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ADOLFSON
ASSOCIATES, INC.

April 19, 1996

TO: Chee Choy, City of Portland, BES

FROM: Jean Ochsner, Adolfson Associates, Inc. *J. Ochsner*

RE: Technical Memorandum on the Results of the 1995 Fish Consumption and Recreational Use Surveys - Amendment No. 1

INTRODUCTION

Purpose and Scope

The City of Portland undertook the Columbia Slough Sediment Remedial Investigation and Feasibility Study (Slough RI/FS) to investigate and correct problems caused by elevated levels of chemicals in sediments in the Columbia Slough. The Fish Consumption and Recreational Use Surveys were conducted in 1994 (Phase 1) and 1995 (Phase 2) as a part of the Slough RI/FS project in order to: (1) comply with the Consent Order between the City of Portland and the Oregon Department of Environmental Quality (DEQ # ECSR-NWR-93-09, October 7, 1993), (2) provide information on the fishing habits of people angling in the Slough, (3) provide information on fish consumption and other uses, (4) provide information on the ethnic background of people fishing and consuming fish from the Slough, (5) provide information on the recreational use of the Slough, and (6) provide information for the human health risk assessments (Adolfson Associates, Inc., 1994).

The 1995 surveys were conducted to identify those fish and shellfish (e.g., crayfish) species harvested by local anglers, and again obtain detailed information on the fishing habits, fishing locations, fish consumption preferences and fish preparation methods of the anglers. One of the objectives of the 1995 survey was to refine and improve the 1994 survey questions to supplement the present database regarding fishing behavior. This information will be used directly in a detailed human health risk assessment to assess the variability associated with the fish consumption exposure pathway. Surveys were conducted from June 3, 1995 through July 3, 1995.

This technical memorandum describes the methodology used and the results of the 1995 (Phase 2) surveys. The Columbia Slough Sediment RI/FS Endangerment Assessment report will utilize information on the fish consumption and recreational use surveys, with particular emphasis on fish consumption.

Page 1

Survey Locations

Surveys were conducted along the Columbia Slough and on Sauvie Island. Sauvie Island was included in the survey as a comparable site to the Slough because it was thought that the warning signs posted along the Slough may have discouraged fishing and recreational uses that previously existed, or perhaps could exist under future, improved conditions. These warning signs are not present on Sauvie Island. Also, information from the International Refugee Center of Oregon (IRCO) and the Oregon Department of Fish and Wildlife (ODFW) suggest that people who once fished the Slough now fish at Sauvie Island. The survey sites were located at or near known fishing and/or recreational areas, with available public access to the locations. Much of the Columbia Slough shoreline is privately owned, thus public access in these areas is limited (except by boat).

Figure 1 shows the survey locations for the Lower and Upper Columbia Slough. The Lower Slough extends from Kelley Point Park (near the Willamette River) east to the earth-filled dike (at N.E. 17th Avenue). The Upper Slough extends from the earth-filled dike east to the outlet of Fairview Lake. Figure 2 shows the survey locations for Sauvie Island.

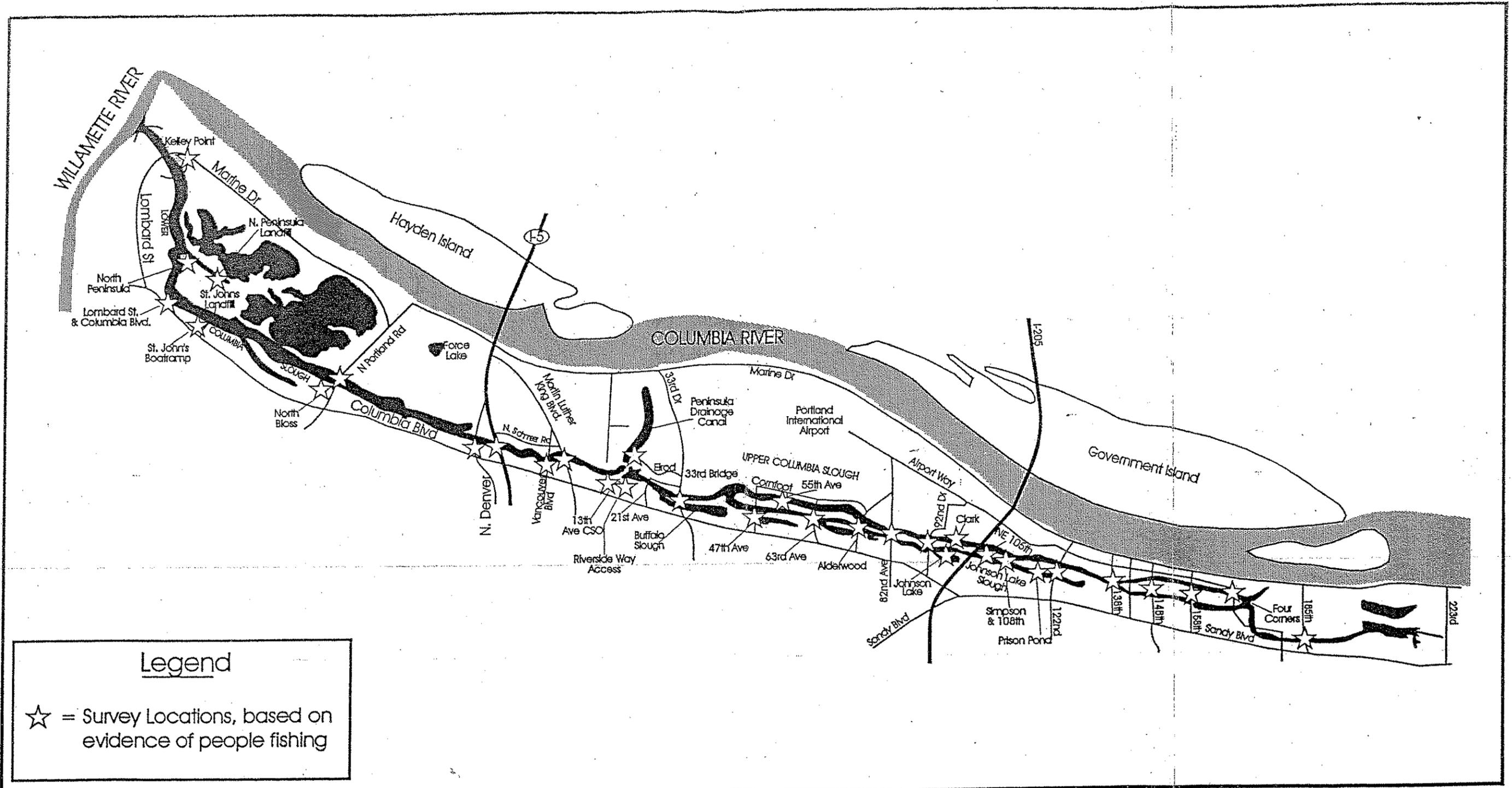
SECTION A - CONSUMPTION SURVEY

Approach

Survey Design

The survey questionnaires were formulated and designed after reviewing angler catch and consumption profile methodologies and results of surveys conducted in the Portland area, the greater Pacific Northwest and other parts of the nation. Experience gained in previous surveys, as well as the 1994 Columbia Slough Phase 1 survey, was useful in determining the survey format. It was critical that the fishery surveys include questions that clarified issues for the Endangerment Assessment¹ being prepared as part of the project, such as ethnic background of people consuming fish from the Slough, the types and amount of fish which are being consumed, and the frequency that people are consuming fish from the Slough. Ethnic background was characterized to establish any potential ethnic bias relating to risk of exposure. The 1994 survey questionnaires were revised by the city's project manager, Parametrix's project manager and Adolfson Associates, Inc. (AAI) project manager. Key revisions included: quantitative information on consumption, detailed information on frequency of fish consumption this year and previous years, and the seasons in which people fished. The Fish Consumption Survey form for the Columbia Slough and Sauvie Island Phase 2 survey can be found in the Appendix A.

¹ Endangerment Assessment is another term for a risk assessment. A risk assessment identifies individuals or organisms (receptors) at potential risk, the exposure pathways and media (e.g., sediment, tissue) of concern, and quantifies the magnitude of potential risk for consideration in identifying cleanup options.



Legend

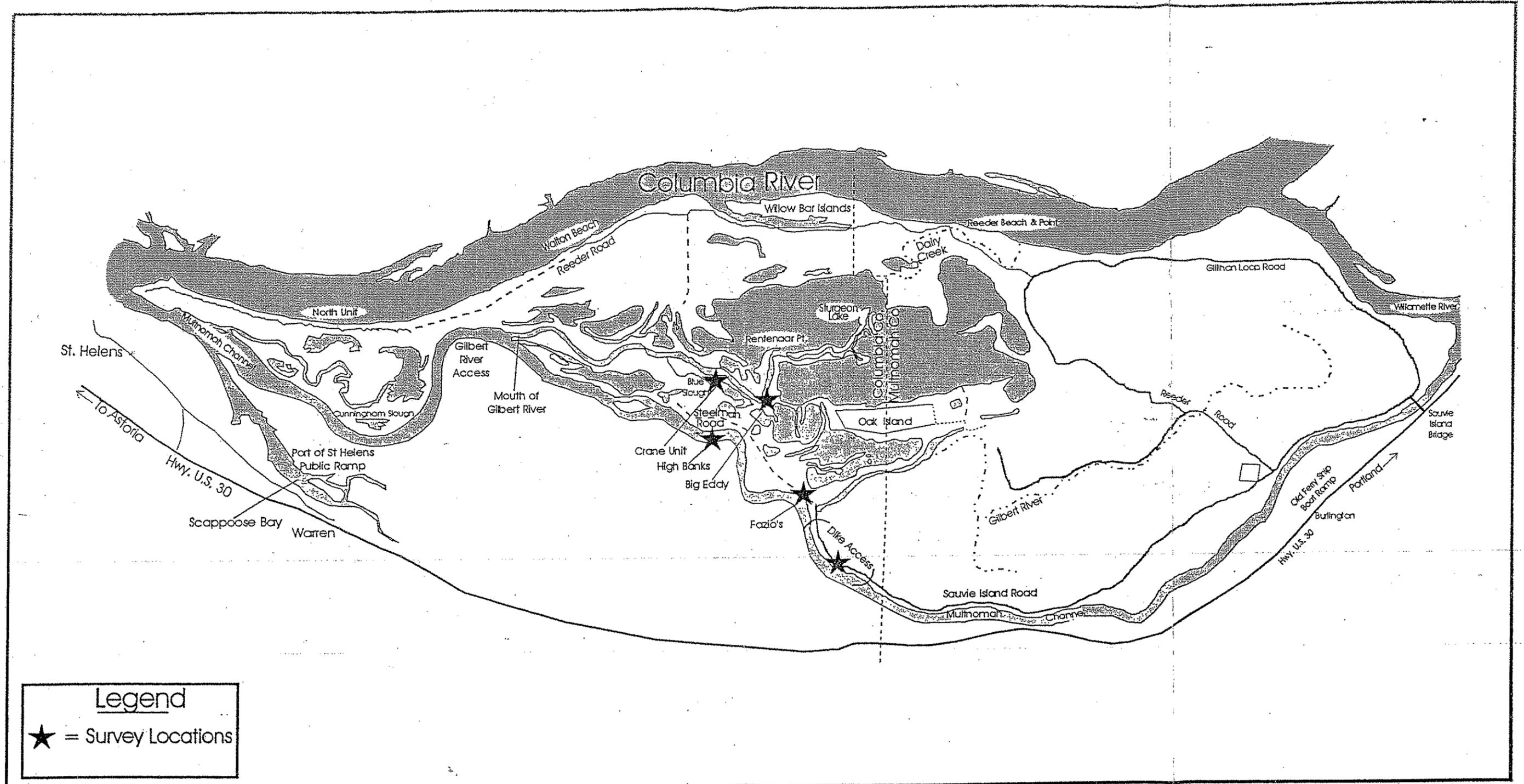
☆ = Survey Locations, based on evidence of people fishing

N
↑
Not to Scale

Columbia Slough
(map adapted from Dames & Moore, 1991)

Figure 1

ADOLPHSON ASSOCIATES, INC.



Legend
 ★ = Survey Locations

N ←
 Not to Scale

Sauvie Island

Figure 2

 ADOLFSON ASSOCIATES, INC.

Survey Period

The survey period included twenty sample days over a one month period from June 3, 1995 through July 3, 1995. Selection of survey days was based on stratified random sampling² of weekends and weekdays. This methodology was used in order to obtain unbiased sampling days and times. The strata or layers of sampling days/times were days of the week (two strata: weekends and weekdays), and times of day (two strata: mornings, 7a.m. - 3p.m. and afternoons-evenings, 11p.m. - 7p.m.). The sampling methodology entailed using a random number table to select Julian days for weekends and weekdays, as well as a.m. (7a.m. - 3p.m.) and p.m. (11p.m. - 7p.m.) shifts. The stratified random sampling methodology was used in order to extrapolate results from limited surveys to the entire Slough and for a larger time period than sampled (ChemRisk, 1994).

The 1995 survey season also included one day in which the interviewers utilized a boat throughout the Lower Columbia Slough. This was performed in order to check areas that the surveyors may have missed while conducting surveys by land. The surveyors also conducted a night shift survey session from 4p.m. to 12a.m. The night shift was conducted to check for people angling for brown bullhead.

Survey Crew

The survey crew consisted of a single, two person team. The team surveyed both the Columbia Slough and Sauvie Island sites on a given sampling day and shift, usually spending six hours at Columbia Slough and two hours at Sauvie Island. AAI coordinated with International Refugee Center of Oregon (IRCO) and Russian Oregon Social Service (ROSS) to employ a multi-lingual surveyor who spoke languages representing the ethnic groups typically found fishing at the Slough or Sauvie Island. The languages that were represented were Eastern European, Vietnamese and Hispanic. The survey team consisted of a Southeast Asian or Vietnamese speaking member, as well as a member who conducted the surveys in 1994 (Phase 1) and could speak some Spanish.

The crew members were trained in survey methodologies by the BES Sediment project manager and AAI's project manager. The classroom training session consisted of reviewing the fish identification key on types of fish found in the area. Role-playing scenarios were also conducted to improve interview techniques and to prepare for various interview situations.

After survey days and times were randomly selected for the field work, the survey team would begin their interviews at a random location each survey day. Random locations were chosen in order to ensure a fixed routine for the survey starting location would

² Stratified random sampling for this study involved two levels or strata: sampling days (weekends and weekdays) and sampling times (morning or afternoon-evening shifts). Selecting the sampling days and times was performed randomly from all possible days and times in such a way that every possible sample date/time that could be selected had an equal likelihood of being selected.

occur. Also, the survey crew did not use a car with a government logo. Use of a government vehicle during the 1994 Phase 1 survey indicated that people (especially Caucasians of Eastern European descents) were reluctant to talk to the survey crew who used that vehicle as their mode of transportation.

Interviewer Approach

Anglers were approached in the least threatening way possible. Generally, a relaxed, pleasant, and smiling (conversational) approach was used to instigate an interview. A standard opening phrase typically was, "Hi, how's the fishing going today?" or "Are you catching anything today?" This often was followed by an explanation such as, "We're doing some surveys on what people are catching and eating. Do you mind if I ask you a few questions?"

Depending on how cooperative anglers appeared to be, a judgment was made as to how extensively they were questioned. In any case, an attempt was always made to get crucial pieces of information such as whether the catch was eaten, how much of the catch was being consumed per person, fishing frequency (hours/day, days/month, months/year), species, and fish parts eaten. If the anglers had caught fish, the interviewers asked permission to identify, weigh and measure the catch. A fish identification key was used to help identify fish. Also, one or two kilogram and seven kilogram scales were used to weigh the catch, and an inch/centimeter ruler was used to measure lengths.

Interviews were generally conducted in English. In instances where anglers only spoke Vietnamese, the interview was conducted in that language. In the event of encountering anglers who only speak other Southeast Asian languages besides Vietnamese, Eastern European or Hispanic, the surveyors communicated as well as they could to obtain the necessary information. Often they spoke with a younger member of the fishing party who spoke English and could translate.

A fish consumption advisory prepared by Oregon Health Division, which recommended that anglers not eat fish caught from the Slough or to take precautions if fish were eaten, was distributed to all anglers interviewed. The advisory was printed in English, Russian, Cambodian, Laotian, Vietnamese, and Spanish. The advisory can be found in the Appendix B.

Survey journal entries were kept on a regular basis. These journal entries contained information in addition to the completed survey forms. The journal entry information did not provide data that was used in the statistical analysis of fish consumption and recreational use. Information recorded included pertinent (or unusual) observations for each day. These observations included the location and times of heavy/light fishing, reactions of people being interviewed, successful/unsuccessful survey techniques, weather patterns, and other variables in fishing occurrences.

Quality Control and Quality Assurance

Periodic meetings and/or telephone conversations were conducted with the city's project manager and the survey crew throughout the survey period. These meetings and conversations were to obtain feedback from surveyors, fine-tune survey forms, collect completed survey forms, and provide crew members with additional needed supplies.

All field survey forms were reviewed to ensure the forms were filled out correctly and completely. Meetings or telephone communications were used frequently to correct for any errors in filling out the field forms or obtaining information on surveying difficulties. All field survey database entries were checked against the field survey forms, and corrected, if necessary. The consumption calculations were also hand calculated in order to confirm accuracy.

Angler and Catch Profiles

Profiles for angler ethnicity, catch and consumption includes all available information obtained from survey questions. Not every angler answered every question on the survey, and thus the sample size for each analysis is different. Angler information was obtained for consumption if the angler indicated that fish were eaten, whether or not the angler had fish. Because the surveys were random, each summary statistic represents a sample of the total population of anglers.

Columbia Slough

Angler Ethnicity: A total of 91 interviews were conducted in the Columbia Slough during the Phase 2, 1995 survey season (a little more than four per survey day). Figure 1 depicts locations where surveys were conducted. Surveyors conducted 83 of the 91 interviews in the Lower Slough, and eight were conducted in the Upper Slough. The entire slough was uniformly surveyed; however, more surveys were conducted in the Lower Slough because more people were encountered fishing within the lower reach.

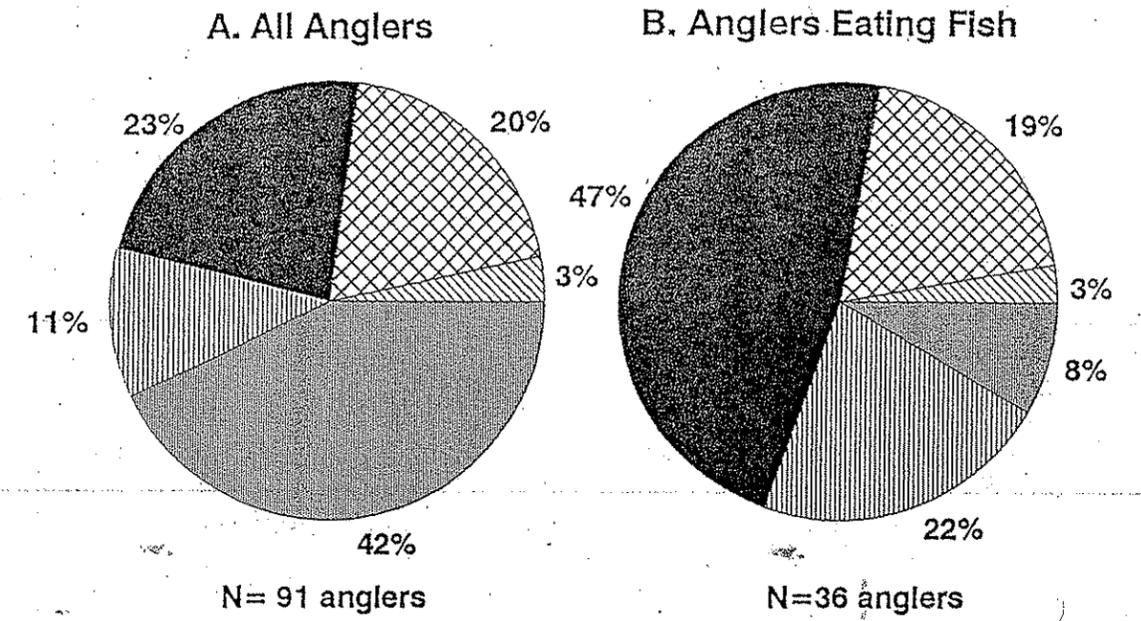
Data was obtained on angler ethnicity. Approximately two-thirds of the 91 people interviewed were Caucasian (excluding Eastern Europeans); 23 percent were Caucasians of Eastern European descent and 42 percent were Caucasians not of Eastern European origin (Figure 3A). African Americans comprised approximately 20 percent of the anglers surveyed.

Thirty-six of the 91 anglers surveyed indicated that they eat fish caught in the Columbia Slough (Figure 3B). In contrast to the ethnicity of anglers which was dominated by Caucasians, the anglers eating fish were primarily Caucasians of Eastern European descent (47%), Hispanic (22%), and African Americans (19%) (Figure 3B).

Catch Information: Approximately 44 percent of the anglers were primarily fishing for "any" kind of fish in Columbia Slough (Figure 4A). Another 25 percent of anglers were

Figure 3

Columbia Slough Ethnicity



Sauvie Island Ethnicity

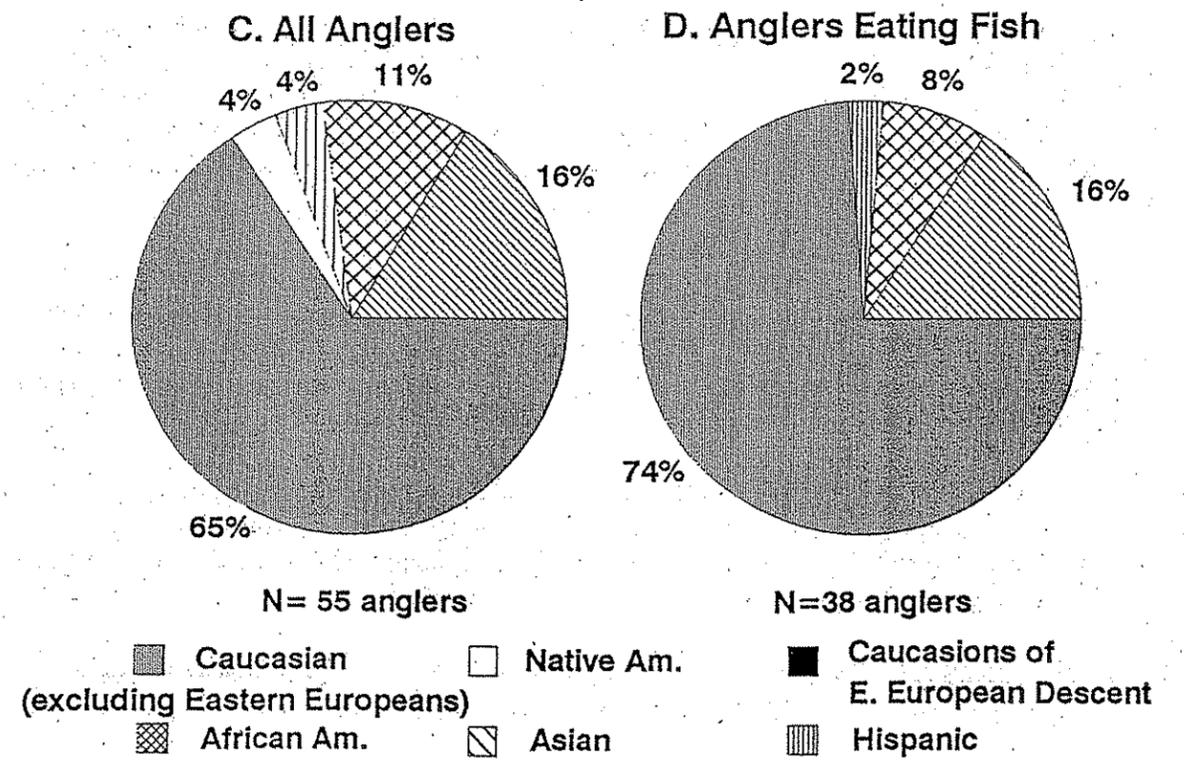
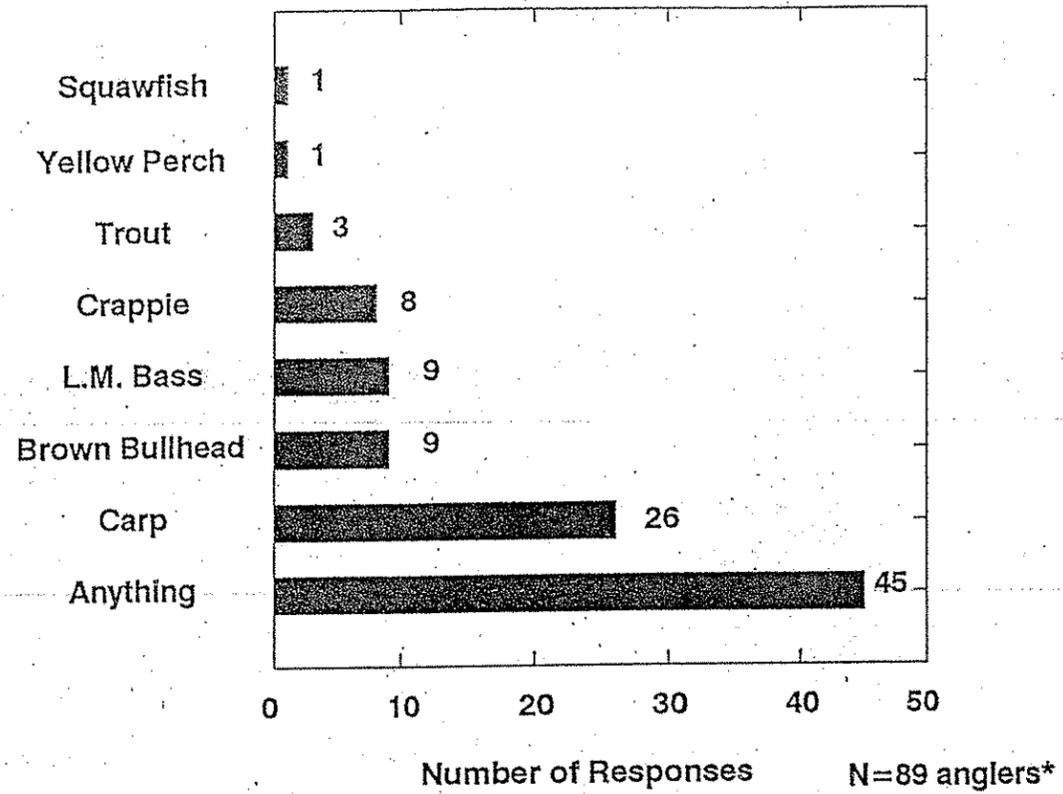
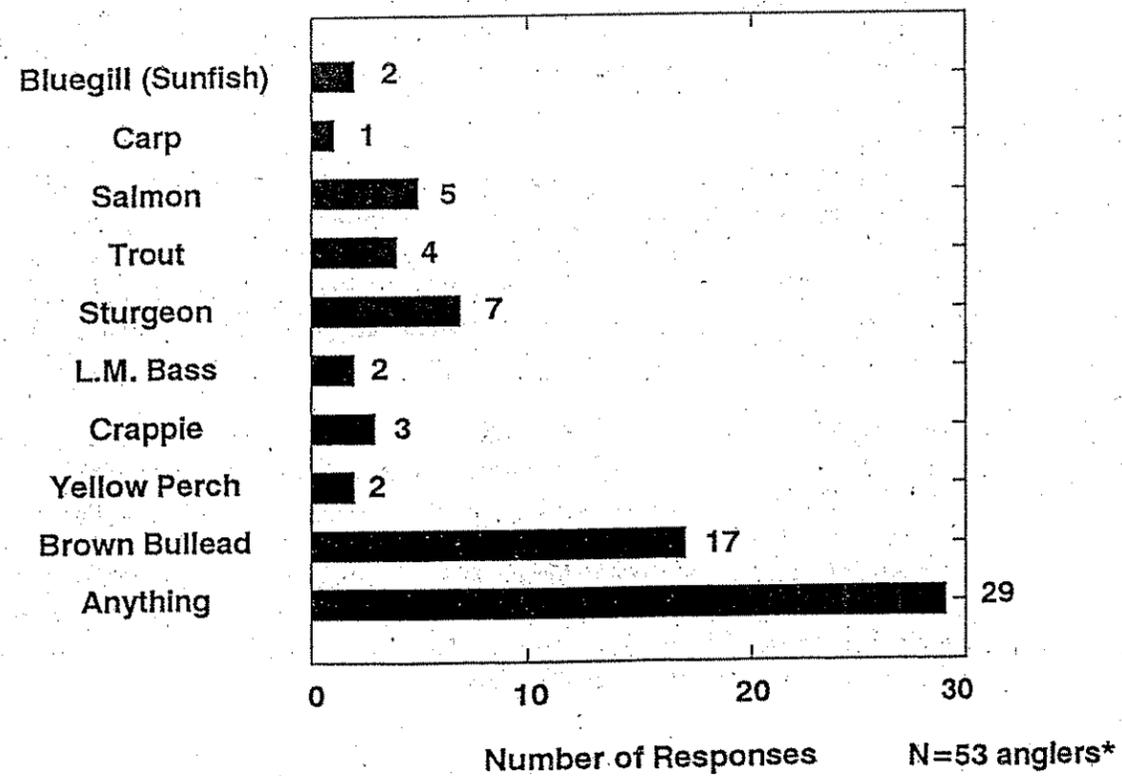


Figure 4 Fish Species Sought by Anglers

A. Columbia Slough Number of Responses



B. Sauvie Island Number of Responses



* Many anglers surveyed gave multiple responses for fish species sought

fishing specifically for carp. Because anglers were often fishing for multiple species (i.e. for bass or brown bullhead), there is a higher number of fish sought than individual anglers.

Very few anglers caught fish in Columbia Slough. Of the 91 people surveyed, 17 people caught a total of 75 fish (Table 1). In addition, one person caught 55 crayfish, which were not included in Table 1. The most common fish caught was carp (29), followed by yellow perch (23), and banded sculpin (10).

Table 1. Columbia Slough Fish Catch Data.

Fish Type	Number of Anglers with Fish	Number of Fish Caught
Carp	11	29
Yellow Perch	5	23
Banded Sculpin	1	10
Squawfish	5	8
Brown Bullhead	1	2
Crappie	1	1
Stickleback	1	1
S.M. Bass	1	1

Nearly half (49%) of the 84 anglers who responded to the question of the fate of fish caught from the Columbia Slough indicated that they release all fish caught (Figure 5A). Another 43 percent of the respondents said that they eat fish caught in the Columbia Slough. Approximately 6 percent discard their catch. Of those anglers that said they would eat fish from the Columbia Slough, eight indicated that some of the catch would be given away, seven said that part of the catch would be frozen, and two would release part of the catch.

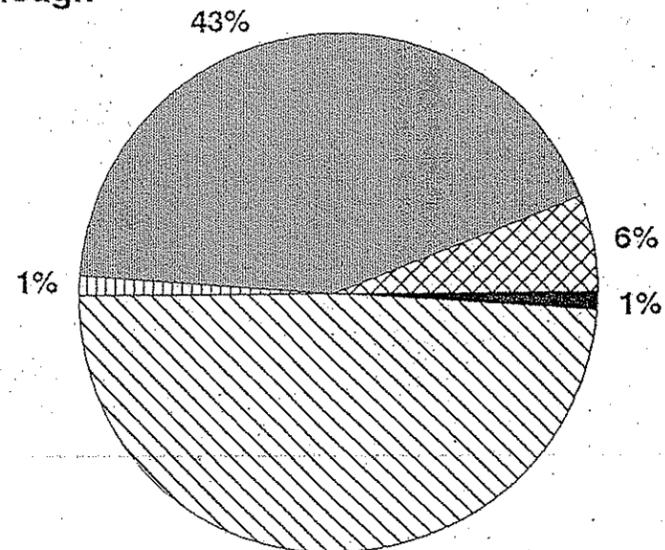
Consumption Information: Twenty-eight people responded that they would eat fish caught from the Columbia Slough. Of the twenty-eight people, 75 percent of the respondents indicated that they eat muscle tissue (Figure 6A). The remainder use the entire fish or make soup from the fish. Of the 21 respondents who indicated that they consume muscle tissue, seven respondents indicated that they would use both muscle and skin. Another three indicated they would eat muscle or make soup of fish caught.

Approximately 53 percent of the twenty-eight people who responded to the questions about fish preparation methods indicated that they would fry fish caught in the Columbia Slough (Figure 6C). The next most common method of preparation, making soup, was indicated by 28 percent of the respondents. Five anglers (included in the frying preparation method category in Figure 6C) indicated that they would fry and/or boil the catch (2 responses), fry and/or bake the catch (1 response), fry and/or BBQ the catch (1 response), or fry and/or make soup with the catch (1 response). Often, the preparation methods depended on the type of fish caught.

Figure 5

Fate of Fish from Angler Survey

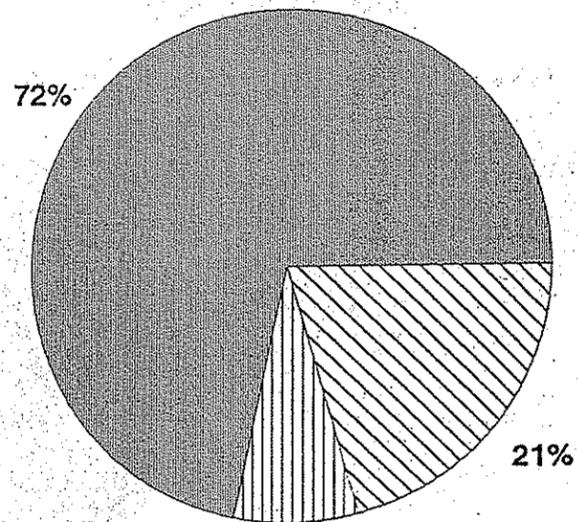
A. Columbia Slough



49%
N=84 anglers

-  Eat
-  Release
-  Sell
-  Give Away
-  Discard

B. Sauvie Island



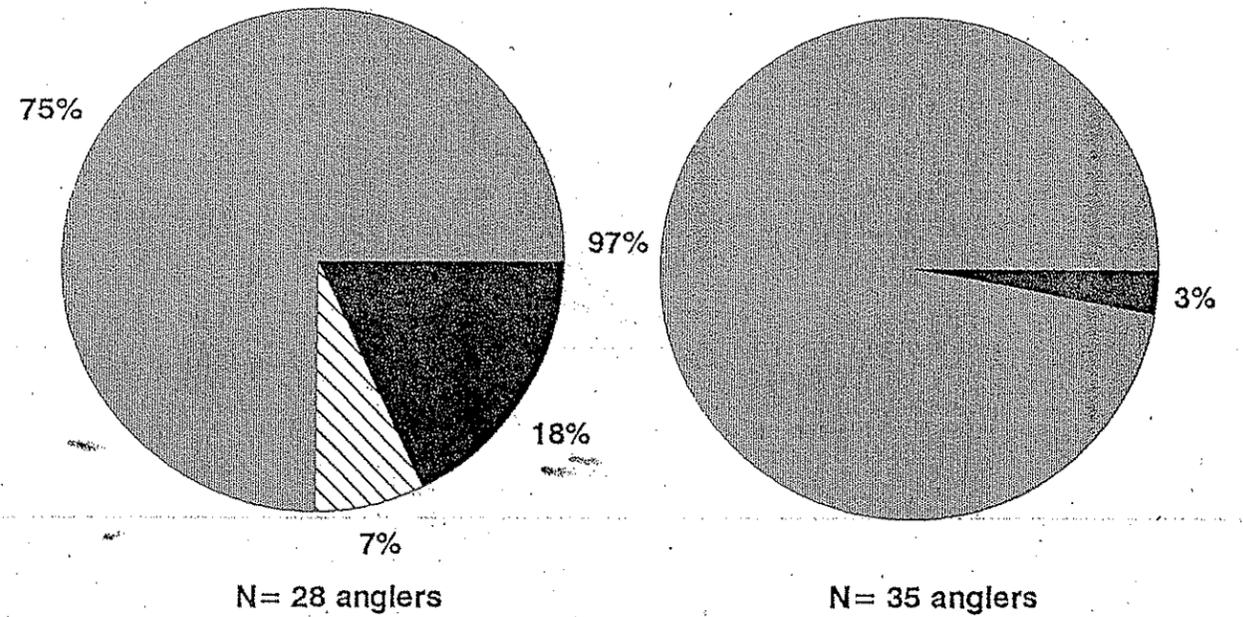
7%
N=53 anglers

Figure 6

Parts of the Fish Consumed

A. Columbia Slough

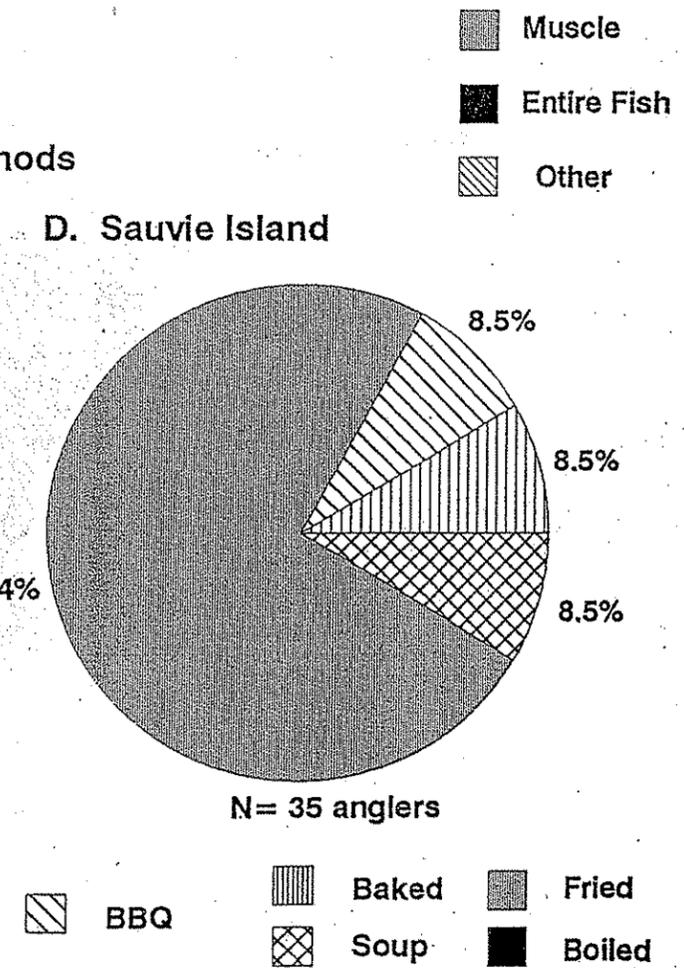
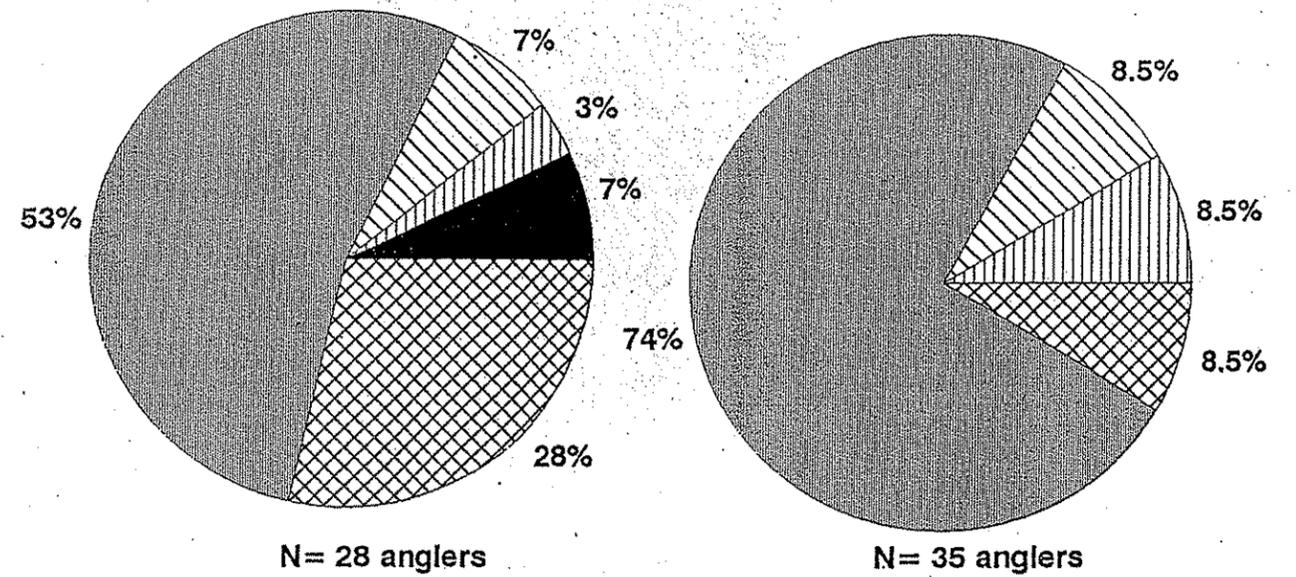
B. Sauvie Island



Cooking Methods

C. Columbia Slough

D. Sauvie Island



Sauvie Island

Angler Ethnicity: A total of 55 interviews were conducted on Sauvie Island during the 1995 survey season (a little more than two per survey day). Figure 2 depicts locations where surveys were conducted.

Data was obtained on ethnicity for all 55 anglers interviewed. As occurred in the Columbia Slough survey sites, the overwhelming majority of anglers interviewed were Caucasian, excluding Eastern Europeans (65%). However, there were no Caucasians of Eastern European descent interviewed on Sauvie Island. Asians (16%) and African Americans (11%) were also commonly interviewed (Figure 3C).

Thirty-eight (69%) anglers surveyed indicated that they eat fish caught on Sauvie Island (Figure 3D). The ethnicity of anglers consuming fish was similar to those catching fish: 74 percent were Caucasian (excluding Eastern European), 16 percent Asian, and 8 percent African American.

Catch Information: Anglers fishing on Sauvie Island were primarily fishing for "any" kind of fish (approximately 40%, Figure 4B). Another 24 percent of anglers were fishing specifically for brown bullhead. Because anglers were often fishing for multiple species (i.e. for crappie or brown bullhead). The total number of fish sought is greater than the number of anglers.

Very few anglers caught fish on Sauvie Island. Of the 55 people surveyed, a total of 12 people caught a total of 26 fish (Table 2). The most common fish caught was yellow perch, followed by brown bullhead, then squawfish, starry flounder and sturgeon.

Table 2. Sauvie Island Fish Catch Data.

Fish Type	Number of Anglers with Fish	Number of Fish Caught
Yellow Perch	4	17
Brown Bullhead	6	6
Starry Flounder	1	1
Sturgeon	1	1
Squawfish	1	1

Seventy-two percent of the 53 anglers who responded to the question of the fate of fish indicated that they eat fish caught on Sauvie Island (Figure 5B). Only 21 percent responded that they release their catch. Approximately 7 percent give away their catch. Of those anglers who said they would eat fish from the Columbia Slough, 10 anglers indicated that some of the catch would be released, four said that part of the catch would be given away, three would freeze part of the catch and one angler would discard some of the catch.

Consumption Information: Thirty-five people responded that they would eat fish caught on Sauvie Island. Of the 35 anglers, 34 indicated that they eat the muscle (97%), and one (3%) would use the entire fish (Figure 6B). Of the "muscle eaters", six would use muscle and skin, one would use muscle and/or the entire fish, and one would use muscle and/or make soup with the catch.

Approximately 74 percent of the 35 anglers who responded to the fish cooking methods question indicated that they would fry fish caught on Sauvie Island (Figure 6D). Eight and one-half percent of the respondents indicated that they would BBQ, bake, or make soup from fish caught on Sauvie Island catch. Six anglers indicated that they would fry and/or make soup with the catch (3 responses), fry and/or bake the catch (2 responses), or fry and/or boil the catch (1 response).

Observations

Typically, people were cooperative and agreed to answer survey questions, however, there were several people who declined to respond to the survey questions. In general, fishing activities along and in the Columbia Slough were found to be higher in the 1995 Phase 2 surveys than during the 1994 Phase 1 surveys. However, the general consensus among anglers questioned was that the fishing potential has declined in recent years. Several people surveyed were fishing for the first time and were engaged in the activity solely for the purpose of catching and releasing. Several people were surveyed who had been fishing on the Columbia Slough for many years and were not surveyed last year. The sites most frequently utilized for fishing in the Lower Slough were Kelley Point Park (64%) and Schmeer Cove (14%). In the Upper Slough, NE 185th bridge (38%) and NE 55th bridge (13%) were utilized most frequently for fishing. These sites are shown on Figure 1. The fish consumed most frequently in Columbia Slough during the 1995 survey season was carp.

Many of the anglers were aware of polluted waters in Columbia Slough and were not eating the fish they caught. However, there were cases of people who were either unaware of the extent of pollution, or disregarded warnings and ate the fish. When fish were eaten, attitudes about eating the fish basically reflected the impression that they had been eating it for years and had never gotten sick. Some people seemed to be selective about the fish they would eat.

The water levels in the Columbia Slough were very high during the 1995 survey season compared to the levels seen during the 1994 survey season. It rained on several of the survey days, but people continued to fish on the Slough. In fact, one person surveyed said that he only fished on the Columbia Slough when it rained. Most of the people that were surveyed during the rainy days said that they did not consume the fish.

On the day the surveyors utilized the boat to conduct surveys on the Lower Slough, they identified three locations where people appeared to fish that had not been previously identified or surveyed. One of the three locations was easily accessible. The boat was not

utilized on Sauvie Island for interviews. During the night shift, the survey crew found four people fishing on the Lower Columbia Slough, no anglers on the Upper Slough, and four anglers at Sauvie Island. The four people found fishing on the Slough were not consuming the fish they caught.

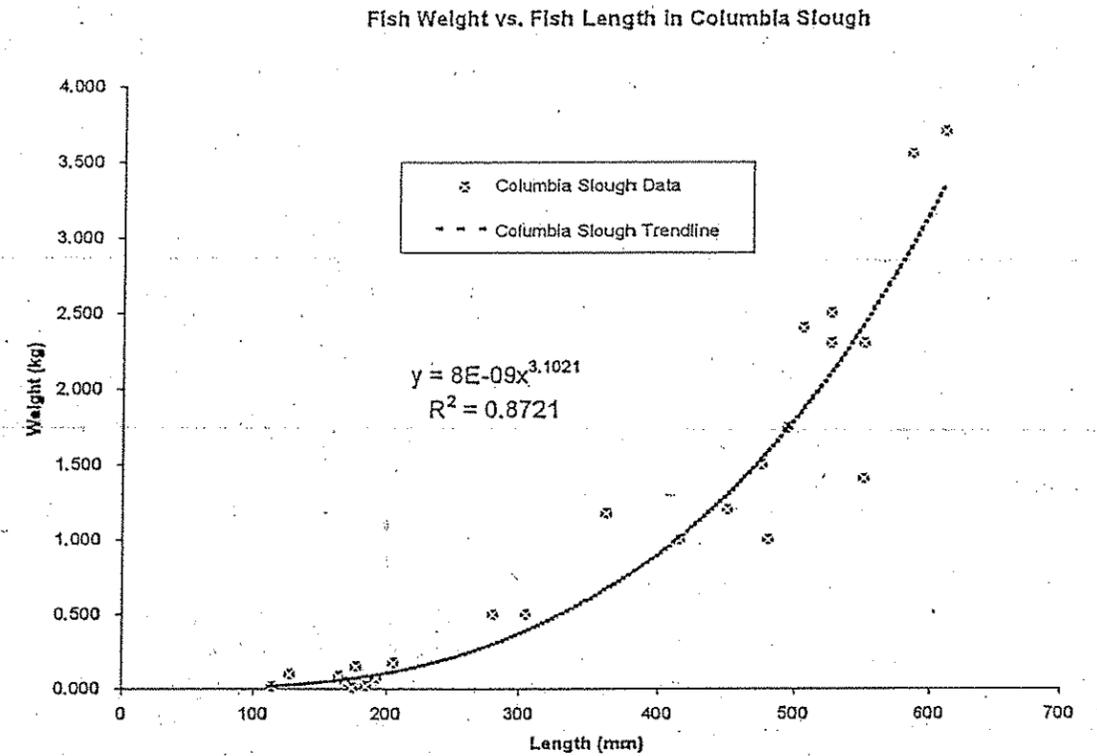
The sites most heavily fished on Sauvie Island were Crane Unit (34%), High Banks (34%), Big Eddy (20%), and Fazio's (11%), as shown on Figure 2. The most frequently consumed fish at Sauvie Island during the 1995 survey season was brown bullhead.

Problems Encountered

Several problems were encountered during the fish consumption surveys and are summarized below:

- Most of the anglers had difficulties in estimating the quantity of fish they consumed. Some of the answers given to the surveyors included: depends on how much I catch; I dry it and put it on salad; I put it in soup and my whole family eats the soup for dinner and left-overs; and I save some for the family and give some away to relatives or friends. We decided to document the answers versus trying to coerce a number out of the anglers.
- The field crew had difficulties in obtaining the age of the people consuming fish, especially the adult ages. We asked the surveyors to, at a minimum, obtain the age of children 0 to 6 years or over 6 years of age.
- The field crew did encounter language barriers primarily with Hispanic and Eastern Europeans. When this occurred the surveyors either asked children in the group the questions, who in turn translated the questions and answers, or provided the anglers with the fish advisory (translated to their language). The surveyors encountered very few anglers that they could not get information from due to a language barrier.
- On numerous occasions the surveyors were unable (or not allowed) to weigh the anglers catch. The field crew recorded the information on type of catch, if possible, but did not record weight(s) or size(s). For the Columbia Slough data, there were 4 instances of fish being measured and not weighed. To be able to use this data we established a relationship between the length and weight of fish caught for those fish that were measured and weighed. This information was then used to fill in the missing weight data from the fish that were only measured. Since the data consisted of several species of fish, a tight fit of a trendline to the data can not be expected; an exponential trendline best fit gives us an R^2 value of 0.87 (1.0 would be a perfect fit). The lengths of the missing fish data range from 76.2 to 127 cm where the variance from the trendline is small enough to be able to interpolate the weights for the missing data. The calculated figures are shown in the spreadsheet in Appendix C in bold italicized fonts. The graph is shown below in Figure 7.

Figure 7 - Fish weight versus fish length in the Columbia Slough for all fish measured and weighed. Trend line indicates exponential fitting to data. 4 extra data points were calculated ranging in length from 76.2 to 127 mm. Because of the high correlation for data within this range, the 4 extra points were used in calculating the final consumption figures.



Assumptions

Numerous assumptions were used to record the survey information as summarized below:

- In groups with more than one person fishing: if the group was a family, then answers received were applied to the number of family members who consumed fish in that family. However, if the group were friends or non-family members, then the answers received were applied only to the member answering the questions.
- The length of the 1995 survey season was 12 months; however the survey was conducted from June to July. Respondents were asked during what seasons they fished (Fall, Winter, Spring, Summer or All Year).
- Respondents who did not eat the fish or did not catch anything received zeros in the "Fish Catch cell". Blank cells remained when there was no answer, for whatever reason. Zeros indicated a negative answer.
- Average weight of fish species was used when there were several fish of the same species caught.

The spreadsheets in which the survey data were entered can be found in Appendix C.

Further assumptions were required to estimate fish consumption, as summarized below:

- Only fish weighed by the surveyors were counted in consumption estimates with the exception of the four added data points in the Columbia Slough Survey as discussed above. On numerous occasions people surveyed were about to leave and did not want to bring out their fish for weighing, or they simply did not want the surveyors to weigh their catch. If part of an angler's catch was not weighed or measured, then the unweighed or unmeasured catch could not be entered in the catch data as a part of the consumption calculations.
- Only those fish that the angler indicated would be eaten were included for consumption calculations. If an angler indicated that some would be frozen and some eaten, then the response was marked "eat".
- Thirty percent of the total weight of fish was considered edible (ChemRisk, 1994). No account was made for the difference between cleaning methods, or whether the angler indicated he/she would be eating the entire fish. Table 4 includes estimates for consumption at 30, 50 and 75 percent edible portion.
- All people that the angler indicated would be sharing the fish with were assumed to eat equal shares of the fish, and were included in the consumption calculations. There were instances where the angler had no fish but indicated that there were people who generally shared the catch. These people were also considered in consumption calculations. This assumption was made to calculate the consumption rate of all fish consumers. Without inclusion of anglers that did not catch fish, then the estimates would not be an estimate of the population as a whole, but instead would apply only to the population of successful anglers on the days of sampling.
- To calculate fish consumption data, the consumption figure for each survey was calculated and then the mean of those consumption figures taken. Mathematically, the formula is:

$$\bar{C} = \frac{\sum_{i=1}^n \frac{W_i \times F \times D_i \times M_i}{P_i}}{n}$$

Where,

- \bar{C} - Mean fish consumption per person per year (people who eat the fish caught)
- W - Weight of fish caught for each survey that indicated they eat or freeze their fish
- F - Fraction of edible fish weight to total fish weight
- D - Days per month spent fishing for each survey that indicated they eat or freeze their fish
- M - Months per year fishing for each survey that indicated they eat or freeze their fish
- P - Number of people that consume fish associated with each fisherman that indicated they eat or freeze their fish

n - Number of people surveyed
i - counting index

- Confidence intervals were calculated using the standard t-test format. The standard t-test formulation to calculate the upper and lower confidence intervals is:

$$\text{Lower} = \bar{x} - t_{\alpha/2, n-1} \times \frac{s}{\sqrt{n}} \qquad \text{Upper} = \bar{x} + t_{\alpha/2, n-1} \times \frac{s}{\sqrt{n}}$$

Where:

Lower - lower confidence interval

Upper - upper confidence interval

\bar{x} - Mean fish consumption

t - t-distribution confidence factor

α - Confidence interval

n - Number of data points in sample

s - Standard deviation

For both the Sauvie Island data and the Columbia Slough data, the lower 95% confidence limit is negative. While statistically correct, this is physically meaningless. There are two methods to increase the lower limit to a positive number. The first method is to lower the confidence factor. Assuming that the standard deviation of the sample is the same as the standard deviation of the entire population, then for the Sauvie Island data, lowering our confidence interval to 75% will give us a lower limit that is greater than 0. For the Columbia Slough we would need to lower the confidence interval to between 92% and 93% to be sure we have a positive lower confidence interval. In Table 4, the 95% confidence intervals for both sets of data, as well as the 75% confidence intervals for the Sauvie Island data, and the 90% confidence intervals for the Columbia Slough data are shown.

The second method is to increase the number of data points. This would require more surveying. For the Sauvie Island data, increasing the number of data points to 58 gives us a lower 95% confidence interval that is greater than zero. Currently we have 31 valid data points. For the Columbia Slough data, we only need 23 valid data points. Currently we have 21 valid data points. The large difference between the Columbia Slough sampling size and the Sauvie Island sampling size is due to the large standard deviation of the Sauvie Island data as compared to its mean. It should be stressed that if increasing the sampling size changes the mean or the standard deviation, then the sampling size needed to give us a positive lower 95% confidence interval would also change (up or down depending on how the statistics change).

Findings

The survey results will be used to identify a range of potential site-specific risks in the Detailed Risk Assessment. Specifically, the surveys will be used to: (1) characterize the angler population of the Slough; (2) develop the range of fish/shellfish consumption frequencies; (3) determine the range of fish/shellfish quantities consumed; and (4) estimate fishing intensity at sites throughout the Slough. This information will then be used to characterize potential public health risks associated with fishing in the Slough. An expanded discussion on the above points (1, 2, 3, and 4) will be part of the Endangerment Assessment report.

General findings for the Lower and Upper Columbia Slough, and Sauvie Island are summarized below:

- Racially diverse people fish the Columbia Slough. They fish all year around, even during combined sewer overflow events. Many people are still consuming fish from the Columbia Slough, while they are aware of the warnings concerning the Slough.
- Fishing Pressure (anglers interviewed): there was more fishing observed in the Lower than the Upper Slough.
- Ethnicity of the anglers: the majority of people found fishing in the Lower Slough were Caucasian (excluding Eastern Europeans) (43%), Caucasians of Eastern European descent (24%), African American (18%), Hispanic (10%) and Asian (4%), compared to Caucasian (excluding Eastern Europeans) (75%), African American (12.5%) and Asian (12.5%) in the Upper Slough. Those found fishing on Sauvie Island included Caucasian (excluding Eastern Europeans) (65%), Asian (16%), African American (11%), Hispanic (4%) and Native American (4%).
- For the consumption figures, the days per month in the months that people indicated they fished is used. For fishing frequency, it is the average days per month per year. As an example, if a person responded that they fish 3 days per month, 3 months per year, that is a total of 9 days per year. This is the figure (9 days per year) that is used in the fish consumption calculations. For the fishing frequency calculations, this figure is normalized to a twelve month period...this person fishes an average of 0.75 days per month for twelve months. Fishing frequency data is shown in Table 3 below:

Fishing Frequency	Columbia Slough	Sauvie Island
Ave. Days/Month for 12 months	2.79	1.44
Minimum	0.08	0.08
Maximum	10	10
Ave. Days/Month for Months Fished	4.10	2.68
Minimum	1	1
Maximum	12	20
Ave. Months/Year	5.71	5.74
Minimum	1	1
Maximum	12	12

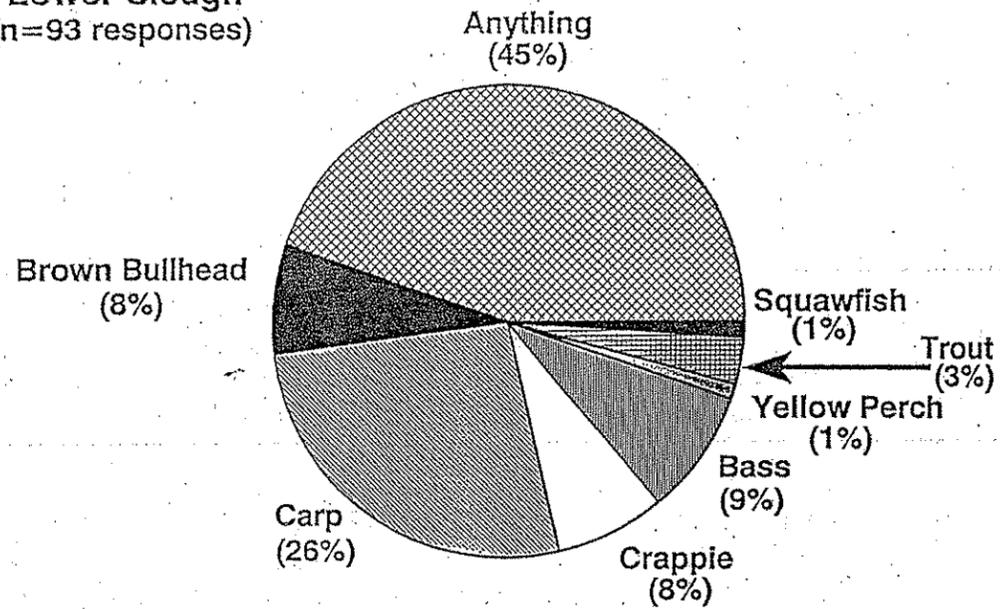
- Type of Fish Sought (Figure 8): the type of fish sought in the Lower Slough (from most to least sought) included: anything (45%), carp (26%), bass (9%), brown bullhead (8%), crappie (8%), trout (3%), squawfish (1%), yellow perch (1%) and crayfish (1%). However, in the Upper Slough, anything (33%), carp (22%), brown bullhead (22%), bass (11%) and crayfish (11%). On Sauvie Island, the type of fish sought (from most to least) included: anything (53%), brown bullhead (35%), sturgeon (15%), salmon (9%), trout (7%), crappie (5%), carp, yellow perch, bluegill and large mouth bass (each 4%), and whitefish (2%).
- Type of Fish Caught: the type of fish caught in the Lower Slough (from most to least caught) included: carp, squawfish, yellow perch, sculpin, crappie, bass and stickleback. However, in the Upper Slough, crayfish only were caught. On Sauvie Island, the type of fish caught (from most to least caught) included: brown bullhead, yellow perch, squawfish, starry flounder and sturgeon.
- Fate of Fish Caught: the fate of those fish caught in both the Lower and Upper Slough included: release (49%), eat (43%), discard (6%), give away (1%) and sell (1%). The fate of fish caught on Sauvie Island included: eat (72%), release (21%) and give away (7%). When discussing the fate of fish caught, "other" refers to using the fish for fertilizer or feeding their pets with the caught fish.
- Ethnicity of anglers consuming the fish: the ethnicity of the anglers consuming fish in the Lower and Upper Slough included: Caucasians of Eastern European descent (47%), Hispanic (22%), African American (19%), Caucasian (excluding Eastern Europeans) (8%) and Asian (3%). Those who consumed fish caught on Sauvie Island included: Caucasian (excluding Eastern Europeans) (74%), Asian (16%), African American (8%) and Hispanic (2%).
- Parts Consumed: the parts of the fish consumed most in the Lower and Upper Slough included: muscle (75%), entire fish (18%) and other parts (7%). From Sauvie Island: muscle (97%) and entire fish (3%). Other parts consumed included the head or entrails.
- Preparation Method: the preparation method most used prior to consumption of the fish in the Lower and Upper Slough included: fried (53%), soup (28%), boiled (7%) barbecued (7%) and baked (3%). Fish from Sauvie Island were: fried (74%), baked (8.5%), barbecued (8.5%) and soup (8.5%). Other preparation methods included steaming, drying, canning, or not cooking at all.
- Table 4, Fish Consumption Rate. See assumptions section for a discussion on confidence intervals and survey results. The consumption rate in kilograms (kg)/person/year:

Percent of Total Weight of Fish Consumed	Columbia Slough			Percent of Total Weight of Fish Consumed	Sauvie Island		
	30%	50%	75%		30%	50%	75%
Consumption Rate	5.23	8.72	13.08	Consumption Rate	0.84	1.40	2.09
Standard Deviation	12.05	20.08	30.12	Standard Deviation	3.81	6.35	9.52
Lower 95% Confidence Limit	-0.25	-0.42	-0.63	Lower 95% Confidence Limit	-0.56	-0.93	-1.40
Upper 95% Confidence Limit	10.72	17.86	26.79	Upper 95% Confidence Limit	2.23	3.72	5.59
Lower 90% Confidence Limit	0.70	1.16	1.74	Lower 75% Confidence Limit	0.00	0.00	0.00
Upper 90% Confidence Limit	9.77	16.28	24.42	Upper 75% Confidence Limit	1.67	2.79	4.19

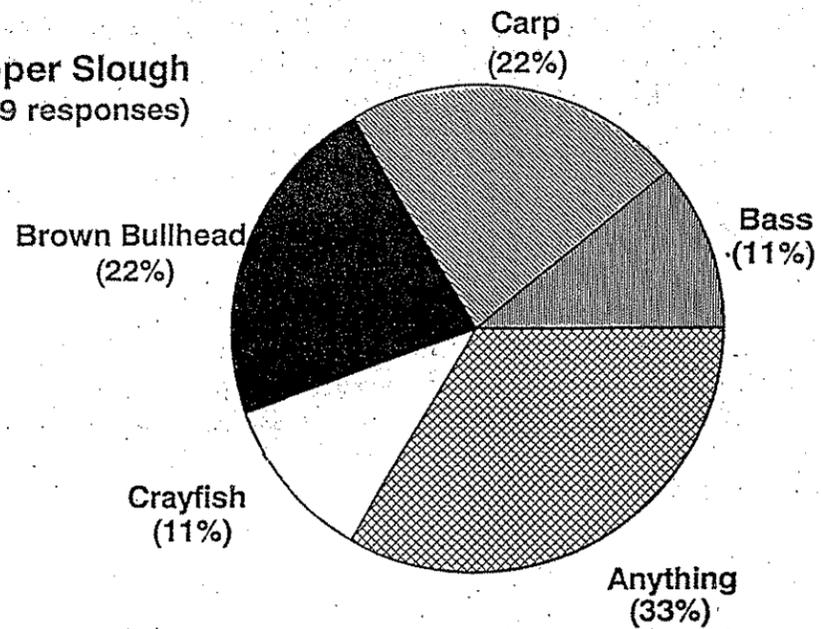
Figure 8

Fish Sought in Columbia Slough*

Lower Slough
(n=93 responses)



Upper Slough
(n=9 responses)



* Many anglers sought multiple species of fish.
The total number of responses (102) was greater than
the total number of anglers interviewed.

SECTION B - RECREATIONAL SURVEY

Approach

Survey Design

The recreational surveys were designed to obtain additional information on the type and level of recreational uses and opportunities within the Lower and Upper Columbia Slough. The surveys characterized current uses which could result in exposure to Slough water, sediments or biota, and also the frequency of these activities. This information will provide a better understanding of activities which could bring people in contact with chemicals in sediments and water, which may be useful in prioritizing clean-up activities. The survey questionnaire was formulated and designed by incorporating survey methods conducted in the Portland area, the Pacific Northwest and other parts of the nation. The 1994 (Phase 1) survey questionnaire was revised by the consultant team with input from the city's project manager, Parametrix's project manager and AAI's project manager. An example of the Recreational Survey for the Columbia Slough can be found in the Appendix D.

Recreational surveys were conducted for the Columbia Slough only. The interviewers conducted the recreational surveys as a part of the consumption surveys or when they encountered people participating in other activities in the Slough besides fishing. It was determined that conducting recreational surveys on Sauvie Island would not have been feasible due to the thousands of recreationalists that utilize the island and the difference in recreational uses and access on Sauvie Island compared with the Slough. However, the anglers interviewed on Sauvie Island were asked if they participated in any other activities on the island, such as boating, camping, swimming, etc. This information was not included in the database, but is available upon request from the city's project manager.

Recreational User and Activity Profiles

A total of thirteen recreational surveys were conducted for the Columbia Slough. Out of the thirteen interviews, eleven surveys were conducted in the Lower Slough and two were conducted in the Upper Slough. Figure 1 shows consumption and recreational survey locations. The Findings Section summarizes ethnicity, age distribution, activities and locations on the recreational information obtained from the 1995 (Phase 2) surveys conducted on the Lower and Upper Columbia Slough.

Observations

Recreational activities on the Slough were concentrated at Kelley Point Park. Most of the activities consisted of boating (motor, canoeing or kayaking), swimming, wading, and sunbathing. The swimming and wading occurred near the confluence of the Slough and the Willamette River.

Problems Encountered

Several problems were encountered during the recreational use surveys and are summarized below:

- The surveyors encountered recreationalist(s) boating in the Slough, but were unable to access them to ask questions from the shoreline. They tried to converse from the Slough banks and often were unsuccessful in obtaining any answers. The surveyors recorded their observations on the forms, prior to departure from the area.
- The surveyors encountered recreationalist(s) who were either intoxicated or participating in a "dangerous" activity (e.g., hunting). Due to the surveyors concern for their own safety, they declined to question the recreationalist(s) and only recorded their observations on the forms.

Findings

General findings are as follows for the Lower and Upper Columbia Slough:

- Ethnicity of the recreationalists: all of people found recreating in the Lower and Upper Slough were Caucasian (excluding Eastern Europeans) (100%).
- Age Distribution: the people recreating in the Lower and Upper Slough ages ranged from 30 to 50 years (44%), 0 to 15 (34%), 15 to 30 years (19%) and over 50 (3%).
- Activities: the activities performed in the Lower and Upper Slough included boating (15%), swimming (15%), wading (15%) and other (77%). Other activities included: picnicking, sunbathing, hiking, bicycling and hunting.
- The majority of the recreationalists were found at Kelley Point Park near the confluence of the Columbia Slough and Willamette River.

ACKNOWLEDGMENTS

We would like to express our appreciation to the teams who conducted the consumption and recreational surveys. Don Francis and Annette Phan comprised the 1995 (Phase 2) survey team. Don was selected because of his experience and familiarity with the Slough. Annette was selected as the Southeast Asian or Vietnamese speaking member. We value their dedication to early morning, evening and weekend "romps" in the wilderness; their commitment to obtaining information, even from the most reluctant fisher-people; and, their unending enthusiasm throughout the survey period. Thank you both, your work is extremely appreciated.

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APPENDIX A

Fish Consumption Survey Form

FISH/SHELLFISH CONSUMPTION SURVEY
COLUMBIA SLOUGH LOCATION

Date: ___/___/___ Time: ___:___ am/pm Surveyor: _____ Interview # _____

Site: _____ (refer to map) Mode: 1. Bank 2. Boat 3. Bridge 4. Dock 5. Other _____

Activity: 1. Fishing 2. Clamming 3. Crayfish Trapping 4. Other: _____

Interview Status: 1. Agree 2. Decline 3. Language barrier 4. Previously Interviewed.

Group type: 1. Alone 2. Family 3. Friends 4. Both No. of people in fishing party (#) _____

Ethnic Background: A. Caucasian B. African American C. Native American D. Asian E. Hispanic
F. Eastern European G. Other _____

Sex: A. Male (#) _____ Approximate Age: _____ 0-15, _____ 15-30, _____ 30-50, _____ over 50

B. Female (#) _____ Approximate Age: _____ 0-15, _____ 15-30, _____ 30-50, _____ over 50

1. What are you fishing for? A. Bass B. Sunfish C. Crappie D. Carp E. Catfish
F. Crayfish G. Salmon H. Trout I. Sturgeon I. Other _____
(refer to fish pictures)

2a. How often do you fish at the Slough? (____ per week) (____ per month) (____ per year)
(____ 1st time) (____ 2nd time)

2b. During which seasons do you fish? _____ (1) Fall, _____ (2) Winter, _____ (3) Spring, _____ (4) Summer, _____ (5) All year

3. How many hours will you spend fishing today? _____ (total hours) (Estimate how long they plan on staying, including time already spent that day.)

4a. How many years have you been fishing in the Columbia Slough? _____ (years)

4b. Do you fish other locations of the Slough? _____ Yes _____ No

4c. If yes, would you tell me these other locations?

Locations:

5a. What do you do with the fish you catch from the Slough? (circle all that are applicable)
A. Eat B. Freeze C. Throw away D. Give to Friend/Relatives E. Sell F. Release G. Bait

5b. If you freeze or refrigerate, how often do you continue to eat the fish caught from the Slough?
(____ per week) (____ per month) (____ per year) (____ 1st time) (____ 2nd time)

Notes:

FISH/SHELLFISH CONSUMPTION SURVEY
SAUVIE ISLAND LOCATION

Date: ___/___/___ Time: ___:___ am/pm Surveyor: _____ Interview # _____

Site: _____ (refer to map) Mode: 1. Bank 2. Boat 3. Bridge 4. Dock 5. Other _____

Activity: 1. Fishing 2. Clamming 3. Crayfish Trapping 4. Other: _____

Interview Status: 1. Agree 2. Decline 3. Language barrier 4. Previously Interviewed

Group type: 1. Alone 2. Family 3. Friends 4. Both No. of people in fishing party (#) _____

Ethnic Background: A. Caucasian B. African American C. Native American D. Asian E. Hispanic
F. Eastern European G. Other _____

Sex: A. Male (#) _____ Approximate Age: _____ 0-15, _____ 15-30, _____ 30-50, _____ over 50

B. Female (#) _____ Approximate Age: _____ 0-15, _____ 15-30, _____ 30-50, _____ over 50

1. What are you fishing for? A. Bass B. Sunfish C. Crappie D. Carp E. Catfish
F. Crayfish G. Salmon H. Trout I. Sturgeon J. Other _____
(refer to fish pictures)

2a. How often do you fish at Sauvie Island? (_____ per week) (_____ per month) (_____ per year)
(_____ 1st time) (_____ 2nd time)

2b. During which seasons do you fish? _____ (1) Fall, _____ (2) Winter, _____ (3) Spring, _____ (4) Summer, _____ (5) All year

3. How many hours will you spend fishing today? _____ (total hours) (Estimate how long they plan on staying, including time already spent that day.)

4a. How many years have you been fishing at Sauvie Island? _____ (years)

4b. Do you fish other locations of Sauvie Island? _____ Yes _____ No

4c. If yes, would you tell me these other locations?
Locations:

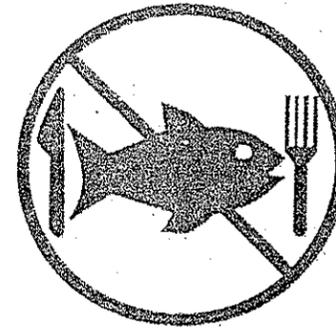
5a. What do you do with the fish you catch from Sauvie Island? (circle all that are applicable)
A. Eat B. Freeze C. Throw away D. Give to Friend/Relatives E. Sell F. Release G. Bait

5b. If you freeze or refrigerate, how often do you continue to eat the fish caught from Sauvie Island?
(_____ per week) (_____ per month) (_____ per year) (_____ 1st time) (_____ 2nd time)

Notes:

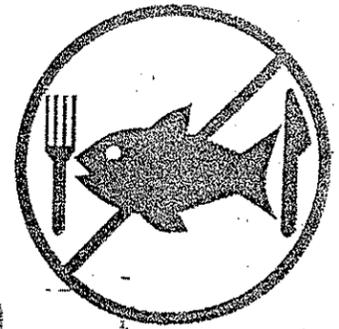
APPENDIX B

Fish Consumption Advisory



WARNING!

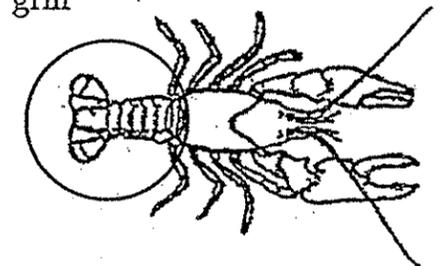
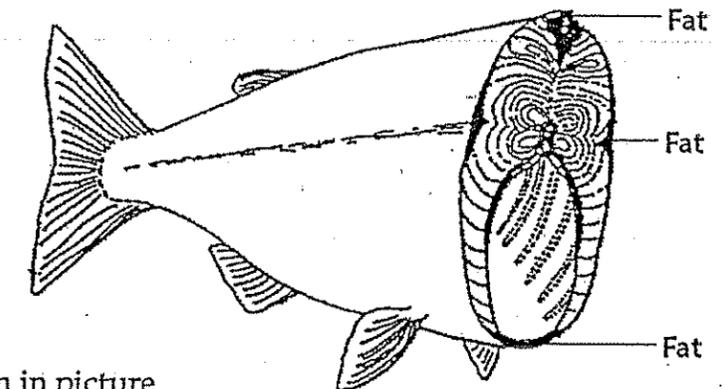
Contaminated Fish Have Been Found In The Columbia Slough



City of Portland tests have shown DDE/DDT and PCBs in fish caught in the Columbia Slough. These chemicals may cause cancer and other health effects and can be particularly harmful for children and pregnant and nursing women. Health officials recommend that people avoid eating fish from the Columbia Slough.

To be cautious, we recommend that you do not eat the fish caught from the Columbia Slough. However, if you choose to eat fish from the Slough, you should take the following safety precautions:

- Eat slough fish less often
- Keep and eat smaller, younger fish
- Eat smaller portions
- Discard all internal organs
- Thoroughly cut away and discard fatty parts, and fillet fish before eating
- Remove all skin before cooking
- Do not eat raw fish meat
- Cut away fatty parts of fish, as shown in picture
- Thoroughly clean and trim fish if making stew or soup
- Bake or broil the skinned, trimmed fish on a rack or grill so more fat drips off, do not use any drippings
- If eating crayfish, eat only the tail meat



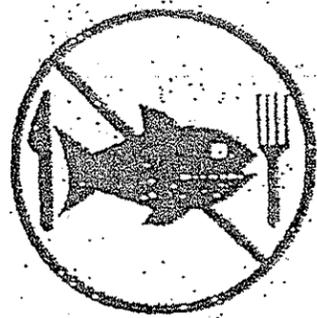
Need More Information?
Please Call:
Chee Choy
(503) 823-5310



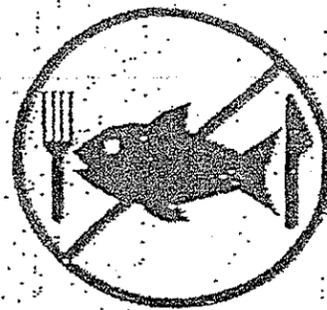
ENVIRONMENTAL SERVICES
CITY OF PORTLAND
CLEAN RIVER WORKS

Version: June 20, 1995

WS 5031



ВНИМАНИЕ!



Заражённая рыба была найдена в заводи реки Колумбия

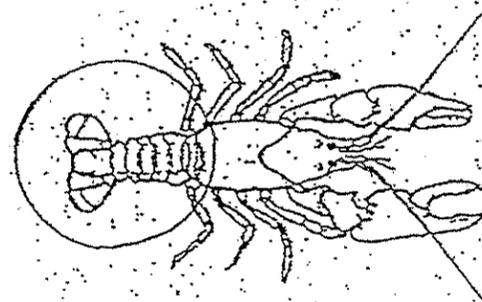
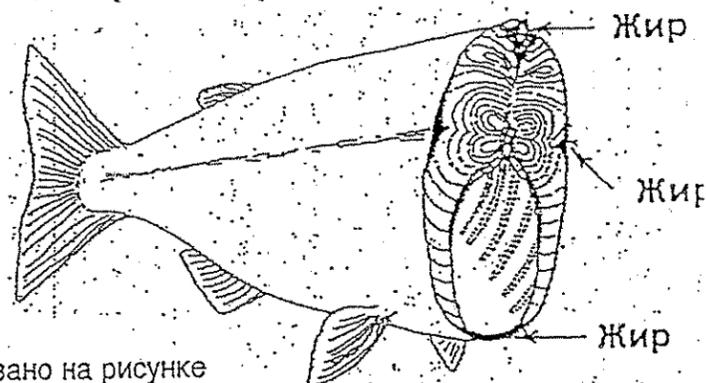
Химические вещества под названием Писибиды (PCB) были найдены в рыбе, пойманной в районе Сэнт-Джонс Ляндфилл (St. Johns Landfill) в северной части Портланда. Писибиды - это группа химикатов, которые могут вызвать возникновение рака, если человек подвергается их воздействию в течение продолжительного периода времени. Работники здравоохранения рекомендуют чтобы люди не ели

рыбу, пойманную в заливе реки Колумбия (По-английски: Колумбия Слаф - Columbia Slough).

В настоящее время Бюро Охраны Окружающей среды Портланда проводит исследования рыбы из всего залива реки Колумбия, чтобы выявить степень заражения рыбы. Мы будем знать результаты исследований к концу 1994 года.

Чтобы избежать опасностей, мы рекомендуем вам не есть рыбу, пойманную в заливе реки Колумбия. Однако если вы будете есть рыбу из залива, вы должны соблюдать следующие предосторожности:

- Реже употребляйте рыбу из залива
- Берите и ешьте маленькую, молодую рыбу
- Ешьте меньшее количество
- Выбрасывайте все внутренности
- Тщательно вырезайте и выбрасывайте все части с жиром, филетируйте рыбу перед употреблением
- Удалите всю кожу (шкуру) перед приготовлением
- Не ешьте сырую рыбу
- Вырезайте все жирные части рыбы, как указано на рисунке
- Запекайте или жарьте обрезающую, без кожи рыбу на вертеле или на сетке так, чтобы стекало больше жира, не используйте стекающий жир.
- Тщательно вычищайте и обрезайте рыбу, если приготавливаете уху или холодец.
- Если едите раков, ешьте только мясо в хвосте.



Нужно больше сведений?

Пожалуйста звоните в:

ИРКО

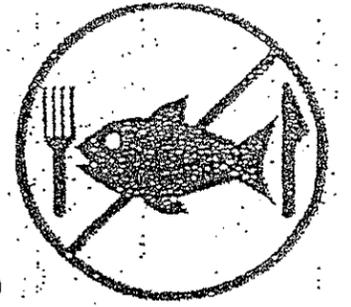
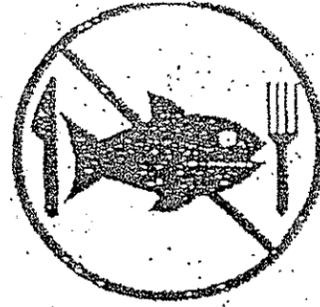
(503) 234-1541



ENVIRONMENTAL SERVICES

CITY OF PORTLAND

RUSSIAN Version: August 12, 1994



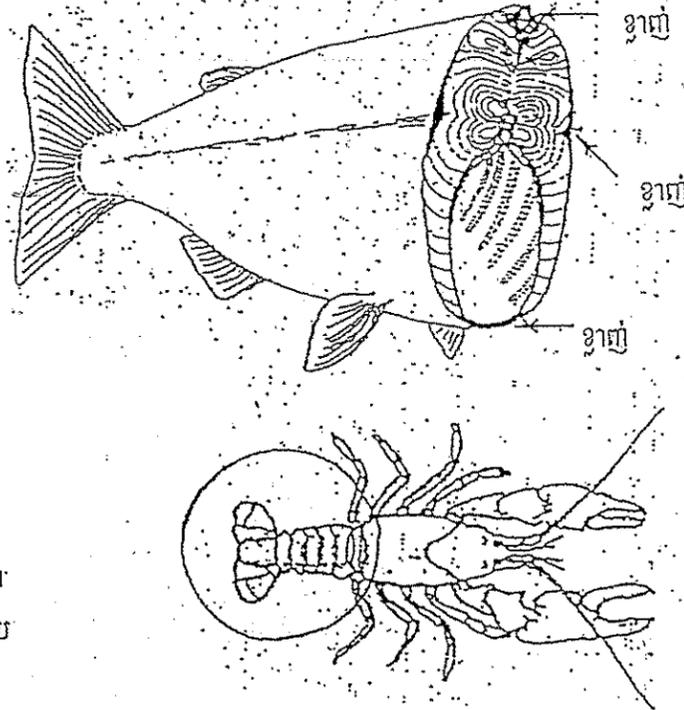
បំរាម
ត្រីដែលមានជាតិពុលត្រូវបាន
គេរកឃើញនៅក្នុងដៃទន្លេ
ខូឡូមប្យេវដែលគ្មានទឹកហូរ (Columbia Slough)

ជាតិ PCB បានត្រូវគេរកឃើញនៅក្នុងត្រីដែលចាប់បានក្បែរកន្លែង
 ចាក់សំរាមតំបន់ St. Johns ផ្នែកខាងជើងនៃទីក្រុង Portland ។
 PCB គឺជាជាតិគីមីមួយក្រុមដែលអាចបណ្តាលឱ្យមានជំងឺមហារីក
 បើមនុស្សនៅក្បែរវាជាច្រើនឆ្នាំ។ ភ្នាក់ងារសុខភាពបានឱ្យដំបូន្មាន
 ថាកុំពិសារត្រីដែលចាប់មកពីដៃទន្លេខូឡូមប្យេវដែលគ្មានទឹកហូរ។

សព្វថ្ងៃនេះ ការិយាល័យពិនិត្យបរិយាកាសនៃទីក្រុងភ័ក្តិទ្រូនដ៍កំពុងតែធ្វើតេស្ត
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 ធ្វើតេស្តនេះនៅដំណាច់ឆ្នាំ ១៩៩៤ នេះ។

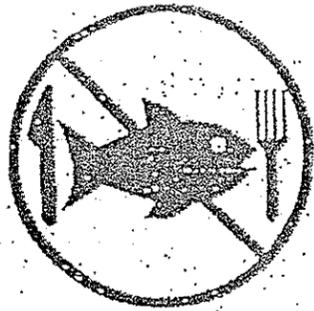
ដើម្បីប្រយ័ត្ន យើងសូមជូនដំបូន្មាន ថាកុំពិសារត្រីដែលចាប់មកពីដៃទន្លេខូឡូមប្យេវដែលគ្មានទឹកហូរ។
 តែទោះជាយ៉ាងណាក៏ដោយ បើអ្នកសំរេចថា នឹង ពិសារត្រីដែលចាប់មកពីដៃទន្លេខូឡូមប្យេវដែលគ្មានទឹកហូរនោះ
 អ្នកអាចប្រុងប្រយ័ត្នដើម្បីការពារសុខសប្បាយដូចតទៅនេះ៖

- កុំពិសារត្រីទឹកនេះញឹកញាប់ពេក
- ទុកនិងពិសារតែត្រីតូចៗ, ត្រីមានមានអាយុតិចតួច
- ពិសារត្រីតាមចំណែកតូចៗ
- បោះគ្រឿងក្នុងពោះចោលទាំងអស់
- កាត់បោះចោលនូវផ្នែកណាដែលមានខ្លាញ់
ហើយវះត្រីជាចំណែកស្លើង
- យកវ៉ែស្យូកចេញទាំងអស់មុននិងចម្អិនវា
- កុំពិសារសាច់ត្រីឆៅ
- កាត់បោះចោលនូវផ្នែកណាដែលមានខ្លាញ់
ដូចបង្ហាញតាមរូបភាព
- សំអាតត្រីទាំងមូលនិងកាត់ព្រួយចេញមុននិងខ្សែស្នា
- ដុតឬអាំងត្រីដែលបានកាត់វ៉ែស្យូកនិងព្រួយចេញហើយ
នៅលើចង្ហើបឆ្នែប ដើម្បីឱ្យខ្លាញ់ស្រកចេញ
ហើយកុំយកខ្លាញ់នោះទៅប្រើ។
- បើពិសារត្រីជំពូកបង្កង សូមពិសារតែសាច់កន្ទុយ។

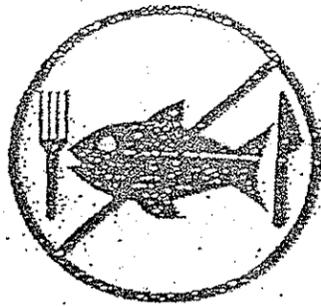


ត្រូវការព័ត៌មានថែមទៀត?
 សូមទូរស័ព្ទទៅ
 IRCO
 (503) 234-1541





ຄຳຕົກເຕືອນ!
ປາບໍ່ສະອາດໄດ້ພົນເຫັນ
ຢູ່ຄອງນ້ຳໂຄລຳເບ້ຍ

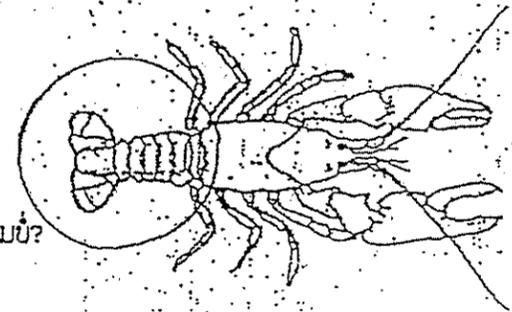
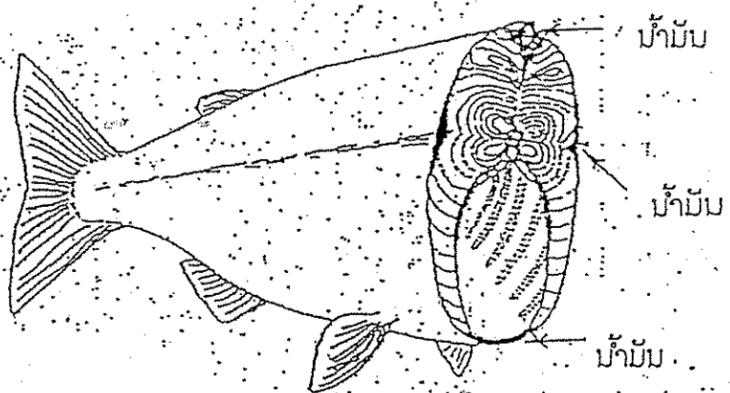


PCB ໄດ້ຖືກພົບເຫັນຢູ່ໃນປາທີ່ຈັບໄດ້ໄກ້ບ່ອນຖິ້ມຂີ້ເຫຼືອ St. Johns ຢູ່ເຂດເໜືອເມືອງພອດແລນດ໌. PCB ແມ່ນໜວດຂອງເຄມີຊຶ່ງສາມາດເຮັດໃຫ້ເກີດໂຮກມະເຮັງໄດ້ ຖ້າຄົນເຮົາໄປຕິດພົວພັນກັບມັນໃນລະຍະຊີວິດ. ເຈົ້າໜ້າທີ່ສາທາລະນະສຸກ ແນະນຳບໍ່ໃຫ້ກິນປາຕາມຄອງນ້ຳໂຄລຳເບ້ຍ.

ປັດຈຸບັນນີ້, ຫ້ອງການພູມສາດສິ່ງແວດລ້ອມຂອງພອດແລນດ໌ ກຳລັງກວດເບິ່ງປາຈາກຄອງນ້ຳໂຄລຳເບ້ຍທັງໝົດ ເພື່ອຮູ້ຄວາມເປັນເປືະຂອງປາມືເຖິງຂັ້ນໃດ. ພວກເຮົາຈະຮູ້ຜົນຂອງການທົດສອບໃນທ້າຍປີ 1994.

ເພື່ອຄວາມຮະມັດຮະວັງ, ພວກເຮົາແນະນຳບໍ່ໃຫ້ທ່ານກິນປາທີ່ໄດ້ມາຈາກຄອງນ້ຳໂຄລຳເບ້ຍເຖິງຢ່າງໃດກໍຕາມ, ຖ້າທ່ານຕັດສິນໃຈຈະກິນປາເຫຼົ່ານີ້, ທ່ານສາມາດໃຊ້ຄວາມຮະມັດຮະວັງ ເພື່ອຄວາມປອດໄພ ດັ່ງຕໍ່ລິງໄປນີ້:

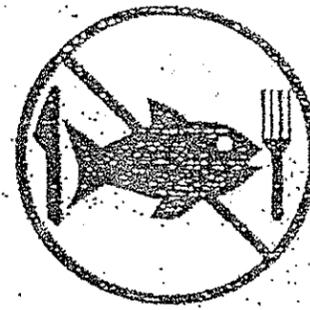
- ກິນປາຕາມຄອງນ້ຳນີ້ໃຫ້ນ້ອຍລົງ
- ຮັກສາ ຜູ້ລະກິນປານ້ອຍ
- ກິນພາກສ່ວນນ້ອຍໆຂອງມັນ
- ຖິ້ມພາກສ່ວນເຄື່ອງອະໄວຍະວະຂອງປາ
- ຕັດຖິ້ມພາກສ່ວນທີ່ອ່ວນພິມີນ້ຳມັນ ໃຫ້ລະອຽດ ຜູ້ລະບໍ່ໃຫ້ມີກ້າງກ່ອນກິນປາ
- ກ່ອນຄົວກິນ ໃຫ້ຕັດໜັງປາທັງໝົດອອກ
- ຫ້າມກິນປາດິບ
- ຕັດຖິ້ມພາກສ່ວນທີ່ອ່ວນພິມີນ້ຳມັນ ຕາມຮູບທີ່ຊີ້ບອກນີ້
- ຖ້າຕົ້ມຫຼືແກງ ໃຫ້ລ້າງຜູ້ລະຕັດປາໃຫ້ຄັກແຜ່ນ
- ອົບ ຫຼືຕົ້ມປາທີ່ເອົາໜັງອອກແລ້ວ, ຕັດປາແລ້ວໃສ່ເຫຼັກປຶ້ງ ຫຼືຢ້າງເພື່ອໃຫ້ນ້ຳມັນໄຫຼອອກ, ຢ່າໃຊ້ນ້ຳມັນທີ່ຍ້ອຍອອກ.
- ຖ້າກິນກັງ (crayfish) ໃຫ້ກິນແຕ່ຊັ້ນຢູ່ຫ່າງເທົ່ານັ້ນ



ທ່ານຕ້ອງການຮູ້ລາຍລະອຽດເພີ່ມເຕີມບໍ່?
 ໃຫ້ຕິດຕໍ່ຫາ: IRCO
 234-1541

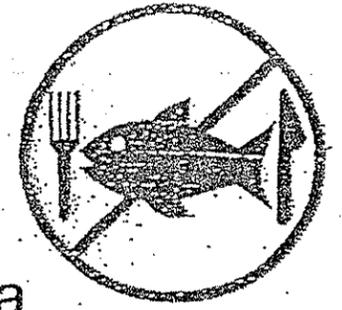


Laotian Version: August 12, 1994



CẢNH CÁO!

Cá Bị Nhiễm Độc Được Tìm Thấy Ở Vũng Lầy Columbia

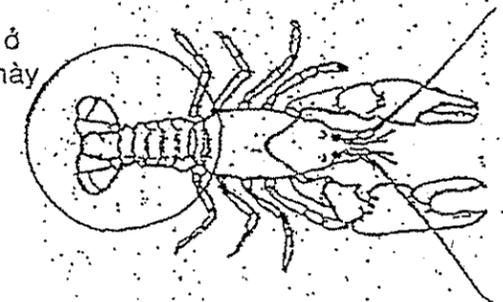
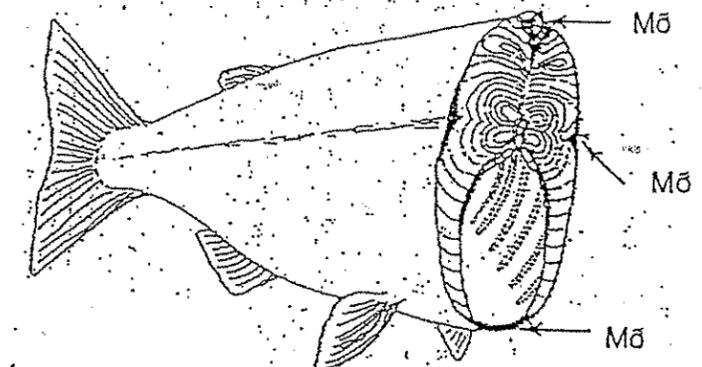


PCBs đã được tìm thấy trong cá câu được gần St. Johns Landfill ở phía bắc Portland. PCBs là một số hóa chất có thể gây ra bệnh ung thư nếu người ta đụng chạm với chất này sau một thời gian lâu dài. Nhân viên y tế đề nghị rằng mọi người tránh ăn cá câu được ở Vũng Lầy Columbia.

Hiện nay, Sở Dịch Vụ Môi Sinh của Thành Phố Portland đang thử nghiệm cá ở toàn Vũng Lầy Columbia để tìm hiểu xem mức độ nhiễm độc của cá ở đây. Chúng tôi sẽ được biết kết quả của cuộc thử nghiệm này vào cuối năm 1994.

Vì thận trọng, chúng tôi đề nghị quý vị không nên ăn cá câu được ở Vũng Lầy Columbia. Tuy nhiên, nếu quý vị muốn ăn cá từ Vũng Lầy, quý vị phải làm theo những dự phòng an toàn sau đây:

- Ít ăn cá ở Vũng Lầy hơn
- Giữ lại và ăn những cá bé hơn và còn nhỏ.
- Ăn những phần ăn nhỏ hơn
- Loại bỏ mọi bộ phận bên trong của cá
- Cắt và loại bỏ cẩn thận những phần có mỡ, và lọc lấy phi-lê cá trước khi ăn
- Bỏ mọi da trước khi nấu nướng
- Đừng ăn cá sống
- Cắt bỏ những chỗ có mỡ của cá, như được chỉ dẫn trong hình
- Rửa và cắt bỏ đầu, đuôi, vây cá cẩn thận trước khi hầm hoặc nấu súp
- Hấp trong lò hoặc nướng cá không da và không đầu đuôi ở trên vỉ hoặc vỉ nướng để mỡ nhỏ xuống, đừng dùng mỡ này
- Khi ăn loại tôm hùm nước ngọt nhỏ (crayfish), chỉ nên ăn phần thịt ở đuôi mà thôi



Cần Thêm Tin Tức?

Xin Gọi:

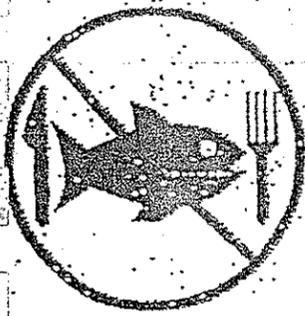
IRCO

(503) 234-1541



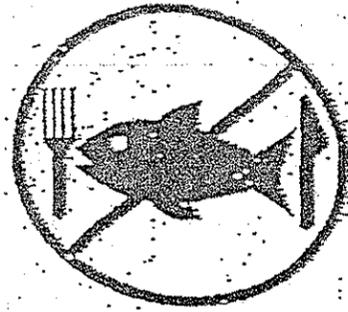
ENVIRONMENTAL SERVICES
CITY OF PORTLAND

Vietnamese Version: August 12, 1994



ATENCIÓN!

Se Han Encontrado Pescados Contaminados En El Sedimento del Río Columbia



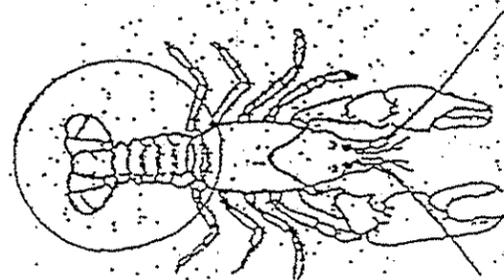
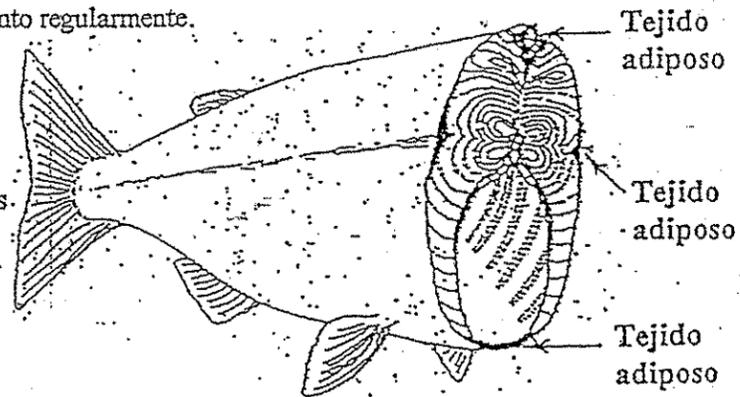
PCBs han sido encontrados en los peces pescados cerca del área rehabilitada de St. Johns en el norte de Portland. Los PCBs son un grupo de químicos que pueden causar cancer si una persona es expuesta por un período largo de su vida. Los oficiales encargados de la salud recomiendan que la

gente evite comer pescados extraídos del río Columbia.

Actualmente, el Departamento de Servicios Ambientales de la Ciudad de Portland está examinando pescados alrededor del río Columbia para verificar el grado y extensión de la contaminación. Los resultados de los exámenes se sabrán al final de 1994.

Sea prudente, le recomendamos no comer pescado extraído del sedimento del río Columbia. Si usted sin embargo, decide comer pescado extraído del sedimento, puede tomar las siguientes precauciones de seguridad:

- No coma pescado extraído del sedimento regularmente.
- Mantenga y coma pescados más jóvenes y pequeños
- Coma porciones más pequeñas
- Deseche todos los órganos internos.
- Corte y bote todos los tejidos adiposos y corte el pescado en filetes
- Remueva toda la piel antes de cocinar
- No coma carne de pescado cruda
- Corte todos los tejidos adiposos, tal como se ilustra en la figura
- Limpie totalmente y corte en tramos el pescado si va a hacer sopa o guisado
- Cocine o ase los tramos descamados de pescado en una parilla para eliminar la grasa del pescado (no use esta grasa)
- Si come astaco (crayfish), coma solo la carne de la cola



Necesita Más Información?

Por favor Llame a:

IRCO

Tel: (503) 234-1541



Environmental Services

City of Portland

Spanish Version: October 10, 1994

APPENDIX C

Spreadsheets

FISH CONSUMPTION STATISTICS

Location	Interview Number	Fish Species	Total # Fish	Total Weight	Edible Percent	Number of Consumers	Normalized day/mnth***	Fishing Effort: day/mth	mmth/yr	kg/person/day
COLSLU	1	.	0	0.00	0.30	1	4.00	4.00	12	0.00
COLSLU	2	.	0	0.00	0.30	1	0.08	1.00	1	0.00
COLSLU	3	1	24	1.06	0.30	5	4.00	4.00	12	3.05
COLSLU	4	17	1	0.10	0.30	2	2.00	4.00	6	0.36
COLSLU	6	.	0	0.00	0.30	2	2.00	4.00	6	0.00
COLSLU	8	.	0	0.00	0.30	3	0.08	1.00	1	0.00
COLSLU	14	.	0	0.00	0.30	4	0.08	1.00	1	0.00
COLSLU	16	.	0	0.00	0.30	2	0.08	1.00	1	0.00
COLSLU	19	4	7	10.60	0.30	4	4.00	8.00	6	38.16
COLSLU	20	.	0	0.00	0.30	1	0.08	1.00	1	0.00
COLSLU	21	4	2	7.10	0.30	5	8.00	8.00	12	40.90
COLSLU	22	4	1	1.20	0.30	4	0.08	1.00	1	0.09
COLSLU	28	4	12	16.90	0.30	11	3.00	4.00	9	16.59
COLSLU	43	.	0	0.00	0.30	2	6.00	12.00	6	0.00
COLSLU	44	.	0	0.00	0.30	5	0.42	1.00	5	0.00
COLSLU	54	4	3	5.20	0.30	4	0.25	3.00	3	3.51
COLSLU	67	4	1	1.00	0.30	5	10.00	10.00	12	7.20
COLSLU	69	.	0	0.00	0.30	3	6.00	8.00	9	0.00
COLSLU	80	.	0	0.00	0.30	2	8.00	8.00	12	0.00
COLSLU	81	.	0	0.00	0.30	4	0.17	1.00	2	0.00
COLSLU	85	17	1	0.01	0.30	1	0.17	1.00	2	0.01
			Count	21	21	21	21	21	21	21
			Mean	2.06	0.30	3.38	2.79	4.10	5.71	5.23
			Stdev	4.42	0.00	2.27	3.18	3.51	4.41	12.05
			95% Lower	0.04	0.30	2.35	1.34	2.50	3.71	-0.25
			95% Upper	4.07	0.30	4.41	4.23	5.69	7.72	10.72

***Normalized fishing days per month is the number of days per year a person fishes, divided by 12 months.

COLUMBIA SLOUGH FISH CONSUMPTION SURVEY
SPREADSHEET CODES

Area	U/L Slough	Mode	Activity	Interview status	Ethnicity	Sex	Fish Species	Fate of Fish	Parts Consumed	Prep Method	Eat
KP = Kully Pt.	0 = Lower	1 = bank	1 = fishing	1 = agree	1 = Caucasian	1 = male	1 = bass (lg. mouth)	1 = eat	1 = entire	1 = raw	0 = No
LOMB = Lombard Bridge	1 = Upper	2 = boat	2 = clamming	2 = decline	2 = African Am.	2 = female	2 = sunfish	2 = freeze	2 = muscle	2 = boiled	1 = Yes
STJ = St. John's Landfill		3 = bridge	3 = crayfishing	3 = lang. barrier	3 = Native Am.		3 = crappie (black or white)	3 = throw awa	3 = skin	3 = steamed	
N.PEN = N. Penin. Landfill		4 = dock	4 = other	4 = prev. interview	4 = Asian		4 = carp	4 = give away	4 = internal organs	4 = baked	
SCHMR = Schmeier Cove		5 = other			5 = Hispanic		5 = catfish (bullhead)	5 = sell	5 = broth/soup	5 = fried	
RR = Railroad Bridge					6 = East Europe		6 = crayfish	6 = release	6 = other	6 = BBQ	
VANCB = Vancouver Bridge					7 = other		7 = salmon	7 = bait		7 = other	
MLKBR = Mt. Luther King Br.							8 = trout				
13CSO = 13th Ave CSO							9 = sturgeon				
MCDD = Mult. Cty. Drainage Dist.							10 = anything/other				
33BR = 33rd st. bridge							11 = bass (sm. mouth)				
DNAV = Denver Ave							12 = pumpkinseed (sunfish)				
55 BR = NE 55th Ave. Br.							13 = bluegill (sunfish)				
WTKR = Whitaker Slough							14 = banded sculpin				
63RD = 63rd Ave							15 = channel catfish				
158TH = NE 158th Ave. Br.							16 = white sucker				
185TH = NE 185th Ave. Br.							17 = yellow perch				
							18 = starry flounder				
							19 = stickleback				
							20 = squawfish				

COLUMBIA SLOUGH FISH CONSUMPTION SURVEY

General Information:										Target Fishing Effort:					Consumption & Preparation:					Amt. eat		Eat last		Fish Catch:		Avg	Total	Total	Avg											
Intrvw	Area	U/L	Date	Time	Mode	Actvty	Int. status	Ethnic	Sex	Age	Grp.#	Fish Species	day/mth	hr/day	# season	# yrs.	Fate	day/mth	# Consuming	Age	Sex	Amt. eat	previous yrs.	C.S. meal	Part Used	Prep.	Species	#	Wt (kg)	species Wt (kg)	catch Wt (kg)	Lgth (mm)	Eat?							
1	SCHMR	0	6/3/95	1145	1	1	1	2	1	50+	2	3	4	1.5	12	25	1	4	1	58	1	2,3	1	7	2	5														
2	SCHMR	0	6/3/95	1150	1	1	1	2	2	50+	2	3	0.1	3	12		1,2	4	1	50	2	4,5	3		2	5														
3	KP	0	6/3/95	1235P	1	1	1	6	1	50+	2	1	4	6.5	12	2	1	12	5	52	1	2,3	3	4	2	2	11	1	0.5	0.5	1.06	305	1							
										1	-15	10					2								3	19	1	0.006	0.01				76	1						
																	4								6	20	3	0.027	0.08				127	1						
																	5									17	#	0.027	0.43				127	1						
																										14	3	0.013	0.04				102	1						
																										17	1	0.1	0.1	0.1			127	1						
4	KP	0	6/3/95	1258P	1	1	3	5	1	15+	3	10	4	3	6	1	1	8	2			2		7	2	5														
																	2																							
5	KP	0	6/3/95	1258P	1	1	3	5	1	30+	3	10	4	3	6	1	1	8	2	1,2	1,2			7	2	5														
6	KP	0	6/3/95	1258P	1	1	3	5	1		3	10	4	3	6	1	1,2	8	2	1,2	1,2			7	2	5														
7	KP	0	6/3/95	100P	1	1	2	2	1		2																													
8	KP	0	6/4/95	825A	1	1	1	5	1	-15	2	4	0.1	2	6		1		3	30+	2	1	4	730	2	7														
										30+							4			30+	1																			
																				15+	1																			
9	33BR	1	6/4/95	930A	1	1	1	4	1	30+	2	10	0.2	1	6	0	6																							
10	WTKR	1	6/4/95	1045	1	4	1	1	1	15+	1	4	0.2		3	2	3																							
11	SCHMR	0	6/4/95	1119	1	4	1	1	1	15+	2																													
12	KP	0	6/4/95	1154	1	1	2	1	1	30+	1																													
13	KP	0	6/4/95	1226P	1	1	1	2	1	15+	1	1	0.2	2	3	0	3																							
												8																												
14	KP	0	6/4/95	1226P	1	1	1	1	1	30+	2	1	0.1	2	3		1	4		1	10,		0	2	4															
												4					3				1	20 oz		3	5															
												8																												
												3																												
15	13CSO	0	6/6/95	530P	1	1	1	2	1	15+	4	10	0.2	1	3	0	3																							
16	SCHMR	0	6/8/95	130P	1	1	1	2	1	30+	1	10	0.1	0.1	3	1.5	1	2																						
17	SCHMR	0	6/8/95	150P	1	4	1	1	1	30+	2	4	12	12	6	0.1	3																							
18	LOMB	0	6/8/95	620P	1	1	1	6	1	15+	2	4	8	3	12		1	4																						
19	KP	0	6/12/95	800A	1	1	3	6	1	50+	4	4	8	5	6	1	1	4	-15	1		2	7	6	7	4	6	2	10.45	10.6	494	1								
										-15										30+	1						20	1	0.15	0.15				178	1					
										-15										30+	2																			
										-15										50+	1																			
20	KP	0	6/13/95	740A	1	1	1	6	1	30+	1	10	0.1	2	3	7	1	1					365	2	6															
																	6	0																						
21	KP	0	6/13/95	830A	1	1	1	6	1	50+	1	4	8	11	12	6	1	30	5					1	1	7	4	2	3.55	7.1	7.1	585	1							
																	4																							
22	LOMB	0	6/13/95	1005	1	1	1	6	1	30+	2	4	0.1	3	3	2	1	4				1	4	0	2	5	4	1	1.2	1.2	1.2	450	1							
23	KP	0	6/13/95		1	1	1	2	1	30+	1	10	0	3	3	1	6	0																						
24	SCHMR	0	6/15/95	1138	1	1	1	2	1	30+	2	10	0.1	2		0.1	6	0																						
25	63RD	1	6/15/95	108P	1	1	1	1	1	30+	1	3																												

COLUMBIA SLOUGH FISH CONSUMPTION SURVEY

General Information:												Target Fishing Effort:					Consumption & Preparation:						Fish Catch:		Avg		Total		Avg							
Intrvw	Area	U/L	Date	Time	Mode	Actvty	Int. status	Ethnic	Sex	Age	Grp.#	Fish Species	day/mth	hr/day	# season	# yrs.	Fate	day/mth	# Consuming	Age	Sex	Amt. eat	previous yrs.	C.S. meal	Part Used	Prep.	Species	#	Wt (kg)	species	Wt (kg)	catch	Wt (kg)	Lgth (mm)	Eat?	
54	KP	0	6/21/95	800A	1	1	1	6	1	30+	3	4	3	12	3	5	1	2	4	30+	1	3	4	2	2	5	4	1	3.7	3.7	5.2	610	1			
										15+							2		30+	2				6		20	1	1	1		415	1				
										15+							6		15+	1						17	1	0.5	0.5		280	1				
55	KP	0	6/23/95	540P	1	1	1	1	1	30+	2	10	0.8		3	2	6	0																		
56	KP	0	6/23/95	540P	1	1	1	1	1	30+	2	10	0.8	4	3	8	6	0																		
58	RR BR	0	6/23/95	444P	1	1	1	2	1	30+	3	1	0.1	1		0	6	0																		
										30+		3																								
										50+		10																								
60	STJ	0	6/24/95	131P	1	1	1	5	1	15+	2	10	0.1	4	3	0.1	1																			
										15+																										
										30+																										
61	KP	0	6/24/95	150P	2	1	1	1	1	30+	2	4	0.1	3	3	15	6	0																		
										30+																										
62	KP	0	6/24/95	150P	2	1	1	1	1	30+	2	4	0.1	3	3	15	6	0																		
										30+																										
64	KP	0	6/24/95	200P	1	1	3	6	1	30+	1	4			3		8																			
65	KP	0	6/24/95	205P	1	1	1	5	1	30+	3						6																			
										30+																										
										30+																										
66	KP	0	6/24/95	205P	1	1	1	5	1	30+	1	4					1																			
										30+																										
67	KP	0	6/24/95	215P	1	1	1	6	1	-15	3	4	10	11	12	6	1	30	5	1	1	1		1	7	4	1	1.0	1.0	1.0	480	1				
										30+							4																			
										50+																										
68	KP	0	6/24/95	236P	2	1	1	2	1	30+	2	5			30		1																			
										30+							6																			
69	SCHMR	0	6/24/95	358P	1	1	1	5	1		1	3	8	5	9	0	1		3	2					7											
												4					6																			
70	SCHMR	0	6/24/95	358P	1	1	1	1	1	30+	1	3	0.2	5	9	0	6	0																		
71	SCHMR	0	6/24/95	400P	1	1	1	1	1	50+	1	1	1	6	9	15	6	0																		
												3																								
72	MLK BR	0	6/24/95	530P	1	1	1	1	1	30+	1	10	8	2	12	3	6	0																		
73	KP	0	6/25/95	920A	1	1	3	6	1	30+	1	4																								
74	KP	0	6/25/95	927A	1	1	1	1	1	30+	2	10	6	2	12	25	6																			
										30+							4																			
76	55 BR	1	6/27/95	410P	3	3	1	1	1	50+	1	6	8	2.5	6	30	1	12	2	50+	1	75	1	1	6	2	6	#	0.04	2.21	2.21	137	1			
										*4																										
78	KP	0	6/27/95	536P	1	1	1	5	1	15+	2	4	8	3	9		1																			
										30+																										
79	KP	0	6/29/95	215P	1	1	1	6	1	30+	2	10	0.3	4	6	5	1	0																		
										30+							6																			
80	KP	0	7/1/95	1205P	1	1	1	4	1	15+	2	4	8	2	12	2	1		2	30+	1	2,3	3	30	2	5										
										15+							2			30+	1															
81	KP	0	7/1/95	1218P	1	1	1	6	1	-15	2	4	0.2	3	3	3	1		4	30+	1	8 oz		60, 90	2	5										
										30+																										
82	KP	0	7/1/95	1230P	1	1	3	6	1	30+	2																									
										30+																										
84	KP	0	7/1/95	1246P	1	1	1	4	1	30+	5	10	0.1	2		0	6																			
										50+																										

COLUMBIA SLOUGH FISH CONSUMPTION SURVEY

General Information:											Target Fish		Fishing Effort:				Consumption & Preparation:						Amt. eat		Eat last		Fish Catch:		Avg Wt	Total species	Total catch	Avg Lgth		
Intrvw	Area	U/L	Date	Time	Mode	Actvty	Int. status	Ethnic	Sex	Age	Grp.#	Species	day/mth	hr/day	# season	# yrs.	Fate	day/mth	#	Age	Sex	eat	previous yrs.	C.S. meal	Part Used	Prep.	Species	#	(kg)	Wt (kg)	Wt (kg)	(mm)	Eat?	
85	KP	0	7/1/95	637P	1	1	1	2	2	15+	2	10	0.2	5	3	20	1	1	30+	2	1.5		730	2	5	17	1	0.01	0.01	0.01	175	1		
87	KP	0	7/3/95	925A	1	1	1	1	1	30+	1	10	0.1	1.5			6									4	1	2.3	2.3	2.3	550	0		
88	KP	0	7/3/95	925A	1	1	1	6	1		1	10																						
89	LOMB	0	7/3/95	930A	1	1	1	6	1	15+	1	10	0.1	3	0	1								2	4	20	1	0.05	0.05	0.05	170	1		
REPEAT INTERVIEWS																																		
*31	KP	0	6/17/95	405P	1	1	1	6	1	50+	1	10	8	3	12	6	1	30	4	1	1			1	7									
							3																											
							5																											
*49	VANC B	0	6/19/95	445P	1	1	1	1	1	30+	1	10	0.33	2	3		6	0																
							4																											
*50	KP	0	6/20/95	502P	1	1	1	6	1	50+	1	4	8	3.5	6		1	30	5	1	1	1	1	1	6	4	1	2.5	2.5	2.5	525	1		
							4										4																	
*53	KP	0	6/21/95	747A	1	1	1	6	1	50+	1	10	8	3	12	6	1	30	5	1	1	1	1	1	7	4	1	2.4	2.4	2.4	505	1		
							3																											
							4																											
*57		0	6/23/95	930P	1	1	2	5			4																							
							4																											
*59	SCHMR	0	6/24/95	1230P	1	1	1	1	1	30+	2	4	2.25	6.5	6	20	3																	
							4																											
*63	KP	0	6/24/95	200P	1	1	1	2	1	30+	2	10	16	3	3	0	6	0																
							4																											
*75	SCHMR	0	6/27/95	1133	1	1	1	2	1	30+	1	10	8	1	12	25	6	0																
							4																											
*77	SCHMR	0	6/27/95	507P	1	1	1	1	1	15+	1	10	3	1.5	3	1	6	0																
							4																											
*83	KP	0	7/1/95	1236P	1	1	3		1	15+	2																							
							4																											
*86		0	7/3/95	850A	1	1	1	6	1	50+	2	4	8		12	6	1	30									1	2.3	2.3	2.3	525	1		
							3					10					4																	
							4																											
*90	LOMB	0	7/3/95	940A	1	1	1	6	1	15+	2	10	0.3	8	3	1	1		5	30+	1	3	14	2	2	4	2	1.18	2.35	3.315	363	1		
										30+																	5	2	0.175	0.35		205	1	
																											17	4	0.086	0.345		165	1	
																											14	7	0.017	0.12		114	1	
																											20	2	0.075	0.15		193	1	
*91	KP	0	7/3/95	400P	1	1	1	1	1	30+	1	10	4	1	12	5	6																	
							4																											

***Fish weight figures shown in Bold and Italics, are calculated from fish/weight correlation

FISH CONSUMPTION STATISTICS
SAUVIES ISLAND

Location	Interview Number	Fish Species	Total # Fish	Total Weight	Edible Percent	Number of Consumers	Normalized days/mth***	Fishing Effort: days/mth	mnth/yr	kg/person/day
SAUV	4		0	0	0.30	3	0.33	1.00	4	0.00
SAUV	6		0	0	0.30	2	0.50	1.00	6	0.00
SAUV	8		0	0	0.30	1	0.08	1.00	1	0.00
SAUV	9	5	1	1.2	0.30	1	0.08	1.00	1	0.36
SAUV	10	5	1	0.4	0.30	2	1.08	2.17	6	0.78
SAUV	11	5	1	0.2	0.30	2	3.00	3.00	12	1.08
SAUV	12	5	1	0.3	0.30	3	1.46	5.83	3	0.53
SAUV	14		0	0	0.30	4	2.08	2.08	12	0.00
SAUV	15		0	0	0.30	7	3.00	4.00	9	0.00
SAUV	16	17	3	0.25	0.30	4	0.75	1.00	9	0.17
SAUV	17	9	1	33.1	0.30	7	1.25	2.50	6	21.28
SAUV	18		0	0	0.30	1	0.58	2.33	3	0.00
SAUV	19		0	0	0.30	2	2.50	3.33	9	0.00
SAUV	20		0	0	0.30	3	3.33	4.44	9	0.00
SAUV	21		0	0	0.30	2	0.08	1.00	1	0.00
SAUV	22		0	0	0.30	4	10.00	20.00	6	0.00
SAUV	25		0	0	0.30	2	0.08	1.00	1	0.00
SAUV	27	20	5	0.5	0.30	3	0.17	1.00	2	0.10
SAUV	28		0	0	0.30	2	2.50	2.50	12	0.00
SAUV	32		0	0	0.30	2	0.08	1.00	1	0.00
SAUV	33	17	1	0.1	0.30	2	0.42	1.67	3	0.08
SAUV	34	17	12	1.6	0.30	4	1.00	1.00	12	1.44
SAUV	35		0	0	0.30	1	0.25	1.00	3	0.00
SAUV	36		0	0	0.30	2	1.00	2.00	6	0.00
SAUV	37	17	2	0.15	0.30	3	0.83	1.67	6	0.15
SAUV	40		0	0	0.30	2	0.25	1.00	3	0.00
SAUV	42		0	0	0.30	3	2.00	2.00	6	0.00
SAUV	46		0	0	0.30	2	3.00	4.00	9	0.00
SAUV	48		0	0	0.30	4	0.42	1.67	5	0.00
SAUV	49		0	0	0.30	3	2.00	4.00	6	0.00
SAUV	53		0	0	0.30	5	0.50	2.00	3	0.00
			Count	31	31	31	31	31	31	31
			Mean	1.22	0.30	2.84	1.44	2.68	5.65	0.84
			Stddev	5.93	0.00	1.51	1.90	3.45	3.58	3.81
			95% Lower	0.00	0.30	2.29	0.74	1.42	4.33	-0.56

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SAUVIE ISLAND FISH CONSUMPTION SURVEY

General Information:											Target Fish	Fishing Effort:				Consumption & Preparation:						Fish Catch:		Avg	Total	Total	Avg							
Intrvw	Area	Date	Time	Mode	Actvty	Int. status	Ethnic	Sex	Age	Grp.#	Species	day/mth	hr/day	# season	# yrs.	Fate	day/mth	#	age	sex	Amt. eat	Amt. eat previous yrs.	Eat last C.S. meal	Part Used	Prep.	Species	#	Wt (kg)	species Wt (kg)	catch Wt (kg)	Lgth (mm)	Eat?		
21	HI BANKS	6/21/95	129P	1	1	1	2	1	15+	2	9	0.1	4		0	1	2	30+	1	1, 2				2	4									
22	HI BANKS	6/21/95	130P	1	1	1	1	1	30+	1	10	20	3	6	40	1	4	30+	1	all	3	90	2	6										
23	HI BANKS	6/21/95	143P	1	1	1	4	1	15+	4	10	2	3	3	4	4					3													
24	FAZIOS	6/23/95	630P	1	1	1	2	1	30+	2	10	0.2	1	3	10	3	0																	
25	FAZIOS	6/23/95	650P	1	1	1	4	1	15+	2	9	0.1	5	1	1	1	2	30+	1		3	0	2	5										
26	BIG EDDY	6/23/95	700P	1	1	1	4	1	15+	3	10	0.1	2	3	0	1																		
27	CRANE	6/23/95	714P	1	1	1	4	1	15+	1	5	0.2	6	3	3	1	3	30+	1	2	1	0	2	5	20	4	0.09	0.37	0.52	213	1			
28	BIG EDDY	6/27/95	116P	1	1	1	1	1	50+	2	10	2.5	6	12	30	1	2	30+	1	2,3	3	0	2	5	5	1	0.15	0.15		210	1			
*29	CRANE	6/27/95	132P	1	1	1	1	1	50+	1	10	8	4.5	30	1	1	30+	1			3	0	2	5										
30	HI BANKS	6/27/95	140P	1	1	1	1	1	15+	2	10	0.3	4	3	3	6	0																	
31	HI BANKS	6/27/95	144P	1	1	1	1	1	30+	1	10	0.4	6	3	10	6	0																	
32	HI BANKS	6/27/95	150P	1	1	1	4	1	15+	3	10	0.08	7	3	4	1	2					1095												
33	HI BANKS	6/27/95	154P	1	1	1	4	1	15+	3	10	0.4	7	3	1	4	2	30+	1				2	5	17	1	0.11	0.11	0.11	210	1			
34	HI BANKS	6/27/95	205	1	1	1	1	1	30+	2	10	1	8.5	12	27	1	4	30+	1	2,3	3	21	2	5	17	12	0.13	1.56	1.56	197	1			
35	FAZIOS	6/27/95	219P	1	1	1	4	1	30+	2	10	0.3	3	3	0	1	1	30+	1			30	2	5										
36	CRANE	6/28/95	101P	1	1	1	2	1	30+	1	1	1	7	6	30	1	2	30+	1			365	2	5										
37	HI BANKS	6/28/95	116PM	1	1	1	1	1	-15	4	3	0.8	4	6	35	1	3	30+	1	4,5	3	60	2	5	18	1	0.08	0.08	0.16	210	1			
38	HI BANKS	6/28/95	444P	1	1	1	1	1	15+	2	4	2	5	12	5	6																		
39	BIG EDDY	6/29/95	1238P	1	1	1	3	1	30+	2	10	0.1	3	9	6																			
40	BIG EDDY	6/29/95	1248P	1	1	1	2	1	30+	1	5	2	5	12	6	1	2	30+	1		3	21	2	5	5									
41	HI BANKS	6/29/95	114P	1	1	1	1	2	30+	2	10	0.5	4	12	6	6																		
42	HI BANKS	6/29/95	120P	1	1	1	1	2	15+	2	10	4	8	6	1	1	3	30+	1	1.7		14	2	5										
43	CRANE	7/1/95	526P	1	1	1	1	1	30+	2	10	0.1	5	30	6																			
44	HI BANKS	7/1/95	547P	1	1	1	5	1	30+	6	10	0.1				1																		
45	HI BANKS	7/1/95	550P	1	1	1	1	1	30+	1	7	4	4.5	6	6	1					3	9	2	3										

SAUVIE ISLAND FISH CONSUMPTION SURVEY

General Information:												Target Fish		Fishing Effort:					Consumption & Preparation:					Fish Catch:											
Intrvw	Area	Date	Time	Mode	Actvty	Int. status	Ethnic	Sex	Age	Grp.#	Species	day/mth	hr/day	# season	# yrs.	Fate	day/mth	#	age	sex	Amt. eat	Amt. eat previous yrs.	Eat last C.S. meal	Part Used	Prep.	Species	#	Avg Wt (kg)	Total species Wt (kg)	Total catch Wt (kg)	Avg Lgth (mm)	Eat?			
											10					4								3	4										
46	HI BANKS	7/1/95	600P	1	1	1	1	1	50+	2	5	4	4.5	9	30	1	2	50+	1	2	3	0	2	7											
								2	50+							2		50+	2					5											
47	CRANE	7/3/95	228P	1	1	1	1	1	30+	2	8	0.5	6.5	9	5	1		30+	1					2	5										
								3	30+									30+	2																
48	CRANE	7/3/95	235P	1	1	1	1	1	30+	2	10	0.4	4	3	2	1	4	30+	1		3			2	5										
								1	30+									30+	1					3											
49	CRANE	7/3/95	240P	1	1	1	1	2	30+	3	10	4	6	6	2	1	3	-15	1	8				2	5										
																		30+	2																
50	CRANE	7/3/95	248P		1	3	4	1	30+	2								30+	2																
								2	30+									30+	2																
*51	HI BANKS	7/3/95	251P	1	1	1	1	1	50+	2	7	4	5	9	30	1	2	30+	1	2	3	0	2	5											
								4	50+							2		30+	2																
52	BIG EDDY	7/3/95	303P	1	1	1	1	1	-15	3	5	5	10	9	3	4																			
								2	15+																										
53	BIG EDDY	7/3/95	305P	1	1	1	1	2	-15	4	5	2	4	3	5	1	5	30+	1		3	0	2	5											
								1	50+									30+	2																
								1	15+									30+	2																
								2	50+									-15	2																
54	BIG EDDY	7/3/95	312P	1	1	1	1	1	30+	1	10	0.1		3				-15	2																
55	BIG EDDY	7/3/95	315P		1	2	1	1	50+	2						6																			
								2	50+																										

APPENDIX D

Recreational Survey Form

COLUMBIA SLOUGH RECREATIONAL SURVEY

Date: ___/___/___ Time: ___:___ am/pm Surveyor: _____ Interview # _____

Site: _____ (refer to map)

Activity: 1. Fishing 2. Wading 3. Swimming 4. Boating 5. Camping
6. Wildlife/Bird Watching 7. Other _____

Interview Status: 1. Agree 2. Decline 3. Language barrier

Group type: 1. Alone 2. Family 3. Friends 4. Both Size of group (#) _____

Ethnic Background: A. Caucasian B. African American C. Native American D. Asian E. Hispanic
F. Eastern European G. Other _____

Sex: A. Male B. Female Approximate Age: ___ 0-15, ___ 15-30, ___ 30-50, ___ over 50

1a. What activities do you like to use the Slough? (circle all that are applicable)

A. Fishing B. Wading C. Swimming D. Boating E. Camping F. Other _____

1b. Approximately how many years have you been pursuing these activities in the Slough? ___ months ___ years

2a. How often do you swim here? ___ (days/week) ___ (weeks/year)

2b. How often do you wade here? ___ (days/week) ___ (weeks/year)

3. How long do you usually stay here? (___ hrs, ___ min)

4a. Do you always go back to the same area in the Slough? Yes ___ No ___

4b. If no, do you usually go to a different area in the Slough? Yes ___ No ___

4c. Where _____ (refer to map)

5. During which seasons do you wade or swim? A. Spring B. Summer C. Fall D. Winter
E. All year round

Notes:

COLUMBIA SLOUGH RECREATION SURVEY
SPREADSHEET CODES

Area	U/I Slough	Interview status	Activity	Ethnicity	Sex	Other Activities	Other Areas	Seasons swim/wade
KP = Kelly Pt.	0 = Lower 1 = Upper	1 = agree 2 = decline 3 = lang. barrier 4 = prev. interview	1 = fishing 2 = wading 3 = swimming 4 = Boating 5 = Camping 6 = Wildlife/ Bird watching 7 = other	1 = Caucasian 2 = African Am. 3 = Native Am. 4 = Asian 5 = Hispanic 6 = East Europe 7 = other	1 = male 2 = female	1 = fishing 2 = wading 3 = swimming 4 = Boating 5 = Camping 6 = Wildlife/ Bird watching 7 = other	0 = Lower 1 = Upper	1 = Spring 2 = Summer 3 = Fall 4 = Winter 5 = All year round
LOMB = Lombard Bridge								
STJ = St. John's Landfill								
N.PEN = N. Penin. Landfill								
SCHMR = Schmeer Cove								
RR = Railroad Bridge								
VANCB = Vancouver Bridge								
MLKBR = Mt. Luther King Br.								
13CSO = 13th Ave CSO								
MCDD = Mult. Cy. Drainage Dist.								
33BR = 33rd st. bridge								
DNAV = Denver Ave								
55 BR = NE 55th Ave. Br.								
WTKR = Whitaker Slough								
63RD = 63rd Ave								
158TH = NE 158th Ave. Br.								
185TH = NE 185th Ave. Br.								

COLUMBIA SLOUGH RECREATIONAL SURVEY

General Information:															
Intrvw	Area	Date	Time	Int. status	Actvty	Grp.#	Ethnic.	Sex	Age	Other Activities	Swim Freq.	Wade Freq.	Hours	Other Areas	Seasons swim/wade
1	KP	6/18/95	1200P	1	7	3	1	1	-15	7			3		2
2	185	6/18/95	540P	1	4	4	1	1	-15	1			2		
3	KP	6/19/95	335P	1	7	4	1	1	-15	7			1	0	5
4	185	6/19/95	542P	1	4	3	1	1	15+	4			2	1	
5	KP	6/23/95	600P	1	3	4	1	1	-15	5	4 Times per year			0	2
6	DENVER	6/24/95	1220P	1	7	1	1	1	-15						
7	SCHMER	6/27/95	1130A	2	7	2	1	1	15+					0	
8	KP	6/27/95	827P	1	7	1	1	1	30+	4, 7			2	0	
9	KP	6/28/95	234P	1	2	2	1	2	15+	2	Once per month			0	2
10	KP	6/28/95	408P	1	7	2	1	2	-15	3					
11	KP	6/29/95	500P	1	7	1	1	2	15	7					
12	KP	7/1/95	405P	1	2	3	1	1	50+	2			2	0	
13	KP	7/3/95	130P	1	7	3	1	2	30+	7			3	0	2
								2	30+						
								2	-15						
								2	30+	7			5	0	
								2	30+						
								2	30+						