THE SUBSISTENCE SALMON FISHERY IN THE NORTON SOUND, PORT CLARENCE, AND KOTZEBUE DISTRICTS, 1994

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ABSTRACT

This report provides estimates of the number of salmon harvested for subsistence in 1994 by residents of 1,169 households in 20 communities in northwest Alaska, including 839 households in 10 communities in the Norton Sound District, 151 households in two communities in the Port Clarence District, and 557 households in 8 communities in the Kotzebue District. It was estimated that 1,237 households in the sampled communities usually fished for salmon for subsistence, and of those 1,028 (83 percent) were contacted. The sample also included 141 households that usually do not fish. The larger communities of Nome and Kotzebue were not included in the sample, but Nome harvests were estimated from permit data.

It was estimated that residents of the study communities harvested 190,063 salmon for subsistence uses in 1994. The estimated harvest included 7,213 chinook salmon, 3,414 sockeye salmon, 24,494 coho salmon, 78,954 pink salmon, and 75,489 chum salmon. Of these, 126,745 salmon were harvested in the Norton Sound District, 10,918 were harvested in the Port Clarence District, and 52,400 were harvested in the Kotzebue District. The estimated mean salmon harvest was 122.9 salmon per household, which included 5.0 chinook salmon, 2.2 sockeye salmon, 15.8 coho salmon, 51.0 pink salmon, and 48.8 chum salmon. About 16 percent of all the salmon harvested in northwest Alaska were fed to dogs; 69 percent of the salmon fed to dogs were chum salmon, and 26 percent were pink salmon.

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The field work would have been impossible without the financial and administrative support of the Bering Sea Fishermen's Association, represented by Dan Albrecht and Karen Gillis. In the Norton Sound and Port Clarence districts, project support also was provided by Kawerak Inc., represented by Ruth Coppock, Charlie Johnson, Art Nelson, Eileen Norbert, and Jake Olanna. In the Kotzebue District, project support also was provided by Maniilaq Association, represented by Art Ivanoff. For the Department of Fish and Game, field work was coordinated by Susan Bucknell and Vicki Vanek, data entry was handled by Sandy Skaggs, and the final report was edited by Elizabeth Andrews and Susan Georgette. Administrative support was provided by Vicky Leffingwell, Ana Lewis, Zella McBrayer, and Kathy Sherman. The Division of Commercial Fisheries and Management, represented by Fred Bue, Tom Kron, Tracy Lingnau, and Charles Lean, provided funding for the project, administered the Nome subdistrict salmon permit system, and provided many helpful comments and suggestions. The project as a whole was ably coordinated by Elizabeth Andrews, regional program manager for the Division of Subsistence.

INTRODUCTION

Subsistence salmon fishing has been a major feature of life in northwest Alaska for centuries. Coastal sites in the area with fishing artifacts date to more than 4,000 years ago, and it is probable that earlier sites have been obscured by rising sea levels (Anderson 1984:84). Salmon, along with marine mammals and terrestrial mammals, likely were among the foundations of the ancient subsistence economy and they remained an essential component to the present day. In the 1990s, salmon's role in the wild food diet varied from community to community, affected primarily by salmon abundance. Reliable contemporary subsistence harvest data have been scarce, but for northwest Alaska communities with at least one full year of documented harvests, salmon averaged about 13 percent (by edible weight) of the estimated total subsistence harvests (Alaska Department of Fish and Game 1993). Estimated salmon harvests ranged from almost 39 percent of the total (in Stebbins) to less than 1 percent of the total (in Kivalina).

In 1994, the Department of Fish and Game initiated a new subsistence salmon harvest assessment effort in northwest Alaska, which provided more extensive, complete, and reliable salmon harvest estimates than existed previously. This effort provided estimates of the number of salmon harvested for subsistence in 20 selected communities in northwest Alaska in 1994, including 10 of the 13 communities in the Norton Sound District, both of the 2 communities in the Port Clarence District, and 8 of the 13 communities in the Kotzebue Sound District. A number of entities cooperated on this project. In the department, both the Division of Commercial Fisheries Management and Development and the Division of Subsistence participated. The National Park Service funded research in Wales, Deering, and Noatak. The Bering Sea Fishermen's Association, Kawerak Incorporated, the Native Village of Deering, and the Native Village of Noatak all contracted with local researchers to collect harvest data.

Research Problem

In the 1990s, declining chum salmon abundance throughout western Alaska emphasized the need for better subsistence salmon harvest data. Western Alaska salmon stocks are harvested by subsistence, commercial,

and sport fisheries, and under state law subsistence uses have a priority over other consumptive uses. Harvest information was readily available for the commercial fisheries, but was incomplete for some of the subsistence fisheries. The lack of reliable subsistence salmon harvest information has made it more difficult to properly manage these fisheries and to provide for the subsistence priority.

In the Yukon and Kuskokwim River drainages, the Alaska Department of Fish and Game has conducted subsistence salmon harvest surveys for about 30 years. Beginning in the late 1980s, survey techniques for the communities in the Yukon and Kuskokwim drainages were refined to increase the reliability and comparability of the data between years. These recent data, in particular, have become an important source of information in the management process.

In northwest Alaska, the Alaska Department of Fish and Game also conducted subsistence salmon surveys from 1963 through 1985 using a combination of surveys, calendars, and permits. Permit data collection methods were the most consistent over time, but were applied only to residents of Nome. Survey and calendar data collection methods were less consistent, and were applied only to selected communities in the region, usually those near commercial salmon fisheries. For some communities harvest data may be substantially complete for some years, but no sampling data were recorded. For other communities, harvest data are incomplete or missing altogether, and no sampling data were recorded. Survey and calendar sampling methods and instruments (if any) were rarely documented. Personnel and methods varied from year to year. The survey and calendar data were published as simple, unexpanded data, with no adjustments for variations in sampling fractions from year to year. Given these methodological limitations, year-to-year and community-to-community comparisons of these data were unreliable. In 1986, facing declining budgets and recognizing the limitations of existing procedures, the Division of Commercial Fisheries Management and Development discontinued subsistence salmon surveys in Norton Sound, Port Clarence, and Kotzebue Sound. But by 1993, it became apparent that managers needed more reliable subsistence salmon harvest data from northwest Alaska. The improved survey methods implemented on the Yukon and Kuskokwim rivers in the late 1980s were working well, and in this project managers applied those methods to northwest Alaska.

The purpose of this project was to estimate the total number of salmon harvested for subsistence uses in selected communities in northwest Alaska (Appendix 1). Additional information also was collected on the use of salmon for dog food, the sharing of salmon, and the adequacy of subsistence harvests to meet subsistence needs (Appendix 1). The objective of this project was to compile and publish estimates of subsistence harvests by community, by subdistrict, by district, and by area for each of the five salmon species in the area.

The subsistence salmon harvests of northwest Alaska have been described and documented in several other sources. The Division of Commercial Fisheries Management and Development (CFMD) of the Alaska Department of Fish and Game published an annual management report with commercial and subsistence fishery summaries and harvest reports, which included the 1963-1985 survey data discussed above (Lean et al. 1995). The Division of Subsistence of the Alaska Department of Fish and Game maintained a database of subsistence harvest information, and published several technical papers with information on harvests by residents of specific communities (Alaska Department of Fish and Game 1993; Conger and Magdanz 1990; Georgette and Loon 1993; Magdanz 1992; Magdanz and Seitz, in press).

Methods and Procedures

The collection of salmon harvest data for this project involved three different harvest assessment procedures in three different sets of communities. The first procedure was developed for this project following the Yukon-Kuskokwim survey model, and used a two-page salmon survey in fifteen communities (Appendices 2 and 3). For the purposes of this report, this procedure was known as the "salmon harvest survey procedure." The second procedure followed the Division of Subsistence's standard baseline harvest survey, and used a comprehensive 25-page survey in three communities. In these communities, the Division of Subsistence and the National Park Service were cooperating as part of a larger ethnographic project associated with the Bering Land Bridge National Preserve. This procedure was known as the "baseline harvest survey procedure." The third procedure was a salmon permit system mandated by regulation in subdistrict 1 (Nome) of the Norton Sound District, where fishing households were required to record

subsistence salmon harvests on a permit calendar. This was known as the "salmon harvest permit procedure."

Limitations & Assumptions

There were a number of limitations and assumptions in the study. Not all the communities in northwest Alaska were included in the project. The decisions about which communities to include and exclude were made in consultation with fishery managers. In selecting communities for inclusion in this study, researchers considered: (1) condition of local salmon stocks, (2) level of exploitation of local salmon stocks, and (3) proximity to commercial salmon fisheries. Communities with depressed salmon stocks, high salmon exploitation rates, and local commercial salmon fisheries were more likely to be included. Gambell and Savoonga on St. Lawrence Island, Ingalik on Little Diomede Island, Buckland, Selawik, Kivalina, and Point Hope were not included in the survey plan. Kotzebue was included in the survey plan, but staffing and funding limitations resulted in cancellation of the Kotzebue effort which, because of Kotzebue's large size, was the most time-consuming of all the study communities. Previous survey data were available for Kotzebue from 1986 and 1991, and a household list was developed for use in Kotzebue in 1995.

The two harvest survey procedures relied on respondent recall, and researchers assumed respondents could remember their salmon harvests. Most of the surveys were completed within four months after salmon fishing had concluded. But in two communities (Noatak and Deering) surveys were not conducted until March, seven months after salmon fishing had concluded. Surveys and permits were administered one to a household, and implicit in this procedure was the assumption that each household harvested or stored its salmon independent of other households. In many cases, however, households cooperatively harvested salmon and, in some cases, households cooperatively stored salmon. Researchers anticipated these cooperative arrangements. Both survey instruments attempted to identify cooperating households and to segregate one household's share of the salmon harvest from other households' shares. But in practice, this proved difficult to do for some households in a few communities.

Compared with salmon fisheries elsewhere in Alaska, subsistence salmon fishing was minimally regulated in northwest Alaska, with no harvest limitations except in Norton Sound subdistrict 1 (Nome). Fishing was open seven days a week, except in Norton Sound subdistricts 1 and 6 (Unalakleet) and the Port Clarence District. In some areas in the Nome and Unalakleet subdistricts, gillnets were limited in length during part or all of the fishing season. Otherwise, there were few regulations affecting subsistence salmon fishing in most of northwest Alaska, and there was virtually no enforcement risk to survey respondents who provided harvest data. Nonetheless, "Fish and Game" historically has enforced the whole spectrum of fish and wildlife regulations, and many residents of northwest Alaska perceived all fishery agency employees as "game wardens." Some respondents were reluctant to provide any information about harvests, perhaps out of fear of enforcement consequences. The enforcement bias was expected to be strongest in Nome, where harvests have been limited and limits were enforced through permits dispensed at the Department of Fish and Game office. In Nome, fishing households who reported excess harvests on their permits could expect enforcement consequences. Therefore, the Nome permit data should be considered a minimum estimate of harvests. Limitations to the Nome permit data were discussed more thoroughly in Magdanz (1992:3, 46-54).

Standardization in data collection procedures was made more difficult because approximately 30 different people gathered data for this project, most of whom lived in the study communities (Table 1). Six department employees served as project managers, and at least one of the six was present in each of the 20 study communities during data collection. The managers were responsible for standardization and quality control, especially in sampling procedures. In most communities, the project also contracted with from one to three local residents for data collection. One important advantage of having local residents as field researchers was their familiarity with local fishing families and fishing conditions. Another advantage was that they were known in their communities and not burdened by the enforcement bias associated with agency employees.

Researchers believed that the most effective way to deal with the respondent recall bias and enforcement bias limitations was by thoroughly informing field researchers and respondents of the purpose of the surveys, of the intended use of the data, of the analysis techniques that would obscure household

TABLE 1. PROJECT STAFF

Community	Project Managers	Field Researchers
Ambler	Susan Bucknell	Myra Jones, Mary K. Williams
Brevig Mission	Vicki Vanek	Michael Olanna
Deering	Jim Magdanz	Dave Andersen, Denise Iyatunguk, Shirley Moto, Fred Tocktoo
Elim	Dave Andersen	Stanton Nakarak
Golovin	Vicki Vanek	Thomas Punguk
Kiana	Susan Bucknell, Amy Paige	Elmer Jackson
Kobuk	Susan Bucknell	Ethel Wood Sr.
Koyuk	Vicki Vanek	Lloyd K. Kimoktoak
Noatak	Jim Magdanz	Clarence Alexander, Dolly Booth, Jim Marcotte, Bert Mitchell, Bessie Monroe
Nome, Solomon	Charles Lean	ADF&G staff
Noorvik	Susan Bucknell	Marlene Jackson
Shaktoolik	Amy Paige	William Takak
Shungnak	Susan Bucknell	Miki Jones
St. Michael	Vicki Vanek	Pius Washington
Stebbins	Amy Paige	Cornelius Dan, Ted Katcheak
Teller	Vicki Vanek	Sam Komok
Unalakleet	Susan Bucknell, Vicki Vanek	Dawn Blankenship, Warren Katchetag
Wales	Jim Magdanz	Clarence Alexander, Jim Marcotte, Jake Olanna, Frank Oxereok, Fred Tocktoo, Emma Weyapuk
White Mountain	Dave Andersen	Robert Charles

identities, and of respondents' right to refuse to participate in the survey. The results of the survey were mailed to all survey respondents to further inform respondents of the nature and extent of the survey project. Respondent recall bias and enforcement bias are not expected to change significantly over time, their effects on data are expected to be consistent, and they should not adversely affect the comparisons of data from year to year.

Samples

The sampling procedures for this study varied depending upon which of the three procedures was used to collect harvest information. Table 2 lists the communities in northwest Alaska and summarizes the samples. In the salmon harvest survey procedure, researchers attempted to contact 100 percent of the households in each community. The first question on the salmon survey asked household respondents, "Does this household usually subsistence fish for salmon?" On the basis of their responses each household was assigned to one of two strata, "usually fish," and "do not usually fish." In the future, researchers will continue to census households in the "usually fish" stratum in each community, but will randomly sample households in the "do not usually fish" stratum. In the baseline harvest survey procedure, researchers attempted to obtain a 100 percent sample of the households in each community. In the salmon harvest permit procedure, fishing households identified themselves by coming to the department offices in Nome to obtain a permit. The Nome sample consisted only of self-identified fishing households.

Variables

The most important variable in this study was the number of salmon harvested by species. Each of the three procedures collected data on the number of salmon harvested by species. But each procedure employed a different instrument, and other variables differed among the instruments. Table 3 shows which variables were collected by each of the three instruments used in this project. The baseline harvest survey instrument included hundreds of other variables not relevant to this project, and those were not listed here. The salmon harvest survey instruments appear in this report as Appendix 2 and Appendix 3.

TABLE 2. CHARACTERISTICS OF COMMUNITIES IN NORTHWEST ALASKA, AND 1994 SAMPLE PERCENTAGES

	1990 Census		1994 Harvest Estimation Study			
	Population	Number of Households	Method Used to Estimate Salmon Harvests	Estimated Number of Households	Number of Households Contacted	Percentage of Households Sampled
NORTON SOUND DISTRICT						
Nome	3,500	1,119	Permits	na	na	na
Solomon	6	4	Permits	na	na	na
Council	8	3	Not Surveyed	3	0	0%
Golovin	127	42	Survey	42	41	98%
White Mountain	180	58	Survey	66	10	15%
Elim	264	73	Survey	74	64	86%
Koyuk	231	61	Survey	69	59	86%
Shaktoolik	178	46	Survey	49	46	94%
Unalakleet	714	207	Survey	233	204	88%
Gambell	525	120	Not Surveyed	120	0	0%
Savoonga	519	116	Not Surveyed	116	0	0%
St. Michael	295	69	Survey	76	70	92%
Stebbins	400	86	Survey	95	50	53%
Norton Sound District	6,947	2,004		943	544	58%
PORT CLARENCE DISTRICT						
Brevig Mission	198	53	Survey	63	57	90%
Port Clarence CDP	26	0	Not Surveyed	0	0	0%
Teller	232	68	Survey	82	64	78%
Port Clarence District	456	121		145	121	83%
KOTZEBUE DISTRICT						
Ambler	311	71	Survey	74	29	39%
Buckland	318	69	Not Surveyed	69	0	0%
Deering	157	44	Survey*	44	38	86%
Kiana	385	91	Survey	104	59	57%
Kivalina	317	67	Not Surveyed	67	0	0%
Kobuk	69	18	Survey	24	22	92%
Kotzebue	2,751	764	Not Surveyed	764	0	0%
Noatak	333	74	Survey*	84	68	81%
Noorvik	531	107	Survey	122	64	52%
Point Hope	639	143	Not Surveyed	143	0	0%
Selawik	596	129	Not Surveyed	129	0	0%
Shishmaref	456	119	Not Surveyed	119	0	0%
Shungnak	223	54	Survey	55	52	95%
Ingalik (Diomede)	178	41	Not Surveyed	41	0	0%
Wales	161	49	Survey*	50	43	86%
Balance of NWAB	122	38	Not Surveyed	38	0	0%
Kotzebue District	7,547	1,878		1,927	375	19%
TOTALS	14,950	4,003		3,015	1,040	34%

* Baseline survey conducted for the National Park Service included all fish and wildlife species.

TABLE 3. VARIABLES FOR SALMON HARVEST SURVEYS AND PERMITS, 1994.

	Salmon Harvest Survey	Baseline Harvest Survey	Salmon Harvest Permit
Number of salmon harvested	Yes	Yes	Yes
Number of sheefish harvested (Kotzebue District only)	Yes	Yes	
Type and size of fishing gear	Yes		Yes
Location of salmon fishing			Yes
Participation in commercial fishery	Yes	Yes	
Number of salmon reserved for subsistence from commercial fishery	Yes	Yes	
Number of people living in household	Yes	Yes	
Use of salmon for dog food	Yes		
Estimates of proportion of salmon in total wild food harvest	Yes		
Estimates of proportion of salmon shared	Yes		
Evaluation of whether subsistence salmon needs were met in 1994	Yes	Yes	

Procedures

Data collection varied for each of the three procedures. In the salmon harvest survey procedure, a department researcher traveled to each community between October 1994 and January 1995. The local government was asked to identify a contractor to collect harvest information in each community. The researcher and the contractor obtained or compiled a list of occupied households in the community. With the assistance of key respondents, the researcher stratified the list into "usually fish" and "usually do not fish" households. The contractor and the researcher then worked simultaneously to contact all the households on the list and administer a survey, tracking their progress on the household list. The baseline harvest survey procedure was similar, except that the household list was not stratified, because no stratification was used in the baseline procedure. Because the baseline harvest survey was much longer than the salmon survey, two or three department researchers and two or three contractors were used in each community. The baseline procedure was used with residents of Deering, Noatak, and Wales.

The key difference between the survey procedures and the salmon permit procedure was in the responsibility for collecting the data. For the surveys, department staff or contractors were responsible for collecting the data. For the permits, the fishing households themselves were responsible for collecting the data. At the beginning of the salmon fishing season, salmon fishing households were required to come by the department offices in Nome and apply for a permit. Their application was logged in department records, and they were given a calendar on which to record harvest. After the fishing season, they were required to return the completed calendar to the department by October 31, whether or not they had actually fished. Before and after the deadline, the department aired reminders on the local radio stations asking permittees to mail in or bring by their permits to the department. After the deadline, the department mailed two series of reminder letters to permittees who had failed to return their permits. Failure to return a permit was grounds for denying a permit in subsequent years. The permit procedure applied only to subsistence salmon fishing from Cape Douglas to Rocky Point (which includes Norton Sound subdistrict 1) and in Salmon Lake and the Pilgrim River drainage in the Port Clarence District, all of which were used primarily by

Nome residents for salmon fishing. Some Nome residents also obtained permits for subsistence salmon fishing in the Niukluk River (subdistrict 2), although this was not required by regulation. Thus "Nome" appears three times in the summary harvest tables, once for each subdistrict or district in which Nome residents obtained permits.

Analysis

Once surveys had been completed, each community's surveys were reviewed by a project supervisor who, in most cases, was not the same person who had supervised data collection in that community. Then the data were entered into personal computers for analysis. Analysis procedures varied, depending upon which sampling procedure had been employed. The salmon survey data, which had been collected from stratified samples, were expanded by stratum to estimate total community harvests with expansion factors varying by stratum depending upon the sampling rate. The average community catch (C_k) was estimated for salmon species from the composite catch per household data. Mean community catch (C_k) was estimated by:

$$C_k = \Sigma^1_{i=0} (N_{ki} * C_{ki}) / \Sigma^1_{i=0} N_{ki}$$

where... k = community
i = indicates whether the group "usually fishes" (1) or "usually does not fish"(0)
N_{ki} = number of households that "usually fish" or "usually do not fish "
C_{ki} = mean harvest for households that "usually fish" or "usually do not fish"

The total community catch (T_k) was estimated by:

$$T_k = \Sigma^1_{i=0} (N_{ki} * C_{ki})$$

Its variance (V_k) includes a finite population correction factor:

$$V_k = \Sigma^1_{i=0} ((N_{ki}^2)(_1-(n_{ki}/ N_{ki}))(s_{ki}^2/ n_{ki}))$$

where... n_{ki} = number of households for which information is available that "usually fish" or "usually do not fish"
S_{ki}^2 = variance for the amount harvested for the "usually fish" or "usually do not fish" households.

If fewer than 30 households and less than 50 percent of all households in a community were contacted, then the community harvests were not estimated. In 1994, samples were insufficient for expansion for surveys in White Mountain and Ambler, and for permits issued for the Port Clarence District and Norton Sound

subdistrict 2. In the same way that estimated harvests were calculated for individual communities, estimated harvests for the subdistricts, districts, and area were calculated from the mean reported harvests for each aggregated subdistrict, district, and the area. Thus the summary estimates do take into account the unsampled populations in White Mountain and Ambler.

The baseline survey data, which were collected from a single stratum, were expanded for each community with a single expansion factor based on the sampling rate of the entire community population. The single stratum baseline survey data are arbitrarily presented under the "usually fish" column. All of the baseline survey households may not actually usually fish for salmon, but the sampled and unsampled households were believed to contain the same proportion of "usually fish" households.

The Nome permit data were expanded by drainage, with drainage-specific expansion factors based upon the fraction of permits not returned. The permit data were expanded based only on the number of Nome residents who applied for the permits rather than the entire population of Nome. The analysis assumes that all salmon fishing households obtained permits. This analysis method results in slightly higher estimates of harvests than previous methods. In the past, the Division of Commercial Fisheries Management and Development published harvests as reported without expansion. Reported harvests for the Nome Subdistrict in 1994 appear in Appendix Table 1 in this report.

In this report, the data are presented by district, following the format of the Annual Management Reports produced by the Division of Commercial Fisheries Management and Development (see Lean, Bue, and Lingnau 1995 as example). Data on participation are presented first, followed by estimated harvests by species and community, estimated retention of commercial harvests for subsistence uses, estimated number of salmon fed to dogs, estimated proportion of salmon in total wild food harvests, estimated proportion of the salmon catch shared with other families, and responses to the "subsistence needs met?" question.

THE SETTING

For this report, northwest Alaska was defined as all the lands drained by waters emptying into the Chukchi and Bering seas between the westernmost tip of Point Hope and Canal Point Light south of Stebbins. As

defined, northwest Alaska included about 57,000 square miles (10 percent) of Alaska's total land mass of 570,833 square miles (Alaska Department of Labor 1986:4). The southern portion of this area corresponded approximately to the Nome census area and Norton Sound-Port Clarence fisheries management areas (Fig. 1). The northern portion of this area corresponded approximately to the Kobuk census area and to the Kotzebue fishing district (Fig. 2). The area included the lands of the NANA and Bering Straits regional Native corporations and a small portion of the lands of the Arctic Slope Regional Corporation, and encompassed the northwest Arctic Borough and a small portion of the North Slope Borough.

Demography and Economy

Northwest Alaska was sparsely populated, with the 1990 census reporting only 14,401 (2.6 percent) of Alaska's 550,043 residents. Almost half of those residents were concentrated in one of only two communities, Nome with 3,500 people or Kotzebue with 2,751 people. The remainder of the population lived in one of 26 smaller communities, ranging in size from Selawik with a 1990 population of 596 to Solomon with a 1990 population of 6. About 79 percent of the residents of the region were Alaska Natives in 1990. Non-Native residents were concentrated in the regional centers of Nome and Kotzebue. Most smaller communities included more than 90 percent Alaska Natives who were primarily Iñupiat Eskimo, except Elim, Stebbins, and St. Michael which included primarily Yup'ik Eskimo. In other words, about one-half of northwest Alaska's population was Alaska Natives living in communities with less than 500 residents.

The regional centers of Nome and Kotzebue were different from the 26 smaller communities in several respects. The regional centers' populations were 10 times larger than the average for the smaller communities. The average 1989 per capita income for Nome and Kotzebue was $15,015, compared with only $6,330 for the smaller communities. This reflected the more complex economies of the regional centers, which offered more opportunities for employment. The regional centers had daily jet service to Anchorage, while the smaller communities were served by air taxis based in Nome and Kotzebue. By

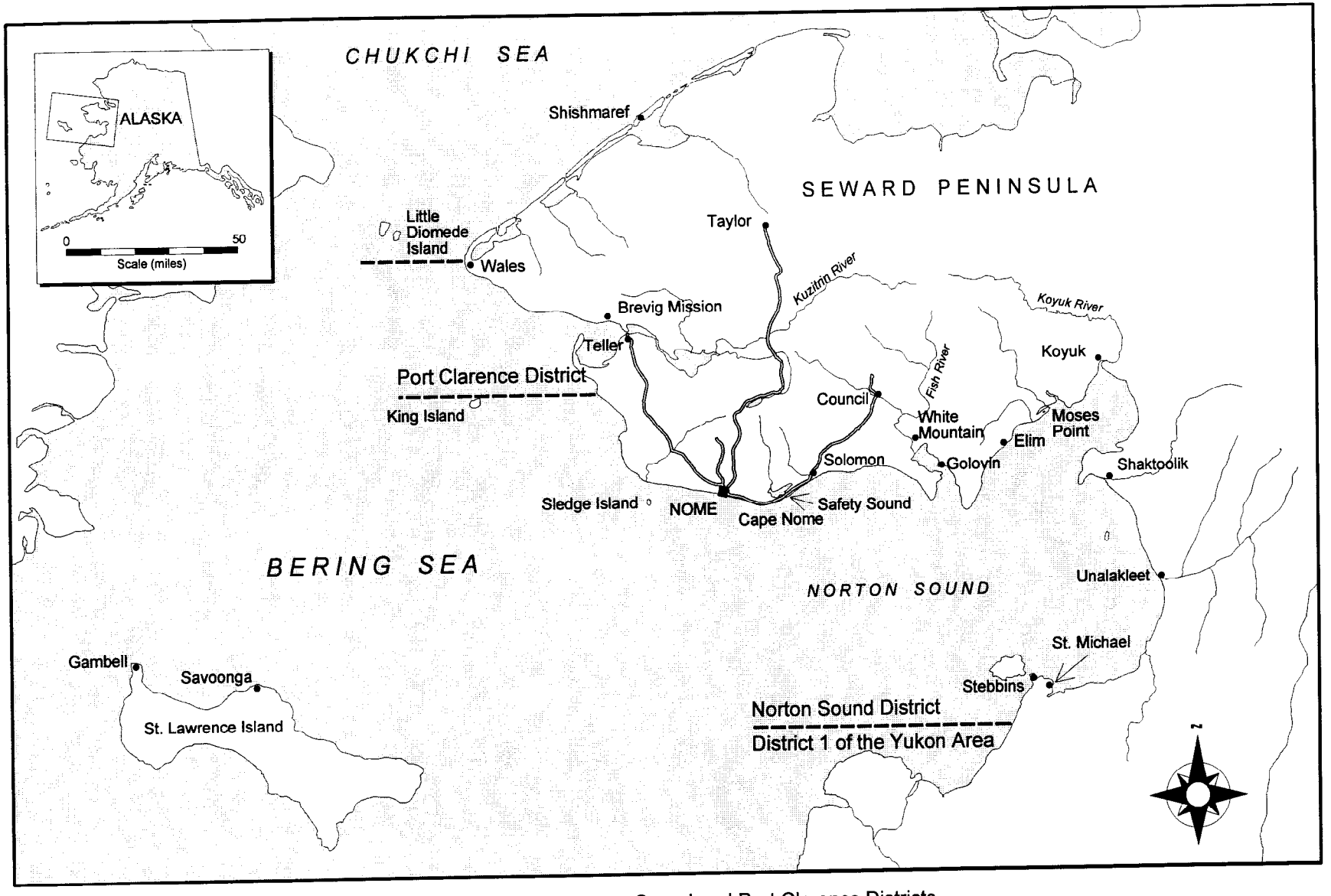

Figure 1. Geographic features and community locations in the Norton Sound and Port Clarence Districts.

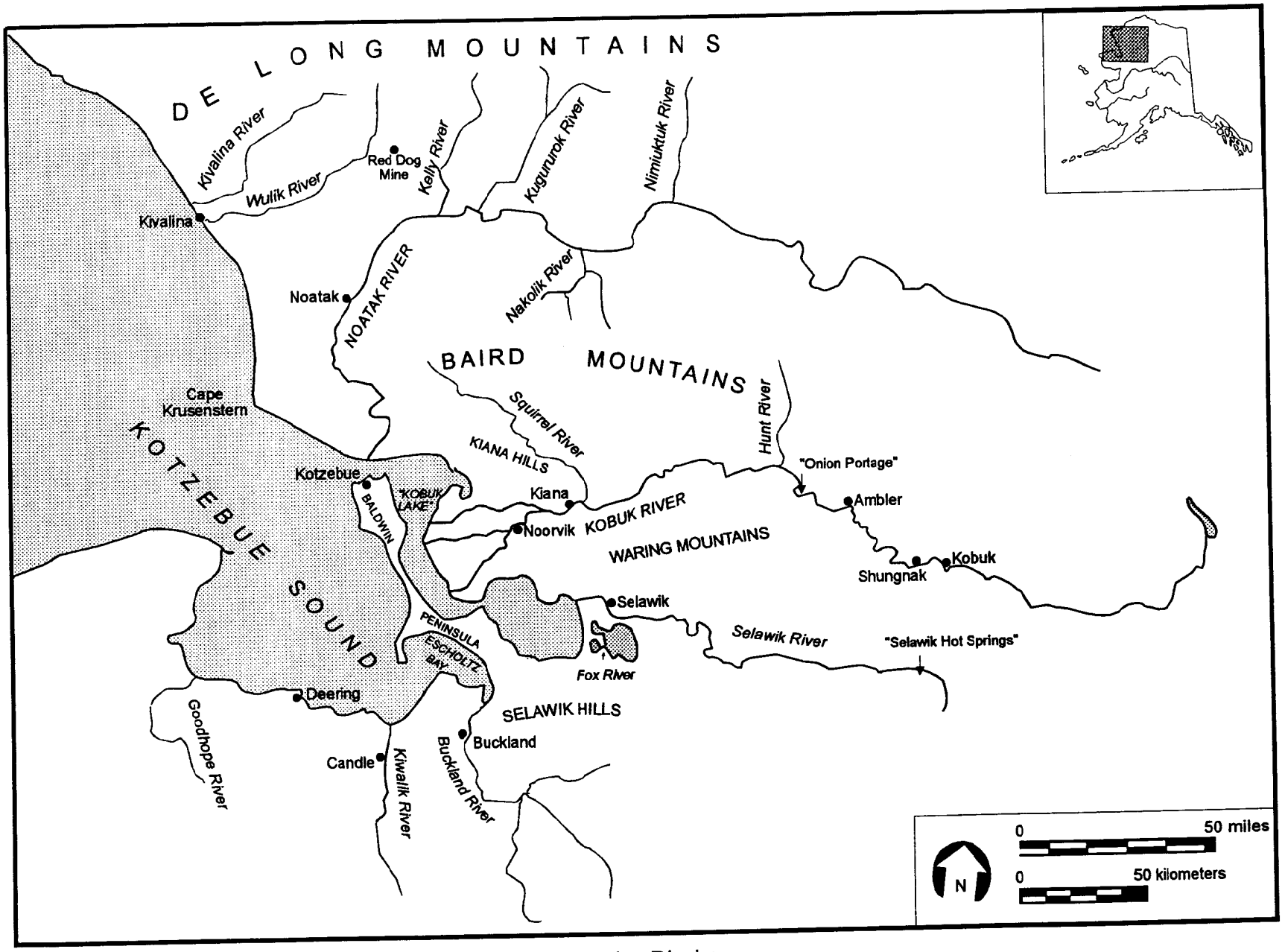

Figure 2. Geographic features and community locations in the Kotzebue District.

1994, most residents of Nome and Kotzebue had access to full utility service including electricity, water, sewer, and garbage collection. Virtually all the smaller communities had electricity, but water and sewer services were not available in a number of communities, including some of the larger communities like Selawik, Shishmaref, and Buckland.

The cost of living was high in northwest Alaska. The University of Alaska Cooperative Extension Service conducted regular surveys of food prices across the state. Recent estimates in northwest Alaska showed the cost of food in Nome to be 161 percent of Anchorage prices; Elim, 215 percent of Anchorage; Koyuk, 214 percent of Anchorage; and Wales, 246 percent of Anchorage (University of Alaska 1994). So not only were average per capita incomes in most communities barely one-third the $17,610 statewide average and the $19,620 Anchorage Borough average, but food prices were as much as 2.5 times greater. (University of Alaska 1994; Alaska Department of Labor 1993:85, 113, 118).

Reliance on wild food for domestic consumption was high, with recent estimates of annual wild food consumption ranging from 398 pounds per capita in Kotzebue in 1986 to 761 pounds per capita in Kivalina in 1992 (Alaska Department of Fish and Game 1993). Fish, terrestrial mammals, and marine mammals comprised the bulk of the wild food harvest, with the mix of species varying by community depending on which species were available. Salmon were more abundant and were harvested in larger quantities in eastern Norton Sound and in the rivers in the Kotzebue District than near the Bering Strait. In eastern Norton Sound, salmon alone may account for one-third of the wild food harvest by edible weight. In northwest Alaska, on the average, salmon probably comprised about one-sixth of the total wild food harvest by edible weight, enough to make salmon one of the largest single sources of wild food.

Salmon Fisheries Management

Five species of Pacific salmon were available in northwest Alaska: chinook salmon (*Oncorhynchus tschawytscha*), sockeye salmon (*O. nerka*), coho salmon, (*O. kisutch*), pink salmon (*O. gorbuscha*), and chum salmon (*O. keta*). Only chum salmon were available throughout northwest Alaska, although in recent

years chum abundance has been declining. Pink and coho could be found primarily in the Port Clarence and Norton Sound districts; during even-numbered years pink salmon were extremely abundant. Sockeye were most common in the Port Clarence District, and only incidentally harvested elsewhere. Chinook were most common in the eastern subdistricts of Norton Sound and in the Port Clarence District, but were harvested in small quantities elsewhere.

The State of Alaska began managing fisheries in northwest Alaska in 1959, and has maintained offices in Nome, in Kotzebue, and seasonally in Unalakleet. The state has established three fishery management districts in northwest Alaska. The Kotzebue District includes all waters of Alaska between the westernmost tip of Point Hope and the westernmost tip of Cape Prince of Wales, including those waters draining into the Chukchi Sea. The Kotzebue District is divided into three subdistricts. Subdistrict 1 and subdistrict 2 are in the vicinity of Kotzebue, while subdistrict 3 includes all the remaining waters in the district. The Port Clarence District includes all waters of Alaska between the westernmost tip of Cape Prince of Wales and the westernmost tip of Cape Douglas. There are no subdistricts in the Port Clarence District. The Norton Sound District includes all waters between the westernmost tip of Cape Douglas and Canal Point Light. The Norton Sound District includes six subdistricts. Subdistrict 1 includes waters in the vicinity of Nome; subdistrict 2 includes Golovnin Bay and its drainages; subdistrict 3 includes waters in the vicinity of Elim and Moses Point; subdistrict 4 includes waters in the vicinity of Koyuk; subdistrict 5 includes waters in the vicinity of Shaktoolik; and subdistrict 6 includes waters in the vicinity of Unalakleet.

The State of Alaska managed salmon fishing in northwest Alaska under three different sets of regulations: subsistence, commercial, and sport. The application of these regulations depended upon the disposition of the catch and the gear used.

1 "Subsistence" was defined as "the noncommercial, customary and traditional uses of wild renewable resources for direct personal or family consumption..., for the making and selling of handicraft articles..., and for the customary trade, barter, or sharing..." (AS 16.05.940)

2 "Commercial fishing" was defined as fishing "with the intent of disposing of (fish) for profit, or by sale, barter, trade, or in commercial channels." (AS 16.05.940)

3 "Sport fishing" was defined as fishing for personal use with a rod and reel. (AS 16.05.940)

In most of northwest Alaska, subsistence salmon fishing was allowed seven days a week and there were no harvest limits. The exceptions were Norton Sound subdistricts 1 (Nome) and 6 (Unalakleet) and the Port Clarence District, which were closed to salmon fishing for one or more days during the week. The Nome subdistrict normally was open four days a week and harvests were limited in fresh water. But in 1994, subsistence salmon fishing in the Nome subdistrict was closed during much of the chum salmon run to help rebuild depressed stocks. The Unalakleet river was open six days a week during the chinook run, and seven days a week thereafter. In some areas in the Nome and Unalakleet subdistricts, gillnets were limited in length during part or all of the fishing season. No license was required to fish for subsistence, but subsistence fishing was open only to Alaska residents.

In 1994, the department managed seven commercial salmon fisheries in northwest Alaska, one in each of the six Norton Sound subdistricts and one in Kotzebue Sound. There was no commercial salmon fishery in the Port Clarence District. Commercial salmon fishing was allowed only in the ocean. Fishermen used set gill nets no longer than 100 fathoms (600 feet). Generally, fishermen were allowed two 48-hour fishing periods each week, unless otherwise directed by emergency order. Fishermen reported their commercial catch through a fish ticket system that recorded each sale of fish. Commercial fishing was open only to individuals who owned limited entry salmon permits. Limited entry permits were granted by the state in 1976, and could be purchased from a fisherman who owned one. There were no residency requirements.

Sport salmon fishing was allowed seven days a week throughout most of the area. Chum salmon sport fishing was closed from the Sinuk River to Topkok Head (including Norton Sound subdistrict 1). Generally, anglers were limited to three chinook per day and three in possession, with only two over 28 inches. Limits on other salmon were 10 per day and 10 in possession with no size limit. Lower chinook salmon limits applied to northern Norton Sound and the Unalakleet River, where anglers were limited to one per day and one in possession. In addition, in northern Norton Sound only three of the other salmon could be coho or chum. A sport fishing license was required for anyone 16 years of age or older using a rod and reel. Sport fishing licenses ranged in cost from $0.25 to $50 depending on the type purchased.

More complete discussions of fishery management, regulations, and histories can be found in the Annual Management Report (Lean et al. 1995) and Magdanz (1992, in press).

FINDINGS

In 1994, researchers collected salmon harvest information from 1,169 households in 20 communities in northwest Alaska, including 667 households in the Norton Sound District, 127 households in the Port Clarence District, and 375 households in the Kotzebue District. It was estimated that 1,237 households in the sampled communities usually fished for salmon for subsistence, and of those 1,028 (83 percent) were contacted. The sample also included 142 households that usually do not fish.

It was estimated that residents of the 20 study communities harvested 190,063 salmon for subsistence uses in 1994. The estimated harvest included 7,713 chinook salmon, 3,414 sockeye salmon, 24,494 coho salmon, 78,954 pink salmon, and 75,489 chum salmon. Of these, 126,745 salmon were harvested in the Norton Sound District, 10,918 were harvested in the Port Clarence District, and 52,400 were harvested in the Kotzebue District (Fig. 3). The estimated mean salmon harvest was 122.9 salmon per household, which included 5.0 chinook salmon, 2.2 sockeye salmon, 15.8 coho salmon, 51.0 pink salmon, and 48.8 chum salmon (Fig. 4).

Tables of the samples, harvests, and related data by subdistrict and by community appear in Appendix 1. Results for each district are discussed below.

Norton Sound District Harvests

In the Norton Sound District, 667 households were contacted in 10 communities, including 120 households in subdistrict 1 (Nome) who returned salmon permits for fishing in the Norton Sound District. This included 609 (87 percent) of the 697 households in these communities (including Nome) that usually fished, and 58 (41 percent) of the 142 households in these communities (excluding Nome) that usually do not fish.

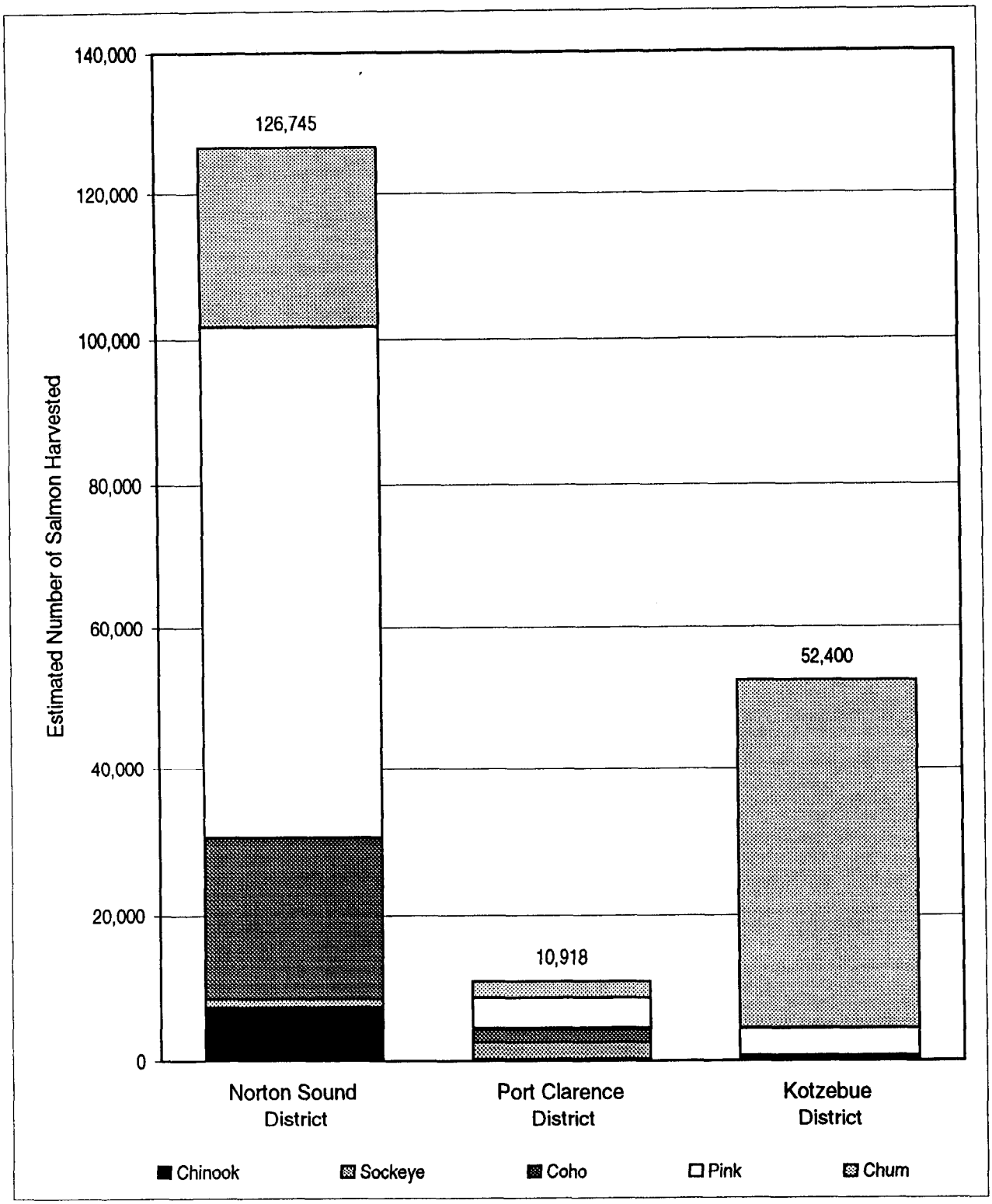

Figure 3. Estimated number of salmon harvested for subsistence in the Norton Sound, Port Clarence, and Kotzebue Sound Districts, 1994. (Data do not include Gambell, Savoonga, Ingalik, Shishmaref, Buckland, Kivalina, Selawik, Point Hope, and Kotzebue.)

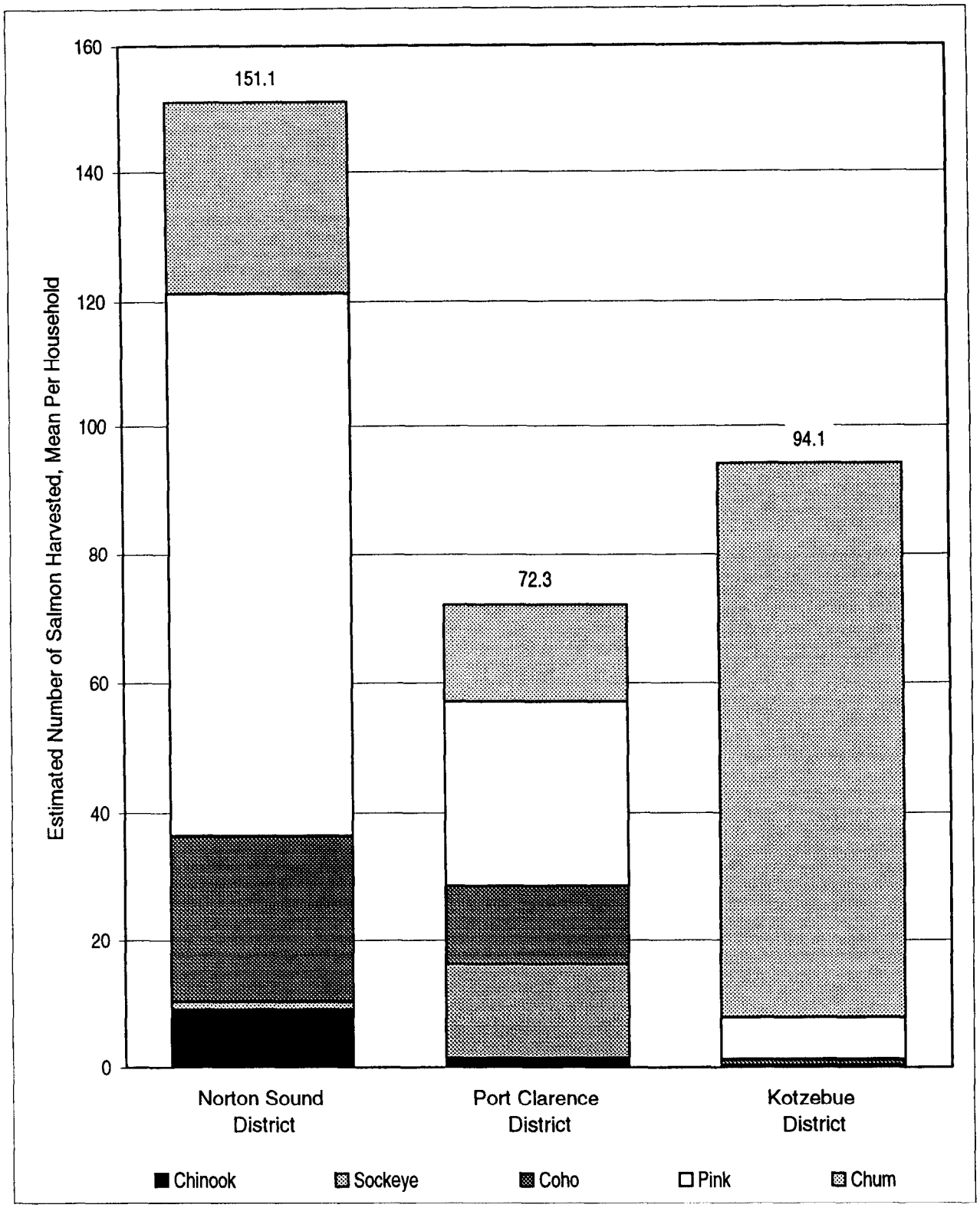

Figure 4. Estimated number of salmon harvested for subsistence in the Norton Sound, Port Clarence, and Kotzebue Sound Districts, mean per household, 1994.

Residents of these 10 communities harvested an estimated total of 126,745 salmon, of which 7,374 (5.7 percent) were chinook salmon, 1,161 (0.9 percent) were sockeye salmon, 22,124 (17.5 percent) were coho salmon, 70,066 (56.2 percent) were pink salmon, and 25,020 (19.7 percent) were chum salmon. The largest number of salmon harvested by a single community was reported by residents of Unalakleet, with 40,295 salmon (Fig. 5). The other communities' estimated harvests were between 6,445 salmon (Golovin) and 17,302 salmon (Stebbins). White Mountain reported 3,630 salmon harvested, but because the sample was small these data were not expanded to calculate an estimated community total.

The estimated mean harvest per household in the Norton Sound District was 151.1 salmon, of which 8.8 were chinook salmon, 1.4 were sockeye salmon, 26.4 were coho salmon, 84.7 were pink salmon, and 29.8 were chum salmon (Fig. 4). For nearly two decades in Norton Sound, pink salmon have been exceedingly abundant in even-numbered years, and 1994 was no exception. This partly explains why pink salmon comprised more than one-half the average harvest; in odd-numbered years the proportion of pink can be expected to be smaller.

Subdistrict 5 (Shaktoolik) accounted for the largest mean household harvest of salmon, an estimated 292.0 fish, including 24.0 chinook, 56.7 coho, 186.4 pink, and 24.9 chum (Fig. 6). The mean household harvests in the other subdistricts were 70.5 salmon in subdistrict 1 (.2 chinook, 7.4 coho, 49.7 pink, and 12.7 chum); 98.2 salmon in subdistrict 2 (2.3 chinook, 1.5 sockeye, 6.6 coho, 75.8 pink, and 12.0 chum); 195.0 salmon in subdistrict 3 (4.3 chinook, 1.4 sockeye, 15.9 coho, 126.3 pink, and 47.0 chum); 163.9 salmon in subdistrict 4 (4.5 chinook, 5.4 coho, 87.7 pink, and 66.4 chum); and 164.6 salmon in subdistrict 6 (including Stebbins and St. Michael) (13.1 chinook, 2.0 sockeye, 39.8 coho, 78.1 pink, and 31.5 chum).

About 21 percent of the Norton Sound District households reported commercial fishing, but only 6 percent of the households in the sample removed salmon from their commercial catches for subsistence uses. An estimated total of 1,452 salmon was retained from commercial catches, or 1 percent of the estimated total subsistence harvest for the sampled communities in Norton Sound. Most of the retained commercial catch occurred in subdistrict 2 (Golovnin Bay) and subdistrict 6 (Unalakleet) (Fig. 7).

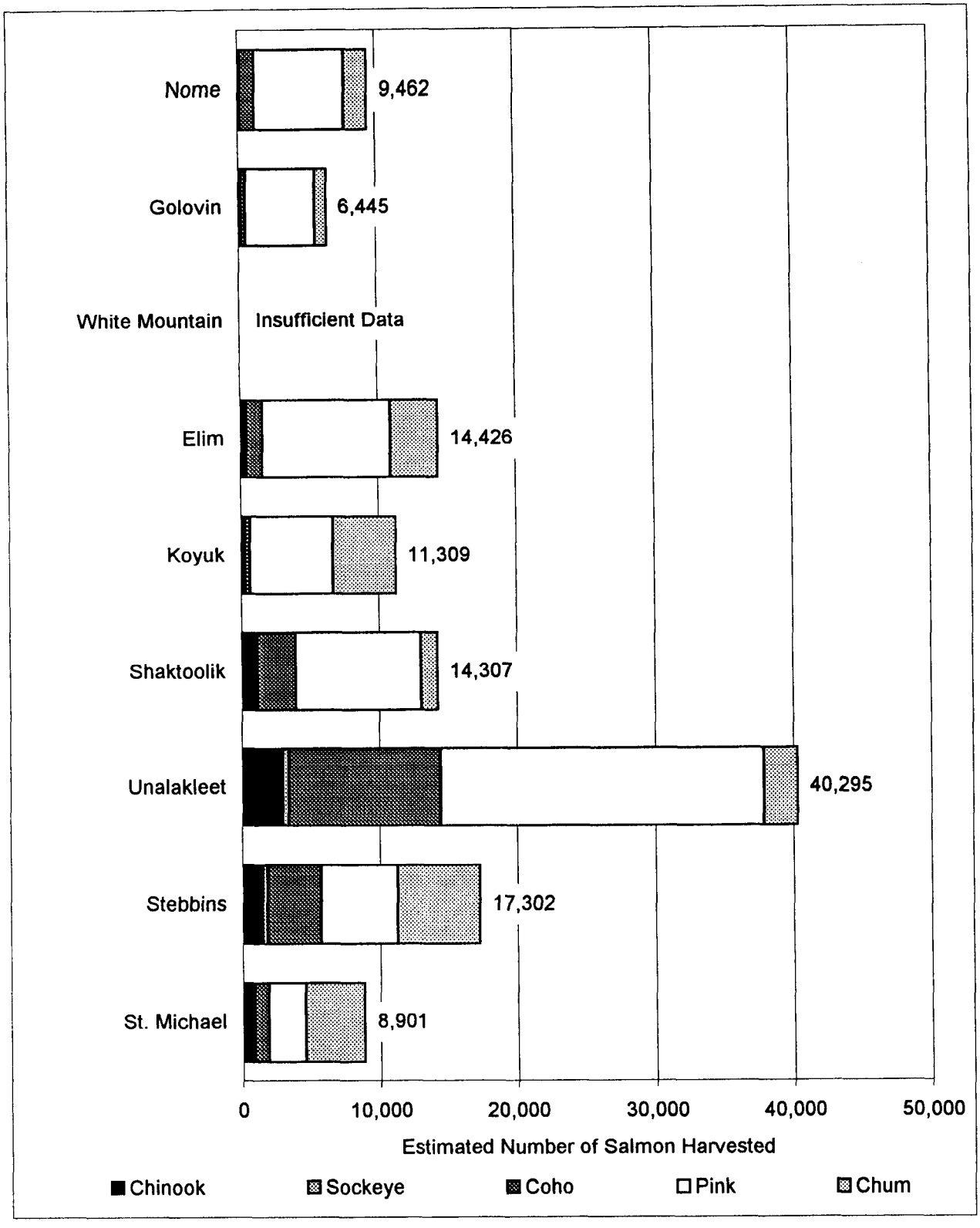

Figure 5. Estimated number of salmon harvested for subsistence in the Norton Sound District, by community, 1994.

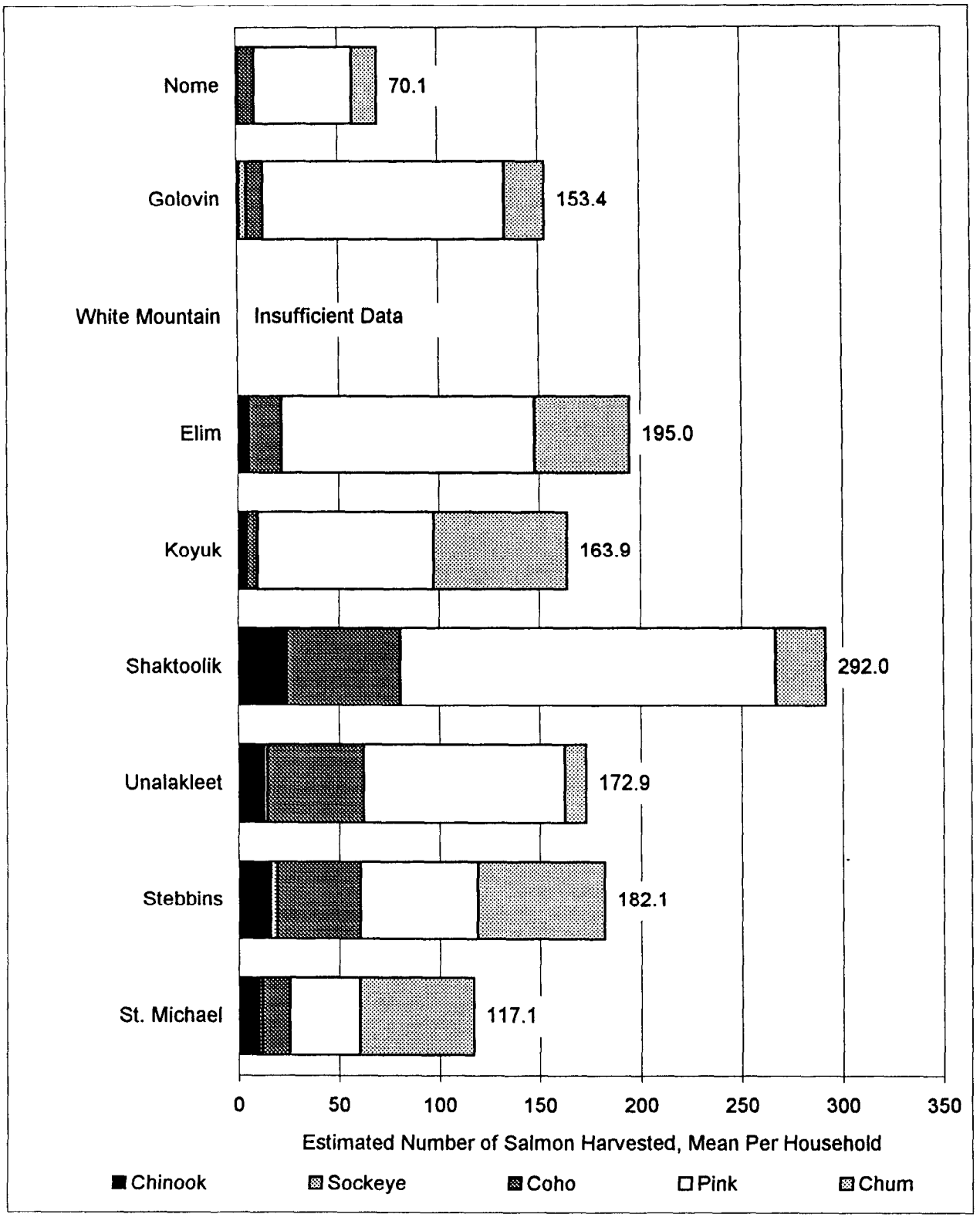

Figure 6. Estimated number of salmon harvested for subsistence in the Norton Sound District, by community, mean per household, 1994.

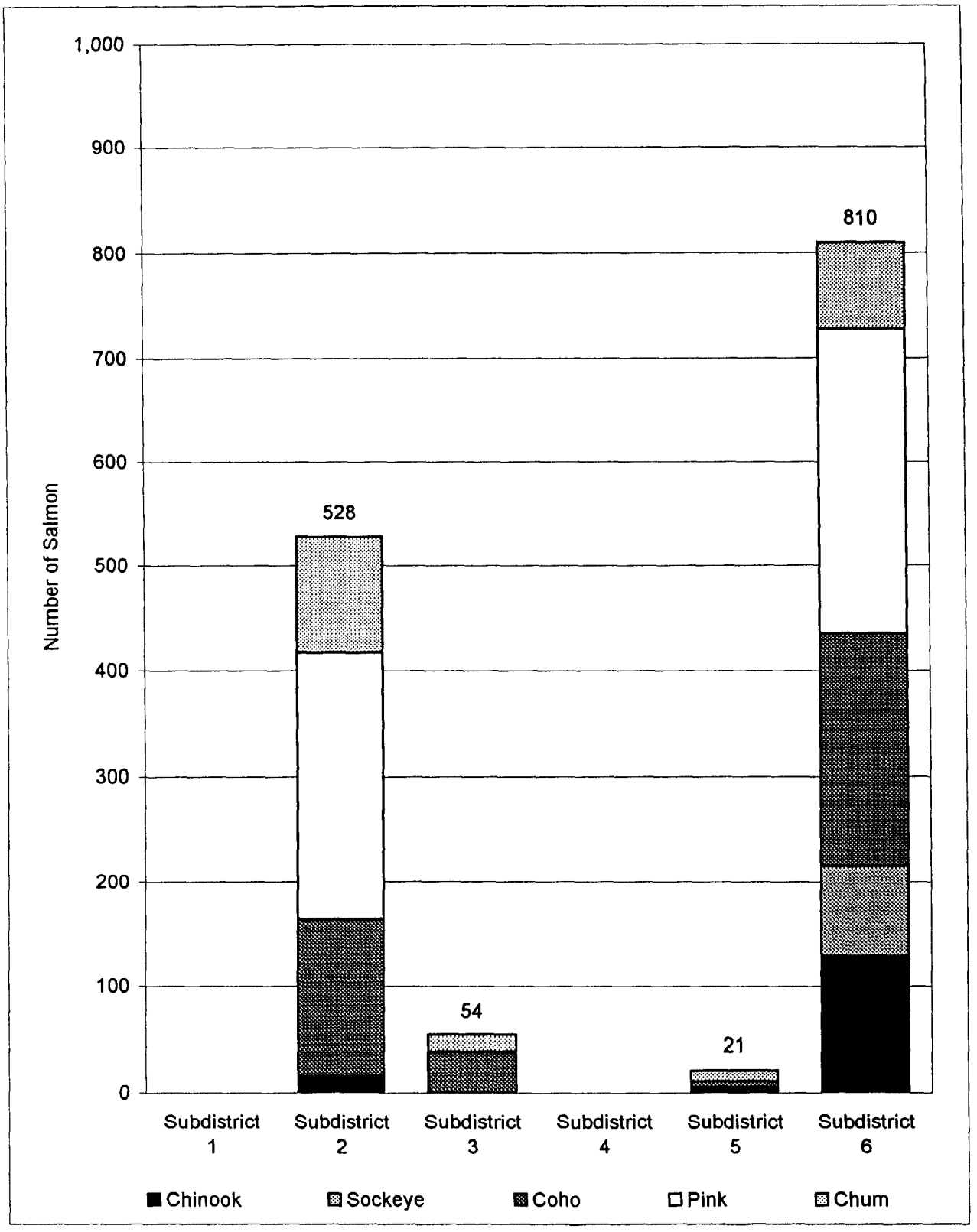

Figure 7. Estimated number of salmon retained from commercial catches for subsistence in Norton Sound, by subdistrict, 1994.

Port Clarence District Harvests

In the Port Clarence District, 127 households were contacted in three communities, including 6 households from Norton Sound subdistrict 1 (Nome) who returned salmon permits for fishing in the Port Clarence District. This included 99 (90 percent) of the 110 households in these communities (including Nome permittees) that usually fished, and 28 (68 percent) of the 41 households in these communities (not including Nome) that usually do not fish.

Residents of these three communities harvested an estimated total of 10,918 salmon in the Port Clarence District, of which 203 were chinook salmon, 2,220 were sockeye salmon, 1,892 were coho salmon, 4,309 were pink salmon, and 2,294 were chum salmon. Teller residents harvested an estimated 7,771 salmon, compared with Brevig residents who harvested an estimated 3,064 salmon (Fig. 8).

The estimated mean harvest per household in the Port Clarence District was 72.3 salmon, of which 1.3 were chinook salmon, 14.7 were sockeye salmon, 12.5 were coho salmon, 28.5 were pink salmon, and 15.2 were chum salmon (Fig. 4). The mean sockeye harvest in the Port Clarence District was ten times as high as in the adjacent Norton Sound District and more than 100 times as high as in the Kotzebue District, reflecting the relative abundance of sockeye in the Kuzitrin River-Salmon Lake system. Also, the estimated mean harvest for Teller, 94.8 salmon, was approximately twice the estimated mean harvest for Brevig Mission, 48.6 salmon (Fig. 9). Previous studies in Brevig Mission have documented substantial harvests of marine mammals, similar to those documented for Shishmaref (Conger and Magdanz 1990). Teller's harvests have not been completely documented, but these data suggest Teller may have a riverine focus when compared with Brevig Mission. Teller includes residents of Mary's Igloo, which traditionally was located inside the Kuzitrin River, and presumably their subsistence activities would have a large riverine component. Teller's harvest patterns, then, may be more similar to those reported for Golovin than those reported for nearby Brevig Mission.

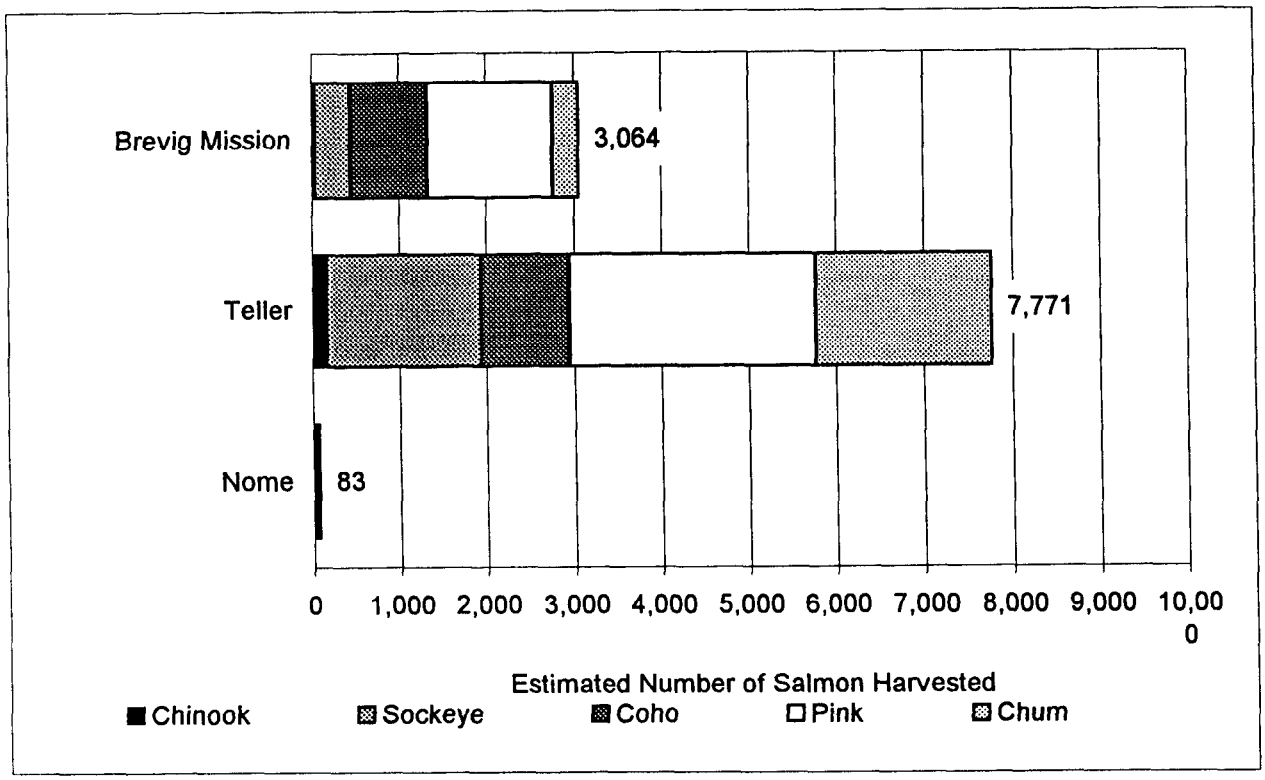

Figure 8. Estimated number of salmon harvested for subsistence in the Port Clarence District, by community, 1994

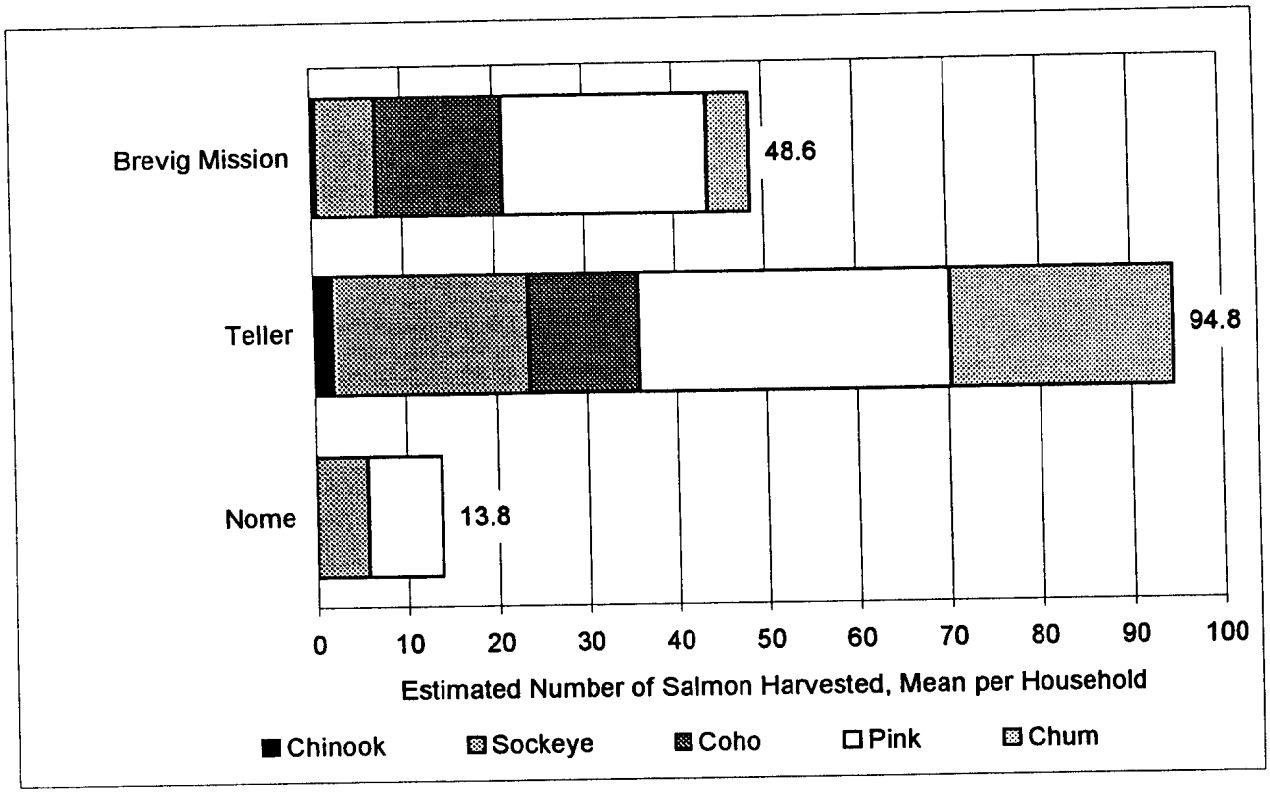

Figure 9. Estimated number of salmon harvested for subsistence in the Port Clarence District, by community, mean per household, 1994

Kotzebue District Harvests

In the Kotzebue District, 375 households were contacted in eight communities. This included 320 (74 percent) of the 430 households in these communities that usually fished, and 55 (43 percent) of the 127 households in these communities that usually do not fish.

Residents of these eight communities harvested an estimated total of 50,400 salmon in the Kotzebue District, of which 135 were chinook salmon, 33 were sockeye salmon, 478 were coho salmon, 3,579 were pink salmon, and 48,175 were chum salmon. The relative abundance of chum salmon was strongly apparent in the harvests, with chum accounting for 92 percent of the estimated subsistence salmon harvest. The remainder was mostly pink and a lesser number of coho, almost all of which were harvested in communities in the southern portion of the district, Wales and Deering (Fig. 10). Kobuk River communities reported virtually no salmon except chum, while Noatak reported a small number of coho salmon. The estimated mean harvest per household in the Kotzebue District was 94.1 salmon, which included 0.2 chinook salmon, 0.1 sockeye salmon, 0.9 coho salmon, 6.4 pink salmon, and 86.5 chum salmon (Fig. 4).

Kobuk had the highest mean household harvest, 265.5 fish (Fig. 11). The mean household harvest in Shungnak was 156.6 salmon; in Deering, 124.2 salmon; in Noatak, 71.0 salmon; in Wales, 54.5 salmon; and in Kiana, 39.3 salmon.

In the Kobuk River communities, the survey also included a question about a household's harvest of sheefish. The estimated harvest of sheefish was 4,455, or an overall mean of 13.3 per household for the five communities of Noorvik, Kiana, Ambler, Shungnak, and Kobuk. Shungnak reported the highest harvest of sheefish (1,349 fish), followed by Kiana (854 fish), and Kobuk (781 fish). Ambler and Noorvik harvest data were not expanded due to insufficient sampling.

Not included among the sampled communities in 1994 was Kotzebue, for which harvests previously were estimated to be 45,489 salmon in 1991, and 32,127 salmon in 1986 (Alaska Department of Fish and

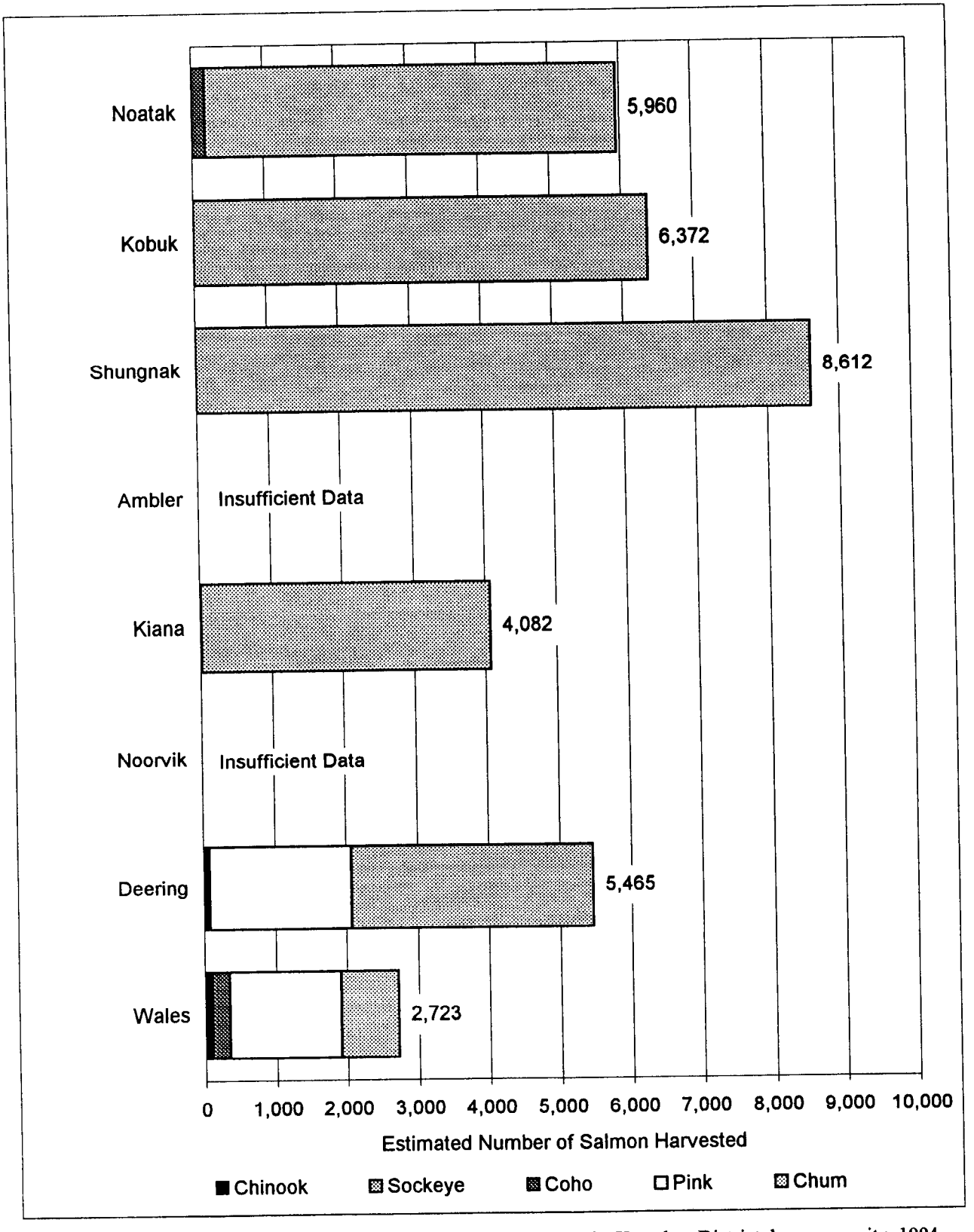

Figure 10. Estimated number of salmon harvested for subsistence in the Kotzebue District, by community, 1994

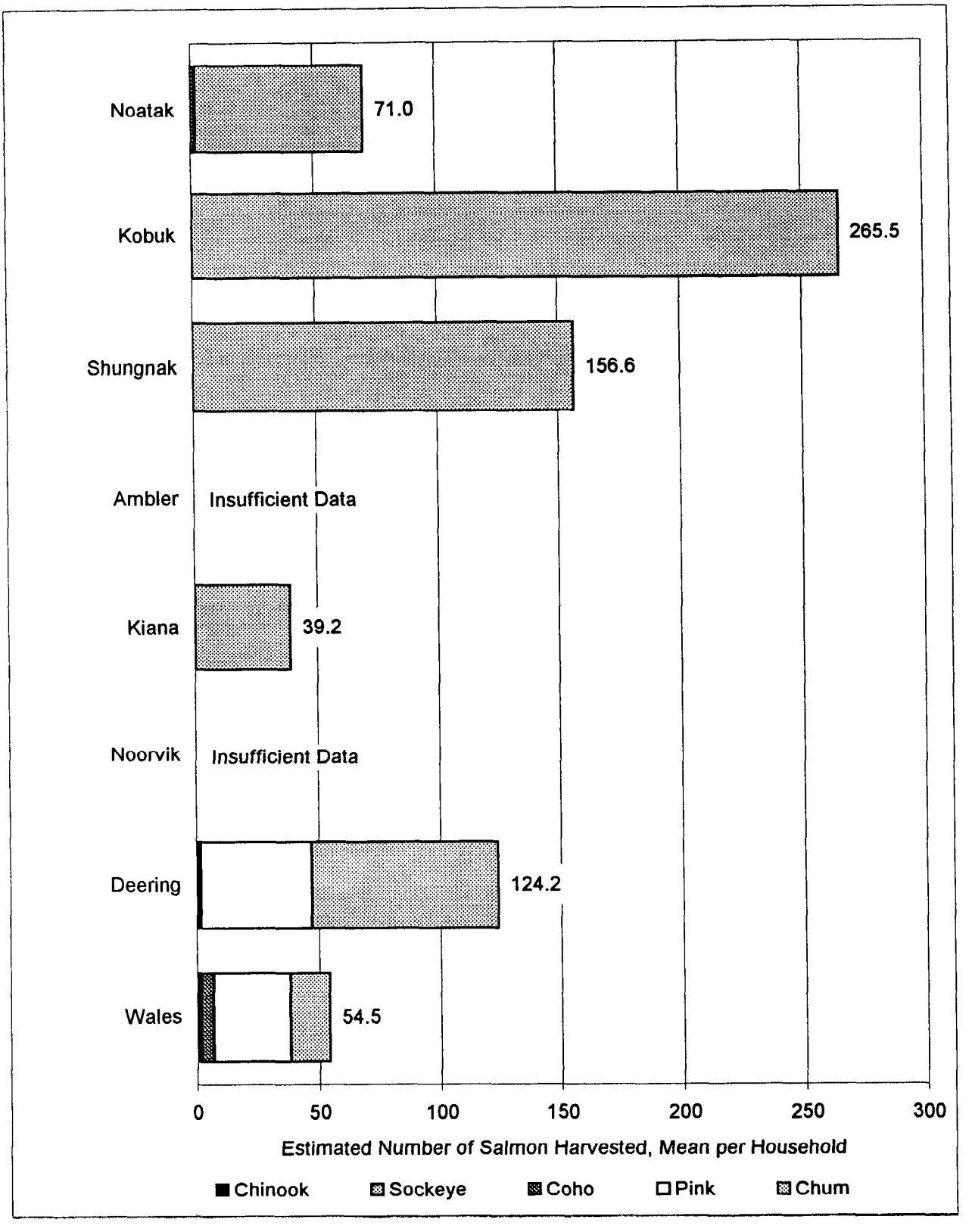

Figure 11. Estimated number of salmon harvested for subsistence in the Kotzebue District, by community, mean per household, 1994.

Game 1993). The 1994 data suggest that Kotzebue may account for one-half or more of the total subsistence salmon catch in the district.

Other Variables

The surveys included a number of other variables in addition to harvest. These included gear type, the number of salmon fed to dogs, the number of salmon taken from commercial catches for subsistence use, the percentage of wild food obtained from salmon, the percentage of the salmon harvests shared with other families, and whether or not each household's subsistence needs for salmon had been met in 1994.

Set nets were the most commonly used gear for salmon fishing by households in the surveyed communities. About 63 percent of households reported using set nets, 54 percent used rods-and-reels, and 19 percent used seines. Households typically used more than one gear type to harvest salmon, particularly in the Norton Sound District where the diversity of salmon species encouraged a diversity of gear types. Data on salmon harvests by gear type were not collected in the survey.

Responses indicate that an estimated 26,380 salmon were fed to dogs, which included 9,389 salmon in the Norton Sound District, 196 salmon in the Port Clarence District, and 16,795 salmon in the Kotzebue District (Fig. 12). In other words, about 14 percent of all the salmon harvested in northwest Alaska were fed to dogs. Overall, 69 percent of the salmon fed to dogs were chum salmon, and 26 percent were pink salmon. In the Kotzebue District, nearly all the salmon fed to dogs were chum salmon, whereas in the Norton Sound District pink salmon accounted for the majority (71 percent) of the salmon fed to dogs with chum and coho accounting for most of the remainder. The greater quantity of salmon fed to dogs in the Kotzebue District was directly related to a larger dog population in that district. The mean salmon fed per dog was approximately the same, 28 salmon in the Norton Sound District, and 25 salmon in the Kotzebue District. In the Port Clarence District, households reported feeding an average of four salmon per household to dogs.

About 13 percent of the households in the surveyed communities commercially fished for salmon in 1994, but only five percent of households removed salmon from their commercial catches for subsistence

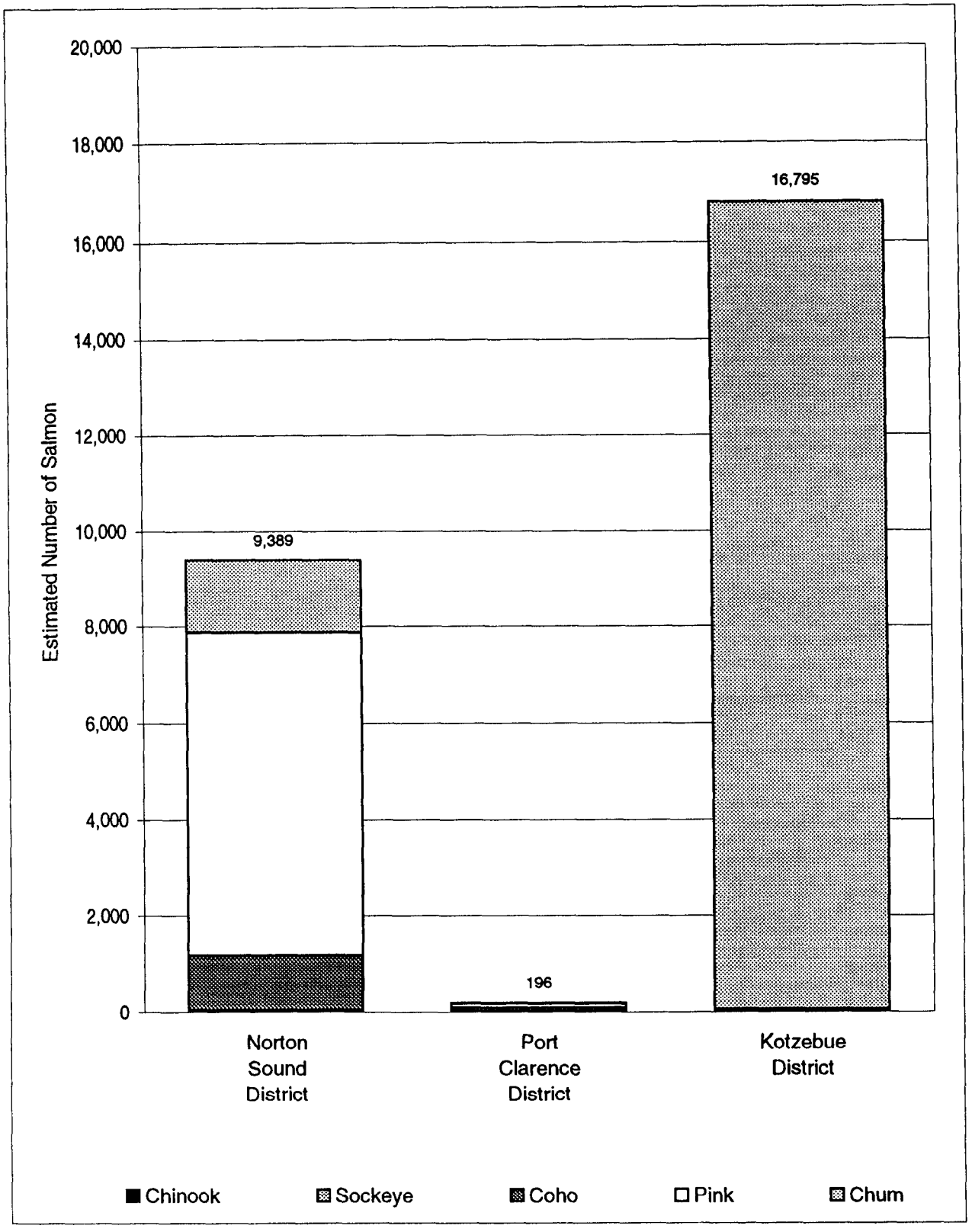

Figure 12. Estimated number of whole salmon fed to dogs in the Norton Sound, Port Clarence and Kotzebue districts, 1994.

use. An estimated total of 1,452 were retained from commercial catches, or less than one percent of the estimated total subsistence harvest in the three districts. Of the salmon retained from commercial catches, 10 percent were chinook, 6 percent were sockeye, 29 percent were coho, 38 percent were pink, and 17 percent were chum. Most of the retained commercial catch occurred in the communities of Unalakleet (55 percent) and Golovin (36 percent).

The 1994 survey included four questions that asked respondents to evaluate their 1994 salmon harvests. Respondents were asked to estimate the percentage of their total wild food harvest that came from salmon (Appendix Table 11). Respondents were asked to estimate how much of their salmon catch was given to other families (Appendix Table 12). Respondents were asked whether their household's subsistence salmon needs had been met in 1994 (Appendix Table 13). Respondents who responded "no" to the "needs" question were then asked why their needs had not been met. Field workers reported that many households had difficulty with these questions, and response rates were poor. More than one-third of the households did not estimate the percentage of wild food that came from salmon. Nearly a quarter did not answer the needs question. Response rates to these questions were especially poor in the Port Clarence District. The poor response rates would seem to suggest some methodological limitations to these questions (see Discussion).

DISCUSSION

A primary use of the data gathered in this project will be salmon management. Managers and fishing interests inevitably will be tempted to compare the 1994 data with previous estimates of salmon harvests for northwest Alaska. While there might be some utility in such comparisons, there also is substantial risk of error. The best way to use the 1994 data is as a baseline against which to measure change in the future. Managers and fishing interests also will be tempted to use responses to the "needs" questions to assess the adequacy of harvests, but there are a number of limitations to these questions.

In the interest of discouraging inappropriate comparisons and conclusions, this section compares 1994 data with previous data for one district, and discusses the limitations of such comparisons. It also discusses some of the limitations of the "needs" data.

Harvest Assessment Methods Compared

Researchers compared subsistence chum salmon harvest estimates developed by three different methods for northwest Alaska during the period 1974 to 1994. The first data set, labeled "CFMD Surveys (1974-83)" in Figure 13, includes the ten-year average subsistence harvests as reported in the department's Annual Management Report (Lean et al. 1993). The second data set, labeled "CPDB Extrapolation (1989-92)," includes expanded estimates of harvests for the region developed from six comprehensive community surveys in the department's Community Profile Database (Alaska Department of Fish and Game 1993). The third data set, labeled "This Study (1994)," includes data from this project. Note that the data in Figure 13 represent harvests in different years. The first data set is a ten-year average, while the second two data sets are from single years and would be affected by normal and possibly substantial annual variation and by actual changes in harvests.

From commercial fisheries catch statistics and from department observations, it is known that chum salmon abundance declined in northwest Alaska between 1974 and 1994. In Nome, one of the few locations where comparable subsistence data were available, subsistence chum salmon harvests also declined (Magdanz 1992:1). Figure 13 would make it appear that in the Norton Sound and Kotzebue districts subsistence harvests have been increasing during a time of declining abundance, while Port Clarence District harvests have been relatively stable. This was not an appropriate conclusion to draw from these data, for two reasons. First, many more households were contacted in 1994 than in the average CFMD survey. The exact number of households contacted during the CFMD surveys is unknown, except in the Port Clarence District. Second, harvest reports in 1994 were expanded to estimate total community harvests. Harvest reports were not expanded for the CFMD surveys, but were minimum harvest estimates.

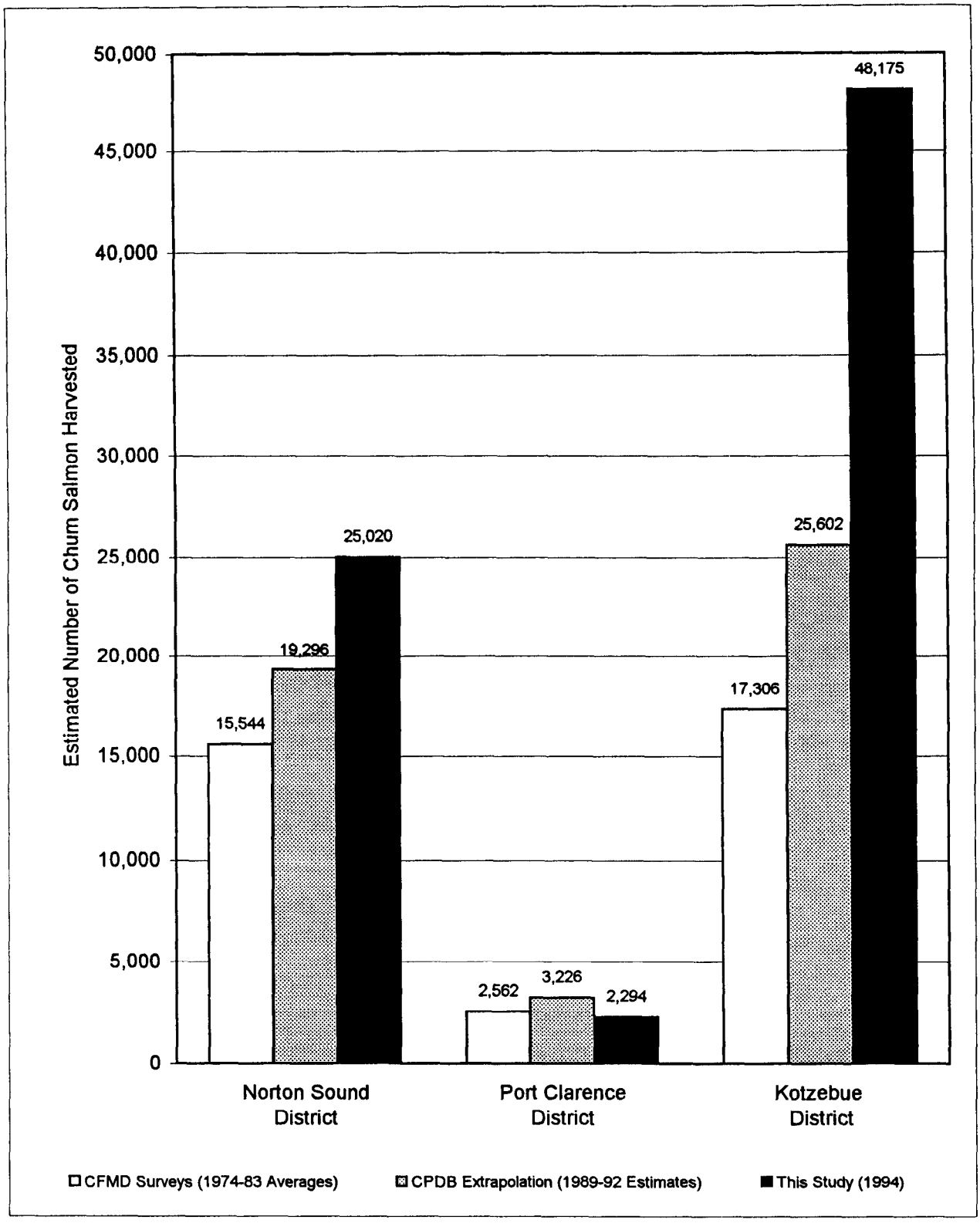

Figure 13. Estimated chum salmon harvests for 1994 compared with estimated harvests by previous methods. The CFMD survey estimates are consistently lower because fewer households were surveyed and reported harvests were not expanded.

The Port Clarence District provided a good opportunity to compare the CFMD and 1994 methods, because it includes only two small communities (Brevig Mission and Teller), and because sample sizes are known for both methods. The important differences between the two methods were:

- CFMD: Between 1974 and 1983, a minimum of 3 and a maximum of 27 "fishing families" were contacted in the Port Clarence District, for an average annual sample of 17 fishing families (Lean et al. 1993:49). Sampling was unsystematic. Harvest reports were not expanded.

- 1994 Study: In 1994, 127 households were contacted in the Port Clarence District, of which 93 usually fish for salmon. The sample was stratified into fishing and non-fishing strata and reported harvests were expanded by stratum.

Five times as many fishing households were contacted in 1994 as were contacted, on average, between 1973 and 1984 (Fig. 14). Such an increase in fishing families could not be explained by community growth alone; the U.S. Census reported 97 households in the district in 1980, and 121 households in 1990 (Alaska Department of Labor 1990:90; 1993:114).

Because the CFMD sample was known, it was possible to apply, at least approximately, the 1994 data expansion methods to the 1974-83 CFMD data. Chum salmon were chosen for the comparison. The number of households and the proportion of fishing households were extrapolated from 1980 census data and from the 1994 surveys, respectively. The CFMD samples appear to have been very incomplete, ranging from an estimated 13 percent of fishing households in 1981 to 37 percent in 1978, so considerable expansion was necessary. As a result, confidence in the estimates based on CFMD survey data was poor. Figure 15 illustrates the results. The dark portion of each column represents the reported chum salmon harvests, as published in the Annual Management Report (Lean et al. 1995:49). The light portion of the column represents the estimated chum salmon harvest. The 1974-83 average estimated annual harvest was 13,662 chum salmon, compared with the 1994 estimated harvest of 2,294 chum salmon. This comparison suggested that in 1994 chum salmon harvests may have declined by more than 80 percent from the

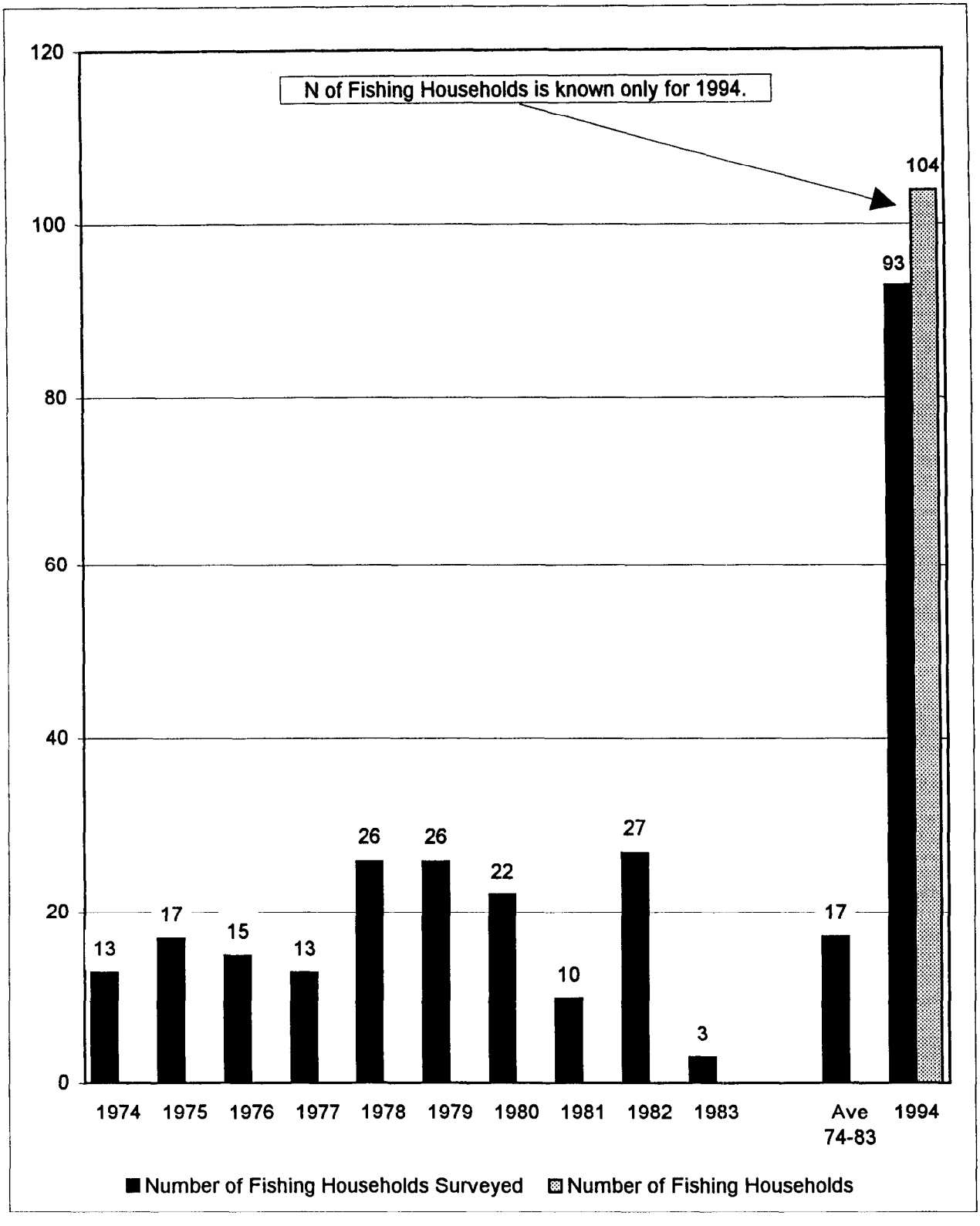

Figure 14. Number of fishing households surveyed, Port Clarence District, 1974-1983, and 1994. The average Port Clarence District sample from 1974-83 was only 17 households, compared with 93 households in 1994. Sampling data for 1974-83 are not available for the Norton Sound District.

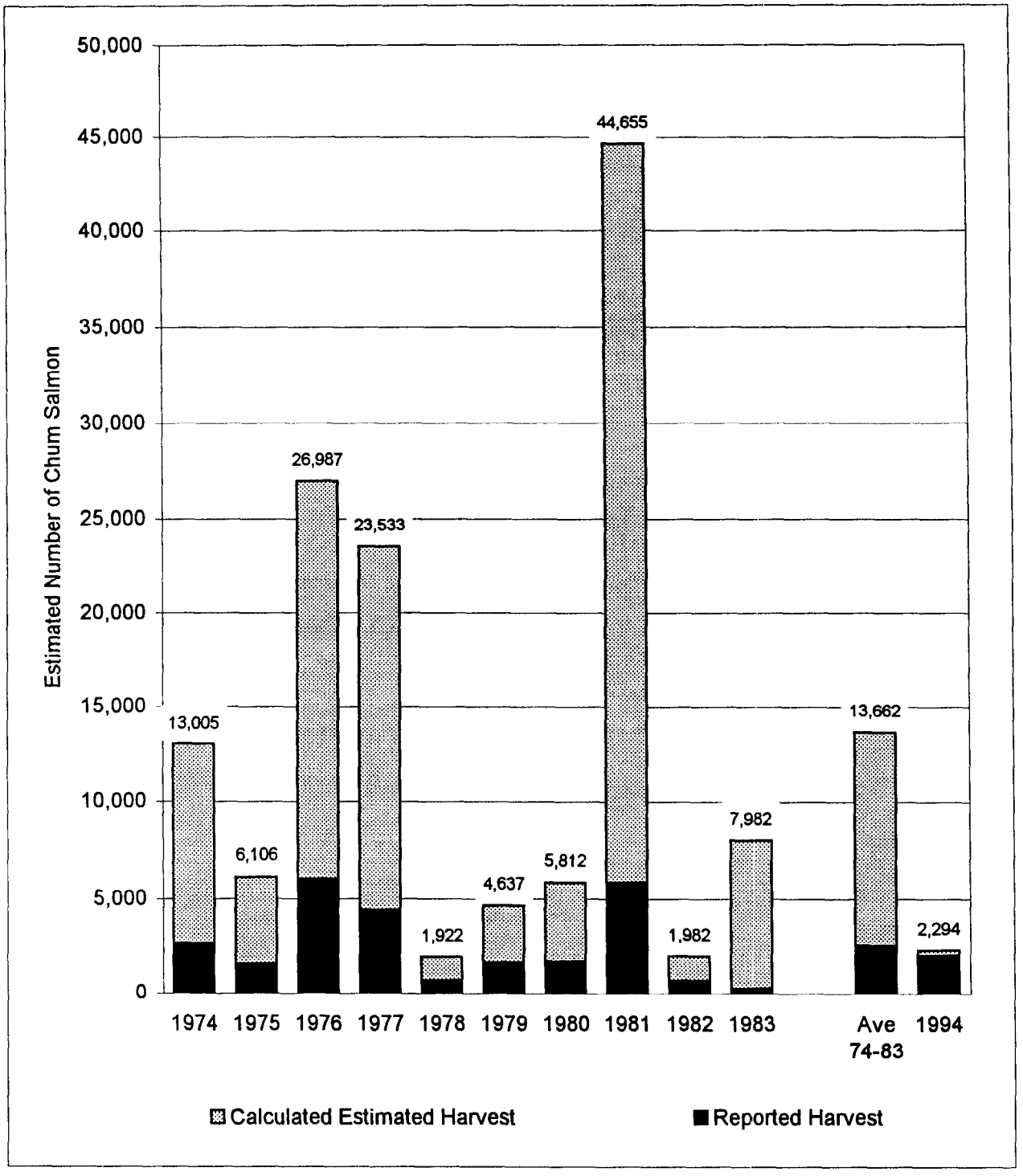

Figure 15. Estimated chum salmon harvests for the Port Clarence District, 1974-1983, and 1994. The 1974-83 estimates were calculated as follows: The number of households surveyed from 1974-83 was known (Fig. 14), but the number of fishing households was not. Researchers assumed: (1) the total number of households in the Port Clarence District increased 2.4 percent per year (based on census data), and (2) the number of fishing households was 77 percent of the total number of households in the Port Clarence District (based on the 1994 survey). These assumptions allowed researchers to calculate an estimated harvest for each year.

1973-84 period. This was a different conclusion than would be drawn from Figure 13, which showed harvests declined by 10 percent.

There are myriad problems with this sort of analysis of the CFMD data. It assumes the CFMD sample was random within the fishing household stratum, and it probably was not. It assumes the number of households in the Port Clarence District changed at a standard rate over time, and it probably did not. It assumes that the proportion of fishing households in the district remained the same over time, which it probably did not. Many of the CFMD samples were so small that confidence intervals for the estimates might exceed the estimates themselves, if the data were available to calculate them. The most that could be said about the comparisons presented in Figures 13 and 15 was that changes in subsistence salmon harvest levels have been masked by major improvements in data collection and analysis methods. The much improved baseline data now available will help measure more accurately change in the future.

Responses to Questions on Sharing, Diet, and Needs

The question, "Were your household's subsistence salmon needs met this year? (yes or no)," was included in the harvest surveys in 1994. The "needs" question was requested by the Alaska Board of Fisheries to assist the board in determining whether a reasonable opportunity has been provided for subsistence. There are a number of limitations to the needs question, and to the similar questions about the proportion of salmon in the diet and the proportion of salmon shared.

The purpose of the subsistence salmon harvest surveys was to assess harvests. Most questions asked about the number of salmon caught and type of gear, and the purpose of these questions was well understood by respondents. Such questions were objective. They employed standard units of measurement, such as the number of fish or inches of mesh, which were simple and familiar to respondents. Response rates to these questions were high, approaching 100 percent for the harvest data themselves.

The questions about the proportion of salmon in the diet and the proportion of salmon shared did not perform so well. Although the questions might be considered objective, both presented respondents with an unfamiliar measurement problem. While some respondents may have occasion to count their catches, most

have no other reason to express their salmon catches in percentages. The most appropriate and most accurate way to estimate the proportion of salmon in the total subsistence diet is to collect complete subsistence harvest information with a baseline harvest assessment survey.

The "needs" questions presented even more complex measurement problems. There was no standard unit of measurement for "needs" and, "needs" itself was undefined. Further, the "needs" construct may not be valid for some respondents because the needs question required a prediction: Will the salmon caught in 1994 last until 1995? Subsistence is less predictable than some other economic pursuits, and some Alaska Native respondents are reluctant to make predictions about subsistence (Pete 1996). Many important factors, such as the future availability of caribou, were unknown when the question was asked and would affect the sufficiency of the 1994 salmon harvest. The needs question might be more reliable if asked retrospectively, at the end of the period of salmon consumption rather than at the beginning.

Although all five salmon species occur in the area, the needs question was not species specific. This was an important limitation in the Norton Sound District, where chum salmon have been depressed in some subdistricts while pink salmon have been extremely abundant. It was difficult, therefore, to relate needs response to harvest estimates for particular species.

Needs questions were not asked at all in Subdistrict 1, because permits rather than surveys were used to collect salmon harvest information. Permits were issued only to people who intend to fish for salmon and who came to the Department office in Nome to get them. Permit applications from residents of Nome have been declining during the past ten years, because of reduced salmon abundance and consequent restrictions on the fishery. The sample of permit holders is not representative of the community of Nome as a whole. It does not include "discouraged" fishers who have ceased fishing and did not apply for permits. It would be inappropriate to include needs questions on the permit system. To collect accurate needs data for Nome would require a random sample or census of the community, as is done for the other smaller communities. The survey method was not used in Nome because of the expense involved in contacting more than 1,000 households, and because harvest data already were being provided by the permit system.

The needs data represent a different kind of information than the harvest estimates, gear reports, and other, objective data presented in this report. Because of considerable limitations to the needs data, needs responses cannot be considered a reliable indicator of the adequacy of salmon harvests in northwest Alaska.

SUMMARY

This project provided the first widespread and reliable estimates of the subsistence harvests of salmon in 20 selected communities in northwest Alaska. While the harvests estimated in this study were higher than harvests estimated and reported by previous studies, the methodologies of the different studies do not lend themselves to comparison. This project, however, establishes a baseline against which future change can be measured more accurately.

The findings support previous conclusions that salmon provide a substantial portion of the wild food diet in northwest Alaska, with approximately 123 salmon harvested per household per year. The composition of the harvests seems closely related to salmon abundance, with chum predominating in the Kotzebue District, and sockeye contributing a much larger proportion of the subsistence harvest in the Port Clarence District than elsewhere in northwest Alaska.

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APPENDIX 1.

SUBSISTENCE SALMON HARVEST ESTIMATES

FOR THE NORTON SOUND, PORT CLARENCE, AND KOTZEBUE DISTRICTS, 1994

APPENDIX TABLE 1. REPORTED AND ESTIMATED NUMBER OF SALMON HARVESTED FOR SUBSISTENCE, NORTHWEST ALASKA, 1994

			Chinook		Chum		Pink		Sockeye		Coho		Total	
	Total HH's	HH's Contacted	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total
Nome Permits**	132	120	22	23	1,575	1,673	6,016	6,556	65	69	886	983	8,564	9,304
Subdistrict 1	132	120		23		1,673		6,556		69		983		9,304
Golovin	42	41	47	48	810	833	4,922	5,066	158	163	326	336	6,263	6,445
Nome Permits**	3	3	0	0	0	0	0	0	0	0	158	158	158	158
White Mountain	66	10	42	*	260	*	3,100	*	5	*	223	*	3,630	*
Subdistrict 2	111	54		253		1,337		8,410		168		733		10,901
Elim	74	64	308	322	3,173	3,476	9,001	9,345	100	104	1,135	1,180	13,717	14,426
Subdistrict 3	74	64		322		3,476		9,345		104		1,180		14,426
Koyuk	69	59	278	308	4,130	4,581	5,454	6,049	1	1	334	370	10,197	11,309
Subdistrict 4	69	59		308		4,581		6,049		1		370		11,309
Shaktoolik	49	46	1,100	1,175	1,143	1,221	8,550	9,133	1	1	2,600	2,777	13,394	14,307
Subdistrict 5	49	46		1,175		1,221		9,133		1		2,777		14,307
Unalakleet	233	204	2,719	3,000	2,210	2,434	21,160	23,347	367	404	10,047	11,110	36,503	40,295
Stebbins	95	50	795	1,525	3,122	5,989	2,894	5,552	150	288	2,058	3,948	9,019	17,302
St. Michael	76	70	768	769	4,303	4,309	2,672	2,673	127	127	1,019	1,022	8,889	8,901
Subdistrict 6	404	324		5,294		12,732		31,572		819		16,081		66,498
NORTON SOUND	839	667		7,374		25,020		71,066		1,161		22,124		126,745
Brevig Mission	63	57	33	37	266	296	1,293	1,436	371	412	795	883	2,758	3,064
Nome Permits**	6	6	0	0	0	0	49	49	34	34	0	0	83	83
Teller	82	64	148	167	1,776	1,998	2,507	2,824	1,574	1,774	897	1,009	6,902	7,771
PORT CLARENCE	151	127		203		2,294		4,309	0	2,220		1,892		10,918
Ambler	74	29	0	*	6,444	*	0	*	0	*	5	*	6,449	*
Deering***	44	38	43	50	2,922	3,383	1,721	1,993	5	6	29	34	4,720	5,465
Kiana	104	59	0	0	1,891	4,060	10	22	0	0	0	0	1,901	4,082
Kobuk	24	22	3	3	5,722	6,369	0	0	0	0	0	0	5,725	6,372
Kotzebue	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Noorvik	122	64	2	*	8,517	*	0	*	0	*	0	*	8,519	*
Noatak***	84	68	3	4	4,672	5,771	0	0	0	0	150	185	4,825	5,960
Shungnak	55	52	0	0	7,982	8,611	1	1	0	0	0	0	7,983	8,612
Wales***	50	43	65	76	694	807	1,345	1,564	23	27	215	250	2,342	2,723
Shishmaref	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
KOTZEBUE SOUND	557	375		135		48,175		3,579		33		478		52,400
TOTALS	1,547	1,169		7,713		75,489		78,954		3,414		24,494		190,063

NA = Not available.

* If less than 50% and less than 30 of the households in a stratum were contacted, then harvest is estimated using district or regional mean harvests, as appropriate.

** *Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, permit returns, 1995. Expansion is by drainage.*

*** Alaska Department of Fish and Game, Division of Subsistence, baseline subsistence harvest surveys, 1994 and 1995. Arbitrarily placed under Usually Fish.

APPENDIX TABLE 2. REPORTED AND ESTIMATED NUMBER OF CHINOOK SALMON HARVESTED FOR SUBSISTENCE, NORTHWEST ALASKA, 1994

	Do Not Usually Fish				Usually Fish				TOTAL						
	Total HH's	HH's Contctd	Mean	Std. Dev.	Total HH's	HH's Contctd	Mean	Std. Dev.	Total HH's	HH's Contctd	Est. Mean	Reported Harvest	Est. Total*	Confid. Interval +/-	% +/-
Nome Permits**					132	120	0.2		132	120	0.2	22	23		
Subdistrict 1					132	120	0.2		132	120	0.2		23		
Golovin	7	7	2.9	7.6	35	34	0.8	2.4	42	41	1.1	47	48	5	10.3%
Nome Permits**					3	3	0.0		3	3	0.0	0	0		
White Mountain	57	1	0.0	0.0	9	9	4.7	13.3	66	10	NA	42	*	NA	NA
Subdistrict 2	64	8	2.9	0.0	47	46	1.5	2.5	111	54	2.3		253	5	1.9%
Elim	17	9	0.3	1.0	57	55	5.5	8.7	74	64	4.3	308	322	26	8.2%
Subdistrict 3	17	9	0.3	1.0	57	55	5.5	8.7	74	64	4.3		322	26	8.2%
Koyuk	8	4	0.0	0.0	61	55	5.1	10.0	69	59	4.5	278	308	51	16.7%
Subdistrict 4	8	4	0.0	0.0	61	55	5.1	10.0	69	59	4.5		308	51	16.7%
Shaktoolik	2	2	0.0	0.0	47	44	25.0	75.3	49	46	24.0	1100	1175	270	22.9%
Subdistrict 5	2	2	0.0	0.0	47	44	25.0	75.3	49	46	24.0		1175	270	22.9%
Unalakleet	25	15	0.9	2.1	208	189	14.3	18.3	233	204	12.9	2719	3000	169	5.6%
Stebbins	1	1	0.0	0.0	94	49	16.2	20.4	95	50	16.1	795	1525	379	24.9%
St. Michael	25	19	0.2	0.7	51	51	15.0	25.0	76	70	10.1	768	769	4	0.5%
Subdistrict 6	51	35	0.5	8.9	353	289	14.9	207.4	404	324	13.1		5294	415	7.8%
NORTON SOUND	142	58	1.5	9.7	697	609	10.3	249.0	839	667	8.8		7374	498	6.8%
Brevig Mission	13	12	0.0	0.0	50	45	0.7	1.4	63	57	0.6	33	37	7	18.5%
Nome Permits**					6	6	0.0		6	6	0.0	0	0		
Teller	28	16	0.0	0.0	54	48	3.1	8.2	82	64	2.0	148	167	43	25.7%
PORT CLARENCE	41	28	0.0	0.0	110	99	1.8	21.7	151	127	1.3		203	43	21.4%
Ambler	34	7	0.0	0.0	40	22	0.0	0.0	74	29	NA	0	*	NA	NA
Deering***					44	38	1.1		44	38	1.1	43	50		
Kiana	20	20	0.0	0.0	84	39	0.0	0.0	104	59	0.0	0	0	0	0.0%
Kobuk	5	5	0.0	0.0	19	17	0.2	0.5	24	22	0.1	3	3	2	47.1%
Kotzebue									NA	NA		NA	NA		
Noorvik	54	9	0.0	0.0	68	55	0.0	0.3	122	64	NA	2	*	NA	NA
Noatak***					84	68	0.0		84	68	0.0	3	4		
Shungnak	14	14	0.0	0.0	41	38	0.0	0.0	55	52	0.0	0	0	0	0.0%
Wales***					50	43	1.5		50	43	1.5	65	76		
Shishmaref									NA	NA		NA	NA		
KOTZEBUE SOUND	127	55	0.0	0.0	430	320	0.3	1.3	557	375	0.2		135	3	2.0%
TOTALS	310	141	0.7	9.7	1237	1028	6.1	249.9	1547	1169	5.0		7713	500	6.5%

NA = Not available.

* If less than 50% and less than 30 of the households in a stratum were contacted, then harvest is estimated using district or regional mean harvests, as appropriate.

** Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, permit returns, 1995. Expansion is by drainage.

*** Alaska Department of Fish and Game, Division of Subsistence, baseline subsistence harvest surveys, 1994 and 1995.

APPENDIX TABLE 3. REPORTED AND ESTIMATED NUMBER OF SOCKEYE SALMON HARVESTED FOR SUBSISTENCE, NORTHWEST ALASKA, 1994

	Do Not Usually Fish				Usually Fish				TOTAL						
	Total HH's	HH's Contctd	Mean	Std. Dev.	Total HH's	HH's Contctd	Mean	Std. Dev.	Total HH's	HH's Contctd	Est. Mean	Reported Harvest	Est. Total*	Confid. Interval +/-	% +/-
Nome Permits**					132	120	0.5		132	120	0.5	65	69		
Subdistrict 1					132	120	0.5		132	120	0.5		69		
Golovin	7	7	0.0	0.0	35	34	4.6	25.7	42	41	3.9	158	163	52	32.1%
Nome Permits**					3	3	0.0		3	3	0.0	0	0		
White Mountain	57	1	0.0	0.0	9	9	0.6	1.7	66	10	NA	5	*	NA	NA
Subdistrict 2	64	8	0.0	0.0	47	46	3.6	26.1	111	54	1.5		168	52	31.1%
Elim	17	9	0.0	0.0	57	55	1.8	13.5	74	64	1.4	100	104	39	37.5%
Subdistrict 3	17	9	0.0	0.0	57	55	1.8	13.5	74	64	1.4		104	39	37.5%
Koyuk	8	4	0.0	0.0	61	55	0.0	0.1	69	59	0.0	1	1	1	62.7%
Subdistrict 4	8	4	0.0	0.0	61	55	0.0	0.1	69	59	0.0		1	1	62.7%
Shaktoolik	2	2	0.0	0.0	47	44	0.0	0.2	49	46	0.0	1	1	1	50.5%
Subdistrict 5	2	2	0.0	0.0	47	44	0.0	0.2	49	46	0.0		1	1	50.5%
Unalakleet	25	15	0.0	0.0	208	189	1.9	9.3	233	204	1.7	367	404	85	21.0%
Stebbins	1	1	0.0	0.0	94	49	3.1	21.4	95	50	3.0	150	288	398	138.4%
St. Michael	25	19	0.0	0.0	51	51	2.5	8.0	76	70	1.8	127	127	0	0.0%
Subdistrict 6	51	35	0.0	0.0	353	289	2.3	203.6	404	324	2.0		819	407	49.7%
NORTON SOUND	142	58	0.0	0.0	697	609	1.7	206.1	839	667	1.4		1161	412	35.5%
Brevig Mission	13	12	0.0	0.0	50	45	8.2	10.8	63	57	6.5	371	412	51	12.3%
Nome Permits**					6	6	5.7		6	6	5.7	34	34		
Teller	28	16	0.3	1.3	54	48	32.7	59.4	82	64	21.6	1574	1774	309	17.4%
PORT CLARENCE	41	28	0.2	5.7	110	99	20.1	156.4	151	127	14.7		2220	313	14.1%
Ambler	34	7	0.0	0.0	40	22	0.0	0.0	74	29	NA	0	*	NA	NA
Deering***					44	38	0.1		44	38	0.1	5	6		
Kiana	20	20	0.0	0.0	84	39	0.0	0.0	104	59	0.0	0	0	0	0.0%
Kobuk	5	5	0.0	0.0	19	17	0.0	0.0	24	22	0.0	0	0	0	0.0%
Kotzebue									NA	NA		NA	NA		
Noorvik	54	9	0.0	0.0	68	55	0.0	0.0	122	64	NA	0	*	NA	NA
Noatak***					84	68	0.0		84	68	0.0	0	0		
Shungnak	14	14	0.0	0.0	41	38	0.0	0.0	55	52	0.0	0	0	0	0.0%
Wales***					50	43	0.5		50	43	0.5	23	27		
Shishmaref									NA	NA		NA	NA		
KOTZEBUE SOUND	127	55	0.0	0.0	430	320	0.1	0.0	557	375	0.1		33	0	0.0%
TOTALS	310	141	0.0	5.7	1237	1028	2.8	258.7	1547	1169	2.2		3414	518	15.2%

NA = Not available.

* If less than 50% and less than 30 of the households in a stratum were contacted, then harvest is estimated using district or regional mean harvests, as appropriate.

** Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, permit returns, 1995. Expansion is by drainage.

*** Alaska Department of Fish and Game, Division of Subsistence, baseline subsistence harvest surveys, 1994 and 1995.

APPENDIX TABLE 4. REPORTED AND ESTIMATED NUMBER OF COHO SALMON HARVESTED FOR SUBSISTENCE, NORTHWEST ALASKA, 1994

	Do Not Usually Fish				Usually Fish				TOTAL						
	Total HH's	HH's Contctd	Mean	Std. Dev.	Total HH's	HH's Contctd	Mean	Std. Dev.	Total HH's	HH's Contctd	Est. Mean	Reported Harvest	Est. Total*	Confid. Interval +/-	% +/-
Nome Permits**					132	120	7.4		132	120	7.4	886	983		
Subdistrict 1					132	120	7.4		132	120	7.4		983		
Golovin	7	7	0.3	0.8	35	34	9.5	15.3	42	41	8.0	326	336	31	9.3%
Nome Permits**					3	3	52.7		3	3	52.7	158	158		
White Mountain	57	1	0.0	0.0	9	9	24.8	39.3	66	10	NA	223	*	NA	NA
Subdistrict 2	64	8	0.3	0.0	47	46	15.2	15.6	111	54	6.6		733	31	4.2%
Elim	17	9	0.4	1.3	57	55	20.6	26.0	74	64	15.9	1135	1180	76	6.4%
Subdistrict 3	17	9	0.4	1.3	57	55	20.6	26.0	74	64	15.9		1180	76	6.4%
Koyuk	8	4	0.0	0.0	61	55	6.1	14.2	69	59	5.4	334	370	73	19.7%
Subdistrict 4	8	4	0.0	0.0	61	55	6.1	14.2	69	59	5.4		370	73	19.7%
Shaktoolik	2	2	0.0	0.0	47	44	59.1	103.4	49	46	56.7	2600	2777	370	13.3%
Subdistrict 5	2	2	0.0	0.0	47	44	59.1	103.4	49	46	56.7		2777	370	13.3%
Unalakleet	25	15	6.3	11.3	208	189	52.7	81.5	233	204	47.7	10047	11110	751	6.8%
Stebbins	1	1	0.0	0.0	94	49	42.0	64.2	95	50	41.6	2058	3948	1193	30.2%
St. Michael	25	19	0.6	1.7	51	51	19.8	47.5	76	70	13.5	1019	1022	10	1.0%
Subdistrict 6	51	35	3.4	46.3	353	289	45.1	703.4	404	324	39.8		16081	1410	8.8%
NORTON SOUND	142	58	1.4	46.6	697	609	31.5	729.4	839	667	26.4		22124	1462	6.6%
Brevig Mission	13	12	0.5	1.2	50	45	17.5	23.6	63	57	14.0	795	883	111	12.6%
Nome Permits**					6	6	0.0		6	6	0.0	0	0		
Teller	28	16	0.0	0.0	54	48	18.7	36.2	82	64	12.3	897	1009	188	18.6%
PORT CLARENCE	41	28	0.2	1.3	110	99	17.1	109.3	151	127	12.5		1892	219	11.6%
Ambler	34	7	0.0	0.0	40	22	0.2	1.1	74	29	NA	5	*	NA	NA
Deering***					44	38	0.8		44	38	0.8	29	34		
Kiana	20	20	0.0	0.0	84	39	0.0	0.0	104	59	0.0	0	0	0	0.0%
Kobuk	5	5	0.0	0.0	19	17	0.0	0.0	24	22	0.0	0	0	0	0.0%
Kotzebue									NA	NA		NA	NA		
Noorvik	54	9	0.0	0.0	68	55	0.0	0.0	122	64	NA	0	*	NA	NA
Noatak***					84	68	2.2		84	68	2.2	150	185		
Shungnak	14	14	0.0	0.0	41	38	0.0	0.0	55	52	0.0	0	0	0	0.0%
Wales***					50	43	5.0		50	43	5.0	215	250		
Shishmaref									NA	NA		NA	NA		
KOTZEBUE SOUND	127	55	0.0	0.0	430	320	1.1	0.0	557	375	0.9		478	0	0.0%
TOTALS	310	141	0.7	46.6	1237	1028	19.6	737.6	1547	1169	15.8		24494	1478	6.0%

NA = Not available.

* If less than 50% and less than 30 of the households in a stratum were contacted, then harvest is estimated using district or regional mean harvests, as appropriate.

** Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, permit returns, 1995. Expansion is by drainage.

*** Alaska Department of Fish and Game, Division of Subsistence, baseline subsistence harvest surveys, 1994 and 1995.

APPENDIX TABLE 5. REPORTED AND ESTIMATED NUMBER OF PINK SALMON HARVESTED FOR SUBSISTENCE, NORTHWEST ALASKA, 1994

	Do Not Usually Fish				Usually Fish				TOTAL						
	Total HH's	HH's Contctd	Mean	Std. Dev.	Total HH's	HH's Contctd	Mean	Std. Dev.	Total HH's	HH's Contctd	Est. Mean	Reported Harvest	Est. Total*	Confid. Interval +/-	% +/-
Nome Permits**					132	120	50.1		132	120	49.7	6016	6556		
Subdistrict 1					132	120	50.1		132	120	49.7		6556		
Golovin	7	7	4.3	11.3	35	34	143.9	168.1	42	41	120.6	4922	5066	341	6.7%
Nome Permits**					3	3	0.0		3	3	0.0	0	0		
White Mountain	57	1	0.0	0.0	9	9	344.4	259.7	66	10	NA	3100	*	NA	NA
Subdistrict 2	64	8	4.3	0.0	47	46	173.1	170.6	111	54	75.8		8410	341	4.1%
Elim	17	9	2.2	6.7	57	55	163.3	283.2	74	64	126.3	9001	9345	817	8.7%
Subdistrict 3	17	9	2.2	6.7	57	55	163.3	283.2	74	64	126.3		9345	817	8.7%
Koyuk	8	4	0.0	0.0	61	55	99.2	142.1	69	59	87.7	5454	6049	733	12.1%
Subdistrict 4	8	4	0.0	0.0	61	55	99.2	142.1	69	59	87.7		6049	733	12.1%
Shaktoolik	2	2	0.0	0.0	47	44	194.3	209.4	49	46	186.4	8550	9133	750	8.2%
Subdistrict 5	2	2	0.0	0.0	47	44	194.3	209.4	49	46	186.4		9133	750	8.2%
Unalakleet	25	15	7.1	19.9	208	189	111.4	374.0	233	204	100.2	21160	23347	3425	14.7%
Stebbins	1	1	0.0	0.0	94	49	59.1	88.0	95	50	58.4	2894	5552	1636	29.5%
St. Michael	25	19	0.2	0.9	51	51	52.3	140.2	76	70	35.2	2672	2673	5	0.2%
Subdistrict 6	51	35	3.6	81.2	353	289	88.9	1895.9	404	324	78.1		31572	3795	12.0%
NORTON SOUND	142	58	3.5	85.3	697	609	101.3	2016.1	839	667	84.7		71066	4036	5.7%
Brevig Mission	13	12	1.4	4.9	50	45	28.4	40.2	63	57	22.8	1293	1436	190	13.2%
Nome Permits**					6	6	8.2		6	6	8.2	49	49		
Teller	28	16	0.3	1.3	54	48	52.1	101.3	82	64	34.4	2507	2824	526	18.6%
PORT CLARENCE	41	28	0.7	7.7	110	99	38.9	279.7	151	127	28.5		4309	560	13.0%
Ambler	34	7	0.0	0.0	40	22	0.0	0.0	74	29	NA	0	*	NA	NA
Deering***					44	38	45.3		44	38	45.3	1721	1993		
Kiana	20	20	0.0	0.0	84	39	0.3	1.6	104	59	0.2	10	22	32	146.4%
Kobuk	5	5	0.0	0.0	19	17	0.0	0.0	24	22	0.0	0	0	0	0.0%
Kotzebue									NA	NA		NA	NA		
Noorvik	54	9	0.0	0.0	68	55	0.0	0.0	122	64	NA	0	*	NA	NA
Noatak***					84	68	0.0		84	68	0.0	0	0		
Shungnak	14	14	0.0	0.0	41	38	0.0	0.2	55	52	0.0	1	1	1	54.1%
Wales***					50	43	31.3		50	43	31.3	1345	1564		
Shishmaref									NA	NA		NA	NA		
KOTZEBUE SOUND	127	55	0.0	0.0	430	320	8.3	15.8	557	375	6.4		3579	32	0.9%
TOTALS	310	141	1.7	85.6	1237	1028	63.4	2035.4	1547	1169	51.0		78954	4074	5.2%

NA = Not available.

* If less than 50% and less than 30 of the households in a stratum were contacted, then harvest is estimated using district or regional mean harvests, as appropriate.

** Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, permit returns, 1995. Expansion is by drainage.

*** Alaska Department of Fish and Game, Division of Subsistence, baseline subsistence harvest surveys, 1994 and 1995.

APPENDIX TABLE 6. REPORTED AND ESTIMATED NUMBER OF CHUM SALMON HARVESTED FOR SUBSISTENCE, NORTHWEST ALASKA, 1994

	Do Not Usually Fish				Usually Fish				TOTAL						
	Total HH's	HH's Contctd	Mean	Std. Dev.	Total HH's	HH's Contctd	Mean	Std. Dev.	Total HH's	HH's Contctd	Est. Mean	Reported Harvest	Est. Total*	Confid. Interval +/-	% +/-
Nome Permits**					132	120	13.1		132	120	12.7	1575	1673		
Subdistrict 1					132	120	13.1		132	120	12.7		1673		
Golovin	7	7	4.3	11.3	35	34	22.9	32.9	42	41	19.8	810	833	67	8.0%
Nome Permits**					3	3	0.0		3	3	0.0	0	0		
White Mountain	57	1	0.0	0.0	9	9	28.9	24.7	66	10	NA	260	*	NA	NA
Subdistrict 2	64	8	4.3	0.0	47	46	22.6	33.4	111	54	12.0		1337	67	5.0%
Elim	17	9	24.4	66.2	57	55	53.7	82.2	74	64	47.0	3173	3476	566	16.3%
Subdistrict 3	17	9	24.4	66.2	57	55	53.7	82.2	74	64	47.0		3476	566	16.3%
Koyuk	8	4	0.0	0.0	61	55	75.1	114.0	69	59	66.4	4130	4581	588	12.8%
Subdistrict 4	8	4	0.0	0.0	61	55	75.1	114.0	69	59	66.4		4581	588	12.8%
Shaktoolik	2	2	0.0	0.0	47	44	26.0	65.5	49	46	24.9	1143	1221	235	19.2%
Subdistrict 5	2	2	0.0	0.0	47	44	26.0	65.5	49	46	24.9		1221	235	19.2%
Unalakleet	25	15	0.2	0.6	208	189	11.7	23.9	233	204	10.4	2210	2434	218	9.0%
Stebbins	1	1	0.0	0.0	94	49	63.7	99.2	95	50	63.0	3122	5989	1844	30.8%
St. Michael	25	19	1.1	4.6	51	51	84.0	143.5	76	70	56.7	4303	4309	26	0.6%
Subdistrict 6	51	35	0.6	13.1	353	289	36.0	928.2	404	324	31.5		12732	1857	14.6%
NORTON SOUND	142	58	5.1	257.5	697	609	34.9	988.4	839	667	29.8		25020	2043	8.2%
Brevig Mission	13	12	0.0	0.0	50	45	5.9	9.6	63	57	4.7	266	296	45	15.3%
Nome Permits**					6	6	0.0		6	6	0.0	0	0		
Teller	28	16	0.0	0.0	54	48	37.0	87.2	82	64	24.4	1776	1998	453	22.7%
PORT CLARENCE	41	28	0.0	0.0	110	99	20.9	227.6	151	127	15.2		2294	455	19.8%
Ambler	34	7	284.0	542.9	40	22	202.5	230.2	74	29	NA	6444	*	NA	NA
Deering***					44	38	76.9		44	38	76.9	2922	3383		
Kiana	20	20	0.6	1.8	84	39	48.2	76.8	104	59	39.0	1891	4060	1512	37.2%
Kobuk	5	5	45.0	100.6	19	17	323.4	731.7	24	22	265.4	5722	6369	2188	34.4%
Kotzebue									NA	NA		NA	NA		
Noorvik	54	9	2.8	8.3	68	55	154.4	226.7	122	64	NA	8517	*	NA	NA
Noatak***					84	68	68.7		84	68	68.7	4672	5771		
Shungnak	14	14	1.3	3.3	41	38	209.6	398.4	55	52	156.6	7982	8611	1433	16.6%
Wales***					50	43	16.1		50	43	16.1	694	807		
Shishmaref									NA	NA		NA	NA		
KOTZEBUE SOUND	127	55	6.5	136.9	430	320	110.1	1763.0	557	375	86.5		48175	3537	7.3%
TOTALS	310	141	5.0	291.7	1237	1028	59.8	2034.0	1547	1169	48.8		75489	4110	5.4%

NA = Not available.

* If less than 50% and less than 30 of the households in a stratum were contacted, then harvest is estimated using district or regional mean harvests, as appropriate.

** Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, permit returns, 1995. Expansion is by drainage.

*** Alaska Department of Fish and Game, Division of Subsistence, baseline subsistence harvest surveys, 1994 and 1995.

APPENDIX TABLE 7. REPORTED AND ESTIMATED NUMBER OF SHEEFISH HARVESTED FOR SUBSISTENCE, KOTZEBUE DISTRICT, 1994

	Do Not Usually Fish				Usually Fish				TOTAL						
	Total HH's	HH's Contctd	Mean	Std. Dev.	Total HH's	HH's Contctd	Mean	Std. Dev.	Total HH's	HH's Contctd	Est. Mean	Reported Harvest	Est. Total*	Confid. Interval +/-	% +/-
Ambler	34	7	73.4	188.1	40	22	13.9	16.5	74	29	NA	819	*	NA	NA
Deering***									NA	NA		NA	NA		
Kiana	20	20	0.3	1.1	84	39	10.1	15.4	104	59	8.2	399	854	304	35.6%
Kobuk	5	5	60.0	134.2	19	17	25.3	42.0	24	22	32.5	730	781	126	16.1%
Kotzebue									NA	NA		NA	NA		
Noorvik	54	9	0.0	0.0	68	55	9.6	30.9	122	64	NA	528	*	NA	NA
Noatak***									NA	NA		NA	NA		
Shungnak	14	14	0.0	0.0	41	38	32.9	58.3	55	52	24.5	1250	1349	210	15.5%
Wales***									NA	NA		NA	NA		
Shishmaref									NA	NA		NA	NA		
KOTZEBUE SOUND	127	55	7.8	0.0	252	171	15.4	231.0	379	226	12.9		4878	462	9.5%

NA = Not available.

* If less than 50% and less than 30 of the households in a stratum were contacted, then harvest is estimated using district or regional mean harvests, as appropriate.

** Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, permit returns, 1995. Expansion is by drainage.

*** Alaska Department of Fish and Game, Division of Subsistence, baseline subsistence harvest surveys, 1994 and 1995.

APPENDIX TABLE 8. TYPES OF GEAR USED FOR SUBSISTENCE SALMON FISHING,

	Total HH's	HH's Responding	Gear Types* Drift Net	Set Net	Seine	Rod & Reel
Nome Permits						
Subdistrict 1						
Golovin	42	31	0.00%	27.78%	47.22%	77.78%
Nome Permits						
White Mountain	66	9	0.00%	3.03%	12.12%	7.58%
Subdistrict 2	108	40	0.00%	12.54%	26.12%	87.46%
Elim	74	50	0.00%	40.87%	33.01%	63.84%
Subdistrict 3	74	50	0.00%	40.87%	33.01%	63.84%
Koyuk	69	48	0.00%	58.94%	12.89%	57.10%
Subdistrict 4	69	48	0.00%	58.94%	12.89%	57.10%
Shaktoolik	49	42	0.00%	54.81%	57.09%	77.65%
Subdistrict 5	49	42	0.00%	54.81%	57.09%	77.65%
Unalakleet	233	179	1.02%	59.17%	17.85%	78.58%
Stebbins	95	47	0.00%	88.42%	2.11%	31.58%
St. Michael	76	41	0.00%	71.70%	0.00%	46.43%
Subdistrict 6	404	267	0.67%	66.69%	12.14%	65.02%
NORTON SOUND	704	447	0.37%	54.45%	20.83%	68.94%
Brevig Mission	63	39	0.00%	50.13%	29.24%	24.81%
Nome Permits						
Teller	82	33	2.00%	63.86%	15.96%	5.99%
PORT CLARENCE	145	72	1.01%	56.57%	22.22%	33.33%
Ambler	74	22	0.00%	97.16%	21.01%	2.84%
Deering						
Kiana	104	30	0.00%	77.72%	13.93%	66.58%
Kobuk	24	15	0.00%	83.04%	0.00%	22.62%
Kotzebue						
Noorvik	122	41	0.00%	98.61%	4.18%	2.79%
Noatak						
Shungnak	55	36	0.00%	70.16%	10.96%	40.80%
Wales						
Shishmaref						
KOTZEBUE SOUND	379	144	0.00%	84.29%	11.52%	27.72%
TOTALS	1228	663	0.35%	63.16%	18.86%	53.72%

* A household may use multiple gear types.

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, household survey

APPENDIX TABLE 9. 1994 Northwest Alaska Subsistence Salmon Harvests: Involvement in Commercial Salmon Fishing

	Total HH's	HH's Responding	Commercial Fishing: HH Commercial Fishing #	HH Commercial Fishing Percentage	HH Removing From CF #	HH Removing From CF Percentage	Retained from Commercial Catch: Chinook	Chum	Pink	Sockeye	Coho	Total
Nome Permits												
Subdistrict 1												
Golovin	42	41	7.21	17.16%	5.15	12.25%	15.44	111.18	252.21	0.00	149.26	528.09
Nome Permits												
White Mountain	66	10	0.00	0.00%	0.00	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
Subdistrict 2	108	51	7.21	6.67%	5.15	4.77%	15.44	111.18	252.21	0.00	149.26	528.09
Elim	74	64	20.73	28.01%	5.18	7.00%	0.00	15.55	0.00	0.00	38.35	53.89
Subdistrict 3	74	64	20.73	28.01%	5.18	7.00%	0.00	15.55	0.00	0.00	38.35	53.89
Koyuk	69	59	4.44	6.43%	0.00	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
Subdistrict 4	69	59	4.44	6.43%	0.00	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
Shaktoolik	49	46	21.36	43.60%	1.07	2.18%	5.34	10.68	0.00	0.00	5.34	21.36
Subdistrict 5	49	46	21.36	43.60%	1.07	2.18%	5.34	10.68	0.00	0.00	5.34	21.36
Unalakleet	233	204	83.64	35.90%	28.61	12.28%	128.76	78.14	292.74	86.94	215.70	802.29
Stebbins	95	50	11.51	12.12%	1.92	2.02%	0.00	3.84	0.00	0.00	3.84	7.67
St. Michael	76	70	1.32	1.73%	0.00	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
Subdistrict 6	404	324	96.47	23.88%	30.53	7.56%	128.76	81.97	292.74	86.94	219.54	809.96
NORTON SOUND	704	544	150.20	21.34%	41.93	5.96%	149.54	219.38	544.95	86.94	412.49	1413.30
Brevig Mission	63	57	1.11	1.76%	0.00	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
Nome Permits												
Teller	82	64	0.00	0.00%	0.00	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
PORT CLARENCE	145	121	1.11	0.77%	0.00	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
Ambler	74	29	1.82	2.46%	1.82	2.46%	0.00	0.00	0.00	0.00	9.09	9.09
Deering												
Kiana	104	59	0.00	0.00%	0.00	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
Kobuk	24	22	2.24	9.31%	0.00	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
Kotzebue												
Noorvik	122	64	7.24	5.93%	6.00	4.92%	0.00	30.00	0.00	0.00	0.00	30.00
Noatak												
Shungnak	55	52	0.00	0.00%	0.00	0.00%	0.00	0.00	0.00	0.00	0.00	0.00
Wales												
Shishmaref												
KOTZEBUE SOUND	379	226	11.29	2.98%	7.82	2.06%	0.00	30.00	0.00	0.00	9.09	39.09
TOTALS	1228	891	162.60	13.24%	49.75	4.05%	149.54	249.38	544.95	86.94	421.58	1452.39

Note: HH = Households.

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, household surveys, 1995.

APPENDIX TABLE 10. 1994 Northwest Alaska Subsistence Salmon Harvests: Whole Salmon Fed to Dogs

	Total HH's	HH's Responding	HH Feeding Dogs #	HH Feeding Dogs Percentage	Whole Salmon Fed to Dogs* Chinook	Chum	Pink	Sockeye	Coho	Total	Est. Dogs	Salmon /Dog
Nome Permits												
Subdistrict 1												
Golovin	42	41	3.09	7.35%	0	7	283	0	0	290	6	47
Nome Permits												
White Mountain	66	10	1.00	1.52%	0	0	75	0	0	75	1	75
Subdistrict 2	108	51	4.09	3.79%	0	7	358	0	0	365	7	51
Elim	74	64	8.29	11.20%	0	259	2,202	0	62	2,524	37	68
Subdistrict 3	74	64	8.29	11.20%	0	259	2,202	0	62	2,524	37	68
Koyuk	69	59	5.55	8.04%	0	21	57	0	0	78	24	3
Subdistrict 4	69	59	5.55	8.04%	0	21	57	0	0	78	24	3
Shaktoolik	49	46	14.95	30.52%	0	333	1,495	0	355	2,183	73	30
Subdistrict 5	49	46	14.95	30.52%	0	333	1,495	0	355	2,183	73	30
Unalakleet	233	204	20.38	8.74%	17	80	2,170	0	659	2,926	147	20
Stebbins	95	50	9.59	10.10%	0	671	345	0	48	1,065	38	28
St. Michael	76	70	2.00	2.63%	16	150	59	3	21	249	4	62
Subdistrict 6	404	324	31.97	7.91%	33	902	2,574	3	728	4,240	189	22
Norton Sound District	704	544	64.85	9.21%	33	1,522	6,686	3	1,145	9,389	331	28
Brevig Mission	63	57	1.11	1.76%	1	16	93	22	63	196	32	6
Nome Permits												
Teller	82	64	3.38	4.12%	0	0	0	0	0	0	24	0
Port Clarence District	145	121	4.49	3.09%	1	16	93	22	63	196	56	4
Ambler	74	29	22.44	30.33%	0	8,651	0	0	0	8,651	227	38
Deering												
Kiana	104	59	12.92	12.43%	0	377	0	0	0	377	19	19
Kobuk	24	22	2.12	8.82%	0	2,447	0	0	0	2,447	103	24
Kotzebue												
Noorvik	122	64	14.84	12.16%	0	2,310	62	0	0	2,371	208	11
Noatak												
Shungnak	55	52	18.34	33.35%	0	2,949	0	0	0	2,949	110	27
Wales												
Shishmaref												
Kotzebue District	379	226	70.66	18.64%	0	16,733	62	0	0	16,795	668	25
TOTALS	1228	891	139.99	11.40%	34	18,271	6,842	25	1,208	26,380	1,055	25

* Does not include feeding scraps or spoiled fish to dogs.

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, household surveys, 1995.

APPENDIX TABLE 11.1994 Northwest Alaska Subsistence Salmon Harvests: Percentage of Wildfood from Salmon

			Total						Valid Responses				
	Total HH's	HH's Contctd	No Info.	0%	0-25%	26-50%	51-75%	76-100%	0%	0-25%	26-50%	51-75%	76-100%
Nome Permits													
Subdistrict 1													
Golovin	42	41	19.33%	2.38%	43.98%	26.96%	4.90%	2.45%	2.95%	54.51%	33.42%	6.08%	3.04%
Nome Permits													
White Mountain	66	10	90.91%	0.00%	7.58%	1.52%	0.00%	0.00%	0.00%	83.33%	16.67%	0.00%	0.00%
Subdistrict 2	108	51	43.67%	7.41%	34.71%	11.37%	1.89%	0.95%	13.15%	61.62%	20.18%	3.36%	1.68%
Elim	74	64	9.31%	0.00%	53.63%	33.11%	3.95%	0.00%	0.00%	59.13%	36.51%	4.36%	0.00%
Subdistrict 3	74	64	9.31%	0.00%	53.63%	33.11%	3.95%	0.00%	0.00%	59.13%	36.51%	4.36%	0.00%
Koyuk	69	59	32.49%	0.00%	35.36%	28.93%	1.61%	1.61%	0.00%	52.38%	42.86%	2.38%	2.38%
Subdistrict 4	69	59	32.49%	0.09%	35.36%	28.93%	1.61%	1.61%	0.13%	52.31%	42.80%	2.38%	2.38%
Shaktoolik	49	46	2.18%	0.00%	76.02%	15.26%	6.54%	0.00%	0.00%	77.71%	15.60%	6.69%	0.00%
Subdistrict 5	49	46	2.18%	0.00%	76.02%	15.26%	6.54%	0.00%	0.00%	77.71%	15.60%	6.69%	0.00%
Unalakleet	233	204	15.16%	1.90%	39.22%	34.02%	6.38%	3.32%	2.24%	46.22%	40.10%	7.52%	3.91%
Stebbins	95	50	7.11%	0.00%	26.25%	62.60%	4.04%	0.00%	0.00%	28.26%	67.39%	4.35%	0.00%
St. Michael	76	70	47.02%	0.00%	19.67%	26.73%	1.32%	5.26%	0.00%	37.12%	50.46%	2.48%	9.93%
Subdistrict 6	404	324	20.63%	1.02%	33.25%	37.06%	4.90%	3.14%	1.29%	41.89%	46.70%	6.17%	3.96%
Norton Sound District	704	544	22.32%	1.22%	39.18%	30.65%	4.31%	2.34%	1.57%	50.43%	39.45%	5.55%	3.01%
Brevig Mission	63	57	41.89%	0.00%	24.65%	29.94%	1.76%	1.76%	0.00%	42.41%	51.52%	3.03%	3.03%
Nome Permits													
Teller	82	64	53.35%	0.00%	10.98%	15.09%	13.72%	6.86%	0.00%	23.53%	32.35%	29.41%	14.71%
Port Clarence District	145	121	47.85%	0.00%	17.21%	21.83%	8.48%	4.63%	0.00%	32.99%	41.87%	16.27%	8.87%
Ambler	74	29	67.22%	0.00%	16.39%	2.46%	13.93%	0.00%	0.00%	50.00%	7.49%	42.51%	0.00%
Deering													
Kiana	104	59	25.37%	0.00%	64.28%	10.36%	0.00%	0.00%	0.00%	86.12%	13.88%	0.00%	0.00%
Kobuk	24	22	49.75%	0.00%	22.79%	27.45%	0.00%	0.00%	0.00%	45.37%	54.63%	0.00%	0.00%
Kotzebue													
Noorvik	122	64	59.76%	0.00%	26.05%	12.16%	2.03%	0.00%	0.00%	64.74%	30.22%	5.04%	0.00%
Noatak													
Shungnak	55	52	72.54%	0.00%	13.73%	9.81%	1.96%	1.96%	0.00%	50.00%	35.71%	7.14%	7.14%
Wales													
Shishmaref													
Kotzebue District	379	226	53.04%	0.00%	32.13%	11.50%	2.94%	0.39%	0.00%	68.42%	24.48%	6.27%	0.83%
TOTALS	1228	891	34.35%	0.64%	34.26%	24.28%	4.42%	2.05%	0.98%	52.18%	36.98%	6.74%	3.13%

NA = Not Available.

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, household surveys, 1995.

APPENDIX TABLE 12.1994 Northwest Alaska Subsistence Salmon Harvests: *Percentage of Salmon Shared*

			Total						Valid Responses				
	Total HH's	HH's Contctd	No Info.	0%	0-25%	26-50%	51-75%	76-100%	0%	0-25%	26-50%	51-75%	76-100%
Nome Permits													
Subdistrict 1													
Golovin	42	41	12.04%	4.83%	75.77%	2.45%	0.00%	4.90%	5.49%	86.15%	2.79%	0.00%	5.57%
Nome Permits													
White Mountain	66	10	90.91%	0.00%	9.09%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%
Subdistrict 2	108	51	34.37%	8.35%	54.44%	0.95%	0.00%	1.89%	12.73%	82.94%	1.44%	0.00%	2.89%
Elim	74	64	6.51%	1.40%	75.54%	12.36%	4.20%	0.00%	1.50%	80.79%	13.22%	4.49%	0.00%
Subdistrict 3	74	64	6.51%	0.00%	75.54%	12.36%	4.20%	0.00%	0.00%	82.02%	13.42%	4.56%	0.00%
Koyuk	69	59	26.06%	11.25%	54.65%	6.43%	0.00%	1.61%	15.22%	73.91%	8.70%	0.00%	2.17%
Subdistrict 4	69	59	26.06%	0.40%	54.65%	6.43%	0.00%	1.61%	0.64%	86.62%	10.19%	0.00%	2.55%
Shaktoolik	49	46	2.18%	0.00%	80.38%	10.90%	6.54%	0.00%	0.00%	82.17%	11.14%	6.69%	0.00%
Subdistrict 5	49	46	2.18%	0.00%	80.38%	10.90%	6.54%	0.00%	0.00%	82.17%	11.14%	6.69%	0.00%
Unalakleet	233	204	9.02%	13.01%	56.25%	14.64%	5.67%	1.42%	14.30%	61.82%	16.09%	6.23%	1.56%
Stebbins	95	50	7.11%	10.10%	68.66%	8.08%	4.04%	2.02%	10.87%	73.91%	8.70%	4.35%	2.17%
St. Michael	76	70	44.39%	1.32%	42.04%	9.63%	1.32%	1.32%	2.37%	75.59%	17.31%	2.37%	2.37%
Subdistrict 6	404	324	16.10%	9.85%	55.25%	12.76%	4.54%	1.51%	11.74%	65.85%	15.20%	5.41%	1.80%
Norton Sound District	704	544	18.19%	6.36%	59.19%	10.22%	3.45%	1.31%	7.90%	73.50%	12.69%	4.28%	1.63%
Brevig Mission	63	57	45.41%	0.00%	49.29%	5.29%	0.00%	0.00%	0.00%	90.31%	9.69%	0.00%	0.00%
Nome Permits													
Teller	82	64	53.35%	1.37%	32.93%	5.49%	1.37%	5.49%	2.94%	70.59%	11.76%	2.94%	11.76%
Port Clarence District	145	121	49.39%	0.77%	40.58%	5.40%	0.77%	3.08%	1.52%	80.19%	10.67%	1.52%	6.10%
Ambler	74	29	47.56%	0.00%	40.96%	9.02%	2.46%	0.00%	0.00%	78.11%	17.20%	4.69%	0.00%
Deering													
Kiana	104	59	23.30%	0.00%	63.31%	10.36%	0.00%	3.03%	0.00%	82.55%	13.50%	0.00%	3.95%
Kobuk	24	22	49.75%	0.00%	32.11%	13.97%	4.17%	0.00%	0.00%	63.90%	27.80%	8.29%	0.00%
Kotzebue													
Noorvik	122	64	52.67%	0.00%	36.18%	4.05%	4.05%	3.04%	0.00%	76.45%	8.56%	8.56%	6.42%
Noatak													
Shungnak	55	52	58.80%	0.00%	31.39%	7.85%	1.96%	0.00%	0.00%	76.19%	19.05%	4.76%	0.00%
Wales													
Shishmaref													
Kotzebue District	379	226	44.10%	0.00%	43.58%	7.22%	2.94%	2.16%	0.00%	77.95%	12.91%	5.26%	3.87%
TOTALS	1228	891	29.79%	3.83%	52.16%	8.71%	2.97%	1.77%	5.52%	75.11%	12.54%	4.28%	2.55%

NA = Not Available.

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, household surveys, 1995.

APPENDIX TABLE 13. "HOUSEHOLD SUBSISTENCE NEEDS MET?" RESPONSES, NORTHWEST ALASKA, 19

			Total			Valid Responses	
	Total HH's	HH's Contctd	No Info.	No	Yes	No	Yes
Nome Permits							
Subdistrict 1							
Golovin	42	41	9.66%	26.96%	63.38%	29.84%	70.16%
Nome Permits							
White Mountain	66	10	90.91%	1.52%	7.58%	16.67%	83.33%
Subdistrict 2	108	51	26.96%	11.37%	61.67%	15.57%	84.43%
Elim	74	64	14.41%	35.67%	49.92%	41.67%	58.33%
Subdistrict 3	74	64	14.41%	35.67%	49.92%	41.67%	58.33%
Koyuk	69	59	22.85%	49.83%	27.33%	64.58%	35.42%
Subdistrict 4	69	59	22.85%	49.83%	27.33%	64.58%	35.42%
Shaktoolik	49	46	0.00%	36.78%	63.22%	36.78%	63.22%
Subdistrict 5	49	46	0.00%	36.78%	63.22%	36.78%	63.22%
Unalakleet	233	204	10.90%	22.21%	66.88%	24.93%	75.07%
Stebbins	95	50	9.13%	50.48%	40.39%	55.56%	44.44%
St. Michael	76	70	36.50%	16.62%	46.88%	26.17%	73.83%
Subdistrict 6	404	324	15.80%	25.33%	58.88%	30.08%	69.92%
Norton Sound District	704	544	18.21%	28.92%	52.87%	35.36%	64.64%
Brevig Mission	63	57	34.88%	56.35%	8.77%	86.53%	13.47%
Nome Permits							
Teller	82	64	51.22%	35.06%	13.72%	71.88%	28.13%
Port Clarence District	145	121	43.52%	44.68%	11.81%	79.10%	20.90%
Ambler	74	29	4.91%	37.70%	57.39%	39.65%	60.35%
Deering							
Kiana	104	59	9.25%	53.62%	37.13%	59.09%	40.91%
Kobuk	24	22	0.00%	68.38%	31.62%	68.38%	31.62%
Kotzebue							
Noorvik	122	64	35.74%	36.04%	28.23%	56.08%	43.92%
Noatak							
Shungnak	55	52	27.99%	25.22%	46.79%	35.02%	64.98%
Wales							
Shishmaref							
Kotzebue District	379	226	18.30%	44.45%	37.25%	54.40%	45.60%
TOTALS	1228	891	21.84%	35.19%	42.97%	45.02%	54.98%

NA = Not Available.

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, household surveys, 1995.

SEE discussion of limitations to these data in Discussion section of report.

APPENDIX TABLE 14. "Why household subsistence needs were not met this year" responses, northwest Alaska, 1994

Fishing District	Weather	Work	Equipment	Health	Did Not Fish	Abundance	Other
Norton Sound District (n=148)							
Elim	2 (12.5%)	(0.0%)	1 (6.3%)	1 (6.3%)	8 (50.0%)		3 (18.8%)
Golovin	4 (57.1%)	(0.0%)	2 (28.6%)			2 (28.6%)	
Koyuk	15 (48.4%)	9 (29.0%)	9 (29.0%)		1 (3.2%)		3 (9.7%)
Saint Michael	3 (25.0%)	4 (33.3%)	3 (25.0%)	1 (8.3%)			5 (41.7%)
Shaktoolik	4 (28.6%)	4 (28.6%)	4 (28.6%)			1 (7.1%)	2 (14.3%)
Stebbins	1 (4.3%)	5 (21.7%)	8 (34.8%)			1 (4.3%)	10 (43.5%)
Unalakleet	17 (38.6%)	4 (9.1%)	2 (4.5%)	4 (9.1%)	1 (2.3%)	1 (2.3%)	16 (36.4%)
White Mountain	1 (100.0%)					1 (100.0%)	
Norton Sound District	47 (31.8%)	26 (17.6%)	29 (19.6%)	6 (4.1%)	10 (6.8%)	6 (4.1%)	39 (26.4%)
Port Clarence District (n=55)							
Brevig Mission	26 (83.9%)	1 (3.2%)	2 (6.5%)		1 (3.2%)		3 (9.7%)
Teller	15 (62.5%)	3 (12.5%)	3 (12.5%)	2 (8.3%)		1 (4.2%)	6 (25.0%)
Port Clarence District	41 (74.5%)	4 (7.3%)	5 (9.1%)	2 (3.6%)	1 (1.8%)	1 (1.8%)	9 (16.4%)
Kotzebue District (n=76)							
Ambler	10 (83.3%)	2 (16.7%)	1 (8.3%)				
Kiana	3 (16.7%)	1 (5.6%)	1 (5.6%)		11 (61.1%)		3 (16.7%)
Kobuk	8 (53.3%)	3 (20.0%)	3 (20.0%)		2 (13.3%)		1 (6.7%)
Noorvik	11 (57.9%)	1 (5.3%)	1 (5.3%)	2 (10.5%)	4 (21.1%)		3 (15.8%)
Shungnak	7 (58.3%)	1 (8.3%)		2 (16.7%)	1 (8.3%)		3 (25.0%)
Kotzebue District	39 (51.3%)	8 (10.5%)	6 (7.9%)	4 (5.3%)	18 (23.7%)	0 (0.0%)	10 (13.2%)
All Districts (N=279)	127 (45.5%)	38 (13.6%)	40 (14.3%)	12 (4.3%)	29 (10.4%)	7 (2.5%)	58 (20.8%)

NOTE: N=Number of households which offered a reason the household subsistence salmon needs were not met. Percentages are calculated from N.
SEE discussion of limitations to these data in Discussion section of report

APPENDIX 2

NORTON SOUND / SEWARD PENINSULA HARVEST SURVEY

COMM. ID#_____

HHID#_____

1994 NORTON SOUND / SEWARD PENINSULA AREA
POST-SEASON SUBSISTENCE SALMON HOUSEHOLD HARVEST SURVEY

* (Questions marked with an asterisk are asked of all households interviewed)

Community: _____ Household Head Name: _____

Survey Date: _____, 1994 Name of Person Interviewed: _____

Interviewer: _____ Household P.O. Box: _____

*1. Does this household usually subsistence fish for salmon? No_____ Yes_____

*2. Did this household catch salmon for subsistence use this year? No_____ (go to 3) Yes_____ (go to 5)

HOUSEHOLD DIDN'T SUBSISTENCE FISH FOR SALMON (Household did not help harvest/catch salmon)

3. Did this household help another household process ("put up") salmon? No _____ (go to 10) Yes _____

If Yes, who? Name/HHID _____

4. Please estimate how many salmon were for your household only.

CHINOOK_____ ("kings") CHUM_____ ("dogs") PINK_____ ("humpies") SOCKEYE _____ ("reds") COHO_____ ("silvers") Could not estimate_____

(Go to Question 10).....

HOUSEHOLD SUBSISTENCE FISHED FOR SALMON

5. Did other households fish with you? No ____ (go to 7) Yes ____ (If Yes, Name/HHID _____)

6. Please estimate how many salmon all households together caught. (Ask about salmon already eaten, frozen, given to other households, and dog food)

CHINOOK_____ ("kings") CHUM_____ ("dogs") PINK_____ ("humpies") SOCKEYE _____ ("reds") COHO_____ ("silvers") Could not estimate_____

7. Please estimate how many salmon were caught for your household only.

CHINOOK_____ ("kings") CHUM_____ ("dogs") PINK_____ ("humpies") SOCKEYE _____ ("reds") COHO_____ ("silvers") Could not estimate_____

(Go to Question 8) .....

FISHING GEAR (For subsistence fishing households only)

8. What type(s) of fishing gear was used for catching subsistence salmon this year?

Drift net _____, Set net _____, Seine _____, Rod-and-reel _____,

Other (Identify)_____

9. What mesh size(s) do you use for catching salmon? Kings_____(inches) Other_____(inches)

HHID#_____

1994 NORTON SOUND / SEWARD PENINSULA AREA
POST-SEASON SUBSISTENCE SALMON HOUSEHOLD HARVEST SURVEY

COMMERCIAL FISHING

*10. Does this household commercial fish for salmon? No _____ (go to 14), Yes _____
If yes, where ?_____

11. Were all of the salmon caught when commercial fishing sold or were some brought home to eat or processed for subsistence? All were sold _____ (go to 14) Some were used for subsistence _____

12. How many commercially caught salmon were used for subsistence?
CHINOOK_____ CHUM_____ PINK_____ SOCKEYE_____ COHO_____

13. Are those salmon included in the catch numbers you gave me? No _____ Yes _____

HOUSEHOLD SIZE

*14.How many people live in this household? _____

DOG FOOD (For subsistence fishing households only)

15. Did this household catch salmon for dog food?
No _____ (go to 19) Only backbones/heads/guts/scraps _____ (go to 19)
Yes _____

16. How many salmon? CHINOOK _____ ("kings") CHUM_____ ("dogs") PINK_____ ("humpies") SOCKEYE _____ ("reds") COHO_____ ("silvers")

17. Are the salmon caught for the dogs included in the estimates you gave me ? No_____ Yes _____

18. How many dogs does this household have? _____

19. (For subsistence fishing households only)
Were your household's subsistence salmon needs met this year? No_____ Yes_____
If no, why not?

How do you plan to meet those needs? (other fish, game, food stamps, etc)

20. How much of your wild food harvest is salmon? (circle)

0 - 25%	26 - 50%	51-75%	76 - 100%
(some)	(about half)	(most)	(all)

21. How much of your salmon catch did you give to other families? (circle)

0 - 25%	26 - 50%	51-75%	76 - 100%
(some)	(about half)	(most)	(all)

*22. Do you have any suggestions or comments?

THANK YOU FOR YOUR TIME AND FOR HELPING WITH THIS PROJECT.
A summary of the subsistence fishing survey will be sent out next spring (April).

APPENDIX 3.

KOTZEBUE SOUND / KOBUK RIVER HARVEST SURVEY

COMM. ID#_____

HHID#_____

1994 KOTZEBUE SOUND / KOBUK RIVER AREA
POST-SEASON SUBSISTENCE SALMON HOUSEHOLD HARVEST SURVEY

* (Questions marked with an asterisk are asked of all households interviewed)

Community: _____ Household Head Name: _____

Survey Date:_____, 1994 Name of Person Interviewed: _____

Interviewer: _____ Household P.O. Box: _____

*1. **Does this household usually subsistence fish for salmon?** No____ Yes____

*2. **Did this household catch salmon for subsistence use this year?** No____ (go to 3) Yes____ (go to 5)

HOUSEHOLD DIDN'T SUBSISTENCE FISH FOR SALMON (Household did not help harvest/catch salmon)

3. **Did this household help another household process ("put up") salmon?** No ____ (go to # 10) Yes ____

If Yes, who? Name/HHID_____

4. **Please estimate how many salmon and sheefish you kept for your household use.**

CHUM_____ OTHER SALMON_____ SHEEFISH _____ Can't estimate_____

(Go to Question 10).....

HOUSEHOLD SUBSISTENCE FISHED FOR SALMON

5. **Did other households fish with you?** No _____ (go to 7) Yes _____ (If Yes, Name/HHID _____)

6. **Please estimate how many salmon and sheefish all households together caught.** (Ask about salmon already eaten, frozen, given to other households, and dog food)

CHUM_____ OTHER SALMON_____ SHEEFISH _____ Can't estimate_____

7. **Please estimate how many salmon and sheefish were caught for your household only.**

CHUM _____ OTHER SALMON_____ SHEEFISH _____ Can't estimate_____

(Go to Question 8) .....

FISHING GEAR (For subsistence fishing households only)

8. **What type(s) of fishing gear was used for catching subsistence salmon this year?**

Drift net _____, Set net _____, Seine _____, Rod-and-reel _____,
Other (Identify)_____

9. **What mesh size(s) do you use for catching salmon?** _____(inches)

COMMERCIAL FISHING

*10. **Does this household commercial fish for salmon?** No ____ (go to 14) Yes ____

If yes, where ?_____

11. **Were all of the salmon caught when commercial fishing sold or were some brought home to eat or processed for subsistence?** All were sold _____ (go to 14) Some were used for subsistence _____

12. **How many commercially caught salmon were used for subsistence?** CHUM_____ KINGS _____

13. **Are those salmon included in the catch numbers you gave me?** No____ Yes _____

HHID#_____

1994 KOTZEBUE SOUND / KOBUK RIVER AREA
POST-SEASON SUBSISTENCE SALMON HOUSEHOLD HARVEST SURVEY

HOUSEHOLD SIZE

*14.How many people live in this household? _____

DOG FOOD (For subsistence fishing households only)

15. Did this household catch salmon for dog food?
No ____ (go to 19) Only backbones/heads/guts/scraps _____ (go to 19)
Yes ____

16. How many salmon? CHUM_____ OTHER_____

17. Are the salmon caught for the dogs included in the estimates you gave me ? No_____ Yes _____

18. How many dogs does this household have? _____

19. (For subsistence fishing households only)
Were your household's subsistence salmon needs met this year? No_____ Yes_____
If no, why not,

How do you plan to meet those needs? (other fish, game, food stamps, etc)

20. How much of your wild food harvest is salmon? (circle)

0 - 25%	26 - 50%	51-75%	76 - 100%
(some)	(about half)	(most)	(all)

21. How much of your salmon catch did you give to other families? (circle)

0 - 25%	26 - 50%	51-75%	76 - 100%
(some)	(about half)	(most)	(all)

*22. Do you have any suggestions or comments?

THANK YOU FOR YOUR TIME AND FOR HELPING WITH THIS PROJECT
A summary of the subsistence fishing survey will be sent out next spring (April)