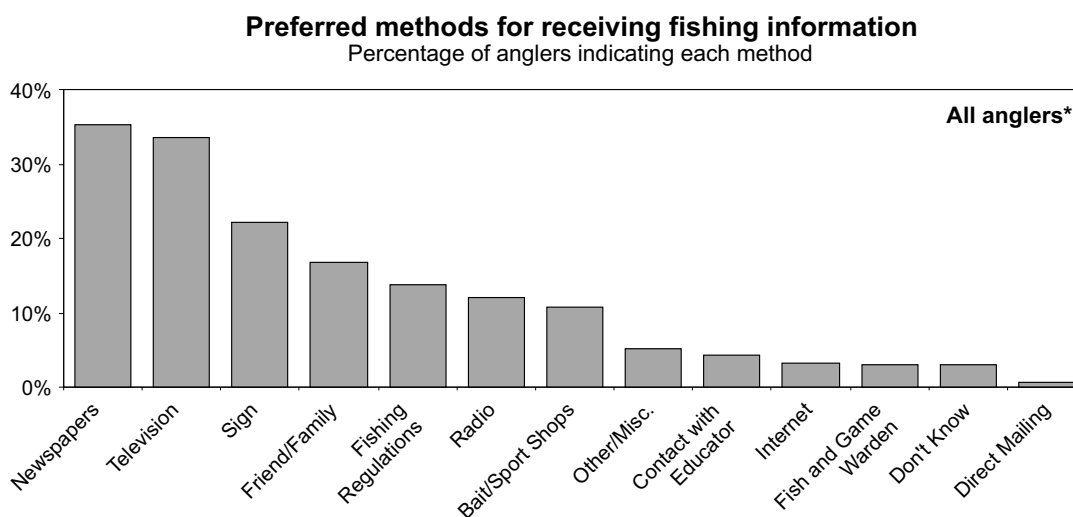
For non-consumers who indicated they had changed their behavior, 74% indicated they stopped eating Bay fish (see Table K55). As expected for non-consumers, when asked why they had not changed their habits upon learning of the advisory, most indicated they already consumed below the limit before they were aware of the advisory.

There were only slight differences between those who changed their behavior or not within demographic groups (see Tables K56 and K57). However, a larger proportion of African American, Latino, and Asian consumers reported changes in their fish consumption habits compared to Caucasians (see Figure 45 and Table K56). Responses for non-consumers by demographic characteristics are shown in Table K57.

5. How Anglers Prefer to Receive Information about Fish

One of the study objectives was to identify ways anglers preferred to receive information about health advisories. All respondents were asked: “What is the best way for you to get information about catching and eating fish from the Bay?” Figure 46 and Table K58 show that among respondents the three most frequently mentioned responses were newspapers, television, and signs. Private boat anglers preferred newspapers, but shore-based anglers mentioned television and newspapers, about equally. Among the different ethnic groups, Caucasians were the only group to prefer newspapers to television. Responses for consumers were similar (see Table K59).

Figure 46



*except party boat anglers, who were not asked health advisory questions. Not adjusted for avidity bias.

6. Discussion Groups

We also conducted four discussion groups with anglers. The purpose of the discussion groups was to further our understanding of anglers' awareness of the health advisory and to explore ways to reach anglers with health information. After reviewing preliminary study results, the project staff identified three groups of shore-based anglers and one group of boat anglers to invite to participate in discussion groups. The shore-based angler groups were: (1) Filipino anglers (the largest group of Asian anglers), (2) anglers who were unaware of the advisory, and (3) anglers who were aware of the advisory but had not changed their consumption habits.

Although we carried out extensive efforts to contact and recruit eligible participants for these discussion groups, only 17 of the 217 anglers we contacted actually participated. Due to the small number of anglers who participated in the discussion groups, generalizations about the findings to the overall fishing population cannot be made. However, those participating in the groups raised pertinent concerns and questions regarding advisory messages and educational strategies that merit further consideration. For example, during discussion over terms used in the health advisory, participants indicated that they did not interpret the term "sport fish" to mean the fish they caught from the SF Bay. Additionally participants indicated preferences for graphics and wording to be used for health advisory recommendations and signs, such as specifying pounds and number of fish meals, rather than grams or ounces, that can be safely consumed. Appendix L contains a more detailed description of the efforts to organize and conduct the discussion groups and content of the discussion groups.

V. Discussion and Conclusions

Our study design, field survey methods and procedures, and data analyses and presentation contained in this report provide documentation that the study goals and objectives have been achieved. We have gathered quantitative data on anglers fishing in SF Bay. This information can be used to characterize anglers' exposure to chemical contaminants. Although we found that the majority of SF Bay anglers consume below health advisory limits, we found that some anglers are highly exposed, and we described

these highly exposed populations in several ways. Finally, we gathered information that can be used to develop educational messages to target specific groups of SF Bay anglers.

In order to gain a better understanding of the results of this study, we compared our findings to results from similar studies where valid comparisons could be made. In particular, we made most of our comparisons to the Santa Monica Bay study (Allen *et al.* 1996, SCCWRP/MBC 1994) and Save San Francisco Bay Association's Save the Bay study (Wong *et al.* 1997). Overall, our findings and methodology were consistent with these studies, who likewise were based on angler interviews at fishing locations. We compared our findings on consumption practices to two community-based studies, one conducted by the Asian Pacific Environmental Network (Chiang 1998) and the other by Sechena *et al.* (1999). These studies drew participants from specific Asian ethnic groups who were recruited through community-based organizations, although participants were not necessarily anglers. We also compared health advisory responses to an angler survey conducted at a single location by the Office of Environmental Health Hazard Assessment (Russell *et al.* 1997). A survey of pier anglers in SF Bay by Communities for a Better Environment (Karras 1998) could not be compared because adequate documentation on this study's methodology was not available.

In addition to comparing our results with other studies, we also describe some of the limitations of how these results should be interpreted. Despite our efforts, we were not able to address all possible sources of bias in this study. These limitations are discussed further at the end of this section.

A. Sampling Success and Angler Characteristics

Overall, we achieved a higher response rate when compared to the Santa Monica Bay and Save the Bay studies (see Table 8). Because Save the Bay's study included only pier anglers, we compared their response rate to pier anglers from our study. Although, in both studies the proportion of decliners, due to language barriers among total interview attempts was similar, we still found a lower rate of decliners among pier anglers in this study.

Table 8. Comparison of Decliners among San Francisco Bay Seafood Consumption Study, Santa Monica Bay Study, and Save the Bay Study

	SF Bay Seafood Consumption Study (unadjusted)		Santa Monica Bay Study (Allen <i>et al.</i> 1996, SCCWRP/MBC 1994)	Save the Bay Study (Wong <i>et al.</i> 1997)
	All Fishing Modes	Pier Only	All Fishing Modes	Pier Only
Total Attempts	1738 ^a	983 ^a	1740	379 ^a
Total Decliners	407 (23%)	288 (29%)	496 (29%)	145 (38%) ^b
Decliners due to language barrier	144 (8%)	125 (13%)	--- ^c	53 (14%)

^a based on net attempts, anglers interviewed before were excluded

^b incomplete interviews excluded from declines but included in total attempts

^c not recorded

We also compared the ethnic composition of respondents from this study with the Santa Monica Bay and Save the Bay studies in Table 9. This study and the Santa Monica Bay study found that Caucasians comprised the largest group of respondents. However, after Caucasians, Asians were the largest group in this study, while Latinos were the largest group in the Santa Monica Bay Study, which reflects the ethnic differences of anglers in the two regions.

Our finding of a high proportion of non-Caucasians among pier anglers in our study population was very similar to Save the Bay's results. Both studies found that Asians were the dominant group

Table 9. Comparison of Ethnic Groups among Respondents for San Francisco Bay Seafood Consumption Study, Santa Monica Bay Study, and Save the Bay Study

Ethnic Group	SF Bay Seafood Consumption Study (unadjusted)		Santa Monica Bay Study (Allen <i>et al.</i> 1996, SCCWRP/MBC 1994)	Save the Bay Study (Wong <i>et al.</i> 1997)
	Respondents (%)	Pier Only (%)	Respondents (%)	Pier Only (%)
Number of respondents	n=1331	n=695	n=1243	n=228
African American	9	11	10	12
Latino	13	16	25	14
Caucasian	40	25	43	24
Asian (includes Pacific Islander)	33	43	18	40
Other	2	3	2 ^a	9
Missing	3	2	2	3
Asian Subgroups				
Chinese	6	7	2	9
Filipino	13	18	6	16
Vietnamese	7	9	1	5
Pacific Islander	2	2	^b	4
Other Asian	5	7	9 ^c	7

^aincludes Middle Easterners, Samoans, and Cambodians

^bPacific Islanders were included under the "Other" category

^cincludes Japanese and Koreans

fishing from piers in SF Bay, with Caucasians representing only about one-fourth of respondents. Filipinos were the largest Asian subgroup in both studies.

B. Fish Consumption Rates

Comparisons of consumption rates between studies are inherently difficult to make. Study methodologies are rarely identical and differences in methods can greatly affect the results. Consumption rates from different studies cannot be compared without a clear understanding of how the rates were derived. Most importantly, it is essential when comparing consumption rates to describe both the population to which the consumption rates applies, and the recall period over which the estimate was made.

1. Consumption Rates Among Recent Consumers

Table 10 summarizes consumption rates from this study, the Santa Monica Bay study (ATES/OEHHA 2000, Allen *et al.* 1996, SCCWRP/MBC 1994), and the Save the Bay study (Wong *et al.* 1997). The consumption rates for recent consumers (based on a four week recall) reported in this study were lower than consumption rates reported in the comparison studies, although these differences can probably be explained by differences in methodology.

The unadjusted geometric mean consumption rate from the Santa Monica Bay study is about 50% higher than the rate derived in this study, and this difference is statistically significant. Although consumption rates in both studies were derived from recent consumers based on a four-week recall, there were important differences in the way the studies calculated consumption rate that can explain the differences in their results. In the Santa Monica Bay study, when calculating the fish consumption rate of a consumer within the last four weeks, fish that an angler had caught—but not yet eaten—was observed by the interviewer and included in the fish consumption rate data. Interviewers attempted to identify

Table 10. Comparison of Consumption Rates (g/d) for San Francisco Bay Seafood Consumption Study, Santa Monica Bay Study, and Save the Bay Study

	SF Bay Seafood Consumption Study (unadjusted)	Santa Monica Bay Study (Allen <i>et al.</i> 1996, SCCWRP/MBC 1994) (Unadjusted)	SF Bay Seafood Consumption Study (adjusted)	Santa Monica Bay Study (adjusted) (ATES/OEHHA 2000)	Save the Bay (Wong <i>et al.</i> 1997)
Respondents	n=1331	n=1244	n=1152	^b	n=222
Population used to derive consumption rate (% of respondents)	n=501 (38%) Consumed fish in last 4 weeks	n=555 (45%) Consumed fish in last 4 weeks	n=465 ^c (40%) Consumed fish in last 4 weeks	^b Consumed fish in last 4 weeks	n=62 (27%) Consumed fish in last 7 days
Mean (Standard Deviation)	28.0 (39.5)	49.6 (111.1)	23.0 (32.1)	30.5 (45.)	^b
Geometric Mean	16.5	23.6 ^a	14.0	^b	^b
Median (50 th Percentile)	16.0	21.4	16.0	15.0	32
Upper 95% Confidence Limit of the Geometric Mean	18.0	25.8 ^a	^b	^b	^b
Lower 95% Confidence Limit of the Geometric Mean	15.2	21.5 ^a	^b	^b	^b

^a Derived from Hill and Lee (1995b).

^b Not reported

^cFor 36 anglers there was insufficient information for deriving a consumption rate. For an additional 36 anglers, fishing frequency was not reported, thus their consumption rate could not be adjusted for avidity bias.

and record all fish that the angler had caught at the time of the interview. For example, if the interviewer observed white croaker in the angler's bucket, the number of times the angler ate fish in the last four weeks was increased by one to account for future consumption of the white croaker. In this study, only fish that had already been consumed (in the past four weeks) was included. Fish that the angler caught on the day of the interview that had not yet been consumed when the interview took place was not included in any consumption rate calculation. This additional factor may explain why Santa Monica Bay estimates were higher than SF Bay estimates.

Furthermore, other differences between the two studies may have contributed to differences in the results, for example, the way sampling effort was allocated across modes in the two studies and the use of different portion size models. In this study, sampling effort was based on the relative amount of fishing activity in each mode (see Section II.B.3 for further discussion). In the Santa Monica Bay study, sampling effort was not explicitly allocated by fishing activity. How this difference would affect consumption rates is not known, because the relative amount of fishing activity by mode in the Santa Monica Bay study was never estimated. The Santa Monica Bay study also used a 150 gram (5.3 ounce) portion model while this study used an 8 ounce (227 gram) portion model. The model size appeared to influence the

responses in both studies. (This will be discussed further below.) Whether the different model sizes would widen or narrow the consumption rate difference between the two studies is not known.

It is likely that other factors unrelated to methodology contributed to the different findings of the two studies. These factors include (1) avidity differences due to climate which could result in anglers in Southern California spending more time fishing than the average angler in SF Bay (as discussed in Section III.D.1, avidity is generally correlated with consumption), (2) differences in how productive the two fisheries are, (3) the different years the studies were conducted, and (4) differences in demographic characteristics of anglers in the two populations.

Staff from the Air Toxics Epidemiology Section within OEHHA adjusted the data from the Santa Monica Bay study for avidity bias (ATES/OEHHA 2000) using methods similar to ours. This adjustment lowered their results significantly so that they are closer to the adjusted data from this study than comparisons of the unadjusted data. For example, the adjusted median is very similar to the one derived from this study.

We also compared the results of this study with Save the Bay's study of pier anglers in SF Bay (Wong *et al.* 1997). Save the Bay found a median consumption rate of 32 g/d, which was two times the median consumption rate of 16.0 g/d found in this study (see Table 11). However, the target population and recall period used in the Save the Bay study differed from this study. This may explain the difference in results. Save the Bay derived a consumption rate from the subset of anglers who had reported consuming fish in the last seven days. In this study, a seven-day recall was never used. The primary consumption rate was derived from anglers who had reported consuming fish in the last four weeks. Anglers who consumed fish in the past seven days represent an even smaller subset of all anglers than those who consumed fish in the last four weeks. This smaller subset selectively includes anglers with the highest consumption rates. Thus, these two groups cannot be directly compared. In fact, the group that was used to derive a consumption rate in the Save the Bay study represented 27% of respondents. In this study, the group (recent consumers) used to derive a consumption rate represented 38% of respondents.

Other factors could also have contributed to the different results. Save the Bay used a 150 g (5.3 ounce) portion size model while this study used an 8-ounce (227 g) model. As noted earlier, while the model size is likely to influence consumption rate estimates, the direction and magnitude of this influence is not known. Save the Bay also conducted interviews only during the fall, while interviews in this study were conducted over a full year. We found that consumption rates of anglers in the fall were higher compared to other seasons, although differences among seasons were not statistically significant (see Tables K35 and K36). Finally, the two studies were conducted several years apart. Many factors during the years between the two studies could have influenced the consumption patterns of the population that fishes in the Bay. These factors include (1) changes in the fishery or variability in fish abundance over time (in fact, an El Niño occurred in 1998), (2) better knowledge of fish contamination issues among anglers (e.g., SFEI released a report on contaminants in fish in 1998 that was widely covered by the press), and (3) changes in the fishing population due to immigration, since many anglers report having fished in the Bay for a relatively short amount of time (See Table K20).

2. Consumption Rates Among Consumers

Although one of the study goals was to gather information for characterizing exposures to the population that consumes Bay fish, comparisons of consumption rates based on all consumers could not be made. Neither of the comparison studies reported consumption rates based on the whole population of consumers, rather than a subset comprised of recent consumers. Both studies only reported consumption rates for a subset of consumers (recent consumers based on a four-week or seven-day recall).

3. Per Angler Consumption Rates

We compared the per-angler consumption rate based on a 12-month recall in this study (see Table K31) to a consumption rate derived by the USEPA (1997) for marine recreational anglers. Both studies reported low consumption rates. USEPA estimated an average consumption rate of 2.0 g/d of marine fish for Northern California recreational anglers. This value is higher than both the geometric mean value of 0.4 g/d and median of 1.8 g/d reported in this study for respondents based on a 12-month recall. It should be noted, however, that the methodologies used in these two studies were very different. The USEPA value was derived using estimates of recreational catch from the National Marine Fisheries Service's Marine Recreational Fisheries Statistics Survey (NOAA/PSMFC 1997) and assumptions about the fraction of the catch that was consumed and the number of anglers who consumed the catch. In addition, the two consumption rates represent different types of fish; the USEPA estimate includes all marine fish and this study includes only SF Bay fish. Also, the USEPA value was adjusted for avidity bias while the value in this study (based on a 12-month recall) was not.

4. Influence of the Portion Size Model

This study used an eight-ounce portion size model to help respondents describe the amount of fish they consume at one time. Multiplying portion size by meal frequency, we derived a consumption rate. Most respondents reported that they ate an amount equal to the model, and many respondents reported that they ate an amount equal to a fraction (e.g., one half of the model) or multiple (e.g., two times) of the model. As a result, the consumption rate distribution did not follow a smooth and continuous shape, but was peaked around multiples of the model (see Figure 22). These results appear to confirm that the model influences consumption rate responses and introduce a degree of bias in the results.

Portion size responses were not reported in the comparison studies so they could not be compared to results from this study. Although not explicitly discussed in either study, the portion size model appears to have influenced results in both the Santa Monica Bay and Save the Bay studies. In the Santa Monica Bay study, the consumption of an amount of fish equal to their model of 150 grams over the 28-day recall period is equal to a consumption rate of 5.36 g/d. Their median consumption rate of 21 g/d was equal to four times the model. Other consumption rate results they report are multiples of their model. For example, consumption rates for individual species are typically 11 g/d (two times the model), 16 g/d (three times the model), etc. A similar pattern can be found in the Save the Bay study.

5. Avidity Bias Adjustment

One of our study findings (discussed in Section IV.D.1) was that the adjustment for avidity bias resulted in only a slight change in the results. For consumption rates of recent consumers, the geometric mean, 16.5 g/d, dropped to 14.0 g/d (adjusted) with the avidity bias adjustment, although the median value did not change. This difference is much smaller than has been observed in other studies such as Price *et al.* (1994). The small effect of an avidity bias adjustment in this study can be explained by the weak correlation between consumption rate and angler avidity ($r = 0.23$). This weak correlation might result from two related factors. Firstly, we limited this consumption rate calculation to only recent consumption (the last four weeks). If a longer recall period was used, the consumption rate responses would likely show greater variation. Secondly, we also limited the angler avidity (fishing frequency) response to the same relatively narrow time range (number of times fishing in the last four weeks). The minimum fishing frequency that could be recorded in our study was one-time fishing in the last four weeks (including the trip during which the interview occurred) and the maximum number of times was 28 (one time per day). The range from one to 28 times in the last four weeks is relatively narrow compared to a longer time

period such as one year. With a longer time period we would expect a wider range of consumption rates and fishing frequencies, a much stronger correlation between these variables, and a much stronger avidity bias effect. In fact, studies finding a strong avidity bias effect, such as Price *et al.* (1994), used a one-year recall to estimate consumption rate and fishing frequency.

C. Consumption Rate Differences Among Ethnic Groups

One important finding of this study was that we were able to show consumption rate differences between ethnic subgroups. In general, we did not find significant differences for other demographic characteristics. Although the planning of this study focussed on obtaining a sample of anglers that reflected the population by mode, ethnic differences appear to be far more important in influencing consumption rates among SF Bay anglers than mode.

Among the comparison studies, only the Santa Monica Bay study described consumption rates by ethnic groups, although the statistical significance of differences between these groups was not described. Table 11 compares geometric mean and median consumption rates for major ethnic groups from this study and the Santa Monica Bay study. Overall, there were only a few similarities between the two studies. For example, both studies found that African Americans had higher rates than other groups, although these differences were not large. In the SF Bay study, we found that Caucasians had the lowest geometric mean consumption rates of all groups and the Santa Monica Bay study found Latinos had lower rates than other groups. Geometric mean consumption rates for Asian subgroups were not available for the Santa Monica Bay study. Based on arithmetic means, the Santa Monica Bay study found Pacific Islanders to have consumption rates considerably higher than other groups, similar to findings from this study. However, these results were based on very small samples in both studies.

Table 11. Comparison of Geometric Mean Consumption Rates (g/d) by Ethnicity (unadjusted) for San Francisco Bay Seafood Consumption Study and Santa Monica Bay Study

Ethnic Groups	SF Bay Seafood Consumption Study (g/d)		Santa Monica Bay Study (g/d) ^a	
	Geometric Mean	Median	Geometric Mean	Median
African American	19.4	16	26.8	24
Latino	16.6	16	17.9	16
Caucasian	14.4	16	26.3	21
Asian	17.8	16	26.1	21

^a Derived from Hill and Lee 1995a.

Other angler studies have also reported consumption rate differences among ethnic groups (Burger *et al.* 1999, Shatenstein *et al.* 1999, Shubat *et al.* 1996, West *et al.* 1992 and 1989). However, direct comparisons to this study could not be made due to differences in sampling and data analysis methods.

As discussed in Section II.B., this study was designed to obtain a highly representative sample of the population fishing in SF Bay. The study design best suited for obtaining a representative sample, however, is not the optimum study design for making comparisons between subgroups. In the absence of specific subgroup variance information, the optimal design for testing subgroup differences would have deliberately sampled equal numbers of persons in each subgroup to be compared (Levy and Lemeshow 1999). Nevertheless, we were able to show some statistically significant differences between subgroups.

In order to help assess whether consumption rate differences between subgroups could be replicated in other studies, we also considered the statistical power of these subgroup comparisons. We found that

the standard deviation of the log consumption rate for most demographic subgroups was about 1.0. This value can be useful in planning future studies, or for calculating the sample size needed to detect specific differences in consumption rate (Armitage and Berry 1987). In Table 12, we show the sample sizes needed to detect differences in consumption rates using a standard deviation of the log consumption rate of 1.0. We assumed 80% power to detect a statistically significant difference ($\alpha=0.05$, two-sided) between a consumption rate of 16 g/d (the overall study unadjusted geometric mean) and alternatives 100% to 33% higher. Groups of 30 to 60 were sufficient to detect 1.5 to 2-fold increases in consumption rate with 80% power. Thus, the statistical power was adequate in many of the subgroups we compared to detect 1.5 to 2-fold differences in consumption rates had they been observed.

Table 12. Minimum Sample Sizes Needed for Detecting Consumption Rate Differences Between Two Groups of San Francisco Bay Anglers

Difference to be Detected	Minimum Sample Size per Group
16 g/d vs. 32 g/d	33
16 g/d vs. 24 g/d	60
16 g/d vs. 21 g/d	212

D. Interpretation of Above Advisory Consumers

Our conclusion that about one in ten consumers of SF Bay fish exceeded the health advisory limit should be considered approximate, as a precise determination of above advisory consumers was not possible. Several factors highlight the lack of precision in the above-advisory estimate. In general, these factors indicate that we may have underestimated the number of above-advisory consumers.

Firstly, the definition of an above-advisory consumer is very sensitive to how the consumption recall period is defined. The health advisory recommends that anglers limit their consumption of Bay fish to no more than two meals per month. If we assume that a month has 30 days, and each meal is equivalent to 8 ounces, the health advisory limit is equal to 15 g/d. However, this study used a 28-day recall period, to be comparable with the Santa Monica Bay study, not one month. Two 8-ounce meals per 28 days are equal to 16 g/d. Although a one-gram difference, between 15 g/d and 16 g/d, appears to be insignificant, it is not. Many SF Bay anglers reported consuming 16 ounces in the last four weeks. This amount is equal to 16 g/d, and thus these anglers are right at the health advisory limit. This lack of precision is also compounded by the use of a portion size model (see Section V.B.4). We define anglers as exceeding the health advisory limit if they consume greater than 16 g/d. If the 15 g/d day level were used to identify above-advisory consumers, the proportion of consumers exceeding the advisory would nearly double, from 9% to 16% (adjusted).

Secondly, the health advisory recommends using body weight to determine a person's meal or portion size. The 8-ounce portion size is based on an angler with a body weight of 154 pounds (70 kilograms). For anglers who weigh more or less than this amount, the portion size should be adjusted up or down. We did not attempt to ascertain body weights of the anglers we interviewed, so we do not know if the reported portion sizes are proportional to the anglers' body weights.

Thirdly, the health advisory recommends no consumption of large striped bass (greater than 35 inches). Although over three-fourths of consumers of Bay fish reported that they consume striped bass, no effort was made to determine if this advice for striped bass was being followed. Thus, we do not know whether this size restriction for striped bass is significant or not in determining who is above the health advisory.

Finally, the health advisory recommends more restrictive limits for women who are pregnant or breastfeeding, planning to become pregnant, and for young children. For these groups the health advisory

sory recommends that consumption of Bay fish be limited to no more than one meal per month. In this study, we did not interview any children and we did not determine whether the women we interviewed were pregnant, breastfeeding, or planning to become pregnant. If consumption rates for these groups of women are similar to the women we did interview, a higher proportion will exceed the more restrictive advisory.

E. Consumption Patterns

In addition to recommending limits on the amount and types of Bay fish that can be eaten, health advisories for SF Bay recommend that anglers consume only the skinned fillet and that the fish be cooked so that the juices drain away and are discarded (see Appendix A). These practices can reduce one's exposure to the contaminants in fish. We have shown that these practices are not always followed, particularly among Asians. This finding is generally consistent with other studies.

Similar to the findings in this study, Save the Bay found consumption of skin of two species—striped bass and white croaker—to be common among pier anglers in SF Bay (Wong *et al.* 1997). They found that 49% of consumers of striped bass ate the skin and 36% of white croaker consumers ate the skin in the previous 30 days. They did not report skin consumption by ethnic group, however. In this study, among pier anglers, we found that consumers of striped bass and white croaker ate skin 40% and 52% (unadjusted) of the time respectively. However, these rates were slightly higher, 49% and 56% (unadjusted), respectively, for Asians who consumed these species.

The Santa Monica Bay study did not report whether skin was eaten. However, a higher proportion of Asians in that study did report eating fish whole/gutted, compared to other ethnic groups.

APEN's community-based study of Laotians in West Contra Costa County, which borders SF Bay, found that among respondents who had ever eaten Bay fish, 76% eat the skin of the fish and 86% eat fish in soup or stews. We interviewed only a very small number of Laotians (<1% of respondents). APEN's findings are higher than the rates we reported for all Asians. This may be due to the fact that APEN asked respondents about consumption patterns for all fish, not by specific species. The higher rates in APEN's study could also be due to Laotians consuming skin and soup more frequently than other Asians groups. Sechena's (1999) community-based study of Asians and Pacific Islanders in King County, Washington, found that 55% of their respondents ate skin of fish; however, the primary source of fish in this study was the grocery store.

F. Consumption of Fish From Other Sources

Few studies of fishing populations have looked at total sport fish and commercial fish consumption. We are aware of no such studies for California populations. Using data collected by West *et al.* (1989), Murray and Burmaster (1994) estimated consumption rates of sport fish and total fish (including both sport and commercial sources) for Michigan anglers. West *et al.* collected the data over a six-month period through a mail survey sent to a sample of licensed Michigan angler. The consumption rate recall period was seven days and the data were not adjusted for avidity bias. Although there were many methodological differences between the Michigan study and our study, we compared the results in Table 13.

The Michigan study showed higher consumption rates for both sport fish and total fish. This may be explained in part by the shorter recall period (seven days) used in the Michigan study compared to our study that used a four week recall. Both studies showed that anglers augment their intake of sport fish with fish from commercial sources.

Table 13. Comparison of Sport Fish and Total Fish Consumption Rates (g/d, unadjusted) Between San Francisco Bay Recent Consumers and Michigan Anglers

	SF Bay Seafood Consumption Study (unadjusted)		Michigan Anglers (Murray and Burmaster 1994)	
	Sport Fish ^a n=501	Total Fish ^b n=501	Sport Fish n=191	Total Fish ^b n=191
Arithmetic Mean (Standard Deviation)	33.0 (42.8)	46.5 (62.5)	45.0 (23.7)	55.1 (33.1)
Median	16.0	32.0	32.7	40.8
95 th Percentile	112.0	324.0	98.0	114.3

^a Sport fish includes fish from SF Bay and other areas (see Table K45a).

^b Total Fish includes sport fish and commercial fish.

G. Health Advisory

We compared our findings on angler's awareness of health advisories to findings from other angler studies that included the Save the Bay and Santa Monica Bay studies (see Table 14). The comparison studies also included an angler survey at Berkeley Pier in SF Bay by the Office of Environmental Health Hazard Assessment (Russel *et al.* 1997) that focused on angler awareness of advisories on posted signs. Awareness to health advisories among the subset of anglers who consume Bay fish (consumers) could not be derived for the comparison studies so only awareness among all survey respondents is compared. Because some of these studies only included pier anglers, we also compared pier anglers from this study to the other studies. We found awareness to health advisories in this study to be very similar to the two other angler studies from SF Bay.

Table 14. Comparison of Awareness to Health Advisories among Respondents of the San Francisco Bay Seafood Consumption Study, Save the Bay Study and OEHHA Study

	SF Bay Seafood Consumption Study (unadjusted)	SF Bay Seafood Consumption Study (unadjusted)	Save the Bay (Wong <i>et al.</i> 1997)	OEHHA (Russell <i>et al.</i> 1995)	Santa Monica Bay (Allen <i>et al.</i> 1996, SCCWRP/MBC 1994)
Population	Shore-based and Private Boat Anglers	Pier Anglers	Pier Anglers	Anglers at Berkeley Pier	All Respondents (Shore-based Anglers and Party and Private Boat Anglers)
No. of Survey Respondents	n=1227 ^a	N=695 ^a	n=212 ^b	n=520	n=1244
No. Aware of Health Advisory	722	392	124	278	942
%	59%	56%	58%	53%	76%

^a missing, don't know, and declined to answer responses are not included in total

^b responses for 16 anglers appear to be missing and are excluded from the total; inclusion of these anglers would lower the rate slightly

Awareness of health advisories among respondents in the Santa Monica Bay study was higher overall than among SF Bay anglers. This difference could be due to health advisory awareness actually being higher in the Los Angeles area. It could also be due in part to a higher proportion of boat anglers—57% compared to 35% in this study (excluding party boat anglers). Although not reported in the Santa Monica Bay study, this study found that boat anglers are more likely to be aware of health advisories than anglers at shore-based modes.

None of the comparison studies attempted to assess angler's knowledge or understanding of health advisories so comparisons with this study could not be made, although OEHHA assessed respondent's knowledge of posted signs.

We also compared findings on what anglers thought was the best way for them to get information on health advisories (see Table 15). The results from this study and the Save the Bay study were similar, with anglers reporting television and newspapers most often. In the OEHHA study, anglers reported the posting of signs more often than other methods. This may have been due to the recently posted signs at Berkeley Pier for the previously issued striped bass advisory when OEHHA administered their survey in 1995. In addition, because the main goal of the OEHHA study was to determine the effectiveness of signs, anglers were asked many questions specifically about signs, which may have influenced their responses relative to the other studies.

Table 15. Comparison of Sources of Health Advisories Information among Respondents of San Francisco Bay Seafood Consumption Study, Save the Bay Study, and OEHHA Study

	SF Bay Seafood Consumption Study (unadjusted)	SF Bay Seafood Consumption Study (unadjusted)	Save the Bay (Wong <i>et al.</i> 1997)	OEHHA (Russell <i>et al.</i> 1997)
Population	Shore-based and Private Boat Anglers	Pier Anglers	Pier Anglers	Anglers at Berkeley Pier
No. of Survey Respondents	n=1227	n=695	n=212 ^a	n=520
Newspaper	35%	34%	30%	13%
Television	33%	35%	29%	17%
Sign	22%	25%	14%	27%
Family/Friend or word of mouth	20%	20%	20%	10%/3% ^b

^a responses for 16 anglers appear to be missing

^b 10% reported "friend" and 3% reported "family"

H. Highly Exposed Populations

A primary goal of this study was to identify populations that may be highly exposed to chemicals from eating Bay fish. We used several different criteria to identify highly exposed populations including consumption rates, the proportion consuming above health advisory levels, species consumed, and consumption methods. We also looked at whether an angler's higher level of exposure was related to lack of access to health advisory information.

Overall, differences among ethnic groups were more distinct than for other demographic locators. Among ethnic groups we found that Asians (particularly Filipinos) were consistently the most highly exposed group. Filipinos and African Americans had the highest overall consumption rates of SF Bay fish. (Pacific Islanders also had high rates but this was based on a small sample.) Vietnamese, Chinese, and Filipinos were more highly represented among anglers who consumed above advisory levels.

Of the three species of Bay fish of greatest health concern (white croaker, striped bass, leopard shark), most anglers in all ethnic groups ate striped bass. However, Asians more frequently ate white croaker compared to other groups and Vietnamese and Chinese more frequently ate leopard shark. In general, Asians were more likely to follow consumption methods (i.e., eating skin, cooking juices, etc.) that increased their exposure to chemicals.

One reason Filipinos may be highly exposed is because of their lack of access to health advisory information. Filipino consumers had the lowest overall awareness and lowest understanding of health advisories compared to other groups.

Some criteria showed shore-based anglers to be more highly exposed than boat anglers. For example, shore-based anglers more frequently consumed white croaker and were more likely to follow consumption methods that increased their exposure to chemicals. This may be due in part to the fact that Asians dominated shore-based fishing modes, although we did not find higher consumption rates among shore-based anglers.

We expected to find a correlation between high consumption of Bay fish and a low level of income and/or education, but we did not. In fact, at the highest levels of consumption (above the 95th percentile), it appeared that anglers with incomes greater than \$45,000 are more highly represented than those with lower incomes. Anglers with low income/education levels are still an important concern, however, for several reasons. Firstly, low income and education are related to consumption of two highly contaminated species, white croaker and leopard shark. Secondly, low income and education were often correlated with consumption methods that increase exposure to chemicals, such as eating skin. Finally, low income and education are related to low awareness and understanding of health advisories.

The health advisory for SF Bay recommends stricter consumption limits for women who are pregnant, breastfeeding, planning to become pregnant, and for young children (under the age of six), because these populations are at greater risk than others. Although consumption rate information on household members was not obtained, anglers reported that these high-risk groups consume the fish the anglers catch from SF Bay.

I. Study Strengths and Limitations

To improve upon previously conducted studies, we included several unique elements in our sampling plan and data analyses procedures. Specifically, we determined a target sample size needed to estimate consumption rates with a defined level of precision. The study was designed to obtain a representative sample of the fishing population in SF Bay, thus the results could be extrapolated to the overall angler population. Moreover, efforts were taken to characterize the group of anglers who declined to participate. We describe consumption rates of SF Bay fish for consumers, recent consumers, and per angler. We also presented data on consumption of sport fish from sources other than SF Bay and commercial fish.

The study greatly benefited by having all phases of the study design, field implementation, data analyses, and report generation undergo rigorous review by members of the Seafood Consumption Task Force and selected outside reviewers (see Appendix C). The data and information contained in this report can reliably be used to estimate demographic characteristics and seafood consumption practices of anglers fishing in San Francisco Bay.

Although we designed and conducted this study to minimize sources of measurement error or other biases, it was not possible to eliminate all sources of bias. To help the reader understand the limitations of the data and to assist in the design of future studies, we have summarized some of these limitations below:

- 1) We experienced higher decline-to-participate rates among shore-based anglers. Since higher proportions of non-Caucasian ethnic groups were represented among shore-based anglers who declined, especially those of Asian ethnicity, our sample may have underrepresented these ethnic groups. We can never truly know consumption rates of anglers who declined to participate. However, we have extrapolated consumption rates for these anglers based on consumption rates derived for anglers who did participate and found no change in overall consumption rates.
- 2) In general, the sampling plan excluded low activity sites and focused on high activity sites for shore-based and private boat modes. (In some cases, low activity beach and bank sites, if adjacent to a high activity pier site, were included). An ideal sampling plan would have begun with a sampling frame that included all known sites. However, such plans would have resulted either in a much lower sample size (since interviewers would be spending time in lightly-used area) or much higher cost. Since the study costs were fixed, our only options were to have lower sample size (with a less precise consumption rate estimate) or a higher sample size with a less representative sample. We opted for a more precise consumption rate estimate.
- 3) Consistent with our sampling plan, interviewers at private boat sites attempted to interview all boat anglers using the site during the scheduled sampling period. Most of the time, the interview staff assigned to a site could attempt to interview all anglers using that site. The field coordinator also made an effort to ensure that sufficient interview staff was assigned to sample these sites. However, on a few sampling days, for example, when we had not anticipated a higher level of fishing activity, not all anglers in a group or an entire group of anglers could be interviewed. We did not attempt to quantify the number of anglers that were not interviewed. These anglers who were missed resulted in a slight under sampling of private boat anglers. Additionally, although interviewers attempted to find anglers who had been fishing on berthed boats, no berthed boat anglers could be found to be interviewed.
- 4) The sample of party boat anglers was about 50% lower than our target. This was due to the lack of cooperation by party boat captains. Furthermore, the sample we did obtain may not be representative of party boat anglers in SF Bay for a number of reasons. For example, the port of origin of the party boat and the sampling days were not randomly selected, and the actual sampling days were not allocated by activity over the 12-month sampling period. In addition, we did not attempt to stratify the party boat sample by day, thus most interviews occurred on weekend days. Also, during exit interviews that we initiated in May 1999, we could not interview all anglers who had been on a boat.
- 5) Party boat anglers were not asked any health advisory questions to avoid discouraging their participation in the survey. As a result, health advisory results only apply to other fishing modes.
- 6) As discussed in our sampling plan (see Appendix D), we over-sampled weekend days and under-sampled weekdays relative to the amount of fishing activity by day type (weekend or weekday) in SF Bay at shore-based modes. We over-sampled weekend days to obtain sufficient sample size. Anglers who fish on weekends may differ in their demographic characteristics and consumption patterns than those who fish on weekdays. Since we did not analyze our data for differences by day, the magnitude and direction of any possible bias due to day type differences are not known.

- 7) Interviewers used a model of an 8-ounce raw fish fillet to help estimate the amount of fish the respondents ate at one time. Most respondents said their portion size was equal to the model. The degree to which the 8-ounce model influenced anglers' responses to this question is not known.
- 8) Consumption rate estimates based on a 12-month recall may be unreliable. Survey questions that use long recall periods are difficult for respondents to answer accurately.
- 9) We made no adjustment for the length of the angler's fishing trip at shore-based sites, a type of bias called length-of-stay bias. This bias is similar to avidity bias in that the probability of being sampled may be greater for anglers whose fishing trip is longer than average, compared to those whose trip is shorter than average (Pollock 1994, Otis 1993, Thomson 1991). Length-of-stay bias will not affect anglers such as boat anglers who are interviewed after their fishing trip is completed. Anglers who tend to fish for longer periods of time may also catch and consume more fish than anglers who fish for shorter periods of time. Unless corrected, as with avidity bias, this bias may result in consumption rates that are biased upwards.
- 10) In our sampling design, interviewers asked anglers if they had been interviewed for this study before. If they had, they were not interviewed again (sampling without replacement). In adjusting our data for avidity bias, we assumed that the probability of being sampled is proportional to an angler's avidity. However, for anglers sampled without replacement, the probability of being sampled is less than proportional to an angler's avidity (USEPA 1997). This occurs because anglers who are not resampled tend to be more avid, on average, than anglers in the sample. The effect of sampling without replacement is that the magnitude of the avidity bias is lessened, thus our adjusted consumption rate results may be biased upward.
- 11) Interviewers' contact with anglers may have influenced anglers' responses to the health advisory questions. Interviewers read respondents a paragraph describing the health advisory and provided written information for those who requested it at the end of the interview. It is likely that information we provided over the 12-month data collection period was shared with other anglers.

VI. Recommendations

This study was undertaken to fill gaps in our understanding of anglers' exposures to Bay fish, to identify highly exposed populations, and to gather information needed for developing educational messages and outreach activities for these populations. Much of the information presented in this report describes parameters for characterizing anglers' exposures, including highly exposed groups. Findings from this study can also be used to help develop educational messages and activities aimed at reducing anglers' exposures to chemical contaminants. Our recommendations focus primarily on how educational messages should be developed, and how outreach and educational activities should be conducted. We also identify areas where additional research is needed.

A. Recommendations for Outreach and Education Activities

- **Conduct outreach and education activities to reach highly exposed groups**

One of the central goals of the study was to identify highly exposed groups and gather information needed for developing educational messages for these groups. As discussed in Section V.H, we identified Asians, particularly Filipinos, as the group most consistently among the highly exposed. In addition, African Americans had high overall rates of Bay fish consumption. The highest priority should be given to developing messages specifically targeted to these groups.

- **Develop educational messages that are culturally appropriate**
Given the ethnic diversity of SF Bay anglers, we recommend that culturally appropriate educational messages be developed. To be culturally appropriate, these messages need to be multilingual, sensitive to ethnic differences, and be at an appropriate literacy level.
- **Develop educational messages that address the consumption practices of the target groups**
We found clear demographic differences among groups in the species that they eat, the parts of the fish they eat, and the ways in which they cook or prepare the fish. For example, Asians were much more likely to eat white croaker than other groups and, in general, Asians ate parts of the fish or prepared fish in ways that increased their exposure. We recommend that educational messages for target groups address these specific consumption practices. Thus, educational messages for Asians should focus on limiting white croaker consumption and emphasize safe consumption practices that would decrease their exposure.
- **Develop educational messages that reflect the current advisory (see Appendix A)**
Until the current advisory is updated, we recommend that all educational messages convey the content of this advisory.
- **Develop educational programs using a variety of approaches**
Because we found that none of the methods of delivering educational information to anglers received overwhelming support by all anglers, education activities will likely require a diversity of approaches. Both the survey results and the fish discussion groups indicated the need for educational material with a range of complexity and depth to meet the needs of the highly diverse SF angler population. We recommend that different methods, including newspaper, television, radio, and written materials, be explored.
- **Post warning signs in all areas of SF Bay**
Although we found signage to be the third most popular method of communicating to anglers on fish contamination issues, signs seem to be the most direct way to reach anglers. We recommend comprehensive sign posting and maintenance in SF Bay at piers, beaches and banks, and at marinas to warn anglers about contaminants in Bay fish.
- **Direct the Education and Outreach Task Force on Fish Consumption and Fish Contamination Issues to carry out the outreach and education activities recommended above**
The goals of the Task Force are consistent with the outreach and educational activities we recommended above. However, the Task Force has been constrained by lack of resources. We recommend that additional resources be obtained to enable the Task Force to implement the outreach and education activities recommended above.
- **Direct the Task Force to take a leadership role**
A major barrier to conducting educational activities, particularly posting of warning signs, in the SF Bay area has been uncertainty over which organizations have jurisdiction to undertake these activities. For example, it is often unclear who has authority to post and maintain a warning sign at a pier. We recommend that the Task Force take a leadership role in developing and overseeing the implementation of an integrated strategy to communicate health advisories on fish in a more effective manner. This would include coordinating input from the different agencies and organizations when conducting educational activities.

B. Recommendations for Community Involvement

- **Expand the membership of the Task Force to have broader community representation**

For outreach and educational activities to be successful, the Task Force membership must more closely reflect the interests of the highly diverse angler population. We recommend that the Task Force seek broader representation from community-based organizations that represent health care, environmental, fishing, and other pertinent interests in the SF Bay area and that commensurate resources be made available for this purpose.

- **Conduct activities that enhance participation from community-based organizations**

In addition to seeking broader membership on the Task Force, we recommend that the Task Force specifically undertake activities that will enhance participation and support from community-based organizations. CDHS is piloting a community-based approach to outreach and education on fish issues in the Los Angeles area. We recommend using this approach as a model for SF Bay activities.

C. Recommendations for Further Study

- **Investigate the influence of the portion-size model on consumption rates**

The use of a single physical model to estimate the amount of fish anglers eat influences the angler's response. In this study, the model produced a consumption rate distribution that was peaked around common multiples or fractions of the model, and introduced an unquantifiable degree of uncertainty in the consumption rate results. Further study should focus on ways to estimate consumption rates that minimize this effect. For example, models of different portion sizes could have elicited a broader range of responses and may have produced more accurate consumption rate responses.

- **Gather additional data on shellfish consumers in SF Bay**

Due to resource constraints, the data we gathered in this study on shellfish consumers was limited. Although we asked anglers (i.e., people who fish) if they consumed shellfish, we did not conduct any interviews with persons who collected only shellfish but did not fish. We also know little about the quantity of shellfish people eat from the Bay, the types of shellfish eaten, and the parts of the shellfish that are consumed. Because Bay shellfish may pose health risks to people who consume it, we recommend that more information be gathered about shellfish consumers in the Bay.

- **Gather additional data on party boat anglers in SF Bay**

The sample of party boat anglers we collected in this study fell short of our target, thus our findings may not accurately reflect this population. In addition, party boat anglers were not asked any questions about health advisories. We recommend that additional data be gathered on party boat anglers to better characterize their consumption rates and practices and their awareness to health advisories.

- **Gather additional data on high risk groups**

We know that some groups, i.e., pregnant and breastfeeding women, women planning to become pregnant, and young children, are at higher risk because they may be more sensitive to the harmful effects of chemicals found in Bay fish. Although we interviewed only people who fish in this study, we did find that many anglers have women of child bearing age and young children in their

households who consume Bay fish. The limited data on female anglers of child bearing age in this study indicate that consumption rates are similar to male anglers. Thus, if these women are pregnant, nursing, or planning to become pregnant, they may be exceeding the more restrictive advisory for these groups. However, we know very little about exposures to these groups and how to develop educational message to reach them. We recommend that additional data be gathered on these groups.

- **Test the effectiveness of educational messages and activities**

Data on the actual effectiveness of alternative messages and how these messages are communicated to target audiences are lacking. We recommend that further research examine how alternative messages are understood and how effective different activities are at reaching target audiences.

VII. References

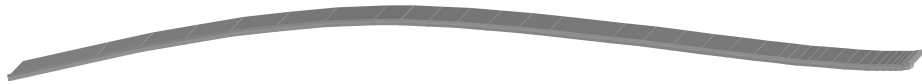
- Air Toxics Epidemiology Section/Office of Environmental Health Hazard Assessment (ATES/OEHHA). September 2000. Air Toxics Hot Spots Program Part IV: Technical Support Document for Exposure Assessment and Stochastic Analysis.
- Allen, JM, PV Velez, DW Diehl, SE McFadden, M Kelsh. 1996. Demographic variability in seafood consumption rates among recreational anglers of Santa Monica Bay, California, in 1991-1992. *Fishery Bulletin* 94:597-610.
- Armitage P and G Berry. 1987. *Statistical Methods in Medical Research*. 2nd Ed. Oxford: Blackwell Scientific Publications, pp 179-185.
- Association of Bay Area Governments (ABAG). 2000. Income, Report 9 for Nine Counties Bay Area, California; <http://www.abag.ca.gov/bayarea/census90>.
- Burger J, WL Stephens, CS Boring, M Kalinski, JW Gibbons and M Gochfeld. Factors in Exposure Assessment: Ethnic and socioeconomic differences in fishing and consumption of fish caught along the Savannah River. *Risk Analysis* 19(3):427-438.
- California Department of Fish and Game. 1998. Data on Commercial Passenger Fishing Vessels in SF Bay from the PMASTER database, provided by Blaise Eitner, Associate Biologist, La Jolla, CA.
- California Department of Fish and Game. 2000. Fish and Game Code Section 7153. <http://www.dfg.ca.gov/regs.html>
- California Department of Finance (CDOF). 2000. Race Ethnicity Population Estimate for California Counties, 4/90 to 7/98. Sacramento, CA.
- Chiang, A. 1998. A Seafood Consumption Survey of the Laotian Community of West Contra Costa County, California, Asian Pacific Environmental Network, Oakland, Calif.
- Cohen, Andrew. 1995. Fishing for Food in San Francisco Bay. Save San Francisco Bay Association. Environmental Health Investigations Branch (EHIB), California Dept. of Health Services. 1994. Fish Contamination in Richmond Harbor Channel.
- Gassel, M. 1997. Chemicals in Fish Report No. 1: Consumption of Fish and Shellfish in California and the United States. Final Draft Report, Pesticide and Environmental Toxicology Section. Office of Environmental Health Hazard. California Environmental Protection Agency. Oakland, CA.
- Hahn GJ, and WQ Meeker. 1991. *Statistical Intervals*. New York: Wiley
- Hill, Martin. 1995. Comparing Michigan Freshwater Fish Consumption with California Saltwater Fish Consumption: A Modified Replication of Murray and Burmaster (1994). Memo to J. Pollock and M. Gassel.
- Hill, MD and DM Lee. 1995a. The High Rate of Fish Consumption Among Anglers in Southern California. Presented at the 1999 Western Regional Epidemiology Network, Ashland Oregon.
- Hill, MD and DM Lee. 1995b. Estimated Distributions of Average Daily Fish Consumption Rates Among Southern California Marine Anglers, Proceedings of the 1995 Pacific Rim Environmental Conference, Air and Waste Management Association.
- Karpov, KA, DP Albin, and WH Van Buskirk. 1995. The Marine Recreational Fishery in Northern California and Central California - A Historical Comparison (1958-86), Status of Stocks (1980-86), and Effects of Changes in the California Current. California Department of Fish and Game Marine Resources Division.
- Karras, Greg. 1998. On the Hook for Zero Dioxin. Communities for a Better Environment. CBE Report No. 98-2.
- Levy PS and S Lemeshow. 1999. *Sampling of Populations, Methods and Applications*. 3rd Ed. New York: John Wiley and Sons, pp. 152-153.
- Liberatos, P, BG Link, and JL Kelsey. 1988. The measurement of social class in epidemiology. *Epidemiologic Reviews* 10:87-121.

- Murray, DM and DE Burmaster. 1994. Estimated distributions for average daily fish consumption of total and self-caught fish for adults in Michigan angler households. *Risk Analysis* 14(4): 513-519.
- National Oceanic and Atmospheric Administration (NOAA) and Pacific States Marine Fisheries Commission (PSMFC). 1997. Marine Recreational Fishery Statistics Survey Procedures Manual Pacific Coast 1997.
- Office of Environmental Health Hazard Assessment (OEHHA). 1994. Health Advisory on Catching and Eating Fish, Interim Sport Fish Advisory for San Francisco Bay. California Environmental Protection Agency.
- Ossiander, Eric (Washington Dept. of Health). 1999. Biased Estimates of Fish Consumption for Creel Surveys. Presented at the 1999 Western Regional Epidemiology Network, Ashland, Oregon.
- Otis, DL, LL McDonald, MA Evans. 1993. Parameter estimation in encounter sampling surveys. *Journal of Wildlife Management* 47(3):543-548.
- Pollock, KH, CM Jones, TL Brown. 1994. **Angler Survey Methods and Their Applications in Fisheries Management**. American Fisheries Society Special Publication 25. Bethesda, Maryland: American Fisheries Society.
- Price, PS, HS Su, and MN Gray. 1994. The effect of sampling bias on estimates of angler consumption rates in creel surveys. *J Exposure Analysis and Environmental Epidemiology* 4: 355-371.
- Roper, Gail. 1997. California Department of Fish and Game, MRFSS Site Descriptions and Fishing Pressure, October 2.
- Ruffle B, D. Burmaster, P. Anderson, and D. Gordon. 1994. Lognormal distributions for fish consumption by the general US population. *Risk Analysis* 14(4):395-404.
- Russell, H, RG Ames, AM Fan, V Steinberg. 1997. Angler Survey: Analysis of Sign Effectiveness and Angler Awareness of San Francisco Bay fish Consumption Advisory, Berkeley, CA 1995. Office of Environmental Health Hazard Assessment. CA Environmental Protection Agency. Oakland, CA.
- San Francisco Bay Regional Water Quality Control Board (SFBRWQCB), State Water Resources Control Board, and California Dept. of Fish and Game. 1995. Contaminant Levels in Fish Tissue from San Francisco Bay, Final Report.
- San Francisco Estuary Institute (SFEI). 2000. The Pulse of the Estuary. Regional Monitoring Program for Trace Substances.
- San Francisco Estuary Institute (SFEI). 1999. 1997 Annual Report. Regional Monitoring Program for Trace Substances.
- SAS Institute Inc. 1998. SAS, Version 7. Cary, North Carolina.
- SAS Institute Inc. 1988. SAS Procedures Guide, Release 6.03 Edition. Cary, North Carolina.
- Scheaffer RL, W Mendenhall II, L Ott. 1996. **Elementary Survey Sampling** (5th edition) Duxbury Press.
- Sechena, R, C Nakano, S Liao, N Polissar, R Lorenzana, S Truong, R Fenske. 1999. Asian Pacific Islander Seafood Consumption Study. EPA 910/R-00-003 U.S. Environmental Protection Agency Region 10, Seattle, Washington.
- Shatenstein, B, T Kosatsky, M Tapia, S Nodon, and BS Leclerc. 1999. Exploratory Assessment of Fish Consumption Among Asian-Origin Sportfishers on the St. Lawrence River in the Montreal Region. *Environmental Research* 80:557-570.
- Shubat PF, KA Raatz, and RA Olson. 1996. Fish Consumption Advisories and Outreach Programs for Southeast Asian Immigrants. *Toxicol Ind Health* 12(3-4):427-434.
- Smith RW. 1998. Evaluation of Shoreline Fishing Sampling Design for San Francisco Bay Seafood Consumption Study. Prepared by EcoAnalysis, Inc. for the San Francisco Estuary Institute, March 30.
- Snedecor, GW, and WG Cochran. 1989. **Statistical Methods**. Ames, Iowa: Iowa State University Press, 8th ed, pp. 431-435.
- Sokol RR and FJ Rohlf. 1981. **Biometry**. San Francisco: WH Freeman and Co., pp 419-421.
- Southern California Coastal Water Research Project and MBC Applied Environmental Sciences (SCCWRP/MBC). 1994. Santa Monica Bay Seafood Consumption Study. Santa Monica Bay Restoration Project.
- Stuart A. 1976. **Basic Ideas of Scientific Sampling** (2nd Edition). New York: Hafner Press, pp. 48-51.
- SYSTAT Inc. 1992. SYSTAT, Version 5.2. Evanston, Illinois.

Appendix A

1994 Interim Health Advisory for the San Francisco Bay

San Francisco Bay Seafood Consumption Study



Health Advisory on Catching and Eating Fish

Interim Sport Fish Advisory for San Francisco Bay

The California Environmental Agency's Office of Environmental Health Hazard Assessment (OEHHA) has performed a preliminary review of the data from the 1994 San Francisco Bay pilot study, "Contaminant Levels in Fish Tissue from San Francisco Bay." The results of the study showed elevated levels of chemical contaminants in the fish tissues. Based on these results, OEHHA is issuing an interim consumption advisory covering certain fish species from the bay.

- Adults should limit their consumption of San Francisco Bay sport fish to, at most, two meals per month.*
- Adults should not eat any striped bass over 35 inches.
- Women who are pregnant or may become pregnant, or who are breast-feeding, and children under 6, should not eat more than one meal per month and, in addition, should not eat any meals of large shark (over 24 inches) or large striped bass (over 27 inches).
- This advisory does not apply to salmon, anchovies, herring, and smelt caught in the bay; other ocean caught sport fish; or commercial fish.
- This advisory supersedes the existing advisory on striped bass in the bay, but does not revoke the recent advisory issued for the Richmond Harbor Channel Area.

Individuals who follow these interim guidelines will protect themselves from potential adverse effects caused by the levels of the chemicals found in fish by the study. OEHHA scientists also have the following simple suggestions for catching and eating fish from San Francisco Bay: (1) fish in a variety of locations, (2) eat smaller amounts of several species of fish rather than large amounts of a single species that may have a higher level of contamination, (3) clean and gut fish, eat only the fillet portion, (4) skin and trim fat from fish, (5) bake, broil or steam fish on a rack, (6) discard the juices from cooked fish.

This interim consumption advice is being issued due to health concerns based on exposure to sport fish from the bay contaminated with methylmercury, polychlorinated biphenyls (PCBs), dioxins, and pesticides like DDT. The principal effects of concern (from long-term consumption of fish) are possible neurotoxicity to developing fetuses, infants, and small children (e.g., impaired mental and motor development), mainly associated with excessive methylmercury or PCBs exposure, and potential increased risks for cancer due to exposure to PCBs, dioxins, and the pesticides. There is some indication of greater sensitivity of the nervous system in fetuses, infants, and young children. Because of this sensitivity, more restrictive consumption advice is given for young children and pregnant or breast-feeding women who may pass the contamination on to their fetus or child.

Although this advisory is based only on a preliminary review of the data from the study, OEHHA felt it would be prudent to issue interim guidelines at this time. More specific advisories and recommendations will be issued when a thorough evaluation of the study data is completed by OEHHA in conjunction with other public agencies.

More information can be obtained by calling OEHHA at (916) 324-7572.

* A fish meal for a 154-pound (70 kilogram) person is considered to be an 8 oz. portion of fish prior to cooking. Meal size should be adjusted according to body weight, with roughly 1 ounce of fish per 20 pound body weight. For a 40-pound child, for example, a fish meal would be 2 ounces of fish.

Appendix B

Education and Outreach Task Force

San Francisco Bay Seafood Consumption Study



Education and Outreach Task Force On Fish Consumption and Fish Contamination Issues

Ian Walker (Chair)	Environmental Health Investigations Branch California Department of Health Services
Pete Alexander	East Bay Regional Parks Department
Christine Arnesen	Environmental Health Investigations Branch California Department of Health Services
Marcia Brockbank	San Francisco Estuary Project
David James	Alameda County Environmental Health
Diana Lee	Environmental Health Investigations Branch California Department of Health Services
Gina Margillo	Environmental Health Investigations Branch California Department of Health Services
Brian Martinez	San Mateo County Department of Health Services
Ethan Rotman	California Department Fish and Game
Ken Sato	San Francisco County Department of Environmental Health
Diana Sokolove	San Francisco Estuary Project
Harmindar Sran	City of Berkeley Department of Health & Human services
John Steiner	East Bay Regional Parks Department
Karen Taberski	Regional Water Quality Control Board Region II
Carol Thornton	San Francisco Estuary Project
Alyce Ujihara	Environmental Health Investigations Branch California Department of Health Services
George Young	Alameda County Health Agency
	Save San Francisco Bay Association Formerly represented by: Johnston Carlyle
	Office of Environmental Health Hazard Assessment Formerly represented by: Hanafi Russell

Appendix C

**San Francisco Bay Seafood Consumption Study
Advisory Task Force and Reviewers**

San Francisco Bay Seafood Consumption Study



The following individuals served as Task Force Members:

Ray Arnold, Exxon Biomedical Sciences, representing Western States Petroleum Association (WSPA)
Marcia Brockbank, San Francisco Estuary Project
Carlyle Johnston, Save San Francisco Bay Association
Bridgette DeShield, Harding Lawson, representing WSPA (replacing Paul Krause)
Margy Gassel, Pesticide and Epidemiology Section, Office of Environmental Health Hazard Assessment, California Environmental Protection Agency
Martin Golden, National Marine Fisheries Service
Paul Gregory, California Dept. of Fish and Game
Kay Johnson, Tetra Tech
Paul Krause, Harding Lawson, representing WSPA (replacing Ray Arnold)
Carrie Pomeroy, Institute of Marine Sciences, University of California, Santa Cruz
Brian Sak, Bureau of Public Works, City and County of San Francisco
Karen Taberski, San Francisco Regional Water Quality Control Board, Region II
Carol Thornton, San Francisco Estuary Project

The following individuals served as special consultants and outside reviewers:

Jeff Bigler, USEPA, Office of Water
Robert Brodberg, PETS/OEHHA, CA EPA
Jordan Gold, Applied Marine Sciences
Tom Grieb, Tetra Tech
Barbara Knuth, Dept. of Natural Resources, Cornell University
John Ong, Office of Water, USEPA, Region IX
Cassandra Roberts, Moss Landing Marine Laboratories
Gail Roper, CA Dept. Fish and Game
Hanafi Russell, PETS/OEHHA, CA EPA
Bob Smith, EcoAnalysis

Task Force members and outside reviewers performed the following tasks:**A. Proposal Review and Contractor Selection**

Ray Arnold
Jay Davis – SFEI
Margy Gassel,
Rainer Hoenicke (SFEI Project Manager)
Brian Sak
Karen Taberski

B. Phase I – Survey Design

Project Staff: Diana Lee, Alyce Ujihara, Dan Smith, Martha Harnly, Bob McLaughlin, Christine Arnesen, Ian Walker, Gloria Cardona – Environmental Health Investigations Branch (EHIB), California Dept. of Health Services

Jim Allen

Ray Arnold

Marcia Brockbank

Margy Gassel

Jordon Gold

Martin Golden

Rainer Hoenicke

Kay Johnson

Barbara Knuth

Carrie Pomeroy

Gail Roper

Hanafi Russell

Brian Sak

Karen Taberski

Patty Velez

C. Phase II – Implementation of Field Survey

EHIB/DHS team

All task force members except Brian Sak, Carrie Pomeroy

D. Phase III – Data Analysis and Report Preparation and Review

All Phase II participants

Bridgette DeShields

Paul Krause

John Ong

Cassandra Roberts

Hanafi Russell

Appendix D

Sample Design, Site Selection, and Sampling Schedule

San Francisco Bay Seafood Consumption Study



Appendix D - Sampling Plan for the San Francisco (SF) Bay Seafood Consumption Study

In Section II.B, we provided an overview of the study's sampling plan. This appendix describes the sampling plan in further detail.

A. Survey Approaches

There are many different survey approaches that can be used to gather fish consumption information about anglers. These approaches include off-site methods such as mail and phone surveys as well as on-site methods such as personal interviews at fishing locations. We determined that the best way to gather fish consumption information from SF Bay anglers was to use personal interviews at fishing sites.

Off-site methods could not be used for this study because, in California, no comprehensive list of anglers, from fishing licenses or other sources, was available when this study was planned. A list of fishing license holders, even if available, may not be complete for SF Bay anglers because fishing licenses are not required at public piers in California (CDFG 2000). A significant amount of fishing activity occurs on these public piers in SF Bay and the proportion of pier anglers who hold licenses is not known. Additionally, on-site personal interviews conducted by bilingual interviewers would enhance participation of respondents who may have difficulty understanding written questionnaires due to cultural or language barriers, or low literacy. Finally, because of the importance of estimating consumption rates, we opted to use a physical model of a fish fillet to elicit information about the quantity of fish typically eaten by the angler. The use of the fillet model required us to use personal interviews.

B. Sampling Frame

The sampling frame is a complete list of the populations units that will be sampled (Pollock et al 1994). For example, the population units can be the individual members of a population, if all the members can be identified. With on-site surveys, the sampling frame is a complete list of all time-place combinations where anglers are present. In other words, it includes all possible fishing sites or access points in the study area and all possible sampling days and times during the study period.

The study area included the San Francisco Bay within the Golden Gate Bridge, including San Pablo Bay in the north (see Figure 1 in the report). To the east, the study area includes the Carquinez Straits and Suisun Bay to Chipps Island (near the city of Pittsburg). The list of fishing sites used in this study was drawn from the Marine Recreational Fisheries Statistics Survey (MRFSS) site list (Roper 1997). The site list from the MRFSS for SF Bay identified 47 sites with shore-based fishing¹, 24 with private boat access, and 8 with party boat access.

¹ Although the MRFSS identifies two shore-based modes, (1) man-made (e.g. piers) and (2) beach and bank, we combined these modes into a single "shore-based" mode.

To ensure that the MRFSS site list included all possible fishing locations in our study area, we consulted task force members, California Department of Fish and Game staff, and other sources. In addition, we identified sites in the Carquinez Straits and Suisun Bay areas of SF Bay where the MRFSS is not conducted. Some areas of SF Bay where we could not gain access, such as military bases, were not included in the study.

In addition to a comprehensive list of sites in the study area, the sampling frame includes all days and times when anglers are present at the sites. The possible sampling days included the one-year period, from July 1, 1998 to June 30, 1999.

C. Sample Size Estimate

1. Sample Size of Recent Consumers

We set a target sample size based on an estimate of the minimum number of interviews needed to meet the objectives of the study. Because of the emphasis placed on defining exposure assessment parameters such as consumption rate, the sample size was based on the minimum number of interviews needed to estimate a reasonably precise mean consumption rate. The consumption rate was derived from the subset of anglers who consumed fish caught from SF Bay in the four weeks prior to the interview, a group we refer to as recent consumers. In choosing the four week time period, we sought to maximize the time period over which a consumption rate estimate could be made while minimizing recall bias. In addition, the Santa Monica Bay Seafood Consumption Study (Allen 1996, SCCWRP/MBC 1994) has to date provided the best estimates of fish consumption rates from a California population. This study also used a four week recall to estimate consumption rate. By using a similar method to define consumption rate, we could compare rates derived from both studies.

We used consumption rate data from the Santa Monica Bay study to estimate the target sample size for this study. Using the mean and standard deviation from the Santa Monica Bay study, we calculated confidence limits around a geometric mean and upper percentiles (90th and 95th) for different sample sizes (Hahn and Meeker 1991). Figure 2 (in the report) shows that for a sample size of $n=480$, the 95% confidence limits are $\pm 10\%$ around a geometric mean. At $n=480$, the 95% confidence limits around the 90th and 95th percentiles are slightly larger ($\pm 13-15\%$). As can be expected, the width of the confidence limits increases as the sample size decreases. Figure 2 also shows that as the sample size increases beyond $n=480$, little increase in precision of the consumption rate estimate is gained. We consider a 95% confidence limit of $\pm 10-15\%$ to be reasonable and thus select $n=480$, or $n\sim 500$, as our target sample size for the group of recent consumers.

2. Target Interview Attempts

The sample size estimate described above showed that we needed to conduct interviews of about 500 recent consumers in order to calculate a reasonably precise consumption rate. We then estimated the number of anglers we would need to approach to obtain

completed interviews of 500 recent consumers. The last row in Table D1 shows that in three past angler surveys, 23% to 32% of attempted interviews yielded a completed interview of a recent consumer.

Table D1. Comparison of Response Rates in Three Angler Surveys in California

Angler Survey	Santa Monica Bay ^a	SF Bay Pier Anglers ^b	SF Bay Pier Anglers ^c
Interviews attempted	1740	388	111
Refusal	496 (29%)	160 (41%)	28 (25%)
Persons interviewed	1244 (71%)	228 (59%)	83 (75%)
Respondents without recent consumption	689 (40%)	137 (35%)	54 (49%)
Respondents with recent consumption	555 (32%)	91 (23%)	29 (26%)

^a Allen et al. (1996) and SCCWRP/MBC (1994).

^b Wong et al. (1997).

^c Ujihara (1997).

The highest percentage (32%) of respondents providing recent consumption information comes from the Santa Monica Bay Seafood Consumption Study. Although this study had a much larger sample size than the other studies, over half of the interviews were of private or party boat anglers, where the proportion of recent consumers was higher than shore-based fishing modes (Table D2).

Table D2. Proportion of Recent Consumers by Fishing Mode for Santa Monica Bay Seafood Consumption Study

Fishing Mode	Attempted Interviews	Recent Consumers
Pier/Beach Intertidal	806	216 (27%)
Private Boat	630	233 (37%)
Party Boat	304	106 (35%)

Source: SCCWRP/MBC (1994) and Allen et al. (1996).

Only shore-based anglers were interviewed in the SSFBA and EHIB studies. The proportion of total attempted interviews where anglers reported recent consumption from these two studies was only 23% and 26%. As discussed further in subsequent sections, SF Bay fishing activity is dominated by shore-based fishing, leading us to estimate that approximately 25% of our interview attempts of anglers will yield interviews of recent consumers. Thus, we concluded that 2000 (500/0.25) interviews must be attempted to reach our target of 500 recent consumers.

D. Sampling Plan Elements

In addition to meeting our sample size goals, there were a number of elements included in the sampling plan that guided our selection of sampling sites and determined how frequently we sampled at the selected sites. These elements include stratification of the sample by mode, season, and day type. In addition, we describe how our budgetary resources shaped the sampling plan.

1. Sample Stratification by Mode

Stratification of a sample into homogenous, non-overlapping groups called strata can improve the overall precision, facilitate administration, and reduce costs of the survey (Pollock et al. 1994, Scheaffer et al. 1996). To determine how much to sample in each strata, Pollock et al. (1994) recommends distributing sampling effort in proportion to fishing effort or the variable of interest such as catch. We stratified our sample by the three fishing modes based on the relative amount of fishing activity in each mode. We used fishing activity (the relative number of anglers using a site) rather than fishing effort (relative amount of time anglers spend at a site) because of our primary interest in angler characteristics (e.g., consumption rate, demographic factors) rather than factors that describe fishing effort (e.g., catch per effort, catch).

For estimates of fishing activity we relied on fishing pressure data developed for the MRFSS. Fishing pressure, as defined by MRFSS, is an estimate the average number of anglers that are present at a site over an eight-hour day. For boat modes, the fishing pressure is an estimate of the number of anglers using a launch ramp or departing from a marina. The number of anglers present at a site is provided as a range, i.e., a site can be assigned a fishing pressure of zero, 1-4 anglers, 5-8 anglers, 9-12 anglers, 13-19 anglers, or 20-29 anglers, etc. A separate fishing pressure estimate is made for weekend days and the weekdays for each of the 12 months of the year at each site.

In order to estimate the relative amount of fishing activity for each mode, we summed MRFSS fishing pressure estimates for 1997, using the mid-points of the ranges, for all sites in SF Bay. We then averaged this value over the 12 months in a year, and weighted the weekend and weekday estimates by the proportion of weekend days and weekdays in a year. The resulting value provided an estimate of the relative number of anglers fishing in each mode for an average eight hour day. These values are shown in column 2 of Table D3.

Table D3. Fishing Activity in SF Bay and Original Target Survey Attempts by Mode

1	2	3	4	5	6
Mode	Fishing Activity in SF Bay (uncorrected)*	Proportion Outside SF Bay	Fishing Activity in SF Bay (corrected)*	% of total	Target number of attempted surveys
Shore-based	263.0	0%	263.0	62.5%	$n_{\text{shore-based}} = 1250$
Private boat	131.9	11.8%	116.3	27.6%	$n_{\text{private}} = 553$
Party boat	93.4	55.6%	41.5	9.9%	$n_{\text{party}} = 197$
Total	488.3	---	420.7	100%	$n_{\text{total}} = 2000$

*The average number of anglers fishing on typical day by mode.

Some anglers on private and party boats depart from sites within SF Bay but they fish primarily outside the Bay. Because the focus of our study is fishing within SF Bay, we sought a correction to eliminate fishing activity originating in the Bay but occurring outside the Bay from our estimates of fishing activity by boat modes. Using data collected by MRFSS interviewers for 1994-1996, we found that a significant amount of the fishing activity, particularly among party boats, originated within SF Bay but was primarily conducted outside the Bay. Of fishing trips originating within the Bay, Table D4 shows the proportion of boat trips that were primarily conducted outside the Bay.

Table D4. Boat Anglers Fishing Outside and Inside SF Bay from MRFSS 1994-1996

	FISHING MODE			
	Private Boat		Party Boat	
	No.	%	No.	%
Outside SF Bay	471	12	421	56
Inside SF Bay	3512	88	336	44
Total	3983	100	757	100

Source: Van Buskirk (1997).

Table D4 shows that 12% of private boat anglers and 56% of party boat anglers originated their trip in the Bay but fished primarily outside the Bay. We then corrected our fishing activity estimates in Table D3 by reducing fishing activity for out of Bay trips among boat modes. Column 3 of Table D3 shows the proportion of fishing activity outside the Bay and column 4 shows the revised fishing activity estimate. We concluded in column 5 that about 62% of the total fishing activity in SF Bay is attributed to anglers fishing at shore-based sites (n_{shore}), 28% to anglers fishing within SF Bay on private boats (n_{private}), and 10% to anglers fishing within SF Bay on party boats (n_{party}).

Column 6 of Table D3 provides an initial target number of interviews we should attempt in each mode, derived by multiplying the percent of total activity for each mode by our targeted of 2000 interview attempts. For example, we estimated that $0.625 \times 2000 = 1250$ interview attempts for shore-based anglers.

2. Seasonal Variation

One of the study's objectives was to characterize seasonal variation in fish consumption patterns and angler characteristics. In order to observe seasonal variations that occurred over the one year study period, we planned to visit the same group of sites each month. Thus, observed differences could be attributed to changes over time rather than differences among the sites sampled. Visiting the same group of sites on a monthly basis also facilitated administration of the survey.

3. Day Type Differences

Overall, there is more fishing activity in SF Bay on a typical weekend day than on a typical weekday. However, in number, there are more weekdays than weekend days. (The ratio of weekdays to weekend days is 5:2). In Table 5 we calculated the relative amount of fishing activity for 1997 by shore-based and private boat modes, based on MRFSS fishing pressure data. For shore-based modes, there is more fishing activity on a typical weekend day, but this is offset by the greater number of weekdays. Thus, the amount of fishing activity by day type over a year is roughly equal. For private boat modes, fishing activity is far greater on a typical weekend day than a weekday. Even after adjusting for the greater number of weekdays, the ratio of fishing activity on weekends to weekdays at private boat sites is approximately two to one.

In making this estimate, we could not exclude fishing activity that originated in the Bay but was primarily conducted outside the Bay. For private boats, the proportion is relatively small (12%) and thus, we ignored it. Because this proportion is large for party boats (56%), we did not make an estimate of fishing activity by day type for this fishing mode.

Table D5. Fishing Activity by Day Type at Shore-based and Private Boat Sites in SF Bay

Fishing Mode	Day Type		Total
	Weekday	Weekend	
Shore-based	51%	49%	100%
Private Boat	38%	62%	100%

In an ideal sampling plan, we would allocate sampling effort by day type according to the percentages in Table D5. Because fishing activity is much lower on weekdays, it is more costly to sample weekdays and the higher the proportion of weekend days, the greater the expected sample size. To reach our sample size goals, we considered oversampling weekend days. But, in order to address concerns that the population fishing on weekdays could be significantly different from the population fishing on weekends, we sought to include some sampling on both day types.

4. Resources

Ultimately, our field data collection efforts were restricted by the resources available in our budget. After taking into account the resources needed for training the interviewers, we calculated that we had about 1700 person-hours available for field data collection activities. We allocated those person-hours by the relative amount of fishing activity in each of the 3 modes (Table D6).

Table D6. Person-Hour Allocation for Data Collection by Mode

Mode	Fishing Activity inside SF Bay	% of total	Person Hours Available for Data Collection
Shore-based	263	62.5%	1063
Private boat	116.3	27.6%	469
Party boat	41.5	9.9%	168
Total	420.7	100%	1700

5. Exclusion of Low Activity Sites

In an ideal study, the sampling frame would include all sites for shore-based and private boat anglers at all fishing locations where anglers fish and all points where anglers depart from. However, according to MRFSS data, many fishing sites in SF Bay have low activity and require more resources per interview to sample.² In selecting sites, we attempted to maximize the number of sites that could be included. But, in order to reach our sample size goal, most sites with low activity were excluded from the sampling plan. In general, low activity areas were included only if adjacent to a high activity site. For example, we included beach or bank areas next to a busy fishing pier.

We did consider the trade-off between the possible introduction of a bias by excluding low activity sites and the loss in precision from a reduced sample size if low activity sites were included. An outside consultant was hired to model these factors for shore-based sites (Smith 1998). This analysis found that any bias introduced by focusing on only high activity sites would be small in comparison to the loss in precision from a smaller sample size that would result by including low activity sites.

6. Geographic Distribution

Because the study addresses fishing throughout SF Bay, we considered the overall geographic distribution of sampling sites. We sought to include sites from all areas of the Bay.

² We defined low activity as sites where the MRFSS has assigned zero or the lowest fishing pressure estimate, a range of 1-4 anglers over an 8-hour day.

E. Sampling Plan for Shore-Based Sites

To derive an optimal sampling plan for shore-based sites we considered several sampling alternatives. For comparison, one alternative included sampling at all 46 MRFSS sites. The other alternatives included fewer numbers of sites but focused on the sites with the highest fishing pressure.

1. Fishing Activity Differences Among Sites

In order for the sampling plan to capture fishing activity differences between sites, the amount of time we conducted interviews at each site was not predetermined.

Interviewers were instructed to interview all anglers present at a site. If no anglers were present, they remained for a minimum of one hour before going to the next site or ending the sampling day. By using this method, site differences in activity would be reflected in the relative number of anglers interviewed at a site.

2. Projecting Interview Attempts

For each sampling alternative, we projected the number of interviews we could expect to attempt during the study using MRFSS fishing pressure data. MRFSS data reflect the number of anglers at a site over an eight hour day, while we planned to interview all anglers present at a site and then leave. We did not expect to remain at a site for eight hours, even at the busiest locations. Thus we had to adjust the MRFSS fishing pressure estimates in order to project the number of interviews we could expect at a site. Based on a census of anglers during site visits we made in 1997, we estimated conservatively that we could expect to find 75% of the MRFSS fishing pressure estimate during our site visits where we remained at a site long enough to interview all anglers present. In other words, if MRFSS data estimate that 13-19 anglers will be present at a site over an 8-hour day, we took the midpoint of the range, 16, and multiply by 75%. Thus we estimated that we expected to find $16 \times .75 = 12$ anglers on average during a site visit.

3. Projecting Person-Hours

In addition to projecting the number of interviews we could attempt for each sampling alternative, we also projected the number of person-hours needed to sample these alternatives. The person-hour estimates included the time needed to conduct the interview, including interviews in languages other than English, the time needed for conducting a census of anglers, travel between sites, and reviewing the completed surveys at the end of the day.

Because of the difficulty in keeping the study within our resources while still maintaining a reasonable a number of sampling sites, several changes were made to the sampling design to reduce costs. We grouped sites into pairs based on geographic proximity and site pairs were sampled together. Interview team size, originally set at three persons to cover all the target languages, was reduced to two persons.

4. Shore-based Sampling Plan Selected

As could be expected, we found that the greater the number of sites included in the sampling plan, the lower the expected sample size. To sample at all 46 sites and stay within our budget, we estimated that the number of interview attempts would be about 40% below our target of 1250.

The final site combination selected included 14 sites (7 site pairs). Two sites were specifically included in the selected sites to improve geographic coverage. One site (Martinez) was added in the Carquinez Straits area which is outside the area of the MRFSS. Also, one site (Dumbarton Bridge) was added to replace the San Mateo Bridge site. The San Mateo Bridge site is one of the most heavily used sites in the Bay but was closed during the duration of survey. The 14 selected sites are listed in Table D7 and shown in Figure D1.

Table D7. MRFSS Fishing Pressure at 14 Selected Shore-based Sites

Rank	County	Site Name	MRFSS Fishing Pressure	
			Weekday	Weekend
1	San Francisco	Fort Point Pier	13.9	19.4
2	Marin	Fort Baker Pier	12.9	20.5
3	Marin	McNear's Pier	9.2	16.7
4	San Francisco	Municipal Pier	8.2	12.8
5	Alameda	Berkeley Pier	5.5	16.5
6	Alameda	Alameda Rockwall	6.6	11.3
7	San Francisco	Candlestick Point	4.3	16.3
8	San Mateo	Oyster Point	4.8	9.5
9	Contra Costa	Point Pinole	2.8	12.0
10	San Mateo	Coyote Point	3.4	10.7
11	Alameda	Port View Park	2.0	13.0
12	Solano	Vallejo shoreline	4.8	9.2
13	Alameda	Dumbarton Pier	1.0	6.5
14	Contra Costa	Martinez Pier*	1.0	1.0
		Total	80.3	175.4

*Martinez Pier is outside the area of the MRFSS. We estimated the fishing pressure based on our own observations.

In Table D5, we estimated that shore-based fishing activity was 51% weekdays and 49% weekends. Thus, we allocated equal sampling days to weekends and weekdays by

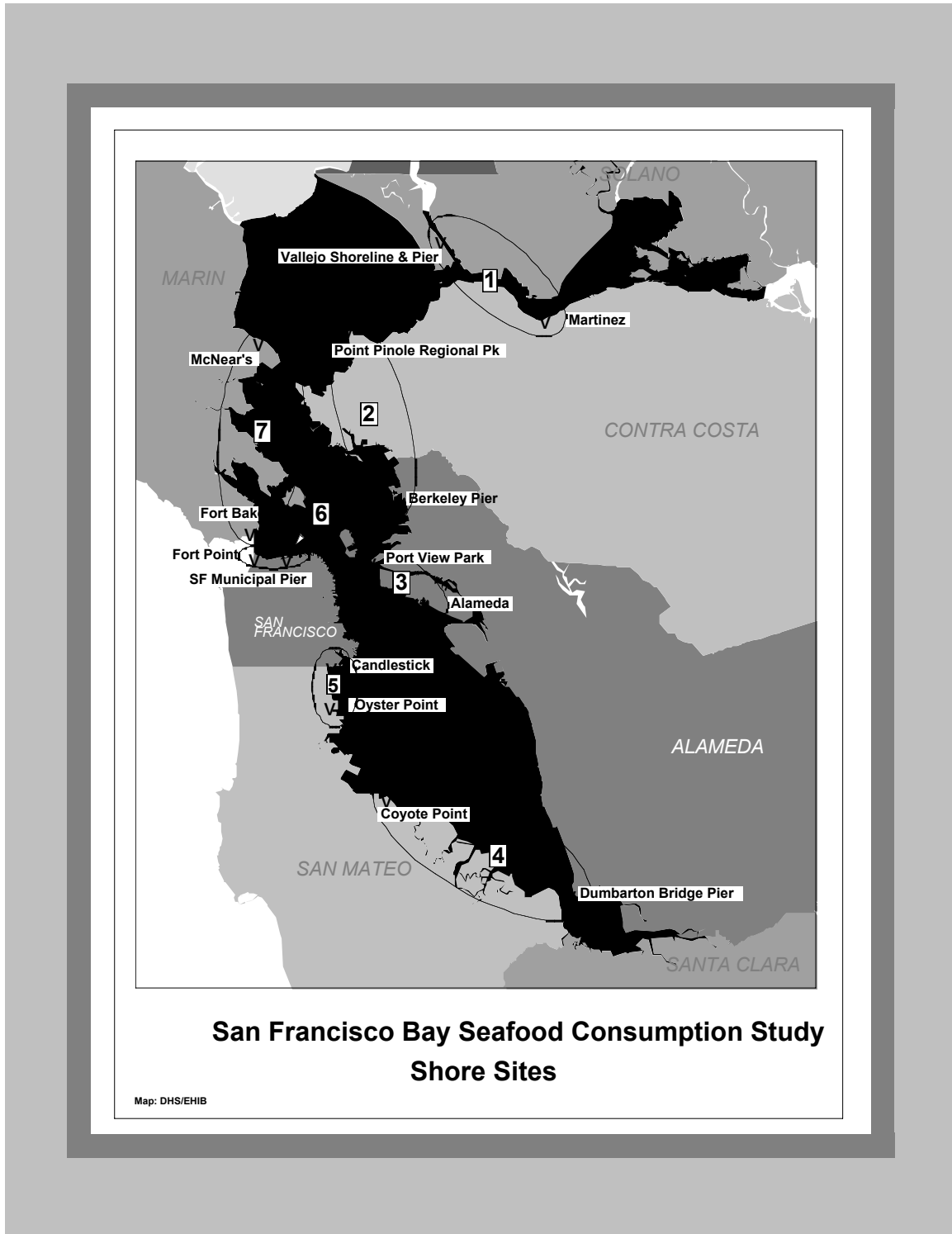


Figure D1. Shore-based Sites

alternating day types at a site each month. However, because activity at all sites was generally higher on weekends, our sampling effort was approximately 2/3 weekend and 1/3 weekday. This resulted in an oversampling of weekend days relative to our estimate of fishing activity but allowed us to maintain an adequate sample size.

Table D7 also shows the average fishing pressure at the 14 sites. We used these averages to estimate the projected number of interview attempts shown in Table D8. By visiting each site one time per month, half on weekdays and half on weekends, we estimated attempting 1150 interviews, below our original target of 1250 but within our resources (Table D9).

Table D8. Estimating Interview Attempts for 14 Shore-based Sites

	Weekday	Weekend	Total
MRFSS Fishing Pressure (average number angler per 8 hour day)	80.3	175.4	256
Estimated Interview Attempts per Visit (75% of fishing pressure)	60.2	131.6	192
Sum Over 12 months (6 weekday and 6 weekend visits per site)	361	789	1151

Table D9. Comparison of Original Target Sampling With Revised Target at Shore-Based Sites

	Interview Attempts	Person-Hours
Original Target	1250	1063
Revised Target Chosen Sampling Plan	1151	1042

F. Sampling Plan for Private Boat Sites

As with the shore-based sites, we considered several sampling alternatives for private boat sites. One alternative included all 24 identified private boat sites in SF Bay. Other alternatives included the top 5 and top 10 sites with the highest fishing pressure. Our primary goal for sampling private boat anglers was to interview anglers at access points as they left on a fishing trip or returned from a fishing trip. The primary access point was a boat launch, where anglers launch boats from trailers. We also screened anglers to ensure that their fishing trip that day was in SF Bay; we did not interview anglers fishing predominately outside SF Bay.

There were concerns that interviewers stationed at launch ramps would miss private boat anglers who used berthed boats. To include anglers using berthed boats, interviewers were instructed to visit marina areas adjacent to launch ramps sites and look for berthed boats about to depart or returning from a fishing trip and interview these anglers.

1. Fishing Activity Differences at Sites

Unlike the shore-based sampling plan, the length of time interviewers were stationed at a launch ramp was precisely determined based on fishing activity differences at the sites. Following Pollock, we assigned a shift length that was proportional to the relative amount of fishing activity at the site, using MRFSS fishing pressure data. Thus, these private boat sampling shifts varied by site, by month and day type (weekend or weekday). In other words, sites with the most activity were assigned longer shifts than sites with less activity. In general, shifts were longer during weekends and during warm weather months because these times generally had more activity.

2. Projecting Interview Attempts

In order to evaluate the sampling alternatives, we projected the number of interview attempt we could expect for each alternative using MRFSS estimates. For example, if MRFSS data estimated a range of 13-19 anglers at a site for an eight hour weekend day in July, we took the range midpoint (16) and estimated that we could encounter two anglers per hour ($16 \text{ anglers/eight hour day} = \text{two angler/hour}$) at that site for a weekend day in July. The interview rate (interview attempts per hour) was multiplied by the assigned shift length (hours) to derive an estimate of the number of interview attempts for a sampling shift. We then summed the interview attempts for all sites, day types, and months to give an estimate of the total interview attempts for the one year study period.

3. Projecting Person-Hours

We also projected the total person-hours by summing all shift lengths for all sampling alternatives. The total was multiplied by two because we planned to assign two interviewers to all shifts. We also assigned additional person-hours to allow interviewers to review their completed surveys at the end of the day.

4. Private Boat Sampling Plan Selected

As with the shore-based sampling plan, the greater the overall number of sites, the lower the projected sample size. The sampling alternative selected included five sites. This was the minimum number of sites that gave reasonable geographic distribution of the Bay (Table D10 and Figure D2).

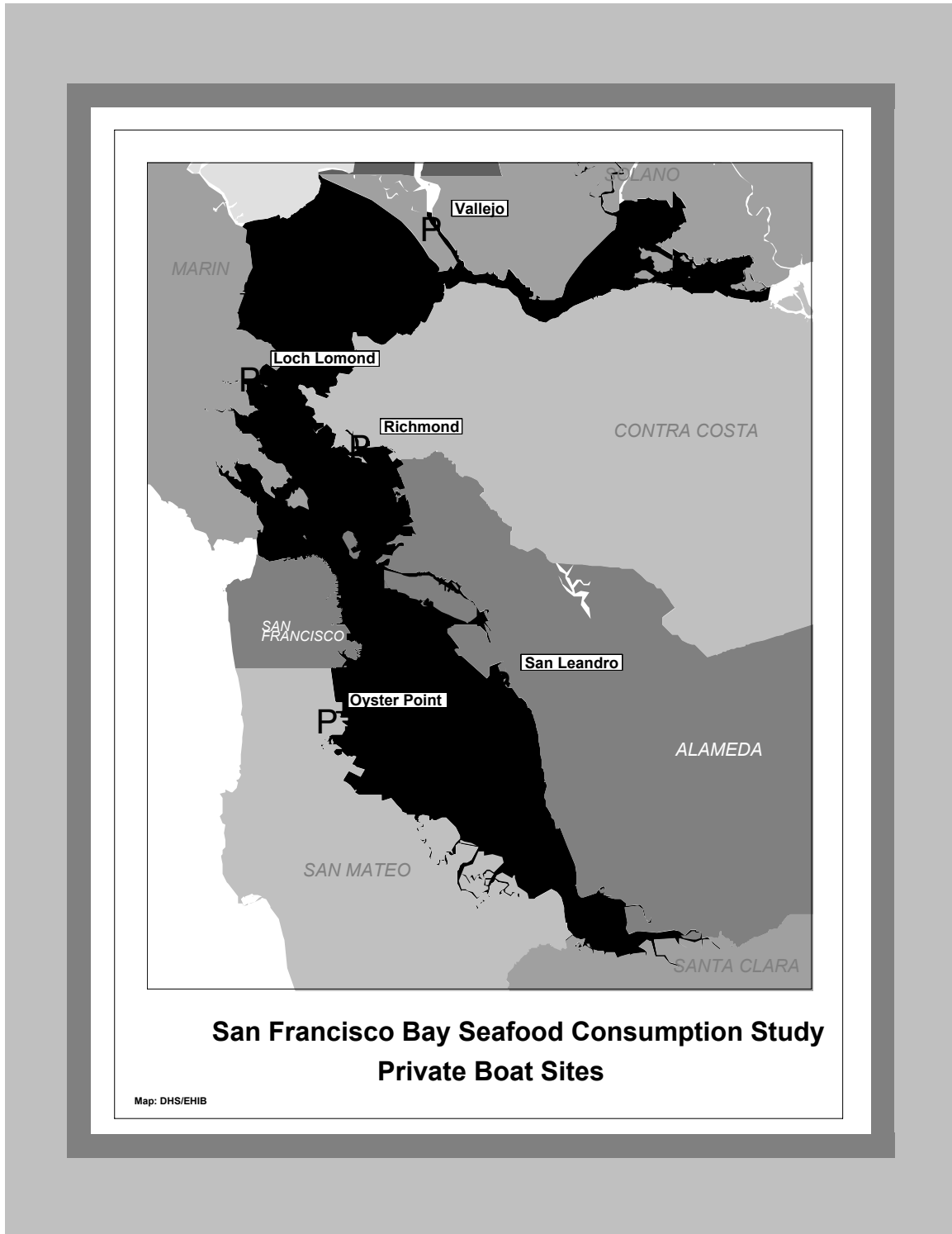


Figure D2. Private Boat Sites

Table D10. MRFSS Fishing Pressure at 5 Selected Private Boat Sites

Rank	County	Site Name	MRFSS Fishing Pressure	
			Weekday	Weekend
1	Contra Costa	Richmond	10.5	22.4
2	Solano	Vallejo	9.2	20.3
3	San Mateo	Oyster Point	8.2	19.5
4	Alameda	San Leandro	1.0	21
5	Marin	Loch Lomond	6.5	14.6
		TOTAL	35.4	97.8

The number of interview attempts we projected was 27% below our original target (Table D11). We opted to accept this lower sample size rather than make other modifications to the sampling plan. Based on the SMB study results (Table D2), we anticipated that we would have greater sampling success with private boat anglers than for shore-based fishing. Thus, we anticipated that the number of private boat anglers who were recent consumers would be adequate.

Table D11. Comparison of Original Target Sampling With Revised Target at Private Boat Sites

	Interview Attempts	Person-Hours
Original Target	553	469
Projection for Chosen Sampling Plan	406	510

In order to reduce the total number of person-hours needed to sample at the five selected sites, we chose not to sample at one of the sites, San Leandro, on weekdays. This site had very low weekday activity. We projected that we would interview only about one angler after six weekday visits. Our person-hour estimate still exceeded our target by about 10%.

G. Selection of Sampling Days and Times for Shore-based and Private Boat Sites

Selection of sampling days and times for shore-based and private boat sites was similar and is discussed in this section.

1. Sampling Days

We randomly selected the sampling days at shore-based and private boat sites. All days in a month were divided into two pools, one for weekdays and one for weekend days. Sampling days were then randomly selected from each pool. A few holidays were

excluded as possible sampling days³ and some weekday holidays were counted as weekend days.⁴

Because of the difficulty in scheduling more than one interview team per day, sampling days for both shore-based sites and private boat sites were selected from the same pool, without replacement. Thus, only one site, either shore-based or private boat, could be sampled on a given day. The starting point for allocating sampling days was rotated among the sites each month, but the order in which days were assigned to sites followed the same order.

To ensure equal coverage of weekend and weekdays, day type was assigned, with half the sites designated as weekday sampling and the remaining sites designated as weekend sampling. For example, for shore-based sites, four site pairs were assigned as weekend days and the remaining three sites were assigned as weekdays for the first month. The weekday/weekend day designations alternated every month.

2. Sampling Times

To ensure coverage of the sampling day, shore-based sites were assigned morning or afternoon shifts. For example, site pair 1 (shore-based sites Vallejo and Martinez) followed the pattern in Table D12 for the first four months of sampling. For safety reasons, we assigned sampling times only during daylight hours for both shore-based and private boat sites. In order to maximize coverage of daylight hours, shifts at shore-based sites began earlier and ended later during the longer summer months.

Table D12. Sampling Schedule for Site Pair 1 for July 1998-October 1998

Month	Date	Day Type	Shift time during day
1	July 1998	Weekend	AM
2	August 1998	Weekday	PM
3	September 1998	Weekend	PM
4	October 1989	Weekday	AM

Private boat anglers generally leave in the morning and return in the afternoon. Because we anticipated that anglers may have more time for an interview when returning from a trip than when departing, all sampling shifts were conducted in the afternoon. However, interviewers attempted to interview all private boat anglers they encountered at a site regardless of whether they were beginning or ending a fishing trip.

For shore-based sites, the individual site of each site pair that was sampled first was also alternated each month.

³ New Years Day, Thanksgiving, Christmas Eve and Christmas Day

⁴ Martin Luther King, Jr. Day, Presidents Day, Memorial Day, July 3rd (a Friday), Labor Day, and the day after Thanksgiving

H. Sampling Plan for Party Boat Sites

Because the MRFSS fishing pressure data for party boat sites predominately reflect fishing trips outside of SF Bay, which was not the objective of this study, these data were not used to develop a sampling plan for party boats. In order to focus only on party boat fishing within SF Bay, we examined data collected by the California Department of Fish and Game (CDFG 1998) on party boat activities. CDFG requires all commercial passenger fishing vessels (also called party or charter boats) owners or operators to file detailed reports on their trips. Using data from the PMASTER database provided by CDFG for 1996 (CDFG 1998), we calculated the total number of party boat trips within SF Bay and determined how these trips were distributed by month. We also looked at the average number of anglers on these trips, and weekend and weekday differences.

CDFG data showed that party boat activities within SF Bay were heaviest between May and August, and were lightest in January and December. These data also showed that the average number of anglers per trip was 13 and the amount of fishing activity by day type was about 50% weekends and 50% weekdays. We estimated conservatively that we could attempt 12 interviews per fishing trip and that a typical trip was nine hours. Based on our budget and our estimate of available person-hours, we estimated that we could meet our sampling target in 18 party boat sampling trips. We then allocated these 18 sampling trips by the relative amount of fishing activity for each month (Table D13).

Table D13. Party Boat Sampling Schedule

Month and Year	Number of Sampling Trips	Projected Interview Attempts	Projected Person-Hours
July 1998	2	24	18
August 1998	3	36	27
Sept. 1998	1	12	9
Oct. 1998	1	12	9
Nov. 1998	1	12	9
Dec. 1998/ Jan. 1999	1	12	9
Feb. 1999	1	12	9
March 1999	1	12	9
April 1999	1	12	9
May 1999	3	36	27
June 1999	3	36	27
TOTAL	18	216	162

Because our party boat sampling effort was relatively small and because few party boats usually remained within SF Bay, we did not attempt to stratify our sample by site. Furthermore, because we had to rely on the party boat captains to agree to allow us to send an interviewer, we did not attempt to randomly select sampling days. Finally, the

primary interviewer we selected to conduct party boat interviews was only available on weekdays, we did not attempt to stratify the sampling days by day type.

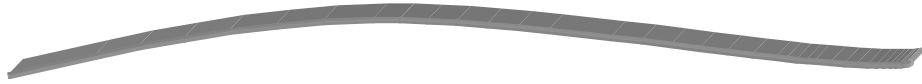
Appendix D References

- Allen, JM, PV Velez, DW Diehl, SE McFadden, M Kelsh (1996). Demographic variability in seafood consumption rates among recreational anglers of Santa Monica Bay, California, in 1991-1992. **Fishery Bulletin** 94:597-610.
- California Department of Fish and Game (1998). Data on Commercial Passenger Fishing Vessels in SF Bay from the PMASTER database, provided by Blaise Eitner, Associate Biologist, La Jolla, CA.
- California Department of Fish and Game (2000). Fish and Game Code Section 7153. <http://www.dfg.ca.gov/regs.html>
- Hahn GJ, and WQ Meeker (1991). **Statistical Intervals**. New York: Wiley
- Pollock, KH, CM Jones, TL Brown (1994). **Angler Survey Methods and Their Applications in Fisheries Management**. American Fisheries Society Special Publication 25. Bethesda, Maryland: American Fisheries Society.
- Roper, Gail (1997). California Department of Fish and Game, MRFSS Site Descriptions and Fishing Pressure, October 2.
- Scheaffer RL, W Mendenahll II, L Ott (1996). **Elementary Survey Sampling** (5th edition) Duxbury Press.
- Smith, RW (1998). Evaluation of Shoreline Fishing Sampling Design for San Francisco Bay Seafood Consumption Study. Prepared for the San Francisco Estuary Institute by EcoAnalysis, Inc. (March 30).
- Southern California Coastal Water Research Project and MBC Applied Environmental Sciences (SCCWRP/MBC) (1994). Santa Monica Bay Seafood Consumption Study. Santa Monica Bay Restoration Project.
- Ujihara, Alyce (1997). Survey of Anglers in San Francisco Bay. California Department of Health Services. (unpublished data)
- Van Buskirk, W (1997). Pacific States Marine Fisheries Commission, personal communication.
- Wong, Kristine and Nakatani, Keith (1997). Fishing for Food in San Francisco Bay: Part II. Save San Francisco Bay Association.

Appendix E

Questionnaire (English and Spanish)

San Francisco Bay Seafood Consumption Study



Date / / Site Code Mode Time Begin Interviewer:

Person is: ☐ Fishing (has poles only) ☐ Both fishing and crabbing

Hello, my name is _____. I am doing a survey for the San Francisco Estuary Institute **SHOW IDENTIFICATION**) We are gathering information about what types of fish or shellfish people catch and eat from the San Francisco Bay. I am not checking fishing licenses or checking your catch. Your answers will be kept confidential and you don't have to answer all the questions. You will also receive a small gift at the end of the survey(**CAN SHOW ITEM**). May I talk to you for a few minutes?

Q1a. ☐ Yes (SKIP TO Q2a)

☐ No (END SURVEY, FILL OUT Q1b-Q1e)

Q1b. Reason

Q1c. Observed Ethnicity

□ No time

□ Caucasian

☐ Native American

□ Language problem

□ African American

□ Filipino

☐ Appeared threatening

Latino/Hispanic

Other

Chinese

Asian (unknown)

□ DK

□ Vietnamese

□ DK

Other

Other

DK

Q2a. Our study is called the San Francisco Bay Seafood Consumption Study. Have you been interviewed before for this study? (talked to someone with same vest/hat on?)

<input type="checkbox"/> Yes	Q2b. When (m/y):	/	<input type="checkbox"/> DK
------------------------------	------------------	---	-----------------------------

□ No (CONTINUE)

DK (CONTINUE)☐ Refuse15147

When I talk about the San Francisco Bay, I mean this area here: (SHOW MAP). I will mainly be referring to fish and shellfish from the Bay. When I say shellfish, I am referring to crab, mussels, or clams.

Q3a. Is this the first time you have ever fished in the SF Bay?

☐ Yes (SKIP TO Q5) ☐ DK ☐ Refuse

☐ No Q3b. When was the last time you fished in the Bay? (m/y) / ☐ DK

Q4. Not including today, in the last 4 weeks, what is the total number of times you have gone fishing in the San Francisco Bay? ☐ DK ☐ Refuse

Q5. What do you usually do (plan to do -FOR FIRST TIME FISHERS) with the fish or shellfish you catch from the SF Bay? (CHECK ALL THAT APPLY)

☐ Eat it ☐ Give it to family or friends ☐ Trade or sell it ☐ Use for bait ☐ Catch and release it ☐ DK ☐ Refuse

☐ Other (specify)

For the next few questions, I am asking about eating fish that you or someone you know has caught from San Francisco Bay. This can be fish that's fresh, or fish from the Bay that you have frozen, dried, canned, or smoked after being caught to eat at a later time.

Q6a. Do you eat fish that you or someone you know catches from the SF Bay?

☐ Yes ☐ DK ☐ Refuse

☐ Used to, but don't anymore Q6b. stopped when:m/y / ☐ DK

☐ No (SKIP TO Q10)

Q7. How many years have you been eating fish that you or someone you know has caught from the SF Bay?

☐ Less than 1 year ☐ 6-10 years ☐ 21-30 years ☐ DK

☐ 1-5 years ☐ 11-20 years ☐ more than 30 years ☐ Refuse

Q8a. In the last 4 weeks, did you eat fish that you caught or someone you know caught from the SF Bay?

☐ Yes ☐ DK

☐ No (SKIP TO Q9) ☐ Refuse

Q8b. In the **last 4 weeks**, how many times did you eat fish that you or someone you know caught from the Bay?

times per day times per week total times in last 4 weeks

☐ DK

☐ Refuse

Q9. Over the last 12 months (___/97-8 to ___/98-9) how many times overall did you eat fish that you or someone you know caught from the SF Bay?

times per day times per week times per month times in last 12 mos.

☐ DK

☐ Refuse

Q10a. This is a model of 8 ounces (half pound) of raw fish fillet. When you eat fish from anywhere (the Bay, other places, stores, restaurants), is the amount that you eat: **(SHOW PERSON FISH PORTION BUT DO NOT LET THEM HOLD IT.)**

☐ About this size (SKIP TO Q11) ☐ DK ☐ Refuse

☐ More ☐ Half more ☐ Two time (double) more ☐ DK ☐ Refuse

☐ More ☐ Q10b. About how much more?

☐ Other

☐ Less ☐ Q10c. About how much less?

☐ Half this amount ☐ One third this amount ☐ DK ☐ Refuse

☐ Other

Now I'm going to show you pictures of 3 specific fish that can be caught from the SF Bay and ask you whether you eat them or not. Again this can be fresh fish, or fish that is frozen, dried, canned or smoked after being caught.

11a. Do you eat this fish (**KINGFISH**) that you or someone you know catches from SF Bay? (POINT TO PIX)

☐ Yes
☐ No (SKIP TO Q12)
☐ DK ☐ Refuse

What do you call it?

11c. When you eat (**kingfish**), how often do you eat the _____?

11c1. Skin

☐ more than half the time
☐ less than half the time
☐ never
☐ DK ☐ Refuse

11c2. Guts

☐ more than half the time
☐ less than half the time
☐ never
☐ DK ☐ Refuse

11b. Have you eaten any (**kingfish**) from the Bay in the last 4 weeks? (fresh, frozen, dried, canned, smoked)

☐ Yes No. times DK
☐ No
☐ DK ☐ Refuse

11d. When you eat (**kingfish**), how often do you _____?

11d1. eat cooking juices/drippings

☐ more than half the time
☐ less than half the time
☐ never
☐ DK ☐ Refuse

11d2. eat it in soup

☐ more than half the time
☐ less than half the time
☐ never
☐ DK ☐ Refuse

11d3. eat it raw

☐ more than half the time
☐ less than half the time
☐ never
☐ DK ☐ Refuse

12a. Do you eat this fish (**LEOPARD SHARK**) that you or someone you know catches from SF Bay? (POINT TO PIX)

☐ Yes
☐ No (SKIP TO Q13)
☐ DK ☐ Refuse

What do you call it?

12c. When you eat (**leopard shark**), how often do you eat the _____

12c1. Skin

☐ more than half the time
☐ less than half the time
☐ never
☐ DK ☐ Refuse

12c2. Guts

☐ more than half the time
☐ less than half the time
☐ never
☐ DK ☐ Refuse

12b. Have you eaten any (**leopard shark**) from the Bay in the last 4 weeks? (fresh, frozen, dried, canned, smoked)

☐ Yes No. times DK
☐ No
☐ DK ☐ Refuse

12d. When you eat (**leopard shark**), how often do you _____?

12d1. eat cooking juices/drippings

☐ more than half the time
☐ less than half the time
☐ never
☐ DK ☐ Refuse

12d2. eat it in soup

☐ more than half the time
☐ less than half the time
☐ never
☐ DK ☐ Refuse

12d3. eat it raw

☐ more than half the time
☐ less than half the time
☐ never
☐ DK ☐ Refuse



13a. Do you eat this fish
(**STRIPED BASS**) that you
or someone you know
catches from SF Bay?
(POINT TO PIX)

- ☐ Yes
☐ No (SKIP TO Q14)
☐ DK ☐ Refuse

What do you call it?

13b. Have you eaten any
(**striped bass**) from the
Bay in the last 4 weeks?
(fresh, frozen, dried,
canned, smoked)

- ☐ Yes ☐ No. times ☐ DK
☐ No ☐ ☐ ☐
☐ DK ☐ Refuse

13c. When you eat
(**striped bass**), how
often do you eat
the _____?

13c1. Skin

- ☐ more than half the time
☐ less than half the time
☐ never
☐ DK ☐ Refuse

13c2. Guts

- ☐ more than half the time
☐ less than half the time
☐ never
☐ DK ☐ Refuse

13d. When you eat (**striped
bass**), how often do you ____?

13d1. eat cooking juices/drippings

- ☐ more than half the time
☐ less than half the time
☐ never
☐ DK ☐ Refuse

13d2. eat it in soup

- ☐ more than half the time
☐ less than half the time
☐ never
☐ DK ☐ Refuse

13d3. eat it raw

- ☐ more than half the time
☐ less than half the time
☐ never
☐ DK ☐ Refuse

Q14 Now I have some pictures of other fish that can be caught from SF Bay. Looking at these pictures, please show me which fish you have eaten in the last 4 weeks. Again, these are the fish you ate in the last 4 weeks which you caught or someone you know caught from SF Bay. The fish could have been fresh, frozen, dried, canned or smoked.

Q14b. How many times have you eaten this fish in the last 4 weeks? (**ASK AS RESPONDENT POINTS TO PICTURE, RECORD RESPONSE IN COLUMN 14B.**)

Q14c. What do you call this? (**ASK AS RESPONDENT POINTS TO PICTURE, RECORD RESPONSE IN COLUMN 14c.**)

(**SHOW PICTURES AND HAVE RESPONDENT POINT OR TELL
YOU WITH PROBING AS NEEDED: "ANY OTHER FISH YOU
HAVE EATEN IN THE LAST 4 WEEKS THAT YOU CAUGHT
OR SOMEONE YOU KNOW CAUGHT FROM SF BAY?"**)



Q14a. Eaten in last 4 weeks?

Q14c. What do you call this?

Q14b. No. of times

Jacksmelt	<input type="checkbox"/> Yes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> DK
Halibut	<input type="checkbox"/> Yes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> DK
Brown Smoothound Shark	<input type="checkbox"/> Yes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> DK
Brown Rockfish	<input type="checkbox"/> Yes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> DK
Pacific Sanddab	<input type="checkbox"/> Yes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> DK
Pacific Sardine	<input type="checkbox"/> Yes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> DK
Black Perch	<input type="checkbox"/> Yes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> DK
Shiner Surfperch	<input type="checkbox"/> Yes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> DK
Walleye Surfperch	<input type="checkbox"/> Yes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> DK
Sturgeon	<input type="checkbox"/> Yes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> DK
Crab	<input type="checkbox"/> Yes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> DK
Clams	<input type="checkbox"/> Yes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> DK
Mussels	<input type="checkbox"/> Yes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> DK

--

Q14d. Are there any other fish from the Bay that you or someone you know catches that you ate in the last 4 weeks for which I don't have pictures? **(IF RESPONDENT NAMES ONE OF THE FOLLOWING LISTED FISH, CHECK THE BOX AND INDICATE NUMBER OF TIMES EATEN. IF RESPONDENT NAMES A FISH THAT IS NOT LISTED, SPECIFY TYPE OF FISH AND NUMBER OF TIMES EATEN IN LAST 4 WEEKS IN THE BLANK BOXES BELOW.)**

Perch	<input type="checkbox"/> Yes <input type="checkbox"/> DK	Pacific Tomcod	<input type="checkbox"/> Yes <input type="checkbox"/> DK
Anchovy	<input type="checkbox"/> Yes <input type="checkbox"/> DK	Goby	<input type="checkbox"/> Yes <input type="checkbox"/> DK
Starry Flounder	<input type="checkbox"/> Yes <input type="checkbox"/> DK	Bat Ray	<input type="checkbox"/> Yes <input type="checkbox"/> DK
Shark (OTHER THAN Brown Smoothhound or Leopard shark)	<input type="checkbox"/> Yes <input type="checkbox"/> DK		

	<input type="checkbox"/> Yes <input type="checkbox"/> DK		<input type="checkbox"/> DK
	<input type="checkbox"/> Yes <input type="checkbox"/> DK		<input type="checkbox"/> DK

Q15. Who in your household eats the fish that you or someone you know catches from the SF Bay? **(CHECK ALL THAT APPLY)**

- ☐ Yourself
- ☐ Women between ages 18-45 years
- ☐ Women who are currently pregnant or breastfeeding
- ☐ Children under age of 6
- ☐ Children between 6 and 17 years
- ☐ People 65 or older
- ☐ DK
- ☐ Refuse

Q16. How many people altogether, including yourself, are in your household?

☐ DK

☐ Refuse

Q17. Who usually cooks or prepares the fish you catch and eat from the Bay? **(CHECK ALL RESPONDENT INDICATES)**

- ☐ Self
- ☐ Family member (specify)
- ☐ Friend
- ☐ Other (specify)

- ☐ DK
- ☐ Refuse

Now I want to ask you some questions about fish from OTHER places, rather than fish from the SF Bay. Again we ask you to think about fresh fish as well as fish that has been, frozen, dried, canned, or smoked after being caught.

Q18. In the last 4 weeks, did you eat fish that you caught or someone you know caught from places other than the SF Bay (like a lake or river)? SHOW MAP AS NEEDED TO REMIND RESPONDENT ABOUT AREA COVERED BY SF BAY)

☐ Yes ☐ No (SKIP TO Q21) ☐ DK ☐ Refuse

Q19. From what places, other than the San Francisco Bay, did you or someone you know catch fish that you ate in the last 4 weeks? (check all that Respondent indicates)

☐ Lake/Reservoir

☐ River ☐ DK ☐ Other (specify)

☐ Delta ☐ Refuse

☐ Ocean (outside SF Bay/other Bays)

Q20. In the last 4 weeks, how many times did you eat fish that you or someone you know caught from places other than SF Bay?

times per day times per week total times in last 4 weeks

☐ DK

☐ Refuse

Q21. In the last 4 weeks, have you eaten any fish from a store or restaurant? This includes any fish fillet burgers or canned tuna also.

☐ Yes ☐ No (SKIP TO Q23) ☐ DK ☐ Refuse

Q22. How many times in the last 4 weeks did you eat fish from a store or restaurant, including any fish fillet burgers or canned tuna ?

times per day times per week total times in last 4 weeks

☐ DK

☐ Refuse

Now I am going to ask you a few questions about information you may have heard about eating fish from the Bay.

Q23. Have you heard or seen any information or health advisories about eating fish from the Bay?

☐ Yes ☐ No (SKIP TO Q25) ☐ DK ☐ Refuse

Q24. What did the information say about fish from the Bay? ☐ DK ☐ Refuse

Q24a. Has the information you have heard or seen about eating fish from the Bay caused you to change your fish eating habits?

☐ Yes ☐ No ☐ DK ☐ Refuse

Q24b. If yes, how have you changed your fish eating habits? If no, why not?

Q25. What is the best way for you to get information about catching and eating fish from the Bay? (CHECK ALL THAT RESPONDENT INDICATES)

☐ Friend/Family ☐ Sign ☐ Fishing regs ☐ Newspaper ☐ Radio ☐ TV ☐ Other (specify) ☐ DK ☐ Refuse

These next few questions will help us describe the people who fish from the SF Bay. We find this information helpful when we are developing information and materials for people who fish. Please remember the information is kept confidential and you don't have to answer if you don't want to.

Q26. How would you describe your racial or ethnic background?

- ☐ Black/African American ☐ Latino/Hispanic
☐ Caucasian ☐ Native American
☐ Chinese ☐ Filipino
☐ Vietnamese ☐ DK ☐ Refuse

☐ Pacific Islander (specify)

☐ Other Asian (specify)

☐ Other (specify)

Q27. What category best describes your age?

- ☐ Under 18 ☐ 18-45
☐ 46-65 ☐ 65+
☐ DK ☐ Refuse

Q28. What is the highest grade in school you have completed?

- ☐ Less than 12th grade ☐ DK
☐ Completed HS or GED
☐ Some college or trade school ☐ Refuse
☐ Completed at least 4 years college

Q29a. Is your total yearly household income greater than \$20,000 per year?

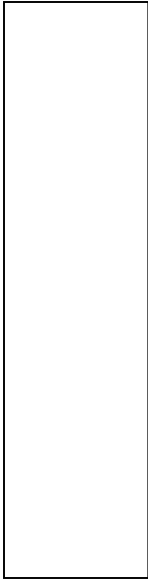
- ☐ Yes (ASK Q29b) ☐ DK
☐ No (DO NOT ASK Q29b) ☐ Refuse

Q29b. greater than \$45,000?

- ☐ Yes ☐ DK
☐ No ☐ Refuse

Q30. Gender of Respondent:

- ☐ Male ☐ Female



That's about all the questions I have. In order to thank you for your participation, we would like to give you a small gift. (OFFER GIFT). We'd also like to enter your name into a monthly drawing. You will be eligible to win a \$20 gift certificate to either Sportmart or Target. If you would like your name entered, we will take down your name, address, and phone number. We can also send you information about the results of this survey when they become available. My supervisor may also contact you to check my work or for some further follow-up.

Q31. Would you like to have your name entered into the drawing?

☐ Yes (FILL OUT NAME, ETC. BELOW) ☐ No

Q32. Would you like us to send you information about the results of our survey when they become available?

☐ Yes (FILL OUT NAME, ETC. BELOW)

☐ No

Q33. May my supervisor contact you ?

☐ Yes (FILL OUT NAME, ETC. BELOW)

☐ No

Name																			
Address																			
City										State		Zip							
Phone					-					-									

I'd also like to give you some information about the current advisory for the SF Bay. **(OFFER COPY OF ADVISORY; READ TO RESPONDENT):** The current health advisory for fish caught from the San Francisco Bay recommends that adults limit their consumption of most types of fish caught from the San Francisco Bay to no more than 2 eight ounce meals/month (one pound total per month). Women who are pregnant, planning to become pregnant, or breastfeeding, and children under 6 years of age should not eat more than one meal per month. There is more detailed information in the handout. If you'd like more information about the advisory or about the survey, you can contact the agencies listed here.

Thanks again. You've really helped us out a lot!

Time completed interview:



Interviewer's initials

Interviewer's impression of
quality of consumption info:

☐ Reliable

☐ Not very reliable

Other observations or notes:

Language in which
interview was
conducted:

☐ English

☐ Spanish

☐ Vietnamese

☐ Cantonese

☐ Mandarin

☐ Other (specify)

If Respondent refused to answer **Q26**, note
observed ethnicity of Respondent:

☐ Black/African American

☐ Caucasian

☐ Chinese

☐ Vietnamese

☐ Pacific Islander (specify)

☐ Other Asian (specify)

☐ Latino/Hispanic

☐ Native American

☐ Filipino

☐ DK

☐ Other (specify)



15147



Fecha / / Codigo de Lugar Modo Hora de Inicio Encuestador

Persona esta: Pescando (cana de pesca unicamente) Pescando y sacando cangrejos

Hola, me llamo _____. Estoy haciendo una encuesta para el Instituto Estuario de San Francisco. **(MOSTRAR IDENTIFICACION)** Estamos recabando informacion sobre los tipos de peces y mariscos que la gente pesca y come en la Bahia de San Francisco. No estoy revisando las licencias de pesca ni lo que pesca. Sus respuestas se mantendran en secreto (confidencialidad) y ademas Ud. no tiene que contestar todas las preguntas si asi lo desea. Estamose dando (incentivo) a los participantes. Me permite entonces hablar uno minutos con Ud?

Q1a Si (AVANCE A Q2a) No (FIN DE ENCUESTA, LLENE Q1b-Q1e)

Q1b. Razon	Q1c. Etnicidad Observada	Q1d. Idioma	Q1e. Genero
Falta de Tiempo	Caucaseo	Ingles	Masculino
Problema con el Idioma	Afro-americano	Espanol	Femenino
Apariencia amenazante	Latino/Hispano	Cantones	
Otro	Chino	Mandarin	
	Filipino	Tagalo	
	Vietnamita	Vietnamita	
	Nativo-americano	Otro	
NS	Asiatico (desconoce)	NS	
	Otro		
	NS		

Q2a. Nuestro proyecto se llama Estudio de Consumo de Pescados y Mariscos do la Bahia de San Francisco. Ha sido entrevistado anteriormente para este estudio? (ha hablado con alguien usando este chaleco/gorra?

SI Q2b. Cuando (m/a): / N/S (ALTO, FIN DE LA ENCUESTA)

No (CONTINUE)

NS (CONTINUE)

Rehusa

Quando hablo de la Bahía de San Francisco, me refiero a esta área (MUESTRE EL MAPA). Me refiero principalmente a los peces y mariscos de la Bahía. Cuando digo mariscos, me refiero al cangrejo (jaiva), mejillones o almejas.

Q3a. Es esta la primera vez que pesca en la Bahía de San Francisco?

Si (AVANCE A Q5)	ns	Rehusa
No		

Q4. Sin incluir hoy día, en las últimas 4 semanas, en total, cuántas veces ha pescado en la Bahía de San Francisco?

NS Rehusa

Q5. Usualmente que hace (planea hacer-PESCADORES PRIMERIZOS) con el pescado o marisco que pesca en la Bahía de San Francisco? (marque todos los que correspondan)

Lo como	Lo doy a familia/amigos	Lo intercambio/vendo	Uso como carnada	NS	Rehusa
Otro (especifique)					

Las siguientes preguntas se refieren a pescado que Ud o alguien que Ud conoce ha pescado en la Bahía de San Francisco. Puede tratarse de pescado fresco, o congelado, secado, enlatado, o ahumado para comerlo posteriormente.

Q6. Come pescado que Ud o alguien que Ud conoce pesca en la Bahía de San Francisco?

Si	NS	Rehusa
Antes si, pero ya no		

Q6b. Detuve cuando: m/a	/	NS
No (AVANCE A Q10)		

Q7. Cuántos años lleva comiendo pescado que Ud o alguien que conoce haya pescado en la Bahía de San Francisco?

Menos de 1 año	6-10 años	21-30 años	NS
1-5 años	11-20 años	mas de 30 años	Rehusa

Q8. En las últimas 4 semanas, ha comido pescado que Ud o alguien que conoce haya pescado en la Bahía de San Francisco?

Si	NS	No	Rehusa
----	----	----	--------

Q8b. En las ultimas 4 semanas, cuantas veces ha comido pescado que Ud o alguien que Ud conoce haya pescado de la Bahia?
Veces por dia veces por semana total de veces en las ultimas 4 semanas
Otro
NS
Rehusa

Q9. En los ultimos 12 meses (___/97-8 a ___/98-9) cuantas veces en total ha comido pescado que Ud o alguien que Ud conoce haya pescado en la Bahia de San Francisco?
veces por dia veces por semana veces por mes veces en ultimos 12 meses
Otro
NS
Rehusa

Q10. Este es un modelo de 8 onzas (media libra) de un filete de pescado crudo. Cuando Ud come pescado de cualquier lugar (la Bahia; otros lugares, tiendas, restaurantes), es la cantidad que Ud come:
(MUESTRE LA PORCION DE PESCADO PERO NO DEJE QUE LA PERSONA LO AGARRE)

De este tamano(AVANCE A Q11)	NS	Rehusa			
Mas Q10b. Cuanto mas?	Mitad mas	Doble	NS	Rehusa	Otro
Menos Q10c. Cuanto menos?	La mitad de esta cantidad	Un tercio	NS	Rehusa	Otro

Ahora voy a mostrarle fotos de 3 clases de peces que se pueden pescar en la Bahia de San Francisco y quisiera saber si Ud los come o no. Recuerde que puede ser fresco o congelado, seco, enlatado o ahumado, despues de haber sido pescado.

11a. Ha comido este pescado (PEZ REY) que Ud o alguien que UD conoce lo haya pescado en la Bahía de San Francisco? (SENALE)	Si No (AVANCE A Q12) NS Rehusa	Si No (AVANCE A Q13) NS Rehusa	12a. Ha comido este pescado (TIBURON LEOPARDO) que Ud o alguien que UD conoce lo haya pescado en la Bahía de San Francisco? (SENALE)	Si No NS Rehusa	12b. Ha comido Tiburon Leopardo en las ultimas 4 semanas? (fresco, congelado, seco, enlatado ahumado)
11b. Ha comido Pez Rey de la Bahía en las ultimas 4 semanas? (fresco, congelado, seco, enlatado, ahumado)	Si No NS Rehusa	Si No (AVANCE A Q13) NS Rehusa	12c. Cuando come Tiburon Leopardo, que tan seguido come...	Si No NS Rehusa	12d. Cuando come Tiburon Leopardo, que tan seguido come...
11c. Cuando come el Pez Rey, que tan seguido come...	Si No (AVANCE A Q12) NS Rehusa	Si No (AVANCE A Q13) NS Rehusa	12d.1 jugos cocidos o destilados?	Si No NS Rehusa	12d.2 lo come en sopa/caldo
11d. Cuando come Pez Rey que tan seguido come...	Si No NS Rehusa	Si No (AVANCE A Q13) NS Rehusa	12d.3 lo come crudo o en ceviche?	Si No NS Rehusa	12d.4 lo come en sopa/caldo
11e. Cuando come el Pez Rey, que tan seguido come...	Si No (AVANCE A Q12) NS Rehusa	Si No (AVANCE A Q13) NS Rehusa	12e.1 El pellejo	Si No NS Rehusa	12e.2 lo come en sopa/caldo
11f. Cuando come el Pez Rey, que tan seguido come...	Si No (AVANCE A Q12) NS Rehusa	Si No (AVANCE A Q13) NS Rehusa	12f.1 jugos cocidos o destilados?	Si No NS Rehusa	12f.2 lo come en sopa/caldo
11g. Cuando come el Pez Rey, que tan seguido come...	Si No (AVANCE A Q12) NS Rehusa	Si No (AVANCE A Q13) NS Rehusa	12g.1 jugos cocidos o destilados?	Si No NS Rehusa	12g.2 lo come en sopa/caldo
11h. Cuando come el Pez Rey, que tan seguido come...	Si No (AVANCE A Q12) NS Rehusa	Si No (AVANCE A Q13) NS Rehusa	12h.1 jugos cocidos o destilados?	Si No NS Rehusa	12h.2 lo come en sopa/caldo
11i. Cuando come el Pez Rey, que tan seguido come...	Si No (AVANCE A Q12) NS Rehusa	Si No (AVANCE A Q13) NS Rehusa	12i.1 jugos cocidos o destilados?	Si No NS Rehusa	12i.2 lo come en sopa/caldo
11j. Cuando come el Pez Rey, que tan seguido come...	Si No (AVANCE A Q12) NS Rehusa	Si No (AVANCE A Q13) NS Rehusa	12j.1 jugos cocidos o destilados?	Si No NS Rehusa	12j.2 lo come en sopa/caldo
11k. Cuando come el Pez Rey, que tan seguido come...	Si No (AVANCE A Q12) NS Rehusa	Si No (AVANCE A Q13) NS Rehusa	12k.1 jugos cocidos o destilados?	Si No NS Rehusa	12k.2 lo come en sopa/caldo
11l. Cuando come el Pez Rey, que tan seguido come...	Si No (AVANCE A Q12) NS Rehusa	Si No (AVANCE A Q13) NS Rehusa	12l.1 jugos cocidos o destilados?	Si No NS Rehusa	12l.2 lo come en sopa/caldo
11m. Cuando come el Pez Rey, que tan seguido come...	Si No (AVANCE A Q12) NS Rehusa	Si No (AVANCE A Q13) NS Rehusa	12m.1 jugos cocidos o destilados?	Si No NS Rehusa	12m.2 lo come en sopa/caldo
11n. Cuando come el Pez Rey, que tan seguido come...	Si No (AVANCE A Q12) NS Rehusa	Si No (AVANCE A Q13) NS Rehusa	12n.1 jugos cocidos o destilados?	Si No NS Rehusa	12n.2 lo come en sopa/caldo
11o. Cuando come el Pez Rey, que tan seguido come...	Si No (AVANCE A Q12) NS Rehusa	Si No (AVANCE A Q13) NS Rehusa	12o.1 jugos cocidos o destilados?	Si No NS Rehusa	12o.2 lo come en sopa/caldo
11p. Cuando come el Pez Rey, que tan seguido come...	Si No (AVANCE A Q12) NS Rehusa	Si No (AVANCE A Q13) NS Rehusa	12p.1 jugos cocidos o destilados?	Si No NS Rehusa	12p.2 lo come en sopa/caldo
11q. Cuando come el Pez Rey, que tan seguido come...	Si No (AVANCE A Q12) NS Rehusa	Si No (AVANCE A Q13) NS Rehusa	12q.1 jugos cocidos o destilados?	Si No NS Rehusa	12q.2 lo come en sopa/caldo
11r. Cuando come el Pez Rey, que tan seguido come...	Si No (AVANCE A Q12) NS Rehusa	Si No (AVANCE A Q13) NS Rehusa	12r.1 jugos cocidos o destilados?	Si No NS Rehusa	12r.2 lo come en sopa/caldo
11s. Cuando come el Pez Rey, que tan seguido come...	Si No (AVANCE A Q12) NS Rehusa	Si No (AVANCE A Q13) NS Rehusa	12s.1 jugos cocidos o destilados?	Si No NS Rehusa	12s.2 lo come en sopa/caldo
11t. Cuando come el Pez Rey, que tan seguido come...	Si No (AVANCE A Q12) NS Rehusa	Si No (AVANCE A Q13) NS Rehusa	12t.1 jugos cocidos o destilados?	Si No NS Rehusa	12t.2 lo come en sopa/caldo
11u. Cuando come el Pez Rey, que tan seguido come...	Si No (AVANCE A Q12) NS Rehusa	Si No (AVANCE A Q13) NS Rehusa	12u.1 jugos cocidos o destilados?	Si No NS Rehusa	12u.2 lo come en sopa/caldo
11v. Cuando come el Pez Rey, que tan seguido come...	Si No (AVANCE A Q12) NS Rehusa	Si No (AVANCE A Q13) NS Rehusa	12v.1 jugos cocidos o destilados?	Si No NS Rehusa	12v.2 lo come en sopa/caldo
11w. Cuando come el Pez Rey, que tan seguido come...	Si No (AVANCE A Q12) NS Rehusa	Si No (AVANCE A Q13) NS Rehusa	12w.1 jugos cocidos o destilados?	Si No NS Rehusa	12w.2 lo come en sopa/caldo
11x. Cuando come el Pez Rey, que tan seguido come...	Si No (AVANCE A Q12) NS Rehusa	Si No (AVANCE A Q13) NS Rehusa	12x.1 jugos cocidos o destilados?	Si No NS Rehusa	12x.2 lo come en sopa/caldo
11y. Cuando come el Pez Rey, que tan seguido come...	Si No (AVANCE A Q12) NS Rehusa	Si No (AVANCE A Q13) NS Rehusa	12y.1 jugos cocidos o destilados?	Si No NS Rehusa	12y.2 lo come en sopa/caldo
11z. Cuando come el Pez Rey, que tan seguido come...	Si No (AVANCE A Q12) NS Rehusa	Si No (AVANCE A Q13) NS Rehusa	12z.1 jugos cocidos o destilados?	Si No NS Rehusa	12z.2 lo come en sopa/caldo

13a. Ha comido este pescado (Robalo) que Ud o alguien que UD conoce lo haya pescado en la Bahía de San Francisco?

13b. Ha comido Robalo de la Bahía en las últimas 4 semanas? (fresco, congelado, seco, enlatado, ahumado)

13c. Cuando come Robalo, que tan seguido come...

13d. Cuando come Robalo, que tan seguido come

Si No (AVANCE A Q14) NS Rehusa

Si No NS Rehusa

13c.1. El pellejo

13d.1 jugos cocidos/destilados

mas de mitad de veces
menos mitad de veces
nunca
NS Rehusa

mas de mitad de tiempo
menos mitad de tiempo
nunca
NS Rehusa

13d.2 en sopa o en caldo

mas de mitad de tiempo
menos mitad de tiempo
nunca
NS Rehusa

Como lo llama?

13c.2. Visceras (organos)

13d.3 lo come crudo o en ceviche?

mas de mitad de veces
menos mitad de veces
nunca
NS Rehusa

mas de mitad de tiempo
menos de mitad de tiempo
nunca
NS Rehusa

Q14a. Ahora le motrare fotos de otros peces que se pueden pescar en la Bahía de San Francisco. Por favor, muéstreme aquellos que Ud. haya comido en las últimas 4 semanas. Puede ser pescado que UD o alguien que Ud conoce haya pescado en la Bahía de San Francisco, que pudo haber sido congelado, secado, enlatado o ahumado.

Q14b. Cuántas veces ha comido este pescado en las últimas 4 semanas?
(PREGUNTE MIENTRAS EL ENCUESTADO SENALA LA FOTO Y REGISTRE LA RESPUESTA EN LA COLUMNA 14c)

MUESTRA LAS FOTOS Y DEJE QUE EL ENCUESTADO SENALE, LE DIGA O INDAGUE SI FUESE NECESARIO: "ALGUN OTRO PESCADO QUE UD HAY COMIDO EN LAS ÚLTIMAS 4 SEMANAS QUE UD O ALGUIEN QUE UD CONOCE HAYA PESCADO EN LA BAHÍA DE SAN FRANCISCO?"

	Q14a. Ha comido en las ultimas 4 semanas?		Q14b. No. Veces	Q14c. Como le llama?
Perca Negra	Si	No	NS	
Pez Rocosó Marrón	Si	No	NS	
Mero	Si	No	NS	
Esperléno	Si	No	NS	
Pez Arenero	Si	No	NS	
Sardina	Si	No	NS	
Perca Brillante	Si	No	NS	
Esturión	Si	No	NS	
Perca “Walleye”	Si	No	NS	
Cangrejo	Si	No	NS	
Almejas	Si	No	NS	
Mejillones	Si	No	NS	

Q14d. Algun otro pescado que Ud o alguien que Ud conoce lo haya pescado en la Bahía y que lo haya comido en las ultimas 4 semanas pero que no estaba entre las fotos que le he mostrado (SI EL ENCUESTADO HA COMIDO LOS PECES DE LA LISTA SIGUIENTE, MARQUELO E INDIQUE EL NUMERO DE VECES QUE LOS HAYA COMIDO; SI EL ENCUESTADO MENCIONA ALGUN PEZ QUE NO ESTA EN LA LISTA, ESPECIFIQUELO EN EL ESPACIO DEL MEDIO, ASI COMO EL NUMERO DE VECES QUE LO HAYA COMIDO EN LAS ULTIMAS 4 SEMANAS)

Perca	Si	NS	Bacalao	Si	NS
Anchoveta Nortena	Si	NS	Gobio	Si	NS
Platija	Si	NS	Bataraya	Si	NS
Tiburón Café de Caza	Si	NS	Tiburón de Siete Agallas	Si	NS

Q15. En su casa, quien come el pescado que UD o alguien que UD conoce pesca de la Bahia de San Francisco?
(MARQUE TODOS LOS QUE CORRESPONDAN)

	Ud. mismo	Mujeres de 18-45 años	Mujeres embarazadas o lactando
Ninos menores de 6 años		Ninos entre 6-17 años	Personas de 65 años o mas
NS		Rehusa	

Q16. En total, cuanto gente vive en su csa, incluyendolo a Ud?

Q17. Usualmente, quien prepara o cocina el pescado que pesca y come de la Bahia?
(MARQUE TODAS LAS RESPUESTAS)

Yo mismo _____

Amigo(a) _____

NS _____

Pariente (especifica) _____

Otro (especifica) _____

Rechusa _____

Ahora le voy a preguntar sobre peces de otros lugares, que no sean de la Bahía de San Francisco. Como le dije antes, puede ser pescado fresco, congelado seco, enlatado o ahumado.

Q18. En las últimas 4 semanas, ha comido pescado que Ud o alguien que UD conoce haya pescado en otros lugares fuera de la Bahía de San Francisco (como de un lago or río)?

DE SER NECESARIO, MUESTRE EL MAPA PARA RECORDAR EL AREA DE LA BAHIA DE SAN FRANCISCO.

Si No(AVANCE A Q21) NS Rehusa

Q19. En las últimas 4 semanas, en que lugares fuera de la Bahía de San Francisco ha comido lo que ha pescado?
(MARQUE TODAS LAS CORRESPONDIENTES)

Lago/reservorio NS Otro (especifique)
Río NS Rehusa
Delta Rehusa
Océano (fuera de SF/Otras Bahías)

Q20. En las últimas 4 semanas, cuantas veces ha comido pescado que ha pescado en lugares fuera de la Bahía de San Francisco?

Veces por día veces por semana total de veces en últimas 4 semanas
Otro
NS

Rehusa

Q21. En las últimas 4 semanas, ha comido pescado de una tienda o restaurante? Incluyendo hamburguesas de filete de pescado o atun.

Si No (AVANCE A Q23) NS Rehusa

Q22. En las últimas 4 semanas, cuantas veces ha comido pescado de una tienda o restaurante?

Veces por día veces por semana total de veces en últimas 4 semanas
Otro
NS
Rehusa

Ahora le voy a preguntar sobre alguna informacion que Ud haya escuchado acerca del consumo del consumno de pescado de la Bahia.

Q23. Ha escuchado o visto alguna informacion or recomendaciones de salud sobre el consumo de pescado de la Bahia?

Si No(AVANCE A Q25) NS Rehusa

Q24. Que decia la informacion sobre el pescdo de la Bahia? NS Rehusa

Q24a. La informacion que Ud. ha escuchado o visto sobre el consumo de pescado de la Bahia, ha hecho que Ud. cambie sus habitc de consumo de pescado?

Si No NS Rehusa

Q24b. Si contesto que si, como ha cambiado sus habitos de consumo de pescado? Si es no, porque no?

Q25. Segun Ud. cual es la mejor manera de obtener informacion sobre la pesca y consumo en la Bahia?
(MARQUE TODOS LOS QUE CORRESPONDAN)

Amistades/Familiar	Letrero	Regulaciones de pesca	Periodico	Radio	TV
NS					
Otro (especifique)					

La proximas preguntas nos ayudaran a describir a las persona que pescan o sacan mariscos de la Bahia de San Francisco. Esta informacion es muy util para desarrollar materiales de informacion para estas personas. Por favor, recuerde que esta informacion es confidencial y si Ud desea no tiene que contestar.

Q26. Como describiria su ascendencia racial o etnica?	Q27. Cual categoria describe mejor su edad?
Afro-americano	Menor de 1818-45
Caucaseo	46-6565+
Chino	NSRehusa
Vietnamita	
Otro, Asia SE (especifique)	
Isleno del Pacifico (especifique)	
Otro, Asia (especifique)	
Otro, (especifique)	
Q29a. Es su ingreso anual mayor de \$20,000	Q30. Genero
Si (Pregunte Q29b)	Masculino
No (No Pregunte Q29b)	Femenino
Rehusa	

Bueno, esto es todo. Para agradecerle por su participacion, me gustaria darle (incentivo). Tambien nos gustaria inscribirle en un sorteo mensual. Ud. podria ganar un cupon de \$20 de las tiendas Target o Sportmart. Si esta de acuerdo, necesitare anotar su nombre, direccion y numero de telefono. Tambien le enviaremos informacion sobre los resultados de esta encuesta, tan pronto esten disponibles. Ademas, quizas mi Supervisor le contacte para revisar el trabajo que estoy haciendo.

- Q31. Le gustaria inscribirse en el sorteo mensual?

Si (LLENE DATOS ABAJO)

No
- Q32. Le gustaria que le enviasemos informacion sobre los resultados de la encuesta?

Si (LLENE DATOS ABAJO)

No
- Q33. Puede mi Supervisor contactarle?

Si (LLENE DATOS ABAJO)

No

Nombre		
Direccion		
Ciudad	Estado	Codigo
Telefono		

Me gustaria darle alguna informacion sobre las actuales recomendaciones de la Bahia de San Francisco. (OFREZCA UNA COPIA DE LAS RECOMENDACIONES; LEASELA): Las recomendaciones de salud para la pesca en la Bahia de San Francisco, indica que los adultos deben limitar el consumo de la mayoria de pescados de la Bahia, a no mas de dos comidas de 8 onzas por mes (en total, una libra por mes), Las mujeres embarazadas, que planean quedar embarazadas o que esten lactando, asi como los ninios menores de 6 anos, no deben comer mas de una comida por mes. En los folletos encontrara mas informacion. Si desea mas informacion sobre las recomendaciones o sobre los resultados, puede llamar a las agencia que estan en el folleto.

Muchisimas gracias. Realmente su ayuda ha sido muy valiosa!

Hora de Termino de Entrevista:

Iniciales de Entrevistador:

Impresion del entrevistador sobre la
calidad de informacion registrada

- Muy confiable
- Confiable
- No muy confiable
- Desconfiable

Otras observaciones:

Idioma en que se condujo la entrevista:

- Inglés
- Español
- Vietnamita
- Contones
- Mandarin

Si el encuestante rehusa la pregunta Q26 anote la etnicidad observada:

- Negro/Afro-americano
- Caucaseo
- Chino
- Vietnamita
- Otro, Asiatico SE (especifique)
- Isleno del Pacifico (especifique)
- Otro, Asiatico (especifique)
- Latino/Hispano
- Nativo-americano
- Filipino
- Otro
- NS

Appendix F

Survey Tools

San Francisco Bay Seafood Consumption Study



Some of the Survey Tools Used by Field Interviewers



Key Chain with Tape Measure, Hat, and Vest with Survey Logo



Plastic Model of an 8-ounce Portion of Raw Fish Fillet



Binder with Map of SF Bay and Color Photographs of 13 species of Fish, 3 Species of Shellfish

Appendix F. Survey Tools

Table F1 . SF Bay Fish Species for Which Pictures Were Available

Fish Name Shown on Pictures (Common name, if available)	Scientific Names
White Croaker (King fish)	<i>Genyonemus lineatus</i>
Leopard Shark	<i>Triakis semifasciata</i>
Striped Bass (Striper)	<i>Morone saxatilis</i>
Jacksmelt (Smelt)	<i>Atherinopsis californiensis</i>
California Halibut	<i>Paralichthys californicus</i>
Brown Smoothhound Shark	<i>Mustelus henlei</i>
Brown Rockfish	<i>Sebastes auriculatus</i>
Pacific Sanddab	<i>Citharichthys sordidus</i>
Pacific Sardine	<i>Sardinops sagax</i>
Black Perch	<i>Embiotoca jacksoni</i>
Shiner Surfperch (Shiner Perch)	<i>Cymatogaster aggregata</i>
Walleye Surfperch	<i>Hyperprosopon argenteum</i>
White Sturgeon	<i>Acipenser transmontanus</i>

Table F2. SF Bay Shellfish for Which Pictures Were Available

Shellfish Names Shown on Pictures	Most Common Bay Species	Scientific Names
Crab	Red Rock Crab	<i>Cancer productus</i>
Clams	Japanese Littleneck Clam	<i>Tapes japonica</i>
Mussels	Bay Mussel	<i>Mytilus edulis</i>

References:

Emmett, RL, SL Stone, SA Hinton, ME Monaco (1991). Distribution and abundance of fishes and invertebrates in west coast estuaries, volume II: species life history summaries. ELMR Report No. 8. NOAA/NOS Strategic Environmental Assessments Division, Rockville, MD.

Gotshall, DW (1989). Pacific Coast Inshore Fishes 3rd Ed. Sea Challengers, Monterey, CA.

Leet, WS, CM Dewees, CW Haugen (1992). California's living marine resources and their utilization, California Sea Grant Extension Publication UCSGEP-92-12.

Morris, RH, DP Abbott, EC Haderlie (1980). Intertidal Invertebrates of California. Stanford University Press, Stanford, CA.

9/9/98

Census of Shore Sites

Date	Site Name	Site Code	Mode Code	No. of Persons <18 years	No. of Persons 18 years & older	Interviewer

Shore Site Codes

1A. Vallejo Shoeline
 1B. Martinez Shoreline Park
 2A. Point Pinole Shoreline Park
 2B. Berkeley Pier
 3A. Port View Park
 3B. Alameda Rockwall
 4A. Dumbarton Bridge Pier
 4B. Coyote Point

Boat Site Codes

5A. Oyster Point
 5B. Candlestick Pt. Rec Area
 6A. SF Municipal Pier
 6B. Fort Point
 7A. Fort Baker Pier
 7B. McNears Park/China Camp
 11. Vallejo Marina
 12. Richmond Marina
 13. San Leandro Marina
 14. Oyster Point Marina
 15. Loch Lomond Marina

Mode Codes for Shore Sites

1. “Free” piers. These areas, primarily municipal piers, where a fishing license is NOT required to fish. Free piers include areas that are not technically piers: the Vallejo Waterfront, Alameda Rockwall, and the jetty at Coyote Point. These areas are highlighted in red on the site maps.
2. All other shore based areas that are not free piers. These areas are primarily rip-rap banks. These areas may include man-made structures such as the small pier adjacent to the Vallejo Launch Ramp and the rock jetty at Fort Baker. These areas are highlighted in green on the site maps.

9/9/98

Summary of Shore and Boat Sites

Date	Site Code	Site Start Time	Site End Time	No. of Interview Attempts	Interviewer

Shore Site Codes

1A. Vallejo Shoeline
 1B. Martinez Shoreline Park
 2A. Point Pinole Shoreline Park
 2B. Berkeley Pier
 3A. Port View Park
 3B. Alameda Rockwall
 4A. Dumbarton Bridge Pier
 4B. Coyote Point

Boat Site Codes

5A. Oyster Point
 5B. Candlestick Pt. Rec Area
 6A. SF Municipal Pier
 6B. Fort Point
 7A. Fort Baker Pier
 7B. McNears Park/China Camp
 11. Vallejo Marina
 12. Richmond Marina
 13. San Leandro Marina
 14. Oyster Point Marina
 15. Loch Lomond Marina

Party Boat Survey Form**San Francisco Bay Seafood Consumption Study**

8/6/98

Interviewer _____ Date _____

Port _____ Boat Name _____

Fishing Trip Start Time _____ End Time _____

Target Species 1* _____

Target Species 2 _____

Target Species 3 _____

Target Species 4 _____

Target Species 5 _____

Target Species 6 _____

*in SF Bay (exclude species targeted in areas outside SF Bay)

Area Fished Outside SF Bay _____

Fishing Activity Outside SF Bay _____

Number of Interview Attempts _____

NOTES (describe your attempt to board a boat even if the boat was full and no interviews were completed):

Site Codes

- 21. Point San Pablo (Contra Costa Co.)
- 22. Emeryville
- 23. Fisherman's Wharf, San Francisco
- 24. Loch Lomond, San Rafael

25. _____

27. _____

Mode Code

Party boat interviews should be assigned mode 9.

26. _____

28. _____

Appendix G

Field Interviewer Training Manual

San Francisco Bay Seafood Consumption Study



Prepared by:

**Diana Lee, MPH
Environmental Health Investigations Branch
CA Department of Health Services
Emeryville, CA**

**Alyce Ujihara, MA
Environmental Health Investigations Branch
CA Department of Health Services
Emeryville, CA**

**Ian Walker, BA
Impact Assessment, Inc.
Emeryville, CA**

**Gloria Cardona, MA
Impact Assessment, Inc.
Emeryville, CA**

**John Baas, Ph.D.
Impact Assessment, Inc.
Emeryville, CA**

Table of Contents

Title	Page
1.0 Introduction	3
1.1 Study Overview, Goals, and Objectives	3
1.2 Importance of accurate data collection	4
1.3 Adopting the right frame of mind	5
2.0 DATA COLLECTION INSTRUMENTS/OTHER ITEMS	7
3.0 DATA RECORDING	8
3.1 Shore Sites	8
3.2 Private Boat Sites	15
3.3 General Interviewing Guidelines	15
4.0 WEEKLY DATA TRANSFER AND DEBRIEFING	20
5.0 HEALTH AND SAFETY	20
6.0 TRAVEL AND ACCESS TO THE SITES	21
7.0 COMPENSATION	21
8.0 DETAILED CODING INSTRUCTIONS	22
9.0 FREQUENTLY ASKED QUESTIONS	30
FIGURES	
Diagram 1. San Francisco Bay Fishing Survey Shore Sites	9
Census Form	11
Summary of Shore and Boat Sites	12
Diagram 2. San Francisco Bay Fishing Survey Private Boat Sites	16

1. INTRODUCTION

Welcome to the San Francisco Bay Seafood Consumption Study! This manual contains some tips and pointers to help make your job easier, and to ensure that the data you will collect are of the highest quality possible. This manual contains materials for the following topics:

- an overview of the study and its goals and objectives
- the importance of accurate data collection
- your desired state of mind for conducting good interviews
- approach and greeting guidelines, methods of dealing with refusals
- data collection tools and props
- angler census methods, and detailed coding instructions for each question
- weekly debrief and administrative duties
- health and safety issues
- travel to and access to sites

1.1. Study Overview, Goals and Objectives

Levels of certain chemical contaminants in fish commonly caught from the San Francisco Bay have raised public concern regarding health risks related to consuming fish and shellfish from the Bay. In response to this concern, the San Francisco Estuary Institute has contracted with the Environmental Health Investigations Branch of the California Department of Health Services and Impact Assessment, Inc. to conduct a comprehensive seafood consumption study of people who catch and consume fish and shellfish from the Bay. Information gathered through the study will be used to develop recommendations and methods for improving outreach and education efforts to different segments of the fishing population and to refine assessments of health risks to people who consume fish caught from the San Francisco Bay.

The goals of the study are as follows:

- To gather quantitative data that can be used to characterize exposures of the general fishing population of San Francisco Bay to chemical contaminants from consumption of Bay-caught fish and shellfish.
- To identify highly exposed fish and shellfish consuming sub-populations
- To gather information needed to develop educational messages for targeted sub-populations

Specific objectives of the study include the following:

1. Develop estimates of exposure assessment parameters (fish and shellfish consumption frequency, duration of exposure, and portion size) for San Francisco fishers. Characterize distributions for these parameters.
2. Characterize pier, boat, and shoreline fishing populations by age, sex, income, ethnic composition, education, mode of fishing, and consumption rates.

3. Characterize consumption of fish tissues other than muscle, such as skin and organs, and preparation/cooking methods.
4. Determine which species are consumed most commonly. Assess the frequency of consumption of white croaker, striped bass, and leopard shark.
5. Characterize what people do with the fish and shellfish they catch or harvest (i.e., release it, eat it themselves, share it with family or friends).
6. Characterize seasonal variation in consumption and demographics.
7. Characterize the frequency of consumption of fish and shellfish obtained from stores and markets, and of fish and shellfish obtained from fishing outside the SF Bay, including freshwater and marine locations.
8. Assess awareness of current health advisories and changes in behavior as a result of awareness (e.g., decreased consumption).
9. Identify how people are informed about advisories and preferred mechanisms for getting information.
10. Identify fishers' reasons for catching and consuming fish and shellfish.
11. Determine whether fishers think the term "sportfish" refers to fish they catch from SF Bay.

1.2. Importance of accurate data collection

As stated above, a crucial task for this study is to estimate consumption of seafood for various subgroups that compose the study population, and the population as a whole. Having the ability to do this relies heavily on an assumption that people have accurately and truthfully reported their seafood consumption. Your role in this task is to facilitate accurate and complete responses, to the extent possible. There is a subtle difference between helping study participants enhance their recall, as opposed to the interviewers providing the answers for them. We DO NOT want the latter situation to develop. You will have to monitor each person who participates in the survey and determine if he or she understands each question asked. You may rephrase the question if a participant is having difficulty giving a response, but DO NOT try to answer the question for them. If it appears that the respondent can't answer the question, give her or him a few minutes to ponder it. In this situation, it is much better to record a 'don't know' response, instead of having the participants guess at their true response.

There will most likely be tremendous variation as to how study participants respond to the survey. Some study participants will have questions about the study, others will not. Participants will vary in how long it takes them to complete the survey, how much they mull over a particular question, how often they change their minds, how many questions they ask you the interviewer, and how often they will digress or otherwise get "off track." The bottom line is

some interviews will be easy to administer, others will not. As a result, some days the surveys you administer will be done easily and you will have a very high completion rate. Other days, things may go very slow. This is to be expected! Do not try to rush things. If you are uncertain of participants' response, don't be reluctant to ask them the same question twice. You will be asking people to recall behaviors that may have occurred a year ago. Do you remember what you had for dinner two weeks ago? Put yourself in the position of the study participant for a few minutes, and you will gain some appreciation of the mental effort they may need to go through in order to accurately answer the questions. Be patient when administering interviews, and remember it is much more important to conduct a few high quality interviews each day, instead of conducting many interviews in a sloppy, incomplete manner. Having high quality data is crucial to the success of this study.

1.3. Adopting the right frame of mind

Your frame of mind will have a great influence on the quality of the data collected. Ideally, you should be in a good mood when you arrive on-site to begin your assignment. If you are not, you should take a few minutes to clear your head of whatever negative things may be occupying your thoughts. This may sound silly, but having the right frame of mind really does influence your ability to conduct a good interview. You should be thinking about what a great study this is, a great day to be outdoors, and what a great opportunity this is for the study participants to provide you information about seafood consumption behaviors that could impact their health. You need to believe in the value of this study, and the potential public benefits associated with it. Finally, you need to believe that you are doing the potential study participants a favor. This, too, may sound funny, but I'm being serious. You are asking potential participants for their invaluable opinions, you are offering an incentive, and if they agree to give their name and address, you will be offering them a chance to win something big. This is a good deal for study participants!

When first approached, anglers may not want to talk to you. They may try to avoid eye contact with you or in some other nonverbal way, ignore you. Don't be deterred! The best way to deal with this is to start the conversation off with an 'icebreaker', such as "How is the fishing today?" It is important to be patient at this point, and simply initiate a conversation. If you get a cold response to the initial question, try asking another non-threatening type question. However, if you are still having problems establishing a connection at this point, you still need to begin the interview protocol.

Dealing with refusals

The respondent may initially refuse to participate but may change his or her mind, as you read through the introduction. Sometimes if you can overcome a potential participant's objections by answering Frequently Asked Questions (study and know your FAQ and their answers! see Section 9) you may get his or her cooperation. However, in the event that you don't, record the nature of the refusal and the other observational type variables (i.e., gender, ethnic group) and move on to the next participant. Don't be discouraged by refusals! It is just part of the screening process that some people will not participate regardless of what you tell them, and regardless of how good you are at establishing rapport. Another possibility is that participants will discontinue the interview before you have completed asking all the questions. This will occur with some participants. In this situation, do not try forcing the respondent to continue. But after the interview has ended, make a note that the respondent did not complete all the questions.

Dealing with belligerent anglers

Some people that you approach won't want to talk to you. That's okay. However, some people won't want to talk to you and they will want to make sure that you know this. They may become hostile. Please bear in mind this is an extremely small minority of the people you will encounter. Everyone has a different tolerance point regarding verbal abuse, and you do not need to tolerate abuse from a potential study participant. During my first job as a field interviewer, I discontinued an interview because I felt the respondent was paranoid and abusive. I interviewed about 300 people for that particular project, and the above mentioned person was the only belligerent one I encountered.

Language barriers

It is likely that most of your interviews will be conducted in English. But an important component of this study is to conduct surveys in: Spanish, Cantonese, Mandarin, and Vietnamese, as needed. Ideally, your interview team will have capability in two languages in order to minimize language barriers for most respondents you will encounter. If you are able to switch to the potential participant's language, this may help put him or her at ease, and increase interview participation rates. If you encounter someone who is speaking a foreign language that you don't speak but your partner does, you should make a note of this, and let your partner know. Some people will pretend they don't speak English in order to avoid participating in the study. If the potential participant does not appear hostile, try asking him or her 2-3 questions in English to see if you can "get the ball rolling."

Frequently Asked Questions

Some individuals will ask questions of you during the interview. Having an answer for them is important. The types of questions you may be asked probably will pertain to:

1) credibility and qualifications of the organization sponsoring this study, 2) who is paying for the study, 3) the ecological health of the SF Bay, and 4) the personal health risks to the study participant from eating SF Bay caught fish.

To enable you to deal with questions in a brief and consistent manner, we have prepared a list of the most Frequently Asked Questions and their answers. We will amend this list after pretesting the survey.

Dealing with Multiple Participants

Sometimes two respondents will try and give you answers to the same survey. To conduct statistical analyses of these survey data, every respondent must complete their own survey independent of the opinions and behaviors of other members of their fishing party. In other words, we want one completed interview for each respondent. If two people try answering the questionnaire at the same time, tactfully tell them that you can only interview one of them at a time. If they don't get the idea that we only want one person to complete an interview at a time, just continue and complete the interview with them and record separate answers for each individual in the margins. At the end of the sampling session, fill out two separate surveys, one for each person.

2. DATA COLLECTION INSTRUMENTS AND OTHER IMPORTANT ITEMS

There are a number of items you will need with you for each interviewing day. The basic items that you will have with you for each interview day include:

- Interviewer identification, including a name badge, and vest and hat with a study logo
- Logo for car
- Clipboard
- Sharpie pens
- Census forms
- Survey forms
- Binder with SF Bay map, fish and shellfish pictures, and staff phone list
- Health advisories (in six languages)
- Referral info sheet
- Answers to frequently asked questions
- Fish fillet model
- Site Map book
- Gifts (tape measures with logo)
- Cellular phone (One per interviewer team)
- Watch or other timepiece

For your personal comfort and convenience:

- Dress in layers and be prepared for windy, cool weather
- Sunscreen
- Food and beverages for yourself
- Backpack or other carryall to hold your items
- Sunglasses

Please be careful with the survey forms! They need to be maintained in good shape to allow for optimal scanning.

3. DATA RECORDING

All data recording should be done with your Sharpie pens. This will allow for optimal scanning of all data collection forms.

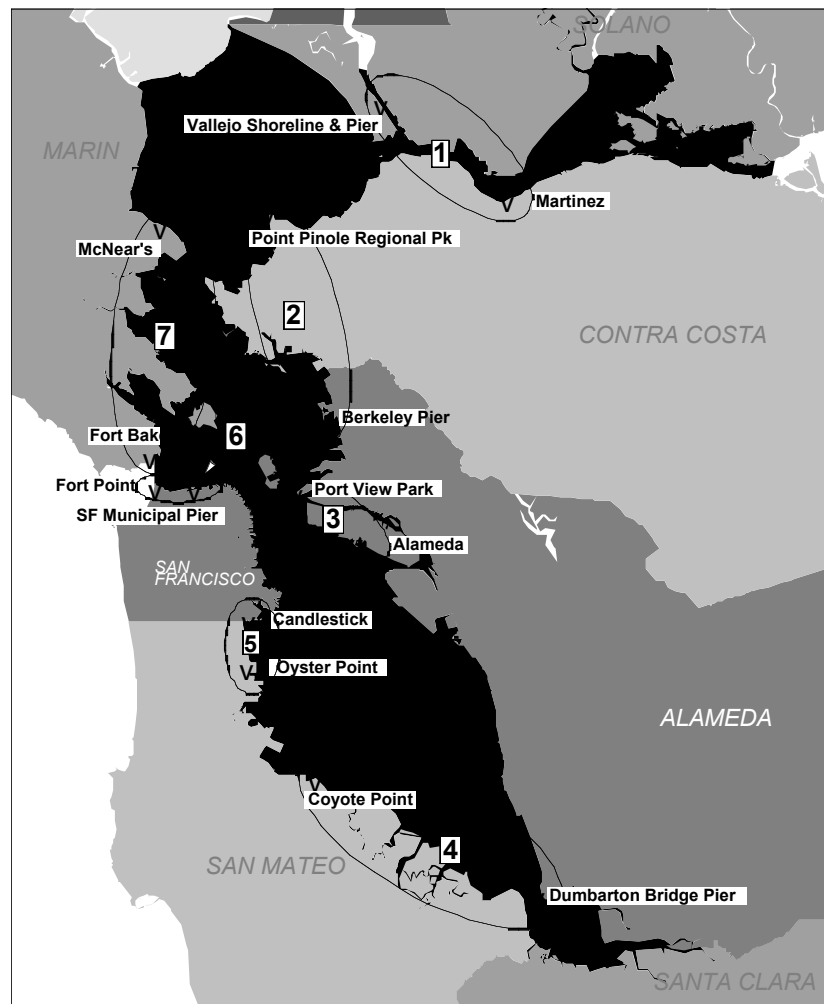
3.1 Shore Sites

3.1.1 Recording Site and Mode

The 14 shore sites are grouped into 7 pairs. Each site has been assigned a site code. The site codes, the site name and the county of the site are listed below. A map showing the sites can be found in Diagram 1. Detailed maps of the sites, including directions to the sites can be found in the Site Map Book.

Shore Sites

Site Code	Site Name	County
1A	Vallejo Shoreline	Solano
1B	Martinez Regional Shoreline Park	Contra Costa
2A	Point Pinole Regional Shoreline Park	Contra Costa
2B	Berkeley Pier	Alameda
3A	Port View Park	Alameda
3B	Alameda Rockwall	Alameda
4A	Dumbarton Bridge Pier	Alameda
4B	Coyote Point	San Mateo
5A	Oyster Point	San Mateo
5B	Candlestick Point State Recreation Area	San Francisco
6A	San Francisco Municipal Pier	San Francisco
6B	Fort Point	San Francisco
7A	Fort Baker Pier	Marin
7B	McNears County Park/China Camp	Marin



**San Francisco Bay Seafood Consumption Study
Shore Sites**

Map: DHS/EHIB

All the shore sites (except 4A. Dumbarton Bridge Pier) can be further divided into 2 or more areas. These areas are classified into fishing modes. The modes for the shore sites are:

Shore Site Modes

Mode Code	Description
1	“Free” piers. These are areas, primarily municipal piers, where a fishing license is NOT require to fish. Free piers include areas that are not technically piers: the Vallejo Waterfront, Alameda Rockwall, and the jetty at Coyote Point.
2	All other shore based areas that are not free piers. These areas are primarily rip-rap banks. These areas may include man-made structures such as the small pier adjacent to the Vallejo Launch Ramp and the rock jetty at Fort Baker.

3.1.2. Conducting the Census

Upon arrival at all shore sites, a census, or count of all anglers present, will need to be conducted. The purpose of the census is to estimate the number of persons fishing at a site at a single point in time. Because interviewing at a site may be conducted over one or more hours (depending on the number present), the number of anglers recorded from the census is likely to differ from the number of interviews completed at the site. Only one person should conduct the census. The other interviewer may begin interviewing.

As indicated on the census form (see next page) record the site code, mode code, date, start time and your initials. We recommend that you break the site up by mode and only census the part of the site you are planning to conduct interviews at next. In other words, census and interview at the pier first then census and interview at the shoreline/bank areas second (see example). The census is taken by walking the site and counting all persons who are fishing, i.e., have poles. It may be easiest to focus on one side of a pier first and then count the other side on the return trip. Only count those anglers who are “in front of you.” This means that if you have already initiated the count and a new anglers arrives but you have already passed the point where he or she is standing, do not include him or her in the census.

You will also need to determine the number of anglers who are adults (18 years of age or older) and the number of anglers who are 17 years and younger. At times, it may be difficult to determine who is actually fishing and who is not, and who is an adult. Some anglers may not be stationed near their poles. Use your best judgement to determine who is fishing and the anglers’ ages without actually stopping to talk with the anglers. Remember the census is only an estimate and should take no longer than the time to walk the site.

Also included on the Census Form is a Site Summary Chart. For each site you and your partner visit on an assigned shift, note the time you and your partner started your shift at the site, the time you left the site, and the total number of interviews attempted at the site. This number should equal the number of interview forms filled out by both you and your partner.

9/9/98

Census of Shore Sites

Date	Site Name	Site Code	Mode Code	No. of Persons <18 years	No. of Persons 18 years & older	Interviewer

Shore Site Codes

1A. Vallejo Shoeline
 1B. Martinez Shoreline Park
 2A. Point Pinole Shoreline Park
 2B. Berkeley Pier
 3A. Port View Park
 3B. Alameda Rockwall
 4A. Dumbarton Bridge Pier
 4B. Coyote Point

Boat Site Codes

5A. Oyster Point
 5B. Candlestick Pt. Rec Area
 6A. SF Municipal Pier
 6B. Fort Point
 7A. Fort Baker Pier
 7B. McNears Park/China Camp
 11. Vallejo Marina
 12. Richmond Marina
 13. San Leandro Marina
 14. Oyster Point Marina
 15. Loch Lomond Marina

Mode Codes for Shore Sites

1. “Free” piers. These areas, primarily municipal piers, where a fishing license is NOT required to fish. Free piers include areas that are not technically piers: the Vallejo Waterfront, Alameda Rockwall, and the jetty at Coyote Point. These areas are highlighted in red on the site maps.
2. All other shore based areas that are not free piers. These areas are primarily rip-rap banks. These areas may include man-made structures such as the small pier adjacent to the Vallejo Launch Ramp and the rock jetty at Fort Baker. These areas are highlighted in green on the site maps.

9/9/98

Summary of Shore and Boat Sites

Date	Site Code	Site Start Time	Site End Time	No. of Interview Attempts	Interviewer

Shore Site Codes

1A. Vallejo Shoeline
 1B. Martinez Shoreline Park
 2A. Point Pinole Shoreline Park
 2B. Berkeley Pier
 3A. Port View Park
 3B. Alameda Rockwall
 4A. Dumbarton Bridge Pier
 4B. Coyote Point

Boat Site Codes

5A. Oyster Point
 5B. Candlestick Pt. Rec Area
 6A. SF Municipal Pier
 6B. Fort Point
 7A. Fort Baker Pier
 7B. McNears Park/China Camp
 11. Vallejo Marina
 12. Richmond Marina
 13. San Leandro Marina
 14. Oyster Point Marina
 15. Loch Lomond Marina

3.1.3. What To Do If There are No Anglers

Sometimes, particularly on weekdays and during the winter months, there may not be any anglers present at a site. You must remain at the site for a minimum of one hour. You may conduct the census at this time and record a zero for the number of anglers. You will also have recorded the start time on the census form and will know when an hour is up. You do not need to revise the census if anglers appear later. If anglers appear, you must attempt to interview them. If you finish interviewing all anglers and one hour has not passed, please make sure you stay the entire 60 minutes. This is important so that we adhere to a consistent approach to counting and interviewing anglers. You should repeat this same procedure at the next site if there are not any anglers there when you arrive. If you have already conducted interviews that day, this would be a good time to review your surveys for completeness. This will save time at the end of your interview day.

3.1.4. How to Cover the Site

Our goal at shore sites is to interview all anglers present at a site. The order in which anglers are interviewed at a site should be similar to the way the census is conducted. We recommend that you break up the site by mode, and census and interview at one area before moving on the next area. This makes sense because some areas within a site are far apart. For example, you may want to start with the pier area first and then move to the shoreline/bank areas next. We also recommend that you interview anglers in a sequential fashion, for example, going up one side of a pier and doing the second side on the return trip.

Because you may be at a site for several hours, there may be many anglers coming and going during the time you are interviewing. We would like to interview new anglers who have arrived after you have begun interviews at an area if possible, but only if you can keep track of the new arrivals. This will require some judgement on your part. If you can't keep track of new anglers, it is best to stick to only those anglers "in front of you." We believe it will be possible to keep track of new arrivals in relatively contained areas (e.g., the pier at Portview Park) or when the number of anglers present is small. With long piers (such as Dumbarton and Berkeley Pier) it will be impossible to keep track of new anglers arriving.

We want to avoid the situation where certain types of anglers always get selected to be interviewed and certain other types of anglers always get overlooked. Keeping track of new arrivals is much harder to do than it sounds. At a site with 20, 30 or more anglers, the anglers really do begin to look alike. We have found that in these situations you may be able to remember not interviewing some anglers, but for many you will not be sure. Again, unless you can keep track of all new anglers arriving at a site you should stick to interviewing only the anglers "in front of you" and not attempt to interview new anglers that have arrived to a point past where you have already interviewed.

3.1.5. Before You Begin the Interview

Before beginning to interview, you can code some information in advance. These include:

- Date
- Site (use the appropriate site codes)
- Mode (use the appropriate mode codes)
- Time (use military time, such that 1300 refers to 1:00 p.m., etc.)
- Your initials
- Whether the angler is fishing only, or is fishing and crabbing

Before beginning an interview you need to make sure each potential study participant meets several screening criteria.

- The person must be fishing, i.e., has one or more poles (doing both crabbing and fishing is ok!)
- The person should not be a child (we want interviews from people 18 years or older) If you are uncertain if a person is at least 18 years old, ask them before beginning the interview
- The person should not have been interviewed previously for *this seafood consumption study*

3.1.6. Reviewing Your Work

After you have completed interviewing at the sites, it is important to review all of your surveys for completeness. This should not take long, but you must flip through all pages to ensure all areas have been filled out properly. For example, there may be areas where you could not fill in a box but wrote in the margins instead. Now is the time to fill in the box. If you made a mistake filling in a box and had to correct the answer, be sure to mark or record the correct answer and circle the correct answer so that we can manually correct it when the form is being scanned. Make notes in the margins if necessary. Also, there may be clarifications that need to be made in the “Other observations or notes” section. We prefer that the review be done before you leave the last site but if it is getting dark, you may review them at home. Be sure the review is done on the same day the interviews were conducted. You may also have time to review some of your surveys while waiting for the other interviewer to finish an interview.

3.1.7. If You Are Unable to Complete Your Assigned Sites

We would like to keep the maximum number of hours worked in a day to no more than 8 hours (excluding a minimum of 30 minutes for a lunch or dinner break if you work 6 or more hours in a day). In some cases, you may not be able to complete the sites assigned to you for the day. This may happen because there are many more anglers than anticipated. We will try to anticipate the number of anglers at a site and add a third interviewer if the expected number is high. However, in some cases a sampling day may take longer than anticipated, and you simply will not be able to finish before dark or before an 8 hour work day has passed. You should also allow time within your shift for reviewing your completed surveys. In these cases it is important to notify the field coordinator as soon as possible (she may be able to find additional interviewers who are available before the day is over). You must notify the field coordinator even if it is near the end of the day when you realize you will not finish your assigned sites. Try to find a clear

ending point, for example, finish the pier or shoreline/bank area if you can. When sites are incomplete they will be finished the next day or as soon as possible.

3.2 Private Boat Sites

3.2.1 Recording Site and Mode

The 5 private boat sites are marinas where boats on trailers are launched at a launch ramp. These marinas also have privately-owned boats that are kept berthed. The site codes, site names, and county are listed below. A map showing the sites can be found in Diagram 2. Detailed maps of the sites, including directions to the sites can be found in the Site Map Book.

Private Boat Sites

Site Code	Site Name	County
11	Vallejo Marina	Solano
12	Richmond Marina	Contra Costa
13	San Leandro Marina	Alameda
14	Oyster Point Marina	San Mateo
15	Loch Lomond Marina	Marin

Anglers interviewed at private boat sites can be classified into two fishing modes. These modes are:

Private Boat Site Modes

Mode Code	Description
3	Private boat anglers intercepted when using a boat launch facility
4	Private boat anglers from berthed boats

3.2.2 Shift Length

Unlike the shore sites, the number of hours you will attempt to conduct interviews at private boat sites has been preset. The private boat site shifts range from 2 to 5 hours. The length of the shift was set based on the amount of fishing activity at the site. The number of hours in a shift varies by site, season, and whether interviewing is on a weekend day or a weekday. If both interviewers cannot remain at the site for the entire shift, you must notify the field coordinator as soon possible.

3.2.3 Determining Whom to Interview

Our primary goal at the private boat sites is to interview all anglers who: (1) are beginning or ending a fishing trip and (2) are using a private boat launched at the launch ramp, and (3) plan to do (or have just completed) the majority of their fishing within San Francisco Bay. You should station yourself near the boat launching area and look for boats both coming in and going out.



**San Francisco Bay Seafood Consumption Study
Private Boat Sites**

Map: DHS/EHIB

The interview shifts for private boat sites are all in the afternoon so that you are more likely to encounter anglers returning from a fishing trip. Not all persons using the launch ramp are anglers and not all persons on a fishing trip are anglers. When you encounter a boat, you must first determine whether any of the persons on the boat plan to fish that day (for outgoing boats) or have just finished fishing (for incoming boats). We want to talk to people before or after their fishing trip; we **do not want** to interview persons who do fish at times but are **not** going out on or coming back from a fishing trip.

You must also determine where they plan to fish (for outgoing boats), or where they went fishing (for incoming boats). **We want to include only people who are fishing within San Francisco Bay.** Some boat anglers leave from one of the 5 sites in the Bay but then travel to the open ocean (past the Golden Gate Bridge), or up the Delta (past Antioch/Pittsburg) to fish. Persons fishing exclusively in areas outside the Bay are to be excluded from the survey. Some anglers may fish in both the Bay and areas outside the Bay. If they do, try to determine whether half or more of their fishing activity was in the San Francisco Bay (regardless of how many fish they caught). If half or more of their fishing activity was in the Bay, you must interview them. In some cases, in outgoing boats, the anglers may not have decided where they are going to fish; where they fish may depend on where the fish are biting that day. In these situations, try to get the anglers' best guess as to where they will be fishing that day. If half or more of their anticipated fishing activity is going to be in the Bay, include them.

Our secondary goal at the private boat sites is to interview anglers on berthed boats who are: (1) beginning or ending a fishing trip and (2) plan to do (or have just completed) the majority of their fishing within San Francisco Bay. Although you should focus on the boats using the launch ramp, we expect there will be times when there is little or no activity at the launch ramp. When this happens, one of the interviewer should walk over to the marina area where berthed boats are docked and look for anglers who may be coming in from or about to depart on a fishing trip. You may also want to check the area where boaters can fuel their boats. As with anglers at the launch area, you want to interview persons who plan to fish that day on a private boat or have just returned from a fishing trip on a private boat. **Do not include** persons who have just fished on a party boat.

Once you encounter a launched or berthed boat with anglers, both interviewers should attempt to interview all anglers on that boat before moving on to a new boat. Sometimes it will not be possible to interview all anglers on a boat because the anglers are anxious to begin their trip or go home. Do the best you can to finish interviewing anglers on that boat. The reason we want to focus on one boat at a time is that we want to avoid selecting only one or two persons who are most vocal from each boat. These selected people as a group may not be representative of all private boat anglers.

As with the interviews conducted at shore sites, you can code some information in advance of beginning your interview. These include:

- Date
- Site (use the appropriate site codes)
- Mode (use the appropriate mode codes)

- Time (use military time, such that 1300 refers to 1:00 pm, etc.)
- Your initials

Before beginning an interview, you need to make sure that each potential study participant meets several screening criteria:

- The person must be planning to fish that day or have just finished fishing
- The person must have been fishing on a private boat, not a party boat
- The person must have conducted (or plans to conduct) the majority of his/her fishing activity in SF Bay
- The person should not be a child (we want to interview only people 18 years or older). If you are uncertain if a person is at least 18 years old, ask them before beginning the interview
- The person should not have been interviewed previously for *this seafood consumption study*

3.2.4 Before you Begin the Interview

As with the interviews conducted at shore sites, you can code some information in advance of beginning your interview. These include:

- Date
- Site (use the appropriate site codes)
- Mode (use the appropriate mode codes)
- Time (use military time, such that 1300 refers to 1:00 p.m., etc.)
- Your initials

Before beginning an interview you need to make sure each potential study participant meets several screening criteria.

- The person must be planning to fish that day or have just finished fishing
- The person must have been fishing on a private boat, not a party boat
- The person should not be a child (we want interviews from people 18 years or older) If you are uncertain if a person is at least 18 years old, ask them before beginning the interview
- The person should not have been interviewed previously for *this seafood consumption study*

Additional suggestions for approaching boat anglers include:

1. Read the survey introduction.
2. Determine whether anyone has been fishing (incoming boats) or plans to fish (outgoing boats). You can ask, for example, “Have you been fishing today?” or “Do you plan to fish today?”
3. Determine whether they are planning to fish or whether they have completed their fishing. For an incoming boat, ask the person “Can you tell me where you fished today?” If they are on an outgoing boat, you can ask “Can you tell me where you plan to fish today?” If they

want to know why you are asking them, tell them they must have fished in SF Bay to be interviewed for this survey. Show them your map of the SF Bay if necessary.

4. If they fished exclusively in the Bay, include them. If they fished exclusively outside the Bay, thank them for their time and go on to the next boat.
5. If they fished in both the Bay and other areas, try to determine whether at least half of their fishing activity was in the Bay. You can ask them: “Did you spend at least half your time fishing in the Bay?” If so, include them. For outgoing boats, if they plan to fish in both the Bay and other areas, ask them: “Do you plan to spend at least half your time fishing in the Bay?” If so, include them.

3.2.5 Reviewing Your Work

As with the shore interviews, it is important to review all of your surveys for completeness. This review can be done while you are waiting for boat anglers to arrive. We prefer that the review be done before you leave the site. At the latest, the review should be done before the day is over.

3.3 General Interviewing Guidelines

Once you have completed the screening questions, and have started the interview, be focused and brief. External factors, such as bad weather, another member of the group wanting to leave, or the study participant suddenly getting a fish on the line can break the tempo of the interview. The longer the interview takes, the greater the likelihood that external factors will prevent you from completing it. This perhaps sounds contradictory to the “be patient” advice discussed earlier, but there is a fine line between being patient and taking too long to complete an interview. After completing a few interviews you’ll get the idea. One of the best things you can do to facilitate a good interview is to practice, and we will provide several practice opportunities during the training sessions. Feel free to practice on family and/or friends too!

Below are some guidelines you should be aware of when making the initial contact and conducting the interview.

- **Speak clearly.** You may also need to speak loudly due to weather conditions.
- **Don’t say more than necessary.** Keep the initial contact and the interview as uncomplicated as possible. The more you talk about matters you are not asking questions about, the more reasons some people can think of not to be interviewed.
- **Please read the questions clearly and as written in order for the survey tool to be consistently administered to all respondents.** If a respondent does not understand the question, you may repeat it, but do not alter the wording. I know this can become tedious, but you must adhere to a consistent way of reading the questions. During the practice and field test sessions, if questions appear awkwardly worded, please make note of what suggested changes are needed.

- **You should be familiar enough with the questions that you can read them naturally and know what is coming next.** This is why we have scheduled several practice sessions. By the time actual data collection begins, you should sound coherent and relaxed.
- **Throughout the interview form, instructions to interviews are written in capital letters.** Do not read these aloud. Also, become familiar with the different skip patterns in the survey.
- **Be aware of the possible responses for each question, and how to code them.** The attached coding instructions (Section 8) are intended as reference material, but you should read through them at least once before you begin practicing administering the interview.

4. WEEKLY DATA TRANSFER AND DEBRIEFING

Every week that you conduct interviewing you will be required to:

- Turn in completed survey forms to the research coordinator
- Fill out a timesheet
- Fill out a mileage reimbursement form
- Pick up additional survey forms as needed
- Briefly meet with the Field Coordinator to discuss the week's events

If your week of data collection has been uneventful this will be a very short meeting, probably 10 or 15 minutes. If there were problems such as high refusal rates, low numbers of anglers to interview, or health and safety issues, our meetings will take more time. Ideally, the Field Coordinator will review your completed interview forms within 1-2 days after receiving them, so any problems with data quality can be resolved in a timely manner. Your availability for work the upcoming week will also be reviewed.

5. HEALTH AND SAFETY

Your health and safety are more important than the data we are collecting. Please be aware of several potential safety hazards that may be present en route to or at some of the sites that you are visiting.

Bad weather can make docks, piers, rocks, and boat ramps slippery. It can also make you wet, cold, and miserable. Please wear shoes with good traction, and always bring warm clothing with you. Even during the Summer months standing immobile next to the Bay for several hours can make you feel pretty uncomfortable.

Do NOT board private boats. When you are trying to interview people in this fishing mode, do not board any private boats, even if someone invites you on board. For those of you who will be interviewing people on party boats, please do not board or disembark from the boat until the captain or the deck hand has given you an okay.

Beware of bad traffic situations. You all know how bad the Bay Area traffic can be. Some days you may encounter serious delays in getting to your assignment. Do not start driving carelessly or recklessly if you find yourself late for work.

Avoid heavy lifting. There isn't anything you need to lift for this job that weighs more than 10-15 pounds. Please do not try moving heavy furniture or boxes during your visits to the office. We have other staff that do that type of work; it is not worth injuring your back doing a job you are NOT paid to do. For those of you who are interviewing on party boats, do not volunteer your services for heavy lifting.

Beware of people conducting illegal activities. Some of the people that use these sites may be doing illegal activities. We are trying to avoid times when illegal activities occur by only conducting interviews during daylight hours. Please do not remain at these sites after dark. If you observe illegal activities taking place, do not get involved in these situations! Also, beware of people that may threaten your own safety. If you have any doubts about whether a site is unsafe, leave immediately.

6. TRAVEL AND ACCESS TO THE SITES

There are 14 shore sites, 5 sites for sampling individuals on private boats, and 4 sites where some of you will be boarding and riding party boats. Please plan accordingly to try and be on time to your interviewing assignments. Some of the sites may require more than 45 minutes travel one way to reach them, assuming no traffic problems. As part of our training session, we will be visiting each site so you can familiarize yourself with them. Also provided in the Site Map Book are maps and directions to help you locate the sites, and a local point of contact.

Two of the sites, Pt. Pinole, and Dumbarton Bridge require traveling at least 1.5 miles from the parking lots to the piers. At Pt. Pinole, a shuttle bus departs every 30 minutes except on Tuesdays and Wednesdays. At Dumbarton Bridge, vehicular access is restricted for five months, from April through August. Access to this pier is 3 miles from the parking lot on a flat road. If you must interview at Dumbarton during this limited access time, you must go to the ranger station and obtain a key to unlock the gate to allow you to drive to the pier. Many of the sites require public users to pay an entrance fee. **YOU SHOULD NOT HAVE TO PAY A FEE** for access to any of these sites. We have made arrangements to have entrance fees waived for all of our interviewers. During your first visit to a site requiring a fee, please take a few minutes to introduce yourself to rangers/managers that are present and show your identification. However, if you are required to pay a fee, you will be reimbursed by claiming it on your travel reimbursement.

7. COMPENSATION

In order to be compensated for your time and reimbursed for project related expenses, there are two forms you must complete. Every week that you work you need to turn in a timesheet and a reimbursable expense record. Impact Assessment, Inc. issues paychecks twice a month. At a minimum you will be paid 4 hours per shift, even if there are no anglers to interview. The other form you must complete pertains to reimbursable expenses. For the most part these expenses will be limited to tolls, parking, and private vehicle mileage. For mileage you will be reimbursed

at the State of California rate of \$0.24/mile for travel between sites and for travel from your home to the site and from the site back to your home. For expenses less than \$6.00 each, you do NOT need to turn in receipts, but for expenses more than this amount, receipts are required. If you are using your own cellular phone to make emergency telephone calls, you will be reimbursed for the number of minutes the call(s) take. A copy of your phone bill itemizing the calls made must be submitted with your reimbursement claim. In general, guidelines for reimbursement for travel related expenses follow those established for state employees.

You are allowed to take one 15 minute break for every 4 hours worked. You will be paid for the break. If you work at least 6 hours, you must take a break of at least 30 minutes (up to one hour) for lunch or dinner. You will not be paid for this lunch/dinner break. We want to limit your workday to no more than 8 hours; for most days you will only work 4 to 6 hours. If it looks like you will not finish your assigned sites within 8 hours, you must notify the Field Coordinator as soon as possible.

8. DETAILED CODING INSTRUCTIONS

- **Use Sharpie pens**
- **Avoid making stray marks on the survey forms, especially in marked boxes.**
- **If you must make notes as the Respondent is trying to answer a question, write in the margins or where there are no boxes.**
- **Write clearly and mark boxes within the boundaries of the box.**
- **When you print letters and numbers, use block letters. Print only one character per box, keeping the character's lines completely inside the box. Do not cross zeros, sevens, or the letter "Z".**
- **If you must correct an answer, circle the corrected answer.**
- **Fill in text in the "other" boxes; please write legibly and neatly.**
- **Mark all appropriate boxes!**
- **In asking the questions, you will read the response categories, unless otherwise noted for specific questions. For all questions, DO NOT READ DK (don't know) or Refuse. The latter two responses are available to be recorded if needed, but do not need to be read.**
- **For people who initially respond DK, try some gentle probing first to see if their memory can be "enhanced" (a true art!)**
- **If there are confusing marks or answers on the survey form, or you used a "translated" form to ask the questions, transcribe the responses to another form and make note of doing so on the original form. Clip both forms together and turn both forms in, indicating to the Field Coordinator that both forms reflect the responses from one Respondent.**

Introducing yourself and the survey: Before reciting the formal introduction, ask a casual question, such as "How's the fishing?", or "What are you catching?", or "Been out here awhile?", etc. Take a minute to engage the person in conversation if they will talk to you, then start the formal introduction. Try to adopt a conversational tone and approach. The end of the interview must include the question asking for permission to interview.

Q1a. Permission to conduct interview: You must obtain the person's consent before beginning the interview. Check one of the boxes 'yes', or 'no'.

Q1b, Q1c, Q1d, and Q1e. Fill out only for individuals refusing to participate. Do not fill these out if Respondent agrees to participate (yes to Q1a). If you have recorded a 'no' to **Q1a**, then you must record only one response for **Q1b** ("reason for refusal"). It may take you a few minutes to gauge the reason for refusal; the person may tell you why he or she will not participate in the study, or you may have to use your judgment and record a reason. **DON'T PROBE THE PERSON FOR REASONS! IF THE POTENTIAL RESPONDENT (R) DOES NOT APPEAR HOSTILE THANK HIM OR HER FOR THEIR TIME, AND THEN MOVE ON TO THE NEXT POTENTIAL RESPONDENT.**

Q1c, Q1e. Check observed ethnic group and gender. (your best guess).

Q1d. Language (if Non-English Speaking): You have several response categories here. Again, choose and mark only one choice. **DO NOT GUESS!** If the person is speaking a language that you do not understand, simply record 'undetermined.'

Q2. Has the person already been interviewed for our seafood consumption study? A response to this question may be given during a refusal following the interview introduction. A person may tell you that she or he has already been interviewed. You should be aware of the other fishery/creel survey type studies that are occurring in the SF Bay area. If a person tells you that she or he has been previously interviewed, try to determine whether it was for this study or some other one. For instance, ask if they have talked to someone wearing the same hat and vest as you have on, with the SF Bay Seafood Consumption Study logo. If the person was interviewed for our study, then check the 'yes' box, and ask if she or he remembers the month and year they were interviewed (Q2b). Mark the noted month and year in the designated boxes. If the person does not remember when, mark the DK box next to the date box. {Note there are two DK boxes, mark the appropriate one!} Thank and end the interview with all individuals who answered YES to Q2, indicating that you can only interview individuals once for this study.

When you have received permission to conduct the survey, and have determined the person has NOT been previously interviewed you are ready to move on to the next portion of the survey instrument.

Show the Respondent (**R**) the map of San Francisco Bay, and identify the boundaries of the area with which we are concerned. You may want to point out a few landmarks (e.g., Antioch, Dumbarton Bridge, etc.) You can also say that you may be referring to the San Francisco Bay as "the Bay". You will need to clarify what you mean by fish and shellfish.

Q3a. "Is this the first time you have ever fished in the San Francisco Bay?" There are four response categories, check one only. If R says No, ask **Q3b**. when was the last time, noting month (if known) and year. If R indicates not remembering or not knowing the last time he or she fished in the Bay, mark the DK box next to the date field and continue to Q4.

For "first time anglers", or those responding yes, skip to Q5.

Q4. Not including today, in the last 4 weeks, what is the total number of times you have gone fishing?

People will probably need a little time to think about their answer. They may give you a total number or they might say something like 3 to 4 times each week. You would then have to say to them: “so like 12 to 16 times total for the last four weeks? Is it closer to 12 or 16 or some number inbetween?” Try to get a specific number and record that number in the noted box.

Q5. “What do you usually do (plan to do for FIRST TIME FISHERS) with the fish or shellfish you catch from the SF Bay?” THIS IS A MULTIPLE RESPONSE QUESTION, SO YOU MAY CHECK AS MANY CATEGORIES THAT APPLY.

TRANSITION: YOU WILL NOW BE ASKING A DIFFERENT SET OF QUESTIONS. TO GET THE RESPONDENT IN THE PROPER FRAME OF MIND, YOU NEED TO READ THE TRANSITION PARAGRAPH TO HIM/HER. TRY TO MAKE SURE HE/SHE UNDERSTANDS WHAT YOU ARE SAYING!

Q6a. “Do you eat fish that you or someone you know catches from the SF Bay?” Read off Yes; Used to, but don’t anymore; or No. If R answered Used to, ask Q6b. and mark month/yr in the noted box. If R indicates he/she doesn’t know when they stopped eating fish from the Bay, mark the DK box next to the date box. If R indicates a ‘no’, then skip to Q10. If R indicates DK to the overall question (not the date as to when he/she stopped eating fish from the Bay), or doesn’t wish to answer the question, mark the appropriate box.

Q7. “How many years have you been eating fish that you or someone you know caught from the Bay?” You have eight possible response categories, record only one response. **You do not need to read** the categories to R, but make sure his/her answer fits one of the eight categories. NOTE: This may be the first question where you encounter a ‘don’t know’ response, since some people may not be able to accurately recall how long they have been fishing. If someone is vague in the time frame they give you, or gives a couple of conflicting answers, record a ‘don’t know’ response.

Q8a. “In the last four weeks, did you eat fish that you caught, or someone you know caught from the Bay?” Make sure R understands you are asking for about the last 4 weeks. For this question there are four response categories, record only one response.

Q8b. In the last four weeks, how many times did you eat fish that you caught or someone you know caught from the Bay? Again, make sure the time frame is understood. Let the Respondent think a bit. Answer can be stated in times per day, times per week, or total times in last 4 weeks. **Record only one response.**

You can prompt: “how many times per day or times per week did you eat fish from the Bay in the last 4 weeks?” or “how many times all together?” The Respondent may give you a total number of times, or give you different frequencies such as “ate it every day a week ago, but not so much last week.” You would have to probe more specifically, such as “So you only ate fish from the Bay every day for a week over the last 4 weeks? You didn’t eat fish the first two

weeks? So you ate fish seven times over the last 4 weeks?, etc. **Make notes and tally later if needed.** Record the number of times corresponding to the specified time period. If Respondent gives a range, such as 2-3 times/week, ask “was it more likely 2 times or 3 times?”

Q9. “In the last 12 months (specify time period, using the current date and then asking for the previous 12 months) how many times overall, did you eat fish that you caught or someone caught from the SF Bay. Make sure the R knows you are talking about the last 12 months! Answer can be stated in times per day, times per week, times per month, or total times in last 12 months. You can prompt: “About how many times per day or times per week?” (especially for frequent consumers). You may have to prompt about seasons or months they fish and eat more often, etc. **You may have to make notes and count up the total times separately.**

Someone who doesn’t eat it a lot may be able to tell you easily the total number of times in the last 12 months.

Record only one response. Record the number of times corresponding to the specified time period.

Q10a. This is a model of 8 ounces (half pound) of raw fish fillet. When you eat fish from anywhere (the Bay, other places, stores, restaurant), is the amount that you eat about this size, more or less? ” SHOW PARTICIPANT THE FISH MODEL BUT DO NOT LET THEM HOLD IT; ALLOW THEM TO LOOK AT IT FOR SEVERAL MINUTES. NOTE: YOU SHOULD KEEP THE 3D MODEL IN YOUR VEST UNTIL YOU REACH THIS QUESTION. ALSO, THIS QUESTION REFERS TO FISH CAUGHT/EATEN FROM ANYWHERE, INCLUDING RESTAURANTS, STORES, AND NOT RESTRICTED TO THE SF BAY. Make sure the participant is aware of this distinction, because in the previous questions we have been talking about Bay caught fish.

If the person responds “about this size”, then skip to **Q11**.

If the person indicates the amount of fish eaten is more than that shown in the 3D model, then ask **Q10b**.

If the person indicates the amount of fish eaten is less than that shown in the 3D model, then skip to question **Q10c**.

Be aware that cooking generally reduces the size by about 25% (one fourth); in other words, 8 ounces of raw fish will generally result in 6 ounces cooked fish.

It is likely that some respondents will not relate to the model, and will not be able to confidently determine their consumption. **DON’T TRY TO FORCE AN ANSWER** but probe gently. For instance, repeat that this is a model of 8 oz. (half a pound). Do you think you eat half more, a fourth more, etc. Try showing what half or one fourth would like, using either paper or your hands to cover up part of the fillet model. If the respondent really seems unsure, check the ‘don’t know’ category.

TRANSITION TO THE NEXT SECTION BY READING THE STATEMENT “Now I’m going to show you pictures of 3 specific fish that can be caught from the SF Bay and ask you whether you eat them or not. YOU WILL NEED TO FOCUS THE RESPONDENT’S ATTENTION TO

THE THREE SPECIES MENTIONED IN Q11-14. TO DO THIS, READ THE ENTIRE PARAGRAPH BEFORE BEGINNING QUESTIONS 11-14.

Q11a. “Do you eat this fish that you or someone you know catches from San Francisco Bay?” (POINT TO Kingfisher/Croaker picture)

Starting with Kingfish, you will record a ‘yes’, ‘no’, or ‘don’t know’. Ask them what he/she calls it and write the response in the noted space. For those responding affirmatively you will continue asking questions Q11b-Q11d3. For those responding with a ‘no’ or ‘don’t know’, you will then ask the same question for the next species (Leopard shark). You will repeat this procedure for all three fish species.

Q11b. “Have you eaten any _____ from the Bay in the last 4 weeks?” (use the name given by the R) For each species the R reports eating, you will ask if he/she has eaten any in the last 4 weeks. It is important to emphasize the last four weeks AND the fish may be freshly caught or frozen, dried, canned or smoked after being caught. If the respondent answers ‘yes’, you will need to record the number of times that he or she has eaten the specific fish. If the R can’t recall the no. of times eaten in the last 4 weeks, mark the DK box next to the No. of times box.

Q11c1 – skin and 11c2- guts. When you eat kingfish (or whatever the respondent indicates calling the pictured fish), how often do you eat the skin of the fish?, (how often do you eat the guts or organs of the kingfish?) Read: “more than half the time, less than half the time or never?” Mark the appropriate box.

Q11d1, d2, d3. When you eat kingfish, how often do you eat the cooking juices or drippings (make soup with it?; eat it raw?) Read: “more than half the time, less than half the time, or never?” Mark the appropriate box.

Q12a to Q12d3 – ask similar questions for **leopard shark**.

Q13a to Q13d3 – ask similar questions for **striped bass**.

Q14a. Now I have some picture of other fish that can be caught from SF Bay. Looking at these pictures, please show me which fish you have eaten in the last 4 weeks. Again these are the fish you ate in the last 4 weeks which you caught or someone you know caught from SF Bay. The fish could have been fresh, frozen, dried, canned, or smoked. SHOW PICTURES AND HAVE RESPONDENTS POINT OR TELL YOU WHICH ONES THEY HAVE EATEN IN THE LAST 4 WEEKS. Some probing may be necessary and you may have to show the pictures more than once. Mark the Yes box only for those the R indicates.

Q14b. As Respondent identifies fish he/she has eaten in the last 4 weeks, ask “How many times have you eaten this fish in the last 4 weeks?”

Q14c. “What do you call this?”. (ASK RESPONDENT AS HE OR SHE POINTS TO THE PICTURES, AND THEN RECORD THE RESPONSE IN COLUMN 14C.) NOTE: For those interviews conducted in Spanish, please record the exact word given by the Respondent; ask them to spell it for you if you are unsure. For interviews conducted in Chinese, Mandarin, or Vietnamese, write the characters or the equivalent.

Q14d. Are there any other fish from the Bay that you eat most often for which I don’t have pictures? If R names one of the listed fish, check box and indicate number of times eaten. If R names a fish that is not listed, specify the type of fish and the number of times eaten in the last 4 weeks in the blank box(es).

Q15. “Who in your household eats the fish that you catch from the SF Bay?”

Please read the 6 main response categories and check all that apply.

Q16. “How many total people, including yourself, are in your household?” You have three choices for this question, record only one response: the number of total people, a don’t know, or a refuse to answer response.

Q17. “Who usually cooks or prepares the fish you catch and eat from the Bay?” This is a multiple response type question, so you may check more than one response. Please record the noted family member or other individuals in the appropriate boxes.

TRANSITION: THE NEXT SET OF QUESTIONS DEALS WITH FISH FROM PLACES OTHER THAN THE SF BAY. YOU WILL NEED TO READ THIS PARAGRAPH TO RESPONDENTS BEFORE ASKING THE NEXT FEW QUESTIONS.

Q18a. “In the last four weeks, did you eat fish that you or someone you know caught from places other than the SF Bay (like a lake or river) in the last four weeks?” (SHOW MAP AS NEEDED TO REMIND RESPONDENT ABOUT THE AREA COVERED BY THE SF BAY)

Mark the given response in the appropriate box. If no, DK, or refuse skip to Q21a. If yes, continue to Q19.

Q19. “From what places, other than the San Francisco Bay, did you or someone you know catch the fish that you ate in the last four weeks?” This is a multiple response type question, so you may check all responses that apply. Fill in text box if Other is marked.

Q20. “In the last four weeks, how many times did you eat fish that you or someone you know caught from places other than SF Bay?” Answer can be stated in times per day, times per week or total times in last 4 weeks. **Record only one response.** If other is marked, please record in the indicated box what the Respondent indicates.

Q21. In the last 4 weeks, have you eaten any fish that you got from a store or restaurant, including any fish fillet burgers or canned tuna?” Check only one response. If the respondent gives a yes response go to Q22. If the respondent gives a ‘no’, ‘don’t know’, or ‘refuse’ response, go to Q23.

Q22. “How many times in the last four weeks did you eat fish that comes from a store or a restaurant, including any fish fillet burgers or canned tuna?” Answer can be stated in times per day, times per week or total times in last 4 weeks. **Record only one response.**

TRANSITION: READ OR SAY: “Now I am going to ask you a few questions about information you may have heard about eating fish from the Bay.”

Q23. “Have you heard or seen any information or health advisories about eating fish from the Bay?” Record only one response. If the respondent answers ‘yes’, go to **Q24**. For all other responses, go to **Q25**.

Q24. “What did the information say about fish from the Bay?” This is an open-ended question. Listen to what the Respondent says and then repeat back in a summary form to make sure you have heard him/her correctly and then record the noted response.

Q24a. Has the information you have heard or seen about eating fish from the Bay caused you to change your fish eating habits? Record only one response.

Q24b. If yes, how have you changed your fish eating habits? If no, why not? Listen to what the Respondent says and then repeat back in a summary form to make sure you have heard him/her correctly and then record the noted response.

Q25. “What is the best way for you to get information about catching and eating fish from the Bay?” This is a multiple response type question; check all that apply. If the other box is checked, record the Respondent’s answer in the text box.

TRANSITION: (The last series of questions deals with personal information, and respondents may be uncomfortable answering these questions.) Read the transition paragraph: **These next few questions will help us describe people fishing or collecting shellfish from the SF Bay. We find this information helpful when we are developing information and materials for people who fish or collect fish. Please remember the information is kept confidential and you don’t have to answer if you don’t want to.**

Q26. “How would you describe your racial or ethnic background?” You do not need to read the response categories. Code the response as the Respondent answers, checking only one box. Note that several of the the response categories require you to record a specific description in the text box. Pacific Islander groups include Samoan, Tongan, Guamanians. Other Asian can include Koreans, Japanese, Cambodians, Thailanders, Laotians, etc. If Respondent indicates a mixture of ethnic backgrounds or some group not listed, check Other and note the response in the text box.

Q27. “What category best describes your age?” Read “under 18, 18-45, 45-65, over 65?” You have six response categories, check only one.

Q28. “What is the highest grade in school you have completed?” Read “less than 12th grade,

etc.” (not DK or Refuse!) You have six response categories, check only one.

Q29a. “Is your total yearly household income greater than \$20,000?” You have four response categories, check only one. If the respondent answers ‘yes’, then ask Q-29b.

Q29b. “Greater than \$45,000?” you have four response categories, check only one.

Q30. Gender DON’T ASK THIS- JUST RECORD THE APPROPRIATE CATEGORY based on your observation.

TRANSITION: You are getting ready to end the interview. Offer R the tape measure key chain as our gift for participating. Read the noted paragraph and ask the following questions.

Q31. “Would you like to have your name entered into the drawing?” Mark the noted box. If yes, fill out name, address, etc. in designated boxes.

Q32. “Would you like us to send you information about the results of our survey when they become available?” Mark the noted box. If yes, fill out name, address, etc. in designated boxes.

Q33. “May my supervisor contact you?” Mark the noted box. If yes, fill out name, address, etc. in designated boxes.

Read paragraph regarding the advisory and offer copy of advisory in the appropriate language. You can point out more specific recommendations as given in the handout. If the R wants more information, refer them the agencies listed on the sheet.

Be sure to thank the Respondent for participating!

Enter time the interview was completed in the noted boxes. Use military time.

The **final page** of the interview form is for you to note your impressions of the quality of the interview, additional observations you may want to note, and language in which the interview was conducted. Also if the Respondent refused to answer Q26 (ethnicity), note your observation of the Respondent’s ethnicity.

9.0 FREQUENTLY ASKED QUESTIONS

1. Who is paying for this study?

The San Francisco Estuary Institute (SFEI), located in Richmond, is paying for this study. SFEI is a nonprofit research organization that conducts studies to assess and monitor the ecological health of the San Francisco Bay.

2. Who do you work for?

I work for a private company, Impact Assessment Inc. Impact Assessment Inc. is under contract with SFEI and is working in close collaboration with the California Department of Health Services to carry out this study.

3. How much are you paid to do this job?

You can answer this question honestly if you wish although you can also politely tell the respondent that this isn't something you want to share with him or her.

4. How much did SFEI get to do this study?

I am not sure. My supervisor, Gloria Cardona, can provide you with an answer to this question. Her number is (510) 450-3818 (or give them a copy of the referral sheet).

5. Who is in charge of this study?

Gloria Cardona is my immediate supervisor and there are two other people at the Department of Health Services who work with Gloria, Diana Lee and Alyce Ujihara. The phone number for Gloria, Diana, and Alyce is (510) 450-3818 (of give them a copy of the referral sheet).

6. Can I get a copy of the study results?

Yes. We will send you a copy of the final study results when we have completed this project in June 2000. Record "yes" on question 32 in the survey. If he or she is not a survey participant, take down his or her name and address and give to Gloria.

7. Is San Francisco Bay badly polluted?

Nearly all water bodies near urbanized areas show some degree of contamination in the sediments, water, and/or biota. Chemical contaminants measured by SFEI's Regional Monitoring Program show that most contaminants are considerably higher inside the Bay than outside the Golden Gate. However, overtime, the level of contamination is slowly decreasing.

8. Which SF Bay fish are safe to eat?

Most species of Bay fish are included in the health advisory for San Francisco Bay. There are some species that are not included in the health advisory. These are salmon, anchovies, herring and smelt. Although these species have not been tested, they are expected to have lower contamination levels because they spend most of their lives in the sea or because their diets differ from the species included in the health advisory.

9. What about Striped Bass and Sturgeon Caught in the Delta?

Striped bass and sturgeon live in both the Bay and Delta thus the Health Advisory applies to these species in both areas.

10. I have never become sick eating fish from the Bay, why should I worry about the amount of fish I consume? What will happen if I eat contaminated fish?

At the levels found in Bay fish, the chemicals should not make you sick from eating just occasional meals or from eating a large amount of fish at one time. Even regularly eating large amounts of contaminated fish is not certain to cause health effects. But the link between eating contaminated fish and potential health effects is not well understood. Some health effects like cancer may develop only after many years of regularly eating large amounts of fish. To be safe, we recommend that you follow the limits in the health advisory. These limits should protect you from any adverse health effects.

11. Should my children and breastfeeding wife eat Bay fish?

Children under 6 and women who are pregnant, may be come pregnant, or who are breastfeeding should not eat more than one meal per month of most Bay fish. In addition, they should not eat any meals of large shark (greater than 24 inches) or large striped bass (over 27 inches). A fish meal for a 120 pound female is about 6 ounces. For a 40 pound child a fish meal is about 2 ounces.

12. Don't contaminated fish look sick? Should I just avoid fish that look sick?

Fish that contain chemicals do not look sick and they do not look any different from fish that do not contain chemicals. You should follow the health advisory for all fish caught in SF Bay.

13. Are there better places to fish?

Chemicals at levels of health concern were found in fish throughout the Bay so the health advisory applies to all areas of the San Francisco Bay west of the Pittsburg/Antioch area. For striped bass and sturgeon, the health advisory should be followed in the Delta as well. There are not any health advisories for fish in the ocean (outside the Golden Gate Bridge) except for Southern California. There are also many freshwater rivers, lakes and reservoirs in the area. Be sure to consult the Department of Fish and Game Sport Fishing Regulations for a listing of other health advisories in freshwater areas.

14. Are store bought fish any better?

The fish you buy in a store or restaurant may also contain chemicals but in most cases they are probably safe. The federal Food and Drug Administration (FDA) monitors levels of chemicals in fish from commercial sources and has set limits on the amount of chemicals these fish can contain. However, because of the many different sources and species, not all fish and shellfish are tested. The FDA has issued advice for consumers of shark and swordfish because these species have higher levels of mercury than other kinds of fish. FDA recommends that pregnant women and women who may become pregnant limit their consumption of shark and swordfish to no more than once a month. For all other persons, shark and swordfish consumption should be limited to no more than once per week. A typical adult serving is about 7 ounces.

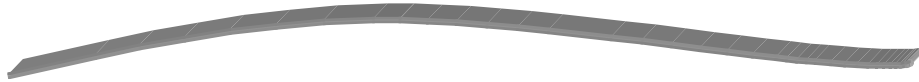
15. Would you eat fish from the Bay?

We can't answer this question for you. But, you should expect to be asked this question in the field and have thought of a response before you begin interviewing in the field. In thinking about a response, it is helpful to be familiar with the materials on the health advisory.

Appendix H

Field Activities Summary

San Francisco Bay Seafood Consumption Study



FISCAL YEAR 1998-1999 FIELD SUMMARY

Site and Site #		Shift Length (hr:min)	Site Actual Shift Length	Site Pair Actual Shift Length*	Census	Site Total Attempts	Site Pair Total Attempts
Vallejo	1A		20:25		97	118	
Martinez	1B	54:30	13:57	40:22	69	61	179
Pt. Pinole	2A		19:25		107	74	
Berkeley	2B	70:30	28:40	56:00	347	216	290
Portview	3A		14:33		43	39	
Alameda	3B	58:00	15:05	34:08	29	41	80
Dumbarton	4A		20:30		90	83	
Coyote Point	4B	56:00	15:15	42:00	38	42	125
Oyster Pt.	5A		16:17		59	79	
Candlestick	5B	57:30	14:45	36:10	42	50	129
Muni Pier	6A		16:10		111	99	
Ft. Point	6B	60:00	15:00	36:10	74	79	178
Ft. Baker	7A		19:15		109	96	
McNears	7B	60:00	22:00	43:45	144	111	207
TOTAL		416:30	251:17	288:35	1,359	1,188	1,188

Private Boats

Vallejo	11	0:00	19:35		0	150	
Vallejo	11	1:30	2:00		0	28	
Richmond	12	10:00	22:35		0	143	
Richmond	12	2:00	6:00		0	5	
San Leandro	13	0:00	0:00		0	85	
Oyster Point	14	23:00	21:40		0	65	
Loch Lomond	15	10:00	10:00		0	81	
TOTAL		214:30	201:50		0	557	

Party Boats

San Pablo	21	0:00	9:00		0	13	
Emeryville	22	0:00	10:15		0	24	
Emeryville	22	0:00	12:30		0	26	
Emeryville	22	0:00	8:25		0	10	
Fshrmn's Whrf	23	11:00	11:30		20	25	
Fshrmn's Whrf	23	0:00	8:00		23	25	
TOTAL		11:00	59:40		43	123	

GRAND TOTAL		642:00	512:47	288:35	1,402	1,868	1,188
--------------------	--	---------------	---------------	---------------	--------------	--------------	--------------

*Actual shift length includes travel time between site pairs

Field Summary July 1998

SITE	Date	Day of Week	Site No.	Start Time	End Time	Shift Length	Actual Start	Actual End	Actual Shift Length*	Census >18 yrs. Old	Census <18 yrs. Old	Attempts	Total Attempts per site pair	Interviewers	Actual Interviewers	On-site
Candlestick Oyster Pt.	6/13/99 ¹	Sun	5B	7:00 AM	1:00 PM	6:00	9:00 AM	11:15 AM		8	2	9		Javier, Yoko	Javier	
	7/11/99 ²	Sun	5A				11:35 AM	12:45 PM	3:45:00			8	17	Javier, Yoko	Yoko, Sheila	
Coyote Point	6/30/99	Wed	4B	2:00 PM	7:00 PM	5:00	2:15 PM	3:15 PM		1	12	3		Sheila	Sheila	
Dumbarton			4A				3:35 PM	4:00 PM	1:45:00	0	3	2	5	Gloria	Javier	Gloria
McNears	6/6/99	Sun	7B	1:00 PM	7:00 PM	6:00	1:00 PM	3:00 PM		20	4	5		Javier, Jeff	Javier, Jeff	
Ft. Baker			7A				4:00 PM	7:00 PM	6:00:00	13	5	17	22	Yoko	Yoko	
Berkeley	6/9/99	Wed	2B	7:30 AM	1:30 PM	6:00	7:25 AM	8:35 AM		3	0	5		Jeff	Jeff	Gloria
Pt. Pinole			2A				9:00 AM	10:00 AM	2:35:00	0	0	0	5	Adrienne	Gloria	
Alameda	6/25/99	Fri	3B	1:30 PM	7:30 PM	6:00	1:30 PM	2:45 PM				3		Melissa	Melissa	
Portview			3A				3:00 PM	4:00 PM	2:30:00			5	8	Adrienne	Sheila	
Ft. Point	6/20/99	Sun	6B	7:00 AM	1:00 PM	6:00	8:00 AM	9:00 AM		5	0	4		Javier	Javier, Jeff	
Muni Pier			6A				9:10 AM	10:10 AM	2:10:00	3	2	2	6	Jeff		
Martinez	6/8/99	Tues	1B	8:00 AM	1:00 PM	5:00	8:00 AM	9:00 AM		2	0	2		Jeff	Jeff	
Vallejo			1A				9:30 AM	10:20 AM	2:20:00	7	0	7	9	Sheila	Sheila	
TOTAL						40:00:00			21:05:00	62	28	72	72			
PRIVATE BOATS																
Oyster Point	6/20/99 ³	Sun	14	4:00 PM	7:00 PM	3:00	4:00 PM	7:00 PM	3:00			13	13	Cong, Quy		
San Leandro	6/19/99	Sat	13	2:00 PM	5:00 PM	3:00	2:00 PM	5:00 PM	3:00			11	11	Quy, Jeff	Quy, Jeff, Cong	
Vallejo	6/15/99	Tues	11	2:00 PM	7:00 PM	5:00	2:00 AM	7:00 AM	5:00			24	24	Jeff, Sheila	Jeff, Sheila	
Loch Lomond	6/26/99	Sat	15	2:00 PM	4:00 PM	2:00	2:00 PM	4:00 PM	2:00			7	7	Cong, Melissa	Cong, Melissa	Gloria
Richmond	6/23/99	Wed	12	2:00 PM	7:00 PM	5:00	12:00 PM	3:00 PM				9		Sheila, Jeff		
	7/8/99 ²	Thurs	12				5:00 PM	7:00 PM				3	12			
TOTAL						18:00:00			#REF!			67	67			
PARTY BOATS																
Fisherman's Wharf	6/19/99	Sat	23									0	0	Courtney		
Fisherman's Wharf	6/20/99	Sun	23									10	10	Courtney	Gloria, Courtney	Gloria
Fisherman's Wharf	7/11/99	Sun	23									0	0	Courtney	Courtney, Sheila	
TOTAL									0	0		10	10			
GRAND TOTAL						58:00:00			#REF!			149	149			

*actual shift length includes travel time between site pairs

1 Conflict with MRFSSS Survey

2 Reschedule to finish site

3 Reschedule to accommodate interviewers schedule

Field Summary August 1998

SITE	Date	Day of Wk	Site No.	Start Time	End Time	Shift Length	Actual Start	Actual End	Actual Shift Length*	Census >18 yrs.	Census <18 yrs. old	Attempts	Total Attempts per site pair	Inter-viewers	Actual Inter-viewers	On-site
Ft. Point Muni Pier	8/8/98	Sat	6B 6A	1:00 PM	8:00 PM	7:00	2:10 PM 5:00 PM	3:30 PM 6:50 PM	4:40:00	40 14	7 2	15 17	32	Jeff, Quay	Jeff, Quay	
Berkeley Pt. Pinole	8/13/98	Thur	2B 2A	1:00 PM	7:00 PM	6:00	12:00 PM 2:40 PM	2:00 PM 4:05 PM	2:00 4:05:00	18 5	3 0	12 5	17	Angle, Ellen	Angel, Ellen,	Gloria
McNears Ft. Baker	8/15/98	Sat	7B 7A	7:00 AM	1:00 PM	6:00:00	7:00 AM 10:30 AM	12:00 PM 12:30 PM	5:30:00	8 20	0 3	9 24	33	Jeff, Javier	Jeff, Javier, Yoko	
Candlestick Oyster Pt.	8/16/98	Sun	5B 5A	1:30 PM	7:30 PM	6:00:00	1:40 PM 4:10 PM	3:30 PM 6:30 PM	4:50:00	11 10	3 7	15 19	34	Jeff, Javier	Jeff, Javier, Yoko	
Coyote Point Dumbarton	8/19/98	Wed	4B 4A	9:00 AM	1:00 PM	4:00:00	9:00 AM 11:15 AM	10:30 AM 12:15 PM	3:15:00	5 1	0 0	5 1	6	Jeene, Angel	Jeene, Angel, Yoko	
Martinez Vallejo	8/21/98	Fri	1B 1A	1:30 PM	6:30 PM	5:00:00	1:35 PM 3:40 PM	2:55 PM 5:30 PM	3:55:00	3 10	7 5	6 10	16	Angel, Quay	Angel, Quay	
Alameda Portview	8/24/98	Mon	3B 3A	8:00 AM	1:00 PM	5:00:00	8:45 AM 10:25 AM	9:45 AM 10:58 AM	2:13:00	4 0	0 0	3 1	4	Javier, Jeene	Javier, Jeene	
TOTAL						39:00:00			30:28:00	149	37	142	142			
PRIVATE BOATS																
Oyster Point	8/2/98	Sun	14	1:00 PM	5:00 PM	4:00	11:20 AM	2:35 PM	3:15:00			17	17	Javier, Jeff	Jeff, Sheila	Alyce
Richmond	8/12/98	Wed	12	10:30 AM	3:30 PM	5:00	10:30 AM	3:30 PM	5:00			16	16	Jeene, Angel	Ellen, Jeff	
Vallejo	8/14/98	Fri	11	1:30 PM	4:30 PM	3:00	1:30 PM	4:30 PM	3:00			15	15	Javier, Cesar	Javier, Cesar	Gloria
San Leandro	8/23/98	Sun	13	11:00 AM	4:00 PM	5:00	11:00 AM	4:00 PM	5:00			23	23	Javier, Cong	Javier, Cong	
Loch Lomond	8/30/98	Sun	15	3:00 PM	6:00 PM	3:00	3:00 PM	6:00 PM	3:00			15	15	Quay, Javier	Quay, Javier	
TOTAL						20:00:00			19:15:00			86	86			
PARTY BOATS																
Emeryville	8/11/98	Tue	22									3	3	Angel	Angel	
Emeryville	8/21/98	Fri	22				5:00 AM	3:30 PM	10:30:00			21	21	Yoko	Yoko	
Emeryville	8/23/98	Sun	22				5:35 AM	2:00 PM	8:25:02			10	10	Courtney	Courtney	
TOTAL									18:55:02	0		34	34			
GRAND TOTAL						59:00:00			68:38:02			262	262			

*actual shift length includes travel time between site pairs

Field Summary September 1998

SITE	Date	Day of Week	Site No.	Start Time	End Time	Shift Length	Actual Start	Actual End	Actual Shift Length*	Census >18 yrs. Old	Census <18 yrs. Old	Attempts	Total Attempts per site pair	Inter-viewers	Actual Inter-viewers	On-site
Oyster Pt.	9/10/98	Thurs.	5A	2:00 PM	7:00 PM	5:00	2:00 PM	3:45 PM		5	2	6		Jeff, Sheila	Jeff	Gloria
Candlestick	9/10/98		5B				4:00 PM	4:45 PM	2:45:00	5	1	3	9			
Pt. Pinole	9/12/98	Sat.	2A	12:30 PM	7:30 PM	7:00	12:30 PM	3:00 PM		15	5	11		Cong, Yoko, Quy	Cong, Yoko	
Berkeley	9/12/98		2B				4:00 PM	7:30 PM	7:00:00	38	18	21	32			
Vallejo	9/13/98	Sun.	1A	1:00 PM	6:00 PM	5:00	1:00 PM	3:00 PM		14	1	16		Yoko, Javier	Yoko, Javier	
Martinez	9/13/98		1B				4:00 PM	6:00 PM	5:00:00	13	1	13	29			
Ft. Baker	9/14/98	Mon.	7A	9:00 AM	2:00 PM	5:00	9:05 AM	10:20 AM		4	0	4		Sheila, Cesar	Sheila	Gloria
McNears	9/14/98		7B				11:00 AM	12:00 PM	2:55:00	6	0	4	8			
Portview	9/20/98	Sun.	3A	8:00 AM	1:00 PM	5:00	8:00 AM	8:55 AM		0	0	0		Javier, Jeene	Javier, Jeene	
Alameda	9/20/98		3B			0:00	9:00 AM	11:35 AM	3:35:00	5	0	10	10			
Dumbarton	9/27/98	Sun.	4A	8:00 AM	1:00 PM	5:00	8:00 AM	10:30 AM		9	0	17		Angel, Cong	Angel, Cong	
Coyote Point	9/27/98		4B			0:00	11:30 AM	1:30 PM	5:30:00	10	2	10	27			
Muni Pier	9/29/98	Tues.	6A	1:30 PM	6:30 PM	5:00	1:40 PM	2:40 PM		2	0	3		Jeff, Sheila	Jeff, Sheila	
Ft. Point	9/29/98		6B			0:00	3:00 PM	4:00 PM	2:20:00	3	0	3	6			
TOTAL						37:00:00			29:05:00	129	30	121	121			
PRIVATE BOATS																
Vallejo	9/7/98	Mon(H)	11	1:00 PM	4:00 PM	3:00	1:00 PM	4:00 PM	3:00:00			12	12	Javier, Cesar	Javier, Cesar	Gloria
Oyster Point	9/15/98	Tues.	14	2:00 PM	5:00 PM	3:00	2:00 PM	5:00 PM	3:00:00			2	2	Jeff, Sheila	Jeff, Sheila	Alyce
Richmond	9/19/98	Sat.	12	1:00 PM	6:00 PM	5:00	1:00 PM	6:00 PM	5:00:00			32	32	Ellen, Jeff	Ellen, Jeff	
Loch Lomond	9/25/98	Fri.	15	2:00 PM	5:00 PM	3:00	2:00 PM	5:00 PM	3:00:00			10	10	Ellen, Quy	Ellen, Quy	
TOTAL						14:00:00			14:00:00			56	56			
PARTY BOATS																
Fishermen's Wharf	10/4/98	Sun.	22	5:30 AM	4:30 PM	11:00:00	5:30 AM	4:30 PM	11:00:00	20		20	20	Courtney	Courtney	
TOTAL						11:00			11:00:00	20		20	20			
GRAND TOTAL						62:00:00			54:05:00			197	197			

*actual shift length includes travel time between site pairs

Field Summary October 1998

SITE	Date	Day of Week	Site No.	Start Time	End Time	Shift Length	Actual Start	Actual End	Actual Shift Length*	Census > 18 yrs. Old	Census <18 yrs. Old	Attempts	Total Attempts per site pair	Inter-viewers	Actual Inter-viewers	On-site
Candlestick	10/4/98 ¹	Sat	5B	8:00 AM	1:00 PM	5:00	8:30 AM	9:30 AM		1	0	1		Ellen, Jeff	Ellen, Jeff	
Oyster Pt.			5A				9:50 AM	11:45 AM	3:15:00	8	0	9	10			
Coyote Poir	10/5/98	Mon	4B	11:00 AM	4:00 PM	5:00	11:00 AM	12:10 PM		3	0	4		Cesar, Sheila	Cesar, Sheila,	Gloria
Dumbarton			4A				12:55 PM	2:15 PM	3:15:00	16	3	10	14			
McNears	10/10/98	Sat	7B	12:30 PM	6:30 PM	6:00	1:00 PM	4:00 PM		29	3	24		Ellen, Jeff	Jeff, Javier	
Ft. Baker			7A				2:20 PM	6:00 PM	5:00:00	17	3	10	34			
Berkeley	10/14/98	Wed	2B	9:00 AM	2:00 PM	5:00	9:00 AM	10:00 AM		1	1	1		Sheila, Jeane	Sheila, Jeane	
Pt. Pinole			2A				11:00 AM	12:00 PM	3:00:00	6	6	6	7			
Alameda	10/23/98	Fri	3B	1:00 PM	6:00 PM	5:00	2:15 PM	2:40 PM		4	0	4		Quay, Angel	Angel, Quay, Sheila	
Portview			3A				3:30 PM	4:45 PM	2:30:00	0	0	0	4			
Ft. Point	10/25/98	Sun	6B	7:00 AM	12:00 PM	5:00	6:30 AM	7:45 AM		4	2	3		Javier, Jeff	Sheila, Jeff	
Muni Pier			6A				8:00 AM	9:30 AM	3:00:00	7	0	9	12			
Martinez	10/27/98	Tues	1B	8:00 AM	12:00 PM	4:00	8:45 AM	9:30 AM		4	0	5		Sheila, Cesar	Sheila, Cesar	Diana
Vallejo			1A				10:00 AM	12:00 PM	3:15:00	15	0	11	16			
TOTAL						35:00:00			23:15:00	115	18	97	97			
PRIVATE BOATS																
Oyster Poin	10/4/98	Sun	14	1:00 PM	4:00 PM	3:00	1:00 PM	4:00 PM	3:00			3	3	Javier, Sheila	Sheila	
Vallejo	10/28/98 ¹	Wed	11	11:00 AM	4:00 PM	5:00	1:30 PM	4:30 PM	3:00			9	9	Cesar, Jeane	Cesar, Jeane	Alyce
Richmond	10/29/98	Thurs	12	11:30 AM	4:30 PM	5:00	11:30 AM	4:30 PM	5:00			15	15	Jeane, Jeff	Jeane, Jeff	
San Leandr	10/31/98	Sat	13	2:00 PM	5:00 PM	3:00	2:00 PM	5:00 PM	3:00			13	13	Angel, Cong	Angel, Cong, Quay	
Loch Lomoi	11/8/98 ²	Sun	15	2:30 PM	4:30 PM	2:00	2:30 PM	4:30 PM	2:00			5	5	Jeff, Sheila	Jeff, Sheila	
TOTAL						16:00:00			14:00:00			45	45			
PARTY BOATS																
	10/10/98 ³	Sat	22				5:00 AM	6:00 AM	1:00:00	0		0	0	Courtney	Courtney	
	10/24/98 ³	Sat	22				5:00 AM	7:00 AM	2:00:00	0		0	0	Courtney	Courtney	
TOTAL										0		0	0			
GRAND TOTAL						51:00:00			39:15:00			142	142			

*actual shift length includes travel time between site pairs

1Conflict with MRFSS Survey

2 Reschedule due to weather

3Attempts. Not able to get on boat due to denial and/or boat full.

Field Summary November 1998

SITE	Date	Day of Week	Site No.	Start Time	End Time	Shift Length	Actual Start	Actual End	Actual Shift Length*	Census >18 yrs. Old	Census <18 yrs. Old	Attempts	Total Attempts per site pair	Inter-viewers	Actual Inter-viewers	On-site
Candlestick	11/9/98	Mon	5B	8:00 AM	12:00 PM	4:00	8:00 AM	9:15 AM		0	3	0	0	Sheila, Angel	Sheila, Adrienne	
Oyster Pt.			5A				9:45 AM	10:45 AM	2:45:00	5	3	5	5			
McNears	11/11/98	Wed. (H)	7B	12:00 PM	4:00 PM	4:00	11:45 AM	2:15 PM		20	3	23		Sheila, Cesar	Sheila, Cong, Gloria	Gloria
Ft. Baker			7A				3:00 PM	4:00 PM	4:15:00	17	3	3	26			
Ft. Point	11/13/98	Fri.	6B	7:00 AM	12:00 PM	5:00	7:30 AM	9:40 AM		5	0	2		Cesar, Sheila,	Cesar, Gloria	Gloria
Muni Pier			6A				10:00 AM	12:45 PM	5:15:00	8	0	13	15			
Berkeley	11/21/98 ¹		2B	7:00 AM	12:00 PM	5:00	7:00 AM	9:30 AM		9	0	9		Javier, Cong	Cong, Quy	
Pt. Pinole		Sat.	2A				10:30 AM	12:45 PM	5:45:00	15	2	12	21			
Coyote Point	11/27/98	Fri.(H)	4B	12:00 PM	5:00 PM	5:00	12:00 PM	1:00 PM		2	0	0		Ellen, Javier	Quy, Sheila	
Dumbarton			4A				1:45 PM	3:45 PM	3:45:00	17	0	6	6			
Martinez	11/28/98	Sat.	1B	7:30 AM	12:00 PM	4:30	7:30 AM	9:30 AM		4	0	10		Jeff, Cesar	Cesar, Jeff	
Vallejo			1A				10:00 AM	12:00 PM	4:30:00	8	1	15	25			
Alameda	12/4/98 ²	Fri	3B	12:00 PM	5:00 PM	5:00	11:45 AM	12:15 PM		0	0	0		Jeene, Javier	Sheila, Gloria	Gloria
Portview			3A				12:45 PM	1:45 PM	2:00:00	2	1	1	1			
TOTAL						32:30:00			28:15:00	112	16	99	99			
PRIVATE BOATS																
Vallejo	11/14/98 ¹	Sat.	11	11:00 AM	4:00 PM	5:00	11:00 AM	4:00 PM	5:00			23	23	Jeff, Cpong	Jeff, Cong	
Oyster Point	11/10/98	Tues.	14	1:00 PM	4:00 PM	3:00	1:00 PM	4:00 PM	3:00			0	0	Jeff, Ellen	Jeff, Ellen	
Loch Lomond	11/12/98	Thur.	15	1:00 PM	4:00 PM	3:00	1:00 PM	4:00 PM	3:00			7	7	Sheila, Jeff	Sheila, Jeff	
Richmond	11/22/98	Sun.	12	1:00 PM	4:00 PM	3:00	1:00 PM	4:00 PM	3:00			11	11	Javier, Ellen, Cesar	Javier, Ellen	
TOTAL						9:00:00			9:00:00			41	41			
PARTY BOATS																
	11/20/98 ³	Fri	23				7:30 AM	8:00 AM	0:30:00			0	0	Courtney	Courtney	
	11/22/98	Sun	23				8:00 AM	2:00 PM	6:00:00	13		11	11	Courtney	Courtney	
TOTAL									6:00:00			11	11			
GRAND TOTAL						41:30:00			43:15:00			151	151			

*actual shift length includes travel time between site pairs

1Conflict with MRFSS Survey

2 Reschedule due to weather

3Attempts. Not able to get on boat due to denial and/or boat full.

Field Summary December 1998

SITE	Date	Day of Week	Site No.	Start Time	End Time	Shift Length	Actual Start	Actual End	Actual Shift Length	Actual Shift Length*	Census >18 yrs.	Census <18 yrs.	Attempts	Total Attempts per site pair	Actual Interviewers	On-site
Oyster Pt.			5A	12:00 PM	4:30 PM	4:30	12:00 PM	1:10 PM			1	1	4			
Candlestick	12/27/98 ¹	Sun	5B				1:30 PM	2:30 PM		2:30:00	0	0	0	4	Sheila, Melissa	
Pt. Pinole	12/7/98	Mon.	2A	11:30 AM	4:30 PM	5:00	12:30 PM	1:45 PM			9	0	6		Quy, Melissa	Gloria
Berkeley			2B				2:20 PM	3:00 PM		2:30:00	6	0	9	15		
Vallejo	12/30/98	Wed	1A	12:00 PM	4:00 PM	4:00	12:30 PM	2:15 PM			15	2	14		Melissa, Quy, Gloria	
Martinez			1B				2:30 PM	3:45 PM		3:15:00	3	0	5	19		
Ft. Baker	12/12/98	Sat	7A	7:00 AM	12:00 PM	5:00	9:00 AM	10:00 AM			9	0	7		Jeff, Ellen	
McNears			7B				10:30 AM	12:30 PM		3:30:00	17	0	10	17		
Portview	12/21/08	Mon.	3A	8:00 AM	12:00 PM	4:00	8:00 AM	9:00 AM			0	0	0		Sheila, Melissa	
Alameda			3B				9:15 AM	9:45 AM		1:45:00	0	0	0	0		
Dumbarton	12/17/98	Thurs	4A	8:00 AM	12:00 PM	4:00	9:15 AM	10:50 AM	1:35:00		13	0	11		Yoko, Melissa	
Coyote Point	12/28/98 ³	Mon.	4B				12:30 PM	1:30 PM	1:00:00	2:35:00	1	0	1	12	Jeff, Sheila	
Muni Pier	12/6/98	Sun	6A	12:00 PM	5:00 PM	5:00	12:35 PM	1:45 PM			8	3	7		Sheila, Melissa, Ellen	Gloria
Ft. Point			6B				2:10 PM	3:35 PM		3:00:00	14	4	6	13		
TOTAL						31:30:00				19:05:00	96	10	80	80		
PRIVATE BOATS																
Vallejo	12/9/98	Wed	11	1:00 PM	4:00 PM	3:00	1:40 PM	4:00 PM		2:20:00			5	5	Melissa	Diana
San Leandro	12/13/98	Sun	13	11:00 AM	4:00 PM	5:00	11:00 AM	4:00 PM		5:00			11	11	Cong, Ellen	
Oyster Point	1/3/99 ²	Sun	14	1:00 PM	4:00 PM	3:00	1:00 PM	4:00 PM		3:00			4	4	Jeff, Sheila	
Richmond	12/18/98	Fri.	12	11:00 AM	4:00 PM	5:00	11:00 AM	2:00 PM		3:00:00			12	12	Yoko, Melissa, Alyce	Alyce
Loch Lomond	12/26/98 ²	Sat	15	1:00 PM	4:00 PM	3:00	1:00 PM	4:00 PM		3:00			14	14	Cong, Melissa	
TOTAL						19:00:00				16:20:00			46	46		
PARTY BOATS																
San Pablo	12/19/98	Sat	21			0:00:00	7:00 AM	4:00 PM		9:00			13	13	Courtney	
TOTAL						0:00				9:00:00			13	13		
GRAND TOTAL						50:30:00				44:25:00			139	139		

*actual shift length includes travel time between site pairs

1Conflict with MRFSS Survey

2Reschedule due to weather

3Reschedule to finish site

Field Summary January 1999: Revised

SITE	Date	Day of Week	Site No.	Start Time	End Time	Shift Length	Actual Start	Actual End	Actual Shift Length*	Census >18 yrs. Old	Census <18 yrs. Old	Attempts	Total Attempts per site pair	Interviewers	Actual Interviewers	On-site
Candlestick	1/12/99	Tues	5B	12:00 PM	4:00 PM	4:00	2:00 PM	3:00 PM		0	0	1		Sheila,	100	
Oyster Pt.			5A				3:20 PM	4:20 PM	2:20:00	4	0	1	2	Jeff	100	
Coyote Point	1/18/99	Mon(H)	4B	8:00 AM	12:00 PM	4:00	8:00 AM	9:00 AM		0	0	0		Jeff,	Jeff,	
Dumbarton			4A				10:00 AM	11:45 AM	3:45:00	0	0	1	1	Cesar	Cesar	
McNears	1/6/98	Wed	7B	8:00 AM	12:00 PM	4:00	8:00 AM	9:00 AM		0	0	0		Sheila,	Sheila,	Gloria
Ft. Baker			7A				9:15 AM	10:15 AM	2:15:00	4	0	2	2	Melissa	Melissa	
Berkeley	1/23/98	Sat	2B	11:30 AM	4:30 PM	5:00	11:30 AM	1:00 PM		9	0	8		Angel,	Yoko	
Pt. Pinole			2A				2:00 PM	3:30 PM	4:00:00	14	0	10	18	Cesar	Cesar	
Alameda	1/10/99	Sun	3B	8:00 AM	12:00 PM	4:00	9:15 AM	10:15 AM		0	3	1		Melissa,	Melissa,	
Portview			3A				10:30 AM	11:45 AM	2:30:00	4	0	7	8	Jeff	Jeff	
Ft. Point	1/28/99	Thurs	6B	12:00 PM	4:00 PM	4:00	12:00 PM	1:00 PM		8	0	4		Angel,	Angel,	Gloria
Muni Pier			6A				1:20 PM	2:20 PM	2:20:00	6	0	5	9	Sheila	Sheila	
Martinez	1/17/98	Sun	1B	12:00 PM	4:00 PM	4:00	12:00 PM	1:00 PM		2	2	1		Melissa,	Melissa	
Vallejo			1A				1:20 PM	2:20 PM	2:20:00	0	0	2	3	Javier		
TOTAL						29:00:00			19:30:00	51	5	43	43			
PRIVATE BOATS																
Oyster Point	1/5/99	Tues	14	11:00 AM	4:00 PM	5:00	11:00 AM	4:00 PM	5:00			4	4	Jeff, Sheila		
Vallejo	1/9/99 ¹ and	Sat	11	1:00 PM	4:00 PM	3:00	1:00 PM	4:00 PM	3:00			4		Jeff, Cong	Jeff, Cong	
	1/16/99	Sat	11	2:30 PM	4:00 PM	1:30	2:30 PM					10	14	Jeff, Sheila	Jeff, Sheila	
Richmond	1/2/99 ¹ and	Sat	12	11:00 AM	4:00 PM	5:00	11:00 AM	2:00 PM				9		Jeff, Cesar	Jeff	
	1/8/99	Fri		2:00 PM	4:00 PM	2:00	2:00 PM	4:00 PM				0	9	Jeff, Melissa	Jeff, Melissa	
Loch Lomond	1/25/99	Mon	15	1:00 PM	4:00 PM	3:00	1:00 PM	4:00 PM	3:00			3	3	Angel, Quy		Gloria
TOTAL						16:30:00			8:00:00			30	30			
PARTY BOATS																
	1/23/99 ²	Sat								0		0	0			
	1/24/99 ²	Sun								0		0	0			
	1/30/99 ²	Sat								0		0	0			
	1/31/99 ²	Sun								0		0	0			
TOTAL									0	0		0	0			
GRAND TOTAL						45:30:00			27:30:00			73	73			

*actual shift length includes travel time between site pairs

1Reschedule due to weather

2 Attempts. Not able to get on boat due to denial and/or boat full.

Field Summary February 1999: Revised

SITE	Date	Day of Week	Site No.	Start Time	End Time	Shift Length	Actual Start	Actual End	Actual Shift Length*	Census >18 yrs. Old	Census <18 yrs. Old	Attempts	Total Attempts per site pair	Interviewers	Actual Interviewers	On-site
Vallejo	2/2/99	Tues	1A	8:00 AM	12:00 PM	4:00	8:00 AM	9:20 AM		2	0	2		Melissa	Melissa	
Martinez			1B				10:00 AM	11:00 AM	3:00:00	4	0	4	6	Angel	Angel	
Pt. Pinole	2/4/99	Thur	2A	7:30 AM	12:00 PM	4:30	9:00 AM	10:30 AM		2	3	2		Yoko	Ellen	
Berkeley			2B				11:00 AM	12:30 PM	3:30:00	7	3	9	11	Sheila	Sheila	
Muni Pier	2/15/99 ¹	Mon (H)	6A	8:00 AM	12:00 PM	4:00	9:00 AM	10:00 AM			1	4		Javier	Javier	Gloria
Ft. Point			6B				10:30 AM	12:00 PM	3:00:00		7	19	23	Jeff	Jeff	
Dumbarton	2/17/98 ²	Tues	4A	12:00 PM	4:00 PM	4:00	1:00 PM	3:00 PM		13	1	11		Angel	Angel	
Coyote Point			4B				3:40 PM	4:15 PM	3:15:00	0	0	0	11	Jeff	Jeff	
Oyster Pt.	2/28/99 ²	Sun	5A	8:00 AM	12:00 PM	4:00	9:10 AM	10:10 AM		3	0	3		Cong	Angel	Gloria
Candlestick			5B				10:20 AM	11:50 AM	2:40:00	2	0	9	12	Quy	Jeff	
Portview	2/24/99	Wed	3A	12:00 PM	4:00 PM	4:00	12:40 PM	1:45 PM		4	0	4		Melissa	Melissa	
Alameda			3B				2:00 PM	3:00 PM	2:20:00	2	0	2	6	Yoko, Sheila	Yoko, Sheila	
Ft. Baker	2/27/99	Sat	7A	11:30 AM	4:30 PM	5:00	11:30 AM	1:00 PM		15	5	11		Melissa	Sheila	
McNears			7B				1:30 PM	2:30 PM	3:00:00	9	1	11	22	Cong	Cong	
TOTAL						24:30:00			17:45:00	63	21	91	91			
PRIVATE BOATS																
Loch Lomond	2/7/99	Sun	15	1:00 PM	4:00 PM	3:00	1:00 PM	4:00 PM	3:00			2	2	Javier, Ellen	Javier, Yoko	
Oyster Point	2/13/99	Sat	14	11:30 AM	4:30 PM	5:00	11:30 AM	4:30 PM	5:00			14	14	Jeff, Ellen	Jeff, Ellen	
San Leandro	2/15/99	Mon(H)	13	11:30 AM	4:30 PM	5:00	11:30 AM	4:30 PM	5:00			26	26	Yoko, Sheila	Yoko, Sheila	
Vallejo	2/22/99	Mon	11	1:00 PM	4:00 PM	3:00	1:00 PM	4:00 PM	3:00			9	9	Angel, Sheila	Angel, Jeff	Gloria
Richmond	2/23/99	Tues	12	11:30 AM	4:30 PM	5:00	11:30 AM	4:30 PM	5:00:00			3	3	Angel, Sheila	Angel, Sheila	
TOTAL						13:00:00			13:00:00			54	54			
PARTY BOATS																
	2/20/99 ³	Sat								0		0	0			
	2/21/99 ³	Sun								0		0	0			
	2/27/99 ³	Sat								0		0	0			
	2/28/99 ³	Sun								0		0	0			
TOTAL						0:00			0:00:00	0		0	0			
GRAND TOTAL						37:30:00			30:45:00			145	145			

*actual shift length includes travel time between site pairs

1Conflict with MRFSS Survey

2Reschedule due to weather

3Attempts. Not able to get on boat due to denial and/or boat full.

Field Summary March 1999

SITE	Date	Day of Week	Site No.	Start Time	End Time	Shift Length	Actual Start	Actual End	Actual Shift Length*	Census > 18 yrs. Old	Census <18 yrs. Old	Attempts	Total Attempts per site pair	Inter-viewers	Actual Interviewers	On-site
Oyster Pt.	3/2/99	Tues	5A	8:00 AM	12:00 PM	4:00	8:10 AM	9:37 AM		3	0	3		Melissa	Melissa,	
Candlestick			5B				9:45 AM	10:45 AM	2:35:00	1	0	1	4	Sheila	Sheila	
Muni Pier	3/5/99	Fri	6A	8:00 AM	12:00 PM	4:00	8:00 AM	9:00 AM		2	0	3		Sheila	Angel	
Ft. Point			6B				9:10 AM	10:00 AM	2:00:00	4	3	4	7	Jeff	Adrienne	
Pt. Pinole	3/7/99	Sun	2A	7:30 AM	12:30 PM	5:00	7:30 AM	9:00 AM		1	0	1		Melissa	Melissa	
Berkeley			2B				10:00 AM	12:00 PM	4:30:00	17	5	15	16	Javier	Javier	
Vallejo	3/13/99	Sat	1A	8:00 AM	12:00 PM	4:00	9:00 AM	12:10 PM		13	1	17		Yoko	Yoko	
Martinez			1B				12:30 PM	1:00 PM	4:00:00	6	3	2	19	Angel	Angel	
Portview	3/27/99 ¹	Sat	3A	12:00 PM	4:00 PM	4:00	12:00 PM	2:00 PM		13	9	7		Yoko	Yoko	
Alameda			3B				2:30 PM	4:15 PM	4:15:00	1	5	5	12	Jeff	Sheila	
Dumbarton	3/27/99	Sat	4A	12:00 PM	5:00 PM	5:00	12:00 PM	4:00 PM		4	4	8		Quy	Quy	
Coyote Point			4B				2:45 PM	3:00 PM	3:00:00	6	6	2	10	Cong	Cong	
Ft. Baker	3/30/99	Tues	7A	12:00 PM	4:00 PM	4:00	12:00 PM	1:45 PM		7	0	5		Sheila	Sheila	
McNears			7B				2:00 PM	3:00 PM	3:00:00	7	0	6	11	Ellen	Ellen	Gloria
TOTAL						30:00:00			23:20:00	85	36	79	79			
PRIVATE BOATS																
Vallejo	3/14/99	Sun	11	1:00 PM	4:00 PM	3:00	1:00 PM	2:15 PM				7		Javier,Angel	Javier, Angel	
	3/20/99 ²	Sat					2:00 PM	4:00 PM	3:00:00			18	25	Jeff, Sheila	Jeff, Sheila	
Oyster Point	3/23/99	Tues	14	12:00 PM	5:00 PM	5:00	12:00 PM	5:00 PM	5:00			4	4	Sheila, Ellen	Sheila, Ellen	
Loch Lomond	3/25/99	Thur	15	1:00 PM	4:00 PM	3:00	1:00 PM	4:00 PM	3:00			3	3	Melissa, Ellen	Melissa,Jeff	Gloria
Richmond	3/28/99	Sun	12	12:00 PM	5:00 PM	5:00	12:00 PM	5:35 PM	5:35			10	10	Ellen, Yoko	Sheila, Melissa	
TOTAL						16:00:00			16:35:00			42	42			
PARTY BOATS																
Fisherman's Wharf	3/13/99 ³	Sat	23							0		0	0	Courtney	Courtney	
Fisherman's Wharf	3/14/99 ⁴	Sun	23							0		0	0	Courtney	Courtney	
San Pablo	3/14/99 ⁵	Sun	21			0:00:00				0		0	0	Courtney	Courtney	
TOTAL						0:00			0:00	0		0	0			
GRAND TOTAL						46:00:00			39:55:00			121	121			

*actual shift length includes travel time between site pairs

1Conflict with MRFSS Survey

2Continued 3/14/99 site

3Trip cancelled. No fishers.

4Trip cancelled, bad wheather

5No response to phone inquiries.

Field Summary April 1999

SITE	Date	Day of Week	Site No.	Start Time	End Time	Shift Length	Actual Start	Actual End	Actual Shift Length*	Actual Shift Length Total	Census >18 yrs. Old	Census <18 yrs. Old	Attempts	Total Attempts per site pair	Interviewers	Actual Interviewers	On-site
Candlestick Oyster Pt.	4/30/99 ¹	FRI	5B 5A	1:00 PM	6:00 PM	5:00	1:00 PM 2:00 PM	1:50 PM 3:00 PM			10 10	1 2	5 6			Sheila, Jeff Gloria	Gloria
Coyote Point	4/2/99	Fri	4B	8:00 AM	12:00 PM	4:00	8:00 AM	9:30 AM			2		2			Sheila	Sheila
Dumbarton			4A				10:00 AM	11:00 AM		3:00:00	0		1	3		Ellen	
McNears	4/18/99	Sun	7B	8:00 AM	1:00 PM	5:00	8:00 AM	9:30 AM			5	0	3			Javier	Gloria
Ft. Baker			7A				10:00 AM	11:00 AM		3:00:00	4	5	3	6		Angel, Sheila, Ellen	
Berkeley	4/22/99	Thur	2B	1:00 PM	6:00 PM	5:00	1:00 PM	2:30 PM	1:30:00		8	8	9			Sheila	Sheila, Gloria
Pt. Pinole	5/6/99 ²	Thur	2A				1:00 PM	2:30 PM	1:30:00	3:00:00	5	0	2	11		Ellen	
Alameda	4/9/99	Fri	3B	8:00 AM	1:00 PM	5:00	8:00 AM	9:00 AM			0	0	0			Angel, Melissa	
Portview			3A				9:15 AM	10:40 AM		2:40:00	0	0	0	0		Melissa	
Ft. Point	4/4/99	Sun	6B	1:00 PM	7:00 PM	6:00	1:40 PM	3:05 PM			2	0	4			Jeff, Javier	Jeff
Muni Pier			6A				3:20 PM	4:25 PM		2:45:00	9	2	9	13			
Martinez	4/29/99	Thur	1B	1:00 PM	5:00 PM	4:00	1:00 PM	2:05 PM			8	0	6			Melissa	Melissa
Vallejo			1A				2:25 PM	4:00 PM		3:00:00	14	0	10	16		Sheila	Sheila, Gloria
TOTAL						34:00:00				19:25:00	77	18	60	60			
PRIVATE BOATS																	
Oyster Point	4/3/99	Sat	14	12:00 PM	5:00 PM	5:00	10:00 AM	3:00 PM	5:00				0	0		Jeff, Yoko	Jeff, Yoko
San Leandro	4/10/99	Sat	13	2:00 PM	5:00 PM	3:00	2:00 PM	5:00 PM	3:00				1	1		Cong, Quy	
Vallejo	4/15/99	Thurs	11	1:00 PM	6:00 PM	5:00	2:00 PM	7:00 PM	5:00				12	12		Jeff, Angel	Jeff, Angel, Gloria
Loch Lomond	4/17/99	Sat	15	2:00 PM	5:00 PM	3:00	2:00 PM	5:00 PM	3:00				9	9		Angel, Yoko	Sheila, Jeff, Gloria
Richmond	4/28/99	Wed	12	1:00 PM	6:00 PM	5:00	1:00 PM	3:00 PM					1			Ellen, Jeff	Jeff, Sheila
	5/7/99 ²	Fri					4:00 PM	6:00 PM	5:00:00				1	2			Sheila, Angel
TOTAL						21:00:00			16:00:00				24	24			
PARTY BOATS																	
Emeryville	4/3/99 ³	Sat	22										0	0		Courtney	Alyce
San Pablo	4/10/99 ³	Sat	21										0	0		Courtney	Diana
Fisherman's Wharf	4/17/99 ⁴	Sat	23										0	0		Courtney	Gloria
Fisherman's Wharf	4/18/99 ⁵	Sun	23						24:00:00				0	0		Courtney	Gloria
TOTAL													0	0			
GRAND TOTAL						55:00:00				19:25:00			84	84			

*actual shift length includes travel time between site pairs

1Reschedule due to weather

2 Reschedule to finish site

3Exit Interview,cancelled, weather

4 Attempt, cancelled: no fishers

5 Attempt, cancelled: no interviewers.

Field Summary May 1999

SITE	Date	Day of Week	Site No.	Start Time	End Time	Shift Length	Actual Start	Actual End	Actual Shift Length*	Census >18 yrs. old	Census <18 yrs. Old	Attempts	Total Attempts per site pair	Interviewers	Actual Interviewers	On-site
Oyster Pt.	5/20/99 ¹	Thur	5A	1:00 PM	6:00 PM	5:00	1:00 PM	2:00 PM		0		3		Sheila	Sheila	Gloria
Candlestick			5B				2:15 PM	2:45 PM	1:45:00	0		1	4	Jeff	Jeff	
Muni Pier	5/4/99	Tue	6A	1:00 PM	7:00 PM	6:00	12:00 PM	1:00 PM		8	0	10		Sheila	Sheila	Gloria
Ft. Point			6B				1:20 PM	2:00 PM	2:00:00	5	0	4	14	Ellen	Melissa	
Pt. Pinole	6/5/99 ¹	Sat	2A	12:30 PM	7:00 PM	6:30	11:30 AM	1:30 PM		9	1	10				Gloria
Berkeley			2B				1:45 PM	3:30 PM	4:00:00	56	23	22	32	Yoko, Quyen, Angel	Jeff, Sheila, Gloria,	
Berkeley	6/13/99 ²	Sun	2B				12:30 PM	2:50 PM	2:20	56		40	40		Jeff, Melissa, Gloria	Gloria
Vallejo	5/2/99	Sun	1A	1:00 PM	7:00 PM	6:00	1:00 PM	2:30 PM		6	1	6		Jeff, Ellen	Jeff, Ellen	
Martinez			1B				2:50 PM	3:00 PM	2:00:00	7	0	7	13	Javier	Javier	
Portview	5/9/99	Sun	3A	8:00 AM	1:00 PM	5:00	8:00 AM	9:30 AM		3	3	2		Javier	Javier	
Alameda			3B				9:45 AM	11:45 AM	3:45:00	6	0	7	9	Cong	Cong	
Dumbarton	5/22/99	Sat	4A	8:00 AM	1:00 PM	5:00	9:00 AM	10:30 AM		9	0	8		Quyen	Quyen	
Coyote Point			4B				11:30 AM	1:00 PM	4:00:00	7	1	6	14	Cong	Cong	
Ft. Baker	5/27/99	Thur	7A	8:00 AM	1:00 PM	5:00	8:30 AM	9:30 AM		3	0	3		Sheila	Sheila	Gloria
McNears			7B				9:50 AM	10:50 AM	2:20:00	8	0	8	11	Angel	Angel	
TOTAL						17:30:00			12:05:00	183	29	137	137			
PRIVATE BOATS																
Vallejo	5/16/99	Sun	11	1:30 PM	6:30 PM	5:00	1:30 PM	6:30 PM	5:00			13	13		100 Javier, Jeff, Quyen	
Oyster Point	5/11/99	Tues	14	1:30 PM	6:30 PM	5:00	1:15 PM	5:40 PM	4:25:00			3	3		100 Ellen, Angel	
Loch Lomond	5/5/99	Wed	15	4:00 PM	7:00 PM	3:00	4:00 PM	7:00 PM	3:00			0	0	Melissa, Ellen	Melissa, Ellen	Gloria
Richmond	5/8/99	Sat	12	1:30 PM	6:30 PM	5:00	1:30 PM	6:30 PM	5:00			10	10	Yoko, Jeff, Melissa	Yoko, Jeff, Melissa	
TOTAL						8:00:00			8:00:00			26	26			
PARTY BOATS																
Fisherman's Wharf	5/15/99 ³	Sat.	23							0		0	0	Courtney	Courtney	
Fisherman's Wharf	5/16/99	Sun	23				5:30 AM	7:30 AM	2:00	10		7	7	Courtney	Courtney	
Fisherman's Wharf	5/22/99 ³	Sat.	23							0		0	0	Courtney	Courtney	
Fisherman's Wharf	5/23/99 ³	Sun	23							0		0	0	Courtney	Courtney	
TOTAL										10		7	7			
GRAND TOTAL												170	170			

*actual shift length includes travel time between site pairs

1 Conflict with MRFSS Survey

2 Rescheduled to finish 6/5/99 Berkeley site.

3 Attempts. Not able to get on boat due to denial and/or boat full.

Field Summary June 1999, Revised

SITE	Date	Day of Week	Site No.	Start Time	End Time	Shift Length	Actual Start	Actual End	Actual Shift Length*	Census >18 yrs. Old	Census <18 yrs. Old	Attempts	Total Attempts per site pair	Interviewers	Actual Interviewers	On-site
Candlestick	6/13/99 ¹	Sun	5B	7:00 AM	1:00 PM	6:00	9:00 AM	11:15 AM		8	2	9		Javier, Yoko	Javier	
Oyster Pt.	7/11/99 ²	Sun	5A				11:35 AM	12:45 PM	3:45:00			8	17	Javier, Yoko	Yoko, Sheila	
Coyote Point	6/30/99	Wed	4B	2:00 PM	7:00 PM	5:00	2:15 PM	3:15 PM		1	12	3		Sheila	Sheila	
Dumbarton			4A				3:35 PM	4:00 PM	1:45:00	0	3	2	5	Gloria	Javier	Gloria
McNears	6/6/99	Sun	7B	1:00 PM	7:00 PM	6:00	1:00 PM	3:00 PM		20	4	5		Javier, Jeff	Javier, Jeff	
Ft. Baker			7A				4:00 PM	7:00 PM	6:00:00	13	5	17	22	Yoko	Yoko	
Berkeley	6/9/99	Wed	2B	7:30 AM	1:30 PM	6:00	7:25 AM	8:35 AM		3	0	5		Jeff	Jeff	Gloria
Pt. Pinole			2A				9:00 AM	10:00 AM	2:35:00	0	0	0	5	Adrienne	Gloria	
Alameda	6/25/99	Fri	3B	1:30 PM	7:30 PM	6:00	1:30 PM	2:45 PM				3		Melissa	Melissa	
Portview			3A				3:00 PM	4:00 PM	2:30:00			5	8	Adrienne	Sheila	
Ft. Point	6/20/99	Sun	6B	7:00 AM	1:00 PM	6:00	8:00 AM	9:00 AM		5	0	4		Javier	Javier, Jeff	
Muni Pier			6A				9:10 AM	10:10 AM	2:10:00	3	2	2	6	Jeff		
Martinez	6/8/99	Tues	1B	8:00 AM	1:00 PM	5:00	8:00 AM	9:00 AM		2	0	2		Jeff	Jeff	
Vallejo			1A				9:30 AM	10:20 AM	2:20:00	7	0	7	9	Sheila	Sheila	
TOTAL						40:00:00			21:05:00	62	28	72	72			
PRIVATE BOATS																
Oyster Point	6/20/99 ³	Sun	14	4:00 PM	7:00 PM	3:00	4:00 PM	7:00 PM	3:00			13	13	Cong, Qu		
San Leandro	6/19/99	Sat	13	2:00 PM	5:00 PM	3:00	2:00 PM	5:00 PM	3:00			11	11	Qu, Jeff	Qu, Jeff, Cong	
Vallejo	6/15/99	Tues	11	2:00 PM	7:00 PM	5:00	2:00 AM	7:00 AM	5:00			24	24	Jeff, Sheila	Jeff, Sheila	
Loch Lomond	6/26/99	Sat	15	2:00 PM	4:00 PM	2:00	2:00 PM	4:00 PM	2:00			7	7	Cong, Melissa	Cong, Melissa	Gloria
Richmond	6/23/99	Wed	12	2:00 PM	7:00 PM	5:00	12:00 PM	3:00 PM				9		Sheila, Jeff		
	7/8/99 ²	Thurs	12				5:00 PM	7:00 PM				3	12			
TOTAL						18:00:00			#REF!			67	67			
PARTY BOATS																
Fisherman's Wharf	6/19/99	Sat	23									0	0	Courtney		
Fisherman's Wharf	6/20/99	Sun	23									10	10	Courtney	Gloria, Courtney	Gloria
Fisherman's Wharf	7/11/99	Sun	23									0	0	Courtney	Courtney, Sheila	
TOTAL									0	0		10	10			
GRAND TOTAL						58:00:00			#REF!			149	149			

*actual shift length includes travel time between site pairs

1 Conflict with MRFSSS Survey

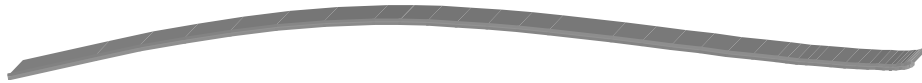
2 Reschedule to finish site

3 Reschedule to accommodate interviewers schedule

Appendix I

Coding for Text Entries

San Francisco Bay Seafood Consumption Study



Appendix I -Text Coding Key

Revised 12/5/00

Q1b Reason for declining interview

Coding of text box responses for "other"

5 = not interested; didn't want to

6 = said information would be same as another respondent

7 = just leaving

8 = first time fisher

9 = doesn't eat fish

10 = other (out of state, etc.)

Q1c Observed ethnicity of decliners

Coding of text box responses for "other"

(recode according to Q1c categories as appropriate)

8 = other Asian (other than Korean, SE Asian, e.g., Japanese)

10 = SE Asian other than Vietnamese

11 = Russian

12 = Korean

Q1d Language of decliners

Coding of text box responses for "other"

8 = other Asian other than Korean, SE Asian

10 = SE Asian other than Vietnamese

11 = Russian

12 = Korean

Q5 Disposition of catch

Coding of text box responses for "other (specify)"

1 = feed to animals, birds, etc.

2 = give to restaurants

3 = eat occasionally, eat only some fish (recode Q5 as "eat it" for angler's response)

Q11-Q13 Consumption Practices of White Croaker, Leopard Shark, and Striped Bass

Anglers who reported that they followed consumption practices (skin, cooking juices, guts, soup, raw) half the time were recorded as "more than half the time."

Q14 Species of fish not listed and for which picture were not available

1 = salmon (included in SF Bay fish consumption)

2 = SF Bay advisory species (included in SF Bay fish consumption)

3 = other fish not from SF Bay (e.g., red snapper, any freshwater fish)

4 = commercial fish

5 = SF Bay shellfish (crab, mussels, clams) (included in SF Bay shellfish consumption)

6 = non-SF Bay shellfish (squid, shrimp, oysters)

Q17 Who cooks or prepares Bay fish

Coding of text box responses for "family member (specify)"

1 = mother/parent/grandparent

2 = wife/partner/spouse/husband

3 = other (daughter, child, nephew, brother, roommate, sister, girlfriend, etc.)

Coding of text box responses for "other (specify)"

1 = roommate, girlfriend, boyfriend

2 = other (anybody, whoever catches)

Q19 Fish consumption from areas outside SF Bay

Coding of text box responses for "other" (recode to Q19 categories as appropriate)

1 = out of state

2 = not specific CA location

3 = unknown

Q23-Q24 Awareness and comprehension of health advisory

To determine whether anglers were aware of the health advisory and their understanding of the advisory, we asked a two-part question. In the first part (Q23), we asked anglers if they had heard or seen health advisory information about eating Bay fish. We then recorded whether the respondent said Yes, No, Don't Know, or refused to answer. In the second part (Q24), we assessed the anglers' comprehension of the health advisory by asking "What did the information say about fish from the Bay?" (We excluded respondents who answered no to the first part). Responses were categorized in the following ways:

Q24 What did information say?

Coding of text responses

1 = Did not express an awareness of current Bay fish advisory

2 = Expressed some knowledge of contaminated fish or waters respondents may have implied awareness of health protective measures, but did not actively state any. (i.e. make you sick, possible kill)

3 = Expressed some knowledge of health protective recommendations

4 = Answered regarding shellfish, not current fish advisory

Respondents who showed no awareness of the current advisory in the second part of the question (Q24) were re-categorized as having no awareness in the first part (Q23). This recategorization of awareness resulted in a 4% drop in awareness across respondent groups, as shown in Table I.1 below. The recategorized response was used for the analysis presented in Section IV.E.

Table I.1. Comparison of Claimed and Actual Awareness of Health Advisory

	RESPONDENTS N=1227*		CONSUMERS N=1054*		NON- CONSUMERS N=173*	
	No.	%	No.	%	No.	%
Claimed to be Aware of Health Advisory in First Part of Questions	771	63	657	62	325	66
Actually Aware of Health Advisory Based on Recategorization in Second Part of Question	722	59	616	58	106	61

*Party boat anglers were excluded because they were not asked health advisory questions.

Q24b Changes in fish eating habits

Coding of text responses for "other (specify)"

1= Claimed to have stopped eating Bay-caught fish entirely after hearing of advisory

2 = Claimed to have engaged in a health protective measures after hearing of advisory. Health protective measures include eating less, preparing or cooking food in a protective manner, and eating different species of fish.

3 = Claimed to eat only uncontaminated fish after hearing of advisory

4 = Claimed not to have consumed above the limit before hearing of advisory.

Respondents replied either that they didn't eat much before, or didn't eat any before learning of the advisory.

5 = Does not believe contamination poses a significant problem

6 = Generally no, have not changed behaviors after hearing of advisory

7 = Not specific to current Bay fish advisory

Q25 Best way for angler to get information

Coding of text responses for "other (specify)"

1 = one-on-one contact from educator, includes Department of Fish and Game, interviewers, others

2 = Direct mailings to fishers

3 = Information in bait & sports shops

4 = Internet

5 = Fish and Game

6 = other/miscellaneous

Q26 Ethnicity

Coding of text responses for "Pacific Islander (specify)"

1 = Guamanian

2 = Samoan

3 = Hawaiian

Coding of text responses for "Other Asian (specify)"

1= South East Asian (other than Vietnamese)

2 = other mixed Asian

3 = Japanese

4 = Korean

Coding of text responses for "Other (specify)"

1 = mixed ethnicity (unspecified)

2 = Russian

3 = Middle Eastern

If an angler reported mixed ethnicity, for example African American and Chinese, he was coded using the first listed ethnicity (African American).

If respondent refused to answer Q26 (ethnicity), interviewers recorded observed ethnicity. Where possible, Q26 responses were recoded.

Appendix J

Defining Consumers and Derivation of Consumption Rates

San Francisco Bay Seafood Consumption Study



Appendix J - Defining Consumers and Deriving Consumption Rates

In this appendix we provide a more detailed discussion of how two groups, consumers and recent consumers, were defined and how consumption rates were calculated in this study. We also describe the shape of the consumption rate distribution and discuss why the consumption rate data were log transformed. Finally, we discuss how consumption rates were weighted across modes.

A. Definition of Consumers

One of the study's central goals was to characterize the population that is exposed to chemicals from consumption of Bay fish. Thus, we have focused much of our analysis and discussion on the subset of the angler population called consumers. Consumers are anglers who reported that they eat Bay fish. Anglers who reported that they do not eat Bay fish (i.e., non-consumers) were excluded from the consumer group.

To define a consumer, we looked at responses to several questions. Respondents were first asked a single, general question (Appendix E, Question 6a): "Do you eat fish that you or someone you know catches from the SF Bay?" They were then asked a series of question about whether they ate specific species of Bay fish (Questions 11-14). We attempted to define consumers as inclusively as possible. Anglers who reported they ate Bay fish in any of the above questions were defined as consumers. Some anglers, however, provided inconsistent responses to these questions. For example, they answered no to the general question, but when asked about specific species of fish, they answered yes to at least once species. Anglers with inconsistent responses were defined as consumers if any of their responses indicated that they ate SF Bay fish.

The one exception to this definition was the angler's responses to the survey question (Question 5) that asked what the angler usually did with the fish he or she caught from SF Bay. Respondents could indicate that they usually ate the fish, gave it to family or friends, traded or sold it, etc. This question was never used to determine whether an angler was a consumer or not because this questions was less reliable than subsequent questions. In other words, if an angler answered this question by indicating he or she usually ate the fish he caught, but later in the survey did not report eating Bay fish or did not identify that he or she ate specific species of Bay fish, he was defined as a non-consumer of Bay fish.

The shaded area of Table J1 describes the survey questions and possible responses that were used to categorize respondents as consumers. Out of 1331 respondents, 179 anglers were categorized as non-consumers. The remaining 1152 anglers we defined as consumers. Most consumers (961 or 83%) provided consistent responses to questions on whether they ate Bay fish. Some consumers (153 or 13%) who answered inconsistently but were still categorized as consumers. In addition, a small number of anglers who were fishing for the first time and (38 or 3%) reported that they planned to consume their catch were also included as consumers even though they had no past consumption of Bay fish.

Table J1. Definition of Consumers (Shaded Areas) N=1152

		Eats specific species of Bay fish (Questions 11-14)		
		Yes	No ^a	
Eats Bay fish (Question 6a)	Yes	961	96	
	No ^a	57	Non-consumers= 179	
			First-time fishers=38 ^b	
				1331 Respondents

^a respondent could also have answered don't know, refused to answer, or the response could have been missing

^b Anglers who were fishing for the first time and also planned to consume their catch.

B. Definition of Recent Consumer

Recent consumers are defined as: 1) a subset of consumers, and 2) anglers who reported eating Bay fish in the last four weeks. Consumers were first asked a single, general question (Question 8a): "In the last four weeks, did you eat fish that you caught or someone you know caught from the SF Bay?" Then they were asked a series of question on whether they had eaten specific species of fish from SF Bay in the last four weeks. (Questions about whether the angler reported recent consumption of specific species of Bay fish were asked in Questions 11-14). The definition of recent consumers was not analogous to the definition of consumers. If anglers reported recent consumption of any specific species of Bay fish in the last four weeks they were defined as recent consumers; the general question (Q8a) was never used to define recent consumers (Table J2). Out of 1152 consumers, 537 were defined as recent consumers.

It should be noted that consumption rates (based on a four week recall) could not be derived for all 537 anglers who were defined as recent consumers. This occurred because some recent consumers provided incomplete information on their consumption rates. For example, some anglers reported that they had recent consumption of specific species of Bay fish yet they did not report the number of time they consumed that species in the previous four weeks (meal frequency). Also some recent consumers did not provide information on their portion size. Both meal frequency and portion size were needed to calculate a consumption rate. As a result, consumption rate estimates could only be derived for a subset of recent consumers (n=501). In addition, some anglers failed to report information on their fishing frequency, which was used to adjust data for avidity bias. Thus, avidity bias adjusted consumption rate data could only be estimated for an even smaller subset (n=465).

Table J2. Definition of Recent Consumers (Shaded Areas) N=537

		Ate specific species of Bay fish in the last four weeks (Questions 11-14)		
		Yes	No ^a	
Ate Bay fish in the last four weeks (Question 8a)	Yes	445	43	
	No ^a	92	572	
				1152 Consumers

^a respondent could also have answered don't know, refused to answer, or the response could have been missing

C. Deriving Consumption Rates Based on a 4 Week Recall

As discussed in the previous section, anglers could be defined as recent consumers in two ways: 1) based on a single general question or 2) based on a series of questions about specific fish species. Similarly, consumption rates (based on a 4 week recall) could be derived in two ways. The questionnaire allowed for consumption rates to be derived in two ways, from the single general question (Q8a), or consumption rates could be derived by summing the total number of times the anglers ate specific species of Bay fish in the last four weeks. When we compared the distributions for these two consumption rates, we found them to be very similar. The correlation between the two consumption rates was high ($n=424$, $r=0.78$).

Rather than present two similar consumption rate results based on a four-week recall in the report, we chose to limit our analyses to the consumption rate derived by summing individual species. We selected this rate for two reasons. First by asking respondents about specific species with the aid of color pictures, we may have helped the respondent to remember all species that had been eaten. In fact, more respondents reported a consumption rate based on the sum of individual species ($n=501$) compared to the consumption rate based on a single question ($n=435$). Second, we wanted to calculate consumption rates based on only advisory species. This consumption rate could only be derived using species specific consumption rates.

D. Shape of the Consumption Rate Distribution

Estimation of population means and statistical tests of consumption rate differences between groups assume normal distributions in each group being compared. Statistical tests are generally reliable as long as the normality assumption is not badly violated (Kleinbaum, Kupper, and Muller 1988, Armitage and Berry 1987). We used a number of approaches to assess how the consumption rate data reported in Section IV.D.1 were distributed and whether they required transformation. Following Hill's (1995)

methodology, we found that the standard deviations were larger than the mean, which indicates a high degree of variability in the distribution. The standard deviation is usually a fraction of the mean in a normal distribution (Table J3). The skewness and kurtosis, which are indicators of normality, were positive. Both are zero in a normal distribution. A positive skewness indicates a distribution with a tail to the right. A positive kurtosis indicates heaviness of the tails. The geometric mean is much closer to the median than is the arithmetic mean, indicative of a log normal distribution.

Table J3. Descriptive Statistics of SF Bay Fish Consumption Rate (g/d) (Unadjusted)

	4 week Recall	12 Month Recall
	N=501	N=1019
Mean (Standard Deviation)	28.0 (39.5)	11.0 (35.7)
Geometric Mean	16.5	1.2
Median	16.0	2.5
Skewness	3.9	7.4
Kurtosis	19.9	70.9

Figures J1a and J1b show histograms of the distribution of consumption rate for recent consumers of SF Bay fish based on a four week recall. Above each histogram is a normal quantile plot (SAS JMP 2000), in which points derived from a normal distribution will lie along the diagonal line, or at least within the dotted-line confidence bounds. In Figure J1a, the distribution of consumption rate is grossly non-normal, and has the long upper tail characteristic of a lognormal distribution. In Figure J2b, applying a log transformation to the data markedly improves the fit to the normal distribution, as nearly all points lie within the confidence bounds of the normal quantile plot.

Because the SF Bay angler population is comprised of different ethnic groups whose consumption rate distributions may be distinct, the distribution of the total combined data may not be lognormally distributed, even if the subgroups are. We therefore examined these distributions for the major ethnic groups in Figures J2 to J5. Similar to the overall consumption rate distribution of recent consumers, the major ethnic groups show grossly non-normal consumption rate distributions and applying the log transformation greatly improves the fit to the normal distribution. As would be expected, the log transformed data for the individual ethnic groups fit the normal distribution better than the data for the overall population of recent consumers.

More complicated transformations (such as the negative reciprocal of the 10th root) were found to improve the normal distribution fit slightly for some of the ethnic groups. But for ease of presentation, consistency across groups, familiarity, and comparison to other

studies, the natural log transformation was used for the overall population of recent consumers and all of the ethnic groups.

Figure J1a. Consumption Rate of Recent Consumers (n = 501)

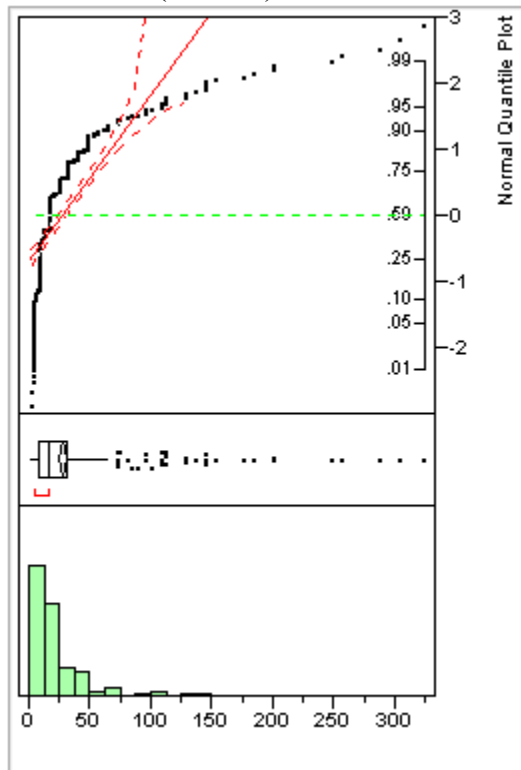


Figure J2a. African-American Consumption Rate (n = 43)

Figure J1b. Log Consumption Rate of Recent Consumers (n=501)

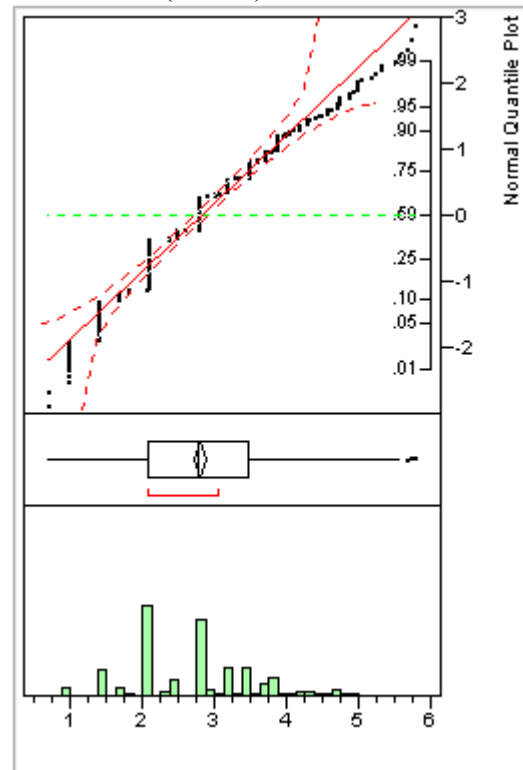


Figure J2b. Log African American Consumption Rate (n=43)

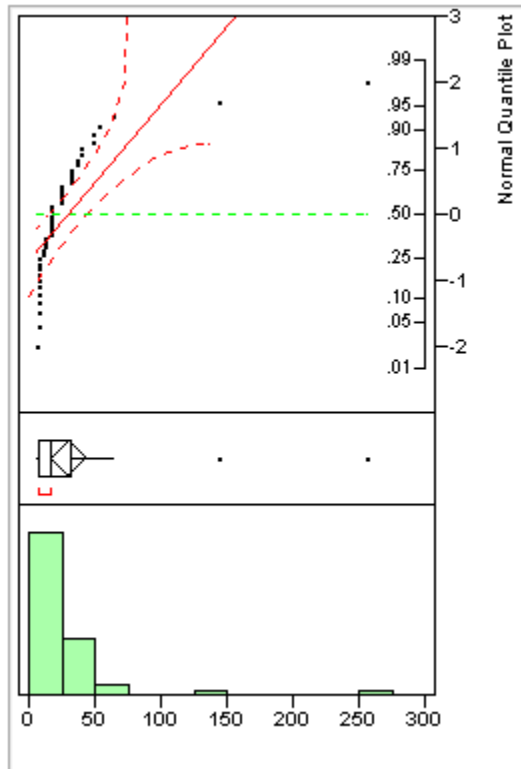


Figure J3a. Asian Consumption Rate (n = 213)

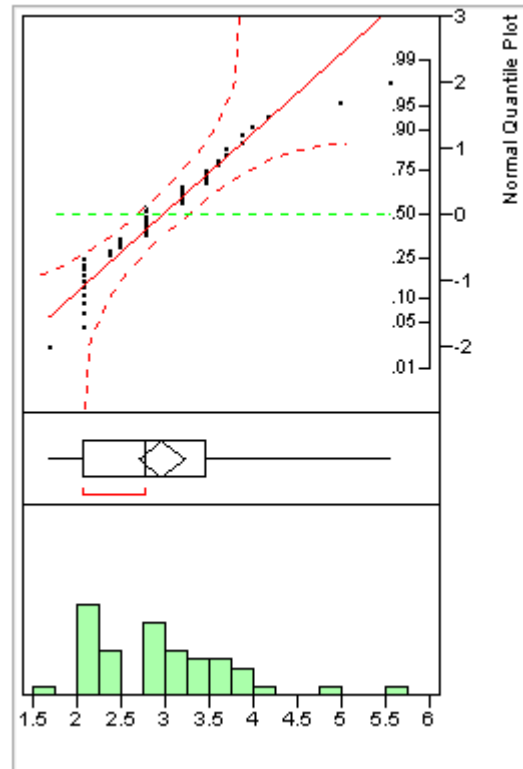


Figure J3b. Log Asian Consumption Rate (n=213)

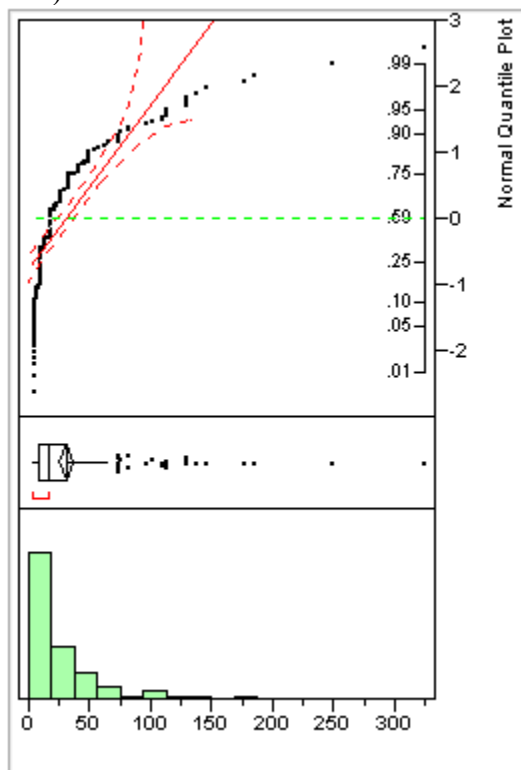


Figure J4a. Caucasian Consumption Rate (n = 163)

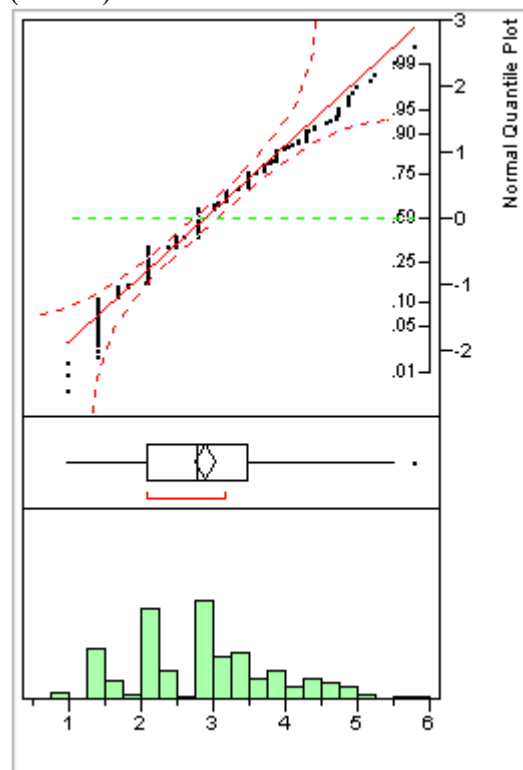


Figure J4b. Log Caucasian Consumption Rate (n=163)

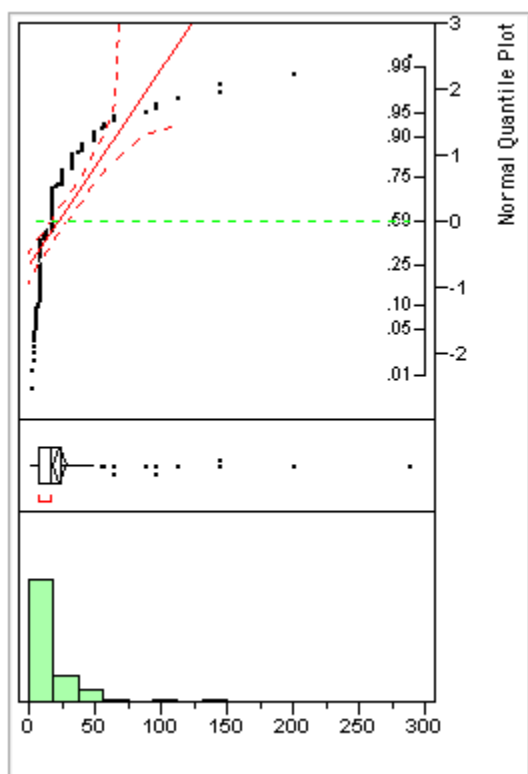


Figure J5a. Latino Consumption Rate (n = 56)

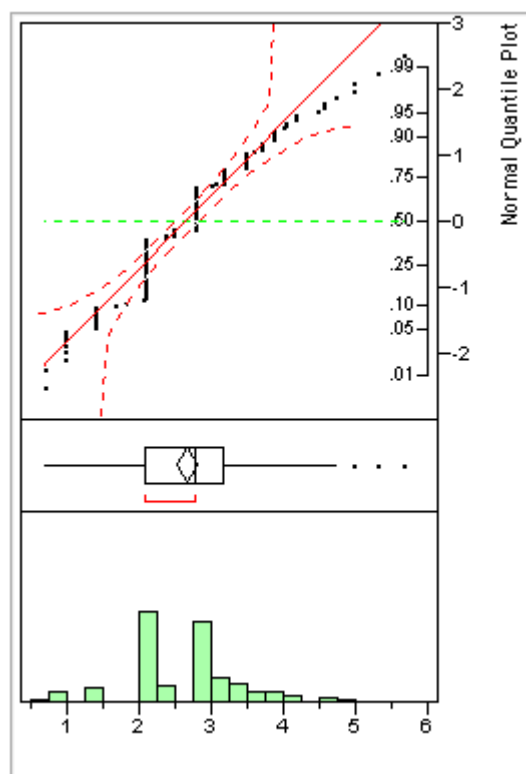
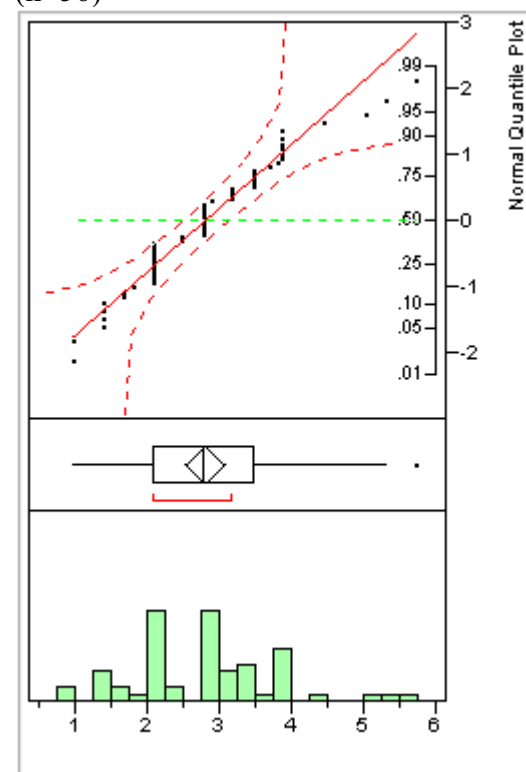
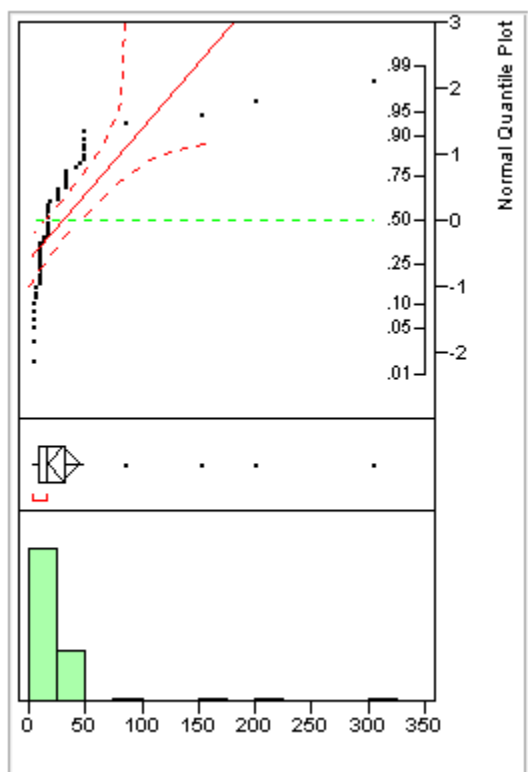


Figure J5b. Log Latino Consumption Rate (n=56)



E. Consumption Rate Estimate Weighted by Mode

In the sampling plan, we sought to derive consumption rates that could be applied across all fishing modes. To do this, we set sampling targets for the fishing modes that were based on estimates of the relative amount of fishing activity in those modes, shown in Table J4. (This was also discussed in Section II.B.3 and Appendix D). Consumption rate estimates for recent consumers reported in Table 4 (of the report) were based on a sample of recent consumers that was slightly different than the original sampling targets. As shown in Table J4, we planned to interview more shore-based and party boat anglers, and fewer private boat anglers, than we actually did.

Table J4. Sample Target Interviews by Mode Compared to Actual Sample

Mode	Sampling Target Interviews Based on Fishing Activity	Actual Sample of Recent Consumers	
		Unadjusted N=501	Adjusted N=465
Shore-Based	62%	58.3%	57.0%
Private Boat	28%	34.3%	35.0%
Party Boat	10%	7.4%	8.0%
Total	100%	100%	100%

To determine if differences by mode between the sampling targets and the actual sample could have caused any bias in consumption rate, we recalculated consumption rates by weighting the geometric means for each mode by the sample targets (Table J5).

Table J5. Consumption Rate Weighted by Sample Targets for Fishing Mode

Mode	Unadjusted Geometric Mean Consumption Rate (g/d)	Avidity Bias Adjusted Geometric Mean Consumption Rate (g/d)
Unweighted by Mode	16.5	14.0
Weighted by Sample Targets Based on the Relative Fishing Activity for Each Mode	16.5	14.1

We found that the consumption rates weighted by the sample targets are nearly identical to the original, unweighted values. We conclude that there is no bias in consumption rate due to differences between the sampling targets and the actual sample.

Appendix J References

Armitage P and G Berry (1987). **Statistical Methods in Medical Research**. 2nd Ed. Oxford: Blackwell Scientific Publications, pp 179-185.

Hill, Martin (1995). Comparing Michigan Freshwater Fish Consumption with California Saltwater Fish Consumption: A Modified Replication of Murray and Burmaster (1994). Memo to J. Pollock and M. Gassell.

Kleinbaum DG, Kupper LL, Muller KE (1988). **Applied Regression Analysis and Other Multivariable Methods**. 2nd Ed. Boston: PWS-Kent, pp. 45-49.

SAS Institute Inc. (2000). JMP Statistics and Graphics Guide. Version 4. Cary, North Carolina, pp: 34-35.

Appendix K

Data Tables for Section IV Results

San Francisco Bay Seafood Consumption Study



Appendix K- Data Tables for Section IV. Results

Table	Title	Page
K1	Declines by Mode (unadjusted)	K-1
K2	Reason for Declines by Observed Ethnicity (unadjusted)	K-2
K3	Ethnicity (major groups) by Mode among Recent Consumers, Consumers and Respondents (unadjusted and adjusted)	K-3
K4	Ethnicity (with Asian subgroups) by Mode among Recent Consumers, Consumers and Respondents (unadjusted and adjusted)	K-4
K5	Ethnicity by Mode among Consumers (unadjusted and adjusted)	K-5
K6	Sites by Ethnicity (major groups) among Respondents (unadjusted)	K-6
K7	Sites by Asian Ethnicity among Respondents (unadjusted)	K-7
K8	Interview Language by Mode among Recent Consumers, Consumers and Respondents (unadjusted and adjusted)	K-8
K9	Sites by Interview Language among Respondents (unadjusted)	K-9
K10	Income by Mode among Recent Consumers, Consumers and Respondents (unadjusted and adjusted)	K-10
K11	Ethnicity by Income among Consumers (unadjusted and adjusted)	K-11
K12	Education by Mode among Recent Consumers, Consumers and Respondents (unadjusted and adjusted)	K-12
K13	Ethnicity by Education Level among Consumers (unadjusted and adjusted)	K-13
K14	Gender by Mode among Recent Consumers, Consumers and Respondents (unadjusted and adjusted)	K-14
K15	Age by Mode among Recent Consumers, Consumers and Respondents (unadjusted and adjusted)	K-15
K16	Age by Gender among Recent Consumers, Consumers and Respondents (unadjusted and adjusted)	K-16
K17	Age by Weekend/Weekday among Consumers and Respondents (unadjusted and adjusted)	K-17
K18	Season of Interview by Mode among Recent Consumers, Consumers and Respondents (unadjusted and adjusted)	K-18
K19	Ethnicity by Season of Interview among Consumers (unadjusted and adjusted)	K-19
K20	Ethnicity by Years Eating SF Bay Fish among Consumers (unadjusted and adjusted)	K-20
K21	Fish Fate for Recent Consumers, Consumers, Non-Consumers, and Respondents (unadjusted and adjusted)	K-21
K22	Household Members Who Eat San Francisco Bay Fish by Mode (unadjusted)	K-22
K23	Household Members Who Eat San Francisco Bay Fish by Ethnicity (unadjusted)	K-23
K24	Who Cooks or Prepares SF Bay Fish by Mode (unadjusted)	K-24
K25	Who Cooks or Prepares SF Bay Fish by Ethnicity (unadjusted)	K-25
K26	Portion Size Responses (unadjusted and adjusted)	K-26

Appendix K – Data Tables for Section IV Results (continued)

Table	Title	Page
K27	Portion Size (in ounces) among consumers (unadjusted and adjusted)	K-27
K28	Meal Frequency among Recent Consumers Based on 4-week Recall (Unadjusted and adjusted)	K-28
K29	Consumption Rates (g/d) among Recent Consumers Based on Four Week Recall (unadjusted and adjusted)	K-29
K30a	Consumption Rates (g/d) among Consumers Based on 4-Week Recall (unadjusted)	K-30
K30b	Consumption Rates (g/d) among Consumers Based on 12 Month Recall (unadjusted)	K-30
K31a	Per Angler Consumption Rates (g/d) Based on 4-Week Recall (unadjusted and adjusted)	K-31
K31b	Per Angler Consumption Rates (g/d) Based on 12 Month Recall (unadjusted)	K-31
K32	Portion Size (ounces) (Mean and Confidence Intervals) among Consumers by Demographic Factors (unadjusted and adjusted)	K-32
K33	Meal Frequency (Last 4 weeks) (Geometric Mean and Confidence Intervals) among Recent Consumers by Demographic Factors (unadjusted and adjusted)	K-33
K34a	Meal Frequency in Last 4 Weeks among Recent Consumers by Demographic Factors (unadjusted)	K-34
K34b	Meal Frequency in Last 4 Weeks among Recent Consumers by Demographic Factors (adjusted)	K-36-K-37
K35	Consumption Rate (g/d) (Geometric Mean and Confidence Intervals) among Recent Consumers by Demographic Factors (unadjusted and adjusted)	K-38
K36a	Consumption Rates (g/d) among Recent Consumers by Demographic Factors (unadjusted)	K-39-K-40
K36b	Consumption Rates (g/d) among Recent Consumers by Demographic Factors (adjusted)	K-41-K-42
K37a	Consumers with Consumption Above and Below Health Advisory (unadjusted and adjusted)	K-43
K37b	Consumers with Consumption Above and Below the Health Advisory (row%) (unadjusted and adjusted)	K-44
K38	Consumers with Consumption Above the 95 th Percentile (unadjusted and adjusted)	K-45
K39	Consumers of White Croaker, Leopard Shark, and Striped Bass by Demographic Factors (unadjusted)	K-46
K40	Recent Consumption of Seven SF Bay Fish Species by Demographic Factors (unadjusted)	K-47
K41	Fish Parts Consumed and Fish Preparation Practices among Consumers of White Croaker, Leopard Shark, and Striped Bass (unadjusted and adjusted)	K-48

Appendix K – Data Tables for Section IV Results (continued)

Table	Title	Page
K42a	Consumption of Striped Bass Skin by Demographic Factors (unadjusted and adjusted)	K-49
K42b	Consumption of Striped Bass Guts by Demographic Factors (unadjusted and adjusted)	K-50
K42c	Consumption of Striped Bass Cooking Juices by Demographic Factors (unadjusted and adjusted)	K-51
K42d	Consumption of Striped Bass in Soup by Demographic Factors (unadjusted and adjusted)	K-52
K42e	Consumption of Striped Bass Raw by Demographic Factors (unadjusted and adjusted)	K-53
K43a	Consumption of White Croaker Skin by Demographic Factors (unadjusted and adjusted)	K-54
K43b	Consumption of White Croaker Guts by Demographic Factors (unadjusted and adjusted)	K-55
K43c	Consumption of White Croaker Cooking Juices by Demographic Factors (unadjusted and adjusted)	K-56
K43d	Consumption of White Croaker in Soup by Demographic Factors (unadjusted and adjusted)	K-57
K43e	Consumption of White Croaker Raw by Demographic Factors (unadjusted and adjusted)	K-58
K44	Recent Consumption of Fish from Areas Outside SF Bay and from Stores or Restaurants (unadjusted and adjusted)	K-59
K45a	Consumption Rates (g/d) for Fish from Other Sources (unadjusted)	K-60
K45b	Consumption Rates (g/d) for Fish from Other Sources (adjusted)	K-61
K46	Recent Consumption of Shellfish Among Consumers of SF Bay Fish (unadjusted and adjusted)	K-62
K47	Recent Consumption of Crab by Demographic Factors (unadjusted and adjusted)	K-63
K48	Meal Frequency of Crab and Shellfish (unadjusted and adjusted)	K-64
K49	Awareness of Health Advisory by Demographic Factors (unadjusted and adjusted)	K-65
K50	Comprehension of Health Advisory by Mode (unadjusted and adjusted)	K-66
K51	Comprehension of Health Advisory by Ethnicity (unadjusted and adjusted)	K-67
K52	Comprehension of Health Advisory by Income (unadjusted and adjusted)	K-68
K53	Comprehension of Health Advisory by Education (unadjusted and adjusted)	K-69
K54	Consumers with Consumption Above and Below the Advisory (unadjusted and adjusted)	K-70

Appendix K – Data Tables for Section IV Results (continued)

Table	Title	Page
K55	How Anglers Have and Have Not Changed Fish Eating Habits (unadjusted and adjusted)	K-71
K56	Consumers Who Changed Fish Eating Habits by Demographic Factors (unadjusted and adjusted)	K-72
K57	Non-Consumers Who Changed Fish Eating Habits by Demographic Factors (unadjusted and adjusted)	K-73
K58	How Respondents Prefer to Receive Information About Fish by Mode and Ethnicity (unadjusted)	K-74
K59	How Consumers Prefer to Receive Information About Fish by Mode and Ethnicity (unadjusted)	K-75

Table K1. Declines by Mode (unadjusted)

A. Reason for Declining	Pier		Beach and Bank		Private Boats		Party Boats		Total	
	n	%	n	%	n	%	n	%	n	%
Language Problem	125	44	7	25	9	11	3	37	144	35
No Time	64	22	8	29	54	66	3	37	129	32
Not Interested	52	18	9	32	7	9	1	13	69	17
Other	27	9	2	7	8	8	1	13	38	9
Missing/Don't Know	20	7	2	7	5	6	0	0	27	7
Total	288	100	28	100	83	100	8	100	407	100

B. Observed Ethnicity of Decliners (major groups)	Pier		Beach and Bank		Private Boats		Party Boats		Total	
	n	%	n	%	n	%	n	%	n	%
African American	12	4	1	4	3	4	0	0	16	4
Latino/Hispanic	16	5	7	27	7	9	0	0	30	7
Caucasian	52	17	4	15	47	64	5	64	108	27
Asian	171	58	14	54	16	22	3	36	204	50
Native American	1	0	0	0	0	0	0	0	1	0
Missing/Don't Know	47	16	0	0	1	1	0	0	48	12
Total	299	100	26	100	74	100	8	100	407	100

C. Observed Ethnicity of Decliners (with Asian subgroups)	Pier		Beach and Bank		Private Boats		Party Boats		Total	
	n	%	n	%	n	%	n	%	n	%
African American	12	4	1	4	3	4	0	0	16	4
Latino/Hispanic	16	5	7	27	7	9	0	0	30	7
Caucasian	52	17	4	15	47	64	5	64	108	27
Chinese	38	13	3	12	2	3	1	12	44	11
Filipino	39	13	0	0	2	3	1	12	42	10
Vietnamese	33	11	8	31	6	8	0	0	47	12
SouthEast Asian (not Vietnamese)	4	2	1	4	0	0	0	0	5	1
Korean	18	6	0	0	0	0	0	0	18	4
Asian - unknown	39	13	2	7	6	8	1	12	48	12
Native American	1	0	0	0	0	0	0	0	1	0
Missing/Don't Know	47	16	0	0	1	1	0	0	48	12
Total	271	91	18	69	64	87	8	100	361	89

D. Observed Language of Decliners	Pier		Beach and Bank		Private Boats		Party Boats		Total	
	n	%	n	%	n	%	n	%	n	%
English	117	38	10	42	61	88	5	64	193	48
Spanish	8	3	4	17	2	3	0	0	14	3
Vietnamese	12	4	7	29	5	7	0	0	24	6
Cantonese	8	3	2	8	1	1	0	0	11	3
Mandarin	0	0	0	0	0	0	1	12	1	0
Tagalog	14	4	0	0	1	1	1	12	16	4
SouthEast Asian (not Vietnamese)	2	1	1	4	0	0	0	0	3	1
Russian	8	3	0	0	0	0	0	0	8	2
Korean	13	4	0	0	0	0	0	0	13	3
Other Asian	6	2	0	0	0	0	0	0	6	1
Missing/Don't Know	117	38	0	0	0	0	1	12	118	29
Total	305	100	24	100	70	100	8	100	407	100

Table K2. Reason for Declines by Observed Ethnicity (unadjusted)

Reason for Declining	Caucasian		African American		Latino/Hispanic		Chinese		Vietnamese		Filipino		Other Asian ¹		Other ²		Missing/Don't Know		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Language Problem	7	7	0	0	10	33	25	58	30	65	13	31	46	65	4	80	9	19	144	36
No Time	54	51	7	43	10	33	5	11	8	17	13	31	12	17	1	20	19	40	129	32
Not Interested	18	17	5	31	6	21	9	20	3	6	9	22	4	6	0	0	11	23	65	16
Appeared Threatening	4	4	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	5	1
First Time Fishing	2	2	0	0	2	7	1	2	1	2	0	0	0	0	0	0	0	0	6	1
Don't Eat Fish	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	5	1
Other	7	7	2	13	1	3	1	2	2	4	1	2	3	4	0	0	3	6	20	5
Missing/Don't Know	9	9	2	13	1	3	3	7	3	6	6	14	5	7	0	0	4	8	33	8
Total	104	100	16	100	30	100	44	100	47	100	42	100	71	100	5	100	48	100	407	100

¹ Other Asian includes Korean (n=18), SE Asian (n=5), and unknown Asian (n=48).

² Other includes Russian (n=4) and Native American (n=1).

Table K3. Ethnicity (major groups) by Mode Among Recent Consumers, Consumers and Respondents (unadjusted & adjusted)

A. Recent Consumers

Ethnicity	n	Pier %	%adj ¹	n	Beach and Bank %	%adj ¹	n	Private Boats %	%adj ¹	n	Party Boats %	%adj ¹	n	Total %	%adj ¹
Black/African American	25	9	8	7	18	19	11	6	4	4	10	14	47	9	8
Latino/Hispanic	36	13	14	10	26	32	11	6	4	2	5	6	59	11	11
Caucasian	41	15	14	5	13	14	99	54	63	25	62	63	170	32	38
Asian	161	57	61	17	43	35	47	26	24	8	20	16	233	43	40
Other	7	3	2	0	0	0	3	2	1	0	0	0	10	2	1
Missing/Don't Know/Declined	7	3	1	0	0	0	10	6	4	1	3	1	18	3	2
Total	277	100	100	39	100	100	181	100	100	40	100	100	537	100	100

Chi-square statistic not valid due to small cell sizes.

B. Consumers

Ethnicity	n	Pier %	%adj ¹	n	Beach and Bank %	%adj ¹	n	Private Boats %	%adj ¹	n	Party Boats %	%adj ¹	n	Total %	%adj ¹
Black/African American	63	11	12	11	14	12	22	6	6	8	8	9	104	9	9
Latino/Hispanic	97	17	20	20	25	28	27	7	7	7	7	6	151	13	14
Caucasian	121	21	21	14	17	16	233	60	66	63	64	65	431	38	43
Asian	273	46	45	34	42	42	77	19	14	16	17	14	400	35	30
Other	15	3	1	1	1	0	10	3	2	1	1	2	27	2	2
Missing/Don't Know/Declined	14	2	1	1	1	2	21	5	5	3	3	4	39	3	2
Total	583	100	100	81	100	100	390	100	100	98	100	100	1152	100	100

Chi-square p-value < 0.0001.²

C. Respondents

Ethnicity	n	Pier %	%adj ¹	n	Beach and Bank %	%adj ¹	n	Private Boats %	%adj ¹	n	Party Boats %	%adj ¹	n	Total %	%adj ¹
Black/African American	73	11	11	16	16	14	28	6	6	8	8	8	125	9	9
Latino/Hispanic	113	16	18	23	23	28	29	7	7	7	7	5	172	13	14
Caucasian	174	25	28	21	21	21	257	60	66	68	65	67	520	40	44
Asian	302	43	40	36	37	35	82	19	14	17	16	15	437	33	28
Other	19	3	2	2	2	1	10	2	2	1	1	2	32	2	2
Missing/Don't Know/Declined	14	2	1	1	1	1	27	6	5	3	3	3	45	3	3
Total	695	100	100	99	100	100	433	100	100	104	100	100	1331	100	100

Chi-square p-value < 0.0001.²

1 Adjusted for avidity bias.

2 Missing/Don't Know/Declined not included in Chi-square statistic. Chi-square statistic was calculated for unadjusted data only.

Table K4. Ethnicity (with Asian subgroups) by Mode Among Recent Consumers, Consumers and Respondents (unadjusted & adjusted)

A. Recent Consumers

Ethnicity	Pier			Beach and Bank			Private Boats			Party Boats			Total		
	n	%	%adj ¹	n	%	%adj ¹	n	%	%adj ¹	n	%	%adj ¹	n	%	%adj ¹
Black/African American	25	9	8	7	18	19	11	6	4	4	10	14	47	9	8
Latino/Hispanic	36	13	14	10	25	32	11	6	4	2	5	6	59	11	11
Caucasian	41	15	14	5	13	14	99	55	62	25	62	63	170	32	38
Chinese	21	8	6	3	8	10	8	4	3	3	8	6	35	6	5
Filipino	70	25	24	3	8	9	9	5	4	2	5	2	84	16	13
Vietnamese	40	14	20	4	10	6	21	12	13	0	0	0	65	12	14
Pacific Islander	8	3	2	5	13	5	1	1	1	0	0	0	14	2	1
Other Asian	22	8	9	2	5	5	8	4	4	3	8	8	35	6	7
Other	7	2	2	0	0	0	3	2	1	0	0	0	10	2	1
Missing/Don't Know/Declined	7	3	1	0	0	0	10	5	4	1	2	1	18	4	2
Total	277	100	100	39	100	100	181	100	100	40	100	100	537	100	100

Chi-square statistic not valid due to small cell sizes.

B. Consumers

Ethnicity	Pier			Beach and Bank			Private Boats			Party Boats			Total		
	n	%	%adj ¹	n	%	%adj ¹	n	%	%adj ¹	n	%	%adj ¹	n	%	%adj ¹
Black/African American	63	11	12	11	13	12	22	6	6	8	8	9	104	9	9
Latino/Hispanic	97	17	20	20	25	28	27	7	7	7	7	6	151	13	14
Caucasian	121	20	21	14	17	16	233	60	66	63	65	65	431	38	43
Chinese	40	7	5	4	5	5	15	4	3	4	4	2	63	6	4
Filipino	120	21	20	12	15	23	17	4	2	8	8	7	157	14	12
Vietnamese	62	11	11	7	9	5	27	7	6	0	0	0	96	8	7
Pacific Islander	12	2	2	8	10	6	5	1	1	1	1	2	26	2	2
Other Asian	39	7	7	3	4	2	13	3	3	3	3	3	58	5	5
Other	15	2	1	1	1	0	10	3	2	1	1	2	27	2	1
Missing/Don't Know/Declined	14	2	1	1	1	3	21	5	4	3	3	4	39	3	3
Total	583	100	100	81	100	100	390	100	100	98	100	100	1152	100	100

Chi-square p-value < 0.0001²

C. Respondents

Ethnicity	Pier			Beach and Bank			Private Boats			Party Boats			Total		
	n	%	%adj ¹	n	%	%adj ¹	n	%	%adj ¹	n	%	%adj ¹	n	%	%adj ¹
Black/African American	73	11	11	16	16	14	28	6	6	8	8	8	125	9	9
Latino/Hispanic	113	16	18	23	24	28	29	8	7	7	7	5	172	13	13
Caucasian	174	25	28	21	21	21	257	59	66	68	65	66	520	39	45
Chinese	48	7	6	4	4	4	17	4	3	4	4	2	73	6	4
Filipino	127	18	17	12	12	18	18	4	2	8	7	7	165	13	11
Vietnamese	64	9	8	7	7	4	27	6	5	0	0	0	98	7	6
Pacific Islander	15	2	2	9	9	6	5	1	1	1	1	2	30	2	2
Other Asian	48	7	7	4	4	3	15	4	3	4	4	4	71	5	5
Other	19	3	2	2	2	1	10	2	2	1	1	2	32	3	2
Missing/Don't Know/Declined	14	2	1	1	1	1	27	6	5	3	3	4	45	3	3
Total	695	100	100	99	100	100	433	100	100	104	100	100	1331	100	100

Chi-square p-value < 0.0001²

1 Adjusted for avidity bias.

2 Missing/Don't Know/Declined not included in Chi-square statistic. Chi-square statistic was calculated for unadjusted data only.

Table K5. Ethnicity by Mode Among Consumers (unadjusted & adjusted)

A. Ethnicity (major groups)	Pier		Beach and Bank		Private Boats		Party Boats		Total				
	n	row% adj row% ¹	n	row% adj row% ¹	n	row% adj row% ¹	n	row% adj row% ¹	n	row% adj row% ¹			
Black/African American	63	61	56	11	10	9	22	21	23	8	12	104	100
Latino/Hispanic	97	64	60	20	13	14	27	18	21	7	5	151	100
Caucasian	121	28	21	14	3	3	233	54	58	63	15	431	100
Asian	273	68	66	34	9	10	77	19	18	16	4	400	100
Other	15	55	35	1	4	2	10	37	49	1	4	27	100
Total ²	569	51	44	80	7	7	369	33	37	95	9	1113	100
Chi-square p-value < 0.0001 ³													

1 Adjusted for avidity bias.

2 Information missing for 39 Consumers.

3 Missing not included in Chi-square statistic. Chi-square statistic was calculated for unadjusted data only.

B. Ethnicity (with Asian subgroups)	Pier		Beach and Bank		Private Boats		Party Boats		Total		
	n	row% row% ¹	n	row% row% ¹	n	row% row% ¹	n	row% row% ¹	n	row% row% ¹	
Black/African American	63	61	11	10	9	22	21	8	8	104	100
Latino/Hispanic	97	64	20	13	14	27	18	7	5	151	100
Caucasian	121	28	14	3	3	233	54	63	15	431	100
Chinese	40	64	4	6	10	15	24	4	6	63	100
Filipino	120	76	12	8	13	17	11	8	5	157	100
Vietnamese	62	65	7	7	5	27	28	0	0	96	100
Pacific Islander	12	46	8	31	26	5	19	1	4	26	100
Other Asian	39	67	3	5	4	13	23	3	5	58	100
Other	15	55	1	4	2	10	37	1	4	27	100
Total ²	569	51	80	7	7	369	33	95	9	1113	100
Chi-square p-value < 0.0001 ³											

1 Adjusted for avidity bias.

2 Information missing for 39 Consumers.

3 Missing not included in Chi-square statistic. Chi-square statistic was calculated for unadjusted data only.

Table K6. Sites by Ethnicity (major groups) Among Respondents (unadjusted)

Sites	African American n row%	Latino/ Hispanic n row%	Caucasian n row%	Asian n row%	Other n row%	Missing/ Don't Know n row%	Total n row%
Piers/Beach and Bank:							
Vallejo Waterfront	19 21	11 12	27 29	30 33	4 4	1 1	92 100
Martinez Shoreline Park	1 2	2 4	39 76	7 14	1 2	1 2	51 100
Point Pinole Shoreline Park	5 11	6 13	5 11	29 63	0 0	1 2	46 100
Berkeley Pier	22 17	17 13	23 18	59 46	5 4	4 3	130 100
Port View Park	16 52	1 3	2 6	12 39	0 0	0 0	31 100
Alameda Rockwall	0 0	4 16	6 24	14 56	1 4	0 0	25 100
Dumbarton Bridge Pier	2 4	13 23	19 34	21 37	0 0	1 2	56 100
Coyote Point	1 3	8 24	6 18	17 52	1 3	0 0	33 100
Oyster Point	3 6	17 31	11 20	18 33	4 7	1 2	54 100
Candlestick Point	2 7	7 25	2 7	16 57	1 4	0 0	28 100
San Francisco Muni Pier	2 4	10 22	8 20	23 52	1 2	1 2	45 100
Fort Point Pier	4 8	3 6	6 12	35 66	3 6	1 2	52 100
Fort Baker Pier	8 11	10 14	22 30	33 44	0 0	1 1	74 100
McNear's Beach	4 5	27 35	19 25	24 31	0 0	3 4	77 100
Piers/Beach/Bank Total	89 11	136 17	195 25	338 43	21 3	15 2	794 100
Private Boats:							
Vallejo Marina	7 5	12 9	86 63	19 14	5 4	8 6	137 100
Richmond Marina	16 13	6 5	62 49	34 27	2 2	6 5	126 100
San Leandro Marina	1 2	4 7	38 64	9 16	2 3	4 7	58 100
Oyster Point Marina	3 7	5 12	16 38	15 36	1 2	2 5	42 100
Lock Lomond Marina	1 1	2 3	55 79	5 7	0 0	7 10	70 100
Private Boats Total	28 6	29 7	257 59	82 19	10 2	27 6	433 100
Party Boats:							
San Pablo Yacht Harbor	1 8	0 0	11 84	1 8	0 0	0 0	13 100
Emeryville Marina	5 9	7 13	31 54	11 20	1 2	1 2	56 100
San Francisco Fisherman's Wharf	2 6	0 0	26 74	5 14	0 0	2 6	35 100
Party Boats Total	8 8	7 7	68 65	17 16	1 1	3 3	104 100
Total	125 9	172 13	520 39	437 33	32 2	45 3	1331 100

Table K7. Sites by Asian Ethnicity Among Respondents (unadjusted)

Sites	Chinese		Filipino		Vietnamese		Pacific Islander		SE Asian ¹		Mixed Asian		Japanese		Korean		Missing		Total	
	n	row%	n	row%	n	row%	n	row%	n	row%	n	row%	n	row%	n	row%	n	row%	n	row%
Piers/Beach and Bank:																				
Vallejo Waterfront	2	7	22	73	0	0	5	17	0	0	0	0	1	3	0	0	0	0	30	100
Martinez Shoreline Park	1	14	2	29	2	29	1	14	0	0	1	14	0	0	0	0	0	0	7	100
Point Pinole Shoreline Park	4	14	7	24	6	21	0	0	2	7	2	7	2	7	5	17	1	3	29	100
Berkeley Pier	11	19	14	24	26	43	3	5	0	0	0	0	3	5	1	2	1	2	59	100
Port View Park	0	0	2	17	5	41	3	25	2	17	0	0	0	0	0	0	0	0	12	100
Alameda Rockwall	1	7	9	65	1	7	0	0	1	7	1	7	0	0	0	0	1	7	14	100
Dumbarton Bridge Pier	4	19	10	47	5	24	1	5	0	0	0	0	0	0	0	0	1	5	21	100
Coyote Point	0	0	7	41	6	35	2	12	0	0	1	6	1	6	0	0	0	0	17	100
Oyster Point	2	11	9	50	4	22	3	17	0	0	0	0	0	0	0	0	0	0	18	100
Candlestick Point	1	6	7	44	8	50	0	0	0	0	0	0	0	0	0	0	0	0	16	100
San Francisco Muni Pier	8	35	9	40	1	4	1	4	2	9	0	0	1	4	0	0	1	4	23	100
Fort Point Pier	9	26	16	44	3	9	1	3	3	9	0	0	1	3	1	3	1	3	35	100
Fort Baker Pier	4	12	18	55	1	3	4	12	4	12	0	0	0	0	1	3	1	3	33	100
McNear's Beach	5	21	7	29	3	13	0	0	1	4	0	0	0	0	8	33	0	0	24	100
Piers/Beach/Bank Total	52	15	139	42	71	21	24	7	15	4	5	1	9	3	16	5	7	2	338	100
Private Boats:																				
Vallejo Marina	0	0	7	37	4	21	4	21	0	0	0	0	1	5	1	5	2	11	19	100
Richmond Marina	6	18	5	15	15	43	0	0	0	0	0	0	3	9	2	6	3	9	34	100
San Leandro Marina	0	0	0	0	8	89	0	0	0	0	0	0	1	11	0	0	0	0	9	100
Oyster Point Marina	7	46	6	40	0	0	1	7	0	0	0	0	0	0	0	0	1	7	15	100
Lock Lomond Marina	4	78	0	2	0	0	0	0	0	0	0	0	0	0	1	20	0	0	5	100
Private Boats Total	17	21	18	22	27	33	5	6	0	0	0	0	5	6	4	5	6	7	82	100
Party Boats:																				
San Pablo Yacht Harbor	0	0	0	0	0	0	0	0	0	0	1	100	0	0	0	0	0	0	1	100
Emeryville Marina	2	18	7	64	0	0	0	0	0	0	1	9	0	0	1	9	0	0	11	100
San Francisco Fisherman's Wharf	2	40	1	20	0	0	1	20	0	0	0	0	1	20	0	0	0	0	5	100
Party Boats Total	4	24	8	46	0	0	1	6	0	0	2	12	1	6	1	6	0	0	17	100
Total	73	17	165	38	98	22	30	7	15	3	7	2	15	3	21	5	13	3	437	100

1 Southeast Asian other than Vietnamese.

Table K8. Interview Language by Mode Among Recent Consumers, Consumers and Respondents (unadjusted & adjusted)

A. Recent Consumers

Interview Language	Pier		Beach and Bank		Private Boats		Party Boats		Total	
	n	%	n	%	n	%	n	%	n	%
English	221	80	29	74	157	86	40	100	447	84
Spanish	22	8	6	15	0	0	0	0	28	5
Vietnamese	17	6	1	3	10	6	0	0	28	5
Cantonese	11	4	2	5	3	2	0	0	16	3
Mandarin	0	0	0	0	0	0	0	0	0	0
Missing/Don't Know/Declined	6	2	1	3	11	6	0	0	18	3
Total	277	100	39	100	181	100	40	100	537	100

Chi-square statistic not valid due to small cell sizes.

B. Consumers

Interview Language	Pier		Beach and Bank		Private Boats		Party Boats		Total	
	n	%	n	%	n	%	n	%	n	%
English	485	83	67	82	352	90	95	97	999	87
Spanish	39	7	9	11	2	1	0	0	50	4
Vietnamese	22	4	2	3	10	2	0	0	34	3
Cantonese	12	2	2	3	3	1	0	0	17	2
Mandarin	1	0	0	0	0	0	0	0	1	0
Missing/Don't Know/Declined	24	4	1	1	23	6	3	3	51	4
Total	583	100	81	100	390	100	98	100	1152	100

Chi-square statistic not valid due to small cell sizes.

C. Respondents

Interview Language	Pier		Beach and Bank		Private Boats		Party Boats		Total	
	n	%	n	%	n	%	n	%	n	%
English	589	85	84	85	392	91	104	100	1169	88
Spanish	41	6	10	10	2	0	0	0	53	4
Vietnamese	22	3	2	2	10	2	0	0	34	3
Cantonese	12	2	2	2	3	1	0	0	17	1
Mandarin	2	0	0	0	0	0	0	0	2	0
Missing/Don't Know/Declined	29	4	1	1	26	6	0	0	56	4
Total	695	100	99	100	433	100	104	100	1331	100

Chi-square statistic not valid due to small cell sizes.

1 Adjusted for avidity bias.

Table K9. Sites by Interview Language Among Respondents (unadjusted)

Sites	English		Spanish		Vietnamese		Cantonese		Mandarin		Missing		Total		Total Non-English	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	row%
Piers/Beach and Bank:																
Vallejo Waterfront	88	8	1	2	0	0	0	0	0	0	3	5	92	7	1	1
Martinez Shoreline Park	47	4	1	2	0	0	0	0	0	0	3	5	51	4	1	2
Point Pinole Shoreline Park	35	3	4	8	4	12	2	12	0	0	1	2	46	3	10	22
Berkeley Pier	101	9	4	8	12	34	2	12	0	0	11	18	130	11	18	14
Port View Park	29	2	1	2	1	3	0	0	0	0	0	0	31	2	2	6
Alameda Rockwall	22	2	2	4	0	0	1	6	0	0	0	0	25	2	3	12
Dumbarton Bridge Pier	51	4	1	2	2	6	1	6	0	0	1	2	56	4	4	7
Coyote Point	25	2	3	6	4	12	0	0	0	0	1	2	33	2	7	21
Oyster Point	48	4	3	6	0	0	1	6	0	0	2	4	54	4	4	7
Candlestick Point	26	2	2	4	0	0	0	0	0	0	0	0	28	2	2	7
San Francisco Muni Pier	33	3	5	9	0	0	4	22	1	50	2	4	45	3	10	22
Fort Point Pier	46	4	1	2	1	3	3	18	0	0	1	2	52	4	5	10
Fort Baker Pier	64	5	5	9	0	0	0	0	1	50	4	7	74	6	6	8
McNear's Beach	58	5	18	32	0	0	0	0	0	0	1	2	77	6	18	23
Piers/Beach/Bank Total	673	57	51	96	24	70	14	82	2	100	30	53	794	60	91	11
Private Boats:																
Vallejo Marina	134	12	1	2	0	0	0	0	0	0	2	4	137	11	1	1
Richmond Marina	111	9	0	0	5	15	0	0	0	0	10	17	126	9	5	4
San Leandro Marina	50	4	1	2	5	15	0	0	0	0	2	4	58	4	6	10
Oyster Point Marina	32	3	0	0	0	0	3	18	0	0	7	13	42	3	3	7
Lock Lomond Marina	65	6	0	0	0	0	0	0	0	0	5	9	70	5	0	0
Private Boats Total	392	34	2	4	10	30	3	18	0	0	26	47	433	32	15	3
Party Boats:																
San Pablo Yacht Harbor	13	1	0	0	0	0	0	0	0	0	0	0	13	1	0	0
Emeryville Marina	56	5	0	0	0	0	0	0	0	0	0	0	56	4	0	0
San Francisco Fisherman's Wharf	35	3	0	0	0	0	0	0	0	0	0	0	35	3	0	0
Party Boats Total	104	9	0	0	0	0	0	0	0	0	0	0	104	8	0	0
Total	1169	100	53	100	34	100	17	100	2	100	56	100	1331	100	106	8
Percent of Total		88		4		3		1		0		4		100		8

Table K10. Income by Mode Among Recent Consumers, Consumers and Respondents (unadjusted & adjusted)

A. Recent Consumers

Income	n	Pier %	%adj ¹	n	Beach and Bank %	%adj ¹	n	Private Boats %	%adj ¹	n	Party Boats %	%adj ¹	n	Total %	%adj ¹
< \$20,000/year	89	32	33	8	21	27	20	11	11	2	5	8	119	22	21
\$20,000 - \$45,000/year	81	30	26	15	38	25	34	19	19	8	20	16	138	26	22
> \$45,000/year	73	26	28	13	33	36	91	50	55	26	65	69	203	38	44
Missing/Don't Know/Declined	34	12	13	3	8	12	36	20	15	4	10	7	77	14	13
Total	277	100	100	39	100	100	181	100	100	40	100	100	537	100	100

Mantel-Haenszel Chi-square p-value < 0.0001.²

B. Consumers

Income	n	Pier %	%adj ¹	n	Beach and Bank %	%adj ¹	n	Private Boats %	%adj ¹	n	Party Boats %	%adj ¹	n	Total %	%adj ¹
< \$20,000/year	159	27	26	14	17	16	41	11	10	3	3	5	217	19	16
\$20,000 - \$45,000/year	187	32	34	31	38	38	71	18	18	20	21	15	309	27	26
> \$45,000/year	166	29	30	29	36	32	205	52	56	63	64	68	463	40	45
Missing/Don't Know/Declined	71	12	10	7	9	14	73	19	16	12	12	12	163	14	13
Total	583	100	100	81	100	100	390	100	100	98	100	100	1152	100	100

Mantel-Haenszel Chi-square p-value < 0.0001.²

C. Respondents

Income	n	Pier %	%adj ¹	n	Beach and Bank %	%adj ¹	n	Private Boats %	%adj ¹	n	Party Boats %	%adj ¹	n	Total %	%adj ¹
< \$20,000/year	182	26	24	16	16	13	42	10	9	3	3	4	243	18	16
\$20,000 - \$45,000/year	216	32	31	35	35	37	77	18	18	20	19	14	348	26	25
> \$45,000/year	211	30	33	38	39	35	231	53	57	68	65	69	548	42	46
Missing/Don't Know/Declined	86	12	12	10	10	15	83	19	16	13	13	13	192	14	13
Total	695	100	100	99	100	100	433	100	100	104	100	100	1331	100	100

Mantel-Haenszel Chi-square p-value < 0.0001.²

1 Adjusted for avidity bias.

2 Missing/Don't Know/Declined not included in Chi-square statistic. Chi-square statistic was calculated for unadjusted data only.

Table K11. Ethnicity by Income Among Consumers (unadjusted & adjusted)

A. Ethnicity (major groups)	< \$20,000			\$20,000 - \$45,000			> \$45,000			Missing			Total		
	n	row%	adj row% ¹	n	row%	adj row% ¹	n	row%	adj row% ¹	n	row%	adj row% ¹	n	row%	
Black/African American	18	17	19	32	31	27	43	41	40	11	11	14	104	100	
Latino/Hispanic	44	29	25	48	32	32	43	28	32	16	11	11	151	100	
Caucasian	44	10	8	108	25	20	222	52	60	57	13	12	431	100	
Asian	106	27	25	110	28	34	132	33	30	52	12	11	400	100	
Other	3	11	9	7	26	19	14	52	62	3	11	10	27	100	
Total ²	215	19	17	305	27	27	454	41	45	139	13	11	1113	100	

Mantel-Haenszel Chi-square p-value = 0.2017³

1 Adjusted for avidity bias.

2 Ethnicity data missing for 39 Consumers.

3 Missing not included in Chi-square statistic. Chi-square statistic was calculated for unadjusted data only.

B. Ethnicity (with Asian subgroups)	< \$20,000			\$20,000 - \$45,000			> \$45,000			Missing			Total		
	n	row%	adj row% ¹	n	row%	adj row% ¹	n	row%	adj row% ¹	n	row%	adj row% ¹	n	row%	
Black/African American	18	17	19	32	31	27	43	41	40	11	11	14	104	100	
Latino/Hispanic	44	29	25	48	32	32	43	28	32	16	11	11	151	100	
Caucasian	44	10	8	108	25	20	222	52	60	57	13	12	431	100	
Chinese	14	22	18	17	27	35	22	35	36	10	16	11	63	100	
Filipino	39	25	23	40	25	34	60	38	35	18	12	8	157	100	
Vietnamese	41	43	47	23	24	24	19	20	19	13	13	10	96	100	
Pacific Islander	1	4	4	13	50	73	9	35	16	3	11	7	26	100	
Other Asian	11	19	10	17	29	36	22	38	38	8	14	16	58	100	
Other	3	11	9	7	26	19	14	52	62	3	11	10	27	100	
Total ²	215	19	17	305	27	27	454	41	45	139	13	11	1113	100	

Mantel-Haenszel Chi-square p-value = 0.0116³

1 Adjusted for avidity bias.

2 Ethnicity data missing for 39 Consumers.

3 Missing not included in Chi-square statistic. Chi-square statistic was calculated for unadjusted data only.

Table K12. Education by Mode Among Recent Consumers, Consumers and Respondents (unadjusted & adjusted)

A. Recent Consumers

Education	Pier		Beach and Bank		Private Boats		Party Boats		Total	
	n	%	n	%	n	%	n	%	n	%
< 12th Grade	58	21	10	26	18	10	0	0	86	16
Completed HS or GED	85	31	11	28	56	31	11	28	163	30
Some college/trade sch.	83	30	12	31	42	23	14	34	151	28
>= 4 years college	42	15	6	15	42	23	12	30	102	19
Missing/Don't Know/Declined	9	3	0	0	23	13	3	8	35	7
Total	277	100	39	100	181	100	40	100	537	100

Mantel-Haenszel Chi-square p-value < 0.0001.²

B. Consumers

Education	Pier		Beach and Bank		Private Boats		Party Boats		Total	
	n	%	n	%	n	%	n	%	n	%
< 12th Grade	113	20	18	22	30	8	2	2	163	14
Completed HS or GED	193	33	28	35	111	28	24	24	356	31
Some college/trade sch.	169	29	24	30	116	30	30	31	339	29
>= 4 years college	89	15	10	12	83	21	37	38	219	19
Missing/Don't Know/Declined	19	3	1	1	50	13	5	5	75	7
Total	583	100	81	100	390	100	98	100	1152	100

Mantel-Haenszel Chi-square p-value < 0.0001.²

C. Respondents

Education	Pier		Beach and Bank		Private Boats		Party Boats		Total	
	n	%	n	%	n	%	n	%	n	%
< 12th Grade	125	18	19	19	30	7	2	2	176	13
Completed HS or GED	235	34	37	38	120	28	25	24	417	32
Some college/trade sch.	195	28	28	28	128	30	33	32	384	29
>= 4 years college	120	17	13	13	97	22	39	37	269	20
Missing/Don't Know/Declined	20	3	2	2	58	13	5	5	85	6
Total	695	100	99	100	433	100	104	100	1331	100

Mantel-Haenszel Chi-square p-value < 0.0001.²

1 Adjusted for avidity bias.

2 Missing/Don't Know/Declined not included in Chi-square statistic. Chi-square statistic was calculated for unadjusted data only.

Table K13. Ethnicity by Education Level Among Consumers (unadjusted & adjusted)

A. Ethnicity (major groups)	<12th Grade			High School/GED			Some College			>=4 years College			Missing			Total		
	n	row%	adj row% ¹	n	row%	adj row% ¹	n	row%	adj row% ¹	n	row%	adj row% ¹	n	row%	adj row% ¹	n	row%	adj row% ¹
Black/African American	8	8	6	38	37	38	34	33	36	19	18	14	5	4	6	104	100	
Latino/Hispanic	54	36	37	60	40	37	25	17	18	7	5	6	5	2	2	151	100	
Caucasian	25	6	6	140	32	28	143	33	34	98	23	26	25	6	6	431	100	
Asian	69	17	17	109	27	29	121	30	32	82	21	18	19	5	4	400	100	
Other	3	11	14	5	19	27	12	44	34	5	19	20	2	7	5	27	100	
Total ²	159	14	14	352	32	31	335	30	31	211	19	20	56	5	4	1113	100	

Mantel-Haenszel Chi-square p-value = 0.0277³.

1 Adjusted for avidity bias.

2 Ethnicity data missing for 39 Consumers.

3 Missing not included in Chi-square statistic. Chi-square statistic was calculated for unadjusted data only.

B. Ethnicity (with Asian subgroups)	<12th Grade			High School/GED			Some College			>=4 years College			Missing			Total		
	n	row%	adj row% ¹	n	row%	adj row% ¹	n	row%	adj row% ¹	n	row%	adj row% ¹	n	row%	adj row% ¹	n	row%	adj row% ¹
Black/African American	8	8	6	38	37	38	34	33	36	19	18	14	5	4	6	104	100	
Latino/Hispanic	54	36	37	60	40	37	25	17	18	7	5	6	5	2	2	151	100	
Caucasian	25	6	6	140	32	28	143	33	34	98	23	26	25	6	6	431	100	
Chinese	15	24	11	14	22	19	14	22	28	16	25	39	4	7	3	63	100	
Filipino	19	12	13	42	27	25	54	34	39	37	24	20	5	3	3	157	100	
Vietnamese	27	28	32	28	29	34	23	24	20	11	11	6	7	8	8	96	100	
Pacific Islander	3	12	14	9	35	40	9	34	26	5	19	20	0	0	0	26	100	
Other Asian	5	9	9	16	28	33	21	36	38	13	22	15	3	5	5	58	100	
Other	3	11	14	5	19	27	12	44	34	5	19	20	2	7	5	27	100	
Total ²	159	14	14	352	32	31	335	30	31	211	19	20	56	5	4	1113	100	

Mantel-Haenszel Chi-square p-value = 0.1053³.

1 Adjusted for avidity bias.

2 Ethnicity data missing for 39 Consumers.

3 Missing not included in Chi-square statistic. Chi-square statistic was calculated for unadjusted data only.

Table K14. Gender by Mode Among Recent Consumers, Consumers and Respondents (unadjusted & adjusted)

A. Recent Consumers														
Gender	Pier			Beach and Bank			Private Boats			Party Boats			Total	
	n	%	%adj ¹	n	%	%adj ¹	n	%	%adj ¹	n	%	%adj ¹	n	%
Male	247	89	89	36	92	94	157	87	84	34	84	84	474	88
Female	23	8	7	3	8	6	11	6	9	5	13	15	42	8
Missing/Don't Know/Declined	7	3	4	0	0	0	13	7	7	1	3	1	21	4
Total	277	100	100	39	100	100	181	100	100	40	100	100	537	100

Chi-square statistic not valid due to small cell sizes.

B. Consumers													
Gender	Pier		Beach and Bank		Private Boats		Party Boats		Total				
	n	%	n	%	n	%	n	%	n	%			
Male	522	89	75	93	326	84	85	87	1008	88			
Female	50	9	6	7	29	7	10	10	95	8			
Missing/Don't Know/Declined	11	2	0	0	35	9	3	3	49	4			
Total	583	100	81	100	390	100	98	100	1152	100			

Chi-square p-value = 0.8750.²

C. Respondents													
Gender	Pier		Beach and Bank		Private Boats		Party Boats		Total				
	n	%	n	%	n	%	n	%	n	%			
Male	624	90	90	91	362	84	91	87	1167	88			
Female	58	8	9	9	31	7	10	10	108	8			
Missing/Don't Know/Declined	13	2	0	0	40	9	3	3	56	4			
Total	695	100	99	100	433	100	104	100	1331	100			
Chi-square p-value = 0.9214 ²													

Chi-square p-value = 0.9214.²

1 Adjusted for avidity bias.

2 Missing/Don't Know/Declined not included in Chi-square statistic. Chi-square statistic was calculated for unadjusted data only.

Table K15. Age by Gender Among Recent Consumers, Consumers and Respondents (unadjusted & adjusted)

A. Recent Consumers

Age	Male		Female		Missing		Total	
	n	%	n	%	n	%	n	%
18-45 years	271	57	24	57	3	14	298	55
46-65 years	154	32	15	36	0	0	169	31
65+ years	47	10	2	5	2	10	51	10
Missing/Don't Know/Declined	2	1	1	2	16	76	19	4
Total	474	100	42	100	21	100	537	100

Mantel-Haenszel Chi-square p-value = 0.5665.²

B. Consumers

Age	Male		Female		Missing		Total	
	n	%	n	%	n	%	n	%
18-45 years	629	62	57	60	8	16	694	60
46-65 years	293	29	31	33	2	4	326	28
65+ years	82	8	5	5	2	4	89	8
Missing/Don't Know/Declined	4	1	2	2	37	76	43	4
Total	1008	100	95	100	49	100	1152	100

Mantel-Haenszel Chi-square p-value = 0.8359.²

C. Respondents

Age	Male		Female		Missing		Total	
	n	%	n	%	n	%	n	%
18-45 years	747	64	68	63	9	16	824	62
46-65 years	324	28	33	30	2	4	359	27
65+ years	92	8	5	5	2	4	99	7
Missing/Don't Know/Declined	4	<1	2	2	43	76	49	4
Total	1167	100	108	100	56	100	1331	100

Mantel-Haenszel Chi-square p-value = 0.6270.²

1 Adjusted for avidity bias.

2 Missing/Don't Know/Declined not included in Chi-square statistic. Chi-square statistic was calculated for unadjusted data only.

Table K16. Age by Mode Among Recent Consumers, Consumers and Respondents (unadjusted & adjusted)

A. Recent Consumers

Age	Pier		Beach and Bank		Private Boats		Party Boats		Total	
	n	%	n	%	n	%	n	%	n	%
18-45 years	157	57	29	74	94	52	18	45	298	55
46-65 years	85	31	9	23	57	31	18	45	169	31
65+ years	29	10	1	3	18	10	3	7	51	10
Missing/Don't Know/Declined	6	2	0	0	12	7	1	3	19	4
Total	277	100	39	100	181	100	40	100	537	100
Mantel-Haenszel Chi-square p-value = 0.3730. ²										

B. Consumers

Age	Pier		Beach and Bank		Private Boats		Party Boats		Total	
	n	%	n	%	n	%	n	%	n	%
18-45 years	363	62	63	78	215	55	53	54	694	60
46-65 years	164	28	16	20	112	29	34	35	326	28
65+ years	46	8	2	2	33	8	8	8	89	8
Missing/Don't Know/Declined	10	2	0	0	30	8	3	3	43	4
Total	583	100	81	100	390	100	98	100	1152	100
Mantel-Haenszel Chi-square p-value = 0.1566. ²										

C. Respondents

Age	Pier		Beach and Bank		Private Boats		Party Boats		Total	
	n	%	n	%	n	%	n	%	n	%
18-45 years	444	64	77	78	244	57	59	56	824	62
46-65 years	188	27	19	19	118	27	34	33	359	27
65+ years	52	7	3	3	36	8	8	8	99	7
Missing/Don't Know/Declined	11	2	0	0	35	8	3	3	49	4
Total	695	100	99	100	433	100	104	100	1331	100
Mantel-Haenszel Chi-square p-value = 0.1803. ²										

1 Adjusted for avidity bias.

2 Missing/Don't Know/Declined not included in Chi-square statistic. Chi-square statistic was calculated for unadjusted data only.

Table K17. Age by Weekend/Weekday Among Consumers and Respondents (unadjusted & adjusted)

A. Consumers

Age	Weekend			Weekday			Total		
	n	%	%adj ¹	n	%	%adj ¹	n	%	%adj ¹
18-45	458	65	64	236	53	51	694	60	59
46-65	197	28	29	129	29	30	326	28	30
+65 years	29	4	4	60	13	13	89	8	7
Missing/Don't Know/Declined	20	3	3	23	5	6	43	4	4
Total	704	100	100	448	100	100	1152	100	100

B. Respondents

Age	Weekend			Weekday			Total		
	n	%	%adj ¹	n	%	%adj ¹	n	%	%adj ¹
18-45	546	67	66	278	54	52	824	62	61
46-65	213	26	27	146	28	31	359	27	28
+65 years	31	4	4	68	13	11	99	7	7
Missing/Don't Know/Declined	23	3	3	26	5	6	49	4	4
Total	813	100	100	518	100	100	1331	100	100

1 Adjusted for avidity bias.

Table K18. Season of Interview by Mode Among Recent Consumers, Consumers and Respondents (unadjusted & adjusted).

A. Recent Consumers

Season	n	Pier %	%adj ¹	Beach and Bank		Private Boats		Party Boats		n	Total %	%adj ¹
				n	%	n	%	n	%			
Winter	32	12	10	11	28	35	19	0	0	78	15	14
Spring	53	19	26	3	8	27	15	1	3	84	16	18
Summer	106	38	36	20	51	78	43	23	57	227	41	41
Fall	86	31	28	5	13	41	23	16	40	148	28	27
Total	277	100	100	39	100	181	100	40	100	537	100	100

Chi-square p-value < 0.0001.²

B. Consumers

Season	n	Pier %	%adj ¹	Beach and Bank		Private Boats		Party Boats		n	Total %	%adj ¹
				n	%	n	%	n	%			
Winter	94	16	19	23	28	85	22	0	0	202	17	20
Spring	114	20	25	6	7	81	21	7	7	208	18	22
Summer	227	39	32	37	46	141	36	53	54	458	40	35
Fall	148	25	24	15	19	83	21	38	39	284	25	23
Total	583	100	100	81	100	390	100	98	100	1152	100	100

Chi-square p-value < 0.0001.²

C. Respondents

Season	n	Pier %	%adj ¹	Beach and Bank		Private Boats		Party Boats		n	Total %	%adj ¹
				n	%	n	%	n	%			
Winter	110	16	18	28	28	97	22	0	0	235	18	20
Spring	142	20	25	7	7	88	20	7	7	244	18	21
Summer	273	40	35	47	48	154	36	56	54	530	40	36
Fall	170	24	22	17	17	94	22	41	39	322	24	23
Total	695	100	100	99	100	433	100	104	100	1331	100	100

Chi-square p-value < 0.0001.²

1 Adjusted for avidity bias.

2 Chi-square statistic was calculated for unadjusted data only.

Table K19. Ethnicity by Season of Interview Among Consumers (unadjusted & adjusted)

A. Ethnicity (major groups)	Winter			Spring			Summer			Fall			Total		
	n	row%	adj row% ¹	n	row%	adj row% ¹	n	row%	adj row% ¹	n	row%	adj row% ¹	n	row%	
Black/African American	23	22	27	13	13	14	43	41	32	25	24	27	104	100	
Latino/Hispanic	40	26	30	29	19	24	45	30	26	37	25	20	151	100	
Caucasian	65	15	18	82	19	23	180	42	36	104	24	23	431	100	
Asian	57	14	15	71	18	22	169	42	38	103	26	25	400	100	
Other	3	11	9	5	19	22	13	48	46	6	22	23	27	100	
Total ²	188	17	20	200	18	22	450	40	35	275	25	23	1113	100	

Chi-square p-value = 0.0572³

1 Adjusted for avidity bias.

2 Information missing for 39 Consumers.

3 Missing not included in Chi-square statistic. Chi-square statistic was calculated for unadjusted data only.

B. Ethnicity (with Asian subgroups)	Winter			Spring			Summer			Fall			Total		
	n	row%	adj row% ¹	n	row%	adj row% ¹	n	row%	adj row% ¹	n	row%	adj row% ¹	n	row%	
Black/African American	23	22	27	13	13	14	43	41	32	25	24	27	104	100	
Latino/Hispanic	40	26	30	29	19	24	45	30	26	37	25	20	151	100	
Caucasian	65	15	18	82	19	22	180	42	37	104	24	23	431	100	
Chinese	13	21	26	13	21	31	21	33	24	16	25	19	63	100	
Filipino	18	11	13	23	15	15	70	45	42	46	29	30	157	100	
Vietnamese	12	12	13	14	15	23	50	52	48	20	21	16	96	100	
Pacific Islander	6	23	31	10	38	40	7	27	11	3	12	18	26	100	
Other Asian	8	14	7	11	19	29	21	36	32	18	31	32	58	100	
Other	3	11	9	5	19	22	13	48	46	6	22	23	27	100	
Total ²	188	17	20	200	18	22	450	40	35	275	25	23	1113	100	

Chi-square p-value = 0.0116³

1 Adjusted for avidity bias.

2 Information missing for 39 Consumers.

3 Missing not included in Chi-square statistic. Chi-square statistic was calculated for unadjusted data only.

Table K20. Ethnicity by Years Eating SF Bay Fish Among Consumers (unadjusted & adjusted)

A. Ethnicity (major groups)	< 1 year		1 - 5 years		6 - 10 years		11 - 20 years		21 - 30 years		30+ years		Total	
	n	row% ¹	adj row% ¹	n	row% ¹	adj row% ¹	n	row% ¹	adj row% ¹	n	row% ¹	adj row% ¹	n	row% ¹
Black/African American	6	6	6	23	23	26	10	10	9	28	29	22	16	16
Latino/Hispanic	28	21	18	56	41	44	19	14	13	13	9	11	11	8
Caucasian	24	6	3	82	21	22	48	12	14	82	21	21	55	14
Asian	63	17	15	147	40	45	63	17	16	52	14	13	19	5
Other	2	9	5	6	27	24	1	4	3	5	23	15	3	14
Total ²	123	12	9	314	31	32	141	14	14	180	18	18	104	10
Mantel-Haenszel Chi-square p-value <0.0001 ³														

1 Adjusted for avidity bias.

2 Information missing for 131 Consumers.

3 Missing not included in Chi-square statistic. Chi-square statistic was calculated for unadjusted data only.

B. Ethnicity (with Asian subgroups)	< 1 year		1 - 5 years		6 - 10 years		11 - 20 years		21 - 30 years		30+ years		Total	
	n	row% ¹	adj row% ¹	n	row% ¹	adj row% ¹	n	row% ¹	adj row% ¹	n	row% ¹	adj row% ¹	n	row% ¹
Black/African American	6	6	23	23	26	10	10	9	28	29	22	16	16	20
Latino/Hispanic	28	21	18	56	41	44	19	14	13	9	11	11	8	9
Caucasian	24	6	3	82	21	22	48	12	82	21	21	55	14	106
Chinese	12	21	15	24	41	43	9	15	5	9	12	3	5	5
Filipino	20	14	13	55	38	39	24	17	27	19	23	10	7	4
Vietnamese	12	14	12	47	53	63	19	22	8	9	4	1	1	0
Pacific Islander	8	32	29	6	24	34	2	8	4	16	7	4	16	23
Other Asian	11	21	21	15	28	35	9	17	8	15	9	1	2	2
Other	2	9	5	6	27	24	1	4	5	23	15	3	14	19
Total ²	123	12	9	314	31	32	141	14	14	180	18	18	104	10
Mantel-Haenszel Chi-square p-value <0.0001 ³														

1 Adjusted for avidity bias.

2 Information missing for 131 Consumers.

3 Missing not included in Chi-square statistic. Chi-square statistic was calculated for unadjusted data only.

Table K21. Fish Fate for Recent Consumers, Consumers, Non-Consumers, and Respondents¹(unadjusted)

Fish Fate	Recent Consumers n=537		Consumers n=1152		Non-Consumers n=179		Respondents n=1331	
	Yes (n)	%	Yes (n)	%	Yes (n)	%	Yes (n)	%
Eat It	503	94	1035	90	20	11	1055	79
Give to Family/Friends	285	53	543	47	77	43	620	47
Trade or Sell It	9	2	15	1	1	<1	16	1
Use for Bait	34	6	66	6	4	2	70	5
Catch and Release	165	31	366	32	110	61	476	36
Other	1	<1	2	<1	6	3	8	1

¹ Respondents may choose more than one category.

Table K22. Household Members Who Eat SF Bay Fish by Mode¹(unadjusted)**A. Recent Consumers**

Household Eaters	Pier n=277		Beach and Bank n=39		Private Boats n=181		Party Boats n=40		Total n=537	
	n	%	n	%	n	%	n	%	n	%
Women between ages 18-45	162	58	24	62	87	48	13	33	286	53
Children between ages 6-17	85	31	15	38	45	25	2	5	147	27
People 65 or older	69	25	5	13	39	22	12	30	125	23
Children under age of 6	55	20	12	31	18	10	3	8	88	16
Women currently pregnant/breastfeeding	13	5	2	5	3	2	0	0	18	3
Missing/Don't Know/Declined	0	0	0	0	0	0	0	0	0	0

B. Consumers

Household Eaters	Pier n=583		Beach and Bank n=81		Private Boats n=390		Party Boats n=98		Total n=1152	
	n	%	n	%	n	%	n	%	n	%
Women between ages 18-45	292	50	45	56	163	42	34	35	534	46
Children between ages 6-17	153	26	24	30	93	24	10	10	280	24
People 65 or older	106	18	10	12	67	17	19	19	202	18
Children under age of 6	81	14	17	21	40	10	6	6	144	13
Women currently pregnant/breastfeeding	16	3	2	3	7	2	1	1	26	2
Missing/Don't Know/Declined	3	1	0	0	1	<1	0	0	4	<1

C. Non-Consumers

Household Eaters	Pier n=112		Beach and Bank n=18		Private Boats n=43		Party Boats n=6		Total n=179	
	n	%	n	%	n	%	n	%	n	%
Women between ages 18-45	12	11	2	11	7	16	2	33	23	13
Children between ages 6-17	5	4	0	0	3	7	1	17	9	5
People 65 or older	7	6	2	11	2	5	1	17	12	7
Children under age of 6	3	3	0	0	2	5	1	17	6	3
Women currently pregnant/breastfeeding	1	1	0	0	0	0	0	0	1	1
Missing/Don't Know/Declined	2	2	0	0	1	2	0	0	3	2

D. Respondents

Household Eaters	Pier n=695		Beach and Bank n=99		Private Boats n=433		Party Boats n=104		Total n=1331	
	n	%	n	%	n	%	n	%	n	%
Women between ages 18-45	304	44	47	47	170	39	36	35	557	42
Children between ages 6-17	158	23	24	24	96	22	11	11	289	22
People 65 or older	113	16	12	12	69	16	20	19	214	16
Children under age of 6	84	12	17	17	42	10	7	7	150	11
Women currently pregnant/breastfeeding	17	2	2	2	7	2	1	1	27	2
Missing/Don't Know/Declined	5	1	0	0	2	<1	0	0	7	1

1 Respondents may choose more than one category.

Table K23. Household Members Who Eat SF Bay Fish by Ethnicity¹ (unadjusted)

A. Recent Consumers											
Household Eaters	African American n=47		Latino/Hispanic n=59		Caucasian n=170		Asian n=233		Other n=10		Total ³ n=519
	n	%	n	%	n	%	n	%	n	%	n
Women between ages 18-45	28	60	36	61	67	39	143	61	6	60	280
Children between ages 6-17	15	32	22	37	30	18	75	32	2	20	144
People 65 or older	3	6	7	12	35	21	73	31	3	30	121
Children under age of 6	13	28	13	22	12	72	44	19	4	40	86
Women currently pregnant/breastfeeding	3	6	4	7	3	0	8	3	0	0	18
Missing/Don't Know/Declined	0	0	0	0	0	0	0	0	0	0	0
B. Consumers											
Household Eaters	African American n=104		Latino/Hispanic n=151		Caucasian n=431		Asian n=400		Other n=27		Total ⁴ n=1113
	n	%	n	%	n	%	n	%	n	%	n
Women between ages 18-45	53	51	79	50	169	39	216	54	11	41	528
Children between ages 6-17	38	37	41	27	79	18	110	28	8	30	276
People 65 or older	8	8	15	10	67	16	101	25	6	22	197
Children under age of 6	22	21	27	18	31	7	55	14	5	19	140
Women currently pregnant/breastfeeding	6	6	6	4	5	1	8	2	0	0	25
Missing/Don't Know/Declined	0	0	1	1	0	0	2	1	1	4	4
C. Non-Consumers											
Household Eaters	African American n=21		Latino/Hispanic n=21		Caucasian n=89		Asian n=37		Other n=5		Total ⁵ n=173
	n	%	n	%	n	%	n	%	n	%	n
Women between ages 18-45	3	14	3	14	9	10	8	22	0	0	23
Children between ages 6-17	1	5	1	5	5	6	2	5	0	0	9
People 65 or older	2	10	1	5	3	3	5	14	1	20	12
Children under age of 6	0	0	1	5	5	6	0	0	0	0	6
Women currently pregnant/breastfeeding	1	5	0	0	0	0	0	0	0	0	1
Missing/Don't Know/Declined	0	0	1	5	2	2	0	0	0	0	3
D. Respondents											
Household Eaters	African American n=125		Latino/Hispanic n=172		Caucasian n=520		Asian n=437		Other n=32		Total ² n=1286
	n	%	n	%	n	%	n	%	n	%	n
Women between ages 18-45	56	45	79	46	178	34	224	51	11	34	548
Children between ages 6-17	39	31	42	24	84	16	112	26	8	25	285
People 65 or older	10	8	16	9	70	13	106	24	7	22	209
Children under age of 6	22	18	28	16	36	7	55	13	5	16	146
Women currently pregnant/breastfeeding	7	6	6	3	5	1	8	2	0	0	26
Missing/Don't Know/Declined	0	0	2	1	2	1	2	1	1	3	7

1 Respondents may choose more than one category.

2 Ethnicity data missing for 45 Respondents.

3 Ethnicity data missing for 18 Consumers.

4 Ethnicity data missing for 39 Recent Consumers.

5 Ethnicity data missing for 6 Non-Consumers.

Table K24. Who Cooks or Prepares SF Bay Fish by Mode¹(unadjusted)**A. Recent Consumers**

Who Cooks or Prepares	Pier n=277		Beach and Bank n=39		Private Boats n=181		Party Boats n=40		Total n=537	
	n	%	n	%	n	%	n	%	n	%
Self	173	62	29	74	116	64	25	63	343	64
Wife/Partner/Spouse/Husband	87	31	6	15	60	33	12	30	165	31
Mother/Parent/Grandparent	35	13	6	15	22	12	8	20	71	13
Other Family Member	27	10	6	15	4	2	1	3	38	7
Friend	13	5	1	3	5	3	1	3	20	4
Roommate/Girlfriend/Boyfriend	1	0	1	3	2	1	0	0	4	1
Other	2	1	0	0	4	2	2	5	8	1
Missing/Don't Know/Declined	0	0	0	0	0	0	0	0	0	0

B. Consumers

Who Cooks or Prepares	Pier n=583		Beach and Bank n=81		Private Boats n=390		Party Boats n=98		Total n=1152	
	n	%	n	%	n	%	n	%	n	%
Self	356	61	59	73	260	67	60	61	735	64
Wife/Partner/Spouse/Husband	173	30	15	19	119	31	22	22	329	29
Mother/Parent/Grandparent	71	12	12	15	37	9	14	14	134	12
Other Family Member	32	5	7	9	10	3	1	1	50	4
Friend	22	4	3	4	6	2	3	3	34	3
Roommate/Girlfriend/Boyfriend	2	<1	1	1	3	1	0	0	6	1
Other	11	2	0	0	5	1	2	2	18	2
Missing/Don't Know/Declined	1	<1	0	0	0	0	0	0	1	<1

C. Non-Consumers

Who Cooks or Prepares	Pier n=112		Beach and Bank n=18		Private Boats n=43		Party Boats n=6		Total n=179	
	n	%	n	%	n	%	n	%	n	%
Self	16	14	3	17	6	14	1	17	26	15
Wife/Partner/Spouse/Husband	16	14	2	11	6	14	1	17	25	14
Mother/Parent/Grandparent	7	6	0	0	2	5	1	17	10	6
Other Family Member	2	2	1	6	0	0	0	0	3	2
Friend	0	0	1	6	0	0	0	0	1	1
Roommate/Girlfriend/Boyfriend	2	2	0	0	0	0	0	0	2	1
Other	4	4	1	6	3	7	1	17	9	5
Missing/Don't Know/Declined	1	1	0	0	1	2	0	0	2	1

D. Respondents

Who Cooks or Prepares	Pier n=695		Beach and Bank n=99		Private Boats n=433		Party Boats n=104		Total n=1331	
	n	%	n	%	n	%	n	%	n	%
Self	372	54	62	63	266	61	61	35	761	57
Wife/Partner/Spouse/Husband	189	27	17	17	125	29	23	22	354	27
Mother/Parent/Grandparent	78	11	12	12	39	9	15	14	144	11
Other Family Member	34	5	8	8	10	2	0	0	52	4
Friend	22	3	4	4	6	1	3	3	35	3
Roommate/Girlfriend/Boyfriend	4	1	1	1	3	1	0	0	8	1
Other	15	2	1	1	8	2	3	3	27	2
Missing/Don't Know/Declined	2	<1	0	0	1	<1	0	0	3	<1

1 Respondents may choose more than one category.

Table K25. Who Cooks or Prepares SF Bay Fish by Ethnicity¹(unadjusted)

A. Recent Consumers

Who Cooks or Prepares	African American n=47		Latino/Hispanic n=59		Caucasian n=170		Asian n=233		Other n=10		Total ⁴ n=519	
	n	%	n	%	n	%	n	%	n	%	n	%
Self	40	85	40	68	120	71	126	54	7	70	333	64
Wife/Partner/Spouse/Husband	6	13	19	32	45	26	90	39	3	30	163	31
Mother/Parent/Grandparent	3	6	4	7	21	12	40	17	1	10	69	13
Other Family Member	2	4	9	15	5	3	20	9	0	0	36	7
Friend	1	2	1	2	10	6	6	3	0	0	18	3
Roommate/Girlfriend/Boyfriend	1	2	1	2	1	1	1	1	0	0	4	1
Other	0	0	2	3	3	2	2	1	0	0	7	1
Missing/Don't Know/Declined	0	0	0	0	0	0	0	0	0	0	0	0

B. Consumers

Who Cooks or Prepares	African American n=104		Latino/Hispanic n=151		Caucasian n=431		Asian n=400		Other n=27		Total ³ n=1113	
	n	%	n	%	n	%	n	%	n	%	n	%
Self	84	81	93	62	300	70	224	56	16	59	717	64
Wife/Partner/Spouse/Husband	19	18	51	34	111	26	133	33	10	37	324	29
Mother/Parent/Grandparent	6	6	15	10	43	10	66	17	1	4	131	12
Other Family Member	4	4	8	5	10	2	26	7	0	0	48	4
Friend	1	1	3	2	17	4	10	3	0	0	31	3
Roommate/Girlfriend/Boyfriend	1	1	1	1	2	1	2	1	0	0	6	1
Other	0	0	5	3	6	1	6	2	0	0	17	2
Missing/Don't Know/Declined	0	0	1	1	0	0	0	0	0	0	1	<1

C. Non-Consumers

Who Cooks or Prepares	African American n=21		Latino/Hispanic n=21		Caucasian n=89		Asian n=37		Other n=5		Total ⁵ n=173	
	n	%	n	%	n	%	n	%	n	%	n	%
Self	4	19	2	10	13	15	6	16	1	20	26	15
Wife/Partner/Spouse/Husband	2	10	3	14	10	11	10	27	0	0	25	14
Mother/Parent/Grandparent	0	0	1	5	3	3	6	16	0	0	10	6
Other Family Member	1	5	0	0	0	0	2	5	0	0	3	2
Friend	1	5	0	0	0	0	0	0	0	0	1	1
Roommate/Girlfriend/Boyfriend	0	0	0	0	2	2	0	0	0	0	2	1
Other	1	5	1	5	4	5	2	5	0	0	8	5
Missing/Don't Know/Declined	0	0	1	5	1	1	0	0	0	0	2	1

D. Respondents

Who Cooks or Prepares	African American n=125		Latino/Hispanic n=172		Caucasian n=520		Asian n=437		Other n=32		Total ² n=1286	
	n	%	n	%	n	%	n	%	n	%	n	%
Self	88	70	95	55	313	60	230	53	17	53	743	58
Wife/Partner/Spouse/Husband	21	17	54	31	121	23	143	33	10	31	349	27
Mother/Parent/Grandparent	6	5	16	9	46	9	72	16	1	3	141	11
Other Family Member	5	4	8	5	9	2	28	6	0	0	50	4
Friend	2	2	3	2	17	3	10	2	0	0	32	2
Roommate/Girlfriend/Boyfriend	1	1	1	1	4	1	2	1	0	0	8	1
Other	1	1	6	3	10	2	8	2	0	0	25	2
Missing/Don't Know/Declined	0	0	2	1	1	1	0	0	0	0	3	<1

1 Respondents may choose more than one category.

2 Ethnicity data missing for 45 Respondents.

3 Ethnicity data missing for 18 Consumers.

4 Ethnicity data missing for 39 Recent Consumers.

Table K26. Portion Size Responses (unadjusted & adjusted)

Portion Size	Recent Consumers		Consumers		Respondents	
	n	%	n	%	n	%
1/2 of model	104	19	222	19	255	19
1 model	269	50	592	51	669	50
1 1/2 of model	43	8	77	7	81	6
2 times model	38	7	78	7	87	7
Other response	76	15	160	14	179	13
Missing/Don't Know/Declined	7	1	23	2	60	5
Total	537	100	1152	100	1331	100

Table K27a. Portion Size (in ounces) Among Consumers (unadjusted & adjusted)

	N	Arith Mean	SD	Min	P10	P20	P30	P40	Med	P60	P70	P80	P90	P95	Max
Consumers- unadjusted ¹	1129	7.69	3.67	1.00	4.00	4.00	6.00	8.00	8.00	8.00	8.00	8.00	12.00	16.00	48.00
Consumers - unadjusted ²	975	7.69	3.63	1.60	4.00	4.00	6.00	8.00	8.00	8.00	8.00	8.00	12.00	16.00	48.00
Consumers - adjusted ²	975	7.66	3.38	1.60	4.00	4.00	8.00	8.00	8.00	8.00	8.00	8.00	12.00	16.00	48.00

1 Portion size data missing for 23 consumers (2%).

2 Portion size and fishing frequency data missing for 177 consumers (15%).

Table K27b. Portion Size (in ounces) Among Recent Consumers (unadjusted & adjusted)

	N	Arith Mean	SD	Min	P10	P20	P30	P40	Med	P60	P70	P80	P90	P95	Max
Recent Consumers - unadjusted ¹	530	7.77	4.05	2.00	4.00	4.00	6.00	8.00	8.00	8.00	8.00	8.00	12.00	16.00	48.00
Recent Consumers - unadjusted ²	490	7.77	4.06	2.00	4.00	4.00	6.00	8.00	8.00	8.00	8.00	8.00	12.00	16.00	48.00
Recent Consumers - adjusted ²	490	7.68	3.76	2.00	4.00	4.00	6.00	8.00	8.00	8.00	8.00	8.00	12.00	16.00	48.00

1 Portion size data missing for 7 recent consumers (1%).

2 Portion size and fishing frequency data missing for 47 recent consumers (9%).

Table K28. Meal Frequency Among Recent Consumers Based on 4-Week Recall (unadjusted & adjusted)

	N	Geom Mean	Arith Mean	SD	Min	P10	P20	P30	P40	Med	P60	P70	P80	P90	P95	Max
Recent Consumers - unadjusted ¹	512	2.37	3.53	4.32	1.00	1.00	1.00	1.00	2.00	2.00	3.00	4.00	5.00	7.00	11.00	32.00
Recent Consumers - unadjusted ²	473	2.40	3.57	4.34	1.00	1.00	1.00	1.00	2.00	2.00	3.00	4.00	5.00	7.00	12.00	32.00
Recent Consumers - adjusted ²	473	2.04	2.87	3.38	1.00	1.00	1.00	1.00	1.00	2.00	2.00	3.00	4.00	6.00	8.00	32.00

¹ Meal frequency data missing for 25 recent consumers (5%).

² Meal frequency and fishing frequency data missing for 64 recent consumers (12%).

Table K29. Consumption Rate (g/d) Among Recent Consumers Based on 4-Week Recall (unadjusted & adjusted)

	N	Geom Mean	Arith Mean	SD	Min	P10	P20	P30	P40	Med	P60	P70	P80	P90	P95	Max
Recent Consumers - unadjusted ¹	501	16.55	28.08	39.63	2.00	5.33	8.00	8.00	12.00	16.00	16.00	24.00	36.00	56.00	108.00	324.00
Recent Consumers - unadjusted ²	465	16.76	28.75	40.74	2.00	5.30	8.00	8.00	12.00	16.00	16.00	24.00	40.00	64.00	108.00	324.00
Recent Consumers - adjusted ²	465	13.97	23.02	32.05	2.00	4.00	8.00	8.00	8.00	16.00	16.00	16.00	32.00	48.00	80.00	324.00

1 Consumption rate data missing for 36 recent consumers (7%).

2 Consumption rate and fishing frequency data missing for 72 recent consumers (13%).

Table K30a. Consumption Rate (g/d) Among Consumers Based on 4-Week Recall (unadjusted & adjusted)

	N	Geom Mean	Arith Mean	SD	Min	P10	P20	P30	P40	Med	P60	P70	P80	P90	P95	Max
Consumers - unadjusted ¹	1116	0.00	12.60	30.00	0.00	0.00	0.00	0.00	0.00	0.00	5.30	8.00	16.00	32.00	53.20	324.00
Consumers - unadjusted ²	1080	0.00	12.39	30.30	0.00	0.00	0.00	0.00	0.00	0.00	4.00	8.00	16.00	32.00	52.60	324.00
Consumers - adjusted ²	1080	0.00	6.30	19.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00	16.00	32.00	324.00

1 Consumption rate data missing for 36 consumers (3%).

2 Consumption rate and fishing frequency data missing for 72 consumers (6%).

Table K30b. Consumption Rate (g/d) Among Consumers Based on 12-Month Recall (unadjusted)

	N	Geom Mean	Arith Mean	SD	Min	P10	P20	P30	P40	Med	P60	P70	P80	P90	P95	Max
Consumers - unadjusted ¹	1019	1.20	11.00	35.70	0.00	0.00	0.60	0.90	1.60	2.50	3.70	6.80	11.00	22.10	44.20	638.20

1 Consumption rate data missing for 133 consumers (12%).

Table K31a. Per Angler Consumption Rate (g/d) Based on 4-Week Recall (unadjusted & adjusted)

	N	Geom Mean	Arith Mean	SD	Min	P10	P20	P30	P40	Med	P60	P70	P80	P90	P95	Max
Respondents - unadjusted ¹	1295	0.00	10.87	28.18	0.00	0.00	0.00	0.00	0.00	0.00	6.00	8.00	16.00	32.00	48.00	324.00
Respondents - unadjusted ²	1259	0.00	10.62	28.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00	16.00	32.00	48.00	324.00
Respondents - adjusted ²	1259	0.00	5.31	18.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.33	16.00	24.00	324.00

1 Consumption rate data missing for 36 all respondents (3%).

2 Consumption rate and fishing frequency data missing for 72 all respondents (5%).

Table K31b. Per Angler Consumption Rate (g/d) Based on 12-Month Recall (unadjusted)

	N	Geom Mean	Arith Mean	SD	Min	P10	P20	P30	P40	Med	P60	P70	P80	P90	P95	Max
Respondents - unadjusted ¹	1198	0.40	9.30	33.10	0.00	0.00	0.00	0.40	0.90	1.80	3.10	4.90	7.70	18.40	36.80	638.20

1 Consumption rate data missing for 133 all respondents (10%).

Table K32. Portion Size (ounces) Among Consumers by Demographic Factors (unadjusted & adjusted)

Demographic Factor	Unadjusted			Adjusted		
	N	Mean	95% CI ¹	N	Mean	95% CI ¹
Total ²	1129	7.69	7.48, 7.91	975	7.66	7.45, 7.88
<u>Mode:</u>						
Piers	572	7.40	7.10, 7.70	482	7.35	7.04, 7.66
Beach and Bank	81	7.93	7.04, 8.82	72	7.38	6.49, 8.27
Private Boats	381	8.08	7.70, 8.46	342	7.98	7.65, 8.32
Party Boats	95	7.67	7.04, 8.30	79	7.93	7.18, 8.68
<u>Ethnicity (major groups):</u>						
African American	103	8.85	8.15, 9.56	94	9.02	8.26, 9.79
Latino/Hispanic	151	8.03	7.43, 8.62	132	8.22	7.56, 8.89
Caucasian	426	7.98	7.63, 8.33	384	7.77	7.47, 8.07
Asian	386	6.86	6.50, 7.23	314	6.71	6.33, 7.10
Other Asian	27	8.74	7.66, 9.82	21	8.61	7.35, 9.86
<u>Asian Subgroups:</u>						
Chinese	60	7.38	6.18, 8.59	44	7.17	5.56, 8.78
Filipino	153	6.61	6.09, 7.13	129	6.71	6.20, 7.22
Vietnamese	95	6.47	5.82, 7.11	70	6.12	5.37, 6.87
Pacific Islander	24	8.83	7.04, 10.63	23	8.40	6.98, 9.81
Other	54	6.82	5.87, 7.78	48	6.73	5.76, 7.71
<u>Annual Income:</u>						
< \$ 20,000	214	7.25	6.65, 7.84	180	7.15	6.65, 7.66
\$ 20 - \$ 45,000	302	7.88	7.47, 8.30	264	7.86	7.44, 8.29
> \$ 45,000	457	7.77	7.48, 8.06	403	7.77	7.46, 8.08
<u>Education:</u>						
<12th Grade	161	7.56	6.83, 8.29	135	7.39	6.77, 8.01
HS/GED	346	7.75	7.35, 8.14	305	7.66	7.26, 8.06
Some College	335	7.80	7.44, 8.15	287	7.95	7.58, 8.32
> 4 Years College	218	7.35	6.95, 7.75	190	7.30	6.92, 7.69
<u>Season Interviewed:</u>						
Winter	200	7.63	7.12, 8.14	180	7.71	7.18, 8.24
Spring	204	7.34	6.90, 7.79	189	7.19	6.76, 7.62
Summer	446	7.72	7.35, 8.09	359	7.64	7.28, 8.00
Fall	279	7.95	7.53, 8.36	247	8.10	7.68, 8.52
<u>Age:</u>						
18-45 years	681	7.81	7.55, 8.07	572	7.85	7.57, 8.12
46-65 years	321	7.80	7.36, 8.24	289	7.63	7.25, 8.01
65+ years	88	6.16	5.53, 6.79	80	6.22	5.65, 6.79
<u>Gender:</u>						
Male	992	7.76	7.54, 7.99	858	7.76	7.54, 7.99
Female	92	6.75	5.95, 7.56	76	6.58	5.78, 7.37

1 CI = Confidence Interval

2 Portion size data missing for 23 Consumers.

Table K33. Meal Frequency (last 4 weeks) Among Recent Consumers by Demographic Factors (unadjusted & adjusted)

Demographic Factor	Unadjusted			Adjusted		
	N	Geom Mean	95% CI ¹	N	Geom Mean	95% CI ¹
Total	512	2.37	2.21, 2.55	473	2.04	1.90, 2.18
<u>Mode:</u>						
Piers	263	2.51	2.26, 2.78	238	2.20	1.99, 2.44
Beach and Bank	37	2.43	1.82, 3.24	32	2.14	1.58, 2.90
Private Boats	175	2.20	1.96, 2.46	166	1.81	1.64, 2.01
Party Boats	37	2.25	1.82, 2.80	37	2.15	1.72, 2.70
<u>Ethnicity (major groups):</u>						
African American	43	2.22	1.77, 2.79	41	2.01	1.59, 2.53
Latino/Hispanic	56	2.26	1.81, 2.81	52	1.82	1.49, 2.22
Caucasian	164	2.00	1.79, 2.23	159	1.72	1.56, 1.91
Asian	222	2.78	2.48, 3.12	196	2.48	2.22, 2.78
Other	9	2.73	1.39, 5.37	7	2.60	1.24, 5.46
<u>Asian Subgroups:</u>						
Chinese	33	2.86	2.19, 3.73	27	2.43	1.86, 3.18
Filipino	80	3.05	2.46, 3.79	72	3.08	2.52, 3.77
Vietnamese	62	2.57	2.14, 3.08	53	2.38	1.92, 2.94
Pacific Islander	14	3.46	1.87, 6.42	13	2.02	1.22, 3.37
Other Asian	33	2.28	1.70, 3.06	31	1.90	1.44, 2.50
<u>Annual Income:</u>						
< \$ 20,000	114	2.50	2.15, 2.91	104	2.11	1.81, 2.45
\$ 20 - \$ 45,000	132	2.46	2.15, 2.82	122	2.06	1.81, 2.34
> \$ 45,000	195	2.43	2.15, 2.75	181	2.06	1.84, 2.31
<u>Education:</u>						
<12th Grade	82	2.70	2.25, 3.24	75	2.38	1.99, 2.84
HS/GED	156	2.25	1.99, 2.54	146	1.91	1.70, 2.14
Some College	143	2.38	2.08, 2.71	128	2.10	1.85, 2.38
> 4 Years College	98	2.49	2.08, 3.00	94	1.98	1.67, 2.35
<u>Season Interviewed:</u>						
Winter	77	2.20	1.84, 2.62	71	1.76	1.49, 2.07
Spring	81	2.02	1.69, 2.42	77	1.76	1.47, 2.10
Summer	215	2.46	2.21, 2.75	193	2.24	2.02, 2.50
Fall	139	2.56	2.23, 2.95	132	2.10	1.85, 2.38
<u>Age:</u>						
18-45 years	284	2.31	2.10, 2.53	261	2.02	1.85, 2.21
46-65 years	163	2.42	2.13, 2.75	150	1.97	1.74, 2.23
65+ years	46	2.86	2.21, 3.70	44	2.39	1.91, 3.00
<u>Gender:</u>						
Male	450	2.35	2.18, 2.53	418	2.00	1.86, 2.15
Female	41	2.79	2.10, 3.69	35	2.29	1.80, 2.91

1 CI = Confidence Interval

Table K34a. Meal Frequency in Last Four Weeks Among Recent Consumers by Demographic Factors (unadjusted)

	N	Geom Mean	Arith Mean	Arith SD	Min	P10	P20	P30	P40	Med	P60	P70	P80	P90	P95	Max
Total	512	2.37	3.53	4.32	1.00	1.00	1.00	1.00	2.00	2.00	3.00	4.00	5.00	7.00	11.00	32.00
<u>Mode:</u>																
Piers	263	2.51	3.92	5.09	1.00	1.00	1.00	1.00	2.00	2.00	3.00	4.00	5.00	8.00	12.00	32.00
Beach and Bank	37	2.43	3.81	5.04	1.00	1.00	1.00	1.00	2.00	2.00	3.00	3.00	5.00	8.00	17.00	27.00
Private Boats	175	2.20	3.06	3.06	1.00	1.00	1.00	1.00	2.00	2.00	2.00	3.00	4.00	6.00	10.00	19.00
Party Boats	37	2.25	2.73	1.64	1.00	1.00	1.00	1.00	2.00	3.00	3.00	3.00	4.00	5.00	6.00	7.00
<u>Ethnicity (major groups):</u>																
African American	43	2.22	3.02	3.01	1.00	1.00	1.00	1.00	2.00	2.00	3.00	3.00	4.00	5.00	8.00	16.00
Latino/Hispanic	56	2.26	3.43	4.54	1.00	1.00	1.00	1.00	2.00	2.00	3.00	3.00	4.00	6.00	19.00	25.00
Caucasian	164	2.00	2.70	2.82	1.00	1.00	1.00	1.00	1.00	2.00	2.00	3.00	4.00	5.00	7.00	25.00
Asian	222	2.78	4.24	5.08	1.00	1.00	1.00	2.00	2.00	2.00	3.00	4.00	6.00	8.00	14.00	32.00
Other	9	2.73	4.00	4.15	1.00	1.00	1.00	2.00	2.00	2.00	3.00	3.00	9.00	13.00	13.00	13.00
<u>Asian Subgroups:</u>																
Chinese	33	2.86	3.73	2.79	1.00	1.00	1.00	2.00	2.00	3.00	3.00	4.00	6.00	8.00	10.00	11.00
Filipino	80	3.05	5.21	6.81	1.00	1.00	1.00	2.00	2.00	3.00	4.00	5.00	6.00	13.00	24.50	32.00
Vietnamese	62	2.57	3.29	2.36	1.00	1.00	1.00	2.00	2.00	2.00	3.00	4.00	5.00	7.00	9.00	10.00
Pacific Islander	14	3.46	6.21	7.90	1.00	1.00	1.00	2.00	2.00	2.50	4.00	6.00	9.00	23.00	25.00	25.00
Other Asian	33	2.28	3.33	3.64	1.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	5.00	6.00	14.00	17.00
<u>Annual Income:</u>																
< \$ 20,000	114	2.50	3.60	3.78	1.00	1.00	1.00	1.00	2.00	2.00	3.00	4.00	5.00	8.00	11.00	25.00
\$ 20 - \$ 45,000	132	2.46	3.51	4.07	1.00	1.00	1.00	1.00	2.00	2.00	3.00	4.00	5.00	7.00	9.00	27.00
> \$ 45,000	195	2.43	3.89	5.23	1.00	1.00	1.00	1.00	2.00	2.00	2.50	3.00	5.00	8.00	14.00	32.00

Table K34a. (cont.) Meal Frequency in Last Four Weeks Among Recent Consumers by Demographic Factors (unadjusted)

[illegible]

Table K34b. Meal Frequency in Last Four Weeks Among Recent Consumers by Demographic Factors (adjusted)

	N	Geom Mean	Arith Mean	Arith SD	Min	P10	P20	P30	P40	Med	P60	P70	P80	P90	P95	Max
Total	473	2.04	2.87	3.38	1.00	1.00	1.00	1.00	1.00	2.00	2.00	3.00	4.00	6.00	8.00	32.00
<u>Mode:</u>																
Piers	238	2.20	3.29	4.23	1.00	1.00	1.00	1.00	2.00	2.00	2.00	3.00	4.00	6.00	9.00	32.00
Beach and Bank	32	2.14	3.15	3.58	1.00	1.00	1.00	1.00	1.00	2.00	2.00	4.00	5.00	7.00	7.00	27.00
Private Boats	166	1.81	2.39	2.40	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	3.00	4.00	8.00	19.00
Party Boats	37	2.15	2.68	1.79	1.00	1.00	1.00	1.00	2.00	2.00	3.00	3.00	4.00	6.00	7.00	7.00
<u>Ethnicity (major groups):</u>																
African American	41	2.01	2.75	2.82	1.00	1.00	1.00	1.00	1.00	2.00	3.00	3.00	3.00	5.00	8.00	16.00
Latino/Hispanic	52	1.82	2.49	2.83	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	3.00	6.00	7.00	25.00
Caucasian	159	1.72	2.26	2.48	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	3.00	4.00	6.00	25.00
Asian	196	2.48	3.59	4.11	1.00	1.00	1.00	1.00	2.00	2.00	3.00	4.00	5.00	6.00	9.00	32.00
Other	7	2.60	3.61	3.55	1.00	1.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00	9.00	13.00	13.00
<u>Asian Subgroups:</u>																
Chinese	27	2.43	3.04	2.20	1.00	1.00	1.00	2.00	2.00	2.00	3.00	4.00	4.00	6.00	8.00	11.00
Filipino	72	3.08	4.78	5.94	1.00	1.00	2.00	2.00	2.00	3.00	4.00	4.00	5.00	12.00	22.00	32.00
Vietnamese	53	2.38	3.18	2.44	1.00	1.00	1.00	1.00	2.00	2.00	3.00	4.00	6.00	6.00	9.00	10.00
Pacific Islander	13	2.02	3.19	4.67	1.00	1.00	1.00	1.00	1.00	2.00	2.00	3.00	3.00	6.00	9.00	23.00
Other Asian	31	1.90	2.62	2.69	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	4.00	6.00	6.00	17.00
<u>Annual Income:</u>																
< \$ 20,000	104	2.11	2.94	2.86	1.00	1.00	1.00	1.00	1.00	2.00	2.00	3.00	4.00	6.00	9.00	25.00
\$ 20 - \$ 45,000	122	2.06	2.83	3.26	1.00	1.00	1.00	1.00	2.00	2.00	2.00	3.00	4.00	5.00	7.00	27.00
> \$ 45,000	181	2.06	3.01	3.89	1.00	1.00	1.00	1.00	2.00	2.00	2.00	3.00	3.00	6.00	8.00	32.00

Table K34b. (cont.) Meal Frequency in Last Four Weeks Among Recent Consumers by Demographic Factors (adjusted)

	N	Geom Mean	Arith Mean	Arith SD	Min	P10	P20	P30	P40	Med	P60	P70	P80	P90	P95	Max
Total	473	2.04	2.87	3.38	1.00	1.00	1.00	1.00	1.00	2.00	2.00	3.00	4.00	6.00	8.00	32.00
<u>Education:</u>																
<12th Grade	75	2.38	3.27	3.18	1.00	1.00	1.00	1.00	2.00	2.00	3.00	4.00	5.00	6.00	8.00	27.00
HS/GED	146	1.91	2.55	2.54	1.00	1.00	1.00	1.00	1.00	2.00	2.00	3.00	4.00	6.00	7.00	31.00
Some College	128	2.10	2.90	3.48	1.00	1.00	1.00	1.00	2.00	2.00	2.00	3.00	4.00	6.00	7.00	28.00
> 4 Years College	94	1.98	3.14	4.43	1.00	1.00	1.00	1.00	1.00	2.00	2.00	3.00	3.00	6.00	11.00	32.00
<u>Season Interviewed:</u>																
Winter	71	1.76	2.32	2.15	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	4.00	4.00	8.00	19.00
Spring	77	1.76	2.79	4.31	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	3.00	5.00	12.00	25.00
Summer	193	2.24	3.06	3.07	1.00	1.00	1.00	1.00	2.00	2.00	3.00	4.00	4.00	6.00	7.00	32.00
Fall	132	2.10	2.94	3.59	1.00	1.00	1.00	1.00	2.00	2.00	2.00	3.00	3.00	6.00	8.00	31.00
<u>Age:</u>																
18-45 years	261	2.02	2.79	2.93	1.00	1.00	1.00	1.00	1.00	2.00	2.00	3.00	4.00	6.00	8.00	32.00
46-65 years	150	1.97	2.94	4.22	1.00	1.00	1.00	1.00	1.00	2.00	2.00	3.00	3.00	4.00	8.00	31.00
65+ years	44	2.39	3.14	2.48	1.00	1.00	1.00	1.00	2.00	2.00	3.00	4.00	6.00	6.00	8.00	19.00
<u>Gender:</u>																
Male	418	2.00	2.83	3.41	1.00	1.00	1.00	1.00	1.00	2.00	2.00	3.00	4.00	6.00	8.00	31.00
Female	35	2.29	3.01	3.11	1.00	1.00	1.00	2.00	2.00	2.00	3.00	3.00	4.00	7.00	7.00	32.00

K-37

Table K35. Consumption Rate Among Recent Consumers by Demographic Factors (unadjusted & adjusted)

Demographic Factor	Unadjusted			Adjusted		
	N	Geom Mean	95% CI ¹	N	Geom Mean	95% CI ¹
Total	501	16.55	15.20, 18.02	465	13.97	12.84, 15.20
<u>Mode:</u>						
Piers	255	16.33	14.41, 18.51	233	13.81	12.17, 15.69
Beach and Bank	37	21.34	15.54, 29.32	32	17.45	12.08, 25.22
Private Boats	172	16.27	14.15, 18.71	163	13.37	11.72, 15.24
Party Boats	37	15.18	11.58, 19.90	37	14.70	10.93, 19.77
<u>Ethnicity (major groups):</u>						
African American	43	19.41	15.03, 25.07	41	17.84	13.91, 22.87
Latino/Hispanic	56	16.56	12.57, 21.83	52	13.34	10.23, 17.40
Caucasian	163	14.43	12.55, 16.58	158	12.06	10.54, 13.79
Asian	213	17.78	15.51, 20.39	190	15.44	13.39, 17.80
Other	9	25.00	13.09, 47.75	7	27.47	13.72, 55.02
<u>Asian Subgroups:</u>						
Chinese	31	19.75	13.93, 28.01	26	15.25	9.87, 23.57
Filipino	77	17.36	13.53, 22.29	70	17.82	13.99, 22.70
Vietnamese	60	15.85	12.74, 19.72	51	14.51	11.18, 18.83
Pacific Islander	13	37.25	19.48, 71.23	12	22.42	11.23, 44.73
Other Asian	32	15.61	10.74, 22.70	31	12.64	8.75, 18.27
<u>Annual Income:</u>						
< \$ 20,000	110	16.27	13.37, 19.81	101	13.21	10.92, 16.00
\$ 20 - \$ 45,000	127	17.31	14.69, 20.41	119	13.44	11.43, 15.82
> \$ 45,000	194	17.40	15.10, 20.05	180	14.83	12.88, 17.08
<u>Education:</u>						
<12th Grade	79	18.85	14.97, 23.74	73	15.49	12.49, 19.21
HS/GED	151	15.89	13.58, 18.60	142	13.28	11.36, 15.51
Some College	140	16.20	13.98, 18.78	126	14.42	12.32, 16.88
> 4 Years College	98	17.57	14.29, 21.61	94	13.50	11.05, 16.50
<u>Season Interviewed:</u>						
Winter	76	15.32	12.18, 19.25	70	11.13	8.82, 14.06
Spring	80	13.59	10.78, 17.12	76	11.21	8.86, 14.19
Summer	209	17.14	15.09, 19.45	189	15.56	13.75, 17.61
Fall	136	18.39	15.65, 21.62	130	15.56	13.38, 18.11
<u>Age:</u>						
18-45 years	276	16.59	14.79, 18.61	256	14.75	13.16, 16.53
46-65 years	161	16.93	14.60, 19.64	148	12.78	11.04, 14.80
65+ years	45	15.55	11.32, 21.35	43	12.90	9.52, 17.48
<u>Gender:</u>						
Male	440	16.59	15.16, 18.16	410	13.69	12.50, 14.98
Female	40	17.27	12.57, 23.73	35	15.24	11.60, 20.03

1 CI = Confidence Interval

Table K36a. Consumption Rates (g/d) Among Recent Consumers by Demographic Factors (unadjusted)

	N	Geom Mean	Arith Mean	Arith SD	Min	P10	P20	P30	P40	Med	P60	P70	P80	P90	P95	Max
Total	501	16.55	28.08	39.63	2.00	5.33	8.00	8.00	12.00	16.00	16.00	24.00	36.00	56.00	108.00	324.00
<u>Mode:</u>																
Piers	255	16.33	28.62	39.79	2.67	4.00	8.00	8.00	12.00	16.00	16.00	32.00	40.00	56.00	108.00	304.00
Beach and Bank	37	21.34	36.97	57.28	4.00	8.00	12.00	16.00	16.00	16.00	24.00	28.00	48.00	108.00	136.00	324.00
Private Boats	172	16.27	26.92	38.09	2.00	8.00	8.00	8.00	12.00	16.00	16.00	24.00	32.00	56.00	96.00	288.00
Party Boats	37	15.18	20.84	18.12	4.00	4.00	8.00	8.00	12.00	16.00	21.44	24.00	32.00	40.00	72.00	84.00
<u>Ethnicity (major groups):</u>																
African American	43	19.41	29.86	42.43	5.36	8.00	8.00	10.67	16.00	16.00	24.00	32.00	36.00	48.00	64.00	256.00
Latino/Hispanic	56	16.56	30.73	50.26	2.67	4.00	8.00	8.00	12.00	16.00	16.08	32.00	40.00	48.00	152.00	304.00
Caucasian	163	14.43	23.23	33.91	2.00	5.33	8.00	8.00	10.64	16.00	16.00	16.00	32.00	48.00	64.00	288.00
Asian	213	17.78	30.71	40.83	2.67	4.00	8.00	8.00	16.00	16.00	21.44	32.00	42.00	72.00	112.00	324.00
Other	9	25.00	34.22	30.99	8.00	8.00	8.00	16.00	24.00	24.00	32.00	36.00	52.00	108.00	108.00	108.00
<u>Asian Subgroups:</u>																
Chinese	31	19.75	30.46	31.69	4.00	6.00	8.00	8.00	16.00	24.00	24.00	32.00	42.00	64.00	128.00	128.00
Filipino	77	17.36	33.89	52.92	2.67	4.00	8.00	8.00	12.00	16.00	21.33	32.00	45.00	72.00	144.00	324.00
Vietnamese	60	15.85	22.49	20.94	2.67	4.64	8.00	11.33	16.00	16.00	16.00	24.00	32.08	48.00	72.00	108.00
Pacific Islander	13	37.25	58.15	52.45	4.00	16.00	16.00	16.00	24.00	32.00	64.00	96.00	100.00	108.00	184.00	184.00
Other Asian	32	15.61	27.58	34.36	4.00	4.00	8.00	8.00	8.00	14.00	16.00	24.00	40.00	72.00	112.00	136.00
<u>Annual Income:</u>																
< \$ 20,000	110	16.27	30.30	47.77	2.67	4.00	8.00	8.00	12.00	16.00	16.00	32.00	34.08	66.00	112.00	304.00
\$ 20 - \$ 45,000	127	17.31	28.18	39.69	2.67	5.33	8.00	8.00	16.00	16.00	24.00	32.00	36.00	48.00	100.00	324.00

Table K36b. Consumption Rates (g/d) Among Recent Consumers by Demographic Factors (adjusted)

Appendix K

	N	Geom Mean	Arith Mean	SD	Min	P10	P20	P30	P40	Med	P60	P70	P80	P90	P95	Max
Total	465	13.97	23.02	32.05	2.00	4.00	8.00	8.00	8.00	16.00	16.00	16.00	32.00	48.00	80.00	324.00
<u>Mode:</u>																
Piers	233	13.81	23.87	34.00	2.67	4.00	5.36	8.00	8.00	12.00	16.00	24.00	32.00	48.00	72.00	304.00
Beach and Bank	32	17.45	31.05	44.75	4.00	4.00	8.00	8.00	16.00	16.00	16.00	24.00	40.00	112.00	112.00	324.00
Private Boats	163	13.37	20.90	29.40	2.00	6.00	8.00	8.00	8.00	16.00	16.00	16.00	24.00	48.00	80.00	288.00
Party Boats	37	14.70	22.05	22.20	4.00	4.00	8.00	8.00	10.64	12.00	16.00	24.00	32.00	72.00	84.00	84.00
<u>Ethnicity (major groups):</u>																
African American	41	17.84	26.71	38.33	5.36	8.00	8.00	10.67	12.00	16.00	16.00	24.00	36.00	48.00	64.00	256.00
Latino/Hispanic	52	13.34	22.04	29.52	2.67	4.00	6.00	8.00	8.00	16.00	16.00	16.08	32.00	48.00	84.00	304.00
Caucasian	158	12.06	18.91	26.95	2.00	4.00	8.00	8.00	8.00	10.72	16.00	16.00	16.00	36.00	56.00	288.00
Asian	190	15.44	26.70	36.00	2.67	4.00	8.00	8.00	8.00	16.00	16.00	24.00	40.00	72.00	108.00	324.00
Other	7	27.47	34.62	25.49	8.00	8.00	24.00	24.00	24.00	32.00	32.00	36.00	36.00	52.00	108.00	108.00
<u>Asian Subgroups:</u>																
Chinese	26	15.25	27.75	34.84	4.00	4.00	6.00	8.00	8.00	12.00	24.00	24.00	40.00	80.00	128.00	128.00
Filipino	70	17.82	32.70	48.80	2.67	5.33	8.00	8.00	13.30	16.00	20.00	24.00	40.00	72.00	176.00	324.00
Vietnamese	51	14.51	21.80	20.70	2.67	4.00	8.00	8.00	12.00	16.00	16.00	24.00	40.00	48.00	72.00	108.00
Pacific Islander	12	22.42	37.95	44.17	4.00	4.00	16.00	16.00	16.00	24.00	24.00	24.00	64.00	96.00	184.00	184.00
Other Asian	31	12.64	22.04	27.62	4.00	4.00	4.00	8.00	8.00	8.00	16.00	16.00	32.00	72.00	72.00	136.00
<u>Annual Income:</u>																
< \$ 20,000	101	13.21	21.90	27.80	2.67	4.00	5.33	8.00	8.00	12.00	16.00	16.00	32.16	48.00	72.00	304.00
\$ 20 - \$ 45,000	119	13.44	21.69	32.90	2.67	4.00	8.00	8.00	8.00	12.00	16.00	18.00	32.00	40.00	56.00	324.00
> \$ 45,000	180	14.83	25.25	35.34	2.00	5.33	8.00	8.00	8.00	16.00	16.00	24.00	31.92	56.00	108.00	256.00

K-41

Table K36b. (cont.) Consumption Rates (g/d) Among Recent Consumers by Demographic Factors (adjusted)

	N	Geom Mean	Arith Mean	SD	Min	P10	P20	P30	P40	Med	P60	P70	P80	P90	P95	Max
Total	465	13.97	23.02	32.05	2.00	4.00	8.00	8.00	8.00	16.00	16.00	16.00	32.00	48.00	80.00	324.00
<u>Education:</u>																
<12th Grade	73	15.49	24.19	28.70	2.67	4.00	8.00	8.00	12.00	16.00	16.00	32.00	32.16	48.00	64.00	288.00
HS/GED	142	13.28	21.48	27.95	2.00	4.00	8.00	8.00	8.00	12.00	16.00	16.00	32.00	48.00	72.00	304.00
Some College	126	14.42	22.65	29.02	2.67	5.33	8.00	8.00	10.64	16.00	16.00	20.00	24.00	45.00	84.00	200.00
> 4 Years College	94	13.50	25.02	42.09	4.00	4.00	6.00	8.00	8.00	12.00	16.00	18.00	24.00	53.20	96.00	324.00
<u>Season Interviewed:</u>																
Winter	70	11.13	19.41	28.18	2.00	4.00	4.00	8.00	8.00	8.00	12.00	16.00	24.00	48.00	80.00	304.00
Spring	76	11.21	22.12	37.56	2.67	4.00	4.00	8.00	8.00	8.00	16.00	16.00	24.00	40.00	144.00	200.00
Summer	189	15.56	23.90	30.56	2.00	7.92	8.00	8.00	12.00	16.00	16.00	24.00	32.00	48.00	72.00	288.00
Fall	130	15.56	24.35	32.10	2.67	5.36	8.00	8.00	12.00	16.00	16.00	21.40	32.00	64.00	96.00	324.00
<u>Age:</u>																
18-45 years	256	14.75	24.20	32.20	2.00	5.33	8.00	8.00	8.00	12.00	16.00	24.00	36.00	48.00	84.00	324.00
46-65 years	148	12.78	21.04	32.90	2.00	4.00	8.00	8.00	8.00	16.00	16.00	16.00	24.00	32.00	64.00	288.00
65+ years	43	12.90	20.76	24.44	2.67	4.00	4.00	8.00	8.00	16.00	16.00	24.00	32.00	64.00	72.00	304.00
<u>Gender:</u>																
Male	410	13.69	22.68	32.30	2.00	4.00	8.00	8.00	8.00	16.00	16.00	16.10	32.00	48.00	72.00	324.00
Female	35	15.24	22.28	26.79	4.00	6.00	8.00	8.00	12.00	16.00	16.00	16.00	24.00	53.20	84.00	200.00

Table K37a. Consumers With Consumption Above and Below the Health Advisory (unadjusted & adjusted)

	Above Advisory			Below Advisory		
	n	%	adj%	n	%	adj%
Total	164	15	9	952	85	91
<u>Mode</u>						
Pier	84	51	46	477	50	43
Beach and Bank	10	6	7	69	7	7
Private Boats	53	32	30	328	35	39
Party Boats	17	11	17	78	8	11
<u>Ethnicity (major groups)</u>						
Black/African American	18	11	12	82	9	10
Latino/Hispanic	18	11	10	130	14	14
Caucasian	41	25	24	383	40	46
Asian	78	48	49	302	32	26
Other	4	2	3	22	2	1
Missing/DK/Refuse	5	3	2	33	3	3
<u>Ethnicity (with Asian subgroups)</u>						
Black/African American	18	11	12	82	9	10
Latino/Hispanic	18	11	10	130	14	14
Caucasian	41	25	24	383	40	46
Chinese	16	10	9	43	4	3
Filipino	29	18	19	121	13	11
Vietnamese	15	9	12	76	8	6
Pacific Islander	7	4	2	18	2	2
Other Asian	11	7	7	44	5	4
Other	4	2	3	22	2	1
Missing/DK/Refuse	5	3	2	33	3	3
<u>Income</u>						
< \$20,000/year	34	21	18	174	18	16
\$20,000 - \$45,000/year	47	29	22	251	26	26
> \$45,000/year	68	41	51	386	41	45
Missing/DK/Refuse	15	9	9	141	15	13
<u>Education</u>						
< 12th Grade	29	18	17	127	13	13
Completed HS or GED	48	29	26	296	31	30
Some college/trade sch.	46	28	31	282	30	30
>= 4 years college	34	21	21	181	19	20
Missing/DK/Refuse	7	4	5	66	7	7
<u>Gender</u>						
Male	146	89	87	828	87	86
Female	13	8	9	80	8	9
Missing/DK/Refuse	5	3	4	44	5	5
<u>Age</u>						
18-45 years	91	56	61	581	61	59
46-65 years	51	31	25	267	28	30
65+ years	18	11	11	65	7	7
Missing/DK/Refuse	4	2	3	39	4	4
<u>Season Interviewed</u>						
Winter	22	14	12	178	19	21
Spring	20	12	15	184	19	23
Summer	64	39	41	376	40	34
Fall	58	35	32	214	22	22

Table K37b. Consumers With Consumption Above and Below the Health Advisory (row%) (unadjusted & adjusted)

	Above Advisory			Below Advisory		
	n	row%	adjrow%	n	row%	adjrow%
Total	164	15	9	952	85	91
<u>Mode</u>						
Pier	84	15	9	477	85	91
Beach and Bank	10	13	9	69	87	91
Private Boats	53	14	6	328	86	94
Party Boats	17	18	13	78	82	87
<u>Ethnicity (major groups)</u>						
Black/African American	18	18	11	82	82	89
Latino/Hispanic	18	12	6	130	88	94
Caucasian	41	10	5	383	90	95
Asian	78	21	15	302	79	85
Other	4	15	17	22	85	83
Missing/DK/Refuse	5	13	6	33	87	94
<u>Ethnicity (with Asian subgroups)</u>						
Black/African American	18	18	11	82	82	89
Latino/Hispanic	18	12	6	130	88	94
Caucasian	41	10	5	383	90	95
Chinese	16	27	21	43	73	79
Filipino	29	19	14	121	81	86
Vietnamese	15	16	14	76	84	86
Pacific Islander	7	28	10	18	72	90
Other Asian	11	20	14	44	80	86
Other	4	15	17	22	85	83
Missing/DK/Refuse	5	13	6	33	87	94
<u>Income</u>						
< \$20,000/year	34	16	10	174	84	90
\$20,000 - \$45,000/year	47	16	7	251	84	93
> \$45,000/year	68	15	10	386	85	90
Missing/DK/Refuse	15	10	6	141	90	94
<u>Education</u>						
< 12th Grade	29	19	11	127	81	89
Completed HS or GED	48	14	7	296	86	93
Some college/trade sch.	46	14	9	282	86	91
>= 4 years college	34	16	9	181	84	91
Missing/DK/Refuse	7	10	6	66	90	94
<u>Gender</u>						
Male	146	15	9	828	85	91
Female	13	14	8	80	86	92
Missing/DK/Refuse	5	10	8	44	90	92
<u>Age</u>						
18-45 years	91	14	9	581	86	91
46-65 years	51	16	7	267	84	93
65+ years	18	22	14	65	78	86
Missing/DK/Refuse	4	9	6	39	91	94
<u>Season Interviewed</u>						
Winter	22	11	5	178	89	95
Spring	20	10	6	184	90	94
Summer	64	15	10	376	85	90
Fall	58	21	12	214	79	88

Table K38. Consumers With Consumption Above the 95th Percentile (unadjusted & adjusted)

	Above 95th Percentile			Below 95th Percentile		
	n	%	adj%	n	%	adj%
Total	53	5	3	1063	95	97
<u>Mode</u>						
Pier	28	53	40	533	51	43
Beach and Bank	5	9	11	74	7	7
Private Boats	18	34	33	363	34	38
Party Boats	2	4	16	93	9	12
<u>Ethnicity (major groups)</u>						
Black/African American	3	6	6	97	9	9
Latino/Hispanic	4	8	9	144	13	14
Caucasian	12	23	28	412	38	45
Asian	30	57	53	350	34	28
Other	1	2	1	25	2	2
Missing/DK/Refuse	3	6	3	35	3	3
<u>Ethnicity (with Asian subgroups)</u>						
Black/African American	3	6	6	97	9	9
Latino/Hispanic	4	8	9	144	13	14
Caucasian	12	23	28	412	38	45
Chinese	4	8	8	55	5	3
Filipino	11	21	19	139	13	12
Vietnamese	5	9	12	86	8	7
Pacific Islander	6	11	4	19	2	2
Other Asian	4	8	12	51	5	5
Other	1	2	1	25	2	2
Missing/DK/Refuse	3	6	3	35	3	3
<u>Income</u>						
< \$20,000/year	13	25	18	195	19	16
\$20,000 - \$45,000/year	11	21	13	287	27	26
> \$45,000/year	25	47	57	429	40	45
Missing/DK/Refuse	4	8	11	152	14	13
<u>Education</u>						
< 12th Grade	11	21	13	145	14	13
Completed HS or GED	13	25	27	331	31	30
Some college/trade sch.	12	23	27	316	30	30
>= 4 years college	14	26	23	201	19	20
Missing/DK/Refuse	3	6	9	70	7	6
<u>Gender</u>						
Male	44	83	77	930	88	86
Female	5	9	10	88	8	9
Missing/DK/Refuse	4	8	13	45	4	5
<u>Age</u>						
18-45 years	28	53	57	644	61	59
46-65 years	17	32	23	301	28	30
65+ years	5	9	11	78	8	7
Missing/DK/Refuse	3	6	9	40	4	4
<u>Season Interviewed</u>						
Winter	9	17	12	191	18	21
Spring	9	17	19	195	18	22
Summer	18	34	34	422	40	35
Fall	17	32	35	255	24	23

Table K39. Consumers of White Croaker, Leopard Shark, and Striped Bass by Demographics Factors (unadjusted)

Consumers	N	White Croaker		Leopard Shark		Striped Bass	
		Yes (n)	Yes (%)	Yes (n)	Yes (%)	Yes (n)	Yes (%)
Total	1152	318	28	231	20	903	78
<u>Mode</u>							
Piers	583	216	37	119	20	443	76
Beach and Bank	81	33	41	17	21	65	80
Private Boats	390	62	16	81	21	316	81
Party Boats	98	7	7	14	14	79	81
Chi-Square p-value		<0.0001		0.5291		0.1989	
<u>Ethnicity (major groups)</u>							
African American	104	35	34	21	20	86	83
Latino	151	44	29	22	15	111	74
Caucasian	431	43	10	97	23	346	80
Asian	400	185	46	74	19	309	77
Other	27	4	15	9	33	22	81
Missing/DK/Refuse	39	7	18	8	21	29	74
Chi-Square p-value		<0.0001		0.0986		0.3286	
<u>Ethnicity (with Asian subgroups)</u>							
African American	104	35	34	21	20	86	83
Latino	151	44	29	22	15	111	74
Caucasian	431	43	10	97	23	346	80
Chinese	63	33	52	18	29	47	75
Filipino	157	66	42	15	10	126	80
Vietnamese	96	51	53	32	33	75	78
Pacific Islander	26	10	38	3	12	20	77
Other Asian	58	25	43	6	10	41	71
Other	27	4	15	9	33	22	81
Missing/DK/Refuse	39	7	18	8	21	29	74
Chi-Square p-value		<0.0001		<0.0001		0.4941	
<u>Income</u>							
<\$20,000	217	94	43	56	26	175	81
\$20,000-\$45,000	309	100	32	66	21	248	80
>\$45,000	463	87	19	87	19	371	80
Missing/DK/Refuse	163	37	23	22	13	109	67
Mantel-Haenszel Chi-Square p-value		<0.0001		0.0348		0.9119	
<u>Education</u>							
<12th Grade	163	62	38	39	24	122	75
HS or GED	356	106	30	87	24	286	80
Some College	339	83	24	66	19	267	79
>=4 yrs. College	219	53	24	29	13	175	80
Missing/DK/Refuse	75	14	19	10	13	53	71
Mantel-Haenszel Chi-Square p-value		0.0013		0.0017		0.4691	
<u>Season Interviewed</u>							
Winter	202	60	30	50	25	156	77
Spring	208	55	26	42	20	167	80
Summer	458	114	25	91	20	246	54
Fall	284	89	31	48	17	234	82
Chi-Square p-value		0.2554		0.2431		0.1147	

Data not adjusted for avidity bias.

Table K40. Recent Consumption of Seven SF Bay Species by Demographic Factors (unadjusted)

Recent Consumers	N	White Croaker Yes (%)	Leopard Shark Yes (%)	Striped Bass Yes (%)	Halibut Yes (%)	Jacksmelt Yes (%)	Sturgeon Yes (%)	Surfperch ¹ Yes (%)
Total	537	16	6	54	24	17	17	13
<u>Mode</u>								
Piers	277	22	6	56	10	24	12	21
Beach and Bank	39	13	10	46	18	41	10	21
Private Boats	181	10	6	50	35	6	29	2
Party Boats	40	3	8	63	73	3	10	3
Chi-Square p-value		0.0688	0.3137	0.2251	<0.0001	<0.0001	<0.0001	<0.0001
<u>Ethnicity (major groups)</u>								
African American	47	15	6	60	28	13	9	21
Latino	59	19	7	49	20	17	22	7
Caucasian	170	2	5	51	39	3	28	2
Asian	233	25	6	55	14	29	9	22
Other	10	10	0	50	20	30	30	20
Missing/DK/Refuse	18	28	17	61	17	11	22	6
Chi-Square p-value		0.1540	0.7374	0.9067	<0.0001	<0.0001	<0.0001	<0.0001
<u>Ethnicity (with Asian subgroups)</u>								
African American	47	15	6	60	28	13	9	21
Latino	59	19	7	49	20	17	22	7
Caucasian	170	2	5	51	39	3	28	2
Chinese	35	40	6	43	17	29	0	14
Filipino	84	21	4	58	10	24	10	35
Vietnamese	65	18	11	58	15	37	12	9
Pacific Islander	14	36	0	50	14	50	7	36
Other Asian	35	29	6	54	20	17	9	17
Other	10	10	0	50	20	30	30	20
Missing/DK/Refuse	18	28	17	61	17	11	22	6
Chi-Square p-value		0.1576	0.7225	0.5886	<0.0001	<0.0001	<0.0001	Not Valid
<u>Income</u>								
<\$20,000	119	27	8	57	12	22	12	16
\$20,000-\$45,000	138	13	4	61	19	20	18	14
>\$45,000	203	12	6	50	34	12	22	10
Missing/DK/Refuse	77	14	6	45	26	18	10	16
Mantel-Haenszel Chi-Square p-value		0.6343	0.9165	0.1475	<0.0001	0.0196	0.0208	0.1293
<u>Education</u>								
<12th Grade	86	28	8	51	14	26	14	15
HS or GED	163	17	6	54	21	16	19	12
Some College	151	9	7	54	26	17	19	13
>=4 yrs. College	102	15	4	54	31	16	18	18
Missing/DK/Refuse	35	17	9	54	34	11	6	6
Mantel-Haenszel Chi-Square p-value		0.2724	0.7844	0.7027	0.0028	0.138	0.5786	0.4793
<u>Season Interviewed</u>								
Winter	78	26	8	37	13	8	40	21
Spring	84	13	0	39	13	19	26	18
Summer	227	12	8	54	35	24	8	11
Fall	148	19	6	70	20	11	14	10
Chi-Square p-value		0.0866	0.0361	<0.0001	<0.0001	0.0015	<0.0001	<0.0001

Data not adjusted for avidity bias.

1 All species of surfperch (Black perch, Walleye surfperch, Shiner surfperch, etc.) are included.

Table K41. Fish Parts Consumed and Fish Preparation Practices Among Consumers of White Croaker, Leopard Shark, and Striped Bass (unadjusted & adjusted)

	Overall ¹									Never Eats White Croaker Leopard Shark, Striped Bass ²			Total
	greater than 1/2 time			less than 1/2 time			never eats fish part			n	%	adj%	n
Skin	230	20	18	67	6	6	667	58	62	188	16	14	1152
Guts	14	1	1	8	1	0	942	82	85	188	16	14	1152
Cooking Juices	163	14	14	108	9	10	693	60	62	188	16	14	1152
Soup	107	9	9	191	17	16	666	58	61	188	16	14	1152
Raw	22	2	1	70	6	6	872	76	79	188	16	14	1152

	White Croaker Consumers									Never Eats White Croaker ³			Total
	greater than 1/2 time			less than 1/2 time			never eats fish part			n	%	adj%	n
Skin	120	10	9	35	3	3	163	14	14	834	72	74	1152
Guts	3	0	0	4	0	0	311	27	26	834	72	74	1152
Cooking Juices	59	5	4	32	3	3	227	20	19	834	72	74	1152
Soup	39	3	3	77	7	6	202	18	17	834	72	74	1152
Raw	1	0	0	5	0	0	312	27	26	834	72	74	1152

	Leopard Shark Consumers									Never Eats Leopard Shark ⁴			Total
	greater than 1/2 time			less than 1/2 time			never eats fish part			n	%	adj%	n
Skin	4	0	0	5	0	1	222	19	20	921	80	79	1152
Guts	3	0	0	1	0	0	227	20	21	921	80	79	1152
Cooking Juices	18	2	1	21	2	2	192	17	18	921	80	79	1152
Soup	11	1	1	28	2	2	192	17	18	921	80	79	1152
Raw	2	0	0	8	1	1	221	19	20	921	80	79	1152

	Striped Bass Consumers									Never Eats Striped Bass ⁵			Total
	greater than 1/2 time			less than 1/2 time			never eats fish part			n	%	adj%	n
Skin	190	16	14	59	5	6	654	57	60	249	22	20	1152
Guts	9	1	1	3	0	0	891	77	79	249	22	20	1152
Cooking Juices	144	13	13	96	8	9	663	58	58	249	22	20	1152
Soup	86	7	7	166	14	14	651	57	59	249	22	20	1152
Raw	19	2	1	61	5	5	823	71	74	249	22	20	1152

1 Consumers who reported consuming either White Croaker, Leopard Shark, or Striped Bass.

2 Includes 6 consumers who are missing White Croaker, Leopard Shark, and Striped Bass data.

3 Includes 13 consumers who are missing White Croaker data.

4 Includes 19 consumers who are missing Leopard Shark data.

5 Includes 8 consumers who are missing Striped Bass data.

Table K42a. Consumption of Striped Bass Skin by Demographic Factors (unadjusted & adjusted)

Skin Consumption	Consumes Striped Bass less than 1/2 time						Does Not Consume Striped Bass ¹		Total
	n	%	adj%	n	%	adj%	n	adj%	n
<u>Mode</u>									
Piers	131	22	23	44	8	10	140	24	583
Beach and Bank	18	22	20	2	2	2	16	20	81
Private Boats	33	8	7	11	3	4	74	19	390
Party Boats	8	8	5	2	2	4	19	19	98
Total	190	16	14	59	5	6	249	22	1152
<u>Ethnicity (major groups)</u>									
African Americans	25	24	22	6	6	11	18	17	104
Latinos/Hispanics	19	13	13	7	5	5	40	26	151
Caucasians	24	6	5	9	2	2	85	20	431
Asians	118	30	28	32	8	10	91	23	400
Other	3	11	4	2	7	2	5	19	27
Missing	1	3	2	3	8	6	10	26	39
Total	190	16	14	59	5	6	249	22	1152
<u>Ethnicity (with Asian subgroups)</u>									
African Americans	25	24	22	6	6	11	18	17	104
Latinos/Hispanics	19	13	13	7	5	5	40	26	151
Caucasians	24	6	5	9	2	2	85	20	431
Chinese	20	32	33	4	6	7	16	25	63
Filipino	48	31	30	12	8	13	31	20	157
Vietnamese	32	33	32	10	10	13	21	22	96
Pacific Islander	10	38	19	0	0	0	6	23	26
Other Asian	8	14	16	6	10	6	17	29	58
Other	3	11	4	2	7	2	5	19	27
Missing	1	3	2	3	8	6	10	26	39
Total	190	16	14	59	5	6	249	22	1152
<u>Income</u>									
< \$20,000	48	22	22	19	9	11	42	19	217
\$20,000 - \$45,000	68	22	18	12	4	5	61	20	309
> \$45,000	51	11	10	20	4	5	92	20	463
Missing	23	14	11	8	5	7	54	33	163
Total	190	16	14	59	5	6	249	22	1152
<u>Education</u>									
< 12th Grade	48	29	25	6	4	6	41	25	163
HS/GED	59	17	13	24	7	8	70	20	356
Some College	45	13	13	18	5	6	72	21	339
>= 4 Years College	31	14	13	8	4	4	44	20	219
Missing	7	9	8	3	4	5	22	29	75
Total	190	16	14	59	5	6	249	22	1152

1 Includes 8 consumers who are missing Striped Bass data.

Table K42b. Consumption of Striped Bass Guts by Demographic Factors (unadjusted & adjusted)

Guts Consumption	greater than 1/2 time				Consumes Striped Bass less than 1/2 time				never eats guts				Does Not Consume Striped Bass ¹		Total	
	n	%	adj%		n	%	adj%		n	%	adj%		n	%	adj%	n
<u>Mode</u>																
Piers	5	1	1		2	0	0		436	75	76		140	24	22	583
Beach and Bank	0	0	0		0	0	0		65	80	79		16	20	21	81
Private Boats	4	1	1		1	0	0		311	80	81		74	19	17	390
Party Boats	0	0	0		0	0	0		79	81	81		19	19	19	98
Total	9	1	1		3	0	0		891	77	79		249	22	20	1152
<u>Ethnicity (major groups)</u>																
African Americans	1	1	1		0	0	0		85	82	80		18	17	19	104
Latinos/Hispanics	1	1	2		1	1	1		109	72	67		40	26	31	151
Caucasians	2	0	0		0	0	0		344	80	83		85	20	17	431
Asians	5	1	2		1	0	0		303	76	80		91	23	19	400
Other	0	0	0		1	4	2		21	78	79		5	19	19	27
Missing	0	0	0		0	0	0		29	74	76		10	26	24	39
Total	9	1	1		3	0	0		891	77	79		249	22	20	1152
<u>Ethnicity (with Asian subgroups)</u>																
African Americans	1	1	1		0	0	0		85	82	80		18	17	19	104
Latinos/Hispanics	1	1	2		1	1	1		109	72	67		40	26	31	151
Caucasians	2	0	0		0	0	0		344	80	83		85	20	17	431
Chinese	2	3	9		0	0	0		45	71	78		16	25	13	63
Filipino	1	1	0		1	1	1		124	79	88		31	20	12	157
Vietnamese	1	1	3		0	0	0		74	77	80		21	22	17	96
Pacific Islander	0	0	0		0	0	0		20	77	65		6	23	35	26
Other Asian	1	2	0		0	0	0		40	69	64		17	29	36	58
Other	0	0	0		1	4	2		21	78	79		5	19	19	27
Missing	0	0	0		0	0	0		29	74	76		10	26	24	39
Total	9	1	1		3	0	0		891	77	79		249	22	20	1152
<u>Income</u>																
< \$20,000	1	0	1		1	0	0		173	80	82		42	19	16	217
\$20,000 - \$45,000	2	1	1		2	1	1		244	79	77		61	20	22	309
> \$45,000	3	1	1		0	0	0		368	79	82		92	20	17	463
Missing	3	2	2		0	0	0		106	65	69		54	33	29	163
Total	9	1	1		3	0	0		891	77	79		249	22	20	1152
<u>Education</u>																
< 12th Grade	1	1	2		1	1	0		120	74	72		41	25	27	163
HS/GED	1	0	0		0	0	0		285	80	81		70	20	19	356
Some College	2	1	0		1	0	0		264	78	77		72	21	23	339
>= 4 Years College	3	1	2		0	0	0		172	79	84		44	20	14	219
Missing	2	3	3		1	1	0		50	67	80		22	29	17	75
Total	9	1	1		3	0	0		891	77	79		249	22	20	1152

1 Includes 8 consumers who are missing Striped Bass data.

Table K42c. Consumption of Striped Bass Cooking Juices by Demographic Factors (unadjusted & adjusted)

Cooking Juices Consumption	Consumes Striped Bass				Does Not Consume Striped Bass ¹		Total
	greater than 1/2 time	less than 1/2 time	never eats juice		n	adj%	
	n	n	n	adj%	n	adj%	n
Mode							
Piers	82	46	315	53	140	22	583
Beach and Bank	9	12	44	49	16	20	81
Private Boats	35	32	249	66	74	19	390
Party Boats	18	6	55	57	19	19	98
Total	144	96	663	58	249	20	1152
Ethnicity (major groups)							
African Americans	7	3	76	73	18	17	104
Latinos/Hispanics	18	11	82	54	40	31	151
Caucasians	36	17	293	68	85	20	431
Asians	79	57	173	43	91	23	400
Other	3	4	15	56	5	19	27
Missing	1	4	24	62	10	24	39
Total	144	96	663	58	249	20	1152
Ethnicity (with Asian subgroups)							
African Americans	7	3	76	73	18	17	104
Latinos/Hispanics	18	11	82	54	40	31	151
Caucasians	36	17	293	68	85	20	431
Chinese	17	3	27	43	16	25	63
Filipino	27	24	75	48	31	12	157
Vietnamese	21	19	35	36	21	22	96
Pacific Islander	3	4	13	50	6	35	26
Other Asian	11	7	23	40	17	29	58
Other	3	4	15	56	5	19	27
Missing	1	4	24	62	10	24	39
Total	144	96	663	58	249	20	1152
Income							
< \$20,000	26	28	121	56	42	19	217
\$20,000 - \$45,000	39	24	185	60	61	20	309
> \$45,000	60	37	274	59	92	17	463
Missing	19	7	83	51	54	33	163
Total	144	96	663	58	249	20	1152
Education							
< 12th Grade	20	17	85	52	41	25	163
HS/GED	44	17	225	63	70	20	356
Some College	30	42	195	58	72	21	339
>= 4 Years College	41	14	120	55	44	14	219
Missing	9	6	38	51	22	29	75
Total	144	96	663	58	249	20	1152

1 Includes 8 consumers who are missing Striped Bass data.

Table K42d. Consumption of Striped Bass in Soup by Demographic Factors (unadjusted & adjusted).

Soup Consumption	greater than 1/2 time				Consumes Striped Bass less than 1/2 time				never eats soup				Does Not Consume Striped Bass ¹		Total	
	n	%	adj%		n	%	adj%		n	%	adj%		n	%	adj%	n
Mode																
Piers	56	10	10		103	18	20		284	49	48		140	24	22	583
Beach and Bank	4	5	7		17	21	24		44	54	48		16	20	21	81
Private Boats	20	5	4		37	9	8		259	66	71		74	19	17	390
Party Boats	6	6	8		9	9	9		64	65	65		19	19	19	98
Total	86	7	7		166	14	14		651	57	59		249	22	20	1152
Ethnicity (major groups)																
African Americans	0	0	0		4	4	5		82	79	76		18	17	19	104
Latinos/Hispanics	10	7	7		26	17	16		75	50	45		40	26	31	151
Caucasians	9	2	3		29	7	8		308	71	72		85	20	17	431
Asians	65	16	17		98	25	27		146	37	38		91	23	19	400
Other	2	7	4		5	19	15		15	56	61		5	19	19	27
Missing	0	0	0		4	10	3		25	64	73		10	26	24	39
Total	86	7	7		166	14	14		651	57	59		249	22	20	1152
Ethnicity (with Asian subgroups)																
African Americans	0	0	0		4	4	5		82	79	76		18	17	19	104
Latinos/Hispanics	10	7	7		26	17	16		75	50	45		40	26	31	151
Caucasians	9	2	3		29	7	8		308	71	72		85	20	17	431
Chinese	4	6	5		10	16	18		33	52	63		16	25	13	63
Filipino	28	18	18		49	31	34		49	31	36		31	20	12	157
Vietnamese	22	23	22		23	24	23		30	31	38		21	22	17	96
Pacific Islander	2	8	16		4	15	16		14	54	33		6	23	35	26
Other Asian	9	16	15		12	21	24		20	34	25		17	29	36	58
Other	2	7	4		5	19	15		15	56	61		5	19	19	27
Missing	0	0	0		4	10	3		25	64	73		10	26	24	39
Total	86	7	7		166	14	14		651	57	59		249	22	20	1152
Income																
< \$20,000	22	10	10		48	22	23		105	48	51		42	19	16	217
\$20,000 - \$45,000	27	9	10		45	15	14		176	57	53		61	20	22	309
> \$45,000	26	6	5		59	13	12		286	62	66		92	20	17	463
Missing	11	7	6		14	9	10		84	52	55		54	33	29	163
Total	86	7	7		166	14	14		651	57	59		249	22	20	1152
Education																
< 12th Grade	14	9	8		28	17	22		80	49	43		41	25	27	163
HS/GED	24	7	6		53	15	13		209	59	62		70	20	19	356
Some College	20	6	6		52	15	14		195	58	58		72	21	23	339
>= 4 Years College	19	9	8		29	13	15		127	53	63		44	20	14	219
Missing	9	12	12		4	5	7		40	53	64		22	29	17	75
Total	86	7	7		166	14	14		651	57	59		249	22	20	1152

1 Includes 8 consumers who are missing Striped Bass data.

Table K42e. Consumption of Striped Bass Raw by Demographic Factors (unadjusted & adjusted)

Raw Consumption	Consumes Striped Bass less than 1/2 time				never eats raw				Does Not Consume Striped Bass ¹				Total	
	n	%	adj%	n	%	adj%	n	%	n	%	adj%	n	n	n
Mode														
Piers	11	2	1	36	6	8	396	68	140	24	22	583		
Beach and Bank	0	0	0	7	9	3	58	72	16	20	21	81		
Private Boats	7	2	2	16	4	3	293	75	74	19	17	390		
Party Boats	1	1	0	2	2	2	76	78	19	19	19	98		
Total	19	2	1	61	5	5	823	71	249	22	20	1152		
Ethnicity (major groups)														
African Americans	0	0	0	0	0	0	86	83	18	17	19	104		
Latinos/Hispanics	2	1	1	9	6	8	100	66	40	26	31	151		
Caucasians	4	1	1	6	1	2	336	78	85	20	17	431		
Asians	12	3	3	42	11	10	255	64	91	23	19	400		
Other	1	4	2	2	7	7	19	70	5	19	19	27		
Missing	0	0	0	2	5	6	27	69	10	26	24	39		
Total	19	2	1	61	5	5	823	71	249	22	20	1152		
Ethnicity (with Asian subgroups)														
African Americans	0	0	0	0	0	0	86	83	18	17	19	104		
Latinos/Hispanics	2	1	1	9	6	8	100	66	40	26	31	151		
Caucasians	4	1	1	6	1	2	336	78	85	20	17	431		
Chinese	0	0	0	5	8	13	42	67	16	25	13	63		
Filipino	3	2	1	12	8	8	111	71	31	20	12	157		
Vietnamese	3	3	4	7	7	5	65	68	21	22	17	96		
Pacific Islander	1	4	1	5	19	7	14	54	6	23	35	26		
Other Asian	5	9	9	13	22	20	23	40	17	29	36	58		
Other	1	4	2	2	7	7	19	70	5	19	19	27		
Missing	0	0	0	2	5	6	27	69	10	26	24	39		
Total	19	2	1	61	5	5	823	71	249	22	20	1152		
Income														
< \$20,000	4	2	2	9	4	6	162	75	42	19	16	217		
\$20,000 - \$45,000	4	1	1	21	7	6	223	72	61	20	22	309		
> \$45,000	10	2	1	22	5	4	339	73	92	20	17	463		
Missing	1	1	1	9	6	7	99	61	54	33	29	163		
Total	19	2	1	61	5	5	823	71	249	22	20	1152		
Education														
< 12th Grade	1	1	2	8	5	5	113	69	41	25	27	163		
HS/GED	5	1	1	17	5	4	264	74	70	20	19	356		
Some College	6	2	1	14	4	5	247	73	72	21	23	339		
>= 4 Years College	6	3	1	18	8	9	151	69	44	20	14	219		
Missing	1	1	1	4	5	4	48	64	22	29	17	75		
Total	19	2	1	61	5	5	823	71	249	22	20	1152		

1 Includes 8 consumers who are missing Striped Bass data.

Table K43a. Consumption of White Croaker Skin by Demographic Factors (unadjusted & adjusted)

Skin Consumption	Consumes White Croaker less than 1/2 time				never eats skin				Does Not Consume White Croaker ¹		Total
	n	%	adj%	n	%	adj%	n	%	n	adj%	n
<u>Mode</u>											
Piers	83	14	15	29	5	6	104	18	367	63	583
Beach and Bank	13	16	14	1	1	2	19	23	48	59	81
Private Boats	24	6	5	3	1	1	35	9	328	84	390
Party Boats	0	0	0	2	2	1	5	5	91	93	98
Total	120	10	9	35	3	3	163	14	834	72	1152
<u>Ethnicity (major groups)</u>											
African Americans	12	12	11	7	7	8	16	15	69	66	104
Latinos/Hispanics	10	7	7	7	5	6	27	18	107	71	151
Caucasians	9	2	2	2	0	1	32	7	388	90	431
Asians	86	22	21	18	5	4	81	20	215	54	400
Other	2	7	2	0	0	0	2	7	23	85	91
Missing	1	3	2	1	3	0	5	13	32	92	39
Total	120	10	9	35	3	3	163	14	834	72	1152
<u>Ethnicity (with Asian subgroups)</u>											
African Americans	12	12	11	7	7	8	16	15	69	66	104
Latinos/Hispanics	10	7	7	7	5	6	27	18	107	71	151
Caucasians	9	2	2	2	0	1	32	7	388	90	431
Chinese	19	30	28	4	6	3	10	16	30	48	63
Filipino	25	16	20	8	5	5	33	21	91	58	157
Vietnamese	24	25	28	5	5	5	22	23	45	47	96
Pacific Islander	8	31	16	0	0	0	2	8	16	62	77
Other Asian	10	17	9	1	2	2	14	24	33	57	58
Other	2	7	2	0	0	0	2	7	23	85	91
Missing	1	3	2	1	3	0	5	13	32	92	39
Total	120	10	9	35	3	3	163	14	834	72	1152
<u>Income</u>											
< \$20,000	45	21	21	9	4	5	40	18	123	57	217
\$20,000 - \$45,000	36	12	12	11	4	5	53	17	209	68	309
> \$45,000	26	6	4	11	2	2	50	11	376	81	463
Missing	13	8	7	4	2	2	20	12	126	77	163
Total	120	10	9	35	3	3	163	14	834	72	1152
<u>Education</u>											
< 12th Grade	35	21	20	4	2	4	23	14	101	62	163
HS/GED	42	12	10	10	3	3	54	15	250	70	356
Some College	20	6	6	17	5	4	46	14	256	76	339
>= 4 Years College	18	8	6	4	2	2	31	14	166	76	219
Missing	5	7	5	0	0	0	9	12	61	81	75
Total	120	10	9	35	3	3	163	14	834	72	1152

1 Includes 13 Consumers who are missing White Croaker data.

Table K43b. Consumption of White Croaker Guts by Demographic Factors (unadjusted & adjusted)

Guts Consumption	Consumes White Croaker less than 1/2 time				never eats guts				Does Not Consume White Croaker ¹		Total
	n	%	adj%	n	%	adj%	n	%	n	adj%	n
Mode											
Piers	1	0	1	3	1	0	212	36	367	63	583
Beach and Bank	0	0	0	0	0	0	33	41	48	59	81
Private Boats	2	1	1	1	0	0	59	15	328	84	390
Party Boats	0	0	0	0	0	0	7	7	91	93	98
Total	3	0	0	4	0	0	311	27	834	72	1152
Ethnicity (major groups)											
African Americans	0	0	0	0	0	0	35	34	69	66	104
Latinos/Hispanics	1	1	1	1	1	0	42	28	107	71	151
Caucasians	0	0	0	0	0	0	43	10	388	90	431
Asians	2	1	1	3	1	1	180	45	215	54	400
Other	0	0	0	0	0	0	4	15	23	85	91
Missing	0	0	0	0	0	0	7	18	32	82	39
Total	3	0	0	4	0	0	311	27	834	72	1152
Ethnicity (with Asian subgroups)											
African Americans	0	0	0	0	0	0	35	34	69	66	104
Latinos/Hispanics	1	1	1	1	1	0	42	28	107	71	151
Caucasians	0	0	0	0	0	0	43	10	388	90	431
Chinese	0	0	0	0	0	0	33	52	30	48	63
Filipino	0	0	0	0	0	0	66	42	91	58	157
Vietnamese	2	2	2	0	0	0	49	51	45	47	96
Pacific Islander	0	0	0	1	4	0	9	35	16	62	26
Other Asian	0	0	0	2	3	4	23	40	33	57	58
Other	0	0	0	0	0	0	4	15	23	85	27
Missing	0	0	0	0	0	0	7	18	32	82	39
Total	3	0	0	4	0	0	311	27	834	72	1152
Income											
< \$20,000	1	0	1	2	1	0	91	42	123	57	217
\$20,000 - \$45,000	1	0	0	1	0	0	98	32	209	68	309
> \$45,000	1	0	0	1	0	0	85	18	376	81	463
Missing	0	0	0	0	0	0	37	23	126	77	163
Total	3	0	0	4	0	0	311	27	834	72	1152
Education											
< 12th Grade	1	1	2	0	0	0	61	37	101	62	163
HS/GED	1	0	0	1	0	0	104	29	250	70	356
Some College	0	0	0	3	1	1	80	24	256	76	339
>= 4 Years College	1	0	1	0	0	0	52	24	166	76	219
Missing	0	0	0	0	0	0	14	19	61	81	75
Total	3	0	0	4	0	0	311	27	834	72	1152

1 Includes 13 Consumers who are missing White Croaker data.

Table K43c. Consumption of White Croaker Cooking Juices by Demographic Factors (unadjusted & adjusted)

Cooking Juices Consumption	Consumes White Croaker less than 1/2 time						Does Not Consume White Croaker ¹						Total n
	n	%	adj%	n	%	adj%	n	%	adj%	n	%	adj%	
<u>Mode</u>													
Piers	34	6	7	19	3	4	163	28	30	367	63	59	583
Beach and Bank	7	9	5	4	5	5	22	27	29	48	59	61	81
Private Boats	18	5	2	9	2	2	35	9	9	328	84	86	390
Party Boats	0	0	0	0	0	0	7	7	5	91	93	95	98
Total	59	5	4	32	3	3	227	20	19	834	72	74	1152
<u>Ethnicity (major groups)</u>													
African Americans	1	1	1	0	0	0	34	33	38	69	66	62	104
Latinos/Hispanics	4	3	3	5	3	4	35	23	23	107	71	70	151
Caucasians	7	2	2	2	0	1	34	8	8	388	90	90	431
Asians	46	12	10	25	6	7	114	29	29	215	54	53	400
Other	0	0	0	0	0	0	4	15	9	23	85	91	27
Missing	1	3	2	0	0	0	6	15	9	32	92	99	39
Total	59	5	4	32	3	3	227	20	19	834	72	74	1152
<u>Ethnicity (with Asian subgroups)</u>													
African Americans	1	1	4	0	0	0	34	33	38	69	66	62	104
Latinos/Hispanics	4	3	3	5	3	4	35	23	23	107	71	70	151
Caucasians	7	2	2	2	0	1	34	8	8	388	90	90	431
Chinese	14	22	20	2	3	3	17	27	23	30	48	54	63
Filipino	10	6	6	8	5	7	48	31	32	30	58	55	157
Vietnamese	18	19	17	11	11	13	22	23	24	45	47	45	96
Pacific Islander	3	12	5	2	8	3	5	19	16	16	62	77	26
Other Asian	1	2	0	2	3	7	22	38	40	33	57	54	58
Other	0	0	0	0	0	0	4	15	9	23	85	91	27
Missing	1	3	2	0	0	0	6	15	9	32	92	99	39
Total	59	5	4	32	3	3	227	20	19	834	72	74	1152
<u>Income</u>													
< \$20,000	14	6	7	14	6	8	66	30	29	123	57	56	217
\$20,000 - \$45,000	21	7	5	11	4	4	68	22	26	209	68	65	309
> \$45,000	14	3	3	6	1	1	67	14	12	376	81	85	463
Missing	10	6	4	1	1	1	26	16	18	126	77	78	163
Total	59	5	4	32	3	3	227	20	19	834	72	74	1152
<u>Education</u>													
< 12th Grade	17	10	9	11	7	7	34	21	21	101	62	63	163
HS/GED	18	5	5	5	1	2	83	23	23	250	70	71	356
Some College	7	2	2	12	4	4	64	19	18	256	76	77	339
>= 4 Years College	15	7	6	3	1	2	35	16	14	166	76	79	219
Missing	2	3	2	1	1	2	11	15	15	61	81	82	75
Total	59	5	4	32	3	3	227	20	19	834	72	74	1152

1 Includes 13 Consumers who are missing White Croaker data.

Table K43d. Consumption of White Croaker in Soup by Demographic Factors (unadjusted & adjusted)

Soup Consumption	Consumes White Croaker						Does Not Consume White Croaker ¹			Total
	greater than 1/2 time			less than 1/2 time			never eats soup			
	n	%	adj%	n	%	adj%	n	%	adj%	n
Mode										
Piers	25	4	5	45	8	7	146	25	29	367
Beach and Bank	4	5	6	13	16	17	16	20	17	48
Private Boats	10	3	1	19	5	5	33	8	8	328
Party Boats	0	0	0	0	0	0	7	7	5	91
Total	39	3	3	77	7	6	202	18	17	834
Ethnicity (major groups)										
African Americans	0	0	0	1	1	2	34	33	36	69
Latinos/Hispanics	2	1	1	10	7	5	32	21	24	107
Caucasians	3	1	1	4	1	1	36	8	8	388
Asians	34	9	9	57	14	14	94	24	23	215
Other	0	0	0	1	4	2	3	11	7	23
Missing	0	0	0	4	10	4	3	8	6	32
Total	39	3	3	77	7	6	202	18	17	834
Ethnicity (with Asian subgroups)										
African Americans	0	0	0	1	1	2	34	33	36	69
Latinos/Hispanics	2	1	1	10	7	5	32	21	24	107
Caucasians	3	1	1	4	1	1	36	8	8	388
Chinese	4	6	7	11	17	16	18	29	23	30
Filipino	9	6	7	17	11	13	40	25	26	91
Vietnamese	15	16	15	19	20	20	17	18	20	45
Pacific Islander	2	8	10	4	15	4	4	15	10	16
Other Asian	4	7	9	6	10	12	15	26	25	33
Other	0	0	0	1	4	2	3	11	7	23
Missing	0	0	0	4	10	4	3	8	6	32
Total	39	3	3	77	7	6	202	18	17	834
Income										
< \$20,000	12	6	8	27	12	13	55	25	24	123
\$20,000 - \$45,000	10	3	3	24	8	7	66	21	25	209
> \$45,000	9	2	2	18	4	3	60	13	11	376
Missing	8	5	4	8	5	5	21	13	14	126
Total	39	3	3	77	7	6	202	18	17	834
Education										
< 12th Grade	12	7	5	20	12	10	30	18	21	101
HS/GED	12	3	5	24	7	5	70	20	20	250
Some College	5	1	2	19	6	5	59	17	17	256
>= 4 Years College	8	4	2	10	5	6	35	16	13	166
Missing	2	3	1	4	5	6	8	11	11	61
Total	39	3	3	77	7	6	202	18	17	834

1 Includes 13 Consumers who are missing White Croaker data.

Table K43e. Consumption of White Croaker Raw by Demographic Factors (unadjusted & adjusted)

Raw Consumption	Consumes White Croaker										Does Not Consume White Croaker ¹			Total	
	greater than 1/2 time				less than 1/2 time				never eats raw			n	% ad/		
	n	%	ad/		n	%	ad/		n	%	ad/				
Mode															
Piers	1	0	0		3	1	0		212	36	40	367	63	59	583
Beach and Bank	0	0	0		1	1	1		32	40	38	48	59	61	81
Private Boats	0	0	0		1	0	0		61	16	14	328	84	86	390
Party Boats	0	0	0		0	0	0		7	7	5	91	93	95	98
Total	1	0	0		5	0	0		312	27	26	834	72	74	1152
Ethnicity (major groups)															
African Americans	0	0	0		0	0	0		35	34	38	69	66	62	104
Latinos/Hispanics	1	1	0		4	3	1		39	26	28	107	71	70	151
Caucasians	0	0	0		0	0	0		43	10	10	388	90	90	431
Asians	0	0	0		1	0	0		184	46	46	215	54	53	400
Other	0	0	0		0	0	0		4	15	9	23	85	91	27
Missing	0	0	0		0	0	0		7	18	11	32	82	89	39
Total	1	0	0		5	0	0		312	27	26	834	72	74	1152
Ethnicity (with Asian subgroups)															
African Americans	0	0	0		0	0	0		35	34	38	69	66	62	104
Latinos/Hispanics	1	1	0		4	3	1		39	26	28	107	71	70	151
Caucasians	0	0	0		0	0	0		43	10	10	388	90	90	431
Chinese	0	0	0		0	0	0		33	52	46	30	48	54	63
Filipino	0	0	0		1	1	0		65	41	45	91	58	55	157
Vietnamese	0	0	0		0	0	0		51	53	55	45	47	45	96
Pacific Islander	0	0	0		0	0	0		10	38	23	16	62	77	26
Other Asian	0	0	0		0	0	0		25	43	46	33	57	54	58
Other	0	0	0		0	0	0		4	15	9	23	85	91	27
Missing	0	0	0		0	0	0		7	18	11	32	82	89	39
Total	1	0	0		5	0	0		312	27	26	834	72	74	1152
Income															
< \$20,000	1	0	0		4	2	1		89	41	43	123	57	56	217
\$20,000 - \$45,000	0	0	0		0	0	0		100	32	35	209	68	65	309
> \$45,000	0	0	0		1	0	0		86	19	15	376	81	85	463
Missing	0	0	0		0	0	0		37	23	22	126	77	78	163
Total	1	0	0		5	0	0		312	27	26	834	72	74	1152
Education															
< 12th Grade	0	0	0		1	1	1		61	37	36	101	62	63	163
HS/GED	1	0	0		2	1	0		103	29	29	250	70	71	356
Some College	0	0	0		1	0	0		82	24	23	256	76	77	339
>= 4 Years College	0	0	0		1	0	0		52	24	21	166	76	79	219
Missing	0	0	0		0	0	0		14	19	18	61	81	82	75
Total	1	0	0		5	0	0		312	27	26	834	72	74	1152

1 Includes 13 Consumers who are missing White Croaker data.

Table K44. Recent Consumption of Fish from Areas Outside of San Francisco Bay and from Stores or Restaurants (unadjusted & adjusted)

	All Respondents (n=1331)			Consumers (n=1152)			Recent Consumers (n=537)		
	n	%	adj%	n	%	adj%	n	%	adj%
Fish from areas outside SF Bay: ¹	309	23	23	273	24	23	119	24	25
Ocean (Outside of SF Bay)	128	41	41	111	41	40	55	46	43
Lake/Reservoir	92	30	34	83	30	35	30	25	27
River	60	19	15	56	21	17	23	19	26
Delta	58	19	17	50	18	17	21	18	17
Other	52	17	15	48	18	15	23	19	11
Fish from a store or restaurant	710	53	57	625	54	58	256	48	50

¹ Percentages of those who had consumption from areas outside SF Bay. Percentages do not sum to 100% because respondents could indicate more than one area.

Table K45a. Consumption Rates (g/d) for Fish from Other Sources (unadjusted)

	N	Geom Mean	Arith Mean	SD	Min	P10	P20	P30	P40	Med	P60	P70	P80	P90	P95	Max
<u>All Respondents</u>																
Fish Outside SF Bay ¹	309	13.98	21.41	27.60	2.00	5.33	8.00	8.00	8.00	16.00	16.00	18.00	24.00	48.00	64.00	200.00
Commercial Fish ²	710	16.32	26.62	41.13	1.00	5.33	8.00	8.00	12.00	16.00	16.00	24.00	32.00	64.00	84.00	672.00
<u>Consumers of SF Bay Fish</u>																
Fish Outside SF Bay ¹	273	13.28	19.80	25.40	2.00	5.30	8.00	8.00	8.00	16.00	16.00	16.00	24.00	36.00	64.00	192.00
Commercial Fish ²	625	16.69	26.90	42.00	1.00	5.36	8.00	8.00	12.00	16.00	16.00	24.00	32.00	60.00	80.00	672.00
<u>Recent Consumers of SF Bay Fish</u>																
SF Bay Fish	501	16.55	28.08	39.63	2.00	5.33	8.00	8.00	12.00	16.00	16.00	24.00	36.00	56.00	108.00	324.00
All Sport Fish ³	501	19.82	32.96	42.84	2.00	5.36	8.00	12.00	16.00	16.00	24.00	32.00	48.00	72.00	112.00	324.00
All Fish ⁴	501	28.84	46.52	62.52	2.00	8.00	12.00	16.00	24.00	32.00	36.00	48.00	60.00	96.00	144.00	848.00
Fish Outside SF Bay ¹	119	14.11	20.52	22.65	2.00	5.28	8.00	8.00	10.72	16.00	16.00	18.00	24.00	40.00	64.00	144.00
All Sport Fish ^{1,3}	119	33.09	45.51	44.25	4.00	13.20	16.00	24.00	24.00	32.00	36.00	48.00	56.00	96.00	168.00	240.00
Commercial Fish ²	256	16.05	26.54	51.37	2.00	5.33	8.00	8.00	13.33	16.00	16.00	24.00	32.00	48.00	80.00	672.00
All Fish ^{2,4}	256	39.95	56.93	71.27	5.33	16.00	24.00	24.00	32.00	40.00	48.00	56.00	72.00	120.00	156.00	848.00
<u>Recent Consumers of Sport Fish⁵</u>																
All Sport Fish ³	694	17.99	29.92	40.02	2.00	5.36	8.00	8.00	16.00	16.00	24.00	32.00	40.00	64.00	108.00	324.00
All Fish ⁴	694	27.99	45.31	58.98	2.00	8.00	12.00	16.00	24.00	32.00	36.00	48.00	60.00	96.00	144.00	848.00

1 Excludes anglers with no consumption of fish from outside SF Bay.

2 Excludes anglers with no consumption of commercial fish.

3 Fish from SF Bay and outside SF Bay.

4 Fish from SF Bay, outside SF Bay, and commercial fish.

5 Anglers with recent consumption of either SF Bay fish or fish from outside SF Bay.

Table K45b. Consumption Rates (g/d) for Fish from Other Sources (adjusted)

	N	Geom Mean	Arith Mean	SD	Min	P10	P20	P30	P40	Med	P60	P70	P80	P90	P95	Max
<u>All Respondents</u>																
Fish Outside SF Bay ¹	266	12.84	18.40	21.10	2.00	5.33	8.00	8.00	8.00	12.00	16.00	16.00	24.00	32.20	64.00	200.00
Commercial Fish ²	608	16.20	26.50	47.10	1.00	5.33	8.00	8.00	12.00	16.00	16.00	24.00	32.00	56.00	80.00	672.00
<u>Consumers of SF Bay Fish</u>																
Fish Outside SF Bay ¹	234	12.18	17.00	19.60	2.00	5.30	8.00	8.00	8.00	12.00	16.00	16.00	24.00	32.00	48.00	192.00
Commercial Fish ²	531	17.17	27.70	49.30	2.00	8.00	8.00	8.00	16.00	16.00	21.40	24.00	32.00	60.00	80.00	672.00
<u>Recent Consumers of SF Bay Fish</u>																
SF Bay Fish	465	13.97	23.02	32.05	2.00	4.00	8.00	8.00	8.00	16.00	16.00	16.00	32.00	48.00	80.00	324.00
All Sport Fish ³	465	17.06	27.86	35.64	2.00	4.00	8.00	8.00	16.00	16.00	24.00	24.00	36.00	56.00	96.00	324.00
All Fish ⁴	465	25.99	43.36	75.96	2.00	8.00	12.00	16.00	24.00	24.00	32.00	40.00	56.00	80.00	128.00	848.00
Fish Outside SF Bay ¹	113	13.54	18.80	20.30	2.00	5.36	8.00	8.00	12.00	16.00	16.00	16.00	24.00	32.00	48.00	144.00
All Sport Fish ^{1,3}	113	30.29	40.17	38.41	4.00	13.20	20.00	24.00	24.00	32.00	32.00	40.00	48.00	80.00	136.00	240.00
Commercial Fish ²	234	15.77	28.66	73.62	2.00	5.36	8.00	8.00	12.00	16.00	16.00	24.00	32.00	48.00	60.00	672.00
All Fish ^{2,4}	234	36.24	55.75	95.31	5.33	12.00	20.00	24.00	28.00	32.16	40.00	54.00	64.00	104.00	144.00	848.00
<u>Recent Consumers of Sport Fish⁵</u>																
All Sport Fish ³	620	15.33	24.47	31.67	2.00	5.28	8.00	8.00	12.00	16.00	16.00	24.00	32.00	48.00	74.67	324.00
All Fish ⁴	620	25.02	40.65	65.24	2.00	8.00	12.00	16.00	22.00	24.00	32.00	40.00	52.00	80.00	128.00	848.00

1 Excludes anglers with no consumption of fish from outside SF Bay.

2 Excludes anglers with no consumption of commercial fish.

3 Fish from SF Bay and outside SF Bay.

4 Fish from SF Bay, outside SF Bay, and commercial fish.

5 Anglers with recent consumption of either SF Bay fish or fish from outside SF Bay.

Table K47. Recent Consumption of Crab by Demographic Factors (unadjusted & adjusted)

Consumers of Bay Fish	N	Consumers of Crab		
		N	%	adj% ¹
Total	1152	76	7	6
<u>Mode</u>				
Piers	583	54	9	8
Beach and Bank	81	5	6	7
Private Boats	390	10	3	2
Party Boats	98	7	7	9
Chi-Square p-value ²		0.0014		
<u>Ethnicity (major groups)</u>				
African American	104	8	8	8
Latino	151	8	5	4
Caucasian	431	17	4	5
Asian	400	41	10	8
Other	27	1	4	0
Missing/Don't Know/Refuse	39	1	3	1
Chi-Square p-value ²		0.0089		
<u>Ethnicity (with Asian subgroups)</u>				
African American	104	8	8	8
Latino	151	8	5	4
Caucasian	431	17	4	5
Chinese	63	3	5	2
Filipino	157	22	14	9
Vietnamese	96	10	10	13
Pacific Islander	26	2	8	6
Other Asian	58	4	7	3
Other	27	1	4	0
Missing/Don't Know/Refuse	39	1	3	1
Chi-Square p-value ²		Not valid		
<u>Income</u>				
<\$20,000	217	19	9	9
\$20,000-\$45,000	309	18	6	4
>\$45,000	463	28	6	5
Missing/Don't Know/Refuse	163	11	7	6
Mantel-Haenszel Chi-Square p-value ²		0.3210		
<u>Education</u>				
<12th Grade	163	12	7	9
HS or GED	356	22	6	5
Some College	339	23	7	6
>=4 yrs. College	219	15	7	5
Missing/Don't Know/Refuse	75	4	5	4
Chi-Square p-value ²		0.9681		
<u>Season Interviewed</u>				
Winter	202	2	1	1
Spring	208	8	4	2
Summer	458	40	9	9
Fall	284	26	9	9
Mantel-Haenszel Chi-Square p-value ²		0.0002		

1 Adjusted for avidity bias.

2 Missing/Don't Know/Declined not included in Chi-square statistic.
Chi-square statistic was calculated for unadjusted data only.

Table K48. Meal Frequency of Crab and Shellfish (unadjusted & adjusted)

	N	Arith Mean	Arith SD	Min	P10	P20	P30	P40	Med	P60	P70	P80	P90	P95	Max
Respondents															
Crab (unadjusted)	73	2.60	3.84	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	3.00	4.00	10.00	30.00
All Shellfish (unadjusted)	80	2.75	3.73	1.00	1.00	1.00	1.00	1.00	1.00	2.00	3.00	4.00	5.00	8.50	30.00
Crab (adjusted)	61	2.39	3.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	3.00	4.00	10.00	30.00
All Shellfish (adjusted)	67	2.46	3.46	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	3.00	5.00	10.00	30.00
Consumers															
Crab (unadjusted)	72	2.63	3.86	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	3.00	4.00	10.00	30.00
All Shellfish (unadjusted)	79	2.77	3.74	1.00	1.00	1.00	1.00	1.00	1.00	2.00	3.00	4.00	5.00	10.00	30.00
Crab (adjusted)	61	2.39	3.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	3.00	4.00	10.00	30.00
All Shellfish (adjusted)	67	2.46	3.46	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	3.00	5.00	10.00	30.00
Recent Consumers															
Crab (unadjusted)	52	2.79	4.31	1.00	1.00	1.00	1.00	1.00	1.50	2.00	3.00	4.00	4.00	10.00	30.00
All Shellfish (unadjusted)	56	3.05	4.19	1.00	1.00	1.00	1.00	1.00	2.00	3.00	4.00	4.00	5.00	10.00	30.00
Crab (adjusted)	46	2.24	3.79	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	3.00	4.00	4.00	30.00
All Shellfish (adjusted)	49	2.53	3.75	1.00	1.00	1.00	1.00	1.00	1.00	2.00	3.00	4.00	4.00	5.00	30.00

K-64

Table K49. Awareness of Health Advisory (unadjusted & adjusted)

A. Mode	Respondents				Consumers				Non-Consumers			
	Total ¹	Responded Yes			Total ¹	Responded Yes			Total ¹	Responded Yes		
	n	n	%	adj%	n	n	%	adj%	n	n	%	adj%
Pier	695	392	56	58	583	324	56	58	112	68	61	58
Beach and Bank	99	54	55	53	81	44	54	51	18	10	56	61
Private Boats	433	276	64	65	390	248	64	65	43	28	65	72
Total	1227	722	59	61	1054	616	58	60	173	106	61	62
Chi-square p-value ²		<0.0001				0.0002				0.1848		

B. Ethnicity (major groups)	Respondents				Consumers				Non-Consumers			
	Total ¹	Responded Yes			Total ¹	Responded Yes			Total ¹	Responded Yes		
	n	n	%	adj%	n	n	%	adj%	n	n	%	adj%
Black/African American	117	81	69	74	96	67	70	73	21	14	67	80
Latino/Hispanic	165	87	53	51	144	73	51	50	21	14	67	55
Caucasian	452	305	67	67	368	254	69	68	84	51	61	61
Asian	420	219	52	53	384	197	51	53	36	22	61	57
Other	31	17	55	72	26	14	54	75	5	3	60	67
Missing/Don't Know/Declined	42	13	31	42	36	11	31	33	6	2	33	75
Total	1227	722	59	61	1054	616	58	60	173	106	61	62
Chi-square p-value ²		<0.0001				<0.0001				0.9903		

C. Ethnicity (with Asian subgroups)	Respondents				Consumers				Non-Consumers			
	Total ¹	Responded Yes			Total ¹	Responded Yes			Total ¹	Responded Yes		
	n	n	%	adj%	n	n	%	adj%	n	n	%	adj%
Black/African American	117	81	69	74	96	67	70	73	21	14	67	81
Latino/Hispanic	165	87	53	51	144	73	51	50	21	14	67	55
Caucasian	452	305	67	67	368	254	69	68	84	51	61	61
Chinese	69	41	59	58	59	36	61	58	10	5	50	56
Filipino	157	76	48	46	149	73	49	47	8	3	38	38
Vietnamese	98	44	45	52	96	42	44	52	2	2	100	100
Pacific Islander	29	21	72	77	25	17	68	72	4	4	100	100
Other Asian	67	37	55	56	55	29	53	57	12	8	67	56
Other	31	17	55	72	26	14	54	75	5	3	60	67
Missing/Don't Know/Declined	42	13	31	42	36	11	31	33	6	2	33	75
Total	1227	722	59	61	1054	616	58	60	173	106	61	62
Chi-square p-value ²		<0.0001				<0.0001				Not Valid		

1 Party boat anglers were excluded because they were not asked any health advisory questions.

2 Chi-square statistic does not include Missing/Don't Know/Declined responses. Chi-square statistic was calculated for unadjusted data only.

Table K49 (cont.). Awareness of Health Advisory (unadjusted & adjusted)

D. Income	Respondents				Consumers				Non-Consumers			
	Total ¹	Responded Yes			Total ¹	Responded Yes			Total ¹	Responded Yes		
	n	n	%	adj%	n	n	%	adj%	n	n	%	adj%
< \$20,000/year	240	120	50	53	214	104	49	51	26	16	62	72
\$20,000 - \$45,000/year	328	190	58	56	289	167	58	56	39	23	59	60
> \$45,000/year	480	339	71	73	400	281	70	73	80	58	73	72
Missing/Don't Know/Declined	179	73	41	40	151	64	42	43	28	9	32	27
Total	1227	722	59	61	1054	616	58	60	173	106	61	62
Mantel-Haenszel Chi-square p-value ²		<0.0001				<0.0001				0.5026		

E. Education	Respondents				Consumers				Non-Consumers			
	Total ¹	Responded Yes			Total ¹	Responded Yes			Total ¹	Responded Yes		
	n	n	%	adj%	n	n	%	adj%	n	n	%	adj%
< 12th Grade	174	90	52	50	161	83	52	49	13	7	54	63
Completed HS or GED	392	233	59	63	332	196	59	65	60	37	62	55
Some college/trade school	351	225	64	64	309	197	64	63	42	28	67	65
>= 4 years college	230	152	66	69	182	120	66	68	48	32	67	75
Missing/Don't Know/Declined	80	22	28	32	70	20	29	32	10	2	20	32
Total	1227	722	59	61	1054	616	58	60	173	106	61	62
Mantel-Haenszel Chi-square p-value ²		0.0027				0.0032				0.6990		

F. Years Fishing in SF Bay	Respondents				Consumers				Non-Consumers			
	Total ¹	Responded Yes			Total ¹	Responded Yes			Total ¹	Responded Yes		
	n	n	%	adj%	n	n	%	adj%	n	n	%	adj%
< 1 year	120	52	43	42	119	51	43	41	1	1	100	100
1-5 years	307	164	5	53	307	164	53	53	0	0	0	0
6-10 years	137	78	57	55	135	76	56	55	2	2	100	100
11-20 years	167	104	62	62	166	103	62	62	1	1	100	100
21-30 years	97	70	72	68	97	70	72	68	0	0	0	0
31+ years	156	122	78	77	154	120	78	76	2	2	100	100
Missing/Don't Know/Declined	243	132	54	66	76	32	42	86	167	100	60	61
Total	1227	722	59	61	1054	616	58	60	173	106	61	62
Mantel-Haenszel Chi-square p-value ²		<0.0001				<0.0001				Not Valid		

1 Party boat anglers were excluded because they were not asked any health advisory questions.

2 Chi-square statistic does not include Missing/Don't Know/Declined responses. Chi-square statistic was calculated for unadjusted data only.

Table K50. Comprehension of Health Advisory by Mode (unadjusted & adjusted)**A. Respondents**

Mode	Vague Knowledge			Specific Knowledge			Total ¹
	n	%	adj%	n	%	adj%	
Pier	177	46	52	205	54	48	382
Beach and Bank	27	51	50	26	49	50	53
Private Boats	101	37	36	170	63	64	271
Total	305	43	45	401	57	55	706
Chi square p-value ²							0.0349

16 Respondents are missing health advisory details.

B. Consumers

Mode	Vague Knowledge			Specific Knowledge			Total ¹
	n	%	adj%	n	%	adj%	
Pier	151	48	56	166	52	44	317
Beach and Bank	20	47	39	23	53	61	43
Private Boats	89	37	35	154	63	65	243
Total	260	43	45	343	57	55	603
Chi square p-value ²							0.0300

13 Consumers are missing health advisory details.

C. Recent Consumers

Mode	Vague Knowledge			Specific Knowledge			Total ¹
	n	%	adj%	n	%	adj%	
Pier	72	46	54	84	54	46	156
Beach and Bank	10	45	35	12	55	65	22
Private Boats	37	32	23	80	68	77	117
Total	119	40	38	176	60	62	295
Chi square p-value ²							0.0468

4 Recent Consumers are missing health advisory details.

D. Non-Consumers

Mode	Vague Knowledge			Specific Knowledge			Total ¹
	n	%	adj%	n	%	adj%	
Pier	26	40	36	39	60	64	65
Beach and Bank	7	70	89	3	30	11	10
Private Boats	12	43	48	16	57	52	28
Total	45	44	45	58	56	55	103
Chi square p-value ²							0.2038

3 Non-Consumers are missing health advisory details.

1 Party boat anglers were excluded because they were not asked any health advisory questions.

2 Chi-square statistic was calculated for unadjusted data only.

Table K51. Comprehension of Health Advisory by Ethnicity (unadjusted & adjusted)

A. Respondents

Ethnicity	Vague Knowledge			Specific Knowledge			Total ¹
	n	%	adj%	n	%	adj%	
African American	40	51	58	39	49	42	79
Latino/Hispanic	41	48	49	45	52	51	86
Caucasian	109	37	39	186	63	61	295
Asian	102	47	49	114	53	51	216
Other	8	47	53	9	53	47	17
Missing/Don't Know/Declined	5	38	34	8	62	66	13
Total	305	43	45	401	57	55	706
Chi square p-value ²							0.0691

African American	40	51	58	39	49	42	79
Latino/Hispanic	41	48	49	45	52	51	86
Caucasian	109	37	39	186	63	61	295
Chinese	17	43	35	23	58	65	40
Filipino	45	60	65	30	40	35	75
Vietnamese	18	42	49	25	58	51	43
Pacific Islander	10	48	45	11	52	55	21
Other Asian	12	32	34	25	68	66	37
Other	8	47	53	9	53	47	17
Missing/Don't Know/Declined	5	38	34	8	62	66	13
Total	305	43	45	401	57	55	706
Chi square p-value ²							0.0224

16 Respondents are missing health advisory details.

B. Consumers

Ethnicity	Vague Knowledge			Specific Knowledge			Total ¹
	n	%	adj%	n	%	adj%	
African American	31	48	55	34	52	45	65
Latino/Hispanic	37	51	55	35	49	45	72
Caucasian	88	36	35	159	64	65	247
Asian	92	47	50	102	53	50	194
Other	7	50	70	7	50	30	14
Missing/Don't Know/Declined	5	45	54	6	55	46	11
Total	260	43	45	343	57	55	603
Chi square p-value ²							0.0413

African American	31	48	55	34	52	45	65
Latino/Hispanic	37	51	55	35	49	45	72
Caucasian	88	36	35	159	64	65	247
Chinese	15	43	35	20	57	65	35
Filipino	44	61	64	28	39	36	72
Vietnamese	16	39	49	25	61	51	41
Pacific Islander	9	53	55	8	47	45	17
Other Asian	8	28	34	21	72	66	29
Other	7	50	70	7	50	30	14
Missing/Don't Know/Declined	5	45	54	6	55	46	11
Total	260	43	45	343	57	55	603
Chi square p-value ²							0.0053

13 Consumers are missing health advisory details.

1 Party boat anglers were excluded because they were not asked any health advisory questions.

2 Chi-square statistic does not include Missing/DK/Declined responses. Chi-square statistic was calculated for unadjusted data only.

Table K51 (cont.). Comprehension of Health Advisory by Ethnicity (unadjusted & adjusted)

C. Recent Consumers

Ethnicity	Vague Knowledge			Specific Knowledge			Total ¹
	n	%	adj%	n	%	adj%	
African American	13	41	45	19	59	55	32
Latino/Hispanic	15	54	58	13	46	42	28
Caucasian	32	32	22	69	68	78	101
Asian	54	45	46	67	55	54	121
Other	2	33	53	4	67	47	6
Missing/Don't Know/Declined	3	43	52	4	57	48	7
Total	119	40	38	176	60	62	295
Chi square p-value ²							0.1825

African American	13	41	45	19	59	55	32
Latino/Hispanic	15	54	58	13	46	42	28
Caucasian	32	32	22	69	68	78	101
Chinese	10	50	49	10	50	51	20
Filipino	25	57	58	19	43	42	44
Vietnamese	10	34	46	19	66	54	29
Pacific Islander	5	50	38	5	50	62	10
Other Asian	4	22	24	14	78	76	18
Other	2	33	53	4	67	47	6
Missing/Don't Know/Declined	3	43	52	4	57	48	7
Total	119	40	38	176	60	62	295
Chi square p-value ²							0.0741

4 Recent Consumers are missing health advisory details.

D. Non-Consumers

Ethnicity	Vague Knowledge			Specific Knowledge			Total ¹
	n	%	adj%	n	%	adj%	
African American	9	64	70	5	36	30	14
Latino/Hispanic	4	29	11	10	71	89	14
Caucasian	21	44	54	27	56	46	48
Asian	10	45	39	12	55	61	22
Other	1	33	0	2	67	100	3
Missing/Don't Know/Declined	0	0	0	2	100	100	2
Total	45	44	45	58	56	55	103
Chi square p-value ²							0.4300

African American	9	64	70	5	36	30	14
Latino/Hispanic	4	29	11	10	71	89	14
Caucasian	21	44	54	27	56	46	48
Chinese	2	40	49	3	60	51	5
Filipino	1	33	58	2	67	42	3
Vietnamese	2	100	46	0	0	54	2
Pacific Islander	1	25	38	3	75	62	4
Other Asian	4	50	24	4	50	76	8
Other	1	33	0	2	67	100	3
Missing/Don't Know/Declined	0	0	0	2	100	100	2
Total	45	44	45	58	56	55	103
Chi square p-value ²							Not Valid

3 Non-Consumers are missing health advisory details.

1 Party boat anglers were excluded because they were not asked any health advisory questions.

2 Chi-square statistic does not include Missing/Don't Know/Declined responses. Chi-square statistic was calculated for unadjusted data only.

Table K52. Comprehension of Health Advisory by Income (unadjusted & adjusted)**A. Respondents**

Income	Vague Knowledge			Specific Knowledge			Total ¹
	n	%	adj%	n	%	adj%	
<\$20,000	58	49	50	60	51	50	118
\$20,000-\$45,000	82	44	51	105	56	49	187
>\$45,000	126	38	39	204	62	61	330
Missing/Don't Know/Declined	39	55	57	32	45	43	71
Total	305	43	45	401	57	55	706
Mantel-Haenszel Chi square p-value ²							0.0300

16 Respondents are missing health advisory details.

B. Consumers

Income	Vague Knowledge			Specific Knowledge			Total ¹
	n	%	adj%	n	%	adj%	
<\$20,000	53	51	51	50	49	49	103
\$20,000-\$45,000	72	44	51	93	56	49	165
>\$45,000	103	38	38	170	62	62	273
Missing/Don't Know/Declined	32	52	56	30	48	44	62
Total	260	43	45	343	57	55	603
Mantel-Haenszel Chi square p-value ²							0.0148

13 Consumers are missing health advisory details.

C. Recent Consumers

Income	Vague Knowledge			Specific Knowledge			Total ¹
	n	%	adj%	n	%	adj%	
<\$20,000	30	50	52	30	50	48	60
\$20,000-\$45,000	28	37	36	48	63	64	76
>\$45,000	46	36	33	83	64	67	129
Missing/Don't Know/Declined	15	50	41	15	50	59	30
Total	119	40	38	176	60	62	295
Mantel-Haenszel Chi square p-value ²							0.0833

4 Recent Consumers are missing health advisory details.

D. Non-Consumers

Income	Vague Knowledge			Specific Knowledge			Total ¹
	n	%	adj%	n	%	adj%	
<\$20,000	5	33	37	10	67	63	15
\$20,000-\$45,000	10	45	47	12	55	53	22
>\$45,000	23	40	43	34	60	57	57
Missing/Don't Know/Declined	7	78	66	2	22	34	9
Total	45	44	45	58	56	55	103
Mantel-Haenszel Chi square p-value ²							0.7766

3 Non-Consumers are missing health advisory details.

1 Party boat anglers were excluded because they were not asked any health advisory questions.

2 Chi-square statistic does not include Missing/Don't Know/Declined responses. Chi-square statistic was calculated for unadjusted data only.

Table K53. Comprehension of Health Advisory by Education (unadjusted & adjusted)

A. Respondents

Education	Vague Knowledge			Specific Knowledge			Total ¹
	n	%	adj%	n	%	adj%	
<12th grade	49	55	57	40	45	43	89
HS/GED	96	42	44	132	58	56	228
Some college	93	42	47	126	58	53	219
>= 4 years college	54	36	32	96	64	68	150
Missing/Don't Know/Declined	13	65	75	7	35	25	20
Total	305	43	45	401	57	55	706
Mantel-Haenszel Chi square p-value ²							0.0131

16 Respondents are missing health advisory details.

B. Consumers

Education	Vague Knowledge			Specific Knowledge			Total ¹
	n	%	adj%	n	%	adj%	
<12th grade	46	55	59	37	45	41	83
HS/GED	81	42	44	110	58	56	191
Some college	82	42	46	111	58	54	193
>= 4 years college	40	34	30	78	66	70	118
Missing/Don't Know/Declined	11	61	71	7	39	29	18
Total	260	43	45	343	57	55	603
Mantel-Haenszel Chi square p-value ²							0.0067

13 Consumers are missing health advisory details.

C. Recent Consumers

Education	Vague Knowledge			Specific Knowledge			Total ¹
	n	%	adj%	n	%	adj%	
<12th grade	22	48	45	24	52	55	46
HS/GED	39	43	45	51	57	55	90
Some college	34	38	35	55	62	65	89
>= 4 years college	20	32	27	42	68	73	62
Missing/Don't Know/Declined	4	50	46	4	50	54	8
Total	119	40	38	176	60	62	295
Mantel-Haenszel Chi square p-value ²							0.0723

4 Recent Consumers are missing health advisory details.

D. Non-Consumers

Education	Vague Knowledge			Specific Knowledge			Total ¹
	n	%	adj%	n	%	adj%	
<12th grade	3	50	30	3	50	70	6
HS/GED	15	41	42	22	59	58	37
Some college	11	42	52	15	58	48	26
>= 4 years college	14	44	39	18	56	61	32
Missing/Don't Know/Declined	2	100	100	0	0	0	2
Total	45	44	45	58	56	55	103
Mantel-Haenszel Chi square p-value ²							Not Valid

3 Non-Consumers are missing health advisory details.

1 Party boat anglers were excluded because they were not asked any health advisory questions.

2 Chi-square statistic does not include Missing/Don't Know/Declined responses. Chi-square statistic was calculated for unadjusted data only.

Table K54. Consumers With Consumption Above and Below the Health Advisory (unadjusted & adjusted)

	Above Advisory			Below Advisory		
	n	%	adj%	n	%	adj%
Total ¹	139	14	8	832	86	92
Not Aware of Health Advisory	54	39	40	332	40	37
Vague Knowledge	42	30	34	212	25	28
Specific Knowledge	43	31	26	288	35	35

¹ Party boat anglers were excluded because they were not asked any health advisory questions.
Missing health advisory data for 50 Consumers.

Table K55. How Anglers Have and Have Not Changed Fish Eating Habits (unadjusted & adjusted)A. Consumers

<u>Have Changed Fish Eating Habits:</u>			
	n	%	adj%
Engaged in protective measures	164	77	71
Stopped eating Bay fish	23	11	16
Eat only uncontaminated fish	9	4	5
Missing	<u>16</u>	<u>8</u>	<u>8</u>
Total	212	100	100
<u>Have Not Changed Fish Eating Habits:</u>			
	n	%	adj%
Consumed below limit before aware of advisory	205	55	60
Believes contamination is not a problem	67	18	15
General no; Did not change behavior	44	12	12
Response not specific to advisory	3	1	1
Missing	<u>55</u>	<u>15</u>	<u>12</u>
Total	374	100	100

30 Consumers are missing habit data.

B. Non-Consumers

<u>Have Changed Fish Eating Habits:</u>			
	n	%	adj%
Engaged in protective measures	6	20	18
Stopped eating Bay fish	22	73	74
Eat only uncontaminated fish	1	3	3
Missing	<u>1</u>	<u>3</u>	<u>5</u>
Total	30	100	100
<u>Have Not Changed Fish Eating Habits:</u>			
	n	%	adj%
Consumed below limit before aware of advisory	48	68	59
Believes contamination is not a problem	1	1	1
General no; Did not change behavior	3	4	8
Response not specific to advisory	1	1	1
Missing	<u>18</u>	<u>25</u>	<u>31</u>
Total	71	100	100

5 Non-Consumers are missing habit data.

C. Respondents

<u>Have Changed Fish Eating Habits:</u>			
	n	%	adj%
Engaged in protective measures	170	70	61
Stopped eating Bay fish	45	19	26
Eat only uncontaminated fish	10	4	5
Missing	<u>17</u>	<u>7</u>	<u>8</u>
Total	242	100	100
<u>Have Not Changed Fish Eating Habits:</u>			
	n	%	adj%
Consumed below limit before aware of advisory	253	57	59
Believes contamination is not a problem	68	15	13
General no; Did not change behavior	47	11	12
Response not specific to advisory	4	1	1
Missing	<u>73</u>	<u>16</u>	<u>15</u>
Total	445	100	100

35 Respondents are missing habit data.

Table K56. Consumers Who Changed Fish Eating Habits (unadjusted & adjusted)

A. Mode	Changed Habits			Didn't Change Habits			Total ¹
	n	%	adj%	n	%	adj%	
Pier	116	38	39	191	62	61	307
Beach and Bank	16	38	39	26	62	61	42
Private Boats	80	34	34	157	66	66	237
Total	212	36	37	374	64	63	586
Chi square p-value ²							0.6027

B. Ethnicity (major groups)	Changed Habits			Didn't Change Habits			Total ¹
	n	%	adj%	n	%	adj%	
African American	25	38	43	40	62	57	65
Latino/Hispanic	32	48	52	35	52	48	67
Caucasian	70	28	29	176	72	71	246
Asian	77	42	43	107	58	57	184
Other	4	29	19	10	71	81	14
Missing/Don't Know/Declined	4	40	46	6	60	54	10
Total	212	36	37	374	64	63	586
Chi square p-value ²							0.0098

C. Ethnicity (with Asian subgroups)	Changed Habits			Didn't Change Habits			Total ¹
	n	%	adj%	n	%	adj%	
African American	25	38	43	40	62	57	65
Latino/Hispanic	32	48	52	35	52	48	67
Caucasian	70	28	29	176	72	71	246
Chinese	11	33	43	22	67	57	33
Filipino	25	36	42	44	64	58	69
Vietnamese	21	51	41	20	49	59	41
Pacific Islander	8	50	56	8	50	44	16
Other Asian	12	48	40	13	52	60	25
Other	4	29	19	10	71	81	14
Missing/Don't Know/Declined	4	40	46	6	60	54	10
Total	212	36	37	374	64	63	586
Chi square p-value ²							0.0234

D. Income	Changed Habits			Didn't Change Habits			Total ¹
	n	%	adj%	n	%	adj%	
<\$20,000	39	39	45	60	61	55	99
\$20,000-\$45,000	59	36	33	105	64	67	164
>\$45,000	97	37	38	165	63	62	262
Missing/Don't Know/Declined	17	28	23	44	72	77	61
Total	212	36	37	374	64	63	586
Mantel-Haenszel Chi square p-value ²							0.7654

E. Education	Changed Habits			Didn't Change Habits			Total ¹
	n	%	adj%	n	%	adj%	
<12th grade	25	32	33	52	68	67	77
HS/GED	71	37	39	120	63	61	191
Some college	65	35	34	119	65	66	184
>= 4 years college	46	40	42	69	60	58	115
Missing/Don't Know/Declined	5	26	24	14	74	76	19
Total	212	36	37	374	64	63	586
Mantel-Haenszel Chi square p-value ²							0.4147

F. Season Interviewed	Changed Habits			Didn't Change Habits			Total ¹
	n	%	adj%	n	%	adj%	
Winter	37	30	31	85	70	69	122
Spring	43	34	32	83	66	68	126
Summer	83	37	40	139	63	60	222
Fall	49	42	46	67	58	54	116
Total	212	36	37	374	64	63	586
Chi square p-value ²							0.2587

1 Party boat anglers were excluded because they were not asked any health advisory questions.

Health advisory behavior details are missing for 30 Consumers.

2 Chi-square statistic does not include Missing/Don't Know/Declined responses. Chi-square statistic was calculated for unadjusted data only.

Table K57. Non-Consumers Who Changed Fish Eating Habits (unadjusted & adjusted)

A. Mode	Changed Habits			Didn't Change Habits			Total ¹
	n	%	adj%	n	%	adj%	
Pier	15	23	30	51	77	70	66
Beach and Bank	3	33	56	6	67	44	9
Private Boats	12	46	58	14	54	42	26
Total	30	30	40	71	70	60	101
Chi square p-value ²							0.0835

B. Ethnicity (major groups)	Changed Habits			Didn't Change Habits			Total ¹
	n	%	adj%	n	%	adj%	
African American	6	43	60	8	57	40	14
Latino/Hispanic	2	14	24	12	86	76	14
Caucasian	15	32	41	32	68	59	47
Asian	5	24	25	16	76	75	21
Other	0	0	2	3	100	100	3
Missing/Don't Know/Declined	2	100	100	0	0	0	2
Total	30	30	40	71	70	60	101
Chi square p-value ²							Not Valid

C. Ethnicity (with Asian subgroups)	Changed Habits			Didn't Change Habits			Total ¹
	n	%	adj%	n	%	adj%	
African American	6	43	60	8	57	40	14
Latino/Hispanic	2	14	24	12	86	76	14
Caucasian	15	32	41	32	68	59	47
Chinese	1	25	45	3	75	55	4
Filipino	0	0	0	3	100	100	3
Vietnamese	0	0	0	2	100	100	2
Pacific Islander	2	50	23	2	50	77	4
Other Asian	2	25	22	6	75	78	8
Other	0	0	0	3	100	100	3
Missing/Don't Know/Declined	2	100	100	0	0	0	2
Total	30	30	40	71	70	60	101
Chi square p-value ²							Not Valid

D. Income	Changed Habits			Didn't Change Habits			Total ¹
	n	%	adj%	n	%	adj%	
<\$20,000	3	19	22	13	81	78	16
\$20,000-\$45,000	7	32	55	15	68	78	22
>\$45,000	17	30	41	39	70	45	56
Missing/Don't Know/Declined	3	43	22	4	57	59	7
Total	30	30	40	71	70	60	101
Mantel-Haenszel Chi square p-value ²							0.4567

E. Education	Changed Habits			Didn't Change Habits			Total ¹
	n	%	adj%	n	%	adj%	
<12th grade	1	14	33	6	86	67	7
HS/GED	7	19	28	30	81	72	37
Some college	12	46	58	14	54	42	26
>= 4 years college	10	32	41	21	68	59	31
Missing/Don't Know/Declined	0	0	0	0	0	0	0
Total	30	30	40	71	70	60	101
Mantel-Haenszel Chi square p-value ²							Not Valid

F. Season Interviewed	Changed Habits			Didn't Change Habits			Total ¹
	n	%	adj%	n	%	adj%	
Winter	7	33	39	14	67	61	21
Spring	9	41	53	13	59	47	22
Summer	7	18	30	32	82	70	39
Fall	7	37	58	12	63	42	19
Total	30	30	40	71	70	60	101
Chi square p-value ²							0.2123

1 Party boat anglers were excluded because they were not asked any health advisory questions.
Health advisory behavior details are missing for 30 Consumers.

2 Chi-square statistic does not include Missing/Don't Know/Declined responses. Chi-square statistic was calculated for unadjusted data only.

Table K58. How Respondents Prefer to Receive Information About Fish (unadjusted)

A. Mode

Method	Piers		Shore		Private Boats		Total ¹	
	n	%	n	%	n	%	n	%
Newspapers	235	34	35	35	163	38	433	35
Television	240	35	36	36	135	31	411	34
Sign	176	25	25	25	70	16	271	22
Friend/Family	140	20	17	17	48	11	205	17
Fishing Regulations	92	13	9	9	69	16	170	14
Radio	87	13	12	12	49	11	148	12
Bait/Sport Shops	77	11	16	16	40	9	133	11
Other/Misc.	44	6	7	7	13	3	64	5
Contact with Educator	29	4	7	7	18	4	54	4
Internet	20	3	4	4	15	3	39	3
Fish and Game Warden	17	2	4	4	17	4	38	3
Don't Know	23	3	5	5	9	2	37	3
Direct Mailing	4	1	0	0	4	1	8	1
All Respondents	695	57	99	8	433	35	1227	100

B. Ethnicity

Method	African American		Latino/Hispanic		Caucasian		Asian		Other		Missing		Total ¹	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Newspapers	40	34	48	29	192	42	133	32	13	42	7	17	433	35
Television	45	38	71	43	120	27	151	36	13	42	11	26	411	34
Sign	35	30	47	28	82	18	100	24	4	13	3	7	271	22
Friend/Family	24	21	34	21	56	12	85	20	3	10	3	7	205	17
Fishing Regulations	16	14	27	16	72	16	47	11	4	13	4	10	170	14
Radio	17	15	30	18	48	11	47	11	2	6	4	10	148	12
Bait/Sport Shops	22	19	15	9	52	12	37	9	3	10	4	10	133	11
Other/Misc.	6	5	10	6	30	7	15	4	3	10	0	0	64	5
Contact with Educator	7	6	5	3	24	5	16	4	2	6	0	0	54	4
Internet	1	1	2	1	23	5	13	3	0	0	0	0	39	3
Fish and Game Warden	2	2	2	1	19	4	13	3	2	6	0	0	38	3
Don't Know	2	2	0	0	6	1	27	6	1	3	1	2	37	3
Direct Mailing	0	0	1	1	3	1	1	1	2	6	1	2	8	1
All Respondents	117	10	165	13	452	37	420	34	31	3	42	3	1227	100

¹ Party boat anglers were excluded because they were not asked any health advisory questions.

Table K59. How Consumers Prefer to Receive Information About Fish by Mode (unadjusted)

Method	Piers		Shore		Private Boats		Total ¹	
	n	%	n	%	n	%	n	%
Newspapers	193	33	27	33	151	39	371	35
Television	210	36	32	40	124	32	366	35
Sign	147	25	21	26	64	16	232	22
Friend/Family	126	22	13	16	45	12	184	18
Fishing Regulations	83	14	9	11	63	16	155	15
Radio	77	13	10	12	45	12	132	13
Bait/Sport Shops	61	10	13	16	36	9	110	10
Other/Misc.	38	7	6	7	11	3	55	5
Contact with Educator	24	4	6	7	17	4	47	4
Fish and Game Warden	11	2	4	5	17	4	32	3
Don't Know	19	3	3	4	8	2	30	3
Internet	14	2	3	4	12	3	29	3
Direct Mailing	4	1	0	0	3	1	7	1
All Consumers	583	55	81	8	390	37	1054	100

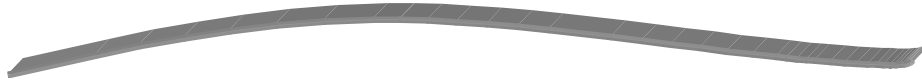
Method	African American		Latino/Hispanic		Caucasian		Asian		Other		Missing		Total ¹	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Newspapers	34	35	41	28	159	43	122	32	9	35	6	17	371	35
Television	37	39	65	45	102	28	141	37	10	38	11	31	366	35
Sign	29	30	41	28	64	17	92	24	4	15	2	6	232	22
Friend/Family	22	23	30	21	46	13	80	21	3	12	3	8	184	18
Fishing Regulations	15	16	24	17	62	17	47	12	4	15	3	8	155	15
Radio	15	16	25	17	42	11	44	11	2	8	4	11	132	13
Bait/Sport Shops	18	19	12	8	43	12	30	8	3	12	4	11	110	10
Other/Misc.	5	5	10	7	25	7	12	3	3	12	0	0	55	5
Contact with Educator	6	6	5	3	20	5	14	4	2	8	0	0	47	4
Fish and Game Warden	2	2	2	1	17	5	9	2	2	8	0	0	32	3
Don't Know	0	0	0	0	2	1	26	7	1	4	1	3	30	3
Internet	1	1	2	1	18	5	8	2	0	0	0	0	29	3
Direct Mailing	0	0	1	1	2	1	1	0	2	8	1	3	7	1
All Consumers	96	9	144	14	368	35	384	36	26	2	36	3	1054	100

¹ Party boat anglers were excluded because they were not asked any health advisory questions.

Appendix L

Health Advisory Discussion Groups

San Francisco Bay Seafood Consumption Study



Appendix L - Health Advisory Discussion Groups

The California Department of Health Services (CDHS) conducted four discussion groups with anglers in order to better assess anglers' actual awareness of the advisory, the effectiveness of the advisory language, and the best messages and modes of delivery for reaching anglers with information. We originally planned to conduct four discussion groups, each consisting of 8-12 participants. Participants would attend a two and one half-hour discussion facilitated by a community relations coordinator.

Discussion group participants were recruited from the survey population. At the conclusion of the interview, respondents were asked for their name, address, and telephone number for the purposes of quality control and follow-up. Of the 1331 respondents, 581 (44%) provided contact information. After reviewing preliminary study results, the project staff identified four target groups to participate in discussion groups. The four groups were categorized as: (1) Filipino anglers, who made up the largest group of Asian anglers; (2) anglers who were unaware of the advisory; (3) anglers who were aware of the advisory but had not changed their consumption habits; and (4) boat anglers. Out of the 581 anglers who provided contact information, 216 were eligible to participate in the discussions because they met the criteria for at least one of the four groups. The field coordinator attempted to contact all eligible participants. She explained the purpose of the focus groups and provided them with several scheduling options by which they could participate, including weekday evenings and weekend mornings. Those who indicated a willingness, received a confirmation letter with the date, time, and place of the discussion, and directions to the site. They also received a reminder call 24 hours before the meeting.

Out of 216 of eligible participants, 35 agreed to participate in the groups, and 17 actually participated. In response to the low attendance of the early meetings, we increased the compensation from \$50 to \$75, and offered meeting times during the workday as well as weekend and evening. We also re-contacted anglers who either declined to participate or failed to show, and offered them the increased compensation and meeting options. Participation by shore-based anglers, however, did not improve. We conducted all four of the proposed groups, and an additional group consisting of anglers from all three of the shore groups (aware, unaware, and Filipino anglers) in order to maximize participation. Information on discussion group contact and participation is presented in Table L1.

Table L1. Discussion Group Dates, Location, Contacts and Participants

Date Location	Target Group	Number Contacted	Number Confirmed	Number Participated
9/21/99 San Francisco	Filipino Consumers	21	5	2
9/23/99 Oakland	Filipino Consumers	55	5	2
10/30/99 Oakland	Unaware of Advisory	117	7	0
11/15/99 Oakland	Unaware of Advisory	117	5	3
11/20/99 Oakland	Unaware, Aware but haven't changed habits	117	5	3*
12/8/99 Martinez	Boat anglers	23	8	7

*One of these anglers was also Filipino.

One group was held in San Francisco, three were held in Oakland, and one was held in the Martinez Yacht Club (boat anglers). The group participants consisted of five Filipino anglers, three anglers who were unaware of the advisory, three anglers who were aware of the advisory but had not changed their behaviors, and seven boat anglers. One Filipino angler was also unaware of the advisory. For the purpose of discussion, we categorized respondents as either boat or shore-based anglers. Among participants, the length of time fishing ranged from 2 to 20 years.

To enhance objectivity in the interpretation of the discussion, three CDHS facilitators were present at each meeting. The groups were led by Ian Walker, Community Relations Coordinator, along with Gloria Cordona, and Diana Lee or Alyce Ujihara. Group participants were guided through a discussion outline (Attachment L-1) which contained specific questions. Responses were qualitative in nature, and recorded both on audio tape and by a note-taker.

Due to the small number of anglers who participated in the discussion groups, generalization to the overall fishing population was not possible. However, discussion group participants raised pertinent questions and concerns regarding the advisory messages and educational strategies. They also provided some insight into the efficacy of the language used in the advisory.

A. Discussion of Health Advisory

Even though anglers in the discussion groups had been read a summary and were offered written materials about the advisory during their field interview, their knowledge of the SF Bay advisory ranged from none whatsoever to two boat anglers who had a firm understanding of all the major recommendations. In general, the majority of participants

had fragmented or incorrect information regarding the health advisory. Anglers often had awareness of one element of the advisory (such as fish in different locations, limit size of fish, or eat less fish) but they were not knowledgeable about more than one aspect of the advisory. Overall, the boat anglers had the most accurate knowledge. Six out of seven expressed an awareness of the advisory and were able to correctly recite some element of it.

Anglers were then shown the health advisory for SF Bay fish (Appendix A). After reading the advisory, overall, the participants indicated that the information was important. Boat anglers and participants who were aware of the advisory but had not changed their habits, attached the least importance to the advisory.

B. Discussion of Terms used in the Health Advisory

In the discussion groups, we tried to assess whether anglers understood the term “sport fish.” In the health advisory, “sport fish” refers to all species of fish from the Bay that an angler may catch and eat. All of the participants claimed to know what the term sport fish meant; however, none of the groups were able to agree on its definition. Despite some awareness of the advisory guidelines, no one from the three shore-based groups believed the term applied to all fish from the Bay. The most common assertion was that it applied to fish one did not eat (e.g. caught and released). Two anglers felt the term referred to fish one could not sell. Some believed it applied to specific kinds of fish, such as bass and shark, or fish from the ocean, that were caught for recreation and not for food. Boat anglers were closest to describing the health advisory’s definition of “sport fish.” Two anglers initially felt that it applied to all fish from the Bay; however this definition was not supported in the discussion, which continued to propose alternate definitions. Some of the boat anglers felt that white croaker, shark, string ray, and other fish were definitely not “sport fish”; two people in this group felt that subsistence fishing was different than sport fishing, and that anglers who needed the fish for food were not catching “sport” fish.

Overall, anglers appeared at a loss for a better term to describe all fish that they may catch and eat. Some anglers felt the term “fish” didn’t need to be qualified if used on a waterfront sign. Others felt that “Bay fish” was a better term, or that a definition (such as “fish caught from the SF Bay”) would help clarify text in which sport fish was used. A couple of anglers felt that the current wording suggested that all fish, including river and ocean fish, were implicated in the advisory. They felt it was important that the wording state very clearly that the advisory was for SF Bay fish only.

In general, terms referring to the fish itself, like fillet, and juices were well understood by the participants. In referring to amounts of fish that can be safely eaten, most anglers felt that indicating “grams” was not helpful. While the majority of participants understood “ounces,” they also felt that people do not think in those terms.

Almost all of the shore-based anglers preferred “pounds” as the best way to express amount. They felt it took into consideration different meal sizes, and gave them more

freedom of choice. In contrast, almost everyone in the boat anglers group preferred that the amounts be expressed as “two meals.” They felt it was simple and sufficient. However, several anglers in this group clearly stated that they would not be following any advice to limit their consumption.

Filipino anglers who participated in the groups felt strongly that they did not think in terms of meal or portion sizes. They indicated that rather than an individual “meal” or portion on a plate, fish is generally put on the table whole, and family members then take what they want throughout the meal.

During the discussions, we noted that the Filipino anglers (4) all reported eating the skin and parts other than the fillet (e.g. head, cheeks). Boat anglers, on the other hand, indicated that they almost always ate only the skinned fillet. Other anglers varied in their response to eating the skin.

C. Discussion of Methods to Conduct Educational Outreach

We asked participants who they thought would be the most believable agency for conveying information about fish. Given a choice between the state health department or a federal health agency, almost everyone from shore-based and boat groups believed that the state was a more believable messenger for advisory information. The majority of people also preferred the state to city or county health departments. On whether the state was a more believable messenger than non-governmental environmental agencies such as Save San Francisco Bay, the response was divided. While the majority of participants felt that the state should be responsible for this type of information, and would be less biased, several participants believed that non-governmental agencies would be more protective and more believable messengers. Many of the anglers felt that the Department of Fish and Game was a very credible messenger; however, a couple of participants felt that they were more interested in enforcing regulations, and considered their presence threatening.

We asked participants whom they would go to if they had a question regarding their health. Everyone stated their doctor as the first person they would ask about their health. Most of the doctors were identified as being connected to a health maintenance organization. Other people mentioned relatives and one individual mentioned his wife. We also asked if there were leaders in their communities who would be effective messengers for fish-related concerns. No one could identify a “leader” in their community. If the question was specifically about fish, other anglers were frequently mentioned as sources of information. Several individuals said they had already spoken to fishing friends about participating in this discussion group, and that they would be sharing with them information from this group.

Almost unanimously people did not participate in community centers, cultural centers, or other cultural/community activities. The local bar was the only “place” identified as a center for shore-based anglers. Boat anglers also indicated the yacht club as a social center for themselves.

Although we did not ask questions about in which languages fish messages should be provided, all four of the Filipino anglers who participated in the discussion group indicated that written materials in Tagalog were unnecessary. These anglers shared that given the many dialects of Tagalog, written communication is difficult, and the majority of individuals who could read Tagalog could also read English. Considering the small number of Filipino anglers who participated in the discussion groups, clarification of this issue is merited.

D. Sign Building Activity and Discussion

We asked participants to assist us in the development of a fish health advisory sign, using their knowledge from our discussion. As a group, participants were shown three fish images, and asked which image they were most drawn to. The images were designed to be prototypes that could be simplified for logos, or elaborated upon for brochures and other educational materials. Each image contained two fish to visually support the advisory of two meals, or two half-pound portions, a month. Each of the three images were presented in three different color choices, making a total of nine possible images to choose from. After selecting their first choice, participants were asked to select a second choice. The most common choice for an image was of two colored fish on a line. The same image in black and white was the second most frequent choice with other images being mentioned with less frequency.

We then asked participants to assist us in the development of an advisory sign to be posted on fishing piers. Each of the signs were to contain three elements: a title, the general advisory consumption guidelines, and a the choice of additional health recommendations or information on how to obtain these recommendations. Participants in the two smallest discussion groups were allowed to create individual signs; the three larger groups developed signs as a group. A total of five signs were created. Participants were asked to choose between two word choices for the title of the sign: “Caution” or “Eat Bay Fish Safely.” Three signs chose “CAUTION” as their title, two signs “EAT BAY FISH SAFELY.”

Next we asked participants to choose between two grids showing consumption guidelines. The first presented the guidelines for the general population and pregnant women with size of fish; the second presented the guidelines with different consumption rates based upon individual species for men and pregnant women with size of fish. Four signs chose the simpler consumption rate, one chose the more complex.

Finally we asked participants to choose between providing information on where to write for additional recommendations and information, and one that provided information on how to prepare fish in healthier ways. Four signs chose additional information on where to write, one chose information on how to prepare fish.

The participant’s choices regarding wording and content often appeared contrary to the views expressed during the earlier discussions. Individuals who had expressed

skepticism regarding the advisory sometimes chose the stronger (Caution) title for their sign. Likewise, people who wanted more information and greater freedom of choice sometimes selected the simpler consumption chart. The importance of access to more information may well have been a result of the lengthy discussion we were able to have with participants, which may have underscored the complexity of the issue.

Despite the small number of anglers who participated in the discussion groups, there were several notable observation:

- Almost none of the anglers who participated in our focus groups understood the term “sport fish.”
- Use of “pounds” to indicate meal size is more acceptable than “ounces” or “grams”.
- Anglers want to maintain some control over how they implement the advisory guidelines.
- None of the participants identified a “community leader” or local social or health center that could be utilized as a vehicle for delivering education.
- No single choice of words or content was preferred by the anglers in our discussion groups.

Attachment L-1**DISCUSSION GROUP -QUESTION GUIDELINES****Introductions****15 minutes**

Who we are

Presentation

Why we're having the group / **goals** / **Agenda**

Presentation

Confidentiality & recording the session

Presentation

Importance of individual answers (it's okay to disagree)

Presentation

Questions and Concerns

Q&A

Ice Breaker**10 Minutes**

Who's been out fishing in the last week?

In your opinion, has the water in the bay gotten worse? Better? Same?

Recognition / Meaning of the term "Sport Fish"**15 Minutes**

1. Have you ever heard of the term "Sport Fish" before?

Show of

Hands

2. What does it mean?

Group Discussion

3. Where have you heard this term?

Group Discussion

4. If you were to refer to all fish from the bay, what term would you use?

Group Discussion

4a. Would the term: "Fish from the Bay" be better?

4b. Would the term: "Fish you catch yourself?"

Health Advisory Knowledge**20 Minutes**

1. Have you heard of a health advisory for the SF Bay?

Show of

Hands

2. What does it say?

Discussion

3. How many fish does it say one can safely eat?

Discussion

4. What types of fish does the advisory include?

Discussion

5. How important do you feel this advisory is?

Discussion

Understanding Lack of Behavior Change**20 Minutes**

(these questions will only be asked of the group which has indicated an awareness of the advisory, yet hasn't changed its behavior)

1. Have you changed how much you eat since hearing the advisory?

Discussion

2. Do you feel the following statements are true?

Show of Hands

2a: The advisory isn't correct

2b: The advice will change in a few years

2c: I don't eat enough to hurt my health

2d: I eat only healthy fish from the Bay

2e: I don't plan to eat the fish forever

3. Why do you feel this/these statements are true?

Group Discussion

The best way to deliver info**20 Minutes**

- | | |
|---|------------------|
| 1. Who would you go to, trust, for advice on your health? | Group Discussion |
| 2. Who do you see as leaders, people you trust? | Group Discussion |
| 3. What groups, or agencies, do you regularly visit? | Group Discussion |
| 3a. Where do you receive health care? | Group Discussion |
| 4. What is the best way to get this type of information to fishers? | Discussion |

BREAK**10 Minutes****Educational Materials Evaluation****30 Minutes**

- | | |
|--|------------------|
| 1. Which card would you pick up first? | Group |
| Activity | |
| 1a. Which card would you pick up second? | |
| 2. (After reading the card) What did the card say? | Group Discussion |
| 3. Do you believe the info on this card? | Group Discussion |
| 3a. Do think it comes from a reliable source? | |
| 3b. What sources would be more reliable? | |
| 3c. What would make the card/info more believable? | |
| 4. Should “one meal” be phrased in grams, pounds, or as “a meal” | Group Discussion |
| 5. What is meant by cooking juices | Group Discussion |
| 6. What part of the fish is the fillet or muscle? | Group Discussion |
| 7. How may types of fish/consumption rates can be included? | Group Discussion |

Build your own Sign Activity**15 Minutes****Thanks/Closing****5 Minutes**

