Exxon Valdez Oil Spill
Restoration Project Final Report

Subsistence Restoration Project: Food Safety Testing

Restoration Project 94279
Final Report

Rita A. Miraglia
Aimee W. Chartrand

Alaska Department of Fish and Game
Division of Subsistence
333 Raspberry Road
Anchorage, Alaska 99518

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Study History: The Subsistence Restoration Project: Food Safety Testing (93017 and 94279) was an outgrowth of work begun by the Oil Spill Health Task Force in 1989 as part of the response to the *Exxon Valdez* oil spill. In 1993, the project was funded by the Trustee Council as part of the 1993 Workplan. Support continued under the 1994 Workplan. The current report covers both years' work. A final report was issued on the 1993 work by Miraglia, R. under the title Subsistence Restoration Project. The project is continuing in 1995 with a different focus (95279, Resource Abnormalities Study).

Abstract: The goal of this project was to restore the confidence of subsistence users in their abilities to determine the safety of their resources. Methods included community meetings, collection and testing of subsistence resources samples for hydrocarbon contamination, accompanying community representatives on tours of the laboratory where tests were conducted and informational newsletters. Community participation was maximized in every phase of the project. The species tested included shellfish, finfish, seals and ducks. Over the two years of the project combined, 228 composite samples of edible tissue from shellfish were tested. The bile of forty rockfish, six sockeye salmon, twelve seals, twenty-three ducks were tested for the presence of hydrocarbon metabolites. Edible tissue (blubber) from seals was also tested. Generally, the tests showed such low levels of hydrocarbons and their metabolites, as to be within the test's margin of error. The project was partly successful in disseminating the subsistence food safety advice of the Oil Spill Health Task Force and in improving the level of trust in the results of hydrocarbon tests on the resources.

Key Words: Alaska Peninsula, community participation, *Exxon Valdez* oil spill, hydrocarbon testing, Kenai Peninsula, Kodiak Archipelago, Prince William Sound, subsistence resources.

Project Data: *Description of data* - Results of the hyrocarbon testing. *Format* - the data is entered into a table on a Word file. *Custodian* - Rita A. Miraglia. *Availability* - the data is public information and is available on request.

Citation:

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EXECUTIVE SUMMARY

Subsistence uses of fish and other wildlife constitute a vital natural resource service injured by the *Exxon Valdez* oil spill. This injury has been documented by the Alaska Department of Fish and Game, Division of Subsistence. While there has been some recovery of subsistence harvests and uses, concerns about subsistence food safety and the health of resource populations persist. The goal of this project was to restore the confidence of subsistence users in their abilities to determine the safety of their resources. The methods used to work towards this goal consisted of: community meetings, the collection and testing of samples of subsistence resources, the taking of community representatives on a tour of the laboratory where the tests were conducted, and informational newsletters to report results back to the communities. An effort was made to maximize community participation in every phase of the project.

This work represented two years of the Trustee Council sponsored subsistence food safety testing project.

In 1993, hydrocarbon tests were conducted on ninety composite samples of edible tissue from shellfish, and blubber and liver samples from five harbor seals. The tests on the edible tissue showed levels of aromatic contaminants so low as to be within the margin of error for the tests. The bile of thirty-two rockfish, five seals and one duck were screened for the presence of metabolites of fluorescent aromatic contaminants. The levels of fluorescent aromatic contaminants in the fish bile were so low, one would not expect to find elevated concentration in the edible flesh of the fish. The concentrations of fluorescent aromatic compounds in the bile of the five harbor seals were also found to be very low. Since, there was only one bile sample from a duck, little can be said about exposure in 1993.

In 1994, hydrocarbon tests were conducted on samples of shellfish, finfish, ducks and seals. One hundred and thirty-eight composite samples of edible tissue from shellfish were collected. The tests on the shellfish showed levels of aromatic contaminants(AC) so low as to be within the margin of error for the tests, all below fifteen parts per billion. The bile of eight rockfish and six sockeye salmon was screened for the presence of metabolites of fluorescent aromatic contaminants. The levels of fluorescent aromatic contaminants in the fish bile was so low, one would not expect to find elevated concentrations in the edible flesh of the fish. Samples were also taken of the liver, blubber and bile of seven seals harvested by hunters from Tatitlek for subsistence use. The tests of the 1994 seal samples showed very low concentrations of fluorescent aromatic compounds in the bile, similar to 1993 levels. Analysis for aromatic compounds in the 1994 seals liver and blubber samples was not recommended because AC levels were expected to be in the same low range reported for the 1993 harbor seal samples, based on the low bile concentrations. Samples were taken of the skin, liver and bile of twenty-one ducks and two mergansers harvested by Chenega Bay subsistence hunters. Concentrations of fluorescent aromatic compounds in bile were much lower than concentrations in that species sampled in 1990. Again, because the AC levels were so low, one would not expect to find elevated concentrations in the duck skin and flesh.

There were two tours of the laboratory where the tests were conducted, one in 1993 and one in 1994. These allowed representatives from the oil spill communities the opportunity to meet the

laboratory staff, see samples of subsistence foods being tested and to ask questions.

Two informational newsletters were issued which explained the results of the testing.

The project has been somewhat effective in disseminating the advice of the Oil Spill Health Task Force with regard to subsistence food safety in the wake of the spill, and in improving the level of trust in the results of hydrocarbon tests on the resources.

1994 was the last year for hydrocarbon testing. The emphasis will now shift towards helping people understand the abnormalities they are seeing. This can be done by continuing and expanding the dialogue that has now begun between subsistence users and scientists working with the damaged resources. It is recommended that in 1995, a system be put in place to allow subsistence harvesters to send samples of abnormal resources to be examined by biologists or pathologists. The scientists findings will then be interpreted, with the help of toxicologists and reported back to the communities.

INTRODUCTION

In 1994, for the second year, the Trustee Council funded a subsistence food safety testing project, continuing work begun in 1989 by the Oil Spill Health Task Force, an unofficial, interagency advisory group. Samples of subsistence resources were collected from harvest areas used by the impacted communities and tested for hydrocarbon contamination, under the auspices of the Task Force in 1989, 1990, and 1991. The health advice communicated by the Task Force was that most resources tested by the program, including finfish, deer and ducks had very low to background levels of hydrocarbons and are safe to eat. Marine mammals were also found to be safe to eat, although the blubber of heavily oiled seals was found to have elevated levels of hydrocarbons. These heavily oiled seals were only found in Prince William Sound and only in 1989. Elevated levels of hydrocarbons were also found in some marine invertebrates collected from oiled beaches. While the Oil Spill Health Task Force was partly successful in answering the concerns of subsistence users, some questions remained.

The goal of the 1994 project was to work with subsistence users to restore their confidence in their ability to determine the safety of their resources and:

- To answer lingering questions about oil contamination and subsistence food safety.
- To monitor selected shellfish harvest area, as recommended by the Oil Spill Health Task Force.
- To involve subsistence users in every phase of the project, in hopes of increasing their understanding of and trust in the test results and health advice.
- To communicate test results and health advice to residents of impacted communities.
- To integrate information from other restoration projects with that already developed through the Oil Spill Health Task Force studies.

The methods used to work toward these goals included community meetings, the collection and testing of samples of subsistence resources, taking community representatives on a tour of the laboratory where the tests are conducted, and issuing information newsletters to report results back to the communities. An effort was made to maximize community participation in every phase of the project.

For 1994, hydrocarbon tests were conducted on one hundred and twenty-four composite samples of edible tissue from shellfish. The tests on the shellfish showed levels of aromatic contaminants so low as to be within the margin of error for the tests, all below fifteen parts per billion. The bile of eight rockfish, and six sockeye salmon was screened for the presence of metabolites of fluorescent aromatic contaminants. The levels of fluorescent aromatic contaminants in the fish bile was so low, one would not expect to find elevated concentrations in the edible flesh of the fish.

Samples were also taken of the liver, blubber and bile of five seals harvested by hunters from Tatitlek for subsistence use, and of the skin, liver and bile of twenty-three ducks harvested by Chenega Bay subsistence hunters. The tests of the 1994 seal and duck samples are not complete yet. However, in tests on blubber from seals harvested from the Chenega Bay area in 1993 no oil contamination was found. The concentrations of fluorescent aromatic compounds in the bile of the five harbor seals tested in 1993 was also found to be very low.

There were two tours of the laboratory where the tests are conducted. In 1993, a group of representatives from Chenega Bay, Tatitlek, Port Graham, Nanwalek and Old Harbor attended. A second tour was held in 1994, and was attended by representatives from Kodiak City, Akhiok, Larsen Bay, Karluk, Ouzinkie, and Port Lions. The tour groups were able to meet the laboratory staff, see samples of subsistence foods being tested, and had the opportunity to ask questions. A number of the community representatives involved in the tours indicated they were coming away

with a better sense of how the tests are done, and now had more trust that there is a sincere attempt on the part of the laboratory to get accurate results.

The project has been somewhat effective in getting the advice of the Oil Spill Health Task Force out to subsistence users in the communities impacted by the oil spill. 1994 was the last year for hydrocarbon testing. The emphasis will now shift towards helping people understand the abnormalities they are seeing. This will be done by continuing and expanding the dialog that has now begun between subsistence users and scientists working with the damaged resources. In 1995, under a project funded by the Trustee Council (95279), we will set up a system where subsistence harvesters can send samples of abnormal resources in to be examined by biologists or pathologists. The scientists findings will then be reported back to the communities.

BACKGROUND

Subsistence uses of fish and other wildlife constitute a vital natural resource service that was injured by the *Exxon Valdez* oil spill. Data collected by the Alaska Department of Fish and Game's Division of Subsistence demonstrated this injury (Fall, 1991).

State and federal laws define subsistence as the "customary and traditional" uses of wild resources for food, clothing, fuel, transportation, construction, art, crafts, sharing and customary trade. Harvesting, sharing, and using fish and wildlife are integral to the customs and traditions of a variety of cultural groups. Subsistence uses are also important for Alaska's economy. Many Alaskan communities, including those in the EVOS area, depend upon mixed, subsistence-cash economies, where subsistence production is a major economic sector. The household economies of many families are dependent upon food and raw materials from subsistence activities. State and federal statutes recognize the importance of customary and traditional subsistence uses of wild resources. Subsistence uses are given preference over commercial fishing and recreational fishing and hunting in state and federal law. State and federal laws differ in who qualifies for subsistence uses. Currently, all state residents qualify for subsistence fishing and hunting under state law. Under federal law, rural residents qualify for subsistence fishing and hunting on federal lands in Alaska (Wolfe and Bosworth, 1994).

Within the oil spill area, subsistence harvests are relatively high in diversity. Major resources include seals, sea lions, moose, deer, goats, waterfowl, salmon and other finfish, invertebrates, and plants and berries. Virtually everyone participates in the harvesting and processing of wild resources, especially in the smaller communities. Subsistence harvests make up a large portion of the diet of many families.

Annual per capita subsistence harvests declined dramatically, ranging from a nine percent to a seventy-seven percent decline as compared to pre-spill averages, in ten of the communities in the path of the spill during the first year after the event. Declines also occurred in the breadth of resources used and participation in subsistence activities. In some communities, only limited recovery to pre-spill levels had occurred. Subsistence harvests in seven communities were estimated for 1990, the second post-spill year. Harvests had increased in five of these communities compared to the year after the spill, but the majority of these harvests remained below pre-spill levels. In the other two communities, Chenega Bay and Tatitlek in Prince William Sound, harvest levels showed no signs of recovery and remained about sixty percent or more below those before the spill.

In subsequent years, levels of subsistence harvests, ranges of uses, harvest effort, and the sharing of resources have gradually increased in all of the spill area communities. Generally, subsistence uses rebounded first in communities of the Alaska Peninsula, Kodiak Island and the lower Kenai Peninsula, but lagged behind a year or more in the Prince William Sound villages.

Reasons for increases in subsistence uses after the first spill year were varied and difficult to pinpoint. Some households had renewed confidence in traditional foods after receiving information and health advice from the Oil Spill Health Task Force. Others returned to using

subsistence foods despite their misgivings because of economic and cultural reasons. Still others have travelled to unoiled areas, sometimes outside their traditional use areas, to harvest subsistence resources.

Even in 1994, more than five years after the *Exxon Valdez* oil spill, some subsistence users of the spill area were still raising questions and still looking for answers, as they had since the first post-spill year. Although subsistence harvests and use had bounced back to pre-spill levels for most people and communities, a view persisted in the Prince William Sound communities, and to a lesser extent in the other communities in the oil spill impact area, that the natural environment had changed in ways that still posed a potential threat to their health and their way of life.

There are several factors preventing the complete recovery of subsistence harvests and uses to pre-spill levels. Many subsistence users in the oil spill impact area remain concerned over the possible long term health effects of using resources which may have been contaminated by oil. There has been a loss of confidence on the part of subsistence hunters and fishermen in their own abilities to determine if their traditional foods were safe to eat. Residents of a number of impacted communities had expressed the fear that animals which came into contact with the oil had been altered in some way that could not be seen or detected in laboratory tests. In addition, people report the scarcity of some resources, most notably the failure of pink salmon and herring runs in Prince William Sound in 1993, as well as a decline in the population of harbor seals in Prince William Sound since the oil spill. Subsistence users in the spill area have also observed abnormalities in resource species. These included herring, sea lions and chitons with lesions, evidently malnourished ducks, and herring, salmon and clams of abnormally small size. There is a cultural proscription among Alutiiq peoples against the harvesting or eating of animals which appear sick or abnormal. All of these factors continue to impede the recovery of subsistence in the oil spill area.

The Oil Spill Health Task Force and Hydrocarbon Testing

In 1989, an unofficial, interagency advisory group, the Oil Spill Health Task Force, was formed to address concerns about subsistence food safety in the wake of the *Exxon Valdez* oil spill. Members of the Task Force included the Indian Health Service, the Governor's Office, the Department of Fish and Game, the Department of Health and Social Services, the Department of Environmental Conservation, the National Atmospheric and Oceanic Administration, the North Pacific Rim (now known as Chugachmuit), the Kodiak Area Native Association, and Exxon. Samples of subsistence resources were collected from harvest areas used by the impacted communities, and tested for hydrocarbon contamination, under the auspices of the Task Force in 1989, 1990, and 1991.

Interpreting the results of the tests posed a problem. There were no established guidelines for acceptable levels of aromatic hydrocarbons in foods (Oil Spill Health Task Force, 1990). Further, a literature search by members of the Toxicological Expert Committee, a group organized by the Oil Spill Health Task Force, showed a lack of historical information on oil spills and human health (Toxicological Expert Committee, 1990).

The Oil Spill Health Task Force turned to the United States Food and Drug Administration for assistance. In August, 1990, the Food and Drug Administration issued an advisory opinion on the safety of aromatic hydrocarbon residues in subsistence foods contaminated by the *Exxon Valdez* oil spill, put together by an internal group called the Quantitative Risk Assessment Committee. Based on the assumption that the oil contamination would continue to be found at the same levels in seafood from the oil spill impact area for ten years,

> [The] Quantitative Risk Assessment Committee conclude[d] that the lifetime upperbound risk of consumption is low for unsmoked salmon, other finfish,

> crustaceans and oil contaminated molluscan bivalves (United States Food and Drug Administration, 1990).

Moreover, the group found that smoked salmon presented a much greater health risk than crude oil contamination.

The FDA advisory was presented at a meeting of the Oil Spill Health Task Force in Anchorage. The report was met with distrust by representatives of the communities impacted by the oil spill. One community representative commented, "You have to remember, this is the same group that approved the Dalkon Shield[1].

Community representatives did not believe that one could compare smoked fish with fish contaminated by crude oil, and the idea that contaminated fish could be safe and traditionally prepared fish dangerous, was counterintuitive to them, and therefore, not acceptable. This distrust was heightened because the FDA presenter joked and laughed, giving community representatives the impression he did not take their concerns seriously.

The health advice of the Toxicological Expert Committee, communicated by the Task Force, and also reported in a State of Alaska Epidemiology Bulletin (State of Alaska, 1990), was that most resources tested by the program, including finfish, deer, and ducks had very low to background levels of hydrocarbons and were safe to eat.

Marine mammals were also found to be safe to eat, with the exception of the blubber of heavily oiled seals, which showed elevated levels of hydrocarbons. These heavily oiled seals were only found in Prince William Sound and only in 1989. Tests on blubber from seals harvested in Prince William Sound in 1993 and 1994 as part of the present project, demonstrated that the blubber was no longer contaminated.

Elevated levels of hydrocarbons were also found in some marine invertebrates collected from oiled beaches. The Task Force advised that using shellfish from such beaches represented an increased health risk. Consequently, the Task Force recommended that subsistence users not harvest marine invertebrates from obviously contaminated beaches. The Task Force recommended long-term monitoring of such beaches, as without it, it would not be possible to advise local communities when this increased risk had declined or ended.

The Subsistence Division and Minerals Management Service Study

Directly related to the concern about subsistence food safety has been the loss of confidence on the part of subsistence hunters and fishermen in their own ability to determine whether their traditional foods are safe to eat.

> In 1989, the spills immediate effects caused subsistence users to distrust the safety of subsistence foods. Direct observations of dead, injured and diseased wildlife, interpreted through traditional systems of knowledge, strongly suggested to subsistence users that resources might be unsafe for humans(Fall & Utermohle, 1995: I-v).

The Task Force studies were designed to provide vital information to subsistence harvesters to augment their own ability to judge whether subsistence resources were usable. The evidence, available from findings of research in oil spill communities jointly funded by the Division of Subsistence, ADF&G, and the U.S. Department of the Interior, Minerals Management Service,

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[1]The Dalkon shield was an inter-uterine birth control device approved for use in the United States by the USFDA. It was later found to cause tears in the uterine wall, leading to serious problems such as infertility, and in some cases death. It was removed from the market.

suggested that the Task Force efforts to respond to this loss of confidence were incomplete. The study found that:

> Contamination concerns about specific resources, while substantially reduced from the levels expressed in the first two years after the spill, persisted among many households, especially in Chenega Bay, Tatitlek, Port Graham, and Nanwalek. Substantial percentages of households reported that they had not received adequate information about the safety of subsistence foods. This illustrated an important finding that though the subsistence harvest levels in most of the communities of the oil spill area appeared to be rebounding from the low levels of the first and second post-spill years, many households in the spill area returned to using subsistence foods despite lingering contamination fears (Fall & Utermohle, 1995: I-iv).

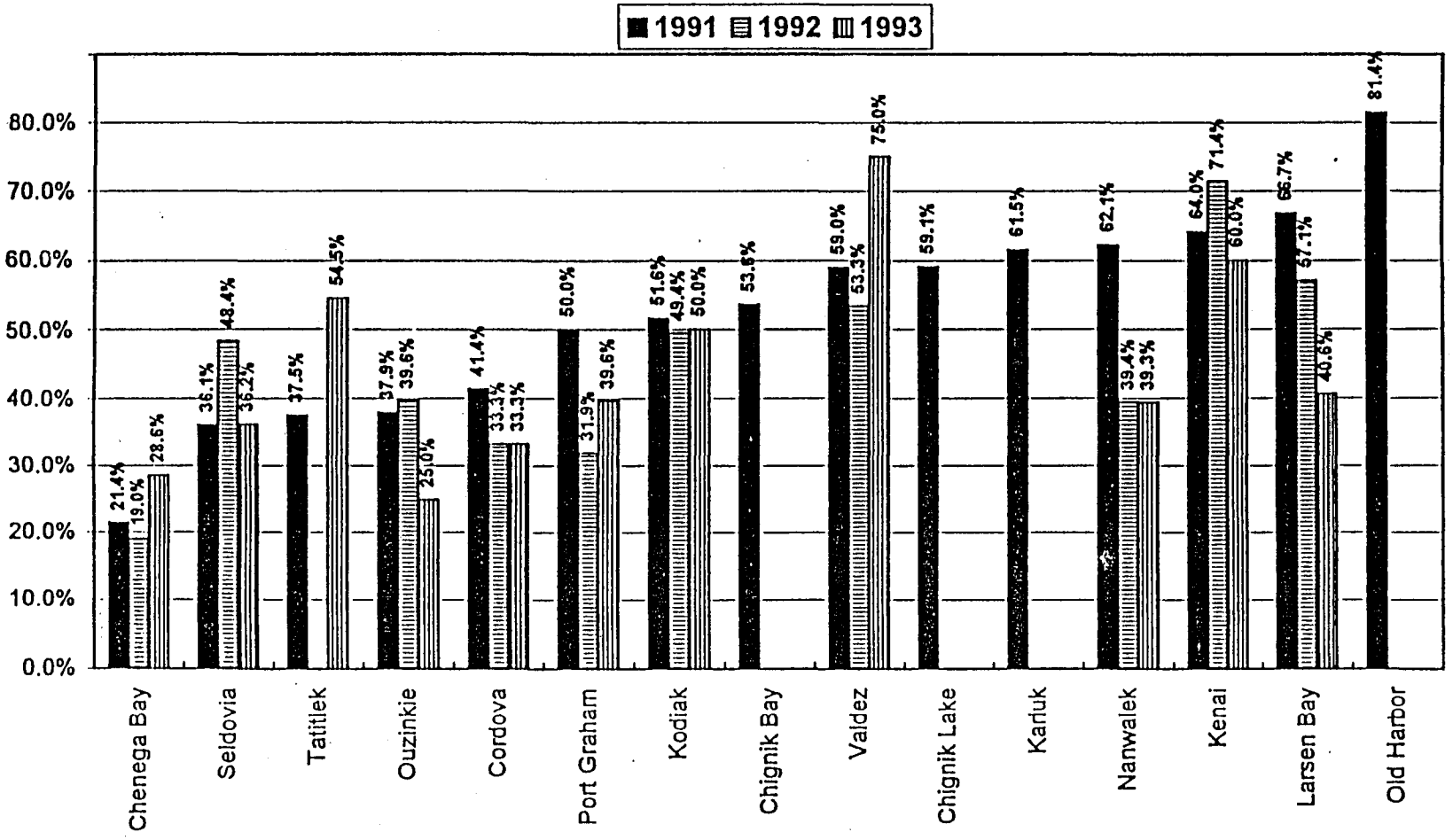
For example, only 21.4 percent of households interviewed in 1991 in Chenega Bay under the joint Subsistence and Minerals Management Service study, reported that they felt adequately informed about the safety of using subsistence foods from the oil spill area(see table 1). Households expressed concerns about the long term health effects of using some of these resources, especially shellfish. By 1993, 28.6 percent of respondents felt that they had been adequately informed. The reasons most commonly given by Chenega Bay residents for not feeling they had been adequately informed included: a lack of definitive advice, or conflicting advice; incomplete information or not enough information available; test results which came too slowly or too late; and, a lack of trust in the health advice.

In 1991, 37.5 percent of Tatitlek respondents said that they felt adequately informed about the safety of subsistence foods. In 1993, 54.5 percent stated that they were adequately informed. In both Nanwalek and Port Graham, respondents confidence in the safety of their subsistence food dropped from 1991 to 1993. In 1991, 62.1 percent of respondents from Nanwalek felt adequately informed about subsistence food safety. In April 1993, the percentage of households indicating that they had been adequately informed was down to roughly 39 percent. Port Graham residents confidence in the safety of their food dropped from 50 percent in 1991 to 31.9 and 39.6 percent in 1992 and 1993 despite concerted efforts by the OSHTF to address food safety concerns.

Respondents were also asked whether they felt specific resources from their harvest areas were safe for children to eat. When asked about clams in 1991, 75 percent of respondents in Chenega Bay said they were not safe(see table 2.) That figure declined to 50 percent in 1993. In Nanwalek in 1991, 34.6 percent said they felt clams were not safe to eat. That figure rose to 46.6 percent in 1992 and 40 percent in 1993. Significant levels of concern with regard to the safety of clams from local harvest areas were also expressed in Port Graham, Ouzinkie, Kodiak City, Cordova, and Valdez. In Port Graham less than half of the respondents (45.4 percent) thought that clams were safe for children to eat in 1991. However, confidence jumped to 69.6 percent and 61.0 percent over the following two years, indicating a slightly diminished concern about safety. In Kenai, Larsen Bay, and Seldovia the majority of respondents who eat clams said they thought clams were safe to eat, but some respondents said they were not sure. A few respondents in each community said they thought clams were not safe. In Chenega Bay, Ouzinkie, Port Graham, Seldovia and Valdez the leading reason given by those who regarded clams as unsafe was the fear of oil pollution. Other reasons given included paralytic shellfish poison, and other forms of pollution.

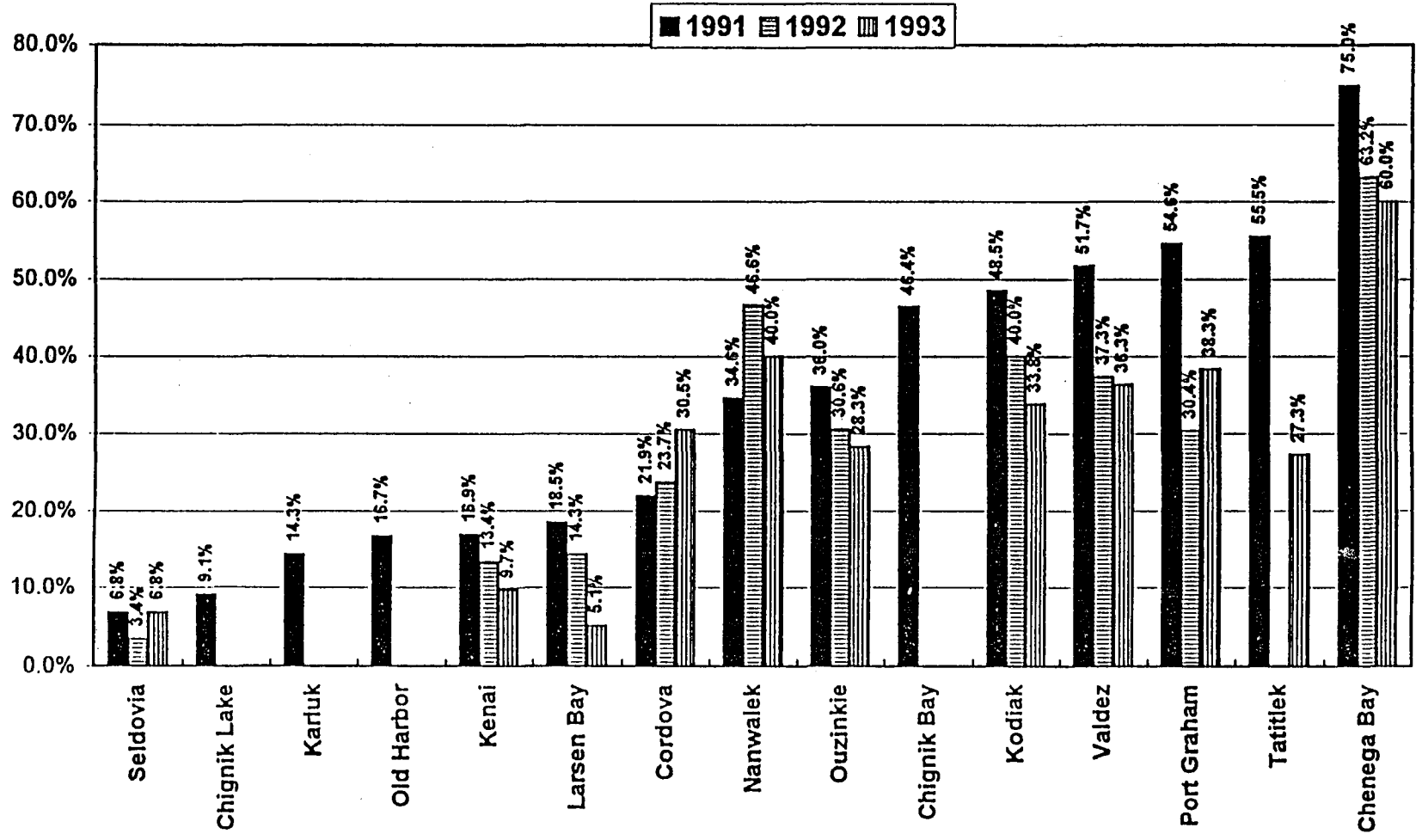
When asked whether they thought seals from their harvest areas were safe for children to eat

Table 1: Percentage of Households Reporting Being Adequately Informed about Subsistence Food Safety, 1991, 1992, and 1993 Study Years



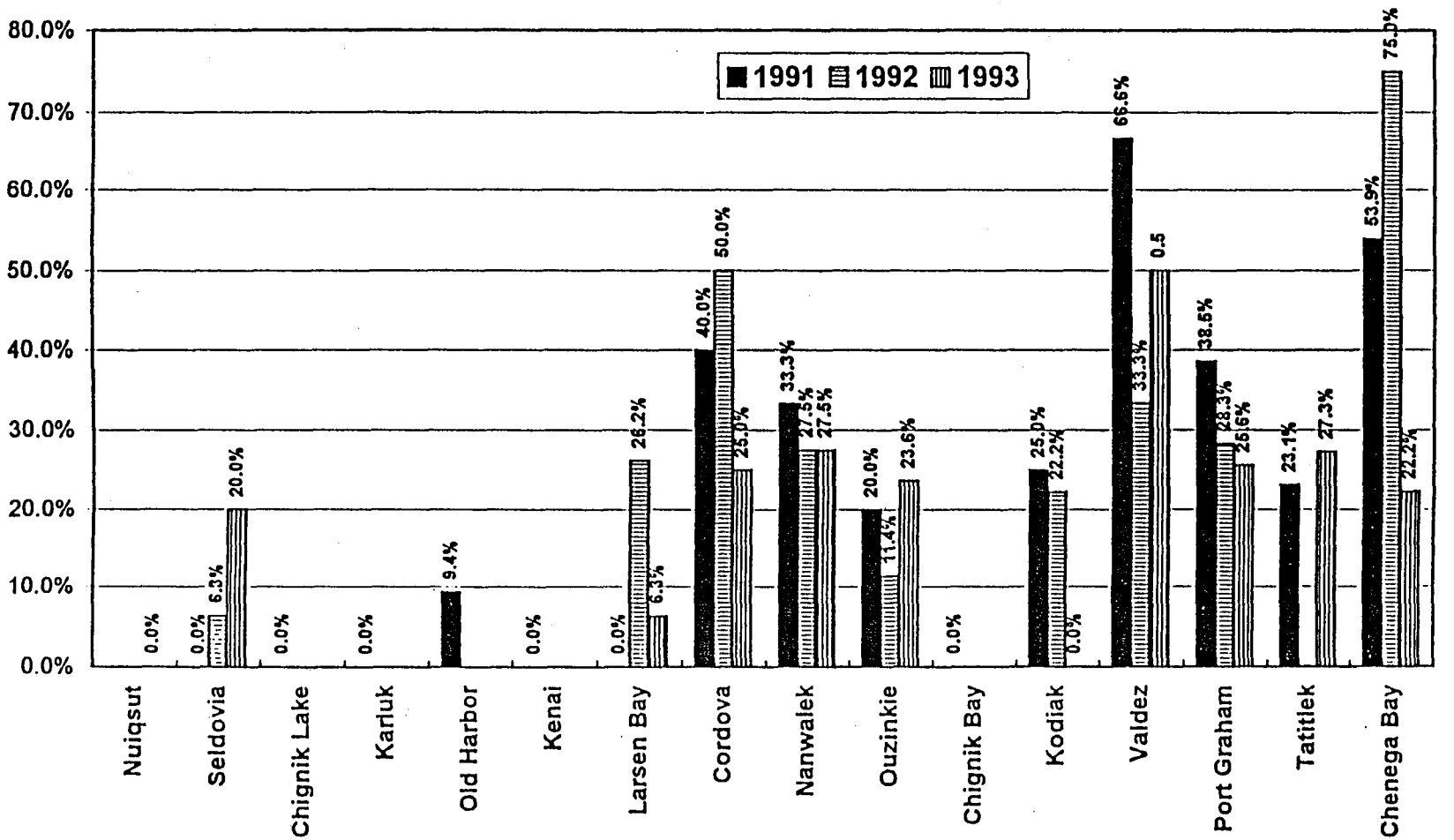
Reproduced from Fall and Utermohle 1995

Table 2: Are Clams Safe for Children to Eat? Percentage of Respondents Saying "No" or "Not Sure", 1991, 1992, and 1993 Study Years



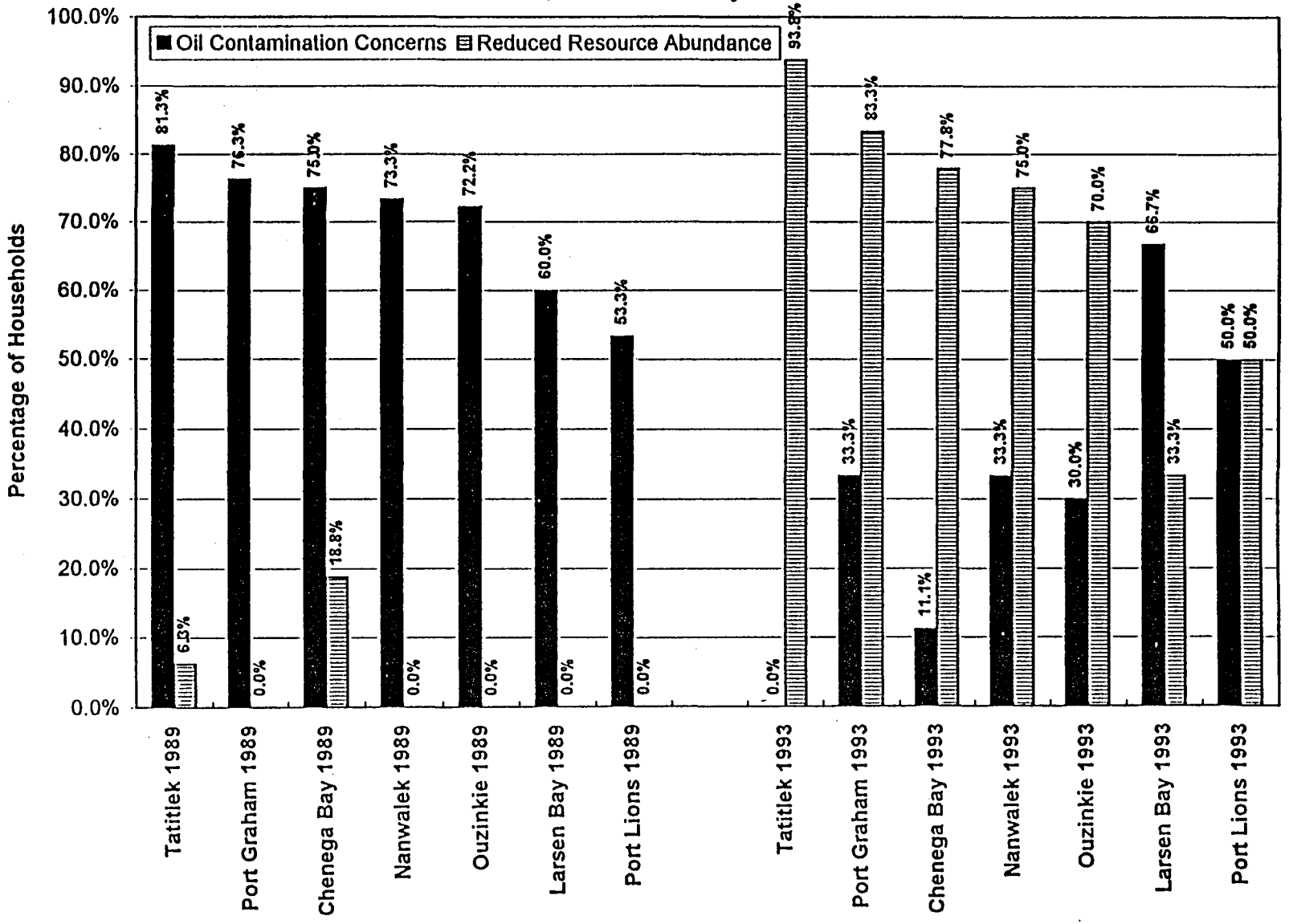
Reproduced from Fall and Utermohle 1995

Table 3: Are Seals Safe for Children to Eat? Percentage of Respondents Saying "No" or "Not Sure", 1991, 1992, and 1993 Study Years



Reproduced from Fall and Utermohle 1995

Table 4: Percentage of Households with Oil Spill-Caused Reductions in Total Subsistence Uses which Cited Oil Contamination or Reduced Resource Abundance as the Cause, Selected Study Communities



Reproduced from Fall and Utermohle 1995

in 1991, 54 percent of respondents in Chenega Bay said they were not safe(see table 3.) In 1992, 75 percent of respondents thought seals unsafe to eat. That figure dropped to 22.2 percent in 1993. In all the other communities, a majority of those respondents who indicated that they eat seal oil or seal meat said they thought seals from their harvest areas were safe. However, in 1993, 27.5 percent of respondents in Nanwalek, and 25.6 percent of respondents in Port Graham said they thought seals from their harvest areas were not safe for children to eat. In Cordova, Larsen Bay, and Ouzinkie, there was a small group of respondents who said they did not think seals were safe. Most of the respondents who did not think seals were safe did not cite a specific reason for their concern. Although a possible reason has been put forward by ADF&G:

> The percentage who felt seals were not safe reached a peak [in] 1992, and declined in 1993. That particular period corresponds to the discovery of viral hemorrhagic septicemia (VHS) in herring and the announcement by the Tatitlek IRA Council of a policy not to eat marine resources because of the presence of the virus and the failure of the herring to spawn in the spring of 1993, when [the 1992] interviews were being conducted (Fall and Utermohle,1995: II-IV-23).

When asked if they thought chitons from their harvest areas were safe for children to eat, a high percentage of respondents in Chenega Bay said they were not safe (for all three years.) In 1992, 30 percent of respondents in Nanwalek said they were not safe. In Kodiak City, Larsen Bay, Ouzinkie, Port Graham, Seldovia, and Valdez, a small minority of the respondents who eat chitons said they did not think their chitons were safe for children to eat. Fear of oil contamination was given as the leading cause for concern about the safety of eating chitons in all of the communities where a continuing concern was indicated.

> Concerns on the part of Tatitlek residents regarding the herring stocks of Prince William Sound are perhaps the best illustration of the continuing issue in the village of the safety of subsistence foods and the health of all resources of the Sound following the spill (Fall & Utermohle, 1995: II-V-20).

The 1993 herring run in PWS, infected by viral hemorrhagic septicemia (VHS), was half the forecasted size and the lowest harvest since 1983. Subsistence harvesters and other villagers direct observations of the diseased animals created substantial doubts about the overall health of the natural environment. Traditional knowledge about food safety and edibility continued to inform people's decisions about subsistence uses.

> A further problem was that the ADF&G had opened the community fishery based on assurances that the herring were safe to use without knowing what the cause of the aberrant behavior and hemorrhages might be... Thus, as in the first several years after the spill, the community raised questions about the quality of the information being used to reassure them about food safety, casting doubt about the trustworthiness of any advice about this critical issue (Fall & Utermohle, 1995: II-V-22).

After the disease was identified, village residents remained concerned about the disease's impacts on both other animals in the food chain and on humans. Despite public health advisories, assurance by health professionals, pathologists, and ADF&G that the herring were safe to eat, there was a persistent doubt that traditional and scientific knowledge together could answer all village residents' questions about the effects of the oil spill.

These concerns supported a widely-held view in the village that oil contamination

was creating long-term effects on the environment, some of which would only be detected years after the spill (Fall & Utermohle, 1995: II-V-21).

By late 1993, the vast majority of households cited reduced resource populations as the primary reason for reduced usage. This represents an important shift in the perception on the part of subsistence users of the relationship between oil spill impacts and reduced resource usage(see table 4).

The study found that, by 1994, pre-spill levels of harvest have been approached or matched in most affected communities.

> However, in the severely impacted communities of Tatitlek, Chenega Bay, and Ouzinkie, harvest levels remain below pre-spill averages and the overall health of the eco-system remains a concern. In Tatitlek and Chenega Bay, harvests appear to have declined in the third year of the study from estimated levels from the first and second years, with a shift in harvest composition from a smaller portion of harvest of marine mammals to a larger portion of the harvest being fish (Fall & Utermohle, 1995: VI-XXIV-2).

Further, the authors concluded that in some cases, harvesters have found it necessary to go outside traditional harvest areas to find resources. This is due both to continuing concerns about oil contamination, and a scarcity of important resources (Fall & Utermohle, 1995: II-IV-24). The report also indicated that increased harvests do not necessarily mean that people are no longer concerned about food safety. Other factors may override these concerns.

> The economic and cultural necessities of using subsistence foods have compelled Alaska Natives of the spill area to resume subsistence harvests even at increased costs of time, money, and health concerns (Fall & Utermohle, 1995: I-iv).

The report concludes:

> In the view of many of the people interviewed as part of this project, and specially in Prince William Sound and among Alaska Native people, the spill has caused fundamental changes to natural resource populations and the natural environment overall that have yet to be adequately explained. This uncertainty has had profound effects on the outlook for the future that people expressed in several communities, such as Tatitlek, Chenega Bay, and Cordova. This remains an important long-term impact of the spill (Fall & Utermohle, 1995: I-v).

OBJECTIVES

The overall goal of the project was to work with subsistence users to restore the subsistence uses of fish and wildlife damaged by the *Exxon Valdez* Oil Spill. To obtain this goal it was imperative that subsistence users confidence be restored in their ability to determine the quality and safety of their subsistence food resources. 1994 was the second year of a three year project, and the plan built upon the results of the work done in 1993. The specific goals of the 1993 project were as follows:

1) To answer lingering questions about oil contamination and subsistence food safety such as:

A. Are bottom fish still safe to eat with the increased exposure to hydrocarbons?

B. Did seals in Prince William Sound still show high levels of aromatic contaminants in their blubber?

C. Did ducks from Prince William Sound show hydrocarbon contamination in their adipose tissue?

2) To monitor selected shellfish harvest areas (trend sites), as recommended by the Oil Spill Health Task Force and local communities, to determine whether the health risks associated with using shellfish from oiled beaches had diminished or remained the same;

3) To involve subsistence users in every phase of the food testing program, in hopes of increasing their understanding of and trust in the test results and health advice resulting from the project;

4) To communicate test results and health advice to residents of communities impacted by the oil spill; and

5) To integrate information from other restoration projects with that already developed through the Oil Spill Health Task Force studies.

In 1994, the project goals were basically the same as in 1993, with the following two changes:

1) The question with regard to contamination of bottom fish had been answered. Despite their increased exposure to hydrocarbons since 1991 (when the ADEC reported the oil), the bottom fish did not show elevated levels of hydrocarbon metabolites in their bile. For this reason, there was no additional sampling or testing of bottom fish in 1994.

2) Since the Trustee Council made it plain that 1994 would be the last year funding would be provided for hydrocarbon testing, the emphasis on shellfish trend sites was dropped. This was done to give communities the opportunity to add new test sites and sample species not previously tested. For this reason the emphasis in the sampling plan was on trying to address any remaining concerns community residents might have with regard to hydrocarbon contamination.

METHODS

The methods used to work towards these goals, in both 1993 and 1994, included; community meetings, interviews and informal visits, the collection and testing of samples of subsistence resources, taking community representatives on a tour of the laboratory where the tests were conducted, and issuing informational newsletters to report results back to the communities. An effort was made to maximize community involvement in every phase of the project.

We conducted community and regional meetings, and informal interviews through-out the spill area. These helped us in assessing the level and nature of continued spill related subsistence food safety concerns, as well as:

1) affording an additional opportunity to relay the advice of the Oil Spill Health Task Force with regard to subsistence food safety in the wake of the spill;

2) reporting the results of tests on the subsistence food samples; and

3) helping us to plan the subsistence food sampling portion of the project, by identifying and

mapping the specific areas and resources of continued concern to subsistence users.

COLLECTION OF SUBSISTENCE FOOD SAMPLES

Samples of subsistence foods were collected from representative harvest areas identified as either being persistently oiled, missed in the 1993 sampling or of especial importance to subsistence users.

In 1993, subsistence food samples were taken from the traditional subsistence harvest areas of eight communities including; Chenega Bay, Tatitlek, Port Graham, Nanwalek, Larsen Bay, Ouzinkie, Karluk and Port Lions. Seal and duck samples were obtained from the Chenega harvest area. The locations of the sampling sites for 1994 are shown on Maps 1 through 4.

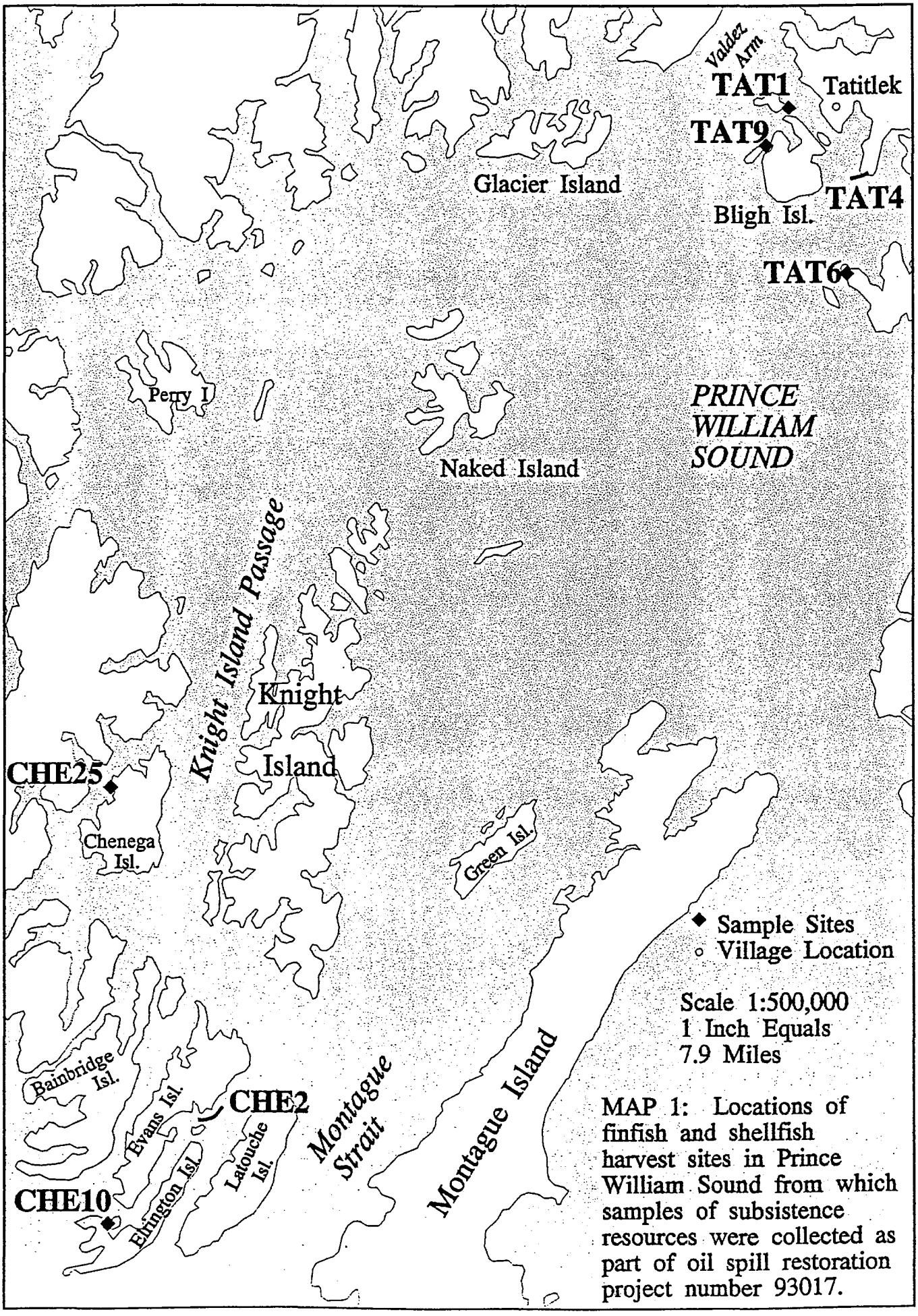
In 1994, subsistence food samples were taken at traditional subsistence harvest sites associated with the following villages: Chenega Bay, Tatitlek, Nanwalek, Port Graham, Old Harbor, Larsen Bay, Port Lions, Karluk, Akhiok, and Ouzinkie. Two shellfish sites were selected in each community, the only exceptions being Ouzinkie with one site and Port Graham having three sites. Seal samples were obtained from the Tatitlek area, with duck samples coming from the Chenega harvest area. The locations of the sampling sites for 1994 are shown on Maps 1A through 4A and Map 5.

SHELLFISH AND FINFISH SAMPLING

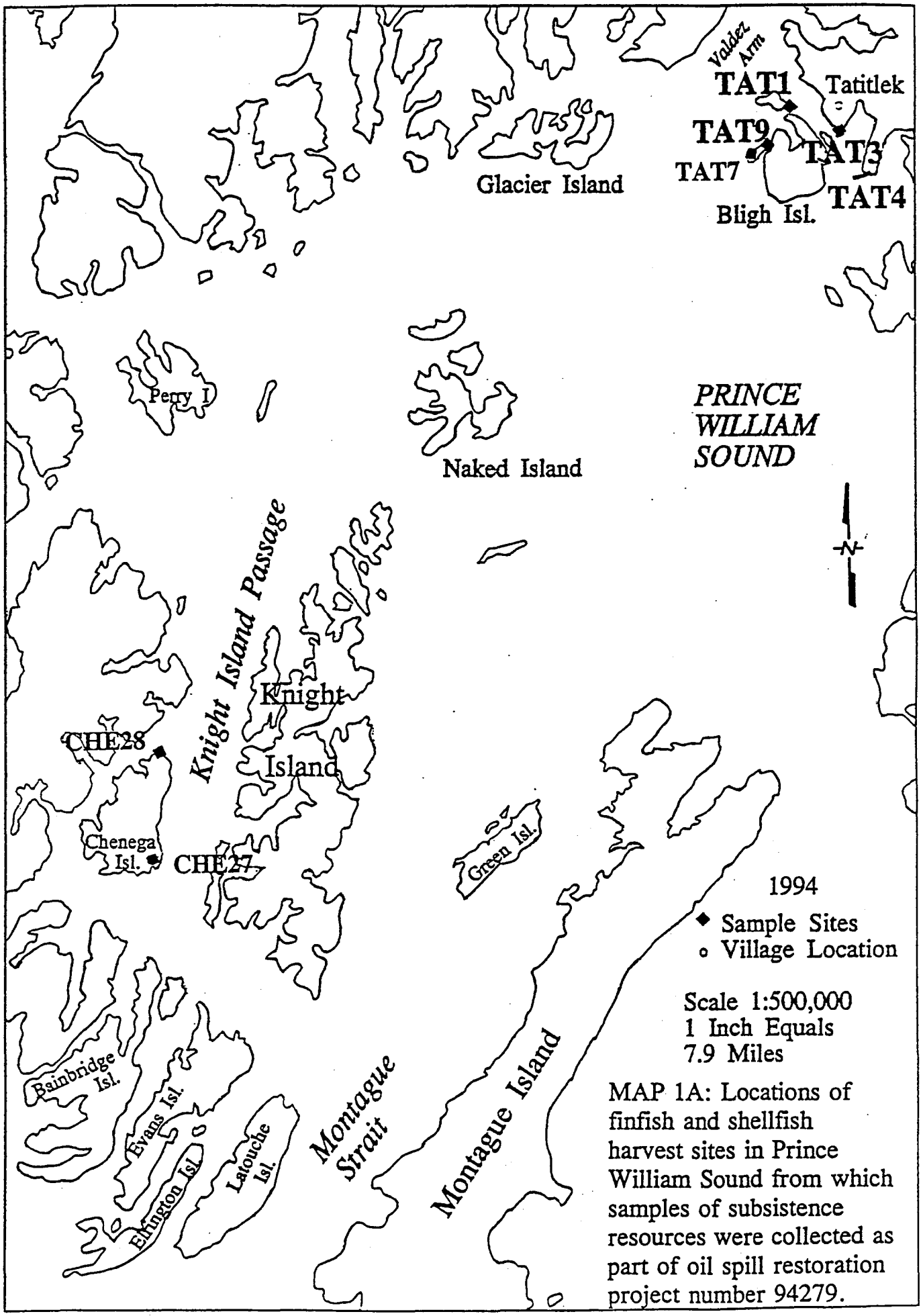
In 1993 the collection of shellfish and finfish samples was coordinated by the Pacific Rim Villages Coalition under a government to government cooperative agreement with the Alaska Department of Fish and Game. The Pacific Rim Villages Coalition was a joint undertaking of the village and regional native corporations of the Chugach region, and was endorsed by the village councils of the region. A copy of the agreement can be found in the final report for 1993 (Miraglia, 1995).

In 1994 the collection of shell and finfish samples was coordinated by the Chugach Regional Resources Commission(CRRC) under a cooperative agreement with the Alaska Department of Fish and Game. The CRRC is a Native tribal organization concerned with natural resource issues in the Chugach Region. It's seven member board has one representative from each of the five Native villages in the Chugach region (Chenega Bay, Eyak, Nanwalek, Port Graham, Tatitlek,) as well as representatives of the Seward and Valdez Native Associations. It has participated in the on-going work of the Oil Spill Health Task Force since 1990. A copy of the agreement is attached as Appendix 1.

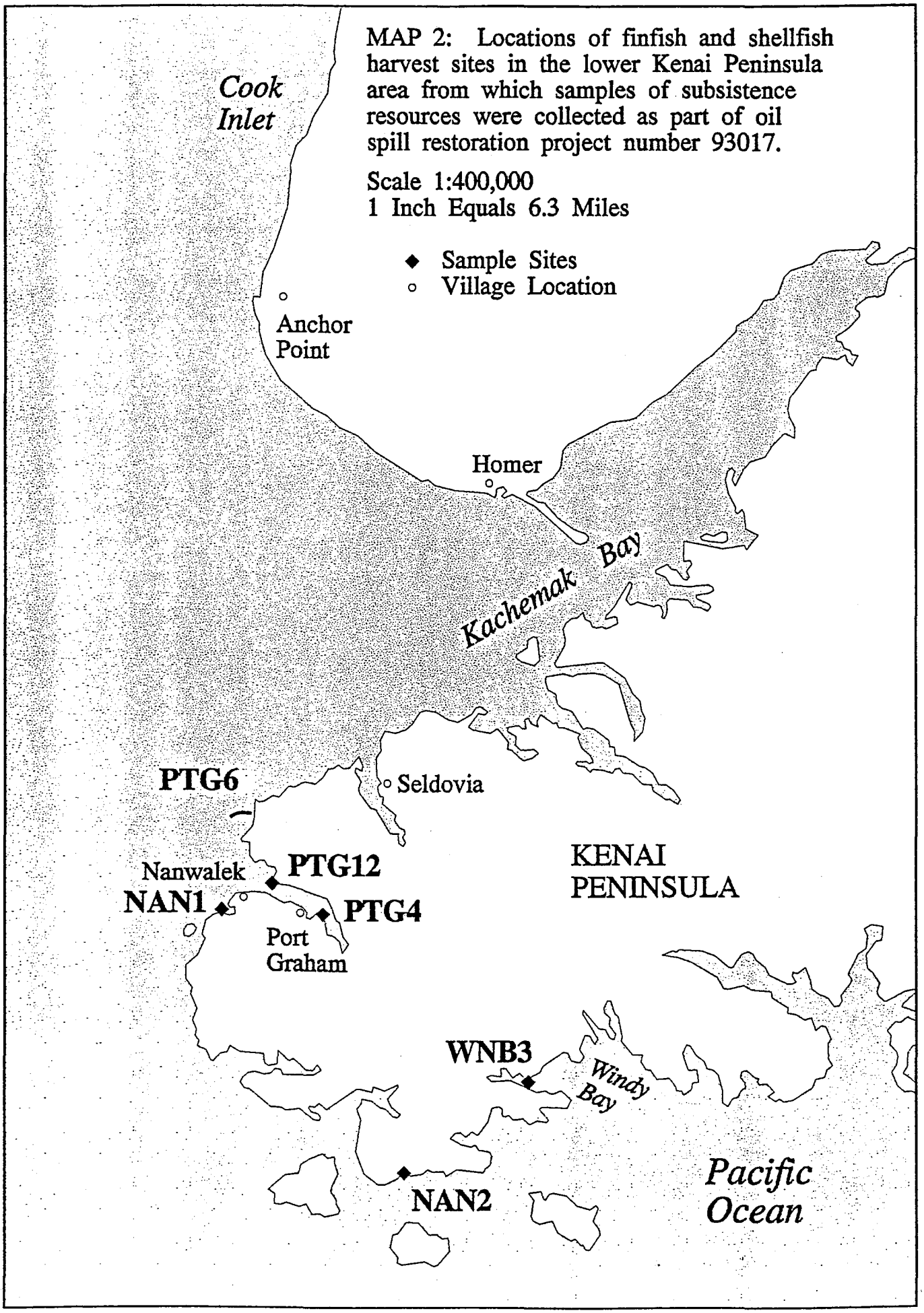
Both the Pacific Rim Villages Coalition and the Chugach Regional Resources Commission subcontracted with Dames and Moore to provide a biologist to supervise the collection of samples. The PRVC and the CRRC were responsible for hiring local assistants and skiff drivers from each community involved in the sampling, and for making travel and lodging arrangements for the biologist. Dames and Moore assigned the task of supervising the collection of the samples to Dave Erikson. Under a Dames and Moore contract with Exxon, Erikson had participated in the collection of subsistence food samples in 1989, 1990 and 1991, working with staff of the Division of Subsistence, the National Oceanic and Atmospheric Administration and the Oil Spill Health Task Force. He was thoroughly familiar with the protocols involved in the collection of samples to be tested for exposure to hydrocarbons. In addition to supervising sample collection, Erikson was also expected to train the local assistants in proper procedures for collection and handling of the samples. He was also required to provide the Division of Subsistence with a final report on the work. The Dames and Moore report for 1993 can be found in the final report on the 1993 project (Miraglia, 1995: Appendix 2). The Dames and Moore report for 1994 is attached as Appendix 2 to this report.

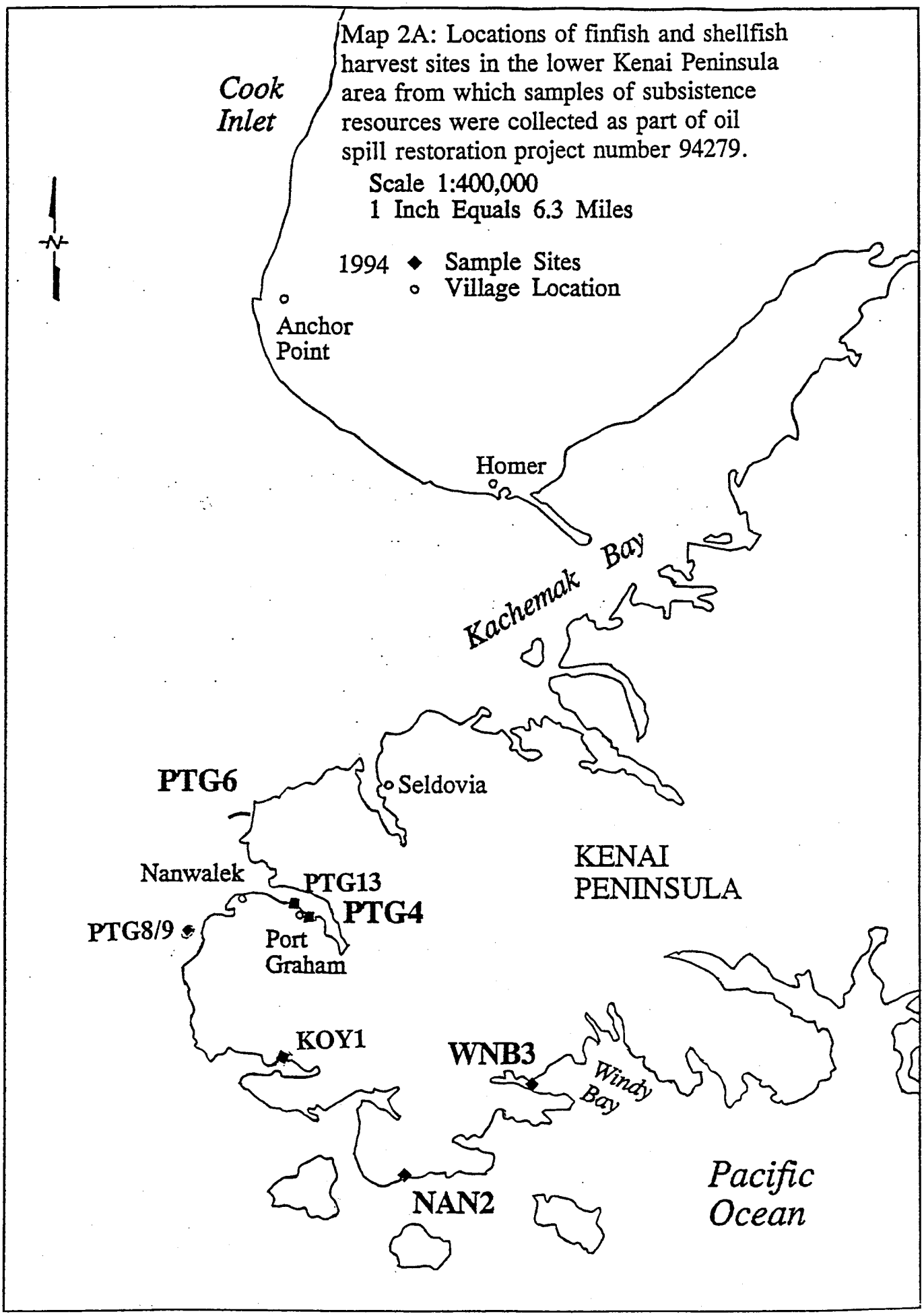


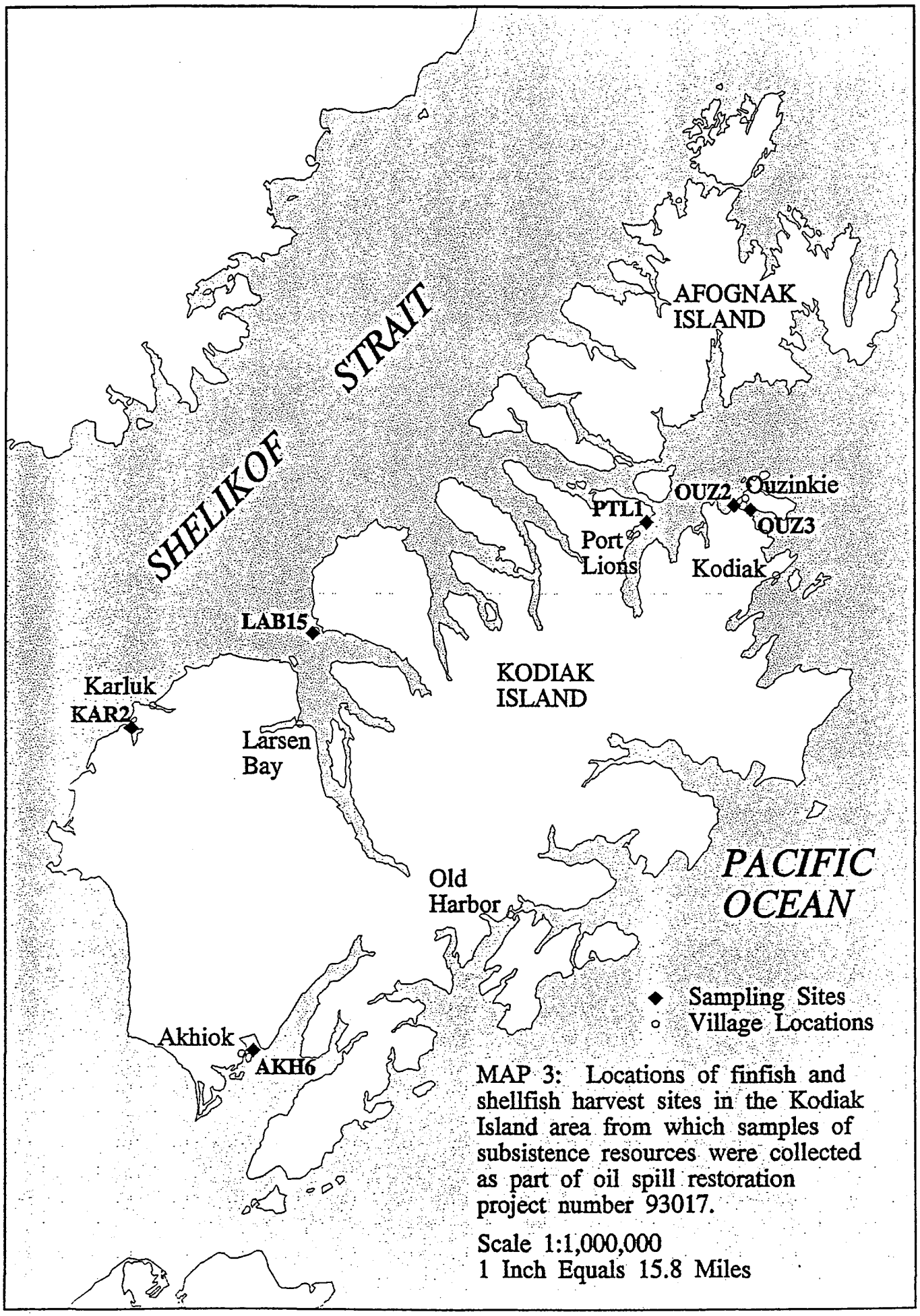
MAP 1: Locations of finfish and shellfish harvest sites in Prince William Sound from which samples of subsistence resources were collected as part of oil spill restoration project number 93017.



MAP 1A: Locations of finfish and shellfish harvest sites in Prince William Sound from which samples of subsistence resources were collected as part of oil spill restoration project number 94279.

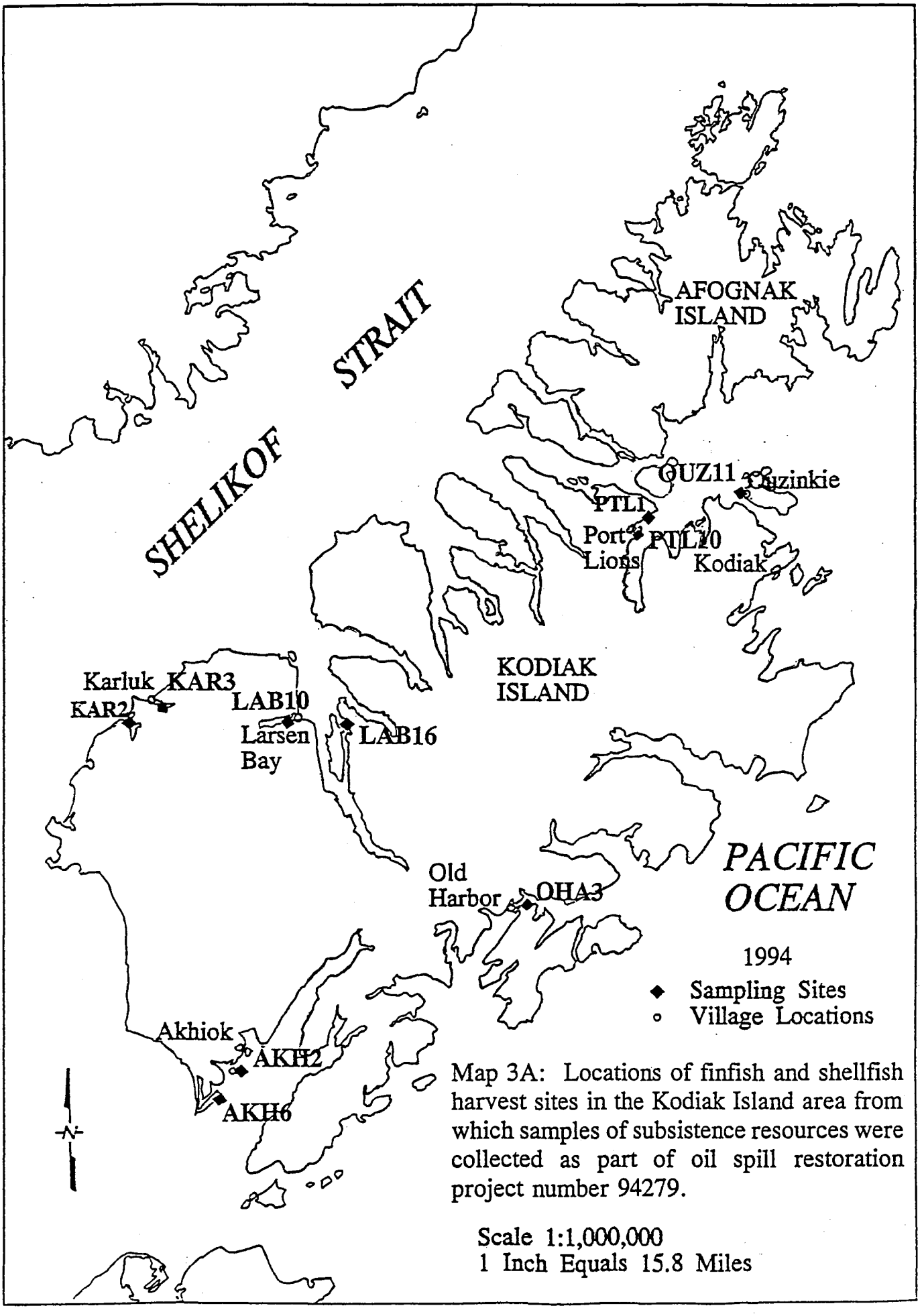

MAP 2: Locations of finfish and shellfish harvest sites in the lower Kenai Peninsula area from which samples of subsistence resources were collected as part of oil spill restoration project number 93017.
Scale 1:400,000
1 Inch Equals 6.3 Miles
◆ Sample Sites
○ Village Location
Cook Inlet
Anchor Point
Homer
Kachemak Bay
Seldovia
PTG6
PTG12
Nanwalek
NAN1
PTG4
Port Graham
KENAI PENINSULA
WNB3
Windy Bay
NAN2
Pacific Ocean


Map 2A: Locations of finfish and shellfish harvest sites in the lower Kenai Peninsula area from which samples of subsistence resources were collected as part of oil spill restoration project number 94279.
Scale 1:400,000
1 Inch Equals 6.3 Miles
1994 ◆ Sample Sites
o Village Location
Cook Inlet
Anchor Point
Homer
Kachemak Bay
PTG6
Seldovia
KENAI PENINSULA
Nanwalek
PTG13
PTG4
PTG8/9
Port Graham
KOY1
WNB3
Windy Bay
NAN2
Pacific Ocean



MAP 3: Locations of finfish and shellfish harvest sites in the Kodiak Island area from which samples of subsistence resources were collected as part of oil spill restoration project number 93017.

Scale 1:1,000,000
1 Inch Equals 15.8 Miles



Map 3A: Locations of finfish and shellfish harvest sites in the Kodiak Island area from which samples of subsistence resources were collected as part of oil spill restoration project number 94279.

Scale 1:1,000,000
1 Inch Equals 15.8 Miles

At each sampling site a total of three samples of each target species were taken. Target invertebrate species were: the hard shell clams, such as butter clams (*Saxidomus giganteus*) and the littleneck clams (*Protothaca staminea*); soft shell clams,(*Mya spp.*); razor clams (*Siliqua patula*); the gumboot chiton (*Katherina tunicata*); whelks (*Nucella lamellosa, N. lima*, and *Volutharpa ampullacea*); and the blue mussel (*Mytilus trosellous*).
Fish species targeted for sampling were the quillback and yelloweye rockfish (*Sebastes maliger* and *S. ruberrimus*) at Tatitlek and the sockeye salmon (*Onchorhyncus nerka*) at Karluk Lagoon(1994.) Hook and line sampling was used for the rockfish and a beach seine was used for the salmon (David Erikson, Dames and Moore, Nov. 18, 1994.)

Sampling Protocol

Samples were collected in such a way as to avoid contamination. For example, sampling personnel were instructed not to collect any subsurface samples through surface slicks. Organisms to be analyzed for petroleum hydrocarbons had to be freshly killed. Decomposed organisms were not collected.

Each sampling site was carefully defined and described in field notes and sketch maps, to allow the site to be re-sampled if necessary. At least one member of the sampling team was present at both the June and September sampling events to ensure consistency.

Samples were wrapped in aluminum foil, which had first been cooked at 350 degrees Fahrenheit for one hour to remove any wax or other residue. All other sampling equipment was washed using detergent and rinsed before and after each sample collection. Instruments used for exterior dissection were cleansed before being used for internal dissection. After they were wrapped and labeled, the samples were placed in insulated coolers containing ice packs. All samples from the same station were kept together by placing them in a separate large plastic bag.

Chain of custody and collection forms were used. The beach and water conditions were clearly noted on the collection forms, as were the results of sight and smell tests conducted in the field. These waterproof forms were placed in a zip lock bag with each individual tissue sample, with the species identification and sample location displayed. Whenever samples were split, a separate chain of custody record was prepared for each portion and marked to indicate with whom the samples were split.

Field notes were recorded in Rite-in the-rain note books. Any deviation from the protocol or the study plan was documented in the field notes. The locations of sampling sites were noted on USGS grid maps.

Entries into the field logbooks or field data sheets were initialed and dated by the person making the entry at the time of entry. Each days entries were closed out with a horizontal line, date and initial. Errors in field logbooks or other records were corrected by drawing a single line through the error, entering the correct information, and signing and dating the correction.

At least one field blank and replicate sample were taken at each collection site. A field blank consisted of a sample container (foil and zip lock bag or bile container) opened in the field, closed and stored as if it contained a sample. Chain of custody forms accompanied blanks, and blanks were sent to the laboratory.

Samples were kept cool in the field, and frozen as soon after collection as possible. Once frozen, the samples were kept frozen until extracted or prepared for analysis. Care was taken that the samples remain frozen throughout the shipping process.

Evidence tape was affixed to the shipping container before the samples left the custody of the sampling personnel. The seal was signed and dated before the container was shipped. The original chain of custody record accompanied the shipment; a copy was retained by the sample

shipper.

Finfish were always handled with latex gloves. Each fish was brought on board the boat in a manner so as not to contaminate it with any petroleum products such as fuel, plastics, or fuel-soaked material. The fish were then dissected in an appropriately clean container or on aluminum foil.

At least three fish of the same species were sampled from each finfish sampling site. Approximately 0.6 to 1.0 kilograms of edible tissue was excised from each fish. The dissected tissue was then double-wrapped in aluminum foil and placed in a zip lock bag.

The bile of all finfish was collected by drawing it from the gall bladder with a sterile disposable syringe and injecting it into a collection vial. The vial was then placed in a zip lock bag. If the gall bladder was punctured while the fish was being eviscerated, causing the bile to be lost, this was noted on the chain of custody form.

Invertebrates were collected with clean shovels. Samples from each shellfish site were taken at the same location and tidal elevation on both the June and September sampling trips. The samples were then double wrapped in aluminum foil, in groups of ten to twelve individuals, comprising a composite sample, and placed in a ziplock bag. At least three composite samples were collected from each shellfish sampling site.

Sampling personnel were directed to identify the species of finfish and shellfish as clearly as possible, to allow the species dependent differences in bile metabolites to be ascertained by the laboratory. In cases where they were unsure of the species, field workers were directed to write detailed descriptions of the animal in the field note book, including color, size, and shape.

Ideally, the goal was to sample two shellfish sites in the harvest area of each community. This allowed us to return to at least one previously tested site for trend assessments, while still giving each community the option to add one site not previously tested. Samples were taken of several types of shellfish from each site. However, due to the limited funds available for testing, we generally tested mussels. Of all the indigenous shellfish species, mussels take up contamination the most readily, and take a longer time to get rid of it than other shellfish species. For this reason, mussels can be used as an indicator. If the mussels showed no contamination, we would not expect to find contamination in the other shellfish from the same location. If significant contamination was found in the mussels, we would have samples of other species of shellfish taken from the same beach at the same time, which could then be tested. The goal was to take four samples of each species from each shellfish site during every sampling trip.

In 1993, samples of rockfish were also collected from the harvest areas of Chenega Bay, Tatitlek, Port Graham and Nanwalek. Rockfish were tested because no bottom fish had been tested since 1990, and DEC had reported that the oil did not hit the bottom in any appreciable amounts until 1991. Rockfish were selected as a representative bottom fish species, because they are more plentiful and therefore easier to catch than halibut or flounder. Ideally, the sample collection team was expected to sample between six and eight fish of the same species from each sampling location.

It was necessary to test the fish and shellfish at different times of the year, because uptake and accumulation of hydrocarbons is influenced by both ambient temperature, and the animals' reproductive cycle. Ideally, there should have been four rounds of sampling over the course of the year, winter, spring, summer and fall. Unfortunately, due to limited funds and a shortened study period, only two rounds of sampling were conducted, one in the summer, the other in the fall. Generally, the collection of samples went well.

The protocol used in the collection of these samples is presented in Appendix 2. It remained the same for both 1993 and 1994.

SEAL AND DUCK SAMPLING

In 1989, some of the very heavily oiled seals sampled from Prince William Sound showed

elevated levels of hydrocarbons in their blubber. Since blubber is used as a food by Alutiiq people, this was a matter of concern to subsistence users in the region.

Samples of seals were collected from the subsistence harvest areas of Chenega Bay, as part of the 1993 project. In 1994, samples of seals were collected from the subsistence harvest areas of Tatitlek. Harbor seal (*Phoca, vitulina*) is the species used for subsistence in the area.

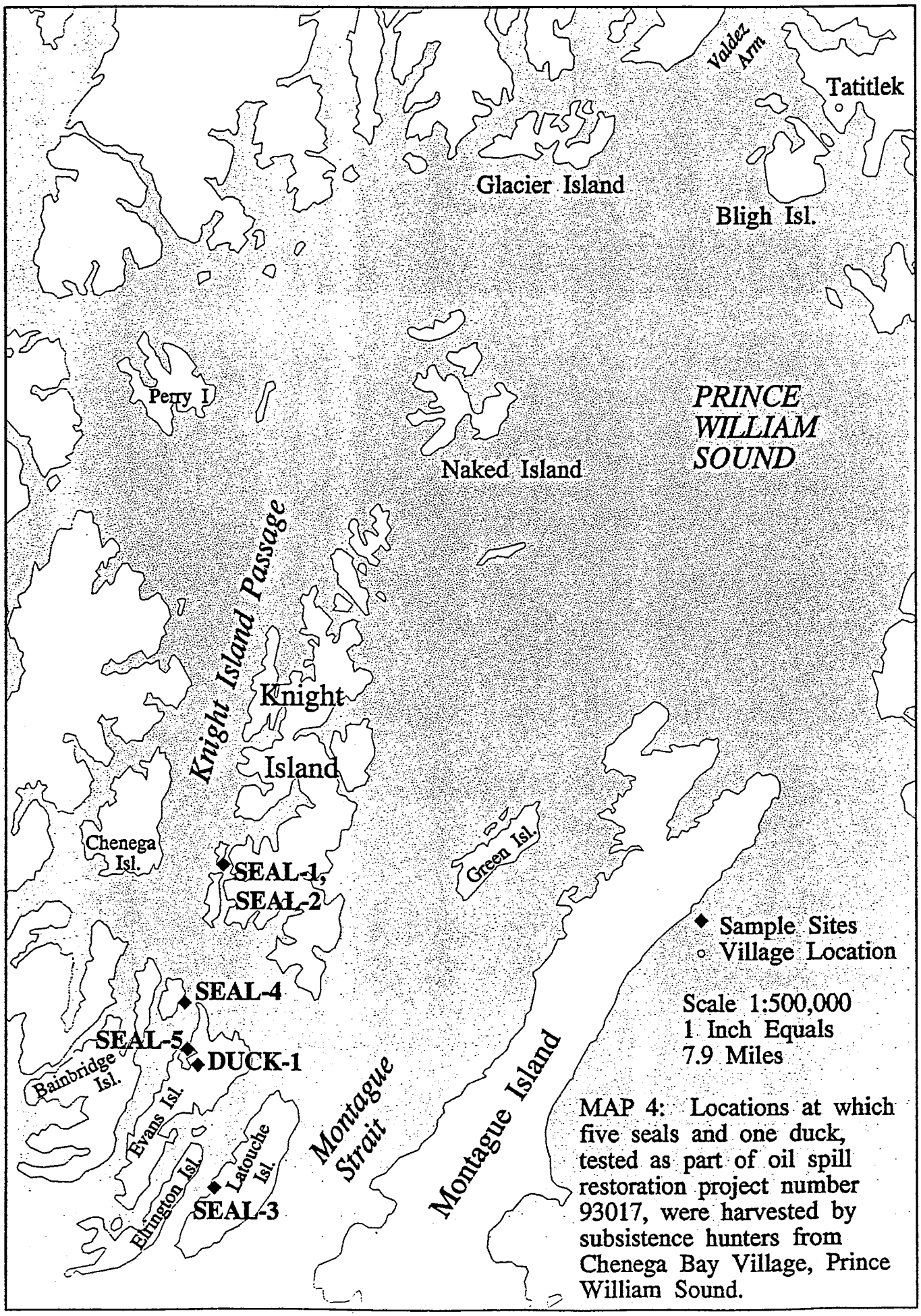
People were also concerned about ducks, both because ducks and other birds have been scarce in western Prince William Sound since the oil spill, and because people in the communities were aware of the finding of impaired reproduction in Harlequin ducks in western Prince William Sound. For this reason, ducks were added to the list of resources to be tested from the Chenega Bay harvest area. The Barrow's Goldeneye *(Bucephala, islandica)* was chosen for sampling because it is used for subsistence and is more plentiful in the area than other duck species.

Because seals are scarce resources, and are protected under the marine mammal protection act, it was thought best to take samples from seals harvested for subsistence, rather than harvesting animals just for testing. The samples came from animals harvested by local subsistence hunters for food, in the company of a technician with the Alaska Department of Fish and Game. In September 1993, Vicki Vanek, a technician with the Division of Subsistence, accompanied Chenega Bay hunters John M. Totemoff and Eddie Levshakoff on subsistence seal and duck hunts. Samples were taken of the bile, liver, and blubber of five harbor seals, and the skin, muscle and bile of one duck. The complete protocol used in the collection of these samples is presented in appendix 3. Approximately 20 to 30 grams blubber, with skin attached was excised from each seal. Twenty to 30 grams of the liver was also collected in 1993 (Liver samples were not collected in 1994 due to negative test results in 1993). The dissected tissue samples were double-wrapped in aluminum foil and placed in a zip lock bag. A bile sample was taken from each seal. The bile was collected by puncturing the gall bladder with a sterile disposable scalpel over a collection vial. If possible, more than one vial of bile was collected. If the gall bladder was punctured while the seal was being eviscerated and the bile was lost, this was clearly noted on the chain of custody form belonging to the seal. The bile sample(s) were then placed in a plastic bag, identifying the species, age, and sex of the seal as clearly as possible. If the collector was unsure of the species, they wrote detailed descriptions of the animal in the field note book, including the color, size shape, and any other identifying characteristics. Each sampling site was carefully defined and described in field notes and sketch maps. Samples were kept cool and frozen as soon as possible. Care was taken so that the samples remained frozen throughout the shipping process.

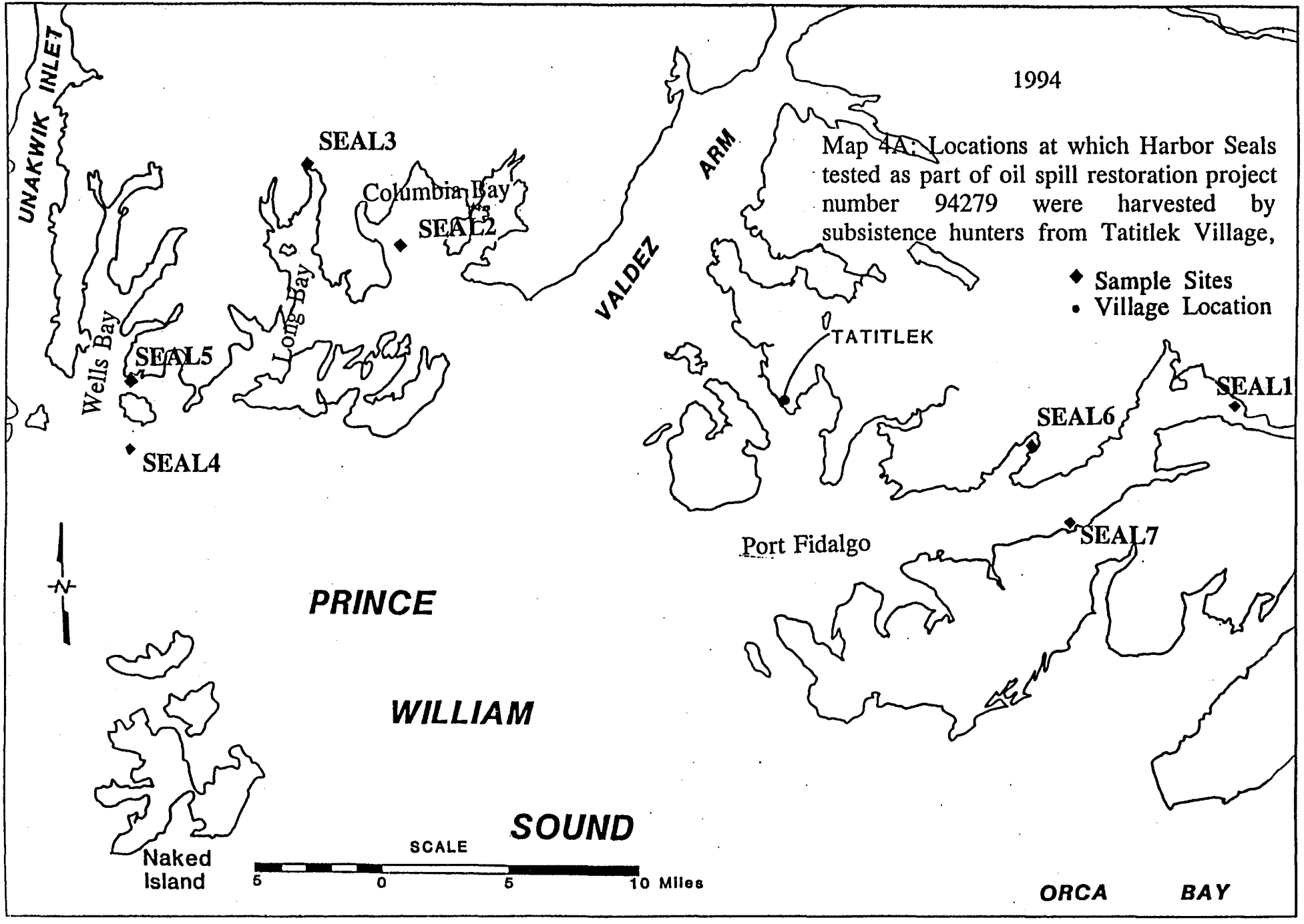
The duck sampling presented a special problem. Since we wanted to take samples from animal actually harvested for subsistence use, we chose to have a Fish and Wildlife Technician accompany a subsistence hunter, and take samples from ducks harvested by the hunter, as opposed to obtaining a scientific collection permit and having department staff harvest the animals. Unlike seals, subsistence users can not simply harvest ducks whenever they need them. It was, therefore, important that the Fish and Wildlife Technician be aware of the regulations regarding which ducks could be taken legally to ensure the project remained within legal bounds.

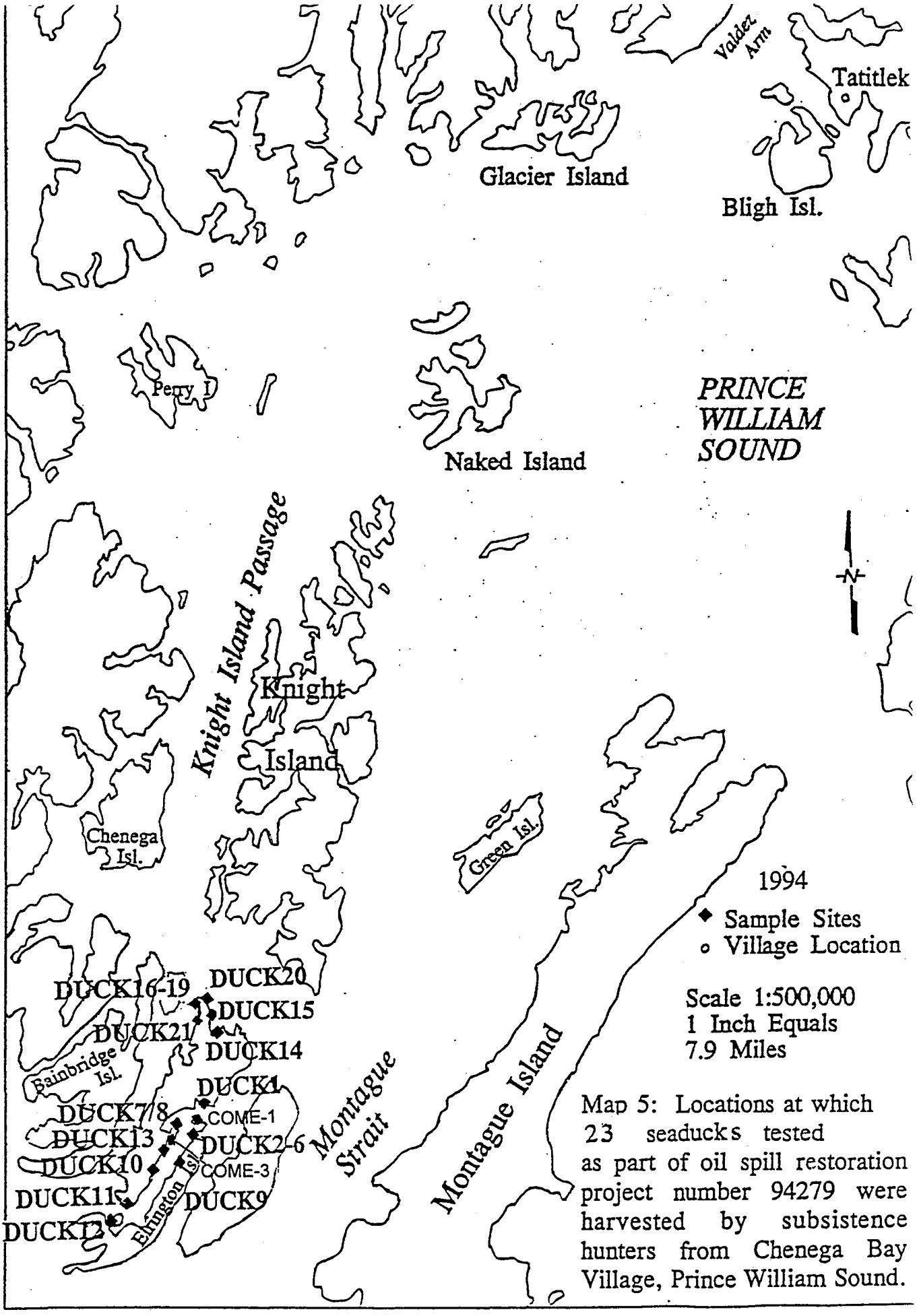
The original intent was to combine the duck hunt with the seal hunt in September 1993. Unfortunately, September proved to be the wrong time of year to hunt ducks in the Chenega Bay area. The single duck harvested by Chenega hunter John M. Totemoff was insufficient to allow the laboratory to do any meaningful analysis. The local hunters indicated that the duck hunting would be better in December.

Vicki Vanek returned to Chenega and accompanied Chenega Bay subsistence hunters Don Kompkoff and John M Totemoff, during the period of December 6 to 15, 1994, on their duck hunting trips. Vanek was able to take liver and skin samples from twenty-four ducks (twenty one Barrows Goldeneyes and three mergansers) harvested in the Chenega area. She also took bile samples from all but one of these ducks (the bile of one of the mergansers was lost when she



MAP 4: Locations at which five seals and one duck, tested as part of oil spill restoration project number 93017, were harvested by subsistence hunters from Chenega Bay Village, Prince William Sound.


1994
Map 4A: Locations at which Harbor Seals tested as part of oil spill restoration project number 94279 were harvested by subsistence hunters from Tatitlek Village,
Sample Sites
Village Location
UNAKWIK INLET
SEAL3
Columbia Bay
SEAL2
VALDEZ ARM
Wells Bay
Long Bay
SEAL5
TATITLEK
SEAL1
SEAL6
SEAL4
Port Fidalgo
SEAL7
PRINCE
WILLIAM
SOUND
Naked Island
SCALE
5 0 5 10 Miles
ORCA BAY



Map 5: Locations at which 23 seaducks tested as part of oil spill restoration project number 94279 were harvested by subsistence hunters from Chenega Bay Village, Prince William Sound.

tried to collect it).

The protocol used in the collection of these duck samples remained the same for both 1993 and 1994. It is included in appendix 3, along with Vanek's field notes and trip report.

A section of the skin, with attached adipose tissue and muscle, totaling 40 or 50 grams was taken from each duck. Liver and bile samples were also taken in 1993, and bile samples in 1994. The entire liver of each duck was collected, double wrapped in aluminum foil and placed in a plastic bag. The bile was collected by puncturing the gall bladder with a sterile disposable scalpel over a collection vial. The same rules used in the collection of bile from finfish and seals, described above, also applied to the collection of bile from ducks. The bile samples were placed in a plastic bag. Field staff were directed to identify the species, age and sex of the duck as clearly as possible. In cases where there was uncertainty as to the species of the duck, field staff were directed to write detailed descriptions of the animal in the field note book.

In September 26 to October 1, 1994, Vanek accompanied subsistence hunters Ken Vlasoff and Louis Vlasoff from Tatitlek on subsistence seal hunts. Samples were taken of the bile and blubber of seven harbor seals, using the sampling protocol described for the Chenega collections above.

RESULTS

LABORATORY TESTS ON SUBSISTENCE FOOD SAMPLES

The tests were conducted at the National Oceanic and Atmospheric Administration/National Marine Fisheries Service, Northwest Fisheries Science Center, Environmental Conservation Division laboratory, under the direction of Dr. Usha Varanasi and Dr. Sin-Lam Chan. This provided consistency with earlier studies undertaken by the Division of Subsistence and Exxon.

In 1993, hydrocarbon tests were conducted on ninety samples of shellfish, and bile metabolite analysis was done on the bile of thirty-two rockfish from the harvest areas of eight communities, including Chenega Bay, Tatitlek, Port Graham, Nanwalek, Larsen Bay, Ouzinkie, Karluk and Port Lions. Tests were also done on samples taken from five harbor seals and one duck harvested by subsistence hunters from Chenega Bay.

In 1994, hydrocarbon tests were conducted on one hundred and thirty-eight samples of edible tissue from shellfish. The bile of eight rockfish and six sockeye salmon was screened for the presence of metabolites of florescent aromatic contaminants from the harvest areas of nine communities, including Chenega Bay, Tatitlek, Port Graham, Old Harbor, Akhiok, Nanwalek, Larsen Bay, Ouzinkie and Karluk. Tests were also conducted on the liver, blubber, and bile of seven seals harvested by hunters from Tatitlek for subsistence use, and of the skin, liver and bile of twenty-three ducks (twenty-one Barrows Goldeneyes and two mergansers) harvested by Chenega Bay subsistence hunters.

BILE ANALYSES

Fish, seals and ducks, in common with other vertebrates, are all able to metabolize hydrocarbons, and then concentrate and excrete the resulting metabolites in their bile. Therefore, if one of these animals has recently been exposed to hydrocarbons, one would expect to find hydrocarbon metabolites in that animals bile. It is much less expensive (by a factor of 10) to test the bile for metabolites than it is to test the edible flesh of an animal for the presence of hydrocarbons. For this reason, bile metabolite testing has been used as a screening method for the vertebrate samples.

Over the several years of this study, the lab has been able to establish the levels of hydrocarbon metabolites in the bile which would indicate an elevated level of hydrocarbons in the edible tissue of a particular vertebrate. Therefore, in 1993 and 1994 the lab recommended

testing the edible flesh of vertebrates only when the level of bile metabolites in the animal was high enough to make it probable that elevated aromatic contaminants would be found in the flesh.

The concentrations of fluorescent aromatic contaminants in bile were determined using a Waters high performance liquid chromatograph equipped with a Perkin-Elmer hydrocarbon-octadecyl silane/polycyclic aromatic hydrocarbon column (0.26 X 25 centimeters), an automatic injector, and Perkin-Elmer model 40 fluorescence (ultra violet-fluorescence) detectors connected in series (Krahn et al. 1988). Thawed bile was injected directly into the high performance liquid chromatograph and eluted through the column using a linear gradient from 100% solvent A (water containing 5 milligrams per liter of acetic acid) to 100% solvent B (methanol) over 15 minutes. The flow rate was 1 milliliter per minute and the column temperature was 50 degrees Celsius. All solvents were degassed with helium. The ultra violet-fluorescence responses were recorded at the wavelength pairs for naphthalene and phenanthrene, prominent constituents of aromatic contaminants in Prudhoe Bay crude oil. The fluorescence of naphthalene metabolites was monitored using excitation and emission wavelength pairs of 260 and 380 nanometers, respectively.

The total integrated area from each detector was then converted to corresponding equivalents of either naphthalene or phenanthrene standards that would give the same integrated response. Concentrations of fluorescent aromatic contaminants in bile are reported on the basis of bile weight and biliary protein. The levels of protein in bile samples were determined by the method of Lowry, et al. (1951).

The bile of the fish, seals, and the ducks sampled, was screened for the presence of metabolites of fluorescent aromatic contaminants. With regard to the 1993 fish bile, Dr. Varanasi reports:

> The small number of bile samples taken from several species, and the lack of reference samples preclude any rigorous treatment of the data. Based on our experience to date, including the earlier subsistence studies, one would not expect to find elevated concentrations of ACs in fish tissue, and as this is applicable to the summer 1993 fish samples, the tissue samples were therefore not analyzed for aromatic contaminants.

Of the 1994 fish biliary samples, Dr. Varanasi says:

> "Concentrations of biliary FACs PHN measured in fish collected in 1994 were similar to those fish from reference areas....These data suggest that fish from the current study have not been exposed to appreciable levels of oil".

In 1993, the concentrations of the fluorescent aromatic contaminants (FACs) in the bile of the five harbor seals were found to be very low. The 1994 bile samples from the seven harbor seals also showed low concentrations of FACs. Analysis for ACs in the 1994 seal liver and blubber samples was not recommended because concentrations of ACs in these tissues would be expected to be in the same low range reported for the 1993 harbor seals samples.

Referring to the 1993 duck sample, Dr. Varanasi adds, "Since there was only one bile sample from a duck, little can be said about exposure." The twenty-one duck samples taken in 1994 show "...much lower concentrations of biliary FACs than concentrations in that species sampled in 1990".

ANALYSIS OF EDIBLE TISSUE

Samples of the edible tissue of mollusks was analyzed for aromatic contaminants using the

procedures of Sloan et al. (1993). The analytical protocol consisted of four major steps: 1) extraction; 2) high performance liquid chromatography cleanup; 3) analyte determination by gas chromatography/mass spectrometry; and 4) quality assurance. Generally, ten to thirty mollusks were collected for one representative sample. All samples were received and stored frozen. For analysis, samples were thawed and the edible tissues were removed from the shell and composited. For each species of shellfish tested from a site, three composite samples were analyzed. Each composite sample consisted of 10 to 30 animals. The composited tissue was homogenized. A 5-gram sample of the homogenized tissue was added to a centrifuge tube containing sodium sulfate and methylene chloride. The method internal standards (surrogate standards) for aromatic contaminants were added, and the mixture was macerated with a Tekmar Tissumizer. The extract was decanted into a centrifuge tube, and the extraction step was repeated one time. The resulting extract was filtered through a column of silica and alumina, and the extract was concentrated to 1 milliliter for cleanup by high performance liquid chromatography.

The extracts were chromatographed using a high performance liquid chromatography method based on size exclusion chromatography with preparatory-size columns containing Phenogel 100-angstrom size-exclusion packing (Phenomenex, Rancho Palos Verdes, California) to obtain an extract fraction that contained the aromatic contaminants separated from the lipids and other interferences (Krahn et al. 1988). Sample extracts were analyzed using capillary-column gas chromatography with mass spectrometry detection (Sloan et al. 1993). An extensive quality assurance program was followed that included analysis of a control material (National Institute of Standards and Technology mussel standard reference material 1974), method blanks and replicate analyses (Sloan et al. 1993).

In 1993, in general, the tests on the edible tissues showed levels of aromatic contaminants so low as to be within the margin of error for the tests, comparable with levels detected in reference samples collected in 1989 from Yakutat and Angoon, both outside the spill area. According to Dr. Varanasi:

> It is important to note that the concentrations of aromatic contaminants in these mollusk and harbor seal samples were very low and did not differ substantially from those found in samples from reference areas, from previous samplings, or from the method blanks. As is common, the method blanks show trace levels (low parts per billion) of unavoidable aromatic contaminants.

Of the 1994 mollusc samples, Dr. Varanasi writes:

> Most mollusc samples contained very low concentrations of ACs that did not differ substantially from concentrations found in shellfish from reference areas sampled previously (generally <10 ng/g). The exceptions included 3 samples of mussels and one of clams from Chenega(CHE28) that had ACs concentrations ranging from 69-747 ng/g. Three samples of littleneck clams and 3 of mussels collected during the summer of 1994 contained ACs in concentration, 10ng/g(CHE28 was not sampled during previous years.) Apparently, the source of the contamination may be related to crude oil, because those ACs present in greater proportions in the CHE28 samples... are those ACs that are also found in the greatest proportions in weathered crude oil.

Concerning the CHE28 samples, Dr. Varanasi points out that there was evidence that oil "contaminated gravel from mussel beds had been discarded on the sampling beach at CHE28 and that a (oil) sheen was evident as "the tide came in." This is a reference to work done by the Alaska Department of Environmental Conservation in cooperation with local residents to try to free oil trapped under mussel beds. This was done by peeling the mussel bed up in strips and

setting it aside, moving the underlying oiled gravel to the lower intertidal and letting the tide was over it to remove the oil. These particular samples were collected from a beach where this work was being done, and there was a visible oil sheen on the water.

There was some variance in the concentrations of ACs found in mollucs samples collected at the Tatitlek station (TAT1), fall levels being lower than summer ones. As this area showed low AC levels in 1990, Dr. Varanasi concluded that " The source of the ACs in the samples collected in summer 1994 samples appeared to be related to combustion products..., but no evidence of this source of contamination was found in current (fall 1994) samples."

Samples of mussels taken from Windy Bay (WNB3), an area heavily oiled in the 1989 spill, in the summer and fall of 1994 showed concentrations of aromatic contaminants to be at background levels. This is in contrast to the very high aromatic contaminant levels found in 1990 and 1991 from this same site, and suggests that this site may have recovered from the effects of the spill.

The results of these tests were reported to the Alaska Department of Fish and Game, Division of Subsistence, by the NMFS laboratory. These reports are attached as appendix 4. See final '93 for 1993 lab test results.

COMMUNITY OUTREACH

On August 25,1993 an Oil Spill Health Task Force meeting was held in Anchorage, and community representatives were brought in from Prince William Sound, the Lower Kenai Peninsula and Kodiak Island to participate. Community representatives were then flown to Seattle for a tour of the National Marine Fisheries Center, Environmental Division laboratory, where the subsistence food samples were tested. On September 22, 1994 a second tour of the laboratory took place for community representatives who had missed the first one.

Three informational newsletters and a flyer were produced to report the test results and other relevant information to the subsistence users in the area impacted by the spill. The newsletters were produced in November 1993 and February 1994. The flyer was sent out in April 1993.

More detailed information on the community outreach portion of the project is provided below.

COMMUNITY MEETINGS AND CONTACTS: May 1993-June 1993

Community leaders throughout the oil spill impact area were contacted to determine whether there were continued concerns about subsistence food safety in relation to the oil spill. Additionally, the Division of Subsistence used the results of a joint study, conducted with the U.S. Minerals Management Service in fifteen communities impacted by the Exxon Valdez oil spill to determine the communities where concern continued to exist, as well as the nature of that concern. Those communities where no concern, or very little concern, was indicated in either the community meetings or the joint Division of Subsistence and Minerals Management Service study were dropped from the study. Where a significant level of concern was found, we held community meetings in order to identify and map the specific harvest areas and resources of continued concern. The findings from the earlier studies by the Oil Spill Health Task Force were also presented at these meetings.

Decisions were made as to which resources and sites to sample based on concerns expressed in the community meetings, and conversations with community leaders and other community residents. Since funds were limited, priority was given to sites that were; 1) significantly oiled by the spill; 2) constituted important subsistence sites prior to the spill, and; 3) had either been avoided or used less after the spill due to concerns of oil contamination.

A summary of the community meetings and contacts is presented below.

MEETINGS

Unfortunately, the first round of community meetings was held in the late spring and early summer, a time of year when most subsistence users were busy harvesting and processing resources. Because of this, the turnout at the community meetings was not as large as we had hoped. However, informal household visits confirmed that this was due to poor timing rather than a lack of interest on the part of community residents. Another problem that very often occurred when we had a meeting dealing with the oil spill, is that some people ended up with the mistaken impression that it was an "Exxon meeting", i.e., a meeting being conducted by Exxon, and stayed away for that reason.

Prince William Sound

Chenega Bay

The Chenega Bay community meeting was held on May 24, 1993, and was attended by Rita Miraglia with the Division of Subsistence, and Una Swain with the Alaska Department of Fish and Game, Division of Habitat and Restoration. Six community residents attended the meeting; two of these were very knowledgeable, active subsistence harvesters.

There were questions about the 1993 herring run in Prince William Sound. Only one-third of the expected number of herring returned to Prince William Sound in 1993, and many of the herring that did return had visible lesions. Miraglia explained that the lesions were caused by a fish virus, and were not a threat to human health. Residents said that tiny herring , only about two inches long came into the dock area at Chenega Bay that March. One woman said "They were so thick that you could just put in a dipnet and come up full. The crows were picking them out of the shallow water, that's how close they came". Herring had not been seen there since the establishment of the Chenega Bay settlement at Crab Bay on Evans Island in 1984. The herring that came this March were all about the same size, and did not have any sores. One of the men told me "They were just perfect. Nothing wrong with them". "I cooked them up whole and ate them like popcorn," another man said. Miraglia later discussed this with Evelyn Brown, a fisheries biologist with the Alaska Department of Fish and Game, Division of Habitat and Restoration. She was not surprised that these juvenile herring showed no sign of disease for two reasons. First, fish biologists with the Alaska Department of Fish and Game think the disease is latent and the lesions only manifest themselves in the last stages of the disease. Secondly, until they are about three years old, herring stay in a cohort group of all the same age. The fish observed in Chenega Bay were probably spawned in 1992, and may not have been exposed to the infected fish.

Some Chenega Bay residents had reported seeing sores on bottom fish, probably cod.

A number of shellfish sampling sites were suggested at the meeting. One man, who did not attend the meeting, wanted us to go back to Port Ashton. Miraglia told him we would most likely not test there, and that people should not consume shellfish from that location. Although some oil did reach there during the spill, the main source of contamination at that site was unrelated to the spill. Creosote on pilings and diesel spilled from a ruptured tank on the hill above the site were two suspected sources of the hydrocarbon contamination found there. The man said that he continued to eat shellfish from that beach. It's unfortunate considering the degree of contamination there. It was one of the few places on the east side of Evans Island where people could find clams large enough to make the trip worthwhile.

Delenia Island in Dangerous Passage, a tiny island just off the northwest shore of Chenega Island was also suggested as a sampling site. The island was an important subsistence shellfish harvest site both before the earthquake and after the establishment of the new settlement at Crab Bay, and was heavily oiled in the spill. According to the village council president, Larry

Evanoff, there was renewed interest in going there to harvest, but in 1993 people were still afraid of contamination there. The same was true of Kake Cove on Chenega Island. Both these sites were more important than they might have been in the recent past because Chenega Island had recently become the site of periodic community picnics by residents of Chenega Bay. The emphasis at these picnics was to eat native foods and participate in traditional activities. While other native foods had been harvested and used at these gatherings, shellfish had been avoided because of uncertainty about their safety.

Whale Bay, just below Claw Peak, and the head of Shelter Bay on Evans Island were also suggested as important clam beaches, which could be tested.

Most of the other shellfish sites mentioned at the meeting were important before the earthquake, but were too far from the present community site to be accessible for most residents. Golden, north of Esther Island in Port Wells was described as an important place for harvesting cockles before the earthquake. People also used to get clams from the Esther Island side of Esther Passage, and the reef at the west end of the passage.

People did not have specific suggestions for locations for bottom fish sampling, but thought it was a good idea to test bottom fish.

At the meeting, Miraglia also discussed plans to take samples from seals and ducks harvested for subsistence. Miraglia was told that hunters were seeing a lot fewer seals along the west side of Knight Island. This was interesting because over the previous two years some Chenega Bay seal hunters had been saying the seals were disappearing, while others were saying they were not sure whether the numbers were declining or the seals were just moving away from the areas immediately adjacent to the village and toward the west side of Knight Island. The hunters present at the meeting also said there used to be a lot of seals at Iktua Rocks at the north end of Evans Island, as well as at Gibbons Anchorage on Green Island and Fox Farm on Elrington. They said they were no longer seeing seals at any of these places.

One of the men at the meeting indicated he might be willing to work with ADF&G to get duck samples.

Although the poor turnout for the meeting was disappointing, this was more likely a result of bad timing than a lack of interest. Several key people were out of the village either because of medical emergencies or because they were commercial fishing. Many were presently working full time, and didn't get off work in time for the meeting. A significant amount of input was provided by both those who did attend the meeting, and the people Miraglia and Swain spoke to informally during the day.

Based on the discussion at the meeting, as well as conversations with other community residents, two shellfish sampling sites and two rockfish sampling sites were selected in the areas used by Chenega Bay residents for subsistence. The two shellfish sites were Delenia Island, in Dangerous Passage, northeast of Chenega Island, and Fox Farm, east of North Twin Bay on Elrington Island. The plan was to collect samples of mussels, butter clams, and littleneck clams from these sites. The two rockfish sites were just north of Shelter Bay, on the north end of Evans Island, and east Sawmill Bay, just southeast of Johnson Cove on Evans Island. Additionally, it was decided to take samples of five seal and twenty ducks from the harvest areas of Chenega Bay.

Tatitlek

On June 8, 1993, Jody Seitz, a subsistence resource specialist with the Division of Subsistence, made a presentation on the subsistence restoration project at a meeting of the Tatitlek Village Council. The meeting was attended by two community residents in addition to the members of the village council. Concern in Tatitlek was high because of the observation of lesions on herring returning to the waters in front of the community. The herring were also abnormally small, only thirty percent of the expected number had returned, and they did not

spawn in front of the village as they normally do. Biologists had determined that the lesions were caused by a fish virus called Viral Hemorrhagic Septicemia virus (VHS). VHS is discussed in greater detail in the section on the Oil Spill Health Task Force meeting, below.

Another source of renewed concern at Tatitlek was a sea lion harvested near the community, which had external sores. Local marine mammal hunters said they had never seen such sores. Seitz was in Tatitlek when this animal was harvested. She took photographs of the sores. Don Calkins, a marine mammal biologist with the Alaska Department of Fish and Game, reviewed these photographs. He identified the sores as target lesions. In a memorandum to James Fall with the Division of Subsistence dated May 10, 1993, Calkins wrote in part,

> These lesions are very common throughout the sea lion population in Alaska. They appear to be caused by a fungus which attacks the hair follicles and radiates out in a circle from the initial infection site, killing hair follicles in the process...I know of no evidence which suggests these lesions, in any quantity may pose a human health threat. Because the lesions are so common, I believe many sea lions which have been consumed in recent years must have had these lesions.

This information was relayed to Tatitlek Village Council President Gary Kompkoff by Seitz.

A number of the sampling sites identified at the meeting were more related to logging operations on Tatitlek Corporation lands than they were to the spill. These included Knowles Head at the tanker anchorage, and Two Moon Bay. However, interest was also shown in testing shellfish from Bligh Island and Reef Island.

This meeting occurred late in the process, after the list of sites to be sampled was due in to the sub-contractor. Based on testimony presented at an Oil Spill Health Task Force meeting held in Tatitlek in the summer of 1992, as well as more recent conversations between community residents and Seitz, staff had suggested testing shellfish from North Bligh Island, and southwest Boulder Bay, and rockfish from near Bidarki Point. In the end, North Bligh Island and Reef Island were designated as the shellfish sampling sites, and Bidarki Point was slated to be sampled for bottom fish.

Lower Kenai Peninsula

Port Graham

Rita Miraglia conducted a community meeting in Port Graham on June 2, 1993. The meeting was attended by the traditional village Chief, Elenore McMullen, the Village Administrator, Fran Norman, and two other community residents. Evidently, there was no notice posted for the meeting. This was also a bad time because there was a work crew repairing local housing, as well as a crew with BIA forestry present in the community. Local people were working with both groups. In the main, though, it seemed people just didn't know about the meeting.

Mrs. McMullen said her son recently caught flounder and halibut just outside Port Graham Bay, a little to the south, with "cancers" on them. She described these cancers as external blisters. She also said the herring run was better that year (1993) than it was the year before. She said tomcod showed up for the first time in years. She saw more of everything that year, even hummingbirds. She pointed out areas that people like to use for clams and for seaweed and also the places where tar balls had washed up recently. Miraglia drew the areas indicated on maps. These maps are reproduced as appendix 1.

People were the most concerned with a site called Duncan Slough. It was oiled and tar balls had been seen there recently. It was a favorite claming site. It was located away from the sewer outfall, but right after the spill a boat cleaning station was operated nearby. Residents of Port

Graham reported that people who worked at the boat cleaning station suffered burns from the chemicals used. People were afraid to harvest flounder in that area. Mrs. McMullen said the residents of Port Graham wanted to know what chemicals were used at the boat cleaning station in 1989, and what the possible effects from these chemicals were.

Since this meeting, Miraglia has made several attempts to get information regarding the chemicals used at the boat cleaning station. However, Exxon, the U.S. Coast Guard and the Alaska Department of Environmental Conservation were all unable to provide any conclusive information on this. It would seem no records were kept of the kinds of chemicals used or the amounts used. The best answer I could get from ADEC staff was that only orange-based solvent (such as Orangesolv) or Simple Green should have been used. If this were the case, these agents would have degraded long ago, and there should be no hazard present. Unfortunately, no one could tell us definitively that these were the only agents used. Once the chemicals used at the location are identified, their fates and effects can be determined. Until such a time, no authoritative statement can be made on this issue. For this reason, as of this writing (November 1995), potential effects from chemicals used at the boat cleaning station remain a concern for residents of Port Graham.

One community resident told Miraglia he had never had any concerns about contamination from the spill in this area, because it didn't hit here the way it did in Prince William Sound or Windy Bay. He said the depletion of the clam beds and the tomcod was unrelated to the spill. He attributed the problems with shellfish to slime that resulted from fish wastes from the cannery. He said that when the cannery was planned they had expected the tides to wash the wastes out of the bay, but that's not what happened. It stayed and caused what he referred to as "a smothering effect" on the shellfish beds. He said that consumption of shellfish by sea otters as well as by community residents also contributed to the decline in shellfish. Although he did see some tar patties floating around right after the spill "that didn't cause me to be worried when I went out to get my bidarkies that year." The opinions expressed by this particular resident were very different from those of any other community resident contacted.

Based on the discussion at the meeting, as well as the conversations Miraglia had with other community residents, a shellfish sampling site and a bottom fish sampling site were selected in the areas used by Port Graham residents for subsistence. The shellfish site was Duncan Slough in Port Graham Bay. Samples of mussels, bidarkies, soft shelled clams and snails were collected there. The bottom fish site was just outside the mouth of Port Graham Bay, rockfish were to be sampled at this location. This area was also used by residents of Nanwalek to harvest bottom fish, and was to serve as the bottom fish sampling site for both communities.

Nanwalek

Rita Miraglia gave a presentation on the subsistence food testing project for the Nanwalek Village Council on April 1, 1993. Miraglia returned to the community in June, 1993. It was not possible to schedule a community meeting in Nanwalek at that time, because people were too busy. Miraglia informally visited with individual households, asking people what they thought about an oil spill testing project, and what they would like to see tested, and where. Where appropriate, this information was added to the Port Graham maps. These maps are reproduced as appendix 1. The following observations were based on some of the conversations with community residents.

People in Nanwalek were worried about deep-sea fish. Tar balls were still seen floating around in the area.

One couple said they thought the lagoon should be tested, because the local children went swimming there and got sick. They said their children had been coming home with water blisters on their legs. They wanted to see goosetongues and bullheads tested from the lagoon.

One man said he wanted to see testing at Elizabeth Island. He said, "During the spill the

barnacles there fell off in sheets. This was a seal hunting spot. No one has hunted there since the spill". He added that there was some oil left behind there because of the difficulty of access to the area. He thought Anderson Beach should be tested. "There was oil in puddles there, and it was never properly cleaned", he said. He reported finding a big tar ball in Dogfish Bay last year.

Another resident said that clams from Kasitsna Bay had lost their flavor since the oil spill, he wanted to see testing there. He said there was still oil under the beach at Port Chatam, and it was never properly cleaned. He also wanted to see testing at Elizabeth Island and Anderson Beach.

One man wanted to see testing at Russian Point and on the Flat Islands.

A woman also mentioned Anderson Beach as an important place for testing.

Based on these discussions, two shellfish sampling sites and a bottom fish sampling site were selected in the areas used by Nanwalek residents for subsistence. The two shellfish sites were Russian Point, just below the village and Anderson Beach at the south end of the Kenai Peninsula, between Elizabeth and Pearl Islands. Samples of mussels, clams, snails and bidarkies were to be collected at Russian Point. Samples of mussels and clams were to be taken at Anderson Beach.

It was also decided to return to Windy Bay to collect mussel samples. The land surrounding Windy Bay belonged to Port Graham Corporation, and was used for subsistence by residents of both Port Graham and Nanwalek. Windy Bay was heavily oiled in 1989, and in 1989 and 1990 mussels from this site showed the highest levels of contamination of any of the sites sampled as part of the subsistence food testing project. For this reason, Dr. Varanasi and Dr. Chan felt it was important to continue sampling at this site.

INFORMAL VISITS

Alaska Peninsula

In March of 1993, Lisa Scarbrough, a subsistence resource specialist with the Division of Subsistence, visited the Alaska Peninsula communities of Chignik Bay, Chignik Lake, Chignik Lagoon, Perryville and Ivanof Bay to conduct marine mammal harvest surveys. While there, she asked several people if they were still concerned about the safety of eating wild resources in their area as a result of the spill.

Her impression overall was that most of the people in these communities no longer feared for the safety of their subsistence foods due to oil contamination as a result of the oil spill. However, many people said they thought the numbers of clams, salmon, birds and marine mammals were down considerably since the spill. Most of them blamed these declines on the effects of oil contamination. Ocean currents carried oil from the north to the southwest past their beaches. Some of that oil ended up on their beaches in the form of tar balls and patties. People in these communities believed that any animals traveling in the path of the oil, or eating the oil died. Many felt that the oil had not been cleaned up, but rather had sunk. They said that when storms churned up the water, the oil got dredged up and deposited on the beaches again.

Concerns about human health in relation to the spill were less prevalent in the Alaska Peninsula communities that they were in Prince William Sound, the Lower Kenai Peninsula and on Kodiak Island. Given that we had limited funds available, we therefore decided not to test any subsistence resources from the Alaska Peninsula.

The following comments were made to Scarbrough during her March, 1993 community visits.

Chignik Lake

Before the oil spill, we used to see a lot of seals around Chignik Lake and along

the beach. We used to see a lot more ducks too, we don't see them like before. This winter there didn't seem to be as much salmon in the lake as there used to be. However, there are more bears.

Chignik Lagoon

There were tar balls along the beach of the lagoon, last summer. Recently, I saw many dead murres on the beach of the lagoon by the village. I don't know what caused them to die. I haven't seen many seals in the area since the oil spill.

I still don't have a lot of confidence in the clams, birds and salmon. I have seen horrible looking salmon since the spill--Reds and silvers with black sores, some with yellow meat. We caught a lot of these in our nets in the lagoon last summer.

In the last three years, I have harvested salmon with red splotches on them. I never noticed this before with a fish. I have found others with two backbones, and one was puffed out with water. You could still see oil on the beaches along the eastern Pacific Alaska Peninsula last summer. I feel during the stress of the oil spill, many of the pregnant seals aborted their young.

We used to get Eider ducks this time of year, but ever since the oil spill, fewer and fewer birds are here. I only saw a dozen this year. The oil spill hurt the birds the worst in this area. I feel it is safe to eat clams. There are fewer of them though, due to an increase in the number of sea otters.

Chignik Bay

I worked on the clean-up in Kodiak, chartered my boat. The spill came here too. Mousse balls and sheen came here, but I was never concerned about getting any shellfish or anything here, but if I lived in Kodiak, I would be asking more questions. I also worked on test fishery here in Chignik in 1989 summer. In 1989 we would make sets and test all the fish for oil. We never found any oiled fish. We spotted sheen.

Perryville

While Scarbrough was in Perryville, in March of 1993, there were tar balls and dead murres washing up on the beach in front of the community. Many residents of Perryville were very concerned about the oil, and most thought it was oil from the *Exxon Valdez* oil spill. They were afraid to harvest shellfish from the local beaches. They wondered if the murres had died from oil ingestion.

Some community residents took Scarbrough out to the beach. She saw oil in the form of tar balls and patties, averaging one to three inches in diameter, spaced every twenty feet or so along the beach.

Scarbrough collected one dead murre, and some tar balls. She turned the murre over to Vivian Mendenhall, a biologist with the U.S. Fish and Wildlife Service in Anchorage. The USFWS determined that the murre had died from starvation. According to Mendenhall, this might be indirectly related to the oil spill, as the oil may have depleted the food murres eat.

The tar balls were collected at the request of Dennis Lundine with the Alaska Department of Environmental Conservation in Anchorage. Scarbrough gave some of the tar balls to ADEC and some to Richard Jameson, the attorney for the village of Perryville. When we called ADEC to

get the results of the tests on the tar balls, Lundine said Perryville would have to pay for the tests. Mark Kuwada with ADF&G, Division of Habitat and Restoration, spoke to ADEC's Bruce Erikson in Juneau in mid-June 1993, regarding the testing of the tar balls from Perryville. Erikson told Kuwada that ADEC would send Mark Broderson to Perryville to collect more samples. Evidently, ADEC staff were concerned because Scarbrough had not filled out ADEC's standard chain of custody forms for the samples, though she did send ADEC her field notes indicating how the samples had been collected and handled. Scarbrough contacted Broderson on April 20, 1994. Broderson said he was aware of the tar balls coming up on the beaches near Perryville, but had been unsuccessful in working with the villages to organize a trip to collect samples. He was unaware of the samples collected by Scarbrough, but added that ADEC would not want to test those tar balls now because of the age of the samples. He said ADEC is still willing to collect and test tar balls from Perryville, if they get the chance. As of April 1994, tar balls continued to wash up on the beach in front of Perryville, according to some residents of Perryville and Ivanof Bay.

The following are comments made to Scarbrough during her March 1993 visit to Perryville.

> Tar balls are coming in more and more near the village. I haven't seen any near the river. We've been finding some with tarred feathers stuck to the oil. I collected some. Our salmon runs have been very poor since the oil spill. It [the spill] must have something to do with the decline.
>
> I haven't seen many seals around since the Exxon deal. There are some dead birds washing up on the beach, more than usual--tar balls coming up too. They are all over. We used to see seals all along the beach. Now we don't see many. We're finding a lot of tar balls along the beach west of here. I saw one two feet in diameter. All winter we've been seeing dead birds along the beach. I haven't noticed if any were oiled or not. It would be nice to have more testing done, I'm not sure how safe shellfish are to eat.
>
> I saw a half dozen murres dead on the beach. I told the Refuge [staff] about it, but they weren't interested. We have no more silvers left in our river. The sea lions are starving, and there aren't many here anymore.

Ivanof Bay

> I saw sick murres on the beach about six months ago. I don't know what caused their death. There should be a tissue sample collected to see if they are being affected by the aftermath of the oil spill. There are still oil balls coming up on the beach.
>
> A couple of years ago, I wasn't feeling too confident. Along the coast, I found black crude oil inside of barnacles. I still dig and eat clams, but wonder about their safety.
>
> I don't really know what is causing the declines of seals and sea lions in our area. Maybe it is pollution, or lack of food. It might have something to do with the oil spill. We are still finding oil outside of the bays.
>
> I saw some tar balls at Humpback Bay the other day. There were big ones. I found some at Ivanof Bay too, near First Creek.

PHONE CONTACTS

Kenai Peninsula

Seward

Jean Galzano of Qutekcak, the local native association in Seward, was contacted by telephone on June 26, 1993, and informed about the subsistence restoration project. She was asked whether there were any concerns regarding subsistence foods and the oil spill among subsistence users in Seward. She said she didn't know. She offered to talk to the president of Qutekcak and get back to the Division. She was faxed information on the subsistence foods testing project, that same day. We never heard back from Qutekcak.

Kodiak Island

Division of Subsistence staff, Rachel Mason and Jeffrey Barnhart, contacted community leaders on Kodiak Island, between May 19 and May 24, 1993 to determine whether oil spill related subsistence food safety concerns persisted in these communities. We considered the concerns expressed by community residents and leaders, the recommendations of the Kodiak staff, and information available from earlier studies. We decided not to test any finfish from the Kodiak area. Little concern was expressed by the residents of Kodiak Island about bottom fish, as compared with the concerns residents of the Prince William Sound and Lower Cook Inlet communities expressed about these resources. Although a number of the people the Kodiak staff contacted wanted to see salmon tested, we decided not to test them. We knew from tests conducted in Prince William Sound and elsewhere, in the two years after the spill, that even salmon swimming through oil slicks did not show signs of contamination in their edible flesh. Rachel and Jeff contacted the same people again between June 11 and June 16, 1993, to tell them which sites would be sampled, and the reasons for our decisions. Their report on the results of these conversations is attached as appendix 2 and is summarized below.

Kodiak City

Four people were contacted, including two representatives of the Kodiak Area Native Association and two members of the city government.

Margie Derenoff of the Kodiak Area Native Association thought that shellfish, birds, sea otters and seals should all be tested. She also thought that there should be some follow up to studies on intertidal resources and algae on the Alaska Peninsula shores.

Margaret Roberts of the Kodiak Tribal Council wanted to see a priority placed on the testing of sea mammals and mollusks. She said that people in the Kodiak area were "still finding oil all over--in areas that were heavily impacted."

Gary Bloomquist, Kodiak City manager, said that he did not know of any resources or any areas that needed to be tested for oil. He had not heard of any problems with subsistence foods. He said he would check around and get back to Jeff and Rachel if he heard of anything.

Jerome Selby, Kodiak Borough Mayor, said that he did not know of any current problems with subsistence foods in the Kodiak area. However, he thought the sites which showed elevated hydrocarbon levels in 1989 should be tested again in 1993 as a follow-up. He mentioned Izhut Bay and Chief Cove as likely locations.

Based on these conversations, and the advice of the Kodiak staff, it was decided not to test any resources from the subsistence harvest areas of Kodiak City. Although some interest was expressed by community leaders in seeing resources tested there, the concerns expressed by other communities took priority for the limited funds available for testing.

Ouzinkie

Arthur Haakanson, Lands Manager for the Ouzinkie Native Corporation, offered the observation that people in Ouzinkie had been eating the clams and they seemed to be alright. He said that people had complained of oil and tar, but he himself did not know specifically where it was. If there were to be testing, he suggested Camel's Rock, Doctor's River, Garden Point, and both sides of Sourdough Flats. These were all popular subsistence harvesting areas for Ouzinkie residents. Arthur thought that the people doing the sampling should be sure to dig beneath the surface. He also mentioned that anadromous streams should be checked, since the salmon seemed "off" in population. Although there were reports of widespread bird deaths, Arthur did not think these were linked to the spill.

Zach Chichenoff, Ouzinkie Mayor, said that cockles and clams should be tested from Camels' Rock. Zach indicated that he did not do much subsistence harvesting himself. He reported that Andy Anderson, while digging clams at Camels' Rock, found an unknown oily substance in the substrate. Zach also said there were not many Old Squaw ducks around since the spill.

Theodore Squartsoff, active subsistence harvester, emphatically stated that no more testing was needed. He said his family was still eating the same wild foods that they were eating before the spill and had eaten since then, and he was still harvesting in the same places. He had noticed a decline in the population of clams, and that those clams that were there were limp and lifeless, but he did not think this had to do with oil. He believed that either sea otters were getting them, or that they had been over-harvested by humans.

Herman Squartsoff of the Ouzinkie Tribal Council, had not personally seen any recent problems in the area with subsistence foods as a result of the spill. But he said he would talk it over with others in the community, and call us back if he heard anything. He said that shellfish and possibly ducks ought to be tested that year. He didn't know about seals or deer. He did not offer suggestions on specific areas to be tested, saying only that these should be "local" areas.

We decided to collect samples of mussels, butter clams, littleneck clams, and chitons from Camels' Rock, and mussels, butter clams, littleneck clams, and sea urchins from Sourdough Flats.

Port Lions

Bobby Nelson, president of the Port Lions Tribal Council, said he had been eating everything himself and had not seen any problems with subsistence foods. He promised to ask around at the tribal office and call if he heard anything new.

Sue Girard, Vice president of the Port Lions Tribal Council, expressed more concern about the social impacts of the spill than about hydrocarbons now in the foods. "They won't find anything," she predicted when she heard that the 1993 testing would be for oil contamination. However, she said if it were up to her, all the resources should be tested that year. She suggested that samples be taken in Barabara Cove and in the clam beds by the Port Lions airstrip as well as in Litnik, Marka Bay, Danger Bay, and other bays on Afognak Island. She emphasized that the testers would have to dig in the sand to find oil: "Of course they're not going to see any oil on the surface."

Pete Squartsoff, an active subsistence harvester, was skeptical of the value of doing any testing. He stated that he had never had any problems with any subsistence resource. Even during the oil spill, he said, he was critical of the testing program and didn't see any need for it.

Initially, we decided not to test any resources from Port Lions, but after additional conversations with Sue Girard, we agreed to test mussels and butter clams from a site near the airstrip.

Larsen Bay

Allen Panamaroff, Larsen Bay City Mayor, thought the 1993 samples should be taken of the same resources and in the same areas tested in 1989 or 1990, so the results could be compared. He suggested testing clams, mussels, bidarkies, sea urchins, bottom fish (especially halibut), and crab. He thought that some resources, including crab, had been dropped from earlier testing programs because of bad weather. He wanted to be sure that crab were tested that year. He also wanted to see salmon from the Karluk River tested. Although he did not think these resources were as critical as others, he also wanted to see berries tested, along with land mammals that went down to the beaches and might have encountered oil there. Allen added that although there were still people in Larsen Bay who wouldn't go to get clams, in the last year they seemed to be coming around. There was less and less concern about oil contamination.

Frank Carlson, former Larsen Bay Tribal Council President, thought that clams, sea urchins, halibut, and harlequin and goldeneye ducks should be tested. In recent months, he had not personally seen any oil-related problems with subsistence foods. He commented that the Cheifs' Point area was used prior to the spill for harvesting clams, and was no longer used because of the fear of oil contamination. No bivalves were ever tested from Chief Point. Frank said he spoke to setnetters who said they found oil at Chief's Point that spring.

Mike Carlson, Deputy Mayor of Larsen Bay, said that crab and other shellfish (especially clams), halibut, harlequin ducks, and goldeneye ducks should be tested this year. In his opinion, Spiridon Bay should be tested, as well as areas closer to Larsen Bay. Mike had not recently seen any problems with subsistence foods as a result of the oil spill.

Brad Aga, Village Public Safety Officer and active subsistence harvester, said he did not see any need for testing. He said most shellfish harvesting occurred close to the community. People did not seem hesitant about harvesting these resources. Harvesting occurred on most every low tide. He said no one had indicated any problems associated with the spill.

Alex Panamaroff, postmaster of Larsen Bay, thought that clams and deer should be tested. He wanted deer to be tested because they ate kelp. He thought that the butter clam beds in Larsen Bay should be tested, as well as the razor clam beds at Long Beach. He was particularly concerned about clams taken from "across the bay". He mentioned that people had found clams with "black stuff" in them. He said, "Since the oil spill I and my family have eaten less than twenty-five percent of what we used to. We won't know the effects for many years. We've had some bad commercial salmon fishing years."

We decided to collect samples of mussels and clams from Chiefs Point.

Karluk

Larry Sugak, former Tribal Council President in Karluk, said that 1993 tests should look at returning salmon to see whether they have been affected by oil. He also thought that clams should be tested, especially the razor clams at Sturgeon Bay, in the lagoon. In 1989, Larry found some sheen in the water while harvesting clams here. He still didn't trust the clams. He saw tar balls drifting in, now and then, in the Karluk Lagoon.

Eli Malutin, Tribal Council member, thought that halibut and clams from the Sturgeon River area should be tested.

Katherine Reft, Tribal Council Member, said that bottom fish, especially halibut, ought to be tested. There seemed to be less bottom fish since the spill. Not many people had been catching halibut lately. She also thought sea urchins and chitons should be tested. She wanted to see the whole area around Karluk tested. According to Katherine, people were still finding tar balls with dead birds in them near the Sturgeon River.

We decided to collect samples of mussels, butter clams, and littleneck clams from the

intertidal area at the mouth of the Sturgeon River.

Akhiok

David Eluska, Deputy Mayor of Akhiok, said that razor clams from Tanner Head, and butter clams and chitons from Akhiok Island should be tested. He said the pink salmon run had been pretty poor around Akhiok in 1993. He wondered if there might be some tests done on this species, not necessarily for oil contamination, but to see if there were population changes, possibly oil related. Mr. Eluska said people in Akhiok were still wondering if it was OK to eat subsistence foods. He said that some people were still harvesting in the inner bay, because there was less oil spill activity there than in the outer bay. He wanted some samples taken from both the inner and outer bays.

We decided to collect samples of mussels and clams from Tanner Head.

Old Harbor

Sven Haakanson, former Mayor of Oil Harbor, thought that mussels, clams, and other shellfish needed to be tested this year. He suggested that testing be done in the Sitkalidak Straits. Sven reported that people in Old Harbor were still finding a few tar balls. He mentioned that there were people who hadn't eaten any clams since the oil spill.

Wanda Price, Old Harbor City Clerk, said that the 1993 test should take "a sampling of everything." She was most concerned about Fox Lagoon and the Sitkalidak Straits.

We decided not to test any resources from the subsistence harvest areas of Old Harbor, because what concern there was seemed to be more related to paralytic shellfish poisoning than oil contamination.

SURVEYS

The Division of Subsistence conducted surveys of harvests of fish and wildlife for home use, and on the social effects of the oil spill in communities throughout the spill area. Based on our finding comparatively little continued concern in Valdez and Cordova over contamination to subsistence foods by the spill, these communities were dropped from the list of communities where testing would occur. Valdez residents did, however, express concern about the effects of chronic oil pollution in the Port of Valdez on shellfish as a result of operations at the Alyeska pipeline terminal and tanker dock.

OIL SPILL HEALTH TASK FORCE MEETING

On August 24th and 25th 1993, representatives began traveling from their home communities to Anchorage to participate in a meeting of the Oil Spill Health Task Force (OSHTF). The OSHTF meeting took place on August 25th at the Alaska Native Medical Center. Of the ten community representatives who were expected, only five managed to make it to the Anchorage meeting. The rest were delayed by bad weather on Kodiak Island. One representative did make it in from Kodiak Island, Sven Haakanson, Sr. from Old Harbor. He avoided the bad weather by coming to Anchorage a day early. The other community representatives present were Larry Evanoff from Chenega Bay, Roy Totemoff from Tatitlek, Robert McMullen from Port Graham and Ephim Moonin from Nanwalek (formerly English Bay). In addition to the community representatives we had invited two Alaska Department of Fish and Game employees to attend the meeting; Evelyn Brown from Cordova, and Ted Meyers from Juneau. We also invited Bruce Wright and Jeff Short who work for the National Oceanic and Atmospheric Administration at the Auk Bay laboratory.

Rita Miraglia presented information on the collection of subsistence food samples for hydrocarbon testing.

Four of the five community representatives made statements about the situations in their communities with regard to the spill. Roy Totemoff brought a written statement from Gary Kompkoff, President of the Tatitlek Village Council, which he asked Miraglia to read aloud. A copy of this statement is attached as part of appendix 7.

Larry Evanoff from Chenega Bay, said that he agreed with Gary Kompkoffs' statement. He added that seals were scarce in his area, and that no one from Chenega Bay was even trying to harvest clams from near their community, because they were afraid to. He said, "The beaches around Chenega Bay continue to ooze oil".

Ephim Moonin from Nanwalek said that a lot of people from his community still don't trust the safety of the seafood. He also said that tar balls were still being found on the shores of the lower Kenai Peninsula.

Sven Haakanson from Old Harbor said that many people in his community still would not eat clams because they were afraid to eat them. He said that the previous last summer (1992) four people got sick from eating clams. It seemed that the issue here was paralytic shellfish poisoning (PSP), rather than the oil spill, but that people did not make that distinction. Judy Meidinger, representing Exxon at the meeting, pointed out that the Alaska Department of Environmental Conservation tests commercial beaches for PSP, but will not test subsistence beaches.

The next topic of discussion was viral hemorrhagic septicemia (VHS) in herring in Prince William Sound. Only one third the expected number of herring returned to Prince William Sound in the spring of 1993. Many of the herring that did return had lesions. Residents of Tatitlek reported that there was very little spawning observed. Residents of Chenega Bay and Tatitlek use both the herring, and the herring roe on kelp, for food. Evelyn Brown, a biologist with the Division of Habitat and Restoration gave a brief chronology of the problem including a description of actions taken in the field. Ted Meyers, a pathologist with the Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development discussed steps taken in the laboratory to determine the cause of the problem. According to Meyers, VHS was the only pathogen identified in the herring. A diagnosis of VHS is consistent with the observed symptoms. Meyers said that it is likely that VHS has always been present in the herring population, but that something had stressed the fish and weakened their resistance to the virus. One possible source of stress is the spill and clean up. However, such a connection is difficult to prove conclusively. Meyers emphasized that the virus is not a threat to human health, although he acknowledged that the lesions are not very appetizing. According to Meyers, fish viruses do not transmit to humans. Laboratory tests have shown that salmon are not easily infected with VHS, but rainbow trout are susceptible.

Next, discussion focused on a paper delivered at the Atlanta conference: Fingerprinting Hydrocarbons in the Biological Resources of the *Exxon Valdez* Spill Area by Bence and Burns. The OSHTF was interested in this paper in particular, because it purports to discredit data from the studies undertaken by the OSHTF, and it received wide attention in the press. Jeff Short, from the NOAA laboratory in Auk Bay explained that the paper contains a few valid points, but in general it represents a misuse of raw data collected as part of discovery for the legal cases pending against Exxon.

Several times during the course of the meeting, the community representatives were asked what could be done to "convince" them that their subsistence foods were safe to eat. Larry Evanoff of Chenega Bay said, "Get the oil off the beaches". The advice of the OSHTF had been and continued to be that shellfish from beaches where oil was observed on the surface or subsurface should not be consumed. It was also pointed out that as long as people continued to see abnormalities, such as those observed in the herring, they would be wary of consuming local wild foods. Additionally, there continued to be a scarcity of some resources.

Subsistence users in Prince William Sound, especially residents of Chenega Bay had found it necessary to travel long distances to harvest foods to replace resources which were either unavailable or deemed unsafe to eat in their pre-spill harvest areas. These trips were paid for by individual harvesters, at a time when few jobs were available in their communities, and those who relied on commercial fishing for their income were hurting with the failure of the herring and pink salmon runs that year. At the OSHTF meeting, funding for such harvesting trips and support for an exchange of resources between communities were again identified as urgent needs in the Prince William Sound communities. The *Exxon Valdez* Trustee Council declined to fund such activities in 1993, because it was the opinion of lawyers working for the U.S. Department of the Interior that it would constitute economic restoration, and would not be a legal use of the settlement dollars. It was estimated that fifty thousand dollars a year would suffice to fill these needs.

TOURS OF THE NATIONAL MARINE FISHERIES SERVICE LABORATORY

The next day, the same five community representatives traveled to Seattle, accompanied by Alaska Department of Fish and Game personnel Rita Miraglia with the Division of Subsistence and Dean Hughes with the Division of Habitat and Restoration.

The tour of the laboratory took place on August 27, 1993. One of the people sent by the laboratory to pick the group up at the hotel was Tom Merculieff, an Aleut originally from Saint George, Alaska. He was a technician at the laboratory, and had been involved in the subsistence food testing for the last two years. At the laboratory the group was greeted by Dr. Usha Varanasi, director of the laboratory. Dr. Varansi introduced the group to her staff, and there followed brief talks on the history of the laboratory, bile metabolite screening, the analysis of flesh samples for the presence of hydrocarbons, fingerprinting of oil and the meaning of one part per billion. This brief instructive program was followed by a question and answer period. The community representatives had quite a few questions, many of them very insightful. There was some confusion about the function of the laboratory, and it had to be explained that the laboratory does not make any determinations about the safety of foods for human consumption. That role had been undertaken in the response to the spill by the Oil Spill Health Task Force, the U.S. Food and Drug Administration, and the Expert Toxicological Committee.

Next the group was given a tour of the laboratory itself. They were not able to follow a single batch of samples through the testing process, because it takes about one week for each batch of samples to be run through all the steps. However, they did get to see actual samples go through the various steps. The laboratory staff did a very good job of explaining the process. Dr. Sin-Lam Chan, assistant director of the laboratory and Catherine Sloan laboratory supervisor accompanied the group throughout the tour to answer any questions that came up. After the tour, there was another question and answer session.

During this second question and answer session, a lot of very pointed questions were raised. Larry Evanoff asked, "Who signs off on your [the laboratories'] expertise?" Don Brown, a research chemist at the laboratory, said "Other laboratories test our methods, and must be able to reproduce our results".

Sven Haakanson asked, "Do you get any money from Exxon?" Dr. Chan replied, "No". Robert McMullen asked, "Has any of your staff worked for Exxon in the past?" The answer, provided by Don Brown, was "No."

A number of the community representatives made comments to the effect that they were coming away with a better sense of how the tests were done. Some also said that they now had more trust that there is a sincere attempt on the part of the laboratory to get accurate test results.

The group returned to Anchorage the next morning. From there the community representatives caught their connecting flights home.

A second tour of the National Marine Fisheries Service laboratory occurred on September

22, 1994. Craig Mishler, with Subsistence Div., ADF&G accompanied representatives from Kodiak area communities that had missed the 1993 tour. Attending representatives included; David Eluska Sr. of Akhiok, Tony Azuyak of Old Harbor, Virginia Squartsoff of Larsen Bay, Mary and Alicia Reft of Karluk, Pete Squartsoff of Port Lions, Angeline Campfield of Ouzinkie, and Mark Olsen and Margaret Roberts of Kodiak.

At around 11 a. m. the group was welcomed by John Stein, deputy director of the lab. The first presenter was Dr. Jack Wekell, an expert on PSP, who promptly dismissed the beliefs people had about "red tide" being associated with shellfish poisoning. He was emphatic that the rule of thumb about harvesting clams only in the "R" months was not useful because PSP has been well-documented in November and December in Washington State waters. Tony Azuyak heard that if you boiled a quarter with your clams that would take care of the PSP. Wekell rejected that also. The only reliable way to test for PSP today is with mouse bioassay. Samples from commercial beaches are fed to mice to see how they respond. If they don't keel over, it's assumed that humans can eat them with no ill effects.

Other presentations were given by Sin-Lam Chan, Peggy Krahn, Tom Hom, and Don Brown. After this, the group took a break and were given a tour of the lab by Catherine Sloan, who showed then the extraction laboratory, liquid chromatography, gas chromatography, mass spectrometry, and computerized data processing. At one station the group witnessed some of 1994's clam samples being unwrapped and prepared for testing. Following the tour the group returned to the conference room for additional questions and answers.

Tony Azuyak asked, "Is there any way the oil spill could have affected the immune systems of the clams and other shellfish?" Dr. Sin-Lam Chan answered, "Not as far as we can tell and certainly not for those clams showing very low levels of exposure to oil".

Margaret Roberts asked, "What is a safe level of hydrocarbons, and does the lab also look at PCB's? We're wondering about the Russians dumping chemicals and nuclear waste in the ocean". Dr. Sin-Lam Chan answered, "You must look at the tissues for evidence of PCB's. They can't be found in the bile. However, DDT is actually more of a concern to us than PCBs".

Tony Azuyak said, "In Old Harbor we see little white balls in the flesh of the salmon, and we throw those salmon away". Pete Squartsoff added, "We only see this in the sockeyes and cohos, not in the pinks and chums, but it's happening more and more often". "Maybe white balls are actually tumors," David Eluska hypothesized. John Stein responded by saying, "We've never found any tumors in the flesh of fish we've tested here".

John Stein talked a good deal about Quality Assurance--the lab's system of checks and balances to make sure error is eliminated and that the instruments used for measuring contaminants are clean. Even a puff of automobile exhaust sucked into the lab will show up right away in the results.

At the end, Angeline Campfield of Ouzinkie, said: "Very impressive. I don't have any doubts now about the reliability of the tests." Pete Squartsoff said the tour just confirmed what he knew all along, that the salmon, clams, and other shellfish were never seriously damaged by the oil spill. He said he wished this presentation could be made right in the villages instead of in Seattle, so that people would really be convinced.

The tour ended at 2 p.m. and the group returned to Anchorage the following day. According to Craig Mishler, "The trip was successful in making believers out of at least some of the people who toured the NMFS lab and saw the tests being performed on their clams. The trip was highly educational, constructive and worthwhile." See appendix 5 for Mishler's trip report on the tour.

PRODUCTION OF INFORMATIONAL NEWSLETTERS

As part of the effort to keep subsistence users informed about the progress of the project, an informational flyer and two newsletters were produced. A copy of the 1994 newsletter is attached as appendix 6.

It was considered important that the findings of damage assessment and restoration studies be integrated into this communication effort. As new information was released, it sometimes caused renewed concern among subsistence harvesters. It was not always possible to anticipate the effect a technical report, or the media accounts derived from it, would have in these communities. The newsletter served to put this information into context for subsistence users, following an evaluation of the information by the Oil Spill Health Task Force. It was also important to follow distribution of the newsletter with community visits. These involved informal visits to households and formal meetings. The purpose was to enable a dialogue to develop between the researchers and the communities regarding the study findings.

The flyer and newsletters were mailed out to approximately 4,100 people, including residents of communities impacted by the oil spill, agency staff, and anyone else who had indicated interest in receiving the newsletter. In addition, copies of the newsletter were distributed during community meetings, and other visits to the impacted communities.

The flyer was sent out in April 1993. It announced that the Trustee Council had funded a Subsistence Restoration Project, and outlined the goals of the project, as well as the methods that would be used to achieve them. The flyer also summarized the earlier subsistence food testing projects, and the advice of the Oil Spill Health Task Force.

The first newsletter was produced in November 1993. It contained an article presenting the results of tests on samples of subsistence foods collected in June and July 1993. Another article described a tour of the NOAA/NMFS laboratory in Seattle for representatives from some of the communities impacted by the spill. The results of the earlier studies were again summarized. The newsletter also contained an article describing how the hydrocarbon tests are done.

The second newsletter was sent out in February 1994, and reported results of tests on the fish, shellfish, seal and duck samples collected in September 1993. It also included an article on the Oil Spill Health Task Force meeting held in Anchorage in August 1993, including information on Viral Hemorrhagic Septicemia presented at that meeting by Dr. Ted Meyers, a fish pathologist with the Alaska Department of Fish and Game. The advice of the Oil Spill Health Task Force was again summarized, and a round of community meetings planned for February and March 1994 was announced.

The third newsletter was issued in August 1995, but it is included here because it reported test results on the seal, duck and shellfish samples collected in 1994.

During the community meeting held in Tatitlek in March 1994, John Wilcock, a fish biologist was asked by village council president, Gary Kompkoff whether the information from his project on herring would be available to the public. "I don't mean as a technical report, I mean as something we can understand, like this", Mr. Kompkoff said, pointing to a stack of the Subsistence Restoration Project newsletters.

COMMUNITY MEETINGS AND CONTACTS: FEBRUARY 1994-APRIL 1994

A round of community meetings were held in February and March 1994. These meetings served three purposes; 1) to report the results of hydrocarbon tests on samples of subsistence resources collected in 1993; 2) to assess the level and nature of any continued oil spill related concerns, and; 3) to plan the 1994 subsistence food sample collection and testing.

Based on concerns expressed in the community meetings, and conversations with community leaders and other community residents, decisions were made as to which resources and sites to sample. Since funds were limited, priority was given to sites that were; 1) significantly oiled by the Exxon Valdez spill; 2) constituted important subsistence sites prior to the spill, and; 3) had been missed in the 1993 round of sampling.

A summary of the 1994 community meetings and contacts is presented below.

Kodiak Island

On February 22, 1994, a meeting was held for representatives of communities in the Kodiak Island region at the Lions Den Lodge in Port Lions. Alaska Department of Fish and Game staff attending the meeting were Rita Miraglia and Craig Mishler with the Division of Subsistence and Dean Hughes with the Division of Habitat and Restoration. The community representatives were Ron Lind and Donny Lind from Karluk, Roy Jones and Randy Christensen from Larsen Bay, Tony Azuyak from Old Harbor, Mark Olsen from Kodiak City, and Nicholas Pestrikoff and Herman Squartsoff from Ouzinkie. Sue Lukin Girard, Ivan Lukin, and Robert J. Nelson, all of Port Lions, attended the meeting. Kate Wynne a marine mammal biologist and John French, both from Kodiak City, also participated. John French had been invited to attend as a member of both the Expert Toxicological Committee and the Public Advisory Group to the *Exxon Valdez* Oil Spill Trustee Council, and turned out to be an invaluable asset during the meeting.

Miraglia started a short presentation by telling the attendees that they should interrupt if they had any questions or comments. She began by talking about the Oil Spill Health Task Force, and the Expert Toxicological Committee. After one slide, and two transparencies, the questions started. Mark Olsen from Kodiak City wanted to know where the members of the expert toxicological committee were from. His concern was that people from outside the area couldn't know anything about the subsistence resources people rely on. Ron Lind from Karluk echoed this concern. John French explained what the committee looked at, and that clams in the lower-48 react to oil the same way as clams on Kodiak Island.

The group was very lively, and had many questions. Miraglia abandoned the slides and overhead transparencies early on. All of the important points got covered, by answering the questions from the group. It was a good, dynamic meeting, and the community representatives seemed satisfied with the answers to their questions.

In general, though subsistence users on Kodiak Island are not experiencing the kind of resource scarcity or abnormalities that those in Prince William Sound are, the contamination concern is similar. In fact, it seemed there was more concern about immediate health effects to humans from eating oil contaminated resources among the Kodiak representatives than in the other regions impacted by the oil spill during this round of community meetings. This may be because the residents of the Kodiak Island communities have been less exposed to the information coming out of the Oil Spill Health Task Force and the Subsistence Restoration Project, and have definitely had less one-on-one attention in this respect. It will be important to concentrate more on Kodiak Island in this year's subsistence restoration project than has been the case in the past.

There was a general concern among the Kodiak Island representatives that even if there is no oil in the edible flesh, that processing the oil contamination has somehow changed the animals in such a way as to make them toxic. There were also several references made to oil in the beaches of Kodiak Island. Miraglia was surprised by this, as it was the first time she had heard about subsurface oil on Kodiak Island. We do not know whether ADEC has documented this.

The community representatives all agreed that they do not think the Trustee Council has heard their concerns. There is also dissatisfaction with the way in which testimony from the communities is handled by the Trustee Council. Roy Jones of Larsen Bay said, "A community representative represents a lot of people and their testimony shouldn't be counted as that of one person". Mark Olsen from Kodiak City added, "We're not just talking about oil here, we're also talking about credibility. The problem won't be resolved until we have mutual respect".

The representatives unanimously expressed the opinion that the Trustee Council should come to Kodiak and visit their communities. They think this is necessary if the Trustee Council wants to understand the problems the people there are having. At a minimum, it would be a

good idea for the Trustee Council staff to contact these communities and offer them the opportunity to be included in the Trustee Council meetings by teleconference.

The community representatives were asked whether there were any continued concerns in their communities with regard to subsistence food safety and the *Exxon Valdez* oil spill. They were also asked what resources and sites, if any, should be tested from their area in 1994. Their responses to these questions are summarized below.

Port Lions

The Port Lions representatives said the red salmon that returned here in 1993 were smaller than normal. They are not sure if this is due to the oil spill. They would like to know if there is still oil laying on the bottom and if so, whether it is dangerous. They are especially concerned about the bottom where beaches were cleaned, near the old village.

Ivan Lukin said he and his wife were part of a beach clean up crew in 1989. Locally, in some places, the oil was two feet and deeper down in the beach sediments. The straits were loaded with sheen.

In 1994, they would like us to test clams at the airstrip, and butter clams from across the bay, at Port Bailey.

Larsen Bay

Randy Christensen said people are still seeing tar balls at the tide line and oil stained drift wood on the beaches in the Uyak Bay area and the outer shores, especially Sourdough Bay.

Roy Jones, who participated in the 1993 sample collections as a local assistant, commented that the last two sampling sites were too far from the community. He asked whether we are only looking for oil in the samples. He is concerned about changes in the animals as a result of processing the oil. He emphasized that there are lingering questions. People are worried about abnormalities in the resources. "The oil was there, where did it go?", he asked.

Randy Christensen said he is concerned about the intertidal area. There are only steamer clams at Jakes Beach (LAB 10) now, there used to be other clams there. Even the steamer clams there are not as plentiful as they used to be. He wants to see that beach tested again. He does not think the problem there is due to sea otters, because sea otters are rarely seen there. He added, "You still see tiny wisps of sheen coming off the beaches today".

Their top priorities for testing in 1994 are sea urchins in the lagoon, directly across from the village (LAB 3), and clams from Jakes beach (LAB 10) and the mouth of Larsen Bay (LAB 2). They would also like to see chitons tested. If possible, they think we should test pink neck clams from Amook Island, but this is the lowest priority.

Karluk

Ron Lind said their biggest concern is the decline of salmon, especially red salmon, and mallard ducks. They are afraid to use clams and mussels. Very few people go to the Sturgeon River to harvest anymore. On some warm days, oil flows out of the beaches, and tar balls have been seen in Karluk Lagoon itself. They are worried about where the oil is, and they are concerned about the risk of cancer.

The representatives listed the testing of razor clams and butter clams from Halibut Bay as their first priority. Mishler pointed out that Halibut Bay is about twenty-five miles from Karluk. They would also like to see us test butter clams from inside the lagoon, and bidarkies from inside the entrance to the lagoon as well as butter clams at Sturgeon River, and red salmon from the lagoon.

Ouzinkie

Herman Squartsoff says they are concerned about deer, clams, sea urchins, bottom fish, especially halibut, and crab. They are eating subsistence foods, but are still in doubt about their safety. The main concern is about the people getting cancer ten or fifteen years down the road. Oil is still seen floating around in the area.

Herman said there needs to be more study on the effects of oil on the clams. There has been a big decline in clams everywhere. At Sourdough Flats (OUZ 7) there are now lots of big empty clam shells. There has also been a big decline on Cat Island. "There is a massive amount of empty adult clam shells on the beaches near Ouzinkie", he said.

He observed, "Society has changed the way of living for the people, the oil spill made it worse, it scared everyone a lot more. We need to get back to the subsistence lifestyle, or we'll lose it".

Herman said someone recently harvested a deer near Ouzinkie that smelled bad, and it was discarded.

They would like us to test horse clams from between the narrows and the airstrip, across from Gardens Point. They also want to see chitons tested.

Kodiak City

Mark Olsen said that people took subsistence for granted before the oil spill. He doesn't go out harvesting anymore since the spill. He has deferred the enjoyment, trust and desire to eat subsistence food because of concerns about oil contamination. He wants to see someone look at the food chain. He said people have reluctantly gone back to the beaches to harvest. They are still seeing deformities in the resources.

Mark Olsen said his first priority was to have butter clams and steamer clams tested on the spit running between Sheep Island and Gull Island. John French pointed out that is next to the boat harbor. Craig added that we have already tested there. Mark said he would also like to see clams on Kalsin Island tested, and bottom fish from the Chiniak Bay area. He said sea otters should be tested as an indicator of what's going on with shellfish.

Old Harbor

Tony Azuyak said there was an outbreak of paralytic shellfish poisoning in Old Harbor a few years ago, which really scared people. He eats clams anyway. Recently, birds have been found with oil mousse on their feathers, and people have been seeing tar balls.

Tony tentatively said he thought we should test butter clams and sea urchins from Sheep Island, the Narrows or Amy Bay. He asked that we check back with him after he has had time to talk with other people in Old Harbor about this.

Akhiok

The Akhiok representatives were unable to make it to the regional meeting due to bad weather. Craig Mishler spoke over the telephone with David Eluska Sr., Vice President of the Akhiok Tribal Council on March 8, 1994. David echoed the complaints were heard from Ouzinkie and Larsen Bay that butter clams are increasingly harder to find, but also acknowledged people have not been attempting to harvest as much lately.

David asked that we test razor clams from Tanner Head and butter clams outside Akhiok Island near the village.

Kenai Peninsula

Nanwalek

The community meeting in Nanwalek was scheduled for 2 PM on February 24, 1994. No one showed up for the meeting, so Rita Miraglia visited informally with residents of Nanwalek to discuss the subsistence restoration project.

Miraglia was later told that the meeting conflicted with a tsunami workshop at the school, and the community's traditional dance group was performing in Fairbanks. Very few people knew about the meeting, and many of those that did were under the misunderstanding that it was an Exxon meeting.

Miraglia met with Vincent Kvasnikoff, the Village Council President, in his home. He wants to see clams, bidarkies and sea weed tested from the Flat Islands. He said people used to get seals at the Flat Islands, but "you don't see seals there anymore". He said some people are still afraid to eat seafood. He told me that in 1989 oil mousse hit the shore at Russian Point, and it also hit the beach below the runway. He said there was oil mousse on his native allotment, too. He noted that the red salmon coming in last year were smaller than usual, but he doesn't know whether that is because of the oil spill or if it is because of the English Bay River sockeye salmon enhancement project.

One man Miraglia spoke to said we should test bidarkies and octopus from Dogfish Bay. He would also like to see red salmon tested from the English Bay River.

Another resident she visited with, suggested testing fish and shellfish at Port Chatam. He said there used to be butter clams and cockles there. Before the oil spill those shellfish beds seemed depleted. There was a lot of oil clean up in Port Chatham. He said people get a lot of fish out of there, especially pinks, chums, flounder and halibut. While he would like to see the resources there tested, he did not feel this should be the first priority. He agreed that testing shellfish from the Flat Islands and Dogfish Bay were both good suggestions. The need to set up an easy way to get abnormal specimens that people encounter to Anchorage so a pathologist or biologist can look at them was also discussed. Division of Subsistence staff need to talk with pathologists and biologists, and possibly set up an account with Southcentral Air, so community residents don't have to pay to ship the samples.

Port Graham

Rita Miraglia attended a community meeting on the subsistence restoration project in Port Graham on February 25th. The meeting began at one in the afternoon. About a dozen people attended, most of them active hunters.

Miraglia summarized the results of the 1993 testing. When she said that the clams from Duncan Slough tested low, so low as to be within the margin of error for the tests, Chief Elenore McMullen said, "Wonderful, that is just what I have been waiting to hear. Now we can harvest our clams again". The group said they wanted to see whelks tested from the same location (Duncan Slough) in 1994, because whelks were observed eating the oil in 1989.

Miraglia mentioned that she has been trying to run down information on the boat cleaning station in Port Graham Bay, and has had trouble finding records regarding the chemicals used there. A number of people at the meeting worked at the station in 1989. They said VECO actually ran the station, and were able to give partial names of the VECO foremen. One concern people here have is the effect of inhaling the chemicals used in cleaning the boats.

One of the men who worked at the boat cleaning station said they did not use the vacuum system Exxons' Rob Dragnich has described for cleaning the outside of the boats here. That system was only used for cleaning the inside of fish holds. Outside, the spread of the chemicals was only controlled by boom.

The people attending the meeting also made the following observations about local resources in relation to the oil spill:

- The mussels in this area all died when the oil hit, and they have been growing very slowly since the spill.

- The birds have finally started coming back here. All the Arctic terns died after the spill.

- This past year there were more herring and tomcods than the year before.

- One man said there were not very many chum or silver salmon last year.

The Village Chief, Elenore McMullen, said there were more reds, and she thought there were enough silvers. She also saw more ducks in the past year than she has in a while; The hunters agreed they are seeing somewhat fewer sea lions. People here are not concerned about any decline in sea otters. Some locals have been hunting them recently.

Miraglia also attended the annual Port Graham Village Council meeting on March 1, 1994. She was the last speaker on the agenda before the nominations for Village Council elections.

Miraglia presented the 1993 test results from the subsistence food safety testing project, emphasizing that all of the samples showed very low levels, so low they were within the "margin of error". She talked about the planned future testing, and summarized the discussions at the community oil spill meeting the previous Friday. There were a few questions, mainly about abnormalities people had heard about from Prince William Sound such as seals with yellow pus under their flippers, and viral hemorrhagic septicemia in herring.

There was little discussion about any of the information presented. This was partly because people were already tired. Another important factor was that a potluck dinner was scheduled to start as soon as Miraglia finished speaking. People could already smell the food, which was laid out on the tables and waiting.

During the visit to Port Graham, Miraglia was given a tar ball which had been collected by a community resident from Johnson Slough the last week in February. It was collected in a glass jar. When Miraglia returned to the community to conduct harvest surveys at the end of March, she was shown another tar ball which had recently been collected in the area. This second tar ball was highly aromatic.

Prince William Sound

Chenega Bay

Jody Seitz and Rita Miraglia participated in a health fair in Chenega Bay on March 12, 1994. The Division of Subsistence had a table there with information on the subsistence food testing program, and staff were prepared to answer any questions. Unfortunately, very few adults attended the health fair, which drew mostly children and teens.

Miraglia visited informally with community residents and discussed the subsistence food testing project in the afternoon.

One hunter said he got five ducks that day. He said he's been having good luck with them, he got about ten other ducks in the previous couple of weeks.

One man said he would like to see clams tested from just below the village again for hydrocarbon contamination. Another wants to see deer from Sleepy Bay tested. He said deer are more scarce than they were before the oil spill.

There was a potluck dinner in the evening. A formal community meeting had been

scheduled after the potluck. However, there had been a change in plans. The Village Council President, Larry Evanoff, asked Miraglia to make her presentation at the potluck.

She gave a brief summary of the most recent test results, and asked that people let the Division of Subsistence staff know what they would like to see tested this year.

There were only a few questions, most of them from one person. There was no clear indication of what should be tested or where. Miraglia pointed out that she and Seitz would be available if anyone had questions or suggestions.

The next morning Miraglia visited the Village Council President at home. She told him she had not gotten the needed feedback from the community, in order to plan for this years sample collection and testing. She agreed to send him a list of all the sites that had been tested in the Chenega Bay area and all the test results, so the village council could review what had already been done before making a decision on what they want done in 1994. He was told that sample collection would not begin until May, at the earliest.

Tatitlek

Alaska Department of Fish and Game staff, Rita Miraglia with the Division of Subsistence and John Wilcock, a fish biologist with the Alaska Department of Fish and Game in Cordova, who works with herring, attended a community meeting in Tatitlek. The Tatitlek community meeting took place at 2 PM on March 17, 1994. At that time, in addition to the Village Council President, there were two adults and a child present. Another adult came in later.

Miraglia talked a little about the test results from 1993. She then opened the floor for comments or questions.

There continues to be concern in Tatitlek about the safety of subsistence foods, these result from a basic distrust of the advice they have been given, observed abnormalities in many of the resource species, and scarcity of most resource species. People here blame both the abnormalities and the scarcity on the oil spill.

Gary Kompkoff, the village council president said that stress related illnesses were up in the community. He blames this on the oil spill.

Mr. Kompkoff said that there were no herring in this area last summer, and because of this, there has been a scarcity of the animals that follow the herring. He said this has been a bad year for subsistence. There are no seals, no sea lions, and even very few deer.

Roy Totemoff, who participated in the Oil Spill Health Task Force meeting and visit to the National Marine Fisheries Center laboratory in Seattle last August, made the comment that the meeting and trip didn't help ease fears here. When he reported back to the community on the trip, people said "Let them come here and eat the food. Then we'll believe it's safe". Mr. Kompkoff added that Oil Spill Health Task Force members declined to eat local food when they were offered it. I think this may refer to Tom Nighswander's negative response when he was asked whether he would eat shellfish from an oiled beach.

According to Mr. Kompkoff the community would like invite the members of the Trustee Council to come to Tatitlek. He said he thinks it is very important that the people making the decisions come to the community and meet the people who are affected by those decisions.

There were a lot of questions for John Wilcock, it was good that he was there. He said that the winter of 1992-1993 was a hard one for herring. A poor plankton bloom meant that the herring were malnourished. He doesn't expect to see the same problem this year. Based on the herring he's already seen here, which are fat, he expects this years' herring will be more healthy (This is now known to have been an overly optimistic prediction. "The herring population continued to decline in 1994, although the incidence of disease was less (Brown, draft NRDA report)"

One of the residents present at the meeting said no one ever remembers seeing herring with lesions like that. He also said they were concerned because the herring didn't spawn. Wilcock

said some herring did spawn at Montague Island, but that the herring there also had lesions. Wilcock agreed that the oil spill may well be part of the problem with the herring, but the link would be difficult, if not impossible to prove. He said other factors include El Nino, and changes in ocean currents which change conditions in Prince William Sound.

There were also questions about viruses found in the salmon. These include something called IHN virus, which was found in hatchery sockeye salmon. This particular virus is transmitted to the eggs. Another virus mentioned goes by the acronym VEN.

One resident said they had seen unusually small red salmon with small eggs, which had blood spots at the end of the egg sac. He wanted to know where he could send samples of the abnormal sockeyes he finds. John Wilcock said he could send them to Sam Sharr in Cordova. He recommended sending the whole fish, fresh and not frozen. The fish should be kept cold and sent within twenty-four hours of death.

Mr. Kompkoff said he would like to see seals tested from Tatitlek's harvest areas. He said the numbers of seals, sea lions, and everything else are down even from last year. He said we probably would have to have someone stay there at least a week in order to get samples of five seals.

Mr. Kompkoff said he fears that the future holds a drastic economic change for his community. He sees much more reliance on store bought foods.

Mr. Kompkoff wanted to take time to talk to some people in the community before getting back to us about what sites and resources they want to see tested.

The meeting ended at three. Since they had nearly an hour before they were scheduled to leave the community, Miraglia and Wilcock took the opportunity to visit with one of the community's elders. The elder was glad for the company, and invited them in for coffee and tea. He had a lot of questions for Wilcock, about herring and salmon and enhancement.

The elder said the octopus dens in the intertidal are still empty. Wilcock asked him how they caught octopus. The elder said "We used to go by the moon. When there was a good moon, the tide would go out, and we'd go down there and get them. We knew where they lived, their places under the rocks, and we had a long stick with a hook on the end, we'd push that under there, and pull them out". He also mentioned that people used to occasionally catch king crab on their halibut hooks. He said there aren't any king crab out there now.

PHONE CONTACTS

Alaska Peninsula

Since there was no testing in the Alaska Peninsula communities in 1993, we did not do a systematic canvassing of these communities in 1994. However, Lisa Scarbrough spoke to some residents of Perryville and Ivanof Bay, in April 1994.

Several people in Perryville recently got sick from eating razor clams from Humpback Bay. This was due to the presence of paralytic shellfish poison in the clams. One resident of Perryville told Scarbrough, "We are still concerned about our wild resources following the oil spill. We harvest what we can, but wonder what happened to seals and octopus and other foods that used to be plentiful".

Residents of Ivanof Bay said that the clam population was down in 1993, and the clams were not as big, and "puffy" as normal. However, they say the clams look good this spring (1994). One person said they thought it might be some sort of a cycle, not related to the oil spill.

Residents of both communities said there are still tar balls coming up on the beaches after big storms, but there does not appear to be as much as oil as there was a year ago.

It is Scarbrough's opinion that there would be interest in testing clams for paralytic shellfish poison, but not for oil contamination.

DISCUSSION

Concern over the effects of the oil spill on subsistence resources persists. Although some people are still concerned about the possibility of adverse health effects on humans consuming resources contaminated with oil, many have accepted the advice of the Oil Spill Health Task Force. An article in the March 16, 1995 edition of the Homer News (Appendix 8) reads in part:

> Since the Exxon Valdez oil spill of 1989, villagers at Port Graham have been afraid to eat shellfish—an interruption of a subsistence way of life handed down from generation to generation
>
> Now Chief Elenore McMullen says, villagers can see light at the end of the tunnel. Port Graham shellfish tested free of contamination this fall for the first time since the spill. Most villagers will collect bidarkis, clams and mussels—shellfish that have sustained the village since its beginning—for the first time since the spill during minus tides this week, she predicted (Loschbaugh, 1995).

However, it must be remembered that while the Task Force found that most resources were safe to eat, even if they had been in contact with oil, there were exceptions to this. The Expert Toxicological Committee found that most animals including finfish, birds and land mammals are able to metabolize hydrocarbons and excrete the toxins in their bile. Because of this the hydrocarbons never get into the edible flesh of the animal.

Some of the very heavily oiled seals found in Prince William Sound in 1989 showed elevated levels of low molecular weight hydrocarbons in their blubber, but not in other tissues in their bodies. According to Kathy Frost, a biologist with the Alaska Department of Fish and Game, this is because oil based contaminants are attracted to fat, so blubber collects more of these contaminants than the muscle or organs. In 1990, seals from some of the same areas showed much lower levels of the low molecular weight hydrocarbons, and slightly higher levels of the high molecular weight hydrocarbons. The blubber of seals taken from the harvest areas of Chenega Bay in 1993 did not show elevated levels of hydrocarbons. The levels of hydrocarbons found in the 1993 blubber samples were as low as the levels found in the laboratory's method blanks. Unless they find a seal that is covered in oil, as many seals were in Prince William Sound in 1989, subsistence users do not need to be concerned about hydrocarbon contamination in seal blubber.

Shellfish also constitute an exception to the general advice of the Expert Toxicological Committee. Shellfish, including clams, mussels, and cockles do not have the ability to get rid of hydrocarbons quickly. They accumulate these toxins and retain them for a long period of time. The advice of the Oil Spill Health Task Force has always been that while the additional risk of cancer resulting from eating shellfish contaminated with crude oil is minimal, it is an avoidable risk, and people should not harvest or consume shellfish from beaches where they can see or smell oil on the surface or subsurface.

Through community meetings and newsletters, the Division of Subsistence, working in cooperation with the Oil Spill Health Task Force has disseminated the advice of the Expert Toxicological Committee. It became evident in the course of the current project, that the communities on Kodiak Island had not received this message as much as the communities of Prince William Sound and the lower Kenai Peninsula. An effective dialogue was begun there with the regional meeting we held there in February 1994. It will be important to concentrate more on Kodiak in the 1994 subsistence restoration effort than we have in the past.

While a few subsistence users may still not be aware of the testing of subsistence resources, or of the advice of the Oil Spill Health Task Force, there are others that are aware, but choose not to accept the advice. Some people have said they do not trust the test results themselves. The

tour of the lab in Seattle was intended to help subsistence users a better understanding of how the tests are done. It also gave community representatives an opportunity to meet the people who run the tests. Comments from some of those who participated in the tour indicated that the tour had been at least partly successful in increasing their trust in the test results. However, it is clear this is not the case for Tatitlek. In 1994 we will be conducting a second tour, this time taking the Kodiak Island representatives who were prevented from attending by bad weather last year.

Distrust of the advice of the Task Force has also arisen as a result of poorly worded or misunderstood comments made publicly by members of the Task Force or its member groups. People are also aware that Exxon remains a member group in the Task Force. Exxon has had a much smaller role in the subsistence restoration project than it has in earlier subsistence food testing programs. Exxon's participation in the current project has been limited to sending representatives to the Oil Spill Health Task Force meeting held in Anchorage in August 1993. It seems that the newsletters are received better now that Exxon is no longer involved in editing them. It also helps that people see the newsletter reporting some of the problems they are seeing, and is not painting an unrealistically rosy version of the state of affairs in the oil spill region.

The residents of Tatitlek have suggested that the only thing that would get them to trust the advice of the Task Force would be for one of the scientists to move to Tatitlek and eat local wild foods for a year (As long as the scientist did not get sick). Staff of the Division of Subsistence do eat local foods when we visit these communities, but we probably could not have someone live in Tatitlek for a year (Though we would not have any trouble finding volunteers).

Although the Oil Spill Health Task Force has encountered some problems, it has also had its successes. The value of the approach used by the OSHTF was recognized at a Contamination Workshop sponsored by the State Epidemiologists office on May 24, 1995. At this workshop, the OSHTF was discussed as a model for the organization of future work on contaminants in the environment.

Another factor in the continued concern over subsistence food safety after the oil spill, is the observation of abnormalities in resource species and other animals. The most dramatic example of this is the failure of the herring fishery in Prince William Sound in 1993 (at this writing, it looks like we are experiencing the same thing again in 1994). In addition to a weak return, the herring that did come back were visibly diseased. Because we had funds available to deal with subsistence food concerns, we were able to bring the biologists working with the herring into contact with the subsistence users. Subsistence users indicated that they appreciated the opportunity for direct communication. This is something we anticipate doing more of in 1994. As concern shifts away from the fear of getting sick from eating foods contaminated with oil, to concern about the effects of metabolizing the oil on the exposed animals themselves, these sorts of meetings are likely to be more useful than additional hydrocarbon tests.

A lot of interest has been expressed by subsistence users in the oil spill area in sending in abnormal animals in so they can be examined by biologists, pathologists or others who may be able to explain the reasons for the abnormalities. It may prove necessary to set up a program which allows residents of the impacted communities to do this. Such a program would involve coming up with a list of researchers willing to work with such samples, training community residents, putting together protocols for the collection and handling of different types of samples, and placing sampling kits and packaging materials in the communities. It would be important to set up accounts with various air carriers, so the community residents would not have to pay to ship the samples.

People continue to report the scarcity of some resources. This is especially the case in Prince William Sound. Subsistence users there report fewer seals, sea lions, and wild birds available to harvest. They are also very concerned about the failure of the herring and pink salmon runs in 1993. Ever since the spill residents of Chenega Bay and Tatitlek have reported that there are no longer any octopus in the dens along the shore where they used to harvest them. People are still getting octopus, but these are larger ones that are caught in pots or on lines out in

deep water. The smaller octopus from the dens near shore are preferred for eating. According to Charlie Trowbridge with the Alaska Department of Fish and Game in Cordova, biologists do not know enough about the octopus in Prince William Sound to know whether these two different sizes of octopus are different species or just different life stages in the same species.

Outside of Prince William Sound, people report some scarcity, but it is not as dramatic, and people are generally not as adamant about a connection between these shortages and the oil spill. More common in the lower Kenai Peninsula and the Kodiak Island regions, is a description of animals that appear smaller or seem to be growing more slowly than they should be. We have heard this with regard to clams and mussels throughout the oil spill impact area. This is consistent with laboratory tests which have shown that shellfish exposed to crude oil will grow at a slower than normal rate. Some community representatives at the Kodiak regional meeting reported that the red salmon that returned in 1993 were smaller than normal.

In Prince William Sound and the lower Kenai Peninsula concerns have been raised about the fate and effects of chemicals used in the oil spill clean up. In Prince William Sound, the concern has mostly centered around Inipol and Correxit. In Port Graham, on the lower Kenai Peninsula, people have repeatedly raised concerns about the chemicals used at the boat cleaning station in Port Graham Bay. They are concerned about both the effects of the chemicals on fish and shellfish in the area, as well as the effects of exposure to the chemicals on people who worked at the station. It has proven difficult to get accurate information on what chemicals were used where and in what quantity. Once such information is assembled, an assessment can be made on what the possible effects of these chemicals may have been. This information can then be published in the newsletter.

CONCLUSIONS

Even in 1994, more than five years after the *Exxon Valdez* oil spill, some subsistence users of the spill area were still raising questions and still looking for answers, as they had since the first post-spill year. Although subsistence harvests and use had bounced back to pre-spill levels for most people and communities, a view persisted in the Prince William Sound communities, and to a lesser extent in the other communities in the oil spill impact area, that the natural environment had changed in ways that still posed a potential threat to their health and their way of life.

There are several factors preventing the complete recovery of subsistence harvests and uses to pre-spill levels. Many subsistence users in the oil spill impact area remain concerned over the possible long term health effects of using resources which may have been contaminated by oil. There has been a loss of confidence on the part of subsistence hunters and fishermen in their own abilities to determine if their traditional foods are safe to eat. Residents of a number of impacted communities express the fear that animals which came into contact with the oil have been altered in some way that can not be seen or detected in laboratory tests. In addition, people report the scarcity of some resources, most notably the failure of pink salmon and herring runs in Prince William Sound in 1993, as well as a decline in the population of harbor seals in Prince William Sound since the oil spill (although the harbor seal population was already in decline throughout the Gulf of Alaska prior to the oil spill). Subsistence users in the spill area have also observed abnormalities in resource species. These include herring, sea lions and chitons with lesions, evidently malnourished ducks, and herring, salmon and clams of abnormally small size. There is a cultural proscription among Alutiiq peoples against the harvesting or eating of animals which appear sick or abnormal. All of these factors continue to impede the recovery of subsistence in the oil spill area.

This project has been somewhat effective in getting the advice of the Oil Spill Health Task Force out to subsistence users in the communities impacted by the oil spill. However, there is little more we can learn about subsistence food safety from additional hydrocarbon testing. Concern in the communities has shifted from hydrocarbon contamination levels to the effects of the oil, and abnormalities observed in resource species.

1994 was be the last year for hydrocarbon testing. The emphasis should now shift more towards helping people understand the abnormalities they are seeing. This can be done by continuing and expanding the dialogue that has now begun between subsistence users and biologists and pathologists working with the damaged resources. Another possible way to help with these concerns is to set up a system where subsistence harvesters can send samples of abnormal resources in to be examined by biologists or pathologists, and then reporting their interpretations back to the communities.

It is expected that by responding to the specific oil spill related concerns of subsistence users, and reporting accurate health information back to the affected communities in clear, understandable language and in one-on-one discussions, subsistence users' confidence in the resource can be restored.

With Exxon no longer involved in the editing of the newsletter, it has become a more effective tool for the communication of information relating to subsistence food safety and the oil spill. The newsletter should continue, and will be useful for reporting the results of other oil spill restoration and monitoring projects to subsistence users. We will continue efforts to run down information on the various chemicals used in the oil spill clean up for a future issue of the newsletter.

The tour of the lab in Seattle was partly successful at increasing the level of trust in the test results. We will be doing another tour in 1994 for representatives of communities that were not involved in the 1993 tour.

As information from the various restoration projects becomes public, it is important to integrate these findings with the health assessments from the Task Force and with subsistence harvesters' own observations. The findings from these studies are potentially a powerful source of information for subsistence harvesters to more fully understand current conditions in their traditional harvest areas. However, injuries to subsistence uses are likely to remain as long as harvesters believe that they have not been fully informed about the condition of natural resources and habitats in the spill area. Consequently, this information must be communicated clearly and by methods appropriate to these communities.

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APPENDIX 1:

Cooperative Agreement Between ADF&G and CRRC

COOP-94-078

Cooperative Agreement
between the
Alaska Department of Fish and Game
and the
Chugach Regional Resources Commission

This agreement is made and entered into by the Alaska Department of Fish and Game, Division of Subsistence, 333 Raspberry Road, Anchorage, Alaska 99518, and the Chugach Regional Resources Commission, 4201 Tudor Drive, Suite 211, Anchorage, Alaska 99508, for the period May 30, 1994 to October 31, 1994.

I. PURPOSE OF AGREEMENT

Subsistence uses of fish and other wildlife constitute a vital natural resource service that was injured by the *Exxon Valdez* oil spill. Data collected by the Alaska Department of Fish and Game's Division of Subsistence demonstrated this injury. Annual per capita subsistence harvests declined dramatically (from 9 percent to 77 percent decline compared to pre-spill averages) in ten of the communities in the path of the spill during the first year after the event. While some of these communities' harvests demonstrated a limited recovery in the second post-spill year, harvest levels in other affected communities showed no signs of recovery. In subsequent years, levels of subsistence harvests, ranges of uses, harvest effort, and the sharing of resources have gradually increased in all of the spill area communities, though in some cases, they have not yet returned to pre-spill levels. Despite this limited recovery, a view persists in the Prince William Sound communities, and to a lesser extent in the lower Kenai Peninsula and Kodiak Island communities, that the natural environment has changed in ways that still pose a potential threat to their health and way of life. In addition, concern over the long term health effects of using resources from the spill area, a loss of confidence on the part of subsistence hunters and fishermen in their own abilities to determine if their traditional foods are safe to eat, and a perceived reduction in available resources, all contribute to the continued reduced harvest levels.

The Alaska Department of Fish and Game, Division of Subsistence (herein after referred to as ADF&G) has obtained funds from the *Exxon Valdez* Trustee Council to continue a project to attempt to restore the subsistence uses of fish and wildlife damaged by the *Exxon Valdez* Oil Spill. As part of this project, samples of those subsistence species cited in community meetings as being of continued concern will be collected from harvest areas identified by subsistence users. The *Exxon Valdez* Trustee Council has indicated that it is desirable to involve the affected communities as much as possible in the project. The people who live in the area impacted by the Exxon Valdez oil spill suffered by the loss of use of subsistence resources, but they have also suffered from a feeling of helplessness to do anything to repair the damage. There is a need in these communities to actively participate in the restoration of the environment. By actively involving subsistence users in the collection of subsistence food samples for testing, we can partly answer this need. We also increase the chances that we can help people get answers to some of the lingering questions they have concerning the safety of subsistence foods in the wake of the *Exxon Valdez* oil spill. To this end, the Alaska Department of Fish and Game, Division of Subsistence has agreed to

cooperatively work with the Chugach Regional Resources Commission (herein after referred to as CRRC) to collect the samples of subsistence foods for testing, and deliver them to the National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northwest Fisheries Center in Seattle, where the samples will then be analyzed for the presence of hydrocarbon contamination. CRRC is a Native tribal organization concerned with natural resource issues in the Chugach Region. Its seven member board has one representative from each of the five Native villages in the Chugach region (Chenega Bay, Eyak, Nanwalek, Port Graham, Tatitlek), as well as representatives of the Seward and Valdez Native Associations. CRRC will be hiring and training local people to work on the sample collection, along with experienced biologists. Entering into this cooperative agreement with CRRC allows ADF&G to satisfy the need to involve subsistence users in this portion of the project, while insuring that the high technical standards required for the undertaking are also met. The CRRC has participated in the on-going work of the Oil Spill Health Task Force since 1990.

II. COVENANTS OF THE DEPARTMENT OF FISH AND GAME
Division of Subsistence does hereby agree:

1. To provide up to $80,000 to CRRC to carry out their duties under this agreement. This includes all salary, travel (including helicopter rental) and supplies. Payments will be made upon receipt and acceptance of invoices received no more frequently than once a month.

2. To carry out the selection of sample collection sites in consultation with the affected communities.

3. To provide the CRRC with a sampling plan, listing the communities, sites and types of resources to be sampled by June 10, 1994. The sampling plan will be incorporated as part of this agreement.

4. To provide CRRC with a sample collection form, and a chain of custody form.

5. Rita Miraglia will serve as project leader for ADF&G.

Chugach Regional Resources Commission KB

III. COVENANTS OF THE ~~PACIFIC RIM VILLAGES COALITION~~
Chugach Regional Resources Commission does hereby agree:

1. To submit a collection plan to the Division of Subsistence, including a detailed budget, staffing, and outlining methodology to be used, steps that will be taken to ensure local residents will be trained and involved in the sample collection process, and that there will be a project leader along on each sampling trip with experience in the collection and handling of biological samples, due by June 15, 1994.This plan must be reviewed and approved by ADF&G prior to commencement of work activities on this project. Once approved, the collection plan and budget will be incorporated and made a part of this agreement.

2 To obtain all permits necessary for collection of samples of fish and shellfish.

3. Upon approval of the collection plan by the Division of Subsistence, and

receipt of all necessary permits, to conduct two collection trips to each study community during the period June 1994 through September 1994.

4. To collect samples of shellfish and finfish at predetermined sites near the study communities, handling the samples according to a protocol established by the Division of Subsistence and the National Marine Fisheries Service Laboratory, which is attached (Appendix A), and made a part of this agreement.

5. Following consultation with the ADF&G project leader, to pack the selected samples, following the protocol, and send them to the National Marine Fisheries Service, Northwest Fisheries Center, 2725 Montlake Blvd. East, Seattle, WA 98112. The remaining samples will be turned over to ADF&G.

6. To provide the Division of Subsistence with a written report after each sampling trip detailing sample collection, handling and delivery, including copies of all relevant field notes, collection forms, chain of custody forms and an inventory of samples.

7. To provide the ADF&G project leader with detailed invoices, no more frequently than once a month, for review, approval and payment by ADF&G.

8. To maintain a separate set of records of their activities.

9. To contact the ADF&G project leader immediately if any problems are encountered.

10. Tasha Chimeilewski will serve as project leader for CRRC.

IV. IT IS MUTUALLY AGREED THAT

1. Nothing in this agreement shall obligate any party in the expenditure of funds, or for future payments of money, in excess of appropriations authorized by law.

2. Each party agrees that it will be responsible for its own acts and the results thereof and each party shall not be responsible for the acts of the other party; and each party agrees it will assume to itself risk and liability resulting in any manner under this agreement.

3. No member of Congress, or the Commissioner, shall be admitted to any share or part of the agreement or to any benefit that may arise therefrom.

4. Each party will comply with all applicable laws, regulations, and executive orders relative to Equal Employment Opportunity.

5. Nothing herein is intended to conflict with federal, state or local laws or regulations. If there are conflicts, this agreement will be amended at the first opportunity to bring it into conformance with conflicting laws or regulations.

6. Policy and position announcements relating specifically to this cooperative program may be made only by mutual consent of the parties to the agreement.

7. Upon termination of this agreement any equipment purchased for studies initiated in furtherance of this agreement will be returned to the agency of initial purchase.

8. The effective date of this agreement shall be May 30, 1994.

9. All field collection must be completed by September 30, 1994. Delivery of samples to the lab, must be completed by October 15, 1994, and all reports and final invoices are due by October 31, 1994.

10. Twenty percent will be withheld by ADF&G pending satisfactory completion of all work items and receipt and acceptance of the final report.

11. A free exchange of research and assessment data among agencies is encouraged and is necessary to insure the success of these cooperative studies.

12. Any material published or data acquired as a result of this cooperative program may be reproduced, with credit given to the agencies, or organizations responsible for the development of the material.

13. This agreement may be revised with mutual consent by issuance of a written amendment, signed and dated by both parties.

14. The CRRC and any agents and employees act in an independent capacity and are not officers or employees or agents of the state in the performance of this contract.

15. The attached indemnity and insurance provisions (Appendix B) are incorporated and made a part of this agreement, CRRC shall provide a certificate of the required insurance prior to the effective date of the agreement.

16. Both parties consent to the jurisdiction of the superior court of the State of Alaska and shall be bound by the laws of Alaska with respect to any dispute under this agreement.

Alaska Department of Fish and Game, Division of Subsistence

By:
Title: Director

Alaska Department of Fish and Game, Division of Habitat and Restoration

By:
Title: Director 6'10.94

Alaska Department of Fish and Game, Division of Habitat and Restoration

By:
Title: Chief of Restoration

Alaska Department of Fish and Game, Division of Administration

By:
Title: Director Kevin Brooks 6/17/94

Chugach Regional Resources Commission

By:
Title: Executive Director

APPENDIX A

SUBSISTENCE FOODS SAMPLING PROGRAM
Protocols for the Collection and Handling of Samples
Alaska Department of Fish and Game
Division of Subsistence
January 8, 1993

Chain of Custody

Chain of custody and collection forms (attached) will be used. The beach and water conditions (degree of oiling) will be clearly noted on the collection forms as well as the results of sight and smell tests conducted in the field. These waterproof forms will be placed in the zip lock bag with each individual tissue sample. Be sure that the species identification and sample location are displayed through the ziplock bag.

Field note books will be rite-in the-rain. Any deviation from protocol and the study plan can be documented in the field notes. The location of the sampling site will be determined with the aid of USGS grid maps or NOAA charts. The site locations should be plotted on the map.

Whenever samples are split, a separate chain of custody record will be prepared for each portion and marked to indicate with whom the samples are being split.

Evidence tape must be affixed to the shipping container before the samples leave the custody of the sampling personnel. The seal must be signed and dated before the container is shipped. The original chain of custody record accompanies the shipment; a copy is retained by the sample shipper. If samples are sent by common carrier, copies of all bills of lading or air bills must be retained as part of the permanent documentation.

Entries into the field logbooks or field data sheets are signed or initialed and dated by the person making the entry at the time of entry. Each days entries are closed out with a horizontal line, date and initial. Errors in field logbooks or other records are corrected by drawing a single line through the error, entering the correct information, and signing and dating the correction. Never erase an entry or any part of an entry. Do not remove the pages from the logbook.

Preparation

Aluminum foil will be cooked at 350 degrees Fahrenheit for one hour before it can be used to wrap tissue samples. All other sampling equipment will be washed using detergent and rinsed before and after each sample collection. This includes clam shovels, knives, containers, and gloves. Instruments used for exterior dissection must be cleansed before they can be used for internal dissection.

Collection Blank

At least one field blank and replicate sample should be taken for each collection site. A field blank is a sample container (foil and zip lock bag or bile container) opened in the field, closed and stored as if it contained a sample. Chain of custody forms will accompany blanks, and blanks will be sent to the laboratory.

Collection

The method of collection must not contaminate the samples. Do not collect any subsurface samples through surface slicks. Organisms to be analyzed for petroleum hydrocarbons should be freshly killed. Decomposed organisms should not be collected.

Fish will always be handled with latex gloves. Each fish will be brought on board the boat in a manner so as not to contaminate it with any petroleum products such as fuel, plastics, or fuel-soaked material. The fish will then be dissected in an appropriately clean container or on aluminum foil.

At least three fish of the same species must be sampled from each fin fish sampling site. Approximately 0.6 to 1.0 kilograms of edible tissue will be excised from each fish. This will provide sufficient tissue to perform chemical analysis. The dissected tissue will then be double-wrapped in aluminum foil and placed in a zip lock bag.

The bile of all fin fish will be collected by drawing it from the gall bladder with a sterile disposable syringe and injecting it into a collection vial. The vial will then be placed in a zip lock bag. The gall bladder may puncture and the bile get lost while the fish is being eviscerated. This should be clearly noted on the chain of custody form belonging to the fish from which the bile was lost.

Invertebrates will be collected with clean shovels. Samples should be taken at the same location and tidal elevation on both the June and September sampling trips. The samples will then be double wrapped in aluminum foil, in groups of ten to twelve individuals (this is referred to as a composite sample), and placed in a ziplock bag. At least three composite samples must be collected from each shellfish sampling site.

Identify the species of finfish and shellfish as clearly as possible. It is necessary to be very accurate so the species dependent differences in bile metabolites can be ascertained by the laboratory. If you are unsure of the species, write detailed descriptions of the animal in the field note book, including the color, size, shape, etc.

Each sampling site should be carefully defined and described in field notes and sketch maps so that the site can be resampled when desired. At least one member of the sampling team must be present at both the June and September sampling events to ensure consistency.

After they are wrapped and labelled, the samples will be placed in insulated coolers containing ice packs. Keep all samples from the same station together by placing them in a separate large plastic bag.

Sample Preservation

Samples must be kept cool. They should be frozen as soon after collection as possible, and the freezing process should be rapid. Once frozen, the samples must be kept frozen until extracted or prepared for analysis. Therefore, care must be taken that the samples remain frozen throughout the shipping process.

CHAIN OF CUSTODY TRANSMITTAL FORM

Use this form to record all collection, transmittal, analysis and disposition activities. Attach to each batch of samples.

Community Name:
Sample Type:

SAMPLE ID#

Send completed forms to:

Subsistence Division
Alaska Department of Fish and Game
333 Raspberry Road
Anchorage, AK 99518
(907) 267-2358

Date	Action	Signature

Community Name: _____

SUBSISTENCE FOOD SAMPLE COLLECTION FORM

FILL OUT A SEPARATE FORM FOR EACH SAMPLE, AND BAG THE FORM WITH THE WRAPPED SAMPLE.

Collectors Names: _____

Date: _____ Time: _____

Type of Sample: _____ Sample ID Number: _____

Place Collected: _____

Circle your answers to the following questions:

Did oil reach this place? YES NO

Can you see oil on the water now? YES NO

Can you see oil on the beach now? YES NO

If there is oil on the beach now:

How much oil is there on the beach **(circle all that apply)**

- small balls of oil
- large balls of oil
- small patches of oil
- large patches of oil
- band of oil less than one foot wide
- band of oil 1-9 feet wide
- band of oil on beach 10-24 feet wide
- band of oil on beach greater than 25 feet wide

Include any other observations you have about the place, here:

Each collector should check the sample for signs of oil soon after collecting it.

1. Look over the fish or shellfish for signs of oil.

   Do you see oil on the fish or shellfish? YES NO

   If yes, please describe where and how much:

2. Smell the sample. Be sure to smell inside the gills if it is a fish. Open a few mussels or clams to check a batch of shellfish.

   How does the sample smell? **(circle only one response)**:

   - Very strong oil smell
   - Somewhat strong oil smell
   - Very faint, almost unnoticeable oil smell
   - No smell of oil

Include any other observations you have about the sample, here:

Division of Subsistence, Alaska Department of Fish and Game
333 Raspberry Road, Anchorage, 99518 (907) 267-2358

APPENDIX B'
INDEMNITY AND INSURANCE

Article 1. Indemnification

The contractor shall indemnify, save harmless and defend the state, its officers, agents and employees from all liability, including costs and expenses, for all actions or claims resulting from injuries or damages sustained by any person or property arising directly or indirectly as a result of any error, omission or negligent act of the contractor, subcontractor or anyone directly or indirectly employed by them in the performance of this contract.

All actions or claims including costs and expenses resulting from injuries or damages sustained by any person or property arising directly or indirectly from the contractor's performance of this contract which are caused by the joint negligence of the state and the contractor shall be apportioned on a comparative fault basis. Any such joint negligence on the part of the state must be a direct result of active involvement by the state.

Article 2. Insurance

Without limiting contractor's indemnification, it is agreed that contractor shall purchase at its own expense and maintain in force at all times during the performance of services under this agreement the following policies of insurance. Where specific limits are shown, it is understood that they shall be the minimum acceptable limits. If the contractor's policy contains higher limits, the state shall be entitled to coverage to the extent of such higher limits. Certificates of Insurance must be furnished to the Contracting Officer prior to beginning work and must provide for a 30 day prior notice of cancellation, nonrenewal or material change. Failure to furnish satisfactory evidence of insurance or lapse of the policy is a material breach and grounds for termination of the contractor's services.

2.1. **Workers' Compensation Insurance:** The contractor shall provide and maintain, for all employees of the contractor engaged in work under this contract, Workers' Compensation Insurance as required by AS 23.30.045. The contractor shall be responsible for Workers' Compensation Insurance for any subcontractor who directly or indirectly provides services under this contract. This coverage must include statutory coverage for states in which employees are engaging in work and employer's liability protection not less than $100,000 per person, $100,000 per occurrence. Where applicable, coverage for all federal acts (i.e. U.S.L.& H. and Jones Acts) must also be included.

2.2. **Comprehensive (Commercial) General Liability Insurance:** with coverage limits not less than $300,000 combined single limit per occurrence and annual aggregates where generally applicable and shall include premises-operations, independent contractors. products/completed operations, broad form property damage, blanket contractual and personal injury endorsements.

2.3. **Comprehensive Automobile Liability Insurance:** covering all owned, hired and non-owned vehicles with coverage limits not less than $100,000 per person/$300,000 per occurrence bodily injury and $50,000 property damage.

1994 SAMPLING PLAN
SUBSISTENCE RESTORATION PROJECT
ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF SUBSISTENCE

COMMUNITY	SITE NUMBER	SITE NAME	LOCATION DESCRIPTION	RESOURCES TO BE COLLECTED
CHENEGA BAY	CHE27	KAKE COVE	Southeast Chenega Island	Mussels, Butterclams, Littleneck Clams
CHENEGA BAY	CHE28	NORTH CHENEGA	Northernmost point on Chenega Island	Mussels, Butterclams, Littleneck Clams
TATITLEK	TAT1	NORTH BLIGH ISLAND	Intertidal area North of Bligh Island	Mussels, Butterclams, Littleneck Clams
TATITLEK	TAT9	REEF ISLAND	Northeast end of Reef Island	Mussels, Butterclams, Littleneck Clams
TATITLEK	TAT3	SOUTH BLIGH ISLAND	1.6 KM S of Tatitlek, 0.8 KM off Bligh Island	Bottomfish
TATITLEK	T-7	OUTER REEF ISLAND	Open water SW of Reef Island	Bottomfish
PORT GRAHAM	PTG4	DUNCAN SLOUGH	.7 KM SE of Port Graham Village	Whelks
PORT GRAHAM			site to be announced	
NANWALEK	PTG8/9	FLAT ISLANDS	Between the two furthest N islets of Flat Islands	Mussels, Clams, Bidarkis, Seaweed
NANWALEK	KOY1	DOGFISH BAY	Koyuktolik Bay	Mussels, Clams
PTG/NAN	WNB3	WINDY BAY	Easternmost of 3 small islands in Windy Bay	Mussels, Chitons
AKHIOK	AKH6	TANNER HEAD	S of Rodman Reach, Kodiak Island	Mussels, Razor Clams
AKHIOK	AKH2	N AKHIOK ISLAND	Sand spit on NE end of Round Hill, Akhiok Isl.	Butterclams
PORT LIONS	PTL1	AIRSTRIP	Island just E of airstrip	Butterclams
PORT LIONS	PTL10	KAZHUYAK BAY	Near Ivan Lukin's house (ask Ivan)	Butterclams
LARSEN BAY	LAB10	JACOB AGA'S BEACH	SW of the cannery complex	Butterclams
LARSEN BAY	LAB16	AMOOK ISLAND	Ask Jimmy Johnson where	Butterclams
OLD HARBOR	OHA3	SHEEP ISLAND	S end of Sheep Island, 3.7KM NE of Old Harbor	Butterclams
OLD HARBOR	OHA6	AMEE BAY	Amee Bay	Sea urchins
KARLUK	KAR2	STURGEON R.	Intertidal at mouth of Sturgeon River	Mussels, Butterclams, Littleneck Clams
KARLUK	KAR3	KARLUK LAGOON	Inside Lagoon	Red salmon
OUZINKIE	OUZ11	GARDENS POINT	3.2 KM N of Uzinki Point	Butterclams, Chitons

APPENDIX 2:

Fish and Shellfish Collection Documentation

FINAL TRIP REPORT

SUBSISTENCE FOOD SAMPLING

FOR

CHUGACH REGIONAL RESOURCES COMMISSION

DAMES & MOORE

November 18, 1994

DAMES & MOORE
5600 B STREET, SUITE 100, ANCHORAGE, ALASKA 99518-1641
(907) 562-3366 FAX: (907) 562-1297

November 18, 1994

Rita Miraglia
Alaska Department of Fish & Game
Subsistence Division
333 Raspberry Road
Anchorage, AK 99518

Final Trip Report
Subsistence Food Sampling
Program
D&M Job No. 29002-001-160

Dear Rita:

Enclosed please find two copies of our final trip report on field activities between June 20 and September 10, 1994. Samples and sample logs have been sent to Don Brown at the NMFS Pacific Marine Environmental Lab in Seattle and we are holding the remainder of the samples. The problem with the freezer which affected some of the samples was discussed with Don Brown and has been indicated on the sample logs for the affected samples. Don indicated that there should be no problem with the tissue samples but the bile samples may need to have a footnote for the analytical results. He also indicated that there should not be a problem with the bile but the person doing the analysis should be aware of the situation.

I am sending a copy of the report to Patty Brown for their file. I also still have photographs of field activities which I will send this weekend.

Once again, it has been a pleasure working with Fish and Game on the subsistence project and this report completes our fifth year on the project. If you have any questions on the report, feel free to contact me in Homer at 235-3487 or 235-7260. Thanks again for all your help in the successful completion of this project.

Sincerely,

DAMES & MOORE, INC.

David E. Erikson
Project Manager

Enclosures

DEE:amw
adfg1110.ltr
cc: Patty Brown

FINAL TRIP REPORT

SUBSISTENCE FOOD SAMPLING

FOR

CHUGACH REGIONAL RESOURCES COMMISSION

Prepared by

DAMES & MOORE
5600 B Street, Suite 100
Anchorage, AK 99518

November 18, 1994
D&M Job No. 29002-001-160

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1.0 INTRODUCTION

Dames & Moore has been contracted by Chugach Regional Resource Commission to conduct field sampling and sample subsistence resources from nearshore areas traditionally used by residents of ten Native villages which were impacted by the *Exxon Valdez* Oil Spill. Dames & Moore has been involved in oil-spill subsistence resource sampling studies since the summer of 1989. These early studies were conducted in coordination with various agencies including: the Alaska Department of Fish and Game (ADF&G), the National Oceanic and Atmospheric Administration (NOAA), and the National Marine Fisheries Service (NMFS). These studies, funded by Exxon, were terminated in 1991.

Funding from the *Exxon Valdez* oil spill settlement has been made available since 1992 for various restoration studies. Among these is a subsistence resource sampling study to be conducted by the ADF&G, Subsistence Division. The purposes of the ADF&G study were to:

1) Continue to collect fish and shellfish samples important to a subsistence lifestyle in order to maintain a reliable and useable contamination data base;

2) Sample at sites or villages where resource utilization has not returned to previous levels;

3) Coordinate with the various village councils to assess use patterns, concerns, and to allow local participation;

4) Continue sampling through the subsistence harvest season to continue documentation of changing levels of contamination, if any exist;

5) Provide results, in as timely a fashion as possible, in order that consumption decisions based on chemical analysis can be made; and

6) Assure subsistence consumers that there is a high degree of concern from various agencies about contamination of resources.

The overall goal of this study is to restore confidence in the quality of resources to the subsistence users, thus allowing them to return to their normal harvest activities.

2.0 METHODS

2.1 SAMPLE AREAS

Subsistence resource samples were taken at traditional subsistence utilization sites associated with the following villages: Chenega Bay, Tatitlek, Nanwalek, Port Graham, Old Harbor, Larsen Bay, Karluk, Akhiok, and Ouzinkie. At each village, sample sites were selected based on subsistence use patterns and the concerns of individual villages utilizing these sites. Two selected shellfish sites were selected for sampling in each community, with the exception of Ouzinkie (one site) and Port Graham (three sites). The only fish collection sites which were sampled were at Tatitlek and Karluk. Location of sample sites by area are presented in Appendix A.

At each village, a local person experienced in subsistence gathering and familiar with the area was employed to assist in sampling. The exception to this was on the second sampling cycle at Karluk, when no local help was available.

2.2 TECHNIQUES AND PROCESSING

At each fish or invertebrate site, a total of three samples of each target species were taken. Target invertebrates species were: the hard shell clams, such as butter clams (Saxidomus giganteus) and littleneck clams (Protothaca staminea); soft shell clams, Mya spp.; razor clams (Siliqua patula); the gumboot chiton (Katherina tunicata); whelks (Nucella lamellosa, N. lima, and Volutharpa ampullacea); and the blue mussel (Mytilus trosellous). The blue mussel was one of the main species sampled, since it is a good indicator of hydrocarbon contamination. All of the intertidal invertebrates were either collected by hand or with a clam shovel and handled with disposable latex gloves. Samples were double-wrapped in aluminum foil, labeled, and placed in zip-lock bags.

Fish species targeted for sampling were the quillback and yelloweye rockfish (Sebastes maliger and S. ruberrimus) at Tatitlek and the sockeye salmon (Onchorhyncus nerka) at Karluk Lagoon. Hook and line sampling was used for the rockfish and a beach seine was used for the salmon. Each fish collected was brought onboard the boat or onshore using methods to prevent contamination with any petroleum products, such as plastics, fuel, or fuel-contaminated material. The fish were dissected on an aluminum foil covered surface using clean dissection tools and handled with clean latex gloves. A sample of the edible tissue was carefully cut out and double wrapped in aluminum foil, then placed in a zip-lock bag. Additionally, bile samples were taken

from each fish using a sterile syringe. Drawn bile was injected into special vials which protects the samples from possible contamination.

After labeling and wrapping, the samples were placed in insulated coolers for transport and frozen as soon as possible. A detailed description of field sampling procedures is given in the Field Procedures Manual.

2.3 SAMPLING SCHEDULE

Sampling was scheduled to coincide with minus tides. Villages in the Prince William Sound and Cook Inlet were sampled on the same low tide series and the Kodiak villages were sampled on the alternate low tide series of the month. This was done because there are not enough minus tides to complete a sampling cycle in one tide series.

The first cycle sampling trips were conducted on June 22 and July 16, 1994 in seven of the ten representative villages. Three villages on Kodiak Island (Old Harbor, Port Lions, and Larsen Bay) were missed due to unseasonable weather during the scheduled low tide series.

The second sampling cycle was conducted from August 20 to September 10 at all of the ten villages. The sampling activities in the Kodiak Villages were split between two low tide cycles due to a low number of minus tides in the late August series and the availability of field personnel.

2.4 ANALYSIS

Frozen samples were packaged and sent to the NMFS, Pacific Marine Environmental Laboratory in Seattle, Washington for analysis. Samples not sent were retained and transferred to ADF&G, Subsistence Division, in Anchorage, Alaska.

3.0 RESULTS

Results of the sampling activity from the first and second sampling cycles are incorporated in the sample database presented in Appendix B. Sample logs from each location and chain-of-custody forms of samples shipped to the lab for analysis are included in Appendix C.

3.1 FIRST SAMPLING CYCLE

A total of 8 fish and 88 shellfish samples were collected for petroleum hydrocarbon analysis during the first sampling cycle (Table 1). In additional, a total of 14 field blanks were also taken during the field sampling activity. Of the 96 tissue samples collected, 14 were sample splits.

After consultation with the Project Manager, Rita Miraglia, ADF&G, Subsistence Division, a number of the samples (60 tissue and 8 bile samples) were shipped on August 8, 1994 to Dr. Sin Lam Chan at the NMFS for analysis. The remainder of the samples were held in the freezers at the Dames & Moore warehouse in Anchorage.

3.2 SECOND SAMPLING CYCLE

During the second sampling cycle, a total of six fish and 115 invertebrate samples were collected from the ten villages, including 17 split samples (Table 2). An additional 17 field blanks were also collected. Old Harbor (Amee Bay - OHA6), was not sampled because the tides were not low enough to collect the target species, the green sea urchin (Strongylocentrotus droebachiensis). One type of algae, requested by residents of Nanwakek, was not collected because it was the wrong time of year and the species was not readily apparent at the sample site on Flat Island.

A number of these samples (78 tissue and 8 bile samples) were shipped on October 5, 1994 to the NMFS Lab after consulting Rita Miraglia. The remainder of these samples were stored at the Dames & Moore warehouse in Anchorage with the samples from the first cycle. These samples will be transferred to ADF&G freezers upon completion of the project.

3.3 SAMPLING ACTIVITIES BY VILLAGE

The following is a anecdotal account of sampling activity by village and sampling cycle.

TABLE 1
SUBSISTENCE FOOD SAMPLES
COLLECTED DURING FIRST SAMPLING CYCLE

Village	Site	Date	Species	No. of samples
CHENEGA	CHE27	6/22/94	BUTTER CLAMS	3
			MUSSELS	4
	CHE28	6/23/94	MUSSELS	4
			LITTLENECK CLAMS	3
			BUTTER CLAMS	3
TATITLEK	TAT9	6/23/94	LITTLENECK CLAMS	3
			MUSSELS	4
	TAT1	6/23/94	LITTLENECK CLAMS	3
			MUSSELS	4
	TAT4	6/23/94	QUILLBACK ROCKFISH	1
	T7	6/23/94	YELLOWEYE ROCKFISH	1
PORT GRAHAM	WNB3	6/27/94	MUSSELS	4
		6/27/94	CHITON	3
	PTG4	6/27/94	LITTLENECK CLAMS	3
		6/27/94	WHELKS	1
	PTG13	6/27/94	WHELKS	3
NANWALEK	PTG8/9	7/10/94	MUSSELS	4
			CHITON	3
	KOY1	7/11/94	MUSSELS	4
			MYA CLAMS	3
OUZINKIE	OUZ11	7/8/94	BUTTER CLAMS	4
			CHITONS	4
AHKIOK	AHK6	7/9/94	RAZOR CLAMS	4
	AHK2	7/9/94	BUTTER CLAMS	3
			MUSSELS	4
KARLUK	KAR2	7/13/94	BUTTER CLAMS	3
			LITTLENECK CLAMS	3
			MUSSELS	4
	KAR3	7/13/94	SOCKEYE SALMON	6
			TOTAL SAMPLES	**96**

TABLE 2
SUBSISTENCE FOOD SAMPLES
COLLECTED DURING SECOND SAMPLING CYCLE

Village	Site	Date	Species	No. of samples
TATITLEK	T7	8/17/94	QUILLBACK ROCKFISH	4
			BLACK ROCKFISH	3
	TAT3	8/18/94	QUILLBACK ROCKFISH	1
	TAT9	8/18/94	LITTLENECK CLAMS	3
			BUTTER CLAMS	1
			MUSSELS	4
	TAT1	8/18/94	BUTTER CLAMS	1
			LITTLENECK CLAMS	3
			MUSSELS	4
CHENEGA	CHE 27	8/19/94	LITTLENECK CLAMS	3
			BUTTER CLAMS	2
			MUSSELS	4
	CHE 28	8/19/94	MUSSELS	4
			CLAMS	1
KARLUK	KAR2	8/20/94	BUTTER CLAMS	3
			LITTLENECK CLAMS	3
			MUSSELS	4
AHKIOK	AKH6	8/21/94	RAZOR CLAMS	4
	AKH2	8/21/94	BUTTER CLAMS	3
			MUSSELS	4
OLD HARBOR	OHA3	8/22/94	BUTTER CLAMS	4
PORT GRAHAM	WNB3	9/6/94	CHITON	3
			MUSSELS	4
	PTG4	9/6/94	LITTLENECK CLAMS	2
			WHELKS	4
	PTG13	9/6/94	WHELKS	3
OUZINKIE	OUZ11	8/23/94	BUTTER CLAMS	3
			CHITONS	4
PORT LIONS	PTL1	9/9/94	BUTTER CLAMS	4
	PTL10	9/9/94	BUTTER CLAMS	4
LARSEN BAY	LAB16	9/10/94	BUTTER CLAMS	4
	LAB10	9/10/94	BUTTER CLAMS	4
NANWALEK	PTG8/9	9/7/94	CHITONS	3
			MUSSELS	4
	KOY1	9/8/94	CLAMS	3
			MUSSELS	4
			TOTAL SAMPLES	**116**

3.3.1 Prince William Sound

Chenega Bay: The two sites selected this year in the Chenega Village region were both on Chenega Island. Site CHE27 was located on the southeast end of the island in Kake Cove and CHE28 was located on the northeast end of the island.

During the first cycle, June 22 and 23, 1994, butter clams and mussels were collected at both sites, littleneck clams were collected only at CHE28. Local assistance was provided by Mike Elashansky and Charles Selanoff.

During the second cycle, on August 18, 1994, sampling was uneventful at Kake Cove but at the northern site, CHE28, a helicopter was on the beach near the sampling site. Malin Babcock with NOAA and Ron Bruyerer with Alaska Department of Environmental Conservation (ADEC) were conducting a mussel bed cleaning project and depositing contaminated beach fines onto the lower beach area where the subsistence sampling site was located. Clams had to be dug a short distance away from the original site but only a small number of clams could be located, enough for only one sample. Mussels were collected from a rock formation near the mussel cleaning operation. Malin Babcock said that fines had been deposited only within the last month and should not have affected the earlier sample results. This activity was reportED to Rita Miraglia after the field trip to see if additional sampling was necessary at the site.

Tatitlek: Sampling for the first cycle was conducted on June 22 and 23, 1994. Steve Totemoff provided the skiff and helped with the clam digging and fishing. Clams at both invertebrate sites, TAT1 and TAT9, were rather scarce, similar to past years. Fishing was difficult and we were only able to catch two rockfish in two days of fishing effort. Fishing was attempted at four locations: TAT4, TAT3, TAT8, and T7. The first fish caught was a quillback rockfish at TAT4 off Bidarki Point. The last site sampled, T7 located off the southwest end of Reef Island, yielded one yelloweye rockfish. Samples were taken from both fish.

The second sampling cycle was conducted on August 18 and 19, 1994. Invertebrate sampling went well and all necessary samples were collected. The major effort for fish collection was focused at T7, off Reef Island, where one fish had been caught during the first cycle. A total of eight rockfish were caught, but only six had enough bile to sample. The remaining two were kept but not sampled since there were six good samples. Species sampled included both black rockfish (Sebastes melanops) and the quillback rockfish.

3.3.2 Cook Inlet

Port Graham: On June 27, a helicopter was used to get to the Windy sample site, a small island at the mouth of the bay (WNB3). Hardened oil residue was still evident among the rocks at the upper beach level. Local knowledge and assistance was provided by Neil Hendrick of Port Graham. The target species at this location were chitons and mussels and samples of these two species were collected from the same areas as last year. The site looks the same as it did on the previous sampling trip in September 1993.

In Port Graham, PTG4 in Duncan's Slough and a new site, PTG13 below the old dump site at the north end of the runway, were sampled on June 27 and September 6, 1994. Littleneck clams were collected at Duncan's Slough in the same area as last year, as well as dog whelks (Nucella spp.) collected from rock intertidal habitat across the slough. These snails were in spawning aggravations under the rocks, but we could only find one area that had enough for a sample. The tide was coming in, which limited the time for locating the snails.

The new site, PTG13, was sampled only for whelks. They were considerably more abundant at this site, and were sampled from on the underside of the large boulder in the mid intertidal area. All species of a certain size range were collected, since we were not sure which one the locals preferred. A total of three samples were collected before the tide came in.

Nanwalek: This area was sampled on July 10 and 11, 1994, after missing one day due to weather. Walley Kvasnikof provided the skiff and assisted in the field. Sample sites included one site on Flat Island (PTG8/9) and on site in Koyuktolik Bay (KOY1). Chitons and mussels were collected on Flat Island and soft shell clams and mussels were collected in Koyuktolik Bay. A certain type of algae was on the list to be collected on Flat Island, but Walley said that it was the wrong time of the year so it was not sampled.

The second sampling trip was on September 7 and 8, 1994. Local help was provided by Gus Uktish, Mike Radtke, and Hans Peterson. Skiffs were provided by Vincent Kvasnikoff and Mike Radtke. Samples were collected at both of the sites sampled in July.

3.3.3 Kodiak

Ouzinkie: The first sampling trip to Ouzinkie was on July 8, 1994. Only one site was scheduled for sample collection in Ouzinkie this year and this site (OUZ11) was located on small island on the west side of Spruce Island. Roger Johnson of Ouzinkie provided both the boat and helped with digging the clams. The habitat at this site was boulder and cobble on top of a consolidated gravel and very difficult to dig, it took considerable effort to get all the clam samples. This site probably gets very little clamming pressure from the locals. Butter clams and chitons were the target species at this site and four sample of each species were collected.

The second trip was on August 23, 1994. Roger Johnson again provided the assistance and boat for the trip. The same site was sampled but the tide was not as low as it was on the previous trip so we were not able get as low on the beach as before. Digging was even harder this time and we were barely able to get enough butter clams for three samples. Chiton were not a problem and four samples were easily obtained.

Akhiok: Because of difficulty in past years sampling at Akhiok due to the marginal weather and rough seas between the sample sites, it was decided to use a helicopter to access the sites to insure that samples were obtained this summer. We flew to the site on July 9, 1994, with Teacon Simeonof of Ahkiok.

Two sites were selected this year in the Ahkiok area, the sandy beach at Tanner Head (AHK6) and the northeast end of Round Island (AHK2), just south of Akhiok. The target species at Tanner Head was razor clams and a total of four samples were collected. Mussels were also to be collected at this site, but the habitat was not suitable for mussels and none were found. The target species at Round Island was butter clams but mussels were also collected since none were found at Tanner Head.

The helicopter developed trouble going back to Kodiak and had to return to Akhiok. A charter airlines was able to fly in needed parts and more fuel, so we were able to get back to Kodiak before a major storm hit that evening.

Karluk: Karluk was another of the villages where it was decided that access would be better with a helicopter because of the likelihood of rough water between Karluk and the sampling sites. John Reft was picked up in Karluk 1 to assist in the sampling on July 13, 1994. The first site sampled was at the mouth of the Sturgeon River (KAR2) on a elevated river bar. This site

has been sampled for the last several years. Butter clams, littleneck clams, and mussels were collected at this site.

The second site was inside the Karluk River Lagoon (KAR3). This site is regularly used by villagers to beach seine sockeye salmon. Two additional helpers were employed from the village, Dale Reft and an additional volunteer, and a skiff. It took only one set to get all the fish needed. Approximately 150 sockeyes were caught, but only six were needed for sampling, so the rest were released back into the river. Tissue and bile samples were taken from each of the six fish.

The second trip to Karluk was on August 20, 1994. We could not contact any of the people who helped us on the previous trip, even after stopping the helicopter at the village. Sampling at Sturgeon River (KAR2) was done without local assistance. The same number of clams and mussels were sampled as the last time. The salmon run was over, so no fish were caught on the second sampling cycle.

Old Harbor: Old Harbor was missed on the first sampling cycle due to a prolonged storm which grounded aircraft for approximately one week.

Old Harbor was sampled during the second cycle on August 22, 1994. David Capjohn of Old Harbor provided the skiff and helped with the sampling. The sample sites were Sheep Island (OHA3) and Ameey Bay (OHA6). The target species were butter clams at Sheep Island and green sea urchins at Amee Bay. The tide was low enough at Sheep Island to get four butter clam samples, but David Capjohn said that we would need a much lower tide to get urchins in Ameey Bay. We decided to try to get some urchins in September if there was any time available on the next trip. The tides did not work out, so no urchins were collected.

Port Lions: Port Lions was also missed on the first cycle due to the stormy weather. Several attempts were make to get there, but the low tide series ended before the weather cleared.

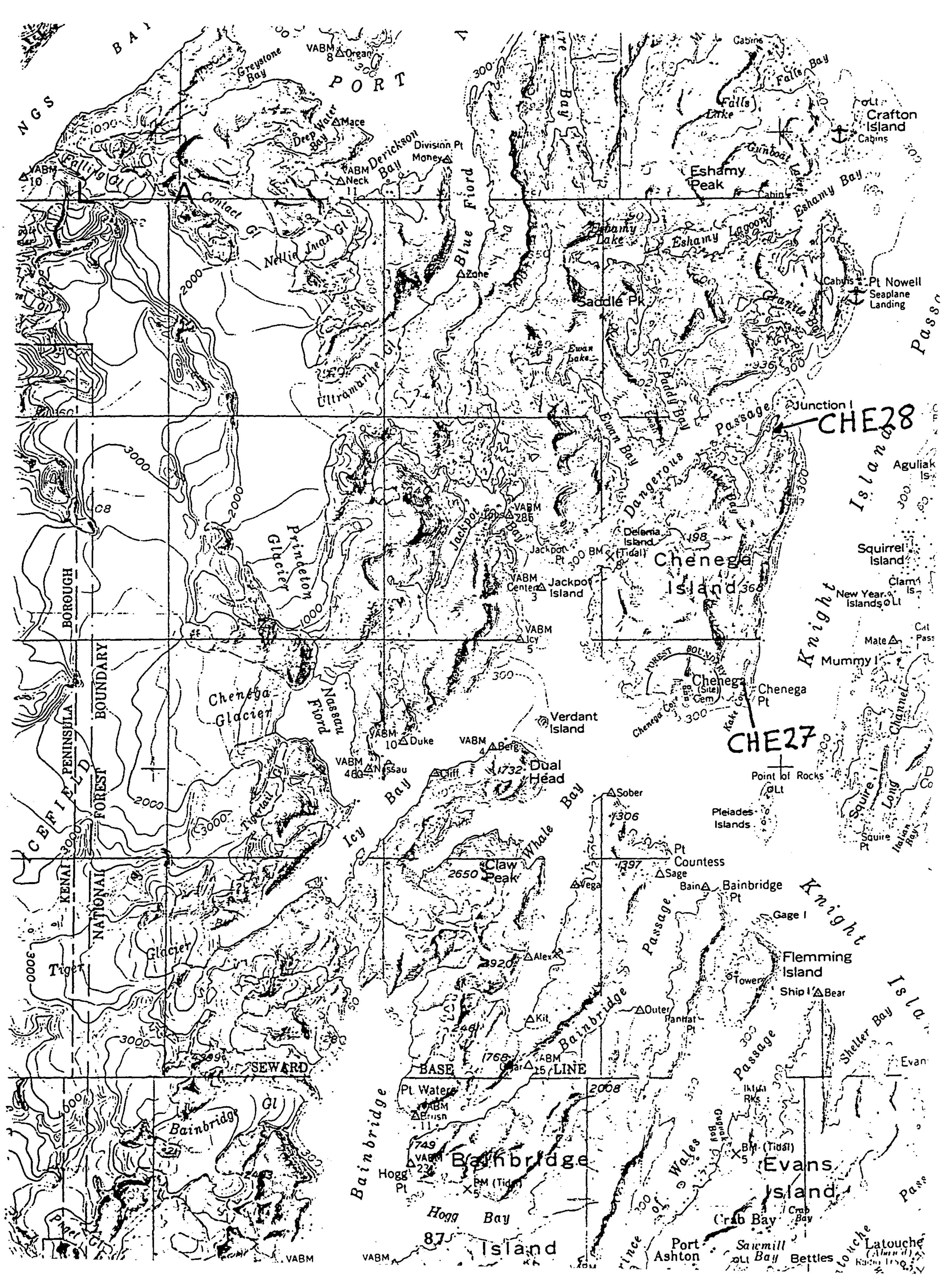
Port Lions was sampled during the second cycle on September 9, 1994. The two selected sample sites were at the north end of the runway (PTL1) and on the outside beach south of Port Wakefield (PTL10). Both sites were within easy access of the road, so no skiff was needed. Arnold Kewin of Port Lions helped with the sampling and logistics. Butter clams were the target species at both of the sites and they were plentiful in both places.

Larsen Bay: Larsen Bay was one of the three villages missed on the first cycle but was sampled on September 10, 1994 during the second cycle, the last village sampled in 1994. Assistance with logistics, sampling, and skiff charter was provided by Roy Jones.

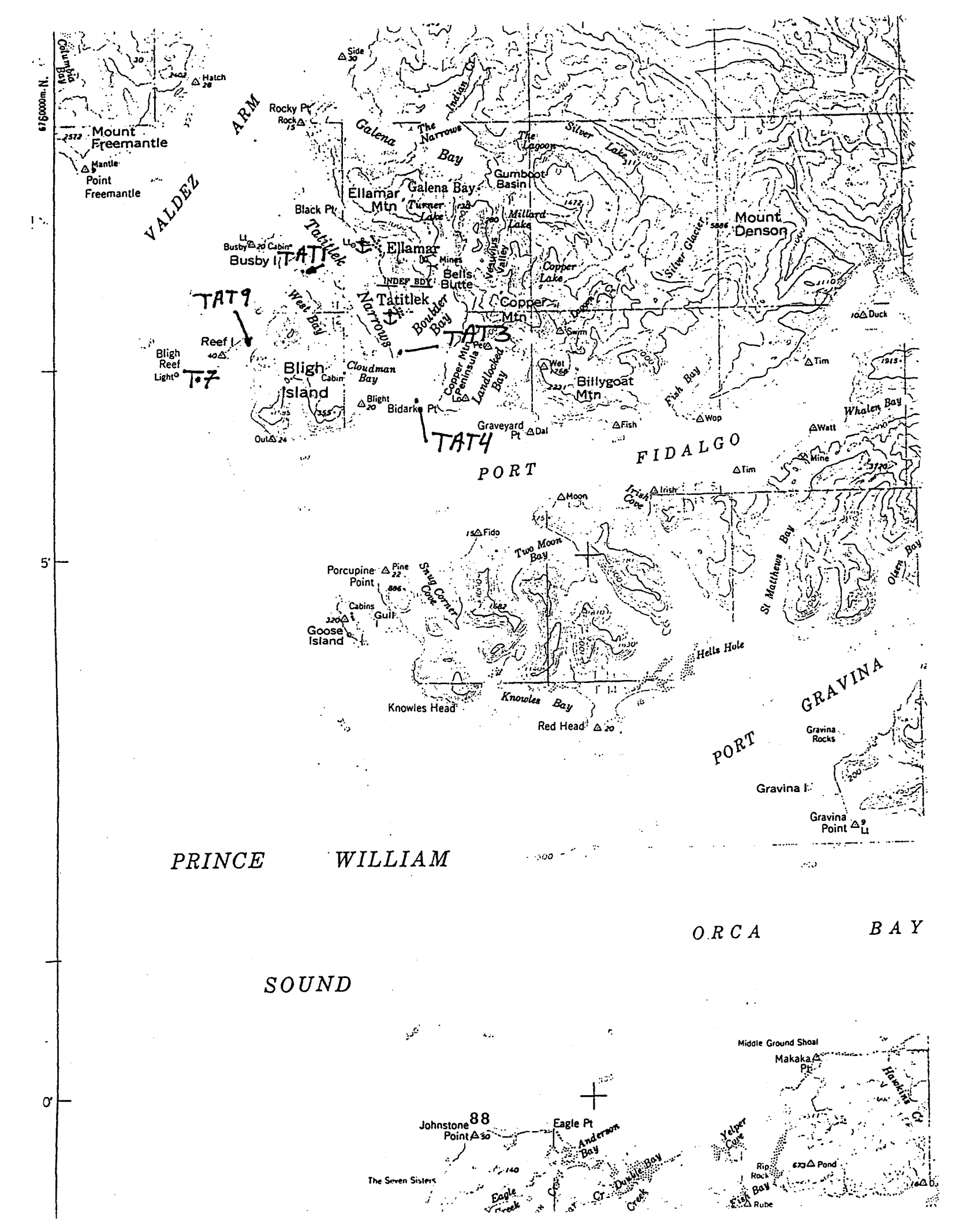
The first site sampled was east of Amook Island on a moderately steep gravel beach (LAB16). The target species was the butter clam, and since densities were quite high, four samples were easily collected. The second site was inside Larsen Bay on the southern shoreline on what is called Jacob Aga's Beach (LAB10). Again, butter clams were the desired species and they were also quite abundant at this location. A total of four samples were taken within approximately 10 minutes.

APPENDIX A

SITE LOCATIONS



PORT
Greystone Bay
Deep Water Bay
Derickson Bay
Division Pt
Falling Gl
Contact Gl
Nellie Juan Gl
Blue Fiord
Eshamy Peak
Crafton Island
Gunboat Lakes
Eshamy Bay
Eshamy Lake
Eshamy Lagoon
Falls Lake
Falls Bay
Saddle Pk
Pt Nowell
Seaplane Landing
Granite Bay
Ewan Lake
Paddy Bay
Ewan Bay
Ultramarine Gl
Junction I
CHE28
Dangerous Passage
Aguliak Is
Squirrel Island
Clam Is
New Year Islands
Princeton Glacier
Jackpot Bay
Jackpot Pt
Jackpot Island
Chenega Island
Knight Island Passage
Mummy I
Chenega Glacier
Nassau Fiord
Verdant Island
Chenega (Site)
Chenega Pt
CHE27
Point of Rocks
Pleiades Islands
Dual Head
Whale Bay
Icy Bay
Claw Peak
Pt Countess
Bainbridge Pt
Gage I
Flemming Island
Ship I
Squire I
Long Channel
Shelter Bay
Tigertail Gl
Tiger Glacier
KENAI PENINSULA BOROUGH BOUNDARY
CHUGACH NATIONAL FOREST BOUNDARY
SEWARD BASE LINE
Bainbridge Passage
Bainbridge Gl
Pt Waters
Hogg Pt
Bainbridge Island
Hogg Bay
Prince of Wales Passage
Evans Island
Crab Bay
Port Ashton
Sawmill Bay
Bettles
Latouche


6760000m N.
Columbia Bay
Mount Freemantle
Mantle Point Freemantle
VALDEZ ARM
Rocky Pt
Rock
Galena Bay
The Narrows
Indian
The Lagoon
Silver Lake
Gumboot Basin
Ellamar Mtn
Galena Bay
Turner Lake
Black Pt
Tatitlek
Busby I
Busby
Cabin
TAT1
Ellamar
Mines
Bells Butte
INDEF BDY
Millard Lake
Mount Denson
Silver Glacier
Copper Lake
Copper Mtn
Tatitlek Narrows
Boulder Bay
West Bay
TAT9
Reef I
Bligh Reef Light
T07
Bligh Island
Cabin
Cloudman Bay
Bidarka Pt
TAT3
Copper Mtn Peninsula
Landlocked Bay
Billygoat Mtn
Fish Bay
Graveyard Pt
TAT4
PORT FIDALGO
Whalen Bay
Mine
Irish Cove
Moon
Fido
Two Moon Bay
Porcupine Point
Pine
Snug Corner
Cabins
Gulf
Goose Island
St Matthews Bay
Olsen Bay
Hells Hole
Knowles Head
Knowles Bay
Red Head
PORT GRAVINA
Gravina Rocks
Gravina I
Gravina Point
PRINCE WILLIAM SOUND
ORCA BAY
5'
0'
Johnstone Point
88
Eagle Pt
Anderson Bay
The Seven Sisters
Eagle Creek
Double Bay Creek
Middle Ground Shoal
Makaka Pt
Hawkins Cr
Yelper Cove
Rip Rock
Pond
Fish Bay
Rube

rk well.

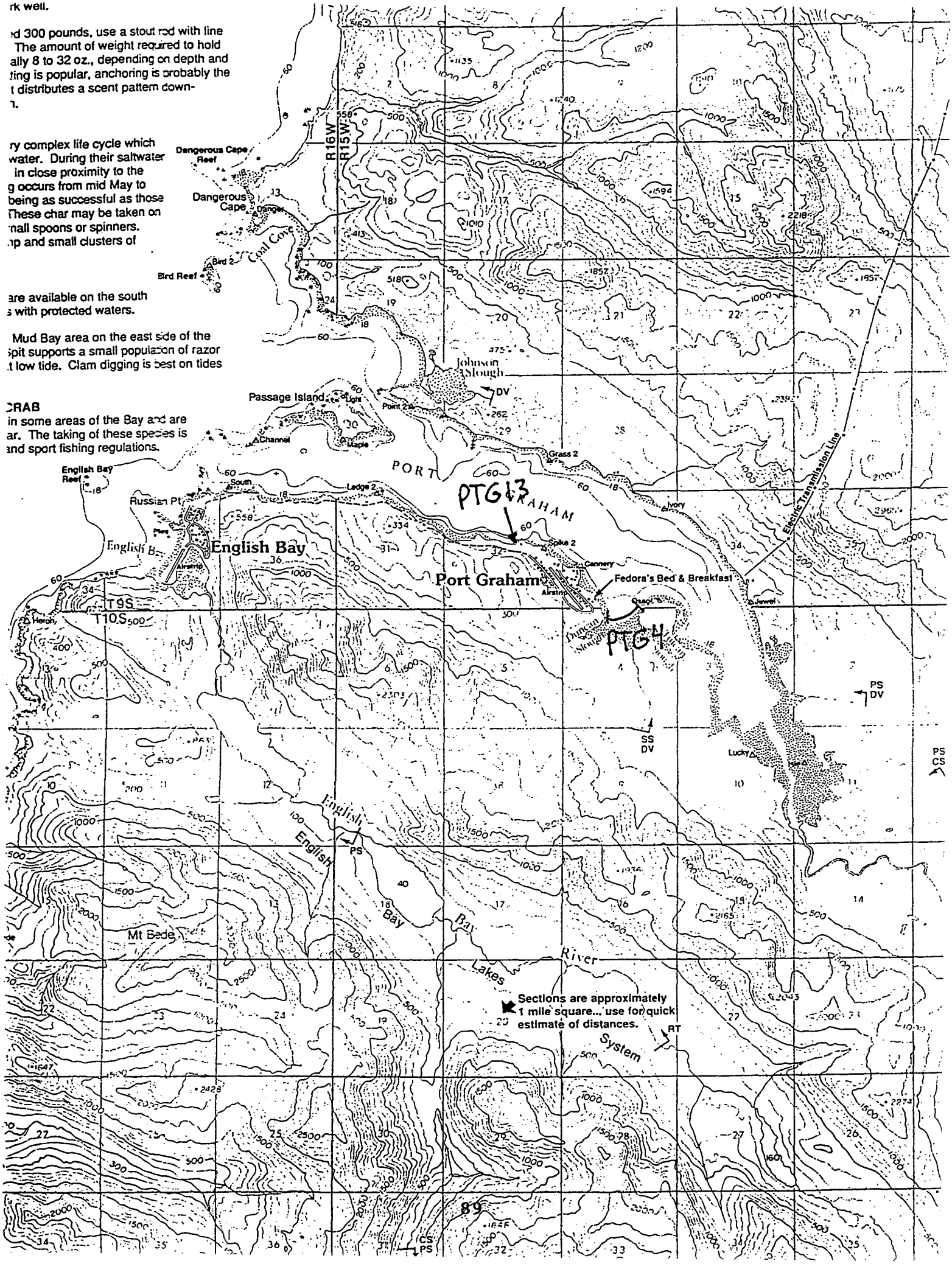
ed 300 pounds, use a stout rod with line
The amount of weight required to hold
ally 8 to 32 oz., depending on depth and
fing is popular, anchoring is probably the
t distributes a scent pattern down-
n.

ry complex life cycle which
water. During their saltwater
in close proximity to the
g occurs from mid May to
being as successful as those
These char may be taken on
nall spoons or spinners.
np and small clusters of

are available on the south
s with protected waters.

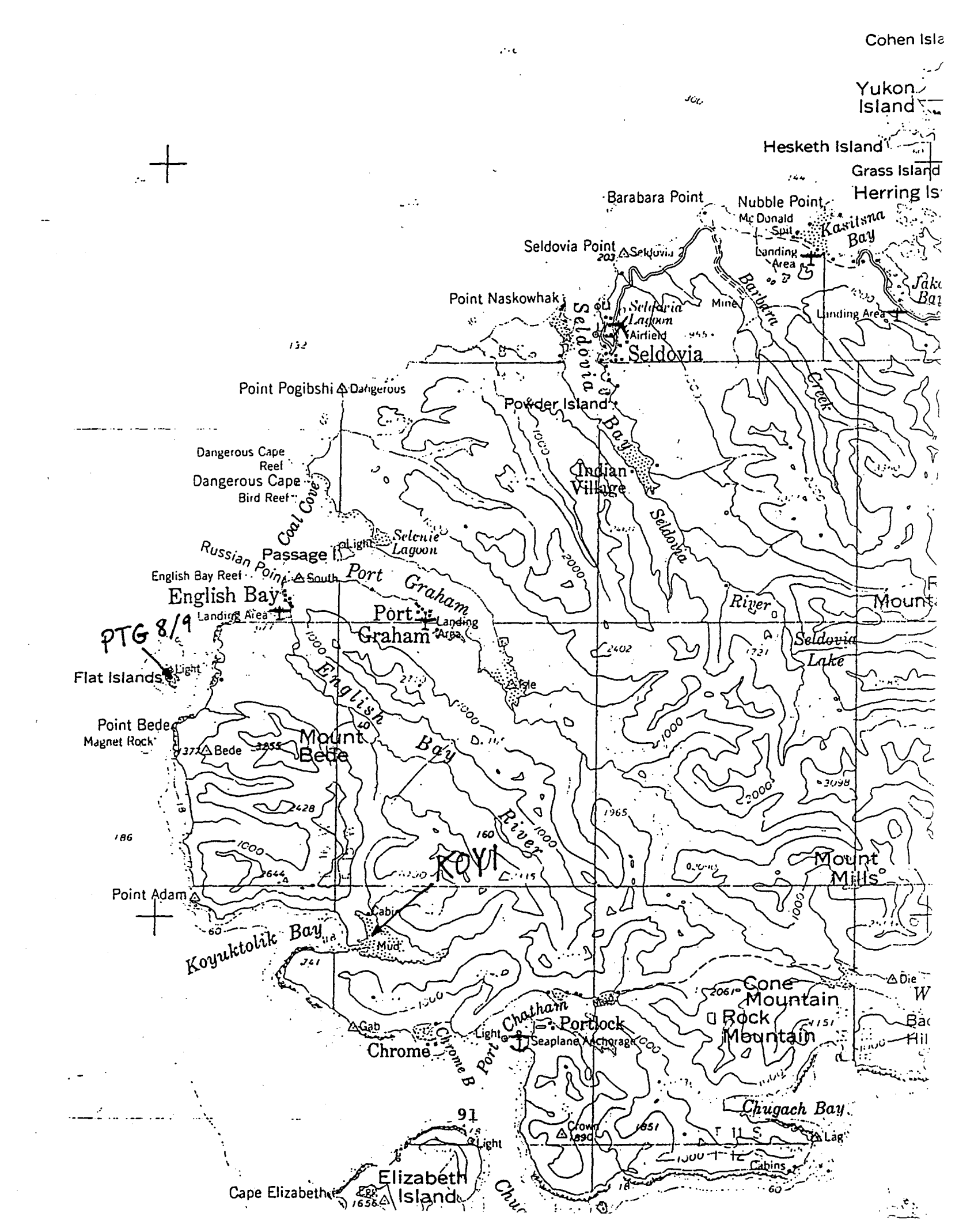
Mud Bay area on the east side of the
spit supports a small population of razor
t low tide. Clam digging is best on tides

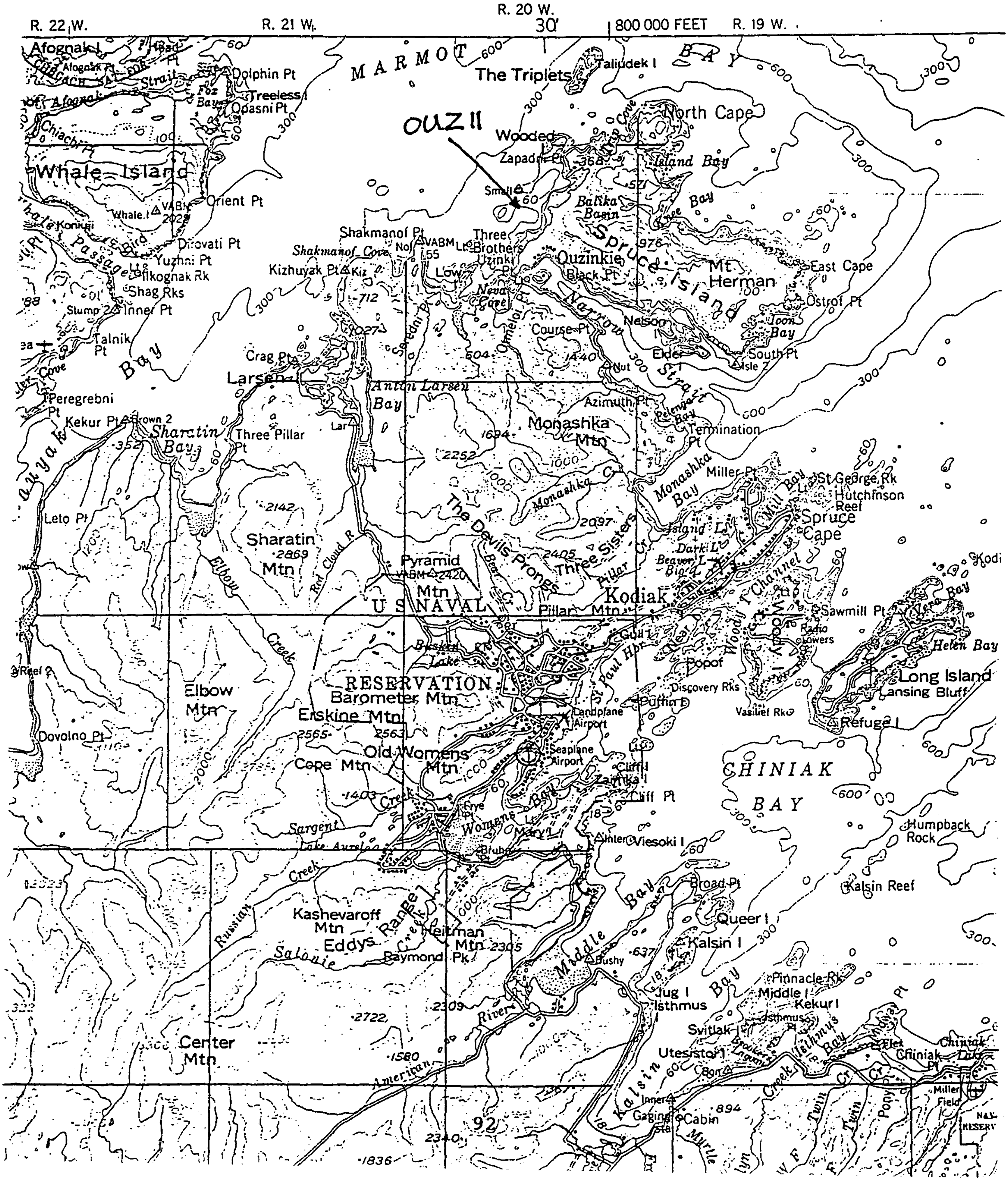
CRAB
in some areas of the Bay and are
ar. The taking of these species is
and sport fishing regulations.

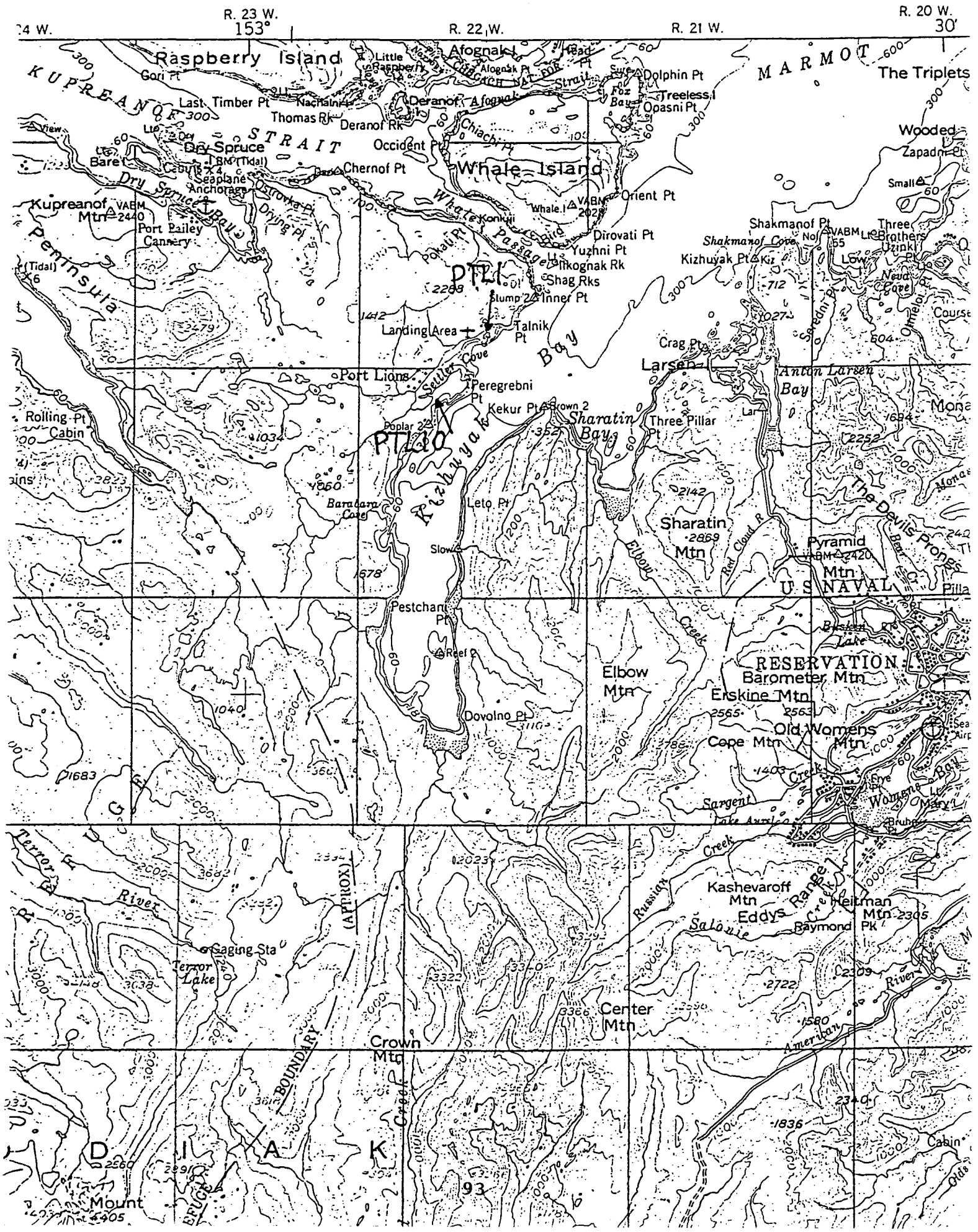


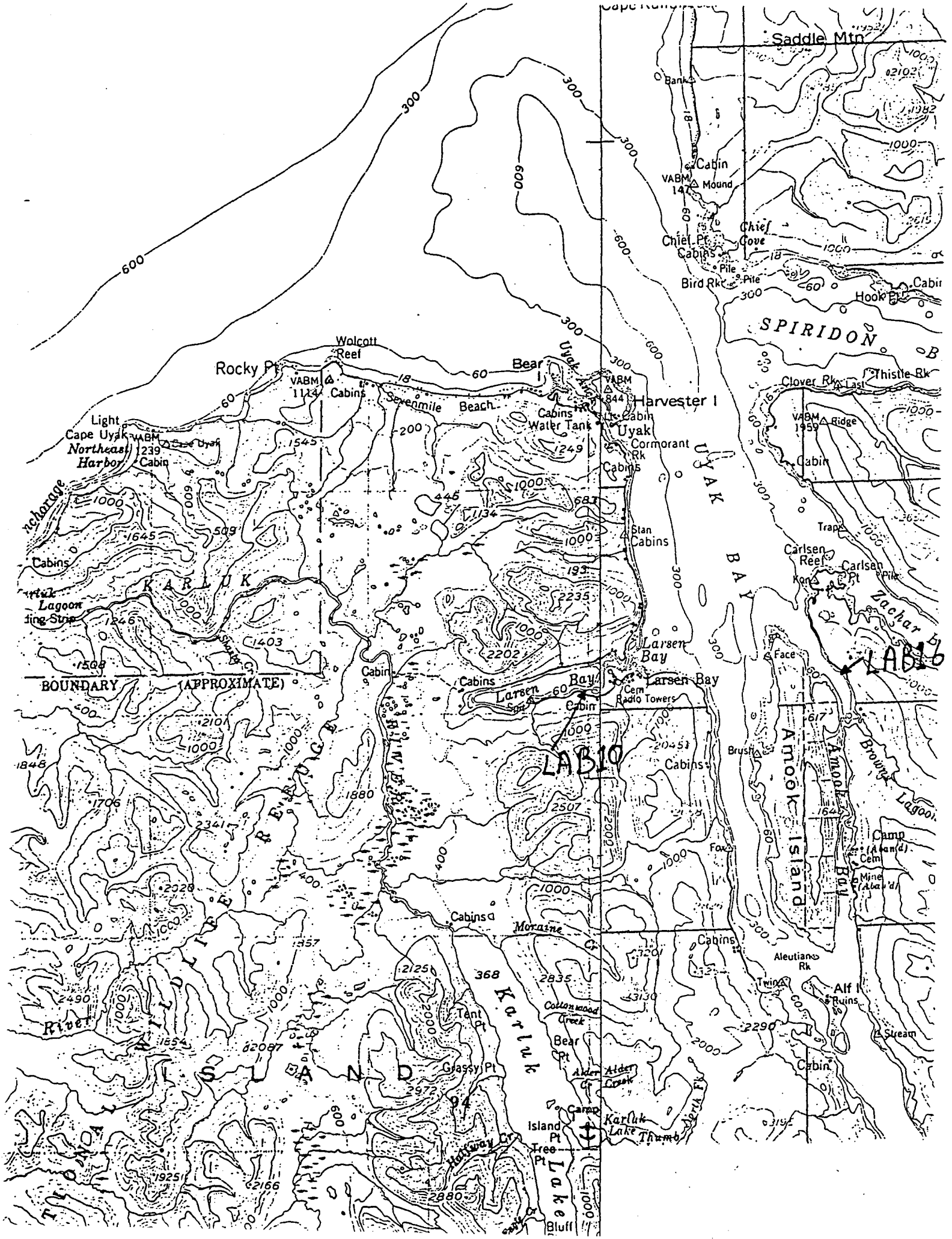

(SELDOVIA B-5)
43'
35'
151°30'
59°15'
Windy Bay
WND3
Cone Mtn
Rock Mtn
Badger Hill
VABM 693
CHUGACH BAY
Cabins
Spit
East
Peach Island
PERU ISLAND
VABM
10'
(SELDOVIA A-4)

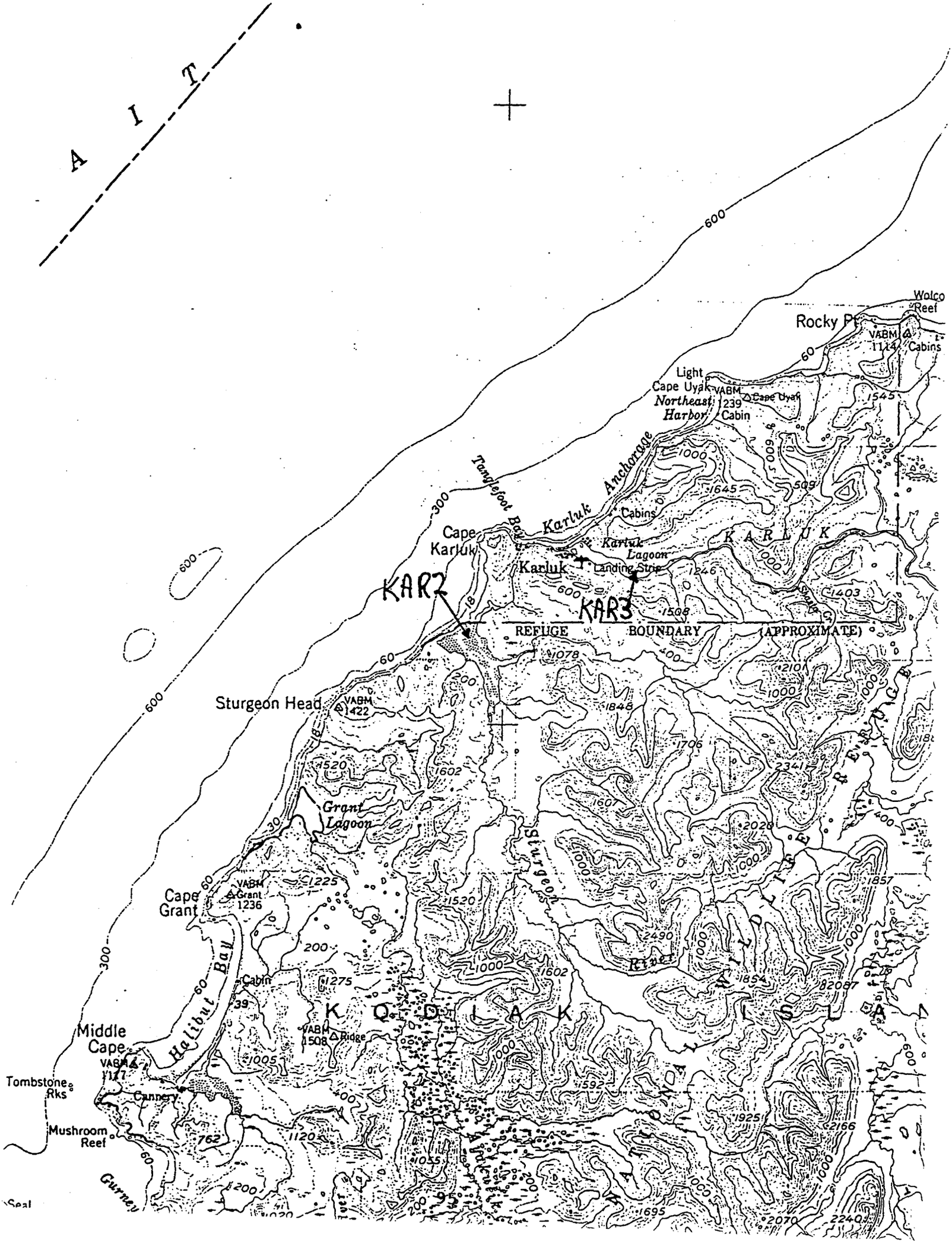
A G E

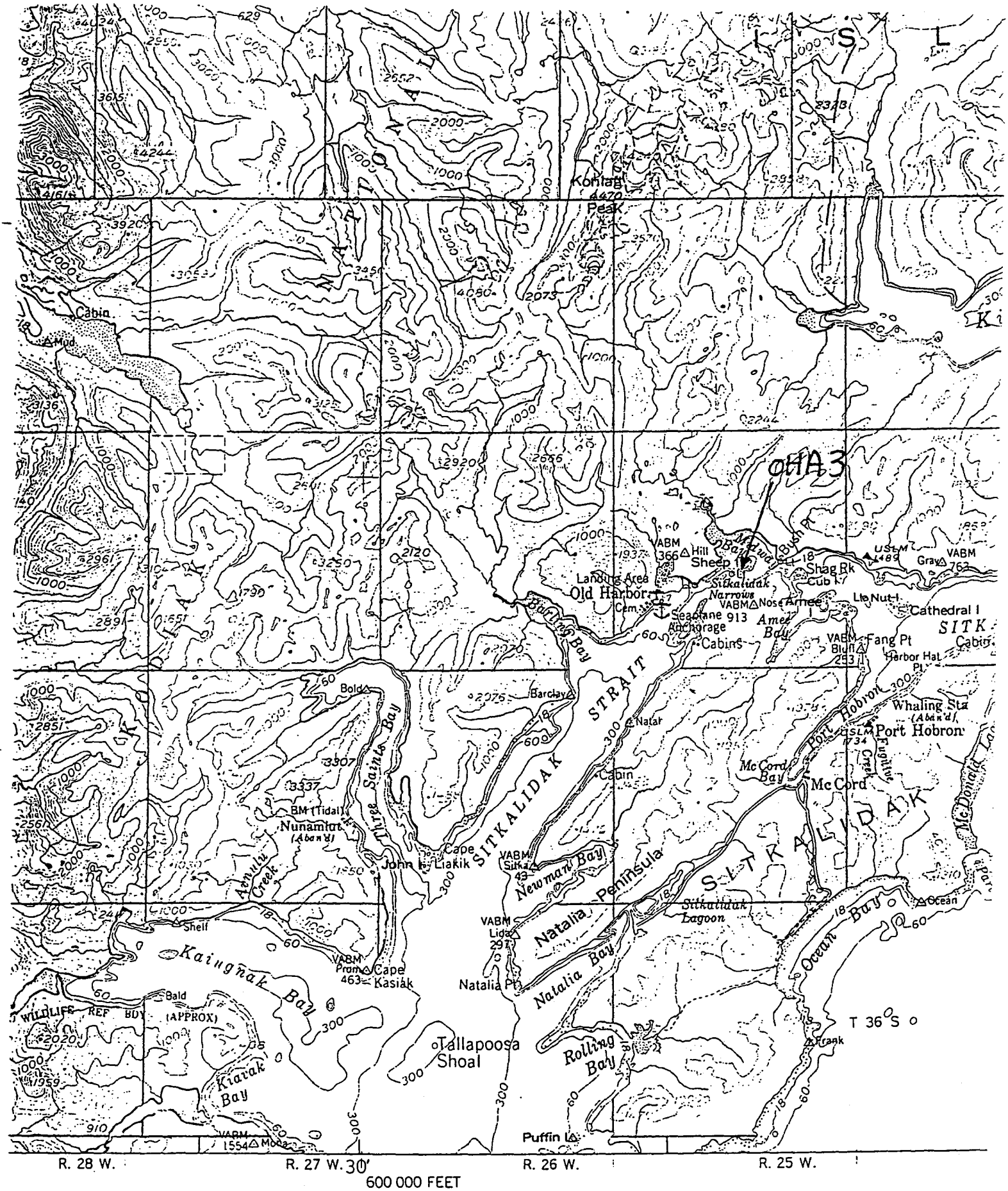

Cohen Isla
Yukon Island
Hesketh Island
Grass Island
Herring Is
Barabara Point
Nubble Point
Mc Donald Spit
Kasitsna Bay
Landing Area
Seldovia Point
Seldovia
Point Naskowhak
Seldovia Lagoon
Airfield
Mine
Seldovia Bay
Seldovia
Landing Area
Point Pogibshi
Dangerous
Powder Island
Creek
Dangerous Cape Reef
Dangerous Cape
Bird Reef
Indian Village
Coal Cove
Selenie Lagoon
Light
Russian Point
Passage I.
English Bay Reef
South
Port Graham
English Bay
Landing Area
Port Graham
Landing Area
River
Mount
PTG 8/9
Flat Islands
Light
Seldovia Lake
English Bay
Point Bede
Magnet Rock
Bede
Mount Bede
Bay
River
Mount Mills
ROV
Point Adam
Cabin
Koyuktolik Bay
Mud
Cone Mountain
Rock Mountain
Chatham
Portlock
Seaplane Anchorage
Light
Gab
Chrome
Chrome B
Port
91
Light
Chugach Bay
Crown
Cabins
Elizabeth Island
Cape Elizabeth


R. 22 W.
R. 21 W.
R. 20 W.
30'
800 000 FEET
R. 19 W.
MARMOT BAY
The Triplets
Taliudek I
OUZ II
North Cape
Wooded
Zapadni Pt
Island Bay
Small
Afognak I
Dolphin Pt
Treeless I
Opasni Pt
Whale Island
Whale I VABM 2029
Orient Pt
Dirovati Pt
Yuzhni Pt
Ilkognak Rk
Shag Rks
Inner Pt
Talnik Pt
Shakmanof Pt
Shakmanof Cove
Kizhuyak Pt
Three Brothers
Uzinki Pt
Ouzinkie
Black Pt
Spruce Island
Mt Herman
East Cape
Ostrof Pt
Narrow Strait
Nelson I
Elder I
South Pt
Course Pt
Crag Pt
Larsen Bay
Anton Larsen Bay
Peregrebni Pt
Kekur Pt
Sharatin Bay
Three Pillar Pt
Monashka Mtn
Azimuth Pt
Termination Pt
Monashka Bay
Miller Pt
St George Rk
Hutchinson Reef
Spruce Cape
Leto Pt
Sharatin Mtn
Elbow Creek
Red Cloud R
Pyramid Mtn
The Devils Prongs
Three Sisters
Pillar Cr
Kodiak
Pillar Mtn
U S NAVAL RESERVATION
Buskin Lake
Gull I
St Paul Hbr
Near I
Woody I
Channel
Sawmill Pt
Radio towers
Long Island
Lansing Bluff
Helen Bay
Popof
Discovery Rks
Puffin I
Vasilief Rk
Refuge I
Elbow Mtn
Barometer Mtn
Erskine Mtn
Dovolno Pt
Landplane Airport
Seaplane Airport
Old Womens Mtn
Cope Mtn
Cliff I
Zaimka I
Cliff Pt
CHINIAK BAY
Humpback Rock
Womens Bay
Sargent Creek
Viesoki I
Kalsin Reef
Russian Creek
Kashevaroff Mtn
Eddys Range
Heitman Mtn
Raymond Pk
Salonie Creek
Middle Bay
Broad Pt
Queer I
Kalsin I
Bushy
Pinnacle Rk
Middle I
Kekur I
Jug I
Isthmus
Isthmus Bay
Svitlak I
Utesistoi I
Center Mtn
American River
Kalsin Bay
Chiniak
Miller Field
Cabin
Twin Cr
92

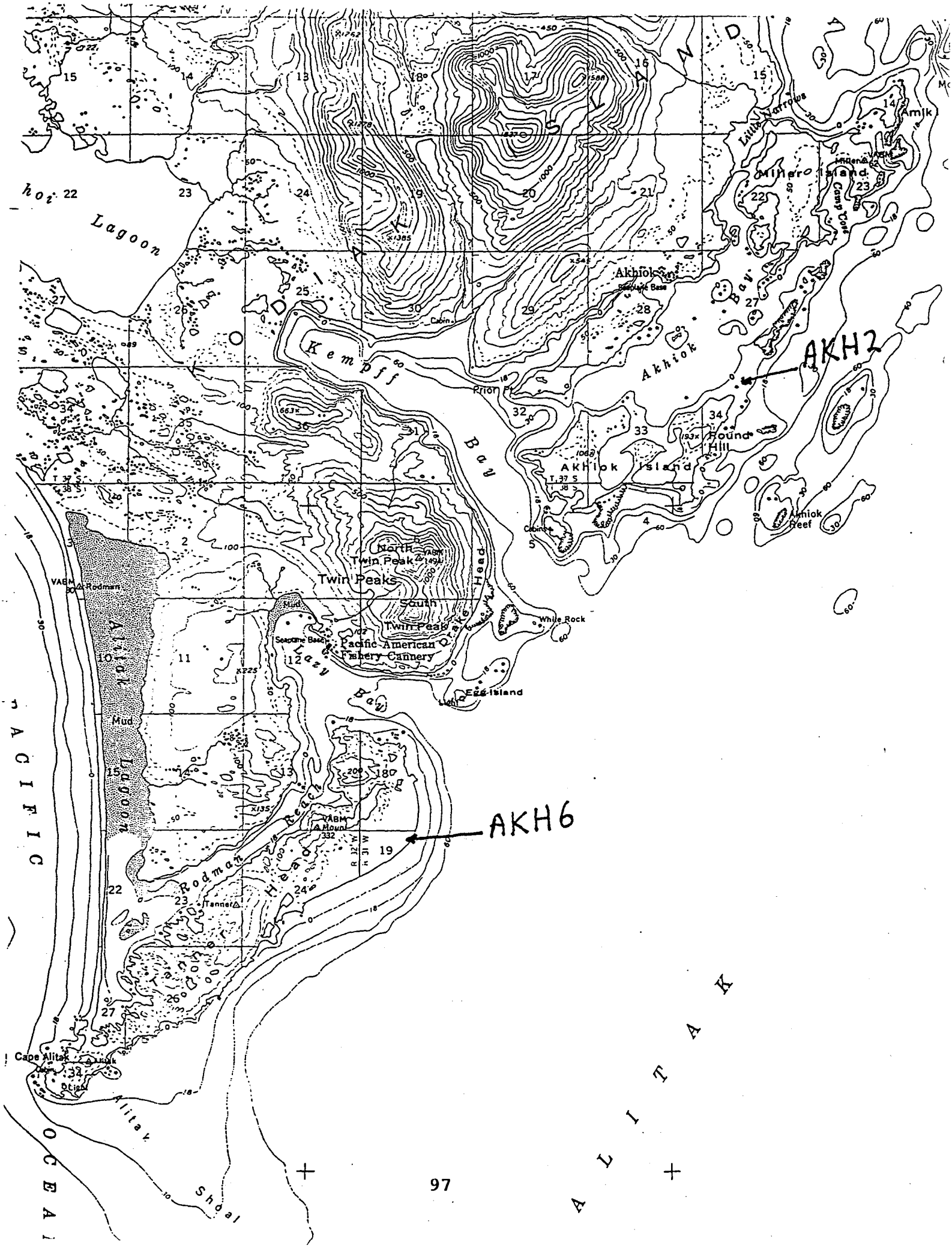

R. 23 W.
153°
R. 22 W.
R. 21 W.
R. 20 W.
30'
Raspberry Island
Afognak I.
Gori Pt
Little Raspberry I.
Afognak Pt
Head Pt
Sunset Pt
Dolphin Pt
MARMOT
The Triplets
KUPREANOF STRAIT
Last Timber Pt
Nachalni I.
Thomas Rk
Deranof Rk
Deranof
Afognak
Fox Bay
Treeless I
Opasni Pt
Wooded
Zapadni Pt
Dry Spruce
Chiachi Pt
Occident Pt
Bare I
Chernof Pt
Whale Island
Seaplane Anchorage
Dry Spruce Bay
Ostrovka Pt
Whale I.
VABM 2028
Orient Pt
Small
Kupreanof Mtn
VABM 2440
Port Bailey Cannery
Drying Pt
Whale Passage
Dirovati Pt
Yuzhni Pt
Shakmanof Pt
Shakmanof Cove
Three Brothers
Uzinki Pk
Kizhuyak Pt
Low I.
Neva Cape
Pokati Pt
Ilkognak Rk
Shag Rks
Inner Pt
Stump 2
Talnik Pt
Landing Area
Crag Pt
Larsen Bay
Anton Larsen Bay
Port Lions
Settler Cove
Peregrebni Pt
Kekur Pt
Brown 2
Sharatin Bay
Three Pillar Pt
Rolling Pt Cabin
Poplar 2
Kizhuyak Bay
Barabara Cove
Leto Pt
Sharatin Mtn
2869
The Devils Prongs
Red Cloud R
Pyramid Mtn
VABM 2420
U S NAVAL RESERVATION
Elbow Creek
Pestchani Pt
Reef 2
Elbow Mtn
Barometer Mtn
Erskine Mtn
Dovolno Pt
Old Womens Mtn
Cape Mtn
Sargent Creek
Terror River
Gaging Sta
Terror Lake
Russian Creek
Kashevaroff Mtn
Eddys Range
Salonie Creek
Baymond Pk
Heitman Mtn
Center Mtn
Crown Mtn
BOUNDARY CREEK
(APPROX)
American River
Cabin
Mount
93


Saddle Mtn
Cabin
VABM Mound
Chief Pt Cabins
Chief Cove
Bird Rk
Pile
Hook Pt
SPIRIDON
Wolcott Reef
Rocky Pt
VABM 1124
Cabins
Bear I
Serenmile Beach
Uyak Bay
VABM 844
Harvester I
Cabins
Water Tank
Lt
Cabin
Uyak
Cormorant Rk
Cabins
Clover Rk
Thistle Rk
VABM 1959
Ridge
Cabin
Light
Cape Uyak
VABM
Northeast Harbor
Cabin
Cabins
Stan
Trap
Carlsen Reef
Carlsen Pt
Pile
Zachar B
KARLUK
Lagoon
Shaw Cr
BOUNDARY (APPROXIMATE)
Larsen Bay
Cabin
Cabins
Larsen Spit
Cem
Radio Towers
LAB16
LAB10
Face
Brush
Cabins
Amook Island
Amook Bay
Brown Lagoon
Camp
Cem
Mine
Fox
Cabins
Moraine Cr
Aleutian Rk
Alf I
Ruins
Stream
Cabin
Tent Pt
Grassy Pt
Bear Pt
Alder Creek
Cottonwood Creek
Karluk River
Karluk Lake Thumb
North Fk
Camp
Island Pt
Tree Pt
Lake
Bluff
Halfway Cr
ALEUTIAN RANGE
ALASKA PENINSULA
94


A I T
Wolco Reef
Rocky Pt
VABM 1114
Cabins
Light
Cape Uyak
VABM 239
Cape Uyak
Northeast Harbor
Cabin
Tanglefoot Bay
Karluk Anchorage
Cabins
Cape Karluk
Karluk Lagoon
Karluk
Landing Strip
KARLUK
KAR2
KAR3
REFUGE BOUNDARY (APPROXIMATE)
Sturgeon Head
VABM 422
Grant Lagoon
Cape Grant
VABM Grant 1236
Halibut Bay
Cabin
Middle Cape
VABM 1117
Tombstone Rks
Cannery
Mushroom Reef
Gurney
Seal
Sturgeon River
KODIAK ISLAND
KODIAK NATIONAL WILDLIFE REFUGE
VABM 1508 Ridge
600
300
60
30
18


Konlag Peak
4470
Cabin
Mud
OHA3
Old Harbor
Landing Area
Cem.
Sheep Hill
366
Shag Rk
Cub I.
Nose
Amee
Lle Nut I.
Cathedral I
SITK
Cabins
Fang Pt
Harbor Hat Pt
Whaling Sta (Aband)
Port Hobron
Bolding Bay
STRAIT
Barclay
Natal
Bold
Three Saints Bay
Nunamiut (Aband)
BM (Tidal)
Cape Liakik
John I.
Armuu Creek
SITKALIDAK
Cabin
McCord Bay
McCord
Creek
Newman Bay
Peninsula
Natalia
Natalia Bay
Natalia Pt
Sitkalidak Lagoon
Ocean Bay
Ocean
Kaiugnak Bay
Shelf
Prom
Cape Kasiak
463
WILDLIFE REF BDY (APPROX)
Bald
Tallapoosa Shoal
Rolling Bay
Kiarak Bay
Frank
T 36 S
Puffin I.
Moss
1554
R. 28 W.
R. 27 W.
R. 26 W.
R. 25 W.
30'
600 000 FEET

5 0 5


AKH2
AKH6
Lagoon
Kempff Bay
Akhiok Bay
Akhiok Island
Round Hill
Akhiok Reef
Miller Island
Amlk
Little Narrows
Camp Cove
Prion Pt
North Twin Peak
Twin Peaks
South Twin Peak
Drake Head
White Rock
Pacific American Fishery Cannery
Egg Island
Lazy Bay
Alitak Lagoon
Mud
Rodman
Rodman Head
Rodman Beach
Tanner
Cape Alitak
Alitak Shoal
PACIFIC OCEAN
ALITAK

APPENDIX B

SAMPLE DATABASES

Id. No	Village	Site	Cycle	Date	Time	Species	Bile Id. No	Disposition
94TISS0001	CHENEGA	CHE27	1	6/22/94	7:30	BUTTER CLAMS		NOAA LAB
94TISS0002	CHENEGA	CHE27	1	6/22/94	7:40	BUTTER CLAMS		NOAA LAB
94TISS0003	CHENEGA	CHE27	1	6/22/94	7:50	BUTTER CLAMS		NOAA LAB
94TISS0004	CHENEGA	CHE27	1	6/22/94	8:00	MUSSELS		NOAA LAB
94TISS0005	CHENEGA	CHE27	1	6/22/94	8:05	MUSSELS		NOAA LAB
94TISS0006	CHENEGA	CHE27	1	6/22/94	8:10	MUSSELS		NOAA LAB
94TISS0007	CHENEGA	CHE27	1	6/22/94	8:10	MUSSELS		ADF&G
94TISS0008	CHENEGA	CHE27	1	6/22/94	8:05	FIELD BLANK		ADF&G
94TISS0009	CHENEGA	CHE28	1	6/23/94	7:30	MUSSELS		NOAA LAB
94TISS0010	CHENEGA	CHE28	1	6/23/94	7:40	MUSSELS		NOAA LAB
94TISS0011	CHENEGA	CHE28	1	6/23/94	7:50	MUSSELS		NOAA LAB
94TISS0012	CHENEGA	CHE28	1	6/23/94	7:50	MUSSELS		ADF&G
94TISS0013	CHENEGA	CHE28	1	6/23/94	7:55	FIELD BLANK		ADF&G
94TISS0014	CHENEGA	CHE28	1	6/23/94	8:05	LITTLENECK CLAMS		NOAA LAB
94TISS0015	CHENEGA	CHE28	1	6/23/94	8:05	BUTTER CLAMS		ADF&G
94TISS0016	CHENEGA	CHE28	1	6/23/94	8:10	LITTLENECK CLAMS		NOAA LAB
94TISS0017	CHENEGA	CHE28	1	6/23/94	8:15	BUTTER CLAMS		ADF&G
94TISS0018	CHENEGA	CHE28	1	6/23/94	8:40	LITTLENECK CLAMS		NOAA LAB
94TISS0019	CHENEGA	CHE28	1	6/23/94	8:40	BUTTER CLAMS		ADF&G
94TISS0022	TATITLEK	TAT9	1	6/23/94	7:00	LITTLENECK CLAMS		NOAA LAB
94TISS0023	TATITLEK	TAT9	1	6/23/94	7:00	LITTLENECK CLAMS		NOAA LAB
94TISS0024	TATITLEK	TAT9	1	6/23/94	7:00	LITTLENECK CLAMS		NOAA LAB
94TISS0025	TATITLEK	TAT9	1	6/23/94	7:15	MUSSELS		NOAA LAB
94TISS0026	TATITLEK	TAT9	1	6/23/94	7:15	MUSSELS		NOAA LAB
94TISS0027	TATITLEK	TAT9	1	6/23/94	7:15	MUSSELS		NOAA LAB
94TISS0028	TATITLEK	TAT9	1	6/23/94	7:15	MUSSELS		ADF&G
94TISS0029	TATITLEK	TAT9	1	6/23/94	7:30	FIELD BLANK		ADF&G
94TISS0030	TATITLEK	TAT1	1	6/23/94	9:00	LITTLENECK CLAMS		ADF&G
94TISS0031	TATITLEK	TAT1	1	6/23/94	9:00	LITTLENECK CLAMS		ADF&G
94TISS0032	TATITLEK	TAT1	1	6/23/94	9:00	LITTLENECK CLAMS		ADF&G
94TISS0033	TATITLEK	TAT1	1	6/23/94	9:15	MUSSELS		NOAA LAB
94TISS0034	TATITLEK	TAT1	1	6/23/94	9:15	MUSSELS		NOAA LAB
94TISS0035	TATITLEK	TAT1	1	6/23/94	9:15	MUSSELS		NOAA LAB
94TISS0036	TATITLEK	TAT1	1	6/23/94	9:15	MUSSELS		ADF&G
94TISS0037	TATITLEK	TAT1	1	6/23/94		FIELD BLANK		ADF&G
94TISS0038	TATITLEK	TAT4	1	6/23/94	13:00	QUILLBACK ROCKFISH	94BILE0038	NOAA LAB
94TISS0039	TATITLEK	TAT4	1	6/23/94	13:40	FIELD BLANK		ADF&G
94TISS0040	TATITLEK	T7	1	6/23/94		YELLOWEYE ROCKFISH	94BILE0040	NOAA LAB
94TISS0041	TATITLEK	T7	1	6/23/94		FIELD BLANK		ADF&G
94TISS0042	PORT GRAHAM	WNB3	1	6/27/94	11:15	MUSSELS		NOAA LAB
94TISS0043	PORT GRAHAM	PTG4	1	6/27/94	13:00	LITTLENECK CLAMS		ADF&G
94TISS0044	PORT GRAHAM	PTG4	1	6/27/94	13:15	LITTLENECK CLAMS		ADF&G
94TISS0045	PORT GRAHAM	PTG4	1	6/27/94	13:15	LITTLENECK CLAMS		ADF&G
94TISS0046	PORT GRAHAM	PTG4	1	6/27/94	13:20	FIELD BLANK		ADF&G
94TISS0047	PORT GRAHAM	PTG4	1	6/27/94	13:30	SNAILS		NOAA LAB
94TISS0048	PORT GRAHAM	PTG13	1	6/27/94	13:40	SNAILS		NOAA LAB
94TISS0049	PORT GRAHAM	PTG13	1	6/27/94	13:40	SNAILS		NOAA LAB
94TISS0050	PORT GRAHAM	WNB3	1	6/27/94	11:20	MUSSELS		NOAA LAB
94TISS0051	PORT GRAHAM	WNB3	1	6/27/94	11:20	MUSSELS		NOAA LAB

94TISS0052	PORT GRAHAM	WNB3	1	6/27/94	12:00	MUSSELS		ADF&G
94TISS0053	PORT GRAHAM	WNB3	1	6/27/94	12:00	CHITONS		ADF&G
94TISS0054	PORT GRAHAM	WNB3	1	6/27/94	12:00	CHITONS		ADF&G
94TISS0055	PORT GRAHAM	WNB3	1	6/27/94	12:00	CHITONS		ADF&G
94TISS0056	PORT GRAHAM	WNB3	1	6/27/94	12:20	FIELD BLANK		ADF&G
94TISS0064	PORT GRAHAM	PTG13	1	6/27/94	13:40	SNAILS		NOAA LAB
94TISS0065	PORT GRAHAM	PTG13	1	6/27/94	13:40	FIELD BLANK		ADF&G
94TISS0071	NANWALEK	PTG8/9	1	7/10/94	10:25	MUSSELS		NOAA LAB
94TISS0072	NANWALEK	PTG8/9	1	7/10/94	10:35	MUSSELS		NOAA LAB
94TISS0073	NANWALEK	PTG8/9	1	7/10/94	10:45	MUSSELS		NOAA LAB
94TISS0074	NANWALEK	PTG8/9	1	7/10/94	10:45	MUSSELS		ADF&G
94TISS0075	NANWALEK	PTG8/9	1	7/10/94	10:50	CHITONS		NOAA LAB
94TISS0076	NANWALEK	PTG8/9	1	7/10/94	10:55	CHITONS		NOAA LAB
94TISS0077	NANWALEK	PTG8/9	1	7/10/94	11:00	CHITONS		NOAA LAB
94TISS0078	NANWALEK	PTG8/9	1	7/10/94	11:05	FIELD BLANK		ADF&G
94TISS0079	NANWALEK	KOY1	1	7/11/94	10:55	MUSSELS		NOAA LAB
94TISS0080	NANWALEK	KOY1	1	7/11/94	11:00	MUSSELS		NOAA LAB
94TISS0081	NANWALEK	KOY1	1	7/11/94	11:05	MUSSELS		NOAA LAB
94TISS0082	NANWALEK	KOY1	1	7/11/94	11:20	MUSSELS		ADF&G
94TISS0083	NANWALEK	KOY1	1	7/11/94	11:20	MYA CLAMS		ADF&G
94TISS0084	NANWALEK	KOY1	1	7/11/94	11:25	MYA CLAMS		ADF&G
94TISS0085	NANWALEK	KOY1	1	7/11/94	11:30	MYA CLAMS		ADF&G
94TISS0086	NANWALEK	KOY1	1	7/11/94	11:35	FIELD BLANK		ADF&G
94TISS0101	OUZINKIE	OUZ11	1	7/8/94	8:40	BUTTER CLAMS		NOAA LAB
94TISS0102	OUZINKIE	OUZ11	1	7/8/94	8:40	BUTTER CLAMS		NOAA LAB
94TISS0103	OUZINKIE	OUZ11	1	7/8/94	8:40	BUTTER CLAMS		ADF&G
94TISS0104	OUZINKIE	OUZ11	1	7/8/94	8:50	BUTTER CLAMS		NOAA LAB
94TISS0105	OUZINKIE	OUZ11	1	7/8/94	9:15	CHITONS		ADF&G
94TISS0106	OUZINKIE	OUZ11	1	7/8/94	9:45	CHITONS		ADF&G
94TISS0107	OUZINKIE	OUZ11	1	7/8/94	9:45	CHITONS		ADF&G
94TISS0108	OUZINKIE	OUZ11	1	7/8/94	9:45	CHITONS		ADF&G
94TISS0109	AHKIOK	AHK6	1	7/9/94	9:45	RAZOR CLAMS		NOAA LAB
94TISS0110	AHKIOK	AHK6	1	7/9/94	9:50	RAZOR CLAMS		NOAA LAB
94TISS0111	AHKIOK	AHK6	1	7/9/94	9:50	RAZOR CLAMS		NOAA LAB
94TISS0112	AHKIOK	AHK6	1	7/9/94	9:50	RAZOR CLAMS		ADF&G
94TISS0113	AHKIOK	AHK2	1	7/9/94	10:15	BUTTER CLAMS		NOAA LAB
94TISS0114	AHKIOK	AHK2	1	7/9/94	10:30	BUTTER CLAMS		NOAA LAB
94TISS0115	AHKIOK	AHK2	1	7/9/94	10:30	BUTTER CLAMS		NOAA LAB
94TISS0116	AHKIOK	AHK2	1	7/9/94	10:45	MUSSELS		ADF&G
94TISS0117	AHKIOK	AHK2	1	7/9/94	10:45	MUSSELS		ADF&G
94TISS0118	AHKIOK	AHK2	1	7/9/94	10:55	MUSSELS		ADF&G
94TISS0119	AHKIOK	AHK2	1	7/9/94	11:00	MUSSELS		ADF&G
94TISS0120	AHKIOK	AHK2	1	7/9/94	11:10	FIELD BLANK		ADF&G
94TISS0121	KARLUK	KAR2	1	7/13/94	11:45	BUTTER CLAMS		NOAA LAB
94TISS0122	KARLUK	KAR2	1	7/13/94	12:00	BUTTER CLAMS		NOAA LAB
94TISS0123	KARLUK	KAR2	1	7/13/94	12:00	BUTTER CLAMS		NOAA LAB
94TISS0124	KARLUK	KAR2	1	7/13/94	12:10	LITTLENECK CLAMS		ADF&G
94TISS0125	KARLUK	KAR2	1	7/13/94	12:15	LITTLENECK CLAMS		ADF&G
94TISS0126	KARLUK	KAR2	1	7/13/94	12:15	LITTLENECK CLAMS		ADF&G

94TISS0127	KARLUK	KAR2	1	7/13/94	12:15	MUSSELS		NOAA LAB
94TISS0128	KARLUK	KAR2	1	7/13/94	12:30	MUSSELS		NOAA LAB
94TISS0129	KARLUK	KAR2	1	7/13/94	12:30	MUSSELS		NOAA LAB
94TISS0130	KARLUK	KAR2	1	7/13/94	12:30	MUSSELS		ADF&G
94TISS0131	KARLUK	KAR2	1	7/13/94	12:30	FIELD BLANK		ADF&G
94TISS0132	KARLUK	KAR3	1	7/13/94	13:15	SOCKEYE SALMON	94BILE0132	NOAA LAB
94TISS0133	KARLUK	KAR3	1	7/13/94	13:15	SOCKEYE SALMON	94BILE0133	NOAA LAB
94TISS0134	KARLUK	KAR3	1	7/13/94	13:15	SOCKEYE SALMON	94BILE0134	NOAA LAB
94TISS0135	KARLUK	KAR3	1	7/13/94	13:15	SOCKEYE SALMON	94BILE0135	NOAA LAB
94TISS0136	KARLUK	KAR3	1	7/13/94	13:15	SOCKEYE SALMON	94BILE0136	NOAA LAB
94TISS0137	KARLUK	KAR3	1	7/13/94	13:15	SOCKEYE SALMON	94BILE0137	NOAA LAB
94TISS0138	KARLUK	KAR3	1	7/13/94	13:30	FIELD BLANK		ADF&G
94TISS0087	KARLUK	KAR2	2	8/20/94		BUTTER CLAMS		NOAA LAB
94TISS0088	KARLUK	KAR2	2	8/20/94		BUTTER CLAMS		NOAA LAB
94TISS0089	KARLUK	KAR2	2	8/20/94		BUTTER CLAMS		NOAA LAB
94TISS0090	KARLUK	KAR2	2	8/20/94		LITTLENECK CLAMS		ADF&G
94TISS0091	KARLUK	KAR2	2	8/20/94		LITTLENECK CLAMS		ADF&G
94TISS0092	KARLUK	KAR2	2	8/20/94		LITTLENECK CLAMS		ADF&G
94TISS0093	KARLUK	KAR2	2	8/20/94		MUSSELS		NOAA LAB
94TISS0094	KARLUK	KAR2	2	8/20/94		MUSSELS		NOAA LAB
94TISS0095	KARLUK	KAR2	2	8/20/94		MUSSELS		NOAA LAB
94TISS0096	KARLUK	KAR2	2	8/20/94		MUSSELS		ADF&G
94TISS0097	KARLUK	KAR2	2	8/20/94		FIELD BLANK		ADF&G
94TISS0139	AHKIOK	AKH6	2	8/21/94	9:10	RAZOR CLAMS		NOAA LAB
94TISS0140	AHKIOK	AKH6	2	8/21/94	9:10	RAZOR CLAMS		NOAA LAB
94TISS0141	AHKIOK	AKH6	2	8/21/94	9:10	RAZOR CLAMS		NOAA LAB
94TISS0142	AHKIOK	AKH6	2	8/21/94	9:10	RAZOR CLAMS		ADF&G
94TISS0143	AHKIOK	AKH6	2	8/21/94	9:10	FIELD BLANK		ADF&G
94TISS0144	AHKIOK	AKH2	2	8/21/94	9:30	BUTTER CLAMS		NOAA LAB
94TISS0145	AHKIOK	AKH2	2	8/21/94	9:30	BUTTER CLAMS		NOAA LAB
94TISS0146	AHKIOK	AKH2	2	8/21/94	9:30	BUTTER CLAMS		NOAA LAB
94TISS0147	AHKIOK	AKH2	2	8/21/94	9:30	MUSSELS		ADF&G
94TISS0148	AHKIOK	AKH2	2	8/21/94	9:30	MUSSELS		ADF&G
94TISS0149	AHKIOK	AKH2	2	8/21/94	9:30	MUSSELS		ADF&G
94TISS0150	AHKIOK	AKH2	2	8/21/94	9:30	MUSSELS		ADF&G
94TISS0151	AHKIOK	AKH2	2	8/21/94	9:30	FIELD BLANK		ADF&G
94TISS0152	OLD HARBOR	OHA3	2	8/22/94	9:50	BUTTER CLAMS		NOAA LAB
94TISS0153	OLD HARBOR	OHA3	2	8/22/94	9:50	BUTTER CLAMS		NOAA LAB
94TISS0154	OLD HARBOR	OHA3	2	8/22/94	9:50	BUTTER CLAMS		NOAA LAB
94TISS0155	OLD HARBOR	OHA3	2	8/22/94	9:50	BUTTER CLAMS		ADF&G
94TISS0156	OLD HARBOR	OHA3	2	8/22/94	10:00	FIELD BLANK		ADF&G
94TISS0157	PORT GRAHAM	WNB3	2	9/6/94	9:15	CHITONS		ADF&G
94TISS0158	PORT GRAHAM	WNB3	2	9/6/94	9:15	CHITONS		ADF&G
94TISS0159	PORT GRAHAM	WNB3	2	9/6/94	9:15	CHITONS		ADF&G
94TISS0160	PORT GRAHAM	WNB3	2	9/6/94	9:15	MUSSELS		NOAA LAB
94TISS0161	PORT GRAHAM	WNB3	2	9/6/94	9:15	MUSSELS		NOAA LAB
94TISS0162	PORT GRAHAM	WNB3	2	9/6/94	9:15	MUSSELS		NOAA LAB
94TISS0163	PORT GRAHAM	WNB3	2	9/6/94	9:15	MUSSELS		ADF&G
94TISS0164	PORT GRAHAM	WNB3	2	9/6/94	9:30	FIELD BLANK		ADF&G

94TISS0165	PORT GRAHAM	PTG4	2	9/6/94	9:45	LITTLENECK CLAMS		NOAA LAB
94TISS0166	PORT GRAHAM	PTG4	2	9/6/94	9:45	LITTLENECK CLAMS		NOAA LAB
94TISS0167	PORT GRAHAM	PTG4	2	9/6/94	10:00	FIELD BLANK		ADF&G
94TISS0168	PORT GRAHAM	PTG4	2	9/6/94	10:30	SNAILS		NOAA LAB
94TISS0169	PORT GRAHAM	PTG4	2	9/6/94	10:30	SNAILS		NOAA LAB
94TISS0170	PORT GRAHAM	PTG4	2	9/6/94	10:30	SNAILS		NOAA LAB
94TISS0171	PORT GRAHAM	PTG13	2	9/6/94	11:00	SNAILS		NOAA LAB
94TISS0172	PORT GRAHAM	PTG13	2	9/6/94	11:00	SNAILS		NOAA LAB
94TISS0173	PORT GRAHAM	PTG13	2	9/6/94	11:00	SNAILS		NOAA LAB
94TISS0174	PORT GRAHAM	PTG13	2	9/6/94	11:00	FIELD BLANK		ADF&G
94TISS0180	OUZINKIE	OUZ11	2	8/23/94	9:45	BUTTER CLAMS		NOAA LAB
94TISS0181	OUZINKIE	OUZ11	2	8/23/94	9:45	BUTTER CLAMS		NOAA LAB
94TISS0182	OUZINKIE	OUZ11	2	8/23/94	9:45	BUTTER CLAMS		NOAA LAB
94TISS0183	OUZINKIE	OUZ11	2	8/23/94	10:00	BUTTER CLAMS		ADF&G
94TISS0184	OUZINKIE	OUZ11	2	8/23/94	10:00	CHITONS		ADF&G
94TISS0185	OUZINKIE	OUZ11	2	8/23/94	10:00	CHITONS		ADF&G
94TISS0186	OUZINKIE	OUZ11	2	8/23/94	10:00	FIELD BLANK		ADF&G
94TISS0187	OUZINKIE	OUZ11	2	8/23/94	10:00	CHITONS		ADF&G
94TISS0188	PORT LIONS	PTL1	2	9/9/94	10:15	BUTTER CLAMS		NOAA LAB
94TISS0189	PORT LIONS	PTL1	2	9/9/94	10:15	BUTTER CLAMS		NOAA LAB
94TISS0190	PORT LIONS	PTL1	2	9/9/94	10:15	BUTTER CLAMS		NOAA LAB
94TISS0191	PORT LIONS	PTL1	2	9/9/94	10:15	BUTTER CLAMS		ADF&G
94TISS0192	PORT LIONS	PTL1	2	9/9/94	10:15	FIELD BLANK		ADF&G
94TISS0193	PORT LIONS	PTL10	2	9/9/94	11:50	BUTTER CLAMS		NOAA LAB
94TISS0194	PORT LIONS	PTL10	2	9/9/94	11:45	BUTTER CLAMS		NOAA LAB
94TISS0195	PORT LIONS	PTL10	2	9/9/94	11:10	BUTTER CLAMS		NOAA LAB
94TISS0196	PORT LIONS	PTL10	2	9/9/94	11:10	BUTTER CLAMS		ADF&G
94TISS0197	PORT LIONS	PTL10	2	9/9/94	11:15	FIELD BLANK		ADF&G
94TISS0198	LARSEN BAY	LAB16	2	9/10/94		BUTTER CLAMS		NOAA LAB
94TISS0199	LARSEN BAY	LAB16	2	9/10/94		BUTTER CLAMS		NOAA LAB
94TISS0200	LARSEN BAY	LAB16	2	9/10/94		BUTTER CLAMS		NOAA LAB
94TISS0201	LARSEN BAY	LAB16	2	9/10/94		BUTTER CLAMS		ADF&G
94TISS0202	LARSEN BAY	LAB16	2	9/10/94		FIELD BLANK		ADF&G
94TISS0203	LARSEN BAY	LAB10	2	9/10/94		BUTTER CLAMS		NOAA LAB
94TISS0204	LARSEN BAY	LAB10	2	9/10/94		BUTTER CLAMS		NOAA LAB
94TISS0205	LARSEN BAY	LAB10	2	9/10/94		BUTTER CLAMS		NOAA LAB
94TISS0206	LARSEN BAY	LAB10	2	9/10/94		BUTTER CLAMS		ADF&G
94TISS0207	LARSEN BAY	LAB10	2	9/10/94		FIELD BLANK		ADF&G
94TISS0302	TATITLEK	T7	2	8/17/94	9:26	QUILLBACK ROCKFISH	94BILE0302	NOAA LAB
94TISS0303	TATITLEK	T7	2	8/17/94	9:38	QUILLBACK ROCKFISH	94BILE0303	ADF&G
94TISS0304	TATITLEK	T7	2	8/17/94	9:40	FIELD BLANK		ADF&G
94TISS0305	TATITLEK	T7	2	8/17/94	10:17	QUILLBACK ROCKFISH	94BILE0305	NOAA LAB
94TISS0306	TATITLEK	T7	2	8/17/94	10:20	BLACK ROCKFISH	94BILE0306	NOAA LAB
94TISS0307	TATITLEK	T7	2	8/17/94	10:53	BLACK ROCKFISH	94BILE0307	NOAA LAB
94TISS0308	TATITLEK	T7	2	8/17/94	11:05	BLACK ROCKFISH	94BILE0308	NOAA LAB
94TISS0309	TATITLEK	T7	2	8/17/94	11:20	QUILLBACK ROCKFISH	94BILE0309	NOAA LAB
94TISS0310	TATITLEK	TAT3	2	8/18/94	12:08	QUILLBACK ROCKFISH	94BILE0310	ADF&G
94TISS0311	TATITLEK	TAT9	2	8/18/94	6:00	LITTLENECK CLAMS		NOAA LAB
94TISS0312	TATITLEK	TAT9	2	8/18/94	6:25	BUTTER CLAMS		ADF&G

94TISS0313	TATITLEK	TAT9	2	8/18/94	6:10	LITTLENECK CLAMS		NOAA LAB
94TISS0314	TATITLEK	TAT9	2	8/18/94	6:15	LITTLENECK CLAMS		NOAA LAB
94TISS0315	TATITLEK	TAT9	2	8/18/94	6:15	MUSSELS		NOAA LAB
94TISS0316	TATITLEK	TAT9	2	8/18/94	6:35	MUSSELS		NOAA LAB
94TISS0317	TATITLEK	TAT9	2	8/18/94	6:40	MUSSELS		NOAA LAB
94TISS0318	TATITLEK	TAT9	2	8/18/94	6:40	MUSSELS		ADF&G
94TISS0319	TATITLEK	TAT1	2	8/18/94	7:20	BUTTER CLAMS		ADF&G
94TISS0320	TATITLEK	TAT1	2	8/18/94	7:25	LITTLENECK CLAMS		ADF&G
94TISS0321	TATITLEK	TAT1	2	8/18/94	8:05	LITTLENECK CLAMS		ADF&G
94TISS0322	TATITLEK	TAT1	2	8/18/94	6:50	FIELD BLANK		ADF&G
94TISS0323	TATITLEK	TAT1	2	8/18/94	8:25	LITTLENECK CLAMS		ADF&G
94TISS0324	TATITLEK	TAT1	2	8/18/94	8:30	MUSSELS		NOAA LAB
94TISS0325	TATITLEK	TAT1	2	8/18/94	8:35	MUSSELS		NOAA LAB
94TISS0326	TATITLEK	TAT1	2	8/18/94	8:40	MUSSELS		ADF&G
94TISS0327	TATITLEK	TAT1	2	8/18/94	8:40	MUSSELS		NOAA LAB
94TISS0328	CHENEGA	CHE 27	2	8/19/94	6:25	FIELD BLANK		ADF&G
94TISS0329	CHENEGA	CHE 27	2	8/19/94	6:40	LITTLENECK CLAMS		NOAA LAB
94TISS0330	CHENEGA	CHE 27	2	8/19/94	6:50	LITTLENECK CLAMS		NOAA LAB
94TISS0331	CHENEGA	CHE 27	2	8/19/94	6:55	LITTLENECK CLAMS		NOAA LAB
94TISS0332	CHENEGA	CHE 27	2	8/19/94	7:00	BUTTER CLAMS		ADF&G
94TISS0333	CHENEGA	CHE 27	2	8/19/94	7:10	BUTTER CLAMS		ADF&G
94TISS0334	CHENEGA	CHE 27	2	8/19/94	7:15	MUSSELS		NOAA LAB
94TISS0335	CHENEGA	CHE 27	2	8/19/94	7:20	MUSSELS		NOAA LAB
94TISS0336	CHENEGA	CHE 27	2	8/19/94	7:25	MUSSELS		NOAA LAB
94TISS0337	CHENEGA	CHE 27	2	8/19/94	7:25	MUSSELS		ADF&G
94TISS0338	CHENEGA	CHE 28	2	8/19/94	7:40	FIELD BLANK		ADF&G
94TISS0339	CHENEGA	CHE 28	2	8/19/94	7:45	MUSSELS		NOAA LAB
94TISS0340	CHENEGA	CHE 28	2	8/19/94	7:50	MUSSELS		ADF&G
94TISS0341	CHENEGA	CHE 28	2	8/19/94	7:55	MUSSELS		NOAA LAB
94TISS0342	CHENEGA	CHE 28	2	8/19/94	7:55	MUSSELS		NOAA LAB
94TISS0343	CHENEGA	CHE 28	2	8/19/94	8:00	CLAMS		NOAA LAB
94TISS0344	NANWALEK	PTG8/9	2	9/7/94	9:45	CHITONS		NOAA LAB
94TISS0345	NANWALEK	PTG8/9	2	9/7/94	10:00	CHITONS		NOAA LAB
94TISS0346	NANWALEK	PTG8/9	2	9/7/94	10:05	CHITONS		NOAA LAB
94TISS0347	NANWALEK	PTG8/9	2	9/7/94	10:10	MUSSELS		NOAA LAB
94TISS0348	NANWALEK	PTG8/9	2	9/7/94	10:15	MUSSELS		NOAA LAB
94TISS0349	NANWALEK	PTG8/9	2	9/7/94	10:20	MUSSELS		NOAA LAB
94TISS0350	NANWALEK	PTG8/9	2	9/7/94	10:20	MUSSELS		ADF&G
94TISS0351	NANWALEK	PTG8/9	2	9/7/94	9:30	FIELD BLANK		ADF&G
94TISS0352	NANWALEK	KOY1	2	9/8/94	10:15	CLAMS		ADF&G
94TISS0353	NANWALEK	KOY1	2	9/8/94	10:30	CLAMS		ADF&G
94TISS0354	NANWALEK	KOY1	2	9/8/94	10:40	CLAMS		ADF&G
94TISS0355	NANWALEK	KOY1	2	9/8/94	10:45	MUSSELS		NOAA LAB
94TISS0356	NANWALEK	KOY1	2	9/8/94	10:55	MUSSELS		NOAA LAB
94TISS0357	NANWALEK	KOY1	2	9/8/94	11:00	MUSSELS		NOAA LAB
94TISS0358	NANWALEK	KOY1	2	9/8/94	11:00	MUSSELS		ADF&G

APPENDIX 3:

Seal and Duck Collection Documentation

SUBSISTENCE FOODS SAMPLING PROGRAM
Protocols for the Collection and Handling of Seal and Duck Samples
Alaska Department of Fish and Game
Division of Subsistence
September 13, 1993

Chain of Custody

Chain of custody and collection forms (attached) will be used. The beach and water conditions (degree of oiling) will be clearly noted on the collection forms as well as the results of sight and smell tests conducted in the field. These waterproof forms will be placed in the zip lock bag with each individual tissue sample. Be sure that the species identification and sample location are displayed through the ziplock bag.

Field note books will be rite-in the-rain. Any deviation from protocol and the study plan can be documented in the field notes. The location of the sampling site will be determined with the aid of USGS grid maps or NOAA charts. The site locations should be plotted on the map.

Whenever samples are split, a separate chain of custody record will be prepared for each portion and marked to indicate with whom the samples are being split.

Evidence tape must be affixed to the shipping container before the samples leave the custody of the sampling personnel. The seal must be signed and dated before the container is shipped. The original chain of custody record accompanies the shipment; a copy is retained by the sample shipper. If samples are sent by common carrier, copies of all bills of lading or air bills must be retained as part of the permanent documentation.

Entries into the field logbooks or field data sheets are signed or initialed and dated by the person making the entry at the time of entry. Each days entries are closed out with a horizontal line, date and initial. Errors in field logbooks or other records are corrected by drawing a single line through the error, entering the correct information, and signing and dating the correction. Never erase an entry or any part of an entry. Do not remove the pages from the logbook.

Preparation

Aluminum foil will be cooked at 350 degrees Fahrenheit for one hour before it can be used to wrap tissue samples. All other sampling equipment will be washed using detergent and rinsed before and after each sample collection. This includes clam shovels, knives, containers, and gloves. Instruments used for exterior dissection must be cleansed before they can be used for internal dissection.

Collection Blank

At least one field blank and replicate sample should be taken for each collection site. A field blank is a sample container (foil and zip lock bag or bile container) opened in the field, closed and stored as if it contained a sample. Chain of custody forms will accompany blanks, and blanks will be sent to the laboratory.

Collection

The method of collection must not contaminate the samples. Do not collect any subsurface samples through surface slicks. Organisms to be analyzed for petroleum hydrocarbons should be freshly killed. Decomposed organisms should not be collected.

The animals to be sampled will always be handled with latex gloves. Each will be brought on board the boat in a manner so as not to contaminate it with any petroleum products such as fuel, plastics, or fuel-soaked material. The specimen will then be dissected in an appropriately clean container or on aluminum foil.

Ideally, samples should be collected from five seals and twenty ducks.

SEALS: Approximately 20 to 30 grams blubber, with skin attached, will be excised from each seal. Twenty to 30 grams of the liver will also be collected. The dissected tissue samples will then be double-wrapped in aluminum foil and placed in a zip lock bag. A bile sample will be taken from each seal. The bile will be collected by puncturing the gall bladder with a sterile disposable scalpel over a collection vial. Do not fill the vial all the way to the top, because the bile will expand when frozen. Only a few drops of bile are needed for analysis. However, if it is possible to collect more than one vial, do so. It never hurts to have a back up in case one vial breaks or is lost. The gall bladder may puncture and the bile get lost while the seal is being eviscerated. This should be clearly noted on the chain of custody form belonging to the seal from which the bile was lost. The bile samples will then be placed in a plastic bag. Identify the species, age, and sex of the seal as clearly as possible. It is necessary to be very accurate so the species dependent differences in bile metabolites can be ascertained by the laboratory. If you are unsure of the species, write detailed descriptions of the animal in the field note book, including the color, size, shape, etc.

DUCKS: It is important to be aware of the regulations regarding which ducks can be taken legally. We are not getting a special permit for this project, so any ducks killed must be legal for subsistence hunters at the time they are taken. A section of the skin, with attached adipose tissue and muscle, totalling 40 or 50 grams will be taken from each duck. Liver and bile samples will also be taken. The entire liver of each duck should be collected, double wrapped in aluminum foil and placed in a plastic bag. The bile will be collected by puncturing the gall bladder with a sterile disposable scalpel over a collection vial. Do not fill the vial all the way to the top, because the bile will expand when frozen. Only a few drops of bile are needed for analysis. However, if it is possible to collect more than one vial, do so. It never hurts to have a back up in case one vial breaks or is lost. The gall bladder may puncture and the bile get lost while the duck is being eviscerated. This should be clearly noted on the chain of custody form belonging to the duck from which the bile was lost. The bile samples will then be placed in a plastic bag. Identify the species, age and sex of the duck as clearly as possible. It is necessary to be very accurate so the species dependent differences in bile metabolites can be ascertained by the laboratory. If you are unsure of the species, write detailed descriptions of the animal in the field note book, including the color, size, shape, etc.

Each sampling site should be carefully defined and described in field notes and sketch maps.

After they are wrapped and labelled, the samples will be placed in insulated coolers containing ice packs. Keep all samples from the same animal together by placing them in a separate large plastic bag.

Sample Preservation
Samples must be kept cool. They should be frozen as soon after collection as possible, and the freezing process should be rapid. Once frozen, the samples must be kept frozen until extracted or prepared for analysis. Therefore, care must be taken that the samples remain frozen throughout the shipping process.

TRIP REPORT

TO: Jim Fall
Rita Miraglia
ADF&G Subsistence - Anchorage

FROM: Vicki Vanek
ADF&G Subsistence - Kodiak

TRAVEL DESTINATION: Tatitlek

TRAVEL DATES: Sept 26 - Oct 4, 1994

PURPOSE: To collect tissue samples from subsistence hunted harbor seals for hydrocarbon analysis

I was scheduled to fly to Tatitlek on charter with JimAir on Sept 24. The winds were high in Tatitlek and for two days I waited in Anchorage on a weather hold at JimAir. JimAir was in phone contact with Gary Kompkoff who was arranging a seal hunter for me to go out with. On Sept 26, the weather improved and we were able to fly to Tatitlek. We left Anchorage about 9:15 AM and arrived in Tatitlek about 10:30AM.

I went directly to the city office to meet Gary Kompkoff (and deliver the latest Anchorage newspaper I was asked to bring), while my equipment and bags were trucked to the village council lodge (a house next to the town generator on beach level) where I was staying. A few men from the village came in to Gary's office while we were talking and I was introduced. I explained what tissues (skin/blubber, liver, and bile) I'd be taking for hydrocarbon analysis.

I also explained, that with the go ahead of the village and hunter, I would take additional biological samples for other studies (non-oil spill related) directed by biologist Kathy Frost (ADF&G Wildlife Conservation-Fairbanks) and for requests to Kate Wynne (Marine Mammal Specialist for University of Alaska Sea Grant Program). Skin/blubber, liver, and kidney samples would be for tissue archiving requests by marine mammal tissue banks such as the National Marine Mammal Bank and the tissue bank at UAF. Whole blood and blood serum would go for blood tests (blood chemistry and white blood cell ratios which might indicate disease processes, and other specific disease tests). Skin samples for DNA genetic analysis. Whiskers for stable isotope work, blubber for work in fatty acid analysis, and whole stomach for stomach content analysis; all of which give information to diet and dietary changes. A lower jaw from which a tooth would be used to section and age the seal exactly.

This was enthusiastically supported and generated a lot of questions and interest (how would I take blood, how a seal can be aged by a tooth, etc). All agreed the more info they could get on what was happening to the seals in their area the better. Gary voiced some concerns that the village doesn't get the results back.

I explained the routes of samples to results and the many months it can take for the labs to process some samples, results interpretted, and info returned.

Ken "Skin" Vlasoff, the hunter, was at the dock ready to go. I got my equipment onboard, we had a quick lunch, and went out to hunt. The boat is a cabin cruiser design. The general procedure was to travel slowly along the shore or rocks looking for seal in the water or hauled out. In places where seal were likely, we would stop and float a short time to watch for surfacing seal. We traveled to Galena Bay, but found no seal. We then traveled up Valdez Arm to Sawmill Bay. One seal was spotted. When he tried to get off a shot, the rifle jammed. Could not be fixed and was the only gun onboard, so we returned to Tatitlek.

Between Sept 27 and Sept 30, Ken's nephew Louis Vlasoff joined us and also hunted. Ken received his nickname "Skin" because he is the best and fastest skinner. His nephew was learning from him. They are able to sell skins to someone in Cordova. Louis practiced skinning on the animals whose skin's were not valuable because of size or coloration.

Seals were either shot from the boat, if it was quiet in the water, or from land. At some places, one or two of us would get out to hide and watch from a set of rocks or from the shore for a seal. Ken could make a verbal noise that was for attracting seal. I helped spot.

For all the seals shot, the routine was to bring the seal to a beach. I took blood samples first, using a syringe inserting the needle through the skin over the lumbar vertebrae into the extradural vein overlying the spinal cord. I then took measurements, determined sex, general age, fur pattern and gave a quick exam for any external abnormalities and in the females signs of lactation. Ken made the first cuts in the skin prior to skinning. I would then don gloves and take the skin and blubber samples from the ventral midline. Ken (or Louis) would then skin the entire animal (it was easier and faster to skin with the animal intact). Halfway into the skinning when the skin was free over the back and before the animal was rolled (touching the back's exposed blubber to the ground), they would pause and I'd take a fat sample from the dorsal midline area (for Kathy Frost). I would then make the incision into the abdomen and take the samples beginning with the liver hydrocarbon testing sample. Additional liver samples were taken, the left kidney and the stomach. The last sample to be collected was the bile as I switched to a fresh scalpel blade to pierce the gall bladder. I examined all the abdominal organs for any abnormal morphology or lesions; and on the females, the reproductive tracts for pregnancy. Then Ken or Louis would finish the gutting.

I would pull a few whisker samples and remove the left lower jaw (easier to remove than single tooth for tooth sectioning to age). Ken would leave the rest of the head on top of a rock at high tide water level for "my brother the eagle", as he said. The whole sampling, skinning, and gutting procedure took on average,

roughly an hour. We would try to start as soon after shooting as possible. Louis became interested in the blood collection and helped with the blood collection tubes. Each sample that needed to be frozen was put into a cooler with ice packs as soon as it was wrapped. At the end of the day, when we returned to Tatitlek, the samples were immediately put into the freezer at the lodge. I had no centrifuge available, but the blood was clotted enough in the evening for me to pull off serum, which was then frozen.

All the samples for hydrocarbon testing were handled according to the protocol set forth. I had prepared the foil (baking at 350 degrees for one hour) and the gloves in Anchorage. The sterile latex gloves come with a powder on them. To avoid any possible contamination for accurate hydrocarbon tests I rinsed each glove in fresh tap water, air dried on fresh paper toweling, and repackaged in the outer paper wrapper the gloves come in (at all times handling only by the cuff edge). After each seal was processed, all instuments were washed with soap and available water (usually sea water). There were no signs of any oil or fuel contamination. At end of day, they would be washed with hot fresh water and soap.

On Sept 27, we hunted in Port Fidalgo, Fish Bay, and Landlocked Bay. We went into Two Moon Bay also, where the logging camp is based (saw no seal here). One female seal was shot in the eastern end of Port Fidalgo and sunk. It was retrieved in short time (under 20 minutes) using a three foot long stick with a hook attached at one end that we taped to a boat oar to make longer to reach the seal.

On Sept 28, we made a quick morning trip into Valdez to get fuel for the boat and more ammunition (Ken was recruited by Gary Kompkoff shortly before my arrival and the weather had been too bad to make it in to Valdez before). I got two topo maps that I was missing for the area. We hunted in the bays along the route from Valdez to Tatitlek on our return. In Shoup and Jack Bays, it was expected to see seal, but there were none. No seal were harvested.

An overnight trip was planned for Sept 29 and 30 to go to areas west that they hunt, but are further away. Louis drove a second skiff and we traveled to Long Bay, anchored the cabin cruiser and used the open skiff to hunt all of Long Bay and over into Columbia Bay. It was clear weather and cold. As we traveled past the mouth of Columbia Bay we were breaking skim ice along the way and ice chunks broken from the Columbia Glacier face were floating in the water around us. Three seals were hit in Columbia Bay, but only one (female) was successfully retrieved. They tried to sight on seal laying on ice, but the seals usually slid into the water before we got close or were scared off by a missed shot. Even though we were already in the skiff, two seals sunk too fast to get. It was decided not to shoot anymore here as they were irretrievable. The water was too deep and also cloudy from the glacier silt. One female seal was harvested in the head of Long Bay.

We overnighted at the oyster farm at Fairmont Point (just west of Fairmont Bay) tied to the dock sleeping onboard. We spent the

evening hours visiting with the man who runs the farm. On Sept 30, the area around Fairmont Point and islands south were hunted. One male seal was taken at Outpost Island and one male seal off of Fairmont Point. We returned to Tatitlek at the end of the day. The samples from Sept 29 were kept in the cooler on ice overnight and the coolers were put on the outside deck. We picked up chunks of glacier ice foating in the water to add to the coolers. The samples were not froze solid in the coolers, even though the outside temperature dropped to around thirty degrees during the night. These were put into the freezer on Sept 30 when we got back to Tatitlek.

On Oct 1, Ken was busy and could not go out hunting. Louis and myself went out in the open skiff and traveled to the Port Fidalgo area. This is one of their common hunting areas. Louis shot one female seal in Fish Bay and one male seal in the south central part of Port Fidalgo. The weather started getting worse with rain and higher winds creating a chop on the water, so we returned to Tatitlek.

A total of seven seals had been harvested and sampled.

On Oct 2-3, the weather was too bad for small boats or planes and I waited on weather hold in Tatitlek. There was remodeling being done to all the HUD homes with the crew being hired within the village. The head construction foreman (from Ninilchik) was also staying at the lodge. His crew would stop in now and then for a cup of coffee and if I was working with the blood or putting samples in freezer it stimulated a lot of interest and technical and medical questions I could answer. I also met people in the village during the evening which I often spent at Ken and Lorinda Vlasof's house visiting for a few hours.

On Oct 4, the weather looked better for flying. However, in the early morning a tsunami warning was issued and all planes were put on hold until it had passed. I moved all the gear up to the school, the designated tsunami refuge, leaving the frozen samples in the freezer. I spent some time at the school and at the village office building. At around 2PM, the warning was canceled and JimAir left Anchorage reaching Tatitlek at about 3:10 PM. We arrived in Anchorage at about 4:30 PM. I went directly to the Fish and Game building to put the coolers with frozen samples in the walkin lab freezer.

ADF&G Sample #: 94-TATAL-TAT-1

SUBSISTENCE HARVEST DATA FORM

Office Use Only
Specimen ID Storage
Vill. Yr Sps #

SAMPLING INFORMATION

Village: TATITLEK

Date Sampled: 09 27 94 (month day year)

Sampler's Name: VICKI VANEIK / Ken Vlasoff

Species: HARBOR SEAL

Sample #: 1 (today)

Location of harvest: Port Fidalgo - near head of bay in front of old cabin site
~ 60°51'05" N
~ 146°09'00" W

BODY MEASUREMENTS (see diagram for location)

Length (A): 45 1/2

Girth (B): 30 3/4

Measured in: ☒ inches or ☐ centimeters

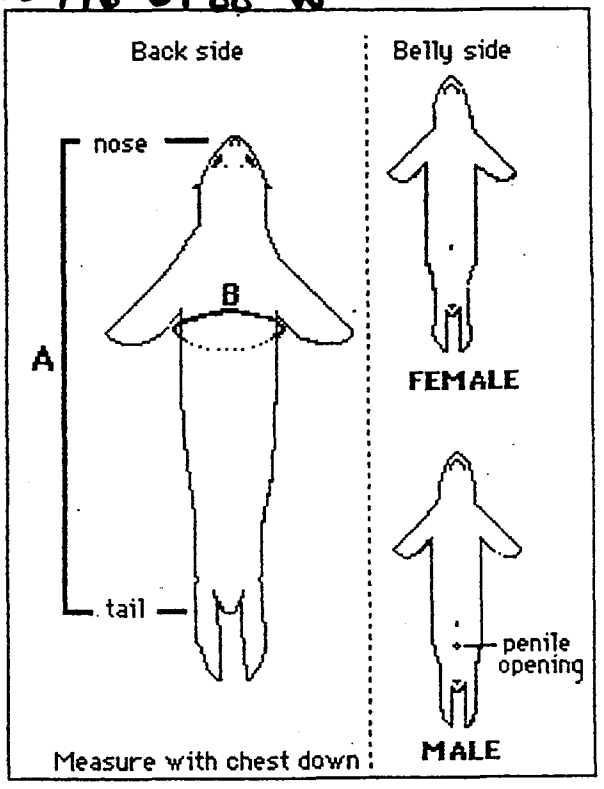
Sex: F

Was the animal Pregnant? N Lactating? N (Y or N)

Was a Fetus Present? N Collected? ☐ (Y or N)

Was a tag or brand present? N (Y or N)

If Yes, please describe it:



SAMPLES What samples did you collect ?

- ☐ whole head
- ☒ stomach
- ☐ canine tooth/snout
- ☒ skin
- ☒ whiskers
- ☒ blubber
- ☐ claw
- ☒ other blood
- ☐ whole carcass
- ☒ kidney tissue - left
- ☐ heart tissue
- ☒ liver tissue
- ☐ ovaries
- ☐ testicles
- ☐ uterus / fetus
- ☒ other bile

Comments written on back ? Y or N [Y]

Fur pattern on back looked most like: (circle one)

Bile
Liver
Skin/Blubber
→ ADF+G Subsistence Division
Hydrocarbon Testing

Blood: EDTA tube → Pam Tuomi (For Kathy Frost)
Serum 5 frozen vials → Kathy Frost . ADF+G

2 Whiskers
Skin in DMSO/salt
Fat (Frozen) (From back)
Stomach
→ Kathy Frost ADF+G

wrapped in
Foil baked
350° 1 hour
in ziploc bag

Liver
Skin/Blubber From ventral midline
Kidney left
→ Kate Wynne

Note: Liver had multiFocal 1-2 mm diam white spots
scattered throughout all of liver

ADF+G Sample #: 94.HSEAL.TAT.2

SUBSISTENCE HARVEST DATA FORM

Office Use Only
Specimen ID (Vill. Yr Sps #) Storage

SAMPLING INFORMATION

Village	Date Sampled (month day year)	Sampler's Name
TATITLEK	09 29 94	Vicki Vanek / Louis Vlasoff

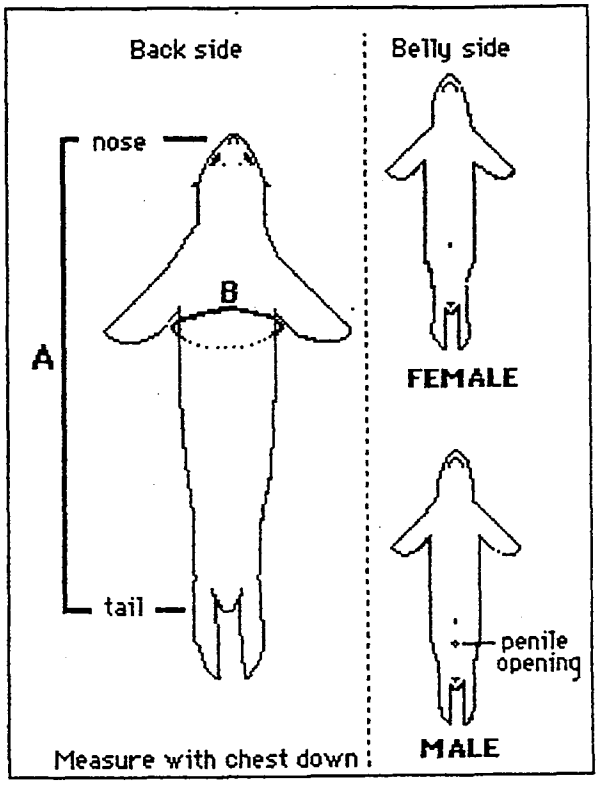
Species	Sample #	Location of harvest
HARBOR SEAL	1 (today)	Glacier Bay - west side ~ 60° 57'50" N 147° 08' 00" W

BODY MEASUREMENTS (see diagram for location)

Length (A)	Girth (B)	Measured in:
44½	31¾	☒ inches or ☐ centimeters

Sex	Was the animal Pregnant?	Lactating?	Was a Fetus Present?	Collected?
F	N	N	N	☐
	Y or N		Y or N	

Was a tag or brand present? N (Y or N) — If Yes, please describe it:



SAMPLES What samples did you collect ?

☐ whole head	☐ whole carcass
☒ stomach	☒ kidney tissue
☒ canine tooth/snout	☐ heart tissue
☒ skin	☒ liver tissue
☒ whiskers	☐ ovaries
☒ blubber	☐ testicles
☐ claw	☐ uterus / fetus
☒ other Blood	☒ other BILE

Comments written on back ? Y or N Y

Fur pattern on back looked most like: (circle one)

94 · HSEAL. TAI. 2

Blubbery Skin
Liver
Bile
→ ADF+G Subsistence Division
Hydrocarbon Testing

Blood in EDTA tube → Pam Tuomi For Kathy Frost

Serum - 5 vials Frozen
2 Whiskers
Skin in DMSO/salt
Fat in BHT/Chloro Form
Fat (Frozen) From back
Stomach
→ Kathy Frost
ADF+G

wrapped in Teflon sheet in Whirl pak

Liver
Kidney - left
Blubbery Skin From ventral midline
Lower Left Jaw
→ Kate Wynne

ADF+G Sample #: 94-HSEAL-TAT-3

SUBSISTENCE HARVEST DATA FORM

Office Use Only
Specimen ID (Vill. | Yr | Sps | #) Storage

SAMPLING INFORMATION

Village: TATITLEK

Date Sampled: 09 (month) 29 (day) 94 (year)

Sampler's Name: Vicki Vanek / Ken Vlasoff

Species: HARBOR SEAL

Sample #: 2 (today)

Location of harvest: LONG BAY - head of eastern arm
~ 61° 00' 20" N
147° 13' 08" W

BODY MEASUREMENTS (see diagram for location)

56½ Length (A)

44½ Girth (B)

Measured in:
☒ inches or
☐ centimeters

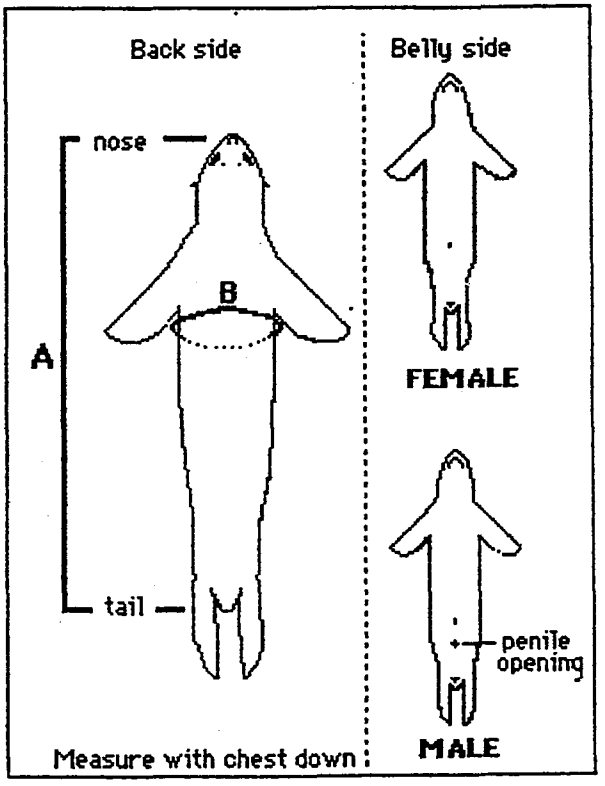
Sex: F

Was the animal Pregnant? N Lactating? N (Y or N)

Was a Fetus Present? N Collected? ☐ (Y or N)

Was a tag or brand present? N (Y or N)

If Yes, please describe it



SAMPLES What samples did you collect ?

- ☐ whole head
- ☒ stomach
- ☒ canine tooth/snout
- ☒ skin
- ☒ whiskers
- ☒ blubber
- ☐ claw
- ☒ other Blood
- ☐ whole carcass
- ☒ kidney tissue
- ☐ heart tissue
- ☒ liver tissue
- ☐ ovaries
- ☐ testicles
- ☐ uterus / fetus
- ☒ other Bile

Comments written on back ? Y or N Y

Fur pattern on back looked most like:
(circle one)

94. HSEAL. TAT. 3.

Blubber w/ Skin
Liver
Bile
→ ADF+G Subsistence Division
Hydrocarbon Testing

Whole Blood in EDTA → Pam Tuomi for Kathy Frost

Serum - 5 vials Frozen
2 Whiskers
Skin in DMSO/salt
Fat in BHT/Chloroform
Fat (Frozen) From back
Stomach
→ Kathy Frost
ADF+G Wildlife Conservation

wrapped in Foil
baked 1 hour 350°
in
whirl paks

Liver
Kidney - left
Blubber w/ Skin From Ventral Midline
Lower Left Jaw
→ Kate Wynne

Note: UTERUS: One 2 cm diam roughly round thickened area of uterine wall on lower end of one horn
Some slightly reddened discoloration.
No signs of developing Fetus
Could it be a recent implantation? Unkown to myself

ADF&G Subsistence Sample #: 94.HSEAL.TAT.4

SUBSISTENCE HARVEST DATA FORM

Office Use Only
Specimen ID: Vill. | Yr | Sps | # — Storage

SAMPLING INFORMATION

Village: TATITLEK

Date Sampled: 09 (month) 30 (day) 94 (year)

Sampler's Name: VICKI VANEK / Ken Vlasoff

Species: HARBOR SEAL

Sample #: 1 (today)

Location of harvest: Outpost Island ~ 60° 50' 48" N 147° 27' 45" W

BODY MEASUREMENTS (see diagram for location)

50" Length (A)

33" Girth (B)

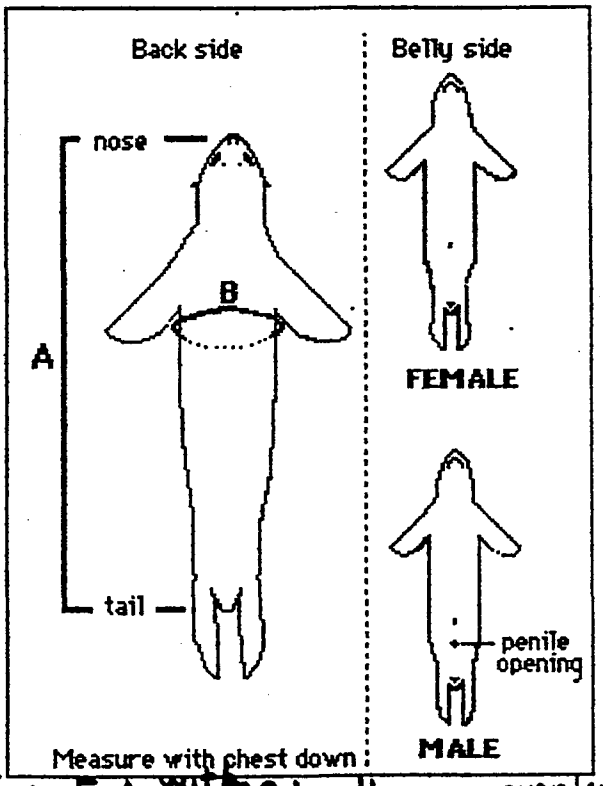
Measured in: ☒ inches or ☐ centimeters

Sex: M

Was the animal Pregnant? ☐ Y or N Lactating? ☐

Was a Fetus Present? ☐ Y or N Collected? ☐

Was a tag or brand present? N (Y or N) If Yes, please describe it



SAMPLES What samples did you collect ?

- ☐ whole head
- ☒ stomach
- ☒ canine tooth/snout
- ☒ skin
- ☒ whiskers
- ☒ blubber
- ☐ claw
- ☒ other Blood

- ☐ whole carcass
- ☒ kidney tissue
- ☐ heart tissue
- ☒ liver tissue
- ☐ ovaries
- ☐ testicles
- ☐ uterus / fetus
- ☒ other Bile

Comments written on back ? Y or N Y

mix of A with C in dk gray overlay
Fur pattern on back looked most like: (circle one)
A spots B dk C

44. HSEAL.TAT.4

Blubber w/ Skin
Liver
Bile
→ ADF+G Subsistence Division
Hydrocarbon Testing

Whole Blood (EDTA tube) → Pam Tuomi For Kathy Frost

Serum in 5 frozen vials
Skin in DMSO/salt
Fat in BHT/Chloroform
Fat (Frozen) (From back)
Stomach
2 Whiskers
→ Kathy Frost
ADF+G Wildlife Conserva

wrapped in Foil
baked 1 hour 350°
in ziploc bags

Liver
Kidney
Blubber/Skin
Lower left jaw
→ Kate Wynne

Note: Liver had multifocal 1-2 mm white spots scattered throughout whole of liver

ADF&G Subsistence Sample #: 94.HSEAL.TAT.5

SUBSISTENCE HARVEST DATA FORM

Office Use Only
Specimen ID Storage
Vill. Yr Sps #

SAMPLING INFORMATION

Village: TATITLEK

Date Sampled: 09 30 94 (month day year)

Sampler's Name: VICKI YANEK / LOUIS VLASOFF

Species: HARBOR SEAL

Sample #: 2 (today)

Location of harvest: Fairmount Point ~ 60° 53' 37" N 147° 26' 45" W

BODY MEASUREMENTS (see diagram for location)

49¼ Length (A)

32¼ Girth (B)

Measured in: ☒ inches or ☐ centimeters

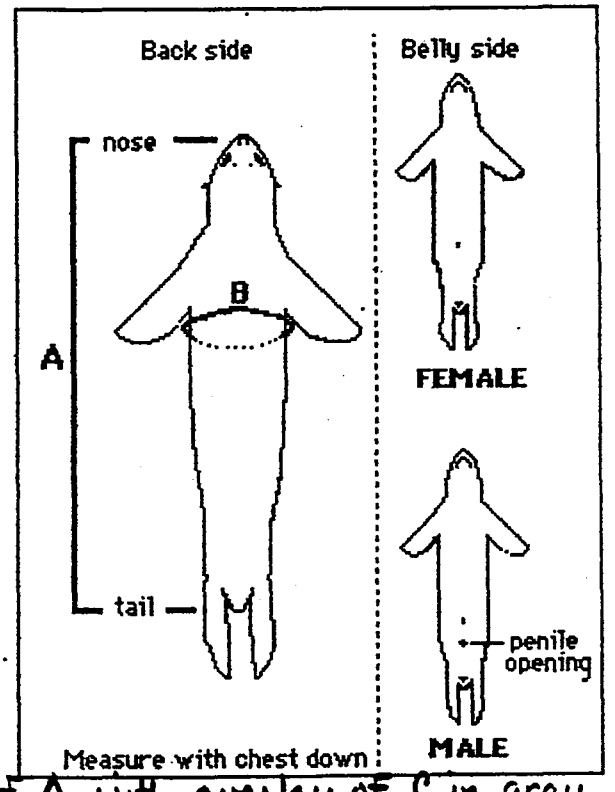
Sex: M

Was the animal Pregnant? ☐ Lactating? ☐ Y or N

Was a Fetus Present? ☐ Collected? ☐ Y or N

Was a tag or brand present? N

Y or N If Yes, please describe it



SAMPLES What samples did you collect ?

- ☐ whole head
- ☒ stomach
- ☒ canine tooth/snout
- ☒ skin
- ☒ whiskers
- ☒ blubber
- ☐ claw
- ☒ other Blood

- ☐ whole carcass
- ☒ kidney tissue
- ☐ heart tissue
- ☒ liver tissue
- ☐ ovaries
- ☐ testicles
- ☐ uterus / fetus
- ☒ other Bile

Comments written on back ? Y or N Y

Mix of A with overlay of C in gray

Fur pattern on back looked most like: (circle one)

Blubber w/ Skin
Liver
Bile
→ ADF+G Subsistence Division
Hydrocarbon Testing

Whole Blood in EDTA → Pam Toumi for Kathy Frost

Serum in 5 frozen vials
2 Whiskers
Skin in DMSO/Salt
Fat (Frozen)
Stomach
→ Kathy Frost
ADF+G Wildlife Conservation

wrapped in foil
baked 1 hour 350°
in ziploc bags

Liver
Kidney
Blubber w/Skin
Lower Left Jaw
→ Kate Wynne

NOTE: Liver: had minimal single 1-3mm diam white spots irregularly scattered

Stomach: 3 external lesions from approximately 10-20mm in length
diffusely colored brown in center with white around edges

Skin: Ventral Neck Area
~ 1 cm diam raised flat lesion
white with irregular excoriated surfaces on flat

ADF+G Subsistence Sample #: 94·HSEAL·TAT·6

SUBSISTENCE HARVEST DATA FORM

Office Use Only
Specimen ID Storage
Vill. Yr Sps #

SAMPLING INFORMATION

Village: TATITLEK

Date Sampled: 10 / 01 / 94 (month / day / year)

Sampler's Name: VICKI VANEK / Louis Vlasoff

Species: HARBOR SEAL

Sample #: 1 (today)

Location of harvest: FISH BAY - head of bay ~ 60° 50' 12" N 146° 23' 10" W

BODY MEASUREMENTS (see diagram for location)

Length (A): 36

Girth (B): 27½

Measured in: ☒ inches or ☐ centimeters

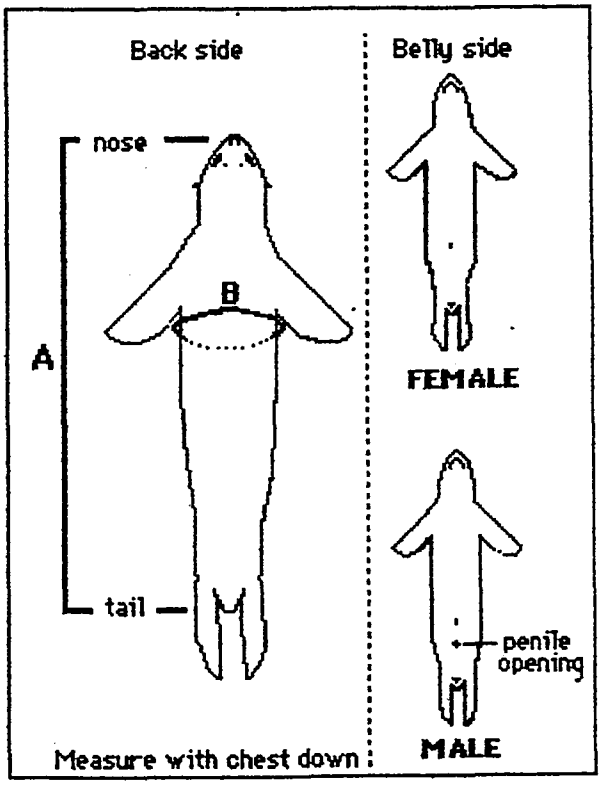
Sex: F

Was the animal Pregnant? N Lactating? N (Y or N)

Was a Fetus Present? N Collected? ☐ (Y or N)

Was a tag or brand present? N (Y or N)

If Yes, please describe it:



SAMPLES What samples did you collect ?

- ☐ whole head
- ☒ stomach
- ☒ canine tooth/snout
- ☒ skin
- ☒ whiskers
- ☒ blubber
- ☐ claw
- ☒ other Bile
- ☐ whole carcass
- ☒ kidney tissue
- ☐ heart tissue
- ☒ liver tissue
- ☐ ovaries
- ☐ testicles
- ☐ uterus / fetus
- ☐ other

Comments written on back ? Y or N [Y]

Fur pattern on back looked most like: (circle one)

94. HSEAL. TAT. 6

Blubber w/ Skin
Liver
Bile
→ ADF+G Subsistence Hydrocarbon Testing

2 Whiskers
Stomach
Fat (Frozen)
→ Kathy Frost ADF+G Wildlife Conservation

wrapped in Foil baked at 350° 1 hour in ziploc bags

Liver
Kidneys - both
Blubber w/ Skin
Lower left jaw
→ Kate Wynne

ADF+G Subsistence Sample #: 94.HSEAL.TAT.7

SUBSISTENCE HARVEST DATA FORM

Office Use Only
Specimen ID Storage
Vill. Yr Sps #

SAMPLING INFORMATION

Village: TATITLEK
Date Sampled: 10 (month) 01 (day) 94 (year)
Sampler's Name: VICKI VANEK / Louis Vlasoff

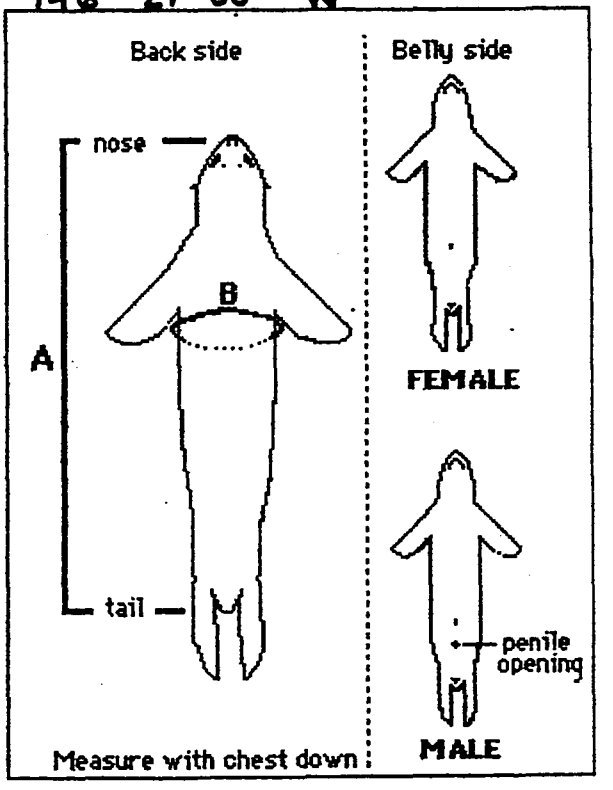
Species: Harbor Seal
Sample #: 2 (today)
Location of harvest: PORT FIDALGO [redacted] - south shore midway between Whalen Bay + Irish Cove
~ 60° 47' 08" N
146° 21' 00" W

BODY MEASUREMENTS (see diagram for location)

41 1/2 Length (A)
29 1/2 Girth (B)
Measured in: [X] inches or [ ] centimeters

Sex: M
Was the animal Pregnant? [ ] Lactating? [ ] Y or N
Was a Fetus Present? [ ] Collected? [ ] Y or N

Was a tag or brand present? N
Y or N If Yes, please describe it



SAMPLES What samples did you collect ?

- [ ] whole head
- [X] stomach
- [X] canine tooth/snout
- [X] skin
- [X] whiskers
- [X] blubber
- [ ] claw
- [X] other Bile
- [ ] whole carcass
- [X] kidney tissue
- [ ] heart tissue
- [X] liver tissue
- [ ] ovaries
- [ ] testicles
- [ ] uterus / fetus
- [ ] other

Comments written on back ? Y or N [Y]

Fur pattern on back looked most like:
(circle one)

94-HSEAL-TAT-7

Blubber w/ Skin
Liver
Bile
→ ADF+G Subsistence Division
Hydrocarbon Testing

2 Whiskers
Fat (Frozen)
Stomach
→ Kathy Frost
ADF+G Wildlife Conservation

samples wrapped in unbleached foil in ziploc bags

Liver
Kidneys - both
Blubber w/ Skin
Lower Left Jaw
→ Kate Wynne

TRIP REPORT

TO: Jim Fall
Rita Miraglia
ADF&G Subsistence - Anchorage

FROM: Vicki Vanek
ADF&G Subsistence - Kodiak

TRAVEL DESTINATION: Chenega Bay

TRAVEL DATES: Dec 5-8 and Dec 13-19 1994

PURPOSE: To collect tissue samples from subsistence hunted seaducks for hydrocarbon analysis

For two days, Dec 3 and 4, I waited in Anchorage on weather hold at JimAir or in hourly contact trying to fly into Chenega Bay. Because of the shorter daylight hours this time of the year, the latest they could leave from Anchorage was about 2PM and the earliest was about 10AM.

The week before, I had tried phoning on different days the village council, corporation, and a few duck hunters to let them know of the work, arrange accomodations, and a boat charter. I always got answering machines and left messages. Eventually, I reached Peter Kompkoff, who agreed to a boat charter. I discovered many in the village including Don Kompkoff Sr. (a premier avid duck hunter) and all from the council /corporation were out of town, some at meetings in Seattle. John M Totemoff, the hunter I worked with last year hunting seal and duck, was in Anchorage also trying to fly to Chenaga Bay with JimAir.

I contacted the school and made arrangements to stay in the old teacher's housing (a trailer attached to the hotel). It is available, if no school district personnel are staying in it, for $50 a night. It has a small kitchen including a refrigerator with freezer and no phone. The samples were kept in this freezer. The hotel was full with the construction crew excavating for the new ferry dock.

On Monday, Dec 5 we were again on weather hold in the morning. The weather improved enough to fly and we left Anchorage about 12:30 PM landing at the new Chenaga Bay airstrip at around 1:30 PM. I went first to the school to get keys for the trailer and to deliver a cooler of fresh vegetables (the reply to my always asked question of what can I bring or do). I also brought news of the anxiously awaited delayed gallons of ice cream the school had ordered for a Christmas party.

I met Peter Kompkoff and Don Kompkoff Sr., who had just arrived back in Chenaga that morning. I had hoped to go out this day, but it was decided it would be too late to hunt because of few daylight hours left.

On Dec 6, I went with Don Kompkoff Sr., who was going to hunt. Another skiff from the village went deer hunting. The skiff we used is Peter's, Don's brother, and the one they both use to hunt from. It has a small wooden cabin midsection to get out of the weather. We had trouble getting the outboard started. It seemed if once it got started and kept running, as long as it wasn't shut off, it would keep going. There was a concern that if we got out in one of the big open passages like Knight Island Passage, and the motor quit, we might not get it started again and would drift with the current into the Gulf. Plus the wind conditions weren't desirable for going far. We traveled around nearby Sawmill Bay and Bettles Islands. Don shot eight Barrow's goldeneye and two common mergansers at four locations within this area. (See topo maps for exact locations of harvesting for all birds.) Don likes eating mergansers. The air temperature reached a high of 19 degrees all day. There was no source of heat in the cabin and the camera would not work after a half hour into the trip. The bird's were kept on their backs outside in the cold on the cabin roof and on the deck until sampled. We returned to the harbor and started plucking. It started snowing.

We plucked the birds in order of being shot. I sampled each bird, according to protocol, as each became available after plucking. The day's samples were taken between two and a half and three and a half hours after shooting depending on the bird. This was the longest length of time between shooting and sampling for the total birds sampled because of the number of birds to process at one time.

For all birds, skin and fat samples were taken from the ventral side of the bird (breast side). A liver sample was taken. Bile was collected when possible. In a few birds, there was almost no bile in the gall bladder.

The next two days were of similar weather, wind, and temperature (low teens to high of 19-20 degrees). On Dec 7, we had an understandable delay as Don's married daughter had an appendicitis attack and flew to Anchorage for surgery. In the afternoon, we traveled through the area hunted the previous day and southwest halfway down Erlington Passage looking for birds on both sides along the shores. The birds were notably more skittish, flying off the water earlier on the skiff's approach. Don said they usually bird hunt one day, then don't for a few days because that's what the birds will do when the area's been recently hunted making it harder to get close to aim. Two Barrow's goldeneye and one merganser were shot at three separate locations and sampled.

On Dec 8, we traveled all of Erlington Passage looking for birds. The sea conditions due to wind were such that we didn't leave Erlington Passage. Throughout all the hunting, I helped spot birds and also drive the skiff. A few times, we beached the skiff, and waited under a common path of flight (as on a point of land at the mouth of a small bay). Don is a wealth of information on ducks. Two Barrow's goldeneye were shot in two new locations and one Barrow's goldeneye was shot on our return route near the location a merganser was harvested the previous day.

The weather forecast of the next few days was about the same. This wasn't encouraging to hunt in other areas to get a variety of sample sites. Don had been out of town a few weeks and then out hunting everyday since and needed to do some other work. The construction crew was beginning to leave and JimAir offered to fly me to Anchorage and back on seat fares adjusting the costs so the total costs of air fares would be the same as my original two charters. A few days off might also give the ducks a short repreive from hunting and so less skittish. I left on JimAir and returned the morning of Dec 13. The first round of samples were put in the freezer at the Fish & Game Office.

On Dec 13, I went with Don Kompkoff Sr. in the skiff to hunt. The weather was now a little warmer at 34 degrees with some fog. We traveled across Latouche Passage to Latouche Island hunting along the western shore northward to Sleepy Bay. We saw no goldeneye in Sleepy Bay, only Harlequins, scoters, and mergansers. No birds were shot. The winds began picking up and the seas developed a chop. We headed back towards Chenega. Out in the passage, the seas were rougher. A coil of rope blew off the cabin roof into the water. We circled around and I tried to fish it onboard. The waves had been quartering us and those hitting the sides splashed on deck and turning to an icy slush. It took a couple tries to reach the rope as the skiff was rocking. We noticed a sluggishness to the boat's handling and in its response to the waves and discovered water had been collecting beneath the deck floorboards. We continued back to the harbor.

I was still hoping to collect samples on the backside of Evans Island or Latouche (hunting areas that are further away). John M Totemoff's bowpicker that we had used to collect samples last year was available. On Dec 14, John M and myself traveled to the north end of Evan's Island hunting in Shelter Bay and around the point into Prince of Wales Passage. John shot six Barrow's goldeneye in three different locations. The temperature was below freezing. Samples were taken a half hour to two hours after the shooting of each bird.

On Dec 15, we left at first light and traveled first along the shore of the north end of Latouche Island and around all of Sleepy Bay. No birds were seen. We then traveled through Knight Island Passage along the north end of Evan's Island and back into Prince of Wales Passage hunting further down the passage than the previous day towards Iktua Bay. John shot two Barrow's goldeneye at two different locations.

This made a total of twenty one Barrow's goldeneye and three common mergansers harvested and sampled (the goal was twenty birds). Although the cold made it harder to work taking samples, there were many more birds around this time of the year than in September.

On Dec 16, I started to try and fly out to Anchorage, but the weather was too bad. I waited on weather hold for three days. A crew from the San Juan cannery were trying to fly out for Christmas and numerous Chenega Bay residents stuck in Anchorage were trying

to return. On the fourth day, Dec 19, there was a slight break in the snow/fog/cloud cover and JimAir flew in a couple planes landing through patchy fog. It needed to be a quick turn around as the weather was coming back down. We took off around 1 PM for a very interesting return flight. The ceiling was descending and we had to turn back a few times as passages closed. Finally, we climbed through the clouds to an altitude above the mountains and flew on instruments back to Anchorage. All the samples were brought directly to the Fish and Game office and put in the freezer.

CHENEGA BAY

Duck Sampling

December 6 - 15 1111

Hunter: Don Kompkoff (Dec 6-13)
ADF+G Sample Collector: Vicki Vanek

Hunter: John M. Totemoff (Dec 14-15)
ADF+G Sample Collector: Vicki Vanek

Duck locations are marked on
USGS MAPS:
SEWARD A-3
BLYING SOUND D-4

BAGO = Barrow's Goldeneye
COME = Common Merganser

94-CB-BAGO-18

ADULT MALE

BARROW'S GOLDENEYE

Shot 2:15 PM

near Prince of Wales Pt - EVAN'S I
(just south of point in strait of Prince of Wales Passage)

Samples taken: 4:00 PM

Hole in Gall Bladder from Shot
only 1 drop of Bile in Vial

94-CB-BAGO-19

ADULT MALE

BARROW'S GOLDENEYE

Shot 2:25 PM

near Prince of Wales Point EVAN'S I
(just south of point in strait of Prince of Wales Passage)

Samples taken 4:30 PM

94-CR-BAGO-16

ADULT MALE
BARROW'S GOLDENEYE
Shot 2:15 PM

near Prince of Wales Point - EVAN'S I.
(just south of point in strait of Prince of Wales Passage).
Samples taken 3:15 PM

94-CR-BAGO-17

ADULT MALE
BARROW'S GOLDENEYE
Shot 2:15 PM

near Prince of Wales Point - EVAN'S I.
(just south of point in strait of Prince of Wales Passage)
Samples taken 3:40 PM
Very little bile in gall bladder

12-14-94

John M Totemoff = hunter

Boat Shaken (Unsuitable) coast.

Clear, ~28-30° F

94-CB-BAGO-14

ADULT MALE

BARROW'S GOLDENEYE

Shot 1:10 PM Shelter Bay - Evan's Island

(When trying to pick bird up out of water a shovel was struck in water + a sheen as of From gasoline floated off across surface - the bird may have Floated through the edge of this for a second or two at most - Feathers were still intact so do not think any touched skin - Extra precautions were taken not to touch outer feathers to skin

Samples taken 1:40 PM

94-CB-BAGO-15

? ADULT? F OR JUVENILE FOR M

BARROW'S GOLDENEYE

Beak mostly black - top ridge black most mottled with lighter color

Good size bird

Shot 1:55 PM Evan's Island - north end on Knight Island Passage between Shelter Bay + Prince of Wales Point

Samples taken 2:45 PM

Duck 16 - 94-CB-BAGO-13

BARROW'S GOLDENEYE

Adult or Immature ?F - or juvenile F or M
(Like BAGO's 11 + 12)
Shot 1:35 PM

Evans Island just south of Sawmill Bay
in Ehlrington Passage
(same spot as Duck 13: 94-CB.COME-3

Samples taken 2:05 PM

12-13-94 Skiff (Peter Kompkoff)
No ducks shot

Sleepy Bay on north end of LaTouche I.:
No Goldeneyes seen
Were Harlequins, Scoters, + Mergansers

Wind picked up and seas became rough
Returned to Cisco Bay

Hunter = Don Kompkoff Sr.
Weather - some Fog, clear skies,
34° F

12-8-94 Air temp: ~15-20°F

Duck 14: 94-CB-BAGO-11

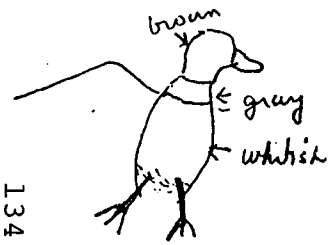
BARROW'S GOLDENEYE

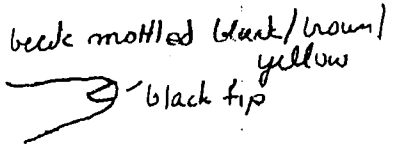
? Immature ? F ADULT

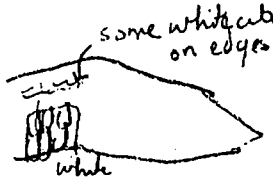
juvenile - F (most likely) or M

Shot 11:10 AM

South end of Evans Island - Elrington Passage







Same as other 5 (Ducks 4-8)
was in flock of BARROW'S GOLDENEYE

Samples taken 11:30 AM

Duck 15: 94-CB-BAGO-12

BARROW'S GOLDENEYE

? Adult F or Juveniles F or M

Shot 12:15 PM

South end Elrington I. - "Fox Farm" (Elrington Passage)

Same coloration as Duck 14.

Samples taken 12:38 PM

NOTE: BILE -

Very little in gall bladder and what did come out was a gelatinous thick glob mostly yellow with a little dark green streaked through.

Duck 12

94.CB.BA60.10

BARROW'S GOLDENEYE

Male Adult

Shot 1:25 PM

across ~~from~~ Elrington passage from Duck 9 (94.CB BA60.9)

on east shore of Evans Island.

Samples 1:45 PM.

Duck 13

94.CB.COME.3

Common Merganser

Female Adult Evans Island

Shot 1:55 P Elrington Passage just south of Sawmill Bay

SAMPLES taken 2:35 PM

Duck 10 : 94-CB-BAGO-8

Goldeneye - Female BARROW'S GOLDENEYE
Adult
Shot ~Noon
Blue Bag in Seavill. Bag

Samples taken 3:30 PM

- NO BILE SAMPLE. -

12-7-94

Air Temp: High of 19°F

DUCK 10:
94-CB-BAGO-9
Male Adult
BARROW'S GOLDENEYE

Shot 12:55 PM
NW shore Elrington Isl. 1/4 way down Elrington passage
Samples 1:20 PM

NOTE: Very little Bile in Gall Bladder.

94-CB-BAGO-4

Samples taken 2:20 PM

94-CB-BAGO-5

Samples taken 2:40 PM

94-CB-BAGO-6

Samples taken 2:55 PM

Duck 9: 94-CB-BAGO-1

Goldeneye - Male BARROW'S GOLDENEYE
Adult

Shot - 11:55 AM

Blue Bag in Seawater Bag

Kept in Air temp of 19°F or lower til sampled

Samples taken at 3:15 PM

DUCKS 2 + 3:

94-CB-COME-1

Merganser - Female COMMON MERGANSER - Adult
north west end Big Bettles Island
shot ~ 10:45 AM
Bird on deck on back in air temp of 19°F or lower
Samples taken ~ 1:20 PM
- NO BILE SAMPLE -
Bile leaked into gut - gallbladder had hole.

94-CB-COME-2

COMMON MERGANSER
Adult Female
Shot ~ 10:45 AM North west end Big Bettles Island
On deck in air temp of 19°F or lower til sampled
Samples taken ~ 1:30 PM

DUCKS 4-8:

Goldeneyes ? Female - Barrow's
Little Bettles Island
Shot ~ 11:10 AM (all 5 birds)
All 5 buds kept on deck on backs
til sampled in air temp of 19°F or lower
Skin taken from breastside of bird
All 5 have beaks which are mostly black
but mottled with a lighter color
Bird 7 has the blackest beak
Feather coloration + pattern similar to Adult
Female Barrow's Goldeneye.
Most likely Adult Females - but may be juveniles
either Female (most likely) or male.

94-CB-BAGO-2

Samples taken ~ 1:45 PM

94-CB-BAGO-3

Samples taken ~ 2:00 PM

Tuesday Dec 6 1994

Partly Cloudy - Air Temp: High of 11° F

DUCK #1 : 94-CB-BAGO-1

Shot 10:10 AM.

GOLDENEYE - MALE - BARROW'S GOLDENEYE
Adult

just to south of Johnson Cove (south) ~½ mi.
EVAN'S ISLAND (Sawmill Bay)

Samples taken 1:00 PM
(Bird kept on deck in air temp (~19° F)
until samples taken.)
Skin taken from breast side.

12-15-94

HUNTER = John M Totemoff

Boat - Shacken.

10-11 AM

Traveled along shore of North end of LaTouche Island and Sleepy Bay. No Goldeneyes seen. No other birds either.

Weather - Overcast, occasional snow, ~ 30° F, slight chop to the water
Winds 10-15

94-CB-BAGO-20

BARROW'S GOLDENEYE

ADULT FEMALE

Shot 12:15 PM

Evan's Island - north end of island on Knight Island Passage (between Prince of Wales Point + Shelter Bay)

Samples taken 1:20 PM

94-CB-BAGO-21

ADULT FEMALE

BARROW'S GOLDENEYE

Shot 1:00 PM

Evans Island - Northwest shore in Prince of Wales Passage midway between Prince of Wales Point + Iktua Bay

Samples taken 1:40 PM

140

DUCK SAMPLES COLLECTED FROM THE CHENEGA BAY AREA, PRINCE WILLIAM SOUND, AND SENT TO THE NMFS LAB FOR TESTING AS PART OF SUBSISTENCE RESTORATION PROJECT 94279

IDENTIFICATION NUMBER	SPECIES	COLLECTION DATE	COLLECTION LOCATION	SEX	SAMPLES TAKEN		
					SKIN/FAT	LIVER	BILE
94-CB-BAGO-1	BARROWS GOLDENEYE	12/6/94	S OF JOHNSON COVE, EVANS ISL	M	YES	YES	YES
94-CB-BAGO-2	BARROWS GOLDENEYE	12/6/94	LITTLE BETTLES ISLAND	?F	YES	YES	YES
94-CB-BAGO-3	BARROWS GOLDENEYE	12/6/94	LITTLE BETTLES ISLAND	?F	YES	YES	YES
94-CB-BAGO-4	BARROWS GOLDENEYE	12/6/94	LITTLE BETTLES ISLAND	?F	YES	YES	YES
94-CB-BAGO-5	BARROWS GOLDENEYE	12/6/94	LITTLE BETTLES ISLAND	?F	YES	YES	YES
94-CB-BAGO-6	BARROWS GOLDENEYE	12/6/94	LITTLE BETTLES ISLAND	?F	YES	YES	YES
94-CB-BAGO-7	BARROWS GOLDENEYE	12/6/94	BLUE BAY, IN SAWMILL BAY	M	YES	YES	YES
94-CB-BAGO-8	BARROWS GOLDENEYE	12/6/94	BLUE BAY, IN SAWMILL BAY	F	YES	YES	NO
94-CB-BAGO-9	BARROWS GOLDENEYE	12/7/94	NW SHORE ELRINGTON ISL	M	YES	YES	YES
94-CB-BAGO-10	BARROWS GOLDENEYE	12/7/94	E SHORE EVANS ISL	M	YES	YES	YES
94-CB-BAGO-11	BARROWS GOLDENEYE	12/8/94	S END EVANS ISL	?F	YES	YES	YES
94-CB-BAGO-12	BARROWS GOLDENEYE	12/8/94	S END ELRINGTON ISL, FOX FARM	?F	YES	YES	YES
94-CB-BAGO-13	BARROWS GOLDENEYE	12/8/94	S OF SAWMILL BAY, EVANS ISL	?F	YES	YES	YES
94-CB-BAGO-14	BARROWS GOLDENEYE	12/14/94	SHELTER BAY, EVANS ISL	M	YES	YES	YES
94-CB-BAGO-15	BARROWS GOLDENEYE	12/14/94	N END EVANS ISL	?F	YES	YES	YES
94-CB-BAGO-16	BARROWS GOLDENEYE	12/14/94	S OF PRINCE OF WALES PT, EVANS	M	YES	YES	YES
94-CB-BAGO-17	BARROWS GOLDENEYE	12/14/94	S OF PRINCE OF WALES PT, EVANS	M	YES	YES	YES
94-CB-BAGO-18	BARROWS GOLDENEYE	12/14/94	S OF PRINCE OF WALES PT, EVANS	M	YES	YES	YES
94-CB-BAGO-19	BARROWS GOLDENEYE	12/14/94	S OF PRINCE OF WALES PT, EVANS	M	YES	YES	YES
94-CB-BAGO-20	BARROWS GOLDENEYE	12/15/94	N END EVANS ISL, KNIGH ISL PASS	F	YES	YES	YES
94-CB-BAGO-21	BARROWS GOLDENEYE	12/15/94	NW SHORE OF EVANS ISL	F	YES	YES	YES
94-CB-COME-1	COMMON MERGANSER	12/6/94	BIG BETTLES ISLAND	F	YES	YES	NO
94-CB-COME-2	COMMON MERGANSER	12/6/94	BIG BETTLES ISLAND	F	YES	YES	YES
94-CB-COME-3	COMMON MERGANSER	12/7/94	S OF SAWMILL BAY	F	YES	YES	YES

NOTE: Birds marked ?F in the sex column are probably adult females, but may be juvenile birds, most likely females.

APPENDIX 4:

NMFS Laboratory Report on Test Results

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Fisheries Science Center
Environmental Conservation Division
2725 Montlake Boulevard East
Seattle, Washington 98112

November 23, 1994

Dr. James Fall
Regional Program Manager
Division of Subsistence
Alaska Department of Fish & Game
333 Raspberry Road
Anchorage, AK 99518-1599

Dear Dr. Fall:

The analyses of invertebrate tissue and fish bile samples collected during the summer of 1994 as part of the ADF&G/NOAA subsistence study have been completed. Fluorescent aromatic compounds (FACs) were measured in bile of fish (Table 1-1) and selected individual aromatic compounds (ACs) were measured in edible tissue of molluscs (Table 2).

Concentrations of biliary $FACs_{PHN}$ measured in fish collected in 1994 were similar to those of fish from reference areas. Sockeye salmon (n=6) collected near the village of Karluk had mean concentrations of $FACs_{PHN}$ of 1500 ± 560 ng phenanthrene equivalents per mg bile protein and $FACs_{PHN}$ in rockfish (n=2) collected near Tatitlek averaged 480 ± 620 ng equiv/mg protein (Table 1-2). In comparison, several species of fish captured from reference areas following the *Exxon Valdez* oil spill had mean concentrations of $FACs_{PHN}$ ranging from 1,000-2,000 ng equiv/mg protein (Collier et al. 1993). These data suggest that fish from the current study have not been exposed to appreciable levels of oil. Previous analyses (1989) of bile from fish from the Tatitlek and Karluk sites also showed reference levels of $FACs_{PHN}$ (Table 1-2). Detailed analyses for individual ACs in muscle tissue of the fish collected from both sites in 1989 revealed extremely low concentrations of ACs ($\leq$1 ng/g). Our earlier findings from laboratory studies and from analyses of field samples collected for the subsistence project showed that fish accumulate minimal levels of ACs in the muscle because of their efficient metabolism of ACs. We recommend, therefore, that tissue samples of fish sampled in 1994 not be analyzed for individual ACs.

Concentrations of the ACs in tissues of shellfish are summarized in Table 2, the detailed data are presented in Table 3 and quality assurance data are included in Table 4. Most mollusc samples contained very low concentrations of ACs that did not differ substantially from the concentrations found in samples from reference areas (previous samplings) or from background levels determined by analysis of method blanks. Low concentrations of ACs were found in molluscs collected at Tatitlek station TAT1 in 1994; the concentrations of ACs in the three mussel samples ranged from 26 to 42 ng/g. Samples collected from TAT1 in 1990 contained concentrations of ACs ranging from <1 ng/g to 11 ng/g. The source of the ACs in samples collected in 1994 appears to be related to combustion products, rather than to petroleum, as shown by the predominance of phenanthrene, fluoranthene, and pyrene relative to alkyl substituted ACs.

In the aftermath of EVOS, Windy Bay station WNB3 was directly impacted by the spilled oil. The mean concentrations of ACs in mussels collected at WNB3 in 1990 and 1991 were 1,600 ng/g and 110 ng/g, respectively. Concentrations of ACs in Windy Bay mussels from the current sampling were <2 ng/g (2 samples), which is similar to background levels. These data suggest that the AC concentrations in mussels at WNB3 have returned to background levels; however, a more extensive sampling at this site would be required to more firmly substantiate such a conclusion.

If you have any questions, please call Peggy Krahn, Don Brown, or me at 206-860-3330.

Sincerely yours,

Sin-Lam Chan, Ph.D.
Deputy Director

Attachment
cc: Rita Miraglia
John Stein
Don Brown
Peggy Krahn
Tom Hom

Reference: Collier, T.K., M.M. Krahn, C.A. Krone, Lyndal L. Johnson, M.S. Myers, S.-L. Chan and U. Varanasi. 1993. Oil exposure and effects in subtidal fish following the *Exxon Valdez* oil spill. In proceedings of: 1993 International Oil Spill Conference, p 301-305

Aromatic Contaminants for Subsistence Summer 1994 Samples Explanatory Notes for Tables 2 through 4.

Abbreviations used:

ACs - the aromatic contaminants listed in Tables 3 and 4.

LACs - low molecular weight ACs, the 2 and 3-ring ACs, as listed in Tables 3 and 4 from naphthalene through the C3-dibenzothiophenes.

HACs - high molecular weight ACs, the 4,5 and 6-ring ACs, as listed in Tables 3 and 4 from fluoranthene through benzo[ghi]perylene.

RSD - relative standard deviation, the standard deviation divided by the mean and expressed as a percent.

A hyphen (-) indicates that the analyte was not detected above the limit of monitoring which ranged from 0.1 to 0.4 ng/g (ppb) wet weight.

Results were determined by GC/MS - selected ion detection.

Naphthalene-d8 was the internal standard for naphthalene through C4-naphthalenes. Acenaphthene-d10 was the internal standard for acenaphthylene through C1-fluoranthenes/pyrenes. Benzo[a]pyrene-d12 was the internal standard for benz[a]anthracene through benzo[ghi]perylene.

Concentrations less than 10 ng/g are rounded to one significant figure; concentrations greater than or equal to 10 ng/g are rounded to two significant figures.

Percent recoveries for the internal standards (surrogates) averaged 92%, RSD = 11%, n = 183. Percent recoveries of the surrogates include quality assurance samples.

Specific Notes

a Levels of the analyte were indistinguishable from those of blank analyses.

Table 2. Summed concentrations of ACs (Tables 3-4, LAC/HAC) in edible tissue, ng/g (ppb) wet weight.

Village:	Akhlok		Chenega Bay		Karluk	Koyuktolik	Ouzinkie	Port Graham			Tatitlek		Windy Bay
Site:	AKH2	AKH6	CHE27	CHE28	KAR2	KOY1	OUZ11	PTG4	PTG13	PTG8/9	TAT1	TAT9	WNB3
Chitons										- / 0.4			
										0.2 / 0.4			
										- / 0.4			
Clams													
butter	1 / 0.5		0.9 / 0.8		0.4 / 0.2		4 / 0.8						
	2 / 0.8		0.5 / 0.7		0.6 / 0.3		2 / 0.8						
	1 / 0.8		0.6 / 0.6		3 / 1		4 / 0.7						
littleneck				0.5 / 0.6								0.6 / 0.2	
				0.8 / 1								0.5 / 0.2	
				0.1 / 0.4								0.7 / 0.2	
razor		4 / 3											
		5 / 3											
		6 / 4											
Mussels			3 / 2	3 / 2	0.8 / 0.2	- / 1				0.5 / 0.4	11 / 27	0.7 / 0.3	0.1 / 1
			1 / 0.4	0.6 / 0.6	0.8 / 0.2	0.6 / 1				0.8 / 1	14 / 28	0.6 / 0.3	0.7 / 1
			2 / 0.6	0.7 / 0.5	0.1 / 0.2	0.5 / 0.4				1 / 1	6 / 20	1 / 0.3	
Snails								1 / 0.4	0.8 / 0.5				
									1 / 0.5				
									0.9 / 0.4				

Table 3-1: Butter Clams. Concentrations, ng/g (ppb) wet weight, of aromatic contaminants (ACs) in edible tissue.

ACs	Village:	<- Akhiok ->			<- Chenega Bay ->			<- Karluk ->		
	Site:	AKH2	AKH2	AKH2	CHE27	CHE27	CHE27	KAR2	KAR2	KAR2
	ID no.:	94TISS-0113	94TISS-0114	94TISS-0115	94TISS-0001	94TISS-0002	94TISS-0003	94TISS-0121	94TISS-0122	94TISS-0123
	Date collected:	7/09/94	7/09/94	7/09/94	6/22/94	6/22/94	6/22/94	7/13/94	7/13/94	7/13/94
	Collector:	D&M	D&M	D&M	D&M	D&M	D&M	D&M	D&M	D&M
	Lab no.:	111-7	111-8	111-9	111-1	111-2	111-3	111-10	111-76	111-77
naphthalene		a	a	a	a	a	a	a	a	a
C1-naphthalenes		a	a	a	a	a	a	a	a	a
C2-naphthalenes		-	-	-	-	-	-	-	0.1	1
C3-naphthalenes		-	-	-	-	-	-	-	-	0.1
C4-naphthalenes		-	-	-	-	-	-	-	-	-
acenaphthylene		-	-	-	-	-	-	-	-	0.1
acenaphthene		-	-	-	-	-	-	-	-	0.2
fluorene		-	-	-	-	-	-	-	-	0.4
C1-fluorenes		-	-	-	-	-	-	-	-	-
C2-fluorenes		-	-	-	-	-	-	-	-	-
C3-fluorenes		-	-	-	-	-	-	-	-	-
phenanthrene		0.6	0.7	0.6	0.5	0.5	0.4	0.4	0.4	0.7
C1-phenanthrenes/anthracenes		0.2	0.9	0.2	0.2	-	0.2	-	0.1	0.4
C2-phenanthrenes/anthracenes		0.2	0.3	0.2	0.2	-	-	-	-	-
C3-phenanthrenes/anthracenes		-	-	-	-	-	-	-	-	-
C4-phenanthrenes/anthracenes		-	-	-	-	-	-	-	-	-
dibenzothiophene		-	-	-	-	-	-	-	-	-
C1-dibenzothiophenes		-	-	-	-	-	-	-	-	-
C2-dibenzothiophenes		-	-	-	-	-	-	-	-	-
C3-dibenzothiophenes		-	-	-	-	-	-	-	-	-
Sum of LACs		**1**	**2**	**1**	**0.9**	**0.5**	**0.6**	**0.4**	**0.6**	**3**
fluoranthene		0.3	0.4	0.4	0.2	0.2	0.2	-	0.2	0.2
pyrene		0.2	0.2	0.2	0.3	0.2	0.2	-	0.1	0.6
C1-fluoranthenes/pyrenes		-	-	-	-	-	-	-	-	0.2
benz[a]anthracene		-	-	-	-	-	-	-	-	-
chrysene		-	-	-	-	-	-	-	-	-
C1-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-	-
C2-chrysenes/benz[a]anthracenes		-	0.2	0.2	0.3	0.3	0.2	0.2	-	-
C3-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-	-
C4-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-	-
benzo[b]fluoranthene		-	-	-	-	-	-	-	-	-
benzo[k]fluoranthene		-	-	-	-	-	-	-	-	-
benzo[a]pyrene		-	-	-	-	-	-	-	-	-
indeno[1,2,3-cd]pyrene		-	-	-	-	-	-	-	-	-
dibenz[a,h]anthracene		-	-	-	-	-	-	-	-	-
benzo[ghi]perylene		-	-	-	-	-	-	-	-	-
Sum of HACs		**0.5**	**0.8**	**0.8**	**0.8**	**0.7**	**0.6**	**0.2**	**0.3**	**1**
sample weight, grams:		5.05	5.05	5.07	5.09	5.07	5.03	5.06	5.00	5.03

Table 3-2: Butter Clams. Concentrations, ng/g (ppb) wet weight, of aromatic contaminants (ACs) in edible tissue.

ACs	Village:	<- Ouzinkie ->		
	Site:	OUZ11	OUZ11	OUZ11
	ID no.:	94TISS-0101	94TISS-0102	94TISS-0104
	Date collected:	7/08/94	7/08/94	7/08/94
	Collector:	D&M	D&M	D&M
	Lab no.:	111-4	111-5	111-6
naphthalene		a	a	a
C1-naphthalenes		a	-	a
C2-naphthalenes		0.5	-	0.6
C3-naphthalenes		0.5	-	0.6
C4-naphthalenes		-	-	-
acenaphthylene		-	-	-
acenaphthene		-	-	-
fluorene		-	0.3	-
C1-fluorenes		-	-	-
C2-fluorenes		0.3	-	0.3
C3-fluorenes		-	-	-
phenanthrene		0.9	1	1
C1-phenanthrenes/anthracenes		1	-	1
C2-phenanthrenes/anthracenes		-	-	0.2
C3-phenanthrenes/anthracenes		-	-	-
C4-phenanthrenes/anthracenes		-	-	-
dibenzothiophene		0.2	0.3	0.3
C1-dibenzothiophenes		0.2	-	0.3
C2-dibenzothiophenes		-	-	-
C3-dibenzothiophenes		-	-	-
Sum of LACs		**4**	**2**	**4**
fluoranthene		0.4	0.6	0.5
pyrene		0.2	0.2	0.2
C1-fluoranthenes/pyrenes		-	-	-
benz[a]anthracene		-	-	-
chrysene		-	-	-
C1-chrysenes/benz[a]anthracenes		-	-	-
C2-chrysenes/benz[a]anthracenes		0.2	-	-
C3-chrysenes/benz[a]anthracenes		-	-	-
C4-chrysenes/benz[a]anthracenes		-	-	-
benzo[b]fluoranthene		-	-	-
benzo[k]fluoranthene		-	-	-
benzo[a]pyrene		-	-	-
indeno[1,2,3-cd]pyrene		-	-	-
dibenz[a,h]anthracene		-	-	-
benzo[ghi]perylene		-	-	-
Sum of HACs		**0.8**	**0.8**	**0.7**
sample weight, grams:		5.03	5.04	5.02

Table 3-3: Chitons. Concentrations, ng/g (ppb) wet weight, of aromatic contaminants (ACs) in edible tissue.

ACs	Village:	<- Port Graham ->		
	Site:	PTG8/9	PTG8/9	PTG8/9
	ID no.:	94TISS0075	94TISS0076	94TISS0077
	Date collected:	7/10/94	7/10/94	7/10/94
	Collector:	D&M	D&M	D&M
	Lab no.:	111-65	111-66	111-67
naphthalene		a	a	a
C1-naphthalenes		-	a	a
C2-naphthalenes		-	0.2	-
C3-naphthalenes		-	-	-
C4-naphthalenes		-	-	-
acenaphthylene		-	-	-
acenaphthene		-	-	-
fluorene		-	-	-
C1-fluorenes		-	-	-
C2-fluorenes		-	-	-
C3-fluorenes		-	-	-
phenanthrene		a	-	a
C1-phenanthrenes/anthracenes		-	-	-
C2-phenanthrenes/anthracenes		-	-	-
C3-phenanthrenes/anthracenes		-	-	-
C4-phenanthrenes/anthracenes		-	-	-
dibenzothiophene		-	-	-
C1-dibenzothiophenes		-	-	-
C2-dibenzothiophenes		-	-	-
C3-dibenzothiophenes		-	-	-
Sum of LACs		-	0.2	-
fluoranthene		0.2	0.2	0.2
pyrene		0.2	0.2	0.2
C1-fluoranthenes/pyrenes		-	-	-
benz[a]anthracene		-	-	-
chrysene		-	-	-
C1-chrysenes/benz[a]anthracenes		-	-	-
C2-chrysenes/benz[a]anthracenes		-	-	-
C3-chrysenes/benz[a]anthracenes		-	-	-
C4-chrysenes/benz[a]anthracenes		-	-	-
benzo[b]fluoranthene		-	-	-
benzo[k]fluoranthene		-	-	-
benzo[a]pyrene		-	-	-
indeno[1,2,3-cd]pyrene		-	-	-
dibenz[a,h]anthracene		-	-	-
benzo[ghi]perylene		-	-	-
Sum of HACs		0.4	0.4	0.4
sample weight, grams:		5.03	5.03	5.02

Table 3-4: Littleneck Clams. Concentrations, ng/g (ppb) wet weight, of aromatic contaminants (ACs) in edible tissue.

ACs	Village:	<- Chenega Bay ->			<- Tatitlek ->		
	Site:	CHE28	CHE28	CHE28	TAT9	TAT9	TAT9
	ID no.:	94TISS0014	94TISS0016	94TISS0018	94TISS0022	94TISS0023	94TISS0024
	Date collected:	6/23/94	6/23/94	6/23/94	6/23/94	6/23/94	6/23/94
	Collector:	D&M	D&M	D&M	D&M	D&M	D&M
	Lab no.:	111-50	111-51	111-52	111-53	111-54	111-55
naphthalene		a	a	a	a	a	a
C1-naphthalenes		-	a	a	a	a	a
C2-naphthalenes		-	-	-	-	-	-
C3-naphthalenes		-	-	-	-	-	-
C4-naphthalenes		-	-	-	-	-	-
acenaphthylene		-	-	-	-	-	-
acenaphthene		-	-	-	-	-	-
fluorene		-	-	-	0.1	-	0.2
C1-fluorenes		-	-	-	-	-	-
C2-fluorenes		-	-	-	-	-	-
C3-fluorenes		-	-	-	-	-	-
phenanthrene		0.5	0.5	a	0.5	0.5	0.5
C1-phenanthrenes/anthracenes		-	0.2	0.1	-	-	-
C2-phenanthrenes/anthracenes		-	0.1	-	-	-	-
C3-phenanthrenes/anthracenes		-	-	-	-	-	-
C4-phenanthrenes/anthracenes		-	-	-	-	-	-
dibenzothiophene		-	-	-	-	-	-
C1-dibenzothiophenes		-	-	-	-	-	-
C2-dibenzothiophenes		-	-	-	-	-	-
C3-dibenzothiophenes		-	-	-	-	-	-
Sum of LACs		**0.5**	**0.8**	**0.1**	**0.6**	**0.5**	**0.7**
fluoranthene		0.3	0.7	0.2	0.2	0.2	0.2
pyrene		0.2	0.3	0.2	-	-	-
C1-fluoranthenes/pyrenes		-	-	-	-	-	-
benz[a]anthracene		-	-	-	-	-	-
chrysene		0.1	0.1	-	-	-	-
C1-chrysenes/benz[a]anthracenes		-	-	-	-	-	-
C2-chrysenes/benz[a]anthracenes		-	-	-	-	-	-
C3-chrysenes/benz[a]anthracenes		-	-	-	-	-	-
C4-chrysenes/benz[a]anthracenes		-	-	-	-	-	-
benzo[b]fluoranthene		-	-	-	-	-	-
benzo[k]fluoranthene		-	-	-	-	-	-
benzo[a]pyrene		-	-	-	-	-	-
indeno[1,2,3-cd]pyrene		-	-	-	-	-	-
dibenz[a,h]anthracene		-	-	-	-	-	-
benzo[ghi]perylene		-	-	-	-	-	-
Sum of HACs		**0.6**	**1**	**0.4**	**0.2**	**0.2**	**0.2**
sample weight, grams:		5.00	5.00	5.08	5.02	5.04	5.02

Table 3-5: Mussels. Concentrations, ng/g (ppb) wet weight, of aromatic contaminants (ACs) in edible tissue.

ACs	Village:				<- Chenega Bay ->		
	Site:	CHE27	CHE27	CHE27	CHE28	CHE28	CHE28
	ID no.:	94TISS0004	94TISS0005	94TISS0006	94TISS0009	94TISS0010	94TISS0011
	Date collected:	6/22/94	6/22/94	6/22/94	6/23/94	6/23/94	6/23/94
	Collector:	D&M	D&M	D&M	D&M	D&M	D&M
	Lab no.:	111-16	111-17	111-18	111-19	111-20	111-21
naphthalene		a	a	a	a	a	a
C1-naphthalenes		a	a	a	a	-	a
C2-naphthalenes		-	-	0.4	-	-	-
C3-naphthalenes		-	-	-	-	-	-
C4-naphthalenes		-	-	-	-	-	-
acenaphthylene		-	-	-	-	-	-
acenaphthene		-	-	-	-	-	-
fluorene		-	-	0.2	-	-	-
C1-fluorenes		-	-	0.2	-	-	-
C2-fluorenes		-	-	-	-	-	-
C3-fluorenes		-	-	-	-	-	-
phenanthrene		0.6	0.6	0.6	a	0.6	0.5
C1-phenanthrenes/anthracenes		0.5	0.2	0.5	0.1	-	0.2
C2-phenanthrenes/anthracenes		0.8	0.2	0.2	0.5	-	-
C3-phenanthrenes/anthracenes		0.5	-	-	1	-	-
C4-phenanthrenes/anthracenes		-	-	-	-	-	-
dibenzothiophene		-	-	-	0.1	-	-
C1-dibenzothiophenes		-	-	-	-	-	-
C2-dibenzothiophenes		0.2	-	-	0.5	-	-
C3-dibenzothiophenes		0.2	-	-	0.8	-	-
Sum of LACs		**3**	**1**	**2**	**3**	**0.6**	**0.7**
fluoranthene		0.2	0.2	0.2	0.2	0.2	0.2
pyrene		0.2	0.2	0.3	0.2	0.2	0.2
C1-fluoranthenes/pyrenes		-	-	-	-	-	-
benz[a]anthracene		-	-	-	-	-	-
chrysene		0.2	-	-	0.3	0.2	-
C1-chrysenes/benz[a]anthracenes		0.2	-	-	0.3	-	-
C2-chrysenes/benz[a]anthracenes		0.2	-	0.1	0.7	-	0.1
C3-chrysenes/benz[a]anthracenes		-	-	-	-	-	-
C4-chrysenes/benz[a]anthracenes		0.9	-	-	-	-	-
benzo[b]fluoranthene		-	-	-	-	-	-
benzo[k]fluoranthene		-	-	-	-	-	-
benzo[a]pyrene		-	-	-	-	-	-
indeno[1,2,3-cd]pyrene		-	-	-	-	-	-
dibenz[a,h]anthracene		-	-	-	-	-	-
benzo[ghi]perylene		-	-	-	0.1	-	-
Sum of HACs		**2**	**0.4**	**0.6**	**2**	**0.6**	**0.5**
sample weight, grams:		5.06	5.07	5.09	5.09	5.02	5.07

Table 3-6: Mussels. Concentrations, ng/g (ppb) wet weight, of aromatic contaminants (ACs) in edible tissue.

ACs	Village:	<- Karluk ->			<- Koyuktolik ->			<- Port Graham ->		
	Site:	KAR2	KAR2	KAR2	KOY1	KOY1	KOY1	PTG8/9	PTG8/9	PTG8/9
	ID no.:	94TISS0127	94TISS0128	94TISS0129	94TISS0079	94TISS0080	94TISS0081	94TISS0071	94TISS0072	94TISS0073
	Date collected:	7/13/94	7/13/94	7/13/94	7/11/94	7/11/94	7/11/94	7/10/94	7/10/94	7/10/94
	Collector:	D&M	D&M	D&M	D&M	D&M	D&M	D&M	D&M	D&M
	Lab no.:	111-47	111-48	111-49	111-39	111-40	111-46	111-36	111-37	111-38
naphthalene		a	a	a	a	a	a	a	a	a
C1-naphthalenes		a	a	a	a	a	a	-	a	a
C2-naphthalenes		0.1	-	-	-	-	-	-	0.2	0.3
C3-naphthalenes		-	-	-	-	-	-	-	-	-
C4-naphthalenes		-	-	-	-	-	-	-	-	-
acenaphthylene		-	-	-	-	-	-	-	-	-
acenaphthene		-	-	-	-	-	-	-	-	-
fluorene		0.1	0.2	-	-	-	-	-	-	0.2
C1-fluorenes		-	-	-	-	-	-	-	-	0.1
C2-fluorenes		-	-	-	-	-	-	-	-	-
C3-fluorenes		-	-	-	-	-	-	-	-	-
phenanthrene		0.5	0.5	a	a	0.5	0.5	0.5	0.5	0.5
C1-phenanthrenes/anthracenes		0.1	0.1	0.1	-	0.1	-	-	0.1	0.2
C2-phenanthrenes/anthracenes		-	-	-	-	-	-	-	-	-
C3-phenanthrenes/anthracenes		-	-	-	-	-	-	-	-	-
C4-phenanthrenes/anthracenes		-	-	-	-	-	-	-	-	-
dibenzothiophene		-	-	-	-	-	-	-	-	-
C1-dibenzothiophenes		-	-	-	-	-	-	-	-	-
C2-dibenzothiophenes		-	-	-	-	-	-	-	-	-
C3-dibenzothiophenes		-	-	-	-	-	-	-	-	-
Sum of LACs		**0.8**	**0.8**	**0.1**	**-**	**0.6**	**0.5**	**0.5**	**0.8**	**1**
fluoranthene		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
pyrene		a	a	a	0.2	0.2	0.2	0.2	0.2	0.2
C1-fluoranthenes/pyrenes		-	-	-	-	-	-	-	-	-
benz[a]anthracene		-	-	-	-	-	-	-	-	-
chrysene		-	-	-	-	-	-	-	-	0.2
C1-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-	-
C2-chrysenes/benz[a]anthracenes		-	-	-	0.8	1	-	-	0.6	0.5
C3-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-	-
C4-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-	-
benzo[b]fluoranthene		-	-	-	-	-	-	-	-	-
benzo[k]fluoranthene		-	-	-	-	-	-	-	-	-
benzo[a]pyrene		-	-	-	-	-	-	-	-	-
indeno[1,2,3-cd]pyrene		-	-	-	-	-	-	-	-	-
dibenz[a,h]anthracene		-	-	-	-	-	-	-	-	-
benzo[ghi]perylene		-	-	-	-	-	-	-	-	-
Sum of HACs		**0.2**	**0.2**	**0.2**	**1**	**1**	**0.4**	**0.4**	**1**	**1**
sample weight, grams:		5.00	5.07	5.05	5.08	5.03	5.00	5.01	5.03	5.01

Table 3-7: Mussels. Concentrations, ng/g (ppb) wet weight, of aromatic contaminants (ACs) in edible tissue.

ACs	Village:	<- Tatitlek ->						<- Windy Bay ->	
	Site:	TAT1	TAT1	TAT1	TAT9	TAT9	TAT9	WNB3	WNB3
	ID no.:	94TISS0033	94TISS0034	94TISS0035	94TISS0025	94TISS0026	94TISS0027	94TISS0050	94TISS0051
	Date collected:	6/23/94	6/23/94	6/23/94	6/23/94	6/23/94	6/23/94	6/27/94	6/27/94
	Collector:	D&M	D&M	D&M	D&M	D&M	D&M	D&M	D&M
	Lab no.:	111-25	111-31	111-32	111-22	111-23	111-24	111-34	111-35
naphthalene		a	a	a	a	a	a	a	a
C1-naphthalenes		a	a	a	a	a	a	a	a
C2-naphthalenes		-	-	-	-	-	-	-	-
C3-naphthalenes		-	-	-	-	-	-	-	-
C4-naphthalenes		-	-	-	-	-	-	-	-
acenaphthylene		-	0.2	0.2	-	-	-	-	-
acenaphthene		-	0.3	-	-	-	-	-	-
fluorene		0.5	0.5	0.3	-	-	-	-	-
C1-fluorenes		0.4	3	0.2	-	-	0.3	-	-
C2-fluorenes		-	-	-	-	-	-	-	-
C3-fluorenes		-	-	-	-	-	-	-	-
phenanthrene		7	7	4	0.5	0.5	0.5	a	0.5
C1-phenanthrenes/anthracenes		2	2	1	0.2	0.1	0.2	0.1	0.2
C2-phenanthrenes/anthracenes		0.4	0.6	0.2	-	-	-	-	-
C3-phenanthrenes/anthracenes		-	-	-	-	-	-	-	-
C4-phenanthrenes/anthracenes		-	-	-	-	-	-	-	-
dibenzothiophene		0.3	0.4	0.2	-	-	-	-	-
C1-dibenzothiophenes		-	-	-	-	-	-	-	-
C2-dibenzothiophenes		-	-	-	-	-	-	-	-
C3-dibenzothiophenes		-	-	-	-	-	-	-	-
Sum of LACs		**11**	**14**	**6**	**0.7**	**0.6**	**1**	**0.1**	**0.7**
fluoranthene		9	10	6	0.2	0.2	0.2	0.2	0.2
pyrene		6	6	4	0.1	0.1	0.1	a	0.2
C1-fluoranthenes/pyrenes		3	3	2	-	-	-	-	-
benz[a]anthracene		2	2	2	-	-	-	-	-
chrysene		3	2	2	-	-	-	-	-
C1-chrysenes/benz[a]anthracenes		0.2	0.3	0.2	-	-	-	-	-
C2-chrysenes/benz[a]anthracenes		-	0.6	0.5	-	-	-	1	0.7
C3-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-
C4-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-
benzo[b]fluoranthene		1	1	1	-	-	-	-	-
benzo[k]fluoranthene		2	2	1	-	-	-	-	-
benzo[a]pyrene		0.3	0.3	0.3	-	-	-	-	-
indeno[1,2,3-cd]pyrene		0.3	0.4	0.2	-	-	-	-	-
dibenz[a,h]anthracene		-	-	-	-	-	-	-	-
benzo[ghi]perylene		0.3	0.4	0.3	-	-	-	-	-
Sum of HACs		**27**	**28**	**20**	**0.3**	**0.3**	**0.3**	**1**	**1**
sample weight, grams:		5.02	5.00	5.00	5.00	5.04	5.07	5.00	5.01

Table 3-8: Razor Clams. Concentrations, ng/g (ppb) wet weight, of aromatic contaminants (ACs) in edible tissue.

ACs	Village:	<- Akhiok ->		
	Site:	AKH6	AKH6	AKH6
	ID no.:	94TISS0109	94TISS0110	94TISS0111
	Date collected:	7/09/94	7/09/94	7/09/94
	Collector:	D&M	D&M	D&M
	Lab no.:	111-68	111-69	111-70
naphthalene		a	a	a
C1-naphthalenes		a	a	a
C2-naphthalenes		-	0.3	0.4
C3-naphthalenes		0.2	0.4	0.6
C4-naphthalenes		-	0.2	0.3
acenaphthylene		-	-	-
acenaphthene		-	-	-
fluorene		0.2	0.2	0.2
C1-fluorenes		-	0.1	0.2
C2-fluorenes		-	-	-
C3-fluorenes		-	-	-
phenanthrene		0.8	0.8	1
C1-phenanthrenes/anthracenes		0.9	0.8	1
C2-phenanthrenes/anthracenes		0.9	1	1
C3-phenanthrenes/anthracenes		-	0.1	0.1
C4-phenanthrenes/anthracenes		-	-	-
dibenzothiophene		0.1	0.1	0.2
C1-dibenzothiophenes		0.1	0.1	0.4
C2-dibenzothiophenes		0.3	0.4	0.6
C3-dibenzothiophenes		-	0.1	0.1
Sum of LACs		4	5	6
fluoranthene		2	2	2
pyrene		0.5	0.5	0.7
C1-fluoranthenes/pyrenes		-	-	-
benz[a]anthracene		-	0.1	0.2
chrysene		0.3	0.3	0.4
C1-chrysenes/benz[a]anthracenes		-	-	-
C2-chrysenes/benz[a]anthracenes		-	-	-
C3-chrysenes/benz[a]anthracenes		-	-	-
C4-chrysenes/benz[a]anthracenes		-	-	-
benzo[b]fluoranthene		-	-	0.1
benzo[k]fluoranthene		-	-	0.1
benzo[a]pyrene		-	-	-
indeno[1,2,3-cd]pyrene		-	-	-
dibenz[a,h]anthracene		-	-	-
benzo[ghi]perylene		-	0.06	-
Sum of HACs		3	3	4
sample weight, grams:		5.01	5.02	5.02

Table 3-9: Snails. Concentrations, ng/g (ppb) wet weight, of aromatic contaminants (ACs) in edible tissue.

ACs	Village:		<- Port Graham ->		
	Site:	PTG4	PTG13	PTG13	PTG13
	ID no.:	94TISS0047	94TISS0048	94TISS0049	94TISS0064
	Date collected:	6/27/94	6/27/94	6/27/94	6/27/94
	Collector:	D&M	D&M	D&M	D&M
	Lab no.:	111-61	111-62	111-63	111-64
naphthalene		a	a	a	a
C1-naphthalenes		a	a	a	a
C2-naphthalenes		-	-	-	-
C3-naphthalenes		-	-	-	-
C4-naphthalenes		-	-	-	-
acenaphthylene		-	-	-	-
acenaphthene		-	-	-	-
fluorene		-	-	0.1	-
C1-fluorenes		-	-	-	-
C2-fluorenes		-	-	-	-
C3-fluorenes		-	-	-	-
phenanthrene		0.9	0.7	1	0.9
C1-phenanthrenes/anthracenes		0.2	0.1	0.2	-
C2-phenanthrenes/anthracenes		-	-	-	-
C3-phenanthrenes/anthracenes		-	-	-	-
C4-phenanthrenes/anthracenes		-	-	-	-
dibenzothiophene		-	-	-	-
C1-dibenzothiophenes		-	-	-	-
C2-dibenzothiophenes		-	-	-	-
C3-dibenzothiophenes		-	-	-	-
Sum of LACs		**1**	**0.8**	**1**	**0.9**
fluoranthene		0.2	0.2	0.2	0.2
pyrene		a	0.2	0.2	0.2
C1-fluoranthenes/pyrenes		-	-	-	-
benz[a]anthracene		0.1	-	-	-
chrysene		0.1	0.1	0.1	-
C1-chrysenes/benz[a]anthracenes		-	-	-	-
C2-chrysenes/benz[a]anthracenes		-	-	-	-
C3-chrysenes/benz[a]anthracenes		-	-	-	-
C4-chrysenes/benz[a]anthracenes		-	-	-	-
benzo[b]fluoranthene		-	-	-	-
benzo[k]fluoranthene		-	-	-	-
benzo[a]pyrene		-	-	-	-
indeno[1,2,3-cd]pyrene		-	-	-	-
dibenz[a,h]anthracene		-	-	-	-
benzo[ghi]perylene		-	-	-	-
Sum of HACs		**0.4**	**0.5**	**0.5**	**0.4**
sample weight, grams:		5.03	5.00	5.03	5.02

Table 4-1. Method blanks. Concentrations, ng/g (ppb) wet weight, of aromatic contaminants (ACs) in method blanks.

ACs							Method Blanks Analyzed (n=5)		
	Lab no.:	111-12	111-27	111-42	111-57	111-72	mean		RSD
naphthalene		1	1	1	1	0.9	1		5
C1-naphthalenes		0.8	0.8	0.6	0.9	0.6	0.7		18
C2-naphthalenes		-	-	-	-	-	-		-
C3-naphthalenes		-	-	-	-	-	-		-
C4-naphthalenes		-	-	-	-	-	-		-
acenaphthylene		-	-	-	-	-	-		-
acenaphthene		-	-	-	-	-	-		-
fluorene		-	-	-	-	-	-		-
C1-fluorenes		-	-	-	-	-	-		-
C2-fluorenes		-	-	-	-	-	-		-
C3-fluorenes		-	-	-	-	-	-		-
phenanthrene		0.2	0.3	0.3	0.3	0.2	0.3		21
C1-phenanthrenes/anthracenes		-	-	-	-	-	-		-
C2-phenanthrenes/anthracenes		-	-	-	-	-	-		-
C3-phenanthrenes/anthracenes		-	-	-	-	-	-		-
C4-phenanthrenes/anthracenes		-	-	-	-	-	-		-
dibenzothiophene		-	-	-	-	-	-		-
C1-dibenzothiophenes		-	-	-	-	-	-		-
C2-dibenzothiophenes		-	-	-	-	-	-		-
C3-dibenzothiophenes		-	-	-	-	-	-		-
Sum of LACs		**2**	**2**	**2**	**2**	**2**	**2**		**0**
fluoranthene		-	-	0.1	0.1	0.1	0.1	(n=3)	0
pyrene		-	-	0.1	0.1	0.1	0.1	(n=3)	0
C1-fluoranthenes/pyrenes		-	-	-	-	-	-		-
benz[a]anthracene		-	-	-	-	-	-		-
chrysene		-	-	-	-	-	-		-
C1-chrysenes/benz[a]anthracenes		-	-	-	-	-	-		-
C2-chrysenes/benz[a]anthracenes		-	-	-	-	-	-		-
C3-chrysenes/benz[a]anthracenes		-	-	-	-	-	-		-
C4-chrysenes/benz[a]anthracenes		-	-	-	-	-	-		-
benzo[b]fluoranthene		-	-	-	-	-	-		-
benzo[k]fluoranthene		-	-	-	-	-	-		-
benzo[a]pyrene		-	-	-	-	-	-		-
indeno[1,2,3-cd]pyrene		-	-	-	-	-	-		-
dibenz[a,h]anthracene		-	-	-	-	-	-		-
benzo[ghi]perylene		-	-	-	-	-	-		-
Sum of HACs		**-**	**-**	**0.2**	**0.2**	**0.2**	**0.2**	(n=3)	**0**

Table 4-2: NIST Control Material (Mytilus edulis). Concentrations, ng/g (ppb) wet weight, of aromatic contaminants (ACs) in NIST Mussel V tissue.

ACs	Lab no.:	111-11	111-26	111-41	111-56	111-71	Mussel V tissue Previously Analyzed (n=8) mean		RSD
naphthalene		3	2	2	3	6	3	(n=1)	-
C1-naphthalenes		2	2	1	2	4	2		30
C2-naphthalenes		-	0.3	0.7	1	1	1		44
C3-naphthalenes		0.5	1	1	1	1	2		36
C4-naphthalenes		-	2	3	2	2	4		68
acenaphthylene		0.6	0.2	0.4	0.3	0.5	0.5	(n=6)	52
acenaphthene		-	-	0.3	0.4	0.7	0.3	(n=6)	30
fluorene		0.7	0.4	0.5	0.5	1	0.5		16
C1-fluorenes		-	0.8	2	1	1	3		120
C2-fluorenes		4	2	5	2	2	5		69
C3-fluorenes		4	3	16	5	8	8		92
phenanthrene		4	2	2	2	2	2		17
C1-phenanthrenes/anthracenes		5	3	4	4	11	4		19
C2-phenanthrenes/anthracenes		12	12	14	12	12	14		19
C3-phenanthrenes/anthracenes		20	20	23	20	17	21		25
C4-phenanthrenes/anthracenes		7	4	10	7	9	8		80
dibenzothiophene		-	0.2	0.3	0.3	0.3	0.3		33
C1-dibenzothiophenes		0.7	0.9	1	1	1	1		38
C2-dibenzothiophenes		6	6	7	6	6	10		18
C3-dibenzothiophenes		10	10	10	10	9	18		22
Sum of LACs		**80**	**72**	**103**	**81**	**95**	**100**		**31**
fluoranthene		31	24	26	25	24	23		14
pyrene		28	22	23	23	23	21		14
C1-fluoranthenes/pyrenes		17	14	16	15	15	17		25
benz[a]anthracene		5	4	4	4	4	3		27
chrysene		13	11	15	12	11	10		18
C1-chrysenes/benz[a]anthracenes		6	6	7	6	5	5		27
C2-chrysenes/benz[a]anthracenes		2	3	3	3	2	2		48
C3-chrysenes/benz[a]anthracenes		-	0.2	1	-	-	0.4		76
C4-chrysenes/benz[a]anthracenes		-	-	-	-	-	0.4	(n=2)	20
benzo[b]fluoranthene		7	7	8	6	5	5		24
benzo[k]fluoranthene		5	4	6	5	4	3		29
benzo[a]pyrene		2	2	0.8	2	2	1		48
indeno[1,2,3-cd]pyrene		3	2	2	2	1	2		53
dibenz[a,h]anthracene		-	0.4	0.5	0.4	0.3	0.7		140
benzo[ghi]perylene		4	4	4	4	3	3		22
Sum of HACs		**120**	**100**	**116**	**110**	**99**	**95**		**17**
sample weight, grams:		3.02	3.09	3.00	3.01	3.01	-		-

ITINERARY
FOR PRINCE WILLIAM SOUND COMMUNITY MEETINGS ON
SUBSISTENCE RESTORATION PLANNING AND IMPLEMENTATION
MARCH 29 THROUGH MARCH 31

March 29: Miraglia, Callaway, Gliva, Zemke, Daisy, and Brown-Schwalenberg depart Anchorage for Chenega Bay via Ketchum Air at 9:30 AM (Craft is a turban otter, 888KA)

Chenega Bay community meeting scheduled for 1PM

Daisy and Brown-Schwalenberg return to Anchorage via a JIM Air charter, which departs Chenega at 4:30PM.

The rest of the group travel to Cordova via a Cordova Air charter leaving Chenega at 4:30PM, reservations have been made at the Reluctant Fisherman in Cordova at a rate of $70/night (we need to call them if we are going to arrive at the hotel later than 7PM).

March 30: Cordova/Eyak meeting, time to be determined.

March 31: Travel to Tatitlek via Cordova Air departing Cordova at 11AM.

Exact time of Tatitlek meeting to be determined.

Return to Cordova via Cordova Air, departing Tatitlek at 3PM.

Return to Anchorage via ERA, leaving Cordova at 7PM (Aircraft is a Dash 8).

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Fisheries Science Center
Environmental Conservation Division
2725 Montlake Boulevard East
Seattle, Washington 98112

February 23, 1995

Dr. James Fall
Regional Program Manager
Division of Subsistence
Alaska Department of Fish & Game
333 Raspberry Road
Anchorage, AK 99518-1599

Dear Dr. Fall:

Analyses of samples collected during the fall of 1994 as part of the ADF&G/ NOAA subsistence study have been completed. Fluorescent aromatic compounds (FACs) were measured in bile of harbor seals and ducks (Table 1) and selected individual aromatic compounds (ACs) were measured in edible tissue of molluscs (Tables 2-5).

Low concentrations of biliary FACs$_{PHN}$ were found in harbor seals sampled in 1994 (Tables 1A and 1B), similar to results from harbor seals sampled in 1993 (Table 1B and reported in a memo dated 3/3/94). In 1993, liver and blubber samples from the same harbor seals were analyzed for ACs (summarized in Table 1B) and concentrations were found to be very low (<10 ng/g)—typical of vertebrate species that metabolize ACs efficiently. Therefore, analyses for ACs in the 1994 seal liver and blubber samples are not recommended because concentrations of ACs in these tissues would be expected to be in the same low range reported for the 1993 harbor seal samples.

Concentrations of biliary FACs$_{PHN}$ measured in Barrow's Goldeneye ducks sampled in 1994 (Tables 1A and 1C) were much lower (5300 ± 5300 ng/g, n = 20) than concentrations in that species sampled in 1990 (summarized from the *Exxon Valdez* Damage Assessment database in Table 1C; 32000 ± 6000 ng/g, n = 5). However, in spite of elevated concentrations of FACs$_{PHN}$ in the 1990 duck bile, AC concentrations in the corresponding liver samples were found to be low (< 200 ng/g; Table 1C), as would be expected for a species capable of metabolizing ACs. Thus, because concentrations of ACs in muscle tissue are generally 10 to 100 times lower than those in liver of most species, we would predict that very low AC concentrations would be found in 1994 duck muscle and thus, we do not recommend analyses of these samples.

A log of samples is shown in Table 2, concentrations of the ACs in tissues of shellfish are summarized in Table 3, detailed data are presented in Table 4 and quality assurance data are included in Table 5. Most mollusc samples contained very low concentrations of ACs that did not differ substantially from concentrations found in shellfish from reference

areas sampled previously (generally <10 ng/g). The exceptions included 3 samples of mussels and one of clams from Chenega (CHE28) that had ACs concentrations ranging from 69-747 ng/g. Three samples of littleneck clams and 3 of mussels collected during the summer of 1994 contained ACs in concentrations <10 ng/g (CHE28 was not sampled during previous years). Apparently, the source of ACs that was evident in the fall samples did not affect the summer samples. The source of the contamination may be related to crude oil, because those ACs present in greatest proportions in the CHE28 samples (C2/C3 phenanthrenes, C2/C3 dibenzothiophenes and C2/C3 chrysenes/benz[a]anthracenes) are those ACs that are also found in the greatest proportions in weathered crude oil. Further evidence for weathered oil as the source of contamination is found in the Dames & Moore Chain of Custody document (10/31/94; p 12) indicating that contaminated gravel from mussel beds had been discarded on the sampling beach at CHE28 and that a (oil) sheen was evident as "the tide came in."

In the fall of 1994, lower concentrations of ACs (<10 ng/g) were found in molluscs collected at the Tatitlek station TAT1 than in those sampled in the summer of 1994 (concentrations ranged from 26 to 42 ng/g). Low AC concentrations were also found in samples collected from TAT1 in 1990, ranging from <1 ng/g to 11 ng/g. The source of the ACs in samples collected in summer 1994 samples appeared to be related to combustion products (as reported in memo of 11/24/94), but no evidence of this source of contamination was found in the current samples.

Windy Bay station WNB3 was directly impacted by the oil spilled from the *Exxon Valdez* (mean concentrations of ACs in mussels collected at this site were 1,600 ng/g in 1990 and 110 ng/g in 1991). In contrast, the summer 1994 sampling—showing concentrations of ACs in 2 samples of mussels from WNB3 to be at background levels (<2 ng/g)—suggested that this site might have recovered from the effects of the spill. This return to background AC levels was further supported by results from the fall sampling in which all 3 mussel samples were found to have concentrations of ACs <5 ng/g (Table 3).

If you have any questions, please call Peggy Krahn, Don Brown, or me at 206-860-3330.

Sincerely yours,

Sin-Lam Chan, Ph.D.
Deputy Director

Attachment

cc: Rita Miraglia - ADF&G
Don Brown - NWC/2
Peggy Krahn - NWC/2
Tom Hom - NWC/2

Table 1-A. Concentrations Of Fluorescent Aromatic Compounds (FACs) in Bile of Harbor Seals and Ducks Collected for the Subsistence Project in the Fall, 1994.

			FACs (ng PAH equiv./g bile)		Protein
Sample #	Species	Site	Naphthalene	Phenanthrene	(mg/ml)
94-HS-TAT-1	Harbor Seal	Tatitlek	19,000	1,100	8.2
94-HS-TAT-2	Harbor Seal	Tatitlek	19,000	1,300	12
94-HS-TAT-3	Harbor Seal	Tatitlek	33,000	2,100	9.7
94-HS-TAT-4	Harbor Seal	Tatitlek	14,000	980	10
94-HS-TAT-5	Harbor Seal	Tatitlek	18,000	1,000	8.7
94-HS-TAT-6	Harbor Seal	Tatitlek	22,000	960	4.8
94-HS-TAT-7	Harbor Seal	Tatitlek	62,000	5,300	11
94CB-BAGO-01	Barrow's Goldeneye	Evan's Island	30,000	6,300	47
94CB-BAGO-02	Barrow's Goldeneye	Little Bettles Is.	46,000	7,000	94
94CB-BAGO-03	Barrow's Goldeneye	Little Bettles Is.	78,000	25,000	100
94CB-BAGO-04	Barrow's Goldeneye	Little Bettles Is.	42,000	7,300	44
94CB-BAGO-05	Barrow's Goldeneye	Little Bettles Is.	51,000	10,000	33
94CB-BAGO-06	Barrow's Goldeneye	Little Bettles Is.	28,000	4,300	36
94CB-BAGO-07	Barrow's Goldeneye	Blue/Sawmill Bay	46,000	6,800	133
94CB-BAGO-09	Barrow's Goldeneye	Blue/Sawmill Bay	46,000	3,600	26
94CB-BAGO-10	Barrow's Goldeneye	Erlington Island	90,000	16,000	39
94CB-BAGO-11	Barrow's Goldeneye	Evan's Island	610	40	25
94CB-BAGO-12	Barrow's Goldeneye	Evan's Island	9,600	280	57
94CB-BAGO-13	Barrow's Goldeneye	Fox Farm	23,000	2,200	31
94CB-BAGO-14	Barrow's Goldeneye	Evan's Island	52,000	8,000	17
94CB-BAGO-15	Barrow's Goldeneye	Shelter Bay	40,000	5,600	33
94CB-BAGO-16	Barrow's Goldeneye	Evan's Island	53,000	6,600	27
94CB-BAGO-17	Barrow's Goldeneye	Evan's Island	30,000	3,900	31
94CB-BAGO-18	Barrow's Goldeneye	Evan's Island	20,000	2,400	33
94CB-BAGO-19	Barrow's Goldeneye	Evan's Island	43,000	5,100	33
94CB-BAGO-20	Barrow's Goldeneye	Evan's Island	41,000	4,500	70
94CB-BAGO-21	Barrow's Goldeneye	Evan's Island	40,000	6,100	100
94CB-COME-02	Common Merganser	Big Bettles Is.	32,000	2,200	20
94CB-COME-03	Common Merganser	Evan's Island	30,000	2,000	11

Table 1-B. Summary of the concentrations [a] (mean ± SD) of fluorescent aromatic compounds (FACs) in bile and aromatic compounds (ACs) in blubber and liver of harbor seals sampled in 1993 and 1994. Number in parentheses indicate the number of samples analyzed.

	1994	1993		
Harbor seals from Prince William Sound	Biliary FACs	Biliary FACs	ACs in liver	ACs in blubber
Concentrations	1800 ± 1600 (7)	1500 ± 1200 (5)	6.8 ± 1.6 (5)	3.7 ± 0.6 (5)
Concentration range	960 - 5300	230 - 3200	4 - 8	2.7 - 4

[a] Units of FACs in bile and ACs in blubber and liver are expressed as ng phenanthrene equivalents per g bile and ng per gram tissue, wet weight, respectively.

Table 1-C. Summary of the concentrations [a] (mean ± SD) of fluorescent aromatic compounds (FACs) in bile and aromatic compounds (ACs) in liver of ducks (Barrow's Goldeneye) sampled in 1990 and 1994. Number in parentheses indicate the number of samples analyzed.

	1994	1990[b]	
Ducks from Prince William Sound	Biliary FACs	Biliary FACs	ACs in liver
Concentrations	5300 ± 5300 (20)	32000 ± 6000 (5)	110 ± 42 (5)
Concentration range	40 - 25000	23000 - 38000	62-185

[a] Units of FACs in bile and ACs in liver are expressed as ng phenanthrene equivalents per g bile and ng per gram tissue, wet weight, respectively.

b Data were provided by Dr. Carol-Ann Manen from the *Exxon Valdez* Damage Assessment database.

Table 2. Species Sampling Log for samples included in this report - 1994 Fall Subsistence. (Total Samples: 71)										
		BUTTER CLAMS	CHITONS	CLAMS*	LITTLENECK CLAMS	BLUE MUSSELS	RAZOR CLAMS	SNAILS*		
Village										
Sampling Site	Site									
Akhiok	AKH2	3								
Akhiok	AKH6						3			
Chenega Bay	CHE27	2			3	3				
Chenega Bay	CHE28			1		3				
Karluk	KAR2	3				3				
Koyuktolik	KOY1					3				
Larsen Bay	LAB10	1								
Larsen Bay	LAB16	5								
Old Harbor	OHA3	3								
Ouzinkie	OUZ11	3								
Port Graham	PTG4				2			3		
Port Graham	PTG13							3		
Port Graham	PTG8/9		3			3				
Port Lions	PTL1	3								
Port Lions	PTL10	3								
Tatitlek	TAT1					3				
Tatitlek	TAT9				3	3				
Windy Bay	WNB3					3				
TOTAL:		26	3	1	8	24	3	6		
* Specific species identification was not provided.										

Aromatic Contaminants for Subsistence Fall 1994 Samples Explanatory Notes for Tables 3 through 5.

Abbreviations used:

ACs - the aromatic contaminants listed in Tables 3-5.

LACs - low molecular weight ACs, the 2 and 3-ring ACs, as listed in Tables 3-5 from naphthalene through the C3-dibenzothiophenes.

HACs - high molecular weight ACs, the 4,5 and 6-ring ACs, as listed in Tables 3-5 from fluoranthene through benzo[ghi]perylene.

RSD - relative standard deviation, the standard deviation divided by the mean and expressed as a percent.

A hyphen (-) indicates that the analyte was not detected above the limit of monitoring which ranged from 0.1 to 0.4 ng/g (ppb) wet weight.

Results were determined by GC/MS - selected ion detection.

Naphthalene-d8 was the internal standard for naphthalene through C4-naphthalenes. Acenaphthene-d10 was the internal standard for acenaphthylene through C1-fluoranthenes/pyrenes. Benzo[a]pyrene-d12 was the internal standard for benz[a]anthracene through benzo[ghi]perylene in all samples except 111-181/190 and 111-151/162. In these samples, acenaphthene-d10 was the internal standard for benz[a]anthracene through benzo[ghi]perylene as well, due to poor recoveries of the internal standard benzo[a]pyrene-d12.

Concentrations less than 10 ng/g are rounded to one significant figure; concentrations greater than or equal to 10 ng/g are rounded to two significant figures.

Specific Notes

a Levels of the analyte were indistinguishable from those of blank analyses.

Table 3. Summed concentrations of ACs (Tables 3-4, LAC\HAC) in edible tissue, ng/g (ppb) wet weight. Replicate analyses are shown by brackets.

Village:	Akhiok		Chenega Bay		Karluk	Koyuktolik	Larsen Bay		Old Harbor	Ouzinkie	Port Graham			Port Lions		Tatitlek		Windy Bay
Site:	AKH2	AKH6	CHE27	CHE28	KAR2	KOY1	LAB10	LAB16	OHA3	OUZ11	PTG4	PTG13	PTG8/9	PTL1	PTL10	TAT1	TAT9	WNB3
Chitons													1\-					
													2\-					
													1\-					
Clams																		
butter	7\1		2\-		3\1		3\0.1	3\3	11\4	3\1				3\2	5\10			
	1\1		1\- 0.4\-		6\2			3\0.2	15\4	2\0.8 2\1				2\2	2\8			
	9\1				4\1			9\6	18\7	3\0.1				2\2	3\9			
								11\7										
								3\7										
clam (mixed butter and littleneck)				650\97														
littleneck			0.3\0.3								2\5 2\5					9\1		
			2\2													1\0.5		
			-\0.2								6\8					0.2\-		
razor		5\3																
		5\2																
		5\2																
Mussels			0.4\0.1	128\24	-\-	-\0.1							2\-			2\1	3\-	1\-
			0.5\0.3	58\11	-\-	-\0.1							1\0.2			3\1	6\0.8	4\0.6
			0.6\-	100\18	-\1	-\-							3\-			1\0.2	3\1	2\- 1\0.3 4\0.3
Snails (no species ID)											3\0.2	1\-						
											2\0.4	1\-						
											3\1	2\0.1						

Table 4-1: Butterclams. Concentrations, ng/g (ppb) wet weight, of aromatic contaminants (ACs) in edible flesh.

ACs	Village:	<- Akhiok 2 ->			<- Chenega 27 ->			<- Karluk 2 ->			Larsen Bay 10
	Site:	AKH2	AKH2	AKH2	CHE27	CHE27	CHE27	KAR2	KAR2	KAR2	LAB10
	ID no.:	94TISS0144	94TISS0145	94TISS0146	94TISS0332	94TISS0333	94TISS0333	94TISS0087	94TISS0088	94TISS0089	94TISS0203
	Date collected:	8/21/94	8/21/94	8/21/94	8/19/94	8/19/94	8/19/94	8/20/94	8/20/94	8/20/94	9/10/94
	Collector:	D&M	D&M	D&M	D&M	D&M	D&M	D&M	D&M	D&M	D&M
	Lab no.:	111-81	111-82	111-83	111-112	111-113	111-186	111-78	111-79	111-80	111-109
naphthalene		a	a	a	a	a	a	a	a	a	a
C1-naphthalenes		a	-	a	a	a	a	a	a	a	a
C2-naphthalenes		0.2	-	0.5	a	a	-	0.2	0.4	0.2	a
C3-naphthalenes		0.5	-	0.2	0.4	-	-	-	-	-	0.2
C4-naphthalenes		-	-	0.1	-	-	-	-	-	-	-
acenaphthylene		-	0.1	-	-	-	-	-	0.2	-	0.1
acenaphthene		-	-	-	-	-	-	-	0.2	-	0.2
fluorene		0.2	0.2	0.2	-	-	-	-	0.2	-	0.2
C1-fluorenes		-	-	0.1	-	-	-	-	-	-	-
C2-fluorenes		0.4	-	0.6	-	-	-	0.2	-	-	-
C3-fluorenes		3	-	5	-	-	-	0.9	1	2	-
phenanthrene		0.7	0.9	0.9	0.4	0.4	0.4	0.4	0.4	0.4	0.5
C1-phenanthrenes/anthracenes		1	-	2	0.4	0.3	-	0.2	0.2	0.3	0.6
C2-phenanthrenes/anthracenes		0.7	-	0.8	0.3	0.2	-	-	-	-	0.5
C3-phenanthrenes/anthracenes		0.3	-	0.4	-	-	-	-	-	-	0.2
C4-phenanthrenes/anthracenes		-	-	-	-	-	-	-	-	-	-
dibenzothiophene		0.1	0.1	-	0.1	0.1	-	-	-	-	-
C1-dibenzothiophenes		0.1	-	0.2	0.1	0.1	-	-	-	-	0.1
C2-dibenzothiophenes		-	-	-	0.3	0.1	-	-	-	-	0.3
C3-dibenzothiophenes		-	-	-	-	-	-	-	-	-	-
Sum of LACs		7	1	9	2	1	0.4	3	6	4	3
fluoranthene		0.5	0.6	0.6	a	a	a	0.4	0.4	a	a
pyrene		a	0.4	0.4	a	a	a	a	0.5	0.4	a
C1-fluoranthenes/pyrenes		-	-	0.1	-	-	-	-	0.2	-	-
benz[a]anthracene		-	-	-	-	-	-	0.2	0.3	0.2	-
chrysene		-	-	-	-	-	-	0.3	0.4	0.3	0.1
C1-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-	-	-
C2-chrysenes/benz[a]anthracenes		0.1	-	0.1	-	-	-	-	-	-	-
C3-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-	-	-
C4-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-	-	-
benzo[b]fluoranthene		-	-	-	-	-	-	-	-	-	-
benzo[k]fluoranthene		-	-	-	-	-	-	-	-	0.3	-
benzo[a]pyrene		-	-	-	-	-	-	0.2	0.3	0.2	-
indeno[1,2,3-cd]pyrene		-	-	-	-	-	-	-	-	-	-
dibenz[a,h]anthracene		-	-	-	-	-	-	0.1	-	-	-
benzo[ghi]perylene		0.6	-	-	-	-	-	-	-	-	-
Sum of HACs		1	1	1	-	-	-	1	2	1	0.1
sample weight, grams:		5.06	5.04	5.01	5.06	5.05	5.05	5.05	5.03	5.06	5.08

Table 4-2: Butterclams. Concentrations, ng/g (ppb) wet weight, of aromatic contaminants (ACs) in edible flesh.

ACs	Village:	<- Larsen Bay 16 ->					<- Old Harbor 3 ->		
	Site:	LAB16	LAB16	LAB16	LAB16	LAB16	OHA3	OHA3	OHA3
	ID no.:	94TISS0198	94TISS0199	94TISS0200	94TISS0204	94TISS0205	94TISS0152	94TISS0153	94TISS0154
	Date collected:	9/10/94	9/10/94	9/10/94	9/10/94	9/10/94	8/22/94	8/22/94	8/22/94
	Collector:	D&M	D&M	D&M	D&M	D&M	D&M	D&M	D&M
	Lab no.:	111-101	111-107	111-108	111-110	111-111	111-84	111-85	111-86
naphthalene		a	a	a	a	a	a	a	a
C1-naphthalenes		a	a	a	a	-	a	a	a
C2-naphthalenes		0.2	a	0.5	0.6	-	0.4	0.5	0.5
C3-naphthalenes		-	0.3	0.7	0.8	-	0.5	1	1
C4-naphthalenes		-	-	0.3	-	-	0.2	0.5	0.6
acenaphthylene		-	0.2	0.2	0.1	0.2	-	-	-
acenaphthene		-	-	0.2	0.2	0.2	-	0.2	0.3
fluorene		0.2	0.2	0.3	0.3	0.4	0.3	0.3	0.4
C1-fluorenes		-	-	0.3	0.4	-	0.2	0.4	0.5
C2-fluorenes		-	-	0.4	0.4	-	0.9	1	1
C3-fluorenes		-	-	-	-	-	2	3	4
phenanthrene		0.7	0.5	2	2	2	2	2	2
C1-phenanthrenes/anthracenes		0.7	0.5	1	2	-	2	2	3
C2-phenanthrenes/anthracenes		0.6	0.2	1	2	-	0.9	1	1
C3-phenanthrenes/anthracenes		-	0.1	0.3	0.5	-	0.4	0.7	0.8
C4-phenanthrenes/anthracenes		-	-	-	-	-	-	-	0.3
dibenzothiophene		-	-	0.1	0.1	0.1	0.1	0.2	0.1
C1-dibenzothiophenes		0.2	0.2	0.3	0.4	-	0.4	0.5	0.7
C2-dibenzothiophenes		-	0.3	0.7	1	-	0.5	1	1
C3-dibenzothiophenes		-	-	0.4	2	-	0.3	0.9	0.6
Sum of LACs		**3**	**3**	**9**	**11**	**3**	**11**	**15**	**18**
fluoranthene		0.5	a	3	3	3	2	2	2
pyrene		0.4	a	1	1	1	0.7	0.8	0.9
C1-fluoranthenes/pyrenes		0.2	-	0.6	0.7	-	0.3	0.6	0.8
benz[a]anthracene		0.2	-	0.4	0.3	0.7	0.1	0.3	0.4
chrysene		0.3	0.1	0.6	0.7	1	0.4	0.5	0.7
C1-chrysenes/benz[a]anthracenes		-	0.1	0.2	0.3	-	-	-	0.2
C2-chrysenes/benz[a]anthracenes		0.3	-	-	0.2	-	-	-	0.1
C3-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-
C4-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-
benzo[b]fluoranthene		0.3	-	0.3	0.4	0.5	-	-	0.7
benzo[k]fluoranthene		0.3	-	0.2	0.2	0.4	-	-	0.4
benzo[a]pyrene		0.2	-	-	-	0.2	-	-	0.3
indeno[1,2,3-cd]pyrene		-	-	-	-	-	-	-	0.3
dibenz[a,h]anthracene		-	-	-	-	-	-	-	-
benzo[ghi]perylene		-	-	-	-	-	-	-	0.3
Sum of HACs		**3**	**0.2**	**6**	**7**	**7**	**4**	**4**	**7**
sample weight, grams:		5.09	5.10	5.09	5.03	5.02	5.04	5.02	5.08

Table 4-3: Butterclams. Concentrations, ng/g (ppb) wet weight, of aromatic contaminants (ACs) in edible flesh.

ACs	Village:	<- Ouzinkie 11 ->				<- Port Lions 1 ->			<- Port Lions 10 ->		
	Site:	OUZ11	OUZ11	OUZ11	OUZ11	PTL1	PTL1	PTL1	PTL10	PTL10	PTL10
	ID no.:	94TISS0180	94TISS0181	94TISS0181	94TISS0182	94TISS0188	94TISS0189	94TISS0190	94TISS0193	94TISS0194	94TISS0195
	Date collected:	8/23/94	8/23/94	8/23/94	8/23/94	9/09/94	9/09/94	9/04/94	9/04/94	9/04/94	9/04/94
	Collector:	D&M	D&M	D&M	D&M	D&M	D&M	D&M	D&M	D&M	D&M
	Lab no.:	111-92	111-184	111-93	111-94	111-95	111-96	111-97	111-98	111-99	111-100
naphthalene		a	a	a	a	a	a	a	a	a	a
C1-naphthalenes		a	a	a	a	a	a	a	a	a	a
C2-naphthalenes		0.3	-	0.2	0.6	0.2	-	-	0.2	-	-
C3-naphthalenes		-	-	-	0.3	-	-	-	-	-	-
C4-naphthalenes		-	-	-	-	-	-	-	-	-	-
acenaphthylene		-	-	-	-	-	-	-	-	-	-
acenaphthene		-	-	-	-	-	-	-	-	-	-
fluorene		-	-	-	0.2	0.2	-	-	0.3	-	0.2
C1-fluorenes		-	-	-	-	-	-	-	-	-	-
C2-fluorenes		-	-	-	-	-	-	-	-	-	-
C3-fluorenes		-	-	-	-	-	-	-	-	-	-
phenanthrene		0.6	0.8	0.7	0.6	1	1	0.9	2	2	2
C1-phenanthrenes/anthracenes		0.7	0.8	0.6	0.7	0.7	0.7	0.7	1	1	0.8
C2-phenanthrenes/anthracenes		0.4	-	0.6	0.5	0.5	0.4	0.2	0.9	0.4	0.4
C3-phenanthrenes/anthracenes		-	-	-	-	-	-	-	0.2	-	-
C4-phenanthrenes/anthracenes		-	-	-	-	-	-	-	-	-	-
dibenzothiophene		-	-	-	-	-	-	-	-	-	-
C1-dibenzothiophenes		0.2	-	-	0.2	-	-	-	-	-	-
C2-dibenzothiophenes		0.4	-	0.3	0.2	-	-	-	0.4	-	-
C3-dibenzothiophenes		-	-	-	-	-	-	-	0.4	-	-
Sum of LACs		3	2	2	3	3	2	2	5	2	3
fluoranthene		0.4	0.5	0.5	a	1	1	0.9	4	3	3
pyrene		a	0.3	a	a	0.5	0.4	0.4	2	1	2
C1-fluoranthenes/pyrenes		0.1	-	-	-	0.1	-	0.2	1	0.7	0.6
benz[a]anthracene		-	-	-	-	0.1	0.1	0.1	1	1	1
chrysene		0.1	-	0.1	-	0.1	0.2	0.2	0.9	0.8	1
C1-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-	-	0.2
C2-chrysenes/benz[a]anthracenes		0.2	-	0.2	0.1	0.3	0.3	0.1	0.3	0.2	0.2
C3-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-	-	-
C4-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-	-	-
benzo[b]fluoranthene		0.1	-	0.1	-	-	-	0.1	0.9	0.7	1
benzo[k]fluoranthene		0.1	-	-	-	-	-	-	0.2	0.2	0.2
benzo[a]pyrene		-	-	-	-	-	-	-	-	-	-
indeno[1,2,3-cd]pyrene		-	-	-	-	-	-	-	-	-	-
dibenz[a,h]anthracene		-	-	-	-	-	-	-	-	-	-
benzo[ghi]perylene		-	-	-	-	-	-	-	-	-	-
Sum of HACs		1	0.8	1	0.1	2	2	2	10	8	9
sample weight, grams:		5.05	5.06	5.03	5.04	5.00	5.02	5.08	5.01	5.06	5.08

Table 4-4: Chitons. Concentrations, ng/g (ppb) wet weight, of aromatic contaminants (ACs) in edible flesh.

ACs	Village:	<- Port Graham 8/9 ->		
	Site:	PTG8/9	PTG8/9	PTG8/9
	ID no.:	95TISS0344	95TISS0345	95TISS0346
	Date collected:	9/07/94	9/07/94	9/07/94
	Collector:	D&M	D&M	D&M
	Lab no.:	111-151	111-152	111-153
naphthalene		a	a	a
C1-naphthalenes		a	a	a
C2-naphthalenes		0.8	0.9	0.4
C3-naphthalenes		-	-	-
C4-naphthalenes		-	-	-
acenaphthylene		-	-	-
acenaphthene		-	-	-
fluorene		-	0.1	0.1
C1-fluorenes		-	-	-
C2-fluorenes		-	-	-
C3-fluorenes		-	-	-
phenanthrene		a	a	a
C1-phenanthrenes/anthracenes		0.4	0.4	0.4
C2-phenanthrenes/anthracenes		0.2	0.2	0.3
C3-phenanthrenes/anthracenes		-	-	-
C4-phenanthrenes/anthracenes		-	-	-
dibenzothiophene		-	-	-
C1-dibenzothiophenes		-	-	-
C2-dibenzothiophenes		-	-	-
C3-dibenzothiophenes		-	-	-
Sum of LACs		1	2	1
fluoranthene		a	a	a
pyrene		a	a	a
C1-fluoranthenes/pyrenes		-	-	-
benz[a]anthracene		-	-	-
chrysene		-	-	-
C1-chrysenes/benz[a]anthracenes		-	-	-
C2-chrysenes/benz[a]anthracenes		-	-	-
C3-chrysenes/benz[a]anthracenes		-	-	-
C4-chrysenes/benz[a]anthracenes		-	-	-
benzo[b]fluoranthene		-	-	-
benzo[k]fluoranthene		-	-	-
benzo[a]pyrene		-	-	-
indeno[1,2,3-cd]pyrene		-	-	-
dibenz[a,h]anthracene		-	-	-
benzo[ghi]perylene		-	-	-
Sum of HACs		-	-	-
sample weight, grams:		5.07	5.04	5.02

Table 4-5: Clams (mixture of butter and littleneck). Concentrations, ng/g (ppb) wet weight, of aromatic con

ACs	Village:	Chenega 28
	Site:	CHE28
	ID no.:	94TISS0343
	Date collected:	8/19/94
	Collector:	D&M
	Lab no.:	111-130
naphthalene		a
C1-naphthalenes		a
C2-naphthalenes		0.8
C3-naphthalenes		10
C4-naphthalenes		34
acenaphthylene		-
acenaphthene		-
fluorene		0.4
C1-fluorenes		3
C2-fluorenes		29
C3-fluorenes		45
phenanthrene		0.5
C1-phenanthrenes/anthracenes		9
C2-phenanthrenes/anthracenes		77
C3-phenanthrenes/anthracenes		130
C4-phenanthrenes/anthracenes		63
dibenzothiophene		1
C1-dibenzothiophenes		14
C2-dibenzothiophenes		97
C3-dibenzothiophenes		140
Sum of LACs		**650**
fluoranthene		1
pyrene		2
C1-fluoranthenes/pyrenes		15
benz[a]anthracene		0.3
chrysene		12
C1-chrysenes/benz[a]anthracenes		20
C2-chrysenes/benz[a]anthracenes		25
C3-chrysenes/benz[a]anthracenes		14
C4-chrysenes/benz[a]anthracenes		5
benzo[b]fluoranthene		2
benzo[k]fluoranthene		-
benzo[a]pyrene		0.3
indeno[1,2,3-cd]pyrene		-
dibenz[a,h]anthracene		0.1
benzo[ghi]perylene		-
Sum of HACs		**97**
sample weight, grams:		5.03

Table 4-6: Littleneck Clams. Concentrations, ng/g (ppb) wet weight, of aromatic contaminants (ACs) in edible flesh.

ACs	Village:	<- Chenega 27 ->			<- Port Graham 4 ->		
	Site:	CHE27	CHE27	CHE27	PTG4	PTG4	PTG4
	ID no.:	94TISS0329	94TISS0330	94TISS0331	94TISS0165	94TISS0166	94TISS0165
	Date collected:	8/19/94	8/19/94	8/19/94	9/06/94	9/06/94	9/06/94
	Collector:	D&M	D&M	D&M	D&M	D&M	D&M
	Lab no.:	111-127	111-128	111-129	111-122	111-123	111-185
naphthalene		a	a	a	a	a	a
C1-naphthalenes		a	a	a	a	a	a
C2-naphthalenes		-	0.5	-	-	0.4	0.2
C3-naphthalenes		-	-	-	-	-	-
C4-naphthalenes		-	-	-	-	-	-
acenaphthylene		-	-	-	-	-	-
acenaphthene		-	0.2	-	-	0.2	-
fluorene		-	-	-	0.2	0.3	0.3
C1-fluorenes		-	-	-	-	0.2	-
C2-fluorenes		-	-	-	-	0.2	-
C3-fluorenes		-	-	-	-	0.2	-
phenanthrene		a	0.4	a	1	2	1
C1-phenanthrenes/anthracenes		0.3	0.4	-	0.7	1	0.7
C2-phenanthrenes/anthracenes		-	-	-	0.4	1	-
C3-phenanthrenes/anthracenes		-	-	-	-	0.3	-
C4-phenanthrenes/anthracenes		-	-	-	-	-	-
dibenzothiophene		-	-	-	-	0.2	-
C1-dibenzothiophenes		-	-	-	-	-	-
C2-dibenzothiophenes		-	-	-	-	0.1	-
C3-dibenzothiophenes		-	-	-	-	-	-
Sum of LACs		**0.3**	**2**	**-**	**2**	**6**	**2**
fluoranthene		a	0.3	a	2	3	2
pyrene		a	a	a	1	2	1
C1-fluoranthenes/pyrenes		-	0.2	-	0.6	1	-
benz[a]anthracene		0.1	0.2	-	0.3	0.6	0.2
chrysene		-	0.3	-	0.5	0.6	0.4
C1-chrysenes/benz[a]anthracenes		-	-	-	-	0.2	-
C2-chrysenes/benz[a]anthracenes		0.2	0.2	0.2	0.1	0.1	-
C3-chrysenes/benz[a]anthracenes		-	-	-	-	-	-
C4-chrysenes/benz[a]anthracenes		-	-	-	-	-	-
benzo[b]fluoranthene		-	0.3	-	-	0.4	0.3
benzo[k]fluoranthene		-	0.3	-	0.3	0.3	0.2
benzo[a]pyrene		-	0.2	-	-	-	-
indeno[1,2,3-cd]pyrene		-	-	-	-	-	-
dibenz[a,h]anthracene		-	-	-	-	-	-
benzo[ghi]perylene		-	-	-	-	-	0.4
Sum of HACs		**0.3**	**2**	**0.2**	**5**	**8**	**5**
sample weight, grams:		5.07	5.08	5.07	5.02	5.02	5.05

Table 4-7: Littleneck Clams. Concentrations, ng/g (ppb) wet weight, of aromatic contaminants (ACs) in edible flesh.

ACs	Village:	<- Tatitlek 9 ->		
	Site:	TAT9	TAT9	TAT9
	ID no.:	94TISS0311	94TISS0313	94TISS0314
	Date collected:	8/18/94	8/18/94	8/18/94
	Collector:	D&M	D&M	D&M
	Lab no.:	111-124	111-125	111-126
naphthalene		3	a	a
C1-naphthalenes		2	a	a
C2-naphthalenes		1	-	-
C3-naphthalenes		-	-	-
C4-naphthalenes		-	-	-
acenaphthylene		0.2	-	-
acenaphthene		0.2	-	-
fluorene		0.4	-	-
C1-fluorenes		0.1	-	-
C2-fluorenes		-	-	-
C3-fluorenes		-	-	-
phenanthrene		0.7	0.4	a
C1-phenanthrenes/anthracenes		0.7	0.2	0.2
C2-phenanthrenes/anthracenes		0.3	0.8	-
C3-phenanthrenes/anthracenes		-	-	-
C4-phenanthrenes/anthracenes		-	-	-
dibenzothiophene		-	-	-
C1-dibenzothiophenes		-	-	-
C2-dibenzothiophenes		-	-	-
C3-dibenzothiophenes		-	-	-
Sum of LACs		**9**	**1**	**0.2**
fluoranthene		a	a	a
pyrene		0.5	a	a
C1-fluoranthenes/pyrenes		0.5	-	-
benz[a]anthracene		-	0.2	-
chrysene		-	-	-
C1-chrysenes/benz[a]anthracenes		-		-
C2-chrysenes/benz[a]anthracenes		0.1	-	-
C3-chrysenes/benz[a]anthracenes		-	-	-
C4-chrysenes/benz[a]anthracenes		-	-	-
benzo[b]fluoranthene		-	-	-
benzo[k]fluoranthene		-	0.3	-
benzo[a]pyrene		-	-	-
indeno[1,2,3-cd]pyrene		-	-	-
dibenz[a,h]anthracene		-	-	-
benzo[ghi]perylene		-	-	-
Sum of HACs		**1**	**0.5**	**-**
sample weight, grams:		5.02	5.03	5.04

Table 4-8: Mussels. Concentrations, ng/g (ppb) wet weight, of aromatic contaminants (ACs) in edible flesh.

ACs	Village:	<- Chenega 27 ->			<- Chenega 28 ->			<- Karluk 2 ->		
	Site:	CHE27	CHE27	CHE27	CHE28	CHE28	CHE28	KAR2	KAR2	KAR2
	ID no.:	94TISS0334	94TISS0335	94TISS0336	94TISS0339	94TISS0341	94TISS0342	94TISS0093	94TISS0094	94TISS0095
	Date collected:	8/18/94	8/19/94	8/19/94	8/19/94	8/19/94	8/19/94	8/20/94	8/20/94	8/20/94
	Collector:	D&M	D&M	D&M	D&M	D&M	D&M	D&M	D&M	D&M
	Lab no.:	111-167	111-168	111-169	111-170	111-171	111-172	111-142	111-143	111-144
naphthalene		a	a	a	a	a	8	a	a	a
C1-naphthalenes		a	a	a	a	a	5	a	a	a
C2-naphthalenes		-	-	-	-	-	2	-	-	-
C3-naphthalenes		-	-	-	-	-	1	-	-	-
C4-naphthalenes		-	-	-	-	-	1	-	-	-
acenaphthylene		-	-	-	-	-	0.6	-	-	-
acenaphthene		-	-	-	-	-	0.7	-	-	-
fluorene		-	-	-	-	-	1	-	-	-
C1-fluorenes		-	-	-	-	0.3	2	-	-	-
C2-fluorenes		-	-	-	-	0.6	1	-	-	-
C3-fluorenes		-	-	-	-	-	-	-	-	-
phenanthrene		a	a	a	0.6	0.6	2	a	a	a
C1-phenanthrenes/anthracenes		0.2	0.2	0.3	3	1	3	-	-	-
C2-phenanthrenes/anthracenes		0.2	0.3	0.3	20	9	12	-	-	-
C3-phenanthrenes/anthracenes		-	-	-	38	17	24	-	-	-
C4-phenanthrenes/anthracenes		-	-	-	3	1	1	-	-	-
dibenzothiophene		-	-	-	0.4	0.2	0.3	-	-	-
C1-dibenzothiophenes		-	-	-	3	2	2	-	-	-
C2-dibenzothiophenes		-	-	-	24	11	-	-	-	-
C3-dibenzothiophenes		-	-	-	39	15	36	-	-	-
Sum of LACs		**0.4**	**0.5**	**0.6**	**128**	**58**	**100**	-	-	-
fluoranthene		a	a	a	0.6	0.4	0.7	a	a	a
pyrene		a	a	a	0.5	a	2	a	a	a
C1-fluoranthenes/pyrenes		-	-	-	2	1	3	-	-	-
benz[a]anthracene		-	0.1	-	-	-	-	-	-	0.2
chrysene		-	-	-	3	1	2	-	-	0.3
C1-chrysenes/benz[a]anthracenes		0.1	0.2	-	7	3	4	-	-	-
C2-chrysenes/benz[a]anthracenes		-	-	-	8	4	5	-	-	-
C3-chrysenes/benz[a]anthracenes		-	-	-	2	0.5	1	-	-	-
C4-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-	-
benzo[b]fluoranthene		-	-	-	0.4	0.3	0.4	-	-	0.4
benzo[k]fluoranthene		-	-	-	-	-	-	-	-	0.3
benzo[a]pyrene		-	-	-	0.3	0.3	0.3	-	-	0.2
indeno[1,2,3-cd]pyrene		-	-	-	-	-	-	-	-	-
dibenz[a,h]anthracene		-	-	-	-	-	-	-	-	-
benzo[ghi]perylene		-	-	-	-	-	-	-	-	-
Sum of HACs		**0.1**	**0.3**	-	**24**	**11**	**18**	-	-	**1**
sample weight, grams:		5.03	5.03	5.06	5.02	5.05	5.00	5.09	5.06	5.02

Table 4-9: Mussels. Concentrations, ng/g (ppb) wet weight, of aromatic contaminants (ACs) in edible flesh.

ACs	Village:	<- Koyuktolik Bay 1 ->			<- Port Graham 8/9 ->			<- Tatitlek 1 ->		
	Site:	KOY1	KOY1	KOY1	PTG8/9	PTG8/9	PTG8/9	TAT1	TAT1	TAT1
	ID no.:	94TISS0355	94TISS0356	94TISS0357	94TISS0347	94TISS0348	94TISS0349	94TISS0324	94TISS0325	94TISS0327
	Date collected:	9/18/94	9/18/94	9/18/94	9/07/94	9/07/94	9/07/94	8/18/94	8/18/94	8/18/94
	Collector:	D&M	D&M	D&M	D&M	D&M	D&M	D&M	D&M	D&M
	Lab no.:	111-181	111-182	111-183	111-173	111-174	111-175	111-159	111-160	111-166
naphthalene		a	a	a	a	a	a	a	a	a
C1-naphthalenes		a	a	a	a	a	a	a	a	a
C2-naphthalenes		-	-	-	0.2	0.2	0.2	a	0.4	0.4
C3-naphthalenes		-	-	-	-	-	-	-	-	-
C4-naphthalenes		-	-	-	-	-	-	-	-	-
acenaphthylene		-	-	-	-	-	-	-	-	-
acenaphthene		-	-	-	-	-	0.3	-	-	-
fluorene		-	-	-	-	-	-	-	-	-
C1-fluorenes		-	-	-	-	-	0.4	-	-	-
C2-fluorenes		-	-	-	-	-	-	-	-	-
C3-fluorenes		-	-	-	-	-	-	-	-	-
phenanthrene		a	a	a	0.6	0.6	0.6	1	0.9	0.7
C1-phenanthrenes/anthracenes		-	-	-	0.6	-	0.7	0.7	0.6	0.2
C2-phenanthrenes/anthracenes		-	-	-	0.2	-	0.5	0.1	0.3	-
C3-phenanthrenes/anthracenes		-	-	-	-	-	-	-	-	-
C4-phenanthrenes/anthracenes		-	-	-	-	-	-	-	-	-
dibenzothiophene		-	-	-	-	-	-	-	-	-
C1-dibenzothiophenes		-	-	-	-	-	-	-	0.1	-
C2-dibenzothiophenes		-	-	-	-	-	-	-	0.2	-
C3-dibenzothiophenes		-	-	-	-	-	-	-	-	-
Sum of LACs		-	-	-	2	1	3	2	3	1
fluoranthene		a	a	a	a	-	a	0.4	0.4	a
pyrene		a	a	a	a	-	a	a	a	-
C1-fluoranthenes/pyrenes		-	-	-	-	-	-	-	-	-
benz[a]anthracene		-	-	-	-	-	-	0.2	0.3	0.1
chrysene		0.1	-	-	-	-	-	0.4	0.4	-
C1-chrysenes/benz[a]anthracenes		-	-	-	-	0.2	-	-	-	0.1
C2-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-	-
C3-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-	-
C4-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-	-
benzo[b]fluoranthene		-	0.1	-	-	-	-	0.1	-	-
benzo[k]fluoranthene		-	-	-	-	-	-	0.1	0.1	-
benzo[a]pyrene		-	-	-	-	-	-	-	-	-
indeno[1,2,3-cd]pyrene		-	-	-	-	-	-	-	-	-
dibenz[a,h]anthracene		-	-	-	-	-	-	-	-	-
benzo[ghi]perylene		-	-	-	-	-	-	-	-	-
Sum of HACs		0.1	0.1	-	-	0.2	-	1	1	0.2
sample weight, grams:		5.06	5.00	5.00	5.06	5.01	5.00	5.02	5.06	5.03

Table 4-10: Mussels. Concentrations, ng/g (ppb) wet weight, of aromatic contaminants (ACs) in edible flesh.

ACs	Village:	<- Tatitlek 9 ->			<- Windy Bay 3 ->				
	Site:	TAT9	TAT9	TAT9	WNB3	WNB3	WNB3	WNB3	WNB3
	ID no.:	94TISS0315	94TISS0316	94TISS0317	94TISS0160	94TISS0161	94TISS0161	94TISS0161	94TISS0162
	Date collected:	8/18/94	8/18/94	8/18/94	9/06/94	9/06/94	9/06/94	9/06/94	9/06/94
	Collector:	D&M	D&M	D&M	D&M	D&M	D&M	D&M	D&M
	Lab no.:	111-156	111-157	111-158	111-145	111-154	111-187	111-188	111-155
naphthalene		a	3	a	a	a	a	3	a
C1-naphthalenes		a	2	a	a	a	a	a	a
C2-naphthalenes		0.5	-	0.5	-	0.5	-	-	0.5
C3-naphthalenes		-	-	-	-	-	-	-	-
C4-naphthalenes		-	-	-	-	-	-	-	-
acenaphthylene		-	-	-	-	-	-	-	-
acenaphthene		-	-	-	-	-	-	-	-
fluorene		0.2	-	0.2	-	0.1	-	-	0.2
C1-fluorenes		-	-	-	-	-	-	-	-
C2-fluorenes		-	-	-	-	-	-	-	-
C3-fluorenes		-	-	-	-	-	-	-	-
phenanthrene		0.7	0.6	0.8	0.6	0.6	0.6	0.6	0.8
C1-phenanthrenes/anthracenes		0.7	0.2	0.7	0.2	0.6	-	-	0.5
C2-phenanthrenes/anthracenes		0.4	-	0.4	-	0.6	0.2	0.2	1
C3-phenanthrenes/anthracenes		-	-	-	-	-	-	-	0.5
C4-phenanthrenes/anthracenes		-	-	-	-	-	-	-	-
dibenzothiophene		-	-	-	-	-	-	-	-
C1-dibenzothiophenes		0.2	-	0.2	-	-	-	-	-
C2-dibenzothiophenes		-	-	-	-	-	-	-	-
C3-dibenzothiophenes		-	-	-	-	-	-	-	-
Sum of LACs		3	6	3	1	2	1	4	4
fluoranthene		a	0.4	0.5	a	a	0.3	0.3	a
pyrene		a	0.4	0.4	a	a	a	a	a
C1-fluoranthenes/pyrenes		-	-	-	-	-	-	-	0.1
benz[a]anthracene		-	-	-	-	-	-	-	-
chrysene		-	-	0.2	-	a	a	a	0.3
C1-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	0.2
C2-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-
C3-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-
C4-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-
benzo[b]fluoranthene		-	-	-	-	-	-	-	-
benzo[k]fluoranthene		-	-	-	-	-	-	-	-
benzo[a]pyrene		-	-	-	-	-	-	-	-
indeno[1,2,3-cd]pyrene		-	-	-	-	-	-	-	-
dibenz[a,h]anthracene		-	-	-	-	-	-	-	-
benzo[ghi]perylene		-	-	-	-	-	-	-	-
Sum of HACs		-	0.8	1	-	-	0.3	0.3	0.6
sample weight, grams:		5.04	5.01	5.05	5.07	5.01	5.01	5.03	5.03

Table 4-11: Razorclams. Concentrations, ng/g (ppb) wet weight, of aromatic contaminants (ACs) in edible flesh.

ACs	Village:	<- Akhiok 6 ->		
	Site:	AKH6	AKH6	AKH6
	ID no.:	94TISS0139	94TISS0140	94TISS0141
	Date collected:	8/21/94	8/21/94	8/21/94
	Collector:	D&M	D&M	D&M
	Lab no.:	111-114	111-115	111-116
naphthalene		a	a	a
C1-naphthalenes		a	a	a
C2-naphthalenes		0.5	0.6	0.6
C3-naphthalenes		0.6	0.5	0.6
C4-naphthalenes		0.2	-	-
acenaphthylene		-	-	-
acenaphthene		-	0.3	-
fluorene		-	0.1	-
C1-fluorenes		-	0.2	-
C2-fluorenes		-	0.1	-
C3-fluorenes		-	-	-
phenanthrene		0.6	0.6	0.6
C1-phenanthrenes/anthracenes		0.7	0.6	0.6
C2-phenanthrenes/anthracenes		0.9	0.8	0.9
C3-phenanthrenes/anthracenes		0.3	0.3	0.3
C4-phenanthrenes/anthracenes		-	-	-
dibenzothiophene		0.1	-	-
C1-dibenzothiophenes		0.2	0.2	0.2
C2-dibenzothiophenes		0.5	0.5	0.6
C3-dibenzothiophenes		-	0.3	0.5
Sum of LACs		**5**	**5**	**5**
fluoranthene		1	1	0.9
pyrene		0.4	0.4	0.4
C1-fluoranthenes/pyrenes		0.2	0.3	0.3
benz[a]anthracene		0.1	0.1	-
chrysene		0.4	0.3	0.3
C1-chrysenes/benz[a]anthracenes		-	-	-
C2-chrysenes/benz[a]anthracenes		-	-	-
C3-chrysenes/benz[a]anthracenes		-	-	-
C4-chrysenes/benz[a]anthracenes		-	-	-
benzo[b]fluoranthene		0.1	0.1	-
benzo[k]fluoranthene		0.2	-	0.1
benzo[a]pyrene		0.1	-	-
indeno[1,2,3-cd]pyrene		-	-	-
dibenz[a,h]anthracene		-	-	-
benzo[ghi]perylene		-	-	-
Sum of HACs		**3**	**2**	**2**
sample weight, grams:		5.03	5.09	5.03

Table 4-12: Snails. Concentrations, ng/g (ppb) wet weight, of aromatic contaminants (ACs) in edible flesh.

ACs	Village:	<- Port Graham 13 ->			<- Port Graham 4 ->			<-
	Site:	PTG13	PTG13	PTG13	PTG4	PTG4	PTG4	
	ID no.:	94TISS0171	94TISS0172	94TISS0173	94TISS0168	94TISS0169	94TISS0170	
	Date collected:	9/06/94	9/06/94	9/06/94	9/06/94	9/06/94	9/06/94	
	Collector:	D&M	D&M	D&M	D&M	D&M	D&M	
	Lab no.:	111-139	111-140	111-141	111-136	111-137	111-138	
naphthalene		a	a	a	a	a	a	
C1-naphthalenes		a	a	a	a	a	a	
C2-naphthalenes		0.4	-	0.2	0.1	-	0.5	
C3-naphthalenes		-	-	0.2	-	-	-	
C4-naphthalenes		-	-	-	-	-	-	
acenaphthylene		-	-	-	-	-	-	
acenaphthene		-	-	-	-	-	-	
fluorene		0.1	-	0.2	0.2	-	0.2	
C1-fluorenes		-	-	-	-	-	-	
C2-fluorenes		-	-	-	-	-	-	
C3-fluorenes		-	-	-	-	-	-	
phenanthrene		0.6	0.8	1	0.7	0.6	0.7	
C1-phenanthrenes/anthracenes		0.1	-	0.1	0.1	-	-	
C2-phenanthrenes/anthracenes		-	-	-	-	-	-	
C3-phenanthrenes/anthracenes		-	-	-	-	-	-	
C4-phenanthrenes/anthracenes		-	-	-	-	-	-	
dibenzothiophene		-	-	-	-	-	-	
C1-dibenzothiophenes		0.7	0.9	1	0.3	0.7	0.6	
C2-dibenzothiophenes		-	-	-	-	-	-	
C3-dibenzothiophenes		-	-	-	-	-	-	
Sum of LACs		3	2	3	1	1	2	
fluoranthene		a	a	0.5	a	a	a	
pyrene		a	a	0.4	a	a	a	
C1-fluoranthenes/pyrenes		-	-	-	-	-	-	
benz[a]anthracene		-	-	0.2	-	-	-	
chrysene		0.2	0.4	0.3	a	a	a	
C1-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	
C2-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	
C3-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	
C4-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	
benzo[b]fluoranthene		-	-	-	-	-		
benzo[k]fluoranthene		-	-	-	-	-	0.1	
benzo[a]pyrene		0.2	-	-	-	-	-	
indeno[1,2,3-cd]pyrene		-	-	-	-	-	-	
dibenz[a,h]anthracene		-	-	-	-	-	-	
benzo[ghi]perylene		-	-	-	-	-	-	
Sum of HACs		0.2	0.4	1	-	-	0.1	
sample weight, grams:		5.00	5.04	5.08	5.00	5.08	5.00	

Table 5-1. Method blanks. Concentrations, ng/g (ppb) wet weight, of aromatic contaminants (ACs) in method blanks.

ACs	Lab no.:	111-103	111-118	111-132	111-147	111-162	111-177	111-190	111-88	Method Blanks Analyzed (n=8) mean	RSD	
naphthalene		1	1	1	1.3	1	1	1	0.8	1.0	13	
C1-naphthalenes		0.8	1	0.9	0.9	0.9	1	0.8	0.7	0.9	12	
C2-naphthalenes		-	0.2	0.3	-	0.2	-	-	-	0.2	25	(n=3)
C3-naphthalenes		-	-	-	-	-	-	-	-	-	-	
C4-naphthalenes		-	-	-	-	-	-	-	-	-	-	
acenaphthylene		-	-	-	-	-	-	-	-	-	-	
acenaphthene		-	-	-	-	-	-	-	-	-	-	
fluorene		-		-	-	-	-	-	-	-	-	(n=1)
C1-fluorenes		-	-	-	-	-	-	-	-	-	-	
C2-fluorenes		-	-	-	-	-	-	-	-	-	-	
C3-fluorenes		-	-	-	-	-	-	-	-	-	-	
phenanthrene		0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.2	0.3	21	
C1-phenanthrenes/anthracenes		-	-	-	-	-	-	-	-	-	-	
C2-phenanthrenes/anthracenes		-	-	-	-	-	-	-	-	-	-	
C3-phenanthrenes/anthracenes		-	-	-	-	-	-	-	-	-	-	
C4-phenanthrenes/anthracenes		-	-	-	-	-	-	-	-	-	-	
dibenzothiophene		-	-	-	-	-	-	-	-	-	-	
C1-dibenzothiophenes		-	-	-	-	-	-	-	-	-	-	
C2-dibenzothiophenes		-	-	-	-	-	-	-	-	-	-	
C3-dibenzothiophenes		-	-	-	-	-	-	-	-	-	-	
Sum of LACs		**2**	**2**	**2**	**3**	**2**	**2**	**2**	**2**	2.2	12	
fluoranthene		0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	26	
pyrene		0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	19	
C1-fluoranthenes/pyrenes		-	-	-	-	-	-	-	-	-	-	
benz[a]anthracene		-	-	-	-	-	-	-	-	-	-	
chrysene		-	-	0.1	0.1	-	0.2	0.1	0.2	0.1	39	(n=5)
C1-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-	-	-	
C2-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-	-	-	
C3-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-	-	-	
C4-chrysenes/benz[a]anthracenes		-	-	-	-	-	-	-	-	-	-	
benzo[b]fluoranthene		-	-	-	-	-	-	-	-	-	-	
benzo[k]fluoranthene		-	-	-	-	-	-	-	-	-	-	
benzo[a]pyrene		-	-	-	-	-	-	-	-	-	-	
indeno[1,2,3-cd]pyrene		-	-	-	-	-	-	-	-	-	-	
dibenz[a,h]anthracene		-	-	-	-	-	-	-	-	-	-	
benzo[ghi]perylene		-	-	-	-	-	-	-	-	-	-	
Sum of HACs		**0.3**	**0.4**	**0.5**	**0.5**	**0.4**	**0.6**	**0.3**	**0.6**	0.5	27	

Table 5-2: NIST Control Material (Mytilus edulis). Concentrations, ng/g (ppb) wet weight, of aromatic contaminants (ACs) in NIST Mussel V tissue.

ACs	Lab no.:	111-102	111-117	111-131	111-146	111-161	111-176	111-189	111-87	Mussel V tissue Historical Values* (n=18) mean	RSD	
naphthalene		3	3	3	4	4	2	3	2	3	50	(n = 5)
C1-naphthalenes		2	2	2	4	3	2	2	2	2	34	(n = 11)
C2-naphthalenes		2	1	0.9	2	1	-	0.9	1	1	47	(n = 11)
C3-naphthalenes		2	2	2	3	2	-	0.4	2	2	52	(n = 11)
C4-naphthalenes		7	4	5	3	4	-	2	6	3	66	(n = 11)
acenaphthylene		0.6	0.3	0.5	0.3	0.3	-	-	0.5	0	45	(n = 11)
acenaphthene		0.6	0.3	-	0.5	0.3	-	-	0.3	0	44	(n = 8)
fluorene		0.8	0.3	0.6	0.6	0.5	-	0.5	0.7	1	33	(n = 11)
C1-fluorenes		2	0.8	1	1	1	-	-	2	2	125	(n = 11)
C2-fluorenes		9	2	8	2	5	2	2	8	5	67	
C3-fluorenes		10	0.2	20	-	-	-	-	18	8	93	(n = 10)
phenanthrene		2	2	2	2	2	2	2	2	2	27	
C1-phenanthrenes/anthracenes		6	4	5	4	5	4	4	6	5	49	
C2-phenanthrenes/anthracenes		18	13	18	11	17	16	17	18	13	14	
C3-phenanthrenes/anthracenes		31	25	32	15	31	23	26	34	22	17	
C4-phenanthrenes/anthracenes		26	3	18	0.8	5	1	1	18	7	87	
dibenzothiophene		-	0.2	0.2	0.3	0.3	0.7	-	0.4	0	27	(n =10)
C1-dibenzothiophenes		1	1	1	1	1	0.4	1	2	1	37	
C2-dibenzothiophenes		11	9	11	6	11	10	10	11	9	27	
C3-dibenzothiophenes		19	14	19	9	19	15	17	21	15	33	
Sum of LACs		**150**	**87**	**150**	**70**	**110**	**78**	**89**	**150**	**96**	**29**	
fluoranthene		25	23	22	26	28	25	26	24	24	14	
pyrene		22	21	20	25	25	23	23	21	22	15	
C1-fluoranthenes/pyrenes		20	14	18	14	20	17	18	19	17	19	
benz[a]anthracene		4	4	5	4	5	4	3	4	4	51	
chrysene		13	16	14	11	14	11	11	12	13	54	
C1-chrysenes/benz[a]anthracenes		7	9	9	6	8	7	6	8	6	52	
C2-chrysenes/benz[a]anthracenes		5	4	6	1	5	4	1	6	3	50	
C3-chrysenes/benz[a]anthracenes		2	0.3	2	-	-	-	0.6	2	1	98	(n = 8)
C4-chrysenes/benz[a]anthracenes		0.4	-	0.2	-	-	-	-	0.4	0	20	(n = 2)
benzo[b]fluoranthene		7	6	8	6	8	6	6	7	7	54	
benzo[k]fluoranthene		5	8	5	4	6	4	4	5	4	67	
benzo[a]pyrene		2	2	2	2	2	2	0.8	2	2	41	
indeno[1,2,3-cd]pyrene		2	5	2	2	3	2	2	2	2	60	
dibenz[a,h]anthracene		0.5	0.5	0.5	0.2	0.5	0.3	0.4	0.3	1	127	(n = 10)
benzo[ghi]perylene		4	5	4	4	4	3	3	4	4	47	
Sum of HACs		**120**	**120**	**120**	**110**	**130**	**110**	**100**	**120**	**110**	**25**	
sample weight, grams:		3.05	3.02	3.10	3.04	3.18	3.00	3.09	3.01	-	-	

* The National Institute of Standards and Technology has not provided certified data for Mussel V, our historical data for this material is listed.

APPENDIX: 5

Tour of NMFS Laboratory

MEMORANDUM

TO: Carl Rosier
Commissioner, Juneau

FROM: Craig Mishler
SRS III, Anchorage

SUBJ: Kodiak/Seattle Trip Report
September 21-23, 1994

DATE: October 6, 1994

This trip had two main objectives. The first was to bring in two representatives of Kodiak area communities to Kodiak City for a one-day workshop on oil spill restoration projects. The second part of the trip was to take one representative from each of these same communities to Seattle for a tour of the National Marine Fisheries Service laboratory where ongoing tests of fish and shellfish are done to determine subsistence food safety.

I left Anchorage early on the morning of September 21 on ERA, in the company of Jim Fall, Sandra Schubert, and Steve Zemke. We left at 6:30 a.m. and arrived in Kodiak at 7:45 a.m. Mary Remole from the Dept. of Community and Regional Affairs arrived the night before and joined us at the Buskin River Inn where our meeting was to be held.

Although our charters were unable to pick up villagers as scheduled on the afternoon of the 20th due to high winds, the bad weather abated overnight, and the charters were able to bring people in early on the morning of the 21st. This actually saved us the cost of meals and lodging for those who were delayed.

Our meeting got underway a little late, but all the villages were represented. Those who attended were David Eluska Sr. of Akhiok, George Inga Sr. and Tony Azuyak of Old Harbor, Virginia Squartsoff of Larsen Bay, Mary and Alicia Reft of Karluk, Pete Squartsoff and Bobby Nelson of Port Lions, Angeline Campfield of Ouzinkie, and Mark Olsen and Margaret Roberts of Kodiak. Linda Freed of the Kodiak Island Borough and Kate Wynne of the University of Alaska Sea Grant Program were also able to attend.

Jim Fall made a presentation and led the discussion about the Exxon criminal and civil settlement monies available for restoration projects. Steve Zemke kept track of ideas and responses by taking notes on a flip chart. Mary Remole made a short presentation on criminal settlement money, which only applies to unincorporated communities--in this case Karluk. Although the Karluk delegation said nothing, exclusion of the other communities from the criminal settlement clearly upset Mark Olsen, who voiced his disapproval several times. Mark did not return to the meetings after lunch.

Linda Freed announced that the Borough was going after some of the $8 million available for parks and recreation projects--things like cabins, trails, floating docks, and mooring buoys and wondered if any of the villages wanted to put in for this but she had no takers.

When it came to project ideas there was quite a bit of interest in all of the villages for clam bed restoration and some talk about working together to put in a joint proposal. Specific areas mentioned were Ouzinkie narrows, Old Harbor narrows, Sheep Island, the Port Lions airport beach, Akhiok, and Larsen Bay "right across".

Pete Squartsoff and Bobby Nelson made the most specific proposal, bidding for a fish ladder to help coho salmon spawn in Crescent Lake. As it is now, they are frustrated by two big waterfalls. They claim an enhanced run would remove subsistence pressure from other areas.

Angeline Campfield observed that harbor seal populations are in decline and wondered what could be done about them. I mentioned Kate Wynne's work and our unfunded proposal for working with subsistence hunters to collect tissue samples. The problem here is trying to tie the sampling project directly to the oil spill, since the harbor seal decline was already in evidence well before the spill. Angeline said the Ouzinkie tribal office was displaced during the spill and that the council needed its own building. Such capital projects, however, do not fall under the guidelines for the civil settlement.

David Eluska wondered if we could retest the deer. He observed that the south end deer populations were way down from what they were a few years ago and others noted that populations were way up on the north end of the Island. This is just the reverse of what it was two years ago. Again, the oil spill can't be implicated in these fluctuations. David's other concern is that pink salmon returns on the south end were low and that they could use some stocking of this species. Linda Freed observed that all restocking projects need to be coordinated with the Kodiak Regional Aquaculture Association (KRAA).

Margaret Roberts wondered if king crab had been injured by the spill, but the presentation team said was that there is no evidence to think so. King crab declined in the Kodiak area well before the oil spill.

The meeting ended at 3 p.m. Bobby Nelson and George Inga Sr. returned to their villages shortly afterwards. The others boarded the 4:40 p.m. flight for Anchorage and continued on to Seattle. At the airport I talked briefly to Alicia Reft about her ideas for projects that would qualify under the criminal settlement money, and she said that what they needed most there was road improvements, especially the road going from the airport down to the old village, where there is a lot of erosion and rutting. The old village site is a popular place for landing skiffs. She also said they needed better trails for 4-wheeler access to subsistence use areas.

We arrived in Seattle on schedule at 11:30 p.m. and were met by two Airport Shuttle vans which took us to our hotel. It was not until we were waiting for the shuttle that Angeline introduced me to her husband. This was a total surprise, since I did not recognize him as one of the group and had no knowledge he was accompanying her. She was under the assumption that she would have her own hotel room, but I had previously notified

everyone that we had booked based on double occupancy and everyone had to share with someone.

These plans were thrown to the winds when we reached the Inn at Queen Anne, where we had confirmed reservations for four double rooms and a single. We were greeted only by a note with a combination to a lock box which had keys to four rooms--two singles and two doubles. The explanation was that someone had not checked out on schedule. What made things worse is that there was no desk clerk on duty at the hotel, and the rooms were clearly substandard. While they were reasonably clean, they were very small, they were hot

and stuffy and had no temperature controls, the beds were uncomfortable, and they were located up three flights of stairs with no elevators.

I went up to one of the rooms to call other hotels for vacancies, but I called for a half hour or so without success. I was informed that there were two big conventions in town that had everything booked. I was finally referred to the Vintage Park Hotel, which had four rooms, so we took them all. Six people remained behind and slept at the Inn at Queen Anne. It was 2 a.m. before I checked in and collapsed in bed.

On Thursday morning the 22nd, we were scheduled to take a tour of the National Marine Fisheries Service Montlake laboratory at 10 o'clock, but first we had to get everyone checked out of the Inn at Queen Anne and settle up for the three rooms which we occupied. Because the hotel refused to invoice us, I took a pre-cut check to cover the exact amount of five rooms for two nights. Since we were short of rooms and preferred to stay at the Vintage Park the second night, this check was no good. I tried unsuccessfully to charge the rooms to our BTA American Express account but could not get approval from American Express because the card is limited to air and ground transportation only. After making several calls to Anchorage, I realized that this effort was futile, so I was forced to pay with my own credit card. Thanks to the good efforts of Jim Fall and Ana Lewis in Anchorage, a second check covering the rooms at the Vintage Park hotel was shipped overnight by Federal Express and saved me from having to overextend my own credit card.

The lab tour was delayed an hour by my wrangling over the hotel bill, but we were still graciously received in a conference room set with fruit plates, doughnuts, and coffee at about 11 a.m. We were welcomed by John Stein, deputy director of the lab. The first presenter was Dr. Jack Wekell, an expert on PSP, who promptly dismissed the beliefs people had about "red tide" being associated with shellfish poisoning. He was emphatic that the rule of thumb about harvesting clams only in the "R" months was not useful because PSP has been well-documented in November and December in Washington State waters. Tony Azuyak heard that if you boiled a quarter with your clams that would take care of the PSP. Wekell rejected that also. The only reliable way to test for PSP today is with mouse bio-assay. Samples from commercial beaches are fed to mice to see how they respond. If they don't keel over, it's assumed that humans can eat them with no ill effects.

Other presentations were given by Sin-Lam Chan, Peggy Krahn, Tom Hom, and Don Brown. After this, we took a break and were then given a tour of the lab by Catherine Sloan, who showed us the extraction laboratory, liquid chromatography, gas chromatography, and mass spectrometry, and computerized data processing. At one station we witnessed some of this year's clam samples being unwrapped and prepared for testing. Following the tour we returned to the conference room for additional questions and answers.

Some of the questions posed were:

1) Tony Azuyak: Is there any way the oil spill could have affected the immune systems of the clams and other shellfish?
Sin-Lam: Not as far as we can tell and certainly not for those clams showing very low levels of exposure to oil.

2) Margaret Roberts: What is a safe level of hydrocarbons, and does the lab also look at PCB's? We're wondering about the Russians dumping chemicals and nuclear waste in the ocean.
Sin-Lam: You must look at the tissues for evidence of PCBs. They can't be found in the bile. However, DDT is actually more of a concern to us than PCBs.

3) Tony Azuyak: In Old Harbor we see little white balls in the flesh of the salmon, and we throw those salmon away.
Pete Squartsoff: We only see this in the sockeyes and cohos, not in the pinks and chums, but it's happening more and more often.
David Eluska: Maybe the white balls are actually tumors.
John Stein: We've never found any tumors in the flesh of fish we've tested here.

At the end John Stein talked a good deal about Quality Assurance--the lab's system of checks and balances to make sure error is eliminated and that the instruments used for measuring contaminants are clean. Even a puff of automobile exhaust sucked into the lab will show up right away in the results. This made me think about the line by lines, frequencies, and logic checks made by the Division of Subsistence when we review our data. I think we should also adopt a term like Quality Assurance to describe what we do.

At the end, Angeline Campfield of Ouzinkie, said: "Very impressive. I don't have any doubts now about the reliability of the tests." Pete Squartsoff said the tour just confirmed what he knew all along, that the salmon, clams, and other shellfish were never seriously damaged by the oil spill. He said he wished this presentation could be made right in the villages instead of in Seattle, so that people would really be convinced.

The tour ended at 2 p.m. and we were driven back to our hotel in two vans. Several of us took a short walk downtown to have lunch. Not inclined to experiment, everyone ordered Alaskan seafood such as clam chowder, grilled salmon, and the like. I tried something called salmon sausage. We then proceeded to the Pike Place Market, where we

were entertained by fishmongers who put on a big theatric show whenever they sell a fish, hollering out and throwing it from the crushed ice display up over the counter to someone who catches it in wrapping paper like a center fielder. This was a way of handling and treating salmon that none of the villagers had never seen.

The following day, Friday the 23rd, I left Seattle at 2:50 p.m. on Northwest Airlines, arriving home in Anchorage at 5:30 p.m. Alaska time.

Trip Summary: It was an exhausting three days, but a lot was accomplished. We were able to develop some concepts for funding proposals under oil spill restoration guidelines, and we made believers out of at least some of the people who toured the NMFS lab and saw the tests being performed on their clams. Because there was active participation and interest by all the Kodiak communities, I believe that both the Kodiak workshop and the trip to Seattle were highly educational, constructive, and worthwhile.

cc: Jim Fall, Rita Miraglia, Rob Bosworth

APPENDIX 6:

Newsletter

Subsistence Restoration Project

February 1994 Report

John M. Totemoff and Eddie Levshakoff haul a seal aboard the *"Shaker"* in Prince William Sound.

Oil Contamination in Prince William Sound Seals Down Dramatically from 1989 Levels

Many harbor seals in Prince William Sound were covered with oil as a result of the 1989 *Exxon Valdez* oil spill. In 1989, some of the very heavily oiled seals showed elevated levels of low molecular weight hydrocarbons in their blubber, but not in other tissues in their bodies. According to Kathy Frost, a biologist with the Alaska Department of Fish and Game, who helped collect the 1989 and 1990 samples, this is because oil-based contaminants are attracted to fat, so blubber collects more of these contaminants than the muscle or organs. Exposure of people to very high levels of low molecular weight hydrocarbons, many times higher than those found in the seal blubber in 1989, is associated with short term effects such as light-headedness and nausea. In 1990, seals from some of the same areas showed much lower levels of the low molecular weight hydrocarbons, and slightly higher levels of the high molecular weight hydrocarbons. This is because low molecular weight hydrocarbons evaporate and dissolve relatively quickly, leaving behind the higher weight hydrocarbons as the oil weathers. The seals that were sampled in 1990 had been exposed to more weathered oil than in 1989.

Vicki Vanek, a technician with the Division of Subsistence, accompanied Chenega Bay hunters John M. Totemoff and Eddie Levshakoff on subsistence seal hunts in September 1993. Samples were taken of the blubber, liver and bile of five harbor seals. The samples were tested for hydrocarbon contamination at the Northwest Fisheries Center, National Marine Fisheries lab in Seattle. The results of these tests are shown in the accompanying table, along with test results for seal samples taken in Prince William Sound in 1989 and 1990. We knew from the earlier tests that even in those seals that were heavily oiled, the contamination did not show up in the muscle of the animals. For this reason, we did not test the muscle tissue of the seals sampled in 1993, but rather tested the blubber, where the contamination had concentrated in the heavily oiled seals. As you can see from the table, the blubber in all the seals

continued on page two

Test Results on Samples of Fish and Shellfish Collected in September 1993 Reported by NMFS Lab

A second round of subsistence food sample collection and testing has been completed as part of the 1993 Subsistence Restoration Project funded by the *Exxon Valdez* Oil Spill Trustee Council. A first round sample collection and testing was conducted in June and July 1993, and the results were reported in a previous newsletter.

As in the earlier round of sample collection, the work was coordinated by the Pacific Rim Villages Coalition, which is a joint undertaking by the village corporations of Chenega Bay, Tatitlek, Port Graham and Nanwalek and the Chugach Alaska Corporation, and is endorsed by the village councils of the Chugach region. The Pacific Rim Villages Coalition hired a biologist, Dave Erikson, to train local assistants in the collection process.

Samples of shellfish were taken from the subsistence use areas of Chenega Bay, Tatitlek, Port Graham, Nanwalek, Larsen Bay, Ouzinkie and Port Lions. Bad weather prevented the collection of samples from the subsistence use areas of Karluk and Akhiok, and also prevented sampling crews from getting to Windy Bay on the Kenai Peninsula and Delenia Island, near Chenega Island. The samples were tested at the NMFS lab in Seattle. According to Dr. Usha Varansi, director of the lab, "The concentrations of aromatic contaminants in these mollusc samples were very low and did not differ substantially from those found in samples from reference areas." The reference areas Dr. Varanasi refers to are subsistence use areas near Angoon and Yakutat, which were not oiled, where samples of subsistence foods were

continued on page three

Year	Location	Date	Oiling	Muscle	Liver	Blubber
1989	Herring Bay	6/18/89	Very heavy	0.7/0.5	Not tested	170/7
	Herring Bay	6/18/89	Very heavy	ND	ND	150/1
	Herring Bay	6/18/89	Very heavy	ND	ND	98/8
	Bay of Isles	6/16/89	Very heavy	4/ND	ND	77/2
	Bay of Isles	6/16/89	Very heavy	ND	ND/0.4	85/1
	Bay of Isles	6/17/89	Very heavy	5/ND	2/ND	520/4
	Seal Island	6/16/89	Heavy	4/ND	ND	21/2
	Seal Island	6/16/89	Heavy	10/0.6	ND	26/ND
	Applegate Rocks	6/17/89	Light	ND	ND	19/1
	Big Fort Island	10/26/89	No sign	ND/0.4	ND	21/2
	Agnes Island	11/1/89	No sign	ND/0.4	ND	21/3
1990	Herring Bay	4/11/90	No sign	ND	ND	19/2
	Herring Bay	4/12/90	No sign	ND	ND	19/2
	Herring Bay	4/12/90	No sign	ND/0.3	15/ND	26/7
	Herring Bay	4/13/90	No sign	ND/2	ND	51/39
	Bay of Isles	4/13/90	No sign	ND/0.8	ND	86/15
	NE Elenore Island	4/12/90	No sign	ND	ND	28/2
	NE Elenore Island	4/12/90	No sign	6/1	ND	20/4
1993	Iktua Bay, Evans Island	9/21/93	No sign	Not tested	3/1	2/2
	Lalouche Island	9/18/93	No sign	Not tested	3/1	5/3
	Mummy Island	9/17/93	No sign	Not tested	2/5	3/1
	Mummy Island	9/17/93	No sign	Not tested	2/6	2/0.7
	Ship Island	9/21/93	No sign	Not tested	3/0.9	4/3

Test results on harbor seals from Prince William Sound. Test results are reported in parts per billion, light aromatics/heavy aromatics.

continued from front page

sampled in 1993 tested at 5/3 parts per billion or less. Compare this with the elevated levels shown in 1989 for the heavily oiled seals, which ranged up to 520/8 parts per billion, and the blubber of the 1990 seals of up to 86/39 parts per billion.

According to Dr. Usha Varanasi, director of the lab where the tests were done, "The concentrations of aromatic compounds in these harbor seal samples were very low and did not differ substantially from the method blanks." Method blanks are run through all the same steps as the samples, and are tested, but they do not contain any actual sample. In this way, the lab can tell how much the samples are being affected by the unavoidable trace contamination from the air and surfaces in the lab. The level of hydrocarbons found in the blubber samples from the seals was as low as the levels found in the method blanks, which is to say very low, or "background" levels, so low as not to be a concern for people eating meat or using blubber from these seals.

Oil Spill Health Task Force Meets to Discuss Continued Community Concerns

The Oil Spill Health Task Force held a meeting at the Alaska Native Medical Center, in Anchorage, on August 25th, 1993. Representatives from communities impacted by the *Exxon Valdez* oil spill were invited to attend, along with representatives of the Indian Health Service, Chugachmiut, the Alaska Department of Fish and Game, the National Oceanic and Atmospheric Administration, and Exxon.

Roy Totemoff presented a written statement from Gary Kompkoff, President of the Tatitlek Village Council, which stated in part: "Residents of the Native Village of Tatitlek were concerned with the safety of consuming any of the subsistence resources in 1989; it has been more than four years since the oil was spilled and the residents are still concerned and their concerns are growing with each failed commercial or subsistence fishing season."

Larry Evanoff from Chenega Bay agreed with Gary Kompkoff's statement, and added that seals are scarce in his area. He said "The beaches around Chenega Bay continue to ooze oil, and no one even tries to harvest clams from near their community, because they are afraid to."

Ephim Moonin from Nanwalek said that a lot of people from his community still don't trust the safety of the seafood, and tar balls are still found on the shores of the lower Kenai Peninsula.

Sven Haakanson from Old Harbor said that many people in his community still don't eat clams because they are afraid, and last summer four people got sick from eating clams. It seemed that the issue here was paralytic shellfish poisoning (PSP), rather than the oil spill, but that people do not make that distinction.

The group also discussed concerns about herring in Prince William Sound. Only one third of the expected number of herring returned to Prince William Sound in the spring of 1993. Many of the herring that did return had lesions. Residents of Tatitlek reported that there was very little spawning observed. Residents of Chenega Bay and Tatitlek use both the herring, and the herring spawn on kelp, for food. According to Ted Meyers, a pathologist with the Alaska Department of Fish and Game, the only pathogen identified in the herring was viral hemorrhagic septicemia virus (VHS), which is consistent with the symptoms observed in the herring. Meyers said that it is likely that the VHS virus has always been present in the herring population, but that something has stressed the fish and weakened their resistance to the virus. Meyers emphasized that the virus is not a threat to human health, although he acknowledged that the lesions are not very appetizing. According to Meyers, fish viruses do not pass to humans, even if a person eats a fish infected with the virus. Lab tests have shown that salmon are not easily infected with the VHS virus, but rainbow trout are susceptible.

The community representatives were asked what could be done to convince them that their subsistence foods were safe to eat. Larry Evanoff of Chenega Bay said, "Get the oil off the beaches." The advice of the OSHTF has been and continues to be that shellfish from beaches where oil is observed on the surface or subsurface should not be consumed. It was also pointed out that as long as people continue to see abnormalities, such as those observed in herring, they will be wary of consuming local wild foods. Additionally, there continues to be a scarcity of some resources.

Subsistence users in Prince William Sound, especially residents of Chenega Bay, have found it necessary to travel long distances to harvest foods to replace resources which are either unavailable or deemed unsafe to eat in their pre-spill harvest areas. These trips are being paid for by individual harvesters, at a time when few jobs are available in their communities, and those who rely on commercial fishing for their income are hurting with the failure of the herring and pink salmon runs in 1993. At the OSHTF meeting, funding for such harvesting trips and support for an exchange of resources between communities were again identified as urgent needs in the Prince William Sound communities.

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taken in 1989 and 1990. The very low levels of hydrocarbons found in these reference samples are considered to be the levels likely to have been present in fish and shellfish in the spill area before the spill.

Samples were also taken of rockfish from the harvest areas of Chenega Bay, Tatitlek, and Port Graham. The bile from these fish was analyzed for metabolites of oil at the NMFS lab. According to Dr. Sin Lam Chan, Deputy Director of the lab, "The concentrations of metabolites of flourescent aromatic compounds in the bile samples from the fifteen fish collected in September 1993 subsistence sampling were low to moderate, indicating minimal exposure to petroleum-related aromatic compounds." We know from past studies that fish with such low levels of hydrocarbon metabolites in their bile have very little, if any, contamination in their edible flesh.

The following test results are given in parts per billion, light aromatics/heavy aromatics.

PRINCE WILLIAM SOUND

Chenaga Bay: John M. Totemoff assisted in the collection of shellfish samples from Fox Farm, east of North Twin Bay on Elrington Island in September 1993. Three samples of mussels from this location tested at 4/1 parts per billion or less; by comparison mussels collected at this same location in April 1990 tested as high as 1100/720 parts per billion.

Also in September 1993, Sean Wilson and Clint Gregorieff assisted Dames and Moore biologist Steve Shaner in the collection of rockfish samples. Samples were taken from two tiger rockfish, two yelloweye rockfish, and one china rockfish caught in east Sawmill Bay, southeast of Johnson Cove on Evans Island. All the bile samples showed very low levels of petroleum metabolites, so low that there is no cause for concern about the safety of eating these fish.

Tatitlek: Steve Totemoff, Jr. assisted in the collection of samples from the Tatitlek area, including three samples of littleneck clams from the southeast side of Reef Island which tested at 3/1 parts per billion, three samples of mussels from the same site which tested at 2/0.8 parts per billion or less, and three samples of mussels from North Bligh Island which tested at 4/1 parts per billion or less, in September 1993. In comparison, mussels collected from North Bligh Island in April 1990 tested at 10/.08 parts per billion or less.

Also in September 1993, samples were taken of four quillback rockfish caught near Bidarki Point. All the bile samples showed very low levels of petroleum metabolites, so low that there is no cause for concern about the safety of eating these fish.

LOWER KENAI PENINSULA

Port Graham: Neil Hedrick, Cliff McGhan and Bob Hinebaugh assisted in the collection of three samples of chitons from the north shore of Port Graham which tested at 3/1 parts per billion or less, three samples of littleneck clams from Duncan Slough which tested at 5/9 parts per billion or less, and three samples of mussels from the same site which tested at 4/3 parts per billion or less, in September 1993. For comparison, mussels taken from Duncan Slough in August 1989 tested at 5/12 parts per billion or less, and littleneck clams collected there in March 1990 tested at 1/19 parts per billion. Also in September 1993, samples were taken from six black rockfish caught in an open water area between Dangerous Cape and Point Pogibshi, north of Point Graham. Dimitri Tanape from Nanwalek assisted in collecting the samples. All the bile samples showed very low levels of petroleum metabolites, so low that there is no cause for concern about the safety of eating these fish.

Nanwalek: Neil Hedrick from Port Graham assisted in the collection of three samples of mussels at Russian Point, just north of Nanwalek which tested at 3/0.9 parts per billion or less, in September 1993.

KODIAK ISLAND

Larsen Bay: In September 1993, Roy Jones assisted in the collection of four samples of mussels at Chief's Point on the northeast side of the entrance to Spiridon and Uyak Bay which tested at 3/.09 parts per billion or less.

Ouzinkie: Roger Johnson assisted in the collection of three samples of butterclams from Camel Rock at Low Island Anchorage which all tested at 3/1 parts per billion or less, two samples of mussels from the same site which tested at 9/12 parts per billion or less, and three mussel samples from the south end of Sourdough Flats on Ouzinkie Point tested at 11/5 parts per billion or less, in September 1993. These very low levels are similar to those seen in samples collected from these same sites in 1989 and 1990.

Port Lions: Bobby Nelson assisted in the collection of three samples of mussels from an island just east of the airstrip at Port Lions which tested at 3/1 parts per billion or less in July 1993. For comparison, mussels collected at this same site in May 1990, tested at 45/14 parts per billion or less.

Vicki Vanek takes samples of a seal killed near Mummy Island in Prince William Sound.

The *Exxon Valdez* Oil Spill and Subsistence Food Safety

Since 1990, the Oil Spill Health Task Force has advised that all the fish, deer, ducks, seals and sea lions tested as part of the subsistence program were found to be safe to eat, but people should not use shellfish from beaches where oil is still present. Between 1989 and 1991, about 1,000 samples of fish and shellfish, 28 samples of deer, 19 samples of ducks, and 144 samples of marine mammals were tested. With the exception of shellfish and the blubber of heavily oiled seals, levels of hydrocarbons in the edible flesh were very low, many non-detectable. This is because fish, birds, marine mammals, and land mammals are all able to rid themselves of limited amounts of contamination in their bile. While this process may cause added stress and potential harm to the organism, it prevents the hydrocarbons from building up and contaminating the meat. However, shellfish are different, because they do not have the ability to get rid of hydrocarbons quickly. They accumulate these toxins and retain them for a long period of time.

John M. Totemoff and a young assistant take seal samples down to the dock at Chenega Bay.

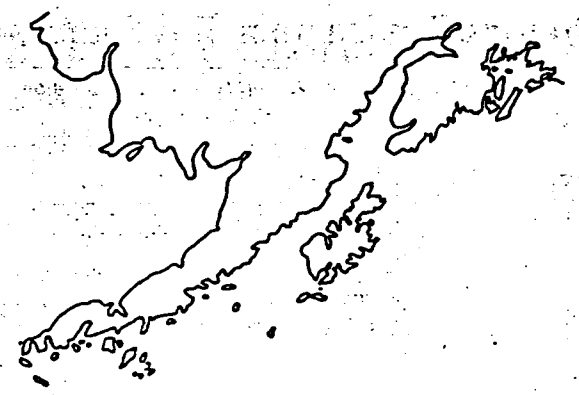
Oil Spill Community Meetings Planned for February and March 1994

The Alaska Department of Fish and Game, Division of Subsistence is in the process of setting up community meetings to discuss the Subsistence Restoration Project. Meetings are planned for Chenega Bay, Tatitlek, Port Graham, Nanwalek and possibly Ouzinkie for late February or early March. We will be working with the village councils in the respective communities to decide on the actual dates and times of each meeting. We will also be conducting a meeting in Port Lions on February 22, 1994 for representatives from the communities of Port Lions, Larsen Bay, Karluk, Old Harbor, Akhiok, and Kodiak City, as well as representatives of the Kodiak Area Native Association.

Topics to be covered at the meetings include, a summary of the advice of the Oil Spill Health Task Force and the Expert Toxicological Committee, a review of the work done in 1993 as part of the Subsistence Restoration Project, any continued community concerns regarding subsistence food safety and the oil spill. We are also interested in hearing from the residents of the various communities about how much they think the project is helping, and what they would like to see us do in the future.

The Alaska Department of Fish and Game, Division of Subsistence has received funds from the *Exxon Valdez* Oil Spill Trustee Council for a subsistence restoration project. Requests for more information on the project or comments and inquiries about information in this newsletter should be directed to the Division of Subsistence, Alaska Department of Fish and Game, ATTN: Rita Miraglia, 333 Raspberry Road, Anchorage, Alaska 99518. Phone (907) 267-2358.

Division of Subsistence
Department of Fish and Game
333 Raspberry Road
Anchorage, Alaska 99518



Subsistence Restoration Project

August 1995 Report

Resource Abnormalities Study Getting Underway

Many subsistence users in the oil spill impact area remain concerned over the possible long term health effects of using resources which may have been contaminated by oil. There has been a loss of confidence on the part of subsistence hunters and fishermen in their own abilities to determine if their traditional foods are safe to eat. Residents of a number of impacted communities have expressed the fear that animals which came into contact with the oil have been altered in some way that can not be seen or detected in laboratory tests. In addition, people have reported the scarcity of some resources, most notably the failure of pink salmon and herring runs in Prince William Sound in 1993, as well as a decline in the population of harbor seals in Prince William Sound since the oil spill. Subsistence users in the spill area have also observed abnormalities in resource species. These include herring, sea lions and chitons with lesions, evidently malnourished ducks, and herring, salmon and clams of abnormally small size. There is a cultural proscription among Alutiq peoples against the harvesting or eating of animals which appear sick or abnormal. All of these factors continue to impede the recovery of subsistence in the oil spill area.

The *Exxon Valdez* Oil Spill Trustee Council and the Oil Spill Health Task Force and its member organizations, including the Division of Subsistence, have tried to help subsistence users regain confidence in their ability to determine the safety of their resources, through the collection of samples of subsistence resources for hydrocarbon testing (the results on the 1994 samples are presented in articles on pages 3, 4, 5, and 6), and interpreting the test results and reporting findings back to the impacted communities. 1994 was

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Local facilitators Walter Meganack, Jr., Gary Kompkoff and Mike Eleshansky.

EVOS Trustee Council Reaches Out to Communities in Oil Spill Impact Area: Local Facilitator Pilot Project Begins

The *Exxon Valdez* oil spill caused severe disruption of the lives of many people living in the spill impact area. The spill also caused residents of the area to be concerned about the safety of their wild food resources, and the integrity of the surrounding natural environment. While scientific studies aimed at restoring the resources and services damaged by the oil spill have occurred throughout the spill area, many of the researchers work for agencies or institutions based in Anchorage, Fairbanks, or outside Alaska. Residents have complained of an inadequate level of involvement by spill area communities in the restoration efforts, and incomplete communication to spill area inhabitants of study proposals and results. At the same time, researchers have recognized the local residents have traditional knowledge that could help them answer questions they have not been able to answer through conventional scientific means. People living in the spill area have detailed knowledge about the condition of resources, which can significantly add to data collected as part of scientific studies, and possibly enhance the success of restoration efforts. Local people have expressed a desire to be involved in all aspects of restoration projects, and a willingness to work with researchers.

Until now, there has not been any formal program in place to facilitate (or make easier) the communication between the Trustee Council, researchers working on oil spill restoration projects, and residents of communities impacted by the spill. The EVOS Trustee Council has funded a Community Involvement and Use of Traditional Knowledge project (Restoration Project 95052) to fill this need. The goal of the project is to increase the involvement of oil spill area communities in the restoration efforts of the Trustee Council, and to improve the communication of findings and results of restoration efforts to spill area residents and the appropriate regional organizations. The community outreach efforts of other restoration

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Community-Based Subsistence Restoration Projects Funded from Two Sources

In a sense, all of the projects which help to restore or enhance the natural resources used by subsistence harvesters are subsistence restoration projects. However, recognizing that residents of the communities impacted by the spill have a need to be involved in restoration, and have a lot to offer to the restoration process, the *Exxon Valdez* Oil Spill Trustee Council funded a subsistence restoration planning and implementation project in 1994. The purpose of this project was to design a coordinated approach to subsistence resource restoration and implement a planning process to develop subsistence restoration project proposals for the Trustee Council Work Plan for FY 95.

The project was undertaken as a joint effort by the Alaska Department of Fish and Game, the Alaska Department of Community and Regional Affairs, the U.S. Department of the Interior, and the U.S. Forest Service, with assistance from the Alaska Department of Law, Trustee Council staff, and representatives of spill-area communities. Meetings were held in the spill-area communities to solicit ideas and priorities for restoration of subsistence resources and lost or reduced subsistence uses. Following the meetings, project staff worked with the communities to develop projects as proposals for funding. After evaluation of the proposals, recommendations were presented to the Trustee Council for review.

The Trustee Council funded four projects for Federal Fiscal Year 1995 (October 1, 1994 through September 30, 1995):

- a chinook salmon remote release project at Chenega Bay
- a coho salmon remote release project at Tatitlek
- a project to reseed clam beds in the harvest areas of Port Graham, Nanwalek and Tatitlek
- and an elders/youth conference for all of the communities in the oil spill impact area to be held in September 1995 (see related article on page 6).

The clam and salmon restoration projects listed above are expected to receive continued funding in Federal Fiscal Year 1996. Several additional community-based projects are being favorably considered for Trustee Council funding in FY 96. These include:

- Funding for oil spill related tasks to be carried out by the newly formed Alaska Native Harbor Seal Commission, including a community-based harbor seal biological sampling program.
- A documentary on subsistence harbor seal hunting in Prince William Sound.
- Wild stock salmon habitat restoration in eastern Prince William Sound.
- Projects to improve salmon spawning habitat in the Chenega Bay area.

As a side benefit, proposals developed through this planning process which are not funded by the Trustee Council can be considered for funding through grants from a $5 million appropriation of *Exxon Valdez* criminal settlement funds by the Alaska Legislature. The legislature authorized the Department of Community and Regional Affairs to award grants to unincorporated rural communities in the oil spill area in order to restore, replace, or enhance subsistence resources or services damaged or lost as a result of the spill (Section 11, Chapter 79, SLA 1993). The legislation required that selection of grant recipients be made after consultation with the state members of the Trustee Council.

In 1994, six projects were funded out of the five million dollars available through the DCRA grant program:

- a spirit camp for all of the Chugach region communities
- a fish and game processing facility for Tatitlek
- a grant to support Chenega Bay residents' harvesting in unoiled areas
- sockeye salmon enhancement on the English Bay River
- oyster mariculture development projects for both Chenega Bay and Tatitlek
- and a subsistence cultural education center for Perryville

The state members of the Trustee Council met on August 2, 1995, and approved two additional projects for funding from the DCRA grant program:

- a coho salmon enhancement project for Port Graham
- and extended operation of the Chignik River fish weir

While these projects do not necessarily restore an injured natural resource, they are designed to help natural resource restoration by developing alternative resources, and making the use of existing resources more efficient, thus relieving harvest pressure on recovering natural resources. The status of the criminal settlement as of August 1995, is summarized in the table at the left.

Although the planning and implementation project will end this fall, residents of the spill area will still be able to get assistance in developing project proposals under the Community Involvement and Use of Traditional Knowledge project, and the local facilitator network proposed as part of that effort (see lead article on page 1).

STATUS OF THE CRIMINAL SETTLEMENT FUNDS SET ASIDE BY THE ALASKA LEGISLATURE FOR SUBSISTENCE RESTORATION ("DCRA $5 MILLION") AS OF AUGUST 1995

Total Criminal Settlement Moneys			**$5,000,000**
Proposals Under Contract			
Tatitlek Mariculture	387,600		
Tatitlek Mariculture, Capital Outlay	606,000		
Tatitlek Fish and Game Processing Facility	187,000		
Nuucig Spirit Camp	228,000		
English Bay Sockeye Enhancement	424,200		
Chenega Subsistence Support	100,000		
Perryville Subsistence Cultural Education Center	125,000		
Subtotal		2,057,800	
Pending Contracts			
Chenega Mariculture	337,300		
Port Graham Coho Salmon Enhancement	445,000		
Entended Operation of Chignik River Weir	105,000		
Subtotal		887,300	
Combined Subtotal for pending and approved contracts		2,945,100	
Balance Available			2,540,900
New Proposals			
Chenega Fish & Game Processing & Storage Center	322,000		
Tatitlek Smokery	33,000		
Tatitlek Subsistence Harvest Assistance	144,900		
Tatitlek Subsistence Distribution Center	200,000		
Tatitlek Documentary on Seal Hunting*	224,500		
Subtotal		924,400	
Total of all proposals, including under contract, pending, and new		**3,869,500**	
Balance Available			**1,130,500**

*The Tatitlek Documentary on Seal Hunting project has been submitted to the EVOS Trustee Council for review under the civil settlement. If the project is not funded, it will be re-submitted for criminal settlement funding. It has been calculated as a criminal settlement expense for planning purposes.

Information Courtesy of John Gliva, State of Alaska, Department of Community and Regional Affairs

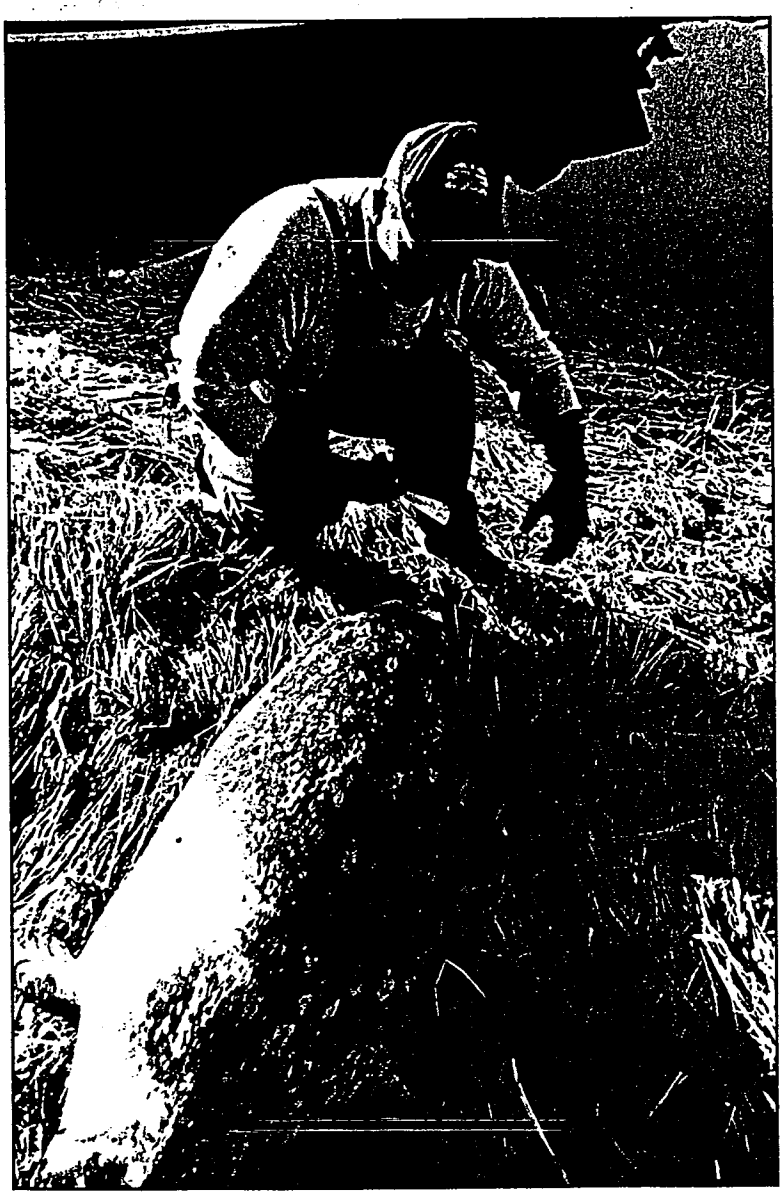
Tests on Bile Taken from Seals Harvested in the Tatitlek Area in 1994 Confirm Low Rate of Oil Exposure for Prince William Sound Seals

In 1989, many seals in Prince William Sound were covered with crude oil spilled by the tanker *Exxon Valdez*. Some of these seals died as a result. Others suffered brain lesions, but survived, and the lesions healed as these seals recovered. Researchers testing the meat and blubber of seals covered with oil, found that the contamination did not get into the lean meat of the seals, but it did get into the blubber of some of the most heavily oiled animals. According to Kathy Frost, a biologist with the Alaska Department of Fish and Game, who helped collect samples of these animals, this is because oil-based contaminants are attracted to fat.

To see if there was still oil contamination in the blubber of seals, samples were taken of seals harvested by subsistence hunters for food in 1993 and 1994. In 1993, Vicki Vanek, a technician with the Division of Subsistence worked with hunters John M. Totemoff and Eddie Levshakoff to collect samples from five seals taken for subsistence from the Chenega Bay area. The level of hydrocarbons found in the blubber samples from these seals was so low, it fell within the same range as the unavoidable trace contamination from the air and surfaces in the lab (the test results for the Chenega Bay samples are reported in more detail in the February 1994 Subsistence Restoration Project Report). In Septmebr 1994, Vicki Vanek accompanied Tatiklek subsistence hunters Ken Vlasoff and Louis Vlasoff as they hunted seals. Samples were taken of the blubber, liver and bile of seven seals from subsistence harvest areas near Tatitlek. The bile samples were tested for hydrocarbon metabolites, which are substances the body produces when it processes crude oil, at the Northwest Fisheries Center, National Marine Fisheries lab in Seattle.

According to Dr. Sin Lam Chan, Deputy Director of the lab where the tests were done, "Low concentrations of biliary flourescent aromatic compounds [hydrocarbon metabolites] were found in harbor seals sampled in 1994 [near Tatitlek], similar to results from harbor seals sampled in 1993 [near Chenega Bay]. In 1993, liver and blubber samples from the same [Chenega Bay] harbor seals were analyzed for aromatic contaminants [hydrocarbons] and concentrations were found to be very low [which is] typical of vertebrate species that metabolize aromatic contaminants efficiently. Therefore, analyses for aromatic contaminants in the 1994 [Tatitlek] seal liver and blubber samples [were] not recommended because concentrations of aromatic contaminants in these tissues would be expected to be in the same low range reported for the 1993 [Chenega Bay] harbor seal samples."

In other words, tests on the Tatitlek seal samples confirmed the results of tests on the Chenega Bay seal samples, that the harbor seals in Prince William Sound are no longer being exposed to the high levels of oil contamination they experienced in 1989. The predicted levels of hydrocarbons in the meat and blubber of these seals was so low as to not be a cause of health concerns for people eating them.



Ken Vlasoff of Tatitlek prepares to skin a seal taken for subsistence and sampled for hydrocarbon testing.

Report on Seals and Sea Otters Being Distributed

A report titled "Status and trends of harbor seal and sea otter populations in Prince William Sound and lower Cook Inlet, Alaska," prepared by Brendan Kelly, Jill Anthony and Laurie Jemison of the Institute of Marine Science at the University of Alaska Fairbanks for the Alaska Sea Otter Commission, as part of the Harbor Seal and Sea Otter Cooperative Harvest Assistance project (Restoration Project 94244), funded by the EVOS Trustee Council, has been released. A copy of the report will be sent to each village council in the oil spill impact area. The supply is limited, but additional copies can be obtained from the ADF&G, Division of Subsistence, in Anchorage. Contact Rita Miraglia at (907) 267-2358.

Test Results on Samples of Shellfish Collected in 1994 Reported by NMFS Lab

Two rounds of subsistence shellfish sample collection and testing were completed as part of the 1994 Subsistence Restoration Project funded by the *Exxon Valdez* Oil Spill Trustee Council. A first round of sample collection and testing was conducted in June and July 1994, and the second round was conducted in August and September 1994.

The work was coordinated by the Chugach Regional Resources Commission, which is a Native non-profit organization dedicated to the preservation, enhancement and wise use of the natural resources of the Chugach Region of Alaska, and is endorsed by the village councils of that region to work on their behalf on issues relating to natural resources and subsistence. The Chugach Regional Resources Commission hired a biologist, Dave Erikson, to work with local assistants to collect the samples.

Samples of shellfish were taken from the subsistence use areas of Chenega Bay, Tatitlek, Port Graham, Nanwalek, Larsen Bay, Ouzinkie, Akhiok, Karluk, Old Harbor, and Port Lions. The samples were tested at the NMFS lab in Seattle. According to Dr. Sin-Lam Chan, Deputy Director of the lab, "Most mollusc samples contained very low concentrations of aromatic contaminants that did not differ substantially from concentration found in shellfish from reference areas sampled previously." The reference areas Dr. Chan refers to are subsistence use areas near Angoon and Yakutat, which were not oiled, where samples of subsistence foods were taken in 1989 and 1990. The very low levels of hydrocarbons found in these reference samples are considered to be the levels likely to have been present in fish and shellfish in the spill area before the spill. Dr. Chan also notes two exceptions. Three samples of mussels and one sample of clams collected from a site at the north end of Chenega Island in August showed evidence of contamination from crude oil. These samples were collected while nearby, workers were removing contaminated mussel beds to get at the oil trapped underneath. The workers moved the oily gravel from under the mussel beds into the lower intertidal area, where it could be cleaned by the tide. This caused oil to be released into the water in the area where the samples of shellfish were being taken for testing. An oily sheen was visible when the tide came in. Samples collected at the same location in June did not show evidence of oil contamination.

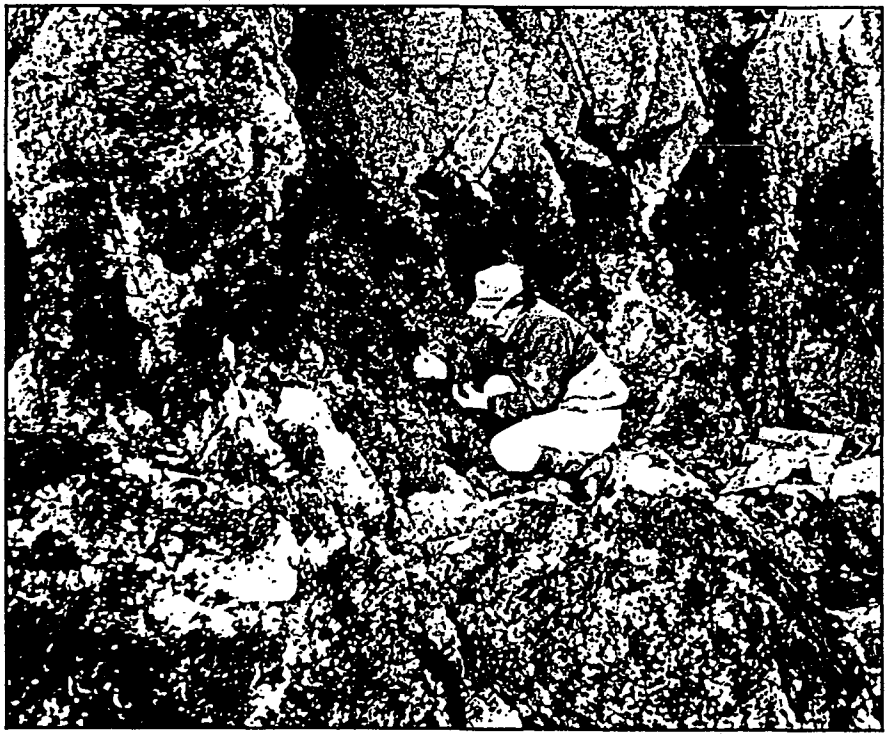
The second exception involved three samples of mussels collected in the first round from an intertidal area north of Bligh Island near Tatitlek in June, which showed evidence of contamination from some sort of fuel. No such contamination was seen in the samples from the same location in the second round.

An important finding is that the oil contamination at Windy Bay seems to have been reduced. To quote Dr. Chan, "Windy Bay station WNB3 [the easternmost of three small islands in Windy Bay] was directly impacted by the oil spilled by the *Exxon Valdez*. The mean concentrations of aromatic contaminants in mussels collected at this site were 1,600 nanograms/gram in 1990 and 110 nanograms/gram in 1991. In contrast, the summer 1994 sampling [which shows] concentrations of aromatic contaminants in two samples of mussels from WNB3 to be at background levels (less than 2 nanograms/gram) suggested that this site might have recovered from the effects of the spill. This return to background aromatic contaminant levels was further supported by results from the fall sampling in which all three mussel samples were found to have concentrations of aromatic contaminants [of] less than 5 nanograms/gram."

The following test results are given in parts per billion, light aromatics/heavy aromatics (nd stands for non-detectable, meaning that hydrocarbons could not be detected, even with the very sensitive equipment used by the lab).

PRINCE WILLIAM SOUND

Chenega Bay: Mike Eleshansky and Charles (Peter) Selanoff assisted in the collection of shellfish samples from the Chenega Bay area. There were two sampling trips: June 1994 and August 1994. Three samples of butter clams taken from Kake Cove on Chenega Island in June tested at 0.9/0.8 parts per billion or less, three samples of butter clams collected here in August tested at 2/nd parts per billion or less. Three samples of mussels collected at Kake Cove in June tested at 3/2 parts per billion or less and three additional samples of littleneck clams collected here in August tested at 2/2 parts per billion or less. In June, three samples of littleneck clams and three samples of mussels were collected at the north end of Chenega Island, these samples tested at 0.8/1 and 3/2 parts per billion or less, respectively. This contrasts with the test results on samples collected in August from the same site when three samples of mussels from the north end of Chenega Island tested at 128/24 parts per billion or less and a sample of mixed clams tested at 650/97 parts per billion. This relatively high level of hydrocarbon contamination is attributed to work being done on oiled mussel beds just above the sampling area during the August sampling, which released oil into the water.



Neil Hedrick of Port Graham collects samples of chitons for testing.

Shellfish ***continued from page 4***

Tatitlek: Steve Totemoff, Jr. assisted in the collection of samples from the Tatitlek area, including three samples of mussels collected from an intertidal area north of Bligh Island in June which tested at 14/28 parts per billion or less. This slightly elevated level resulted from contamination by fuel, not crude oil. Three samples of littleneck clams collected from the northeast end of Reef Island tested at 0.7/0.2 parts per billion or less, three samples of mussels from the same site tested at 1/0.3 parts per billion or less, all collected in June 1994, and three samples of littleneck clams from north of Bligh Island which tested at 9/1 parts per billion or less, three samples of mussels from the same site which tested at 3/1 parts per billion or less, and three samples of mussels from the Reef Island site which tested at 6/1 parts per billion or less, in August 1994.

LOWER KENAI PENINSULA

Port Graham: Neil Hedrick assisted in the collection of samples from the Port Graham area, including a sample of snails from Duncan Slough collected in June 1994 which tested at 1/0.4 parts per billion, and two samples of littleneck clams from Duncan Slough which tested at 6/8 parts per billion or less, and three samples of snails from the same site which tested at 3/1 parts per billion or less, all collected in August 1994. Three samples of snails from just below the old dump site collected in June tested at 1/0.5 parts per billion or less and three additional samples of snails collected here in August tested at 2/0.1 parts per billion or less.

Nanwalek: In July 1994, Wally Kvasnikoff assisted in the collection of three samples of chitons and three samples of mussels from the Flat Islands, which tested at 0.2/0.4 parts per billion or less and 1/1 parts per billion or less, respectively. Gus Ukatish, Mike Radtke and Hans Peterson assisted in the collection of three samples of chitons from the Flat Islands which tested at 1/nd parts per billion or less and three samples of mussels from the same location which tested at 3/0.2 parts per billion or less, in August 1994.

Windy Bay: Neil Hedrick, from Port Graham assisted in the collection of three samples of mussels from Windy Bay in June and August 1994, which tested at 0.7/1 and 4/0.6 parts per billion or less, respectively. This site was heavily contaminated with oil in 1989. The hydrocarbon levels are now down to background, or the levels that would have been found before the oil spill.

Roy Jones of Larsen Bay, and his son collect butter clams for testing.

KODIAK ISLAND

Akhiok: Teacon Simeonof assisted in the collection of samples in the Akhiok area. Three samples of butter clams collected at the northeast end of Round Island in July 1994 tested at 2/0.8 parts per billion or less and three additional samples of butter clams taken from the same site in August 1994 tested at 9/1 parts per billion or less. Three samples of razor clams taken from Tanner Head in July 1994 tested at 6/4 parts per billion or less and three additional razor clam samples collected at this site in August 1994 tested at 5/3 parts per billion or less.

Karluk: John Reft assisted in the collection of three samples of butter clams from the mouth of the Sturgeon River in July 1994, the samples tested at 3/1 parts per billion or less. The August 1994 collections were done without local assistance, because none was available. Three samples of butter clams were taken from the mouth of the Sturgeon River, these tested at 6/2 parts per billion or less, and three samples of mussels from the same location tested at nd/1 parts per billion or less.

Larsen Bay: In September 1994, Roy Jones and his son assisted in the collection of five samples of butter clams east of Amook Island which tested at 11/7 parts per billion or less and one sample of butter clams collected inside Larsen Bay on the southern shoreline, on what is called Jacob Aga's Beach, which tested at 3/0.1 parts per billion.

Old Harbor: In August 1994, David Capjohn assisted in the collection of three samples of butter clams from Sheep Island which tested at 18/7 parts per billion or less.

Ouzinkie: Roger Johnson assisted in the collection of butter clams from Garden Point, of the west side of Spruce Island, on two sampling trips in July and August 1994. Three samples of butter clams were collected on each sampling trip, the July samples tested at 4/0.8 parts per billion or less and the August samples tested at 3/1 parts per billion or less. These very low levels are similar to those seen in samples collected from these same sites in 1989 and 1990.

Port Lions: Arnold Kewin assisted in the collection of three samples of butter clams from an island just east of the airstrip at Port Lions which tested at 3/2 parts per billion or less, and three additional samples of butter clams from the outside beach south of Port Wakefield which tested at 5/10 parts per billion or less, in September 1994.

Tests of Ducks Harvested Near Chenega Bay in 1994 Show Oil Exposure Down

When asked what species they would like to see tested as part of the final round of hydrocarbon testing, Chenega Bay residents indicated they would like to see more tests on ducks. Some ducks had been tested in 1990, and while the levels of hydrocarbons in their meat was very low, they did show evidence of exposure to oil. There had been no tests done on ducks as part of the subsistence food safety project since 1990.

In December 1994, Vicki Vanek, a technician with the Division of Subsistence went along on subsistence duck hunts with Don Kompkoff, Sr. and John M. Totemoff, both of Chenega Bay. Bile samples of twenty Barrow's Goldeneye ducks harvested near Chenega Bay were tested for bile metabolites, substances produced when an animal's body breaks down oil.

According to Dr. Sin-Lam Chan, Deputy Director of the lab where the tests were done, "Concentrations of biliary flourescent aromatic compounds measured in Barrow's Goldeneye ducks sampled in 1994 (near Chenega Bay) were much lower than concentrations in that species sampled in 1990. However, in spite of elevated concentrations of flourescent aromatic compounds in the 1990 duck bile, aromatic contaminant (hydrocarbon) concentrations in the corresponding liver samples were found to be low, as would be expected for a species capable of metabolizing aromatic contaminants. Thus, because concentrations of aromatic contaminants in muscle tissue are generally 10 to 100 times lower than those in liver of most species, we would predict that very low aromatic contaminant concentrations would be found in 1994 duck muscle."

In other words, the ducks sampled in 1990 did show evidence of exposure to oil, but the ducks were able to process (or metabolize) the oil, and it did not get into the meat in high enough levels to be a cause for concern. In contrast, the samples of ducks harvested near Chenega Bay in 1994, showed no evidence of exposure to crude oil. In fact, the levels of flourescent aromatic compounds in the bile were as low as "background" levels, or the levels that would be found naturally in the environment. This means that the exposure of ducks to crude oil in Prince William Sound has decreased significantly since 1990.

Community Conference Planned on Subsistence and the Oil Spill

A community conference on subsistence and the *Exxon Valdez* oil spill will take place in Anchorage on September 22 and 23. This project was funded by the EVOS Trustee Council as Restoration Project No. 95138 (youth/elders conference). Four people will be chosen by their village council to attend from each of the following communities: Cordova, Tatitlek, Chenega Bay, Valdez, Seward, Nanwalek, Port Graham, Seldovia, Kodiak City, Akhiok, Ouzinkie, Karluk, Old Harbor, Larsen Bay, Port Lions, Chignik Lake, Chignik Lagoon, Chignik Bay, Ivanof Bay and Perryville. If possible the community representatives should be two youth, one elder and one active subsistence producer (preferably someone in their middle years). The goal of the conference is to enhance the recovery of subsistence in the oil spill area. During the conference people can share their experiences and concerns about natural resources and discuss ways local people can become involved in the restoration of subsistence resources and their uses. The conference will be held at the Anchorage Sheraton Hotel. Participants are expected to arrive on Thursday night September 21. Travel, lodging and per diem will be provided for each community representative.

The agenda committee for the conference has met twice via teleconference. Members of the agenda committee are Virginia Aleck from Chignik Lake, Mike Eleshansky from Chenega Bay, Fred Elvsaas from Seldovia, Karen Katelnikoff from Tatitlek, Kathy Reft from Karluk, Derenty Tabios of Chugachmuit, Steve Braund and Lisa Moorehead of Stephen R. Braund & Associates (the firm hired to organize the conference), Sandra Schubert of the EVOS Trustee Council staff, and Bill Simeone of Subsistence Division, Alaska Department of Fish and Game. After consultation, the agenda committee came up with the conference theme: "Looking Back and Looking Ahead."

On the first day of the conference participants will have a chance to look back at what happended to them and their communities during the oil spill. To start things off a keynote speaker will address the conference. The person or persons who will give this address have not yet been identified, are there any suggestions? We also need suggestions for someone to make closing remarks on the last day of the conference.

Following the opening address a panel composed of youth and elders from each region will review their community's experiences during the oil spill. Conference members will be able to participate in the panel through an open microphone. In the afternoon, participants will have the chance to ask a panel of scientists questions about the resources injured by the oil spill. Next the assembly will divide into small groups of between ten and fifteen people, composed of community representatives and scientists. In these small groups community representatives will have an opportunity to talk to each other and ask questions of the scientists. Towards the end of the day the groups will reconvene and assess what has been lost and what has been gained through the experience of the oil spill.

At the end of the first day there will be an Alutiiq traditional foods potluck. Everyone is urged to bring their favorite traditional foods with them when attending the conference. If funds are available the evening will be capped with entertainment provided by the Kodiak Alutiiq dancers.

The second day of the conference will focus on looking ahead. Activities will be organized around working groups. Each group will address ways to help both the resources, and the subsistence uses of the resources, recover from the injuries suffered in the oil spill. These discussions will include, among other topics, the ways Alutiiq people have dealt with disasters in the past, how we can help resources recover, and how communities can re-invigorate subsistence.

The afternoon session on the second day of the conference will focus on the theme of "where do we go from here?"

The conference will be video taped and a proceedings of the conference will be prepared by Stephen Braund & Associates. Both the tape and the proceedings will be made available to the participating communities.

If there are any questions or suggestions regarding the conference please feel to call Bill Simeone of Subsistence Division, Alaska Department of Fish and Game at 267-2309 or Steve Braund and Lisa Moorehead at 276-8222. Collect calls will be accepted. It is important that community representatives be chosen as soon as possible and that their names be turned in to Steve and Lisa, so travel arrangements can be made for them. Their address is P.O. Box 1480, Anchorage, Alaska 99510.

Abormalities ***continued from page 1***

the last year for hydrocarbon testing. It was determined that this type of testing had already provided all the information it could (a summary of the hydrocarbon tests and health advice appears in the box at the top of page 8). At the same time, it was clear that the abnormalities people were reporting reflected a significant concern. For this reason, the emphasis of the subsistence food safety project will now shift more towards helping people understand the abnormalities they are seeing. This will be done by continuing and expanding the dialog that has now begun between subsistence users and scientists working with the damaged resources.

In 1995, the Division of Subsistence began setting up a system where subsistence harvesters will be able to send samples of abnormal resources in to be examined by biologists or pathologists. The scientists' findings will then be reported back to the communities. This work is being done under the Resource Abnormalities Study (Restoration Project number 95279), a project funded by the EVOS Trustee Council.

During the month of August, Environmental Scientists Dave Erikson, Mike Fitzgerald, and Mark Vania from the environmental consulting firm Dames & Moore will conduct a training session for each participating community. Dames & Moore staff have worked on all years of the hydrocarbon testing project, and have worked with local village assistants to collect samples in the past. The goal for the present project is to teach up to three residents per community how to use biological sampling kits. The training session will take about four hours, and will include topics such as recognizing different kinds of abnormalities and their causes, as well as sampling, preservation and documentation techniques. There will be hands-on demonstrations using kit components on actual resources. In addition, the packaging and shipping of samples according to hazardous materials (HAZMAT) air transport regulations will be covered. A biological sampling kit and a videotape of the training session will be left in each participating community. All training, materials, and shipping will be at the expense of the Alaska Department of Fish and Game, Division of Subsistence, using the funds provided by the EVOS Trustee Council.

Letters went out to each village council in the oil spill impact area in mid-June, informing them of the project and inviting them to participate. If interested, each village council was asked to provide the names of up to three people from their community who are willing to participate in the training, and volunteer their services to the community. If less than three people are interested, training will still be provided.

The Division of Subsistence will serve as a clearing house to make sure the samples get to the appropriate scientists for examination, and will also work with scientists to interpret the results of the examinations, and ensure that the information gets back to the community.

For further information on this project, contact Karen Shemet with the Division of Subsistence, Alaska Department of Fish and Game at (907) 267-2354.

Facilitators ***continued from page 1***

projects will be coordinated under this project, including information exchange and local hiring.

One means being used to improve the involvement of the impacted communities in restoration activities is providing funding to allow local people to serve as facilitators. In 1995, this has taken the form of a pilot project designed to assess how effective such a program can be. Local facilitators are being funded in three communities, Chenega Bay and Tatitlek in Prince William Sound, the area most impacted by the oil spill, and Port Graham, as a representative community for the lower Kenai Peninsula. The coordinator of the pilot project is Rita Miraglia with the Division of Subsistence.

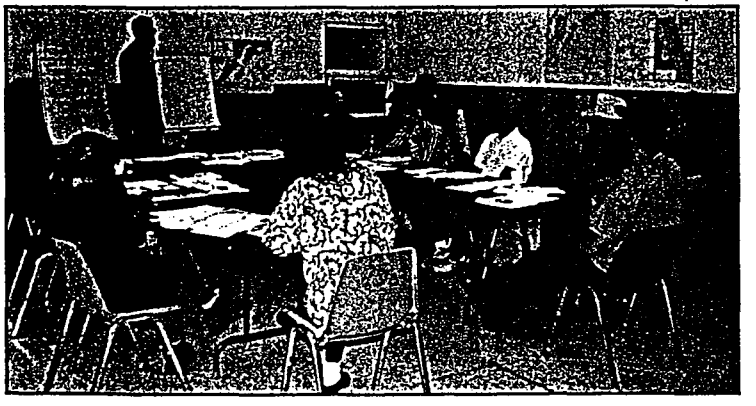
Because the facilitators are expected to represent their community, it was decided that, it would be more appropriate for them to be employees of the local village council, rather than government employees. Cooperative agreements have been negotiated and signed between the Alaska Department of Fish and Game, Division of Subsistence, and the village councils of Chenega Bay, Tatitlek, and Port Graham. Under the terms of the cooperative agreements, each village council has agreed to provide local facilitation services to further community outreach, including the communication of traditional knowledge and local interests, as well as communication between the community and Trustee Council and agency staff. In addition, the village councils have agreed to coordinate local support and equipment for researchers working in or near their communities.

Each village council has designated a local facilitator. The local facilitators are Mike Eleshansky for Chenega Bay, Gary Kompkoff for Tatitlek, and Walter Meganack, Jr. for Port Graham. If residents of these communities have questions about or suggestions for the restoration process, these are the people they should go to.

A coordination meeting for the pilot project took place on July 18, 1995, at the ADF&G offices in Anchorage. Participants included the three local facilitators, the ADF&G pilot project coordinator, Sandra Schubert, project coordinator for the EVOS Trustee Council, and Dean Hughes, assistant program manager with ADF&G, Division of Habitat and Restoration. The group discussed the role of the local facilitators, and how Subsistence Division and Trustee Council staff can help the facilitators do their jobs. The first task the local facilitators decided to work on was to coordinate their communities' response to the 1996 Restoration Work Plan. The public comment period for the Work Plan ended August 4, 1995.

A strong suggestion made by the local facilitators is that there should be a meeting of all the village council presidents in the oil spill impact area to discuss community priorities for restoration. It was agreed that it is not possible to organize such a meeting in time to review the 1996 Restoration Work Plan. However, the facilitators advised it is important that such a meeting be included in the planning for next year's Community Involvement project.

The future of this project will be decided by the *Exxon Valdez* Trustee Council at their August 25th meeting.



Community meeting held to discuss Subsistence Restoration Projects for Tatitlek (see article on page 2).

The *Exxon Valdez* Oil Spill and Subsistence Food Safety

Since 1990, the Oil Spill Health Task Force has advised that all the fish, deer, ducks, seals and sea lions tested as part of the subsistence program were found to be safe to eat, but people should not use shellfish from beaches where oil is still present. Between 1989 and 1991, about 1,000 samples of fish and shellfish, 28 samples of deer, 19 samples of ducks, and 144 samples of marine mammals were tested. With the exception of shellfish and the blubber of heavily oiled seals (see article on page 3), levels of hydrocarbons in the edible flesh were very low, many non-detectable. This is because fish, birds, marine mammals, and land mammals are all able to rid themselves of limited amounts of contamination in their bile. While this process may cause added stress and potential harm to the organism, it prevents the hydrocarbons from building up and contaminating the meat. However, shellfish are different, because they do not have the ability to get rid of hydrocarbons quickly. They accumulate these toxins and retain them for a long period of time.

The Alaska Department of Fish and Game, Division of Subsistence has received funds from the *Exxon Valdez* Oil Spill Trustee Council for subsistence restoration projects. Requests for more information on the projects or comments and inquiries about information in this newsletter should be directed to the Division of Subsistence, Alaska Department of Fish and Game, ATTN: Rita Miraglia, 333 Raspberry Road, Anchorage, Alaska 99518. Phone (907) 267-2358.

Division of Subsistence
Department of Fish and Game
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APPENDIX 7:

Trip Reports and Related Correspondence

MEMORANDUM
STATE OF ALASKA
DEPARTMENT OF FISH AND GAME
DIVISION OF SUBSISTENCE

TO: James A. Fall
Regional Program Manager
Division of Subsistence
Anchorage

DATE: June 22, 1995

FROM: Rita A. Miraglia
Oil Spill Coordinator
Division of Subsistence
Anchorage

RE: Trip report backlog

SUMMARY: I have finally had a chance to sit down and type up my notes from five trips I made to Port Graham and Nanwalek in the second half of 1994. What follows are brief reports on each trip. In general, the purpose of these trips was to discuss oil spill restoration projects with community leaders and residents, and to distribute and pick up subsistence salmon harvest calendars for the Port Graham and Koyuktolik subdistricts.

TRIP 1 (5-31-94 through 6-2-94)
I left Anchorage at 4:05 PM, May 31, 1994, via ERA, arriving in Homer at 5 PM. Southcentral Air was running late. I left Homer at 6 PM, the plane stopped in Seldovia, and we arrived in Nanwalek at 6:30 PM.

Two men were sitting on their 4-wheelers at the top of the bluff edge near the community center, enjoying the view. It was a sunny, hot day and people were fishing from the beach. I stayed and talked to them a while. I told them the subsistence and commercial fishing would be closing on the 6th of June. They said very few fish had been seen in the English Bay River, so far. One of the men said he would be subsistence fishing despite the closure, because he needs to put up fish for food. He said there's too much regulation.

A couple from Port Graham were visiting with my hosts. I got the impression the two couples did not know one another well, and this was a sort of get acquainted visit. The wife had stayed overnight, and her husband had brought his skiff over to pick her up. They stayed to dinner, and I did too. Our hostess had made seal ribs for dinner. There were two pans of ribs, one with the ribs simply cooked in their own juices with potatoes, and the other with barbecue sauce. The ribs were served with rice and condiments were laid out to eat with it (soy sauce, prepared mustard), but I liked it best plain.

My hostess and her guest said they were up late the night before, barbecuing salmon for a midnight snack, which they ate with hard-boiled seagull eggs.

When the guests left to skiff back to Port Graham, the hostess gave them seal meat, sea gull eggs and salmon to take back with them.

After dinner, I visited with the editor of the community newsletter. She made me tea, and we sat and talked. While there, I wrote a blurb for the community newsletter on the Subsistence Restoration Planning and Implementation Project (94428), letting people know the Trustee Council needs ideas for subsistence restoration. Meanwhile, the editors daughter and another girl about 11 or 12 years old, taught a 2 year old boy to dance *masqalada*. He already knew some steps, and every time he heard the music, he would do some of the steps. The editor played videos of last years masking for him and he was fascinated by it.

By the time I left the editors house, it was nearly 10 PM. I stopped by another house, but the residents were ready for bed. So I went back to my hosts'. Both husband and wife were making dolls. They carve the faces out of driftwood, glue beads on for eyes, and then glue on contrasting strips of fur for ruffs and hair. They make cloth bodies for some of them, others are left just as masks. They dress the cloth bodies up in kuspuks and parkas, and mukluks with beads. I sat with them, and worked on my knitting until midnight.

My hosts told me their 4-wheeler overturned on the way to Dogfish Bay recently. The wife was slightly injured when she was thrown from the vehicle. They said they don't like the idea that they have to go over there if they want to subsistence fish in June and July, because the trip is dangerous.

The next morning, I was up at 8:30 AM. I ate breakfast with my hosts, and several people came over to visit. One of the men who visited, said it is too crowded at Dogfish Bay with three villages (Port Graham, Nanwalek and Seldovia) trying to fish there.

After breakfast, I went house to house distributing calendars. Two of the men I visited this day were drunk.

One woman told me she made her family *ohiduk* (chiton) eggs mixed with a little mayonnaise yesterday, and it went fast.

I gave the Emergency Orders closing the fisheries to the Village Administrator, he said he would make copies and post them. I later saw the VPSO and asked if he needed copies. He said he did not.

I met with the Village Council President and explained the Subsistence Restoration Planning and Implementation Project (94428). I left copies of the '94 workplan, the Restoration Plan and the '95 Invitation with him. I was unable to set up a specific date or time for a community meeting. He said he needs to talk to others about it. I also explained all of this to the Village Administrator.

I had seal ribs, rice and a sea gull egg for lunch.

I left Nanwalek via Southcentral Air at 3:30 PM, arriving in Port Graham at 3:35 PM.

The Chief of Port Graham left just minutes after I arrived, and I didn't get a chance to talk to her. She isn't due back until Saturday. The Village Administrator isn't here either.

I arranged for a place to stay, then started going house to house, distributing calendars. In all I visited 19 households.

People here say that English Bay residents will continue to harvest red salmon despite the closure and people in English Bay did tell me they would harvest regardless. People here are angry, because they say they obey the law, but suffer the penalty for those who don't. They say the department has been made aware of the problem, but nothing has been done about it. One man told me he thinks the only solution to Port Grahams problems is to subdivide the Port Graham sub-district and separate Port Graham and Nanwalek because the fisheries are so different. A few people here have done very well catching kings. One person reported catching 8 in one day, another reported catching 5 in one day.

One man, a hatchery employee, told me he is working on a proposal for the Trustee Council . I gave him the materials I brought for the Chief, since she's not here. I can mail her a set later.

The next day, I continued going house to house, distributing calendars.

An elder told me he used to eat Lynx when a boy. His father used to trap them. His mother would roast the meat. He said it was white meat, like chicken. He always tells those that trap locally to save the meat for him if they get a Lynx.

Another man told me he is planning to hunt marmot. He figures the population in the area should be healthy, because only the older folks talk about their fathers trapping them.

Unfortunately, during this trip to the community I was touched in an inappropriate and suggestive manner by an adult male resident of the community, whom I did not know well, and whom I suspected to be under the influence of drugs and/or alcohol at the time. I reported this incident to the Traditional Chief and the VPSO on a later trip to the community.

I returned to Anchorage via Southcentral Air and ERA, through Homer, arriving at 6 PM.

TRIP 2 (8-1-94 through 8-4-94)
I left Anchorage via ERA scheduled flight to Homer at 1:55 PM, on August 1, 1994, arriving in Homer at 2:45 PM.

Lee Hammarstrom met me at the airport in Homer, and gave me a packet of Seldovia permits and instructions and drove me over to the Southcentral Air terminal.

I left Homer via Southcentral Air at 3:15 PM, arriving in Seldovia at 3:25 PM. No one met me at the airport, so I started walking toward town, but a woman I had seen at the airport offered me a ride. It was a good thing she did, too, because the offices of the Seldovia Native Association have moved since I was there last, and I might not have found them on my own. I met with Crystal Collier, who had forgotten I was coming, and I gave her the permits. We read through the accompanying memo from Hammarstrom together, and I answered her questions.

I visited briefly with Lillian Elvsaas. I got dinner and left Seldovia via Southcentral Air at 6 PM, arriving in Port Graham at 6:30 PM (we had to land in Nanwalek and pick up a passenger first).

I spent the evening visiting briefly with one household, and then filling the Traditional Chief in on the Subsistence Restoration Planning and Implementation Project (94428).

I started going around house to house, distributing calendars, at 10 AM the next morning. I went up to the Village Council office and briefed the Village Administrator on the Subsistence Restoration Planning and Implementation Project (94428), and gave her copies of all the project descriptions plus our project list and the prioritized list from Trustee Council staff.

I continued visiting house to house, with breaks for lunch and dinner, until 9 PM. I visited 25 households in all.

The Village Administrator told me that witnesses at the state trial had information from the subsistence salmon fishing calendars used against them. The specific example she gave was the Exxon attorney saying that Port Graham residents harvested 500 pounds of herring in 1990. That could not have come from a calendar, it has to be from a survey form. Even then, the figure seems much too high. I explained to her how our harvest figure helped in setting the 20 million dollar settlement figure. She hadn't realized that. Another person in the community made a similar comment, about information from the harvest calendars being used against people in the trial.

The Chief told me that a pilot came to Nanwalek yesterday and released several cages full of pigeons. He didn't explain why. He told her they belong to a woman who works for ERA and he asked the Chief if he could release some in Port Graham. She said no. The Chief is very concerned about a non-native species being released like that. I later heard that these are homing pigeons, and they've been releasing them this way for years.

People have commented that they are seeing a lot of dog salmon this year and that the silvers are still running.

Quite a few people have been out fishing during my visit. One man had a few small halibut he was cleaning. He found a small fish in the stomach of one which he was curious about. It was about 4 inches long and had ridges on either side and a long fin on the bottom and a darkened spot at the base of the head, it was silver in color.

After talking to the Chief, I decided to report the inappropriate touching I received the last time I was here to the VPSO. It turns out that the individual involved has accosted several other women here. I told the VPSO I didn't want to press charges at this time, but I wanted someone to talk to him about the incident, so he would know I wouldn't keep quiet about any similar incidents in the future.

I left Port Graham at 11 AM on August 3, 1994, via Southcentral Air, arriving in Nanwalek five minutes later. I stayed overnight in Nanwalek, and visited house to house distributing catch calendars. I left Nanwalek at 4 PM on August 4, 1994, via Southcentral Air, arriving in Homer at 4:15 PM. I departed Homer via ERA at 5:10 PM, arriving at home in Anchorage at 6 PM.

TRIP 3 (9-6-94 through 9-9-94)
I left Anchorage via ERA at 10:15 AM, on September 6, 1994, arriving in Homer at 11:05 AM. I left Homer via Southcentral Air at 11:45 AM, arriving in Port Graham at 12:05 PM.

I visited 10 households and collected calendars. Many of the smokehouses in the community are in use. At one household, I was fed smoked salmon.

Several people have told me this is a bad year for berries here. Fortunately, I brought several jars of my homemade wild berry jams and jellies with me to give away as gifts. One man said he thinks the berries go in cycles, with a good blueberry year every second or third year.

I took pictures of two young sisters cutting fish. There were a few maggots in the fish, and when they saw them the girls got all upset, because they were afraid to touch them, and they didn't know what to do with the fish. They called the maggots "ka-boo-lucks". I asked their grandmother about this later, evidently this was an approximation of the Alutiiq name for maggots "ku-buth-lukh". The girls' older brother came along, and made fun of them for being afraid. He told them just to cut away the parts that had maggots in them.

The next morning, I had long conversations with both the Chief and the Village Administrator. They told me there are two major issues in the community right now:
1) One local household has been accused of harvesting fish under subsistence/sport regulations and giving it to relatives in another community, who smoke it, can it, then sell it. Someone else told me that members of this same household have also been taking fish from the creek which are ready to spawn, stripping the eggs and discarding the fish. When I asked whether anyone had spoken to them about this, I was told "They're not reasonable people", and "We're all related, if you say something to them, they get mad and stop speaking to you, and then start telling stories about you". Evidently, the village council has had meetings about this issue. The comment was also made that this family does not share with other households in the community. This family has also been doing well financially. While some of the concern may be over real violations, it is possible that the fact that they are currently doing well, and are perceived as not sharing may have something to do with their being singled out.

I called Jim and he read me the statute with regard to customary trade. He said if the situation had been accurately represented to us, the activities described may not fall under customary trade. We agreed, that since we don't know the full story, Ron would talk to the household in question. Ron did speak with them, and they denied that they participated in any illegal activities. We had no evidence of any illegal activities, and determined it was best to let the community handle the situation.

2) The proposed solid fill dock. After a visit to Anchorage, the President of Port Graham Corporation came to the conclusion that ADF&G is holding up this project and that it is Ron Stanek all on his own who is keeping it from happening. The Village Administrator is really angry, she said "Who are they to treat us like children and tell us what to do?" The Village Administrator said the council has discussed inviting Jim Fall to the community to talk about it. The Chief is very concerned about the departments position on this project as well. I told the Village Administrator I was under the impression that the Division of Habitat has problems with this type of dock, and I didn't think Ron could single-handedly hold up the permit if he wanted to. The Village Administrator says the present dock is owned by the village corporation, not the village. They want a permanent facility because they would like the ferry to stop here, to reduce the cost of shipping food and supplies.

I spent the afternoon visiting house to house and distributing calendars.

One man told me it seems to him as if there were two runs of silvers this year. Another man said there is only one run, but there are a lot of silvers this year. Generally people seem happy with their catch this year, and the weather has been very good for drying fish the last few weeks. I was told a community meeting was recently held to get everyone to agree not to take fish in the creek.

I visited a total of 18 households this day.

The next morning, I visited four more households in Port Graham. I left Port Graham via Southcentral Air at 11:45 AM, arriving in Nanwalek at 11:50 AM.

I visited seven households in Nanwalek. I discussed the logging situation with the Village Administrator. Habitat Division is concerned about planned logging along the drainage of the English Bay River. Habitat wants assurances that a substantial buffer will be left to protect the banks of the River. Habitat is recommending that the Commission veto Trustee Council approval of funding of further sockeye salmon enhancement efforts on the River pending assurances from the community that the drainage will be protected. It is the feeling among the allotment holders in the community that they have no control over the logging. The Village Administrator says that the U.S. Forest Service has complete control of logging on the allottees land. The village sees the question of buffers as a dispute between the State and Federal governments, and not between the State government and allotment holders.

There was a name day celebration for a woman, which her son invited me to attend. the celebration consisted of an elaborate sit-down dinner. The meal was held at the woman's home, but the food was all prepared by other family members, with four households providing the food. There were so many people participating, that we were served in shifts. I was included in the first group, with the immediate family and elders. There were many traditional foods, including *ohiduks* (chitons), seal, salmon and moose, as well as western foods. Before dinner, everyone faced the corner altar, which was decorated for the occasion with lights and tinsel. A local lay priest said a benediction, and then a song was sung in Russian. After the first group finished eating, others were called and invited. A good part of the population of the village passed through, and participated in the event.

One man reported a bigfoot sighting near his cabin this past week.

One of the local men who received a Tier II permit got his moose either yesterday or today. The other resident with a permit went out hunting today, determined to get one.

The enhancement project in Nanwalek gave 5, 400 pounds of red salmon to people in the village after stripping off the eggs. Thomas Kohler, who is running the enhancement project for Chugach Regional Resources Commission, said he estimates the total red escapement at 17 thousand fish (they stopped counting at 13,500). The fish weighed an average of 5.4 pounds live and 4.5 pounds whole after the eggs were stripped.

A woman, now in her middle to late forties, told me her two older sisters were confined in a tent for three days at the time of their first menses. They had to eat off of a single plate with a single utensil while confined. She, herself, was confined, not in a tent, but in a darkened room for three days at the onset of menses. I asked her how it made her feel. First she said she didn't remember, then she said they just didn't think about it, because that was the way things were done then.

I left Nanwalek via Southcentral Air at 2 PM the next day, arriving in Homer at 2:15 PM. I left Homer at 3:45 PM via ERA, arriving at home in Anchorage at 6 PM.

TRIP 4 (9-30-94 through 10-3-94)
I left Anchorage via ERA at 10:15 AM on September 30, 1994, arriving in Homer at 11 AM. I left Homer via Southcentral Air at 11:45 AM, arriving in Port Graham at 12 noon.

I was invited to join in a potluck luncheon, already in progress, to mark the end of an elders conference. The food included salmon and halibut cooked in various ways. I was told all the "good stuff" was already gone when I got there.

The participants of the conference who were still present when I got there included several people I know from Chenega Bay, and Cordova. Everyone seemed very happy, almost jubilant. I was told that this was the first time these people got to talk about how the oil spill affected them, without lawyers or scientists challenging them.

After lunch I met with the Village Administrator to discuss restoration projects.

I visited a few households, but the weather was so good, I didn't find many people at home. I was tired and quit early.

One man, who was very involved in the Exxon trial in state court, told me his feelings are very mixed up about the end of the trial. On the one hand, he's upset by the verdict handed down by the jury. On the other hand, he's glad the trial is over. Many people in the community were unaware that a verdict had been reached in state court.

The next day I continued visiting house to house. One woman told me she went up the creek yesterday with a neighbors family. They got some silvers up there. She said she just likes the heads and the ribs of those late salmon. She boils the heads and likes to fry the ribs with lots of pepper.

I got a lot more done today because people were kept home due to the constant rain and near gale force winds. Several people told me I was crazy to be out walking around in that kind of weather. It was worth it though, because was well fed. In one home I visited, my hosts laid out salmon strips (smoked silver and red salmon), and dried halibut, to snack on. At another house, I was served both kippered salmon and smoked salmon strips.

That night, the winds were so strong, I feared the window over my bed would shatter. For this reason, I got very little sleep. The winds died down by morning. I did a little more visiting in the morning.

I left Port Graham via Southcentral Air at 1:20 PM, arriving in Nanwalek at 1:25 PM. I was tired, so I only visited 3 households. I picked blueberries in the afternoon.

The next day, I continued visiting house to house, distributing calendars. I left Nanwalek at 2:30 PM via Southcentral Air, arriving in Homer at 3 PM. The nose wheel on the airplane I was on got jammed on takeoff at Nanwalek affecting our lift there. We had to do a preliminary approach at Homer, so someone could on the ground look at the wheel. They gave us the go-ahead to land, but the wheel was jammed. The pilot had to use the brakes to slow us down and gambled that he could get the wheel turned. The gamble paid off, but for a few moments, it seemed like the plane would flip.

I left Homer at 3:45 PM via ERA, arriving at Anchorage airport at 4:30 PM, and home by 6 PM.

TRIP 5 (11-7-94 through 11-10-94)
I left Anchorage via ERA at 10:20 AM on November 7, 1994, arriving in Homer at 11:10 AM. I left Homer via Southcentral Air at 11:45 AM, arriving in Port Graham at 12 noon.

Visited with three households, and picked up harvest calendars.

I met with the Village Administrator to discuss the status of the projects that were proposed under the Subsistence Restoration Planning and Implementation Project (94428). The Village Administrator wanted to know if it would be possible to put in a proposal to pay for boom to protect the Port Graham Bay in case of another oil spill.

The next day, I continued my household visits, and the collection of calendars.

I met with President of Port Graham Corporation discuss the oil spill projects. He would like to rewrite the Port Graham Baseline project (94132), for funding out of the criminal money, to emphasize a population assessment of the resources with some limited hydrocarbon testing to prepare in case of another spill.

I also met with a hatchery employee to talk about the hatchery project. He wants to get funding for a coho project. The project would involve collecting eggs from the coho, a side benefit of this project would be to protect the coho in the event the logging causes the stream to become silted up. If this happens, they will have eggs from the same stock to restore the run. He emphasized that the hatchery is a non-profit operation, the sale of some of the fish would be for cost recovery only, and all the returning fish would be part of a common property fishery. He said the proposed water-pipeline would benefit the whole operation, not just the cohos. We agreed we would get together at a later date with Dave Daisy, other members of the Subsistence Restoration Planning Group and the Port Graham Hatchery Board to revise the proposal for re-submittal.

I left Port Graham the next morning at 10 AM, via Southcentral Air, arriving in Nanwalek at 10:05 AM.

I spent the rest of the day visiting households and picking up calendars.

I left Nanwalek at 10:45 AM the next day, via Southcentral Air, arriving in Homer at 11 AM. I left Homer via ERA at 11:30 AM, arriving in Anchorage at 12:20 PM.

cc: Ron Stanek
Karen Shemet

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To	Rita Miraglia	From	Gary Kompkoff
Co.	ADFG	Co.	Tatitlek IRA
Dept.	Subst Div	Phone #	
Fax #		Fax #	

May 18, 1994

TO: Rita Miraglia, ADF&G Subsistence Div. (FAX: 349-4712)

FR: Gary Kompkoff, Pres, Tatitlek IRA (FAX: 325-2311)

RE: Subsistence Food Sample Collection - Subsistence Restoration Project, 1994

Rita:

The following is a prioritized listing of specific locations and resources that the Village of Tatitlek would like tested as part of the upcoming hydrocarbon testing of subsistence resources. Since this is likely to be the final testing of these resources, we have listed more resources than usual; but will accept whatever the budget allows.

Priority #:	Location:	Resource:
1)	Tatitlek Narrows	clams, mussels, bottom fish
2)	Outer Reef Id.	bottom fish (halibut, cod, flounder), clams
3)	Boulder Bay	bottom fish, clams
4)	Boulder Bay	salmon (pink, silver)
5)	Port Fidalgo (3 locations)	tanner crab, bottom fish
6)	Galena Bay	salmon, bottom fish, clams
7)	Ellamar	clams, salmon
8)		

I will be gone from May 22-29, if you have any questions or concerns regarding the above listing, call my office - I will check my messages daily. There are more specific locations that I will discuss with the sample collectors as actual collection time draws near. Let me know if there is anything that we may do: village personnel? boat hire? accomodations? We appreciate your assistance with this project - thank you very much.

Take Care -

WALTER J. HICKEL, GOVERNOR

DEPARTMENT OF FISH AND GAME

333 RASPBERRY ROAD
ANCHORAGE, ALASKA 99518-1599
PHONE (907) 344-0541

July 29, 1994

Sin-Lam Chan
Northwest Fisheries Center
National Marine Fisheries Service
2725 Montlake Blvd. East
Seattle, WA 98112

Dear Dr. Chan:

This letter is to confirm our conversation with regard to the respective expectations and responsibilities the Division of Subsistence, Alaska Department of Fish and Game (ADF&G), and the Environmental Conservation Division of the Northwest Fisheries Center Laboratory, National Marine Fisheries Service (NMFS lab) each have in reference to the subsistence restoration project funded by the *Exxon Valdez* Oil Spill Trustee Council (project number 94279).

Chugach Regional Resources Commission, operating under a cooperative agreement with ADF&G, will send the NMFS lab up to 125 samples of shellfish which the NMFS lab will analyze for the presence of polynuclear aromatic hydrocarbons. Up to 45 samples of finfish bile will be provided for analysis by the NMFS lab for aromatic compound metabolites . After the results of the bile tests are available, the finfish flesh samples may be tested for the presence of polynuclear aromatic hydrocarbons if ADF&G and the NMFS lab decide this is appropriate. These samples will be sent to the NMFS lab in two groups, the first by August 8, 1994, the second by October 8, 1994.

Additionally, ADF&G will send the NMFS lab bile and blubber samples from five harbor seals, by October 8, 1994. ADF&G will also send the NMFS lab skin and liver or bile samples from twenty ducks, by January 31, 1995. The seal and duck bile samples will be analyzed for aromatic compound metabolites, and the flesh and other organ samples will be analyzed for the presence of polynuclear aromatic hydrocarbons (if bile screening proves a valid method for use with the ducks, we will not test the livers unless evidence of exposure to polynuclear aromatic hydrocarbons is found in the bile).

If fewer bile samples are submitted, these may be replaced with additional tissue samples at a rate of one additional tissue analysis for eight bile samples deleted.

The NMFS lab will be responsible for ensuring that the precision, accuracy and completeness of data resulting from the analyses described above are of known quality in accordance with standard methods.

It is expected that the NMFS lab will be able to provide test results to ADF&G within three months of receipt of samples.

In addition to the reports of test results outlined above, the NMFS lab will provide ADF&G with a final report on the lab activities on this project. A draft of this final report is due to ADF&G for review and mutual acceptance by March 31, 1995. The final report is due to ADF&G by May 31, 1995.

The NMFS lab will provide a tour of its facilities and operations in relation to this project for community representatives and ADF&G personnel in late September 1994. ADF&G will provide transportation and expenses for the group. The group will not exceed twelve persons.

If you disagree with any of the above, please contact me within the next week.

Thank you.

Sincerely,

Rita A. Miraglia
Oil Spill Coordinator
Division of Subsistence

cc:
Tasha Chimeilewski, Chugach Regional Resources Commission
Patty Brown-Schwalenberg, Chugach Regional Resources Commission
Jim Fall, Division of Subsistence
Joe Sullivan, Division of Habitat & Restoration
Jerome Montague, Division of Habitat & Restoration
Dean Hughes, Division of Habitat & Restoration

APPENDIX 8:

Newspaper Article

The legacy of a spill

Villagers oppose new oil lease after six years of tainted shellfish

by Doug Loshbaugh
Staff Writer

Since the Exxon Valdez oil spill of 1989, villagers at Port Graham have been afraid to eat shellfish — an interruption of a subsistence way of life handed down from generation to generation.

Now, Chief Elenore McMullen says, villagers can see light at the end of the tunnel. Port Graham shellfish tested free of contamination this fall for the first time since the spill. Most villagers will collect bidarkis, clams and mussels —shellfish that have sustained the village since its beginning— for the first time since the spill during minus tides this week, she predicted.

Meanwhile, the federal government is preparing a Cook Inlet oil-lease sale it says will almost certainly lead to a major oil spill if developed. Villagers are worried.

"Another disaster might happen," said Port Graham's Mickey Anahonak. "It's just like a time bomb ticking. It could happen any day, day or night."

Nearby, Nanwalek Chief Vincent

See VILLAGERS, Page 7

. . . Villagers oppose federal oil Lease Sale 149

FROM PAGE ONE

Kvasnikoff said the industry is no better prepared for a spill now than it was in 1989.

"In Prince William Sound, they went crazy. It was like a bunch of clowns," he said.

Jim Kvasnikoff, secretary of the Nanwalek Village Council, said Nanwalek relies on the sea for nine tenths of its food — the main course of every meal. While most in Port Graham haven't collected shellfish since the spill, villagers in Nanwalek have continued.

"Every time there's a minus tide, people are down on the beach collecting bidarkis, octopus. Next month, we'll have seaweed. The seals all around us — the halibut, rockfish, Chinese caps, mussels — anything around here. As you grow up in Nanwalek, you learn that subsistence is a part of living."

But people live in fear of lingering contamination, he said. He and McMullen said the villages plan to conduct a letter-writing campaign against federal Lease Sale 149, which would cover nearly all of lower Cook Inlet. Villagers couldn't stand to lose subsistence foods, he said.

"It's our biggest tie to our cultural background — we've been impacted so hard by western society," Jim Kvasnikoff said. "I hope the big guys look at it that way. I hope they take it seriously, because it's our livelihood that they take away from us if another oil spill happens."

Robin Cacy, spokeswoman for the Minerals Management Service in Anchorage, said U.S. Interior Secretary Bruce Babbitt will have to weigh local concerns against the national interest in deciding whether to hold the sale. But she said there's no compassion in the law for people who have made their living off the beaches for thousands of years.

"I think there's a movement to incorporate traditional knowledge into the process," she said. "But at this point, we're bound by the National Environmental Policy Act, which is fairly specific about what scientific information we have to look at in the environmental impact study. That's mostly fishery studies, water-quality studies, socio-economic studies."

Even if the lease sale proceeds, that doesn't mean oil will be developed, she said. Actual exploration requires a new set of plans and permits.

Most villagers contacted this week remain opposed to the sale.

"We're opposed to it," said Vincent Kvasnikoff. "We're still in that fear from the last oil spill."

The helicopters and ships required to serve offshore platforms would scare off seals and seabirds, he said, and if there's another spill, villagers could lose all their subsistence foods.

Anahonak said the seals have declined since the Exxon spill. McMullen said seabirds have only just begun to recover from the 1989 catastrophe.

Meanwhile, Anahonak said, there are less than half as many bidarkis — shellfish also known as chitons or gum boots — as there were before the spill.

"There aren't too many people who collect them," he said. "They don't feel too well about it. That was our livelihood, our lifestyle, our food. Now that they're infected from the spill, it's risky to eat what you want. You can't just go out there any day. It's risky."

Anahonak said he's one of the few in Port Graham who have continued to collect shellfish. He hasn't gone often, though, and he worries about the wholesomeness of his catch.

Wally Kvasnikoff, the chief's brother, said Nanwalek has continued to eat traditional foods.

"It's like, who cares? You're going to live or die," he said. "For a while, they were scared. We've seen the oil dripping off that stuff. We've seen the mussels and barnacles falling off the rocks."

Just last year, a tar ball the size of a basketball washed up on a Nanwalek beach, he said. But state officials have told villagers again and again that if they can't smell the oil, the traditional foods are safe to eat.

"I was raised on this stuff. I can't turn away too long," he said.

McMullen said she's looking forward to harvesting her first shellfish this week, now that the tests have come back clean.

"It's something I did as a child," she said. "It was a family affair. It was a social gathering on the beach. People have favorite spots to go to. When we take the elders, we go to more accessible spots. We make it a fun day.

"I think people will be able to do that this year. Last year, there was oil found."

McMullen recently visited a favorite spot for mussels where she hopes to bring her grandchildren. The 1989 spill killed all the mussels there, she said. The mussels there now aren't growing nearly as fast as they did before.

"I don't think it's because I'm impatient," she said. "I think it's something else in the environment. There are not as many bidarkis on the beaches. I don't think it's because of people collecting, because not many people have been collecting since the spill."

At Windy Bay, where Port Graham people traditionally hunt, oil still oozes out of the beaches on warm days, McMullen said.

"I don't have to dig very deep to get emotional, angry and frustrated because of how it's impacted my village, my community," she said.