

ANNUAL MANAGEMENT REPORT KUSKOKWIM AREA, 1988

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## PREFACE

This is the twenty-eighth annual management report detailing the management activities of the Division of Commercial Fisheries staff in the Kuskokwim Area. The 1960-1974 management reports for the "Kuskokwim District" appear in the Arctic-Yukon-Kuskokwim Area report series. The 1975-1986 management reports appear in the Kuskokwim Area Annual Report series. Since 1987 the annual management report has become a contribution to the Regional Information Report Series.

Data presented in this report supersedes information found in previous management reports. This report includes summary data from many special research projects. Complete documentation of these projects and results appear in separate reports. Some of the data presented is preliminary and may be presented with minor differences in future reports.

Subsistence catch estimates for the years before 1978 are different from the estimates presented in the Kuskokwim Area Annual Management Reports for 1978 through 1984. The historical data was reanalyzed in 1978 and tables were revised accordingly.. The method and the reason for the revision was not recorded. In an effort to standardize the subsistence catch data, the estimates originally reported in the Management Reports before 1978 have replaced the 1978 revisions.

To simplify use of this report, the tabular data are separated into current year tables and appendix tables. The appendix tables are separated by species and fishing district. The appendix tables show annual comparisons and information that seldom change.

"Total fishermen" is the term used to represent the total number of fishermen who made at least one delivery during a particular interval. In the past many area fishermen only delivered once or twice during each season. The increasing importance of cash in the area economy has resulted in higher levels of sustained effort throughout the fishing season.

"Total fishermen hours" is the product of the number of unique CFEC permits used in a fishing period multiplied by the total number of hours the district was open to commercial fishing. The catch divided by the resulting number of fishermen hours equals catch per fishermen hour (catch per unit effort or C.P.U.E.).

Computer tabulations of fish tickets provide the commercial catch data presented in this report. The computer software program used to tabulate fish ticket data is the statewide system provided by the Division of Commercial Fisheries Computer Services section.

## PART I. SALMON FISHERY

### INTRODUCTION

#### *Area and District Boundaries*

The Kuskokwim Area includes all waters of Alaska between Cape Newenham and the Naskonat Peninsula, plus Nunivak and St. Matthew Islands (Figure 1). Commercial salmon fishing occurs in four districts in the area:

District 1 consists of the Kuskokwim River from a line from Apokak Slough to Popokamiut upstream to a line between ADF&G regulatory markers located upstream of the mouth of Bogus Creek (Figure 2). The Bogus Creek boundary was an extension added in 1988.

District 2 consists of the Kuskokwim River from ADF&G regulatory markers located at High Bluffs upstream to the ADF&G regulatory markers located at Chuathbaluk (Figure 3). These boundaries were first used in 1988.

District 4 consists of the waters of Kuskokwim Bay between Oyak Creek and the Arolik River adjacent to the village of Quinhagak (Figure 4). These boundaries have been in effect since 1960.

District 5 consists of the waters of Goodnews Bay (Figure 5). This boundary has been in effect since 1968.

These districts correspond to the local geography and distribution of the five species of salmon harvested by the subsistence and commercial fishery.

#### *Fishery Resources*

Five species of Pacific salmon are indigenous to the area; chinook or "king" salmon (*Oncorhynchus tshawytscha*), sockeye or "red" salmon (*O. nerka*), coho or "silver" salmon (*O. kisutch*), pink or "humpy" salmon (*O. gorbuscha*) and chum or "dog" salmon (*O. keta*). The Kuskokwim River drainage has the largest populations of chinook, sockeye, coho and chum salmon in the area. Pink salmon occur throughout the area. Little quantitative data on the population size of pink salmon is available because of the lack of commercial markets and interest by subsistence fishermen.

The management objective for all species and districts is to achieve desired escapement objectives and allow for the orderly harvest of fish surplus to spawning requirements. Subsistence fishing receives the highest priority among beneficial uses of the resources.

### *Management Programs*

The vast size of the area and the turbid nature of many streams make accurate estimates of the size of salmon returns and spawning escapements difficult to obtain. The relative lack of comparative catch data, caused by the expansion of the fisheries since their initiation, hampers management. Management of the commercial harvest is complicated by the need to provide optimum spawning escapements, as well as sufficient harvest to the important subsistence fishery. In recent years, salmon migratory timing data bases have become extensive enough to use for in-season management.

Prior to 1983, a management strategy of conservatively increasing the level of commercial catch to establish definite trends between catch and escapement allowed development of the fishery. The area's escapement data base allowed the assignment of provisional salmon spawning escapement objectives in major spawning systems in 1983. These objectives are an average of aerial survey, tower, weir, and sonar indices obtained in these systems since 1960 under good to fair conditions (Appendix A-1). Indices obtained under poor conditions (primarily turbid water or radically incomplete counts) were excluded.

Unusually large chum salmon surveys from the Tuluksak River and Kanektok River data bases were removed from the index calculations because of their disproportionate effect.

The index of annual spawning escapements is accomplished through aerial surveys of "key" streams and lakes throughout the area. A weir on the Kogruklu River, a sonar counter in the Aniak River, and a counting tower on the Goodnews River provide more accurate estimates of escapement and allow calibration of some aerial surveys. Turbid water conditions and inclement weather often prevent accurate aerial estimates of escapement.

Attainment of escapement objectives is needed to maintain salmon runs at recent historic levels. Future adjustment of objectives may be required to optimize salmon production. Improvement of the escapement assessment program continues to be a priority.

The change from a harvest-guideline-based management strategy to an escapement-objective-based strategy in 1983 appears to be increasing the average harvest (Table A.3). It is too early to determine if the escapement-based management strategy will provide a long term increase in production in the Kuskokwim Area.

Adjustments of the number and duration of commercial fishing periods and time intervals between periods are the primary methods of distributing the harvest throughout the run. This avoids over-harvesting discrete stocks and allows harvests to remain within guidelines, achievement of escapement objectives, and

sufficient fishing time for the subsistence fishery. Commercial fishing periods vary between 6 and 12 hours in length depending on the species, effort, and return magnitude.

In 1987 the Board of Fisheries, Department of Fish and Game, local Fish and Game Advisory Committees, local subsistence, and commercial fishermen agreed to work together to increase the sustained yield of Kuskokwim River salmon stocks. The JOINT STATEMENT ON THE MANAGEMENT OF THE KUSKOKWIM RIVER SALMON FISHERY was adopted by the Board of Fish as a result (ADF&G 1988A).

To achieve the goal the Kuskokwim River salmon users formed a working group with two purposes:

1. To arrive at a consensus regarding the openings and closures of the Kuskokwim River fishery.
2. To work towards the development of a comprehensive management plan for all Kuskokwim River salmon stocks.

Adjustments of commercial fishing time in Districts 4 and 5 are made during the season. Adjustments are in response to run magnitudes and allow the harvest of salmon surplus to the needed spawning escapement. Run magnitude is measured by commercial catch data and by various Department escapement studies.

Several research projects help with assessing in-season run strength. In 1988 a new industry-Department test fishery for salmon began near the downstream boundary of District 1. The Working Group developed the operational plan, and the test fishery was sponsored by Kemp and Paulucci Seafoods and the Department. This test fishery index provides an earlier assessment of run strength than the Department test fishery located near Bethel. A Biosonics (TM) dual beam side-scanning sonar counter was deployed in the Kuskokwim River to enumerate salmon for the first time in 1988. The primary objective was to determine the feasibility of using this technology to enumerate all species of salmon in the Kuskokwim River. Analysis of the sonar data is still underway but the location and technology appear to be suitable. The Kuskokwim River Salmon Working Group developed a program to provide CPUE information from the subsistence fishery. This program was sponsored by the Kuskokwim Fishermen's Cooperative and the Department through a contract. It was very successful at providing objective subsistence catch information from Districts 1 and 2. It was a great improvement over the previous subjective ad-hoc reporting system used by the Department and provided important data for in-season management.

Communicating management plans and decisions to the public is always difficult. Many of the people in the Kuskokwim Area cannot read or speak English. More often English is a second language which increases the challenge of communicating management plans and decisions. The Department and the Working Group worked closely

together which dramatically improved the acceptance and understanding of the users. Many special regulation notices were broadcast over local radio stations and over VHF and CB radio in English and Yup'ik languages.

A weekly English language fishery program is broadcast over radio station KYUK in Bethel. The program provides information on regulations, biology, and fisheries management throughout the year.

#### SUBSISTENCE FISHERY

Only residents of Alaska domiciled in the Kuskokwim Area, except those persons residing on the United States military installations located on Cape Newenham, Sparevohn and Tatalina, may take salmon in the Kuskokwim Area for subsistence. Subsistence fishing for salmon occurs in all waters of the area. Except in districts where intensive commercial fisheries occur, the subsistence fishery is subject to very few restrictions in order to give preference to subsistence users. Salmon may be taken by gill net, beach seine or fish wheel; in the Holitna River drainage, spears are also legal gear. The total length of set or drift gill nets in use by an individual may not exceed 50 fathoms. Gill nets with six inch or smaller mesh may not be more than 45 meshes in depth. Gill nets with greater than six inch mesh may not be more than 35 meshes in depth. There are no permits required for subsistence fishing in the Kuskokwim Area.

Most commercial fishermen take salmon for both commercial and subsistence purposes. Short subsistence fishing closures before, during and after each commercial fishing period in the commercial fishing districts discourage illegal commercial fishing under the guise of subsistence fishing. In the Middle Kuskokwim (District 2), Quinhagak (District 4), and Goodnews Bay (District 5) the spawning tributaries are also closed before, during and after commercial periods to discourage illegal commercial fishing. In the Lower Kuskokwim (District 1) only the commercial fishing district and Kuskokuak Slough close while the spawning tributaries remain open. That portion of the Kuskokwim River between Districts 1 and 2 is included in the District 1 subsistence closure (Figure 2).

The inclusion of the Kuskokwim River upstream of commercial fishing District 1 in the subsistence closure was new in 1988. This appeared to be a very successful regulation change. In the past, on overflights during subsistence fishing periods, only 1 to 3 boats were seen fishing in this area. In previous years when this area remained open to subsistence fishing but closed to commercial fishing, the effort would increase to as many as 20 boats preceding and during commercial periods. The public reported that the effort increased because the fishermen were transferring their catch to permit holders for sale. Closing this area appeared to solve the problem. One fishermen was ticketed for fishing during the closure

in 1988. Very few fishermen reported anyone fishing during the closure. Only one complaint about the restriction was received by the Working Group and the Department. District 1 was closed to commercial fishing above Bethel during the first two commercial openings. This resulted in the subsistence closure affecting the entire area from Bethel to High Bluffs (Figure 2). Following the second commercial opening in District 1 a representative from Kwethluk asked that subsistence fishing be opened if commercial fishing remained closed. Opening the portion of District 1 above Bethel on the third commercial period satisfied the complaint.

Substantially more subsistence fishing time occurs compared with commercial fishing in all areas. For example, during the 1988 fishing season in District 1, fishermen could subsistence fish for approximately 80 days out of the 107 days when harvestable numbers of salmon were present. There were 23 fishing periods totaling 140 hours of fishing time for commercial fishermen.

The Division of Commercial Fisheries began annual subsistence salmon harvest surveys in 1960, 1967, and 1979 in the Kuskokwim River, Quinhagak, and Goodnews Bay districts. In 1988 the Division of Subsistence took over the annual subsistence salmon harvest surveys under a memorandum of agreement with the Commercial Fisheries Division.

Residents of 30 communities within the Kuskokwim River drainage harvest salmon for subsistence uses (Figure 1). These communities consist of approximately 3,150 households, many of which fish for salmon for subsistence purposes. Outside of the drainage, residents of three Kuskokwim Bay communities (Quinhagak, Goodnews Bay and Platinum) utilize Kuskokwim area salmon stocks (Figure 1). These communities have about 200 households combined. In addition, residents of Mekoryuk, Tununak, Toksook Bay, Newtok, Chefornak and Nightmute may harvest salmon bound for the Kuskokwim River drainage. An additional 200 households live in these communities. Five species of salmon, chinook, sockeye, chum, pink, and coho are harvested for subsistence use.

As in the past, a primary means of collecting subsistence salmon harvest information in 1988 was through the distribution of subsistence salmon harvest calendars. These calendars were distributed by the Division of Commercial Fisheries to known subsistence fishing households. An example of the calendar is given in Appendix 1. Calendars were designed for recording the catch of each of the salmon species on a daily basis. Approximately 1,500 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 was postage paid and addressed for return to the Bethel office of the Department of Fish and Game. Although attempts were made to have salmon catch calendars distributed prior to the fishing season, several

households indicated that they did not receive calendars until late June. Therefore, some chinook salmon harvests may not have been recorded.

In order to better define potential subsistence salmon harvesting households within communities fishing Kuskokwim area salmon stocks in 1988, the Division of Subsistence created a household list database. This database identified households residing in the study communities and was developed from three sources. First, households identified as "fishing families" in 1987 by the Division of Commercial Fisheries were added to the database. A fishing family represented at least one household unit, but more in some cases. These households were the basis of sampling and estimation of subsistence salmon harvests for the Kuskokwim Area during recent years. Second, any household which had returned Kuskokwim River subsistence salmon catch calendars between 1981 and 1986 was also added. Some attempt was made to eliminate obvious duplications and to associate households with the community in which they were last known to have lived. Finally, researchers within the Division of Subsistence provided community census lists which were used during the course of surveys conducted during the last few years.

Households identified by these three sources were combined onto a master list within a microcomputer database. Each household on the list was assigned a unique identifier through which subsequent information could be tracked. Prior to the post-season community visits described below, report listings from the database were prepared for each community.

The goals of the post-season survey were:

- 1) to collect harvest data that would result in a total harvest estimate for subsistence salmon by species for the Kuskokwim drainage and by community;
- 2) to compile information on fishing effort, gear types, participation rates, and timing of the subsistence harvest;
- 3) to identify salmon harvest issues;
- 4) to update community household lists and identify fishing households.

In order to accomplish these goals catch calendars, surveys conducted during community visits, and reminder letters were utilized. As noted above, an attempt was made to distribute catch calendars prior to the fishing season. The calendars were later mailed to Fish and Game offices in Bethel or were picked up during the course of community visits.

Thirty two communities were targeted for post-season surveys (Napaimute was not targeted). Existing Division of Subsistence

staff were assigned to conduct surveys in 13 of the targeted communities. The remaining 19 communities were surveyed by special project staff consisting of seasonal employees of the Division of Commercial Fisheries. Three special project staff were identified and hired beginning on 12 August. Following the termination of employment of special project staff, Division of Commercial Fisheries staff revisited two communities (Aniak and Sleetmute) where additional field work was required. Although 19 communities were targeted for post-season surveys, 2 of these communities (Kipnuk and Kwigillingok) declined to participate in the post-season survey project.

Special project staff were oriented by the project leader and other Division of Subsistence researchers on project goals, survey techniques, and the schedule of field visits. Initial field visits to communities near Bethel began on 13 August and were conducted as a group with the assistance of the project leader. As staff became more familiar and comfortable with the survey process, they worked in communities individually or in pairs. Approximate dates of community visits are listed in Table 11.

Prior to beginning the community surveys, efforts were made to inform and prepare fishermen for the arrival of survey crews. This was done weeks or days in advance of their arrival through radio announcements, posters in public buildings, and phone calls to city offices. In addition, a letter of support for this project was obtained from the Kuskokwim River Salmon Management Working Group which represented a majority of fishermen in the area. This letter was mailed to city offices in many lower and middle Kuskokwim River communities.

Survey work was conducted systematically. Upon arrival in a community, field researchers checked in with the city office to introduce themselves and outline their task. Knowledgeable individuals within the community were identified to assist in the compilation and verification of the pre-season household list. In addition, these individuals helped to identify households that fished for subsistence salmon in 1988. Field researchers attempted to contact all identified fishing households. Structured interviews were conducted with these households through the use of survey instruments (described below) and subsistence salmon harvest calendars were collected. If time permitted, other households on the community list were contacted about their salmon fishing activities, if any.

A typical community visit lasted 2-3 days. In some communities many residents were unavailable. Wage employment, such as fire fighting or hunting and fishing activities that took them away from the community caused their unavailability. In these cases, return visits were made 3- 10 weeks after the initial visit. Two color coded survey instruments were developed and used (Appendix 2). One instrument was for use in communities situated

along the lower and middle sections of Kuskokwim River, the other instrument was used in communities situated along the upper section of the river. Survey questions were identical between these forms, except for local terms used for the salmon species, and the addition of questions related to subsistence uses of fish removed from the commercial catch. These questions were not applicable to residents of communities along the upper section of the river where there is no commercial fishery. Questions related to the use beach seine and spear to harvest salmon were asked of Kuskokwim Bay residents.

Salmon harvest information for Tununak, Toksook Bay, Newtok and Nightmute was collected during other harvest monitoring activities conducted by the Division of Subsistence. Information for these communities would include salmon harvests through the end of June 1988.

In an attempt to increase the rate of contact with households in Bethel, questionnaires were mailed to about 100 households that had been identified as fishing in previous years, but had not been contacted through a calendar return or a survey in 1988. This mailing was conducted during December 1988. These questionnaires (with a pre-paid pre-addressed envelope enclosed) simply requested information as to whether or not a household member fished for salmon for subsistence, and, if so, the number caught of each species. An example of the questionnaire is contained in Appendix 3.

#### Subsistence Salmon Harvest Estimation

Information from the three information sources (calendars, surveys, mail-outs) was 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 from each of the information gathering sources. In order to provide a single best estimate for a household's harvest of a salmon species during 1988, information was composited from the various information sources. This process was conducted by a single researcher on the project to ensure data consistency. In most cases, there were few discrepancies between the information available from the different sources. In those cases where a household survey was conducted and indicated that the household fished for salmon, but no salmon harvest could be quantified through any information source, the harvest was identified as "missing."

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

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

Salmon harvests identified as "removed from the commercial catch" were included in the households subsistence harvest.

The average community catch ( $C_k$ ) of fishing households was estimated for salmon species from the composite catch per household data. Mean community catch ( $C_k$ ) was estimated by

$$C_k = \sum_{i=1}^n ( C_i ) / n$$

where

$n$  = number of households that fished for subsistence salmon and for which harvest information is known

$C_i$  = salmon harvest information for a particular household.

The total community catch ( $T_k$ ) was estimated by

$$T_k = ( N_k * C_k )$$

where

$N_k$  = number of households that were determined to have fished for subsistence salmon.

Community catch estimates were summed across communities for river section subtotals and across all river sections for drainage totals.

### Sampling Summary

Table 12 presents data on the number of households contacted using the three means of data collection. Of the estimated 3,350 households in communities located in the Kuskokwim area (Kuskokwim River and Kuskokwim Bay), only 1,750 have been defined in the microcomputer database. Information is particularly lacking in Bethel where only 315 of the estimated 1,400 households have been defined.

Of the 1,554 defined households living in communities along the Kuskokwim River, 1,018 (65.5%) were contacted through at least one of the three means of data collection. The majority of contacts (950) were through survey interviews. Of the contacted households, 773 (81.4%) were determined to have fished for subsistence salmon in 1988. This rate reflects the efforts of field researchers to attempt to contact identified fishing households.

Over one-half (54.0%) of the nearly 200 households living in the Kuskokwim Bay communities of Quinhagak, Goodnews Bay and Platinum were contacted. Of these, 87.9% were found to have fished for salmon in 1988.

Over 200 households have been identified in the communities of Mekoryuk, Tununak, Toksook Bay, Newtok and Nightmute. Information is available on about one-half of these households that were found to have fished for salmon in 1988. No households were identified in Chefornek because the village was not included in the study.

Approximately 11% (164) of the estimated 1,500 subsistence salmon calendars which were mailed pre-season were used and returned. In addition, there were responses to about 50% (49) of the 100 post-season questionnaires which were mailed to Bethel households who had not returned harvest calendars and were not surveyed.

### Harvest Summary

Sample information and harvest estimates by community and fishing area are presented in Table 10. The 1988 harvest estimates for the Kuskokwim area (Kuskokwim River and Kuskokwim Bay communities) are 56,695 chinook, 25,581 sockeye, 118,180 chum, and 34,426 coho salmon. These estimates are based on information from 87.7% (759

of 865) of the households that were identified to have fished for salmon in 1988. Reported harvests account for 87.0% of the estimated chinook salmon harvest; 88.6% of the sockeye; 86.1% of the chum; and 89.3% of the coho.

Households residing in areas along the lower section of the Kuskokwim River harvested 74.2% of the estimated chinook salmon catch, 70.5% of the sockeye, 65.4% of the chum, and 65.3% of the coho. About two-thirds (63.7%) of the identified fishing households reside in this area. Households that reside in either Mekoryuk, Tununak, Toksook Bay, Newtok or Nightmute harvested an additional estimated 279 chinook and 4,678 sockeye and chum combined.

Table 13 presents information on the gear used to harvest subsistence salmon. The majority of fishing households that reside in areas along the lower (88.8%, 434 of 489 households for which there is information) and middle (77.9%) sections of the Kuskokwim River utilized drift gill nets, predominantly with mesh sizes of 6 inches or smaller. Eight households in communities along the middle section of the river also used fish wheels to harvest salmon. The majority (81.1%) of fishing households in communities along the upper section of the river utilized set gill nets, predominantly with mesh sizes of 6 inches or smaller. However, residents living in communities along the upper river use rod and reel as a primary means of harvesting chinook salmon. Sixty percent of the households in the upper river area used rod and reel. In addition, 5 households used fish wheels in this area.

Over one-half (56.6%) of the fishing households residing in the Kuskokwim Bay communities used drift gill nets to harvest subsistence salmon. In addition to gill nets, seines, spears and rod and reels were used by residents of Quinhagak and Goodnews Bay for harvesting salmon. In Quinhagak, 12 of 23 households who reported harvesting salmon for subsistence with rod and reel, used rod and reels as the sole harvest method. One Goodnews Bay household used rod and reel as the only harvest method for salmon. Gill nets and small mesh nets were also used as seines by households in Quinhagak (1) and Goodnews Bay (2).

#### COMMERCIAL FISHERY

The total 1988 Kuskokwim Area commercial salmon catches (District 1, 2, 4 and 5) consisted of 74,552 chinook, 149,927 sockeye, 623,719 coho, 37,592 pink and 1,443,916 chum salmon (Table 1). The total amount paid to fishermen was \$12,514,000 (excluding bonuses and other incentives, Table 2). In 1988 the average Kuskokwim permit holder earned \$15,431 (Table A-2). This is the highest value catch and income per fisherman in the history of the fishery. Record prices for all species except chum and pink salmon and the largest harvest in history were responsible for the high value of the catch (Tables A.3 & A.8). The average price of \$1.30

a pound for chinook salmon was 15 cents higher than the previous record price of \$1.15 per pound in 1977. Sockeye salmon also exceeded the 1987 record price of \$1.30 per pound by bringing 1.42 per pound in 1988. The average price per pound for coho salmon of \$1.25 was 50 cents higher than the previous 1979 record price of \$0.75 a pound. The chum and pink salmon prices exceeded the previous five year average but were lower than the record prices paid in 1977.

During the 1988 season there were a large number of incentive programs available to fishermen in the Kuskokwim Area. These ranged from free round-trip airline tickets to loyalty bonuses. Each individual fishermen had a different actual value received for their catch, depending on which of the programs they participated in. The actual value received for the catch is unknown but probably was 20 to 30 percent greater than reported.

#### *Kuskokwim River*

#### Chinook Salmon

The Board stated in 5 AAC. 07.365 KUSKOKWIM RIVER SALMON MANAGEMENT PLAN that there be no directed commercial harvest of chinook salmon (ADF&G 1988A). This was done to provide for a subsistence harvest that has averaged 54,000 (Table A-13) chinook salmon during the past five years and to maintain average spawning escapements. This action in 1987 followed earlier attempts to correct the declining escapements of Kuskokwim River chinook salmon.

Beginning in 1985, the commercial fishery was restricted to the use of gill nets of 6-inch or smaller mesh size. This action, taken to reduce the harvest of the larger female chinook salmon, did not stop the decline in total escapement in 1985 and 1986. The strategy used in 1987 continued to require the use of 6-inch or smaller mesh nets to concentrate the incidental harvest on the smaller "jack" chinook salmon. The six-inch mesh restriction appeared to result in an improvement in quality of the escapement with an increase in the proportion of females at the Kogrukluks weir. However, the female sex ratio since 1985 is within the range of recorded sex ratios (22 to 49 percent female) before the gear change in 1985 (Schneiderhan 1988). The commercial catch is showing an increase in the number of males and a decrease in the number of females. From 1982-1984 while using large mesh gear the commercial catch was 35 to 40 percent female (Appendix B.13, B.14). During the similar 1985-1987 period with the gear restrictions the commercial catch was 23 to 35 percent female. The number of years of data available is too small to provide a significant comparison but the trend appears promising.

In addition, the 1987 plan provided for three eight hour fishing periods scheduled 6 days apart. This insured that chinook salmon

not caught during the opening would have adequate time to travel through District 1 before the next opening. This schedule also guaranteed the fishermen and processors that there would be an average 24 hours of commercial fishing in June in which to harvest sockeye and chum salmon. During the first commercial opening on 18 August commercial fishing was allowed only downstream of Bethel (half the length of the district). This provision reduced the harvest of earlier running chinook salmon in the upstream portion of the district, which the later running sockeye and chum salmon had not yet reached.

The final provision of the 1987 plan allowed the sale of 14,000 chinook salmon during June. This provision encouraged commercial fishermen to take home the chinook salmon caught incidental to the chum salmon fishery and not subsistence fish for chinook salmon.

The 1987 strategy resulted in chinook salmon reaching their escapement objectives in the Kuskokwim River for the first time since 1981. However, the prohibition of sale of incidentally caught chinook salmon resulted in a large number of unsalable fish. Dissatisfaction with the 1987 plan resulted in a new management plan for 1988 and the creation of the Kuskokwim River Salmon Management Working Group. Using the new plan allowed chinook salmon to reach escapement objectives again in 1988.

Fishing periods in District 1 and 2 are usually six hours in duration, from 1:00 p.m. until 7:00 p.m. The time was new in 1988. The local advisory committees requested this six hour period to maximize the daylight preceding and following the commercial periods. This was done to reduce the opportunity for illegal fishing before and after openings under the cover of darkness. If the fishing periods are longer, the extra time is divided equally before 1:00 p.m. and after 7:00 p.m. The Management Plan also authorized three 8 hour periods in June. Following the first 8 hour period many fishermen appeared at the Working Group meeting to express their unhappiness with 8 hour periods. As a result the Working Group recommended that the fishing periods all be from 1:00 p.m. until 7:00 p.m. for the remainder of the season in the Kuskokwim River Districts.

The Working Group recommended on 8 June that the first fishing period be in District 1, downstream of Bethel (Stat. Area 335-11, Figure 2) on 16 June (Table 4). The lack of data on which to base a decision concerned the Working Group. The JOINT STATEMENT ON THE MANAGEMENT OF THE KUSKOKWIM RIVER SALMON FISHERY, adopted by the Board of Fisheries in 1987, requires announcement of the first period by 10 June (ADF&G 1988A). Based on prior years data and the experience of the Working Group it was felt that by 16 June chinook salmon would be an incidental species in the catch.

On 17 June, following the first period, the Working Group had a difficult decision. The commercial catch and test fisheries

confirmed that an exceptional chum salmon run was occurring but that the chinook salmon run was only average (Appendix B.8 & B.11). Another opening, in the entire district, to harvest chum salmon could over harvest the chinook salmon. After much discussion of the past and present data the group recommended that another fishing period be held in District 1 downstream of Bethel on 20 June. The group felt that this would allow increased escapement of the earlier running chinook salmon while allowing the harvest of the abundant chum salmon.

The harvest guideline for chinook salmon was being approached following the second opening (Table 4). The chum salmon run was large and further harvest was appropriate. The entire length of District 1 opened for the first time on 24 June. District 2 opened for the first time coincidentally with District 1 on 24 June (Table 5). Chinook salmon catches rapidly declined in the third period making it clear that further efforts to conserve chinook salmon were unnecessary (Tables 4 & 5). The management emphasis concentrated on harvesting chum salmon without over taxing processor capacity.

A record 55,716 chinook salmon were harvested incidentally to the chum salmon fishery in the Kuskokwim River (Table 1). For the second time since 1981 chinook salmon reached escapement objectives (Figure 6). An increase in the run size over recent years contributed to the improvement in catch and escapement. The Kuskokwim River Salmon Working Group's recommendation to have an extra fishing period downstream from Bethel was crucial to the achievement of the chinook salmon escapement objectives.

The Bureau of Land Management and the Fisheries Rehabilitation and Enhancement Division (FRED) conducted a chinook salmon enhancement project in the upper Tuluksak River in 1988. A weir was assembled across the Tuluksak River just downstream of the lower gold mining dredge operation. Two gravity-flow Kitoi incubation boxes were installed at sites selected by FRED. One incubator was in the overflow channel of the hydroelectric facility that drains into Slate Creek. This was a temporary location chosen primarily for its easy access to test the feasibility of the project. The other box is located on Dugout Creek which was expected to be a permanent location. The weir was installed from 2 to 4 July and chinook salmon were observed above the weir before it was completed. The weir was not fish tight since fish escaped by pushing under the pickets or through the trap. The weir was operated until 25 July and was removed before the chinook migration was completed. The crew passed 57 chinook, 210 chum, and 1 pink salmon during the operation of the weir.

Two male and 3 female chinook salmon were placed in holding pens beginning on 10 July until 13 July. One female died before the fish were spawned on 19 July. The eggs were fertilized and transferred to the Slate Creek incubation box. On 14 September the

incubator was checked. There was no flow in the box and all the eggs were dead.

### Sockeye Salmon

Sockeye salmon are also harvested incidentally to chum salmon in Districts 1 and 2. Before 1981, sockeye and chum salmon in commercial or subsistence catches were not accurately identified in the Kuskokwim River. For this reason, the true accounting of the sockeye and chum salmon harvest in the main Kuskokwim River is not known. Fishermen, processors, and the Department have worked since 1981 to identify each species accurately in the commercial harvest. Sockeye salmon have comprised 6 to 24 percent of the chum-sockeye salmon catch since 1981. Before 1981, the reported sockeye salmon catch was less than 2 percent of the chum-sockeye salmon catch (Appendix B.5). The limited sockeye salmon database and interviews with lifelong residents of the drainage suggest that the recent increase in catch is not all due to the improved reporting. The size of the sockeye salmon return seems to have increased in recent years.

In 1988 the commercial harvest was 92,025 sockeye salmon, which was 6.2 percent of the chum-sockeye salmon catch (Table 1). There are no escapement objectives for sockeye salmon in the Kuskokwim River (Table 3). The Kogrukluik weir estimated an escapement of 6,415 sockeye salmon in 1988 (Appendix B.6), well above the 2,000 sockeye salmon average escapement.

### Chum Salmon

Chum salmon in the Kuskokwim River provided a record catch of 1.38 million, while achieving escapement objectives. The Kuskokwim River Salmon Management Working Group used the new industry test fishery near Eek and the new in-season subsistence effort program in combination with the Department's established programs, to make an early determination that the chum salmon run was larger than normal. By fishing steadily throughout the run, the Working Group allowed a record harvest. The same strategy did not over-harvest any individual spawning stocks of fish. As a result, fishing continued throughout the month of July in District 1 for the first time in the history of the fishery (Table 3).

District 1 does not have a regulatory harvest guideline for chum salmon. The District 2 chum salmon guideline is 4,000 to 8,000. The commercial chum salmon harvest for the Kuskokwim River (Districts 1 and 2) normally ranges from 200,000 to 400,000 salmon. Catches within this range normally provide for traditional subsistence requirements and adequate spawning escapements. The commercial harvest exceeds 300,000 when:

- 1) Main river test fishing catches show an adequate escapement of chum salmon is occurring.
- 2) Commercial catch per unit effort (especially in early and middle July) is above average.
- 3) Subsistence fishermen report adequate subsistence catches.
- 4) Chum salmon escapement projects in spawning tributaries show adequate escapements are occurring.

Declining run strength normally results in a 2 to 3 week closure beginning in early to mid-July. Before 1985 only the lower half of District 1 was open to commercial fishing after 25 June. The Board instructed the Department to use the entire length of District 1 beginning in 1985.

District 2 closed on 2 July. This was done because the chum salmon catch exceeded the harvest guideline, fish quality was becoming very poor, and subsistence fishermen in District 2 desired undisturbed fishing.

Unusually warm temperatures and the volume of fish available strained processor capacity. The steady fishing schedule allowed the processors to deal with the catch with only minor losses because of spoilage.

#### Coho Salmon

Fishing throughout the month of July caused a slight increase in the coho salmon catch. In the past the early portion of the coho salmon run entered the river during the closure in July. Only 7,600 coho salmon were taken during the fishing periods on 21 and 25 July (Table 4). Coho salmon dominated the catch beginning on 28 July about the time the fishery normally reopens. District 2 reopened on 8 August when the new in-season subsistence catch program showed that most of the fish available were coho salmon (Table 5). By 9 August it was clear that a strong coho salmon run was occurring and fishing periods became more frequent. The Working Group found clear evidence in the subsistence, commercial, and test fishing catches that the fishing schedule was too intense on 19 August. The meeting on 19 August adjourned without setting any openings (an opening for 20 August was already set). At the next meeting the Working Group recommended that the fishery be closed for the rest of the week to allow improvement of coho salmon escapement.

Two final fishing periods occurred in District 1 on 27 and 31 August (Table 4). These two openings confirmed the data from the two test fisheries that showed the coho salmon run was declining. These periods also allowed a harvest of the later coho salmon

stocks which may not yet have been harvested. The coho salmon catch of 524,296 fish is the third largest on record for the Kuskokwim River (Appendix B.5).

Coho salmon escapement counts were prevented by weather and stream conditions. Residents of the lower river report that adequate numbers of coho salmon are being seen in drainage spawning streams. Residents in the Aniak drainage reported the number of spawners seemed below normal. The estimated coho salmon escapement at the Department's weir was 13,700. This escapement index is 11,300 coho salmon less than the desired 25,000 objective for this project. Daily passage rates increased at the weir and remained somewhat higher than in previous years beginning about 20 days following commercial fishery closure. The delay in the improvement matches the estimate of travel time from District 1 to the weir in previous years (Schneiderhan 1988).

#### Pink Salmon

Pink salmon are taken incidentally to the chum and coho salmon fishery in the Kuskokwim River. A record 10,825 pink salmon were taken in 1988 (Table 1). There is no pink salmon escapement program in the Kuskokwim River.

#### Enforcement

The Working Group and other member's of the public continued to express their concern over the growing enforcement problems in the commercial salmon fishery. Fishing before and after fishing periods, fishing in closed waters, and fishing without a permit are the areas of greatest concern.

#### *Quinhagak, District 4, All Salmon Species*

District 4 opened on 13 June in compliance with 5 AAC 07.367. DISTRICT 4 SALMON MANAGEMENT PLAN (ADF&G 1988A). Later periods coincided with openings in the other districts whenever possible. This strategy came out of the discussion with fishermen on how to reduce effort transfer between districts. Coincidental openings were successful in limiting large scale effort transfers (Table 9). No other districts were open on 13 June and effort in District 4 was 202 boats, the highest of the season (Table 6). Effort remained less than 100 boats for the remainder of the season except for the period on 17 August when District 1 was closed (Table 6). District 4 had the largest coho salmon catch of the season on the preceding period (15 August, Table 6). As a result of the strong catch and the District 1 closure, a significant effort shift to District 4 occurred on the 17 August period. Based on catch reports by subsistence and sport fishermen fishing in the Kanektok River and past years' run timing, District 4 opened on 13 June in 1988. The commercial chinook salmon harvest level

in District 4 is about 15,000 unless the Department escapement projects determine adequate escapement is occurring. Chinook salmon catches were very weak and became smaller with each fishing period through 20 June (Table 6). Normally catches would be increasing (Appendix C.8). Fishing closed from 21 June to 28 June due to the unexpected weakness of the run.

On 24 June subsistence and sport fishermen, and the Department catch monitor in Quinhagak reported that large numbers of chinook salmon were entering the Kanektok River. A fishing period on 28 June to check the status of the run had good catches. The twice a week fishing schedule resumed based on the improvement in the run. The total chinook catch in District 4 was 13,873, well below the previous 5 year average of 31,900 (Appendix C.7). Chinook salmon were the second most valuable fish in the district producing \$289,100 for the fishermen (Table 2). The aerial survey index of 11,100 chinook salmon exceeded the escapement objective of 5,800 (Table 3).

The chinook salmon run was weaker than expected in 1988. Fishing time and effort was similar to previous years with comparable escapement indexes. However, most of those years' catches were well above average suggesting that the total run size was greater. The outlook for 1988 had been good since parent years' escapements were good and recent years' survival trends were good in the district. Fishermen reported the presence of beluga whales, which normally are absent, as a possible cause. However, the numbers of beluga (~20) make predation an unlikely cause of the weak run (Kathy Frost, ADF&G, personal communication).

Sockeye salmon dominated the catch beginning 2 July and management for sockeye salmon began (Table 6). As required by the Management Plan (ADF&G 1988A), sockeye salmon become the target species when chinook salmon are less than 50 percent of the chinook-sockeye salmon catch in District 4. Commercial fishing time often is scheduled for three 12-hour periods per week once the less abundant chinook salmon have passed through the districts.

Sockeye salmon catches were above average in July (Appendix C.5). Aerial surveys of the Kanektok River showed that sockeye salmon escapements were below average. In response, the two period per week schedule continued until 27 July, when coho salmon became the dominate species in the district (Table 6). This strategy resulted in the largest sockeye salmon catch (21,534) in the district's history (Appendix 7) and an escapement index of 30,400 sockeye salmon, 1600 less than the 32,000 objective (Table 3).

Chum salmon are taken incidentally to the chinook and sockeye salmon fishery in District 4. The 1988 chum salmon catch of 29,183 was above the previous 5 year average of 26,400 (Appendix 7). The escapement index of 20,500 was 10,000 chums less than the average escapement of 30,500 (Table 3).

Coho salmon dominated the catch in District 4 beginning with the 27 July fishing period. The fishing schedule was adjusted to three 12 hour periods per week on Monday, Wednesday, and Friday at that time. This schedule, when used in the past, has allowed adequate escapement. The fishery continued this schedule until 9 September (Table 6). The fishery closes by regulation on 8 September, since that was a Thursday this year, the season continued until the 9th by emergency order. There was no catch or effort on the 9th due to the absence of processors.

The coho salmon catch of 68,591 was slightly above the previous 5 year average of 61,100 (Appendix 7). No escapement surveys were possible because of weather conditions. Coho salmon were the most valuable fish in the Quinhagak district bringing the fishermen \$688,206 (Table 2).

Pink salmon are taken incidentally to the sockeye and coho fishery in District 4. The 1988 catch of 21,258 was nearly identical to the previous 5 even years' average of 21,100 (Appendix 7).

Fish and Wildlife Protection Division issued 4 citations for fishing in closed waters of District 4 before 26 August. In each case they reported that there were more boats fishing illegally but these boats escaped while the others were being cited. During an effort count on 26 August the Department observed 39 percent (33) of the boats fishing in closed waters. Fishermen were told that continued widespread violations would result in a closure of the fishery as provided by 5 AAC 01.040 and 39.185. POLICY ON CLOSURES DUE TO ILLEGAL FISHING (ADF&G 1988A). Later observations did not find such widespread and flagrant violations, although members of the public continued to report that fishing in closed waters continued. If widespread and flagrant violations resume in 1989, fishery closures may be necessary.

#### *Goodnews Bay, District 5, All Salmon Species*

District 5, Goodnews Bay normally opens between 11 and 20 June depending on the entry pattern of sockeye salmon into the Goodnews River. The sockeye salmon and chinook salmon stocks migrate through the district together in June. The increased fleet efficiency and small size of the chinook salmon stock has resulted in a special emphasis on protection of chinook salmon from over-harvest during the June sockeye salmon fishery. Two 12-hour periods per week from mid-June to early July are the normal fishing schedule when the target species are chinook and sockeye salmon. The commercial chinook salmon harvest level is about 5,000 fish unless Department escapement projects determine that escapement is adequate.

Goodnews Bay opened on 16 June in 1988. Fishing periods coincided with openings in the other districts whenever possible. Coincidental openings were successful in limiting large scale effort transfers (Table 9). The highest effort period was on 23 June when District 4 closed and transfers resulted in 68 boats fishing in District 5 (Table 7). There were fewer than 50 boats in the district during most of the season (Table 7).

The chinook salmon catch of 4,964 fish in 1988, was about 2,000 fish less than the previous 5 year average of 6,920 (Appendix D.5). Aerial survey escapement indexes were at objective levels (Table 3). The tower objective of 3,000 was approached with a count of 2,600 chinook salmon.

Sockeye salmon are the target species in District 5 in June and July. The catch of 36,368 is well above the previous 5 year average of 17,352 (Appendix D.5). The 1988 catch is the third largest sockeye catch on record and fishermen received \$399,595 for it (Table 2). The strong catches and low escapement counts at the tower resulted in fishing time continuing as two 12 hour periods per week in July. Because a strong chum salmon run was observed, further restrictions were not made. In spite of the reduction of fishing time sockeye escapements were low. The aerial index of 9,000 was far below the average of 20,000. The tower count of 15,500 was also well below the objective of 35,000.

Sockeye and chum salmon escapements have approached or exceeded escapement objectives since 1983. Except for 1985 when both species were below the objectives and 1988 when sockeye salmon escapement was below the objective. A run size data base of only five years is very limited. However, the exploitation rate appears to be low (Appendix D.3). The Department is reviewing the present escapement objectives (which as mentioned above are simple averages of prior years) with the total run size estimates to determine if adjustments are appropriate. The limited data base will of course require that changes be approached cautiously. In 1988 the preliminary results of this review suggested that a reduction in the sockeye salmon escapement could occur without damaging production. This knowledge combined with the large chum salmon return resulted in the fishery continuing a reduced schedule rather than a long closure trying to achieve the present escapement objective.

Chum salmon are taken incidentally to sockeye salmon in District 5. The 1988 catch of 33,059 is the largest on record and nearly three times the previous 5 year average of 11,300 (Appendix D.4). Catches and escapement trends showed that the chum salmon run was very large. A difficult management problem was created by the concurrent strong chum salmon and weak sockeye salmon runs. The tower count of chum salmon escapement (20,797) exceeded the objective of 15,000.

On 1 August coho and pink salmon dominated the catch and a schedule of three 12 hour periods per week began (Table 7). This schedule provided coincidental openings with District 4 and, in the past, has allowed adequate escapement. The fishery continued this schedule until 9 September. The fishery closes by regulation on 8 September. The season extension until the 9th allowed the fishery to close on a Friday. There was no catch or effort on the 9th because the processors had left the district.

The 1988 coho salmon catch of 30,832 was very similar to the previous 5 year average catch of 31,150 (Table D-4). Weather prevented coho escapement surveys. The pink salmon catch of 5,509 was slightly below the previous 5 even years' average of 6,153 (Table D- 4).

#### PERSONAL USE FISHERY

The Board of Fisheries established a personal use fishery for the Kuskokwim Area in 1988. Salmon may only be taken by holders of a valid resident Alaska sport fishing license or by an Alaskan resident exempt from licensing. Qualified Alaska residents must have a Kuskokwim Area Personal Use Salmon Fishing Permit before fishing. Salmon may only be taken from 1 July through 30 September. Salmon taken for personal use may not be used for bait or fed to dogs. Personal use salmon or their parts may not be bought, sold, traded or bartered. Personal Use fishermen must plainly and legibly inscribe their first initial, last name, and home address on a keg or buoy attached to their gill net. Both lobes of the caudal (tail fin) must be removed immediately upon landing. The personal use fishery is subject to the same closures before, during, and after commercial fishing periods as the subsistence fishery in the affected district. Personal use salmon may only be taken with gill net, beach seine or fish wheel except in the Holitna River drainage where they may also be taken with spears. Set or drift gill nets may not exceed 50 fathoms in length. The maximum depth of gill nets is 45 meshes for 6 inch or smaller mesh. On gill nets greater than 6 inches, the mesh may not exceed 35 meshes in depth. A stationary fishing device may not obstruct more than one half of the width of any body of water.

Two Kuskokwim Area Personal Use Salmon Fishing Permits were issued in 1988. One personal use permit was returned with catch data, the other fishermen reported his catch verbally. The total personal use fishery catch in 1988 was 8 sockeye, 26 coho, and 2 pink salmon (Table 1).

#### OUTLOOK FOR 1989

The Kuskokwim Area is still developing a data base for future return forecasts. Only broad range harvest projections are possible by examining the brood year's escapement and recent harvest trends.

### *Chinook Salmon*

The brood year escapement for Kuskokwim River chinook salmon was 70 to 42 percent below objective levels in 1983 and 1984 (Figure 6). The improved run strength in 1987 and 1988 makes a projection difficult. The trend of declining chinook salmon escapement that occurred from 1982-1986 may result in smaller returns. However, the improved survival evidenced by the 1987 and 1988 runs may provide an average chinook salmon run in 1989. This should result in an incidental commercial harvest of 19,000 to 56,000 chinook salmon (Table 10).

Chinook salmon escapements in the Kanektok River were above objective levels in the brood years for 1989 (Appendix C.2). An average or better return in 1989 should result from those escapements. Whatever caused the poor return in 1988 may also effect the 1989 chinook salmon run. The commercial harvest should be between 14,000 and 34,000 (Table 10).

In the Goodnews River chinook salmon achieved the escapement objectives during the 1983 and 1984 brood years (Appendix D.4). An average return of chinook salmon is expected in 1989 in the Goodnews Bay District. The commercial harvest in Goodnews Bay should be 2,800 to 8,600 chinook salmon (Table 10).

### *Sockeye Salmon*

Quinhagak (District 4) and Goodnews Bay (District 5) are the only fisheries within the Kuskokwim area which target on sockeye salmon. Most sockeye salmon return at five years of age with a few maturing at four years. Sockeye salmon approached the escapement objective in 1984 which should result in an average return to both districts. The commercial catch should be from 6,500 to 22,000 in District 4, and from 6,700 to 36,000 in District 5 (Table 10).

### *Chum Salmon*

Kuskokwim River chum salmon return primarily as four and five year old fish. The 1989 return will be from the 1984 and 1985 brood year escapements. The escapements in those two years were at objective levels in most systems (Appendix A.4). The strong 1988 return of 4-year-olds should also result in a strong return of 5 year old fish in 1989. Therefore, the chum salmon return is expected to be above average in 1989. The Kuskokwim River districts should catch 200,000 to 574,000 chum salmon (Table 10).

The Kuskokwim Bay districts (Districts 4 and 5) do not have directed chum salmon fisheries. The incidental chum salmon catch in District 4 should be between 8,500 and 50,000. In District 5,

the incidental catch normally ranges from 4,700 to 33,000 (Table 10).

#### *Coho Salmon*

Little information is available to assess coho salmon abundance in 1989. Escapement at the Kogrukluk River Weir in 1985 (the primary brood year) was below objective levels (Appendix A.4). The coho salmon runs have continued to increase in size since 1979. However, the odd year runs are smaller than the even year coho salmon runs. An average to above average odd year run is expected in 1989. The commercial harvest should be 200,000 to 574,000 salmon (Table 10).

The coho salmon catches were the poorest in the last 10 years in Quinhagak and Goodnews Bay in 1985 (Appendix C.7 & D.5). No escapement surveys were done in 1985 due to poor conditions. Below average to average runs, based on the poor catch in the primary brood year, should occur in 1989. This should mean a catch 30,000 to 50,000 in Quinhagak (District 4) in 1989. The coho salmon catch in Goodnews Bay (District 5) may be 19,000 to 42,000 (Table 10).

#### **FRESHWATER FIN FISH FISHERY**

Several species other than salmon, herring, and halibut are used for commercial, subsistence, and recreation purposes in the Kuskokwim Area. They are inconnu or sheefish (Stenodus leucichtys), whitefish (Coregonus spp. and Prosopium sp), char (Salvelinus sp), rainbow trout (Oncorhynchus mykiss), burbot (Lota), Arctic grayling (Thymallus arcticus), northern pike (Esox lucius), Arctic lamprey (Lamperta japonica), rainbow smelt (Osmerus mordax), blackfish (Dallia pectoralis) and longnose sucker (Catostomus) (Appendix A-9). The Division of Sport Fish documents the recreational fisheries.

#### *Subsistence Fishery*

Miscellaneous fin fish are taken by seine, set and drift gill nets, fish traps, dip nets, "jigging" through the ice and rod- and-reel. Most of the harvest is made by subsistence fishermen. Subsistence catches taken during the winter are usually stored frozen. Human consumption is the primary use but dog food is a significant use. No regulations limit the number of these miscellaneous species taken for subsistence. There is no funding to monitor this harvest.

#### *Commercial Fishery*

The commercial fishery has been sporadic, primarily harvesting whitefish and burbot for local markets. Most of the whitefish harvest occurs incidentally to the salmon fishery.

The regulations require, besides the permit requirements of the Commercial Fisheries Entry Commission, a permit from the Department to conduct commercial fisheries on whitefish, sheefish, char, trout, pike, smelt, burbot, and lamprey. Those species may also be taken incidentally to commercial salmon fishing. There were three freshwater permits issued in 1988 for the Kuskokwim Area. The guidelines for permits are:

1. All waters of the area are open, except for the Johnson River drainage, to commercial freshwater fin fishing. The heavy subsistence utilization of those species in the Johnson River drainage is the reason for its closure to commercial fishing.
2. Whitefish, ciscos, smelt, pike, burbot, and lamprey may be taken. Sheefish, char, and trout may not be taken due to their small population, low reproductive rates, and their heavy utilization in the subsistence fishery.
3. Harvest limits are:

Whitefish	5,000
Ciscos	10,000
Pike	200
Burbot	500
Smelt	Unlimited
Lamprey	Unlimited
4. All legal commercial gear types are allowed; the only restriction is that gill nets must be greater than 5 inches stretch mesh. This mesh size limitation accomplishes several purposes:
  - a. minimizing the incidental catch of grayling, trout, char and other forbidden species
  - b. the catch of whitefish, burbot, and pike is predominantly of older age fish that have spawned at least once.

Appendix A-12 presents the freshwater fin fish fishery catches and value since 1977.

#### *Status of the Stocks*

The Department does not monitor the status of the freshwater species in the Kuskokwim Area. Limited Department observations, advisory committee recommendations and fishermen interviews give no indication of declining populations in most drainage.

## PART II. HERRING FISHERY

### INTRODUCTION

#### *Area and District Boundaries*

There are five commercial gill net sac roe districts and a subsistence herring fishery in the Kuskokwim Area. The Security Cove District includes all waters between the latitude of Cape Newenham and the latitude of the Salmon River (Figure 7). The Goodnews Bay District includes the waters of Goodnews Bay inside the north and south spits at the mouth and a line between the Ukfigag and Tunulik Rivers. The Cape Avinof District (Figure 8) consists of all waters landward of Kikegtek, Pingurbek and Kwigluk Islands from the longitude of Tsintulik Slough (163° 48' W long) to the longitude of the Ursukfak River (164° 11' W long). The Nelson Island District consists of all waters north of Chinigyak Cape and east of Atnrak Point, and all waters north of Talurarevuk Point and south of the southernmost tip of Chinit Point and east of 165° 30' W. long., and all waters north of the northernmost tip of Chinit Point and south of Kigigak Island and east of 165° 30' W. long. (Figure 9). The Nunivak Island District includes all waters extending three miles seaward of mean low water along the northern and east sides of Nunivak Islands from Kikoojit Rocks (60°19'30" N. lat., 166°56'30"W.long.) to the small bay approximately two miles east of Ingrirak Hill (60°17'25"N.lat., 166°26'55"W.long.) (Figure 10).

#### *Management Programs*

The Security Cove and Goodnews Bay commercial herring fisheries are managed under the Bering Sea Herring Fishery Management Plan which sets the maximum exploitation rate at 20% of the estimated spawning biomass. The Department attempts to harvest stocks in good condition (large volume, increasing abundance, good recruitment) at the upper end of the range (15-20%). Stocks in poor condition (small volume, decreasing abundance, poor recruitment) are exploited at lower than maximum rates (0-15%). The Alaska Board of Fisheries has directed the Department to manage the commercial herring fisheries in the Nelson Island, Nunivak Island and Cape Avinof Districts for an exploitation rate not to exceed 15% of the estimated available biomass. To provide additional protection for the subsistence herring harvest in the Nelson Island District, the following guidelines have been established by the Board of Fisheries:

1. The commercial fishery will be allowed to take up to 15% of the herring biomass, compared to up to 20% for most other fisheries having stocks of similar size and condition.

2. The commercial fishing season will be opened when a biomass of 2,500 st or spawning activity is documented.
3. Periodic closures of the commercial fishery will be scheduled, during which time only subsistence fishing will allowed.
4. Several important subsistence use areas occur throughout the district (e.g. waters north of Cape Vancouver) and specific areas may be closed to commercial fishing to insure the adequacy of subsistence harvests.
5. The Department will use all available means, including input from local residents, to insure the adequacy of subsistence herring harvests during the commercial fishing season.

#### *Season Summary*

The total Kuskokwim Area herring harvest for 1988 was approximately 1,929 tons of Pacific herring with a total estimated value to the fishermen of approximately \$1,802,000 (Table 12). The only food/bait fishery in this area occurs during the sac-roë fishery when the roë content is below the processors' acceptable minimums. Food/bait sales are a very small portion of the harvest. The food/bait sales totaled 23.2 tons, while the sac roë harvest was 1,906.1 tons.

Fishing effort, measured in number of fishermen who made deliveries, decreased from 1987 levels by 52% in the Security Cove, 49% in the Goodnews Bay and 26% in the Nelson Island District (Table 13). Average percent roë recovery ranged from 8.0 in Goodnews Bay District to 9.3 in Security Cove District. Percent harvest of estimated herring biomass ranged from 6.6 in the Security Cove District to 10.8 in the Nelson Island District (Table 12).

The 1988 total estimated herring spawning biomass of 23,445 tons for the surveyed portion of the Kuskokwim Area herring districts was 23% higher than the 1987 estimate (Table 12). Ages 8 and older herring comprised 68% of the total run. Younger age fish (ages 3, 4, and 5) accounted for only 13% of the total biomass (Table 14).

During the 1987 season, herring fishermen from many western Alaska communities requested information about the possibility of establishing limited entry in A-Y-K herring fisheries. A decision was made by the Commercial Fisheries Entry Commissions (CFEC) as a first step towards limited entry status for these fisheries to limit participation in the Nelson Island District to permit holders

who had fished in these fisheries before 1 January 1988. CFEC is seeking public input to establish the final number of permits allowed in each fishery and the criterion used to determine which eligible permit holders will obtain a limited entry permit.

The CFEC carried out a similar moratorium for the Nunivak Island District. Since 1988, only permit holders who had fished in the Nunivak District before 1 January 1988 are eligible for an interim-use permit.

## STOCK STATUS

### *Assessment Methods*

Aerial surveys were flown throughout the Pacific herring spawning season in all Kuskokwim Area commercial fishing districts to determine relative abundance, distribution, and biomass of herring. Occurrence and extent of milt, numbers of fishing vessels, and visibility features affecting survey quality were also recorded. Data collection methods were similar to those used since 1978. Approximately 40 hours were spent conducting aerial surveys in the Kuskokwim Area: 19 hours in Security Cove and Goodnews Bay, 6 hours in the central Kuskokwim Bay area, 6 hours in Nelson Island and 9 hours in Nunivak Island. Weather and sea conditions were exceptionally good in all but the Nunivak Island District. Fair to unfavorable weather (advection fog) hampered survey coverage much of the season in the Nunivak Island District.

Standard conversions of 1.52 st/538 ft<sup>2</sup> (water depths of 16 ft (ft) or less), 2.58 st/538 ft<sup>2</sup> (water depths between 16 and 26 ft) and 2.83 st/538 ft<sup>2</sup> (water depths greater than 26 ft) were used to convert estimated herring school surface areas to biomass within all districts.

Test fishing with variable mesh gill nets occurred in Security Cove, Goodnews Bay and Nelson Island districts to determine age, sex, size and sexual maturity of herring and to note occurrence of other schooling fishes. Commercial landings were sampled in all fishing districts. Age composition of herring collected from the Department test fishery and the commercial catch is summarized, by district, in Table 15. Additionally, volunteer gill net vessels collected herring samples within all districts. This information allows interpretation and modification of aerial survey biomass data. Age composition of herring collected from the Department test fishery and the commercial catch is summarized in Table 15.

Ground surveys conducted in some districts provide information on the distribution and density of eel grass beds and herring spawn deposition.

## Spawning Populations

### Security Cove District

A total of 13 aerial surveys was flown on 11 days during the 1988 season, from 30 April to 23 May. Herring schools were first observed in the district on 16 May (536 tons). The largest biomass estimate (4,906 tons) came on 22 May. A total of 11.5 linear miles of milt was observed in 13 spawn sightings during aerial surveys with the peak spawn observed on May 18.

The Security Cove test fish crew fished from 5 May to 23 May with variable mesh gill nets. A total of 1,005 herring was caught of which 473 were sampled for age, sex, size and maturity. Age 8 and older herring comprised 56% of the test fish catch while 4 to 7 year old fish were 44% of the catch.

A total of 429 herring was sampled from the commercial catch. Ages 5, 6, and 7 herring comprised 20% and ages 8 and older herring represented 80% of the commercial catch (Figure 11). No age-4 or younger herring were found in the commercial catch sample.

### Goodnews Bay District

A total of 14 aerial surveys was flown on 11 days during the 1988 season, from 30 April - 23 May. The largest biomass estimate (4,479 tons) occurred on 21 May. During aerial surveys a total of 5 linear miles of milt was observed. The peak of observed spawning was 17 May.

Test fishing occurred from 29 April - 22 May. A total of 1,844 herring was caught of which 707 were sampled. Age 8 and older herring made up 47% while aged 4 - 7 fish were 53% of the test catch.

Volunteer commercial fishermen collected herring samples from designated areas of the Bay which industry roe technicians evaluated for roe quality.

A total of 617 herring was sampled from the commercial catch. Herring age 8 and older were 73% of the commercial catch and fish under age 6 were less than 1% of the catch.

### Cape Avinof District

Between 24 May and 4 June, 5 aerial surveys were flown in the Cape Avinof District. A peak biomass of 4,108 tons was seen on 28 May. No spawning activity was observed in the Cape Avinof District during these surveys.

No test fishing with variable mesh gill nets was conducted in the Cape Avinof District.

A total of 595 herring was sampled from the commercial catch. Eighty-six percent of the harvest was age 8 or older and ages 5 - 7 fish made up 14% of the catch.

#### Nelson Island District

A total of 17 aerial surveys was flown on 16 days from 18 May to 11 June during the 1988 season. Surveys were made under good to poor conditions. The peak aerial survey biomass estimate of 7,152 tons was observed on 25 May. A total of 17.8 linear miles of milt was observed during aerial surveys with the peak spawn observed on 11 June.

Test fishing with variable mesh gill nets occurred from 19 May - 13 June. A total of 1,051 herring was caught of which 707 were sampled for age, sex, size and maturity. Age 3 to 7 fish made up 50% of the test catch with the other 50% being age 8 or older herring.

Volunteer commercial fishermen under the supervision of the Department of Fish and Game conducted additional sampling of the Nelson Island herring stock before the first commercial opening. Analysis of the samples for roe quality occurred onboard processing vessels by company technicians. ADF&G included this information in the scheduled fleet radio broadcasts. Additional samples were brought in daily to the beach at Toksook Village and the Tununak Airport where roe analysis occurred, allowing the fishermen to follow the progression of roe maturity. These test fishing results showed a daily progression of roe maturity and fishery development before the first commercial opening.

A total of 393 herring was sampled from the commercial catch on 26 May. Age 8 and above fish comprised 89% of the commercial catch while age 5 to 7 fish made up the remaining 11%.

#### Nunivak Island District

A total of 14 aerial surveys was flown on 14 days between 18 May and 11 June during the 1988 season. Most surveys were made under unsatisfactory conditions. The peak aerial biomass estimate of 1,316 tons was made under unsatisfactory conditions on 21 May. A total of 15.7 linear miles of milt was observed while surveying with peak spawn seen on 11 June.

No Department test fishing occurred within the Nunivak Island District. Age composition data collected for the Nelson Island District provided the basis for a biomass outlook for Nunivak Island for 1988. Age composition for these districts has been similar during past years.

No commercial fishery occurred in the Nunivak Island District in 1988, therefore, no commercial catch samples were collected.

## SUBSISTENCE FISHERY

Subsistence fishing for Pacific herring in the northeastern Bering Sea is very important in villages of the Yukon-Kuskokwim River delta. The subsistence fishery is conducted primarily by residents of the coastal villages of Kwigillingok, Kongiganak, Kipnuk, Chefornak, Toksook Bay, Umkumiut, Tununak, and Newtok. The herring stocks utilized by the subsistence fishery are the same ones targeted by the commercial fishery in the nearby commercial fishing districts.

Subsistence harvest surveys have occurred annually in Yukon delta villages and sporadically in Kuskokwim delta villages since 1975. Average annual herring subsistence harvests have been at least 110 tons since 1975 (Table 16). During 1988, the subsistence survey of Nelson Island communities resulted in an estimated 136 tons of subsistence herring harvested by at least 104 fishing families. Subsistence survey results reflect harvest trends and reported catches represent minimum figures since not all fishermen are contacted and surveys were not allowed by Kuskokwim River delta village councils in Kipnuk, Kongiganak and Kwigillingok.

## COMMERCIAL FISHERY

### *Security Cove District*

The commercial herring fishery in the Security Cove District has opened and closed by emergency order since 1981 to provide for an orderly fishery and periodic reassessments of herring biomass. Three fishing periods occurred for a total fishing time of 23.5 hours in which 324 tons were harvested (Table 17).

The initial harvest guideline of 150 tons was increased to 200 tons on May 17 and then to 240 tons on May 19 as observed biomass during aerial surveys increased. The first opening was for 8.5 hours on 19 May. An extension of 8 hours was announced for 20 May when a catch of only 90 tons was estimated. After the closure on 20 May, verbal estimates from the purchasing companies indicated 129 tons of herring with an average roe recovery of 10.2% had been taken by 10 fishermen. The district was reopened for 7 hours on 20 May. At the close of this period, verbal estimates from four purchasing companies indicated 198.5 tons of herring with an average roe content of 9.7% had been taken.

All the 1988 season harvest was sac roe quality with an average roe recovery of 9.3%. Value of the harvest was about \$0.36 million (Table 12). Average price was \$1000 per ton for 10% roe recovery, with an increase or decrease of \$100 per ton for each percentage point above or below 10%.

Four processors, four fewer than in 1987, purchased herring in Security Cove (Table 14). A total of 31 fishermen made 51 deliveries in the 1988 fishery. This was a 52% decrease in fishermen from 1987. Area residents (i.e. fishermen living in Platinum, Goodnews Bay, Quinhagak, and Bethel) did not make landings in the Security Cove herring fishery during the 1988 season.

The commercial exploitation rate of Pacific herring was 6.6% of the estimated available biomass (Table 14). Ages 8 and older Pacific herring comprised 81% of the total harvest. There were no herring under age 5 in the commercial catch sample.

The Fish and Wildlife Protection vessel, Woldstad, was on patrol in the Security Cove District during the season. No major fishing violations were reported.

#### *Goodnews Bay District*

Since 1981, to provide for an orderly fishery and periodic reassessments of herring biomass, commercial herring fishing in Goodnews Bay has opened and closed by emergency order. A total of 482.7 tons were taken during 40 hours of fishing in 5 fishing periods.

The initial guideline harvest level was raised from 130 tons to 240 tons on 19 May and then to 450 tons on 21 May as biomass observed during aerial surveys increased. Beach meetings with fishermen occurred to monitor the quality of the herring in Goodnews Bay. Samples were brought in by volunteer fishermen and analyzed by industry roe technicians.

The commercial herring season opened with an 8 hour period on 24 May 1988 (Table 17). An estimated 152.1 tons was taken with a percent roe of 7.7%. A second opening was allowed for 8 hours on 24 May. An estimated 71.1 tons was taken with a roe recovery of 8.6%. A third, 8 hour opening occurred on 25 May in which an estimated 16 tons of herring with 9.7% roe was caught. Another opening was allowed on 25 May which saw a harvest of 122 tons with 7.5% roe being delivered. The last opening began on 26 May in which 9.4 tons with a roe recovery of 8.9% were landed.

Sac roe herring accounted for 98% (473 tons) of the harvest. Wastage of herring was not a problem. Average roe recovery for the season was 8.0%. The value of the catch to the fishermen was \$0.46 million (Table 12). Average price was \$1200 per ton for 10% roe recovery, with an increase or decrease of \$120 per ton for every percentage point above or below 10%. Six processors purchased Pacific herring (Table 13). Most processors established 7% as the minimum roe recovery required for sac roe quality Pacific herring. Pacific herring of less than 7% roe recovery sold as bait

and the price averaged \$50 per ton. A total of 60 fishermen made 309 deliveries in the 1988 fishery, a 49% decrease in fishermen from 1987. Local fishermen (i.e. residents of Platinum, and Goodnews Bay) accounted for 77% of the harvest.

The exploitation rate of herring was 10.7% of estimated available biomass (Table 12). Ages 8 and older herring comprised 73% of the total harvest. No age-4 or younger herring occurred in the harvest sample.

Management of the 1988 herring fishery in Goodnews Bay was without major problems. The Fish and Wildlife Protection vessel Woldstad patrolled the district during the season. No major fishing violations were reported.

#### *Cape Avinof District*

This was the first year that a commercial herring fishery occurred in the Cape Avinof District. As in all other Kuskokwim Bay districts, commercial herring fishing is regulated by emergency order. A total of 348 tons of herring were harvested during 88.5 hours of fishing time.

The initial harvest guideline of 80 tons was raised to 155 tons on 23 May, increased again to 235 tons on 27 May and then to 410 tons on 29 May as observed biomass during aerial surveys increased.

The district was first open to commercial harvest on 29 May and extended through 30 May. With only 16 tons landed through 30 May, the district was opened till further notice. On 3 June the district was closed when roe percentages began dropping and the purchasing company had to pull out due to prior commitments. The harvest of 348 tons was 62 tons short of the guideline.

All of the herring delivered was of sac roe quality with an average roe recovery of 8.6%. Three companies registered but only one company bought herring during the 1988 season. A total of 98 fishermen made 485 deliveries. Local fishermen (i.e. residents of Kipnuk, Kwigillingok, Chefornak and Tuntutuliak) accounted for 87% of the harvest.

The exploitation rate of herring was 8.5% of estimated available biomass (Table 12). Ages 8 and older herring comprised 80% of the total harvest. No age-4 or younger herring occurred in the harvest sample.

#### *Nelson Island District*

The commercial harvest of Pacific herring began in the Nelson Island District in the 1985 season. To provide for an adequate subsistence harvest, an orderly commercial fishery, and to allow for periodic reassessments of the herring biomass the commercial

fishery has opened and closed by emergency order. Two commercial fishing periods on 26 May totaled 7.5 hours of fishing time. The commercial fishery took 775 ton of herring (Table 17).

The initial harvest guideline of 500 tons was increased to 715 tons as observed biomass during aerial surveys increased. The district was opened to the commercial harvest of herring on 26 May for 4 hours. Fishermen landed an estimated 447 tons of herring during this first opening. A second opening was allowed on 26 May for 3.5 hours, during which approximately 353 tons of herring were taken.

Sac roe herring accounted for 98% (760 ton) of the harvest. Average sac roe recovery was 9.2%. Wastage of herring was not a problem. The commercial herring harvest was worth \$0.71 million to the fishermen (Table 12). Average price was \$1000 per ton for 10% roe recovery, with an increase or decrease of \$100 per ton for each percentage point above or below 10%. The average price per ton paid for food or bait herring was \$50. Seven companies operated in the Nelson Island District (Table 13). A total of 174 fishermen participated in the fishery. This represents a 26% decrease in effort levels since 1987. Area fishermen (residents of northern Kuskokwim Bay and Etolin Strait villages) accounted for 83% of the harvest.

The commercial exploitation rate of herring was 10.8%. Ages 8 and older herring comprised 50% of the total harvest.

The Fish and Wildlife Protection vessel, Woldstad, patrolled the Nelson Island District during the season. The following citations were issued: 11 for fishing during closed periods, one for not having a photo ID, two for violating the superexclusive registration regulation and three for processors failing to register.

#### *Nunivak Island District*

As in the Nelson Island District, the initial commercial fishery for herring in the Nunivak Island District occurred in 1985. To provide for an orderly fishery and to allow for periodic reassessments of herring biomass the fishery has opened and closed by emergency order.

Commercial test fishing in the Nunivak Island District failed to find any quantity of herring with marketable roe, therefore, no commercial herring fishery occurred there in 1989.

### OUTLOOK AND MANAGEMENT STRATEGY FOR 1989

Based upon apparent weak recruitment of younger age classes (ages 4-7) and reduced returns of the abundant 1977 and 1978 year classes

(ages 12 and 11 herring) a decline in the harvestable surplus of herring available in all districts is expected in 1989. Forecast methods are under development and reliable estimates of recruitment are not available, so observed herring spawning biomass will determine harvest levels during the season. If it is not possible to determine herring abundance using aerial survey methods, assessment of stock abundance will use information from test and commercial catches along with spawn deposition observations.

Projections from post-season escapement estimates, using mean rates of natural mortality and growth for each age class, suggest that the 1989 minimal spawning biomass for the Kuskokwim Area herring stocks (Security Cove to Nelson Island) should be roughly 15,943 tons (Table 18). However, increased recruitment of ages 3 through 5-year-old herring could increase this figure. (NOTE - use all projection estimates with extreme caution as projection methods are under development and the data base is not extensive.)

Available data on age composition shows a continuation of the downward trend in herring spawning biomass for all Kuskokwim Area districts due to the lack of any significant recruitment of younger age fish into the population beyond the 1978 year class. The factors responsible for this decline are not known. The increases in biomass in 1988 were due to aerial survey conditions, relative to past years, being unusually good. The resources now available to conduct research activities can not support an investigation extensive enough to find the causes of the decline. Continuation of this declining biomass trend may precipitate reduced harvest levels or complete closure of some commercial fishing districts beginning with the 1990 herring commercial fishing season. Reduced exploitation rates during 1989 will allow a harvest while protecting the declining populations.

#### *Security Cove District*

The commercial season opens when the biomass reaches 1,200 tons or spawning activity is observed. The occurrence and length of fishing periods depends on stock strength, fishing effort, and spawning activity. The declining recruitment of younger age fish into the population requires a 15 percent exploitation rate for the Security Cove herring stock in 1989. The 1989 projected return is 3,312 tons which at a 15% exploitation rate would result in a harvest of about 497 tons (Table 18). A larger catch may occur if the 1989 biomass assessment is greater than the projection.

#### *Goodnews Bay District*

Management strategy for this district will be similar to that used for Security Cove. The season will open and close by emergency

order when a biomass of 1,200 tons is observed or spawning activity occurs. The 1989 projected return of herring to the Goodnews Bay District is 3,077 tons which at a 15% exploitation rate would result in a harvest of 462 tons (Table 18). A larger catch may occur if the 1989 biomass assessment is greater than the projection.

#### *Cape Avinof District*

Either spawning activity or a biomass of 500 tons must be observed before the commercial herring season can be opened. The season will open and close by emergency order. The projected 1989 biomass for the Cape Avinof area stock is 2,777 tons (Table 18). The Cape Avinof District's herring stocks appear to be showing a lack of recruitment similar to that seen in all southwestern Alaska herring fisheries. The 15% exploitation rate will take into account the limited data base for this area and insure recognition of the subsistence fishing priority. Assuming a 15% commercial exploitation rate, the projected harvest would be 417 tons of herring. With an additional estimated 30 tons of subsistence herring harvest, total exploitation rate in 1988 would be 16%.

#### *Nelson Island District*

The Nelson Island commercial fishery will continue to open and close by emergency order authority. To provide additional protection for the subsistence herring harvest, the Alaska Board of Fisheries Policy Statement of Management of the Nelson Island District Herring Fishery will be followed (ADF&G 1988B). The spawning biomass projected to return to the Nelson Island District during 1989 is 4,709 tons which at a 10% exploitation rate would result in a commercial harvest of 471 tons (Table 18). A subsistence herring harvest of about 200 tons is expected in the Nelson Island District. The estimated subsistence and commercial herring harvest will result in a total exploitation rate of 14%.

#### *Nunivak Island District*

The Nunivak Island District commercial herring fishery will continue to open and close by emergency order. The commercial fishery will open when observed biomass reaches 1,500 tons or spawning occurs. Commercial harvest of herring will be up to 15% of the total spawning biomass. The biomass projected to return to the Nunivak Island District during 1989 is 2,068 tons which at a 15% exploitation rate would result in a 310 tons harvest (Table 18).

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## TABLES

Table 1. Kuskokwim Area commercial and subsistence salmon catches by species and district, 1988.

<u>DISTRICT</u>	<u>Chinook</u>	<u>Sockeye</u>	<u>Coho</u>	<u>Pink</u>	<u>Chum</u>	<u>Total</u>
District 1, Lower Kuskokwim River:						
Commercial	53,810	89,764	508,417	10,805	1,361,982	2,024,778
Subsistence	44,801	19,273	22,472		83,098	169,644
Personal use	0	8	26	2	0	36
SUBTOTAL	98,611	109,045	530,915	10,807	1,445,080	2,194,458
District 2, Middle Kuskokwim River:						
Commercial	1,906	2,261	15,879	20	19,692	39,758
Subsistence	6,827	2,867	1,736		20,919	32,349
SUBTOTAL	8,733	5,128	17,615	20	40,611	72,107
Upper Kuskokwim River:						
Commercial	CLOSED TO COMMERCIAL SALMON FISHING					
Subsistence	2,249	1,509	4,123		12,992	20,873
SUBTOTAL	2,249	1,509	4,123		12,992	20,873
Kuskokwim River:						
Commercial	55,716	92,025	524,296	10,825	1,381,674	2,064,536
Subsistence	53,877	23,649	28,331		117,009	222,866
Personal use	0	8	26	2	0	36
SUBTOTAL	109,593	115,682	552,653	10,827	1,498,683	2,287,430
District 4, Quinhagak:						
Commercial	13,872	21,534	68,591	21,258	29,183	154,438
Subsistence	2,508	857	2,933		724	7,022
SUBTOTAL	16,380	22,391	71,524	21,258	29,907	161,460
District 5, Goodnews Bay:						
Commercial	4,964	36,368	30,832	5,509	33,059	110,732
Subsistence	310	1,065	1,162		941	3,478
SUBTOTAL	5,274	37,433	31,994	5,509	34,000	114,210
Kuskokwim Bay:						
Commercial	18,836	57,902	99,423	26,767	62,242	265,170
Subsistence	2,818	1,922	4,095		1,172	10,007
SUBTOTAL	21,654	59,824	103,518	26,767	63,414	275,177
Kuskokwim Area:						
Commercial	74,552	149,927	623,719	37,592	1,443,916	2,329,706
Subsistence	56,695	25,571	32,426		118,181	232,873
Personal use	0	8	26	2	0	36
TOTAL	131,247	175,506	656,171	37,594	1,443,916	2,565,615

Table 2. Value of Kuskokwim area commercial salmon harvest, 1988.

	<u>CHINOOK</u>	<u>SOCKEYE</u>	<u>COHO</u>	<u>PINKS</u>	<u>CHUM</u>	<u>DISTRICT TOTAL</u>
<u>DISTRICT 1</u>						
(LOWER KUSKOKWIM)						
TOTAL FISH	53,810	89,764	508,417	10,805	1,361,982	2,024,778
TOTAL POUNDS	722,747	653,418	3,549,342	36,574	9,316,606	14,278,687
TOTAL DOLLARS	\$939,571	\$927,853	\$4,436,677	\$5,486	\$3,726,642	\$10,036,230
AVERAGE WEIGHT	13.43	7.28	6.98	3.38	6.84	
<u>DISTRICT 2</u>						
(MIDDLE KUSKOKWIM)						
TOTAL FISH	1,906	2,261	15,879	20	19,692	39,758
TOTAL POUNDS	26,995	15,724	107,063	63	137,018	286,863
TOTAL DOLLARS	\$35,093	\$22,328	\$133,828	9.45	\$54,807	\$246,066
AVERAGE WEIGHT	14.16	6.95	6.74	3.15	9.96	
<u>DISTRICT 4</u>						
(QUINHAGAK)						
TOTAL FISH	13,872	21,534	68,591	21,258	29,183	154,438
TOTAL POUNDS	222,372	156,355	550,565	77,900	214,344	1,221,536
TOTAL DOLLARS	\$289,083	\$222,024	\$688,206	\$11,685	\$85,737	\$1,296,736
AVERAGE WEIGHT	16.03	7.26	8.03	3.66	7.34	
<u>DISTRICT 5</u>						
(GOODNEWS BAY)						
TOTAL FISH	4,964	36,368	30,832	5,509	33,059	110,732
TOTAL POUNDS	82,308	281,405	255,297	17,714	267,709	904,433
TOTAL DOLLARS	\$107,000	\$399,595	\$319,121	\$2,657	\$107,083	\$935,457
AVERAGE WEIGHT	16.58	7.74	8.28	3.22	8.10	
<u>TOTAL ALL DISTRICTS</u>						
WT. AVE. PRICE/LB	\$1.30	\$1.42	\$1.25	\$0.15	\$0.40	<u>TOTAL</u>
TOTAL DOLLARS	\$1,370,748	\$1,571,800	\$5,577,833	\$19,837	\$3,974,270	<u>VALUE</u>
PRICE/FISH	\$19.57	\$10.38	\$9.38	\$0.50	\$3.22	
AVERAGE WEIGHT	15.05	7.31	7.51	3.35	8.06	

Table 3. Peak aerial survey salmon escapement estimates in Kuskokwim spawning tributaries by species, 1988<sup>a</sup>.

	Location	Date	Chinook	Sockeye	Coho	Chum
<u>KUSKOKWIM RIVER:</u>						
1	Aniak R.	24-Jul	945	1,675	b	24,538
	Aniak Sonar <sup>c</sup>	31-Jul				401,511
2	Cheeneetnuk	4-Aug	417	0	b	82
3	Chineekluk	20-Jul	0	0	b	0
4	Chukowan R.	23-Jul	1,120	170	b	940
5	Eek R.	23-Jul	2,459	304	b	3,920
6	Mdl. Fk. Eek R.					
7	Holitna R. <sup>bd</sup>	27-Jul	10,317		b	
8	Holokuk R.	20-Jul	149	0	b	4,781
9	Kisaralik R.	2-Aug	1,793	0	b	1,505
10	Kogrukluk R. <sup>e</sup>	17-Sep	11,194	6,158	12,799	41,881
11	Kwethluk R.	2-Aug	711	35	b	1,684
12	Oskawalik R.	20-Jul	80	0	b	4,110
13	Salmon R. <sup>f</sup>	18-Jul	244	0	b	310
14	Salmon R. <sup>g</sup>	25-Jul	501	0	b	0
15	Tuluksak R.	28-Jul	286	0	b	1,445
<u>KUSKOKWIM BAY:</u>						
16	Goodnews River <sup>h</sup>	3-Aug	3,731	10,581	b	8,716
17	Goodnews Tower <sup>i</sup>	30-Jul	2,674	15,591	b	21,221
18	Kanektok River	21-Jul	11,140	30,440	b	20,063

- a Peak aerial salmon escapement index count (Schneiderhan 1988b). Aerial index counts do not represent total escapement, but reflect annual spawner abundance trends when made using standard survey methods under acceptable conditions.
- b Poor survey conditions.
- c Expanded sonar count (Schneiderhan 1988c).
- d Kogrukluk and Holitna Rivers downstream from Kogrukluk Weir.
- e Weir count (Schneiderhan 1989).
- f Aniak River system.
- g Big River/Windy Fork/Pitka Fork System.
- h Goodnews River and Middle Fork Goodnews River.
- i Expanded tower count.

Table 4. Lower Kuskokwim River, District 1, commercial harvest by species and fishing effort by period, 1988.

PERIOD	HOURS	PERMITS	LANDINGS	CHINOOK		SOCKEYE		COHO		PINK		CHUM	
				NUMBERS	CPUE <sup>b</sup>	NUMBERS	CPUE <sup>b</sup>						
JUNE 16	8	602	750	12,640	2.62	7,408	1.54	0	0.00	0	0.00	72,219	15.00
JUNE 20	6	612	826	11,708	3.19	14,502	3.95	0	0.00	0	0.00	113,628	30.94
JUNE 24	6	644	838	9,710	2.51	19,894	5.15	0	0.00	3	0.00	119,808	31.01
JUNE 28	6	609	821	5,350	1.46	17,628	4.82	0	0.00	4	0.00	154,027	42.15
JULY 02	6	580	835	3,531	1.01	15,102	4.34	0	0.00	28	0.01	187,916	54.00
JULY 05	6	579	756	2,340	0.67	7,284	2.10	9	0.00	18	0.00	163,971	47.20
JULY 08	6	604	705	1,891	0.52	3,623	1.00	1	0.00	49	0.01	138,772	38.29
JULY 11	6	598	693	1,628	0.45	2,467	0.69	24	0.01	123	0.03	137,450	38.31
JULY 14	6	597	655	1,751	0.49	822	0.23	141	0.04	402	0.11	116,930	32.64
JULY 18	6	567	575	1,107	0.33	396	0.12	502	0.15	503	0.15	57,749	16.98
JULY 21	6	539	543	621	0.19	164	0.05	1,278	0.40	1,022	0.32	39,643	12.26
JULY 25	6	494	508	329	0.11	109	0.04	6,323	2.13	1,488	0.50	24,893	8.40
JULY 28	6	552	561	333	0.10	70	0.02	20,970	6.33	1,572	0.47	16,028	4.84
AUGUST 01	6	594	607	201	0.06	32	0.01	33,954	9.53	1,869	0.52	6,967	1.95
AUGUST 04	6	639	684	206	0.05	105	0.03	76,576	19.97	1,235	0.32	5,152	1.34
AUGUST 08	6	640	701	114	0.03	92	0.02	76,345	19.88	835	0.22	2,890	0.75
AUGUST 10	6	596	645	73	0.02	9	0.00	53,874	15.07	517	0.14	1,376	0.38
AUGUST 12	6	624	677	115	0.03	11	0.00	84,700	22.62	469	0.13	1,422	0.38
AUGUST 15	6	613	625	76	0.02	14	0.00	59,724	16.24	215	0.06	663	0.18
AUGUST 18	6	620	641	37	0.01	8	0.00	37,415	10.06	175	0.05	230	0.06
AUGUST 20	6	577	586	29	0.01	5	0.00	24,046	6.95	84	0.02	121	0.03
AUGUST 27	6	532	549	14	0.00	8	0.00	22,683	7.11	109	0.03	93	0.03
AUGUST 31	6	408	421	6	0.00	10	0.00	9,852	4.02	85	0.03	34	0.01
Unknown <sup>a</sup>		2	14	50		510		2,412		26		2,551	
SEASON TOTAL 140		746	15,216	53,860	0.60	90,273	1.05	510,829	6.24	10,831	0.13	1,364,533	16.40
Average weight (lbs)				13.43		7.28		6.98		3.38		6.84	

a ADF&G test fishery catch

b CPUE = Catch Per Unit Effort = HARVEST/(HOURS FISHED X NUMBER OF PERMITS)

Table 5. Middle Kuskokwim River, District 2, commercial harvest by species and fishing effort by period, 1988.

PERIOD	HOURS	PERMITS	LANDINGS	CHINOOK		SOCKEYE		COHO		PINK		CHUM	
				NUMBERS	CPUE <sup>a</sup>								
JUNE 24	6	13	14	669	8.58	1041	13.35	0	0.00	0	0.00	4232	54.26
JUNE 28	6	17	21	746	7.31	639	6.26	0	0.00	0	0.00	6087	59.68
JULY 02	6	19	20	468	4.11	579	5.08	0	0.00	0	0.00	8155	71.54
AUGUST 08	6	14	14	6	0.07	0	0.00	1465	17.44	3	0.04	308	3.67
AUGUST 10	6	16	16	10	0.10	0	0.00	3823	39.82	6	0.06	312	3.25
AUGUST 12	6	20	20	3	0.03	2	0.02	5216	43.47	5	0.04	244	2.03
AUGUST 15	6	21	21	1	0.01	0	0.00	2317	18.39	4	0.03	144	1.14
AUGUST 18	6	15	15	2	0.02	0	0.00	1483	16.50	1	0.01	116	1.29
AUGUST 20	6	17	17	1	0.01	0	0.00	1573	15.42	1	0.01	94	0.92
SEASON TOTAL	54	29	158	1906	2.25	2261	2.75	15879	16.78	20	0.02	19692	21.97
Average weight (lbs)				14.16		6.95		6.74		3.15		6.96	

<sup>a</sup> CPUE = Catch Per Unit Effort = HARVEST/(HOURS X NUMBER OF PERMITS)

Table 6. Quinhagak, District 4, commercial harvest by species and fishing effort by period, 1988.

PERIOD	HOURS	PERMITS	LANDINGS	CHINOOK		SOCKEYE		COHO		PINK		CHUM	
				NUMBERS	CPUE <sup>a</sup>								
JUNE 13-14	12	202	207	1716	0.71	151	0.06	0	0.00	0	0.00	1092	0.45
JUNE 16-17	12	94	102	1179	1.05	277	0.25	0	0.00	0	0.00	847	0.75
JUNE 20-21	12	88	99	803	0.76	367	0.35	0	0.00	2	0.00	746	0.71
JUNE 28	12	69	127	4089	4.94	2413	2.91	0	0.00	0	0.00	5449	6.58
JULY 02	12	98	134	1891	1.61	3121	2.65	0	0.00	0	0.00	4337	3.69
JULY 05	12	62	76	967	1.30	2295	3.08	0	0.00	5	0.01	3303	4.44
JULY 08	12	71	94	918	1.08	2453	2.88	0	0.00	38	0.04	3672	4.31
JULY 11	12	66	83	621	0.78	3369	4.25	0	0.00	67	0.08	2940	3.71
JULY 14	12	64	93	596	0.78	3465	4.51	0	0.00	159	0.21	1748	2.28
JULY 18	12	73	80	202	0.23	1454	1.66	1	0.00	760	0.87	1310	1.49
JULY 21	12	79	79	162	0.17	769	0.81	15	0.02	1709	1.80	1380	1.46
JULY 25	12	61	63	135	0.18	393	0.54	519	0.71	2865	3.91	813	1.11
JULY 27	12	49	54	93	0.16	253	0.43	273	0.46	1972	3.35	320	0.54
JULY 29	12	55	61	104	0.16	212	0.32	565	0.86	2943	4.46	353	0.60
AUGUST 01	12	69	75	54	0.07	129	0.16	1315	1.59	2231	2.69	246	0.37
AUGUST 03	12	72	73	74	0.09	81	0.09	2793	3.23	1809	2.09	247	0.30
AUGUST 05	12	60	70	40	0.06	46	0.06	4517	6.27	1133	1.57	98	0.11
AUGUST 08	12	67	72	59	0.07	94	0.12	2991	3.72	1597	1.99	106	0.15
AUGUST 10	12	57	87	19	0.03	10	0.01	5298	7.75	278	0.41	43	0.05
AUGUST 12	12	73	86	45	0.05	64	0.07	3033	3.46	1168	1.33	47	0.07
AUGUST 15	12	77	118	36	0.04	31	0.03	15,733	17.03	594	0.64	53	0.06
AUGUST 17	12	107	112	24	0.02	18	0.01	2775	2.16	415	0.32	15	0.02
AUGUST 19	12	75	82	14	0.02	13	0.01	4373	4.86	257	0.29	15	0.01
AUGUST 22	12	86	91	11	0.01	6	0.01	4502	4.36	329	0.32	13	0.01
AUGUST 24	12	84	112	5	0.00	16	0.02	8673	8.60	389	0.39	7	0.01
AUGUST 26	12	86	99	17	0.02	14	0.01	4825	4.68	242	0.23	8	0.01
AUGUST 29	12	70	74	4	0.00	6	0.01	2701	3.22	118	0.14	3	0.00
AUGUST 31	12	56	66	3	0.00	11	0.02	1524	2.27	99	0.15	3	0.00
SEPTEMBER 02	12	40	41	0	0.00	4	0.01	558	1.16	50	0.10	0	0.00
SEPTEMBER 05	12	34	37	2	0.00	16	0.04	1012	2.48	58	0.14	5	0.00
SEPTEMBER 07	12	29	31	0	0.00	5	0.01	609	1.75	23	0.07	1	0.00
SEPTEMBER 09	12	0	0										
NO COMMERCIAL FISHING - NO BUYERS													
SEASON TOTAL	384	288	2678	13883	0.46	21556	0.82	68,605	2.05	21310	0.89	29220	1.07
Average weight (lbs)				16.03		7.26		8.03		3.67		7.34	

<sup>a</sup> CPUE = Catch Per Unit Effort = HARVEST/(HOURS FISHED X NUMBER OF PERMITS)

Table 7. Goodnews Bay, District 5, commercial harvest by species and fishing effort by period, 1988.

PERIOD	HOURS	PERMITS	LANDINGS	CHINOOK		SOCKEYE		COHO		PINK		CHUM	
				NUMBERS	CPUE <sup>a</sup>								
JUNE 16	12	22	25	251	0.95	696	2.64	0	0.00	0	0.00	1091	4.13
JUNE 20	12	32	37	404	1.05	1989	5.18	0	0.00	0	0.00	3501	9.12
JUNE 23	12	68	107	1639	2.01	2701	3.31	0	0.00	1	0.00	7833	9.60
JUNE 28	12	48	63	1307	2.27	2932	5.09	0	0.00	5	0.01	8369	14.53
JULY 02	12	42	49	234	0.46	2657	5.27	0	0.00	16	0.03	3434	6.81
JULY 05	12	36	49	467	1.08	3328	7.70	0	0.00	44	0.10	3193	7.39
JULY 08	12	47	53	147	0.26	3600	6.38	0	0.00	4	0.01	1894	3.36
JULY 11	12	54	60	124	0.19	2851	4.40	0	0.00	35	0.05	1525	2.35
JULY 14	12	48	55	89	0.15	3173	5.51	0	0.00	110	0.19	1019	1.77
JULY 18	12	48	51	71	0.12	3049	5.29	0	0.00	172	0.30	649	1.13
JULY 25	12	39	41	30	0.06	1534	3.28	24	0.05	440	0.94	227	0.49
JULY 29	12	35	37	32	0.08	1312	3.12	91	0.22	530	1.26	72	0.17
AUGUST 01	12	33	34	27	0.07	811	2.05	171	0.43	683	1.72	55	0.14
AUGUST 03	12	23	23	13	0.05	578	2.09	192	0.70	471	1.71	33	0.12
AUGUST 05	12	25	26	12	0.04	527	1.76	752	2.51	517	1.72	63	0.21
AUGUST 08	12	30	35	19	0.05	926	2.57	1343	3.73	531	1.48	23	0.06
AUGUST 10	12	31	33	10	0.03	659	1.77	1340	3.60	240	0.65	20	0.05
AUGUST 12	12	34	38	7	0.02	564	1.38	1766	4.33	339	0.83	9	0.02
AUGUST 15	12	32	33	5	0.01	398	1.04	2338	6.09	177	0.46	4	0.01
AUGUST 17	12	35	38	16	0.04	498	1.19	3237	7.71	133	0.32	7	0.02
AUGUST 19	12	36	40	10	0.02	360	0.83	4180	9.68	73	0.17	6	0.01
AUGUST 22	12	41	53	10	0.02	353	0.72	4520	9.19	175	0.36	5	0.01
AUGUST 24	12	52	53	17	0.03	244	0.39	3467	5.56	237	0.38	5	0.01
AUGUST 26	12	52	62	8	0.01	204	0.33	2868	4.60	255	0.41	7	0.01
AUGUST 29	12	61	61	4	0.01	155	0.21	1675	2.29	112	0.15	3	0.00
AUGUST 31	12	52	52	6	0.01	88	0.14	1125	1.80	80	0.13	5	0.01
SEPTEMBER 02	12	39	40	2	0.00	57	0.12	792	1.69	49	0.10	4	0.01
SEPTEMBER 05	12	28	28	2	0.01	61	0.18	525	1.56	46	0.14	2	0.01
SEPTEMBER 07	12	24	24	1	0.00	63	0.22	426	1.48	34	0.12	1	0.00
SEPTEMBER 09	12	0	0										
NO COMMERCIAL FISHING - NO BUYER													
SEASON TOTAL	360	125	1300	4964	0.31	36368	2.56	30832	2.32	5509	0.47	33059	2.12
Average weight (lbs)				16.58		7.74		8.28		3.22		8.1	

<sup>a</sup> CPUE = Catch Per Unit Effort = HARVEST/(HOURS FISHED X NUMBER OF PERMITS)

Table 8. Reported and Estimated Total Subsistence Harvest in Sampled Kuskokwim Area Communities by Species, 1988.

	Fishing Families Contacted	Total Reported Harvest					Estimated Total Fishing Families	Estimated Total Expanded Harvest 1/				
		Chinook	Sockeye	Chum	Sockeye /Chum	Coho		Chinook	Sockeye	Chum	Sockeye /Chum	Coho
Kongiganak	12	468	664	1178		917	12	468	664	1178	917	
Tuntutuliak	29	2,138	468	3666		588	35	2580	565	4424	710	
Ek	28	1,795	273	1073		236	31	1987	302	1188	261	
Kasigliuk	31	927	255	2401		614	36	1077	296	2788	713	
Nunapitchuk	33	1,445	556	4613		565	38	1664	640	5312	651	
Atmautluak	18	764	216	3172		228	21	891	252	3701	266	
Vapaklak	31	1,960	689	2876		373	31	1960	689	2876	373	
Vapaskiak	22	2,339	672	6974		902	28	2977	855	8876	1148	
Jscarville	6	415	1,752	2461		50	6	415	1752	2461	50	
Serchal	164	9,866	3,683	11443		5,439	194	11671	4357	13536	6434	
Kwerhuk	50	7,116	3,389	13837		3,442	53	7543	3592	14667	3649	
Akiachak	37	5,325	2,723	9883		4,414	39	5613	2870	10417	4653	
Aklak	23	2,756	1,025	4981		1,173	27	3235	1203	5847	1377	
Tulukak	28	2,176	988	4661		1,017	35	2720	1235	5826	1271	
Lower Kuskokwim River												
Subtotal 2/	512	39,490	17,353	73,219		19,958	586	44,801	19,273	83,098	22,472	
Upper Kalskag	14	2016	1054	5488		105	23	3312	1732	9016	173	
Upper Kalskag	14	747	300	2884		118	15	800	321	3090	126	
Aniak	55	2281	604	6515		1066	63	2613	692	7463	1221	
Chushbaluk	3	34	44	450		72	9	102	132	1350	216	
Upper Kuskokwim River												
Subtotal	86	5,078	2,002	15,337		1,361	110	6,827	2,877	20,919	1,736	
Vapalmute	2	96	48	88		23	2	96	48	88	23	
Hooked Creek	6	481	254	597		69	6	481	254	597	69	
Red Devil	7	175	291	2112		448	7	175	291	2112	448	
Sleetmute	16	274	569	3086		1125	18	308	640	3472	1266	
Stony River	5	210	130	2270		107	5	210	130	2270	107	
Time Village	4	343	0	913		1055	5	426	0	1141	1319	
McGrath	18	253	146	367		308	18	253	146	367	308	
Takotna	2	100	0	200		3	3	150	0	300	0	
Nikolai	10	136	0	2404		530	11	150	0	2644	583	
Upper Kuskokwim River												
Subtotal 3/	70	2,068	1,438	12,037		3,665	75	2,249	146	4453	2210	
Juinbagak	65	2397	819	692		2804	68	2508	857	724	2933	
Joodnews Bay	20	289	898	405		1072	20	289	898	405	1072	
Platinum	6	21	167	43		90	6	21	167	43	90	
Kuskokwim Bay												
Subtotal	91	2707	1884	1140		3966	94	2818	1922	1172	4095	
Kuskokwim Area												
Total	759	49343	22677	101733		28950	865	56695	25581	118180	32426	
Mekoryuk	1	0	1	500		501	0	1	0	1	500	
Tununak 4/	25	52		720		720	na	31	64		893	
Toksook Bay 4/	22	81		1477		1477	na	37	136		2484	
Newtok 4/	4	14		18		18	na	16	56		72	
Nightmute 4/	13	17		557		557	na	17	22		728	
Other Area												
Total	65	164		3273		3273	na	102	279		4678	

1/ Average harvest of fishing families contacted expanded to the estimated total fishing families.

2/ No salmon harvest information is available for residents of Kipnuk or Kwigillingok.

3/ Two households in Telida were known to have fished, but harvest information is unavailable.

4/ Sockeye and chum salmon reported combined.

na - Information not available

Table 9. Kuskokwim area district transfers, 1988.

<u>DISTRICT W-1 HOME</u>		<u>DISTRICT W-2 HOME</u>	
To W-2:	5	To W-1:	10
To W-4:	143	To W-4:	1
To W-5:	23	To W-5:	1
<u>DISTRICT W-4 HOME</u>		<u>DISTRICT W-5 HOME</u>	
To W-1:	34	To W-1:	6
To W-2:	0	To W-2:	0
To W-5:	44	To W-4:	16
Total transfers:	283		

Table 10. Projections of the 1989 Kuskokwim Area commercial salmon harvests in thousands of fish by species.

Species	Management Region		Total Kuskokwim Area <sup>a</sup>
	Kuskokwim River	Kuskokwim Bay	
Chinook	19 - 56	17 - 43 <sup>b</sup>	36 - 99
Sockeye	48 - 137	15 - 58	63 - 195
Coho	196 - 400 <sup>c</sup>	48 - 92 <sup>d</sup>	244 - 492
Pink	0 <sup>e</sup>	0 <sup>e</sup>	0 <sup>e</sup>
Chum	199 - 1,380	13 - 83	212 - 1,463
Total	462 - 1,973	93 - 276	555 - 2,249

- a Except as noted all the projections are based on the previous (1983-87) average catches in all districts.
- b The chinook salmon catches in Kuskokwim Bay have declined in recent years. The projection is based on the recent 5 year average (1984-88) to exclude the record catches made in 1983.
- c Kuskokwim River coho salmon have displayed a strong odd-even cycle in recent years. This projection is based on the average odd year catch for the previous 10 years.
- d The 1984 coho salmon catches were the largest on record and 40% above average. The projection is based on the recent (1985-88) four years to exclude the unusually high 1984 catches.
- e Pink salmon catches are typically less than 100 in both the river and the bay during odd years.

Table 11. Kuskokwim Bay subsistence salmon fishery summary, 1988.

VILLAGE	NUMBER FAMILIES CONTACTED	ESTIMATED FAMILIES NOT CONTACTED	NUMBER FISHING FAMILIES SURVEYED	REPORTED HARVEST					ESTIMATED TOTAL NO. FISHING FAMILIES	EXPANDED HARVEST				
				CHINOOK	SOCKEYE	COHO	PINK	CHUM		CHINOOK	SOCKEYE	COHO	PINK	CHUM
GOODNEWS	20	0	20	289	898	1,072	0	405	20	289	898	1,072	0	405
PLATINUM	6	0	6	21	167	90	0	43	6	21	167	90	0	43
GOODNEWS BAY SUB-TOTAL	26	0	26	310	1,065	1,162	0	448	26	310	1,065	1,162	0	448
QUINHAGAK	65	3	65	2,397	819	2,804	0	692	68	2,508	857	2,933	0	724
KUSKOKWIM BAY TOTAL	91	3	91	2,707	1,884	3,966	0	1,140	94	2,818	1,922	4,095	0	1,661

Table 12. Estimated biomass and commercial harvest of Pacific herring in Kuskokwim Area fishing districts, Alaska, 1981 - 1988.

District	Estimated Biomass (st)	Harvest (st)			Roe %	Estimated Value (\$ x1,000)	Exploitation Rate (%)
		Catch	Waste	Total			
<u>1988</u>							
Security Cove	4,906	324	0	324	9.3	362	6.6
Goodnews Bay	4,479	483	0	483	8.0	463	10.7
Cape Avinof	4,108	348	0	348	8.6	264	8.5
Nelson Is.	7,152	775	0	775	9.2	713	10.8
Nunivk Is.	2,800 <sup>a</sup>	-	-	-	-	-	-
Total	23,445	1,930	0	1,930	8.8	1,802	8.2
<u>1987</u>							
Security Cove	2,300	313	0	313	9.7	242	13.4
Goodnews Bay	2,000	321	0	321	7.3	133	16.0
Nelson Is.	8,100	923	0	923	9.2	661	11.4
Nunivak Is.	4,400	414	0	414	7.8	231	9.2
Total	16,800	1,971	0	1,971	8.7	1,267	11.7
<u>1986</u>							
Security Cove	3,700	751	0	751	11.2	535	20.3
Goodnews Bay	3,000	557	0	557	10.4	325	18.1
Nelson Is.	7,300	886	0	886	10.3	428	12.1
Nunivak Is.	6,000	511	0	511	10.1	213	8.5
Total	20,000	2,705	0	2,705	10.5	1,501	13.5
<u>1985</u>							
Security Cove	4,900	703	30	733	10.1	355	15.0
Goodnews Bay	4,300	724	0	724	8.7	309	16.8
Nelson Is.	9,500	977	0	977	10.6	527	10.3
Nunivak Is.	5,700	358	0	358	8.9	146	6.3
Total	24,400	2,762	30	2,792	9.8	1,337	11.4
<u>1984</u>							
Security Cove	5,100	325	10	335	11.8	110	6.6
Goodnews Bay	4,100	667	50	717	10.1	168	17.5
Total	9,200	992	60	1052	10.6	278	11.4
<u>1983</u>							
Security Cove	6,400	1,073	0	1,073	9.4	443	16.8
Goodnews Bay	3,200	435	0	435	9.4	185	13.6
Total	9,600	1,508	0	1,508	9.4	628	15.7
<u>1982</u>							
Security Cove	5,100	813	0	813	9.3	271	15.9
Goodnews Bay	2,600	486	0	486	9.5	188	18.7
Total	7,700	1,830	0	1,830	9.4	459	16.9
<u>1981</u>							
Security Cove	8,300	1,173	0	1,173	8.1	347	14.1
Goodnews Bay	4,300	657	0	657	7.7	196	15.3
Total	12,600	1,830	0	1,830	8.0	543	14.5

<sup>a</sup> Inseason biomass estimate from poor aerial survey, therefore 1988 projected biomass used.

Table 13. Number of buyers and fishermen participating in Kuskokwim Area Pacific herring fisheries, Alaska, 1981-1988.

<u>Year</u>	<u>District</u>	<u>Number of Buyers</u>	<u>Number of Fishermen</u>
<u>1988</u>	Security Cove	4	31
	Goodnews Bay	6	60
	Cape Avinof	1	98
	Nelson Island	7	174
	Nunivak Island	0	0
<u>1987</u>	Security Cove	8	65
	Goodnews Bay	4	117
	Nelson Island	9	235
	Nunivak Island	4	61
<u>1986</u>	Security Cove	11	88
	Goodnews Bay	5	104
	Nelson Island	4	163
	Nunivak Island	5	36
<u>1985</u>	Security Cove	6	107
	Goodnews Bay	5	83
	Nelson Island	6	143
	Nunivak Island	5	37
<u>1984</u>	Security Cove	4	38
	Goodnews Bay	4	130
<u>1983</u>	Security Cove	6	94
	Goodnews Bay	4	84
<u>1982</u>	Security Cove	3	107
	Goodnews Bay	3	84
<u>1981</u>	Security Cove	7	113
	Goodnews Bay	5	175

Table 14. Kuskokwim area Pacific herring proportion of biomass by age class, 1988.

District	Age (years)											Total Wt. (st)
	3	4	5	6	7	8	9	10	11	12	13+	
<b>Commercial catch<sup>a</sup></b>												
Security Cove			0.3	3.7	13.3	20.7	33.0	21.0	6.8	0.9	0.3	324
Goodnews Bay			0.4	2.3	15.3	18.6	27.3	25.1	9.7	0.6	0.6	483
Cape Avinof			0.6	1.7	8.6	18.7	37.9	24.7	6.6	1.1	0.0	348
Nelson Island			0.5	1.4	5.9	8.9	26.5	30.6	22.5	3.2	0.5	775
<b>Test Fishery<sup>b</sup></b>												
Security Cove		2.1	7.3	3.6	16.3	12.5	26.2	23.2	6.2	2.2	0.3	4582
Goodnews Bay		6.2	11.1	5.7	13.4	16.0	25.3	15.5	5.1	1.5	0.5	3996
Nelson Island	0.2	4.8	7.7	5.8	12.7	10.9	24.8	23.6	7.9	1.2	0.5	6377
All Districts <sup>c</sup>	0.1	4.4	8.5	5.1	14.0	12.7	25.4	21.3	6.6	1.6	0.4	14955

a Commercial drift gill net

b ADF&G variable mesh gill net

c ADF&G variable mesh gill net catch - all districts combined

Table 15. Kuskokwim area Pacific herring age frequency by district, 1988.

District	Age (years)											Sample Size
	3	4	5	6	7	8	9	10	11	12	13+	
Commercial catch <sup>a</sup>												
Security Cove												
Goodnews Bay												
Cape Avinof			0.9	2.4	10.8	18.9	37.4	22.5	6.0	0.9	0.2	546
Nelson Island												
Test Fishery <sup>b</sup>												
Security Cove		5.0	13.0	5.0	18.0	11.5	22.6	18.0	4.8	1.8	0.3	399
Goodnews Bay												
Nelson Island												
All Districts <sup>c</sup>	0.0	5.0	13.0	5.0	18.0	11.5	22.6	18.0	4.8	1.8	0.3	399

a Commercial drift gill net

b ADF&G variable mesh gill net

c ADF&G variable mesh gill net catch - all districts combined

Table 16. Pacific herring subsistence harvest (st) and effort data from selected Kuskokwim Area, Alaska, 1975-1988<sup>a</sup>.

Village	Year													
	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
<u>Nelson Island</u>														
Tununak	22	15	57	38	34	65	40	48	94	e	43	63	48	49
Unkumiut	33	9	3	11	8	3	10	0	e	e	e	e	d	d
Toksook Bay	34	35	21	37	51	29	14	35			46	70	51	59
Nightmute											3 <sup>b</sup>	21	15	16
Newtok											7 <sup>b</sup>	13	10	12
Total	89	59	81	86	93	97	64	83	94		99	167	124	136
No. of Fishing Families														
	109	42	90	83	54	70	93	65	43		65 <sup>b</sup>	72 <sup>b</sup>	96	104
<u>Nunivak Island</u>														
Mekoryuk											<1	<1		e
No. of Fishing Families														
											11	8 <sup>b</sup>		
<u>Other Kuskokwim Delta</u>														
Chefornak											13 <sup>b</sup>	c	14	e
Kipnuk											9	c	14	c
Kongiganak											3	2	c	e
Kwigillingok		11	1		8	13		13			5	c	c	e
Total		11	1		8	13		13			30	2	28	
No. of Fishing Families														
		8	9		22	19		21			55 <sup>b</sup>	12 <sup>b</sup>	49	
<u>All Areas Combined</u>														
Total Catch	92	75	85	91	112	121	78	107	103	11	138	177	155	136
No. of Fishing Families														
	143	91	129	112	160	150	139	89	80	47	175 <sup>b</sup>	131	184	104

- a Subsistence survey results are believed to accurately reflect harvest trends, however, reported catches reflect minimum figures since all fishermen cannot be contacted.  
b Fishing families were not interviewed or only a portion of fishing families were interviewed as catch was enumerated while on drying racks.  
c Survey not allowed by village council.  
d Unkumiut effort included with Toksook Bay and Nightmute.  
e Not surveyed.

Table 17. Kuskokwim Area Pacific herring commercial fishing periods summary by district, Alaska, 1988.

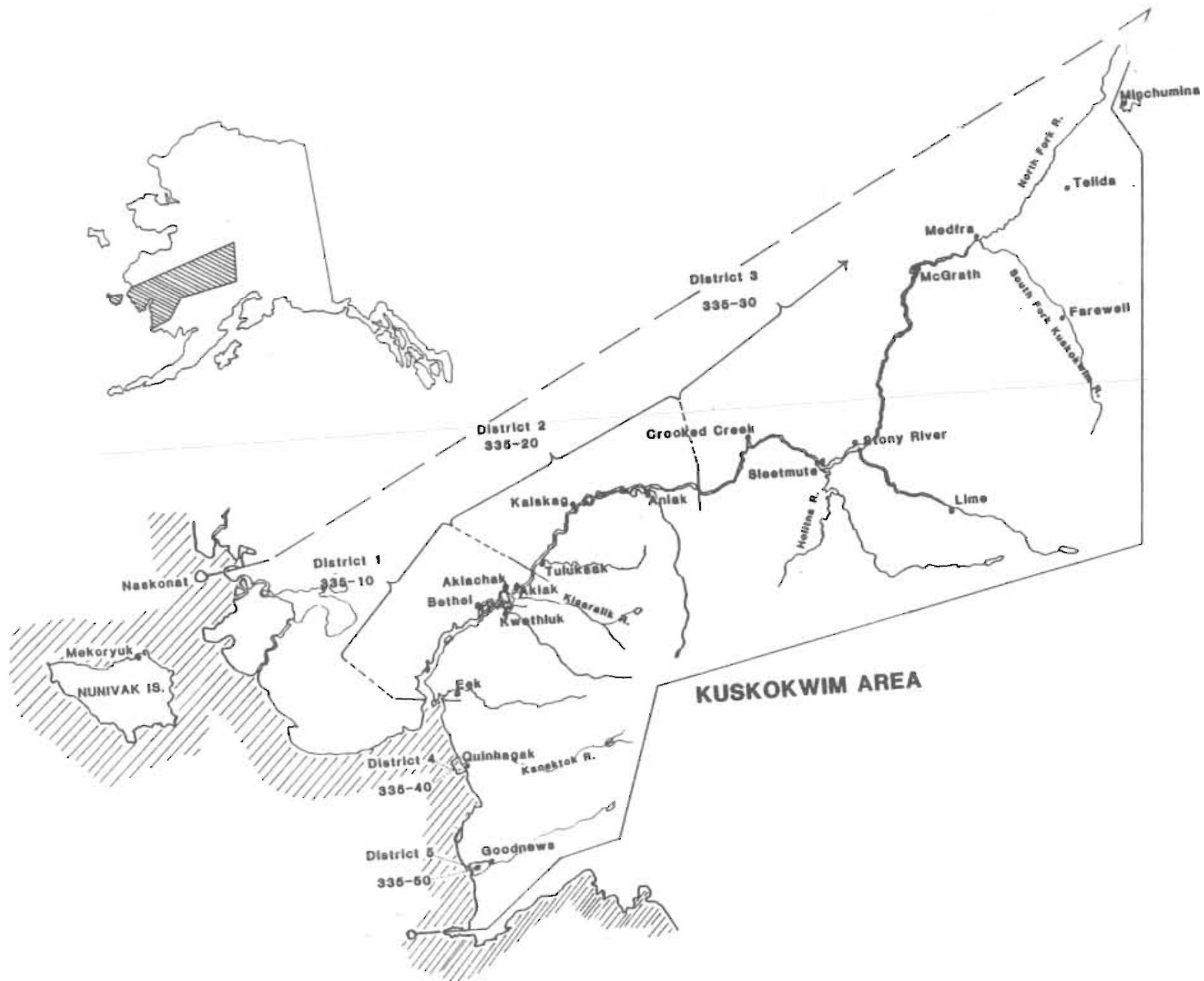
<u>District</u>	<u>Period</u>	<u>Date</u>	<u>Time</u>	<u>Total hours</u>	<u>Harvest (st)</u>
Security Cove	1	5/19	1530-2400	8.5	
		5/20	0000-0800	8.0	
	2	5/20	1000-1700	<u>7.0</u>	<u>324.2</u>
			Total	23.5	324.2
Goodnews Bay	1	5/24	0000-0800	8.0	
	2	5/24	1130-1930	8.0	244.1
	3	5/25	0000-0800	8.0	
	4	5/25	1200-2000	8.0	146.8
	5	5/26	0100-0900	<u>8.0</u>	<u>91.8</u>
		Total		50.0	482.7
Cape Avinof	1	5/29-6/3	1900-1130	88.5	347.7
Nelson Island	1	5/26	0600-1000	4.0	
	2	5/26	1930-2400	<u>3.5</u>	<u>774.7</u>
		Total		7.5	774.7
Nunivak Island	-- NO COMMERCIAL FISHERY --				

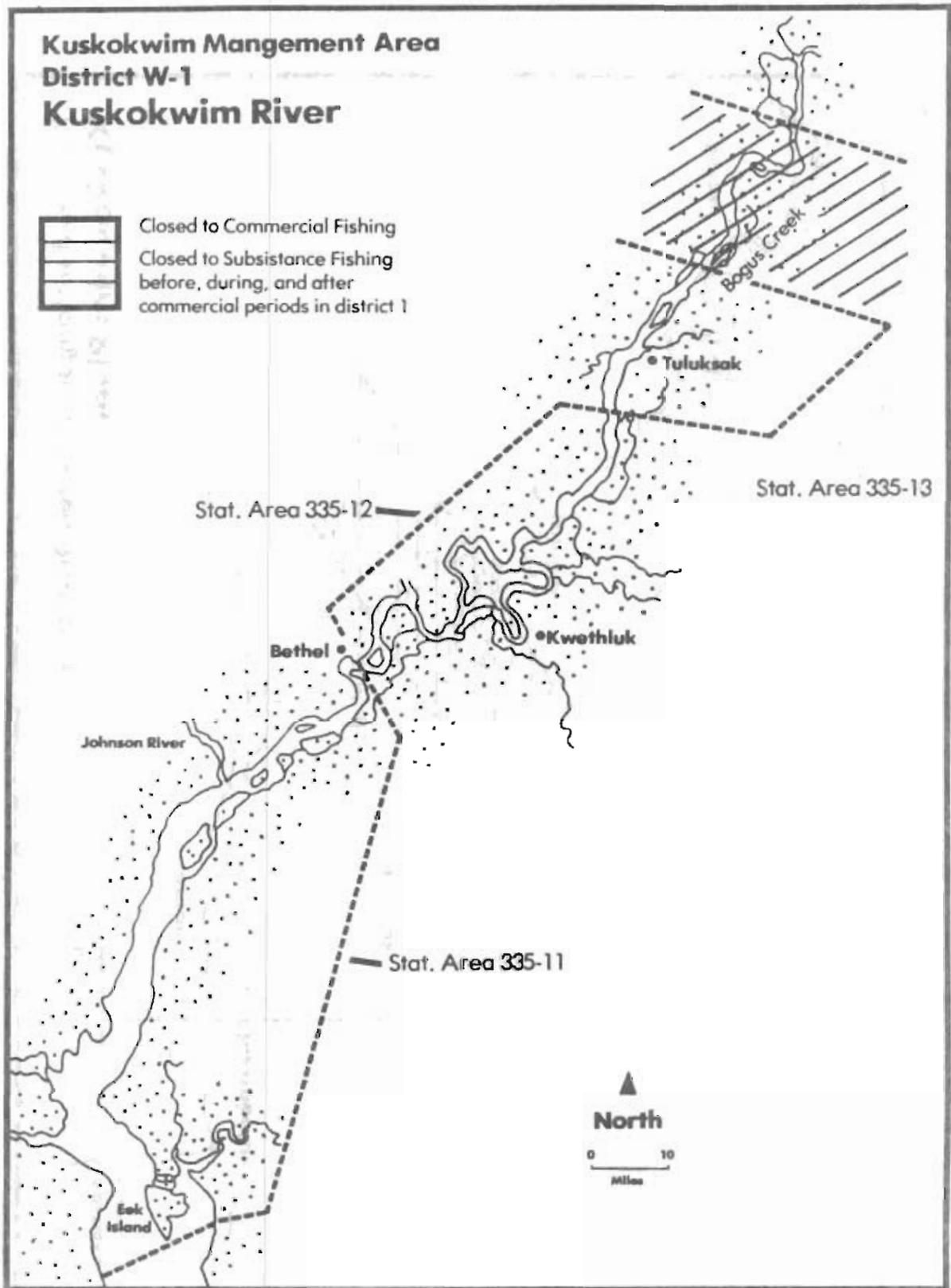
Table 18. Projections of Pacific herring spawning biomass and harvest for commercial fishing districts in the Kuskokwim Area, Alaska, 1989.

<u>District</u>	<u>1989 Projection<sup>a</sup></u>		
	<u>Biomass (st)</u>	<u>Harvest (st)</u>	<u>@ Exploitation Rate (%)</u>
Security Cove	3,312	497	15
Goodnews Bay	3,077	462	15
Cape Avinof	2,777	417	15
Nelson Island	4,709	471	10
Nunivak Island	2,068	310	15
Total	15,943	2,157	

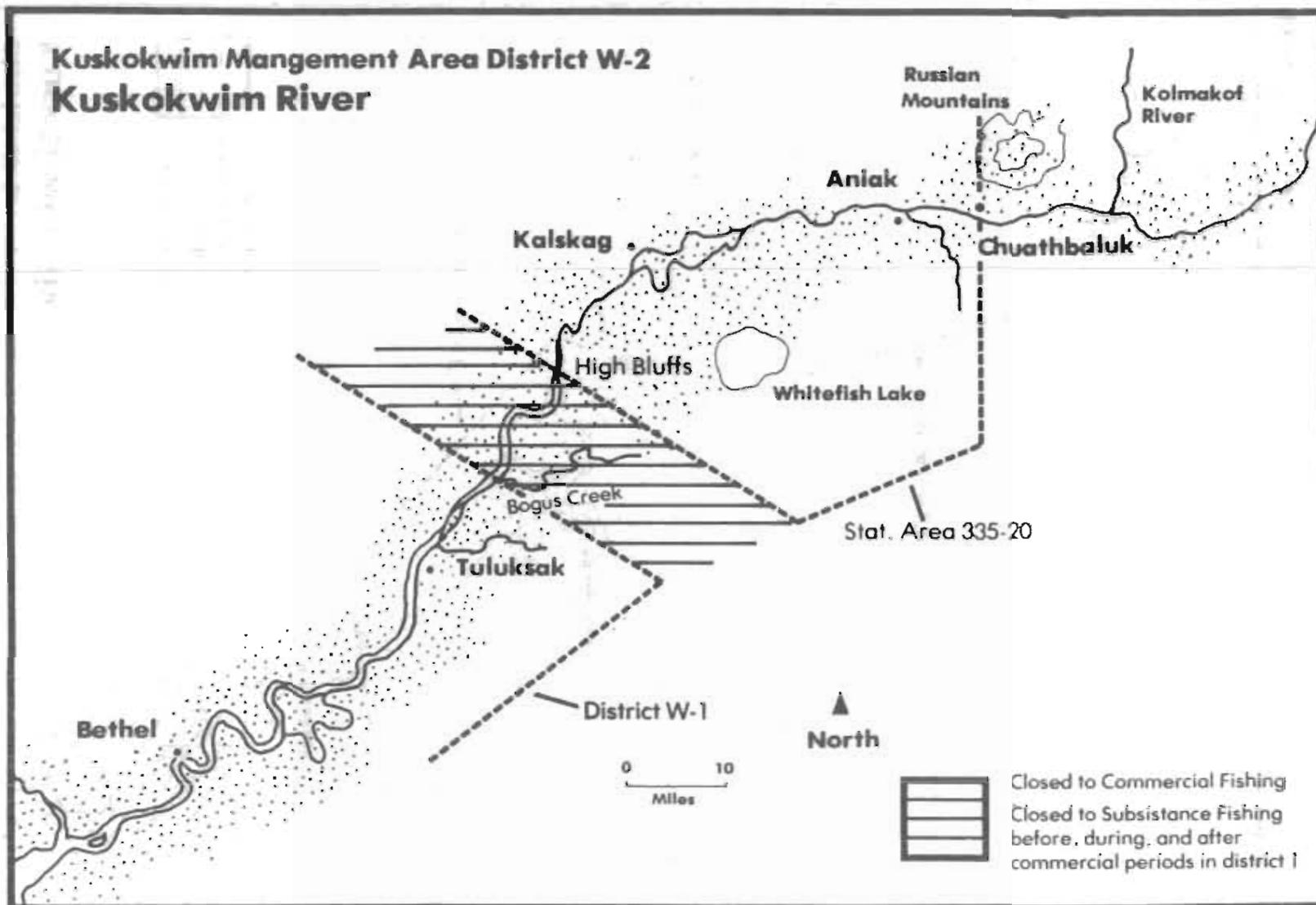
<sup>a</sup> Preseason projection. Projection may be adjusted based on inseason biomass estimates.

## FIGURES





**Figure 2.** Kuskokwim Management Area, District W-1



**Figure 3.** Kuskokwim Management Area, District W-2

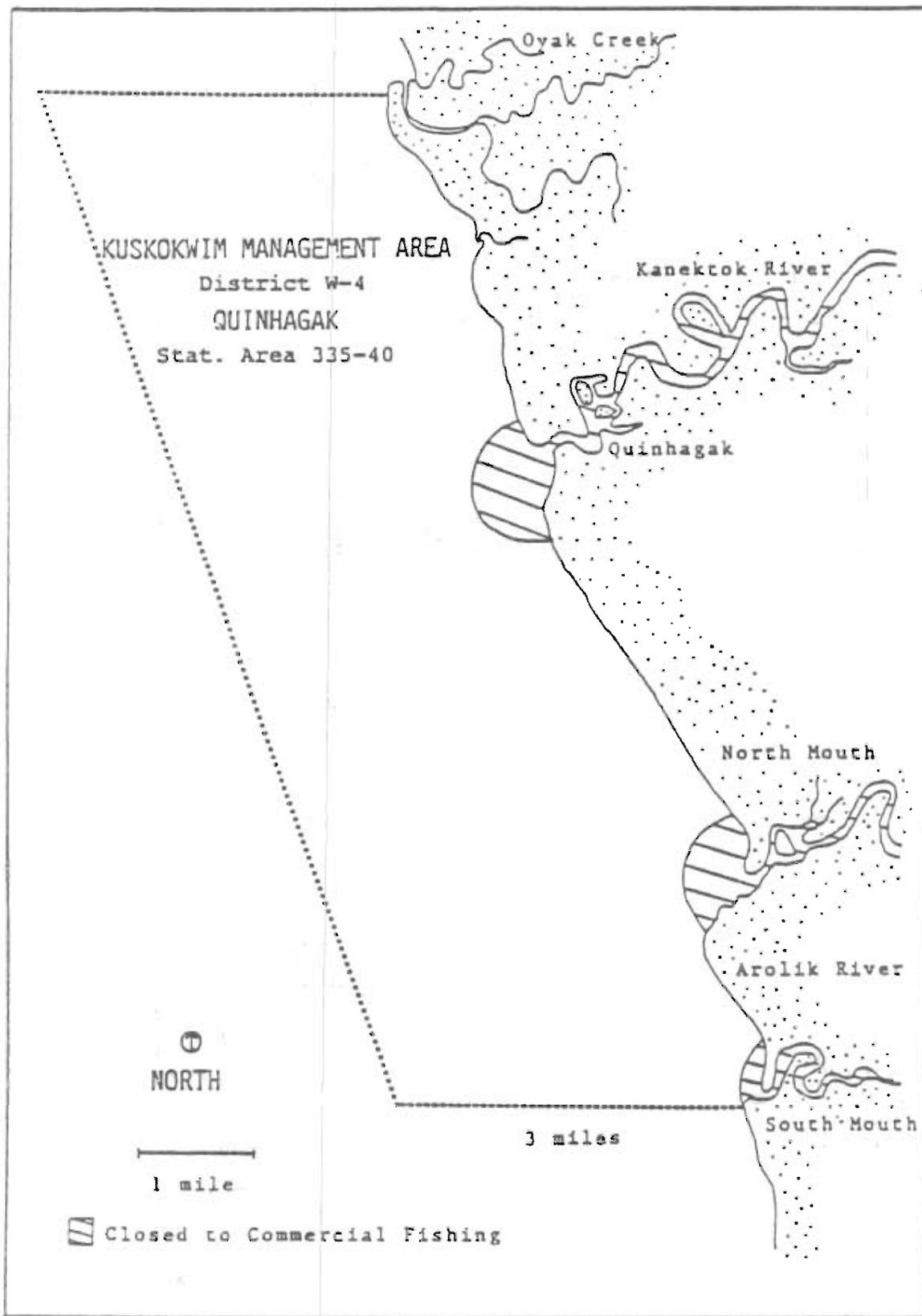


Figure 4. Kuskokwim Management Area District 4, Quinhagak

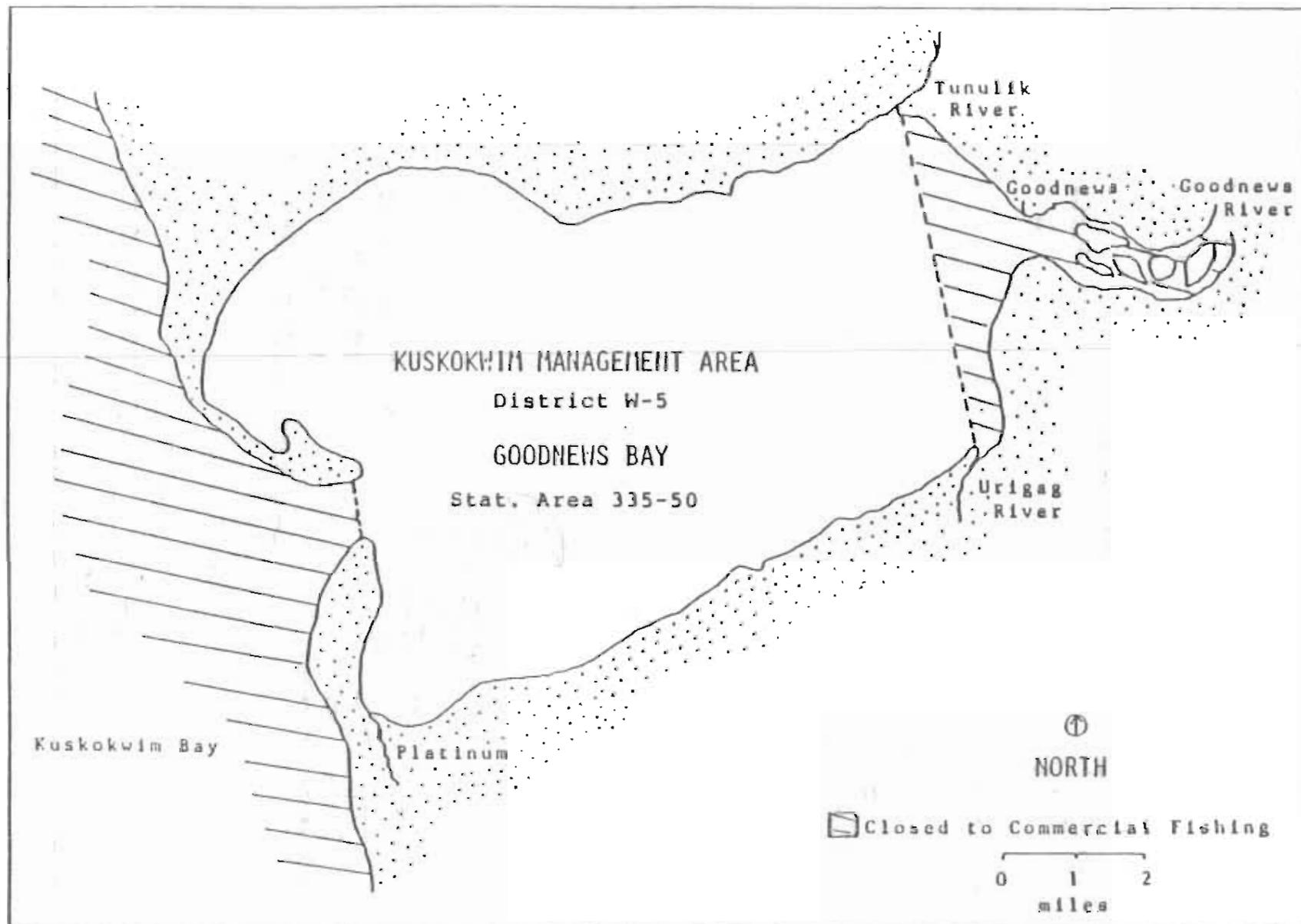


Figure 5. Kuskokwim Management Area District 5, Goodnews Bay

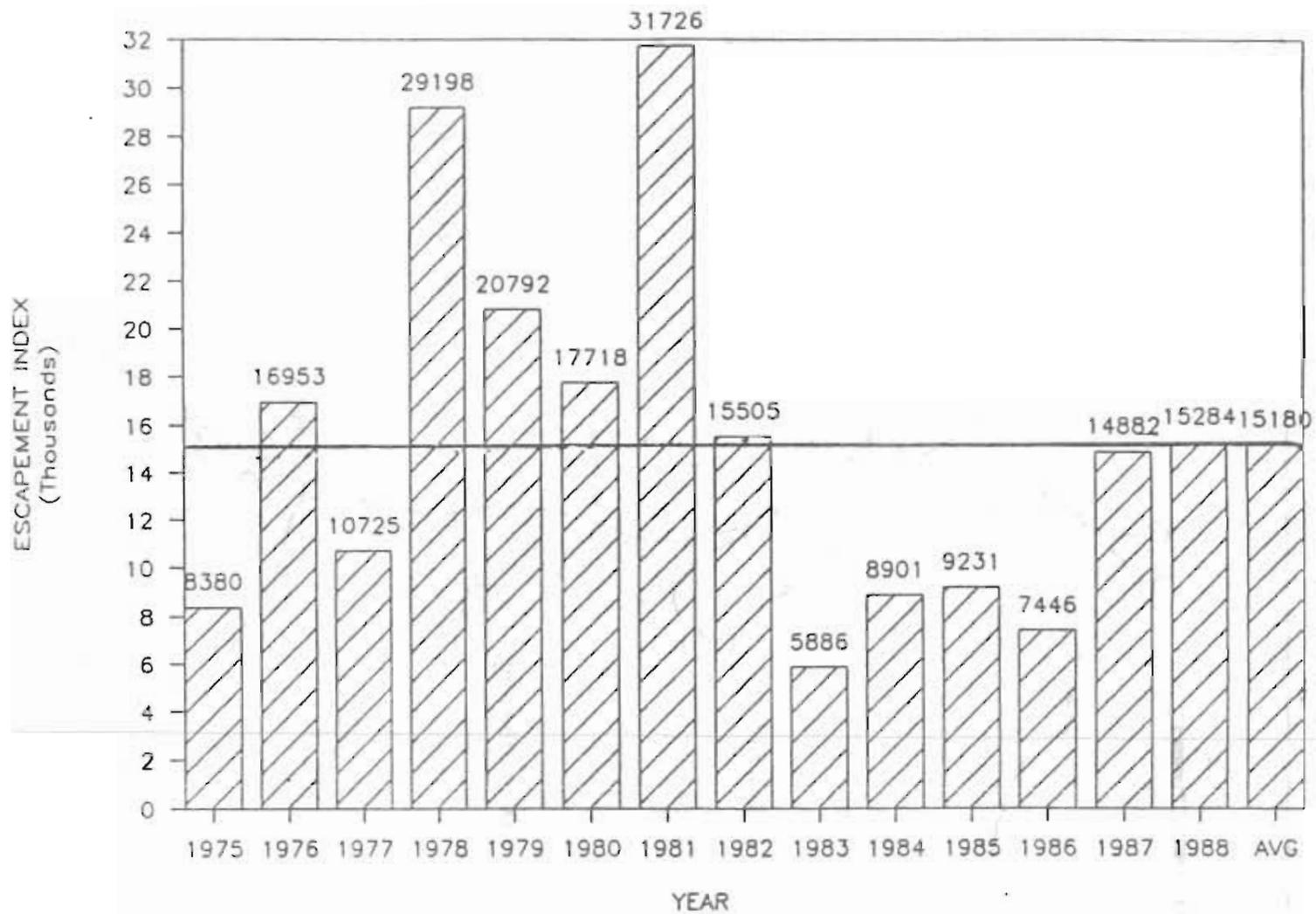


Figure 6. Kuskokwim drainage aerial chinook salmon escapement index, 1975-1988.

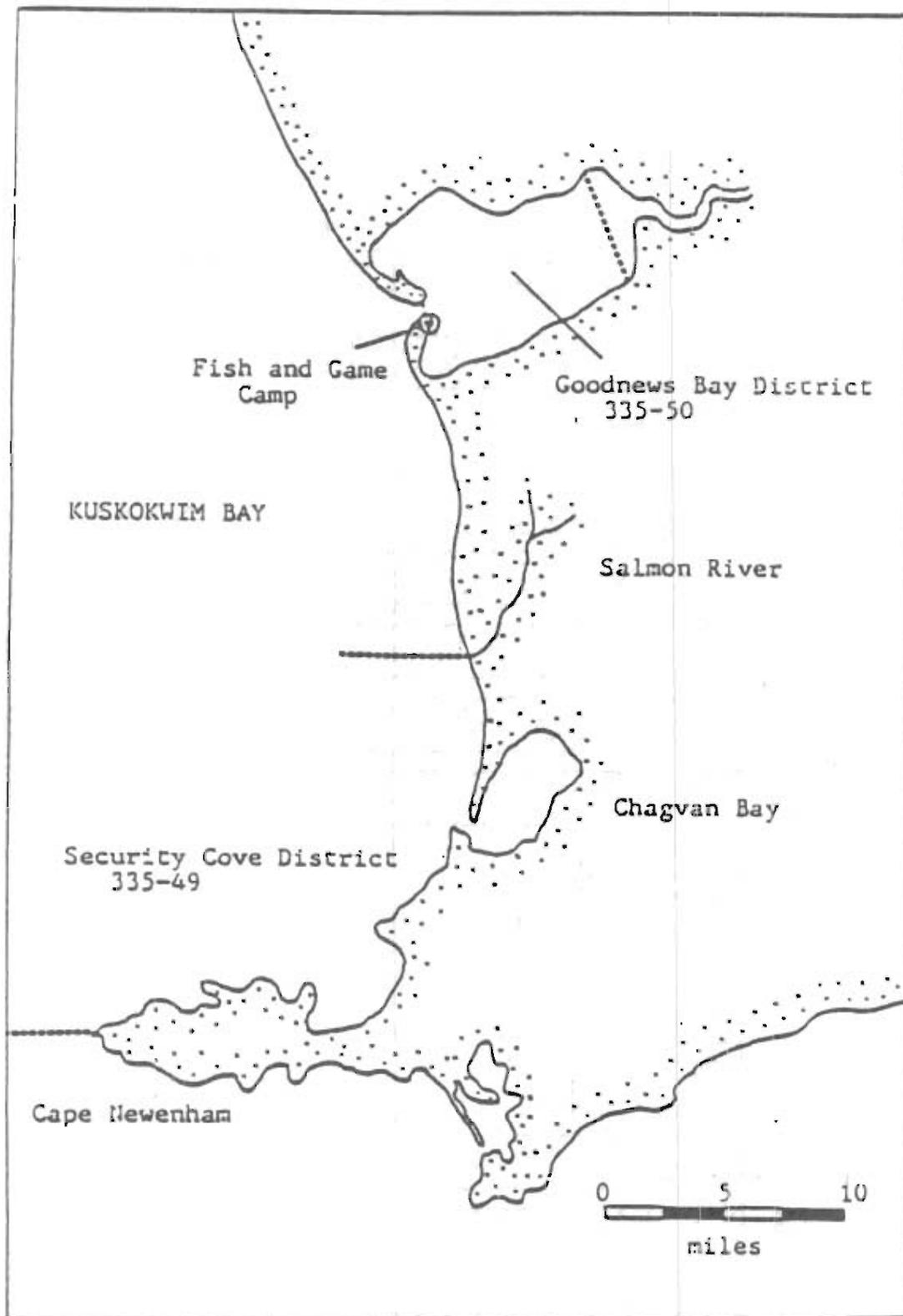


Figure 7. Goodnews Bay and Security Cove Herring Districts

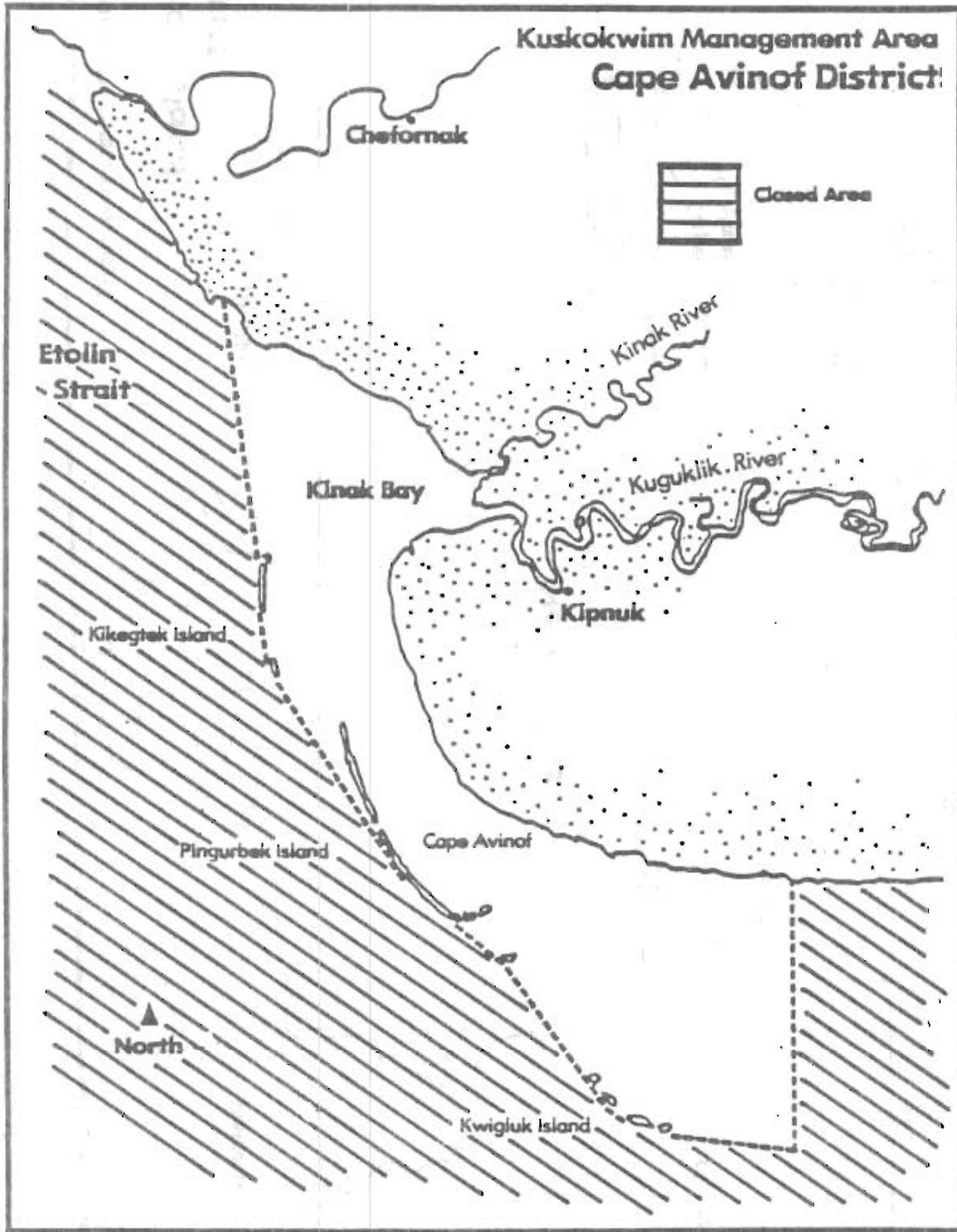


Figure 8. Cape Avinof Herring District

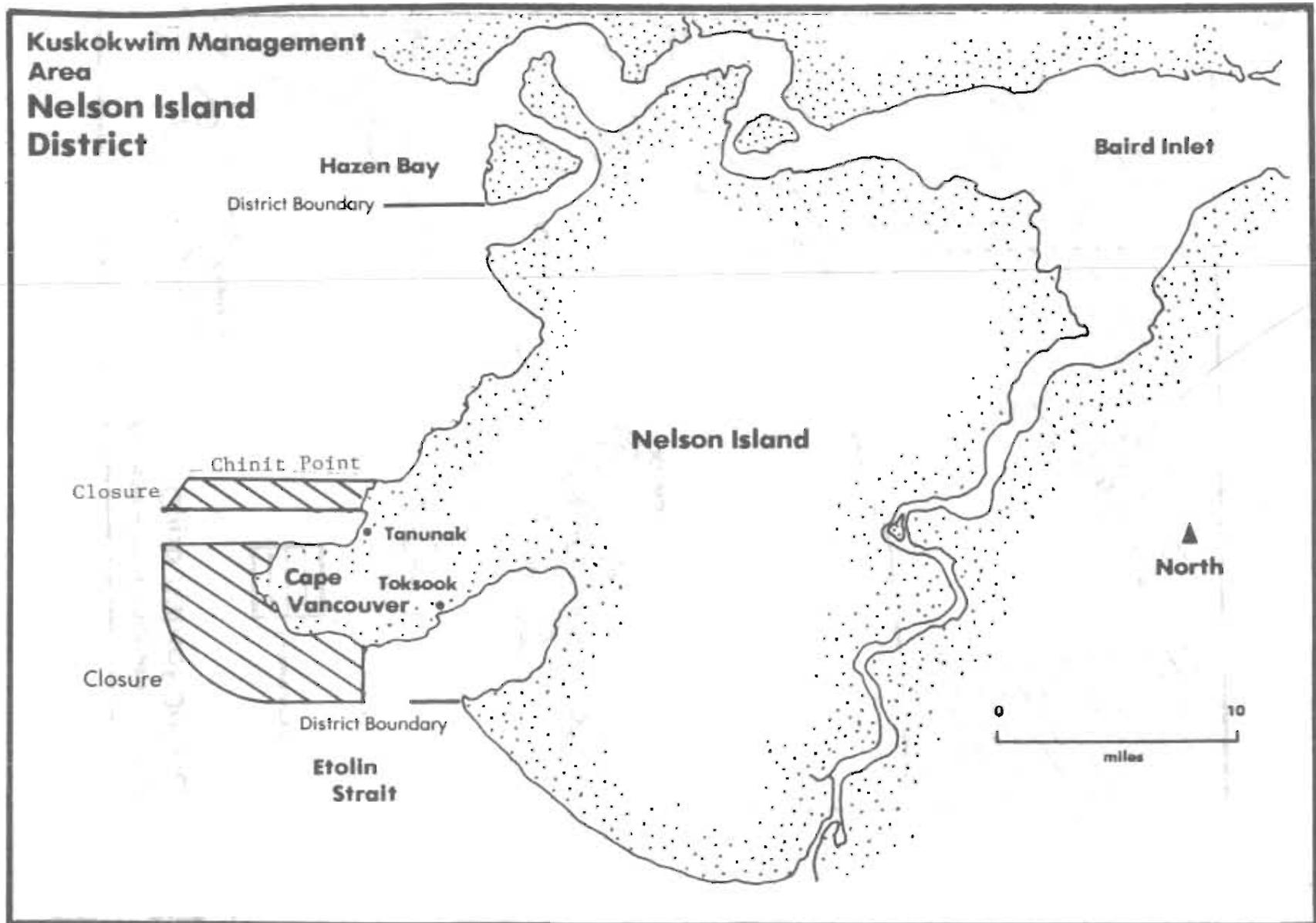


Figure 9. Nelson Island Herring District

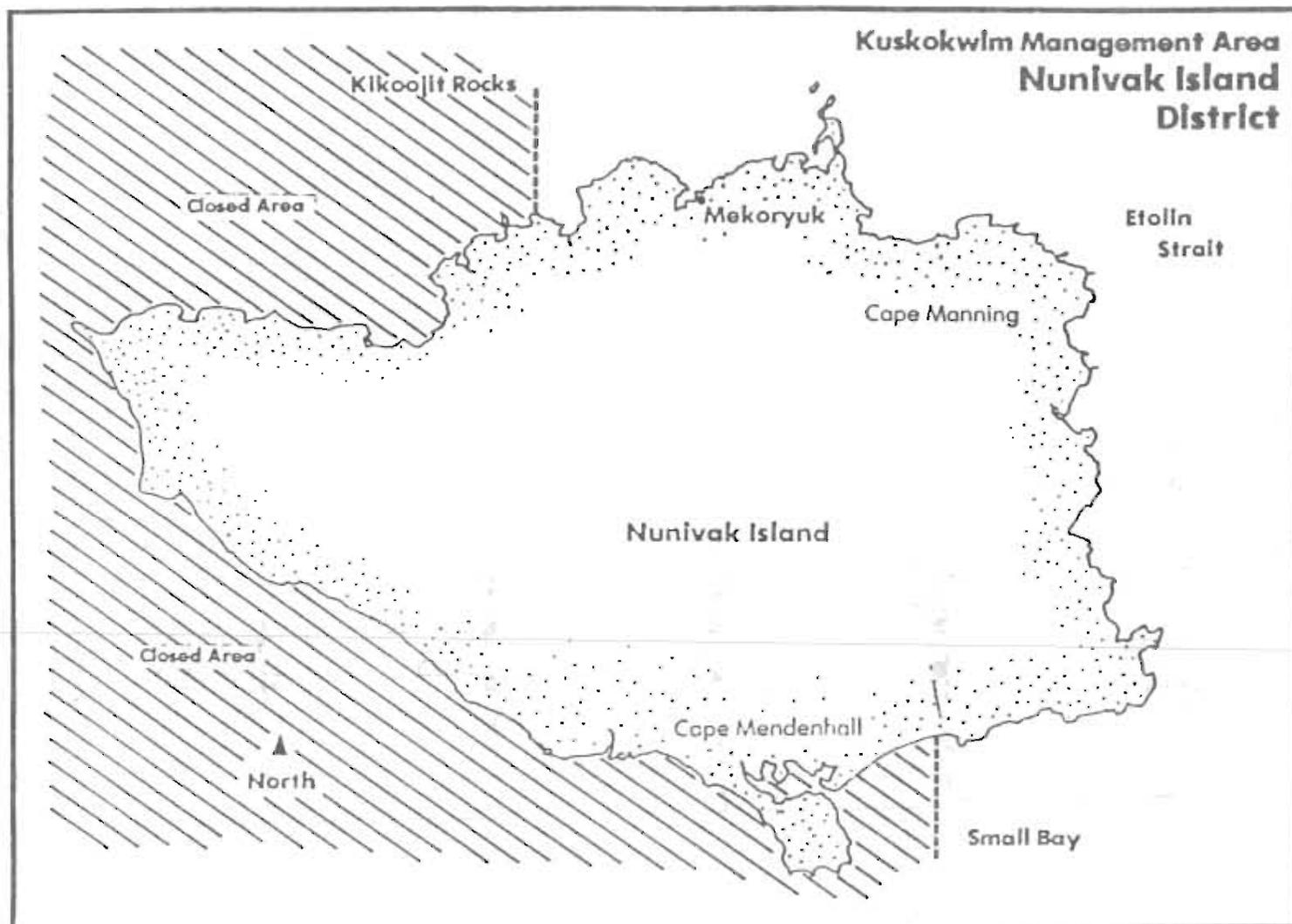


Figure 10. Nunivak Island Herring District

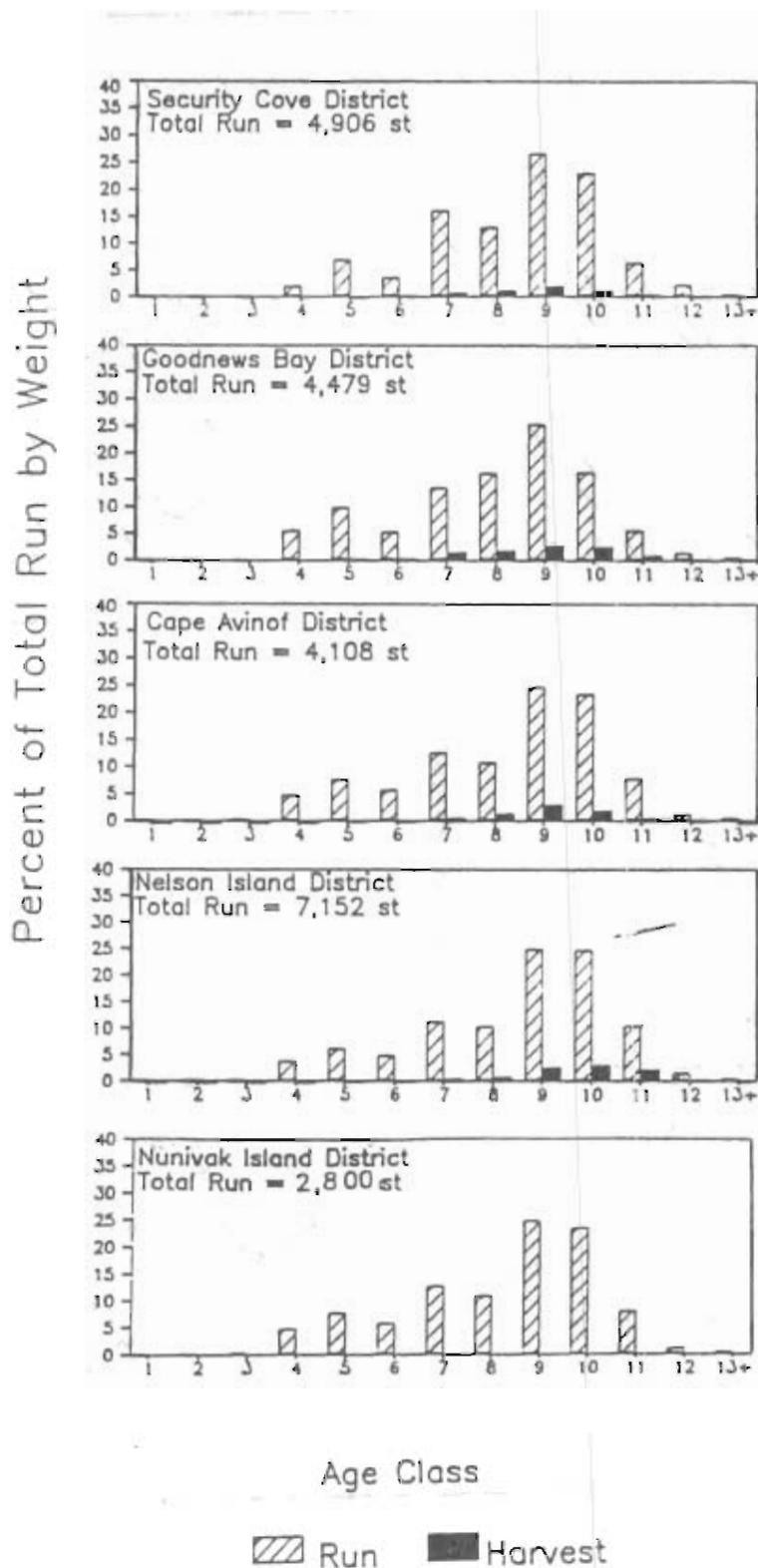


Figure 11. Age composition of Pacific herring in spawning populations and commercial harvest, Kuskokwim Area, 1988.

## APPENDICES

Appendix A.1. Kuskokwim Area escapement index objectives for chinook, sockeye, coho and chum salmon.

		Escapement Objectives <sup>a</sup>			
		Chinook	Sockeye	Coho	Chum
<u>KUSKOKWIM RIVER:</u>					
1.	Kwethluk River	1.0	-	-	7.0
	a. 3-step Mt. to Canyon Cr.	0.2	-	-	-
	b. Canyon Creek				
2.	Kisaralik River				
	a. Airstrip to Kisaralik L.	1.0	-	-	8.0
	b. Kasigluk R. (upper to lower)	1.0	-	-	8.0
3.	Tuluksak R. (Fog R. to Bear Cr.)	0.4	-	-	5.0
4.	Aniak River				
	a. Buckstock R. to Aniak L.	1.5	-	-	10.0
	b. Salmon River	1.6	-	-	3.0
	c. Aniak Sonar Project <sup>b</sup>	-	-	-	250.0
5.	Holitna River				
	a. Nogamut to Kashegok <sup>c</sup>	2.0	1.0	-	49.0
	b. Kogrukluk Weir <sup>c</sup>	10.0	2.0	25.0	30.0
6.	Salmon River (Pitka Fork)	1.3	-	-	-
<u>KUSKOKWIM BAY:</u>					
1.	Kanektok River to Kagati Lake	5.8	32.0	25.0	30.5
2.	Goodnews River System				
	a. Main Fork and lakes	1.6	15.0	15.0	17.0
	b. Middle Fork and lakes	0.0	5.0	2.0	4.0
	c. Middle Fork Tower Project <sup>d</sup>	3.5	40.0	-	15.0

- a Escapement objectives in thousands of fish are preliminary and are subject to change as additional data becomes available. Unless otherwise indicated, escapement objectives are based on aerial index counts which do not represent total escapement, but do reflect annual spawner abundance trends when made using standard survey methods under acceptable survey conditions.
- b Sonar total escapement estimates.
- c Total Kogrukluk River escapement estimates.
- d Tower total escapement estimates.

Appendix A.2. Estimated dollar value of Kuskokwim Area commercial salmon fishery, 1964 - 1988.

<u>YEAR</u>	<u>GROSS VALUE OF CATCH TO FISHERMAN<sup>a</sup></u>	<u>PERMITS<sup>b</sup> FISHED</u>	<u>AVERAGE INCOME</u>
1964	83,030		
1965	90,950		
1966	87,466		
1967	138,647		
1968	290,370		
1969	297,233		
1970	362,470		
1971	371,220		
1972	360,727		
1973	827,735		
1974	1,056,042		
1975	899,178		
1976	1,380,229		
1977	3,891,950		
1978	2,337,470		
1979	3,678,000		
1980	2,725,134		
1981	3,766,525		
1982	4,213,954		
1983	2,670,400		
1984	5,809,000	774	7,505
1985	3,248,948	781	4,159
1986	4,746,089	789	6,015
1987	6,392,822	798	8,011
1988	\$12,514,491	811	\$15,431
FIVE YEAR AVERAGE (1983-1987)	\$4,573,452		

- a Does not include confiscated or the Department's test fish project deliveries. Incentives, post season bonuses, and other monies not reported on the fish ticket is not included in the value of the catch.
- b Permit holders who made at least one delivery. Information not available prior to 1984.

Appendix A.3. Kuskokwim Area commercial, subsistence and personal use<sup>a</sup> salmon catches, 1913-1988.

Date	COMMERCIAL CATCH					Total	SUBSISTENCE\PERSONAL USE CATCH			COMBINED TOTAL
	Chinook	Sockeye	Coho	Pink	Chum		Chinook	Other <sup>b</sup>	Total	
1913	7,800					7,800				7,800
1914		2,667				2,667				2,667
1915										
1916	949					949				949
1917	7,878					7,878				7,878
1918	3,055					3,055				3,055
1919	4,836					4,836				4,836
1920	34,853					34,853				34,853
1921	9,854					9,854				9,854
1922	8,944	6,120				15,064			180,000	195,064
1923	7,254					7,254				7,254
1924	19,253	900	7,167	7,167		34,487	17,700	203,148	220,848	255,335
1925	1,644	5,800				7,444	10,800	230,850	241,650	249,094
1926									738,576	738,576
1927									286,254	286,254
1928									481,090	481,090
1929									560,196	560,196
1930	7,626	2,448				10,074			538,650	548,724
1931	8,541					8,541			389,367	397,908
1932	9,339					9,339			746,415	755,754
1933							6,290	443,998	450,288	450,288
1934							20,800	597,132	617,932	617,932
1935	6,448		8,296			14,744	22,930	554,040	576,970	591,714
1936	624					624	33,500	549,423	582,923	583,547
1937	480					480			537,111	537,591
1938	624		828			1,452	10,153	400,242	410,395	411,847
1939	134					134	14,000	125,425	139,425	139,559
1940	247		500			747	8,000	415,523	423,523	424,270
1941	187		674			861	8,000	415,523	423,523	424,384
1942							6,400	325,339	331,739	331,739
1943							6,400	325,339	331,739	331,739
...										
1946	2,288		674			2,962				2,962
1947	5,356					5,356				5,356
...										
1951	4,210					4,210				4,210
...										
1954	57					57				57
...										
1959	3,760					3,760				3,760
1960	5,969	5,649	5,498		3	17,119	18,752	301,753	320,505	337,624
1961	23,246	2,308	5,090	91	18,864	49,599	27,457	179,529	206,986	256,585
1962	20,867	10,313	12,598	4,340	45,707	93,825	13,455	161,849	175,304	269,129
1963	18,571		15,660			34,231	33,180	137,649	170,829	205,060
1964	21,230	13,422	28,992	939	707	65,290	29,017	190,191	219,208	284,498

- Continued -

Date	COMMERCIAL CATCH						SUBSISTENCE/PERSONAL USE CATCH				COMBINED TOTAL
	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Coho <sup>a</sup>	Small <sup>d</sup>	Total	
1965	24,965	1,886	12,191		4,242	43,284	24,697		250,878	275,575	318,859
1966	25,823	1,030	22,985	268	2,610	52,716	49,022		175,735	224,757	277,473
1967	29,986	652	58,239		8,235	97,112	60,919		214,468	275,387	372,499
1968	43,157	5,887	154,302	75,818	19,694	298,858	35,380		278,008	313,388	612,246
1969	64,777	10,362	110,473	1,251	50,377	237,240	40,208		204,105	244,313	481,553
1970	65,832	12,654	62,245	27,422	60,566	227,919	69,219	11,868	246,810	327,897	555,816
1971	44,936	6,054	10,006	13	99,423	160,432	42,926	6,899	116,391	166,216	326,648
1972	55,482	4,312	23,880	1,952	97,197	182,823	40,145	1,325	120,316	161,786	344,609
1973	51,374	5,224	152,408	634	184,207	393,847	38,526	23,746	179,259	241,531	635,378
1974	30,670	29,003	179,579	60,052	196,127	495,431	26,665	32,780	277,170	336,615	832,046
1975	27,799	17,535	109,814	899	223,532	379,579	47,569		176,389	223,958	603,537
1976	49,262	13,636	112,130	39,998	231,877	446,903	57,899	4,312	223,792	286,003	732,906
1977	58,256	18,621	263,728	434	298,959	639,998	57,925	12,193	203,397	273,515	913,513
1978	63,194	13,734	247,271	61,968	282,044	668,211	38,209	12,437	125,052	175,698	843,909
1979	53,314	39,463	308,683	574	297,167	699,201	57,031		163,451	220,482	919,683
1980	48,242	42,213	327,908	30,306	561,483	1,010,152	62,139	47,335	168,987	278,461	1,288,613
1981	79,378	105,940	278,587	463	485,635	950,003	63,248	28,301	163,554	255,103	1,205,106
1982	79,816	97,716	567,451	18,259	325,471	1,088,713	60,426	45,181	195,691	301,298	1,390,011
1983	93,676	90,834	249,018	379	306,554	740,461	51,020	2,834	149,172	203,026	943,487
1984	74,006	81,307	829,965	23,902	488,482	1,497,662	60,668	15,016	144,651	220,335	1,717,997
1985	74,083	121,221	382,096	111	224,680	802,191	45,718	24,667	131,484	201,869	1,004,060
1986	44,972	142,029	736,910	16,569	349,268	1,289,748	54,256	29,742	142,930	226,928	1,516,676
1987	65,558	170,849	478,594	163	603,274	1,318,438	71,804	18,085	102,555	192,444	1,510,882
1988	74,552	149,927	623,719	37,592	1,443,916	2,329,706	56,695	32,452	143,762	232,873	2,562,579
FIVE YEAR AVERAGE (1983-1987)											
	70,459	121,248	535,317	8,225	394,452	1,129,700	54,418	23,488	152,786	230,691	1,314,446

- a Prior to 1988 there was no personal use fishery and all the catches are subsistence catches.  
b Primarily chum and coho salmon.  
c Reported subsistence coho salmon harvest only. Coho salmon subsistence harvest is poorly documented with no Kuskokwim River estimate attempted.  
d Includes sockeye, pink and chum salmon.

Appendix A-4. Historic salmon escapement data from current Kuskokwim Area projects, 1976 - 1988.

YEAR	Operating Period	SPECIES				
		Chinook	Sockeye	Coho	Pink	Chum
<u>KOGRUGLUK WEIR<sup>a</sup></u>						
1976	06/29 to 07/31	5,818	2,366	b	-	8,417
1977	07/14 to 07/27	1,945	1,637	b	2	19,444
1978	06/28 to 07/31	13,601	1,699	b	2	47,010
1979	07/01 to 07/24	11,420	476	b	1	4,836
1980	07/01 to 07/11	6,572	3,200	b	1	41,777
1981	06/27 to 10/25	16,820	18,077	11,537	6	57,373
1982	07/09 to 09/14	12,185	22,156	40,395	19	79,580
1983	06/22 to 07/02	2,992	1,176	8,513	-	9,407
1984	06/19 to 09/15	4,928	4,130	26,538	-	41,484
1985	06/29 to 09/07	4,438	4,366	18,520	-	17,181
1986	07/06 to 10/05	4,296	4,179	21,431	-	15,511
1987	08/09 to 09/23 <sup>b</sup>	4,063	973	25,870	-	17,422
1988	07/05 to 09/17	11,194	6,158	12,799	-	41,881
<u>ANIAK SONAR<sup>c</sup></u>						
1980	06/22 to 07/30	56,469	-	-	-	1,091,286
	08/16 to 09/12	-	-	81,556	-	-
1981	06/16 to 08/06	42,060	-	-	-	526,320
1982	06/21 to 08/01	33,864	-	-	-	389,226
1983	06/18 to 07/28	4,911	-	-	-	114,869
1984	06/16 to 07/30	-	-	-	-	275,261
1985	06/22 to 07/28	-	-	-	-	253,048
1986	06/26 to 07/24	-	-	-	-	209,080
1987	06/22 to 07/31	-	-	-	-	193,464
1988	06/22 to 07/31	-	-	-	-	401,511
<u>MIDDLE FORK GOODNEWS RIVER TOWER<sup>d</sup></u>						
1981	06/13 to 08/15	3,688	49,108	357	1,327	21,827
1982	06/23 to 08/03	1,395	56,255	62	13,855	6,767
1983	06/11 to 07/28	6,027	25,816	d	34	15,548
1984	06/15 to 07/31	3,260	32,053	249	13,744	19,003
1985	06/27 TO 07/31	2,831	24,131	282	144	10,367
1986	06/16 TO 07/24	2,083	51,069	163	8,133	14,756
1987	06/22 to 07/30	2,274	28,871	62	62	17,519

a Estimates revised in 1988 (Schneiderhan 1989). Pink salmon can pass freely through the Kogruluk Weir.

b Counts estimated from aerial survey data (Schneiderhan 1989).

c Aniak sonar counts are adjusted to provide the total estimated escapements (Schneiderhan 1988c).

d Expanded estimates - the Goodnews River salmon counting tower's scheduled termination date precludes adequate assessment of the coho and pink salmon escapement.

Appendix A.5A. Lower Kuskokwim River, District 1, commercial effort,  
1970 - 1988.

<u>YEAR</u>	<u>UNRESTRICTED MESH SEASON</u>	<u>RESTRICTED MESH SEASON</u>	<u>COHO SALMON SEASON</u>	<u>TOTAL</u>
1970	361	b	266	387
1971	418	216	83	422
1972	405	176	245	425
1973	456	341	411	530
1974	606	467	516	666
1975	472	540	533	737
1976	561	517	516	674
1977	563	522	572	653
1978	615	61	597	723
1979	591	617	613	685
1980	553	579	586	663
1981	589	613	586	679
1982	610	576	596	686
1983	544	619	577	679
1984	520	587	619	654
1985	a	598	627	654
1986	a	631	663	688
1987	a	677	694	703
1988	a	c	c	746
FIVE YEAR AVERAGE (1983-1987)		623	616	676

- a No unrestricted mesh season.
- b No commercial salmon season.
- c Fishery continued without interuption.

Appendix A.5B. Middle Kuskokwim River, District 2, commercial effort,  
1970 - 1988.

<u>YEAR</u>	<u>UNRESTRICTED MESH SEASON</u>	<u>RESTRICTED MESH SEASON</u>	<u>COHO SALMON SEASON</u>	<u>TOTAL</u>
1970	10	b	11	18
1971	22	b	b	22
1972	12	b	b	12
1973	28	b	b	28
1974	36	b	16	37
1975	38	b	b	38
1976	55	b	11	57
1977	83	54	24	105
1978	28	b	16	43
1979	41	b	20	43
1980	37	21	12	43
1981	153	11	16	153
1982	38	50	25	60
1983	14	42	9	43
1984	15	49	32	58
1985	a	17	16	23
1986	a	21	35	43
1987	a	22	18	29
1988	a	19	21	28
FIVE YEAR AVERAGE (1983-1987)				
		30	22	39

a No unrestricted mesh season.  
b No commercial salmon season.

Appendix A.6. Kuskokwim Area subsistence chinook salmon harvest by village, 1960 - 1988.

VILLAGE <sup>a</sup>	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
1 KIPNUK		248	11	123	75	8							0	0	
2 KWIGILLINGOK	250	35	43	106	339	8	250	957	70		220	200	10	75	
3 KONGIGANAK	h	h	h	h						385	891	41	0		
4 TUNTUTULIAK	226	2,226	842	2,853	1,826	1,575	3,097	3,462	2,214	2,195	3,558	1,841	3,214	2,859	1,577
5 EEK						f	f	2,921	4,572	2,566	2,038	1,882	1,969	1,981	2,356
6 KASIGLUK & EEK					1,857	3,123	3,953	7,338	4,051	4,926	5,996	3,527	3,261	3,845	3,767
7 KASIGLUK	135	1,215	127	1,302		f	f	1,032	2,766	1,485	2,888	3,931	1,645	1,292	1,864
8 NUNAPITCHUK	683	2,042	848	1,874	636	490	2,213	1,926	1,750	2,279	4,680	1,978	2,496	2,663	1,165
9 ATMAUTLUAK	h	h	h	h	h	h	h	h	h	h	1,205	548	864	1,106	382
10 NAPAKIAK	1,830	2,573	2,191	3,148	2,677	2,872	3,658	3,895	2,468	3,546	4,960	1,868	2,009	1,763	1,224
11 NAPASKIAK	536	1,258	759	1,569	2,201	1,071	2,710	2,998	1,663	2,227	3,446	1,916	1,578	2,048	900
12 OSCARVILLE	1,968	282	75	309	339	688	322	1,127	393	457	542	570	196	586	180
13 BETHEL	1,923	4,150	1,378	7,019	4,114	3,371	8,046	13,925	6,205	7,472	17,026	8,731	8,371	8,898	4,631
14 KWETHLUK	2,692	3,763	2,329	5,050	3,262	2,887	6,551	6,993	2,848	3,187	7,932	5,564	5,137	3,444	2,694
15 AKIACHAK	1,626	3,052	1,800	2,533	3,488	3,685	4,904	5,543	3,755	2,602	7,022	4,818	3,872	2,592	1,726
16 AKIAK	1,865	3,159	906	2,869	2,495	1,345	3,670	3,660	1,822	1,275	3,290	2,688	1,899	1,895	1,292
17 TULUSAK	737	1,486	493	1,295	572	1,021	1,576	1,709	1,048	1,131	1,995	1,280	1,318	1,322	883
18 LOWER KALSKAG	961	571	f	f	710	f	f	f	1,502	2,102	2,146	2,355	2,604	1,309	1,586
19 UPPER KALSKAG	667	1,049	f	f	1,143	f	f	f	1,619	1,623	734	601	401	938	463
20 KALSKAGS COMB.	1,628	1,620	805	2,661	1,853	1,395	3,379	3,567	3,121	3,725	2,880	2,956	3,005	2,247	2,049
21 ANIAK	1,057	688	185	602	1,104	f	2,072	1,280	517	1,406	2,136	1,076	2,105	1,030	1,952
22 ANIAK <sup>b</sup>	1,121	742	195	632	1,178	642	2,211	1,497	551	1,586	2,355	1,255	2,366	1,972	2,626
23 CHUATHBALUK <sup>c</sup>	64	54	10	30	74	f	139	217	34	180	219	179	261	942	674
24 NAPAIMUTE	20	16	44	52	134	8	78	60	94	19	22	17	20	13	6
25 CROOKED CREEK	747	318	561	859	1,358	374	1,446	585	77	541	684	291	183	269	650
26 GEORGETOWN							12		0	9	2	0	0	0	
27 RED DEVIL	f	40	f	f	f	f			111	142	232	135	182	138	205
28 SLEETMUTE	f	222	f	f	f	f	303	343	207	267	161	181	69	504	269
29 SLEETMUTE <sup>d</sup>	465	262	144	228	314	79			318	409	393	316	251	642	474
30 KASHEGLOK <sup>e</sup>							10								
31 STONY RIVER	435	25	31		299	79	636	303	176	2,187	105	402	95	287	439
32 LIME VILLAGE									0	50	15	2,119	0	0	
33 MCGRATH							300	25							
34 TAKOTNA															
35 MEDFRA															
36 NIKOLAI															
37 TELIDA															
38 QUINHAGAK								1,349	2,756						
39 GOODNEWS BAY															
40 PLATINUM															
TOTAL	18,752	27,457	13,455	33,180	29,017	24,697	49,022	60,919	35,380	40,208	69,219	42,926	40,145	38,526	26,665

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VILLAGE <sup>a</sup>	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	AVE. 1982-86
1 KIPNUK								60						
2 KWIGILLINGOK		75	382	75										
3 KONGIGANAK		122	361											
4 TUNTUTULIAK	3,492	4,807	2,470	1,656	2,268	2,545	4,446	1,984	2,523	3,519	2,644	2,452	2,522	2,497
5 EEK	2,110	3,232	2,675	1,807	2,003	1,557	1,731	2,578	2,040		1,436			
6 KASIGLUK & EEK	3,823	4,845	3,999	2,415	3,145	3,261	5,108	5,693			3,490			
7 KASIGLUK	1,713	1,613	1,324	608	1,142	1,704	3,377	3,115			2,054			
8 NUNAPITCHUK	2,092	2,578	2,622	2,178	2,109	2,612	2,918	2,577	2,688		2,019	3,410	3,372	2,514
9 ATMAUTLUAK	1,042	1,159	1,015	966	2,242	1,288	1,247	1,752			1,559			
10 NAPAKIAK	2,864	3,330	2,702	2,140	2,191	2,582	3,017	3,500	2,047		1,805		2,760	
11 NAPASKIAK	2,303	3,566	1,989	2,122	2,085	3,160	2,911	2,872			2,155		2,907	
12 OSCARVILLE	891	623	672	349	629	477	495	523			916		745	
13 BETHEL	11,688	13,215	9,408	6,905	11,564	12,591	15,367	13,516	8,492	11,066	6,940	11,984	8,107	9,861
14 KNEHTLUK	3,179	4,193	5,563	3,172	6,919	7,627	6,167	5,897		6,732	4,937	5,824	8,779	5,848
15 AKIACHAK	3,534	4,915	5,407	2,951	4,818	5,405	3,094	4,468		5,588	3,254		4,871	
16 AKIAK	2,837	3,076	2,880	1,850	3,567	3,355	2,386	2,745		3,413	2,975		3,683	
17 TULUKSAK	1,338	1,411	2,906	1,906	1,489	2,807	2,446	2,220	1,671	2,286	2,749		3,712	
18 LOWER KALSKAG	2,755	4,536	1,750	1,951	2,821	3,917	3,271	2,594		3,242	1,707	1,666		2,204
19 UPPER KALSKAG	1,752	1,413	2,813	1,253	1,590	1,889	1,171	963		657	605	587		693
20 KALSKAGS COMB.	4,507	5,949	4,563	3,204	4,411	5,806	4,442	3,557		3,899	2,312	2,253		2,847
21 ANIAK	1,391	1,490	4,991	1,331	2,634	2,750	3,102	2,071	3,174	1,847	1,828	4,624	2,131	2,258
22 ANIAK <sup>b</sup>	1,985	2,147	6,498	2,569	4,823	4,257	3,943	3,562			2,930			
23 CHUATHBALUK <sup>c</sup>	594	657	1,507	1,238	2,189	1,507	841	1,491			1,102			
24 NAPAIMUTE	16	420	176	144	149	90	45	138			53			
25 CROOKED CREEK	238	264	619	488	728	654	512	515			218			
26 GEORGETOWN			66	0		93								
27 RED DEVIL	623	195	324	153	488	255	298	273			176			
28 SLEETMUTE	256	356	684	300	755	220	728	242		154	745			
29 SLEETMUTE <sup>d</sup>	879	551	1,008	453	988	475					921			
30 KASHEGELOK <sup>e</sup>			h	156	233	92								
31 STONY RIVER	761	620	33	182	171	332	233	419			167			
32 LIME VILLAGE	100	33	0		38									
33 MCGRATH					581			160	830	730	59			
34 TAKOTNA					65									
35 MEDFRA							1	1	1	1	1	1		
36 NIKOLAI					60		500	778	750	795	615			
37 TELIDA														
38 QUINHAGAK			2,012	2,328	1,420	1,940	2,562	2,402	2,542	3,109	2,341	2,682	3,663	2,615
39 GOODNEWS BAY			574		228	498	1,309	1,185	1,004	597	399	513	640	740
40 PLATINUM					110	192	100	51	62	32	27	42	176	43
TOTAL	47,569	57,899	57,925	38,209	57,031	62,139	63,248	60,426	51,020	60,668	45,720	54,256	71,804	59,500

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- a Lower Kuskokwim River villages 1 through 16; Middle Kuskokwim River villages 17 through 23; Upper Kuskokwim River villages 24 through 37; Kuskokwim Bay villages 38 through 40.
- b Aniak, Chuathbaluk and Russian Mission.
- c Chuathbaluk and Russian Mission.
- d Sleetmute to Red Devil.
- e Kashegelok and Holitna.
- f Data collected, but reported with another village.
- g Data collected, combined with unspecified village or villages.
- h Village not yet founded.
- i Village abandoned.
- j Kuskokwim Area total estimate based on a village subsurvey.

Appendix A.7. Kuskokwim Area subsistence "small" salmon harvest by village, 1960 - 1988.

VILLAGE <sup>a</sup>	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
1 KIPNUK		2,959	739	1,877	1,395	g							0		
2 KWIGILLINGOK	1,430	320	1,251	685	1,663	g	680	2,847	2,800		340	500	1,284	770	
3 KONGIGANAK	h	h	h	h	h	h	h	h	h	2,481	3,597	610	0	37	
4 TUNTUTULIAK	4,101	8,526	9,692	6,791	8,445	15,943	10,524	15,625	15,384	17,464	10,600	9,964	11,103	13,572	28,321
5 EEK					f	f	1,340	3,071	2,989	3,437	4,855	2,213	783	2,401	4,227
6 KASIGLUK & EEK					3,139	7,077	3,102	5,380	8,240	6,745	10,586	4,256	2,717	8,491	11,000
7 KASIGLUK	1,400	3,657	1,705	1,020	f	f	1,762	2,309	5,251	3,308	5,731	2,043	1,934	6,090	6,773
8 NUNAPITCHUK	2,743	4,868	7,474	2,462	1,171	4,251	3,095	6,278	9,941	6,933	11,412	3,375	5,600	7,663	12,498
9 ATMAUTLUAK	h	h	h	h	h	h	h	h	h	h	1,191	1,197	947	2,818	4,585
10 NAPAKIAK	9,888	5,789	6,167	3,711	12,307	12,170	9,167	14,624	13,280	12,390	16,371	4,427	5,191	8,461	21,494
11 NAPASKIAK	5,199	4,286	5,546	3,584	6,275	25,969	9,090	8,325	12,526	12,237	11,169	7,039	8,858	8,478	20,467
12 OSCARVILLE	3,948	1,680	1,723	1,025	487	8,125	504	1,983	2,104	2,743	4,669	1,675	498	3,081	5,617
13 BETHEL	12,972	12,845	8,470	8,623	15,423	18,820	13,769	16,629	31,522	14,615	33,475	9,905	16,885	33,930	34,892
14 KWETHLUK	32,975	21,106	22,788	13,188	19,186	22,869	23,610	24,294	35,090	23,463	27,702	13,941	11,721	19,565	39,747
15 AKIACHAK	15,932	12,578	10,521	6,725	10,085	23,979	13,998	13,936	21,409	10,646	29,776	12,298	9,266	9,864	15,108
16 AKIAK	13,061	8,205	6,551	8,478	9,659	10,422	10,746	9,085	18,849	9,853	13,003	9,264	5,108	6,118	18,434
17 TULUKSAK	19,261	7,928	8,526	10,289	9,777	11,678	12,048	10,458	11,114	6,057	7,626	5,115	5,145	5,946	13,261
18 LOWER KALSKAG	11,563	7,764	f	f	9,472	f	f	f	8,483	10,621	11,158	3,509	3,490	2,873	12,265
19 UPPER KALSKAG	38,398	27,149	f	f	11,391	f	f	f	11,244	9,413	5,309	3,530	1,460	5,607	9,631
20 KALSKAGS COMB	49,961	34,913	16,478	23,249	20,863	31,783	18,246	24,626	19,727	20,034	16,467	7,039	4,950	8,480	21,896
21 ANIAK	36,673	15,935	10,120	10,608	17,874	f	12,930	16,158	19,221	15,126	10,030	4,933	5,243	13,547	9,305
22 ANIAK <sup>b</sup>	59,043	18,857	13,904	13,237	22,933	18,400	18,555	23,411	29,154	22,649	21,001	10,565	13,752	27,718	13,592
23 CHUATHBALUK <sup>c</sup>	22,370	2,922	3,784	2,629	5,059	f	5,625	7,253	9,933	7,523	10,971	5,632	8,509	14,171	4,287
24 NAPAIMUTE	11,017	6,235	3,898	5,192	4,873	g	3,704	5,862	1,694	1,453	1,224	1,862	4,645	3,451	76
25 CROOKED CREEK	41,596	17,558	27,259	23,166	32,550	17,549	19,201	13,894	12,754	6,810	9,216	3,094	3,658	1,981	4,954
26 GEORGETOWN							70	0	2,030	3,664	800	0	0	10	
27 RED DEVIL	f	1,350	f	f	f	f			2,400	1,130	2,454	1,067	1,695	2,782	2,688
28 SLEETMUTE	f	6,884	f	f	f	f	4,319	6,951	11,773	8,258	4,464	3,203	4,293	2,168	4,212
29 SLEETMUTE <sup>d</sup>	16,926	8,234	9,007	5,367	5,706	9,380			14,173	9,388	6,918	4,270	5,988	4,950	6,900
30 KASHEGELOK <sup>e</sup>							670								
31 STONY RIVER	1,700	2,642	1,855		4,254	12,463	3,956	9,488	12,808	12,080	8,407	2,293	3,000	3,875	4,328
32 LIME VILLAGE									1,200	2,400	1,260	3,702	0	0	
33 MCGRATH							1,000	50							
34 TAKOTNA															
35 MEDFRA								750							
36 NIKOLAI								900							
37 TELIDA								0							
38 QUINHAGAK								6,023	2,209						
39 GOODNEWS BAY															
40 PLATINUM															
TOTAL	301,753	179,529	161,849	137,649	190,191	250,878	175,735	214,468	278,008	204,105	246,810	116,391	120,316	179,259	277,170

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VILLAGE <sup>a</sup>	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	AVE. 1982-86
1 KIPNUK								60						
2 KWIGILLINGOK		75	382	75										
3 KONGIGANAK		122	361											
4 TUNTUTULIAK	3,492	4,807	2,470	1,656	2,268	2,545	4,446	1,984	2,523	3,519	2,644	2,452	2,522	2,497
5 EEK	2,110	3,232	2,675	1,807	2,003	1,557	1,731	2,578	2,040		1,436			
6 KASIGLUK & EEK	3,823	4,845	3,999	2,415	3,145	3,261	5,108	5,693			3,490			
7 KASIGLUK	1,713	1,613	1,324	608	1,142	1,704	3,377	3,115			2,054			
8 NUNAPITCHUK	2,092	2,578	2,622	2,178	2,109	2,612	2,918	2,577	2,688		2,019	3,410	3,372	2,514
9 ATMAUTLUAK	1,042	1,159	1,015	966	2,242	1,288	1,247	1,752			1,559			
10 NAPAKIAK	2,864	3,330	2,702	2,140	2,191	2,582	3,017	3,500	2,047		1,805		2,760	
11 NAPASKIAK	2,303	3,566	1,989	2,122	2,085	3,160	2,911	2,872			2,155		2,907	
12 OSCARVILLE	891	623	672	349	629	477	495	523			916		745	
13 BETHEL	11,688	13,215	9,408	6,905	11,564	12,591	15,367	13,516	8,492	11,066	6,940	11,984	8,107	9,861
14 KWETHLUK	3,179	4,193	5,563	3,172	6,919	7,627	6,167	5,897		6,732	4,937	5,824	8,779	5,848
15 AKIACHAK	3,534	4,915	5,407	2,951	4,818	5,405	3,094	4,468		5,588	3,254		4,871	
16 AKIAK	2,837	3,076	2,880	1,850	3,567	3,355	2,386	2,745		3,413	2,975		3,683	
17 TULUKSAK	1,338	1,411	2,906	1,906	1,489	2,807	2,446	2,220	1,671	2,286	2,749		3,712	
18 LOWER KALSKAG	2,755	4,536	1,750	1,951	2,821	3,917	3,271	2,594		3,242	1,707	1,666		2,204
19 UPPER KALSKAG	1,752	1,413	2,813	1,253	1,590	1,889	1,171	963		657	605	587		693
20 KALSKAGS COMB.	4,507	5,949	4,563	3,204	4,411	5,806	4,442	3,557		3,899	2,312	2,253		2,847
21 ANIAK	1,391	1,490	4,991	1,331	2,634	2,750	3,102	2,071	3,174	1,847	1,828	4,624	2,131	2,258
22 ANIAK <sup>b</sup>	1,985	2,147	6,498	2,569	4,823	4,257	3,943	3,562			2,930			
23 CHUATHBALUK <sup>c</sup>	594	657	1,507	1,238	2,189	1,507	841	1,491			1,102			
24 NAPAIMUTE	16	420	176	144	149	90	45	138			53			
25 CROOKED CREEK	238	264	619	488	728	654	512	515			218			
26 GEORGETOWN			66	0		93								
27 RED DEVIL	623	195	324	153	488	255	298	273			176			
28 SLEETMUTE	256	356	684	300	755	220	728	242		154	745			
29 SLEETMUTE <sup>d</sup>	879	551	1,008	453	988	475					921			
30 KASHEGELOK <sup>e</sup>			h	156	233	92								
31 STONY RIVER	761	620	33	182	171	332	233	419			167			
32 LIME VILLAGE	100	33	0		38									
33 MCGRATH					581			160	830	730	59			
34 TAKOTNA					65									
35 MEDFRA							1	1	1	1	1	1		
36 NIKOLAI					60		500	778	750	795	615			
37 TELIDA														
38 QUINHAGAK			2,012	2,328	1,420	1,940	2,562	2,402	2,542	3,109	2,341	2,682	3,663	2,615
39 GOODNEWS BAY			574		228	498	1,309	1,185	1,004	597	399	513	640	740
40 PLATINUM					110	192	100	51	62	32	27	42	176	43
TOTAL	47,569	57,899	57,925	38,209	57,031	62,139	63,248	60,426	51,020	60,668	45,720	54,256	71,804	59,500

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- a Lower Kuskokwim River villages 1 through 16; Middle Kuskokwim River villages 17 through 23; Upper Kuskokwim River villages 24 through 37; Kuskokwim Bay villages 38 through 40.
- b Aniak, Chuathbaluk and Russian Mission.
- c Chuathbaluk and Russian Mission.
- d Sleetmute to Red Devil.
- e Kashegelok and Holitna.
- f Data collected, but reported with another village.
- g Data collected, combined with unspecified village or villages.
- h Village not yet founded.
- i Village abandoned.
- j Kuskokwim Area total estimate based on a village subsurvey.

Appendix A.7. Kuskokwim Area subsistence "small" salmon harvest by village, 1960 - 1988.

VILLAGE <sup>a</sup>	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
1 KIPNUK		2,959	739	1,877	1,395	g							0		
2 KWIGILLINGOK	1,430	320	1,251	685	1,663	g	680	2,847	2,800		340	500	1,284	770	
3 KONGIGANAK	h	h	h	h	h	h	h	h	h	2,481	3,597	610	0	37	
4 TUNTUTULIAK	4,101	8,526	9,692	6,791	8,445	15,943	10,524	15,625	15,384	17,464	10,600	9,964	11,103	13,572	28,321
5 EEK					f	f	1,340	3,071	2,989	3,437	4,855	2,213	783	2,401	4,227
6 KASIGLUK & EEK					3,139	7,077	3,102	5,380	8,240	6,745	10,586	4,256	2,717	8,491	11,000
7 KASIGLUK	1,400	3,657	1,705	1,020	f	f	1,762	2,309	5,251	3,308	5,731	2,043	1,934	6,090	6,773
8 NUNAPITCHUK	2,743	4,868	7,474	2,462	1,171	4,251	3,095	6,278	9,941	6,933	11,412	3,375	5,600	7,663	12,498
9 ATMAUTLUAK	h	h	h	h	h	h	h	h	h	h	1,191	1,197	947	2,818	4,585
10 NAPAKIAK	9,888	5,789	6,167	3,711	12,307	12,170	9,167	14,624	13,280	12,390	16,371	4,427	5,191	8,461	21,494
11 NAPASKIAK	5,199	4,286	5,546	3,584	6,275	25,969	9,090	8,325	12,526	12,237	11,169	7,039	8,858	8,478	20,467
12 OSCARVILLE	3,948	1,680	1,723	1,025	487	8,125	504	1,983	2,104	2,743	4,669	1,675	498	3,081	5,617
13 BETHEL	12,972	12,845	8,470	8,623	15,423	18,820	13,769	16,629	31,522	14,615	33,475	9,905	16,885	33,930	34,892
14 KWETHLUK	32,975	21,106	22,788	13,188	19,186	22,869	23,610	24,294	35,090	23,463	27,702	13,941	11,721	19,565	39,747
15 AKIACHAK	15,932	12,578	10,521	6,725	10,085	23,979	13,998	13,936	21,409	10,646	29,776	12,298	9,266	9,864	15,108
16 AKIAK	13,061	8,205	6,551	8,478	9,659	10,422	10,746	9,085	18,849	9,853	13,003	9,264	5,108	6,118	18,434
17 TULUKSAK	19,261	7,928	8,526	10,289	9,777	11,678	12,048	10,458	11,114	6,057	7,626	5,115	5,145	5,946	13,261
18 LOWER KALSKAG	11,563	7,764	f	f	9,472	f	f	f	8,483	10,621	11,158	3,509	3,490	2,873	12,265
19 UPPER KALSKAG	38,398	27,149	f	f	11,391	f	f	f	11,244	9,413	5,309	3,530	1,460	5,607	9,631
20 KALSKAGS COMB	49,961	34,913	16,478	23,249	20,863	31,783	18,246	24,626	19,727	20,034	16,467	7,039	4,950	8,480	21,896
21 ANIAK	36,673	15,935	10,120	10,608	17,874	f	12,930	16,158	19,221	15,126	10,030	4,933	5,243	13,547	9,305
22 ANIAK <sup>b</sup>	59,043	18,857	13,904	13,237	22,933	18,400	18,555	23,411	29,154	22,649	21,001	10,565	13,752	27,718	13,592
23 CHUATHBALUK <sup>c</sup>	22,370	2,922	3,784	2,629	5,059	f	5,625	7,253	9,933	7,523	10,971	5,632	8,509	14,171	4,287
24 NAPAIMUTE	11,017	6,235	3,898	5,192	4,873	g	3,704	5,862	1,694	1,453	1,224	1,862	4,645	3,451	76
25 CROOKED CREEK	41,596	17,558	27,259	23,166	32,550	17,549	19,201	13,894	12,754	6,810	9,216	3,094	3,658	1,981	4,954
26 GEORGETOWN							70	0	2,030	3,664	800	0	0	10	
27 RED DEVIL	f	1,350	f	f	f	f	f	f	2,400	1,130	2,454	1,067	1,695	2,782	2,688
28 SLEETMUTE	f	6,884	f	f	f	f	4,319	6,951	11,773	8,258	4,464	3,203	4,293	2,168	4,212
29 SLEETMUTE <sup>d</sup>	16,926	8,234	9,007	5,367	5,706	9,380			14,173	9,388	6,918	4,270	5,988	4,950	6,900
30 KASHEGELOK <sup>e</sup>							670								
31 STONY RIVER	1,700	2,642	1,855		4,254	12,463	3,956	9,488	12,808	12,080	8,407	2,293	3,000	3,875	4,328
32 LIME VILLAGE									1,200	2,400	1,260	3,702	0	0	
33 MCGRATH							1,000	50							
34 TAKOTNA															
35 MEDFRA								750							
36 NIKOLAI								900							
37 TELIDA								0							
38 QUINHAGAK								6,023	2,209						
39 GOODNEWS BAY															
40 PLATINUM															
TOTAL	301,753	179,529	161,849	137,649	190,191	250,878	175,735	214,468	278,008	204,105	246,810	116,391	120,316	179,259	277,170

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Appendix A.7. (page 2 of 3)

VILLAGE <sup>a</sup>	1975	1976	1977	1978	1979	1980	1981	1982	1983 <sup>h</sup>	1984 <sup>h</sup>	1985	1986 <sup>h</sup>	1987	1988	Ave. 1982-86
1 KIPNUK								280							
2 KWIGILLINGOK		463	1,595	60				h							
3 KONGIGANAK		439	595					206			803				
4 TUNTUTULIAK	7,429	8,390	9,109	5,563	5,300	8,305	5,873	8,500	3,585	5,103	5,934	3,075	6,381		5,799
5 EEK	2,754	3,637	1,286	1,055	625	743	1,188	1,012	1,441		644				
6 KASIGLUK & EEK	6,462	7,681	4,790	2,297	2,804	5,915	4,171	7,888			5,981				
7 KASIGLUK	3,708	4,044	3,504	1,242	2,179	5,172	2,983	6,876			5,337				
8 NUNAPITCHUK	5,447	6,466	8,991	4,369	5,189	6,354	5,465	8,646	7,137		5,799	6,679	5,809		6,762
9 ATMAUTLUAK	2,524	3,361	3,319	3,720	5,170	4,405	2,663	4,787			5,774				
10 NAPAKIAK	11,630	9,265	7,945	5,163	6,281	6,102	6,667	8,618	3,120		5,017		4,256		
11 NAPASKIAK	12,930	21,380	11,588	8,376	5,251	7,391	7,290	10,139			6,991		9,031		
12 OSCARVILLE	3,237	2,376	1,910	1,213	956	1,363	1,260	1,665			2,286		1,573		
13 BETHEL	26,808	26,533	14,957	12,394	21,240	22,593	35,093	37,857	20,267	18,863	12,746	26,866	11,901		24,965
14 KWETHLUK	19,183	26,443	25,405	11,311	14,173	18,188	10,736	16,837		14,516	12,476	15,778	11,484		13,641
15 AKIACHAK	14,008	15,298	18,233	8,824	8,403	11,481	6,292	13,083		13,214	9,176		7,887		
16 AKIAK	13,890	12,163	13,728	8,720	11,705	10,125	10,736	9,339		8,027	8,133		5,748		
17 TULUKSAK	7,819	11,673	7,575	4,386	4,874	7,641	6,500	5,040	5,077	9,407	7,750		5,199		
18 LOWER KALSKAG	9,823	17,158	7,886	3,508	8,659	7,903	3,894	6,925		8,886	5,728	3,734			6,358
19 UPPER KALSKAG	6,904	8,527	11,720	6,100	5,955	6,020	5,746	5,362		2,568	2,087	5,268			3,941
20 KALSKAGS COMB	16,727	25,685	19,606	9,608	14,614	13,923	9,640	12,287		11,454	7,815				10,299
21 ANIAK	9,597	13,355	21,256	7,600	14,936	13,091	11,922	14,946	23,349	8,849	11,127	8,842	7,891		14,079
22 ANIAK <sup>b</sup>	10,158	21,179	26,232	12,325	20,449	15,293	20,382	21,898			16,717				
23 CHUATHBALUK <sup>c</sup>	561	7,824	4,976	4,725	5,513	2,202	8,460	6,952			5,590				
24 NAPAIMUTE	226	1,636	4,892	1,886	2,057	2,531	684	2,392			552				
25 CROOKED CREEK	2,461	3,236	2,934	2,133	3,105	7,165	6,843	3,622			4,158				
26 GEORGETOWN			1,095	0		1,042									
27 RED DEVIL	4,481	4,231	5,445	5,565	7,782	4,651	4,205	7,380			1,230				
28 SLEETMUTE	5,767	7,571	5,111	2,771	1,200	1,670	7,520	2,936		2,208	5,084				
29 SLEETMUTE <sup>d</sup>	10,248	11,802	10,556	8,336	8,982	6,321	11,725	10,316			6,314				
30 KASHEGELOK <sup>e</sup>			4,580	5,239	6,207										
31 STONY RIVER	3,992	5,523	3,300	3,545	3,355	2,827	1,586	2,198			1,307				
32 LIME VILLAGE	1,210	2,800	0		3,580										
33 MCCRATH					5,398			53	2,900	2,450	792				
34 TAKOTNA					0										
35 MEDFRA							j	j	j	j	j	j			
36 NIKOLAI					2,711		3,700	4,360	2,600	5,100	2,900				
37 TELIDA					0		0	0	0	0					
38 QUINHAGAK			4,186	6,243	1,130	1,992	2,737	2,186	776	890	1,008	1,347	2,151		1,519
39 GOODNEWS BAY			856		554	1,823	3,178	2,210	1,308	1,177	903	1,048	1,205		1,755
40 PLATINUM					528	0	333	544	210	42	151	86	328		256
41 MEKORYUK								740							
TOTAL	176,389	223,792	203,397	125,052	163,451	168,987	163,554	195,691	149,172	144,651	131,484	142,930 <sup>k</sup>	102,555		156,910

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- a Lower Kuskokwim River villages 1 through 16; Middle Kuskokwim River villages 17 through 23; Upper Kuskokwim River villages 24 through 37; Kuskokwim Bay villages 38 through 41.
  - b Aniak, Chuathbaluk and Russian Mission.
  - c Chuathbaluk and Russian Mission.
  - d Sleetmute to Red Devil.
  - e Kashegelok and Holitna.
  - f Data collected, but reported with another village.
  - g Data collected, combined with unspecified village or villages.
  - h Data not collected.
  - i Village not yet founded.
  - j Village abandoned.
  - k Preliminary data.
  - l Catches include a majority of chum salmon but include small numbers of sockeye, coho, pink and small chinook salmon.
  - m 1986 Kuskokwim Area total does not include a upper Kuskokwim River estimate.
  - n Expanded Kuskokwim Area total estimate based on a village subsurvey.
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Appendix A.8. Mean salmon weights and prices paid to commercial fisherman, Kuskokwim Area, 1967 - 1988.

Year	Mean Weights - Pounds					Average Price - \$/Pound				
	Chinook	Sockeye	Coho	Pink	Chum	Chinook	Sockeye	Coho	Pink	Chum
1967	27.8	7.4	5.9	a	7.0	0.13	0.05	0.09	a	0.04
1968	23.8	6.2	7.2	4.0	7.9	0.16	0.10	0.09	0.05	0.04
1969	19.6	6.2	7.3	3.6	5.8	0.19	0.15	0.10	0.06	0.07
1970	18.9	5.4	7.3	3.3	6.1	0.20	0.21	0.14	0.08	0.08
1971 <sup>b</sup>	26.2	6.9	6.1	a	6.4	0.17	0.10	0.13	a	0.08
1972	a	a	a	a	a	0.20	a	0.16	a	0.08
1973	a	a	a	a	a	0.25	a	0.26	a	0.19
1974	a	a	a	a	a	0.46	0.34	0.27	0.23	0.25
1975	a	a	a	a	a	0.54	a	0.31	a	0.26
1976 <sup>c</sup>	17.0	6.7	7.8	3.5	7.0	0.64	0.43	0.40	0.25	0.27
1977	22.7	8.3	7.8	3.9	7.3	1.15	0.45	0.65	0.25	0.45
1978	24.2	6.5	7.1	3.9	8.9	0.50	0.49	0.40	0.12	0.32
1979	16.6	6.9	7.9	3.9	7.0	0.66	0.53	0.75	0.11	0.37
1980	14.1	6.7	6.9	3.6	6.4	0.47	0.31	0.64	0.12	0.24
1981	17.8	7.2	6.4	3.5	7.5	0.84	0.61	0.63	0.11	0.23
1982	19.3	7.2	7.3	3.6	7.3	0.82	0.41	0.53	0.05	0.22
1983	18.8	6.8	6.8	3.5	7.4	0.54	0.51	0.39	0.05	0.33
1984	16.4	6.6	7.7	3.2	6.7	0.89	0.52	0.55	0.07	0.28
1985	17.0	7.0	7.5	3.6	7.1	0.71	0.59	0.51	0.05	0.25
1986	17.0	7.2	6.4	3.4	6.8	0.80	0.70	0.60	0.05	0.25
1987	15.2	7.5	7.2	3.7	6.8	1.10	1.30	0.73	0.10	0.27
1988	13.4	7.3	7.0	3.4	6.8	1.30	1.42	1.25	0.05	0.40
Five Year Average (1983-1987)	16.9	7.0	7.1	3.5	6.9	0.81	0.72	0.56	0.06	0.28

a Information unavailable.

b Information was not available for district 5.

c Information was not available for district 4.

Appendix A.9. Fishes commonly found in the Kuskokwim Area<sup>a</sup>.

Species Code	Genus and Species	Common Name
162	<i>Cottus cognatus</i>	Slimy Sculpin
410	<i>Onchornynchus tshawytscha</i>	Chinook Salmon
420	<i>Onchornynchus nerka</i>	Sockeye Salmon
430	<i>Onchornynchus kisutch</i>	Coho Salmon
440	<i>Onchornynchus gorbuscha</i>	Pink Salmon
450	<i>Onchornynchus keta</i>	Chum Salmon
500	<i>Esox lucius</i>	Northern Pike
513	<i>Osmerus mordax</i>	Rainbow Smelt
514	<i>Hypomesus olidus</i>	Pond Smelt
520	<i>Salvelinus alpinus</i>	Arctic Char
541	<i>Onchornynchus mykiss</i>	Rainbow Trout
550	<i>Salvelinus namaycush</i>	Lake Trout
570	<i>Stenodus leucichthys</i>	Inconnu
581	<i>Coregonus nasus</i>	Broad Whitefish
582	<i>Coregonus pidschian</i>	Humpback Whitefish
583	<i>Coregonus sardinella</i>	Least Cisco
584	<i>Coregonus autumnalis</i>	Arctic Cisco
585	<i>Prosopium cylindraceum</i>	Round Whitefish
590	<i>Lota lota</i>	Burbot
601	<i>Lamperta japonica</i>	Arctic Lamprey
610	<i>Thymallus arcticus</i>	Arctic Grayling
630	<i>Dallia pectoralis</i>	Alaska Blackfish
640	<i>Catostomus catostomus</i>	Longnose Sucker
661	<i>Pungitius pungitius</i>	Ninespine Stickleback
113	<i>Eleginus gracilis</i>	Saffron Cod
121	<i>Platichthys stellatus</i>	Starry Flounder
122	<i>Liopsetta glacialis</i>	Arctic Flounder
166	<i>Oligocottus maculosus</i>	Tidepool Sculpin
200	<i>Hippoglossus stenolepis</i>	Pacific Halibut
230	<i>Clupea harengus pallasii</i>	Pacific Herring
516	<i>Mallotus villosus</i>	Capelin

a Based on American Fisheries Society Special Publication No. 12, A List of Common and Scientific Names of Fishes from the United States and Canada (Fourth Edition). Committee and Names of Fishes, Bethesda, Maryland, 1980.

Appendix A.10. Kuskokwim River distances<sup>a</sup>.

	Distance from the Mouth		Distance from Bethel	
	Kilometer	Miles	Kilometer	Miles
Popokamiut (Lower boundry District 1)	-3	-2	-129	-80
Kuskokwim River Mouth 60.80 N, 162.42 W	0	0	-125	-78
Eek Island, Southernmost tip, (Lower boundry District 1)	19	12	-106	-66
Apokak Slough (Lower boundry District 1)	35	22	-90	-56
Eek River	39	24	-87	-54
Kwegooyuk	42	26	-84	-52
Kinak River	48	30	-78	-48
Tuntutuliak Village	56	35	-87	-54
Kialik River	59	37	-66	-41
Fowler Island	83	52	-42	-26
Johnson River	93	58	-32	-20
Napakiak Village	104	65	-21	-13
Napaskiak Village	115	71	-12	-7
Oscarville Village	115	71	-11	-7
Bethel City	125	78	0	0
Gweek River	145	90	20	12
Kwethluk Village	159	99	34	21
Akiachak Village	169	105	43	27
Kasigluk River	173	108	48	30
Kisaralik River	175	109	50	31
Akiak Village	190	118	64	40
Mishevik Slough,	212	132	87	54
Tuluksak Village	218	136	93	58
Bogus Creek (Boundry of District 1)	234	146	109	68
High Bluffs (Boundry of District 2)	264	164	139	86
Mud Creek Slough	297	185	172	107
Kalskag Village	309	192	184	114
Aniak Village, Aniak River	362	225	237	147
Chuathbaluk Village (Upper boundry District 2)	375	233	250	155
Kolmakof River	395	246	270	168
Napamiut Village	410	255	285	177
Holokuk River	415	258	290	180
Oskawalik River	449	279	324	201
Crooked Creek Village	466	290	341	212
Georgetown Village, George River	497	309	372	231
Red Devil Village	526	327	401	249
Sleetmute village	539	335	414	257
Holitna River	540	336	415	258

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	Distance from the Mouth		Distance from From Bethel	
	Kilometer	Miles	Kilometer	Miles
Stony River Village	585	364	460	286
Stony River	587	365	462	287
Swift River	611	380	486	302
Tatlawisksuk River	616	383	491	305
Devil's Elbow	645	401	520	323
Vinasale	740	460	615	382
McGrath Village	815	507	690	429
Middle Fork	889	553	764	475
Big River	801	560	776	482
Pitka Fork	920	572	795	494
Medra Village	928	577	803	499
South Fork	931	579	806	501
East Fork	943	586	818	508
North Fork	943	586	818	508
Nikolai Village	999	621	874	543
Swift Fork	1,136	706	1,011	628
Telida Village	1,184	736	1,059	658
Highpower Creek	1,200	746	1,075	668
Fish Creek	1,284	798	1,159	720
North Fork Lake	1,334	829	1,209	751
Top of Kuskokwim Drainage	1,498	931	1,373	853

a These distances were taken from the USGS 1:36,300 series of topographic maps. The "mouth" was defined as the point where the "grassland" banks are 24 miles apart. Some locations are not on the mainstem of the Kuskokwim River, as a result their mileages appear to be out of sequence since they are listed in the order of the turn off.

Appendix A.11. Estimated swimming speed of salmon in the Kuskokwim River.

<u>Tagged at Tuluksak, 1961<sup>a</sup></u>	<u>AVG/DAY</u>	<u>RANGE</u>
Chinook Salmon	11.5	6.0 - 16.0
Sockeye Salmon	7.7	4.9 - 16.0
Coho Salmon	9.7	3.6 - 13.2
Chum Salmon	12.2	3.4 - 48.0
Pink Salmon	13.2	3.0 - 26.0

Tagged at Tuluksak, 1962<sup>b</sup>

Chinook Salmon	7.07
Sockeye Salmon	11.16
Coho Salmon	N/A
Chum Salmon	13.66
Pink Salmon	14.22

Note comparison of peak catch indicated chinook salmon travel time of 20 miles per day.

Tagged at Enarayak, 7 mi upstream Eek Island<sup>c</sup>

Chinook Salmon	7.7	3.3 - 19.6
Sockeye Salmon	7.0	5.1 - 10.6
Chum Salmon	6.2	5.1 - 36.0

Peak subsistence catches at seven locations Napakiak to Crooked Creek indicate:

Chinook Salmon	16.7
Sockeye Salmon	23.0
Chum Salmon	13.6

a Source: AYK Regional Kuskokwim Stock Separation Report No. 1

b Source: AYK Regional Kuskokwim Stock Separation Report No. 2

c Source: AYK Regional Kuskokwim Stock Separation Report No. 3

Appendix A.12. Commercial freshwater fin fishery catch data, Kuskokwim Area, 1977-1988.

Year	Number of Fishermen <sup>b</sup>	Number Caught <sup>a</sup>		Total Weight (lbs)		Total Value (\$)		
		Whitefish	Burbot	Whitefish	Burbot	Whitefish	Burbot	Total
1977	3	718	0	c	0	952	0	952
1978	b	1,735	0	6,017	0	c	0	c
1979	b	3,219	0	11,211	0	c	0	c
1980	4	603	0	2,173	0	830	0	830
1981	4	1,197	0	4,620	0	2,310	0	2,310
1982	5	1,512	0	6,219	0	2,856	0	2,856
1983	0	0	0	0	0	0	0	0
1984	2	0	651	0	c	0	c	c
1985	5	555	1,829	2,275	2,016	1,137	455	1,593
1986	3	0	0	0	3,428	0	857	857
1987	3	276	0	986	0	789	0	789
1988	3	c	0	2,006	0	1,605	0	1,605

a Does not include catches incidental to the commercial salmon fishery.

b Does not include fisherman who delivered catches incidental to the commercial salmon fishery.

c Data not available.

d Preliminary data.

Appendix B.1. Associated environmental and catch data,  
Bethel, Kuskokwim River, 1965-1988<sup>a</sup>.

YEAR	RIVER BREAKUP	RIVER CLEAR OF ICE	FIRST REPORTED		RIVER FREEZE-UP
			Chinook Salmon	Smelt	
1965	b	b	May 31	May 25	b
1966	June 01	b	June 1 <sup>c</sup>	June 06	Oct. 20
1967	May 06	May 17	May 20	May 25	Oct. 19
1968	May 14	May 17	May 26	b	b
1969	May 06	May 13	May 23	b	b
1970	May 12	May 16	May 21	May 27	Oct. 18
1971	May 24	May 29	June 06	June 07	Nov. 04
1972	May 23	May 28	June 05	June 06	Nov. 03
1973	May 14	May 18	May 27	May 31	Oct. 15
1974	May 07	May 19	May 23	May 25	b
1975	May 19	May 25	May 26	May 29	Oct. 29
1976	May 18	May 18	June 01	b	Oct. 27
1977	May 23	June 01	May 31	June 02	Oct. 18
1978	b	b	May 18	May 22	Oct. 25
1979	Apr 27	May 07	May 16	b	Nov. 19
1980	May 04	May 10	May 17	May 22	b
1981	May 09	May 12	May 22	May 06	b
1982	May 18	May 22	June 01	June 03	Oct. 30
1983	May 11	May 13	May 23	June 01	Oct. 22
1984	May 13	May 23	May 27	May 27	Oct. 18
1985	May 25	May 29	June 03	June 04	Oct. 22
1986	May 11	May 18	May 28	May 28	Oct. 24
1987	May 17	May 20	May 25 <sup>d</sup>	May 31	Nov. 06
1988	May 11	May 15	May 16	b	Nov. 14

- a Environmental data, breakup, clear of ice and freeze-up from National Weather Service
- b Data not available
- c Caught at Kalskag
- d Also first chum

Appendix B.2. Comparative chinook salmon catches by fishing period  
by year in District 1, Lower Kuskokwim River,  
1974 - 1988<sup>a</sup>.

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1974	June 10-11	4,384	422	5,064	0.90
	June 13-14	5,790	488	5,957	1.00
	June 17-18	5,857	506	6,072	1.00
Subtotal <sup>b</sup>		16,031	606	16,992	0.90
	June 27	558	267	1,602	0.40
	July 01-02	561	380	4,560	0.08
	July 04-05	196	282	3,384	0.06
	July 08-09	286	376	4,512	0.06
	July 18	31	190	1,140	0.03
Total		17,663	666	32,190	0.50
1975	June 16	359	12	72	5.00
	June 19-20	1,031	46	532	1.90
	June 23-24	17,235	483	5,796	2.90
Subtotal <sup>b</sup>		18,625	541	6,420	2.90
	June 30	691	279	1,674	0.40
	July 03	636	360	2,160	0.30
	July 07	421	369	2,214	0.20
	July 10	195	304	1,824	0.10
	July 14	179	326	1,956	0.10
Total		20,747	539	16,248	1.20
1976	June 17	6,962	459	2,754	2.50
	June 21	13,048	495	2,970	4.40
Subtotal <sup>b</sup>		20,010	561	5,724	3.40
	June 28	4,143	348	2,088	2.00
	July 01	1,550	415	2,490	0.60
	July 08	894	381	2,286	0.40
	July 12	377	344	2,262	0.20
	July 15	236	265	1,590	0.10
Total		27,177	517	16,440	1.70

- Continued -

## Appendix B.2. (page 2 of 6)

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1977	June 15	12,458	467	2,802	4.50
	June 20	16,227	484	2,904	5.60
Subtotal <sup>b</sup>		28,685	563	5,706	5.00
	June 27	1,337	378	2,268	0.60
	June 30	504	409	2,454	0.20
	July 04	266	331	1,986	0.10
	July 07	407	368	2,208	0.20
	July 14	153	385	2,310	0.06
Total		31,352	653	16,932	1.80
1978	June 09	7,590	509	3,054	2.50
	June 14	6,142	266	1,596	3.90
	June 16	12,341	396	2,376	5.20
	June 22	1,724	72	288	6.00
	June 23	8,342	429	1,716	4.90
Subtotal <sup>b</sup>		36,139	615	9,030	4.00
	June 26	1,964	499	2,694	0.70
	June 29	1,759	422	2,652	0.70
	July 03	894	476	2,856	0.30
	July 06	1,460	485	5,820	0.30
	July 10	694	428	5,136	0.10
	July 10	293	422	2,532	0.10
Total		43,203	617	30,720	1.40
1979	June 11	12,270	523	3,138	3.90
	June 15	12,363	549	3,294	3.80
Subtotal <sup>b</sup>		24,633	591	6,432	3.80
	June 22	5,651	502	3,012	1.90
	June 26	2,277	531	3,186	0.70
	June 29	1,583	542	3,252	0.30

- Continued -

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1979	July 03	1,233	542	3,252	0.40
	July 10	470	520	3,120	0.20
Total		35,847	617	22,254	1.60
1980	June 12	9,891	469	2,814	3.50
	June 18	16,921	468	2,808	6.00
Subtotal <sup>b</sup>		26,812	553	5,622	4.80
	June 23	4,777	426	2,616	1.80
	June 26	1,460	408	2,448	0.60
	July 02	498	383	2,298	0.20
	July 09	445	431	2,586	0.20
Total		33,992	597	15,570	2.20
1981	June 10	11,897	489	2,934	4.10
	June 16	17,985	541	3,246	5.50
Subtotal <sup>a</sup>		29,882	589	6,180	4.80
	June 22	3,830	511	3,066	1.25
	June 25	2,000	508	3,048	0.66
	June 30	2,563	484	2,904	0.88
	July 02	1,707	459	2,754	0.62
	July 06	1,088	461	2,766	0.39
	July 09	491	440	2,640	0.37
Total		42,011	613	23,358	1.80
1982	June 14	4,912	464	2,784	1.80
	June 17	11,285	496	2,892	3.80
	June 21	13,343	499	2,994	4.50
	June 24	8,548	459	1,836	4.70
Subtotal <sup>b</sup>		38,088	610	10,506	3.60

- Continued -

## Appendix B.2. (page 4 of 6)

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1982	June 28	1,943	352	1,408	1.38
	June 30	2,064	483	1,932	1.07
	July 02	1,095	434	1,736	0.63
	July 05	875	372	2,232	0.39
	July 08	748	435	2,610	0.29
	July 12	307	354	2,124	0.14
	<b>Total</b>		<b>45,120</b>	<b>610</b>	<b>22,548</b>
1983	June 13	7,445	489	2,934	2.54
	June 16	5,961	450	2,700	2.21
<b>Subtotal<sup>b</sup></b>		<b>13,406</b>	<b>544</b>	<b>5,634</b>	<b>2.38</b>
	June 20	4,776	474	2,844	1.68
	June 23	3,287	450	2,700	1.22
	June 27	2,566	446	2,676	0.96
	June 30	2,359	547	3,282	0.72
	July 04	1,213	443	2,658	0.46
	July 07	1,202	496	2,976	0.40
	July 11	633	466	2,796	0.23
<b>Total</b>		<b>16,036</b>	<b>619</b>	<b>25,566</b>	<b>0.63</b>
1984	June 18	10,845	484	2,904	3.73
	June 21	6,336	443	2,658	2.38
<b>Subtotal</b>		<b>17,181</b>	<b>520</b>	<b>5,562</b>	<b>3.08</b>
	June 25	3,018	466	2,796	1.08
	June 28	2,625	470	2,820	0.93
	July 02	1,988	483	2,898	0.69
	July 05	1,218	426	2,556	0.48
	July 09	1,211	496	2,976	0.41
	July 12	858	436	2,616	0.33
	July 16	744	373	2,238	0.33
<b>Total</b>		<b>28,843</b>	<b>587</b>	<b>24,462</b>	<b>1.18</b>

-Continued-

## Appendix B.2. (page 5 of 6)

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1985 <sup>c</sup>	June 20	6,519	423	2,538	2.07
	June 24	10,413	488	2,928	3.56
	June 27	8,791	492	2,952	2.98
	July 01	6,168	514	3,084	2.00
	July 04	3,774	460	2,760	1.37
Total		35,665	598	14,262	11.98
1986 <sup>c</sup>	June 26	7,786	514	3,084	2.52
	June 30	4,200	576	3,456	1.22
	July 03	3,224	556	3,336	0.97
	July 07	1,805	586	3,516	0.51
	July 10	1,156	532	3,192	0.36
Total		18,171	631	16,584	5.58
1987	June 18	18,336	526	4,208	4.36
	June 24				
	June 30				
	July 03	5,970	580	3,480	1.72
	July 07	3,636	578	3,468	1.05
	July 11	1,910	597	3,582	0.53
	July 15	1,415	569	3,414	0.41
	July 20	1,227	551	3,306	0.37
	Aug. 06	207	590	3,540	0.06
	Aug. 13	103	604	3,624	0.03
	Aug. 17	76	595	3,570	0.02
Total		4,862	677	17,466	0.28
1988	June 16	12,640	602	4,816	2.62
	June 20	11,708	612	3,672	3.18
	June 24	9,710	644	3,864	2.51
	June 28	5,350	609	3,654	1.46
	July 02	3,531	580	3,480	1.01
	July 05	2,340	579	3,474	0.67
	July 08	1,891	604	3,624	0.52
	July 11	1,628	598	3,588	0.45
	July 14	1,751	597	3,582	0.49
	July 18	1,107	575	3,450	0.32
	July 21	621	539	3,234	0.19
	July 25	329	494	2,964	0.11
	July 28	333	552	3,312	0.10
	Aug 01	201	594	3,564	0.06

-Continued-

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1988	Aug 04	206	639	3,834	0.05
	Aug 08	114	640	3,840	0.03
	Aug 10	73	596	3,576	0.02
	Aug 12	115	624	3,744	0.03
	Aug 15	76	613	3,678	0.02
	Aug 18	37	620	3,720	0.01
	Aug 20	29	577	3,462	0.01
	Aug 27	14	532	3,192	0.00
	Aug 31	56	412	2,472	0.02
Total		53,860	746	81,796	0.66

- a The catch totals exclude small numbers of chinook salmon taken in late July and August.
- b Unrestricted mesh size.
- c Preliminary harvest figures.

Appendix Table B.3. Comparative sockeye salmon catches by fishing period by year in District 1, Lower Kuskokwim River, 1981 - 1988<sup>a</sup>.

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1981	June 10	48	489	2,934	0.02
	June 16	316	541	3,246	0.10
	June 22	3,852	511	3,066	1.26
	June 25	6,037	508	3,048	1.98
	June 30	12,262	484	2,904	4.22
	July 02	9,769	459	2,754	3.55
	July 06	5,510	461	2,766	1.99
	July 09	7,760	440	2,640	2.94
Total		45,554	613	23,358	1.95
1982	June 14	321	464	2,784	0.12
	June 17	1,061	496	2,892	0.37
	June 21	2,432	499	2,994	0.81
	June 24	3,157	459	1,836	1.72
	June 28	9,938	352	1,408	7.06
	June 30	5,824	483	1,932	3.01
	July 02	3,110	434	1,736	1.79
	July 05	2,769	372	2,232	1.24
	July 08	1,786	435	2,610	0.68
	July 12	638	354	2,124	0.30
Total		31,036	610	22,548	1.38
1983	June 13	114	489	2,934	0.04
	June 16	156	450	2,700	0.06
	June 20	3,289	474	2,844	1.16
	June 23	4,807	450	2,700	1.78
	June 27	10,465	446	2,676	3.91
	June 30	12,490	547	3,282	3.81
	July 04	24,540	443	2,658	9.23
	July 07	7,286	496	2,976	2.45
	July 11	3,001	466	2,796	1.07
	Total		66,148	619	25,566
1984	June 18	409	484	2,904	0.14
	June 21	2,618	443	2,658	0.98
	June 25	10,743	466	2,796	3.84
	June 28	10,942	470	2,820	3.88

-Continued-

Appendix Table B.3. (page 2 of 3)

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1984	July 02	8,145	483	2,898	2.81
	July 05	6,798	426	2,556	2.66
	July 09	2,821	496	2,976	0.95
	July 12	2,188	436	2,616	0.84
	July 16	1,121	373	2,238	0.50
Total		45,785	587	24,462	1.87
1985 <sup>b</sup>	June 20	5,246	423	2,538	2.07
	June 24	25,536	488	2,928	8.72
	June 27	26,155	492	2,952	8.86
	July 01	31,082	514	3,084	10.08
	July 04	16,114	460	2,760	5.84
Total		104,133	598	14,262	7.30
1986 <sup>b</sup>	June 26	40,468	514	3,084	13.12
	June 30	22,633	576	3,456	6.55
	July 03	15,766	556	3,336	4.73
	July 07	8,347	586	3,516	2.37
	July 10	5,488	532	3,192	1.72
Total		92,702	631	16,584	5.59
1987	June 18	9,102	526	4,208	2.16
	June 24	24,355	607	4,856	5.02
	June 30	39,112	564	4,512	8.67
	July 03	44,030	580	3,480	12.65
	July 07	9,196	578	3,468	2.65
	July 11	4,611	597	3,582	1.29
	July 15	2,301	569	3,414	0.67
	July 20	774	551	3,306	0.23
Total		99,250	677	32,496	3.05
1988	June 16	7,408	602	4,816	1.53
	June 20	14,502	612	3,672	3.95
	June 24	19,894	644	3,864	5.15
	June 28	17,628	609	3,654	4.82
	July 02	15,102	580	3,480	4.34
	July 05	7,284	579	3,474	2.10
	July 08	3,623	604	3,624	1.00
	July 11	2,467	598	3,588	0.69

-Continued-

Appendix Table B.3. (page 3 of 3)

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
	July 14	822	597	3,582	0.23
	July 18	396	575	3,450	0.11
	July 21	164	539	3,234	0.05
	July 25	109	494	2,964	0.37
	July 28	70	552	3,312	0.21
	Aug 01	32	594	3,564	0.01
	Aug 04	105	639	3,834	0.27
	Aug 08	92	640	3,840	0.02
	Aug 10	9	596	3,576	0.00
	Aug 12	11	624	3,744	0.00
	Aug 15	14	613	3,678	0.00
	Aug 18	8	620	3,720	0.00
	Aug 20	5	577	3,462	0.00
	Aug 27	8	532	3,192	0.00
	Aug 31	10	410	2,460	0.00
Total		89,763	746	81,784	1.10

a The catch totals exclude small numbers of chinook salmon taken in late July and August.

b Unrestricted mesh size.

c Preliminary harvest figures.

Appendix B.4. Comparative chum salmon catches by fishing period by year in District 1, Lower Kuskokwim River, 1971 - 1988<sup>a</sup>.

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1971	June 28-29	11,386	150	180	6.30
	July 01-02	8,949	111	1,332	6.70
	July 05-06	17,672	104	1,248	14.20
	July 08-09	12,603	93	1,116	11.30
	July 12-13	2,550	18	216	11.80
	July 15-16	8,000	69	828	9.70
	July 19-20	5,989	71	852	7.00
<b>Totals</b>		67,149	216	7,392	9.10
1972	June 29-30	9,863	87	1,044	9.40
	July 03-04	19,084	115	1,380	13.80
	July 06-07	19,839	101	1,212	16.40
	July 10-11	13,972	113	1,356	10.30
	July 13-14	6,290	80	960	6.60
<b>Totals</b>		69,048	176	5,952	11.60
1973	June 25-26	19,073	202	2,424	7.90
	June 28-29	47,258	250	6,000	7.90
	July 02-03	21,410	242	2,904	7.40
	July 05-06	31,056	212	2,544	12.20
	July 09-10	24,593	217	2,604	9.40
<b>Totals</b>		143,390	341	16,476	8.70
1974	June 27	27,017	267	1,602	16.90
	July 01-02	55,356	380	4,560	12.10
	July 04-05	27,211	282	3,384	8.00
	July 08-09	50,672	376	4,512	11.20
	July 18	6,661	190	1,140	5.84
<b>Totals</b>		166,917	467	15,198	11.00
1975	June 30	31,216	279	1,674	18.60
	July 03	35,525	360	2,160	16.00
	July 07	39,369	396	2,214	17.80

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## Appendix B.4. (page 2 of 5)

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1975	July 10	39,910	304	1,824	21.90
	July 14	21,092	326	1,956	10.80
Totals		167,112	539	9,828	17.00
1976	June 28	42,464	348	2,088	20.30
	July 01	44,024	415	2,490	17.70
	July 08	48,669	381	2,286	21.30
	July 12	21,153	377	2,262	9.40
	July 15	14,176	265	1,590	8.90
Totals		170,486	517	10,716	15.90
1977	June 27	40,321	378	2,268	17.80
	June 30	58,884	409	2,454	24.00
	July 04	37,500	331	1,986	18.90
	July 07	56,943	368	2,208	25.80
	July 14	24,765	385	2,310	10.70
Totals		218,413	522	11,226	19.50
1978	June 26	44,296	449	2,694	16.40
	June 29	36,793	442	2,652	13.90
	July 03	26,629	476	2,856	9.30
	July 06	48,031	485	5,820	8.30
	July 10	48,931	428	5,136	9.50
	July 13	14,935	422	2,532	5.90
Totals		219,615	617	21,690	10.10
1979	June 22	32,295	502	3,012	10.70
	June 26	53,648	531	3,186	16.80
	June 29	48,643	542	3,252	14.90
	July 03	83,164	542	3,252	25.60
	July 10	32,434	520	3,120	10.40
Totals		250,184	617	15,822	15.80

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Appendix B.4. (page 3 of 5)

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1980	June 23	105,825	436	2,616	40.50
	June 26	131,945	408	2,448	53.90
	July 02	122,613	383	2,298	53.40
	July 09	90,233	431	2,586	34.90
<b>Totals</b>		450,616	579	9,948	45.20
1981	June 22	78,168	511	3,066	25.50
	June 25	81,431	508	3,048	26.70
	June 30	51,942	484	2,904	17.90
	July 02	58,594	459	2,754	21.30
	July 06	55,799	461	2,766	20.20
	July 09	66,138	440	2,640	25.00
	<b>Totals</b>		392,072	613	17,178
1982	June 28	58,528	352	1,408	41.60
	June 30	47,773	483	1,932	24.70
	July 02	38,918	434	1,736	22.40
	July 05	29,315	372	2,232	13.10
	July 08	28,942	435	2,610	11.90
	July 12	20,709	354	2,124	9.80
	<b>Totals</b>		224,185	576	12,042
1983	June 20	28,915	474	2,844	10.20
	June 23	24,625	450	2,700	9.10
	June 27	44,802	446	2,676	16.70
	June 30	55,209	547	3,282	16.80
	July 04	46,176	443	2,658	17.40
	July 07	36,965	496	2,976	12.40
	July 11	20,560	466	2,769	7.40
	<b>Totals</b>		257,252	619	19,905
1984	June 25	91,773	466	2,796	32.80
	June 28	67,120	470	2,820	23.80
	July 02	69,897	483	2,898	24.10

-Continued-

## Appendix B.4. (page 4 of 5)

<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1984	July 05	54,981	426	2,556	21.50
	July 09	36,440	496	2,976	12.10
	July 12	24,269	436	2,616	9.30
	July 16	18,613	373	2,238	8.30
<b>Totals</b>		<b>363,093</b>	<b>587</b>	<b>18,900</b>	<b>19.20</b>
1985	June 20	19,762	423	2,538	7.79
	June 24	42,778	488	2,928	14.61
	June 27	47,443	492	2,952	16.07
	July 01	47,471	514	3,084	15.39
	July 04	28,581	460	2,760	10.36
<b>Total</b>		<b>186,035</b>	<b>598</b>	<b>14,262</b>	<b>13.04</b>
1986	June 26	68,947	514	3,084	22.36
	June 30	60,780	576	3,456	17.59
	July 03	65,839	556	3,336	19.74
	July 07	55,983	586	3,516	15.92
	July 10	48,990	532	3,192	15.35
<b>Total</b>		<b>300,539</b>	<b>631</b>	<b>16,584</b>	<b>18.12</b>
1987	June 18	13,472	526	4,208	3.20
	June 24	54,454	607	4,856	11.21
	June 30	112,963	564	4,512	25.04
	July 03	66,783	580	3,480	19.19
	July 07	103,059	578	3,468	29.72
	July 11	72,118	597	3,582	20.13
	July 15	71,923	569	3,414	21.07
	July 20	62,044	551	3,306	18.77
	Aug. 08	4,074	590	3,540	1.15
	Aug. 13	894	604	3,624	0.25
<b>Total</b>		<b>561,784</b>	<b>677</b>	<b>37,990</b>	<b>14.79</b>
1988	June 16	72,219	602	4,816	15.00
	June 20	113,628	612	3,672	30.94
	June 24	119,808	644	3,864	31.00
	June 28	154,027	609	3,654	42.15
	July 02	187,916	580	3,480	54.00
	July 05	163,971	579	3,474	47.20
	July 08	138,772	604	3,624	38.20

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<u>YEAR</u>	<u>DATE</u>	<u>CATCH</u>	<u>NUMBER OF FISHERMEN</u>	<u>FISHERMEN HOURS</u>	<u>CATCH PER HOUR (CPUE)</u>
1988	July 11	137,450	598	3,588	38.31
	July 14	116,930	597	3,582	32.64
	July 18	57,749	575	3,450	16.73
	July 21	39,643	539	3,234	12.25
	July 25	24,893	494	2,964	8.40
	July 28	16,028	552	3,312	4.50
	Aug 01	6,967	594	3,564	1.95
	Aug 04	5,152	639	3,834	1.34
	Aug 08	2,890	640	3,840	0.75
	Aug 10	1,376	596	3,576	0.38
	Aug 12	1,422	624	3,744	0.38
	Aug 15	663	613	3,678	0.18
	Aug 18	330	620	3,720	0.09
	Aug 20	121	577	3,462	0.03
	Aug 27	93	532	3,192	0.03
	Aug 31	2,585	412	2,472	1.05
Total		1,364,533	746	81,796	16.68

a The catch totals exclude small numbers of chinook salmon taken in late July and August.

Appendix B.5. Lower Kuskokwim River, District 1, and the middle Kuskokwim River, District 2, combined commercial salmon harvest, 1960 - 1988.

<u>Year</u>	<u>Chinook</u>	<u>Sockeye</u>	<u>Coho</u>	<u>Pink</u>	<u>Chum</u>	<u>Total</u>
1960	5,969	0	2,498	0	0	8,467
1961	18,918	0	5,044	0	0	23,962
1962	15,341	0	12,432	0	0	27,773
1963	12,016	0	15,660	0	0	27,676
1964	17,149	0	28,613	0	0	45,762
1965	21,989	0	12,191	0	0	34,180
1966	25,545	0	22,985	0	0	48,530
1967	29,986	0	56,313	0	148	86,447
1968	34,278	0	127,306	0	187	161,771
1969	43,997	322	83,765	0	7,165	135,249
1970	39,290	117	38,601	44	1,664	79,716
1971	40,274	2,606	5,253	0	68,914	117,047
1972	39,454	102	22,579	8	78,619	140,762
1973	32,838	369	130,876	33	148,746	312,862
1974	18,664	136	147,269	84	171,887	338,040
1975	21,720	23	81,945	10	181,840	285,538
1976	30,735	2,971	88,501	133	177,864	300,204
1977	35,830	9,379	241,364	203	248,721	535,497
1978	45,641	733	213,393	5,832	248,656	514,255
1979	38,966	1,054	219,060	78	261,874	521,032
1980	35,881	360	222,012	803	483,211	742,267
1981	47,663	48,375	211,251	292	418,677	726,258
1982	48,234	33,154	447,117	1,748	278,306	808,559
1983	33,174	68,855	196,287	211	276,698	575,205
1984	31,742	48,575	623,447	2,942	351,718	1,058,424
1985	37,889	106,647	335,606	75	199,478	679,695
1986	19,414	95,433	659,988	3,422	309,213	1,087,470
1987	36,179	136,602	399,467	43	574,336	1,146,627
1988	55,716	92,025	524,296	10,825	1,381,674	2,064,536
FIVE YEAR						
AVERAGE						
(1983-1987)						
	31,680	91,222	442,959	1,339	342,289	909,484

Appendix B.6. Kuskokwim River escapement of chum salmon by age and sex, 1982-1988.

Sex	Sample Size	Total years of life at maturity <sup>a</sup> .				Total
		3	4	5	6	
1982: Aniak River <sup>d</sup>						
Male	371	0.0	35.8	29.2	0.7	65.7
Female	194	0.0	24.6	9.7	0.0	34.3
Combined	565	0.0	60.4	38.9	0.7	100.0
Total Esc. <sup>a</sup>		0	234,913	151,557	2,756	389,226
1982: Kogrukluk River <sup>b</sup>						
Male	147	0.0	39.2	17.8	0.0	57.0
Female	111	0.0	31.7	10.9	0.4	43.0
Combined	258	0.0	70.9	28.7	0.4	100.0
Total Esc. <sup>c</sup>		0	36,320	14,686	198	51,204
1982: Salmon River <sup>b</sup>						
Male	18	0.0	62.1	13.8	0.0	75.9
Female	7	0.0	24.1	0.0	0.0	24.1
Combined	25	0.0	86.2	13.8	0.0	100.0
Total Esc. <sup>c</sup>						
1983: Aniak River <sup>d</sup>						
Male	137	0.0	6.1	70.4	0.0	76.5
Female	42	0.0	6.7	16.8	0.0	23.5
Combined	179	0.0	12.8	87.2	0.0	100.0
Total Esc. <sup>a</sup>		0	14,760	100,109	0	114,869
1983: Kogrukluk River <sup>b</sup>						
Male	280	0.0	9.6	47.6	1.0	58.2
Female	201	0.4	12.3	28.5	0.6	41.8
Combined	481	0.4	21.9	76.1	1.6	100.0
Total Esc. <sup>c</sup>		37	1,964	6,846	150	8,997
1984: Aniak River <sup>d</sup>						
Male	69	0.0	50.5	14.6	1.9	67.0
Female	34	0.0	21.3	10.7	1.0	33.0
Combined	103	0.0	71.8	25.3	2.9	100.0
Total Esc. <sup>a</sup>		0	197,760	69,484	8,017	275,261
1984: Kogrukluk River <sup>b</sup>						
Male	840	0.0	50.8	13.7	2.0	66.5
Female	408	0.0	23.8	8.4	1.3	33.5
Combined	1,248	0.0	74.6	22.1	3.3	100.0
Total Esc. <sup>c</sup>		0	30,934	9,170	1,380	41,484

-continued-

Sex	Sample Size	Total years of life at maturity <sup>a</sup>				Total
		3	4	5	6	
1985: Aniak River <sup>d</sup>						
Male	88	0.0	18.5	32.7	1.2	52.4
Female	80	0.0	22.6	25.0	0.0	47.6
Combined	168	0.0	41.1	57.7	1.2	100.0
Total Esc. <sup>e</sup>		0	90,825	127,508	2,652	220,985
1985: Kogrukluk River <sup>b</sup>						
Male	478	0.2	15.9	38.1	0.5	54.7
Female	396	0.0	14.4	30.9	0.0	45.3
Combined	874	0.2	30.3	69.0	0.5	100.0
Total Esc. <sup>c</sup>		30	4,546	10,351	75	15,002
1986: Kogrukluk River <sup>b</sup>						
Male	359	0.2	26.0	9.7	0.8	36.7
Female	209	0.2	43.7	17.8	1.6	63.3
Combined	568	0.4	69.7	27.5	2.4	100.0
Total Esc. <sup>c</sup>		62	10,811	4,266	372	15,511
1986: Kisaralik River <sup>b</sup>						
Male	478	0.0	13.6	27.3	0.0	40.9
Female	396	0.0	13.6	45.5	0.0	59.1
Combined	874	0.0	27.2	72.8	0.0	100.0
Total Esc. <sup>f</sup>						
1987: Kogrukluk River <sup>b</sup>						
Male						55.0
Female						45.0
Combined	160	0.0	22.5	69.4	8.1	100.0
Total Esc. <sup>h</sup>		0	3,920	12,091	1,411	17,422
1988: Kogrukluk River <sup>b</sup>						
Male	400	0.0	43.0	19.6	1.8	64.4
Female	221	0.0	26.2	9.2	0.2	35.6
Combined	621	0.0	69.2	28.8	2.0	100.0
Total Esc. <sup>c</sup>		0	28,981	12,062	838	41,881

- a Total years of life at maturity represents the total number of freshwater and marine annuli, plus one.
- b Allocation by age and sex based on weir samples (Schneiderhan 1982a, 1984, 1984a, 1985, 1988, 1989). Total 1987 escapement estimate was derived using indirect methods (Schneiderhan 1989).
- c Escapement based on weir counts for the Kogrukluk and Salmon Rivers (see footnote b).

-continued-

- d Allocation by age and sex based on 4.25 in (11 cm), 5.5 in (14 cm), and 8.5 in (22 cm) stretch mesh gill net samples. (Schneiderhan 1982, 1984b, 1985, 1988a).
- e Escapement estimate based on adjusted sonar counts.
- f No escapement estimates available.
- g Allocation by age and sex based on 'hook and line' samples.

Appendix B-7. Kuskokwim River commercial and subsistence chum salmon catch by age and sex, 1982-1988.

Sex	Sample Size	Total years of life at maturity <sup>a</sup>				Total
		3	4	5	6	
1982:						
Male	258	0.7	31.1	18.8	0.6	51.2
Female	166	0.5	35.8	12.1	0.4	48.8
Combined	424	1.2	66.9	30.9	1.0	100.0
Total Harvest <sup>b</sup>		5,620	313,321	144,718	4,683	468,342
1983:						
Male	814	0.4	20.3	26.5	1.0	48.2
Female	833	0.6	25.5	25.4	0.3	51.8
Combined	1,647	1.0	45.8	51.9	1.3	100.0
Total Harvest <sup>b</sup>		4,766	218,262	247,332	6,195	476,555
1984:						
Male	773	0.3	37.4	4.8	0.7	43.2
Female	1,052	0.5	51.3	4.8	0.2	56.8
Combined	1,825	0.8	88.7	9.6	0.9	100.0
Total Harvest <sup>b</sup>		4,584	508,267	55,010	5,157	573,018
1985:						
Male	476	0.3	16.4	29.3	0.3	46.3
Female	553	0.4	18.4	34.8	0.1	53.7
Combined	1,029	0.7	34.8	64.1	0.4	100.0
Total Harvest <sup>b</sup>		2,039	101,382	186,741	1,165	291,328
1986: Commercial Harvest						
Male	502	0.2	35.9	10.4	0.2	46.7
Female	562	0.3	41.0	11.7	0.3	53.3
Combined	1,064	0.5	76.9	22.1	0.5	100.0
Comm. Harvest <sup>b</sup>		1,546	237,785	68,336	1,647	309,213
1986: Subsistence Harvest						
Male		0.0	25.0	7.0	0.0	32.0
Female		0.0	58.8	8.3	0.9	68.0
Combined	228	0.0	83.8	15.3	0.9	100.0
Subsist. Harvest		0	78,471	14,327	843	93,641

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Appendix B-7. (page 2 of 2)

Sex	Sample Size	Total years of life at maturity <sup>a</sup>				Total
		3	4	5	6	
1987: Commercial Harvest						
Male	559	0.8	21.0	20.3	0.5	42.6
Female	753	0.8	31.3	24.9	0.4	57.4
Combined	1,312	1.6	52.3	45.2	0.9	100.0
Comm. Harvest <sup>b</sup>		7,589	248,078	214,400	4,269	474,336
1987: Subsistence Harvest <sup>c</sup>						
Male						
Female						
Combined		1.6	52.3	45.2	0.9	100.0
Subsist. Harvest <sup>b</sup>		1,105	36,112	31,209	621	69,047
1988: Commercial Harvest						
Male	1,182	0.4	37.7	10.6	0.5	49.2
Female	1,222	0.5	41.6	8.2	0.5	50.8
Combined	2,404	0.9	79.3	18.8	1.0	100.0
Comm. Harvest <sup>b</sup>		12,435	1,095,667	259,755	138,167	1,381,674
1988: Subsistence Harvest <sup>c</sup>						
Male						
Female						
Combined		0.9	79.3	18.8	1.0	100.0
Subsist. Harvest <sup>b</sup>		621	54,755	12,981	690	69,047

<sup>a</sup> Total years of life at maturity represents the total number of freshwater and marine annuli, plus one.

<sup>b</sup> Allocation by age and sex based on commercial harvest samples.

<sup>c</sup> Age and sex composition was not determined.

Appendix B.8. Kuskokwim River chinook salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-88.

Date	CPUE					Percent				
	1984	1985	1986	1987	1988	1984	1985	1986	1987	1988
06/02					2.96	0.0	0.0	0.0	0.0	0.8
06/03					2.96	0.0	0.0	0.0	0.0	0.8
06/04	0.00	0.00		0.00	2.96	0.0	0.0	0.0	0.0	0.8
06/05	1.43	0.00		5.10	4.84	0.5	0.0	0.0	0.9	1.3
06/06	1.43	0.00		8.39	4.84	0.5	0.0	0.0	1.4	1.3
06/07	2.58	0.00		12.89	7.63	0.9	0.0	0.0	2.2	2.1
06/08	2.58	0.00	0.00	29.25	29.69	0.9	0.0	0.0	5.0	8.2
06/09	2.58	0.00	2.93	38.37	44.10	0.9	0.0	1.5	6.6	12.2
06/10	2.58	0.00	4.36	58.83	49.42	0.9	0.0	2.2	10.1	13.7
06/11	3.30	0.00	5.82	76.58	70.78	1.2	0.0	2.9	13.2	19.6
06/12	7.10	0.00	10.32	98.39	89.01	2.6	0.0	5.2	16.9	24.7
06/13	11.00	0.00	10.32	111.84	100.01	4.0	0.0	5.2	19.2	27.7
06/14	14.64	0.00	11.60	132.81	102.98	5.4	0.0	5.8	22.8	28.5
06/15	18.25	0.00	11.60	142.89	110.99	6.7	0.0	5.8	24.6	30.8
06/16	25.32	0.00	11.60	154.06	119.16	9.3	0.0	5.8	26.5	33.0
06/17	35.39	0.00	11.60	207.83	139.83	13.0	0.0	5.8	35.7	38.7
06/18	43.45	0.00	11.60	221.89	147.03	15.9	0.0	5.8	38.1	40.7
06/19	55.32	0.00	13.06	234.87	160.41	20.3	0.0	6.5	40.4	44.4
06/20	64.67	0.00	21.88	253.26	185.22	23.7	0.0	10.9	43.5	51.3
06/21	76.40	1.43	41.83	276.63	201.13	28.0	1.3	20.9	47.5	55.7
06/22	83.83	7.95	55.51	306.29	214.28	30.7	7.0	27.7	52.6	59.4
06/23	111.48	7.95	59.47	332.74	230.56	40.8	7.0	29.7	57.2	63.9
06/24	125.63	10.62	74.02	341.85	251.81	46.0	9.3	37.0	58.7	69.8
06/25	132.42	10.62	76.77	379.40	259.60	48.5	9.3	38.3	65.2	71.9
06/26	146.74	15.08	94.13	399.75	269.77	53.7	13.2	47.0	68.7	74.7
06/27	150.43	15.08	108.90	425.23	283.90	55.1	13.2	54.4	73.1	78.7
06/28	157.92	17.63	123.08	439.81	288.82	57.8	15.5	61.5	75.6	80.0
06/29	164.10	25.87	136.52	458.25	292.14	60.1	22.7	68.2	78.7	80.9
06/30	171.30	34.53	137.61	470.54	295.03	62.7	30.3	68.7	80.9	81.7
07/01	173.55	38.31	143.01	485.92	306.85	63.5	33.6	71.4	83.5	85.0
07/02	180.39	50.54	147.80	495.39	308.10	66.0	44.3	73.8	85.1	85.4
07/03	190.98	51.82	147.80	498.43	312.87	69.9	45.4	73.8	85.6	86.7
07/04	193.59	60.49	150.69	506.47	318.19	70.9	53.0	75.2	87.0	88.2
07/05	199.62	66.91	153.52	513.03	325.78	73.1	58.6	76.6	88.2	90.3
07/06	207.65	76.31	160.57	522.07	325.78	76.0	66.9	80.2	89.7	90.3
07/07	216.55	84.72	166.08	536.69	325.78	79.3	74.2	82.9	92.2	90.3
07/08	221.79	87.45	172.70	536.69	325.78	81.2	76.6	86.2	92.2	90.3
07/09	230.89	92.76	175.78	537.99	325.78	84.5	81.3	87.8	92.4	90.3
07/10	233.41	97.89	178.71	541.05	325.78	85.5	85.8	89.2	93.0	90.3
07/11	237.96	99.32	180.14	543.27	325.78	87.1	87.0	89.9	93.3	90.3
07/12	240.49	101.72	181.60	545.44	325.78	88.0	89.1	90.7	93.7	90.3
07/13	242.94	103.15	185.85	547.79	325.78	88.9	90.4	92.8	94.1	90.3
07/14	250.06	104.61	188.59	548.90	333.66	91.6	91.7	94.2	94.3	92.4
07/15	250.06	104.61	188.59	548.90	333.66	91.6	91.7	94.2	94.3	92.4
07/16	250.91	106.47	190.41	548.90	341.40	91.9	93.3	95.1	94.3	94.6
07/17	251.80	106.47	190.41	551.45	347.00	92.2	93.3	95.1	94.8	96.1
07/18	251.80	107.43	190.41	551.45	348.78	92.2	94.1	95.1	94.8	96.6
07/19	251.80	107.43	192.41	565.90	348.78	92.2	94.1	96.1	97.2	96.6
07/20	256.09	107.43	192.41	566.83	348.78	93.8	94.1	96.1	97.4	96.6
07/21	260.80	107.43	192.41	568.94	348.78	95.5	94.1	96.1	97.8	96.6

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Date	CPUE					Percent				
	1984	1985	1986	1987	1988	1984	1985	1986	1987	1988
07/22	262.58	107.43	192.41	568.94	348.78	96.1	94.1	96.1	97.8	96.6
07/23	262.58	107.43	192.41	572.30	348.78	96.1	94.1	96.1	98.3	96.6
07/24	264.32	107.43	192.41	572.30	349.86	96.8	94.1	96.1	98.3	96.9
07/25	265.99	107.43	192.41	572.30	349.86	97.4	94.1	96.1	98.3	96.9
07/26	265.99	107.43	194.36	572.30	352.02	97.4	94.1	97.0	98.3	97.5
07/27	265.99	107.43	196.31	576.52	354.02	97.4	94.1	98.0	99.1	98.1
07/28	265.99	109.43	196.31	576.52	354.02	97.4	95.9	98.0	99.1	98.1
07/29	266.84	109.43	200.29	576.52	354.02	97.7	95.9	100.0	99.1	98.1
07/30	266.84	111.24	200.29	576.52	358.18	97.7	97.5	100.0	99.1	99.2
07/31	268.44	111.24	200.29	576.52	358.18	98.3	97.5	100.0	99.1	99.2
08/01	268.44	111.24	200.29	576.52	358.18	98.3	97.5	100.0	99.1	99.2
08/02	268.44	111.24	200.29	576.52	358.18	98.3	97.5	100.0	99.1	99.2
08/03	268.44	111.24	200.29	577.66	358.18	98.3	97.5	100.0	99.3	99.2
08/04	268.44	111.24	200.29	577.66	358.18	98.3	97.5	100.0	99.3	99.2
08/05	271.46	111.24	200.29	577.66	358.18	99.4	97.5	100.0	99.3	99.2
08/06	273.13	111.24	200.29	577.66	358.18	100.0	97.5	100.0	99.3	99.2
08/07	273.13	111.24	200.29	579.82	358.18	100.0	97.5	100.0	99.6	99.2
08/08	273.13	111.24	200.29	579.82	358.18	100.0	97.5	100.0	99.6	99.2
08/09	273.13	113.11	200.29	579.82	358.18	100.0	99.1	100.0	99.6	99.2
08/10	273.13	113.11	200.29	579.82	358.18	100.0	99.1	100.0	99.6	99.2
08/11	273.13	113.11	200.29	581.98	360.94	100.0	99.1	100.0	100.0	100.0
08/12	273.13	113.11	200.29	581.98	360.94	100.0	99.1	100.0	100.0	100.0
08/13	273.13	113.11	200.29	581.98	360.94	100.0	99.1	100.0	100.0	100.0
08/14	273.13	113.11	200.29	581.98	360.94	100.0	99.1	100.0	100.0	100.0
08/15	273.13	113.11	200.29	581.98	360.94	100.0	99.1	100.0	100.0	100.0
08/16	273.13	113.11	200.29	581.98	360.94	100.0	99.1	100.0	100.0	100.0
08/17	273.13	113.11	200.29	581.98	360.94	100.0	99.1	100.0	100.0	100.0
08/18	273.13	113.11	200.29	581.98	360.94	100.0	99.1	100.0	100.0	100.0
08/19	273.13	113.11	200.29	581.98	360.94	100.0	99.1	100.0	100.0	100.0
08/20	273.13	113.11	200.29	581.98	360.94	100.0	99.1	100.0	100.0	100.0
08/21	273.13 <sup>a</sup>	114.11 <sup>b</sup>	200.29 <sup>c</sup>	581.98 <sup>d</sup>	366.94	100.0	100.0	100.0	100.0	100.0

$\tau = 6/22$   $\tau = 6/28$   $\tau = 6/22$

- a Estimated passage based on 1984 calibration (344.44 fish/index): 200,458  
b Estimated passage based on 1985 calibration (573.59 fish/index): 333,819  
c Estimated passage based on 1986 calibration (356.94 fish/index): 207,733  
d Estimated passage based on 1987 calibration (405.10 fish/index): 235,761

Appendix B-9. Kuskokwim River sockeye salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-88.

Date	CPUE					Percent				
	1984	1985	1986	1987	1988	1984	1985	1986	1987	1988
06/04	0.0	0.0		6.0	0.0	0.0	0.0	0.0	0.2	0.0
06/05	0.0	0.0		6.0	0.0	0.0	0.0	0.0	0.2	0.0
06/06	0.0	0.0		9.1	0.0	0.0	0.0	0.0	0.3	0.0
06/07	0.0	0.0		18.2	0.0	0.0	0.0	0.0	0.7	0.0
06/08	0.0	0.0	0.0	35.2	12.3	0.0	0.0	0.2	1.3	0.8
06/09	0.0	0.0	0.0	47.8	26.6	0.0	0.0	0.0	1.7	1.8
06/10	0.0	0.0	0.0	63.5	38.3	0.0	0.0	0.0	2.3	2.6
06/11	2.7	0.0	0.0	79.6	81.6	0.5	0.0	0.0	2.9	5.4
06/12	2.7	0.0	6.0	191.4	143.2	0.5	0.0	0.2	6.9	9.5
06/13	2.7	0.0	14.1	240.0	190.7	0.5	0.0	0.6	8.7	12.7
06/14	2.7	0.0	26.9	248.7	204.5	0.5	0.0	1.1	9.0	13.6
06/15	7.7	0.0	29.8	290.4	213.6	1.3	0.0	1.2	10.3	14.2
06/16	7.7	0.0	64.5	458.2	220.9	1.3	0.0	2.5	16.6	14.7
06/17	9.6	0.0	70.3	710.2	247.2	1.7	0.0	2.8	25.7	16.5
06/18	16.3	0.0	81.8	779.2	295.6	2.8	0.0	3.2	28.2	19.7
06/19	16.3	0.0	87.6	795.7	393.6	2.8	0.0	3.4	28.8	26.2
06/20	23.1	0.0	135.3	842.8	419.4	4.0	0.0	5.3	30.5	28.0
06/21	29.8	0.0	240.3	918.8	554.1	5.2	0.0	9.4	33.3	36.9
06/22	51.9	0.0	292.6	1084.7	689.5	9.0	0.0	11.5	39.3	46.0
06/23	51.9	2.7	374.9	1439.6	806.6	9.0	0.2	14.7	52.1	53.8
06/24	66.0	16.0	494.3	1581.9	869.4	11.4	1.0	19.4	57.3	57.9
06/25	86.4	16.0	528.5	1630.5	898.2	14.9	1.0	20.7	59.1	59.9
06/26	96.9	28.3	675.9	1692.7	1012.9	16.7	1.7	26.5	61.3	67.5
06/27	108.7	39.5	853.3	1726.7	1081.6	18.8	2.4	33.4	62.5	72.1
06/28	144.3	137.0	915.8	1768.2	1123.8	24.9	8.3	35.9	64.0	74.9
06/29	182.9	137.0	949.2	1805.4	1132.9	31.6	8.3	37.2	65.4	75.5
06/30	201.4	272.3	1180.7	1969.2	1177.7	34.8	16.5	46.3	71.3	78.5
07/01	241.5	399.9	1384.8	2210.5	1268.8	41.7	24.2	54.3	80.1	84.6
07/02	258.8	526.2	1592.8	2273.3	1296.6	44.7	31.8	62.4	82.3	86.4
07/03	271.0	643.3	1745.3	2308.9	1329.0	46.8	38.9	68.4	83.6	88.6
07/04	293.6	899.4	1768.4	2433.1	1383.2	50.7	54.4	69.3	88.1	92.2
07/05	334.4	1049.1	2000.0	2599.0	1428.1	57.7	63.4	78.4	94.1	95.2
07/06	359.4	1239.0	2017.8	2611.1	1444.7	62.0	74.9	79.1	94.6	96.3
07/07	395.1	1292.7	2115.4	2655.4	1456.2	68.2	78.1	82.9	96.2	97.0
07/08	437.1	1360.7	2200.5	2661.9	1468.8	75.4	82.3	86.2	96.4	97.9
07/09	451.0	1393.6	2232.5	2691.5	1478.4	77.9	84.2	87.5	97.5	98.3
07/10	498.1	1438.9	2279.7	2721.8	1483.4	86.0	87.0	89.3	98.6	98.9
07/11	525.0	1495.4	2313.2	2726.0	1487.8	90.6	90.4	90.6	98.7	99.2
07/12	542.4	1553.0	2386.7	2729.3	1487.8	93.6	93.9	93.5	98.9	99.2

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Appendix B-9. (continued)

Date	CPUE					Percent				
	1984	1985	1986	1987	1988	1984	1985	1986	1987	1988
07/14	546.5	1578.6	2428.2	2740.7	1487.8	94.3	95.4	95.1	99.3	99.2
07/15	548.9	1584.4	2429.2	2743.7	1490.8	94.8	95.8	95.2	99.4	99.4
07/16	548.9	1596.8	2437.4	2743.7	1492.4	94.8	96.5	95.5	99.4	99.5
07/17	549.8	1602.6	2460.6	2745.8	1492.4	94.9	96.9	96.4	99.5	99.5
07/18	552.7	1607.3	2480.2	2745.8	1495.7	95.4	97.2	97.2	99.5	99.7
07/19	562.4	1609.3	2495.9	2751.9	1497.5	97.1	97.3	97.8	99.7	99.8
07/20	564.0	1609.3	2497.9	2755.1	1497.5	97.3	97.3	97.9	99.8	99.8
07/21	569.2	1618.6	2505.5	2755.1	1497.5	98.2	97.8	98.2	99.8	99.8
07/22	573.2	1622.1	2512.9	2755.1	1497.5	98.9	98.1	98.5	99.8	99.8
07/23	573.2	1625.8	2518.5	2755.1	1498.6	98.9	98.3	98.7	99.8	99.9
07/24	575.1	1629.2	2522.4	2755.1	1498.6	99.3	98.5	98.8	99.8	99.9
07/25	576.0	1634.6	2526.1	2755.1	1499.7	99.4	98.8	99.0	99.8	99.9
07/26	576.0	1639.4	2534.1	2755.1	1499.7	99.4	99.1	99.3	99.8	99.9
07/27	576.0	1647.8	2538.1	2755.1	1499.7	99.4	99.6	99.4	99.8	99.9
07/28	577.7	1650.8	2540.0	2755.1	1499.7	99.7	99.8	99.5	99.8	99.9
07/29	579.3	1650.8	2540.0	2755.1	1499.7	100.0	99.8	99.5	99.8	99.9
07/30	579.3	1650.8	2540.0	2755.1	1499.7	100.0	99.8	99.5	99.8	99.9
07/31	579.3	1652.5	2540.0	2755.1	1499.7	100.0	99.9	99.5	99.8	99.9
08/01	579.3	1652.5	2542.2	2755.1	1500.5	100.0	99.9	99.6	99.8	100.0
08/02	579.3	1652.5	2542.2	2757.2	1500.5	100.0	99.9	99.6	99.9	100.0
08/03	579.3	1652.5	2544.3	2759.0	1500.5	100.0	99.9	99.7	99.9	100.0
08/04	579.3	1652.5	2546.4	2759.0	1500.5	100.0	99.9	99.8	99.9	100.0
08/05	579.3	1652.5	2546.4	2759.0	1500.5	100.0	99.9	99.8	99.9	100.0
08/06	579.3	1652.5	2547.6	2759.0	1500.5	100.0	99.9	99.8	99.9	100.0
08/07	579.3	1652.5	2547.6	2759.0	1500.5	100.0	99.9	99.8	99.9	100.0
08/08	579.3	1654.2	2547.6	2759.0	1500.5	100.0	100.0	99.8	99.9	100.0
08/09	579.3	1654.2	2547.6	2759.0	1500.5	100.0	100.0	99.8	99.9	100.0
08/10	579.3	1654.2	2547.6	2759.0	1500.5	100.0	100.0	99.8	99.9	100.0
08/11	579.3	1654.2	2548.7	2759.0	1500.5	100.0	100.0	99.9	99.9	100.0
08/12	579.3	1654.2	2548.7	2761.0	1500.5	100.0	100.0	99.9	100.0	100.0
08/13	579.3	1654.2	2548.7	2761.0	1500.5	100.0	100.0	99.9	100.0	100.0
08/14	579.3	1654.2	2548.7	2761.0	1500.5	100.0	100.0	99.9	100.0	100.0
08/15	579.3	1654.2	2551.4	2761.0	1500.5	100.0	100.0	100.0	100.0	100.0
08/16	579.3	1654.2	2551.4	2761.0	1500.5	100.0	100.0	100.0	100.0	100.0
08/17	579.3	1654.2	2551.4	2761.0	1500.5	100.0	100.0	100.0	100.0	100.0
08/18	579.3	1654.2	2551.4	2761.0	1500.5	100.0	100.0	100.0	100.0	100.0
08/19	579.3	1654.2	2551.4	2761.0	1500.5	100.0	100.0	100.0	100.0	100.0
08/20	579.3	1654.2	2551.4	2761.0	1500.5	100.0	100.0	100.0	100.0	100.0
08/21	579.3	1654.2 <sup>a</sup>	2552.3 <sup>b</sup>	2761.0 <sup>c</sup>	1500.5	100.0	100.0	100.0	100.0	100.0

t = 6/30      t = 6/27

a Estimated passage based on 1985 calibration (213.18 fish/index)      588,596  
 b Estimated passage based on 1986 calibration (170.28 fish/index)      470,148  
 c Estimated passage based on 1987 calibration (162.25 fish/index)      447,977

Appendix B-10. Kuskokwim River coho salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-88.

Date	CPUE					Percent				
	1984	1985	1986	1987	1988	1984	1985	1986	1987	1988
07/12	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
07/13	1.2	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0
07/14	1.2	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0
07/15	1.2	0.0	1.9	0.0	1.0	0.0	0.0	0.0	0.0	0.0
07/16	2.7	0.9	3.9	0.0	1.0	0.1	0.1	0.1	0.0	0.0
07/17	4.1	2.5	5.7	0.0	3.9	0.1	0.2	0.1	0.0	0.1
07/18	7.5	2.5	9.5	0.0	3.9	0.2	0.2	0.2	0.0	0.1
07/19	13.2	4.2	18.3	0.0	3.9	0.4	0.3	0.4	0.0	0.1
07/20	22.2	7.9	28.4	0.0	5.7	0.7	0.5	0.7	0.0	0.2
07/21	26.4	13.3	40.3	0.0	7.9	0.9	0.8	0.9	0.0	0.3
07/22	29.9	28.1	48.2	6.8	11.1	1.0	1.8	1.1	0.5	0.4
07/23	36.7	28.1	64.6	8.0	11.1	1.2	1.8	1.5	0.4	0.4
07/24	45.3	31.1	115.7	8.0	24.2	1.5	2.0	2.7	0.4	0.8
07/25	56.6	48.5	145.0	9.3	37.4	1.9	3.1	3.4	0.5	1.2
07/26	72.6	68.9	163.2	12.4	43.7	2.4	4.4	3.8	0.6	1.4
07/27	95.4	72.8	215.4	16.7	81.0	3.1	4.6	5.0	0.8	2.6
07/28	127.7	89.1	235.0	19.1	152.9	4.2	5.7	5.4	1.0	4.8
07/29	186.3	128.4	299.2	30.8	182.4	6.1	8.2	6.9	1.5	5.8
07/30	341.3	147.7	351.2	36.5	226.2	11.2	9.4	8.1	1.8	7.2
07/31	491.4	167.2	374.2	38.9	279.6	16.1	10.6	8.7	1.9	8.9
08/01	685.9	205.1	652.4	52.5	328.9	22.4	13.0	15.1	2.6	10.4
08/02	768.7	233.4	746.5	91.2	357.2	25.1	14.8	17.3	4.5	11.3
08/03	1049.9	290.4	1111.8	171.1	444.6	34.3	18.4	25.7	8.5	14.1
08/04	1094.9	348.3	1498.0	227.9	483.8	35.8	22.1	34.7	11.4	15.3
08/05	1183.6	377.8	1721.2	253.0	518.1	38.7	24.0	39.9	12.6	16.4
08/06	1318.0	463.0	1933.2	297.2	858.9	43.1	29.4	44.8	14.8	27.2
08/07	1350.8	605.2	2143.0	392.4	1195.5	44.2	38.4	49.6	19.6	37.9
08/08	1456.2	690.8	2230.2	435.1	1343.4	47.6	43.9	51.6	21.7	42.5
08/09	1534.1	799.0	2372.5	470.3	1385.1	50.2	50.7	54.9	23.5	43.9
08/10	1588.5	895.9	2651.2	505.6	1500.3	52.0	56.9	61.4	25.2	47.5
08/11	1699.4	1096.8	2733.7	537.7	1738.9	55.6	69.6	63.3	26.8	55.1
08/12	1782.5	1189.6	3024.0	710.7	1941.1	58.3	75.5	70.0	35.5	61.5
08/13	1819.0	1256.1	3120.7	822.9	2006.6	59.5	79.7	72.3	41.1	63.5
08/14	1842.8	1286.5	3186.3	1145.0	2176.4	60.3	81.7	73.8	57.1	68.9
08/15	1841.8	1347.6	3351.6	1291.2	2349.8	60.2	85.5	77.6	64.4	74.4
08/16	1957.2	1416.0	3402.4	1405.4	2404.1	64.0	89.9	78.8	70.1	76.1
08/17	2169.2	1433.8	3442.8	1487.9	2521.1	71.0	91.0	79.7	74.2	79.8
08/18	2463.5	1456.9	3551.1	1540.3	2631.7	80.6	92.5	82.2	76.8	83.3
08/19	2645.5	1460.9	3636.6	1556.2	2666.3	86.5	92.7	84.2	77.6	84.4
08/20	2649.8	1473.8	3669.7	1566.6	2702.5	86.7	93.6	85.0	78.1	85.6
08/21	2676.8	1490.9	3761.8	1582.2	2711.3	87.6	94.6	87.1	78.9	85.9
08/22	2794.5	1490.9	3813.2	1590.4	2779.0	91.4	94.6	88.3	79.3	88.0
08/23	2816.8	1499.5	3940.8	1611.3	2849.1	92.1	95.2	91.2	80.4	90.2
08/24	2826.1	1507.5	4020.2	1636.0	2943.2	92.4	95.7	93.1	81.6	93.2
08/25	2860.2	1519.2	4214.2	1647.5	3048.4	93.6	96.4	97.6	82.2	96.5
08/26	2876.8	1519.2	4303.7	1662.7	3097.2	94.1	96.4	99.6	82.9	98.1
08/27	2892.3	1529.2	4319.0	1693.3	3144.7	94.6	97.1	100.0	84.5	99.6
08/28	2908.4	1567.3	4319.0	1736.9	3153.6	95.1	99.5	100.0	86.6	99.9
08/29	2952.7	1575.3	4319.0	1762.7	3159.7	96.6	100.0	100.0	87.9	100.0

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Date	CPUE					Percent				
	1984	1985	1986	1987	1988	1984	1985	1986	1987	1988
08/30	2971.7	1575.3	4319.0	1807.4	3159.7	97.2	100.0	100.0	90.2	100.0
08/31	2997.2	1575.3	4319.0	1807.4	3159.7	98.0	100.0	100.0	90.2	100.0
09/01	3005.2	1575.3	4319.0	1827.5	3159.7	98.3	100.0	100.0	91.2	100.0
09/02	3015.7	1575.3	4319.0	1858.6	3159.7	98.6	100.0	100.0	92.7	100.0
09/03	3019.2	1575.3	4319.0	1898.8	3159.7	98.8	100.0	100.0	94.7	100.0
09/04	3022.8	1575.3	4319.0	1911.6	3159.7	98.9	100.0	100.0	95.4	100.0
09/05	3049.9	1575.3	4319.0	1943.4	3159.7	99.8	100.0	100.0	96.9	100.0
09/06	3057.2	1575.3	4319.0	1956.5	3159.7	100.0	100.0	100.0	97.6	100.0
09/07	3057.2	1575.3	4319.0	1974.0	3159.7	100.0	100.0	100.0	98.5	100.0
09/08	3057.2	1575.3	4319.0	1982.1	3159.7	100.0	100.0	100.0	98.9	100.0
09/09	3057.2	1575.3	4319.0	2001.1	3159.7	100.0	100.0	100.0	99.8	100.0
09/10	3057.2	1575.3	4319.0	2004.7	3159.7	100.0	100.0	100.0	100.0	100.0
09/11	3057.2 <sup>a</sup>	1575.3 <sup>b</sup>	4319.0 <sup>c</sup>	2004.7 <sup>d</sup>	3159.7	100.0	100.0	100.0	100.0	100.0

c = 8/9    τ = 8/8    τ = 8/7

a	Estimated passage based on 1984 calibration (265.27 fish/index)	521,789
b	Estimated passage based on 1985 calibration (384.87 fish/index)	771,553
c	Estimated passage based on 1986 calibration (222.66 fish/index)	446,369
d	Estimated passage based on 1987 calibration (336.34 fish/index)	674,264

Appendix B-11. Kuskokwim River chum salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-88.

Date	CPUE					Percent				
	1984	1985	1986	1987	1988	1984	1985	1986	1987	1988
06/04	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
06/05	0.0	0.0		3.3	8.7	0.0	0.0	0.0	0.1	0.2
06/06	0.0	0.0		15.7	8.7	0.0	0.0	0.0	0.3	0.2
06/07	0.0	0.0		21.8	11.7	0.0	0.0	0.0	0.4	0.2
06/08	4.7	0.0	0.0	30.3	23.0	0.2	0.0	0.0	0.6	0.4
06/09	4.7	0.0	0.0	45.3	60.9	0.2	0.0	0.0	0.9	1.2
06/10	4.7	0.0	6.0	51.5	90.3	0.2	0.0	0.1	1.1	1.7
06/11	4.7	0.0	15.0	72.4	152.8	0.2	0.0	0.4	1.5	2.9
06/12	7.0	0.0	15.0	85.7	243.8	0.3	0.0	0.4	1.8	4.7
06/13	17.0	0.0	23.3	104.8	331.1	0.7	0.0	0.6	2.1	6.4
06/14	27.4	0.0	51.8	107.6	350.3	1.2	0.0	1.2	2.2	6.8
06/15	29.9	0.0	57.6	117.4	395.4	1.3	0.0	1.4	2.4	7.6
06/16	44.8	0.0	69.4	159.4	421.0	1.9	0.0	1.7	3.3	8.1
06/17	52.6	0.0	78.7	281.0	476.6	2.2	0.0	1.9	5.7	9.2
06/18	63.3	2.7	78.7	321.8	671.3	2.7	0.2	1.9	6.6	12.9
06/19	68.3	2.7	87.5	327.7	831.7	2.9	0.2	2.1	6.7	16.0
06/20	99.6	5.4	125.5	387.7	881.4	4.2	0.4	3.0	7.9	17.0
06/21	140.7	8.3	171.4	412.1	1024.9	5.9	0.6	4.1	8.4	19.8
06/22	215.9	16.5	295.1	612.6	1276.0	9.1	1.2	7.0	12.5	24.6
06/23	224.9	24.6	402.6	715.1	1522.3	9.4	1.9	9.6	14.6	29.3
06/24	245.3	89.8	553.9	763.1	1608.0	10.3	6.8	13.2	15.6	31.0
06/25	302.1	204.6	623.5	828.9	1623.9	12.7	15.4	14.9	16.9	31.3
06/26	307.3	207.2	710.6	928.4	1687.1	12.9	15.6	16.9	19.0	32.5
06/27	424.5	231.8	841.9	1015.3	1992.7	17.8	17.5	20.1	20.7	38.4
06/28	608.2	259.8	1046.1	1120.3	2101.2	25.5	19.6	24.9	22.9	40.5
06/29	831.6	262.8	1164.3	1388.5	2209.5	34.9	19.8	27.7	28.4	42.6
06/30	865.3	315.2	1637.0	1634.5	2298.0	36.3	23.7	39.0	33.4	44.3
07/01	1001.1	380.1	1817.3	1786.6	2680.4	42.0	28.6	43.3	36.5	51.7
07/02	1067.6	438.4	1934.9	1906.3	2868.4	44.8	33.0	46.1	38.9	55.3
07/03	1071.0	462.9	1970.6	1940.5	3305.8	45.0	34.9	47.0	39.6	63.7
07/04	1172.1	642.8	1976.5	2002.6	3774.7	49.2	48.4	47.1	40.9	72.7
07/05	1321.6	819.6	2094.9	2179.7	3966.4	55.5	61.8	49.9	44.5	76.4
07/06	1449.2	896.4	2101.3	2568.8	4086.2	60.8	67.5	50.1	52.5	78.8
07/07	1537.2	927.5	2179.8	3031.5	4113.7	64.5	69.9	51.9	61.9	79.3
07/08	1807.2	951.7	2378.7	3069.9	4147.9	75.9	71.7	56.7	62.7	79.9
07/09	1844.7	957.1	2502.1	3341.5	4240.2	77.5	72.1	59.6	68.2	81.7
07/10	1947.9	996.9	2810.3	3549.8	4387.7	81.8	75.1	67.0	72.5	84.6
07/11	1995.7	1022.0	2950.8	3612.4	4471.1	83.8	77.0	70.3	73.8	86.2
07/12	2047.8	1114.9	3018.5	3665.0	4536.1	86.0	84.0	71.9	74.8	87.4
07/13	2086.6	1117.9	3092.2	3751.8	4599.3	87.6	84.2	73.7	76.6	88.6
07/14	2093.2	1123.3	3338.4	4006.8	4636.9	87.9	84.6	79.6	81.8	89.4
07/15	2109.1	1123.3	3372.8	4068.3	4705.8	88.6	84.6	80.4	83.1	90.7
07/16	2124.8	1123.3	3460.2	4101.2	4787.7	89.2	84.6	82.5	83.7	92.3
07/17	2132.2	1126.3	3623.1	4208.0	4851.9	89.5	84.9	86.3	85.9	93.5
07/18	2223.4	1136.6	3756.7	4333.0	4909.2	93.4	85.6	89.5	88.5	94.6
07/19	2247.5	1136.6	3782.2	4535.4	4925.0	94.4	85.6	90.1	92.6	94.9

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Date	CPUE					Percent				
	1984	1985	1986	1987	1988	1984	1985	1986	1987	1988
07/22	262.58	107.43	192.41	568.94	348.78	96.1	94.1	96.1	97.8	96.6
07/23	262.58	107.43	192.41	572.30	348.78	96.1	94.1	96.1	98.3	96.6
07/24	264.32	107.43	192.41	572.30	349.86	96.8	94.1	96.1	98.3	96.9
07/25	265.99	107.43	192.41	572.30	349.86	97.4	94.1	96.1	98.3	96.9
07/26	265.99	107.43	194.36	572.30	352.02	97.4	94.1	97.0	98.3	97.5
07/27	265.99	107.43	196.31	576.52	354.02	97.4	94.1	98.0	99.1	98.1
07/28	265.99	109.43	196.31	576.52	354.02	97.4	95.9	98.0	99.1	98.1
07/29	266.84	109.43	200.29	576.52	354.02	97.7	95.9	100.0	99.1	98.1
07/30	266.84	111.24	200.29	576.52	358.18	97.7	97.5	100.0	99.1	99.2
07/31	268.44	111.24	200.29	576.52	358.18	98.3	97.5	100.0	99.1	99.2
08/01	268.44	111.24	200.29	576.52	358.18	98.3	97.5	100.0	99.1	99.2
08/02	268.44	111.24	200.29	576.52	358.18	98.3	97.5	100.0	99.1	99.2
08/03	268.44	111.24	200.29	577.66	358.18	98.3	97.5	100.0	99.3	99.2
08/04	268.44	111.24	200.29	577.66	358.18	98.3	97.5	100.0	99.3	99.2
08/05	271.46	111.24	200.29	577.66	358.18	99.4	97.5	100.0	99.3	99.2
08/06	273.13	111.24	200.29	577.66	358.18	100.0	97.5	100.0	99.3	99.2
08/07	273.13	111.24	200.29	579.82	358.18	100.0	97.5	100.0	99.6	99.2
08/08	273.13	111.24	200.29	579.82	358.18	100.0	97.5	100.0	99.6	99.2
08/09	273.13	113.11	200.29	579.82	358.18	100.0	99.1	100.0	99.6	99.2
08/10	273.13	113.11	200.29	579.82	358.18	100.0	99.1	100.0	99.6	99.2
08/11	273.13	113.11	200.29	581.98	360.94	100.0	99.1	100.0	100.0	100.0
08/12	273.13	113.11	200.29	581.98	360.94	100.0	99.1	100.0	100.0	100.0
08/13	273.13	113.11	200.29	581.98	360.94	100.0	99.1	100.0	100.0	100.0
08/14	273.13	113.11	200.29	581.98	360.94	100.0	99.1	100.0	100.0	100.0
08/15	273.13	113.11	200.29	581.98	360.94	100.0	99.1	100.0	100.0	100.0
08/16	273.13	113.11	200.29	581.98	360.94	100.0	99.1	100.0	100.0	100.0
08/17	273.13	113.11	200.29	581.98	360.94	100.0	99.1	100.0	100.0	100.0
08/18	273.13	113.11	200.29	581.98	360.94	100.0	99.1	100.0	100.0	100.0
08/19	273.13	113.11	200.29	581.98	360.94	100.0	99.1	100.0	100.0	100.0
08/20	273.13	113.11	200.29	581.98	360.94	100.0	99.1	100.0	100.0	100.0
08/21	273.13 <sup>a</sup>	114.11 <sup>b</sup>	200.29 <sup>c</sup>	581.98 <sup>d</sup>	366.94	100.0	100.0	100.0	100.0	100.0

$\tau = 6/22$   $\tau = 6/28$   $\tau = 6/22$

- a Estimated passage based on 1984 calibration (344.44 fish/index): 200,458  
b Estimated passage based on 1985 calibration (573.59 fish/index): 333,819  
c Estimated passage based on 1986 calibration (356.94 fish/index): 207,733  
d Estimated passage based on 1987 calibration (405.10 fish/index): 235,761

Appendix B-9. Kuskokwim River sockeye salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-88.

Date	CPUE					Percent				
	1984	1985	1986	1987	1988	1984	1985	1986	1987	1988
06/04	0.0	0.0		6.0	0.0	0.0	0.0	0.0	0.2	0.0
06/05	0.0	0.0		6.0	0.0	0.0	0.0	0.0	0.2	0.0
06/06	0.0	0.0		9.1	0.0	0.0	0.0	0.0	0.3	0.0
06/07	0.0	0.0		18.2	0.0	0.0	0.0	0.0	0.7	0.0
06/08	0.0	0.0	0.0	35.2	12.3	0.0	0.0	0.2	1.3	0.8
06/09	0.0	0.0	0.0	47.8	26.6	0.0	0.0	0.0	1.7	1.8
06/10	0.0	0.0	0.0	63.5	38.3	0.0	0.0	0.0	2.3	2.6
06/11	2.7	0.0	0.0	79.6	81.6	0.5	0.0	0.0	2.9	5.4
06/12	2.7	0.0	6.0	191.4	143.2	0.5	0.0	0.2	6.9	9.5
06/13	2.7	0.0	14.1	240.0	190.7	0.5	0.0	0.6	8.7	12.7
06/14	2.7	0.0	26.9	248.7	204.5	0.5	0.0	1.1	9.0	13.6
06/15	7.7	0.0	29.8	290.4	213.6	1.3	0.0	1.2	10.3	14.2
06/16	7.7	0.0	64.5	458.2	220.9	1.3	0.0	2.5	16.6	14.7
06/17	9.6	0.0	70.3	710.2	247.2	1.7	0.0	2.8	25.7	16.5
06/18	16.3	0.0	81.8	779.2	295.6	2.8	0.0	3.2	28.2	19.7
06/19	16.3	0.0	87.6	795.7	393.6	2.8	0.0	3.4	28.8	26.2
06/20	23.1	0.0	135.3	842.8	419.4	4.0	0.0	5.3	30.5	28.0
06/21	29.8	0.0	240.3	918.8	554.1	5.2	0.0	9.4	33.3	36.9
06/22	51.9	0.0	292.6	1084.7	689.5	9.0	0.0	11.5	39.3	46.0
06/23	51.9	2.7	374.9	1439.6	806.6	9.0	0.2	14.7	52.1	53.8
06/24	66.0	16.0	494.3	1581.9	869.4	11.4	1.0	19.4	57.3	57.9
06/25	86.4	16.0	528.5	1630.5	898.2	14.9	1.0	20.7	59.1	59.9
06/26	96.9	28.3	675.9	1692.7	1012.9	16.7	1.7	26.5	61.3	67.5
06/27	108.7	39.5	853.3	1726.7	1081.6	18.8	2.4	33.4	62.5	72.1
06/28	144.3	137.0	915.8	1768.2	1123.8	24.9	8.3	35.9	64.0	74.9
06/29	182.9	137.0	949.2	1805.4	1132.9	31.6	8.3	37.2	65.4	75.5
06/30	201.4	272.3	1180.7	1969.2	1177.7	34.8	16.5	46.3	71.3	78.5
07/01	241.5	399.9	1384.8	2210.5	1268.8	41.7	24.2	54.3	80.1	84.6
07/02	258.8	526.2	1592.8	2273.3	1296.6	44.7	31.8	62.4	82.3	86.4
07/03	271.0	643.3	1745.3	2308.9	1329.0	46.8	38.9	68.4	83.6	88.6
07/04	293.6	899.4	1768.4	2433.1	1383.2	50.7	54.4	69.3	88.1	92.2
07/05	334.4	1049.1	2000.0	2599.0	1428.1	57.7	63.4	78.4	94.1	95.2
07/06	359.4	1239.0	2017.8	2611.1	1444.7	62.0	74.9	79.1	94.6	96.3
07/07	395.1	1292.7	2115.4	2655.4	1456.2	68.2	78.1	82.9	96.2	97.0
07/08	437.1	1360.7	2200.5	2661.9	1468.8	75.4	82.3	86.2	96.4	97.9
07/09	451.0	1393.6	2232.5	2691.5	1478.4	77.9	84.2	87.5	97.5	98.3
07/10	498.1	1438.9	2279.7	2721.8	1483.4	86.0	87.0	89.3	98.6	98.9
07/11	525.0	1495.4	2313.2	2726.0	1487.8	90.6	90.4	90.6	98.7	99.2
07/12	542.4	1553.0	2386.7	2729.3	1487.8	93.6	93.9	93.5	98.9	99.2

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Appendix B-9. (continued)

Date	CPUE					Percent				
	1984	1985	1986	1987	1988	1984	1985	1986	1987	1988
07/14	546.5	1578.6	2428.2	2740.7	1487.8	94.3	95.4	95.1	99.3	99.2
07/15	548.9	1584.4	2429.2	2743.7	1490.8	94.8	95.8	95.2	99.4	99.4
07/16	548.9	1596.8	2437.4	2743.7	1492.4	94.8	96.5	95.5	99.4	99.5
07/17	549.8	1602.6	2460.6	2745.8	1492.4	94.9	96.9	96.4	99.5	99.5
07/18	552.7	1607.3	2480.2	2745.8	1495.7	95.4	97.2	97.2	99.5	99.7
07/19	562.4	1609.3	2495.9	2751.9	1497.5	97.1	97.3	97.8	99.7	99.8
07/20	564.0	1609.3	2497.9	2755.1	1497.5	97.3	97.3	97.9	99.8	99.8
07/21	569.2	1618.6	2505.5	2755.1	1497.5	98.2	97.8	98.2	99.8	99.8
07/22	573.2	1622.1	2512.9	2755.1	1497.5	98.9	98.1	98.5	99.8	99.8
07/23	573.2	1625.8	2518.5	2755.1	1498.6	98.9	98.3	98.7	99.8	99.9
07/24	575.1	1629.2	2522.4	2755.1	1498.6	99.3	98.5	98.8	99.8	99.9
07/25	576.0	1634.6	2526.1	2755.1	1499.7	99.4	98.8	99.0	99.8	99.9
07/26	576.0	1639.4	2534.1	2755.1	1499.7	99.4	99.1	99.3	99.8	99.9
07/27	576.0	1647.8	2538.1	2755.1	1499.7	99.4	99.6	99.4	99.8	99.9
07/28	577.7	1650.8	2540.0	2755.1	1499.7	99.7	99.8	99.5	99.8	99.9
07/29	579.3	1650.8	2540.0	2755.1	1499.7	100.0	99.8	99.5	99.8	99.9
07/30	579.3	1650.8	2540.0	2755.1	1499.7	100.0	99.8	99.5	99.8	99.9
07/31	579.3	1652.5	2540.0	2755.1	1499.7	100.0	99.9	99.5	99.8	99.9
08/01	579.3	1652.5	2542.2	2755.1	1500.5	100.0	99.9	99.6	99.8	100.0
08/02	579.3	1652.5	2542.2	2757.2	1500.5	100.0	99.9	99.6	99.9	100.0
08/03	579.3	1652.5	2544.3	2759.0	1500.5	100.0	99.9	99.7	99.9	100.0
08/04	579.3	1652.5	2546.4	2759.0	1500.5	100.0	99.9	99.8	99.9	100.0
08/05	579.3	1652.5	2546.4	2759.0	1500.5	100.0	99.9	99.8	99.9	100.0
08/06	579.3	1652.5	2547.6	2759.0	1500.5	100.0	99.9	99.8	99.9	100.0
08/07	579.3	1652.5	2547.6	2759.0	1500.5	100.0	99.9	99.8	99.9	100.0
08/08	579.3	1654.2	2547.6	2759.0	1500.5	100.0	100.0	99.8	99.9	100.0
08/09	579.3	1654.2	2547.6	2759.0	1500.5	100.0	100.0	99.8	99.9	100.0
08/10	579.3	1654.2	2547.6	2759.0	1500.5	100.0	100.0	99.8	99.9	100.0
08/11	579.3	1654.2	2548.7	2759.0	1500.5	100.0	100.0	99.9	99.9	100.0
08/12	579.3	1654.2	2548.7	2761.0	1500.5	100.0	100.0	99.9	100.0	100.0
08/13	579.3	1654.2	2548.7	2761.0	1500.5	100.0	100.0	99.9	100.0	100.0
08/14	579.3	1654.2	2548.7	2761.0	1500.5	100.0	100.0	99.9	100.0	100.0
08/15	579.3	1654.2	2551.4	2761.0	1500.5	100.0	100.0	100.0	100.0	100.0
08/16	579.3	1654.2	2551.4	2761.0	1500.5	100.0	100.0	100.0	100.0	100.0
08/17	579.3	1654.2	2551.4	2761.0	1500.5	100.0	100.0	100.0	100.0	100.0
08/18	579.3	1654.2	2551.4	2761.0	1500.5	100.0	100.0	100.0	100.0	100.0
08/19	579.3	1654.2	2551.4	2761.0	1500.5	100.0	100.0	100.0	100.0	100.0
08/20	579.3	1654.2	2551.4	2761.0	1500.5	100.0	100.0	100.0	100.0	100.0
08/21	579.3	1654.2 <sup>a</sup>	2552.3 <sup>b</sup>	2761.0 <sup>c</sup>	1500.5	100.0	100.0	100.0	100.0	100.0

t = 6/30      t = 6/27

a Estimated passage based on 1985 calibration (213.18 fish/index)      588,596  
 b Estimated passage based on 1986 calibration (170.28 fish/index)      470,148  
 c Estimated passage based on 1987 calibration (162.25 fish/index)      447,977

Appendix B-10. Kuskokwim River coho salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-88.

Date	CPUE					Percent				
	1984	1985	1986	1987	1988	1984	1985	1986	1987	1988
07/12	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
07/13	1.2	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0
07/14	1.2	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0
07/15	1.2	0.0	1.9	0.0	1.0	0.0	0.0	0.0	0.0	0.0
07/16	2.7	0.9	3.9	0.0	1.0	0.1	0.1	0.1	0.0	0.0
07/17	4.1	2.5	5.7	0.0	3.9	0.1	0.2	0.1	0.0	0.1
07/18	7.5	2.5	9.5	0.0	3.9	0.2	0.2	0.2	0.0	0.1
07/19	13.2	4.2	18.3	0.0	3.9	0.4	0.3	0.4	0.0	0.1
07/20	22.2	7.9	28.4	0.0	5.7	0.7	0.5	0.7	0.0	0.2
07/21	26.4	13.3	40.3	0.0	7.9	0.9	0.8	0.9	0.0	0.3
07/22	29.9	28.1	48.2	6.8	11.1	1.0	1.8	1.1	0.5	0.4
07/23	36.7	28.1	64.6	8.0	11.1	1.2	1.8	1.5	0.4	0.4
07/24	45.3	31.1	115.7	8.0	24.2	1.5	2.0	2.7	0.4	0.8
07/25	56.6	48.5	145.0	9.3	37.4	1.9	3.1	3.4	0.5	1.2
07/26	72.6	68.9	163.2	12.4	43.7	2.4	4.4	3.8	0.6	1.4
07/27	95.4	72.8	215.4	16.7	81.0	3.1	4.6	5.0	0.8	2.6
07/28	127.7	89.1	235.0	19.1	152.9	4.2	5.7	5.4	1.0	4.8
07/29	186.3	128.4	299.2	30.8	182.4	6.1	8.2	6.9	1.5	5.8
07/30	341.3	147.7	351.2	36.5	226.2	11.2	9.4	8.1	1.8	7.2
07/31	491.4	167.2	374.2	38.9	279.6	16.1	10.6	8.7	1.9	8.9
08/01	685.9	205.1	652.4	52.5	328.9	22.4	13.0	15.1	2.6	10.4
08/02	768.7	233.4	746.5	91.2	357.2	25.1	14.8	17.3	4.5	11.3
08/03	1049.9	290.4	1111.8	171.1	444.6	34.3	18.4	25.7	8.5	14.1
08/04	1094.9	348.3	1498.0	227.9	483.8	35.8	22.1	34.7	11.4	15.3
08/05	1183.6	377.8	1721.2	253.0	518.1	38.7	24.0	39.9	12.6	16.4
08/06	1318.0	463.0	1933.2	297.2	858.9	43.1	29.4	44.8	14.8	27.2
08/07	1350.8	605.2	2143.0	392.4	1195.5	44.2	38.4	49.6	19.6	37.9
08/08	1456.2	690.8	2230.2	435.1	1343.4	47.6	43.9	51.6	21.7	42.5
08/09	1534.1	799.0	2372.5	470.3	1385.1	50.2	50.7	54.9	23.5	43.9
08/10	1588.5	895.9	2651.2	505.6	1500.3	52.0	56.9	61.4	25.2	47.5
08/11	1699.4	1096.8	2733.7	537.7	1738.9	55.6	69.6	63.3	26.8	55.1
08/12	1782.5	1189.6	3024.0	710.7	1941.1	58.3	75.5	70.0	35.5	61.5
08/13	1819.0	1256.1	3120.7	822.9	2006.6	59.5	79.7	72.3	41.1	63.5
08/14	1842.8	1286.5	3186.3	1145.0	2176.4	60.3	81.7	73.8	57.1	68.9
08/15	1841.8	1347.6	3351.6	1291.2	2349.8	60.2	85.5	77.6	64.4	74.4
08/16	1957.2	1416.0	3402.4	1405.4	2404.1	64.0	89.9	78.8	70.1	76.1
08/17	2169.2	1433.8	3442.8	1487.9	2521.1	71.0	91.0	79.7	74.2	79.8
08/18	2463.5	1456.9	3551.1	1540.3	2631.7	80.6	92.5	82.2	76.8	83.3
08/19	2645.5	1460.9	3636.6	1556.2	2666.3	86.5	92.7	84.2	77.6	84.4
08/20	2649.8	1473.8	3669.7	1566.6	2702.5	86.7	93.6	85.0	78.1	85.6
08/21	2676.8	1490.9	3761.8	1582.2	2711.3	87.6	94.6	87.1	78.9	85.9
08/22	2794.5	1490.9	3813.2	1590.4	2779.0	91.4	94.6	88.3	79.3	88.0
08/23	2816.8	1499.5	3940.8	1611.3	2849.1	92.1	95.2	91.2	80.4	90.2
08/24	2826.1	1507.5	4020.2	1636.0	2943.2	92.4	95.7	93.1	81.6	93.2
08/25	2860.2	1519.2	4214.2	1647.5	3048.4	93.6	96.4	97.6	82.2	96.5
08/26	2876.8	1519.2	4303.7	1662.7	3097.2	94.1	96.4	99.6	82.9	98.1
08/27	2892.3	1529.2	4319.0	1693.3	3144.7	94.6	97.1	100.0	84.5	99.6
08/28	2908.4	1567.3	4319.0	1736.9	3153.6	95.1	99.5	100.0	86.6	99.9
08/29	2952.7	1575.3	4319.0	1762.7	3159.7	96.6	100.0	100.0	87.9	100.0

-continued-

Appendix B-11. Kuskokwim River chum salmon cumulative mean tidal test fishing CPUE and percent by day, 1984-88.

Date	CPUE					Percent				
	1984	1985	1986	1987	1988	1984	1985	1986	1987	1988
06/04	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
06/05	0.0	0.0		3.3	8.7	0.0	0.0	0.0	0.1	0.2
06/06	0.0	0.0		15.7	8.7	0.0	0.0	0.0	0.3	0.2
06/07	0.0	0.0		21.8	11.7	0.0	0.0	0.0	0.4	0.2
06/08	4.7	0.0	0.0	30.3	23.0	0.2	0.0	0.0	0.6	0.4
06/09	4.7	0.0	0.0	45.3	60.9	0.2	0.0	0.0	0.9	1.2
06/10	4.7	0.0	6.0	51.5	90.3	0.2	0.0	0.1	1.1	1.7
06/11	4.7	0.0	15.0	72.4	152.8	0.2	0.0	0.4	1.5	2.9
06/12	7.0	0.0	15.0	85.7	243.8	0.3	0.0	0.4	1.8	4.7
06/13	17.0	0.0	23.3	104.8	331.1	0.7	0.0	0.6	2.1	6.4
06/14	27.4	0.0	51.8	107.6	350.3	1.2	0.0	1.2	2.2	6.8
06/15	29.9	0.0	57.6	117.4	395.4	1.3	0.0	1.4	2.4	7.6
06/16	44.8	0.0	69.4	159.4	421.0	1.9	0.0	1.7	3.3	8.1
06/17	52.6	0.0	78.7	281.0	476.6	2.2	0.0	1.9	5.7	9.2
06/18	63.3	2.7	78.7	321.8	671.3	2.7	0.2	1.9	6.6	12.9
06/19	68.3	2.7	87.5	327.7	831.7	2.9	0.2	2.1	6.7	16.0
06/20	99.6	5.4	125.5	387.7	881.4	4.2	0.4	3.0	7.9	17.0
06/21	140.7	8.3	171.4	412.1	1024.9	5.9	0.6	4.1	8.4	19.8
06/22	215.9	16.5	295.1	612.6	1276.0	9.1	1.2	7.0	12.5	24.6
06/23	224.9	24.6	402.6	715.1	1522.3	9.4	1.9	9.6	14.6	29.3
06/24	245.3	89.8	553.9	763.1	1608.0	10.3	6.8	13.2	15.6	31.0
06/25	302.1	204.6	623.5	828.9	1623.9	12.7	15.4	14.9	16.9	31.3
06/26	307.3	207.2	710.6	928.4	1687.1	12.9	15.6	16.9	19.0	32.5
06/27	424.5	231.8	841.9	1015.3	1992.7	17.8	17.5	20.1	20.7	38.4
06/28	608.2	259.8	1046.1	1120.3	2101.2	25.5	19.6	24.9	22.9	40.5
06/29	831.6	262.8	1164.3	1388.5	2209.5	34.9	19.8	27.7	28.4	42.6
06/30	865.3	315.2	1637.0	1634.5	2298.0	36.3	23.7	39.0	33.4	44.3
07/01	1001.1	380.1	1817.3	1786.6	2680.4	42.0	28.6	43.3	36.5	51.7
07/02	1067.6	438.4	1934.9	1906.3	2868.4	44.8	33.0	46.1	38.9	55.3
07/03	1071.0	462.9	1970.6	1940.5	3305.8	45.0	34.9	47.0	39.6	63.7
07/04	1172.1	642.8	1976.5	2002.6	3774.7	49.2	48.4	47.1	40.9	72.7
07/05	1321.6	819.6	2094.9	2179.7	3966.4	55.5	61.8	49.9	44.5	76.4
07/06	1449.2	896.4	2101.3	2568.8	4086.2	60.8	67.5	50.1	52.5	78.8
07/07	1537.2	927.5	2179.8	3031.5	4113.7	64.5	69.9	51.9	61.9	79.3
07/08	1807.2	951.7	2378.7	3069.9	4147.9	75.9	71.7	56.7	62.7	79.9
07/09	1844.7	957.1	2502.1	3341.5	4240.2	77.5	72.1	59.6	68.2	81.7
07/10	1947.9	996.9	2810.3	3549.8	4387.7	81.8	75.1	67.0	72.5	84.6
07/11	1995.7	1022.0	2950.8	3612.4	4471.1	83.8	77.0	70.3	73.8	86.2
07/12	2047.8	1114.9	3018.5	3665.0	4536.1	86.0	84.0	71.9	74.8	87.4
07/13	2086.6	1117.9	3092.2	3751.8	4599.3	87.6	84.2	73.7	76.6	88.6
07/14	2093.2	1123.3	3338.4	4006.8	4636.9	87.9	84.6	79.6	81.8	89.4
07/15	2109.1	1123.3	3372.8	4068.3	4705.8	88.6	84.6	80.4	83.1	90.7
07/16	2124.8	1123.3	3460.2	4101.2	4787.7	89.2	84.6	82.5	83.7	92.3
07/17	2132.2	1126.3	3623.1	4208.0	4851.9	89.5	84.9	86.3	85.9	93.5
07/18	2223.4	1136.6	3756.7	4333.0	4909.2	93.4	85.6	89.5	88.5	94.6
07/19	2247.5	1136.6	3782.2	4535.4	4925.0	94.4	85.6	90.1	92.6	94.9

-continued-

## Appendix B-11. (continued)

Date	CPUE					Percent				
	1984	1985	1986	1987	1988	1984	1985	1986	1987	1988
07/20	2262.2	1136.6	3792.2	4705.6	4954.2	95.0	85.6	90.4	96.1	95.5
07/21	2276.2	1142.2	3808.3	4728.7	4989.8	95.6	86.1	90.8	96.6	96.2
07/22	2291.9	1173.8	3855.0	4740.3	4999.4	96.2	88.4	91.9	96.8	96.3
07/23	2300.5	1183.0	3897.8	4748.3	5005.4	96.6	89.1	92.9	97.0	96.5
07/24	2318.3	1201.6	3947.4	4776.4	5029.6	97.3	90.5	94.1	97.5	96.9
07/25	2322.7	1208.9	3963.4	4817.0	5045.1	97.5	91.1	94.9	98.4	97.2
07/26	2330.4	1213.5	4035.1	4837.0	5057.7	97.8	91.4	96.2	98.8	97.5
07/27	2336.6	1225.4	4068.6	4841.3	5075.2	98.1	92.3	97.0	98.9	97.8
07/28	2340.9	1231.3	4094.6	4847.3	5084.9	98.3	92.8	97.6	99.0	98.0
07/29	2348.0	1233.3	4123.8	4852.0	5097.5	98.6	92.9	98.3	99.1	98.2
07/30	2351.4	1242.7	4142.3	4854.3	5120.4	98.7	93.6	98.7	99.1	98.7
07/31	2359.0	1248.9	4144.3	4855.6	5126.0	99.0	94.1	98.8	99.1	98.8
08/01	2364.9	1250.9	4148.0	4859.9	5131.4	99.3	94.2	98.8	99.2	98.9
08/02	2365.6	1255.3	4155.1	4863.2	5135.3	99.3	94.6	99.0	99.3	99.0
08/03	2367.2	1265.1	4167.5	4872.3	5141.8	99.4	95.3	99.3	99.5	99.1
08/04	2370.0	1268.9	4172.2	4883.5	5144.8	99.5	95.6	99.4	99.7	99.2
08/05	2372.6	1269.9	4172.2	4886.7	5147.6	99.6	95.7	99.4	99.8	99.2
08/06	2378.4	1269.9	4176.8	4890.9	5155.1	99.9	95.7	99.5	99.9	99.3
08/07	2380.1	1270.7	4176.8	4890.9	5174.1	99.9	95.7	99.5	99.9	99.7
08/08	2380.1	1272.4	4181.1	4890.9	5176.9	99.9	95.9	99.6	99.9	99.8
08/09	2380.1	1280.6	4181.1	4893.1	5179.7	99.9	96.5	99.6	99.9	99.8
08/10	2380.1	1280.6	4181.1	4895.4	5184.0	99.9	96.5	99.6	100.0	99.9
08/11	2380.1	1284.6	4183.7	4897.6	5187.2	99.9	96.8	99.7	100.0	100.0
08/12	2380.1	1290.3	4184.7	4897.6	5188.9	99.9	97.2	99.7	100.0	100.0
08/13	2380.1	1290.3	4184.7	4897.6	5188.9	99.9	97.2	99.7	100.0	100.0
08/14	2380.1	1290.3	4187.1	4897.6	5188.9	99.9	97.2	99.8	100.0	100.0
08/15	2380.1	1326.3	4187.1	4897.6	5188.9	99.9	99.9	99.8	100.0	100.0
08/16	2380.1	1327.3	4187.1	4897.6	5188.9	99.9	100.0	99.8	100.0	100.0
08/17	2380.1	1327.3	4187.1	4897.6	5188.9	99.9	100.0	99.8	100.0	100.0
08/18	2380.1	1327.3	4187.1	4897.6	5188.9	99.9	100.0	99.8	100.0	100.0
08/19	2380.1	1327.3	4189.0	4897.6	5188.9	99.9	100.0	99.8	100.0	100.0
08/20	2381.7	1327.3	4196.4	4897.6	5188.9	100.0	100.0	100.0	100.0	100.0
08/21	2381.7 <sup>a</sup>	1327.3 <sup>b</sup>	4196.4 <sup>c</sup>	4897.6 <sup>d</sup>	5188.9	100.0	100.0	100.0	100.0	100.0

t = 7/1    t = 7/4    t = 7/2

a	Estimated passage based on 1984 calibration (448.42 fish/index)	2,196,182
b	Estimated passage based on 1985 calibration (386.11 fish/index)	1,891,012
c	Estimated passage based on 1986 calibration (194.38 fish/index)	951,995
d	Estimated passage based on 1987 calibration (275.55 fish/index)	1,349,534

Appendix B.12. Commercial coho salmon catches by week, lower Kuskokwim River (District 1), 1974-1988.

<u>Year</u>	<u>Date</u>	<u>Catch</u>	<u>Fishermen</u>	<u>Fishermen</u>	
				<u>Hours</u>	<u>Catch/Hr.</u>
1974	Aug 01-02	9,576	267	3,444	2.8
	Aug 05-08	59,090	444	31,968	1.8
	Aug 12-15	58,066	396	28,512	2.0
	Aug 19-22	12,301	263	18,936	0.6
	Aug 26-29	5,360	107	7,704	0.7
	Sept 2-05	430	25	1,815	0.2
	Totals	144,823	516	92,379	1.6
1975	Aug 10	2,357	142	852	2.8
	Aug 04-06	12,500	292	14,016	0.9
	Aug 11-13	18,551	373	17,904	1.0
	Aug 18-20	34,435	388	18,624	1.9
	Aug 25-27	16,277	270	12,960	1.3
	Totals	84,120	533	64,356	1.3
1976	Aug 02-03	10,534	286	6,864	1.5
	Aug 09-11	29,728	400	19,200	1.5
	Aug 16-18	28,664	387	18,576	1.5
	Aug 23-25	14,543	300	14,400	1.0
	Aug 30-31	4,420	174	7,308	0.6
	Totals	87,889	516	66,348	1.3
1977	Aug 01-02	23,987	360	8,640	2.8
	Aug 03-10	91,474	487	23,376	3.9
	Aug 15-16	60,935	438	10,512	5.8
	Aug 18	25,589	378	4,536	5.6
	Aug 22	16,980	361	4,332	3.9
	Aug 25	11,874	264	3,168	3.7
	Aug 29	6,819	204	2,448	2.8
	Totals	237,658	572	57,012	4.2
1978	Aug 01	6,311	297	3,564	1.8
	Aug 04	9,455	364	4,368	2.2
	Aug 08	20,501	433	5,196	3.9
	Aug 11	42,428	485	5,820	7.3
	Aug 15	48,950	476	5,712	8.6
	Aug 18	29,485	434	5,208	5.7
	Aug 22	22,287	396	4,752	4.7
	Aug 25	11,168	293	3,516	3.2
	Aug 29	12,215	250	3,000	4.1
	Totals	202,800	597	41,136	4.9

-continued-

Year	Date	Catch	Fishermen	Fishermen	
				Hours	Catch/Hr.
1979	Aug 02	52,276	478	5,736	9.1
	Aug 06	53,797	480	2,880	18.7
	Aug 09	26,422	497	2,982	8.9
	Aug 13	27,915	463	2,778	10.0
	Aug 16	21,675	467	2,802	7.7
	Aug 20	19,445	390	2,340	8.3
	Aug 23	5,376	328	1,968	2.7
	Aug 27	6,342	310	3,720	1.7
	Aug 30	2,182	179	2,148	1.0
	Totals	215,430	613	27,354	7.9
1980	Aug 02	9,889	375	2,250	4.4
	Aug 07	36,126	455	2,730	13.2
	Aug 11	35,178	482	2,892	12.2
	Aug 14	28,211	439	2,634	10.7
	Aug 18	43,748	441	2,646	16.5
	Aug 21	33,274	419	2,514	13.2
	Aug 25	19,264	370	2,220	8.7
	Aug 28	13,484	319	1,914	7.0
	Totals	219,174	586	19,800	11.1
	1981	Aug 03	16,184	430	2,580
Aug 06		13,885	441	2,646	5.2
Aug 10		26,972	445	2,670	10.1
Aug 13		46,252	473	2,838	16.3
Aug 17		34,739	458	2,748	12.6
Aug 20		24,184	380	2,280	10.6
Aug 24		23,771	372	2,232	10.7
Aug 27		13,785	346	2,076	6.6
Aug 31		8,096	278	1,668	4.9
Totals		207,868	586	21,738	9.6
1982	July 29	19,561	416	2,496	7.8
	Aug 02	31,944	388	2,328	13.7
	Aug 05	35,766	455	2,670	13.4
	Aug 09	61,231	442	2,652	23.1
	Aug 12	80,685	449	2,694	29.9
	Aug 16	77,785	420	2,520	30.9
	Aug 19	49,566	403	2,418	20.5
	Aug 23	25,218	349	2,094	12.0
	Aug 26	26,761	314	1,884	14.2
	Aug 30	26,815	302	1,812	14.8
Totals	435,332	596	23,568	18.5	

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Year	Date	Catch	Fishermen	Fishermen	
				Hours	Catch/Hr.
1983	Aug 01	9,767	377	2,262	4.3
	Aug 04	15,389	430	2,580	6.0
	Aug 08	34,541	383	2,298	15.0
	Aug 11	35,268	485	2,910	12.1
	Aug 15	24,072	462	2,772	8.7
	Aug 18	22,822	408	2,448	9.3
	Aug 22	34,918	388	2,328	15.0
	Aug 26	19,039	323	1,938	9.8
	Totals	195,816	577	19,536	10.0
1984	July 30	56,609	459	2,754	20.6
	Aug 02	79,240	401	2,406	32.9
	Aug 06	84,406	542	4,878	17.3
	Aug 09	80,990	523	4,707	17.2
	Aug 13	80,268	504	4,536	17.7
	Aug 16	78,342	502	4,518	17.3
	Aug 20	63,829	491	4,419	14.4
	Aug 23	49,372	481	4,329	11.4
	Aug 27	16,472	350	3,150	5.2
	Aug 30	11,222	210	1,890	5.9
	Sept 03	1,603	690	360	4.5
	Sept 06	1,877	39	234	8.0
	Totals	604,230	619	38,181	15.8
1985	Aug 01	34,052	487	2,922	11.7
	Aug 05	54,819	527	3,162	17.3
	Aug 08	78,149	525	3,150	24.8
	Aug 12	77,809	530	3,180	24.5
	Aug 15	28,013	441	2,646	10.6
	Aug 19	19,316	406	2,436	7.9
	Aug 22	17,534	390	2,340	7.5
	Aug 26	10,688	297	1,782	6.0
	Aug 29	9,568	262	1,572	6.1
Totals	329,948	627	23,190	14.2	
1986	July 31	27,553	352	2,112	13.0
	Aug 04	96,127	530	3,180	30.2
	Aug 07	127,024	600	5,400	23.5
	Aug 11	82,215	553	3,318	24.8
	Aug 13	92,918	526	3,156	29.4
	Aug 15	55,633	519	3,114	17.9
	Aug 18	51,328	477	2,862	17.9
	Aug 21	50,640	465	2,790	18.2
	Aug 25	37,365	458	2,748	13.6
	Aug 28	16,436	346	2,076	7.9
	Sept 01	5,949	234	1,404	4.2
	Totals	643,188	663	32,160	20.0

-continued-

Year	Date	Catch	Fishermen	Fishermen	
				Hours	Catch/Hr.
1987	Aug 06	46,182	590	3,540	13.0
	Aug 13	104,968	604	3,624	29.0
	Aug 17	73,867	595	3,570	20.7
	Aug 19	45,277	585	3,510	12.9
	Aug 21	33,601	540	3,240	10.4
	Aug 24	27,607	500	3,000	9.2
	Aug 27	21,772	479	2,874	7.6
	Aug 31	12,873	364	2,184	5.9
	Sept 03	11,352	278	1,668	6.8
	Sept 07	4,311	132	792	5.4
	Totals	381,810	694	28,002	13.6
1988	June 16	0	602	4,816	0
	June 20	0	612	3,672	0
	June 24	0	644	3,864	0
	June 28	0	609	3,654	0
	July 02	0	580	3,480	0
	July 05	9	579	3,474	0
	July 08	1	604	3,624	0
	July 11	24	598	3,588	0.0
	July 14	141	597	3,582	0.04
	July 18	502	575	3,450	0.14
	July 21	1,278	539	3,234	0.39
	July 25	6,323	494	2,964	2.13
	July 28	20,970	552	3,312	6.33
	Aug 01	33,954	594	3,564	9.53
	Aug 04	76,576	639	3,834	19.97
	Aug 08	76,345	640	3,840	19.88
	Aug 10	53,874	596	3,576	15.06
	Aug 12	84,700	624	3,744	22.62
	Aug 15	59,724	613	3,678	16.23
	Aug 18	37,415	620	3,720	10.06
Aug 20	24,046	577	3,462	6.95	
Aug 27	22,683	532	3,192	7.10	
Aug 31	12,264	412	2,472	4.96	
Total	510,829	746	81,796	6.24	

- a The catch totals exclude small numbers of chinook salmon taken in late July and August.  
b Unrestricted mesh size.  
c Preliminary harvest figures

Appendix B.13. Kuskokwim River escapement of chinook salmon by age and sex, 1982-1988.

Sex	Sample Size	Total years of life at maturity <sup>a</sup>				Total
		4	5	6	7	
1982: Aniak River <sup>b</sup>						
Male	371	0.0	35.8	29.2	0.7	65.7
Female	194	0.0	24.6	9.7	0.0	34.3
Combined	565	0.0	60.4	38.9	0.7	100.0
Total Esc. <sup>c</sup>		0	234,913	151,557	2,756	389,226
1982: Kogrukluk River <sup>d</sup>						
Male	147	0.0	39.2	17.8	0.0	57.0
Female	111	0.0	31.7	10.9	0.4	43.0
Combined	258	0.0	70.9	28.7	0.4	100.0
Total Esc. <sup>c</sup>		0	36,320	14,686	198	51,204
1982: Salmon River <sup>d</sup>						
Male	18	0.0	62.1	13.8	0.0	75.9
Female	7	0.0	24.1	0.0	0.0	24.1
Combined	25	0.0	86.2	13.8	0.0	100.0
Total Esc. <sup>e</sup>						
1983: Aniak River <sup>b</sup>						
Male	137	0.0	6.1	70.4	0.0	76.5
Female	42	0.0	6.7	16.8	0.0	23.5
Combined	179	0.0	12.8	87.2	0.0	100.0
Total Esc. <sup>c</sup>		0	14,760	100,109	0	114,869
1983: Kogrukluk River <sup>d</sup>						
Male	280	0.0	9.6	47.6	1.0	58.2
Female	201	0.4	12.3	28.5	0.6	41.8
Combined	481	0.4	21.9	76.1	1.6	100.0
Total Esc. <sup>e</sup>		37	1,964	6,846	150	8,997
1984: Aniak River <sup>b</sup>						
Male	69	0.0	50.5	14.6	1.9	67.0
Female	34	0.0	21.3	10.7	1.0	33.0
Combined	103	0.0	71.8	25.3	2.9	100.0
Total Esc. <sup>c</sup>		0	197,760	69,484	8,017	275,261
1984: Kogrukluk River <sup>b</sup>						
Male	840	0.0	50.8	13.7	2.0	66.5
Female	408	0.0	23.8	8.4	1.3	33.5
Combined	1,248	0.0	74.6	22.1	3.3	100.0
Total Esc. <sup>c</sup>		0	30,934	9,170	1,380	41,484

-continued-

## Appendix B.13. (page 2 of 3)

Sex	Sample Size	Total years of life at maturity <sup>a</sup>				Total
		3	4	5	6	
1985: Aniak River <sup>b</sup>						
Male	88	0.0	18.5	32.7	1.2	52.4
Female	80	0.0	22.6	25.0	0.0	47.6
Combined	168	0.0	41.1	57.7	1.2	100.0
Total Esc. <sup>c</sup>		0	90,825	127,508	2,652	220,985
1985: Kogrukluk River <sup>b</sup>						
Male	478	0.2	15.9	38.1	0.5	54.7
Female	396	0.0	14.4	30.9	0.0	45.3
Combined	874	0.2	30.3	69.0	0.5	100.0
Total Esc. <sup>b</sup>		30	4,546	10,351	75	15,002
1986: Kogrukluk River <sup>b</sup>						
Male	359	0.2	26.0	9.7	0.8	36.7
Female	209	0.2	43.7	17.8	1.6	63.3
Combined	568	0.4	69.7	27.5	2.4	100.0
Total Esc. <sup>f</sup>						
1986: Kisaralik River <sup>g</sup>						
Male	478	0.0	13.6	27.3	0.0	40.9
Female	396	0.0	13.6	45.5	0.0	59.1
Combined	874	0.0	27.2	72.8	0.0	100.0
Total Esc. <sup>f</sup>						
1987: Kogrukluk River <sup>b</sup>						
Male						
Female						
Combined						
Total Esc. <sup>f</sup>						
1987: Aniak River <sup>g</sup>						
Male						
Female						
Combined						
Total Esc. <sup>f</sup>						
1988: Kogrukluk River <sup>b</sup>						
Male						
Female						
Combined						
Total Esc. <sup>f</sup>						
1988: Aniak River <sup>g</sup>						
Male						
Female						
Combined						

Total Esc.<sup>f</sup>

- a Total years of life at maturity represents the total number of freshwater and marine annuli, plus one. See Kuskokwim C&E for more detailed age composition data.
- b Allocation by age and sex based on weir samples.
- c Escapement based on weir counts.
- d Allocation by age and sex based on 4.25 in (11 cm), 5.5 in (14 cm), and 8.5 in (22 cm) stretch mesh gill net samples.
- e Escapement estimate based on adjusted sonar counts.
- f No escapement estimates available.
- g Allocation by age and sex based on 'hook and line' samples.

Appendix B-14. Kuskokwim River commercial and subsistence chinook salmon catch by age and sex, 1982-1988.

Sex	Sample Size	Total years of life at maturity <sup>a</sup>				Total
		3	4	5	6	
1982:						
Male	258	0.7	31.1	18.8	0.6	51.2
Female	166	0.5	35.8	12.1	0.4	48.8
Combined	424	1.2	66.9	30.9	1.0	100.0
Total Harvest <sup>b</sup>		5,620	313,321	144,718	4,683	468,342
1983:						
Male	814	0.4	20.3	26.5	1.0	48.2
Female	833	0.6	25.5	25.4	0.3	51.8
Combined	1,647	1.0	45.8	51.9	1.3	100.0
Total Harvest <sup>b</sup>		4,766	218,262	247,332	6,195	476,555
1984:						
Male	773	0.3	37.4	4.8	0.7	43.2
Female	1,052	0.5	51.3	4.8	0.2	56.8
Combined	1,825	0.8	88.7	9.6	0.9	100.0
Total Harvest <sup>b</sup>		4,584	508,267	55,010	5,157	573,018
1985:						
Male	476	0.3	16.4	29.3	0.3	46.3
Female	553	0.4	18.4	34.8	0.1	53.7
Combined	1,029	0.7	34.8	64.1	0.4	100.0
Total Harvest <sup>b</sup>		2,039	101,382	186,741	1,165	291,328
1986: Commercial Harvest						
Male	502	0.2	35.9	10.4	0.2	46.7
Female	562	0.3	41.0	11.7	0.3	53.3
Combined	1,064	0.5	76.9	22.1	0.5	100.0
Comm. Harvest <sup>b</sup>		1,546	237,785	68,336	1,647	309,213
1986: Subsistence Harvest						
Male		0.0	25.0	7.0	0.0	32.0
Female		0.0	58.8	8.3	0.9	68.0
Combined	228	0.0	83.8	15.3	0.9	100.0
Subsist. Harvest		0	78,471	14,327	843	93,641

- continued -

Sex	Sample Size	Total years of life at maturity <sup>a</sup>				Total
		3	4	5	6	
1987: Commercial Harvest						
Male						0.0
Female						0.0
Combined	0	0.0	0.0	0.0	0.0	0.0
Comm. Harvest	<sup>b</sup>	0	0	0	0	
1987: Subsistence Harvest <sup>c</sup>						
Male						0.0
Female						0.0
Combined		0.0	0.0	0.0	0.0	0.0
Subsist. Harvest		0	0	0	0	

Sex	Sample Size	Total years of life at maturity <sup>a</sup>				Total
		3	4	5	6	
1988: Commercial Harvest						
Male						0.0
Female						0.0
Combined	0	0.0	0.0	0.0	0.0	0.0
Comm. Harvest	<sup>b</sup>	0	0	0	0	
1988: Subsistence Harvest <sup>c</sup>						
Male						0.0
Female						0.0
Combined		0.0	0.0	0.0	0.0	0.0
Subsist. Harvest		0	0	0	0	

<sup>a</sup> Total years of life at maturity represents the total number of freshwater and marine annuli, plus one.

<sup>b</sup> Allocation by age and sex based on commercial harvest samples.

<sup>c</sup> Allocation by age class based on subsistence harvest samples, and allocation by sex based on commercial harvest samples.

Appendix C-1. Historical age composition percentage, chinook salmon,  
Quinhagak commercial harvest and escapement, 1982 - 1988.

Age composition	Total years of life at maturity <sup>a</sup> .					Total
	3	4	5	6	7+	
1982 commercial sample size:	309					
Male	0.0	3.6	33.3	9.4	1.3	47.6
Female	0.0	1.3	31.1	18.4	1.6	52.4
Combined	0.0	4.9	64.4	27.8	2.9	100.0
Commercial Harvest <sup>b</sup>	0	1,083	14,236	6,145	641	22,106
1982 no escapement sockeye salmon samples were collected.						
1983 commercial sample size:	758					
Male	0.4	25.9	6.1	27.3	1.5	61.2
Female	0.0	0.1	0.8	37.0	0.9	38.8
Combined	0.4	26.0	6.9	64.3	2.4	100.0
Commercial Harvest <sup>b</sup>	186	12,060	3,201	29,826	1,113	46,385
1983 escapement sample size:	580					
Carcass samples only.						
Male	0.3	6.7	10.9	29.7	1.0	48.6
Female	0.0	0.2	2.4	45.8	3.0	51.4
Combined	0.3	6.9	13.3	75.5	4.0	100.0
Estimated Escapement <sup>c</sup>	148	3,403	6,558	37,231	1,972	49,312
1984 commercial sample size:	583					
Male	0.0	12.0	52.7	14.8	3.9	83.4
Female	0.0	0.0	1.5	10.1	5.0	16.6
Combined	0.0	12.0	54.2	24.9	8.9	100.0
Commercial Harvest <sup>b</sup>	0	4,038	18,239	8,379	2,995	33,652
1984 escapement sample size:	545					
Carcass samples only.						
Male	1.5	5.0	34.0	20.0	2.6	63.1
Female	0.0	0.0	4.3	28.5	4.1	36.9
Combined	1.5	5.0	38.3	48.5	6.7	100.0
Estimated Escapement <sup>c</sup>	574	1,912	35,973	14,648	18,549	38,245
1985 commercial sample size:	569					
Male	0.0	19.3	20.9	26.7	1.6	59.1
Female	0.0	0.0	2.5	28.3	0.7	40.9
Combined	0.0	19.3	23.4	55.0	2.3	100.0
Commercial Harvest <sup>b</sup>	0	5,867	7,114	16,721	699	30,401

-Continued-

Age composition	Total years of life at maturity <sup>a</sup> .					Total
	3	4	5	6	7+	
1985 escapement sample size: 661						
Combined beach seine (n=131) and carcass (n=530) samples.						
Male	0.6	5.3	11.0	30.6	0.9	48.4
Female	0.0	0.0	3.7	45.5	2.4	51.6
Combined	0.6	5.3	14.7	76.1	3.3	100.0
Estimated Escapement <sup>c</sup>	215	1,895	5,256	27,210	1,180	35,755
1986 commercial sample size: 502 <sup>d</sup>						
Male	2.0	6.0	43.0	16.0	4.0	71.0
Female	0.0	0.0	2.0	19.0	8.0	29.0
Combined	2.0	6.0	45.0	35.0	12.0	100.0
Commercial Harvest <sup>b</sup>	457	1,370	10,276	7,992	2,740	22,835
1986 sport fish sample size: 406 <sup>d</sup>						
Male	0.0	9.3	37.7	10.6	5.9	63.5
Female	0.0	1.5	8.4	18.2	8.4	36.5
Combined	0.0	10.8	46.1	28.8	14.3	100.0
Estimated sport fish Harvest <sup>e</sup>	0	90	385	240	119	835
1986 escapement sample size: 406 <sup>d</sup>						
Combined beach seine (n=31) and carcass (n=168) samples.						
Male	1.5	6.0	21.2	18.1	6.0	52.8
Female	0.0	0.0	6.5	26.6	14.1	47.2
Combined	1.5	6.0	27.7	44.7	20.1	100.0
Escapement <sup>c</sup>	e	e	e	e	e	e
1987 commercial sample size: 270						
Male	0.0	13.0	19.2	15.6	0.0	47.8
Female	0.0	3.0	12.6	34.4	2.2	52.2
Combined	0.0	16.0	31.8	50.0	2.2	100.0
Commercial Harvest <sup>b</sup>	0.0	4,164	8,275	13,011	572	26,022
1987 escapement sample size: 381						
Carcass samples only.						
Male	0.5	2.9	10.8	34.6	3.1	51.9
Female	0.0	0.8	3.7	39.4	4.2	48.1
Combined	0.5	3.7	14.5	74.0	7.3	100.0
Estimated Escapement <sup>c</sup>	e	e	e	e	e	e
1988 commercial sample size: 592						
Male	0.0	19.8	24.1	12.8	3.2	59.9
Female	0.0	2.7	9.5	18.1	9.8	40.1
Combined	0.0	22.5	33.6	30.9	13.0	100.0
Commercial Harvest <sup>b</sup>	0	3,121	4,661	4,286	1,803	13,872
1988 escapement sample size: <sup>e</sup>						

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- a The total years of life at maturity are represented by the following European salmon age designations. European age designates the number of fresh water and marine annuli, respectively.  
Age composition 3 includes 1.1 and small numbers of 0.2.  
Age composition 4 includes 1.2 and small numbers of 0.3.  
Age composition 5 includes 1.3 and small numbers of 0.4.  
Age composition 6 includes 1.4 and small numbers of 2.3 and 0.5.  
Age composition 7+ includes age compositions 1.5 and 2.4.
  - b Allocations by age class based on that years commercial catch sample results.
  - c Allocations by age class based on that years escapement sample results. Escapement estimate based on the Kanektok River salmon side scan sonar project.
  - d Preliminary data.
  - e Information not available.

Appendix C.2. Kanektok River peak aerial surveys by species,  
1960 - 1988a.

Year	SPECIES			
	Chinook	Sockeye	Coho	Chum
1960	6,047	34,900		36,100
1961				
1962	935	43,108		
1963				
1964				
1965				
1966	3,718			28,800
1967				
1968	4,170	8,000		14,000
1969				
1970	4,112	3,028		80,100
1971				
1972				
1973	814			
1974				
1975		6,018		
1976		2,936		8,697
1977	5,787	6,304		32,157
1978 <sup>b</sup>	19,180	44,215		229,290
1979				
1980	6,172	113,931	69,325	25,950
1981 <sup>c</sup>	15,900	49,175		71,840
1982 <sup>d</sup>	8,142	55,940		
1983	8,890	2,340		9,360
1984 <sup>e</sup>	12,182	30,840	46,830	48,360
1985	13,465	16,270		14,385
1986	3,643	14,949		16,790
1987	4,223	51,753	20,056	9,420
1988	11,140	30,440		20,063
AVERAGE:	7,560	30,244	45,404	29,716
OBJECTIVE:	5,000	32,000	25,000	30,500

- a Peak aerial surveys are those rated fair or good surveys obtained between 20 July and 5 August for chinook and sockeye salmon, 20-31 July for chum salmon, and 20 August and 5 September for coho salmon. Some surveys which do not meet these criteria may be referenced in this table; these are footnoted.
- b Chum salmon count excluded from escapement objective calculation due to exceptional magnitude.
- c Poor survey for chinook, sockeye, chum salmon.
- d Late Survey for chinook, sockeye salmon (after 5 August).
- e Poor coho survey.

Appendix C-3. Historical age composition percentage, sockeye salmon, Quinhagak commercial harvest and escapement, 1982 - 1988.

Age composition	Total years of life at maturity <sup>a</sup>				Total
	3	4	5	6	
1982 commercial sample size:	203				
Male	0.0	17.2	38.0	0.0	55.2
Female	0.0	13.3	31.5	0.0	44.8
Combined	0.0	30.5	69.5	0.0	100.0
Commercial Harvest <sup>b</sup>	0	7,834	17,851	0	25,685
1982 no escapement sockeye salmon samples were collected.					
1983 commercial sample size:	470				
Male	0.0	23.0	20.9	4.0	47.9
Female	0.0	31.0	18.5	2.6	52.1
Combined	0.0	54.0	39.4	6.6	100.0
Commercial Harvest <sup>b</sup>	0	5,542	4,044	677	10,263
1983 no escapement sockeye salmon samples were collected.					
1984 commercial sample size:	531				
Male	0.0	17.1	34.5	4.9	56.5
Female	0.0	10.0	30.1	3.4	43.5
Combined	0.0	27.1	64.6	8.3	100.0
Commercial Harvest <sup>b</sup>	0	4,677	11,149	1,432	17,258
1984 escapement sample size:	382				
Carcass samples only.					
Male	0.3	22.8	36.7	1.5	61.3
Female	0.0	8.9	29.0	0.8	38.7
Combined	0.3	31.7	65.7	2.3	100.0
Estimated Escapement <sup>c</sup>	164	17,357	35,973	1,259	54,754
1985 commercial sample size:	569				
Male	0.0	9.3	40.4	1.6	59.1
Female	0.0	11.9	35.3	1.6	40.9
Combined	0.0	21.2	75.6	3.2	100.0
Commercial Harvest <sup>b</sup>	0	1,666	5,957	252	7,876
1985 escapement sample size:	26				
Combined beach seine (n=12) and carcass (n=14) samples.					
Male	0.0	19.2	27.0	0.0	46.2
Female	0.0	15.4	26.9	11.5	53.8
Combined	0.0	34.6	53.9	11.5	100.0
Estimated Escapement <sup>c</sup>	0	2,166	3,374	720	6,259

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Age composition	Total years of life at maturity <sup>a</sup>				Total
	3	4	5	6	
1986 commercial sample size: 314 <sup>d</sup>					
Male	0.0	11.7	39.2	0.2	51.1
Female	0.0	9.8	39.2	0.0	48.9
Combined	0.0	21.4	78.3	0.2	100.0
Commercial Harvest	0	4,607	16,827	50	21,484
1986 escapement sample size: 79 <sup>d</sup>					
Beach seine samples only					
Male	0.0	10.1	26.6	0.0	36.7
Female	0.0	10.1	50.6	2.6	63.3
Combined	0.0	20.2	77.2	2.6	100.0
Estimated Escapement <sup>c</sup>	e	e	e	e	e
1987 commercial sample size: 545					
Male	0.0	4.0	45.5	0.0	49.5
Female	0.0	3.0	47.5	0.0	50.5
Combined	0.0	7.0	93.0	0.0	100.0
Commercial Harvest <sup>b</sup>	0	529	7,027	0	7,556
1987 escapement sample size: 295					
Beach seine samples only.					
Male	0.0	34.6	12.2	0.0	46.8
Female	0.0	46.8	6.4	0.0	53.2
Combined	0.0	81.4	18.6	0.0	100.0
Estimated Escapement	e	e	e	e	e
1988 commercial sample size: 748					
Male	0.1	6.4	50.5	3.3	60.3
Female	0.0	3.8	32.8	3.1	39.7
Combined	0.1	10.2	83.3	6.4	100.0
Commercial Harvest <sup>b</sup>	22	2,196	17,938	1,378	21,534
1988 escapement sample size: *					
Beach seine samples only.					
Male					
Female					
Combined					
Estimated Escapement	e	e	e	e	e

a The total years of life at maturity are represented by the following European salmon age designations. European age

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designates the number of fresh water and marine annuli, respectively.

Age composition 3 includes 1.1 and small numbers of 0.2.

Age composition 4 includes 1.2 and small numbers of 0.3.

Age composition 5 includes 1.3 and small numbers of 0.4 and 2.2.

Age composition 6 includes 1.4 and small numbers of 2.3 and 0.5.

b Allocations by age class based on commercial catch sample results.

c Allocations by age class based on escapement sample results.

Escapement estimate based on the Kanektok River salmon side scan sonar project.

d Preliminary data.

e Information not available.

Appendix C-4. Historical age composition percentage, chum salmon, Quinhagak commercial harvest and escapement, 1981 - 1988.

Age composition	Total years of life at maturity <sup>a</sup>				Total
	3	4	5	6	
1982 commercial sample size:	414				
Male	1.0	24.6	13.7	1.0	40.3
Female	0.0	38.7	19.6	1.4	59.7
Combined	1.0	63.3	33.3	2.4	100.0
Commercial Harvest <sup>b</sup>	333	21,108	11,104	800	33,346
1982 no escapement chum salmon samples were collected.					
1983 commercial sample size:	482				
Male	0.0	24.7	16.0	0.6	41.3
Female	0.6	34.9	22.8	0.4	58.7
Combined	0.6	59.6	38.8	1.0	100.0
Commercial Harvest <sup>b</sup>	139	13,762	8,959	231	23,090
1983 escapement sample size: 401					
Gillnet samples only					
Male	0.0	15.5	37.6	1.0	54.1
Female	0.2	21.9	23.8	0.0	45.9
Combined	0.2	37.4	61.4	1.0	100.0
Estimated Escapement <sup>c</sup>	108	20,157	33,092	539	53,895
1984 commercial sample size:	464				
Male	0.2	33.8	13.4	0.0	47.4
Female	0.0	39.9	12.1	0.6	52.6
Combined	0.2	73.7	25.5	0.6	100.0
Commercial Harvest <sup>b</sup>	101	37,162	12,858	303	50,424
1984 escapement sample size: 772					
Carcass samples only					
Male	0.1	38.1	17.1	1.2	56.5
Female	0.1	32.0	11.1	0.3	43.5
Combined	0.2	70.1	28.2	1.5	100.0
Estimated Escapement <sup>c</sup>	400	140,298	56,439	3,002	200,140

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## Appendix C-4. (page 2 of 3)

Age composition	Total years of life at maturity <sup>a</sup>				Total
	3	4	5	6	
1985 commercial sample size: 458					
Male	0.0	25.5	21.4	0.2	59.1
Female	0.0	27.5	25.3	0.0	40.9
Combined	0.0	53.0	46.7	0.2	100.0
Commercial Harvest <sup>b</sup>	0	10,822	9,535	41	20,418
1985 escapement sample size: 440					
Combined beach seine (n=150) and carcass (n=290) samples.					
Male	0.2	24.1	27.1	0.0	51.4
Female	0.2	25.7	22.7	0.0	48.6
Combined	0.4	49.8	49.8	0.0	100.0
Estimated Escapement <sup>c</sup>	61	7,632	7,632	0	15,325
1986 commercial sample size: 314 <sup>d</sup>					
Male	0.0	22.6	17.1	0.0	39.7
Female	0.0	41.7	18.6	0.0	60.3
Combined	0.0	64.3	35.7	0.0	100.0
Commercial Harvest <sup>b</sup>	0	19,097	10,603	0	29,700
1986 escapement sample size: 431 <sup>d</sup>					
Beach seine samples only.					
Male	0.2	27.1	28.8	0.9	57.0
Female	0.0	23.0	19.3	0.7	43.0
Combined	0.2	50.1	48.1	1.6	100.0
Estimated Escapement <sup>c</sup>	e	e	e	e	e
1987 commercial sample size: 241					
Male	0.0	20.7	35.3	0.0	56.0
Female	0.0	17.4	26.6	0.0	44.0
Combined	0.0	38.1	61.9	0.0	100.0
Commercial Harvest <sup>b</sup>	0	3,673	5,968	0	9,641
1987 escapement sample size: 150					
Beach seine samples only.					
Male	0.0	14.0	32.0	2.0	48.0
Female	0.0	22.0	30.0	0.0	52.0
Combined	0.0	36.0	62.0	2.0	100.0
Estimated Escapement	e	e	e	e	e

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1988 commercial sample size: 593					
Male	0.5	31.0	16.9	1.2	49.6
Female	0.7	34.1	14.8	0.8	50.4
Combined	1.2	65.1	31.7	2.0	100.0
Commercial Harvest <sup>b</sup>	350	18,998	9,251	584	29,183
1988 escapement sample size: *					
Beach seine samples only.					
Male					
Female					
Combined					
Estimated Escapement	.	.	.	.	.

- a Total years of life at maturity represents the number of winters development and return of the mature fish for spawning. This is the sum of the two digits (European notation) plus one.
- b Age class allocations based on commercial catch sample results.
- c Age class allocations based on escapement sample results. Escapement estimate based on the Kanektok River side scan sonar project.
- d Preliminary data.
- e Information not available.

Appendix C.5. Summary of historical commercial harvest by period, Quinhagak District, sockeye salmon, 1981-1988.

<u>Date</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Average cumulative proportion harvest</u>
6/12	1	0	0	0	0.00000
6/13	2	14	151	83	0.00105
6/14	0	0	0	0	0.00105
6/15	1	89	89	89	0.00169
6/16	3	0	277	142	0.00512
6/17	1	1119	1119	1119	0.01057
6/18	3	355	468	419	0.02530
6/19	1	171	171	171	0.02630
6/20	2	111	367	239	0.03019
6/21	2	1336	2141	1739	0.05028
6/22	2	379	746	563	0.06739
6/23	2	343	1371	857	0.07956
6/24	2	638	1595	1117	0.09745
6/25	3	732	1640	1221	0.13951
6/26	1	2300	2300	2300	0.15292
6/27	2	461	543	502	0.16685
6/28	3	1908	2413	2096	0.20437
6/29	1	0	0	0	0.20437
6/30	2	1360	2601	1981	0.24574
7/1	1	975	975	975	0.26121
7/2	4	1242	3121	2029	0.31030
7/3	2	2244	3604	2924	0.37454
7/4	2	627	1201	914	0.40124
7/5	3	1157	2934	2129	0.43721
7/6	1	1126	1126	1126	0.44535
7/7	3	1211	4118	2711	0.49648
7/8	2	1289	2453	1871	0.53116
7/9	3	1532	3048	2359	0.57515
7/10	1	2786	2786	2786	0.59140
7/11	4	1901	3369	2473	0.68746
7/12	1	1601	1601	1601	0.69525
7/13	2	1842	2278	2060	0.72506
7/14	4	1426	3465	2408	0.78991
7/15	2	1240	3099	2170	0.83199
7/16	2	564	1293	929	0.84237
7/17	2	937	1502	1220	0.85790
7/18	3	657	1454	1144	0.88718
7/19	1	866	866	866	0.89140
7/20	2	477	1722	1100	0.90730
7/21	3	722	989	827	0.92104
7/22	2	799	1312	1056	0.94025
7/23	2	328	361	345	0.94446
7/24	1	907	907	907	0.95102
7/25	3	0	393	237	0.95560

-Continued-

<u>Date</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Average cumulative proportion harvest</u>
7/26	1	0	0	0	0.95560
7/27	4	0	253	151	0.96035
7/28	1	102	102	102	0.96085
7/29	3	126	429	256	0.96671
7/30	2	19	112	66	0.96740
7/31	1	97	97	97	0.96810
8/1	4	42	157	95	0.97181
8/2	1	38	38	38	0.97199
8/3	5	30	272	119	0.97772
8/4	2	3	69	36	0.97807
8/5	4	6	293	124	0.98238
8/6	4	16	153	61	0.98583
8/7	1	240	240	240	0.98757
8/8	5	0	94	25	0.98833
8/9	1	6	6	6	0.98836
8/10	5	10	77	42	0.99066
8/11	2	25	28	27	0.99094
8/12	4	1	103	54	0.99267
8/13	4	0	28	16	0.99329
8/14	2	1	44	23	0.99362
8/15	4	12	42	29	0.99459
8/16	2	0	3	2	0.99464
8/17	5	1	71	25	0.99616
8/18	2	6	10	8	0.99625
8/19	5	2	19	9	0.99672
8/20	3	3	27	13	0.99694
8/21	3	0	7	3	0.99710
8/22	4	1	32	11	0.99755
8/23	2	1	2	2	0.99758
8/24	4	0	16	6	0.99774
8/25	3	1	28	10	0.99810
8/26	4	0	14	5	0.99827
8/27	3	0	7	3	0.99833
8/28	3	0	7	3	0.99848
8/29	4	1	7	5	0.99863
8/30	2	0	0	0	0.99863
8/31	4	0	20	8	0.99909
9/1	3	0	8	3	0.99914
9/2	4	0	14	5	0.99943
9/3	3	0	1	1	0.99944
9/4	3	0	18	8	0.99983
9/5	4	0	16	4	0.99992
9/6	2	0	1	1	0.99993
9/7	4	0	5	1	0.99996
9/8	3	0	3	1	1.00000

Appendix C.6. Summary of historical commercial harvest by period, Quinhagak District, chum salmon, 1981-1988.

<u>Date</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion of harvest</u>
6/12	1	0	0	0	0.00000
6/13	2	84	1092	588	0.00513
6/14	0	0	0	0	0.00513
6/15	1	1008	1008	1008	0.00749
6/16	3	0	847	545	0.01537
6/17	1	1556	1556	1556	0.02121
6/18	3	1162	2611	1861	0.04878
6/19	1	1198	1198	1198	0.05383
6/20	2	746	968	857	0.06294
6/21	2	2278	4471	3375	0.08257
6/22	2	1051	2177	1614	0.10302
6/23	2	1103	3226	2165	0.12257
6/24	2	1403	3228	2316	0.14759
6/25	3	1711	5417	3578	0.19447
6/26	1	4329	4329	4329	0.21268
6/27	2	1855	1874	1865	0.23420
6/28	3	2458	5449	4203	0.27838
6/29	1	0	0	0	0.27838
6/30	2	2066	3860	2963	0.32481
7/1	1	2131	2131	2131	0.33785
7/2	4	1972	6034	3961	0.38696
7/3	2	1959	3743	2851	0.43133
7/4	2	2333	3155	2744	0.46327
7/5	3	1820	3303	2630	0.49109
7/6	1	2953	2953	2953	0.49801
7/7	3	3069	4016	3598	0.54528
7/8	2	3231	3672	3452	0.58077
7/9	3	3830	7408	5616	0.62640
7/10	1	4022	4022	4022	0.64333
7/11	4	2552	4567	3256	0.69891
7/12	1	3742	3742	3742	0.71293
7/13	2	4270	7438	5854	0.74095
7/14	4	1748	3080	2220	0.78119
7/15	2	2796	10756	6776	0.82351
7/16	2	1784	2193	1989	0.83616
7/17	2	2326	3218	2772	0.85349
7/18	3	1310	3022	2247	0.88143
7/19	1	2339	2339	2339	0.89020
7/20	2	2256	3934	3095	0.90501
7/21	3	1143	1827	1450	0.92257
7/22	2	1668	2219	1944	0.93849
7/23	2	791	1316	1054	0.94472
7/24	1	1280	1280	1280	0.94772
7/25	3	0	1397	737	0.95466

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<u>Date</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
7/26	1	0	0	0	0.95466
7/27	4	0	677	364	0.96019
7/28	1	333	333	333	0.96144
7/29	3	353	797	542	0.96739
7/30	2	173	232	203	0.96869
7/31	2	5	188	97	0.96915
8/1	4	246	429	299	0.97471
8/2	1	153	153	153	0.97529
8/3	5	110	580	259	0.98194
8/4	2	4	134	69	0.98246
8/5	4	98	357	224	0.98639
8/6	4	52	285	136	0.99142
8/7	1	114	114	114	0.99169
8/8	5	0	132	57	0.99267
8/9	1	11	11	11	0.99271
8/10	5	16	108	66	0.99513
8/11	2	27	37	32	0.99538
8/12	4	15	53	40	0.99607
8/13	4	2	53	21	0.99652
8/14	2	24	37	31	0.99676
8/15	4	6	53	28	0.99720
8/16	2	2	23	13	0.99735
8/17	5	2	50	21	0.99814
8/18	2	9	9	9	0.99821
8/19	5	5	15	10	0.99853
8/20	3	3	14	9	0.99863
8/21	3	2	11	6	0.99879
8/22	4	1	18	9	0.99895
8/23	2	3	9	6	0.99902
8/24	4	0	7	4	0.99914
8/25	3	0	5	3	0.99918
8/26	4	0	9	5	0.99936
8/27	3	0	2	1	0.99937
8/28	3	2	4	3	0.99946
8/29	4	0	3	2	0.99948
8/30	2	0	1	1	0.99949
8/31	4	0	10	4	0.99965
9/1	3	0	1	1	0.99966
9/2	4	0	7	3	0.99978
9/3	3	0	0	0	0.99978
9/4	3	0	13	4	0.99997
9/5	4	0	5	1	0.99999
9/6	2	0	0	0	0.99999
9/7	4	0	2	1	1.00000
9/8	3	0	0	0	1.00000

Appendix C.7. Quinhagak District commercial salmon harvest, 1967-1988.

<u>Year</u>	<u>Chinook</u>	<u>Sockeye</u>	<u>Coho</u>	<u>Pink</u>	<u>Chum</u>	<u>Total</u>
1960	0	5,649	3,000	0	0	8,649
1961	4,328	2,308	46	90	18,864	25,636
1962	5,526	10,313	0	4,340	45,707	65,886
1963	6,555	0	0	0	0	6,555
1964	4,081	13,422	379	939	707	19,528
1965	2,976	1,886	0	0	4,242	9,104
1966	278	1,030	0	268	2,610	4,186
1967	0	652	1,926	0	8,087	10,665
1968	8,879	5,884	21,511	75,818	19,497	131,589
1969	16,802	3,784	15,077	953	38,206	74,822
1970	18,269	5,393	16,850	15,195	46,556	102,263
1971	4,185	3,118	2,982	13	30,208	40,506
1972	15,880	3,286	376	1,878	17,247	38,667
1973	14,993	2,783	16,515	277	19,680	54,248
1974	8,704	19,510	10,979	43,642	15,298	98,133
1975	3,928	8,584	10,742	486	35,233	58,973
1976	14,110	6,090	13,777	31,412	43,659	109,048
1977	19,090	5,519	9,028	202	43,707	77,546
1978	12,335	7,589	20,114	47,033	24,798	111,869
1979	11,144	18,828	47,525	295	25,995	103,787
1980	10,387	13,221	62,610	21,671	65,984	173,873
1981	24,524	17,292	47,557	160	53,334	142,867
1982	22,106	25,685	73,652	11,838	33,346	166,627
1983	46,385	10,263	32,442	168	23,090	112,348
1984	33,652	17,258	135,342	16,249	50,424	252,925
1985	30,401	7,876	29,992	28	20,418	88,715
1986	22,835	21,484	57,544	8,700	29,700	140,263
1987	26,022	6,489	50,070	66	8,557	91,204
1988 <sup>a</sup>	13,872	21,534	68,591	21,258	29,183	154,438
Five Year Average (1983-1987)	31,859	12,674	61,070	5,042	26,438	137,091

a. Preliminary harvest figures.

Appendix C.8. Summary of historical commercial harvest by period, Quinhagak District, chinook salmon, 1981-1988.

<u>Date</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
6/12	1	0	0	0	0.00000
6/13	2	1716	7720	4718	0.03625
6/14	0	0	0	0	0.03625
6/15	1	2948	2948	2948	0.05128
6/16	3	0	7835	3005	0.08301
6/17	1	3527	3527	3527	0.10295
6/18	3	6694	11997	8768	0.21821
6/19	1	5801	5801	5801	0.24997
6/20	2	803	6617	3710	0.28440
6/21	2	4268	5458	4863	0.32881
6/22	2	4002	10586	7294	0.40006
6/23	2	6276	11652	8964	0.46582
6/24	2	5406	6698	6052	0.52392
6/25	3	3719	4539	4123	0.57996
6/26	1	1703	1703	1703	0.58928
6/27	2	3795	9711	6753	0.63105
6/28	3	1438	4089	2937	0.68820
6/29	1	0	0	0	0.68820
6/30	2	690	4496	2593	0.71612
7/1	1	3752	3752	3752	0.73155
7/2	4	1204	1902	1713	0.77189
7/3	2	2018	2319	2169	0.79408
7/4	2	2727	4068	3398	0.81816
7/5	3	850	967	910	0.83518
7/6	1	996	996	996	0.84026
7/7	3	960	1566	1349	0.85847
7/8	2	918	2407	1663	0.87663
7/9	3	739	1259	963	0.89011
7/10	1	736	736	736	0.89413
7/11	4	621	1545	1160	0.91394
7/12	1	687	687	687	0.91783
7/13	2	639	1011	825	0.92484
7/14	4	406	1351	758	0.93991
7/15	2	1236	1306	1271	0.95158
7/16	2	441	533	487	0.95624
7/17	2	222	290	256	0.95893
7/18	3	202	845	497	0.96468
7/19	1	390	390	390	0.96688
7/20	2	412	490	451	0.97091
7/21	3	131	203	165	0.97423
7/22	2	211	629	420	0.97700
7/23	2	88	324	206	0.97871
7/24	1	187	187	187	0.97966
7/25	3	0	379	171	0.98228

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Appendix C.8. (page 2 of 2)

<u>Date</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
7/26	1	0	0	0	0.98228
7/27	4	0	194	100	0.98415
7/28	1	56	56	56	0.98446
7/29	3	103	116	108	0.98627
7/30	2	73	104	89	0.98713
7/31	2	0	41	21	0.98734
8/1	4	54	153	92	0.98887
8/2	1	53	53	53	0.98917
8/3	5	40	160	80	0.99103
8/4	2	0	27	14	0.99119
8/5	4	40	141	74	0.99245
8/6	4	25	78	42	0.99325
8/7	1	43	43	43	0.99347
8/8	5	0	71	28	0.99433
8/9	1	6	6	6	0.99436
8/10	5	19	125	58	0.99555
8/11	2	6	15	11	0.99567
8/12	4	24	74	47	0.99659
8/13	4	0	36	15	0.99684
8/14	2	6	29	18	0.99701
8/15	4	8	43	29	0.99760
8/16	2	1	10	6	0.99764
8/17	5	2	66	24	0.99817
8/18	2	9	10	10	0.99828
8/19	5	3	51	19	0.99870
8/20	3	6	10	7	0.99880
8/21	3	4	13	7	0.99891
8/22	4	3	33	13	0.99913
8/23	2	1	5	3	0.99916
8/24	4	3	14	7	0.99931
8/25	3	1	16	8	0.99939
8/26	4	5	17	9	0.99962
8/27	3	3	4	3	0.99967
8/28	3	3	8	5	0.99974
8/29	4	1	7	4	0.99982
8/30	2	0	1	1	0.99982
8/31	4	0	3	2	0.99986
9/1	3	0	10	4	0.99990
9/2	4	0	4	2	0.99993
9/3	3	0	2	1	0.99994
9/4	3	2	2	2	0.99997
9/5	4	0	2	1	1.00000
9/6	2	0	1	1	1.00000
9/7	3	0	0	0	1.00000
9/8	3	0	0	0	1.00000

Appendix C.9. Quinhagak District commercial effort 1970-1988.

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<u>YEAR</u>	<u>EFFORT<sup>a</sup></u>
1970	88
1971	61
1972	107
1973	109
1974	196
1975	127
1976	181
1977	258
1978	200
1979	206
1980	169
1981	186
1982	117
1983	226
1984	263
1985	300
1986	324
1987	310
1988	288
FIVE YEAR AVERAGE (1983-1987)	285

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a Permits that made at least one delivery during that year.

Appendix D.1. Peak aerial survey results, Goodnews River, 1979-1988.

Year	Species	Goodnews River <sup>a</sup>	Middle Fork <sup>b</sup>	South Fork	Total
1979	Chinook	635	1,032	c	1,667
	Sockeye	987	1,166	c	2,153
	Chum	8,349	3,375	c	11,724
1980	Chinook	1,228	1,164	c	2,392
	Sockeye	41,576	18,596	c	60,172
	Chum	1,975	3,782	c	5,757
1981	Chinook	c	c	c	c
	Sockeye	c	c	c	c
	Chum	c	c	c	c
1982	Chinook	1,990	1,546	c	3,536
	Sockeye	19,160	2,327	c	21,487
	Chum	9,700	6,300	c	16,000
1983	Chinook	2,600	2,500	141	5,241
	Sockeye	9,650	5,900	50	15,600
	Chum	c	c	c	c
1984	Chinook	3,235	2,020	6	5,261
	Sockeye	9,240	12,897	0	22,137
	Chum	17,250	9,172	925	27,347
1985	Chinook	3,535	2,050	c	5,585
	Sockeye	2,843	2,710	c	5,553
	Chum	4,415	3,593	c	8,008
1986	Chinook	1,068	1,249	c	2,317
	Sockeye	8,960	16,990	c	25,950
	Chum	11,850	4,400	c	16,250
1987	Chinook	2,234	1,598	38	3,870
	Sockeye	19,786	9,033	0	28,819
	Chum	12,103	2,805	680	15,588
1988	Chinook	637	1,024	c	1,661
	Sockeye	5,880	5,831	c	11,711
	Chum	3,846	5,814	c	9,660
Escapement <sup>d</sup> Objective	Chinook	1,600	800	c	2,400
	Sockeye	15,000	5,000	c	20,000
	Chum	17,000	4,000	c	21,000

a Includes Goodnews Lake.

b Includes Middle Fork Lakes

c Information not available.

d Escapement objectives are preliminary and are subject to change as additional data becomes available. Escapement objectives are based on aerial index counts which do not represent total escapement, but do reflect annual spawner abundance trends when made using standard survey methods under acceptable survey conditions.

Appendix D-2. Historical age composition percentage, chinook salmon,  
Goodnews Bay commercial harvest and escapement, 1982 - 1988.

Age composition	Total years of life at maturity <sup>a</sup>					Total
	3	4	5	6	7+	
1982 commercial sample size:	107					
Male	0.0	5.6	37.4	11.2	0.0	54.2
Female	0.0	2.8	29.9	13.1	0.0	45.8
Combined	0.0	8.4	67.3	24.3	0.0	100.0
Commercial Harvest <sup>b</sup>	0	796	6,377	2,303	0	9,476
1982 no escapement samples were collected.						
1983 commercial sample size:	655					
Male	0.0	14.4	7.6	25.3	1.1	48.4
Female	0.0	0.2	0.6	48.8	2.0	51.6
Combined	0.0	14.6	8.2	74.1	3.1	100.0
Commercial Harvest <sup>b</sup>	0	2,061	1,158	10,461	438	14,117
1983 escapement sample size:	139					
Carcass samples.						
Male	0.0	0.0	9.4	39.5	2.9	51.8
Female	0.0	0.0	2.2	44.6	1.4	48.2
Combined	0.0	0.0	11.6	84.1	4.3	100.0
Estimated Escapement <sup>c</sup>	0	0	1,670	12,109	619	14,398
1984 commercial sample size:	500					
Male	0.2	7.6	32.4	22.4	5.4	68.0
Female	0.0	0.0	2.8	22.0	7.2	32.0
Combined	0.2	7.6	35.2	44.4	12.6	100.0
Commercial Harvest <sup>b</sup>	17	655	3,031	3,824	1,085	8,612
1984 escapement sample size:	111					
Carcass samples.						
Male	0.0	4.5	22.6	20.7	3.6	51.4
Female	0.0	0.0	4.5	39.6	4.5	48.6
Combined	0.0	4.5	27.1	60.3	0.0	100.0
Estimated Escapement <sup>c</sup>	0	393	2,369	5,272	0	8,743

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Age composition	Total years of life at maturity <sup>a</sup>					Total
	3	4	5	6	7+	
1985 commercial sample size: 532						
Male	0.2	18.2	7.5	30.8	2.4	59.1
Female	0.0	10.0	4.5	25.2	1.1	40.9
Combined	0.2	28.2	12.0	56.0	3.6	100.0
Commercial Harvest <sup>b</sup>	12	1,634	695	3,244	208	5,793
1985 escapement sample size: 19						
Carcass samples.						
Male	0.0	0.0	0.0	21.0	5.3	59.1
Female	0.0	0.0	0.0	73.7	0.0	40.9
Combined	0.0	0.0	0.0	94.7	5.3	100.0
Estimated Escapement <sup>c</sup>	0	0	0	7,556	423	7,979
1986 commercial sample size: 363						
Male	0.0	17.0	49.0	16.0	4.0	86.0
Female	0.0	0.0	2.0	19.0	8.0	29.0
Combined	0.0	17.0	51.0	35.0	12.0	115.0
Commercial Harvest <sup>b</sup>	0	463	1,389	953	327	2,723
1986 escapement sample size: 1						
Beach seine sample.						
Male	0.0	0.0	0.0	0.0	0.0	0.0
Female	0.0	0.0	0.0	100.0	0.0	100.0
Combined	0.0	0.0	0.0	100.0	0.0	100.0
Estimated Escapement <sup>c</sup>	0	0	0	0	0	4,094
1987 commercial sample size: 270 <sup>d</sup>						
Male	0.0	12.9	19.3	15.6	0.0	47.8
Female	0.0	3.0	12.6	34.4	2.2	52.2
Combined	0.0	15.9	31.9	50.0	2.2	100.0
Commercial Harvest <sup>b</sup>	0	534	1,071	1,678	74	3,357
1987 escapement sample size: 39 <sup>d</sup>						
Beach seine sample.						
Male	0.0	12.8	7.7	25.7	0.0	46.2
Female	0.0	5.1	17.9	23.1	7.7	53.8
Combined	0.0	17.9	25.6	48.8	7.7	100.0
Estimated Escapement <sup>c</sup>		804	1,149	2,191	346	4,490

-continued-

Age composition	Total years of life at maturity <sup>a</sup>					Total
	3	4	5	6	7+	
1988 commercial sample size: 471 <sup>d</sup>						
Male	0.0	18.9	16.1	15.3	2.5	52.8
Female	0.0	8.0	8.3	27.4	3.4	47.2
Combined	0.0	26.9	24.4	42.7	6.0	100.0
Commercial Harvest <sup>b</sup>	0	1,335	1,211	2,120	298	4,964
1988 escapement sample size		94 <sup>d</sup>				
Beach seine sample.						
Male	0.0	2.1	12.8	35.2	8.5	58.6
Female	0.0	0.0	10.6	22.3	8.5	41.4
Combined	0.0	2.1	23.4	57.5	17.0	100.0
Estimated Escapement <sup>c</sup>		Kim - need '88 escapement estimate here!!!				

- a Total years of life at maturity are represented by the follow Eropean salmon age designations. European age designate the number of fresh water and marine annuli, respectively. Age composition 3 includes 1.1 and small numbers of 0.2.  
 Age composition 4 includes 1.2 and small numbers of 0.3.  
 Age composition 5 includes 1.3 and small numbers of 0.4.  
 Age composition 6 includes 1.4 and small numbers of 2.3 and 0.5.  
 Age composition 7+ includes age compositions 1.5 and 2.4.
- b Allocations by age class based on that years commercial catch sample results when  $n \geq 30$ .
- c Allocations by age class based on that years escapement sample results where  $n \geq 30$ . Escapement estimate is based on the Goodnews River salmon counting tower project.
- d Preliminary data.

Appendix D.3. Historical estimated run size and commercial exploitation rate, Goodnews River, 1981 - 1988.

Year	Species	Middle Fork Tower Estimate	Middle Fork Aerial Survey Count as a Percentage of Tower Estimate	Goodnews River Escapement Estimate	Goodnews Bay Subsistence Harvest Estimate	Goodnews Bay Commercial Harvest	Goodnews Bay Total Run Size Estimate	Exploitation <sup>a</sup> Percentage of Run Size
1981 <sup>b</sup>	Chinook	3,688	-	-	1,409	7,190	-	-
	Sockeye	69,108	-	-	3,511 <sup>c</sup>	40,273	-	-
	Chum	21,827	-	-	-	13,642	-	-
1982 <sup>b</sup>	Chinook	1,395	-	-	1,236	9,476	-	-
	Sockeye	56,255	-	-	2,754 <sup>c</sup>	38,877	-	-
	Chum	6,767	-	-	-	13,829	-	-
1983	Chinook	6,027	36 %	14,398	1,066	14,117	29,581	51 %
	Sockeye	25,816	22 %	69,955	1,518 <sup>c</sup>	11,716	83,189	16 %
	Chum	15,548	-	-	-	6,766	-	-
1984	Chinook	3,260	35 %	8,743	629	8,612	17,984	51 %
	Sockeye	32,053	27 %	67,213	964	15,474	83,651	20 %
	Chum	19,003	35 %	117,739	189	14,340	132,268	11 %
1985	Chinook	2,831	70 %	7,979	426	5,793	14,198	44 %
	Sockeye	24,131	11 %	50,481	704	6,698	57,883	13 %
	Chum	10,367	32 %	25,025	348	4,784	30,157	17 %
1986	Chinook	2,083	57 %	4,094	555	2,723	7,372	44 %
	Sockeye	51,069	28 %	93,228	942	22,608	116,778	20 %
	Chum	14,765	38 %	51,910	191	10,355	62,456	17 %
1987	Chinook	2,274	100 %	4,490	816	3,357	8,663	48 %
	Sockeye	28,871	85 %	51,989	955	27,758	80,702	36 %
	Chum	17,519	58 %	37,802	578	20,381	58,761	36 %
1988 <sup>d</sup>	Chinook	2,674	39 %	4,642	-	4,964	-	-
	Sockeye	15,591	30 %	33,457	-	36,368	-	-
	Chum	21,221	21 %	46,640	-	33,059	-	-

a Commercial and subsistence harvest

b Incomplete aerial survey results.

c Subsistence caught chum salmon is included in subsistence sockeye salmon harvest.

d Preliminary figures.

Appendix D-4. Historical age composition percentage, sockeye salmon, Goodnews Bay commercial harvest and escapement, 1982 - 1988.

Age composition	Total years of life at maturity*				Total
	3	4	5	6	
1982 commercial sample size:	102				
Male	0.0	3.9	43.1	10.8	57.8
Female	0.0	1.0	36.3	4.9	42.2
Combined	0.0	4.9	79.4	15.7	100.0
Commercial Harvest <sup>b</sup>	0	1,905	30,868	6,104	38,877
1982 no escapement sockeye salmon samples were collected.					
1983 commercial sample size:	404				
Male	0.0	19.0	31.3	4.2	54.5
Female	0.0	20.0	22.3	3.2	45.5
Combined	0.0	39.0	53.6	7.4	100.0
Commercial Harvest <sup>b</sup>	0	4,569	6,280	867	11,716
1983 escapement sample size:	18				
Carcass samples only.					
Male	0.0	72.2	11.1	0.0	83.3
Female	0.0	5.6	11.1	0.0	16.7
Combined	0.0	77.8	22.2	0.0	100.0
Estimated Escapement <sup>c</sup>	0	54,425	15,530	0	69,955
1984 commercial sample size:	549				
Male	0.0	14.8	45.1	2.2	62.1
Female	0.0	6.2	31.0	0.7	37.9
Combined	21.0	97.1	79.0	2.9	100.0
Commercial Harvest <sup>b</sup>	3,250	15,025	12,224	449	15,474
1984 escapement sample size:	47				
Carcass samples only.					
Male	0.0	23.4	27.7	0.0	51.1
Female	0.0	21.3	27.6	0.0	48.9
Combined	0.0	44.7	55.3	0.0	100.0
Estimated Escapement <sup>c</sup>	0	30,044	37,169	0	67,213

- Continued -

## Appendix D-4. (page 2 of 3)

Age composition	Total years of life at maturity <sup>a</sup>				Total
	3	4	5	6	
1985 commercial sample size: 488					
Male	0.0	10.7	43.6	0.0	59.1
Female	0.0	13.5	32.2	0.0	40.9
Combined	0.0	24.2	75.8	0.0	100.0
Commercial Harvest <sup>b</sup>	0	1,621	5,077	0	6,698
1985 escapement sample size: 17					
Carcass samples only.					
Male	0.0	17.7	47.0	0.0	64.7
Female	0.0	29.4	5.9	0.0	35.3
Combined	0.0	47.1	52.9	0.0	100.0
Estimated Escapement <sup>c</sup>	0	23,777	26,704	0	50,481
1986 commercial sample size: 488					
Male	0.0	5.1	49.8	0.0	54.9
Female	0.0	3.5	41.6	0.0	45.1
Combined	0.0	8.5	91.5	0.0	100.0
Commercial Harvest <sup>b</sup>	0	2,146	22,966	0	25,112
1986 escapement sample size: 91					
Beach seine samples only.					
Male	0.0	5.5	54.9	0.0	60.4
Female	1.1	2.2	36.3	0.0	39.6
Combined	1.1	7.7	91.2	0.0	100.0
Estimated Escapement <sup>c</sup>	1,026	7,179	85,024	0	93,228
1987 commercial sample size: 577 <sup>d</sup>					
Male	0.0	4.0	45.5	0.0	49.5
Female	0.0	2.9	47.6	0.0	50.5
Combined	0.0	6.9	93.1	0.0	100.0
Commercial Harvest <sup>b</sup>	0	1,915	25,843	0	27,758
1987 escapement sample size 545 <sup>d</sup>					
Beach seine samples only.					
Male	0.0	4.0	46.6	2.4	53.0
Female	0.0	6.1	39.3	1.6	47.0
Combined	0.0	10.1	85.9	4.0	100.0
Estimated Escapement <sup>c</sup>	0	5,352	45,517	2,120	52,989

-continued-

Age composition	Total years of life at maturity <sup>a</sup>					Total
	3	4	5	6	7	
1988 commercial sample size: 735 <sup>d</sup>						
Male	0.1	3.5	51.8	3.0	0.1	58.5
Female	0.0	0.7	37.9	2.9	0.0	41.5
Combined	0.1	4.2	89.7	5.9	0.1	100.0
Commercial Harvest <sup>b</sup>	36	1,527	32,623	2,146	36	36,368
1988 escapement sample size: 314 <sup>d</sup>						
Beach seine samples only.						
Male	0.0	5.1	36.0	1.0	0.0	42.1
Female	0.0	8.0	48.0	1.9	0.0	57.9
Combined	0.0	13.1	84.0	2.9	0.0	100.0
Estimated Escapement <sup>c</sup>	Kim, need escapement estimate here!!					

- a The total years of life at maturity are represented by the following European salmon age designations. European age designate the number of fresh water and marine annuli, respectively. Age composition 3 includes 1.1 and small numbers of 0.2. Age composition 4 includes 1.2 and small numbers of 0.3 and 2.1. Age composition 5 includes 1.3 and small numbers of 0.4 and 2.2. Age composition 6 includes 1.4 and small numbers of 0.5 and 2.3. Age composition 7 includes age compositions 1.5 and 2.4.
- b Allocations by age class based on commercial catch sample results.
- c Allocations by age class based on escapement sample results. Escapement estimate based on the Goodnews River salmon counting tower project.
- d Preliminary data.

Appendix D.5. Goodnews Bay District commercial salmon harvest, 1968-1988.

<u>YEAR</u>	<u>CHINOOK</u>	<u>SOCKEYE</u>	<u>COHO</u>	<u>PINK</u>	<u>CHUM</u>	<u>TOTAL</u>
1968			5,458			5,458
1969	3,978	6,256	11,631	298	5,006	27,169
1970	7,163	7,144	6,794	12,183	12,346	45,630
1971	477	330	1,771	0	301	2,879
1972	264	924	925	66	1,331	3,510
1973	3,543	2,072	5,017	324	15,781	26,737
1974	3,302	9,357	21,340	16,373	8,942	59,314
1975	2,156	9,098	17,889	419	5,904	35,466
1976	4,417	5,575	9,852	8,453	10,354	38,651
1977	3,336	3,723	13,335	29	6,531	26,954
1978	5,218	5,412	13,764	9,103	8,590	42,087
1979	3,204	19,581	42,098	201	9,298	74,382
1980	2,331	28,632	43,256	7,832	11,748	93,799
1981	7,190	40,273	19,749	11	13,642	80,865
1982	9,476	38,877	46,683	4,673	13,829	113,538
1983	14,117	11,716	19,660	0	6,766	52,259
1984	8,612	15,474	71,176	4,711	14,340	114,313
1985	5,793	6,698	16,498	8	4,784	33,781
1986	2,723	25,112	19,378	4,447	10,355	62,015
1987	3,357	27,758	29,057	54	20,381	80,607
1988	4,964	36,368	30,832	5,509	33,059	110,732
Five year Average (1983-1987)	6,920	17,352	31,154	1,844	11,325	68,595

Table D.6. Average cumulative estimated escapement and proportion by day for chinook, sockeye and chum salmon, Goodnews River counting tower project, 1981 - 1988<sup>a</sup>.

Date	Chinook		Sockeye		Chum	
	<u>Ave. Cumulative</u> Number	Percent	<u>Ave. Cumulative</u> Number	Percent	<u>Ave. Cumulative</u> Number	Percent
6/11	0	0.0001	1	0.0000	0	0.0000
6/12	0	0.0001	1	0.0000	0	0.0000
6/13	0	0.0001	1	0.0000	0	0.0000
6/14	0	0.0000	1	0.0000	0	0.0000
6/15	0	0.0000	14	0.0004	0	0.0000
6/16	0	0.0000	16	0.0005	0	0.0000
6/17	0	0.0001	21	0.0006	0	0.0000
6/18	0	0.0001	33	0.0010	0	0.0000
6/19	1	0.0004	79	0.0024	0	0.0000
6/20	3	0.0011	104	0.0031	1	0.0000
6/21	8	0.0024	199	0.0060	1	0.0001
6/22	15	0.0047	333	0.0101	5	0.0003
6/23	40	0.0125	745	0.0225	6	0.0004
6/24	66	0.0209	1479	0.0447	27	0.0017
6/25	114	0.0362	2493	0.0753	123	0.0077
6/26	153	0.0485	3491	0.1054	227	0.0142
6/27	202	0.0638	4666	0.1409	340	0.0212
6/28	240	0.0758	5487	0.1657	411	0.0256
6/29	301	0.0950	6430	0.1942	506	0.0316
6/30	388	0.1227	7388	0.2231	677	0.0422
7/1	478	0.1512	8551	0.2582	953	0.0594
7/2	573	0.1810	9777	0.2952	1167	0.0728
7/3	632	0.1998	10844	0.3274	1357	0.0846
7/4	710	0.2245	12336	0.3725	1604	0.1000
7/5	825	0.2608	14288	0.4314	1882	0.1173
7/6	937	0.2961	15941	0.4813	2168	0.1352
7/7	1077	0.3404	17465	0.5274	2520	0.1572
7/8	1178	0.3724	19146	0.5781	2857	0.1782
7/9	1295	0.4092	21076	0.6364	3493	0.2178
7/10	1423	0.4498	22541	0.6806	4084	0.2547
7/11	1562	0.4935	24070	0.7268	4811	0.3000
7/12	1696	0.5361	25306	0.7641	5688	0.3547
7/13	1810	0.5721	26383	0.7966	6285	0.3920
7/14	1922	0.6073	27341	0.8256	6920	0.4315
7/15	2036	0.6433	28303	0.8546	7630	0.4758
7/16	2149	0.6791	29150	0.8802	8507	0.5305
7/17	2283	0.7214	29808	0.9001	9338	0.5824
7/18	2388	0.7546	30409	0.9182	9872	0.6157
7/19	2468	0.7798	30946	0.9344	10402	0.6487
7/20	2555	0.8074	31464	0.9501	10981	0.6848
7/21	2632	0.8318	31884	0.9628	11619	0.7245
7/22	2706	0.8551	32233	0.9733	12209	0.7614
7/23	2781	0.8789	32430	0.9792	12792	0.7977
7/24	2850	0.9007	32594	0.9842	13300	0.8294

- Continued -

Date	Chinook		Sockeye		Chum	
	<u>Ave. Cumulative</u> Number	<u>Percent</u>	<u>Ave. Cumulative</u> Number	<u>Percent</u>	<u>Ave. Cumulative</u> Number	<u>Percent</u>
7/25	2913	0.9207	32738	0.9885	13866	0.8647
7/26	2973	0.9396	32836	0.9915	14376	0.8965
7/27	3004	0.9493	32905	0.9936	14747	0.9196
7/28	3041	0.9612	32972	0.9956	15277	0.9527
7/29	3074	0.9716	33018	0.9970	15532	0.9686
7/30	3105	0.9814	33053	0.9980	15695	0.9787
7/31	3123	0.9870	33066	0.9984	15806	0.9857
8/1	3133	0.9900	33081	0.9989	15856	0.9888
8/2	3140	0.9923	33096	0.9993	15912	0.9923
8/3	3149	0.9952	33107	0.9997	15977	0.9964
8/4	3153	0.9966	33112	0.9998	15989	0.9971
8/5	3158	0.9980	33116	1.0000	16001	0.9978
8/6	3160	0.9988	33117	1.0000	16009	0.9983
8/7	3162	0.9993	33117	1.0000	16013	0.9986
8/8	3163	0.9997	33117	1.0000	16016	0.9988
8/9	3164	1.0000	33118	1.0000	16021	0.9991
8/10	3164	1.0000	33118	1.0000	16023	0.9992
8/11	3164	1.0000	33119	1.0000	16026	0.9994
8/12	3164	1.0000	33118	1.0000	16029	0.9996
8/13	3164	1.0000	33118	1.0000	16031	0.9997
8/14	3164	1.0000	33118	1.0000	16032	0.9998
8/15	3164	1.0000	33118	1.0000	16036	1.0000

a Average for the years 1981-1985, 1987-1988. Early termination date of project in 1986 precluded assesment of the entire chinook, sockeye and chum salmon migration. The project's normal termination date precludes adequate assesment of coho and pink salmon escapement.

Appendix D-7. Historical age composition percentage, chum salmon, Goodnews Bay commercial harvest and escapement, 1982 - 1988.

Age composition	Total years of life at maturity <sup>a</sup>				Total
	3	4	5	6	
1982 commercial sample size:	135				
Male	0.0	16.3	20.0	0.0	36.3
Female	0.7	29.6	32.7	0.7	63.7
Combined	0.7	45.9	52.7	0.7	100.0
Commercial Harvest <sup>b</sup>	97	6,348	7,288	97	13,829
1982 no escapement chum salmon samples were collected.					
1983 commercial sample size:	216				
Male	0.9	15.3	22.7	0.5	39.4
Female	2.8	27.3	30.5	0.0	60.6
Combined	3.7	42.6	53.2	0.5	100.0
Commercial Harvest <sup>b</sup>	250	2,882	3,600	34	6,766
1983 escapement sample size:	174				
Carcass samples only.					
Male	0.6	19.0	37.3	0.0	56.9
Female	0.6	15.5	27.0	0.0	43.1
Combined	1.2	34.5	64.3	0.0	100.0
Estimated Escapement <sup>c</sup>					
1984 commercial sample size:	457				
Male	0.0	30.6	15.3	2.0	47.9
Female	0.4	38.5	12.5	0.7	52.1
Combined	69.5	96.9	30.5	2.7	100.0
Commercial Harvest <sup>b</sup>	9,966	13,895	4,374	387	14,340
1984 escapement sample size:	90				
Carcass samples only.					
Male	0.0	32.3	4.4	0.0	36.7
Female	0.0	56.6	6.7	0.0	63.3
Combined	0.0	88.9	11.1	0.0	100.0
Estimated Escapement <sup>c</sup>	0	104,670	13,069	0	117,739

- Continued -

Age composition	Total years of life at maturity <sup>a</sup>				Total
	3	4	5	6	
1985 commercial sample size: 270					
Male	0.0	27.8	14.4	0.0	59.1
Female	0.0	30.0	27.5	0.0	40.9
Combined	0.0	57.8	41.9	0.0	100.0
Commercial Harvest <sup>b</sup>	0	2,765	2,004	0	4,784
1985 escapement sample size: 46					
Carcass samples only.					
Male	0.0	30.4	19.6	0.0	50.0
Female	0.0	28.3	21.7	0.0	50.0
Combined	0.0	58.7	41.3	0.0	100.0
Estimated Escapement <sup>c</sup>	0	14,690	10,335	0	25,025
1986 commercial sample size: 353 <sup>c</sup>					
Male	0.2	37.7	12.2	0.2	50.3
Female	0.5	36.0	12.5	0.7	49.7
Combined	0.7	73.7	24.7	0.9	100.0
Commercial Harvest <sup>b</sup>	72	7,632	2,558	93	10,355
1986 escapement sample size: 21 <sup>d</sup>					
Beach seine samples only.					
Male	0.0	38.0	19.0	0.0	57.0
Female	0.0	33.0	10.0	0.0	43.0
Combined	0.0	71.0	29.0	0.0	100.0
Estimated Escapement <sup>c</sup>	0	36,856	15,054	0	51,910
1987 commercial sample size: 430 <sup>d</sup>					
Male	0.0	37.2	17.9	0.0	55.1
Female	0.0	28.6	16.3	0.0	44.9
Combined	0.0	65.8	34.2	0.0	100.0
Commercial Harvest <sup>b</sup>	0	13,411	6,970	0.0	20,381
1987 escapement sample size: 467 <sup>d</sup>					
Beach seine sample only					
Male	0.0	37.2	30.2	0.0	67.4
Female	0.2	22.3	10.1	0.0	32.6
Combined	0.2	59.5	40.3	0.0	100.0
Estimated Escapement <sup>c</sup>	76	22,492	15,234	0	37,802

-continued-

<u>Age composition</u>	<u>Total years of life at maturity<sup>a</sup></u>				<u>Total</u>
	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	
1988 commercial sample size: 469 <sup>d</sup>					
Male	0.7	9.4	33.9	1.1	45.1
Female	0.2	13.6	40.7	0.4	54.9
Combined	0.9	23.0	74.6	1.5	100.0
Commercial Harvest <sup>b</sup>	298	7,604	24,661	496	33,059
1988 escapement sample size: 412 <sup>d</sup>					
Beach seine sample only					
Male	0.5	12.6	35.7	1.2	50.0
Female	0.0	16.5	32.5	1.0	50.0
Combined	0.5	29.1	68.2	2.2	100.0
Estimated Escapement <sup>c</sup>	Kim, need escapement estimate here!!				

- a The total years of life at maturity are represented by the following European salmon age designations. European age designates the number of fresh water and marine annuli, respectively.  
 Age composition 3 includes 0.2.  
 Age composition 4 includes 0.3.  
 Age composition 5 includes 0.4.  
 Age composition 6 includes 0.5.  
 Age composition 7 includes 0.6.
- b Allocations by age class based on commercial catch sample results.
- c Allocations by age class based on escapement sample results. The escapement estimate based on the Goodnews River salmon counting tower project.
- d Preliminary data.

Appendix D.8. Summary of historical commercial harvest by period, Goodnews Bay District, chinook salmon, 1981-1988.

<u>Date</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion of harvest</u>
6/12	0	0	0	0	0.00000
6/13	1	1252	1252	1252	0.01109
6/14	0	0	0	0	0.01109
6/15	1	197	197	197	0.01451
6/16	2	251	1096	674	0.03054
6/17	1	362	362	362	0.03531
6/18	3	387	1706	1084	0.09462
6/19	1	296	296	296	0.10820
6/20	3	404	2642	1231	0.15575
6/21	2	1298	1535	1417	0.19484
6/22	1	1591	1591	1591	0.22250
6/23	2	788	1639	1214	0.29995
6/24	3	476	988	695	0.34717
6/25	2	1621	1896	1759	0.40287
6/26	1	352	352	352	0.41903
6/27	2	1627	3944	2786	0.48906
6/28	3	807	1307	1024	0.54633
6/29	1	457	457	457	0.55428
6/30	2	927	1551	1239	0.60926
7/1	1	1156	1156	1156	0.63420
7/2	3	234	578	380	0.65420
7/3	1	391	391	391	0.66876
7/4	1	2301	2301	2301	0.68913
7/5	3	351	1809	876	0.72985
7/6	1	272	272	272	0.73458
7/7	4	736	1119	833	0.81553
7/8	3	147	495	277	0.83321
7/9	2	347	351	349	0.84288
7/10	2	156	199	178	0.85350
7/11	4	124	408	262	0.87590
7/12	2	327	737	532	0.89037
7/13	1	135	135	135	0.89271
7/14	4	54	514	237	0.90677
7/15	3	77	354	204	0.92044
7/16	3	66	294	146	0.92912
7/17	1	210	210	210	0.93277
7/18	3	54	217	114	0.93896
7/19	1	66	66	66	0.93983
7/20	3	75	192	137	0.94793
7/21	2	35	68	52	0.95043
7/22	2	80	228	154	0.95384
7/23	3	17	97	46	0.95657
7/24	1	77	77	77	0.95791
7/25	4	0	82	33	0.96082

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<u>Date</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
7/26	0	0	0	0	0.96082
7/27	3	45	122	90	0.96419
7/28	2	5	21	13	0.96522
7/29	3	31	157	73	0.96796
7/30	3	16	73	36	0.97000
7/31	1	34	34	34	0.97059
8/1	5	12	78	42	0.97405
8/2	1	19	19	19	0.97430
8/3	5	13	102	54	0.97850
8/4	2	6	12	9	0.97893
8/5	4	12	54	27	0.98054
8/6	3	6	79	32	0.98231
8/7	1	43	43	43	0.98306
8/8	5	0	60	19	0.98498
8/9	1	11	11	11	0.98512
8/10	5	10	78	32	0.98741
8/11	2	5	9	7	0.98789
8/12	4	7	47	25	0.98937
8/13	4	0	36	11	0.99026
8/14	2	8	41	25	0.99114
8/15	4	5	26	15	0.99215
8/16	2	0	12	6	0.99241
8/17	5	2	22	12	0.99355
8/18	2	0	8	4	0.99391
8/19	4	5	14	10	0.99477
8/20	3	1	12	6	0.99523
8/21	3	0	6	3	0.99541
8/22	4	3	17	10	0.99608
8/23	2	0	6	3	0.99621
8/24	4	2	17	9	0.99703
8/25	3	0	13	6	0.99733
8/26	4	2	8	5	0.99784
8/27	3	2	13	6	0.99816
8/28	3	1	3	2	0.99836
8/29	4	3	4	4	0.99873
8/30	2	1	2	2	0.99877
8/31	4	1	6	3	0.99905
9/1	3	0	7	2	0.99937
9/2	4	1	5	3	0.99966
9/3	3	0	2	1	0.99969
9/4	3	0	6	2	0.99983
9/5	4	0	5	2	0.99996
9/6	2	0	0	0	0.99996
9/7	4	0	1	0	0.99998
9/8	3	0	2	1	1.00000

Appendix D.9. Summary of historical commercial harvest by period, Goodnews Bay District, sockeye salmon, 1981-1988.

<u>Date</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion of harvest</u>
6/12	0	0	0	0	0.00000
6/13	1	27	27	27	0.00029
6/14	0	0	0	0	0.00029
6/15	1	70	70	70	0.00051
6/16	2	125	696	411	0.00423
6/17	1	774	774	774	0.00675
6/18	3	281	596	408	0.01312
6/19	1	478	478	478	0.01550
6/20	3	102	1989	875	0.02995
6/21	2	967	1280	1124	0.04193
6/22	1	569	569	569	0.04370
6/23	2	1029	2701	1865	0.05810
6/24	3	596	2120	1536	0.08465
6/25	2	1040	2087	1564	0.10474
6/26	1	1719	1719	1719	0.11329
6/27	2	685	952	819	0.13623
6/28	3	2097	3371	2800	0.17423
6/29	1	1422	1422	1422	0.17865
6/30	2	5094	8143	6619	0.22812
7/1	1	1143	1143	1143	0.24945
7/2	3	1818	2657	2194	0.28125
7/3	1	5510	5510	5510	0.30607
7/4	1	1598	1598	1598	0.32311
7/5	3	2056	4221	3202	0.36491
7/6	1	2346	2346	2346	0.37220
7/7	4	2057	4833	3895	0.45104
7/8	3	1231	3600	2320	0.49299
7/9	2	2167	3751	2959	0.52272
7/10	2	3217	4494	3856	0.55508
7/11	4	1397	3826	2473	0.62756
7/12	2	1444	2318	1881	0.64678
7/13	1	2720	2720	2720	0.65522
7/14	4	1039	3173	2432	0.70041
7/15	3	1229	4818	2942	0.75082
7/16	3	902	2841	1675	0.77642
7/17	1	3936	3936	3936	0.78863
7/18	3	559	3049	1802	0.81403
7/19	1	1683	1683	1683	0.81951
7/20	3	395	3852	1975	0.84222
7/21	2	507	1318	913	0.85043
7/22	2	614	2207	1411	0.86383
7/23	3	162	874	451	0.87128
7/24	1	2458	2458	2458	0.87891
7/25	4	0	1534	550	0.88792

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<u>Date</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
7/26	0	0	0	0	0.88792
7/27	3	166	1270	597	0.89700
7/28	2	278	555	417	0.90067
7/29	3	630	1312	1045	0.91560
7/30	3	84	344	257	0.91911
7/31	1	803	803	803	0.92160
8/1	5	45	811	338	0.93348
8/2	1	335	335	335	0.93457
8/3	5	36	949	518	0.94686
8/4	2	188	190	189	0.94842
8/5	4	94	932	440	0.95708
8/6	3	34	251	153	0.95905
8/7	1	686	686	686	0.96117
8/8	5	0	926	245	0.96603
8/9	1	46	46	46	0.96618
8/10	5	18	659	339	0.97340
8/11	2	0	174	87	0.97427
8/12	4	17	564	238	0.97866
8/13	4	0	204	86	0.98030
8/14	2	4	316	160	0.98136
8/15	4	5	398	137	0.98368
8/16	2	0	5	3	0.98378
8/17	5	4	498	179	0.98705
8/18	2	0	120	60	0.98764
8/19	4	5	360	125	0.98978
8/20	3	0	138	47	0.99049
8/21	3	1	89	58	0.99117
8/22	4	7	353	120	0.99313
8/23	2	0	4	2	0.99320
8/24	4	1	244	90	0.99450
8/25	3	0	36	20	0.99492
8/26	4	0	204	88	0.99620
8/27	3	0	28	9	0.99634
8/28	3	1	79	39	0.99683
8/29	4	1	155	45	0.99754
8/30	2	0	4	2	0.99762
8/31	4	0	88	44	0.99829
9/1	3	0	39	15	0.99855
9/2	4	2	69	41	0.99921
9/3	3	0	21	7	0.99931
9/4	3	0	53	18	0.99957
9/5	4	0	61	15	0.99978
9/6	2	0	0	0	0.99978
9/7	4	0	63	16	1.00000
9/8	3	0	0	0	1.00000

Appendix D.10. Summary of historical commercial harvest by period, Goodnews Bay District, chum salmon, 1981-1988.

Date	No. Years w/ fishing period on this date	Minimum harvest	Maximum harvest	Average harvest	Cumulative proportion of harvest
6/12	0	0	0	0	0.00000
6/13	1	10	10	10	0.00018
6/14	0	0	0	0	0.00018
6/15	1	102	102	102	0.00112
6/16	2	89	1091	590	0.00689
6/17	1	167	167	167	0.00840
6/18	3	194	501	316	0.01610
6/19	1	249	249	249	0.01911
6/20	3	165	3501	1336	0.04295
6/21	2	591	698	645	0.05441
6/22	1	708	708	708	0.06090
6/23	2	886	7833	4360	0.10121
6/24	3	594	1188	868	0.13532
6/25	2	724	2351	1538	0.16244
6/26	1	866	866	866	0.17290
6/27	2	691	728	710	0.20439
6/28	3	649	8369	3666	0.25917
6/29	1	425	425	425	0.26306
6/30	2	1627	2048	1838	0.29033
7/1	1	710	710	710	0.30888
7/2	3	713	3434	2012	0.34487
7/3	1	3074	3074	3074	0.36372
7/4	1	1626	1626	1626	0.39373
7/5	3	1720	3193	2296	0.43866
7/6	1	963	963	963	0.44748
7/7	4	1357	4478	2468	0.54297
7/8	3	949	1894	1392	0.58713
7/9	2	1191	1371	1281	0.60985
7/10	2	1346	1601	1474	0.64077
7/11	4	562	5830	2165	0.71067
7/12	2	1057	1384	1221	0.73240
7/13	1	1143	1143	1143	0.74287
7/14	4	601	2123	1185	0.78903
7/15	3	767	2495	1735	0.84385
7/16	3	476	1360	1017	0.87516
7/17	1	1532	1532	1532	0.88920
7/18	3	488	1191	776	0.91504
7/19	1	506	506	506	0.91961
7/20	3	657	1265	951	0.94164
7/21	2	233	467	350	0.94938
7/22	2	307	362	335	0.95888
7/23	3	35	301	196	0.96503
7/24	1	244	244	244	0.96727
7/25	4	0	236	167	0.97276

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<u>Date</u>	<u>No. Years w/ fishing period on this date</u>	<u>Minimum harvest</u>	<u>Maximum harvest</u>	<u>Average harvest</u>	<u>Cumulative proportion harvest</u>
7/26	1	0	0	0	0.97276
7/27	3	58	166	114	0.97694
7/28	2	89	93	91	0.97885
7/29	3	32	166	90	0.98248
7/30	3	42	120	84	0.98499
7/31	1	8	8	8	0.98507
8/1	5	22	61	47	0.98833
8/2	1	47	47	47	0.98876
8/3	5	22	105	54	0.99120
8/4	2	23	29	26	0.99174
8/5	4	21	63	32	0.99317
8/6	3	22	41	31	0.99407
8/7	1	21	21	21	0.99427
8/8	5	0	26	13	0.99483
8/9	1	19	19	19	0.99500
8/10	5	15	36	23	0.99596
8/11	2	10	13	12	0.99620
8/12	4	0	16	8	0.99656
8/13	4	2	22	12	0.99693
8/14	2	9	10	10	0.99727
8/15	4	0	10	5	0.99746
8/16	2	0	5	3	0.99759
8/17	5	6	22	10	0.99802
8/18	2	0	3	2	0.99805
8/19	4	2	16	7	0.99828
8/20	3	0	7	3	0.99839
8/21	3	0	10	4	0.99848
8/22	4	3	6	5	0.99865
8/23	2	0	0	0	0.99865
8/24	4	0	8	4	0.99873
8/25	3	0	3	2	0.99881
8/26	4	0	42	13	0.99920
8/27	3	0	4	1	0.99923
8/28	3	0	11	4	0.99935
8/29	4	0	6	3	0.99947
8/30	2	0	1	1	0.99950
8/31	4	0	9	4	0.99957
9/1	3	0	4	2	0.99963
9/2	4	0	10	4	0.99979
9/3	3	0	4	2	0.99985
9/4	3	0	9	4	0.99994
9/5	4	0	3	1	0.99998
9/6	2	0	0	0	0.99998
9/7	3	0	2	1	1.00000
9/8	2	0	0	0	1.00000

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