U.S. Fish and Wildlife Service
Office of Subsistence Management
Fisheries Resource Monitoring Program

"Subsistence Fisheries Harvest Assessment and Traditional Ecological Knowledge, Lower Alaska Peninsula and Aleutian Islands"

Final Report Number: FIS 02 032

Brian Davis

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Division of Subsistence
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ABSTRACT

The people of the Aleutian Islands and lower Alaska Peninsula communities depend on fisheries resources as a significant portion of their overall subsistence harvest. But poor salmon returns starting in the mid-1990s have focused the attention of managers onto the fisheries in southwest Alaska. Here, annual subsistence harvests of salmon are not well documented; in communities where a subsistence permit is required, harvest estimates leave out significant amounts of salmon harvested for home use. In 2002 and 2003, local residents conducted household surveys to improve the accuracy of harvest estimates. The results show that permitted households harvested more salmon than the Alaska Department of Fish and Game had previously recorded based on returned permits. The effect of having a local person conduct a face-to-face survey increased the rate of participation in the subsistence permit process. The effects of changes in commercial fishing regulations also affected the way certain area communities obtain salmon for home use. Also, traditional ecological knowledge (TEK) and qualitative data gathered through interviews with local people help explain the current marine ecology and fisheries conditions by making observations about historical trends, environmental inter-relationships, and traditional means of harvesting fish for subsistence.

Key Words: Alaska Peninsula, Aleutian Islands, commercial fisheries, fish, marine ecology, marine mammals, salmon (genus *Oncorhynchus*), subsistence permit, Traditional Ecological Knowledge, and "winter salmon" (*Oncorhynchus masou).*

Citations: Davis, Brian 2005. Subsistence Fisheries Harvest Assessment and Traditional Ecological Knowledge, Lower Alaska Peninsula and Aleutian Islands. Federal Subsistence Fishery Monitoring Program, Final Project Report No. FIS 02-032. U. S. Fish and Wildlife Service, Office of Subsistence Management, Fisheries Resource Monitoring Program, Fisheries Information Service, Anchorage, Alaska.

Davis, Brian 2005. Subsistence Fisheries Harvest Assessment and Traditional Ecological Knowledge, Lower Alaska Peninsula and Aleutian Islands. Technical Paper Number 301. Alaska Department of Fish and Game, Division of Subsistence, Juneau, Alaska.

INTRODUCTION

The Unangan/Unangax, or Aleut, people of Alaska's Aleutian Islands and lower Alaska Peninsula region have depended on fish, including salmon, halibut, and cod, for thousands of years, and continue to do so today. Previous research in this region has documented the significant contribution of fisheries resources to the household larder, as well as their value as a means of maintaining the cultural identity of individuals and communities (Braund et al 1986, Fall et. al., 1993a, 1993b, 1996, Reedy-Maschner 2004, Veltre and Veltre 1981, 1983). The communities in this region, and their 2000 populations, are listed in Table 1.

Salmon are a major component of the subsistence harvest for communities in this region. The Alaska Department of Fish and Game (ADF&G), Division of Subsistence has done systematic baseline research in many of the communities in the region. On average, households in Aleutian Islands communities harvest 1,292 pounds of fish, game, wild plants and marine mammals per year, and salmon constitute approximately 25% of the harvest's usable weight. On the lower Alaska Peninsula the contribution of salmon is approximately 51% (Table 2: ADF&G 2001). While data like these are helpful in establishing the importance of the role salmon resources play to the community's subsistence economy, fisheries managers and local governmental organizations recognize the need for improved methods of numerical data collection, as well the need for more qualitative, contextual data. Both kinds are necessary in

order to understand the interaction between human groups and fisheries in the region, allowing resource managers to better sustain the fisheries into the future.

This project (FIS02-032) addressed these needs for more and better information. The "Subsistence Fisheries Harvest Assessment and Traditional Ecological Knowledge, Lower Alaska Peninsula and Aleutian Islands" project focused on improved methods of collecting numerical harvest data, including more local involvement in the process, and produced some new data related the quantitative aspect of harvest. Qualitative information related to the history and social context of the fishery is also documented here, as are observations of biological and environmental factors that surround the health and productivity of the fishery. Recommendations follow that will allow the new methods to take root through increased community involvement, persistence, planning, and more sharing of information between fisheries managers and the local subsistence fishers of the region.

Subsistence Fisheries Harvest Working Group

The specific objectives of this project were shaped by the recommendations made in 2000 by a statewide working group on subsistence harvest assessment, as well as meetings of Aleutian Islands and lower Alaska Peninsula community members, in which a course of action was plotted to improve the collection of subsistence fisheries data in that region.

In 2000, the United States Fish and Wildlife Service, Office of Subsistence Management (OSM) funded project FIS00-017, which created a Subsistence Fisheries Harvest Assessment Working Group (SFHAWG). The SFHAWG comprised tribal representatives, state and federal agency personnel, local advisory council members, and certain other knowledgeable individuals from around the state. The SFHAWG developed a set of recommendations for a "Statewide Subsistence Fisheries Harvest Monitoring Strategy" which, among other things, recommended the systematic assessment of ongoing harvest monitoring programs, the development of partnerships between management agencies and users to improve these programs, and the incorporation of local knowledge of the resources and their environments into these programs to better inform management decisions and interpretation of harvest information (SFHAWG 2000).

The recommendations of the SFHAWG were then brought to eleven regions throughout the state, where workshops were conducted to review the SFHAWG's proposals and plan a course of action for each particular region. The regional workshops also evaluated existing ADF&G harvest assessment programs within that region, and participants proposed changes for improving the way harvests are documented. As part of that project, also funded by OSM (FIS01-107), workshops were held in the Aleutian Islands and lower Alaska Peninsula region in the early summer of 2002. The proceedings of those workshops, one in Sand Point and one in Unalaska, helped guide the objectives for this project (FIS02-032).

The Sand Point workshop (May 29-31, 2002) was attended by ADF&G biologists; ADF&G Division of Subsistence staff; personnel from the regional Native non-profit organization, Aleutian/Pribilof Islands Association (A/PIA); representatives of several local

Subsistence Advisory Committees; a representative of the Aleut Marine Mammal Commission; representatives from the Aleut tribes from Sand Point, King Cove, and Nelson Lagoon. The False Pass invitee could not attend due to weather. The number of local attendees was 10.

The two-and-a-half day discussion focused on the issues faced by subsistence fishers in the communities on the lower Alaska Peninsula (Fall and Caylor, 2002a). The workshop content was outlined beforehand in an agenda that included presentations detailing the SFHAWG's findings and the existing quantitative salmon harvest information maintained by the ADF&G Division of Subsistence. There was also a presentation by the principal investigator for this project (FIS02-032) describing the objectives and methods for collecting both better harvest numbers and contextual, TEK data.

The agenda was set to focus primarily on subsistence salmon harvest assessment and TEK data, but the participants felt that it was important to address other topics that they consider related to the ecology and management of their communities' subsistence resources. These included shifts in marine mammal populations, the reductions in commercial fishing openings, and the importance of commercial fishing and customary trade to people living in Alaska Peninsula communities.

A similar workshop was held in Unalaska (June 26-28, 2002) and was attended by 10 local people representing Aleutian Islands tribes or their local community. Representatives from the agencies presented the goals of the project, the recommendations of the SFHAWG, and current harvest assessment methods. Representatives of the tribal councils of Atka, Akutan,

Unalaska, and Nikolski responded to the presentations and addressed the specific concerns of Aleutian Islands communities (Fall and Caylor, 2002b). The content of this workshop was similar to that of the Sand Point workshop; discussion centered on harvest assessment, the involvement of local tribes in data collection, and broadened when necessary to address wider ecosystem observations that people feel are impacting subsistence fisheries.

At each workshop, discussion was give-and-take between the tribal representatives, A/PIA, and ADF&G personnel. The objectives and methods set out for project FIS02-032 were presented during each meeting and opened for discussion. People made suggestions as to the best way to achieve certain objectives, such as: focus TEK interview efforts on elders rather than younger harvesters; document instances of pollution and resource contamination; document rod and reel harvests as part of subsistence catch; employ local people to collect harvest data. Special attention was drawn to the need to involve tribes in the planning, and local people in the execution, of harvest assessment strategies. Finally, the project outline was approved by the tribal representatives as the right course of action to improve harvest assessment, increase the amount of qualitative data collection, and facilitate more local involvement in the data collection process (Fall and Caylor 2002a, 2002b, Fall 2003).

Quantitative Data Concerns

The quantitative aspects of subsistence salmon harvests in Aleutian Islands and lower Alaska Peninsula communities are not completely or accurately documented. In the Aleutian communities of Atka, Nikolski, and Akutan, ADF&G does not attempt a yearly estimate of subsistence salmon harvests. The only estimates available are from periodic household harvest surveys done by the ADF&G Division of Subsistence. In the Alaska Peninsula Management Area (the communities of False Pass, King Cove, Sand Point, Nelson Lagoon, and Cold Bay) ADF&G Division of Commercial Fisheries issues subsistence salmon permits to fishers and requests the permits be sent back to ADF&G with harvest numbers filled in. The Unalaska Management District has a similar permitting system for the communities of Unalaska/Dutch Harbor and Adak. These permits ask for harvest numbers, dates, locations, and have printed on them the limit for subsistence harvest for that household. These are then compiled for publication in the Annual Salmon Management Report by ADF&G Division of Commercial Fisheries.

Comparisons of these annual, permit-derived numbers with the independent harvest data collected through the Division of Subsistence's systematic, door-to-door household harvest surveys suggest that the existing harvest recording system significantly underestimates communities' actual harvests (Table 3). The problem of systematic underestimation was confirmed by participants at the two workgroup sessions held in Sand Point and Unalaska. These data are used by the Alaska State Board of Fisheries for determining the "Amount Necessary for Subsistence" (as required in Alaska Statute 16.05.258(b)), the level of harvest for

home use that the state must provide. Underestimation of actual subsistence harvests effectively lowers the minimum amounts subsistence fishers must be provided under state law.

Baseline subsistence harvest research done by the Division of Subsistence is conducted in a community by going door-to-door requesting harvest information in person. Attempts are made to contact households regardless of whether or not they received or returned a subsistence salmon harvest permit; the research assumes, as has been historically observed, that not every fishing household receives a permit. Individual households report their annual harvest of different resources without being reminded of the regulations and harvest limits. Anonymity and confidentiality are guaranteed, and this method gives the household the confidence to honestly and accurately report actual harvests, even those that have exceeded certain restrictions. From the sampled households, a total community harvest estimate is derived.

The annual ADF&G subsistence permit system is less systematic and does not provide anonymity to the respondent. Harvest estimates are made from permits that are first mailed to fishing households, filled in, then mailed back to ADF&G. The permit has a number-of-fish limit printed on it (250 salmon per household, in lower Alaska Peninsula communities; 25 salmon per household member in Unalaska). This record has the fisher's name on it, unlike the anonymous reporting possible during the face-to-face household harvest survey.

The discussion at the Sand Point and Unalaska workgroup sessions addressed the problems inherent in the permit system as it is administered by ADF&G, and voiced their support for proposed improvements in that system.

A fundamental reason why the annual permit system underestimates harvest is that not every fishing household requests or receives a permit. Enforcement of the permit reporting requirements is very lax, and many households don't bother themselves with the paperwork and postage. Making ADF&G permits available for issue locally, possibly at the tribal office, was seen as one way to increase participation in the permit fishery (see Results section).

The permits issued for the lower Alaska Peninsula communities have an annual limit of 250 salmon per household. For Unalaska and Adak, the limit is 25 per person. The tribal representatives and local participants acknowledged that some households require a large amount of fish, both for themselves and for other households with which they share, and are afraid they might be penalized for harvesting (or reporting a harvest of) more fish than the permit specifies. In fact, participants at the Sand Point meeting said it is very easy and quite common for households to harvest more than 250 fish, but report only that they harvested 250 to remain in compliance (Fall and Caylor, 2002a).

During the workshops in Sand Point and Unalaska, ADF&G Division of Commercial Fisheries personnel recommended that these households simply apply for another permit, thus acquiring license for another 250 fish per household (lower Alaska Peninsula), or 25 fish per household member (Unalaska). But the tribal representatives responded that the additional paperwork precludes very many people from doing this. This is especially inconvenient, they say, when one is in the middle of bringing in a subsistence net with more than the allocated amount of fish—is it necessary to stop fishing, go back to shore and send a fax to the ADF&G

office requesting another permit, and then go back and continue fishing? Subsistence fishing demands flexibility and the ability to react quickly to the comings and goings of the fish themselves. Conforming to the permitting requirements of the current system presents particular difficulties to subsistence fishers.

Another integral element of the subsistence salmon fishery that prevents managers from gaining an accurate understanding of harvest levels is the practice of some households of removing fish from their commercial catch for home use. This is especially common in the lower Alaska Peninsula communities (Table 4). Commercial fishing households have traditionally depended on the fish harvested using this method, as do the neighbors with whom commercial fishers share. Indeed, it is documented in other research that the history of a community like King Cove shows the inextricable connection between commercial harvest of salmon and subsistence use of the same species (Fall et al 1993, Reedy-Maschner 2004, Braund et al 1986). Yet these fish, caught during the commercial fishery but used in the home, are not tallied on the subsistence permit, even though that method is a legal, common means of fishing for home use (5 AAC 01.021). Agency and tribal representatives agree that this should be documented so that any "Amount Necessary for Subsistence" determination takes this method into full account. The significance of fish retained from commercial catch is illustrated in Table 4 (Scott, et al 2001), and has been documented with interviews and community history research done by cultural anthropologist, Dr. Katherine Reedy-Maschner (2004).

Because of the resource's importance to the social and cultural well being, tribal participants at the working group meeting in Sand Point recommended measures to improve the

accounting of salmon removed from commercial catch. The systematic household surveys conducted by the Division of Subsistence document the salmon that are not accounted for in a community's recorded harvest via permit returns, but such systematic surveys are only done intermittently and at great cost. The household survey, done face-to-face with the guarantee of anonymity, has a better chance of including households that do not receive a subsistence permit, fish harvests that exceed the level shown on the permit, as well as fish retained from commercial catch. These are the primary deficiencies that agency personnel, tribal organizations, and local fishers have with the reported harvest estimates based solely on the annual return of subsistence salmon permits, and the reason that improvements should be made in the way ADF&G permits are issued, collected, and followed-up (Fall and Caylor 2002a, 2002b).

Throughout the region the quantitative parameters of the subsistence salmon harvest are ill defined, out of date and, in general, erroneous. More accurate harvest assessments are necessary to give the State Board of Fisheries an accurate understanding of the extent to which communities in the region depend on wild fish for food. In determining the Amount Necessary for Subsistence, the Board of Fisheries uses the best information possible to define the minimum amount of a fish stock that must be harvestable for subsistence uses. In many cases, the Board relies on the harvest data tabulated from the subsistence permits that are received by certain households, filled out by some of those households, and then returned to ADF&G Division of Commercial Fisheries. (The Board has also recognized the importance of salmon kept out of commercial catch, and in their 1998 considerations included the estimates from the 1992 Division of Subsistence study for King Cove and Sand Point.) Participants in the working group meetings in Unalaska and Sand Point emphasized the need to provide the Board of Fisheries the

most accurate information possible by improving reporting accuracy and overall participation in the subsistence permit system, as well as by providing important background (TEK, specific observations of seasonal trends, cycles, changes, etc.) that will assist the Board in interpreting annual harvest estimates. The requirements of the law, and the determination of local tribal organizations to improve harvest assessment accuracy, initiated the work done in this project. Working together, all the project partners and participants began to better document the subsistence fisheries of the region, on which communities and their traditional way of life depend so greatly.

Qualitative Data Concerns: TEK

Qualitative data are also needed for a more adequate understanding of the subsistence salmon fishery on the community level. An increased effort to collect and use information provided by local residents in management of the area fisheries was recommended by the both the SFHAWG, as well as the workgroups in both Sand Point and Unalaska (Fall 2003, Fall and Caylor 2002a, 2002b).

Non-numerical, descriptive information illustrates the relationships between fish, animals, weather, and human impacts throughout time. These data are extremely varied in scope and focus but usually comprise observations and understandings of natural resources, natural phenomena, and subsistence activities. All these kinds of information are often lumped together

under the title “Traditional Ecological Knowledge”, or TEK (Miraglia 1998). With “ecological” being its middle name, TEK focuses on these inter-relationships. From this perspective, the local observer represents his or her environment as a web of biological, meteorological, geological, chemical, and oceanographic variables to which the salmon fishery is inextricably tied. Changes in one part of the system can be observed to correspond with other changes in the system, and a relationship can be deduced (Berkes 1999, Vansina 1975).

Anthropologists and ecologists interested in the usefulness of TEK have documented scientific exercises that have successfully incorporated TEK into research design and into the discussion of research results. The qualitative data provided through TEK enables a scientific research project to achieve a fleshed-out, contextualized understanding of results that might otherwise have a very narrow scope (Berkes 1999; Brush and Stabinsky 1996; Freeman 1992; Ortiz 1999; Vansina 1975).

The way TEK propels scientific research of an ecological nature has much to do with the way local people acquire that type of knowledge. Indigenous peoples who interact with a particular environment over an extended period of time, whose period of observation and trial-and-error may effectively extend back beyond their own lives (through tradition and inherited knowledge), offer tremendous insight into research and management schemes that seek an ecological approach. By interacting with their environment, local indigenous peoples note changes in their ecosystem that result from relationships within the system (including their own actions) as well as those that come of forces outside the system.

Recent research done in the Amazon has demonstrated that indigenous people's knowledge of their environment can increase the accuracy of estimating monkey populations (Colchester 1994; Weber et al. 2000). In Africa, wildlife biologists have promoted their understanding of the cheetah populations in their area by joining their methods with those of the local Maasai (Gros 1997; Gros et al 1996).

Likewise, among the indigenous inhabitants of the Aleutian Islands and the lower Alaska Peninsula are individuals who have spent their entire lives on or near the water, observing marine ecology directly. They come from long ancestral lines of fishermen, both indigenous and from early settlement, through which they have acquired an outlook on the marine environment that understands the effects of human practices in ways that are both practical and systemic (Reedy-Maschner 2004).

The work conducted by Veltre and Veltre (1983) with the residents of Atka provides one of the most comprehensive descriptions of historic and modern subsistence practices available. Reedy-Maschner (2004) has spent numerous months in the village of King Cove during the salmon and crab fishing seasons documenting fishers' observations and opinions about abundance, distribution, and harvest levels for various species. Ongoing studies by the Division of Subsistence have documented subsistence practices throughout the North Pacific (Scott et al 2001). In these studies researchers identify aspects of the local human-environmental ecosystem, some of which are unique to a particular location, and others that are generally applicable to understanding groups across a region (Fall et al 1993a; Fall et al. 1993b; Fall et al 1996). These studies have shown that TEK, including information on indigenous place names, personal and

family histories, and traditional subsistence patterns, has much to contribute to interpretations of fisheries harvest data (Veltre and Veltre 1981, 1987). Project 02-032 complements these studies and extends the knowledge base for the Aleutian Islands and the Alaska Peninsula.

Despite evidence of its usefulness, TEK is often labeled pejoratively as anecdotal, particularistic, or subjective, and is often viewed with skepticism by biologists. Many scientists of the western tradition use methods that emphasize extremely close control over particular variables in efforts to define the most direct link between cause and effect. In this model, relevant observations derive only from a very narrow frame of reference, at the exclusion of observations from elsewhere in the ecosystem. The researcher may disregard certain data (e.g. the movements of local sea lion populations) that seem peripheral to the primary concern (e.g. diminished salmon runs). The logical connection between such observations may be unapparent to the specialized scientist, and important data remains unused or undocumented as part of a research program. The unique, useful characteristics of qualitative TEK data are something western scientists have been slow to recognize.

However, fisheries management can gain from a better understanding of the ecosystem approach, from which attempts to deal with particular resource questions are directed by an understanding of the system as a whole. Examples include Bill Simeone's work with the Ahtna Athabaskans of Alaska's Copper River basin, Dave Andersen's work on the relationships between whitefish and beaver in the Yukon flats, and recent work done by Andersen and others on non-salmon fish in the Koyukuk River Drainage (Simeone and Kari 2002, Andersen and Fleener 2001, Andersen et. al. 2004).

Biologists are realizing that marine life science research does not succeed in its efforts at conservation with only a narrow scope. Studies suggest that what is necessary is a consideration of the wider ecosystem, including human-animal interactions (e.g. papers in Western and Wright 1994). These studies indicate that managing a sustainable marine environment requires the addition of broad, ecological perspectives, and makes special consideration for understanding the historic and modern interactions between humans and the environment in which they live.

This project provides some initial qualitative findings related to marine ecology and fisheries. Some of the key topics addressed in this study include:

1. Long term changes in the ecology of southwestern Alaska Peninsula and Aleutian Islands salmon.
2. Details of salmon behavior, ecological relationships, and distributions.
3. Long-term changes in the regional marine ecosystem, including marine mammal populations.
4. History of traditional fisheries use in the 20th century, including commercial fisheries.

The documenting of TEK for this project was divided between the partners by community. Drs. Maschner and Reedy-Maschner were to address the topics listed above for the communities of Akutan, King Cove, False Pass, Sand Point, and Nelson Lagoon, and their findings are not presented in this report. The communities of Atka, Nikolski, and Unalaska were to be covered by Mr. Davis. (In Table 5, an "*" indicates a community where the task

referenced is to be completed by Drs. Maschner and Reedy-Maschner and will not be accounted for in this report.) The topics listed above provided a general outline for the research, with narrower focus emerging in discussions with different households in different communites.

For the work done by Mr. Davis, the above items were approached from several research angles. The first was the use of unstructured interviews with experts, elders, and other knowledgeable individuals from several communities (Atka and Nikolski). Respondents spoke freely about their observations, their memory of historical practices, and their interpretation of the patterns they have observed from their unique perspective. Maps were used to record information tied to a particular geographic location.

Another method was a structured list of questions asked of a broader group of individuals. Respondents discussed their own particular views or behavior patterns, but which can be easily classified or analyzed as a group. For example, a question might ask for specific impressions related to salmon populations, or the amount of sharing that goes on in a community, or for the length of time a person has spent doing certain activities like subsistence fishing or hunting. Tape recorded interviews with Aleut elders, done by A/PIA staff in 1998 and 1999, follow a format of this type (for communities of Unalaska, False Pass, Akutan, and St. Paul [not one of the original study communities]). Also, the "Post Season Survey" administered as part of this project collected individual impressions of a qualitative nature (Figure 2 and Table 5).

Local Involvement

Fostering local involvement in the planning, definition, and collection of subsistence data lends the process legitimacy and increases participation at the community level, a major shortcoming in the present system (Brubaker 1998). This is the view expressed by tribal representatives at the workgroups in Unalaska and Sand Point who say that often villagers fail to understand the goals behind harvest assessment. This leads to suspicion and resentment toward the work of the agencies, considering it an intrusion on what villagers consider an inherent and personal occupation: their subsistence way of life. Still, many of these workshop participants acknowledge the legitimate goals of fisheries science and desire a system that includes more tribal oversight and local involvement on all levels (Fall and Caylor 2002a, 2002b).

Fisheries managers can ensure greater participation, accuracy, and validity in the subsistence harvest information by giving local residents more of a say into what kind of data to collect, how it should be collected, by whom, when, and to what ends. Not only does fostering tribal and local involvement create a cooperative atmosphere of "buy in" by subsistence fishers, it also creates a cooperative environment in which local perspective can guide research design and data interpretation.

Indigenous perspectives, embodied in TEK, illuminate the interactions of non-human biological and environmental factors, but very often include careful observation of interactions between the human and non-human environment. Some of these perspectives contain the

frameworks of traditional management strategies, the function of which may be tremendously helpful to managers (Simeone 2001). The most successful attempts to understand and mitigate the impact of humans on the ecosystems recognize the important role that indigenous populations play in the management and sustainability of local resources (Berkes 1999; Weber et al. 2000).

In many parts of the world, scientific research programs have achieved high levels of success by explicitly including community-based organizations and local peoples in data collection and resource management programs (Berkes 1999, Weber et al 2000). Research design extends from the subjective understanding of the scientist, whose hypotheses and frames of reference are limited by what she knows and does not know. For example, fisheries science that focuses on adjacent factors such as salmon return counts, feed abundance, or industrial pollutants might not recognize the importance of other factors such as predator populations, stream morphology, or history of salmon runs. Including the local perspective into the planning phase of research, as well as its execution, provides new opportunities for recognizing systemic inter-relationships that the non-local scientist could not have achieved on her own.

Documentation of subsistence harvests and TEK in the Aleutian Islands and lower Alaska Peninsula area is especially critical and timely. Salmon stocks in the region are falling, and there is increasing pressure on subsistence and commercial users from the Gulf of Alaska to the Yukon and Kuskokwim Rivers. With subsistence patterns poorly documented, there is a danger of communities getting overlooked when allocations are being made.

The Alaska Board of Fisheries has in the past four years made significant changes to the plans governing commercial salmon fishing in the Aleutian Islands and Alaska Peninsula Salmon Management Area (ADF&G 2002), the negative effects of which have been felt in the economy of the lower Alaska Peninsula communities. The "Area M" fishery, as it is frequently called, extends from the Shumagin Islands (Sand Point is on Unga Island in the Shumagin Islands group) west to the south side of Unimak Island. The residents of King Cove, Sand Point, and False Pass have fished those same waters for subsistence, and commercial harvest as well, for generations. The salmon that pass through this area are mostly heading north to spawn in rivers in western Alaska where other rural communities all along the Yukon, Kuskokwim, Kvichak drainages catch them, as well.

The fact that Area M is an "intercept fishery", insofar as the fish that are caught there are headed someplace else to spawn, has long been understood (Joe Dinnocenzo 2004, personal communication). Salmon were tagged in waters off of the lower Alaska Peninsula and tracked all over Bristol Bay and north into Bering Straits. Measures to protect these runs of salmon were put in place beginning in 1975, when the projected run of sockeye salmon for Bristol Bay (another important commercial fishery) was used to establish an annual guideline harvest level, or "GHL". Concern for the passage of chum salmon through the intercept fishery into Bristol Bay led to the creation in 1986 of a limit on the number of chum allowed to be caught in Area M. These restrictions varied from year to year through the 1980s and 1990s, with the lowest chum cap being 350,000 fish in 2000 (Connolly and Dinnocenzo 2002).

In 2001 the Alaska Board of Fisheries accepted changes to the Area M commercial fishing regulations, making them more restrictive, both for general conservation measures as well as to allow for more salmon passage north. Restrictions on the days and number of hours commercial fishers could be out on the water led to greatly diminished catches, and the negative effects were compounded when the price of the salmon was in dispute through the month of June. The effort fell off drastically beginning that year (Connolly and Dinnocenzo 2002)(see Table 13). The Board of Fisheries restrictions on time remained in place through the 2002 and 2003 seasons. (The Board of Fisheries loosened these restrictions at its April 2004 meeting, and the effects on the Area M fishery are not yet understood at the time of this writing.)

At the April 2004 Board of Fisheries meetings in Anchorage, residents of King Cove and Sand Point argued "this [commercial fishing] is our traditional use, our right, our culture," (Gay 2004). With fishing so fundamental to the social fabric in King Cove and Sand Point, it is important to document both components of the system, both commercial and subsistence harvests. Understanding the characteristics of all the subsistence fisheries in the Aleutian Islands and lower Alaska Peninsula will help managers follow the laws that require opportunities for adequate subsistence harvests, thus minimizing legal liabilities as well as negative impacts on community economies and cultural identities.

OBJECTIVES

The objectives of this project as presented in the Investigation Plan included:

1. Estimates of subsistence harvests of salmon and freshwater fish by gear type, location, and date for the Alaska Peninsula Area communities of: Cold Bay, False Pass, King Cove, Nelson Lagoon, and Sand Point, and five communities of the Aleutian Islands Area: Adak, Akutan, Atka, Nikolski, and Unalaska.
2. An assessment of the relationship between commercial fishing and subsistence harvests, including estimates of fish removed from commercial catches for home use.
3. Interviews to document the traditional knowledge of Aleut elders, fishermen and other residents of the region as related to the ecology of Western Alaska Peninsula salmon and other fisheries.
4. A searchable database of traditional knowledge about the fisheries resources of the Alaska Peninsula and Aleutian Islands areas.
5. A geographic information system (GIS) of the history and modern characteristics of subsistence fisheries use in the region that includes traditional ecological knowledge.
6. A short (approximately eight page) summary of project findings, written for a general audience, to be distributed to all households in the study communities.
7. A final report.

Because ADF&G and A/PIA were working independently from Dr. Maschner and Dr. Reedy-Maschner of Idaho State University, using different methods in different communities, the objectives for the project were split up. This report will address the only the work done by ADF&G, A/PIA, and select communities. In June 2004, the principal investigator talked with Dr. Polly Wheeler, of the Fisheries Information Service, OSM, USFWS, and Dr. Wheeler allowed that the work done by Dr. Maschner and Dr. Reedy-Maschner would be submitted separate from this report.

The potential success of all the project's objectives rested on the partners' ability to engage tribes and coordinate the efforts of numerous individuals on different levels of organization. Coordinating and establishing these working relationships, first between ADF&G and the local tribal governments, extending to local assistants, and finally including the subsistence fishers themselves, took tremendous effort. Most of the communications between the principal investigator and the tribal administrators and the local assistants took place over the phone and by post, because of the challenges of traveling in the region.

The communities in the region are spread out over great distances. The principal investigator was based in Anchorage, nearly 1,000 miles from Atka, and hundreds of miles away from the other communities, as well. Scheduled flights are irregular and frequently interrupted by weather. Organizing travel to any of the study communities was difficult due to coordinating schedules, making flexible plans, and dealing with the possibility of tremendous expense brought about by delays. To attend a one-day meeting in a community may cost over $1,000 to the principal investigator, plus a time commitment of three or four days away from his other duties

in Anchorage due to the infrequency of scheduled flights. Weather causes flight cancellations year-round, and then the one-day trip may easily turn into a seven-day trip, compounding travel expenses and time lost. Planning became difficult, and in the end, some mistakes were made by the principal investigator where a chance to travel out to the communities was passed by with hopes of going at a future time that never materialized. The spirit of proaction established at the working group sessions diminished as time, distance, and looming expense caused the principal investigator to rely more on telephone and post communications rather than physical visits to the communities.

The level of success in different communities in different years was highly variable. In some cases, progress was only made so far that tribes acknowledged the project, posted information in their offices and began to talk to people about the project's goals, with no further progress. In others, progress halted at the tribal office when no one came forward to take the role of local assistant. In still others, the work actually got as far as hiring local assistants and collecting data, some complete and in line with research objectives, some incomplete. Therefore, the slow pace of activating community participation and the low number of communities actually taking part made collecting data for this project a great challenge. As a result, the findings are uneven and less than thorough.

Objective 1 was achieved with varying degrees of success within several communities over the two years of the project (Table 5). Tribal offices in six study communities were able to locate local assistants who successfully completed harvest surveys and/or post-season interviews; three study communities made similar efforts but were ultimately unable to do so. The

successful tribes were: the Qawalangin Tribe in Unalaska, the Atka IRA Council, the Nikolski IRA Council, the Akutan Traditional Council, the False Pass Tribal Council, and the Agdaagux Tribal Council in King Cove. The Nelson Lagoon Tribal Council and the Qagan Tayagungin Tribe in Sand Point both attempted to hire local assistants but were unable to do so for unknown reasons. ADF&G and A/PIA staff attempted to maintain contact with tribal representatives to maintain the level of enthusiasm demonstrated (and participation promised) at the workshops. Once assistants were identified they were contacted and provided with training materials and information, and their suggestions and input were also requested to make the project work smoothly.

Cold Bay and Adak do not have tribal organizations with which ADF&G or A/PIA could cooperate on this project. Their populations are fluid, with employment being seasonal or term in nature, and with many recent arrivals. The recently de-commissioned U.S. Naval Air Station at Adak is slowly being populated with non-military families, many of which still commute back and forth to their "home" villages; the Alaska Natives who reside on Adak belong to tribes elsewhere. Cold Bay is a highly transitory population, with half of its population (88 people in the US Census 2000) having moved there just since 1995. No other Aleutian or lower Alaska Peninsula community has such a high percentage of recent arrivals. Many of these are on temporary assignment (of 4 years or less) for the Federal Aviation Administration, Alaska Department of Transportation, or the USFWS in Cold Bay. The partners had included these communities in the original plan for this project, but soon realized that their unique population characteristics, coupled with a lack of a tribal organization, would hurt the overall effectiveness of the project. Efforts to include these two communities in the study were dropped, bringing the

potential community involvement down from ten to eight, which was still a tremendous challenge.

Assessing the relationships between commercial fishing and subsistence harvests was the focus of Objective 2. The means of gaining this information was approached differently in different communities. In the Aleutian Islands communities of Nikolski, Akutan and Unalaska, the percentage of salmon that comes out of commercial catches is negligible and this method is of little consequence to the community's overall subsistence harvest (Table 4). In Atka, some of the deep-sea fishing (halibut, cod) that is processed in the village at Atka Pride Seafoods is kept out for home use, but nearly all the salmon is harvested using subsistence methods.

In the lower Alaska Peninsula communities of Sand Point, King Cove, Nelson Lagoon and False Pass, Drs. Maschner and Reedy-Maschner spent time as part of this project discussing with local residents the situation of the "Area M" commercial fishery and how the changes in the industry directly impact the average household's subsistence activity (Reedy-Maschner 2004); their progress will be documented in a separate report, as mentioned earlier.

Many commercial fishing households in King Cove and Sand Point have traditionally taken fish from their commercial catch for use in the home (Table 4). The recent changes (time restrictions and harvest limits) in ADF&G management of the Area M fishery (ADF&G, 2002) have impacted the economic and social aspects of the community organization; documenting this method of obtaining subsistence salmon today will shed light on the ways changing commercial fisheries industry is affecting communities and the subsistence patterns of households.

The methods set out in the Investigation Plan called for a 100% sample of the commercial fishing permit holders in King Cove and Sand Point, and a representative sample in Unalaska. However, due to the problems mobilizing local individuals to collect data, in the end the sampling was not done this way. King Cove was the only community surveyed in 2003 with a commercial fishing population; the False Pass Tribal Council, and the numerous tribes in Sand Point were all unable to hire local assistants to collect the information in those communities, each of which has an established pattern of removing salmon from commercial catch for home use. The commercial fishing households in King Cove provided some information on how changes in the Area M commercial fishery is impacting subsistence in that community, and this may give an indication about potential impacts in the other communities that have traditionally depended on the Area M commercial fishery for home use salmon: False Pass and Sand Point.

In Unalaska, the Commercial Fisheries Entry Commission (CFEC 2004) reported that only two individuals fished commercially for salmon in 2002. Harvest surveys conducted with subsistence fishing households coincidentally met with one of those individuals, who reported taking no salmon out of his commercial catch.

To meet the goals of the project, the method outlined in this objective was altered so that a sample of commercial fishing households in King Cove was taken from another community sample-- those households that had also applied for a subsistence fishing permit. More discussion on the changes to this objective's method is in the section "Permit Survey Results, 2003, Removing Fish From Commercial Catch For Home Use."

Interviews with elders and other knowledgeable individuals touched on a variety of subjects including fish biology, stream and marine ecology, local fisheries history, fishing technology and management practices. Working towards fulfilling Objective 3, the principal investigator of this project met with Unangan/Unangax elders in their homes in Atka and Nikolski in 2002, and collected information about their traditions and the ecology of the region. Additional work was done with 15 existing taped interviews housed in the Cultural Heritage Department at A/PIA (not the 25 documents mentioned in the Investigation Plan). The information contained in these interviews is summarized in this report in the section "TEK Interview Results." Edited portions of these interviews are contained in the AskSam database "The View From The Beach," a computer application submitted as part of this project's completion in the Appendix (Objective 4).

Objective 3 called for the transcriptions and maps of the TEK interviews to be presented and discussed with the respondents, and additional information gathered from community members during a round of community meetings to be held at the end of the project. Because of time constraints, flight cancellations due to weather, and a family tragedy in 2003 that affected a large number of households throughout the region, the scheduled second round of TEK interviews for 2003 never took place. Additionally, the harvest assessment work done by local assistants took longer than expected; in some cases, attempting to get 2003 harvest data extended into the summer of 2004. The principal investigator had hoped to use the community meetings to present information from two rounds of TEK interviews, as well as the results of harvest assessment work done over the course of this project. For these reasons, the community

meetings projected for the Investigation Plan did not take place. The principal investigator and the staff at Division of Subsistence plan to present the information back to the communities at a later time at their own expense.

The spatial information collected during the two years of this project by ADF&G personnel is limited in its scope. (Dr. Maschner and Dr. Reedy-Maschner will document the GIS data for their part of the project in their separate report.) The second round of TEK interviews, scheduled for 2003 but never materializing, was meant to gather enough information to make a series of maps describing the traditional and the contemporary fisheries, as well as other biological data related to subsistence. Unfortunately, the information collected in 2002 did not provide the type of data most effectively displayed using digital maps (e.g. salmon spawning streams over time, fish or marine mammal migration routes, areas of environmental contamination, etc.). Nor did the handful of in-depth interviews provide the numerical robustness normally suited for GIS analysis. Descriptive summaries of the spatial information gathered in 2002 are included in this report (TEK Interview Results, Discussion), as are some maps taken created from that information (Objective 5, see Figures 4 and 5). The maps and information created for the Aleutian Islands portion of this project should be viewed as preliminary and a base on which more spatial information can be collected. A full-blown GIS program is not submitted with this final report because of the relatively small number of interviews conducted and because of the types of data provided during those interviews.

Objective 6, a general overview of the project findings, is included in this report, and the report itself constitutes Objective 7.

METHODS

Harvest Assessment

At the workshops held in Sand Point and Unalaska as part of Project FIS01-107 agency and tribal representatives reviewed and approved the survey tools and protocols to be used for this project. Planning and duty assignments were also discussed. Tribes would be responsible for finding a local assistant to administer the survey, and ADF&G staff would be responsible for reviewing with them the purpose and goals of the project, and training them. ADF&G staff would advise and supervise the local assistant in their data collection work, and the information would finally be assembled and analyzed in Anchorage by ADF&G staff. These aspects of planning were reviewed and approved by all the tribal representatives attending the 2002 workshops, and were later reviewed again over the telephone on a community-by-community basis (Fall and Caylor 2002a, 2002b).

Once their local tribes had identified the individuals, ADF&G Division of Subsistence staff (and principal investigator for this project) Brian Davis contacted them by telephone. Mr. Davis supplied each local assistant with survey materials, step-by-step instruction and training

forms related to the survey, and a summary of the project's Investigation Plan with background about the project.

Each prospective local assistant was provided with a list of households in the community for tracking their progress. They were asked to check the list for accuracy, indicating any changes in the community's population by marking households as "moved" or "deceased", and adding or removing names, whenever necessary. This "tracking sheet" contained gridlines and columns for documenting survey progress on a household-by-household basis. Completed surveys, refusals, households that had moved from the community, and households that otherwise could not be surveyed were all documented on these tracking sheets.

Copies of a survey instrument, reviewed and approved by tribal representatives at the workshops at Sand Point and Unalaska, were provided to the local assistant. For Nikolski, Akutan, and Atka, communities with no formal permit system, a "Harvest Calendar" survey form was created for recording the annual harvest of subsistence salmon and other fish. On the form there was space for the harvest date, the location, the numbers of each species of salmon caught, the number and description of "other fish." Additionally, the surveyor was encouraged to record any specific comments, or observations on the fishery or the marine environment made during that year. An example of the calendar is reproduced in Figure 1.

In 2002, local surveyors were employed and paid by A/PIA (with the funds appropriated by OSM for project 02-032) in Nikolski and Akutan to collect the Calendar Surveys for that year, as well as ask another series of questions called the "Post Season Survey". This particular

form sought qualitative data on the household's fishing history, organization and practice, as well as any notable observations about that year's fishery. The Post Season Survey form is reproduced in Figure 2.

The survey instrument used in the communities of the lower Alaska Peninsula and Unalaska differed from the Harvest Calendar Survey used in Atka, Nikolski, and Akutan because the former communities already have a harvest recording system in place with the use of ADF&G subsistence permits (see Introduction). This "Permit Survey" was a modified version of the standard ADF&G subsistence salmon permit, with space for information about the harvest using subsistence gear, and an added section for recording fish that the household may have retained from their commercial catch (Figure 3).

The tribal organizations in Sand Point and Nelson Lagoon were unable to find local assistants to administer the Permit Survey in 2002 or 2003. In King Cove, no assistant was found for 2002. In False Pass and Unalaska, the tribes did find local surveyors in 2002, and these individuals were provided a list of all the households in their community who had applied for a subsistence fishing permit for 2002. Training for the False Pass assistant happened while she was on a separate trip to Anchorage, as well as over the phone once she returned to False Pass. All other training for local assistants was conducted by the principal investigator over the phone and via post and e-mail.

In 2002, the local assistant in False Pass contacted all 15 permittees, and in Unalaska, 78 of 225 permittees (35%) were contacted. The Permit Survey administered in each community

was designed to determine, 1) whether the household had returned a completed permit to ADF&G (Figure 3, Questions 2 and 3), and 2) if the household had commercial fished in 2002, whether they kept any fish out of their commercial catch for home use (Figure 3, Questions 5 and 6).

If the respondent did subsistence fish in 2002, but did not return a permit to ADF&G, the local assistant asked for the dates, numbers, and locations of harvest and that information was recorded on the Permit Survey. If the respondent did any fishing after the permit was returned, or if they acknowledged that they underreported their harvests on the permit out of fear of punishment, those fish were recorded on the Permit Survey. If the respondent kept any fish out of their commercial catch, those fish were recorded separately on the form.

The Post Season Survey form used in the Aleutian communities (Figure 2) was also administered in False Pass and Unalaska. Not every False Pass or Unalaska household who participated in the Permit Survey participated in the Post Season Survey (two in False Pass and 70 in Unalaska). In some cases this was because the local assistant overlooked the Post Season Survey, and in others the respondent may have declined to participate. Rates of participation in the Post Season Survey were not systematically documented by the local assistants, and cannot be reconstructed for this report.

The Investigation Plan for this project stated that all the commercial fishing households in King Cove and Sand Point, and a sample of the commercial fishing households in Unalaska, would be surveyed in addition to the list of subsistence permittees, with the intent being to

capture fish taken out of commercial catches for use in the home. Due to the fact that the Qagan Tayagungin Tribe in Sand Point could not find a willing local assistant to help with the work in either of the two project years, no surveys were performed in Sand Point.

In Unalaska, the Permit Survey interviews done in 2002 asked 78 households that had subsistence permits whether or not they had retained commercially caught salmon for home use, but none had in 2002. (The ADF&G Commercial Fisheries Entry Commission [CFEC 2004] reports that only two commercial salmon permits were fished from that community in 2002, and one of those individuals was contacted during the Permit Survey.) No local assistant was hired for 2003 in Unalaska, and there are no data for that year.

In King Cove, no local assistant was hired for 2002, but the Permit Survey work done there in 2003 included the same questions regarding commercial fish retention. For the reasons discussed in the Results section, the method of sampling commercial fishing households deviated from the method set out in the Investigation Plan in that the sample came from the list of names of subsistence permit holders for that year.

ADF&G and A/PIA staff tried to encourage the tribes in Sand Point, False Pass, Nelson Lagoon, and Unalaska to locate local assistants to help with the project for 2003, but those tribes were unsuccessful (Table 5). Due to circumstances within the tribal organizations in False Pass (staff turnover and a fire in the tribal office building) and Unalaska (staff turnover), no local assistants were located to continue the work there. A local assistant was, however, located by the Agdaagux Tribal Council of King Cove, and she administered the Permit Surveys in that

community. Harvest information for 2003 was successfully collected in Atka, Nikolski, and Akutan, giving one year's worth of data for Atka and 2 years of data for Nikolski and Akutan

A/PIA, as the regional tribal non-profit organization and partner in this project, was able to hire and pay the local assistants who worked during 2002 using the monies they received from the Office of Subsistence Management for FIS02-032. The work done by the local assistants in Unalaska in 2002 was paid for by an agreement between A/PIA and the Qawalangin Tribe of Unalaska, with the tribe acting as the employer in their community. However, the funding for the 2003 survey work was never conveyed by OSM to A/PIA, and therefore was not used to pay the local assistants who worked in Atka, Nikolski, Akutan, and King Cove. Local assistants were instead hired by ADF&G Division of Subsistence and paid with funds from that partner's other accounts, not from the funds granted by FIS.

Local Involvement

Local involvement in the project began when representatives from the tribes in the region came to participate in the workshops in Sand Point and Unalaska. At these workshops, they gave their consent and support for the objectives and methods laid out for this project. Their assistance was useful in developing the strategies for collecting harvest data and TEK, with the understanding that methods and guidelines for research must remain flexible when dealing with different communities or different households. The importance of hiring local research

assistants, through the recommendation and approval of the tribe, was also advocated by the participants at the workshop, with the understanding that community involvement would strengthen and improve the results of the work.

The tribal representatives were encouraged to present the work plan, including the part to be played by local people, to their tribal councils, and to help locate individuals to assist with data collection. ADF&G and A/PIA tried to maintain communication with the tribes after the workshop, and encouraged their active participation through phone contact, through the post and e-mail.

Another way local involvement was incorporated into this project was establishing local vendors for ADF&G subsistence permits in certain communities. In the spring of 2003, ADF&G Division of Commercial Fisheries and Division of Subsistence began discussions with tribes in Nelson Lagoon, King Cove, and False Pass to allow an individual at the tribal office to issue subsistence fishing permits locally. By utilizing local vendors in other communities around Alaska (Port Graham, Nanwalek, various communities around Bristol Bay) ADF&G has built cooperative relationships with local fishers and tribal organizations to help improve harvest reporting, and this was one of the goals identified at the Sand Point workshop. (There are ADF&G offices in Unalaska and Sand Point where local residents can go to get their subsistence permits, so there was no need for permit vendors from the tribal offices in those communities.)

In 2003, the tribal offices at Agdaagux Tribe of King Cove and the Native Village of False Pass began issuing ADF&G subsistence permits locally; although the Native Village of Nelson Lagoon received permits for issue, no one in that community requested one. King Cove

issued 11 permits, and False Pass issued seven permits (Table 6). The data for these permits were incorporated directly into the ADF&G Division of Commercial Fisheries databases for subsistence harvests in those communities.

For the 2004 season currently underway, the vendors at Nelson Lagoon, King Cove and False Pass are again issuing ADF&G subsistence permits at the tribal offices. No information is available on the number of permits issued for the 2004 season, as vendors usually turn in their documentation at the end of the fishing season in October or November.

Establishing local involvement was to be an essential part of this project. By cooperating with tribal organizations on elements of planning and research execution, the partners would be giving the community a stake in the successful collection of harvest data and TEK, providing a more accurate assessment of total salmon harvest as well as a more thorough, relevant documentation of ecological and TEK data. However, although tribal representatives indicated support for the project at the workshops, the follow through in their home communities was less enthusiastic. ADF&G and A/PIA partners tried to encourage tribes in their job of recruiting and selecting local assistants, but in the end, a lack of interest on the part of the tribes and/or community members resulted in a much less than desired amount of harvest and TEK data during 2002 and 2003. Other circumstantial events caused delays and problems (an office fire at the tribal offices in False Pass, a vital staff resignation from the tribe in Unalaska, etc.). In the end, better communication between the partners, re-emphasizing the importance of the project, and the tribes, expressing any difficulties, misgivings, or confusion about the project, would have

probably resulted in more local assistants going to work, more participation from community members as respondents, and ultimately better data.

Traditional Ecological Knowledge

Fishery and ecology information of a qualitative, historical nature was collected in a series of interviews done by the principal investigator, Mr. Davis, of ADF&G, Division of Subsistence. He interviewed elders in the communities of Atka and Nikolski during the summer of 2002, spending a week in each community. The tribal organizations in these communities were asked to find a local assistant to accompany Mr. Davis on the interviews, but no one was available, so he proceeded alone.

As directed by the tribal representatives at the workshops, Mr. Davis asked the tribe to recommend elders in the community who had expert knowledge and extensive experience in the subsistence fisheries of the region. Mr. Davis sought out the elders pointed out by the tribal leadership, as well as other individuals recommended by community members in casual conversation. Age, length of residency in the community, and reputation as an expert, knowledgeable fisher were the criteria used to select interviewees. (These were the same criteria recommended by tribal representatives at the Sand Point and Unalaska workshops.)

The interviews were arranged in person or over the phone, and each took place in the respondents' homes and generally lasted from one to three hours. They consisted of relatively unstructured conversations about the history of fishing in the community, the respondent's personal experiences in the fisheries or other types of subsistence activity, and their personal ideas and observations about the ecology of the marine environment in their area. The course of the discussions was suggested by Mr. Davis but mostly directed by the respondents and was not restricted by Mr. Davis strictly to fisheries-specific topics. There was no written schedule or guide for these interviews. The interviews were recorded on cassette tape with the informed, signed consent of respondents.

Generally, Mr. Davis began the interview by introducing himself and providing a brief background of the project. He described for the potential respondent the importance of documenting the history of the local fishery, specifically salmon, as well as the personal observations and impressions of the respondent. He paraphrased the perspective contained in the Investigation Plan (and elsewhere in this report) wherein particular observations, made over time and within greater contexts, may demonstrate a general understanding; what the individual fisher or hunter has seen to be true can sometimes be used to predict what will happen in future situations.

If the respondent wished to proceed, Mr. Davis began by asking simple questions about the person's childhood, his or her early experiences in fishing or subsistence activities, the technology used in the past, the way their family and other families worked together to obtain fish, fishing locations, as well as observations of changes in the fishery, in the health or condition

of individual salmon in the area or changes in the size or intensity or time of salmon runs. Other avenues of discussion were always open (and frequently pursued) as in the changing nature of marine mammal populations (lately a common topic of discussion in Aleutian and Alaska Peninsula communities), or the current role of young people in subsistence economy.

In Atka Mr. Davis conducted interviews with five individual elders in a total of three separate sessions. In Nikolski, the smaller population allowed Mr. Davis to focus his efforts on the four prominent, knowledgeable elders recommended by the tribe. In all, over 12 hours of audiotape was recorded and transcribed. The individuals who took part in the interviews were recognized by the tribal representatives and other villagers as the most knowledgeable on the subject of subsistence fishing, community history, and traditional aspects of the subsistence economy. Still, there were others in the communities whose knowledge of the fishery and the marine environment should be documented in the future.

The interviews with Atka and Nikolski Elders were conducted by Mr. Davis in a manner consistent with the guidelines in "*Protocols for Including Indigenous Knowledge in the Exxon Valdez Oil Spill Restoration Process*", reproduced in Miraglia 1998. The nature of TEK data requires a degree of flexibility be incorporated into the data collection procedures. The formatting of TEK data is understood to be fundamentally different than that typically employed by "western science", with significantly more credence given to qualitative observations, value judgments, feelings, instincts, and personal or ancestral history of the individual. The protocols take this into account by allowing the respondent—the source of the information—much liberty

in determining the course of the interview. Questions pertaining to fisheries ecology, community harvest methods, and personal history were all inserted by Mr. Davis throughout the interview, but for the most part, the respondent was allowed to talk on whatever topic he or she saw fit. This accounts for the variety of topics covered in the TEK interviews (in the Results section), which stretch beyond the narrow frames of reference that would define a fisheries research project conducted solely in the terms of western science. This wider frame of reference is important for creating a rich biological, historical, and social context within which each community's subsistence fishery can be managed.

Individual respondents received an honorarium of $25 for their contribution to this project and to the knowledge base on which their fisheries are managed. Each respondent signed a standard release form, which indicates their consent to be interviewed, their consent to ADF&G to use the information in a public document describing the histories and traditions of their community's subsistence resources. The consent form also protects the intellectual property rights of the respondents, explicitly stating that ownership of the information remains with the individual respondent and may not be claimed by ADF&G or any of the partners in this project. This topic is part of the protocols described by Miraglia.

A/PIA's Cultural Heritage Department has amassed a large collection of interviews with Aleuts from the Aleutian Islands and lower Alaska Peninsula. Most of these interviews were conducted in the spring of 1999, and many focus on subsistence practices and environmental observations. The Investigation Plan for FIS02-032 called for a review of twenty-two audio tapes and three video tapes documenting TEK, however, the Cultural Heritage Department at

A/PIA had recently moved offices and could only locate fifteen audio tapes. Some of these A/PIA had transcribed already, so ADF&G personnel summarized the un-transcribed testimonies and reviewed the A/PIA transcriptions and identified the passages that contribute to the TEK objectives of this project. Parts of these taped/transcribed interviews are included in the searchable database, along with the new data Mr. Davis collected in Atka and Nikolski in 2002.

Despite his efforts to do so, Mr. Davis was unable to return to the communities for additional interviews in 2003 because of poor weather, the family tragedy mentioned above, and respondent's conflicting schedules. Still, a significant amount of TEK has been collected, transcribed, and archived as part of this project. A brief overview of the kinds of information collected is presented in the Results section of this report, and the entire catalog of interview data is presented in the searchable AskSam database "The View From The Beach" on the CD in the single Appendix to this report.

RESULTS

2002 and 2003 Harvest Assessment

Harvest assessment data were successfully collected in six of ten communities originally listed in the Investigation Plan for this project (ten reduced to eight when Cold Bay and Adak were dropped for efficiency). Communications began with eight tribal offices, and of those eight,

six were successful in finding local assistants to collect subsistence harvest data. In 2002, participating communities included Akutan, Unalaska, False Pass, and Nikolski, and in 2003, Atka, Akutan, Nikolski, and King Cove (Table 5).

The project was designed to collect subsistence fishing information through a collaborative effort between ADF&G, ISU, A/PIA, and, at the local level, individual tribal entities. The participation of the tribes was written into the planning and the execution phases of the project, and establishing the working relationship between the tribes and ADF&G which was also an essential goal of the project. By allowing tribes and community members to become responsible for collecting their own harvest data, the project meant to integrate improved harvest assessment measures into the fabric of the community.

When the hiring and the actual work of the local assistants started to lag, causing delays in meeting other project goals (such as implementing all the planned research surveys in each community, and ultimately presenting the data in Community Meetings), the principal investigator made the decision on a community-by-community basis to continue trying to get the tribes engaged with the project, rather than proceed with data collection by himself. In the end, data collected near the end of the project in King Cove proved to be some of the most valuable, worth-the-wait information of the whole project (see sections on King Cove salmon harvests later in this chapter).

Harvest Calendar Survey Results, 2002 and 2003

In the communities where there is no subsistence permit requirement, the goal was to collect subsistence harvest data on the Harvest Calendar Surveys for every household in the community. Local assistants kept track of their success in contacting households on the Tracking Sheet provided by ADF&G, with a count of the number of households surveyed, the number unavailable to contact, and a final count of the total number of households living in the community.

In 2002, Harvest Calendar surveys were distributed and collected in Nikolski and Akutan by the local assistants there. Mr. Davis talked to local residents about the project and distributed the Harvest Calendars in Atka while he was there in the early summer of 2002, but the Native Village of Atka tribal office could not find a local assistant to help with the follow-up so the Harvest Calendars there were never collected.

In 2003, the local assistants in Nikolski and Akutan again distributed Harvest Calendars and collected harvest data for households in those communities, and this time the Native Village of Atka successfully located a local assistant who collected data in that community. The Harvest Calendars asked households to record the amount of fish they harvested in that year by species, by month, and by gear type. The results for Nikolski, Akutan, and Atka are in respective Tables 7, 8, and 9.

In estimating a community's overall harvest, the Division of Subsistence routinely uses a simple mathematical function that allows the information collected from a portion of the

population to be “expanded” to the portion of the population that was not surveyed. When the goal is to survey all households in a community, and the local assistant contacts households as possible, the assumption exists that there should be no significant difference in subsistence behaviors between those households that were contacted and those that were not surveyed. The expanded harvest estimate, then, is made using a multiplier calculated by dividing the number of total households by the number of households for which there is survey information. This is the method used in the Division of Subsistence’s Community Profile Database, and allows for an approximation of a community’s total harvest levels when it is not possible to get information from all harvesters in that community (Scott et al 2001).

The Harvest Calendars data collection in 2002 achieved a 100% sample in Nikolski and Akutan, with no households not accounted for. Therefore no expansion was necessary to estimate total community harvest for that year. In 2003, the sample in Nikolski again was 100%, while an 82% sample was achieved in Atka and a 78% sample was achieved for Akutan. The expanded harvest estimates for Nikolski, Akutan, and Atka are reported in Tables 7, 8, and 9, respectively.

Table 11 compares the recent harvest estimates to previous findings. In that table, past estimates for salmon harvests in Nikolski (1991), Atka (1992, 1994), Akutan (1991), and Unalaska (1994) are all derived from expansion of surveys done by the Division of Subsistence as part of a baseline subsistence study (Scott et al 2001).

The local assistants in Akutan and Nikolski, with two years of data collection under their belts, requested Harvest Calendars in early 2004 and have distributed them to households in their communities. Harvest Calendars are available at the Atka IRA Council office in Atka. Completed Harvest Calendars will hopefully be collected by local assistants in the fall and winter of 2004/2005.

Permit Survey Results, 2002

Subsistence fishing households in the study communities of Unalaska, False Pass, King Cove, Sand Point, and Nelson Lagoon are required to have a subsistence fishing permit issued by ADF&G Division of Commercial Fisheries. In the winter of 2002/2003, local assistants in Unalaska and False Pass attempted to contact the households that received a subsistence permit for 2002. If the household had applied for a permit, fished, but never sent the permit in to the ADF&G office, then the local assistant recorded the harvest information (which included the numbers of salmon of different species, the date of harvest, and the location, see Figure 3).

A local assistant, working in conjunction with the Native Village of False Pass, contacted all nine households that had received subsistence permits for 2002. All these households had already returned their subsistence permits to ADF&G, and claimed no additional fish, so there are no new data shown here.

Return rates for the permit system were lower in Unalaska, and conducting the Permit Survey in that community produced new data that was not captured within the standard method of permit recording and submittal. Permit Surveys were conducted in Unalaska with 78 individuals who had received ADF&G subsistence permits in 2002, and of those, 15 households reported salmon harvests that they had not submitted to the Division of Commercial Fisheries for inclusion in the community's annual harvest estimates. An additional 751 salmon were accounted for, raising the 2002 harvest estimate 11% from 6,757 to 7,508. Those data are shown in Table 10.

Some Unalaska households that had already returned their permits reported additional fish caught after returning the permit that year, and some indicated that they had underestimated their harvests on the original permit for fear of punishment (see Introduction, Quantitative Data Concerns). The face-to-face encounter with a local assistant, working under the auspices of the Qawalangin Tribe, encouraged fishers to report accurate harvests; the results of those Permit Surveys were added to the existing harvest estimates for those communities.

Fishers in the communities of King Cove, Nelson Lagoon, Sand Point, and Adak are also required to have an ADF&G subsistence fishing permit, and the prospectus for this project included administering Permit Surveys in these communities. However, in 2002 no surveys were conducted for these communities because the tribes could not find any local residents available or willing to conduct the survey, despite the constant encouragement of the principal investigator.

Tribal Vendors of ADF&G Subsistence Permits, 2003

In 2003, the Agdaagux Tribe of King Cove acted as a vendor of ADF&G subsistence permits to community members as an alternative to sending away for a permit by mail: 11 permits were distributed this way, and the data are being included in the 2003 harvest estimates for King Cove. The Native Village of False Pass also acted as a vendor in their community for the 2003 season, issuing eight permits. The tribal administrator in Nelson Lagoon was also given instructions and blank forms for vending ADF&G permits locally, but no additional permits were issued in that community.

Part of the project's goal to capture more data about subsistence harvests was effected by making subsistence permits available locally. This idea was strongly supported by the tribal representatives attending the working group sessions in Unalaska and Sand Point (Fall and Caylor 2002a, 2002b). The results of vendors' work in 2003 show that people who are not currently receiving permits from ADF&G in the mail will request them if they are available locally. The number of permits issued in King Cove went up 19% in 2003, from 58 to 69. In False Pass, the number of permits increased 80%, from 10 to 18 (Table 6).

The additional permits issued by local vendors resulted in an increase in the reported harvests of salmon in 2003; in False Pass, 17% of the reported harvest came from the permits issued locally. In King Cove, a small increase of 3% of the reported harvest came from the additional permits (Table 6).

The project goal to make permits available locally has met with some success, the persistence of which has yet to be seen. The results in False Pass are encouraging, however. Both the Native Village of False Pass and the Agdaagux Tribe in King Cove are issuing permits again this year for the 2004 subsistence season, and in Nelson Lagoon the tribal office has requested some permits to issue there.

King Cove Subsistence Permit Returns, 2003

ADF&G Division of Subsistence and A/PIA staff maintained communications with the tribal organizations in Unalaska, Nelson Lagoon, Sand Point, and False Pass. However, none of these tribes was able to facilitate harvest data collection for 2003. The Qawalangin Tribe in Unalaska had staff turnover in two key positions, and there was a fire in the office of the Native Village of False Pass. The Agdaagux Tribe of King Cove, however, found a local assistant to conduct the Permit Surveys (and the Post Season Surveys) in that community. The results of the 2003 work in King Cove constitute the harvest results discussed in this section.

The local assistant in King Cove contacted 19 individuals who had applied for a 2003 subsistence salmon permit from ADF&G. The list of names came from the subsistence permit rosters of ADF&G Division of Commercial Fish, and the principal investigator of this project provided the local assistant with those names. The list included 45 households, some of which had returned their subsistence permits to ADF&G and some that had not returned their permits

by winter of 2003/2004. As has been mentioned before, the Permit Survey conducted in King Cove was designed to collect harvest data from households that failed to return their permit, as well as discover whether or not the household removed any fish for home use from their commercial catch.

Only two of the 19 contacts in King Cove were with households that failed to return their permits. However, the Permit Survey failed to capture their harvest information because both respondents answered "Yes" to question #3, which asks, "If you or other household members had a permit, did you return the permit to Fish and Game? [If Yes, We have the information and do not need to re-count it. Skip to Question 5]" (Figure 3). The respondents thought they had sent in their permits, or there may have been some mix up at the ADF&G data entry office where their harvest data were not entered, but either way the Permit Survey failed to capture the missing harvest data for those two households.

Retaining Fish from Commercial Catch for Home Use

As was mentioned in the Introduction section, the households in communities like King Cove and Sand Point have incorporated into their subsistence economies the fish removed from commercial catches for home use. Since the community was first founded in 1911, the families that live there have formed their social and economic traditions on the tides of the commercial fishery, selling their fish to a cannery, taking them home to their families, or distributing them through the community. Families fish together, with wives and children on the boat as well as

men, and some conduct their subsistence fishing (with an ADF&G subsistence permit) from their commercial fishing boats. The fish removed from commercial catch for home use function not only as a subsistence food source, but through group participation and sharing, as a means of binding the community together (Braund et al 1986, Reedy-Maschner 2004).

The systematic household harvest surveys done in 1992 in King Cove by the Division of Subsistence (Fall et al 1993) showed the way households in that community depend on salmon removed from commercial catch, and how those fish are distributed in the community. That year in King Cove, 96% of all the households used salmon, and 52% received a gift of salmon. Over half the salmon harvested for home use came from commercial catch (52%) and over half the harvesting households participated in this method (51%).

Use of salmon from the commercial catch is regular and follows a particular pattern through the season, as documented by Braund (Braund et al 1986:7-9). In the first part of the commercial salmon fishing season in June, captain, crew, and their families are “fish hungry” because their winter stores of fish have probably been exhausted. During that time, it is common for salmon to be removed from the commercial catch and brought home or given away to crew or other community members. Later on in the season, the tendency to take fish out of the commercial catch falls off.

The history of the commercial fishery in King Cove is the history of the community itself, and the traditions of the families that live there are grounded in the commercial harvest (Braund et al 1986, Gay 2004, Reedy-Maschner 2004). This is why the tribal representatives at

the workshop conducted before this project started emphasized the importance of estimating the amount of salmon removed from commercial catch.

The 2003 work in King Cove achieved some success in its goal to capture harvest information regarding the keeping of salmon from commercial catch. Because of recent changes in the management of commercial fisheries in the area, documenting this method of obtaining salmon for home use is especially critical. The important contribution that commercial fisheries make to the social life and subsistence lifestyle in King Cove is substantial, and any changes in the way residents get commercial salmon will likely impact the average household's subsistence use as well. This analysis of subsistence patterns in King Cove offers insight as to how changes in one community's economic and social structures are levering changes in its subsistence system (see Discussion section).

In order to understand the current practice of removing fish from commercial catches, this project's aim was to talk to a representative sample of households that own commercial fishing permits. The Investigation Plan stated that all commercial fishing households in King Cove, Sand Point, and False Pass would be surveyed to determine the annual removal of fish from the commercial nets for home use. The goal was to obtain sample information from a portion of the commercial fishing population that could then be expanded to estimate with some degree of accuracy the entire community's dependence on commercial fishing as a source for subsistence salmon.

Instead, it was only the commercial fishers who also had applied for subsistence permits that constituted the sample from which this type of information was drawn, and the only community in which this was done was King Cove, as was explained in the Objectives section. The main reason why the sample of all commercial fishing households was not drawn for King Cove was the tremendous delay created by the limited time the local assistant (with a full-time job) could spend doing the survey work. She was only able to conduct the Permit Survey with a portion of the subsistence permit applicants, and as the spring of 2004 wore on, the principal investigator advised her to focus on completing as many Permit Surveys as possible. He determined that there would be sufficient data contained in 15 or more Permit Surveys, and the accompanying Post Season surveys, to provide at least some of the information regarding commercial salmon retention for home use.

The local assistant collected data from 19 households, 12 of which indicated keeping salmon out of their commercial catch for home use. (This percentage, 63%, is fairly consistent with the 52% measured for a random sample in 1992 [Fall et al 1993].) These results form the basis of the following analysis, containing important information from which to infer the relationship between commercially caught fish and household subsistence needs in King Cove.

The data collected in 2003 can be interpreted by using other, independent data sets concerning the removal of commercial fish for home use. As has been documented in Division of Subsistence reports (Fall, et. al., 1993b, 1993c, 1996), and by other researchers (Reedy-Maschner 2004), many households in lower Alaska Peninsula communities depend heavily on commercially caught salmon for their subsistence needs (Table 4). In communities such as King

Cove, Sand Point, and False Pass, dramatic changes have occurred in the commercial fishing industry over the last 10 years, the effects of which will predictably change the way local residents access their subsistence salmon. The 2003 information from King Cove, combined with data that exist within the databases of ADF&G's Commercial Fisheries Entry Commission (CFEC), Division of Commercial Fisheries, and previous Division of Subsistence studies, is enough to present a picture of the current state of subsistence salmon fishing in King Cove. As a case study, the findings for King Cove illustrate the way it has responded to changes in its economic and social organization; the possible effects of these changes on the other communities of impact, Sand Point and False Pass, communities where commercial fishing has been such an important part of the social and economic fabric, will be discussed later (Reedy-Maschner 2004).

In the 1992 Division of Subsistence study in King Cove households kept an estimated 8,752 salmon out of their commercial catch. This amount constituted 51% of the total estimated harvest of 17,136 salmon. Eighty households, about 51% of all households that harvested salmon for home use that year, participated in this method (Fall, et. al. 1993b).

In 1992, CFEC records indicate that 74 commercial permit holders living in King Cove actually fished that year (CFEC 2004). The Division of Subsistence estimate that, for 1992, 80 households were involved in removing commercially caught salmon for home use indicates that not only commercial permit holders participate in this method, but crewmembers and substitute skippers of commercial boats as well.

Based on the 1992 figures, it can be shown that each permit fished resulted in 1.08 household that kept fish out of commercial catch for home use (80 participating households/74 commercial fishing households=1.08).

For the year 2003, the CFEC reported there were 44 commercial permits fished out of the King Cove. (The restrictions imposed on the Area M commercial fishery after 2001 is correlated with the sudden decrease in the number of permitted fishermen fishing in Area M.) (CFEC 2004)

Using the rates of participation seen in 1992, an estimated 48 households in King Cove would be expected to retain fish from commercial catch for home use in 2003. This assumes that for the 44 commercial fishing households in King Cove in 2003, approximately 1.08 households would have obtained salmon by removing them from a commercial catch. Therefore, an estimated 48 households would have used that method in 2003, and the 12 Permit Surveys are a representative portion of that population.

In 2003, the 12 surveyed households kept a combined 581 salmon out of their commercial catches (377 sockeye, 119 kings, 50 pinks, 30 chum, and 5 silvers). The average number kept out of commercial catch was 48 salmon. Thus, if that average is applied to the 48 households expected to use that method, the estimated total number of salmon kept out of commercial catch is 48 salmon X 48 households, or 2,304 salmon total.

This figure is 74% less than the estimated 8,752 salmon kept out of commercial nets in 1992 (Fall 1993b). In 1992, salmon kept out of commercial catch supplemented the harvest

recorded on subsistence permits by 147% (8,752 / 5,856). In 2003 the salmon obtained by commercial retention only added an additional 32% to the amount reported caught in subsistence nets (Table 12). These significant decreases demonstrate the effect that changes in the productivity and profitability in theh commercial fishing industry is having on communities like King Cove.

The entire face of the Area M commercial fishery changed considerably between 1992 and 2003 (Table 13). For King Cove specifically, the average commercial fishing household in 1992 brought in 376,000 pounds of fish (all commercial species), and the estimated value of the commercial fish harvest that year was close to $190,000 per fisherman (CFED 2004).

The overall commercial harvest in 2003 was down significantly for King Cove fishers, from 27.8 million pounds in 1992 to 18.3 million pounds in 2003, but because of the sharp decrease in the number of people fishing (from 74 to 44) the average per fisherman was up from 376,000 to 416,000 fish. Even though each fisherman caught more fish on average, the amount of money earned by the average fisherman was down nearly 44%, from $189,000 to $107,000 (CFEC 2004). Significantly fewer King Cove residents are fishing commercially in Area M, their local fishery, making commercial-retention a possibility for fewer households. These households are also less able to provide for the community members who had previously depended on them for gifts of subsistence salmon.

Also, those households that are still commercial fishing can no longer afford to keep fish out of their nets for use in the home, having to sell those fish instead. (These realities were

voiced by community members during the workshop in Sand Point, as well.) The effects of the shifting industry and economics at the local level may be seen in the changing relationship between commercial fisheries and subsistence practices in King Cove, where the decline of one method of obtaining salmon is resulting in a shift, an adjustment toward a different method.

The analysis of the King Cove data shows that the diminishing commercial fish harvests, the value, and the level of participation in the industry are all affecting the way King Cove residents obtain fish for home use. Baseline household harvest data collected for 1992 show that 51.5% of all home use salmon came from commercial catch. The data from 2003 show that the productivity and/or the reliance on that method have diminished significantly.

Independent data sources indicate the use of non-commercial subsistence methods to harvest salmon is increasing. In 2003, the Division of Commercial Fisheries reported that 42 subsistence fishing permits in King Cove harvested a total of 7,142 salmon, an average of 170 per successful household (Table 12). Permit returns in 1992 found that 44 households harvested an average of 134 salmon. (Beyond that, the years 1985-1992 had an average subsistence permit harvest of 142 salmon [ADF&G 2001].) With commercial-retention activity down (due to the need to sell all commercially-caught salmon) and subsistence permit fishing up, it is evident that households are adjusting their subsistence efforts to meet their needs for salmon in the home.

The 2003 average permit return indicates a general increase of 21% since 1992, and 16% since the 1985-1992 period. These data show that the diminished importance of retaining commercially caught salmon for home use coincides with a general increase in subsistence methods. The inability of King Cove households to depend on commercially caught salmon for

home use is causing them to adjust their methods of obtaining these salmon by participating more in the subsistence salmon permit fishery. However, the amount of salmon used by the average household in King Cove has probably decreased over the last few years, since the observed increase in permit reported salmon has not yet matched the amount of salmon formerly contributed by commercial fisheries.

Post Season Survey Results, 2002

Nikolski

Only two Nikolski households (out of nine surveyed in 2002) provided answers on the 2002 Post Season Survey interview (the local assistant did not explain why this was the case). Each of those households have lived and fished in Nikolski for over 20 years. Subsistence fishing mostly takes place on or from the beach directly in front of the village (also documented on the 2002 Calendar for all respondents). These households report nothing unusual about the 2002 harvest, nor any unusual changes or shifts in fish availability or fish health during the recent past.

Akutan

Seven households in Akutan took part in the Post-Season Survey interview in 2002. The respondents have a range of years' experience subsistence fishing, from four to 30 years. Popular fishing areas included the waters surrounding Akutan Island, Akun Island, and Avatanik Island. All households said that the 2002 harvest was an average year. All the households reported processing salmon by one or more methods: drying, smoking, freezing, and salting, all very common, traditional methods, with freezing being the most recent addition. Most said they receive help processing their household's fish, either from extended family or from neighbors, and then share the product with others.

In Akutan, the questions relating to changes in fish populations over the years received a variety of responses. Some households said that the changes, if any, have been negligible. Two households reported that there have been more salmon in the area in recent years, with one mentioning pinks specifically. One household noted that numbers started declining in the 1980s and have continued to decline through recent years. This respondent attributed the change to the waste products from fish processor plants being dumped into the harbor (Immoderate amounts of fish waste are dangerous to marine environments for several reasons. See "Discussion" section.)

False Pass

Only two False Pass households, of seven surveyed, took part in the interview in 2002. These households each had over 20 years residence and experience fishing in False Pass. Both said that they usually fish near the village, generally somewhere between Ikutan Bay to the south and St. Catherine Cove to the north. One household specified the months May through October as their family's fishing period. One household said their harvest was interrupted because their usual location, on the beach immediately in front of the village, was not open for fishing in 2002 by order of ADF&G. Because only two households participated in the Post Season Survey, the survey failed to gauge the full impact of this closure on False Pass subsistence harvests.

Both households seemed to believe that salmon populations have varied up and down year by year, but that the long-term population has been constant. One said specifically that the June sockeye run used to be stronger in the 1980s and early 1990s, but did not elaborate further.

Both households indicated that retaining commercial fish for home use is important to the community of False Pass. One said that nearly all their subsistence salmon for 2002 (about 60 fish) came from their commercial catch, and the other said that, in the past when they were fishing commercially, about half came from that method. This household did not give a reason why they are no longer commercial fishing, but the very low profits reported by False Pass fishers over the last few years may be to blame (CFEC 2004). For more information on the removal of commercial fish for home use, see "King Cove Commercial Retention of Salmon" in the Discussion section.

Unalaska

Seventy-eight households responded to the Permit Survey in Unalaska in 2002, and 70 answered the Post Season Survey. Not every household answered every question on the survey, however. Half of these households were headed by individuals who have lived and fished in the Unalaska area for over 20 years, and eight respondents have fished there for 50 years or more. The most important fishing locations at present are at Wislow/Reese Bay/McLees Lake and Broad Bay. Forty-five respondents (60%) said that their harvest for 2002 was average. Seven households reported catching less than usual in 2002, while 3 households said they caught more.

Processing fish is a family affair in Unalaska, where adults, their parents and children work together to harvest, cut up, and preserve fish. The survey form asked for information about the roles played by family members in the processing of fish, but most positive responses were short and without much detail: "Dad and I catch it, Mom cuts it up," "The whole family helps," or "Husband catches, Wife cuts and cleans, Husband freezes and cooks." No patterns about the role of children, extended family, or gender differences emerged from the data. Most households surveyed used one or more of the following methods of preservation: smoking, drying, canning, pickling, and freezing. (All are more or less traditional methods, with freezing being the most recently adopted method.) Although it was not specifically asked in the interview, seven households stated that they regularly share their catch with family and friends.

Unalaska households have noticed some fluctuations in salmon populations throughout the years. Seventeen respondents noted increases in some salmon species for certain locations,

most notably silvers in the bay immediately in front of the village and sockeye at Reese Bay. About eight years is the estimated period of time during which the increase has been evident. Some have noticed increases in pinks and sockeye as well. About 16 households reported that there were fewer salmon than in other recent years, listing specific locations and species. Some of these responses specifically noted the diminishing salmon populations in Summers Bay since about 1997, which is the location and the year of the grounding of the Japanese refrigerator ship Kuroshima. The resulting oil spill of approximately 39,000 gallons may have affected salmon populations in the vicinity, the respondents believe. TEK interviews with Unalaska residents also mentioned decreased subsistence activity in the Summers Bay area, and tied it directly to concerns about the effects of the oil spill (See A/PIA Taped Interviews, this section).

Post Season surveys in Unalaska show that retaining fish from commercial catches is not an important part of household subsistence, confirming the Division of Subsistence data shown in Table 4. Only three households said that in the past they have kept fish out of commercial harvest for home use, and, of the two that did commercial fish in 2002, neither kept salmon out of commercial catch in 2002.

When asked for additional comments or concerns regarding subsistence fishing in Unalaska, responses ranged widely. A common complaint was that the fishery at Reese Bay (also known as Wislow and/or McLees Lake) is becoming too crowded with other subsistence fishers. (This, along with noted increases in the numbers of fish there: see above.) At the Unalaska workshop in June the local participants voiced their concerns that too many people are moving to their community and are now participating in the fishery at Reese Bay. Another

concern is the restrictions on where and when people may fish in Reese Bay, in place since sometime before 1992 (State of Alaska 5 AAC 01.375(5)). A possible solution to the question of over-crowding, mentioned numerous times in the Post Season Survey responses, is to allow for fishing at night—being limited to daylight hours increases congestion, danger, frustration, and irritation.

The location of markers set at Broad Bay were cited several times as being too far from the mouth of the bay. Others said that they have seen too many people abusing the regulations, over-harvesting, as well as shipping large amounts of fish out of town, which they see as a violation of the true aim of a subsistence fishery.

Post Season Survey Results, 2003

Nikolski

Nikolski was the only community in 2003 to participate in the Post Season survey. Seven households answered questions that were similar to those asked the previous year, where only two households participated.

The 2002 responses were from long-time fishermen from Nikolski; responses in 2003 came from people with a broad range of experience, from one and two years experience to twenty-plus years. Most respondents said that 2003, like 2002, was an average year as far as fish available to harvest. However, one said that the silver salmon run was especially productive and two respondents noted a decline in chum salmon in 2003, attributing the decline to changes in water temperature. The respondents did not specify the kinds of temperature changes they had observed.

Sharing patterns are varied in Nikolski. One household reported having no sharing relationships at all, neither giving nor receiving, and another said they share routinely with everybody in the village. Some households reported a total dependence on receiving fish, being too old to provide for themselves anymore. The population in Nikolski has changed over recent years, and with only 15 households in 2003, an addition or subtraction of only two or three households can have a significant effect on community organization. Changes in household structure (i.e. children moving away, grandparents moving in) and household economics might have affected sharing in Nikolski. The elders interviewed for this project, however, did not indicate that significant changes have occurred, from their point of view.

The 2003 Post Season Survey results for King Cove are described in the "Results" section, "King Cove Subsistence Permit Returns 2003."

TEK Interview Results

In 2002, several interviews were conducted with elders in the communities of Atka and Nikolski. Mr. Davis spent a week in each community, visiting with the participants either individually or in small groups. He directed the questions toward the fisheries of the area, asking about traditional fishing locations and methods, particular observations about changes in the fisheries, as well as peripheral areas regarding other subsistence resources and activities. However, the respondents contributed much more ecological and historical information than just that directly connected to fisheries. The ecosystem approach to wildlife management seeks this broader perspective, however, (see Introduction) and this kind of management paradigm benefits from knowledge of the system components to which fisheries are intrinsically linked.

In addition, as discussed in Miraglia (1998), collecting information from traditional people is most effectively done when the conversations are open and gently directed by the researcher; in all the TEK interviews done for this project, information on other system components, from marine mammals to birds to pollutants, was documented and included in the database presented with this report. With nine people interviewed, over 12 hours of audiotape was recorded and transcribed. The transcriptions were edited and entered into an AskSam database, "The View From The Beach". This searchable text database is similar to the "From Neqa To Tepa" collection of Bristol Bay traditional ecological knowledge.

Atka

In Atka, TEK interviews focused on fish populations, fishing locations, the marine environment, and historical aspects of community and the subsistence fishery around Atka and Amlia Islands. A map showing salmon harvest locations documented by Mr. Davis in 2002 is shown in Figure 4.

Elders talked about the way the community used to gather at Korovin Bay to fish collectively for sockeye salmon in the summer. Atka Island comprises two extensive mountain locales connected by a three-mile-wide, low-lying strip of land. The two bays form either side of this narrow waist of land, Korovin Bay to the west and Nazan Bay, the location of the village of Atka, on the east. Korovin Lake lies on this strip of land and drains a short distance to Korovin Bay. In the past, villagers would walk from the Nazan Bay side and establish fish camps in the summer. The remains of some of these fish camps, including semi-subterranean dwellings called "barabaras" still line the shore of Korovin Bay. In the years before and just after World War II, a community fish trap was used until the USFWS fisheries biologists shut it down around 1949. Atka residents believe that the government official responsible for that decision was observing a territory-wide policy on phasing out fish traps, despite there being no history of over-harvesting or harmful effect on salmon populations. Another fish trap was built in 1981 and used for several years, but by the early 1990s villagers reportedly lost interest in maintaining the trap. Gill nets are apparently easier to maintain than a fish trap, requiring less attendance. They allow the individual fisher more autonomy, as they are easy to manage, and they also allow the fisher to fish in a number of spots during the season (e.g. Nazan Bay for a while, then over to Korovin

Lake stream). Now, most fishing households choose to use gill nets at the Korovin Lake stream site and near the dock on north side of Nazan Bay, across from the village.

In general the knowledgeable elders in Atka report stable salmon populations and dependable harvest levels. One informant described the spawning of sockeye salmon in Korovin Lake. He said that some years the lake is so full of salmon that the banks are covered with spawn, and that the road, which courses along the south shore of the lake, is covered as well. Some years the lake is too full, and fish will retreat toward the bay and detour up into a slow-moving stream that leads off to the north between two old beach berms and spawn in the slow water there.

Some people in Atka travel west to Adak in boats to fish for king salmon, where certain coves are known to have large runs where fishers can troll off-shore or cast from the beach.

Nikolski

Nikolski elders told Mr. Davis about the way the community used to fish for salmon in the small stream that flows out of Umnak Lake, using a communal fish trap. The trap is believed to have been used last in the early 1940s, earlier than the 1949 closure of the fish trap in Atka. It was taken down each fall and set up again in the early summer. There is a picture of the trap, called a “box trap,” which was taken in 1909 or 1910 and is included in the book by Waldemar

Jochelson (2001), recently re-published by Aleutian/Pribilof Islands Association. Respondents said that, when the trap was being used before World War II, it was "closed" during the week days, with the gate down and the salmon pooling up below. On Friday night it would "open" and the fish would pass through until Monday morning, when it was closed again. People in Nikolski would walk down to the trap, which was monitored by an elder or some other adult, and take the fish they needed.

The trap was also set up in late winter, beginning sometime in February, to catch what Nikolski residents calls "winter salmon" or *kiimadgix*.[1] Elders said this was a small salmon, usually around 12 inches long, with rich, oily flesh, and with eggs that were smaller than the other species of salmon. Nikolski elders report that this fish is not seen much anymore. It began to disappear in the 1950s, they say. They did not know the biological relationship of this salmon to other species, but several suggested it might be a type of sockeye salmon.

This fish, *kiimadgix*, might be one of the two species of Pacific salmon that are usually found a few thousand miles west in the northwestern Pacific. The *Oncorhynchus masou* is a species of Pacific salmon commonly known as "cherry salmon" or "masou" that is usually found in the waters near Japan. This species has the smallest maximum length of any of the Pacific salmon species at 71cm (Masuda, et. al., 1984).

A sport fishing guide recently reported identifying a sixth Pacific salmon species in Alaska waters, in a small stream near the village of Nikolski. The newsletter "Redd Fish",

[1] "Kiimadgix: En [Eastern-Nikolski] 1952 winter salmon (fat), has got small roe (in September)" (Bergsland 1994:239).

published by the Bering Sea Fishermen's Association and Four Waters Aquatics (Rowland and Sidorov, 2004) reported that in 2003 a man caught an *Oncorhynchus masou*, or "cherry salmon", in the stream on Sandy Beach, south of Nikolski. (No official identification had been made by US Fish and Wildlife Service or ADF&G personnel when the article was published.) The article says, "The locals had coined them 'Winter Salmon' because they were spawning in the late fall " (2004:10). The article has a picture of the specimen, a small salmonid with small spots on its back and large spots along its sides. However, the Nikolski elders described the *kiimadgix* as looking like a small sockeye, which doesn't have any spots at all. Mr. Davis did not get a chance to show these pictures to the discussants in Nikolski to deny or confirm that this is indeed what they are referring to as *kiimadgix*.

Conservation and habitat management also figured into the traditional salmon fishery in Nikolski. Each spring before the fish started to show up, villagers would dam off the flow of the small stream and clean out debris so the fish would pass unimpeded. Big rocks, storm sediments, driftwood, cans and garbage might have accumulated in the stream and these were all cleared away as a means of assisting and preserving the fish runs. One elder said, "Even then, nobody taught them conservation but they practiced it before the word was invented."

After the fish trap was discontinued in the early 1940s, the villagers began using seines to harvest salmon in Nikolski Bay. The beach seines were about 25 or 30 fathoms long and could be operated by six or eight people. Salmon passed by the shoreline of the bay near the village, and a skiff would tow one end of the seine net out in front of the fish. With the other end anchored to the beach, the skiff would drag the net in an arc encircling the fish, and then bring it

back to the beach, where six or eight people would then help haul the net in with all the fish inside. Use of the seines, the location and timing of the sets, was controlled by a "chief," and the fish were shared among all the families in the village.

Villagers in Nikolski targeted both sockeye and coho salmon equally. An estimated 250-300 salmon per family was generally what was taken for subsistence, and processed, salted, smoked, and dried for winter stores.

Elders report that there are far fewer salmon returning to the stream in Nikolski today than in the past (about 20 years ago). Increased pressure from commercial fishing boats around Umnak Island is one reason given for the diminishing salmon populations.

They also said that the misbehavior of young people, harassing and killing fish going up the stream in the village, is causing the fish returns to decline. Elders believe that molesting the fish as they enter the stream inhibits their reproductive capacity. The cumulative stress of escaping the commercial nets offshore and then the subsistence nets near the beach, with added stress coming from careless individuals in the spawning stream, crosses a threshold with some of the salmon that precludes their healthy spawning.

This corresponds directly with the traditional protective measures described by several respondents, wherein access to the stream (located in the middle of the village) was closely monitored by an adult and children were not allowed to get too near the fish in the stream.

Similarly, one respondent said that they do not set their subsistence seines very close the mouth of the stream in order to avoid stressing the fish at that late stage of their spawning.

As people said in Atka, some respondents in Nikolski mentioned a decrease in fish populations immediately after the Amchitka Island nuclear test blast in November 1971. People said the fish they caught that year were abnormal, with bubbly, diseased flesh. Although the people were told by government scientists that there was no risk of contamination of the food supply, they did not eat or preserve any of the fish that year because of the way the fishes' flesh appeared. Respondents said that after one-and-a-half years, the fish returned to their normal, healthy-looking state.

Other biological information was collected during the TEK interviews in Nikolski. Seal lion and harbor seal populations are both perceived to be going down. One individual attributed the declining sea lion numbers to over-fishing in the Bering Sea by ocean trawlers. Another described the movements of sea lions as responding to changes in fish populations. Observations about marine mammals, a paramount component in the marine food chain, cannot be irrelevant to a well informed, ecology-minded perspective on fisheries.

Today, people in Nikolski fish for salmon with poles, gaff fish in the stream, and seine in the bay near the mouth of the stream. People share their catch, either before or after processing it. Most salmon fishing goes on in June, July, and August, with fishing for Dolly Varden beginning in late May.

Other Aleutian Islands Concerns

In general, the people in Atka believe that the fisheries are in good health. No one who fishes has trouble getting enough fish for themselves, and there are enough fish to share with others. In Nikolski, the consensus is that the salmon fisheries are in a state of decline and have been for a number of decades. Reasons for the decline in Nikolski are ascribed to harassment of fish in the stream by children, the effects of commercial fishing (including factory trawlers), and possibly to environmental factors such as radiation from the Amchitka blast.

Also of concern are the diminishing populations of other resources on which residents of these communities depend for subsistence. Duck populations have been observed to be in flux, with some species vanishing from local areas and others changing their seasonal cycle and taking up year-round residence on local bays. The individuals who observed these anomalies expressed befuddlement and confusion, viewing them as a portent to shifts in the marine ecosystem that they were at a loss to explain. See Figure 5 for current Atka and Amlia Island sea lion hunting locations and haul outs.

Some individuals in Nikolski discussed the increased presence of outsiders visiting the island to sport fish through the lodge run by the village corporation. Fishermen visiting Nikolski often pursue ducks as well, and residents are annoyed with the killing of ducks out-of-season by these visitors. Enforcement of the regulations is inconsistent in this remote village, and some have suggested that the tribal organization or the Nikolski IRA council take a more proactive approach to protecting their duck populations.

Orca, or killer whale, predation is a growing concern for individuals in the Aleutian Islands. Porpoises are said to have been diminishing since the 1970s, as well as humpback whales and sea lions. There is a very strong belief among some residents that the diminished sea lion populations in the Aleutian Islands is the result of increased orca predation. Several individuals report personal observations of orcas attacking and eating sea lions.

Other indirect observations make locals believe that orcas are having an impact on whale populations. While discussing the range of subsistence practices, testimonies on the A/PIA tapes indicate that people in the past have harvested meat and fat from beached whales, and they are attuned to the rates at which whales are beached. People can comment on the condition of the carcass and have some idea of the cause of death. Atkans report seeing fewer bloated, decomposing whale carcasses on the beaches, which to them indicates that the animals are not dying natural deaths but instead are falling prey to orcas. Others have observed some beached whales with scarring from orca attacks. Biological research is confirming the conclusions of these observers, and the destructive capabilities of orcas on other marine mammal populations is becoming more widely acknowledged (Heise et al 2003, Matkin et al 2001).

From an ecosystem point of view, all these observations provide context within which to form a better understanding of the subsistence fisheries of the region. From pollutants to orca predation, from aberrant bird migrations to sea lion relocations, all these species are linked to salmon within the web of the marine ecosystem. Anything scientists can learn about the

environment by considering these non-fish species will likely have a direct effect on their understanding of fisheries.

Lower Alaska Peninsula Communities

Documentation of TEK in the lower Alaska Peninsula communities, and Akutan, was part of the project assigned to Dr. Herbert Maschner and Dr. Katherine Reedy-Maschner, of Idaho State University. Dr. Reedy-Maschner has recently completed her doctoral dissertation work in which she focuses on the importance of commercial fishing industry to the household economy and regional cultural identity of this region (Reedy-Maschner 2004). Ethno-historic sources, as well as contemporary interviews and community-based research, inform the work of Drs. Maschner and Reedy-Maschner, which will be submitted separate from this report (mentioned above as per the suggestion of Ms. Wheeler at FIS, OSM, USFWS).

A/PIA Taped Interviews

The Cultural Heritage Department at A/PIA was able to locate 15 tape recorded interviews with elders and knowledgeable individuals from around the Aleutian Islands and the lower Alaska Peninsula region. (The Investigation Plan specified 22 audio tapes and 3 video

tapes, but the Cultural Heritage Department had recently moved offices and could not locate all their materials.) Information from residents of St. Paul Island, in the Pribilof Islands, is also included. The interviews, conducted by A/PIA staff in 1998 and 1999, contain many observations that fit well with the other types of environmental, biological, and traditional information discussed in this TEK section.

The transcribed texts of 15 interviews were edited for inclusion in the AskSam database prepared for completion of this project. This section of the report highlights some of the observations and points for discussion raised by these local observers.

Knowledge of subsistence (and commercial) fisheries is evident in many of the interviews. One individuals talks about the movement of salmon around points of land and across particular beaches, as well as up into the streams near Unalaska. In general, interviewees report diminished numbers of salmon compared to several decades ago, but in some cases population stability is noted.

Some mention is made of sickly salmon and/or other fish specimens that have been observed—cysts in the flesh or puss or "burns" on the skin. Several people talk about their perception that community waste and pollution is harming the marine habitat near the villages, both sewage and industrial waste from fish plants. Solids and other organic substances discharged into the marine environment can cause damage by building up on the ocean floor, by creating an unhealthy amount of hydrogen sulfide in the immediate vicinity (from their decomposition), spreading disease directly from the fish tissues, and by depleting the oxygen

available in the immediate area for its decomposition (OSPAR 1998). One person ascribed the cause of the "burns" to waste that is dumped into the bay, possibly either the physical result of the hydrogen sulfide concentrations, or the result of a disease.

The effects of the Kuroshima oil spill (mentioned above) on the marine resources near Unalaska are mentioned by all the interviewees in that community. Shellfish populations are diminishing as a result, the respondents believe, and the condition of live clams, shellfish, and finfish are seen to be poor and in some cases abnormal.

In addition to water pollution by city sewage and industrial waste, respondents record their frustration with destruction of terrestrial habitats as well. Bird nesting grounds and plant gathering areas, and places for collecting marine invertebrates in the inter-tidal areas are all being disturbed by construction or by negligent use of all-terrain vehicles, for example.

Bird harvesting areas, traditional practices, and information on habitat and ecological relationships are mentioned in a number of these interviews.

One item that was part of the A/PIA interview script (a particular species that was asked about) was the scavenging of beached whales. People from several communities describe the historical process of finding, examining, harvesting, distributing and preserving whale meat and blubber. As mentioned in the orca discussion above, experience with beached whales has given local residents the ability to gauge the number and condition of these whales, including the

effects of predation and certain specific inter-relationships between members of the marine environment.

Other marine mammals are mentioned frequently in the A/PIA interviews, as they were in the 2002 interviews. Unangax/Unangan subsistence depends heavily on harbor seal, Steller sea lion, and in the Pribilof Islands, northern fur seal. People may venture out onto the water with the intention of fishing for halibut, for example, and will bring a rifle in case a seal presents itself. The way such activities are integrated makes their description useful in coming to understand natural resources as interrelated parts of an ecosystem. It becomes difficult to extract particular information about one species without also considering the species upon which it depends for food, which depend on it for food, or with species that share a common food source, for example.

The complexity of the marine ecosystem is visible to local residents in seemingly anomalous, erratic events. When enough of these observations are documented, patterns may emerge for a more general understanding. In certain locales, people have observed dramatic declines of Steller sea lions, but no change in harbor seal populations. In others, sea lion rookeries are popping up out of the blue, and populations are strong as ever. Of all species discussed in this project, the variability of Steller sea lion populations is the most remarkable. The information can be very useful to biologists and managers who seek to understand the geographic and temporal distribution of this threatened species, as well as the reactions of Aleut hunters to perceived changes. Again, with regard to salmon fisheries, Aleut sea lion hunters

spend a lot of time on the water; they also fish, and understand that many factors tie marine species to one another.

One curious absence is mention of orca predation on sea lions. This is not brought up in the A/PIA tapes of 1999, but it was frequently mentioned in the 2002 interviews in Atka and Nikolski.

Other ecological changes observed in the A/PIA recordings include the balancing act of sea otter and marine invertebrate populations, and one individual makes similar observations regarding king crab and cod, where the populations cycle opposite one another.

"The View From The Beach" Searchable Database

"The View From The Beach" is the name of the CD-ROM attached at the end of this report. It contains important pieces of the TEK interviews done for this project, as well as those taken from the A/PIA interviews. The subject matter is generally related to subsistence fisheries, but also includes information on local residents observations on marine mammals, other marine fishes, weather, community history, pollutants, and other components of the subsistence ecosystem in the Aleutian Islands and lower Alaska Peninsula.

The CD-ROM was created using the AskSam program and contains a free version of AskSam with which to run "The View From The Beach." (The project is designed to run only from the user's computer's CD drive; it is not designed to be copied to and run from another computer's hard drive.) The project opens to the Home page, with the title of the project, an introduction and instructions for using the project. (Instructions and help can be found using the menu items at the top of the AskSam window.)

On the Home page, there are links to "Acknowledgements" and a "Map of the Area", as well as "Keywords." The "Keywords" link describes the way the database is organized, with the names of the communities, the notations used to identify respondents, and subjects mentioned in each data entry. "Link To Database" takes the user to the set of searchable data records containing TEK from FIS02-032.

The database opens up to the first of 229 records. A "Search" box appears at the top of the window, and the user can type the word or words of interest. Any word that appears in a data record can be found with the Search function. The results of the search appear at the bottom of the window (choose View --> Search Results to see/hide the list of records identified by the search). Arrow buttons allow the user to proceed through the data records containing that search item.

For example, if the user types "Atka" in the search box, in the Search Results area at the bottom of the window it says "Found:80", which means that 80 of the 229 records contain the word "Atka" in their text. If the user types "Atka Sea Lion", 12 records are selected that contain

those words. Conducting a new search clears the previous search results and pr oduced a new set of records.

DISCUSSION

Harvest Assessment

The results of the harvest assessment portion of this study can be compared to the harvest estimates made by the Division of Subsistence in the Community Profile Database (CPDB) for each community (Scott et al 2001). For King Cove and Unalaska, additional comparisons can be made with subsistence permit data compiled by the Division of Commercial Fisheries (ADF&G 2003).

In both 2002 and 2003, all the households in Nikolski were interviewed, and the harvest estimates are both much lower than those made for previous years. In 1991, the Division of Subsistence baseline survey project estimated a total subsistence salmon harvest of 1,624 for Nikolski; the surveys done in 2002 for this project estimated the harvest to be 1,137, and for 2003 the number went down to 605 (Table 11).

The 2002 harvest included a large percentage of coho (silver) salmon. The average coho harvest per household was 71 salmon, compared to 46 salmon in 1991. The percentage of total salmon harvested using subsistence methods rose from 30% coho in 1991 to 57% coho in 2002. The reason for this increase is not apparent. No one in Nikolski mentioned the abundance of coho salmon in 2002, but numerous individuals in Unalaska did, where the coho harvests were similarly high. The 2003 harvest indicates that the coho/sockeye ratio was going back down nearly to pre-2002 levels.

Considering the general decrease in the combined salmon harvest for Nikolski, the lower numbers may be part of the normal year-to-year fluctuations for this community, or it may be indicative of other factors. One possible reason might be that population demographic of Nikolski has changed considerably in the past 10 years (Table 14). Between 1990 and 2000 in Nikolski, the number of individuals over 60 years of age dropped from 13 to 8, and the number of individuals younger than 18 years old increased from 7 to 14. Elders becoming unable to participate in the fisheries, changing family and economic situations, and changing employment might have contributed to a trend of diminishing subsistence salmon harvests (US Census 2001).

Although the two respondents of the Post Season Survey in Nikolski indicated that there have been no noticeable changes in fish populations over the last 20 years, those interviewed as part of the Traditional Ecological Knowledge project said that the present runs of salmon are significantly diminished from those of 30-40 years ago. One possible reason for this decrease centered on increased pressure from the commercial fishing fleet, either directly affecting salmon populations or indirectly affecting the marine ecosystem in the area. The other focused on lax

stewardship of the small stream in Nikolski, which is the preferred fishing location for the village.

In Akutan, the 2002 and 2003 harvests of salmon can be compared to the results of a study done in that community by the Division of Subsistence in 1991 (Table 11). In that study, an estimated 24 households harvested 3,042 salmon. The 2002 estimated harvest of 1,070 salmon is significantly smaller, however, the average number of salmon per harvesting household 119 in 2002 and 136 in 1991 did not change significantly. The 2003 estimates indicate something of a rebound from the low overall harvest in 2002, with 1,674 salmon estimated.

The composition of the harvests differed from 1991 to 2002, but the 2002 and 2003 harvests are rather similar (Table 11). In 1991, sockeye composed 57% of the total salmon harvest, coho 13%, pinks 28%; in 2002, sockeye composed 76% of the total salmon, coho 14%, and pinks were only 6%. The 2003 harvest was again 76% sockeye, with 16% pink and 8% coho. No respondents to the Post Season survey in Akutan mentioned that the 2002 and 2003 seasons' sockeye harvests were unusual in any way, although one respondent did mention there being a preponderance of pink salmon in 2003, which is borne out in the harvest species composition comparison.

The efforts to increase the accuracy of harvest assessment in Unalaska resulted in the addition of 15 households' harvest data being added to the count of those households who had already returned their permit to ADF&G in 2002 (Table 11). An additional 756 salmon were

counted, and will be reported to the Division of Commercial Fisheries. These fish were not included in the 2002 Alaska Subsistence Fisheries Annual Report (ADF&G 2003), but the updated harvest information will be included in the 2003 Annual Report.

Table 11 shows the harvest estimates from Unalaska for 1994, 2001, and 2002. The 1994 figures were created as part of a community baseline harvest study by the Division of Subsistence. This study, which is based on reported harvests of individual households regardless of whether or not they used an ADF&G subsistence permit, estimated the subsistence salmon harvest at 16,723 fish (CPDB 2004). For the estimated 700 households in the community in 1994, the average household harvested 24 salmon using subsistence methods.

As mentioned earlier in the report, the harvest estimates created by this type of door-to-door survey method captures harvest data that do not regularly find their way into the permit reporting system, and can provide a guide as to the level of under-counting present in the permit system.

In 2001, using subsistence permit data records, 5,793 salmon were harvested by 164 households in Unalaska, significantly lower than the 1994 estimate made using systematic door-to-door surveys. The 2000 US Census reports estimate total number of occupied households in Dutch Harbor/Unalaska at 834, which makes the average household subistence harvest seven salmon.

For 2002, 180 permits returned to ADF&G reported 6,757 salmon, for a total community household average harvest of eight. Like the 2001 data, this figure probably under-represents the total community harvest because of the way households participate in the permit system. However, some of the perceived deficiencies for the 2002 permit data can be mitigated using the information collected in the Permit Survey effort. The Permit Surveys done in Unalaska found additional fish that were harvested in 2002 that were not reported to ADF&G previously. When these salmon are added to the numbers reported for 2002, the harvest reaches 8,663, with 185 households fishing (Table 9). The average harvest was 10 per household, a increase of 25% for the average household from 2001.

The composition of the 2001 and 2002 Unalaska harvests were fairly similar. 2001 saw a large harvest of sockeye, at 73% of the total harvest, and the sockeye harvest in 2002 was also high at 65%.

Pink and coho salmon harvests were almost equal in 2001. However, the year 2002, as respondents testified in the Post Season surveys, was an exceptionally good year for cohos and these fish composed 26% of the harvest in that year, while in 2001 they only contributed 13%. The 2002 increase in coho salmon was also recorded in the Nikolski harvest, on Umnak Island adjacent to Unalaska Island.

No harvest information for 2002 for Atka was collected in this project, but the Harvest Calendars collected by the local assistant there in 2003 produced a harvest estimate for that year (Table 9). Table 11 compares the available harvest data for Atka between 1992 and 2003.

In 1992, an estimated 18 Atka households harvested 1,454 salmon using all methods (an average of 81 per household). Approximately 23 households harvested 1,322 salmon using subsistence methods in 1994 (averaging 57 per household). Harvest Calendar survey data for 2003 estimate the subsistence harvest at 1,792 salmon, for an average of 64 per household.

The harvest composition for those three years are quite variable. In 1992, sockeye, pink, and coho salmon each accounted for approximately one-third of the harvest, while in 1994 the harvest was almost half pink (47%). The 2003 harvest shows a growing dependence on sockeye salmon in Atka (66% of the harvest), with a steep decline in pink salmon harvests (15%). Because no Post Season Surveys were completed for Atka in 2003, there is no qualitative data to help interpret the shifting harvests indicated by the numerical survey data.

King Cove Commercial Retention of Salmon

The recent downturn in the Area M commercial salmon fishery as a whole is well documented (CFEC 2004): its falling productivity, profitability, and participation rates (Table 13). The subsistence harvest data collected in 2003 for King Cove show how the subsistence patterns in one community are impacted by the changes in the Area M commercial fishery.

Here, King Cove stands as a case study. Other communities in the area, like Sand Point and False Pass, also have a well-documented, generations-long tradition of using commercial caught salmon for food. Like King Cove, their subsistence system is inextricably tied, through the commercial fishery, to such factors as global salmon markets, management of commercial areas, limited entry permit value, as well as the local cash economy. The King Cove case may shed light on how these other Area M fishing communities may change in the near future.

The analysis done using the King Cove harvest data for 2003 shows that commercial fishing households are removing fewer salmon from their commercial harvests for home use, as compared to 1992. This change is very likely directly related to changing regulations and performance of the Area M commercial salmon fishery. The specific changes in commercial fisheries harvest, participation levels, and profits for the community of King Cove (see Results section) provide the context within which to understand the fact that, in 2003, King Cove households appear to be relying less on commercially caught fish for home use and more on fish taken in the subsistence permit fishery. Other data from CFEC also indicate a similar de-escalation of the important commercial fishery for Sand Point and False Pass. They, too, have been impacted by the changes in Area M, and changes in the subsistence salmon situation in those communities should also be expected.

Sand Point's commercial fishing activity (for all species) has, like King Cove's, fallen off in recent years; in 1992 there were 275 permits fished out of that community, down to 165 in 2003. The profits per permit fished for those years fell from $76,000 in 1992 to $55,000 in 2003 (uncorrected for inflation). In False Pass, throughout most of the 1990s there were 16-18

commercial permits fished by local residents; in 2002 it had grown to 23 permits, but 2003 saw only 11 permits fishing out of that community. Profitability had fallen from $118,000 per permit in 1992, to $43,000 in 2002. The following year, 2003, with only half the previous year's fleet fishing, the 11 permits earned an average of $54,000 for the year (CFEC 2004).

Other, more general Commercial Fisheries data for the Area M fishery show the decade-long decline in salmon productivity and profitability, which corresponds with the decline in participation in the fishery and shifts in the way commercial fishing households make use of their catch. The number of salmon purse seiners actually fishing in Area M has declined from 94 in 1991, to 80 in 1996, to 42 in 2002. The other salmon fisheries in Area M, the drift gill net fishery and the set gill net fishery, have seen similar declines in participation, the biggest drops occurring between the 2001 and 2002 seasons. These are accompanied by concomitant drops in the estimated earnings for resident fishermen and the average value of a commercial fishing permit in Area M (CFEC 2004).

While households in King Cove, based on the data collected for this project for 2003, appear to be using subsistence permit fisheries to compensate for diminishing access to commercial harvest retention, it might be assumed that Sand Point and False Pass households would follow a similar pattern. However, the trends in subsistence permit returns from those communities (based on permit return data, imperfect though it is, from ADF&G Division of Commercial Fisheries) do not indicate that more households are subsistence fishing to replace the fish they previously got from commercial catch.

In Sand Point, participation in the subsistence salmon permit fishery appears to be decreasing. In 1992, 76 households request a subsistence fishing permit, whereas in 2002 there were only 31. The average harvest per permit went up from 103 in 1992 to 121 in 2003. The drop off in commercial salmon fishing in Sand Point may have shut down some households that normally fish their subsistence permits using their commercial gear (in between commercial openings, for example, or after the commercial season is over). What this means for the community's overall access to salmon for home use is unclear; the average increase in permit harvest (as reported to ADF&G Division of Commercial Fisheries) is not enough such that subsistence fishing households could distribute their catch to households who are no longer fishing. The tendency for people to subsistence fish without a permit (and thus outside the system for harvest assessment) might also account for the fact that the harvest numbers appear to be dropping significantly.

In False Pass, the ADF&G permit returns show that between 1992 and 2001, the numbers of permits has gone steadily down --from 12 to 4-- but rebounded in 2002 to 14. Perhaps what that indicates is that as the commercial fishery was winding down and profits were falling steeply (see above), individuals chose to focus all their energies on commercial fishing for the market rather than fishing their subsistence permits as well. The rebound in 2002 is hard to explain in these terms, and an in-depth survey in False Pass might be necessary to determine how this small community is dealing with the need for both commercial fishing income and subsistence salmon for use in the home.

With commercial fishing time restricted, harvest restrictions in place, the number of commercial fishing households diminishing, and the decreased ability of commercial fishers to earn a living wage, the families that live and work around Area M are making hard decisions about how to best use their commercial catch. For families that are still able to take their boats out for commercial fishing, the salmon that used to be kept out for home use are most likely now being sold in an attempt to re-coup some of the losses in recent years, leaving a deficit in the amount of salmon available for use in the home. Possibly as a result of this, the King Cove data show that the average harvest of salmon on subsistence permits has increased over the years, most likely accomplished by households that used to take more fish from their commercial catch but now have to make up the difference using their subsistence nets.

Viewed within the context of significant changes in the commercial salmon fishing industry, the need to adjust subsistence strategies seen in King Cove might be expected to trigger changes in Sand Point and False Pass as well. All these communities have a tradition of integrated commercial-subsistence fisheries, and the diminished productivity and profitability of commercial fishing will likely result in pressure on households' use of salmon. While there appears to be a decrease in subsistence permit fishing in Sand Point, and no significant change in False Pass, future research might determine how that need for subsistence salmon is being addressed.

TEK Interviews

The fishing locations mentioned by Atka residents in the 2002 interviews are similar to those named by Veltre and Veltre in 1983 (Figure 4). An important work, Veltre and Veltre provide a basis for comparing changes measured in the 2002 interviews.

The silver salmon spawning data from 2002 do not differ significantly from the 1983. These salmon are still found in approximately eight streams on Atka and Amlia Islands, sometimes in addition to sockeye salmon. At least one silver salmon fishing place on Amlia has a common-use cabin nearby for travelers to use for extended fishing trips or in case of emergency.

Veltre and Veltre (1983:117) report that Korovin Lagoon was a productive chum salmon fishing location. The continued productivity and use of this location was confirmed in 2002. Seining was the preferred method of getting chum salmon, but it is unclear if anyone still seines there frequently.

Veltre and Veltre (1983:120) described the use of a fish trap at the mouth of Korovin Lake stream between 1981 and 1983. The trap was used occasionally until about 1990, but has not been used since then. People in Atka in 2002 acknowledged this, implying that the trap required a community effort, where gill nets offer more freedom for the individual (to accommodate work schedules, for example). Seines are also used only infrequently by

subsistence fishers since the early 1990s. Most people set 25-50 fathom gill nets at various locations around Atka and Amlia Islands for their subsistence salmon.

Nikolski residents reported that porpoise populations have been diminishing since the 1970s, as well as humpback whales and sea lions. People in Atka and Nikolski attribute part of the decline to the increased predation of orcas. Research projects, supported by National Marine Fisheries Service, are using biological as well as local informant data to document the predation of orcas on Steller sea lions (Alaska Fisheries Science Center, 2003). Other recent research is supporting these observations as well, as orcas are becoming more generally accepted as a significant factor in the decrease in Steller sea lion populations, and possibly other species of marine mammals such as humpback whales and beluga whales (Heise, et al. 2003, Matkin, et al. 2001).

Veltre and Veltre's report (1983: 88) showed the major sea lion hunting areas, rookeries and haul out locations on Atka and Amlia Islands, information gathered in 1983. Figure 5 shows the present sea lion hunting areas, and those documented by Veltre and Veltre. In 2002, reports from Atka indicate that many of the places sea lions used to frequent that are near the village are now vacant. Respondents don't have explanations for this, but are assured of the accuracy of their observations around their islands. Hunters report having to go further east, across open and dangerous waters, along the southern edge to the middle and the end of Amlia Island to find sea lions.

CONCLUSIONS

Through harvest assessment tools, Post Season Surveys, and Traditional Ecological Knowledge interviews, the "Subsistence Fisheries Harvest Assessment and Traditional Ecological Knowledge, Lower Alaska Peninsula and Aleutian Islands" project has generated a sizeable body of information with which to interpret and understand the subsistence salmon harvests of the Aleutian Islands and Alaska Peninsula region. Initial efforts to implement the recommendations of the SFHAWG (2000) in six communities have contributed to more accurate harvest assessment and increased tribal and community participation.

As the fisheries of the region continue to come under public scrutiny, including the Area M commercial salmon fishery, these improvements in data collection will help define the customary and traditional relationships that people in this region share with their fisheries resources. The debates over commercial fisheries allocations must not overlook the cultural values, historical foundations, and economic needs of these communities.

The example of King Cove's recent subsistence fishing activity shows that the commercial fishing industry, influenced by global markets, Alaska politics, and North Pacific environmental changes, is seen to be a prime mover for change in some communities' subsistence patterns. Understanding the way commercial and subsistence fishing are co-related in these communities will help managers understand the processes by which communities absorb the changes that threaten their social, economic, and ecological foundations.

To the west, the communities of the Aleutian Islands are escaping the direct effects of Area M commercial fishing restrictions, but documenting their subsistence harvests is no less important. Future allocations may depend on reliable subsistence harvest data from these communities; information regarding pollutants and environmental contamination needs to be adequately documented; and thorough management of the entire North Gulf of Alaska and Bering Sea ecosystem depends on the knowledge of local observers like those who participated in this project.

The results of the project confirm the general understanding that harvests of salmon continue to be an important element of the economic and social fabric of all the study area communities. Whether through TEK interviews or harvest assessment surveys, the study findings indicate continuity in practice and ideals related to subsistence fishing over time. This continuity grows out of the communities' ability to absorb change, to maintain their subsistence way of life despite shifts in other parts of the human-marine ecosystem.

The changes vary from community to community within the region. Unalaska, with the industry built up in its neighbor, Dutch Harbor, is the largest and most developed community in terms of economics, infrastructure, and potential contaminants. Local residents complain of a recent immigration of people who crowd their local fishing places, as well as visitors that deplete fish stocks. Overharvest by commercial fishing boats is also seen as a problem. The problems of localized sewage outfalls, the dumping of fish plant waste, as well as major oil spills have affected the productivity and perceived safety of subsistence resources like salmon, shellfish, and bottomfish. Local people who still participate in subsistence around Unalaska emphasize the

importance of sharing duties and the resulting food with their families and neighbors as a means of maintaining their traditions.

The nuclear tests on Amchitka Island, although proclaimed by the US government at the time to be safe, are perceived by people in Nikolski and Atka to have been seriously detrimental to the fish in the region. Interviews available on the CD-ROM "The View From The Beach" describe the interruptions in subsistence that immediately followed the blasts, as well as the long-term repercussions on fish and marine mammal populations.

Nikolski has undergone a sociological shift in the form of depopulation, which has affected the integrity of kinship and social networks in the community. With fewer and fewer elders remaining in this village, and fewer people elders can teach, some people in Nikolski feel that their neighbors are disrespecting their role as traditional guardians of their subsistence resources.

The socio-economic changes experienced in the commercial fishing communities like King Cove impact the way families organize themselves to harvest subsistence. For generations, households worked from their commercial fishing boats, using commercial gear, to harvest fish for household income as well as household consumption. The ability to maintain an expensive commercial fishing boat has decreased, and many are getting out of the business all together. This, combined with diminished overall productivity of the fishery, has major implications for the way the households in King Cove acquire salmon for home use, and it appears that individual households are responding by enlisting more in the permit subsistence fishery. Research into the

changing harvest patterns in other Area M commercial fishing communities, like Sand Point and False Pass, will show how their unique populations are adapting their subsistence strategies to a new economic environment.

Throughout the Aleutian Islands and lower Alaska Peninsula region subsistence fishing is changing. Individuals, households, networks, and entire communities are adjusting to environmental factors (chronic and periodic pollution, natural shifts in resource distribution), user pressure (over-harvesting, crowding), internal changes of population and demographic shifts, and socio-economic hardship. People in the region display a keen awareness of the changes, and they are reacting to them. By talking to local residents, fisheries managers will be better able to characterize the way subsistence practices—and harvest numbers—fluctuate over the short- and long-term.

RECOMMENDATIONS

The data collected from the Unalaska and King Cove Permit Surveys will be provided to ADF&G Division of Commercial Fisheries, and will become part of the Alaska Subsistence Fisheries Database (ASFDB) (the on-going development of which is funded through FIS01-107 and FIS04-751), and included in the Alaska Subsistence Fisheries 2003 Annual Report. The 2002 Unalaska data were not ready in time for inclusion in the 2002 Annual Report, but the figures will be updated for the 2003 version (ADF&G 2003).

The acknowledged deficiencies in the current ADF&G, Division of Commercial Fisheries-run permit reporting system were addressed directly in the research design and through a three-part effort: to issue subsistence permits locally, to capture undocumented subsistence salmon harvest through the use of the Permit Survey, and to administer the Permit Surveys by a local assistant.

The success of this objective, as well as objectives 2 and 3 from the Investigation Plan, was hindered by the difficult task of coordinating with tribal organizations and employing a local assistant to help collect the data. As discussed earlier, and shown in Table 5, only False Pass, Unalaska, and King Cove participated in the Permit Survey during the two-year project. Sand Point and Nelson Lagoon expressed interest but were unable to find local residents willing to help with the survey work. The time spent by the principal investigator in working with tribal officers to recruit and secure local assistants caused significant delays in collecting data, which

then led to delays in organizing data for presentation. The community meetings in which the study findings were to be discussed were not held during the time allocated during this project, but the Division of Subsistence staff will make efforts to do this over the next year in conjunction with its ongoing work in the region.

For future work of this sort, better communication must exist between the tribes, community members, and ADF&G. The individuals who represented their tribes at the planning and review workshops should have presented the project more thoroughly to their home communities, enlisting more participation from both the tribal organization and the community at large. Presenting the reasons for doing the Permit Surveys well ahead of time will expedite the job of finding local assistants.

Time constraints and the inability to get local research assistants working caused a great delay in the effort to survey commercial fishing households in King Cove and Sand Point. When time was running out, and a local assistant was finally hired in King Cove, the principal investigator decided that, instead of sticking to the research plan (to target every commercial fishing household in the community), to allow the local assistant to contact subsistence fishers and hope that at least some of them were commercial fishers as well. The information collected in King Cove turned out to be some of the most important for this project. However, more time working with each local assistant would have allowed the original sampling plan to work and would have resulted in even better data on the retention of commercial salmon for home use.

The Harvest Calendar survey is being gradually introduced to the communities of Atka, Nikolski, and Akutan. With no permit requirements in these communities, people are not used to reporting their subsistence salmon harvests and were initially wary of the added paperwork requested of them in 2002 and 2003. Yet, a high level of participation was achieved, with all households in Nikolski and Akutan taking part in 2002, and a large percentage of all three communities participating in 2003.

Again, working with the tribes to locate local assistants posed a challenge and slowed down the work of distributing and collecting the Harvest Calendars. However, growing familiarity with the project is helping to facilitate the work. Local assistants in Akutan and Nikolski are in touch with the Division of Subsistence and are helping to coordinate Harvest Calendars for the 2004 season. With future efforts by the Division of Subsistence, the tribes, and the continued increases in cooperation in these communities, the annual Harvest Calendar recording effort can continue to collect data and ensure accurate harvest assessments for these remote communities.

Another goal of the project is to use local vendors for issuing ADF&G Subsistence permits, either the through the tribal office or with a particular individual, in the communities in and around the lower Alaska Peninsula where a permit is required. In 2003 vendors in King Cove and False Pass issued a number of permits, and in 2004 those communities as well as Nelson Lagoon have ADF&G subsistence permits available for issue out of the tribal offices. It is hoped that easier access to permits will increase participation rates, alleviate some of the

negative emotion associated with harvest reporting, and foster an inclusive, comprehensive participation in harvest reporting in these communities.

Mapping is a valuable tool for understanding the changes in subsistence hunting and fishing behaviors over time. The maps created for this project have been simple and fairly narrow in scope. It is hoped that a continued effort to collect TEK from Elders and other knowledgeable individuals in the area will provide a more thorough, complete picture of the historical and contemporary fisheries, and marine ecosystems, in the area.

Integrating oral histories and TEK interviews into a searchable, distributable database was also a goal met by this project. "The View From The Beach" CD-ROM database provides access to hours of traditional knowledge to interested researchers, students, or community members. Once the content and organization is finalized, and community members have a chance to comment on it, copies of "The View From The Beach" will be distributed to schools, tribal offices, and Subsistence Advisory Councils for use as a resource and reference tool.

ACKNOWLEDGEMENTS

The author would like to thank James Fall, Alaska Department of Fish and Game (ADF&G), Division of Subsistence, for his assistance in compiling, writing, and editing this report. Madel Kerlin and Dave Caylor, ADF&G Division of Subsistence, Information Management staff helped compile a lot of the data for this project. Also from the Division of Subsistence, Lisa Scarborough helped with transcribing the TEK interview tapes, Jesse Dizard helped edit the final version of this report, and Pippa Kenner helped create "The View From the Beach" CD-ROM.

Thank you to the U. S. Fish and Wildlife Service, Office of Subsistence Management, for providing the Division of Subsistence $56,292 in funding support for this project through the Fisheries Resource Monitoring Program, under the agreement number 701812J441 (ADF&G Coop #03-015). Project partner Aleutian/Pribilof Islands Association received $39,646 in 2002 for their part in organizing and employing the local assistants, and the partners at Idaho State University received $51,600 for their contribution (not covered in this report).

Polly Wheeler, of the Office of Subsistence Management, Fisheries Information Service, provided valuable assistance in tracking the project progress and editing this report. The partners also appreciate the flexibility she allowed when this project needed an extension of its due date.

Special thanks to all the people who assisted with the survey work in the communities; they were Antone Shelikoff in Akutan, Agnes Shales in False Pass, Janice Krukoff and Cecil Magone in Unalaska, Belinda Valelei and Tanya Kyle in Nikolski, Annie Walker in King Cove, and Julian Thompson in Atka. Connie Fredenberg, A/PIA Natural Resources Coordinator, helped with the search for, and hiring of, local assistants for this project. Also, much thanks to all the individuals who donated their time, their knowledge and their patience, without which this type of work could not be done.

Arnie Shaul, ADF&G, Division of Commercial Fisheries, assisted in the effort to issue subsistence fishing permits locally in False Pass, King Cove, and Nelson Lagoon. Joseph Dinnocenzo, ADF&G, Division of Commercial Fisheries, compiled the data from those permits. They are currently working with the tribal offices in False Pass, King Cove, and Nelson Lagoon to make subsistence permits available locally.

Mark Snigaroff, George Bezezekoff, and Jacob Stepetin all assisted in the field work portion of this study by advising and housing research staff.

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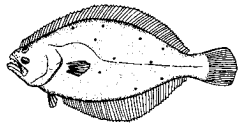
Figure 1. Calendar Survey Form

ATKA SUBSISTENCE FISHING DAILY RECORD, SUMMER 2002

Please record harvest by date, species,
and use the last column for additional notes.



		Number of Fish						
Date	Location Description	Red	King	Dog	Pink	Silver	Other	Notes (Gear, Run Timing, Observations, etc.)

Figure 2. Post Season Survey Form

ALEUTIANS AND ALASKA PENINSULA SUBSISTENCE SALMON SURVEY
2002 FISHING SEASON

COMMUNITY__ _____
HHID/PERMIT_____Date_____

THIS IS AN ANONYMOUS AND CONFIDENTIAL INTERVIEW MEANT TO COLLECT GENERAL INFORMATION ABOUT THE IMPORTANCE OF SUBSISTENCE FISHING IN YOUR COMMUNITY — YOUR NAME WILL NOT BE RELEASED.

1. How long have you fished for subsistence? Where and when do you usually go?

2. Is this year's harvest an average for your household? If not, please explain.

3. How does your household usually process subsistence fish? Who in your household performs the tasks? (e.g. Father and daugher catch fish, mother and daughter cut and dry fish, we give some to Uncle and he smokes it)

4. Have you noticed any changes in fish populations over the years? If yes, describe the changes BY YEAR as best you can (for example, "In the early 1960s the pinks began increasing around here, and in the mid-1970s the silvers started declining in the same streams.") What do you believe is the reason for each change?

5. What percentage of your subsistence fish (home use or to give away) comes from your family's commercial catch? What affects how much fish you keep out for home use?

6. Do you have any other observations or information on the subsistence fisheries in your community?

THANK YOU FOR YOUR PARTICIPATION!

Figure 3. Permit Survey Form

EASTERN ALEUTIANS AREA SUBSISTENCE SALMON FISHERY 2002 *Seq. #* _____

Division of Subsistence, Alaska Department of Fish and Game *Permit #* _____

Community: _____ Interviewer _____

HH/ Name: _____ Date _____

1. Did you or any member of your household subsistence fish for salmon in 2002?
   Yes _____ No _____

2. Did you or any member of your household obtain a subsistence salmon permit for 2002?
   Yes _____ No _____ (If no & fished, skip to Question 4)
   (If no & did not fish, you are done)

3. If you or other household members had a permit, did you return the permit to Fish and Game?
   Yes _____ No _____ Not sure _____
   (Skip to Question 5)

4. If the household did not have a permit or did not return it or lost it, please fill out the following catch report. If the household can't remember dates or locations, just fill in the total harvest in the bottom row.

Did the household subsistence fish? Yes _____ No _____

Note: <u>DO NOT</u> include salmon that other households gave you.
<u>DO</u> include salmon that you caught and gave away.

		Number of salmon harvested					
Date	Location	Kings	Reds	Coho/Silver	Pinks/Humpy	Chums/Dogs	Total
	Totals						

5. Did you remove fish from your commercial catch for home use?
   Yes _____ No _____

6. If yes, how many did you harvest?

		Number of salmon harvested					
Date	Location	Kings	Reds	Coho/Silver	Pinks/Humpy	Chums/Dogs	Total
	Totals						

Figure 4. TEK Interviews, Atka, Present Day Salmon Harvest Locations, 2002

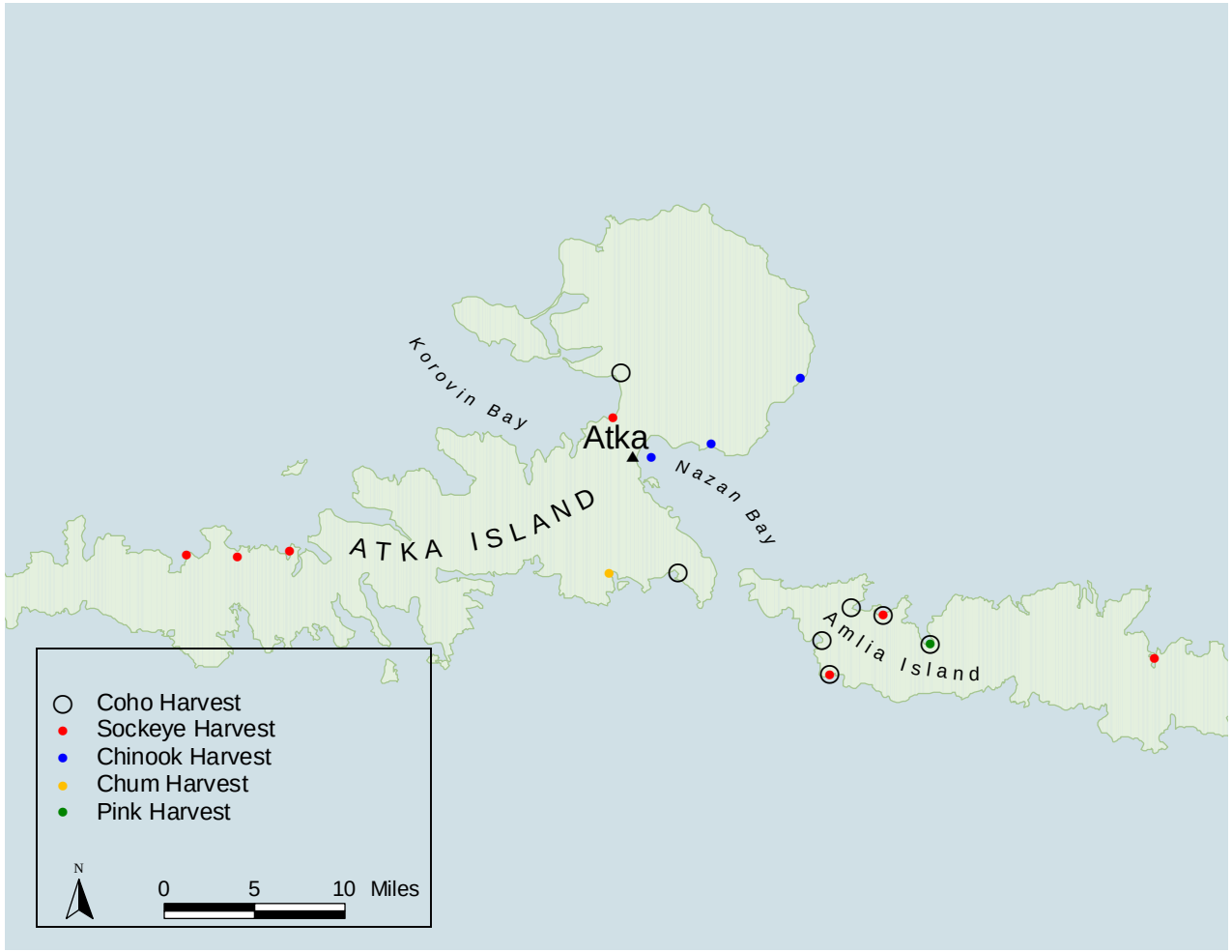


Figure 5. TEK Interviews, Atka, Sea Lion Hunting and Haul Out Locations, 1983 and 2002

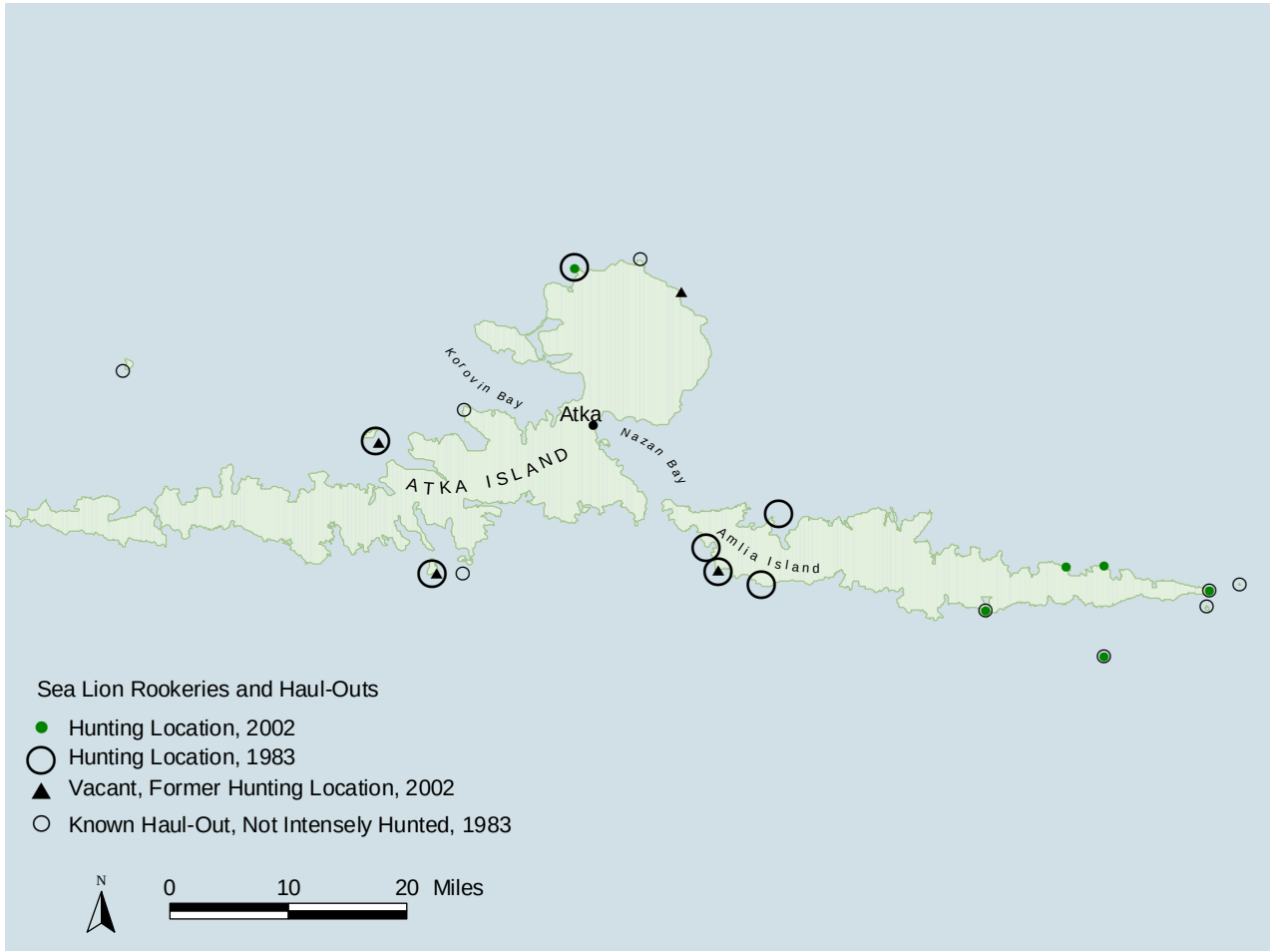


Table 1. Population of Proposed Study Communities, 2000

Community	2000 Population	No. of Households
Adak	316	159
Akutan	75	34
Atka	86	32
Cold Bay	82	36
False Pass	64	22
King Cove	493	170
Nelson Lagoon	83	31
Nikolski	39	15
Sand Point	612	229
Unalaska	2091	834

Note: Excludes group quarters population
Source: US Census Bureau, 2001

Table 2. Salmon Harvests, and Contribution to Average Per Capita Harvest

Community	Study Year	All Resources, Pounds Per Capita	Salmon, Pounds Per Capita	Salmon, As Percent of Total Harvest
Aleutian Islands				
Unalaska	1994	195	54	28%
Nikolski	1990	760	160	21%
Akutan	1990	466	121	26%
Atka	1994	440	95	22%
Lower Alaska Peninsula				
False Pass	1988	412	193	47%
King Cove	1992	256	136	53%
Sand Point	1992	256	137	54%

Source: Scott et al 2001

Table 3. Comparisons of Subsistence Salmon Harvest Estimates, Sand Point and King Cove, 1992

	Number of Salmon		Subsistence Fishing Participation	
Community	Permits	Surveys	Permits Issued	Estimated Number of Fishing HHs from Survey
King Cove	5,856	7,036	61	55
Sand Point	7,833	11,338	77	82

Note: Households may hold multiple permits
Sources: Fall et al. 1993a:61; Fall et al. 1993b:58

Table 4. Sources of Salmon for Home Use

		Percentage of Harvest (number of salmon)		
Community	Study Year	Subsistence Methods	Removal From Commercial Harvests	Rod and Reel
Akutan	1991	93.1%	1.2%	5.7%
Atka	1993	55.4%	10.0%	34.6%
False Pass	1987	39.3%	60.0%	7.0%
King Cove	1992	41.1%	51.3%	7.6%
Nelson Lagoon	1986	52.5%	47.5%	0.0%
Nikolski	1991	83.2%	0.0%	16.8%
Sand Point	1992	58.3%	39.4%	2.3%
Unalaska	1993	62.0%	4.2%	33.8%

Source: Scott et al 2001

Table 5. Community Success in Harvest Assessment, Post Season Surveys, and TEK Interviews, 2002 and 2003

Community	Harvest Assessment 2002	Harvest Assessment 2003	Post-Season Interview 2002	Post-Season Interview 2003	TEK Interviews 2002	TEK Interviews 2003
Adak	--	--	--	--	--	--
Atka	--	Y	--	Y	Y	--
Akutan	Y	Y	Y	--	*	*
Cold Bay	--	--	--	--	*	*
False Pass	Y	--	Y	--	*	*
King Cove	--	Y	--	--	*	*
Nelson Lagoon	--	--	--	--	*	*
Nikolski	Y	Y	Y	Y	Y	--
Sand Point	--	--	--	--	*	*
Unalaska	Y	--	Y	--	--	--

Y denotes a community/task achieved during this project
-- denotes a community/task unachieved during this project
* denotes a community/task to be performed by Drs. Maschner and Reedy-Maschner

Table 6. Local Subsistence Permit Vendor Performance, 2003

	King Cove	False Pass
Vendor Permits Issued	11	8
ADF&G Permits Issued	69	18
Increase in Permits Issued	16%	44%
Vendor Permits Harvest	200	345
ADF&G Permits Harvest	7142	2009
Increase in Harvest Recorded	3%	17%
Percent Vendor Permits Returned	36%	38%
Percent ADF&G Permits Returned	86%	60%

Table 7. Nikolski Subsistence Salmon Harvest, 2002 and 2003

2002 Harvest Calendar Surveys, 14 Households Surveyed (100%)

Month	Sockeye	King	Chum	Pinks	Silvers	Total Salmon
May	0	0	0	8	0	8
July	250	0	0	164	0	414
August	62	0	0	10	473	545
September	0	0	0	0	170	170
Totals	312	0	0	182	643	1137

2003 Harvest Calendar Surveys, 13 Households Surveyed (100%)

Month	Sockeye	King	Chum	Pink	Silver	Total Salmon
July	230	0	0	0	0	230
August	42	12	0	35	40	130
September	15	0	0	0	230	245
Totals	287	12	0	35	270	605

Table 8. Akutan Subsistence Salmon Harvest, 2002 and 2003

2002 Harvest Calendar Surveys, 33 Households Surveyed (100%)

Month	Sockeye	Kings	Chum	Pink	Silvers	Total Salmon
June	680	0	34	0	0	714
July	127	0	10	0	75	212
August	0	0	0	70	39	109
September	2	0	0	0	33	35
Totals	809	0	44	70	147	1070

2003 Harvest Calendar Surveys, 25 Households Surveyed (78%)

Month	Sockeye	King	Chum	Pink	Silver	Total Salmon
May	1	0	0	0	0	1
June	681	0	0	54	3	737
July	483	3	0	91	0	576
August	105	0	0	131	28	264
September	0	0	0	0	96	96
Totals	1270	3	0	275	127	1674

Table 9. Atka Subsistence Salmon Harvest, 2003

2003 Harvest Calendars, 23 Households Surveyed (82% sample)

Month	Sockeye	King	Chum	Pink	Silver	Total Salmon
June	323	6	0	24	0	353
July	442	0	0	53	58	553
August	422	2	0	187	275	886
Totals	1187	8	0	264	333	1792

Table 10. Unalaska Subsistence Salmon Harvest, 2002

180 ADF&G Division of Commercial Fisheries Subsistence Permits						
	Sockeye	**Kings**	**Chum**	**Pink**	**Silvers**	**Total Salmon**
All Months	5598	2	65	385	707	6757

Permit Survey Results: 15 HHs' harvest not reported on ADF&G Permit						
Month	**Sockeye**	**Kings**	**Chum**	**Pink**	**Silvers**	**Total Salmon**
June	118	0	0	0	80	198
July	265	0	0	0	6	271
August	70	0	6	25	0	101
September	0	0	0	50	95	145
Unknown	30	0	0	0	6	36
Totals	488	0	6	75	187	751

2002 Harvest Estimate, Updated, 195 permits of 225						
	Sockeye	**Kings**	**Chum**	**Pink**	**Silvers**	**Total Salmon**
All Months	6086	2	71	460	894	7508

2002 Harvest Estimate, Expanded, 225 permits (Exp. Factor: 1.1538)						
	Sockeye	**Kings**	**Chum**	**Pink**	**Silvers**	**Total Salmon**
All Months	7022	2	82	531	1031	8663

Table 11. Subsistence Harvest Characteristics, Historical Comparisons

	Nikolski 1991	Nikolski 2002	Nikolski 2003	Akutan 1991	Akutan 2002	Akutan 2003	Atka 1992[1]	Atka 1994	Atka 2003	Unalaska 1994	Unalaska 2001[2]	Unalaska 2002[2]	Unalaska 2002 (Survey Results)[3]	Unalaska 2002 Combined
Total Salmon Harvest	1,624	1,137	605	3,042	1,070	1,674	1,454	1,322	1,792	16,723	5,793	6,757	751	8,663
Number of Surveys	12	14	13	24	33	32	18	23	23	128	164	180	15	185
Number of Households	12	14	13	24	33	32	18	23	28	700	834	834	--	834
Average Household Harvest (numbers of salmon)	135	126	86	127	32	52	81	103	64	24	7	8	--	10
Percent Sockeye	58%	27%	47%	57%	76%	76%	35%	19%	66%	55%	73%	64%	65%	65%
Percent Coho	30%	57%	45%	13%	14%	8%	32%	25%	19%	14%	13%	27%	25%	26%
Percent Pink	10%	16%	6%	28%	6%	16%	32%	47%	15%	26%	14%	9%	10%	10%
Percent Chum	2%	0%	0%	1%	4%	0%	1%	8%	0%	3%	1%	0%	0%	0%
Percent King	0%	0%	2%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%

[1]Source: Division of Subsistence. Includes harvests for home use by all methods, including subsistence nets, rod & reel, and removal from commercial harvests

[2] Source: ADF&G, Division of Commercial Fisheries Subsistence Permit Data

[3] 5 new households, 10 households with additional fish to add to original

Table 12. King Cove, Subsistence Salmon Harvest, Permit Totals, and with the Addition of Salmon Retained From Commercial Catch, 1992 and 2003

	1992			2003		
	Permit Returns	Commercial Retention	Combined Total	Permit Returns	Commercial Retention	Combined Total
Sockeye	1452	4744	6196	3868	1495	5363
Coho	2891	1645	4536	2541	20	2561
Pink	327	996	1323	110	198	308
Chum	1177	1026	2203	608	119	727
King	9	341	350	15	472	487
Total Salmon	5856	8752	14608	7142	2304	9446
Average Permit	134			170		
Percent Increase*			147%			32%

* Calculated (Commercial Retention/Permit Returns)

Source: ADF&G 2001:61

Table 13. Commercial Fishing Statistics for Area M Salmon Fisheries (Combined Gear Types), 1990-2002

Year	Total Resident Permits	Total Permits	Resident Total Permits Fished	Total Permits Fished	Resident Total Pounds	Total Pounds	Resident Average Pounds	Average Pounds	Total Earnings	Resident Average Earnings	Average Earnings	Average Permit Price
1990	285	404	274	393	34,051,311	51,248,790	369,303	392,342	$51,334,459	$351,414	$381,601	$704,296
1991	283	404	274	392	55,019,326	74,124,716	592,596	586,719	$31,768,776	$230,429	$239,430	$719,500
1992	283	403	272	392	62,650,948	88,848,697	690,047	695,906	$69,054,772	$489,214	$511,520	$612,400
1993	284	404	278	398	62,072,129	85,500,912	668,934	654,259	$41,382,259	$288,684	$302,475	$716,800
1994	281	402	273	391	56,905,400	79,567,562	617,039	633,263	$37,538,205	$264,519	$280,924	$631,100
1995	279	402	270	391	78,028,704	108,008,662	848,965	868,187	$50,130,191	$359,902	$377,103	$597,300
1996	274	402	256	373	25,469,609	37,182,998	303,514	310,635	$20,187,034	$145,750	$155,641	$581,700
1997	271	401	239	350	26,822,377	38,834,282	350,141	349,467	$26,104,111	$202,865	$210,272	$548,200
1998	267	399	240	350	40,392,941	54,332,145	543,777	572,435	$27,840,220	$235,555	$245,946	$473,600
1999	270	398	237	341	45,181,473	58,547,562	634,343	651,959	$34,255,985	$309,682	$323,221	$315,000
2000	267	395	232	341	30,058,229	45,518,383	419,670	458,361	$24,301,469	$195,292	$210,450	$284,100
2001	264	394	208	299	27,428,530	35,506,273	430,891	459,163	$8,552,961	$85,272	$92,633	$245,100
2002	266	394	174	244	23,929,407	29,596,711	496,275	499,460	$7,595,869	$97,222	$100,149	$127,000

Source: CFEC 2004

Table 14. Nikolski Population Characteristics, 1990 and 2000

Population Characteristic	1990	2000
Population	35	39
Number of Households	19	15
Number of Family Households	10	12
Number of Adults Over 60 Years Old	13	8
Number of Children Under 18 Years Old	7	14
Percent of Adult Population Employed	47%	56%

Source: US Census 1990, 2000

Appendix 1. “The View From The Beach” TEK Database CD