

**SUBSISTENCE SALMON HARVESTS IN THE
KUSKOKWIM AREA DURING 1989**

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ABSTRACT

Salmon are an important element of the subsistence-cash economy of western and interior Alaska. A significant portion of the salmon harvested in the Kuskokwim Fisheries Management Area are used for subsistence. Subsistence fishermen have not been required to report the amount of salmon harvested for subsistence, however, the Alaska Department of Fish and Game has collected subsistence salmon harvest information from Kuskokwim Area fishermen since 1960. Sampling effort and the methodology used to estimate the total subsistence salmon harvest has varied over time. In 1989 a new sampling and estimation methodology was developed to improve the estimates of the total number of Kuskokwim Area salmon harvested for subsistence use. The new methodology included updating community households lists and then categorizing each household into one of two strata, "usually fish" or "usually do not fish."

Data were collected from 36 communities throughout the Kuskokwim Fisheries Management Area. Of the 2,478 households for which some information was collected, 1,527 were determined to have subsistence fished for salmon during 1989. Estimates of the total number of subsistence salmon harvested from the Kuskokwim Fisheries Management Area for 1989 were 77,030 chinook, 132,858 chum, 34,255 sockeye, and 49,691 coho salmon. Levels of confidence for the estimated total subsistence salmon harvest was within 6.5 percent of the estimated total. Comparisons of the 1989 harvest estimates developed using the newly revised methodology with the 1989 harvest estimates developed using pre-1989 estimation methods indicate that the older method significantly overestimated salmon harvests. The ability to develop reliable estimates of subsistence caught salmon are largely dependent on maintaining up to date community lists of households that "usually fish" and "usually do not fish," and by having staff conduct house-to-house harvest surveys well after people have completed subsistence salmon fishing for the season.

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INTRODUCTION

Residents of 37 communities harvest salmon within the Kuskokwim Management Area (Fig. 1). Twenty-six of these communities are situated along the Kuskokwim River or its tributaries. Outside of the drainage, residents of six Kuskokwim Bay communities (Platinum, Goodnews Bay, Quinhagak, Kwigillingok, Kongiganak, and Kipnuk) utilize Kuskokwim Area stocks. Platinum and Goodnews Bay utilize primarily Goodnews River stocks, while Quinhagak utilizes primarily Kanektok and Arolik river stocks. Families from Kwigillingok, Kongiganak, and Kipnuk, utilize Kuskokwim River stocks as well as stocks within the tributaries near their communities. Residents of Mekoryuk, Tununak, Toksook Bay, Newtok, and Nightmute harvest salmon in coastal waters and adjacent tributaries within the Kuskokwim Area. Overall, approximately 3,400 households reside within the Kuskokwim Fisheries Management Area and many of them harvest salmon for subsistence use.

Subsistence fishing for salmon occurred throughout the area. Except in commercial salmon fishing districts where intensive commercial fisheries occurred, the subsistence fishery was subjected to few restrictions in order to give preference to subsistence uses. During 1989, salmon could be taken by gill net, beach seine, or fish wheel. Spears were also legal gear in the Holitna River drainage. Set gill nets and drift gill nets were the predominant gear types used. Fish wheels were also used by residents of some communities upstream of Lower Kalskag. Residents of the Kuskokwim Area also used rod-and-reel gear to harvest salmon for subsistence use.

Permits were not required for subsistence fishing in the Kuskokwim Area. In each of the four commercial salmon fishing districts, most commercial fishermen take salmon for both commercial and subsistence purposes (Fig. 2).

Since 1960, the Alaska Department of Fish & Game has collected data on subsistence salmon harvests of Kuskokwim River salmon. Surveys have been conducted in Quinhagak, Goodnews Bay, and Platinum consistently since 1979. In the 1960s, the department utilized smokehouse counts to determine total utilization of subsistence caught fish. In an effort to determine additional timing and magnitude data, the department began using subsistence catch forms in 1962. It is unclear if

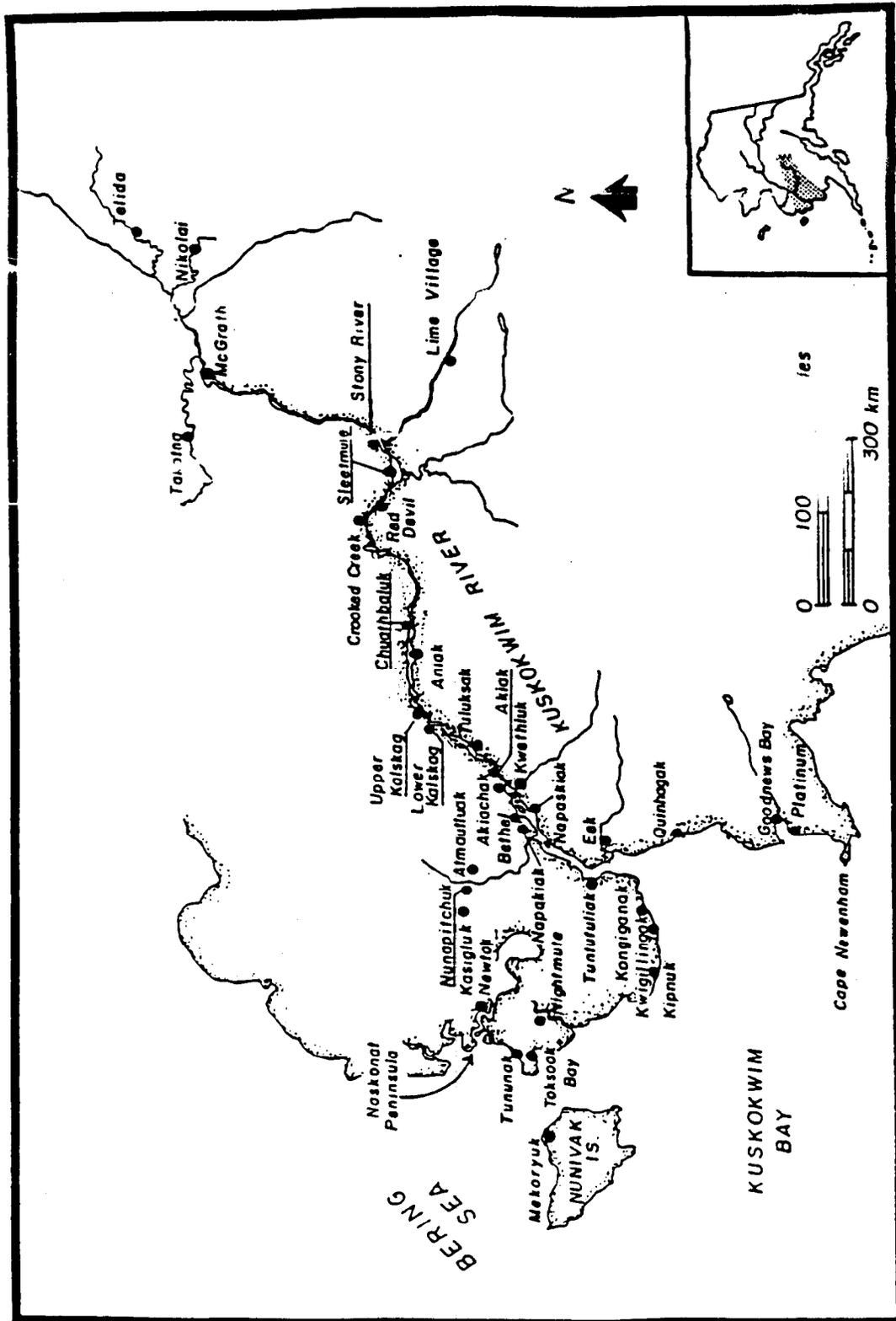


Fig. 1. Kuskokwim Area communities.

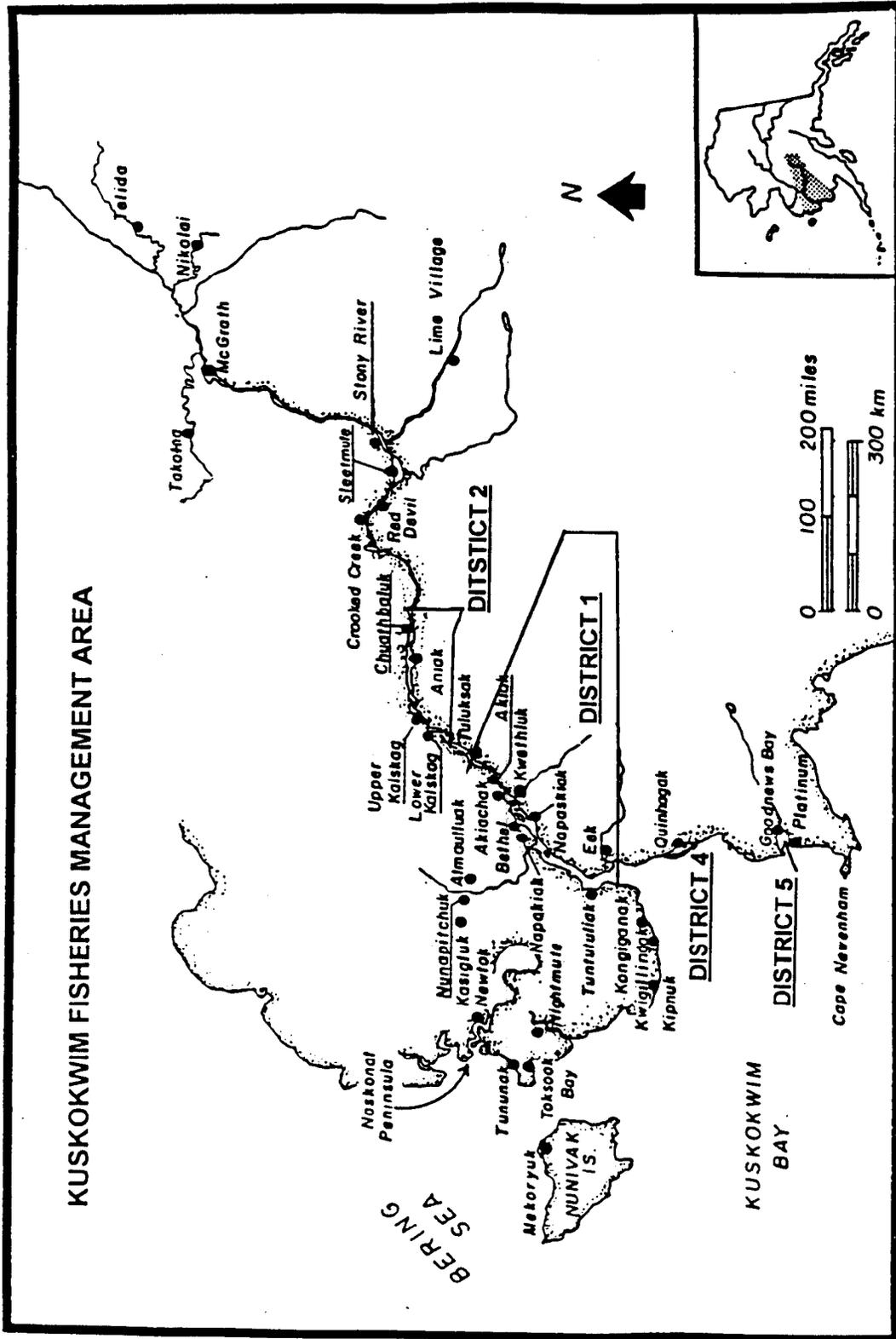


Fig. 2. Kuskokwim Area commercial salmon fishing districts.

subsistence catch forms were used from 1963 through 1965, however, in 1966 the department started using subsistence catch calendars to help determine subsistence salmon harvest levels on the Kuskokwim River. These calendars were picked up during the annual surveys of smokehouses, drying racks, caches, and personal interviews conducted in July and August. Beginning in 1969, subsistence catch calendars have been printed with return postage prepaid by the department. Since that time subsistence fishermen have been asked to mail their completed catch calendar to the department after they were through fishing for the season. Salmon catch calendars were also picked up by department staff conducting salmon harvest surveys in most communities during July and August except in 1983, 1984, 1986, and 1987 when many of the communities were not surveyed.

Estimates of the subsistence salmon harvest have been derived through from harvest data obtained from subsistence salmon catch calendars and from household surveys with "fishing families." Subsistence fishing and processing was usually an activity involving several people of an extended family. The participants making up the each "fishing family" were commonly related to one another and cooperated during the summer in the harvesting, cutting, drying, smoking, and storing of salmon. The "fishing family" sometimes included one or more individuals having a limited entry commercial fisheries permit who fished for both commercial and subsistence purposes.

Subsequent to the chinook, sockeye, and chum salmon runs, department staff traveled to Kuskokwim Area communities in order to collect subsistence salmon catch calendars and to conduct household interviews aimed at gathering information on subsistence salmon fishing. These interviews usually began in early August while the coho salmon run was still in progress. As a result, the subsistence harvest of coho salmon was not completely documented. Prior to 1989, little effort was made to determine the extent of the subsistence coho salmon harvest. The department also felt that harvests of sockeye, chum, coho, and pink salmon were not accurately reported; that some sockeye and coho were reported as chum, for example. Because of that opinion, the department has classified sockeye, chum, coho, and pink salmon into a category called "small salmon" when comparing year to year harvests. Reminder letters were also mailed to households who were not contacted during the community visits and did not return their catch calendar.

The subsistence salmon harvest information has been presented in tabular form as expanded data in order to include estimates for those families known to have fished, but for one reason or another did not return their salmon catch calendar or were not personally contacted. Harvest data for these families were assumed to be the same as the average catch for other "fishing families" in the particular community. Although subsistence salmon harvest information was available for 1960 through 1988, the statistical methods used to expand the harvest data to arrive at the total harvest of Kuskokwim area salmon, had not been documented fully.

During 1983, 1984, 1986, and 1987, funds were not available to conduct subsistence harvest surveys in all Kuskokwim Area communities. Subsets of villages were sampled during these years, and expansion to other communities in the area were made. Beginning in 1988, the Division of Subsistence, through an agreement and partial funding through the Division of Commercial Fisheries, was responsible for carrying out all aspects of collecting subsistence salmon harvest data from Kuskokwim area communities.

The Alaska fish and game law (Title 16) requires that fishery resources be "conserved in a manner consistent with the sustained-yield principle" (A.S. 16) State law also requires that the highest priority be given to subsistence uses as long as sustained yield of the resource is provided (ch. 52, SLA 1986). In addition to mandating the conservation of fisheries, the state was also charged with their commercial development. These legal measures provided the framework for the allocation of fishery resources, such as Kuskokwim Area salmon, among subsistence, commercial, and recreational uses.

Management of the Kuskokwim Area salmon fisheries requires a determination of the allowable harvest consistent with maintaining sustained-yield of the salmon stocks. After determining the necessary escapement levels, excess salmon can be allocated among different uses. The number of salmon necessary for subsistence are considered first among these uses. As subsistence use of Kuskokwim Area salmon stocks is significant, conserving, managing, and allocating salmon in the Kuskokwim Area rests on having reliable data on subsistence salmon harvests.

In 1989, a new method was developed and subsequently used to achieve the objective of improving harvest reporting and the estimation of the total harvest. This report describes the methodologies used for documenting subsistence salmon harvests and estimating the total harvest by communities which may utilize Kuskokwim Area salmon stocks. It concludes with an evaluation of the methodologies based on the results of the 1989 study.

Objectives

The primary objective of the 1989 subsistence salmon harvest project was to develop and implement a revised harvest reporting and estimation procedure for determining harvest levels by species by each Kuskokwim Area community potentially harvesting Kuskokwim Area stocks for subsistence. Secondly, the 1989 study had additional objectives: (1) update community household lists and identify salmon fishing households in each community; (2) evaluate the precision and accuracy of the estimated harvest using the new methodology and compared to the previously used methodology; (3) compile information on fishing effort (number of households participating), gear types, and timing of the subsistence harvest.

METHODS

Recording Subsistence Salmon Harvests, 1989

During 1989, Kuskokwim Area households were situated in three general areas: 1) along the Kuskokwim River and its tributaries, 2) along Kuskokwim and Goodnews bays, and 3) along the Bering Sea coast in the vicinity of Nunivak Island and Nelson Island (Fig. 1). Twenty-six communities were situated along 1,000 miles of the Kuskokwim River or its tributaries from Eek to Telida. Based on the 1988 survey, there were an estimated 759 "fishing families" living within this area. A "fishing family" represented at least one household unit, but more in some cases. In addition, 94 "fishing

families" lived in the southern Kuskokwim Bay communities of Quinhagak, Goodnews Bay, and Platinum in 1988. Twelve lived in Kongiganak, situated on northern Kuskokwim Bay. Some families in Kipnuk and Kwigillingok also harvested Kuskokwim Area salmon for subsistence use, however, these two communities did not allow household salmon harvest interviews to be conducted in their communities. As a result, the number of "fishing families" or fishing households is unknown. One-hundred and two "fishing families" lived in the communities of Mekoryuk, Tununak, Toksook Bay, Nightmute, and Newtok in 1988. Residents of all Kuskokwim Area communities were predominantly Alaskan Native.

In 1989, a new method was developed and subsequently used to improve both harvest reporting and the estimation of the total harvest. The first step toward improving the accuracy of harvest estimates was to improve existing information on the number of households engaged in salmon fishing. That is, the total harvest estimate could be improved simply by having a more accurate count of the number of households participating in the fishery. The total number of households was previously undocumented. The 1989 study had the objective of censusing subsistence salmon harvests of all Kuskokwim Area households.

The 1989 goal of recording the harvests of all households, whether or not they were included on previous lists of "fishing families," was a departure from the methodology used in the earlier surveys. Prior to 1989, subsistence salmon harvest studies were aimed at gathering salmon harvest data from groups of people having fishing camps. Many of these groups had been mailed salmon catch calendars or were surveyed in previous years, however, the total harvest of the group, or "fishing family," was usually attributed to the primary household returning the calendar to the household that was surveyed. Households that were part of a "fishing family", although they received a portion of the group's harvest, were not indicated as having fished for salmon. As a result, the total amount of fishing effort, at the household level, was grossly underestimated.

The 1989 efforts attempted to identify all households participating in subsistence salmon fishing activities and attempted to identify harvest levels for each household. The dynamics of participation in salmon fishing indicate that often there are households in a community that do not fish

for one or several seasons, but subsequently begin to fish; whereas other households no longer fish. This was often a result of changes in household composition, such as the household becoming smaller when younger members marry and form new households.

In 1989, several changes were also made in the methods for recording subsistence salmon harvests. First, it was determined the study should seek data on salmon harvests from each household involved in subsistence salmon fishing rather than a sample of "fishing families." The household unit was selected for the purpose of systematically updating the list of participants in salmon fishing and to help reduce duplicate counts or omissions of salmon harvests. This approach also aided in maintaining a more accurate list of current fishing households given the dynamism of participation in salmon fishing. Each household identified was assigned a unique number in order to track information related to individual households.

Although the fishing list compiled during surveys at the end of the 1988 fishing season included many household names, in spring, 1989, a number of sources were used to supplement those community household lists. These data sources included (1) household census lists from the Alaska Department of Community and Regional Affairs for 1985-88 (information was not available for all communities for all years); (2) the names of 1987 commercial fishing permit holders in Bethel and McGrath; (3) the names of 1988 sport fishing license holders in Bethel and McGrath; and (4) the names of individuals in the 1988 phone books for Bethel and McGrath.

Except for residents of Bethel or McGrath, subsistence salmon catch calendars were sent to all households in Kuskokwim Area communities identified at the end of the 1988 fishing season. Bethel and McGrath households were sent a postcard survey prior to the 1989 fishing season (Appendix 1). This survey simply asked if the recipient planned to fish for subsistence salmon during 1989. If the respondent returned the card and replied that he/she would fish for salmon, a calendar was then mailed.

A second change in data collection was made to the catch calendar itself. Three similar calendars were used for different regions of the Kuskokwim Area: 1) the Kuskokwim Bay region, 2) the Upper Kuskokwim region, and 3) the Lower Kuskokwim, Middle Kuskokwim, and Bering Sea Coast region (Appendix 2). Each calendar, as in the past, was designed for recording the daily harvest

of each salmon species. However, each calendar was modified in three major ways. First, it indicated only those salmon species which occurred in each particular region. Second, because local names for each species of salmon varied within the Kuskokwim Area, each species was identified by both its common name and the term used by local residents. Third, since salmon were available in the different regions at different times of the season, the time period or months provided on the three calendar types varied for each region and included only those months which most people fished. For example, June through September for the Lower-Middle Kuskokwim and Bering Sea Coast regions and July through October for the Upper Kuskokwim region. These changes were intended to improve accuracy of reporting and to facilitate the entry of data into computer files. The catch calendar was the only harvest recording instrument used that was capable of recording timing of harvest by species on a daily and monthly basis.

Approximately 1,750 of these calendars were distributed. Where addresses were available, the calendars were mailed to post office boxes; otherwise, calendars were sent general delivery for the post office clerk to distribute. Each calendar had a postage paid addressed envelope attached for return to the Bethel Subsistence Division office.

A third component in data collection was the post-season harvest interview administered by staff to community households. Following the fishing season, Division of Subsistence staff, permanent and seasonal, traveled to each of the communities in October or November to collect catch calendars and administer a brief questionnaire to each household. The questionnaire (Appendix 3) served to collect harvest information, if the salmon catch calendar had not been used or was partially used, and also facilitated the recording information on fishing gear used, household size, other households in a fishing group, number of dogs, and number of salmon harvested for dog food¹. Comments on salmon runs, fishing conditions, and regulations were also recorded and name and address information was updated as necessary. Similar to the subsistence salmon catch calendars, slightly different versions of the household interview instrument were used in the different regions of the drainage.

¹ As subsistence uses of wild resources includes uses for "transportation," salmon taken and used for feeding dogs which are used for other subsistence activities are included in the salmon harvest estimates. Salmon species used for feeding dogs included chum, sockeye and coho.

Thirty-one communities were targeted for post-season household interviews during October and November (Table 1). Telida, Mekoryuk, Newtok, Nightmute, Toksook Bay, and Tununak, were not selected for household interviews. Two of the communities, Kipnuk and Kwigillingok, declined to participate in the post-season survey project.

Prior to beginning the community surveys, efforts were made to inform and prepare communities for the arrival of survey staff. This was done weeks or days in advance of their arrival through radio and television announcements, posters in public buildings, phone calls to city offices, and letters to City, IRA, or Traditional Councils in each community visited.

Survey work was conducted systematically. Upon arrival in a community, staff checked in with the city office to introduce themselves and outline their task. Knowledgeable individuals within the community assisted in compiling a list of households and identifying those that fished for subsistence salmon in 1989. Staff attempted to contact all identified fishing households. Structured interviews were conducted with these households through the use of the interview instruments and subsistence salmon catch calendars were also collected. If time permitted, other households on the community list were contacted about their salmon fishing activities, if any. A typical community visit lasted 1-2 days.

The fourth important and additional component of the 1989 project was the collection of harvest data from postcard and telephone surveys conducted after fishing was over. The postcard survey (Appendix 4) simply asked if the household fished for subsistence salmon and the quantities harvested of each of the salmon species. The postcard could be separated in half and returned, postage prepaid. Generally, the postcard survey was mailed to households that had not returned a subsistence salmon catch calendar or had not been contacted during the post-season community visit. As visits were not made to households in Kipnuk, Kwigillingok, Bethel, Telida, Mekoryuk, Newtok, Nightmute, Toksook Bay, or Tununak, all households in these communities were mailed the postcard survey in October. Attempts were also made to contact Bethel households which did not respond to the postcard survey with a phone survey during November. The telephone interviews asked the same questions as the postcard survey.

TABLE 1. KUSKOKWIM AREA COMMUNITIES AND DATES OF COMMUNITY VISITS FOR SUBSISTENCE SALMON HARVEST INTERVIEWS, 1989

<u>Region</u>	<u>Community</u>	<u>Dates of Surveys</u>
<u>Lower Kuskokwim</u>	Kipnuk	Contacted by letter and phone
	Kwigillingok	October 31 (Visited, but not surveyed)
	Kongiganak	October 31
	Tuntutuliak	November 1
	Eek	October 16-17
	Kasigluk	October 9
	Nunapitchuk	October 10
	Atmautluak	October 9
	Napakiak	October 4-5, November 1
	Napaskiak	October 4-5
	Oscarville	October 3
	Bethel	Various (Phone surveys)
	Kwethluk	October 26-28
	Akiachak	November 20-22
Akiak	October 12	
Tuluksak	October 17	
<u>Middle Kuskokwim</u>	Lower Kalskag	October 19
	Upper Kalskag	October 19
	Aniak	October 23-26
	Chuathbaluk	October 26
<u>Upper Kuskokwim</u>	Crooked Creek	October 25
	Red Devil	October 26
	Sleetmute	October 25
	Stony River	October 25
	Lime Village	November 7-8
	McGrath	November 1-3
	Takotna	November 3-4 (Phone surveyed via McGrath)
	Nikolai	November 1-2
Telida	Not Visited	
<u>Kuskokwim Bay</u>	Quinhagak	November 1-3
	Goodnews Bay	November 8-9
	Platinum	October 30-31
<u>Bering Sea Coast</u>	Mckoryuk	Not Visited
	Newtok	Not Visited
	Nightmute	Not Visited
	Toksook Bay	Not Visited
	Tununak	Not Visited

Estimating Subsistence Salmon Harvests

Ideally, salmon harvest information from every household in a community would be collected. However, due to staffing and fiscal constraints, this was not possible and information from a subset of households was used. If the information from the subset of households could be considered to be a representative sample of the population, inferences about the larger defined population could be made from the information gathered.

However, this use of "random" information is often very inefficient. For a heterogeneous population statistical estimates for characteristics (means, totals, percentages) of the population provided by the "random sample" may be very imprecise. Perhaps only a few households were involved in a certain harvest activity, or a few households harvested the majority of salmon within a community. Under these conditions it would take a large sample fraction to guarantee that these households would be included in the sample, and care must be taken that an overemphasis on sampling these households not be made so that the "random sample" assumption not be violated.

One relatively straightforward sampling alternative to the random sample approach is the stratified sample. Under this design households within the community were pre-categorized into groups, or strata. For the Kuskokwim Area subsistence salmon project, households were identified as "usually fish" or "usually do not fish." Households that "usually fish" either were identified as such during the community visit (see examples of the surveys in Appendix 3) or were known to have fished in 1988 and 1989. All other households were classified as "usually do not fish." Whenever possible during the community visits, local residents provided staff information which helped classify households as either "usually fish" or "usually do not fish." This methodology followed one developed for estimating subsistence salmon harvests for Yukon River communities in 1988.

In order to calculate community level statistics, strata level statistics were calculated and combined after adjusting for disproportionate sampling intensity within each stratum. A further refinement to previously used methodologies is the use of a "finite population correction factor" in the calculation of variances associated with sample statistics. Variance is a measure of the imprecision of

a statistical estimate (i.e., the reliability of the estimate). The effect of the finite population correction factor is to reduce the variance of an estimate as the relative sample size increases. As the sample size approaches the size of the population, the variance approaches zero, which is intuitively correct as there is no variation associated with a statistic calculated from a censused population. Literature (e.g., Cochran 1977) suggests this adjustment factor be used when 10 percent or more of the population is sampled. For the Kuskokwim Area subsistence salmon project, information was collected from 72 percent of the households defined within the area, and between 11 and 100 percent of the households within individual communities for which estimates were made.

Data from the three information sources (subsistence salmon catch calendars, household interviews, postcard surveys and telephone interviews) were entered into a microcomputer database. Data were verified against source documents, and several logic checks of the data were made. The master list of names and addresses of resident households was updated to reflect changes in household composition and number of households residing in each community. The unique household numbering system was maintained on the master list and on the database tables containing information from each of the three information sources.

Harvest information was collected by each of the information sources. Information for a single household may have been available from more than one source. In order to provide a single best estimate for a household's harvest of a salmon species during 1989, information was composited from the various information sources. In most cases, there were few discrepancies between information available from the different sources. In those cases where a household interview was conducted and the interview indicated that the household fished for subsistence salmon, but no salmon harvest could be quantified through any information source, the harvest was identified as "missing." Harvests for groups of households that fished together were partitioned between the households.

Guidelines developed during the course of the process to composite harvest information included the assumptions that:

- (1) the salmon catch calendar would be the most accurate means of recording a household's harvest.

- (2) information from the different sources for various species needed to be evaluated concurrently in order to identify the harvest for a particular species;
- (3) information from the different sources for a particular species may be different due to the timing of the collection of this information;
- (4) information on the use of salmon to feed dogs be used as a minimum estimate of the household's catch if no other harvest information is available.

The average community catch (C_k) was estimated by fish species from the composite catch per household data. Mean community catch (C_k) was estimated by

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

where

k = community

i = indicates whether the group usually fishes (1) or does not usually fish (0)

N_{ki} = number of households that usually fish/usually do not fish

C_{ki} = mean harvest for households that usually fish/usually do not fish

The total community catch (T_k) was estimated by

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

and its variance (V_k) includes a finite population correction factor

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

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 groups.

Community catch estimates and their variances were summed across communities for region subtotals and across all regions for area totals. Community catches were considered strata and the area wide variance was the sum of the variances of community catches. Calculated variances do not

account for any form of measurement error. Estimates for community, region, and total area harvests are reported with approximate 95 percent confidence intervals (two standard errors of the totals).

RESULTS

Sampling Summary

Table 2 presents data on the number of households contacted. Over 3,400 households were defined in the microcomputer database for households in communities located in the Kuskokwim Area (Kuskokwim River, Kuskokwim Bay, and Bering Sea Coast). Subsistence salmon fishing information was collected from over 72 percent of these households. The majority of contacts (969) were through interviews, however, 630 Bethel households were contacted during telephone interviews. Of all of households contacted, 1,527 (61.6 percent) were determined to have subsistence fished for salmon in 1989. Approximately 15 percent (267) of the 1,745 subsistence salmon catch calendars and 22 percent (348) of the 1,581 postcard surveys which were mailed, were returned.

Nearly 1,300 households were classified as "usually fish" (Table 3). Salmon harvest information was collected on 98.4 percent of these households, and 89.1 percent of these households fished for salmon in 1989. Nearly 24 percent of the "usually fish" households mailed subsistence salmon catch calendars used them. In addition, 29.8 percent of the "usually fish" households that were mailed post-season postcard surveys returned them.

Over 2,100 households were classified as "usually do not fish" for subsistence salmon (Table 4). Information was collected on 56.8 percent of these households, and 17.8 percent of them fished for salmon in 1989. Only 4 percent of the "usually do not fish" households that were mailed salmon catch calendars returned them. Twenty percent of the "usually do not fish" households that were mailed postcard surveys returned them. Over one-half of the "usually do not fish" households resided in Bethel. Nearly 50 percent of those Bethel households were interviewed by telephone.

TABLE 2. KUSKOKWIM AREA SUBSISTENCE SALMON PROJECT SAMPLING SUMMARY, 1989

Community	Total Households	Calendars		Postcards		Household Surveys	Telephone Contacts	Any Info	Subsistence Fished
		Mailed	Returned	Mailed	Returned				
Kipnuk	94	93	1	0	0	0	0	3	3
Kwigillingok	32	32	0	32	0	0	0	0	0
Kongiganak	56	16	0	23	2	38	0	43	29
Tuntutuliak	59	48	11	20	4	40	1	54	47
Eek	60	48	19	7	2	38	0	59	42
Kasigluk	93	55	7	24	4	66	0	77	60
Nunapitchuk	82	74	11	28	5	45	0	80	62
Atmautluak	53	36	3	30	7	23	0	33	22
Napakiak	79	60	10	24	2	51	0	69	51
Napaskiak	71	45	8	20	2	50	0	66	56
Oscarville	17	16	3	11	3	7	1	11	11
Bethel	1,281	276	53	744	182	0	630	866	420
Kwethluk	126	76	23	19	2	77	0	113	78
Akiachak	93	79	11	13	1	60	1	89	63
Akiak	55	38	11	20	4	33	0	47	43
Tuluksak	67	55	16	13	1	45	0	62	52
<u>Lower Kuskokwim Totals</u>	2,318	1,047	187	1,028	221	573	633	1,672	1,039
Lower Kalskag	68	30	9	21	3	45	0	61	49
Upper Kalskag	42	24	9	9	5	23	0	40	25
Aniak	172	104	24	57	10	85	0	152	121
Chuathbaluk	23	19	2	5	3	14	0	23	16
<u>Middle Kuskokwim Totals</u>	305	177	44	92	21	167	0	276	211
Crooked Creek	34	17	1	10	3	20	0	32	21
Red Devil	12	11	3	4	2	4	0	11	10
Sleetmute	27	23	3	11	3	13	0	25	17
Stony River	14	12	1	1	0	12	0	14	10
Lime Village	13	9	0	1	1	12	0	13	5
McGrath	153	59	4	99	30	33	0	149	31
Takotna	6	6	0	0	0	4	0	6	2
Nikolai	29	20	6	5	1	12	0	26	16
Telida	3	3	1	3	2	0	0	3	3
<u>Upper Kuskokwim Totals</u>	291	160	19	134	42	110	0	279	115
<u>Kuskokwim River Totals</u>	2,914	1,384	250	1,254	284	850	633	2,227	1,365
Quinhagak	119	93	14	13	3	76	0	113	81
Goodnews Bay	67	46	1	19	2	31	0	60	37
Platinum	25	13	0	8	0	12	0	19	8
<u>Kuskokwim Bay Totals</u>	211	152	15	40	5	119	0	192	126
Mekoryuk	49	5	1	46	21	0	0	21	19
Newtok	60	40	0	58	15	0	0	15	2
Nightmute	26	26	0	26	2	0	0	2	1
Toksook Bay	76	76	1	76	11	0	0	11	9
Tununak	86	62	0	81	10	0	0	10	5
<u>Bering Sea Coast Totals</u>	297	209	2	287	59	0	0	59	36
<u>Kuskokwim Area Totals</u>	3,422	1,745	267	1,581	348	969	633	2,478	1,527

TABLE 3. SAMPLING SUMMARY FOR KUSKOKWIM AREA HOUSEHOLDS CATEGORIZED AS "USUALLY FISH," 1989

Community	Total Households	Calendars		Postcards		Household Surveys	Telephone Contacts	Any Info	Subsistence Fished
		Mailed	Returned	Mailed	Returned				
Kipnuk	0	0	0	0	0	0	0	0	0
Kwigillingok	0	0	0	0	0	0	0	0	0
Kongiganak	26	11	0	2	0	26	0	26	24
Tuntutuliak	46	40	11	12	2	37	0	46	45
Eek	39	37	19	5	1	29	0	38	37
Kasigluk	66	44	6	9	2	58	0	64	58
Nunapitchuk	71	65	11	27	5	40	0	70	62
Atmautluak	24	22	3	4	1	20	0	24	18
Napakiak	51	45	10	13	2	40	0	51	50
Napaskiak	58	40	8	15	2	47	0	58	55
Oscarville	9	8	3	4	3	6	1	9	9
Bethel	142	134	36	125	53	0	74	142	141
Kwethluk	84	66	22	12	1	71	0	77	75
Akiachak	62	58	11	8	1	51	0	62	58
Akiak	42	33	11	10	3	30	0	41	40
Tuluksak	54	45	15	8	0	42	0	53	49
<u>Lower Kuskokwim Totals</u>	774	648	166	254	76	497	75	761	721
Lower Kalskag	50	28	9	12	2	36	0	49	45
Upper Kalskag	30	21	9	6	2	21	0	28	22
Aniak	133	92	23	49	8	75	0	133	116
Chuathbaluk	18	14	2	4	3	14	0	18	16
<u>Middle Kuskokwim Totals</u>	231	155	43	71	15	146	0	228	199
Crooked Creek	26	12	1	8	3	18	0	26	21
Red Devil	11	10	3	3	2	4	0	11	10
Sleetsmute	25	21	3	9	3	13	0	25	17
Stony River	13	11	1	1	0	12	0	13	10
Lime Village	5	5	0	0	0	5	0	5	4
McGrath	36	31	4	7	2	27	0	34	19
Takotna	3	3	0	0	0	3	0	3	2
Nikolai	15	13	5	1	0	10	0	15	14
Telida	2	2	1	2	1	0	0	2	2
<u>Upper Kuskokwim Totals</u>	136	108	18	31	11	92	0	134	99
<u>Kuskokwim River Totals</u>	1,141	911	227	356	102	735	75	1,123	1,019
Quinhagak	85	73	13	4	1	72	0	84	74
Goodnews Bay	39	30	1	12	1	26	0	39	36
Platinum	11	6	0	3	0	8	0	9	7
<u>Kuskokwim Bay Totals</u>	135	109	14	19	2	106	0	132	117
Mekoryuk	0	0	0	0	0	0	0	0	0
Newtok	2	2	0	2	2	0	0	2	2
Nightsmute	1	1	0	1	1	0	0	1	1
Toksook Bay	5	5	1	5	5	0	0	5	5
Tununak	3	3	0	3	3	0	0	3	3
<u>Bering Sea Coast Totals</u>	11	11	1	11	11	0	0	11	11
<u>Kuskokwim Area Totals</u>	1,287	1,031	242	386	115	841	75	1,266	1,147

TABLE 4. SAMPLING SUMMARY FOR KUSKOKWIM AREA HOUSEHOLDS CATEGORIZED AS "USUALLY DO NOT FISH," 1989

Community	Total Households	Calendars		Postcards		Household Surveys	Telephone Contacts	Any Info	Subsistence Fished
		Mailed	Returned	Mailed	Returned				
Kipnuk	94	93	1	0	0	0	0	3	3
Kwigillingok	32	32	0	32	0	0	0	0	0
Kongiganak	30	5	0	21	2	12	0	17	5
Tuntutuliak	13	8	0	8	2	3	1	8	2
Eek	21	11	0	2	1	9	0	21	5
Kasigluk	27	11	1	15	2	8	0	13	2
Nunapitchuk	11	9	0	1	0	5	0	10	0
Atmautluak	29	14	0	26	6	3	0	9	4
Napakiak	28	15	0	11	0	11	0	18	1
Napaskiak	13	5	0	5	0	3	0	8	1
Oscarville	8	8	0	7	0	1	0	2	2
Bethel	1,139	142	17	619	129	0	556	724	279
Kwethluk	42	10	1	7	1	6	0	36	3
Akiachak	31	21	0	5	0	9	1	27	5
Akiak	13	5	0	10	1	3	0	6	3
Tuluksak	13	10	1	5	1	3	0	9	3
<u>Lower Kuskokwim Totals</u>	1,544	399	21	774	145	76	558	911	318
Lower Kalskag	18	2	0	9	1	9	0	12	4
Upper Kalskag	12	3	0	3	3	2	0	12	3
Aniak	39	12	1	8	2	10	0	19	5
Chuathbaluk	5	5	0	1	0	0	0	5	0
<u>Middle Kuskokwim Totals</u>	74	22	1	21	6	21	0	48	12
Crooked Creek	8	5	0	2	0	2	0	6	0
Red Devil	1	1	0	1	0	0	0	0	0
Sleetmute	2	2	0	2	0	0	0	0	0
Stony River	1	1	0	0	0	0	0	1	0
Lime Village	8	4	0	1	1	7	0	8	1
McGrath	117	28	0	92	28	6	0	115	12
Takotna	3	3	0	0	0	1	0	3	0
Nikolai	14	7	1	4	1	2	0	11	2
Telida	1	1	0	1	1	0	0	1	1
<u>Upper Kuskokwim Totals</u>	155	52	1	103	31	18	0	145	16
<u>Kuskokwim River Totals</u>	1,773	473	23	898	182	115	558	1,104	346
Quinhagak	34	20	1	9	2	4	0	29	7
Goodnews Bay	28	16	0	7	1	5	0	21	1
Platinum	14	7	0	5	0	4	0	10	1
<u>Kuskokwim Bay Totals</u>	76	43	1	21	3	13	0	60	9
Mekoryuk	49	5	1	46	21	0	0	21	19
Newtok	58	38	0	56	13	0	0	13	0
Nightmute	25	25	0	25	1	0	0	1	0
Toksook Bay	71	71	0	71	6	0	0	6	4
Tununak	83	59	0	78	7	0	0	7	2
<u>Bering Sea Coast Totals</u>	286	198	1	276	48	0	0	48	25
<u>Kuskokwim Area Totals</u>	2,135	714	25	1,195	233	128	558	1,212	380

1989 Community and Drainage Harvest Totals

Harvest estimates by community and region are presented in Table 5. The 1989 harvest estimates for the Kuskokwim Area communities² are 77,030 chinook, 132,858 chum, 34,255 sockeye, and 49,691 coho salmon. Reported harvests accounted for 78.5 percent of the estimated chinook salmon harvest, 78.0 percent of the chum, 81.2 percent of the sockeye, and 75.6 percent of the coho salmon harvest.

Households in communities who fished in the Lower Kuskokwim region, which included communities from Tuluksak to Kongiganak, harvested 81.1 percent of the estimated subsistence chinook salmon catch, 69.3 percent of the chum, 61.5 percent of the sockeye, and 69.0 percent of the subsistence coho salmon catch. About two-thirds (68.0 percent) of the identified fishing households reside in this area.

Sample information, harvest estimates, and confidence intervals by community and region for chinook salmon are presented in Table 6. The 1989 harvest estimate for chinook was 77,030 fish with an approximate 95 percent confidence interval of +/- 2,978 fish (or +/- 3.9 percent of the estimated total). Harvest estimates for the Lower Kuskokwim and Middle Kuskokwim regions as well as the estimates for the Kuskokwim Bay region had levels of precision within 10 percent of the estimated totals. Bethel harvested more chinook salmon than any other community (19,336 fish).

The 1989 chum salmon harvest estimate was 132,858 fish with an approximate 95 percent confidence interval of +/- 7,465 fish (or +/- 5.6 percent of the estimated total, Table 7). Harvest estimates for the Lower Kuskokwim and Upper Kuskokwim regions had levels of precision within 10 percent of the estimated totals. The community of Bethel harvested an estimated 19,214 chum salmon, and the communities of Napaskiak and Kwethluk each harvested over 10,000 chum salmon. The 1989 sockeye harvest estimate (34,255) has the same relative precision (+/- 5.5 percent, or 1,869 fish) as the chum salmon estimate (Table 8).

² No estimates are used for Kipnuk, Kwigillingok or Nightmute. Red Devil and Sleetmute households that do not usually fish are also omitted.

Harvest estimates for the Lower Kuskokwim and Upper Kuskokwim regions had levels of precision within 10 percent of the estimated totals. The communities of Bethel and Lime Village each harvested over 5,000 sockeye salmon.

Sample information, harvest estimates, and confidence intervals by community and fishing area for coho salmon are presented in Table 9. The 1989 harvest estimate was 49,691 coho with an approximate 95 percent confidence interval of +/- 3,124 fish (or +/- 6.3 percent of the estimated total). The harvest estimate for the Lower Kuskokwim region had a level of precision within 10 percent of the estimated total. Bethel (18,594 fish) was the main coho salmon harvesting community.

Gear Types

Several types of gear were used to harvest salmon for subsistence (Table 10). This information was available only for those households during community visits. Based on information from 91.3 percent (418 of 458) of the Lower Kuskokwim region households and 75.8 percent of the households that reside along the Middle Kuskokwim region for which there was information, the majority of the fishing households utilized drift gill nets. Set gill nets were also used by over 25 percent of the households in these areas. Note that households may have used more than one gear type over the course of the fishing season. One household in Aniak reported using a fish wheel. Fifteen households in Aniak, two in Chuathbaluk, and four households in Kwethluk also reported the use of rod-and-reel gear to harvest salmon.

The majority (60.6 percent) of fishing households in communities within the Upper Kuskokwim region utilized set gill nets. Over 50 percent of fishing households in Nikolai as well as households in Sleetmute and McGrath used rod-and-reel gear for harvesting salmon. About 17 percent of the households within the Upper Kuskokwim region used rod-and-reel gear. In addition, nine Upper Kuskokwim region households used fish wheels.

TABLE 5. KUSKOKWIM AREA SUBSISTENCE SALMON HARVESTS, 1989

Community	Total Households	Households Contacted	Chinook		Chum		Sockeye		Coho	
			Reported Harvest	Estimated Harvest						
Kipnuk	94	3	134	4,199	37	1,159	402	12,596	243	7,614
Kwigillingok	32	0	0	0	0	0	0	0	0	0
Kongiganak	56	35	979	1,307	1,351	1,830	454	603	397	525
Tuntutuliak	59	43	2,764	3,552	3,534	4,559	785	1,018	374	484
Eek	60	55	1,553	1,685	890	966	155	168	275	299
Kasigluk	93	73	1,821	2,013	2,602	2,872	210	231	582	687
Nunapitchuk	82	60	2,174	3,087	4,700	6,674	695	987	343	487
Atmautluak	53	31	824	1,227	2,419	3,014	992	1,129	617	971
Napakiak	79	62	3,221	3,785	5,965	6,934	1,480	1,722	1,521	1,763
Napaskiak	71	61	3,893	4,181	11,361	12,203	577	620	753	809
Oscarville	17	9	914	1,200	1,006	1,132	231	329	150	684
Bethel	1,281	761	13,352	19,336	13,861	19,214	3,981	5,712	12,545	18,594
Kwethluk	126	104	6,070	7,388	8,412	10,237	2,007	2,443	2,717	3,307
Akiachak	93	82	4,988	5,438	6,700	7,307	2,358	2,584	1,680	1,879
Akiak	55	36	3,107	4,562	4,760	7,216	991	1,301	1,885	2,523
Tuluksak	67	52	3,004	3,781	5,859	7,961	1,746	2,234	971	1,261
<u>Lower Kuskokwim</u>										
<u>Totals</u>	2,192	1,464	48,664	62,542	73,420	92,118	16,662	21,080	24,810	34,273
Lower Kalskag	68	50	2,181	2,843	3,139	4,069	583	765	551	731
Upper Kalskag	42	39	1,144	1,256	3,089	3,427	307	338	635	688
Aniak	172	111	2,060	2,860	6,736	9,332	549	761	1,776	2,461
Chuathbaluk	23	22	421	446	2,153	2,280	216	229	288	305
<u>Middle Kuskokwim</u>										
<u>Totals</u>	305	222	5,806	7,404	15,117	19,107	1,655	2,093	3,250	4,185
Crooked Creek	34	25	312	427	564	772	302	413	392	536
Red Devil	11	9	128	156	943	1,153	272	332	1,240	1,516
Sleetmute	25	20	336	420	1,450	1,813	621	776	807	1,009
Stony River	14	13	639	692	1,248	1,352	1,001	1,084	564	611
Lime Village	13	13	105	105	2,100	2,100	5,653	5,653	2,025	2,025
McGrath	153	149	494	519	2,143	2,258	88	90	584	607
Takotna	6	6	62	62	250	250	0	0	40	40
Nikolai	29	25	646	706	1,051	1,178	166	178	129	150
Telida	3	3	1	1	15	15	30	30	30	30
<u>Upper Kuskokwim</u>										
<u>Totals</u>	288	263	2,723	3,089	9,764	10,891	8,133	8,557	5,811	6,524
<u>Kuskokwim River</u>										
<u>Totals</u>	2,785	1,949	57,193	73,035	98,301	122,116	26,450	31,730	33,871	44,982
Quinhagak	119	103	2,802	3,048	1,168	1,262	417	450	2,965	3,346
Goodnews Bay	67	45	264	414	375	609	451	704	513	819
Platinum	25	18	32	44	101	140	109	151	49	68
<u>Kuskokwim Bay</u>										
<u>Totals</u>	211	166	3,098	3,507	1,644	2,011	977	1,305	3,527	4,232
Mekoryuk	49	21	0	0	3,601	8,402	0	0	117	273
Newtok	60	14	5	10	20	40	10	20	15	30
Nightmute	26	2	0	0	30	30	0	0	70	70
Toksook Bay	76	11	136	450	95	203	286	1,066	44	87
Tununak	86	9	5	28	16	86	83	135	9	86
<u>Bering Sea Coast</u>										
<u>Totals</u>	271	55	146	488	3,732	8,732	379	1,221	185	477
<u>Kuskokwim Area</u>										
<u>Totals</u>	3,267	2,170	60,437	77,030	103,677	132,858	27,806	34,255	37,583	49,691

Note: Because of the small sample size, estimates for Kipnuk, Kwigillingok, and Nightmute are not included in totals. Red Devil and Sleetmute households that do not usually fish are also omitted.

TABLE 6 KUSKOKWIM AREA CHINOOK SALMON SUBSISTENCE HARVESTS, 1989

Community	"Usually Do Not Fish" Households					"Usually Fish" Households					All Households					+/- percent
	Total House- holds	House- holds Contacted	Mean Harvest	Standard Dev.	Total House holds	House- holds Contacted	Mean Harvest	Standard Dev.	Total House- holds	House- holds Contacted	Mean Harvest	Total Reported Harvest	Total Estimated Harvest	Total Harvest		
Kipnuk	94	3	44.7	12.9	0	0	0		94	3	44.7	134	4,199	1,373	32.7%	
Kwigillingok	32	0			0	0			32	0	0.0	0	0	0	0.0%	
Kongiganak	30	15	3.3	8.8	26	20	46.5	58.4	56	35	23.3	979	1,307	340	26.0%	
Tuntutuliak	13	7	5.0	13.2	46	36	75.8	54.2	59	43	60.2	2,764	3,552	397	11.2%	
Eek	21	19	5.6	15.6	39	36	40.2	27.7	60	55	28.1	1,553	1,685	110	6.5%	
Kasigluk	27	13	0.8	2.8	66	60	30.2	29.3	93	73	21.6	1,821	2,013	153	7.6%	
Nunapitchuk	11	10	0.0	0.0	71	50	43.5	49.4	82	60	37.6	2,174	3,087	539	17.5%	
Almautluak	29	9	17.1	39.3	24	22	30.5	31.5	53	31	23.2	824	1,227	638	52.0%	
Napakakiak	28	18	7.2	30.6	51	44	70.3	63.3	79	62	47.9	3,221	3,785	434	11.5%	
Napaskiak	13	7	0.0	0.0	58	54	72.1	56.0	71	61	58.9	3,893	4,181	232	5.6%	
Oscanville	8	1	25.0	0.0	9	8	111.1	92.0	17	9	70.6	914	1,200	196	16.3%	
Bethel	1,139	643	9.0	27.7	142	118	64.4	91.0	1,281	761	15.1	13,352	19,336	1,913	9.9%	
Kwethluk	42	35	2.5	10.6	84	69	86.7	69.7	126	104	58.6	6,070	7,388	599	8.1%	
Akiachak	31	25	3.2	10.6	62	57	86.1	71.5	93	82	58.5	4,988	5,438	338	6.2%	
Akiak	13	4	62.5	125.0	42	32	89.3	116.6	55	36	83.0	3,107	4,562	1,594	34.9%	
Tuluksak	13	8	29.5	68.7	54	44	62.9	46.9	67	52	56.4	3,004	3,781	511	13.5%	
Lower Kuskokwim	1,418	814	9.0	1,136.6	774	650	64.3	873.9	2,192	1,464	28.5	48,664	62,542	2,867	4.6%	
Totals																
Lower Kalskag	18	11	11.9	34.7	50	39	52.6	42.2	68	50	41.8	2,181	2,843	394	13.9%	
Upper Kalskag	12	12	11.7	25.9	30	27	37.2	33.4	42	39	29.9	1,144	1,256	122	9.7%	
Aniak	39	15	0.3	1.3	133	96	21.4	26.5	172	111	16.6	2,060	2,860	380	13.3%	
Chuatbaluk	5	5	0.0	0.0	18	17	24.8	25.4	23	22	19.4	421	446	52	11.7%	
Middle Kuskokwim	74	43	5.0	117.8	231	179	30.5	255.9	305	222	24.3	5,806	7,404	563	7.6%	
Totals																
Crooked Creek	8	6	0.0	0.0	26	19	16.4	18.6	34	25	12.6	312	427	115	26.9%	
Red Devil	1	0			11	9	14.2	17.0	11	9	14.2	128	156	53	34.0%	
Sleetmute	2	0			25	20	16.8	26.9	25	20	16.8	336	420	135	32.1%	
Stony River	1	1	0.0	0.0	13	12	53.3	109.9	14	13	49.4	639	692	229	33.0%	
Lime Village	8	8	0.4	1.1	5	5	20.4	28.8	13	13	8.1	105	105	0	0.0%	
McGrath	117	115	0.9	5.0	36	34	11.4	28.7	153	149	3.4	494	519	85	16.3%	
Takotna	3	3	0.0	0.0	3	3	20.7	26.1	6	6	10.3	62	62	0	0.0%	
Nikolai	14	11	6.4	14.3	15	14	41.1	76.1	29	25	24.4	646	706	167	23.7%	
Telida	1	1	0.0	0.0	2	2	0.5	0.7	3	3	0.3	1	1	0	0.0%	
Upper Kuskokwim	152	145	1.3	28.9	136	118	21.2	172.0	288	263	10.7	2,723	3,089	349	11.3%	
Totals																

TABLE 6. CONTINUED

Community	"Usually Do Not Fish" Households				"Usually Fish" Households				All Households				+/- percent		
	Total House- holds	House- holds Contacted	Mean Harvest	Standard Dev.	Total House- holds	House- holds Contacted	Mean Harvest	Standard Dev.	Total House- holds	House- holds Contacted	Mean Harvest	Total Reported Harvest		Total Estimated Harvest	
<u>Kuskokwim River</u>	1,644	1,002	8.1	1,143.1	1,141	947	52.3	926.7	2,785	1,949	26.2	57,193	73,035	2,943	4.0%
<u>Totals</u>															
Quinhagak	34	24	4.1	14.3	85	79	34.2	40.5	119	103	25.6	2,802	3,048	232	7.6%
Goodnews Bay	28	21	2.4	10.9	39	24	8.9	16.0	67	45	6.2	264	414	171	41.3%
Platinum	14	10	0.5	1.6	11	8	3.4	4.7	25	18	1.8	32	44	20	46.4%
<u>Kuskokwim Bay</u>															
<u>Totals</u>	76	55	2.8	63.4	135	111	24.4	130.0	211	166	16.6	3,098	3,507	289	8.2%
Mekoryuk	49	21	0.0	0.0	0	0	0	0	49	21	0.0	0	0	0	0.0%
Newtok	58	13	0.0	0.0	2	1	5.0	0.0	60	14	0.2	5	10	0	0.0%
Nightmute	25	1	0.0	0.0	1	1	0.0	0.0	26	2	0.0	0	0	0	0.0%
Toksook Bay	71	6	4.8	6.3	5	5	21.4	18.0	76	11	5.9	136	450	352	78.1%
Tununak	83	7	0.3	0.8	3	2	1.5	2.1	86	9	0.3	5	28	46	161.9%
<u>Bering Sea Coast</u>															
<u>Totals</u>	261	47	1.4	177.2	10	8	12.2	2.6	271	55	1.8	146	488	354	72.6%
<u>Kuskokwim Area</u>															
<u>Totals</u>	1,981	1,104	7.0	1,158.5	1,286	1,066	49.1	935.7	3,267	2,170	23.6	60,437	77,030	2,978	3.9%

a Confidence intervals are reported at the approximate 95 percent level.

NOTE: Because of the small sample size, estimates for Kipnuk, Kwigillingok, and Nightmute are not included in totals. Red Devil and Sleestmufe households that do not usually fish are also omitted.

TABLE 7. KUSKOKWIM AREA CHUM SALMON SUBSISTENCE HARVESTS, 1989

Community	"Usually Do Not Fish" Households				"Usually Fish" Households				All Households				+/- percent		
	Total House- holds	House- holds Contacted	Mean Harvest	Standard Dev.	Total House- holds	House- holds Contacted	Mean Harvest	Standard Dev.	Total House- holds	House- holds Contacted	Mean Harvest	Total Reported Harvest		Total Estimated Harvest	
Kipnuk	94	3	12.3	21.4	0	0	0		94	3	12.3	37	1,159	2,281	196.8%
Kwigilingok	32	0	0		0	0			32	0	0.0	0	0	0	0.0%
Kongiganak	30	15	7.0	15.3	26	20	62.3	58.9	56	35	32.7	1,351	1,830	369	20.2%
Tuntutuliak	13	7	10.7	28.3	46	36	96.1	94.1	59	43	77.3	3,534	4,559	699	15.3%
Eek	21	19	3.4	11.8	39	36	22.9	30.1	60	55	16.1	890	966	114	11.8%
Kasigliuk	27	13	0.8	2.8	66	60	43.2	46.6	93	73	30.9	2,602	2,872	241	8.4%
Nunapitchuk	11	10	0.0	0.0	71	50	94.0	111.9	82	60	81.4	4,700	6,674	1,222	18.3%
Almautluak	29	9	19.6	31.8	24	22	102.0	127.1	53	31	56.9	2,419	3,014	634	21.0%
Napakiaik	28	18	2.8	11.8	51	44	134.4	176.2	79	62	87.8	5,965	6,934	1,008	14.5%
Napaskiak	13	7	0.0	0.0	58	54	210.4	257.3	71	61	171.9	11,361	12,203	1,067	8.7%
Oscarville	8	1	0.0	0.0	9	8	125.8	120.5	17	9	66.6	1,006	1,132	256	22.6%
Bethel	1,139	643	6.9	26.6	142	118	79.7	186.8	1,281	761	15.0	13,861	19,214	2,553	13.3%
Kwethluk	42	35	5.9	27.6	84	69	118.9	115.6	126	104	81.2	8,412	10,237	1,001	9.8%
Akiachak	31	25	5.0	16.1	62	57	115.4	140.3	93	82	78.6	6,700	7,307	660	9.0%
Akiak	13	4	125.0	250.0	42	32	133.1	207.8	55	36	131.2	4,760	7,216	3,095	42.9%
Tuluksak	13	8	242.3	624.5	54	44	89.1	96.4	67	52	118.8	5,859	7,961	3,624	45.5%
Lower Kuskokwim															
Totals	1,418	814	10.0	2,389.9	774	650	100.7	1,777.1	2,192	1,464	42.0	73,420	92,118	5,956	6.5%
Lower Kuskokwim															
Totals	18	11	11.4	37.7	50	39	77.3	100.3	68	50	59.8	3,139	4,069	795	19.5%
Upper Kuskokwim	12	12	4.2	14.4	30	27	112.6	289.2	42	39	81.6	3,089	3,427	1,056	30.8%
Aniak	39	15	0.0	0.0	133	96	70.2	223.3	172	111	54.3	6,736	9,332	3,197	34.3%
Chuathbaluk	5	5	0.0	0.0	18	17	126.6	153.2	23	22	99.1	2,153	2,280	315	13.8%
Middle Kuskokwim															
Totals	74	43	3.4	127.6	231	179	81.6	1,732.3	305	222	62.6	15,117	19,107	3,474	18.2%
Upper Kuskokwim															
Totals	8	6	0.0	0.0	26	19	29.7	37.5	34	25	22.7	564	772	232	30.1%
Crooked Creek	1	0			11	9	104.8	97.6	11	9	104.8	943	1,153	305	26.5%
Red Devil	2	0			25	20	72.5	97.4	25	20	72.5	1,450	1,813	487	26.9%
Sleetmute	1	1	0.0	0.0	13	12	104.0	139.0	14	13	96.6	1,248	1,352	289	21.4%
Stony River	8	8	3.1	8.8	5	5	415.0	372.3	13	13	161.5	2,100	2,100	0	0.0%
Lime Village	117	115	2.2	19.1	36	34	55.5	158.9	153	149	14.8	2,143	2,258	466	20.6%
McGrath	3	3	0.0	0.0	3	3	83.3	76.4	6	6	41.7	250	250	0	0.0%
Takotna	14	11	23.6	61.2	15	14	56.5	105.5	29	25	40.6	1,051	1,178	324	27.5%
Nikolai	1	1	5.0	0.0	2	2	5.0	7.1	3	3	5.0	15	15	0	0.0%
Telida															
Upper Kuskokwim	152	145	4.1	122.7	136	118	75.5	427.1	288	263	37.8	9,764	10,891	889	8.2%
Totals															

TABLE 7. CONTINUED

Community	"Usually Do Not Fish" Households				"Usually Fish" Households				All Households				+/- percent		
	Total House- holds	House- holds Contacted	Mean Harvest	Standard Dev.	Total House- holds	House- holds Contacted	Mean Harvest	Standard Dev.	Total House- holds	House- holds Contacted	Mean Harvest	Total Reported Harvest		Estimated Harvest	
<u>Kuskokwim River</u>	1,644	1,002	9.1	2,396.5	1,141	947	93.8	2,518.2	2,785	1,949	43.8	98,301	122,116	6,953	5.7%
<u>Totals</u>															
Quinhagak	34	24	0.6	2.5	85	79	14.6	62.7	119	103	10.6	1,168	1,262	319	25.3%
Goodnews Bay	28	21	0.0	0.0	39	24	15.6	31.6	67	45	9.1	375	609	312	51.2%
Platinum	14	10	3.1	9.8	11	8	8.8	16.4	25	18	5.6	101	140	81	58.2%
<u>Kuskokwim Bay</u>															
<u>Totals</u>	76	55	0.9	25.0	135	111	14.4	225.4	211	166	9.5	1,644	2,011	454	22.6%
Mekoryuk	49	21	171.5	165.0	0	0			49	21	171.5	3,601	8,402	2,668	31.8%
Newtok	58	13	0.0	0.0	2	1	20.0	0.0	60	14	0.7	20	40	0	0.0%
Nightmute	25	1	0.0	0.0	1	1	30.0	0.0	26	2	1.2	30	30	0	0.0%
Toksook Bay	71	6	1.7	4.1	5	5	17.0	19.9	76	11	2.7	95	203	226	111.4%
Tununak	83	7	0.9	2.3	3	2	5.0	7.1	86	9	1.0	16	86	137	159.3%
<u>Bering Sea Coast</u>															
<u>Totals</u>	261	47	32.9	1,340.4	10	8	14.0	8.7	271	55	32.2	3,732	8,732	2,681	30.7%
<u>Kuskokwim Area</u>															
<u>Totals</u>	1,981	1,104	12.0	2,746.0	1,286	1,066	84.9	2,528.3	3,267	2,170	40.7	103,677	132,858	7,465	5.6%

a Confidence intervals are reported at the approximate 95 percent level.

Note: Because of the small sample size, estimates for Kipnuk, Kwigillingok, and Nightmute are not included in totals. Red Devil and Sleetmute households that do not usually fish are also omitted.

TABLE 8 KUSKOKWIM AREA SOCKEYE SALMON SUBSISTENCE HARVESTS, 1989

Community	"Usually Do Not Fish" Households					"Usually Fish" Households					All Households				
	Total Households	Households Contacted	Mean Harvest	Standard Dev.	Total Households	Households Contacted	Mean Harvest	Standard Dev.	Total Households	Households Contacted	Mean Harvest	Total Reported Harvest	Total Estimated Harvest	+/- percent	
	Households	Households	Households	Households	Households	Households	Households	Households	Households	Households	Households	Households	Households	Households	
Kipruk	94	3	134.0	232.1	0	0	134.0	402	12,596	24,787	196.8%				
Kwigilingok	32	0	0	0	0	0	0	0	0	0	0.0%				
Kongiganak	30	15	1.2	2.6	26	20	21.8	27.4	56	35	10.8	454	603	25.8%	
Tuntutuliak	13	7	3.6	9.4	46	36	21.1	45.2	59	43	17.2	785	1,018	32.3%	
Eek	21	19	1.1	3.6	39	36	3.8	6.9	60	55	2.8	155	168	16.2%	
Kasigluk	27	13	0.0	0.0	66	60	3.5	8.3	93	73	2.5	210	231	43	18.5%
Nunapitchuk	11	10	0.0	0.0	71	50	13.9	16.8	82	60	12.0	695	987	183	18.5%
Atmaitluak	29	9	2.4	6.6	24	22	44.1	91.0	53	31	21.3	992	1,129	289	25.6%
Napakia	28	18	0.9	4.0	51	44	33.3	76.7	79	62	21.8	1,480	1,722	438	25.5%
Napaskiak	13	7	0.0	0.0	58	54	10.7	17.1	71	61	8.7	577	620	71	11.5%
Oscarville	8	1	10.0	0.0	9	8	27.6	33.2	17	9	19.3	329	329	70	21.4%
Bethel	1,139	643	2.5	11.3	142	118	20.0	54.5	1281	761	4.5	3,981	5,712	888	15.5%
Kwethluk	42	35	0.6	3.7	84	69	28.8	37.9	126	104	19.4	2,007	2,443	325	13.3%
Akiachak	31	25	5.0	16.1	62	57	39.2	61.1	93	82	27.8	2,358	2,584	298	11.6%
Akiak	13	4	0.0	0.0	42	32	31.0	55.8	55	36	23.6	991	1,301	404	31.1%
Tuluksak	13	8	28.6	57.1	54	44	34.5	59.8	67	52	33.3	1,746	2,234	530	23.7%
Lower Kuskokwim	1,418	814	2.6	379.6	774	650	22.4	571.3	2,192	1,464	9.6	16,662	21,080	1,372	6.5%
Lower Kuskokwim	18	11	4.5	15.1	50	39	13.7	20.6	68	50	11.3	583	765	186	24.3%
Upper Kalskag	12	12	2.1	7.2	30	27	10.4	18.8	42	39	8.1	307	338	68	20.2%
Aniak	39	15	0.0	0.0	133	96	5.7	13.3	172	111	4.4	549	761	191	25.1%
Chuathbaluk	5	5	0.0	0.0	18	17	12.7	18.6	23	22	9.9	216	229	38	16.8%
Middle Kuskokwim	74	43	1.4	51.0	231	179	8.6	129.0	305	222	6.9	1,655	2,093	277	13.3%
Middle Kuskokwim	8	6	0.0	0.0	26	19	15.9	21.6	34	25	12.2	302	413	134	32.4%
Crooked Creek	1	0			11	9	30.2	41.7	11	9	30.2	272	332	130	39.2%
Red Devil	2	0			25	20	31.1	54.0	25	20	31.1	621	776	270	34.8%
Sleetmute	1	1	0.0	0.0	13	12	83.4	128.5	14	13	77.5	1,001	1,084	268	24.7%
Stony River	8	8	9.8	27.6	5	5	1,115.0	1,318.1	13	13	434.8	5,653	5,653	0	0.0%
Lime Village	117	115	0.7	7.0	36	34	0.1	0.5	153	149	0.6	88	90	20	22.5%
McGrath	3	3	0.0	0.0	3	3	0.0	0.0	6	6	0.0	0	0	0	0.0%
Takotna	14	11	0.0	0.0	15	14	11.9	32.6	29	25	6.1	166	178	68	38.0%
Nikolai	1	1	20.0	0.0	2	2	5.0	7.1	3	3	10.0	30	30	0	0.0%
Telida	152	145	1.2	10.1	136	118	61.6	214.5	288	263	29.7	8,133	8,557	429	5.0%
Upper Kuskokwim	152	145	1.2	10.1	136	118	61.6	214.5	288	263	29.7	8,133	8,557	429	5.0%

TABLE 8. CONTINUED

Community	"Usually Do Not Fish" Households				"Usually Fish" Households				All Households				+/- percent		
	Total House- holds	House- holds Contacted	Mean Harvest	Standard Dev.	Total House- holds	House- holds Contacted	Mean Harvest	Standard Dev.	Total House- holds	House- holds Contacted	Mean Harvest	Total Reported Harvest		Estimated Harvest	
<u>Kuskokwim River</u>															
<u>Totals</u>	1,644	1,002	2.4	383.2	1,141	947	24.3	623.7	2,785	1,949	11.4	26,450	31,730	1,464	4.6%
Quinhagak	34	24	0.2	0.7	85	79	5.2	12.7	119	103	3.8	417	450	65	14.3%
Goodnews Bay	28	21	4.8	21.8	39	24	14.6	22.2	67	45	10.5	451	704	256	36.4%
Platinum	14	10	3.1	9.8	11	8	9.8	17.6	25	18	6.0	109	151	85	56.5%
<u>Kuskokwim Bay</u>															
<u>Totals</u>	76	55	2.4	70.6	135	111	8.3	119.5	211	166	6.2	977	1,305	278	21.3%
<u>Mekoryuk</u>															
Mekoryuk	49	21	0.0	0.0	0	0	0	0.0	49	21	0.0	0	0	0	0.0%
Newtok	58	13	0.0	0.0	2	1	10.0	0.0	60	14	0.3	10	20	0	0.0%
Nightmute	25	1	0.0	0.0	1	1	0.0	0.0	26	2	0.0	0	0	0	0.0%
Toksook Bay	71	6	12.0	20.2	5	5	42.8	49.5	76	11	14.0	286	1,066	1,120	105.1%
Tununak	83	7	0.1	0.4	3	2	41.0	55.2	86	9	1.6	83	135	137	101.6%
<u>Bering Sea Coast</u>															
<u>Totals</u>	261	47	3.3	560.3	10	8	35.7	67.5	271	55	4.5	379	1,221	1,129	92.5%
<u>Kuskokwim Area</u>															
<u>Totals</u>	1,981	1,104	2.5	682.5	1,286	1,066	22.7	638.7	3,267	2,170	10.5	27,806	34,255	1,869	5.5%

a Confidence intervals are reported at the approximate 95 percent level.

Note: Because of the small sample size, estimates for Kipnuk, Kwigillingok, and Nightmute are not included in totals. Red Devil and Sleestmute households that do not usually fish are also omitted.

TABLE 9. KUSKOKWIM AREA COHO SALMON SUBSISTENCE HARVESTS, 1989

Community	"Usually Do Not Fish" Households				"Usually Fish" Households				All Households					+/- percent	
	Total House- holds	House- holds Contacted	Mean Harvest	Standard Dev.	Total House- holds	House- holds Contacted	Mean Harvest	Standard Dev.	Total House- holds	House- holds Contacted	Mean Harvest	Total Reported Harvest	Total Estimated Harvest		
Kipnuk	94	3	81.0	103.7	0	0	0		94	3	81.0	243	7614	11,074	145.4%
Kwigillingok	32	0	0		0	0			32	0	0.0	0	0	0	0.0%
Kongiganak	30	15	0.9	2.6	26	20	19.2	44.4	56	35	9.4	397	525	250	47.5%
Tuntutuiak	13	7	1.4	3.8	46	36	10.1	18.0	59	43	8.2	374	484	131	27.1%
Eek	21	19	1.4	4.8	39	36	6.9	10.3	55	55	5.0	275	299	40	13.3%
Kasigluk	27	13	3.7	13.3	66	60	8.9	23.7	93	73	7.4	582	687	188	27.4%
Nunapitchuk	11	10	0.0	0.0	71	50	6.9	13.1	82	60	5.9	343	487	143	29.3%
Almautluak	29	9	15.6	34.3	24	22	21.7	32.1	53	31	18.3	617	971	559	57.5%
Napakiaak	28	18	0.0	0.0	51	44	34.6	75.9	79	62	22.3	1,521	1,763	432	24.5%
Napaskiak	13	7	0.0	0.0	58	54	13.9	35.0	71	61	11.4	753	809	145	18.0%
Oscanville	8	1	75.0	0.0	9	8	9.4	13.2	17	9	40.3	150	684	28	4.1%
Bethel	1,139	643	9.6	28.8	142	118	54.1	146.0	1,281	761	14.5	12,545	18,594	2,319	12.5%
Kweithluk	42	35	0.8	4.6	84	69	39.0	123.2	126	104	26.2	2,717	3,307	1,054	31.9%
Akiachak	31	25	13.6	60.1	62	57	23.5	48.7	93	82	20.2	1,680	1,879	399	21.2%
Akiak	13	4	6.3	12.5	42	32	58.1	103.1	55	36	45.9	1,885	2,523	759	30.1%
Tuluksak	13	8	21.9	61.9	54	44	18.1	33.2	67	52	18.8	971	1,261	423	33.5%
Lower Kuskokwim	1,418	814	9.1	934.1	774	650	27.5	1,068.7	2,192	1,464	15.6	24,810	34,273	2,839	8.3%
Totals															
Lower Kalskag	18	11	6.4	15.7	50	39	12.3	24.2	68	50	10.8	551	731	210	28.7%
Upper Kalskag	12	12	13.0	43.2	30	27	17.7	28.0	42	39	16.4	635	688	102	14.9%
Aniak	39	15	0.0	0.0	133	96	18.5	45.6	172	111	14.3	1,776	2,461	653	26.5%
Chuahtbaluk	5	5	0.0	0.0	18	17	16.9	29.6	23	22	13.3	288	305	61	20.0%
Middle Kuskokwim	74	43	3.7	53.0	231	179	16.9	344.1	305	222	13.7	3,250	4,185	696	16.6%
Totals															
Crooked Creek	8	6	0.0	0.0	26	19	20.6	31.5	34	25	15.8	392	536	195	36.4%
Red Devil	1	0			11	9	137.8	141.8	11	9	137.8	1,240	1,516	443	29.3%
Sleetmute	2	0			25	20	40.4	91.1	25	20	40.4	807	1,009	455	45.1%
Stony River	1	1	0.0	0.0	13	12	47.0	86.7	14	13	43.6	564	611	181	29.5%
Lime Village	8	8	0.0	0.0	5	5	405.0	393.9	13	13	155.8	2,025	2,025	0	0.0%
McGrath	117	115	2.4	19.0	36	34	9.1	26.6	153	149	4.0	584	607	94	15.5%
Taikotna	3	3	0.0	0.0	3	3	13.3	23.1	6	6	6.7	40	40	0	0.0%
Nikolai	14	11	5.5	18.1	15	14	4.9	11.0	29	25	5.2	129	150	74	49.4%
Telida	1	1	0.0	0.0	2	2	15.0	7.1	3	3	10.0	30	30	0	0.0%
Upper Kuskokwim	152	145	2.3	44.5	136	118	45.3	346.8	288	263	22.7	5,811	6,524	699	10.7%
Totals															

TABLE 9. CONTINUED

Community	"Usually Do Not Fish" Households				"Usually Fish" Households				All Households				+/- percent		
	Total House- holds	House- holds Contacted	Mean Harvest	Standard Dev.	Total House- holds	House- holds Contacted	Mean Harvest	Standard Dev.	Total House- holds	House- holds Contacted	Mean Harvest	Total Estimated Harvest		Total Harvest	
<u>Kuskokwim River</u>	1,644	1,002	8.3	936.7	1,141	947	27.5	1,175.1	2,785	1,949	16.2	33,871	44,982	3,005	6.7%
<u>Totals</u>															
Quinhagak	34	24	19.0	93.1	85	79	31.8	63.3	119	103	28.1	2,965	3,346	771	23.0%
Goodnews Bay	28	21	2.4	10.9	39	24	19.3	29.0	67	45	12.2	513	819	294	35.9%
Platinum	14	10	1.0	3.2	11	8	4.9	8.7	25	18	2.7	49	68	38	56.9%
<u>Kuskokwim Bay</u>															
<u>Totals</u>	76	55	9.6	352.0	135	111	26.0	216.0	211	166	20.1	3,527	4,232	826	19.5%
Mekoryuk	49	21	5.6	8.9	0	0			49	21	5.6	117	273	144	52.7%
Newtok	58	13	0.0	0.0	2	1	15.0	0.0	60	14	0.5	15	30	0	0.0
Nightmute	25	1	0.0	0.0	1	1	70.0	0.0	26	2	2.7	70	70	0	0.0%
Toksook Bay	71	6	0.7	106	5	5	8.0	11.0	76	11	1.1	44	87	91	103.7%
Tununak	83	7	10	1.9	3	2	1.0	1.4	86	9	1.0	9	86	115	133.7%
<u>Bering Sea Coast</u>															
<u>Totals</u>	261	47	1.5	102.7	10	8	7.3	1.7	271	55	1.8	185	477	205	43.1%
<u>Kuskokwim Area</u>															
<u>Totals</u>	1,981	1,104	7.4	1,005.9	1,286	1,066	27.2	1,194.7	3,267	2,170	15.2	37,583	49,691	3,124	6.3%

a Confidence intervals are reported at the approximate 95 percent level.

Note: Because of the small sample size, estimates for Kipnuk, Kwigillingok, and Nightmute are not included in totals. Red Devil and Sleetmufe households that do not usually fish are also omitted.

TABLE 10. REPORTED USE OF FISHING GEAR BY SUBSISTENCE SALMON FISHING HOUSEHOLDS IN THE KUSKOKWIM AREA, 1989

Community	Surveys	Gear							Rod and Reel
		Subsistence Fished	Information Available	Driftnet	Setnet	Fishwheel	Seine	Spear	
Kipnuk	0	-	-	-	-	-	-	-	-
Kwigillingok	0	-	-	-	-	-	-	-	-
Kongiganak	38	27	27	27	5	0	0	0	0
Tuntutuliak	40	37	35	34	3	0	0	0	0
Eek	38	30	26	24	6	0	0	0	0
Kasigluk	66	52	51	51	0	0	0	0	0
Nunapitchuk	45	37	37	36	4	0	0	0	0
Atmautluak	23	14	14	12	3	0	0	0	0
Napakiak	51	40	39	38	12	0	0	0	0
Napaskiak	50	44	41	40	6	0	0	0	0
Oscarville	7	7	7	7	0	0	0	0	0
Bethel	0	-	-	-	-	-	-	-	-
Kwethluk	77	70	65	49	43	0	0	0	4
Akiachak	60	50	50	46	28	0	0	0	0
Akiak	33	29	29	22	15	0	0	0	0
Tuluksak	45	38	37	32	12	0	0	0	0
<u>Lower Kuskokwim Totals</u>	573	475	458	418	137	0	0	0	4
Lower Kalskag	45	35	35	26	21	0	0	0	0
Upper Kalskag	23	15	15	14	2	0	0	0	0
Aniak	85	63	62	46	6	1	0	0	15
Chuathbaluk	14	12	12	8	4	0	0	0	2
<u>Middle Kuskokwim Totals</u>	167	125	124	94	33	1	0	0	17
Crooked Creek	20	13	13	11	7	1	0	0	0
Red Devil	4	3	3	1	2	0	0	0	0
Sleetmute	13	7	7	6	2	0	0	0	2
Stony River	12	9	9	1	5	5	0	0	0
Lime Village	12	4	4	0	4	0	0	0	0
McGrath	33	18	17	1	12	2	0	0	3
Takotna	4	2	2	0	1	1	0	0	0
Nikolai	12	11	11	0	7	0	0	0	6
Telida	0	-	-	-	-	-	-	-	-
<u>Upper Kuskokwim Totals</u>	110	67	66	20	40	9	0	0	11
<u>Kuskokwim River Totals</u>	850	667	648	532	210	10	0	0	32
Quinhagak	76	67	64	53	18	0	2	0	6
Goodnews Bay	31	24	24	11	12	0	1	0	2
Platinum	12	7	7	5	4	0	0	0	1
<u>Kuskokwim Bay Totals</u>	119	98	95	69	34	0	3	0	9
Mekoryuk	0	-	-	-	-	-	-	-	-
Newtok	0	-	-	-	-	-	-	-	-
Nightmute	0	-	-	-	-	-	-	-	-
Toksook Bay	0	-	-	-	-	-	-	-	-
Tununak	0	-	-	-	-	-	-	-	-
<u>Bering Sea Coast Totals</u>	0	-	-	-	-	-	-	-	-
<u>Kuskokwim Area Totals</u>	969	765	743	601	244	10	3	0	41

NOTE. This table includes counts of all gear used by fishing households. Some households used more than one gear type during the course of the fishing season. Data not available for Kipnuk, Kwigillingok, Bethel, Telida, Mekoryuk, Newtok, Nightmute, Toksook Bay, and Tununak.

In the Kuskokwim Bay region communities of Quinhagak, Goodnews Bay, and Platinum, almost three-quarters (72.6 percent) of the fishing households used drift gill nets to harvest subsistence salmon, and over one-third (35.8 percent) used set gill nets. In addition to gill nets, seines and rod-and-reel gear were used by residents of Quinhagak and Goodnews Bay for harvesting salmon.

Household Size and Number of Dogs

The post-season interviews also yielded information on household size and the number of dogs per community (Table 11). Household size information was recorded for 943 households, however, the number of dogs per household was not always recorded. The information on the number of dogs represents only the reported numbers from the sample of households that fished for subsistence, fed salmon to their dogs, and were interviewed. Unlike the estimated total salmon harvest data, the data on dogs have not been expanded to account for households not interviewed. Therefore, the number of dogs reported in a community should be used as a minimum estimate of the actual number.

Overall, these 943 households included 4,398 people and averaged 4.7 people per household. Largest household sizes were in communities the Lower Kuskokwim region (5.1 per household) and smallest household sizes in communities along the Upper Kuskokwim region (3.4 per household).

Harvest of Salmon For Dog Food

A total of 117 of the 948 households interviewed reported harvesting salmon to feed 1,430 dogs (Table 12). The number of dogs owned by these 117 households ranged from 1 to 180 per household and averaged 12.2 dogs. More than half (59 percent) of the households harvesting salmon for dog food had 10 dogs or less, 30 percent had from 11 to 20 dogs, and 11 percent had more than 20 dogs. Only one household reported having more than 37 dogs.

TABLE 11. NUMBER OF PEOPLE AND DOGS IN SURVEYED COMMUNITIES REPORTING INFORMATION, 1989

	Total Households	Surveyed Households	Surveyed Households with Info	People	Dogs
Kipnuk	94	0	-	-	-
Kwigillingok	32	0	-	-	-
Kongiganak	56	38	38	215	0
Tuntutuliak	59	40	39	201	41
Eek	60	38	36	163	65
Kasigluk	93	66	61	338	73
Nunapitchuk	82	45	42	216	145
Atmautluak	53	23	23	118	51
Napakiak	79	51	49	234	127
Napaskiak	71	50	45	218	141
Oscarville	17	7	6	26	15
Bethel	1,281	0	-	-	-
Kwethluk	126	77	76	371	109
Akiachak	93	60	60	326	245
Akiak	55	33	33	166	445
Tuluksak	67	45	45	255	130
<u>Lower Kuskokwim Totals</u>	2,318	573	553	2,847	1,587
Lower Kalskag	68	45	45	220	70
Upper Kalskag	42	23	23	87	55
Aniak	172	85	84	307	120
Chuathbaluk	23	14	14	46	8
<u>Middle Kuskokwim Totals</u>	305	167	166	660	253
Crooked Creek	34	20	20	71	38
Red Devil	12	4	4	15	5
Sleetmute	27	13	13	52	18
Stony River	14	12	12	43	51
Lime Village	13	12	12	39	45
McGrath	153	33	32	109	62
Takotna	6	4	3	5	32
Nikolai	29	12	11	31	22
Telida	3	0	-	-	-
<u>Upper Kuskokwim Totals</u>	291	110	107	365	273 [†]
<u>Kuskokwim River Totals</u>	2,914	850	826	3,872	2,113
Qunhagak	119	76	76	359	21
Goodnews Bay	67	31	29	121	7
Platinum	25	12	12	46	0
<u>Kuskokwim Bay Totals</u>	211	119	117	526	28
Mekoryuk	49	0	-	-	-
Newtok	60	0	-	-	-
Nightmute	26	0	-	-	-
Toksook Bay	76	0	-	-	-
Tununak	86	0	-	-	-
<u>Bering Sea Coast Totals</u>	297	0	-	-	-
<u>Kuskokwim Area Totals</u>	3,422	969	943	4,398	2,141

NOTE: This table includes all dogs reportedly owned by households that were interviewed, whether or not they were fed salmon. Data not available for Kipnuk, Kwigillingok, Bethel, Telida, Mekoryuk, Newtok, Nightmute, Toksook Bay, and Tununak.

TABLE 12. REPORTED HARVEST OF SALMON USED TO FEED DOGS, 1989

Community	Number of Households Harvesting Salmon to Feed Dogs	Average Number of Dogs Per Household	Number of Dogs Fed Salmon	Number of Salmon Harvested to Feed Dogs ^a			
				Chum	Sockeye	Coho	Total
Tuntutuliak	6	6.83	41	375	187	5	567
Eek	1	5.00	5	20	0	10	30
Kasigluk	4	12.00	48	144	0	0	144
Nunapitchuk	4	13.25	53	915	50	100	1,065
Napakiak	4	12.25	49	1,120	50	30	1,200
Napaskiak	12	9.50	114	2,979	15	170	3,164
Kwethluk	11	9.27	102	1,385	25	1,182	2,592
Akiachak	10	17.10	171	2,150	400	670	3,220
Akiak	11	34.73	382	5,732	780	1,305	7,817
Tuluksak	4	12.00	48	280	100	120	500
<u>Lower Kuskokwim</u>							
<u>Totals</u>	67		1,013	15,100	1,607	3,592	20,299
<u>Household Averages</u>		15.12	15.12	225.37	24	53.61	303
Lower Kalskag	9	6.78	61	1,173	12	280	1,465
Upper Kalskag	2	13.50	27	423	0	0	423
Aniak	7	9.57	67	3,020	100	300	3,420
Chuathbaluk	1	3.00	3	--	--	--	--
<u>Middle Kuskokwim</u>							
<u>Totals</u>	19		158	4,616	112	580	5,308
<u>Household Averages</u>		8.31	8.31	256	6.22	32.22	295
Crooked Creek	8	4.75	38	127	0	0	127
Sleetmute	1	5.00	5	150	150	0	300
Stony River	5	10.20	51	725	541	293	1,559
Lime Village	4	9.75	39	1,850	2,650	1,190	5,690
McGrath	6	9.00	54	428	0	0	428
Takotna	2	16.00	32	240	0	35	275
Nikolai	1	12.00	12	100	0	0	100
<u>Upper Kuskokwim</u>							
<u>Totals</u>	27		231	3,620	3,341	1,518	8,479
<u>Household Averages</u>		8.56	8.56	134	123.7	56.2	314
Quinhagak	3	7.00	21	260	0	150	410
Goodnews Bay	1	7.00	7	100	20	100	220
<u>Kuskokwim Bay</u>							
<u>Totals</u>	4		28	360	20	250	630
<u>Household Averages</u>		7.00	7.00	90	5	62.5	157.5
<u>Kuskokwim Area</u>							
<u>Totals</u>	117		1,430	23,696	5,080	5,940	34,716
<u>Household Averages</u>		12.22	12.22	204.3	43.8	51.2	299.3
<u>Average Harvest Per Dog</u>				16.6	3.56	4.16	24.33

a Chinook salmon are generally not harvested for dog food.

NOTE: This table includes only those communities where households reported feeding salmon to dogs. The number of salmon fed to dogs in Chuathbaluk was not available. All harvests were calculated based on 116 households providing harvest data. Chuathbaluk omitted. Data not available for Kipnuk, Kwigillingok, Bethel, Telida, Mekoryuk, Newtok, Nightmute, Toksook Bay, and Tununak.

Among households that reported feeding salmon to dogs, the fewest average number of dogs per household (7.0) was in the Kuskokwim Bay region and the largest number of dogs (15.12 per household) was in the Lower Kuskokwim region. Households in the Middle and Upper Kuskokwim regions that fed salmon to dogs averaged approximately 8 dogs per household.

A total of 23,696 chum salmon, 5,080 sockeye, and 5,940 coho salmon were harvested for dogs by 116 of these households. One household which reported feeding salmon to dogs could not provide an estimate of the number of salmon used. Household harvests of chum salmon ranged from 0 to 1,500 and averaged 204.3 fish per household. Harvests of sockeye ranged from 0 to 500 fish per household, averaging 43.8 salmon. Coho harvests ranged from 0 to 333 fish per household with an average of 51.2

On the average, households in the Upper Kuskokwim region harvested more sockeye salmon for dog food than households in the other regions. This was primarily due to the harvest by households in Lime Village; only three of the seven communities in that region reported harvesting sockeye salmon. Average household harvests of chum salmon were largest in the Middle Kuskokwim region, however, households in the Lower Kuskokwim region also harvested significant numbers of chum salmon. Average household harvests of coho salmon to feed dogs was greatest in the Kuskokwim Bay region, followed by the Upper Kuskokwim and the Lower Kuskokwim regions. Overall, among households in the Kuskokwim Area that harvest salmon for dog food, households averaged 299 salmon harvested for that purpose.

DISCUSSION

Comparison of 1989 and Previous Harvest Estimation Methods

The newly developed estimation method used in 1989 improved the harvest estimates compared to the methodology used in previous years. This was determined by applying the previously used methodology to the 1989 data and comparing the results (Table 13). The old methodology would

have first estimated the total number of fishing households in a community based on the proportion of households whose salmon harvest activity was known and then would have estimated the total harvest by applying the average harvests of the known fishing households across the estimated total number of fishing households. This comparison showed, overall, that the previous method would have overestimated salmon harvests significantly. The reason that the pre-1989 statistical methods overestimated the 1989 harvests may be due to the overemphasis of fishing households in the reporting of 1989 harvest information. That is, a higher fraction of households in the sample were found to have fished, which may be the result of targeting fishing households during community surveys and the higher return rates for salmon catch calendars and post-season postcards by households that "usually fish."

1989 Frequency of Harvests for Fishing Households

Harvest levels for households that "usually fish" were grouped into ranges for each species. Data are presented only for households that actually reported fishing. In 1989, chinook salmon harvests ranged from 0 to over 380, although this varied among regions of the Kuskokwim River, Kuskokwim Bay, and Bering Sea coast (Figures 3 through 7). Except in the Bering Sea Coast region, the majority of fishing households reported harvesting. Among households that did harvest chinook, between 1 and 19 chinook were the usual number.

The estimated number of chum salmon harvested was almost as large (83 percent) as the number of all other species of salmon harvested combined. Nevertheless, significant numbers of households in the Middle Kuskokwim and Kuskokwim Bay regions did not harvest this species (Figures 8 through 12). Households that harvested chum salmon commonly harvested between 1 and 49 chum salmon. A few households in the Lower, Middle, and Upper Kuskokwim regions each harvested over 950 chum salmon.

The majority of fishing households harvesting sockeye salmon caught between 1 and 49 such salmon, however, significant numbers of households in each study area did not harvest this species

(Figures 13 through 17). Only in the Upper Kuskokwim region (Lime Village) did households report harvests greater than 400 sockeye salmon. Reportedly, sockeye salmon are not abundant upriver from the community of Stony River and may not be available to many fishing households in the Upper Kuskokwim region. Coho salmon harvests ranged from 1 to over 380 salmon per household (Figures 18 through 22). Significant numbers of households in each study area did not harvest coho.

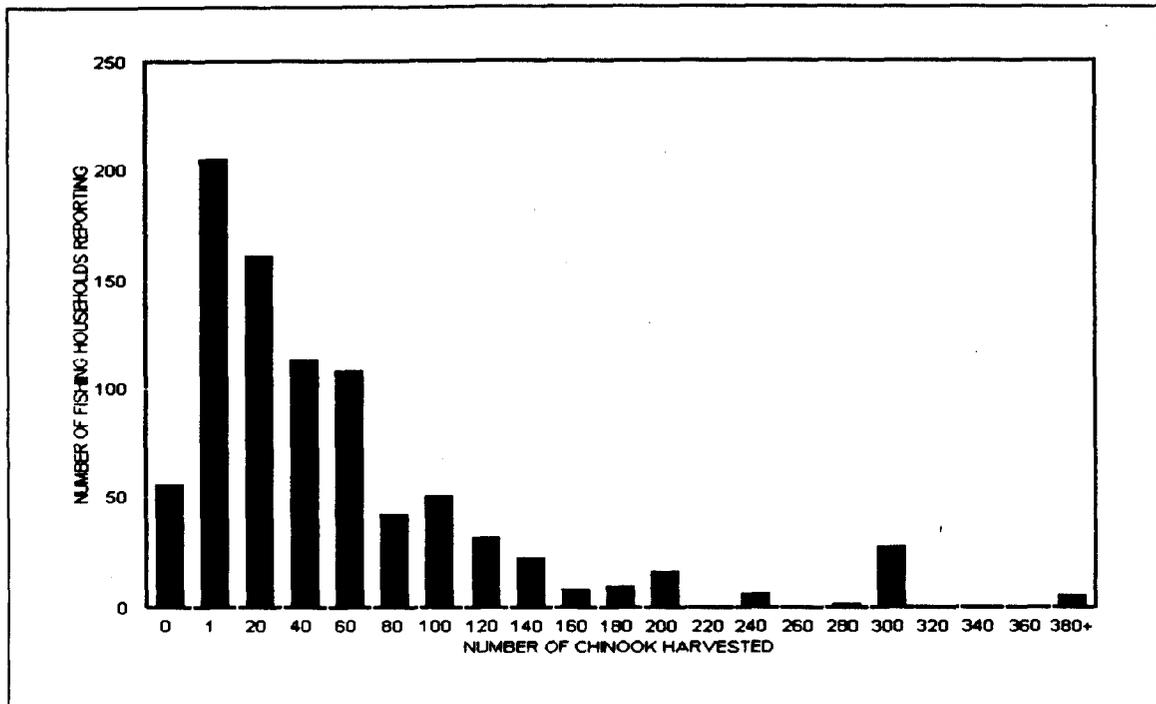


Fig. 3. Frequency of the reported chinook salmon harvested for subsistence use by households in the Lower Kuskokwim region.

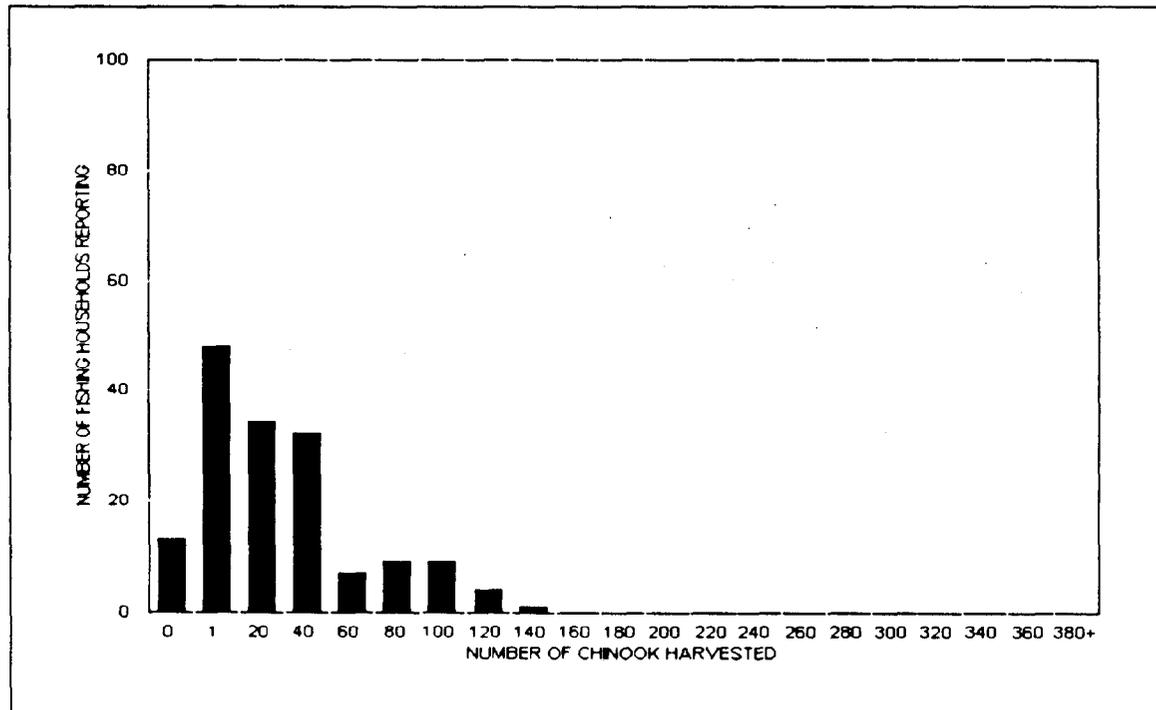


Fig. 4. Frequency of the reported chinook salmon harvested for subsistence use by households in the Middle Kuskokwim region.

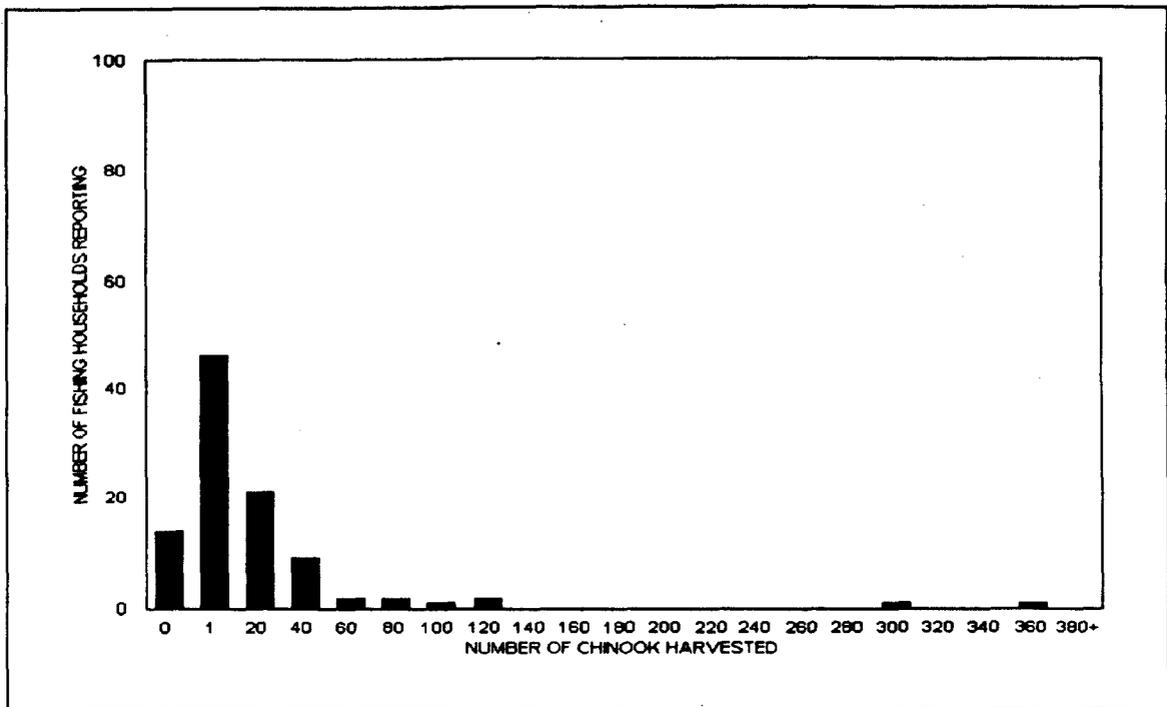


Fig. 5. Frequency of the reported chinook salmon harvested for subsistence use by households in the Upper Kuskokwim region.

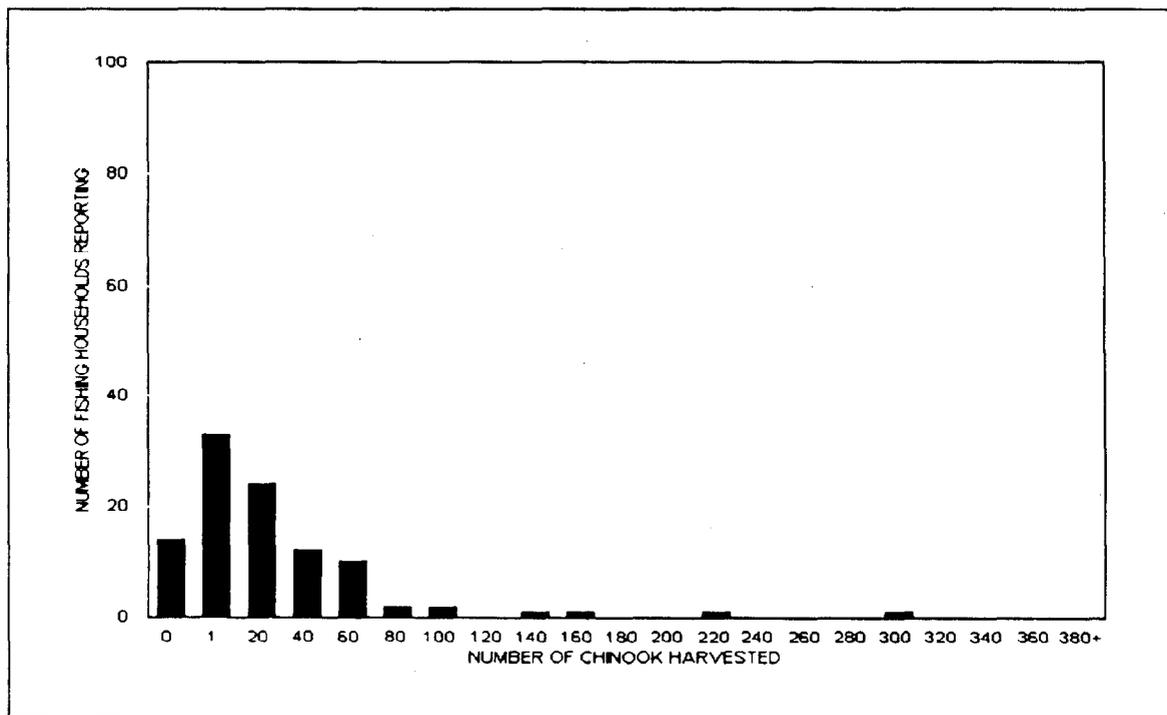


Fig. 6. Frequency of the reported chinook salmon harvested for subsistence use by households in the Kuskokwim Bay region.

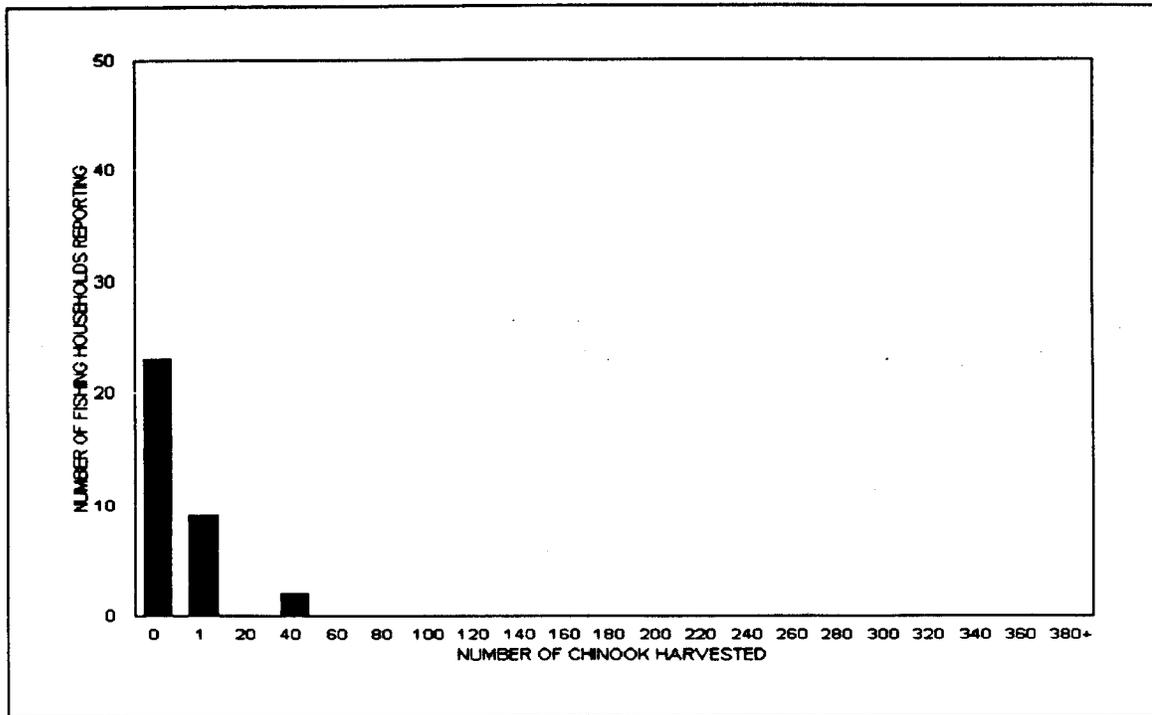


Fig. 7. Frequency of the reported chinook salmon harvested for subsistence use by households in the Bering Sea Coast region.

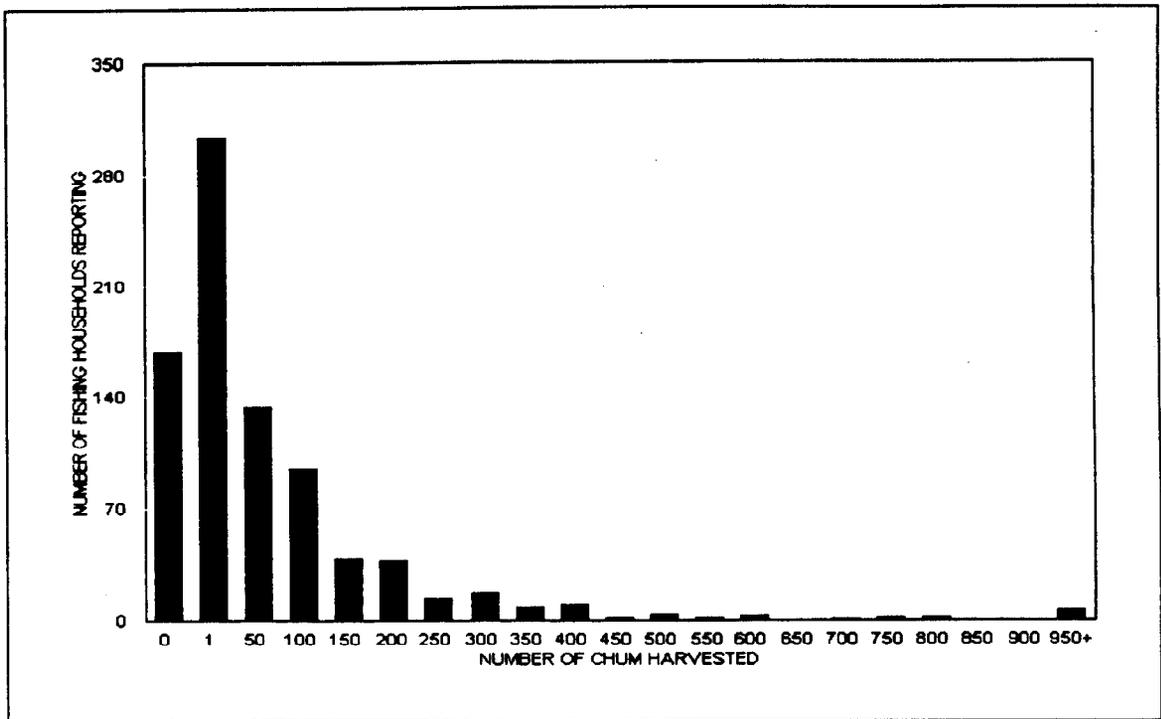


Fig. 8. Frequency of the reported chum salmon harvested for subsistence use by households in the Lower Kuskokwim region.

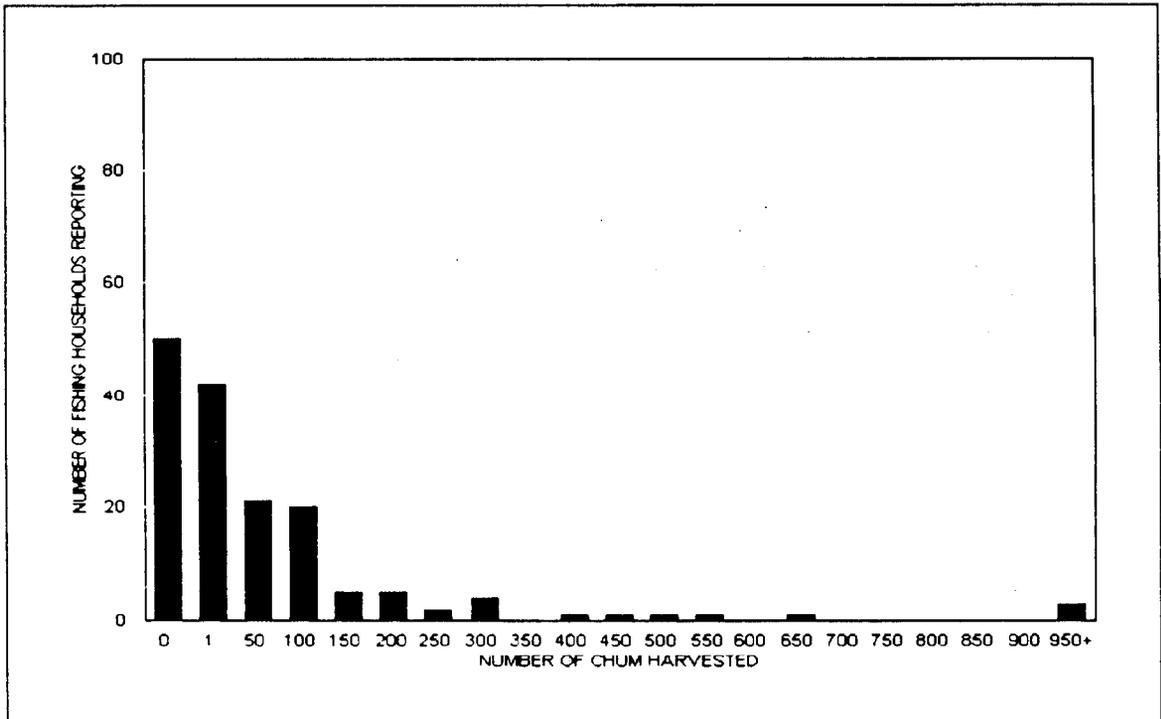


Fig. 9. Frequency of the reported chum salmon harvested for subsistence use by households in the Middle Kuskokwim region.

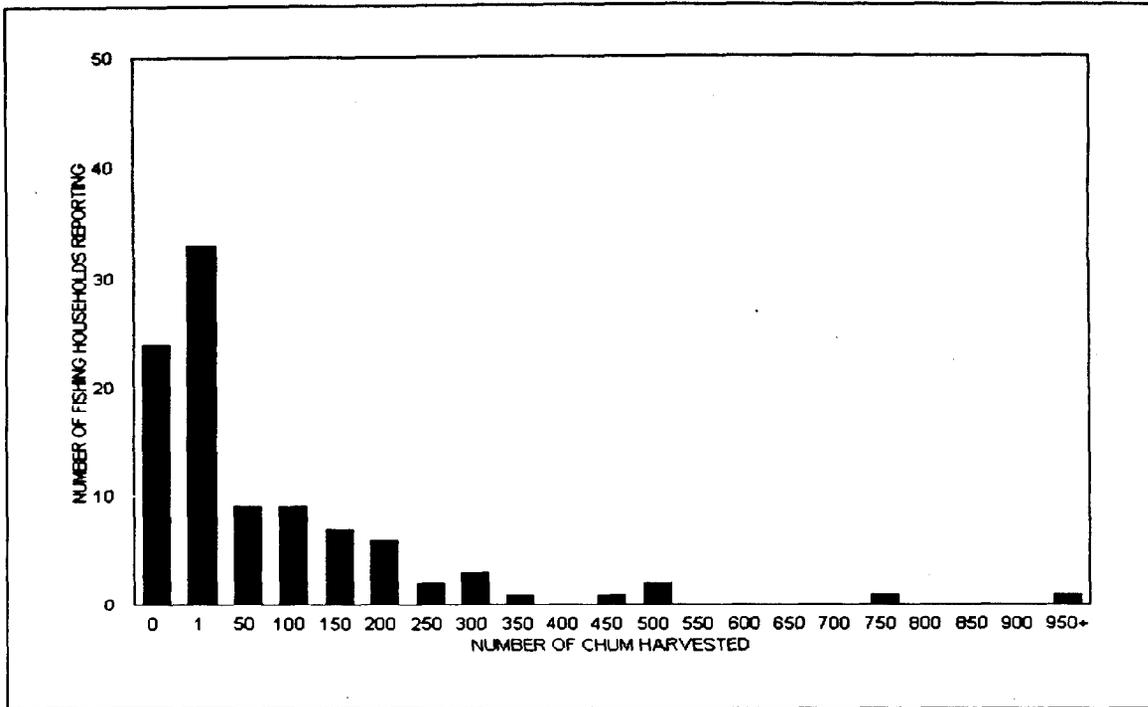


Fig. 10. Frequency of the reported chum salmon harvested for subsistence use by households in the Upper Kuskokwim region.

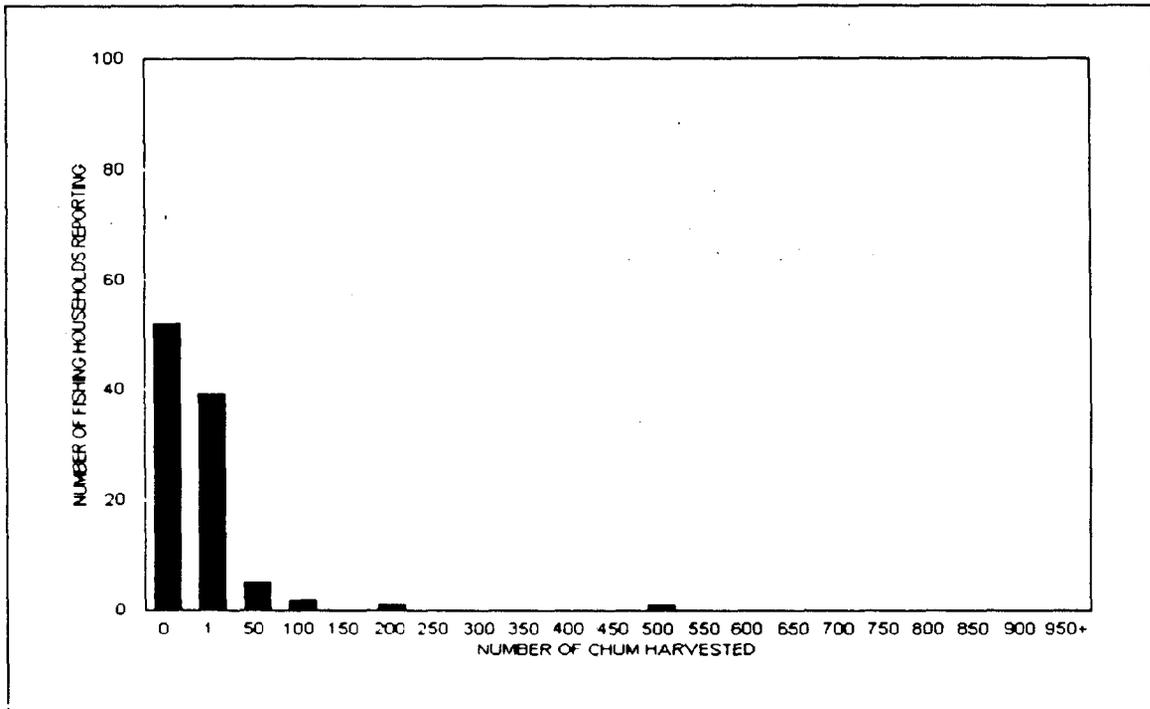


Fig. 11. Frequency of the reported chum salmon harvested for subsistence use by households in the Kuskokwim Bay region.

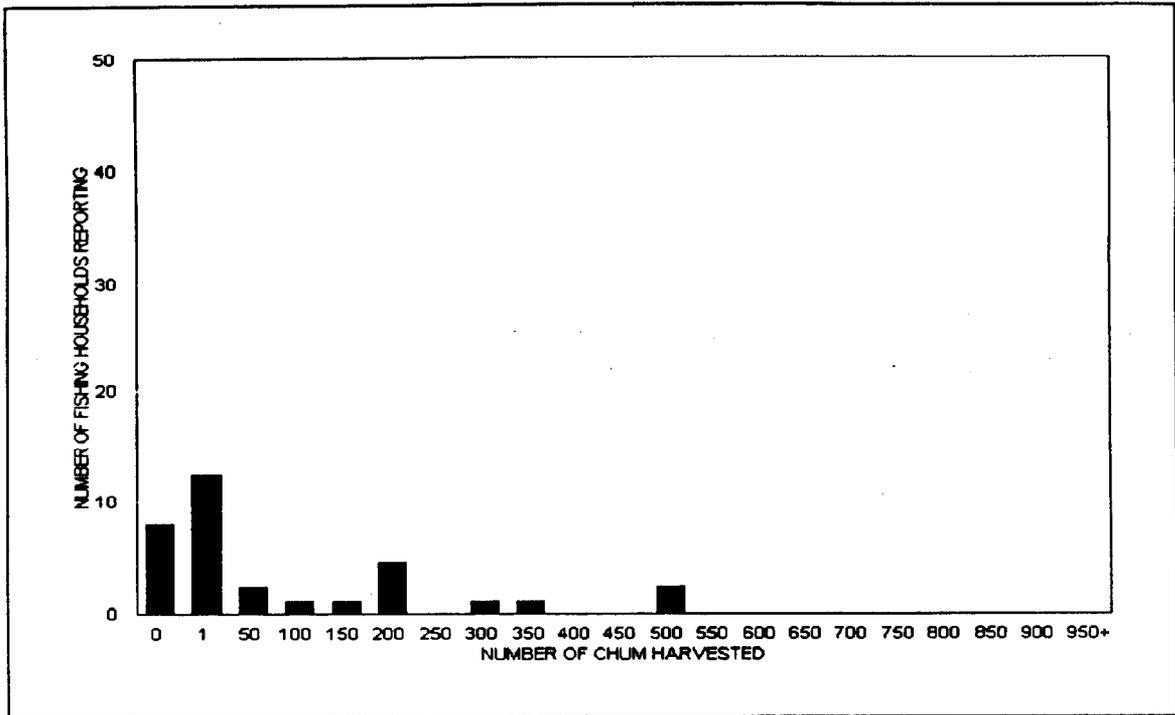


Fig. 12. Frequency of the reported chum salmon harvested for subsistence use by households in the Bering Sea Coast region.

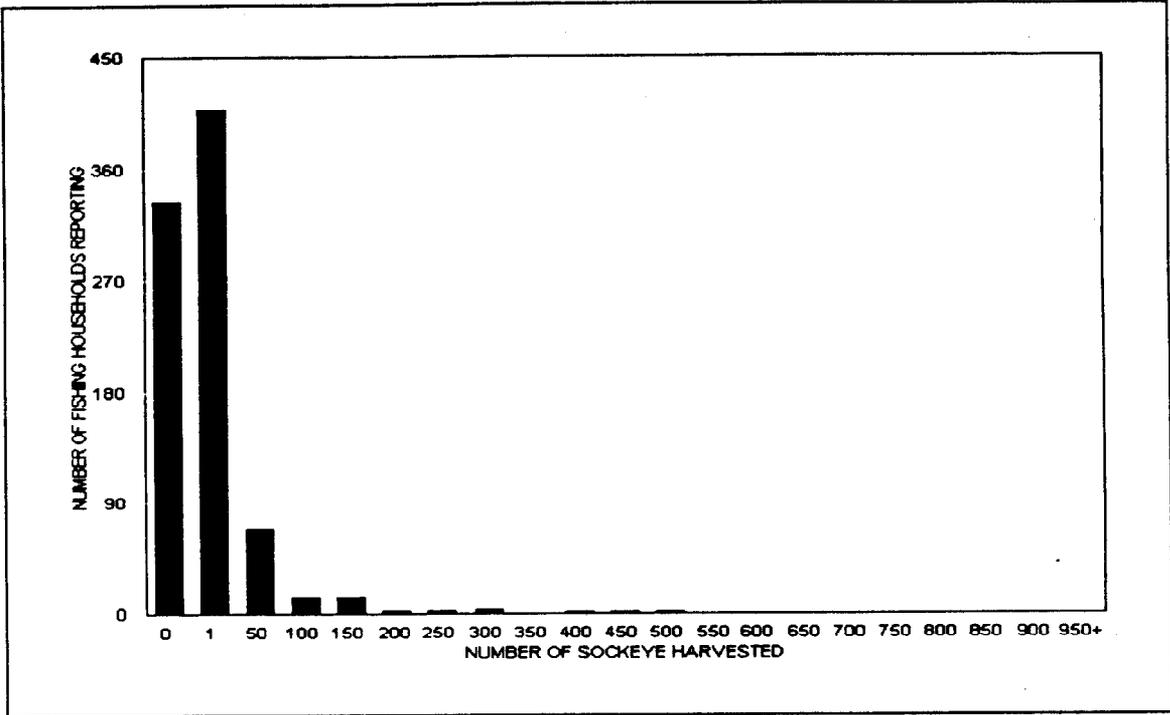


Fig. 13. Frequency of the reported sockeye salmon harvested for subsistence use by households in the Lower Kuskokwim region.

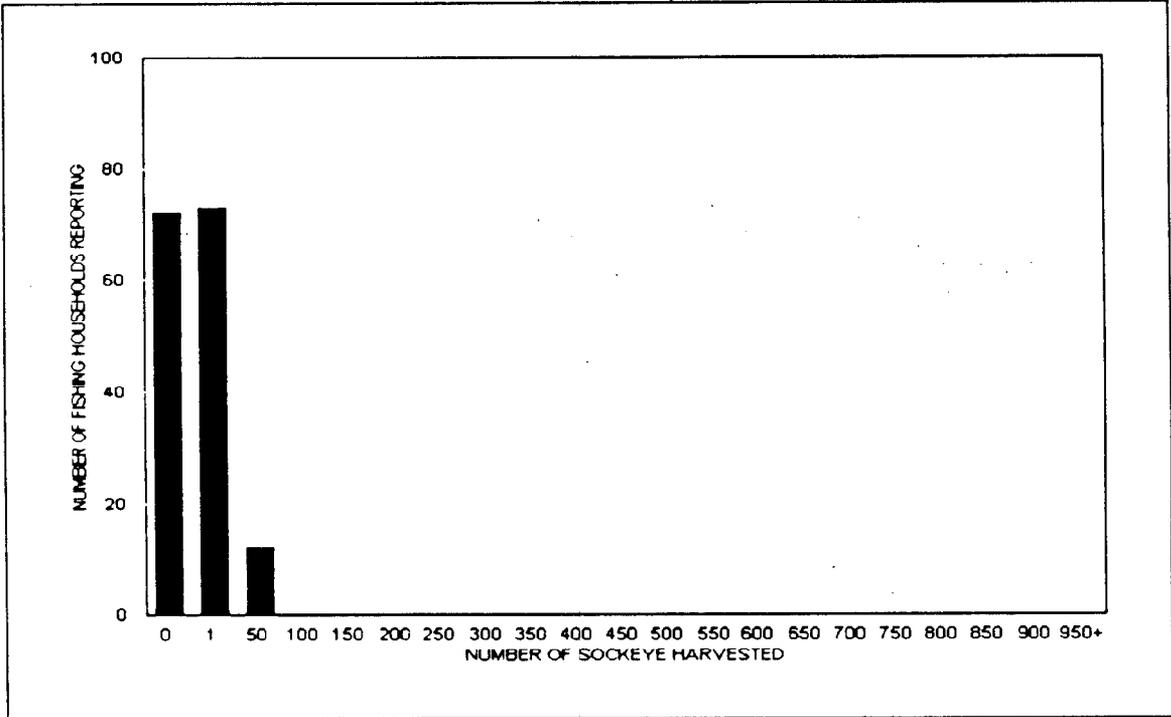


Fig. 14. Frequency of the reported sockeye salmon harvested for subsistence use by households in the Middle Kuskokwim region.

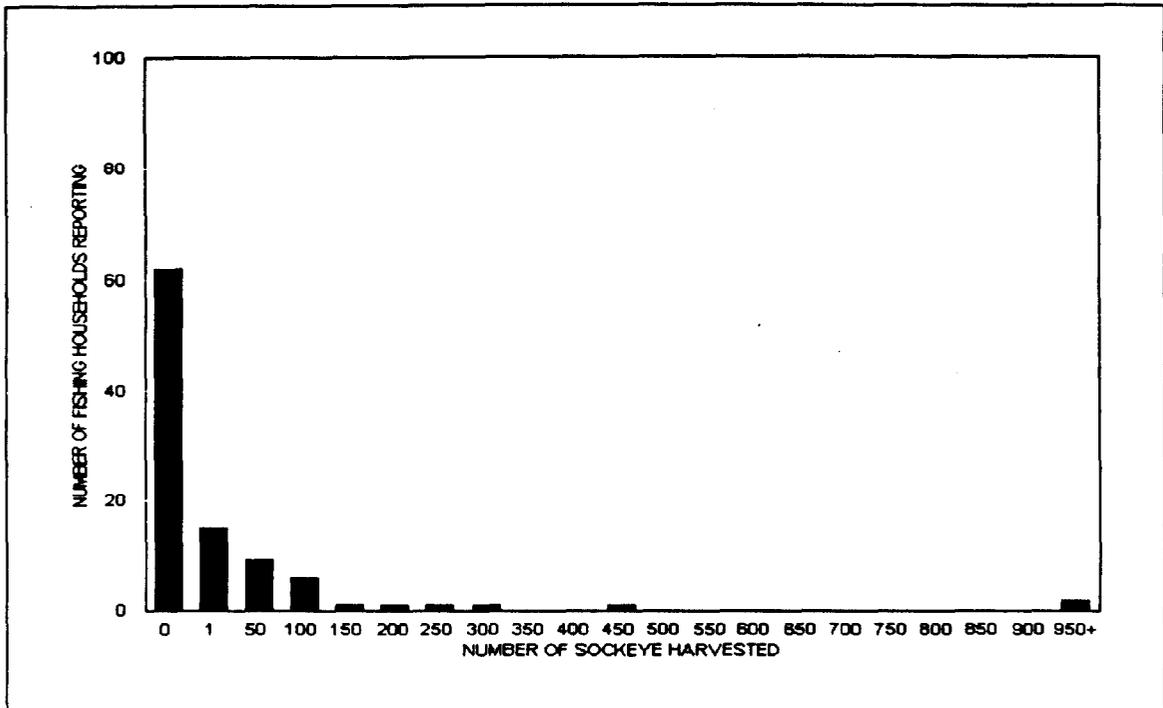


Fig. 15. Frequency of the reported sockeye salmon harvested for subsistence use by households in the Upper Kuskokwim region.

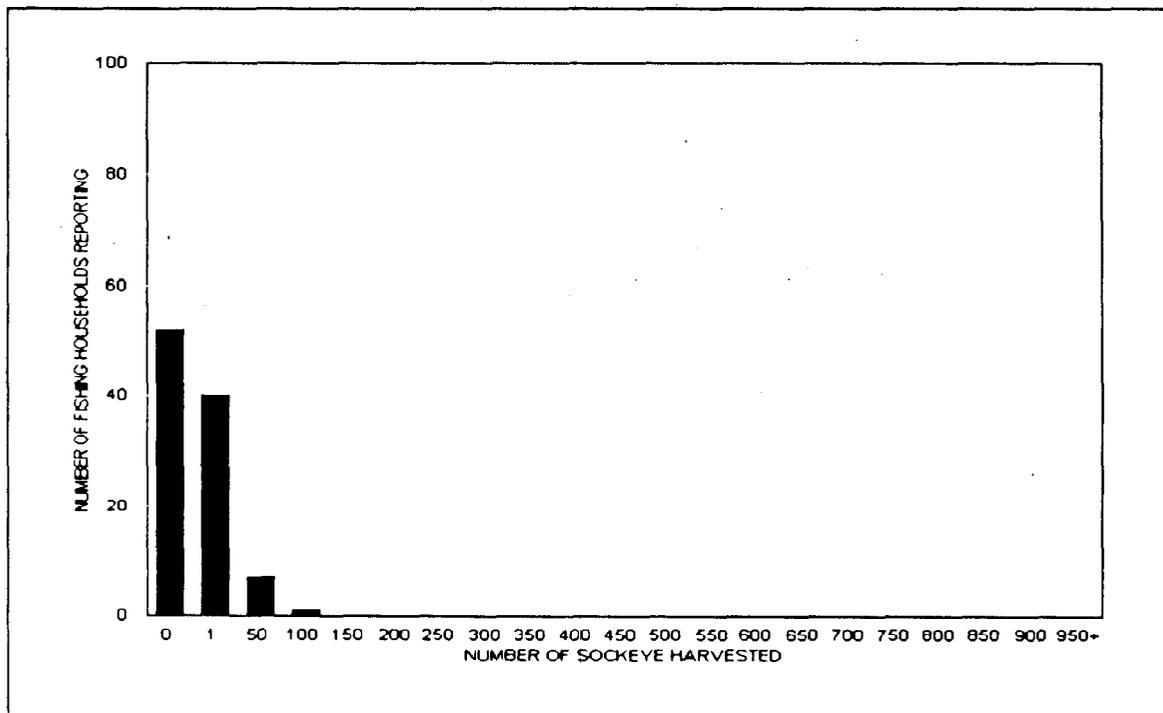


Fig. 16. Frequency of the reported sockeye salmon harvested for subsistence use by households in the Kuskokwim Bay region.

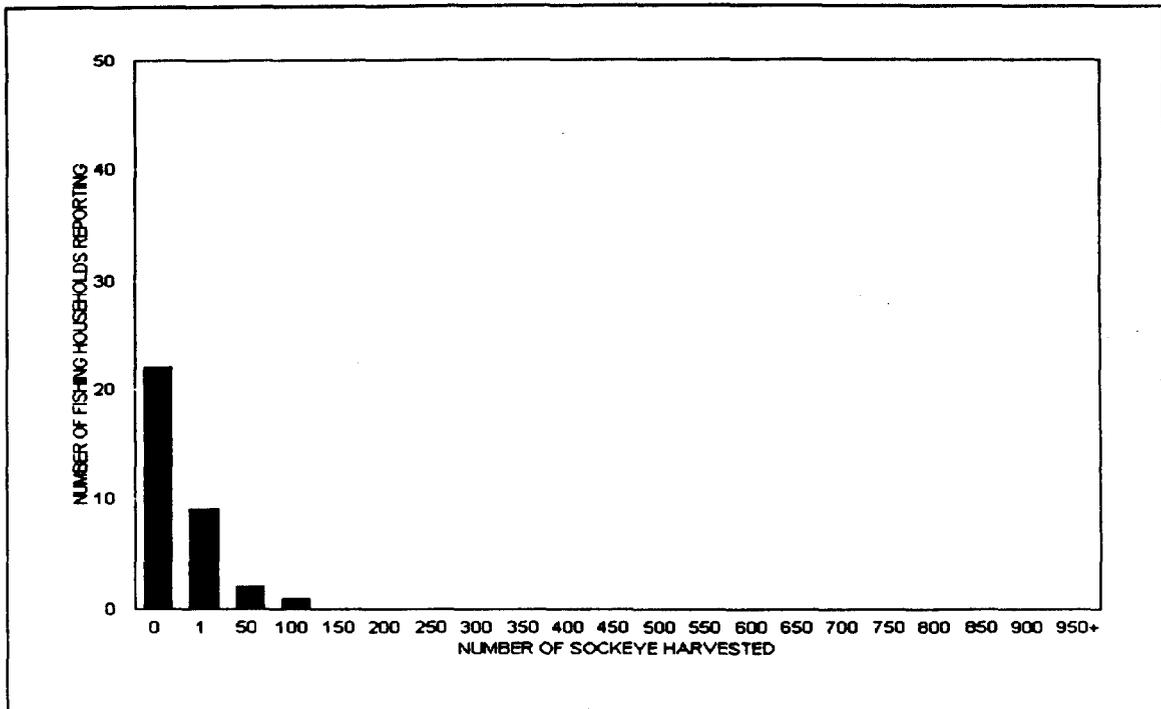


Fig. 17. Frequency of the reported sockeye salmon harvested for subsistence use by households in the Bering Sea Coast region.

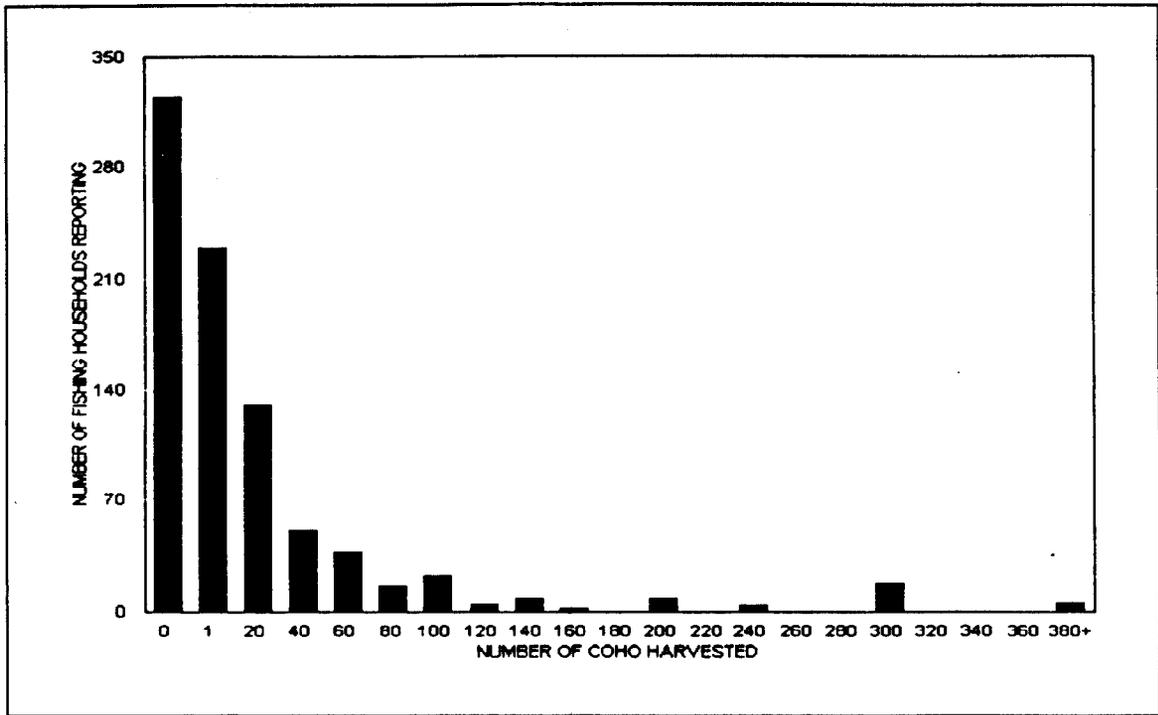


Fig. 18. Frequency of the reported coho salmon harvested for subsistence use by households in the Lower Kuskokwim region.

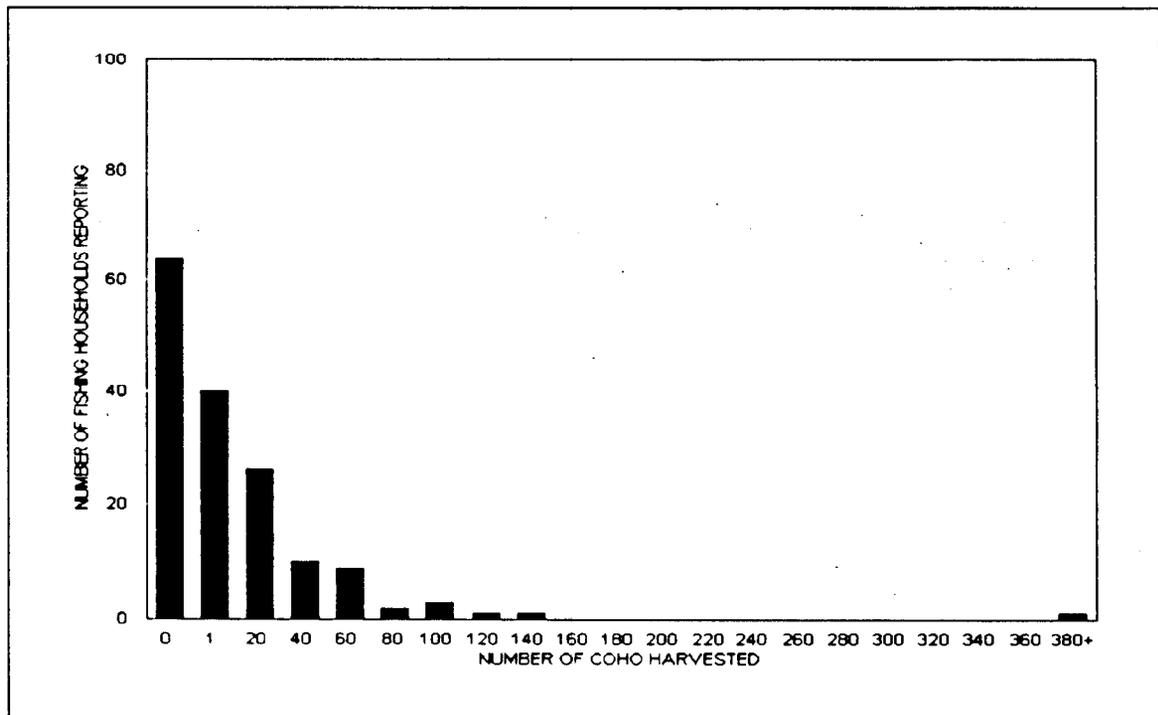


Fig. 19. Frequency of the reported coho salmon harvested for subsistence use by households in the Middle Kuskokwim region.

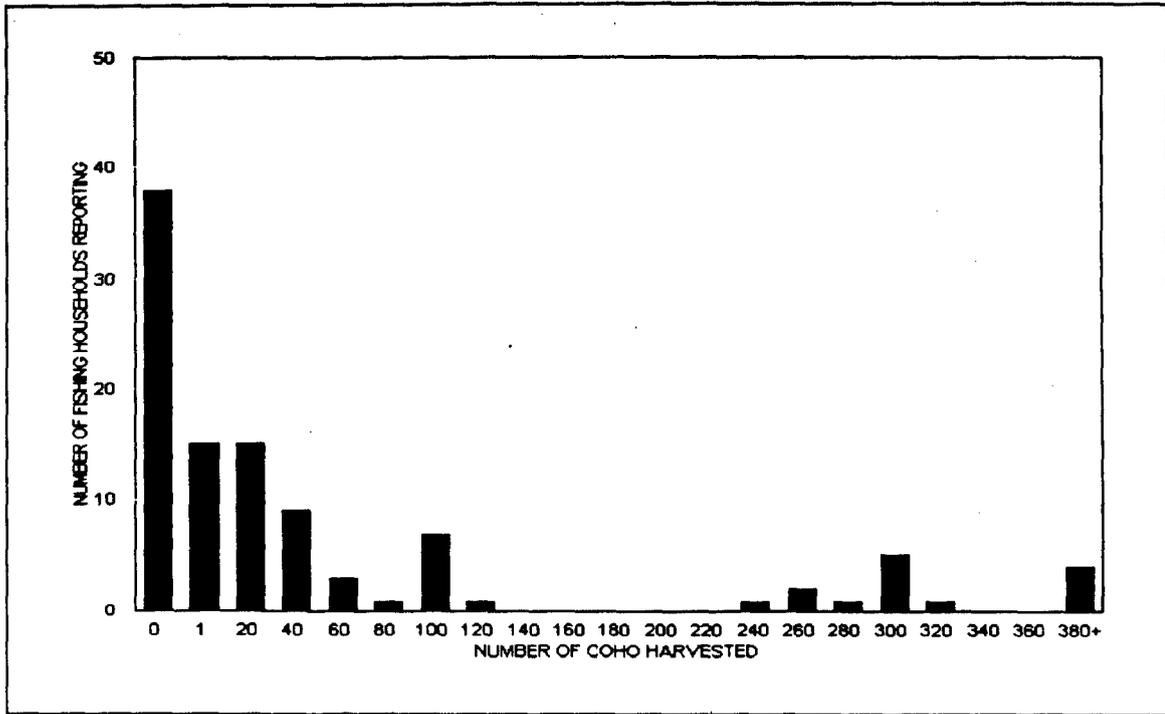


Fig. 20. Frequency of the reported coho salmon harvested for subsistence use by households in the Upper Kuskokwim region.

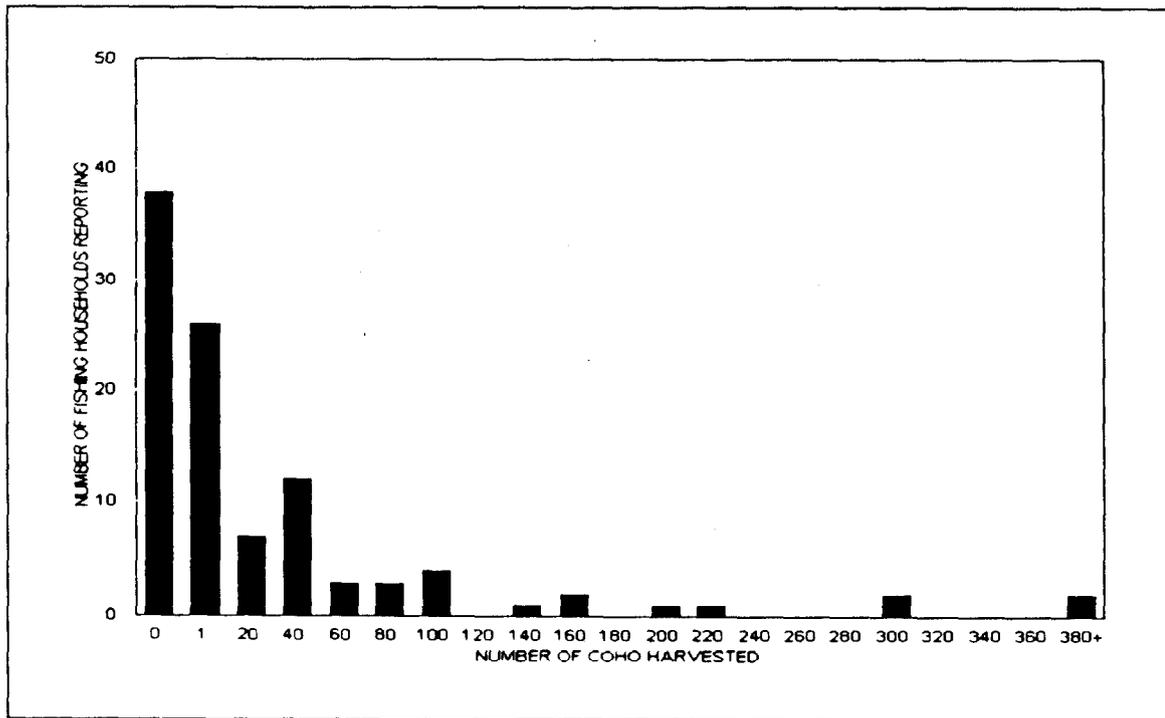


Fig. 21. Frequency of the reported coho salmon harvested for subsistence use by households in the Kuskokwim Bay region.

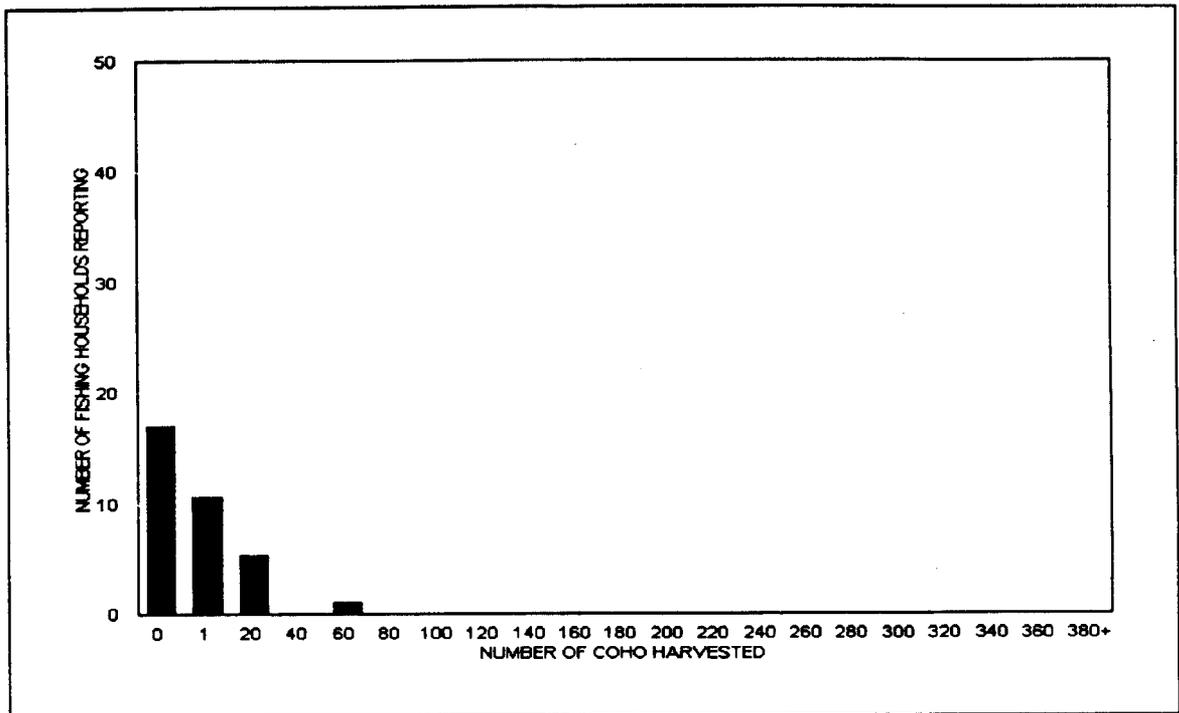


Fig. 22. Frequency of the reported coho salmon harvested for subsistence use by households in the Bering Sea Coast region.

Subsistence Harvest Levels, 1980-89

Subsistence salmon harvests for Kuskokwim River drainage communities have been estimated since 1960 by the Alaska Department of Fish and Game. Through 1985, harvests were reported for chinook salmon and "other" or "small" salmon. "Small" salmon have been described as mostly chum, with lesser numbers of sockeye, pinks and small chinook. Tables 14 and 15 present chinook and small salmon harvest estimates for the period 1980 through 1989.

Prior to 1989, the total estimated chinook salmon harvest for communities throughout the Kuskokwim Area have ranged from nearly 45,661 in 1985 to 67,000 in 1987. The 1989 harvest estimate for chinook salmon (77,030) exceeds the previous high harvest by nearly 8,000 fish. The 1989 harvest estimates were also the highest estimates in Lower Kuskokwim and Upper Kuskokwim regions. "Small" salmon harvest estimates have ranged from 98,220 in 1987 to 190,011 in 1982. The 1989 harvest estimate (153,846) is the highest estimate since 1982.

During 1989, the increased effort to document households and categorize each into "usually fish" or "usually do not fish" significantly increased the number of households that were known to have fished for salmon for subsistence purposes in the Kuskokwim Area (Table 16). In 1989, over 1,500 households were determined to have fished compared to 969 households identified as fishing in 1988. The greatest increase in the number of households that fished occurred in the Lower Kuskokwim region, where there was an increase of over 400 households. That increase was primarily due to the increase in the number of Bethel households that were found to have subsistence fished and were added to the database.

TABLE 13 ALTERNATIVE ESTIMATES FOR 1989 KUSKOKWIM AREA SUBSISTENCE SALMON HARVESTS

Community	Total Households	Known Fishing Status	Known to Have Subsistence Fished	Estimated to Have Subsistence Fished	Chunook			Estimated Harvests			Colto Number (#)	
					Number (#)	Number (#)	Number (#)	Chum Number (#)	Sockeye Number (#)	Number (#)		
Kipnuk	94	3	3	-	-	-	-	-	-	-	-	-
Kwigillingok	32	0	0	-	-	-	-	-	-	-	-	-
Kongiganak	56	43	29	38	1,761	2,430	372	816	179	714	292	78
Tuntutuhak	59	54	47	51	3,943	5,041	404	1,120	196	533	309	17
Eek	6	59	42	43	1,746	1,000	50	174	12	309	17	193
Kasigluk	93	77	60	72	2,356	3,367	362	272	66	753	193	35
Nunapichuk	82	80	62	64	3,289	7,112	286	1,052	43	519	35	332
Amaautluak	53	33	22	35	1,456	4,274	1,138	1,753	870	1,090	442	2,018
Napakiak	79	69	51	58	4,275	7,916	1,021	1,964	446	2,018	442	889
Napakiak	71	66	56	60	4,599	13,420	1,109	682	75	889	153	153
Oscarville	17	11	11	17	1,726	1,900	732	436	192	283	153	153
Bethel	1,281	852	420	631	25,628	26,610	4,288	7,620	1,294	24,055	3,386	779
Kwethluk	126	113	78	87	7,651	10,603	722	253	239	3,425	262	262
Akiachak	93	87	63	67	5,893	7,916	599	2,786	262	1,985	602	602
Akiak	55	47	43	50	4,886	7,485	1,265	1,558	327	2,964	602	176
Tuluksak	67	62	52	56	4,019	7,839	1,177	2,336	268	1,299	176	176
<u>Lower Kuskokwim</u>												
Totals	2,318	1,656	1,039	1,454	73,227	106,912	5,183	25,098	1,747	40,838	3,608	3,608
Lower Kalskag	68	61	49	55	3,135	4,512	502	838	107	792	125	125
Upper Kalskag	42	40	25	26	1,251	3,379	696	336	45	695	89	89
Aniak	172	152	121	137	3,526	11,529	2,058	940	122	3,040	417	417
Chuathbaluk	23	23	16	16	449	2,297	0	230	0	307	0	0
<u>Middle Kuskokwim</u>												
Totals	305	276	211	233	8,361	21,716	2,229	2,344	168	4,833	445	445
Crooked Creek	34	32	21	22	497	899	91	481	54	625	80	80
Red Devil	12	11	10	11	175	1,286	19	371	85	1,691	281	281
Sleetmute	27	25	17	18	514	2,219	242	95	151	1,235	269	269
Stony River	14	14	10	10	710	1,387	0	1,112	0	627	0	0
Lime Village	13	13	5	5	105	210	0	5,653	0	2,025	0	0
McGrath	153	149	31	32	507	2,201	308	9	25	60	80	80
Takotna	6	6	2	2	62	250	0	0	0	4	0	0
Nikolai	29	26	16	18	769	125	306	197	91	153	51	51
Telida	3	3	3	3	1	15	0	3	0	3	0	0
<u>Upper Kuskokwim</u>												
Totals	291	279	115	120	3,340	11,606	540	8,885	204	7,025	409	409

TABLE 13. CONTINUED

Community	Total Households	Known Fishing Status	Known to Have Subsistence Fished	Estimated to Have Subsistence Fished	Chinook Number (#)	Cjum Number (#)	Estimated Harvests		Coho Number (#)			
							Sockeye Number (#)	Sockeye Number (#)				
<u>Kuskokwim River</u>												
Totals	2,914	2,211	1,365	1,799	84,928	2,737	140,234	5,668	36,327	1,767	52,697	3,658
Quinhagak	119	113	81	85	3,366	172	1,403	281	501	56	3,562	351
Goodnews Bay	67	60	37	41	496	81	704	143	847	126	963	131
Platinum	25	19	8	11	48	17	152	67	164	70	74	33
<u>Kuskokwim Bay</u>												
Totals	211	192	126	138	3,910	191	2,259	322	1,512	154	4,599	376
Mckoryuk	49	21	19	44	0	0	8,615	2,497	0	0	276	142
Newtok	60	15	2	8	40	0	16	0	80	0	120	0
Nightmute	26	2	1	-	-	-	-	-	-	-	-	-
Toksook Bay	76	11	9	62	940	587	656	624	1,976	1,532	304	332
Iununak	86	10	5	43	54	54	172	177	892	1,428	97	75
<u>Bering Sea Coast</u>												
Totals	297	59	36	181	1,033	589	9,604	258	2,948	2,095	797	369
<u>Kuskokwim Area</u>												
Totals	3,422	2,462	1,527	2,122	89,872	2,806	152,098	6,236	40,787	2,745	58,093	3,696

a Confidence intervals are calculated at the 95percent level.

TABLE 14 KUSKOKWIM AREA CHINOOK SALMON SUBSISTENCE CATCHES BY COMMUNITY, 1980-1989

Community	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 ^a
Kipnuk	b	b	60	b	b	b	b	b	b	b
Kwigillingok	b	b	b	b	b	b	b	b	b	b
Kongiganak	2,545	4,446	1,984	2,523	3,519	2,644	2,452	2,522	468	1,307
Tuntutuliak	1,557	1,731	2,578	2,040	b	1,436	b	b	2,580	3,552
Eek	1,704	3,377	3,115	b	b	2,054	b	b	1,987	1,685
Nunapitchuk	2,612	2,918	2,577	2,688	b	2,019	3,410	3,372	1,077	2,013
Atnautiluak	1,288	1,247	1,752	b	b	1,559	b	b	1,664	3,087
Napakiaik	2,582	3,017	3,500	2,047	b	1,805	b	2,760	891	1,227
Napaskiak	3,160	2,911	2,872	b	b	2,155	b	2,907	1,960	3,785
Oscarville	477	495	523	b	b	916	b	745	2,977	4,181
Bethel	12,591	15,367	13,516	8,492	11,066	6,940	11,984	8,107	415	1,200
Kwethluk	7,627	6,167	5,897	b	6,732	4,937	5,824	8,779	11,671	19,336
Akiachak	5,405	3,094	4,468	b	5,588	3,254	b	4,871	7,543	7,388
Akiak	3,355	2,386	2,745	b	3,413	2,975	b	3,683	5,613	5,438
<u>Lower Kuskokwim</u>										
<u>Totals</u>	44,903	47,156	45,639	33,315 ^c	45,591 ^c	32,929	42,883 ^c	55,914 ^c	42,081	58,761
<u>Tuluksak</u>										
Lower Kaliskag	2,807	2,446	2,220	1,671	2,286	2,749	b	3,712	2,720	3,781
Upper Kaliskag	3,917	3,271	2,594	b	3,242	1,707	1,666	b	3,312	2,843
Amiak	1,889	1,171	963	b	657	605	587	b	800	1,256
Chuathbaluk	2,750	3,102	2,071	3,174	1,847	1,828	2,371	2,131	2,613	2,860
1,507	841	1,491	b	b	b	1,102	b	b	102	446
<u>Middle Kuskokwim</u>										
<u>Totals</u>	12,870	10,831	9,139	11,993	10,090 ^c	7,991	8,136 ^c	11,411 ^c	9,547	11,185
<u>Napaimute</u>										
Crooked Creek	90	45	138	b	b	53	b	b	96	b
Georgetown	654	512	515	b	b	218	b	b	481	427
Red Devil	93	b	b	b	b	b	b	b	b	b
Sleetmute	255	298	273	b	b	176	b	b	175	156
Kashegelok/Holitna	220	728	242	b	154	745	b	b	308	420
Stony River	92	b	b	b	b	b	b	b	b	b
Lime Village	332	233	419	b	b	167	b	b	210	692
McGrath	b	b	b	b	b	b	b	b	426	105
Takotna	b	b	160	830	730	b	b	b	253	519
Nikolai	b	b	b	b	b	b	b	b	150	62
Telida	b	500	778	750	795	615	b	b	150	706
d	d	d	d	d	d	b	b	b	b	15
<u>Upper Kuskokwim</u>										
<u>Totals</u>	1,736	2,316	2,525	1,580	1,525	1,974	b	b	2,249	3,089
<u>Kuskokwim River Totals</u>	59,509	60,303	57,303	46,888 ^c	57,206 ^c	42,894	51,019 ^c	67,325 ^c	53,877	73,035

TABLE 14. CONTINUED

Community	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 ^a
Quinhagak	1,940	2,562	2,402	2,542	3,109	2,341	2,682	3,663	2,508	3,048
Goodnews Bay	306	1,309	1,185	1,004	597	399	513	640	289	414
Platinum	192	100	51	62	32	27	42	176	21	44
<u>Kuskokwim Bay</u>										
Totals	2,438	3,971	3,638	3,608	3,738	2,767	3,237	4,479	2,818	3,507
Mekoryuk	b	b	b	b	b	b	b	b	0	0
Newtok	b	b	b	b	b	b	b	b	56	10
Nightmute	b	b	b	b	b	b	b	b	22	b
Toksook Bay	b	b	b	b	b	b	b	b	136	450
Tununak	b	b	b	b	b	b	b	b	64	28
<u>Bering Sea Coast</u>										
Totals	b	b	b	b	b	b	b	b	278	488
<u>Kuskokwim Totals</u>	61,947	64,274	60,941	50,496 ^c	60,944 ^c	45,661	54,256 ^c	71,804 ^c	56,973	77,030

a To maintain consistency with historic information, Tuluksak is included in the Middle Kuskokwim.

b Data not collected

c Expansion from subset of communities

d No catch reported

TABLE 15 KUSKOKWIM AREA COMBINED SUBSISTENCE CATCHES OF CHUM, SOCKEYE, PINK, AND SMALL CHINOOK SALMON BY COMMUNITY, 1980-1989

Community	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 ^a
Kipruuk	b	b	280	b	b	b	b	b	b	b
Kwigillingok	b	b	b	b	b	b	b	b	b	b
Kongiganak	8,305	5,873	8,500	3,585	5,103	803	3,075	6,381	1,842	2,433
Tuntutuliak	743	1,188	1,012	1,441	b	5,934	b	b	4,989	5,577
Fek	5,172	2,983	6,876	b	b	644	b	b	1,490	1,134
Kasighuk	6,354	5,465	8,646	7,137	b	5,337	b	b	3,084	3,103
Nunapitchuk	4,405	2,663	4,787	b	b	5,799	b	b	5,952	7,661
Atnautluak	6,102	6,667	8,618	3,120	b	5,774	b	b	3,953	4,143
Napakiaik	7,391	7,290	10,139	b	b	5,017	b	4,256	3,565	8,656
Napaskiak	1,363	1,260	1,665	b	b	6,991	b	9,031	9,731	12,823
Oscarville	22,593	35,093	37,857	20,267	b	2,286	b	1,573	4,213	1,461
Bethel	18,188	10,736	16,837	b	18,863	12,746	24,915	11,901	17,893	24,926
Kwethluk	11,481	6,292	13,083	b	14,516	12,476	15,778	11,487	18,259	12,680
Akiachak	10,125	10,736	9,339	b	13,214	9,176	b	7,887	13,287	9,891
Akiak				b	8,027	8,133	b	5,748	7,050	8,517
Lower Kuskokwim										
<u>Totals</u>	102,222	96,246	127,845	69,903 ^c	84,834 ^c	81,116	95,835 ^c	70,316 ^c	95,308	103,005
Tuluksak	7,641	6,500	5,040	5,077	9,407	7,750	b	5,199	7,061	10,195
Lower Kalskag	7,903	3,894	6,925	b	8,886	5,728	3,734	b	10,748	4,834
Upper Kalskag	6,020	5,746	5,362	b	2,568	2,087	4,509	b	3,411	3,765
Aniak	13,091	11,922	14,946	23,549	8,849	11,127	8,844	7,891	8,155	10,093
Chuathbaluk	2,202	8,460	6,952	b	b	5,590	b	b	1,482	2,509
Middle Kuskokwim										
<u>Totals</u>	36,857	36,522	39,225	55,049 ^c	56,916 ^c	32,282	44,614 ^c	27,904 ^c	30,857	31,396
Napaimute	2,531	684	2,392	b	b	552	b	b	136	b
Crooked Creek	7,165	6,843	3,622	b	b	4,158	b	b	851	1,185
Georgetown	1,042	b	b	b	b	b	b	b	b	b
Red Devil	4,651	4,205	7,380	b	b	1,230	b	b	2,403	1,485
Sleetmute	1,670	7,520	2,936	b	2,208	5,084	b	b	4,112	2,589
Kashgegok/Holitna	6,207	b	b	b	b	b	b	b	b	b
Stony River	2,827	1,586	2,198	b	b	1,307	b	b	2,400	2,436
Lime Village	b	b	b	b	b	b	b	b	1,141	7,753
McGrath	b	b	53	2,900	2,450	b	b	b	513	2,348
Takotna	b	b	b	b	b	b	b	b	300	250
Nikolai	b	3,700	4,360	2,600	5,100	2,900	b	b	2,644	1,356
Telida	b	d	d	d	d	b	b	b	b	45
Upper Kuskokwim										
<u>Totals</u>	26,093	24,538	22,941	5,500	7,550	15,231	b	b	14,500	19,447
<u>Kuskokwim River Totals</u>	165,172	157,306	190,011	130,452 ^c	149,300 ^c	128,629	140,449 ^c	98,220 ^c	140,665	153,848

TABLE 15. CONTINUED

Community	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 ^d
Quinhagak	1,992	2,737	2,186	776	890	1,008	1,347	2,151	1,581	1,712
Goodnews Bay	1,823	3,178	2,210	1,308	1,177	903	1,048	1,205	1,303	1,313
Platinum	0	333	544	210	42	151	86	328	210	291
<u>Kuskokwim Bay</u>										
<u>Totals</u>	3,815	6,248	4,940	2,294	2,109	2,062	2,481	3,684	3,094	3,316
Mekoryuk	b	b	740	b	b	b	b	b	501	8,402
Newtok	b	b	b	b	b	b	b	b	72	60
Nightmute	b	b	b	b	b	b	b	b	728	b
Toksook Bay	b	b	b	b	b	b	b	b	2,484	1,269
Tununak	b	b	b	b	b	b	b	b	893	221
<u>Bering Sea Coast Totals</u>	b	b	740	b	b	b	b	b	4,678	9,952
<u>Kuskokwim Totals</u>	168,987	163,550	195,691	132,746 ^c	151,409 ^c	130,691	142,930 ^c	101,904 ^c	148,437	167,113

a To maintain consistency with historic information, Tuluksak is included in the Middle Kuskokwim.

b Data not collected.

c Expansion from subset of communities.

d No catch reported.

TABLE 16. KUSKOKWIM AREA FISHING FAMILIES BY COMMUNITY, 1980-1989

Community	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 ^a
Kipnuk	b	b	1	b	b	b	b	b	b	b
Kwigillingok	b	b	b	b	b	b	b	b	b	b
Kongiganak	b	b	b	b	b	10	b	b	12	29
Tuntutuliak	35	15	22	42	28	34	26	26	35	47
Eek	34	28	29	39	b	27	b	b	31	42
Kasigluk	39	31	40	b	b	45	b	b	36	60
Nunapitchuk	29	27	40	36	b	29	32	33	38	62
Atmatuliak	29	17	31	b	b	30	b	b	21	22
Napakrak	43	37	31	51	b	39	b	28	31	51
Napaskiak	35	23	27	b	b	22	b	22	28	56
Oscarville	8	2	9	b	b	9	b	8	6	11
Bethel	205	151	141	282	181	184	209	149	194	420
Kwethluk	67	46	57	b	59	48	50	57	53	78
Akiachak	51	28	38	b	47	37	b	40	39	63
Akiak	25	22	28	b	26	28	b	23	27	43
<u>Lower Kuskokwim</u>										
Totals	611	411	476	411	341	542	317	386	551	984
Tuluksak	27	23	24	27	26	35	b	38	35	52
Lower Kalskag	31	20	24	b	27	23	17	b	23	49
Upper Kalskag	16	12	14	b	15	15	14	b	15	25
Aniak	40	35	45	76	37	43	76	51	63	121
Chuathbaluk	14	11	15	b	b	13	b	b	9	16
<u>Middle Kuskokwim</u>										
Totals	128	101	122	27	68	129	108	89	145	263
Napaimute	2	2	3	b	b	2	b	b	2	b
Crooked Creek	18	16	14	b	b	10	b	b	6	21
Georgetown	1	b	b	b	b	b	b	b	b	b
Red Devil	8	7	8	b	b	5	b	b	7	10
Sleetmute	12	20	14	b	14	19	b	b	18	17
Stony River	7	6	9	b	b	8	b	b	5	10
Lame Village	b	b	b	b	b	b	b	b	5	5
McGrath	b	b	7	18	27	b	b	b	18	31
Takotna	b	b	b	b	b	b	b	b	3	2
Nikolai	b	21	24	22	28	19	b	b	11	16
Telida	b	b	b	2	6	b	b	b	2	3
<u>Upper Kuskokwim</u>										
Totals	59	72	79	42	61	63	b	b	77	115
<u>Kuskokwim River Totals</u>	798	584	677	480	470	734	425	475	773	1362

TABLE 16. CONTINUED

Community	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 ^a
Quinhagak	76	53	52	60	73	60	61	75	68	81
Goodnews Bay	44	13	17	24	35	29	33	35	20	37
Platinum	11	4	5	6	7	4	6	10	6	8
<u>Kuskokwim Bay</u>										
<u>Totals</u>	131	70	74	90	115	93	100	120	94	126
Mekoryuk	b	b	1	b	b	b	b	b	1	19
Newtok	b	b	b	b	b	b	b	b	16	2
Nightmute	b	b	b	b	b	b	b	b	17	b
Toksook Bay	b	b	b	b	b	b	b	b	37	9
Tununak	b	b	b	b	b	b	b	b	31	5
<u>Bering Sea Coast</u>										
<u>Totals</u>	b	b	1	b	b	b	b	b	102	36
<u>Kuskokwim Totals</u>	929	654	752	570	585	827	525	595	969	1524

a To maintain consistency with historic information, Tuluksak is included in the Middle Kuskokwim.

b Data not collected

CONCLUSION

Salmon harvest statistics are essential for fisheries management purposes and are of ever-increasing importance in the applied social and biological sciences. The harvest of salmon in the Kuskokwim Area has been and continues to be important both in the subsistence economy and also in the market economy. Subsistence and commercial fishermen, often the same individuals, share a real interest in the maintenance of the sustained yield of salmon stocks in the Kuskokwim Area. This can be accomplished best when there are reliable data on the biological status of salmon stocks and adequate social science information including subsistence harvest data.

The Kuskokwim Fisheries Management Area is large. Communities which depend upon the harvest of salmon for subsistence are situated throughout the Kuskokwim River drainage, along Kuskokwim Bay, and along the Bering Sea coast. In 1989, there were over 3,400 households in these communities, most of which use salmon for subsistence. Although not all households actively participated in harvesting salmon, many were directly involved in cutting and processing the fish and in distributing the finished products to other households. It was important to identify all households involved in subsistence salmon production and, to the degree possible, households given salmon in order to arrive at subsistence salmon use information at the household level.

Overall, the methodology developed and used in 1989 provided very reliable estimates. The estimated 1989 subsistence harvest was 77,030 chinook, 132,858, chum, 34,255 sockeye, and 49,691 coho salmon. Because of the relatively low harvest of pink salmon, data on this species were not collected. The degree of reliability was greater for some salmon species harvested and for certain fishing areas than for others. Levels of confidence for estimated total salmon harvest was within 6.5 percent of the estimated totals.

The application of a refined methodology in 1989 demonstrated the importance of having a current list of households that "usually fish" and that "usually do not fish" and the

need to contact households during community visits after the fishing season. Because the estimate was derived from a sample of households (those that could be contacted or who returned their catch calendar or postcard, regardless of whether they were in the "usually fish" or "usually do not fish" category), it was critical to be able to accurately describe both the population from which the sample was selected and the sample itself. Secondly, the best means for recording harvests came from staff visits to the communities and household interviews, rather than from returned catch calendars or harvest postcards. However, the post-season reminder postcard was an efficient and cost-effective method of contacting households that were not likely to have fished for subsistence salmon.

The success of the revised methodology resulted from the derivation of a statistically-valid sample and the emphasis on household interviews for collecting harvest data. The broad-based approach of personally contacting most households which fished for salmon also contributed to the reliability of the data. Household members voluntarily answered a series of questions about their fishing activities and were also interested to learn of the effort to improve subsistence harvest estimates. Higher overall harvest levels for 1989 are primarily a result of the concerted and increased effort expended to identify and contact households, conduct thorough field surveys during October or November after salmon fishing was completed and households had returned from fall moose and caribou hunting activities, do not necessarily represent any significant increases in harvest, harvest effort, or use of salmon for subsistence. In the future, using a sampling method which accommodates the dynamism in fishing participation by maintaining current household lists will help insure that all fishing households will be contacted for harvest information. Finally, the improved accuracy of the subsistence harvest estimate can go a long way toward bringing together salmon harvesters, users, and fishery managers through a mutual appreciation of the relevance of accurate subsistence harvest data in managing and allocating the salmon resource.

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APPENDIX 1. 1989 KUSKOKWIM AREA SUBSISTENCE SALMON HARVEST PRE-SEASON SURVEY

Dear Boxholder,

Each year the Alaska Department of Fish and Game mails subsistence catch calendars to households that we think fish for salmon for subsistence use. This postcard was mailed to you in an effort to update our list. If you think that someone in your household will fish for subsistence this year, please fill out the back side of the bottom card and drop it in the mail. Thank you.

Name: _____

P.O. Box _____

City, State, Zipcode _____

Phone Number _____

(please check one of the following)

_____ Yes, I plan to catch salmon for subsistence use this year.

_____ No, I do not plan to harvest salmon for subsistence use this year.

APPENDIX 2. 1989 KUSKOKWIM AREA SUBSISTENCE SALMON CATCH CALENDARS

Division of Subsistence
 Alaska Department of Fish and Game
 Box 1786
 Sitka, Alaska 99581

NAME _____

This calendar is sent to you by the Alaska Department of Fish and Game in Sitka.

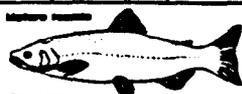
PLEASE WRITE THE NUMBER OF ALL SALMON CAUGHT EACH DAY BY PEOPLE LIVING IN YOUR HOUSE. PLEASE INCLUDE SALMON THAT WERE GIVEN TO PEOPLE WHO LIVE IN OTHER HOUSES AND SALMON THAT WERE CAUGHT FOR DOGFOOD.

DO NOT INCLUDE SALMON SOLD WHEN COMMERCIAL FISHERY.

JUNE 1989 SUBSISTENCE SALMON CALENDAR

WHAT DATE DID YOU START SUBSISTENCE SALMON FISHING THIS YEAR? _____ PLEASE WRITE HERE THE TOTAL NUMBER OF SALMON CAUGHT IN MAY. KING _____ CHUM _____ RED _____				THURSDAY	FRIDAY	SATURDAY
				1	2	3
				KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	8	9	10
4	5	6	7	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____
KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____
11	12	13	14	15	16	17
KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____
18	19	20	21	22	23	24
KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____
25	26	27	28	29	30	
KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	

JULY 1989 SUBSISTENCE SALMON CALENDAR

						SATURDAY
  <p style="text-align: center; font-size: small;"> Brooding male Mature female Chinook salmon Silver salmon </p>						1
						KING _____ CHUM _____ RED _____
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	8
2	3	4	5	6	7	KING _____ CHUM _____ RED _____
KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____
9	10	11	12	13	14	15
KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____
16	17	18	19	20	21	22
KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____
23	24	25	26	27	28	29
KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____
30	31	  <p style="text-align: center; font-size: small;"> Brooding male Mature female Chinook salmon Red salmon </p>				
KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____					

APPENDIX 2. CONTINUED

AUGUST 1989 SUBSISTENCE SALMON CALENDAR

Breeding male 		TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	
Common name: King salmon		1	2	3	4	5	
SUNDAY		MONDAY		TUESDAY		WEDNESDAY	
6		7	8	9	10	11	12
TARYAQVAK =	KING _____	KING _____					
IQALLUK =	CHUM _____	CHUM _____					
SAYAK =	RED _____	RED _____					
OAKBYAQ =	SILVER _____	SILVER _____					
13		14	15	16	17	18	19
20		21	22	23	24	25	26
IQALLUK =	CHUM _____	CHUM _____					
SAYAK =	RED _____	RED _____					
OAKBYAQ =	SILVER _____	SILVER _____					
27		28	29	30	31	Mature female  King salmon	

SEPTEMBER 1989 SUBSISTENCE SALMON CALENDAR

					FRIDAY	SATURDAY	
					1	2	
					CHUM _____	CHUM _____	
					RED _____	RED _____	
					SILVER _____	SILVER _____	
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY			
3	4	5	6	7	8	9	
IQALLUK =	CHUM _____						
SAYAK =	RED _____						
OAKBYAQ =	SILVER _____						
10		11	12	13	14	15	16
CHUM _____		CHUM _____					
RED _____		RED _____					
SILVER _____		SILVER _____					
17		18	19	20	21	22	23
CHUM _____		CHUM _____					
RED _____		RED _____					
SILVER _____		SILVER _____					
24		25	26	27	28	29	30
CHUM _____		CHUM _____					
RED _____		RED _____					
SILVER _____		SILVER _____					
PLEASE WRITE HERE THE TOTAL NUMBER OF SALMON CAUGHT IN <u>OCTOBER</u> . RED _____ CHUM _____ SILVER _____							

THANK YOU for writing your subsistence salmon catches on this calendar.

We appreciate people letting us know the number of salmon that are caught each day for subsistence. This information is used to try and make sure there will be enough salmon for Kuskokwim River and Kuskokwim Bay families.

Please mail this calendar in the attached envelope when you are done salmon fishing.

Division of Subsistence
 Alaska Department of Fish and Game
 Box 1788
 Bethel, Alaska 99559

Division of Subsistence
 Alaska Department of Fish and Game
 Box 1120
 Bethel, Alaska 99550

APPENDIX 2. CONTINUED.

NAME

This calendar is sent to you by the Alaska Department of Fish and Game in Bethel.

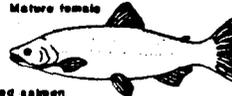
PLEASE WRITE THE NUMBER OF ALL SALMON CAUGHT EACH DAY BY PEOPLE LIVING IN YOUR HOUSE. PLEASE INCLUDE SALMON THAT WERE GIVEN TO PEOPLE WHO LIVE IN OTHER HOUSES AND SALMON THAT WERE CAUGHT FOR DOGFOOD.

DO NOT INCLUDE SALMON SOLD WHEN COMMERCIAL FISHING.

JUNE 1989 SUBSISTENCE SALMON CALENDAR

WHAT DATE DID YOU START SUBSISTENCE SALMON FISHING THIS YEAR? _____ PLEASE WRITE HERE THE TOTAL NUMBER OF SALMON CAUGHT IN MAY. KING _____ CHUM _____ RED _____				THURSDAY	FRIDAY	SATURDAY
				1	2	3
				KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____
SUNDAY	MONDAY	TUESDAY	WEDNESDAY			
4	5	6	7	8	9	10
TARYAQVAK KANGITNEO SAYAK	KING _____ CHUM _____ RED _____					
	11	12	13	14	15	16
	KING _____ CHUM _____ RED _____					
	18	19	20	21	22	23
	KING _____ CHUM _____ RED _____					
	25	26	27	28	29	30
	KING _____ CHUM _____ RED _____					
						

JULY 1989 SUBSISTENCE SALMON CALENDAR

  Common name: Red salmon						SATURDAY
						1
						KING _____ CHUM _____ RED _____
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	
2	3	4	5	6	7	8
TARYAQVAK KANGITNEO SAYAK	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____
	9	10	11	12	13	14
	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____	KING _____ CHUM _____ RED _____
	16	17	18	19	20	21
TARYAQVAK KANGITNEO SAYAK QAKBYAQ	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____
	23	24	25	26	27	28
	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____
	30	31	  Common name: King and Chinook salmon			
	KING _____ CHUM _____ RED _____ SILVER _____	KING _____ CHUM _____ RED _____ SILVER _____				

APPENDIX 2. CONTINUED

SEPTEMBER 1989 SUBSISTENCE SALMON CALENDAR

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
17	18	19	20	21	22	23
CHUM RED SILVER						
24	25	26	27	28	29	30
CHUM RED SILVER						

OCTOBER 1989 SUBSISTENCE SALMON CALENDAR

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1	2	3	4	5	6	7
CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER
8	9	10	11	12	13	14
CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER
15	16	17	18	19	20	21
CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER
22	23	24	25	26	27	28
CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER
29	30	31	PLEASE USE for entries your subsistence salmon catches in this calendar. We require people fishing for subsistence salmon that are caught each day for subsistence. This information is used to try and make sure there will be enough salmon for Kachikwaik River and Kachikwaik Bay families.			
CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER				

Division of Subsistence
Alaska Department of Fish and Game
Box 1726
Barrow, Alaska 99589

Please mail this calendar in the attached envelope when you are done salmon fishing.

AUGUST 1989 SUBSISTENCE SALMON CALENDAR

TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1	2	3	4	5
CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER
6	7	8	9	10
CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER
13	14	15	16	17
CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER
20	21	22	23	24
CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER
27	28	29	30	31
CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER	CHUM RED SILVER


 Breeding and
 Common name: Chinook
 Common name: Chinook

SEPTEMBER 1989 SUBSISTENCE SALMON CALENDAR

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
3	4	5	6	7	8	9
CHUM RED SILVER						
10	11	12	13	14	15	16
CHUM RED SILVER						
17	18	19	20	21	22	23
CHUM RED SILVER						
24	25	26	27	28	29	30
CHUM RED SILVER						


 Breeding and
 Common name: Silver salmon
 Common name: Silver salmon

APPENDIX 2. CONTINUED

Division of Subsistence
Alaska Department of Fish and Game
Box 1720
Bethel, Alaska 99560

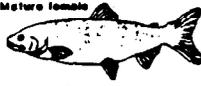
NAME

This calendar is sent to you by the Alaska Department of Fish and Game in Bethel.
PLEASE WRITE THE NUMBER OF ALL SALMON CAUGHT EACH DAY BY PEOPLE LIVING IN YOUR HOUSE.
PLEASE INCLUDE SALMON THAT WERE GIVEN TO PEOPLE WHO LIVE IN OTHER HOUSES AND SALMON THAT WERE CAUGHT FOR DOGFOOD.
DO NOT INCLUDE SALMON SOLD WHEN COMMERCIAL FISHING.

JULY 1989 SUBSISTENCE SALMON CALENDAR

WHAT DATE DID YOU START SUBSISTENCE SALMON FISHING THIS YEAR? _____ PLEASE WRITE HERE THE TOTAL NUMBER OF SALMON CAUGHT IN JUNE: KING _____ DOG _____ RED _____						SATURDAY
						1 KING _____ DOG _____ RED _____
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	
2 KING _____ DOG _____ RED _____	3 KING _____ DOG _____ RED _____	4 KING _____ DOG _____ RED _____	5 KING _____ DOG _____ RED _____	6 KING _____ DOG _____ RED _____	7 KING _____ DOG _____ RED _____	8 KING _____ DOG _____ RED _____
9 KING _____ DOG _____ RED _____	10 KING _____ DOG _____ RED _____	11 KING _____ DOG _____ RED _____	12 KING _____ DOG _____ RED _____	13 KING _____ DOG _____ RED _____	14 KING _____ DOG _____ RED _____	15 KING _____ DOG _____ RED _____
16 KING _____ DOG _____ RED _____	17 KING _____ DOG _____ RED _____	18 KING _____ DOG _____ RED _____	19 KING _____ DOG _____ RED _____	20 KING _____ DOG _____ RED _____	21 KING _____ DOG _____ RED _____	22 KING _____ DOG _____ RED _____
23 KING _____ DOG _____ RED _____	24 KING _____ DOG _____ RED _____	25 KING _____ DOG _____ RED _____	26 KING _____ DOG _____ RED _____	27 KING _____ DOG _____ RED _____	28 KING _____ DOG _____ RED _____	29 KING _____ DOG _____ RED _____
30 KING _____ DOG _____ RED _____	31 KING _____ DOG _____ RED _____	  <p style="text-align: center; font-size: small;">Common names: King and Chinook salmon</p>				

AUGUST 1989 SUBSISTENCE SALMON CALENDAR

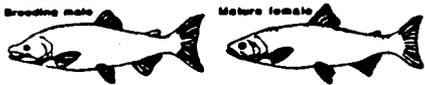
 Common name: Dog salmon		TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		1 KING _____ DOG _____ RED _____	2 KING _____ DOG _____ RED _____	3 KING _____ DOG _____ RED _____	4 KING _____ DOG _____ RED _____	5 KING _____ DOG _____ RED _____
SUNDAY	MONDAY					
6 KING _____ DOG _____ RED _____	7 KING _____ DOG _____ RED _____	8 KING _____ DOG _____ RED _____	9 KING _____ DOG _____ RED _____	10 KING _____ DOG _____ RED _____	11 KING _____ DOG _____ RED _____	12 KING _____ DOG _____ RED _____
13 KING _____ DOG _____ RED _____	14 KING _____ DOG _____ RED _____	15 KING _____ DOG _____ RED _____	16 KING _____ DOG _____ RED _____	17 KING _____ DOG _____ RED _____	18 KING _____ DOG _____ RED _____	19 KING _____ DOG _____ RED _____
20 KING _____ DOG _____ RED _____ SILVER _____	21 KING _____ DOG _____ RED _____ SILVER _____	22 KING _____ DOG _____ RED _____ SILVER _____	23 KING _____ DOG _____ RED _____ SILVER _____	24 KING _____ DOG _____ RED _____ SILVER _____	25 KING _____ DOG _____ RED _____ SILVER _____	26 KING _____ DOG _____ RED _____ SILVER _____
27 KING _____ DOG _____ RED _____ SILVER _____	28 KING _____ DOG _____ RED _____ SILVER _____	29 KING _____ DOG _____ RED _____ SILVER _____	30 KING _____ DOG _____ RED _____ SILVER _____	31 KING _____ DOG _____ RED _____ SILVER _____	 Common name: Dog salmon	

APPENDIX 2. CONTINUED

SEPTEMBER 1989 SUBSISTENCE SALMON CALENDAR

					FRIDAY	SATURDAY
					1	2
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY		
3	4	5	6	7	8	9
DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____
10	11	12	13	14	15	16
DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____
17	18	19	20	21	22	23
DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____
24	25	26	27	28	29	30
DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____

OCTOBER 1989 SUBSISTENCE SALMON CALENDAR

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1	2	3	4	5	6	7
DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____			
8	9	10	11	12	13	14
DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____			
15	16	17	18	19	20	21
DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____			
22	23	24	25	26	27	28
DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____	DOG _____ RED _____ SILVER _____			
29	30	31	 <p>Breeding male Mature female</p> <p>Common name: Silver salmon</p>			

THANK YOU for writing your subsistence salmon catches on this calendar.

We appreciate people letting us know the number of salmon that are caught each day for subsistence. This information is used to try and make sure there will be enough salmon for Kuskokwim River and Kuskokwim Bay families.

Please mail this calendar in the attached envelope when you are done salmon fishing.

Division of Subsistence
Alaska Department of Fish and Game
Box 1788
Bethel, Alaska 99559

APPENDIX 3. 1989 KUSKOKWIM AREA SUBSISTENCE SALMON HOUSEHOLD SURVEY

King= "tarysqvak," Chum= "iqalluk," Sockeye= "sayak," Silver= "qakiyaq"
 Community _____ HHID# & Name _____
 Date of Survey _____ Person Interviewed _____
 Interviewer _____ Relation to HH _____

KUSKOKWIM AREA
1989 POST-SEASON SUBSISTENCE SALMON HARVEST SURVEY
 (Questions marked with an asterisk are asked of all households interviewed)

- *1. We would like to make sure we have the correct name and address for this household.
 Name of household head: _____
 Mailing address: _____
- *2. Do you have a salmon harvest calendar?
 Yes __, No __, Mailed it in __, Didn't receive __, Didn't use __
- *3. Did anyone living in this house fish for subsistence salmon this year?
 No __: Don't usually fish __, Usually fish __

Did this household help another household put up salmon?

No __ (Go to Question 6, next page)

Yes __:

Which households did this household help (Who, Names, HHID) _____

How many salmon did this household get? (are they all on the calendar?)

KINGS _____ CHUMS _____ SOCKEYES _____ SILVERS _____
 ("chinook") ("dog") ("red") ("coho")

Do you know how many salmon all of you caught? No __

KINGS _____ CHUMS _____ SOCKEYES _____ SILVERS _____

(Go to Question 6, next page) _____

Yes __

(For calendar holders) (For Non-calendar holders, see next page)

Are all of the salmon this household caught listed on the calendar?

(Ask about salmon cooked, eaten, frozen, dog food, given away)

+ Yes __: (If calendar was not received in Bethel or is unavailable, get estimates)

Kings _____ Chums _____ Sockeyes _____ Silvers _____

Did other households fish with you?

no __

yes __: (Who, Names, HHID) _____

Are the salmon that were caught, for this household only?

yes __

no __: What other households are they for? _____

How many are for this household?

KINGS _____ CHUMS _____ SOCKEYES _____ SILVERS _____

(Go to Question 4, next page) _____

+ No __:

How many subsistence salmon did members of this household catch?

KINGS _____ CHUMS _____ SOCKEYES _____ SILVERS _____

Did other households fish with you?

no __

yes __: (Who, Names, HHID) _____

Are the salmon that were caught, for this household only?

yes __

no __: What other households are they for? _____

How many are for this household?

KINGS _____ CHUMS _____ SOCKEYES _____ SILVERS _____

(Go to Question 4, next page) _____

APPENDIX 3. CONTINUED

(For Non-calendar holders)

How many subsistence salmon did members of this household catch?

(Ask about salmon cooked, eaten, frozen, dog food, given away)

KINGS _____ CHUMS _____ SOCKEYES _____ SILVERS _____

Did other households fish with you?

no _____

yes _____ : (Who, Names, HHID) _____

Are the salmon that were caught, for this household only?

yes _____ (Go to Question 4)

no _____ : What other households are they for? _____

How many are for this household?

KINGS _____ CHUMS _____ SOCKEYES _____ SILVERS _____

(Go to Question 4) _____

4. Did you harvest salmon for dog food?

No _____ (Go to Question 5)

Yes _____ :

How many?

CHUMS _____ SOCKEYES _____ SILVERS _____
("dogs") ("reds") ("cobos")

Are these on the calendar? Yes _____, No _____

How many dogs do you have? _____

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

Drift net _____, Fish wheel _____, Seining _____, Spear _____

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

*6. Does this household commercial fish?

No _____ (Go to Question 7)

Yes _____ : (Where? _____ Kuskokwim _____ Yukon _____ Bristol Bay)

Did you keep any of your commercial caught salmon for subsistence use?

No _____ (Go to question 7)

Yes _____ :

How many did you keep?

KINGS _____ CHUMS _____ SOCKEYES _____ SILVERS _____

Are these listed on the salmon calendar? Yes _____, No _____

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

8. (For subsistence fishing households only)

How were the salmon and salmon runs this year? _____

*9. Do you have anything you would like to say about fishing regulations, such as problems or changes you would like to see? (record comments here)

*10. Would you like to receive a summary of results of this survey? Yes _____, No _____

THANK YOU VERY MUCH. This information will be used to help make sure that there will be enough subsistence salmon for Kuskokwim Area families.

APPENDIX 4. 1989 KUSKOKWIM AREA SUBSISTENCE SALMON POST-SEASON
HARVEST SURVEY

Dear Kuskokwim Area Resident,

Each spring the Alaska Department of Fish and Game mails subsistence salmon catch calendars to households that we think fish for salmon for subsistence use. This postcard was mailed to you as part of our effort to collect information about the harvest of Kuskokwim salmon for subsistence use. We would appreciate your assistance by filling out the back side of the bottom of this postage paid card and dropping it in the mail to us.

This information will be used to help make sure there will be enough salmon for Kuskokwim area families.

Thank you,
Bethel Subsistence Division Office
(543-3100)

----- CARD INFORMATION LINE IS HERE -----
(address correction requested)

NAME _____
P.O. BOX _____
CITY, _____
STATE, ZIPCODE _____

1. Did your household harvest salmon for subsistence use during 1989?

(eaten fresh, smoked, frozen, or used as dog food?)

Yes _____ No _____

2. How many salmon did your household harvest for subsistence use?

(include the salmon you kept for subsistence use when commercial fishing)

Chinook _____ Chum _____ Sockeye _____ Silver _____
(king) (dog) (red) (coho)

3. Would you like to receive a copy of the 1989 Kuskokwim Area subsistence salmon harvest summary?

Yes _____ No _____