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NORTON SOUND - PORT CLARENCE - KOTZEBUE

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PRESENTATION

This report summarizes the 1996 season and historical information concerning management of the commercial and subsistence fisheries of the Norton Sound, Port Clarence and Kotzebue Sound districts. Data from special management and research projects are included in this report. A more complete documentation of project results will be presented in separate reports.

Data presented in this report supersedes information found in previous management reports. An attempt has been made to correct errors presented in earlier reports. Previously unreported data has been included and is indicated by appropriate footnotes. Current year catch data presented has been derived from seasonal field data.

This report is organized into the following major sections:

- (1) Salmon
- (2) Herring
- (3) King Crab
- (4) Miscellaneous species

In order to facilitate use of this report, tabular data has been separated into two categories: 1) tables presenting annual data; 2) appendix tables which present historic comparisons. The text for each major section is followed by tables, figures, and appendices.

SECTION 1: SALMON
(Includes Norton Sound, Port Clarence
and Kotzebue Districts)

SECTION 1 - SALMON

INTRODUCTION

Boundaries

The Norton Sound, Port Clarence and Kotzebue Sound salmon management districts include all waters from Canal Point in southern Norton Sound to Point Hope and includes St. Lawrence Island. These management districts comprise over 65,000 square miles, with a coastline exceeding that of California, Oregon, and Washington combined.

Salmon Resources

Five species of Pacific salmon are indigenous to the area with chum (*Oncorhynchus keta*) and pink salmon (*O. gorbuscha*) historically being the most abundant. Chum, pink, and chinook (king) salmon (*O. tshawytscha*) have been found as far north as Barrow; however, these species are uncommon north of the Kotzebue Sound drainages. The northernmost large concentrations of chum salmon are found within the Kotzebue Sound drainages, while large numbers of pink, chinook and coho (*O. kisutch*) salmon are not found north of Norton Sound. Very small sockeye (red) salmon (*O. nerka*) populations exist within a few Seward Peninsula drainages.

Commercial Fishery

In 1959 and 1960, Department biologists conducted resource inventories which indicated harvestable surpluses of salmon available in several rivers systems of the Norton Sound Arctic area. The Department liberalized various regulations and encouraged processors to explore and develop new fishing grounds. As a result, commercial salmon fishing activity has grown significantly since statehood, enabling many local residents to obtain a cash income.

The majority of commercial fishermen and many buying station workers are resident Native Alaskans (Central Yupik, Inupiat, St. Lawrence Island Yupik). Commercial fishermen operate set gillnets from outboard powered skiffs to capture salmon. All commercial salmon fishing is done in coastal marine waters.

Salmon effort and catch per unit effort data (CPUE) presented throughout this section have been derived as follows. Boat (or fisherman) hours have been computed after assuming that if a fishing boat delivers during a fishing period, it fished the entire period. The total number of individual boats delivering in any period is multiplied by the number of hours open to commercial fishing. Catch per fisherman (or boat) hour is obtained by dividing the total fishermen hours into the catch for the corresponding period of time. Total fishermen (or boats) is the total number of fishermen

making deliveries, regardless of how many deliveries were made or days fished during a particular period or season. There are a number of fishermen who deliver only once or twice during the entire season. Total days fished is the total number of hours open to commercial fishing during the season divided by 24 hours.

Subsistence Fishery

There are approximately 16,000 people in the area, the majority of whom are Native Alaskans, residing in more than 26 small villages scattered along the coast and the major river systems. Nearly all of the local people are dependent to varying degrees on the fish and game resources for their livelihood.

Subsistence fishermen operate gillnets or seines in the main rivers and, to a lesser extent, in the coastal marine waters capturing primarily salmon, whitefish, arctic char and inconnu (sheefish). Beach seines are used near the spawning grounds to catch schooling or spawning salmon and other species of fish. The major portion of fish taken during the summer months is air dried or smoked for later consumption by villagers or occasionally their dogs.

Subsistence catch information has been derived from interviews of fishermen, actual counts of fish, and subsistence catch calendars returned by fishermen. Subsistence salmon catches in the Nome Subdistrict (Subdistrict 1) have been determined from the return of catch calendars as required under a permit system.

The Department conducted annual surveys of the important subsistence salmon fisheries from the early 1960's until 1982. Subsistence harvest information prior to 1960 is incomplete or entirely lacking for many years. Beginning in 1983, budgetary restrictions have made it impossible to conduct systematic surveys in each village as was done from 1964 to 1982. For the last 5 years that complete surveys were conducted for Norton Sound (1978-1982) the average subsistence catch was 73,000 salmon including all species (Appendix Table A8). The majority of salmon taken are pinks and chums. Subsistence surveys for the Kotzebue area were less complete. An expansion of documented surveys from several years for different villages estimates total subsistence salmon harvest for the Kotzebue Sound area to approach 75,000 (Appendix Table C6). These reported harvests are primarily based on village household surveys. Since not all fishermen are contacted, these harvests should be considered minimum figures. Since 1994 the Department initiated a new subsistence salmon harvest assessment effort in Northwest Alaska which provided more extensive, complete, and reliable salmon harvest estimates than existed previously.

Management

The Division of Commercial Fisheries of the Alaska Department of Fish and Game is responsible for the management of commercial and subsistence fisheries in this vast area. The permanent full-time staff assigned to this area during 1996 consisted of an area management biologist stationed in

Nome, an assistant area biologist stationed in Nome, an Area Fish Culturist, an assistant management biologist in Kotzebue, a Administration Clerk assigned to the Nome office and a seasonal Fish Culturist in the Nome office. In addition, summer seasonal assistance in conducting various management and research activities was provided by 17 seasonal biologists and technicians in Norton Sound and Kotzebue Sound. Additional assistance was provided by biologists from the regional staff.

The main objective of the Department's program is to manage the commercial salmon fisheries on a sustained yield basis. Various field projects are conducted to provide information on salmon abundance, migration and stock composition. Summaries of these projects are presented in Appendix G2.

Management of the salmon fishery is complicated by the difficulty in obtaining valid escapement data in this large area and by insufficient comparative catch and return information. Management problems are compounded by the need to provide not only for adequate escapements, but for the needs of several different user groups. Past Alaska Department of Fish and Game policy has been to provide for subsistence as the primary beneficial use of the fishery resource. This policy is now State law. If the subsistence harvest or demands increase, commercial fishing may be restricted. It should be pointed out that increases in commercial fishing efficiency are expected and may balance any immediate decline in subsistence utilization or increase in run size with the result that present regulations have been maintained or made even more restrictive.

The basic regulation that governs the commercial salmon harvest in all districts is the scheduled weekly fishing period. Commercial fishing regulations provide for a total of two to four days of fishing per week during the open season depending on area and season. The Department attempts to distribute fishing effort throughout the entire return to avoid harvesting only particular segments of the return. Occasionally, fishing time is increased or decreased by emergency order, depending upon fishing conditions and the strength of the returns or spawning escapements, as determined by special studies conducted by the Department. Emergency orders issued during the 1996 seasons are presented in Appendix G3.

Weekly fishery reports, which give information on fishery status and fishing schedules, are broadcast during the fishing season over radio KICY and KNOM in Nome, and KOTZ in Kotzebue. In addition, fishery news articles are published in the Nome Nugget and the Arctic Sounder.

NORTON SOUND DISTRICT

District Boundaries

The Norton Sound Salmon District consists of all waters between Cape Douglas in the north and Point Romanof Light in the south. The District is divided into six subdistricts: Subdistrict 1, Nome; Subdistrict 2, Golovin; Subdistrict 3, Moses Point; Subdistrict 4, Norton Bay; Subdistrict 5, Shaktoolik; and Subdistrict 6, Unalakleet Subdistrict (Figure 1). Each of these subdistricts contain at least one major salmon producing stream. Subdistrict boundaries were established to facilitate management of individual salmon stocks.

All commercial salmon fishing in the district is by set gillnets in marine waters; fishing effort is usually concentrated near river mouths. Commercial fishing typically begins in June and targets chinook salmon. Emphasis switches to chum salmon around June 25 and the coho salmon fishery begins the third week of July. The season closes September 7. Pink salmon may be very abundant on even year returns and a pink directed fishery may replace or may be scheduled to alternate periods with the historical chum directed fishery.

Salmon management has changed significantly during recent years due to limited market conditions and marginal returns of many salmon stocks within the district. The Eastern subdistricts, Norton Bay, Shaktoolik, and Unalakleet all have fairly healthy salmon stocks. Commercial fishing in these subdistricts is managed using commercial fishing statistics and the Unalakleet River test fishing escapement index. Both the Golovin and Moses Point Subdistricts have recently suffered from poor chum salmon returns. In these two subdistricts, management first insures an adequate escapement, then a subsistence harvest within historical levels and finally an attempt is made to provide for a commercial and sport harvest. The Nome Subdistrict is managed intensively for subsistence use. Registration permits, closed waters, setting fishing period length, limiting gear and harvest limits are all tools that can be employed throughout the season to provide for escapement needs and to maximize subsistence opportunity.

Historical Fishery Use

Fishing has been a part of life for Norton Sound residents for many centuries as indicated by archeological evidence dating back 2,000 years (Bockstoe, 1979). There were only a few actual pre-contact settlements like Shishmaref and Wales which still exist today. They were located where marine mammals were the primary subsistence resource. The rest of the population lived in small groups scattered along the coast and often moved on a seasonal basis prior to the introduction of western civilization (Thomas 1982). During summer months residents would disperse, usually in groups comprised of one or two families, and setup camps near the mouths of streams. Harvest levels of fish on any one stream were relatively small because of the low concentrations of people who caught only what their families and one or two dogs needed through the winter (Thomas 1982).

A large scale fur trade had been developed by the Russians in the late 1800's which continued after the American purchase (Magdanz 1981). The activities and support for hundreds of commercial whalers and trading ships caused trading to increase in the region around 1848 (Ray 1975). The increased competition for walrus, caribou, and other species from outsiders may have increased the importance of salmon to area residents (Magdanz 1981). In the late 1890's gold was discovered on the Seward Peninsula and boom-towns sprang up with thousands of new immigrants flocking to the region. Commerce developed which drew people to central locations that evolved into year-round communities. Other reasons for communities to become established stemmed from the operation of missions.

The impacts of mining was significant on fish populations. Nearly every stream on the Seward Peninsula had some sort of mining operation working on it which ranged from simple gold panning to sluice boxes to hydraulic giants to bucket line dredges. One example of extensive impact was on the Solomon River which is only 30 miles long but had 13 dredges working at one time. Another obvious impact was simply the large number of people who came to live in the region between 1900 and 1930. Communities like Nome, with a population of 30,000 and Council with 10,000 people at one time, did not exist before gold was discovered.

It was in the late 19th century when the size of the dog teams increased from two or three to as many as ten to twenty. At about the same time wooden boats began to replace kayaks (Thomas 1982). Consequently, the demand for dry fish to feed the dog teams increased along with the development of better means to harvest fish. Winter transportation throughout the region was done with hired dog teams and drivers who carried mail or freight along the coast and across the state to the ice-free port at Seward. Dry fish became a major barter item in response to the great demand for dog food which consisted of primarily chum and pink salmon (Thomas 1982).

Local residents would spend most of their summers catching and drying large amounts of salmon, some of which they kept for themselves and the rest would be bartered or sold to mining camps, roadhouses, and trading posts or stores. For example, the Haycock mining camp on the Koyuk River would buy about two tons of dry fish each year. There were roadhouses at Golovin, Walla, Moses Point, Isaac's Point, Ungalik, Robertvale, foothills (south of Shaktoolik), Egavik, and many other locations. Dry fish was bought in units of bundles (50 dry fish tied together) at a typical price of 10 cents per pound from the fishermen. One elder in the area felt that more fish were retained for their own use as compared to the amount sold which may have averaged five to ten bundles per household (Thomas 1982).

After the gold rush the number of people gradually decreased over the next twenty years as the gold deposits were worked out. The number of dog teams diminished by the mid 1930's with the introduction of the mail plane. The last mail team contract ended in 1962 at Savoonga. Local stores continued to trade in dry fish at Shaktoolik, Saint Michael, Unalakleet, and Golovin. An example of quantity was the Shaktoolik store that had a cache 8x20x40 feet which would be filled to the top with dry fish. One elder said the stores would buy the fish for 6 cents a pound and sell them for 10 cents a pound or their equivalent in groceries and supplies (Thomas 1982). By the early 1960's, commercial salmon fishing developed into a source of summer cash and

snowmachines were replacing the need for dog teams (Thomas 1982). Dry fish was no longer needed to feed dogs and cash was becoming more available for trading at stores.

Commercial Fishery Overview

Commercial salmon fishing in this district first began in the Unalakleet and Shaktoolik Subdistricts in 1961. Most of the early interest involved chinook and coho salmon which were flown in dressed condition to Anchorage for further processing. A single U.S. freezer ship also purchased and processed chum and pink salmon during 1961. In 1962, two floating cannery ships operated in the district and the commercial fishery was extended into the Norton Bay, Moses Point and Golovin Bay Subdistricts. The peak in salmon canning operations occurred during 1963.

Since then, markets have been sporadic and some subdistricts have often been unable to attract buyers for entire seasons. A joint venture between KEG (Koyuk-Elim-Golovin) Fisheries and NPL Alaska, Inc., operated from 1984 until mid-season in 1988. A permit issued by the Governor allowed two Japanese freezer ships to buy directly from domestic fishermen and was limited to salmon caught in the internal waters of Golovin and Norton Bays. Currently, the most consistent markets are at Unalakleet and Shaktoolik where fish are purchased, iced, and flown directly to Anchorage for processing and resale.

The commercial salmon fishing season opens by emergency order between June 8 and July 1, depending on run timing within each subdistrict. The season closes by regulation on August 31 in Subdistricts 1, 2, and 3, and on September 7 in Subdistricts 4, 5, and 6, but processors often terminate their operations prior to the regulatory closure dates. Two 48 hour fishing periods normally occur each week unless changed by emergency order with the exception of the Nome and Moses Point Subdistricts, where two 24 hour fishing periods are scheduled each week.

Commercial fishing gear is restricted to set gillnets, with a maximum aggregate length of 100 fathoms allowed for each fisherman. There are no mesh size or depth restrictions during the normally scheduled periods. The majority of the gillnets fished are approximately 5 3/4 inch stretched measure. In the Unalakleet and Shaktoolik Subdistricts, 8 1/4 inch stretched mesh gillnets are commonly used during the chinook salmon run in June through early July. During years when large pink salmon runs occur, the Department provides fishing periods when only 4 1/2 inch mesh nets or less may be set or drifted. These special small mesh periods are an attempt to target pink salmon without over harvesting the larger sized salmon species.

Most fishermen do not tend their nets continuously once they are set, leaving them unattended overnight. Fish quality suffers due to the length of time fish may be left in the nets and is especially poor when storms prevent fishermen from checking their gear for extended periods of time.

Commercial Fishery Management

The Norton Sound District is managed on the basis of comparative commercial catch data, escapements and weather conditions. A single factor or combination of factors may result in issuance of emergency orders affecting seasons, fishing periods, allowable mesh size, and areas.

Aerial surveys are used to monitor escapements in the majority of the Norton Sound streams. Weather conditions, time of day, type of aircraft, water conditions, bottom conditions, date of survey, and efficiency of the surveyor and pilot must be taken into account when making inter-annual aerial survey comparisons. Counting towers are a much more consistent and accurate method of obtaining escapement information and have been utilized on many river systems in Norton Sound. Seven counting towers were operated in 1996.

The Commercial fishing season begins with chinook salmon in mid June. Emphasis switches to chum salmon around June 25, then gradually shifts to coho during the third week in July. Pink salmon are abundant during even years, but there is often no market for this species. The southern Subdistricts 5 and 6 (Shaktoolik and Unalakleet) have maintained commercial fisheries. They target chinook, chum, and coho salmon, with chinook and coho salmon catches remaining fairly stable while chum salmon catches have been declining since the early 1980's. Management has consisted of a series of Emergency Orders that open the season, adjust fishing time, restrict mesh size, and occasionally eliminate a fishing period.

Commercial fisheries in Subdistricts 2 and 3 (Golovin and Moses Point) target chum salmon. The commercial chum salmon harvest has dropped dramatically since the mid 1980's. Poor returns have resulted in restrictive management actions during recent years when the seasons have been closed by E.O. to allow for escapement and subsistence needs.

There has been little or no commercial salmon harvests in Subdistricts 1 and 4 (Nome and Koyuk) since the early 1980's. In the Nome Subdistrict this is due to very depressed stocks which in some years require closure or severe restrictions on the fishery. Conversely, the Koyuk Subdistrict has healthy stocks but can't attract markets willing to operate in this remote area.

Salmon management has changed significantly during recent years due to limited market conditions and marginal returns of many salmon stocks within the district. The Eastern subdistricts, Norton Bay, Shaktoolik, and Unalakleet all have relatively healthy salmon stocks. Commercial fishing in these subdistricts is managed using commercial fishing statistics and the Unalakleet River test fishing escapement index. Both the Golovin and Moses Point Subdistricts have recently suffered from poor chum salmon returns. In these two subdistricts, management first insures an adequate escapement, then a subsistence harvest within historical levels and finally an attempt is made to provide for a commercial and sport harvest. The Nome Subdistrict is managed intensively for subsistence use. Registration permits, closed waters, setting fishing period length, limiting gear and harvest limits are all tools that can be employed throughout the season to provide for escapement needs and to maximize subsistence opportunity.

Subsistence Fishery Overview

Household subsistence surveys had not been conducted district wide since 1985 in Norton Sound villages due to budgetary restrictions. During this time the Subsistence Division had been selecting one village each year in which to conduct formal in-depth studies of subsistence harvest levels and trends. The information was not used for inseason management, but identifies subsistence needs which must be considered in management decisions. Since 1994 the Department initiated a new subsistence salmon harvest assessment effort in Northwest Alaska. In 1995, households in eight of the 12 communities in the Norton Sound District were surveyed. The Division of Commercial Fisheries Management and Development funded the household surveys and the Division of Subsistence collected and analyzed the data. The Bering Sea Fishermen's Association provided funding for local village researchers to assist with data collection.

Daily surveys of Unalakleet River and ocean subsistence fishermen have been conducted annually since 1985 during the chinook salmon run. Although total harvests by subsistence fishers were not documented, effort and catch information were used to judge timing and magnitude of the chinook salmon return. The commercial fishery is delayed until it becomes apparent subsistence needs are being met and chinook salmon are beginning their upstream migration as indicated by the Department of Fish and Game test net in the lower Unalakleet River. There is a growing trend to move subsistence nets from the river mouth out to the ocean in order to avoid large debris loads from spring runoff. It is presently unclear what changes this fishing technique will have on chinook salmon escapement.

Low salmon stock levels in the Nome Subdistrict combined with a large concentration of users has required issuing subsistence harvest permits for the area since 1974. These are issued by regulation to each household and designated fishing location. Each location may have its own catch limit per permit and the fisherman is allowed to change locations after notifying the local Fish and Game office.

Regulatory Actions in Nome Subdistrict

Although pink salmon are usually the most abundant species of salmon in Subdistrict 1 streams, the commercial fishery has primarily targeted chum salmon. The relatively large chum salmon catches in this subdistrict in conjunction with weak local stock abundance implied that the fishery intercepts non-local stocks. A 1978-79 Norton Sound stock separation study confirmed this view. Salmon tagged near Nome were re-captured in fisheries from Golovin (Subdistrict 2) to Kotzebue. In an attempt to provide for spawning requirements in addition to an important subsistence fishery that targets local stocks, a commercial harvest guideline of 5,000-15,000 chum salmon was adopted as a regulation.

Due to poor chum salmon escapement during the 1982 and 1983 seasons, the Board of Fisheries, in response to an advisory committee petition, directed the Department to manage the commercial

fishery so that chum salmon escapement could be optimized. During the 1984 fall Board of Fisheries meetings, these directives became regulation. In response to public and advisory board proposals, the following commercial fishery restrictions were adopted as regulations:

- 1) Salmon may be taken commercially only from July 1 through August 31.
- 2) Fishing periods were restricted to two 24 hour periods per week.
- 3) Waters west of Cape Nome were closed to commercial salmon fishing.

The Department was also directed to allow a harvest at the lower end of the guideline harvest range of 5,000 to 15,000 chum salmon, as stipulated in 5AAC 04.360.

In addition to these commercial fishing restrictions, a proposal to restrict the sport fishery in the Nome and Snake Rivers was adopted in 1984:

With a bag and possession limit of 15 salmon, other than chinook salmon, only 5 could be chum and coho salmon, in combination.

Subsistence permit limits in the Nome and Snake Rivers were restricted to 20 chum and 20 coho salmon. The remainder of the permit limit could be filled with salmon other than chum or coho salmon.

However, even with these restrictive regulations in place, chum salmon escapement goals were difficult to attain. The 1987 fishing season experienced poor returns of both chum and pink salmon to Nome Subdistrict streams. Numerous management actions were made which curtailed commercial fishing activities, and later, sport, personal use, and subsistence were also restricted. Even with such drastic fishery restrictions, escapement goals for chum salmon were not attained during 1987 in the Nome, Eldorado, Flambeau, Bonanza, Snake, and Solomon Rivers. In response to this continuing trend of decreasing chum and pink salmon returns to the Nome Subdistrict, several new regulations were adopted during the 1987 Alaska Board of Fisheries meetings.

With the commercial fishery all but eliminated in recent years, proposals affecting the sport, personal use, and subsistence fisheries were considered. The following new sport fish regulations were adopted for all Nome area road system streams (Seward Peninsula drainages from Cape Prince of Wales to Cape Darby):

- 1) For salmon other than chinook, 10 per day, 10 in possession, only 3 which may be chum salmon and coho salmon, in combination.
- 2) For chinook salmon, 1 per day, 1 in possession.

These new regulations superseded those adopted during 1984. Additional new regulations affecting personal use and subsistence fishermen which were adopted in 1987 included:

- 1) In the Nome River, no person may operate more than 50 feet of gillnet in the aggregate.
- 2) The Nome River was added to the regulation 5AAC 01.170 (e) which states that small mesh gillnets (less than 4 1/2 inch mesh) and beach seines may not be used in specific Nome Subdistrict streams.

Regulation changes in 1992 restricted the use of beach seines in the Nome subdistrict. The managers now have the authority to allow the subsistence harvest of chum or pink salmon by beach seine if escapement needs are likely to be met. Beginning in 1991, no chum salmon harvests have been allowed until escapement goals were likely to be met or conservative management actions were judged to be no longer effective. In the past beach seines were viewed as an overly effective means to harvest fish, but during the last two years, beach seines were used as a means to harvest abundant species, while allowing the live release of other species experiencing depressed runs.

1996 Norton Sound Salmon Fishery

Commercial Fishery Overview

The 1996 Norton Sound District commercial salmon fishing season was first opened in the Unalakleet and Shaktoolik Subdistricts on June 13 and ended on September 10. Commercial fishing periods dates and times were set throughout the season by Emergency Order (E.O.). The commercial salmon harvest totaled 571,095 fish which was comprised of 4,984 chinook, 1 sockeye, 68,033 coho, 487,441 pink, and 10,636 chum salmon (Table 1). Approximately 86 permit holders participated in the fishery and received \$340,347 for their catch (Appendix Table A1, A11).

Appendix Table A8 lists the Norton Sound historical salmon and the current year commercial harvests relative to the previous 5 year (1991-1995) and the previous 10 year (1986-1995) averages. The chinook salmon harvest was 26% below the previous 5 year average and 24% below the previous 10 year average. The coho salmon harvest was 6% below the previous 5 year average and 21% above the previous 10 year average catches. Historically Norton Sound has had very limited, but sporadic markets for pink salmon. A new market for pink salmon opened in 1994 which focused on the abundant even year return. The 1994 fishery went well so it was attempted on the weaker return in 1995 with poor results. The commercial harvest of pink salmon in 1996 was less than hoped for, totaling 487,441 fish. This was the second highest harvest on record, but only about one half of the 1994 season catch. The chum salmon commercial harvest was 81% below the 5 year average and 86% below the 10 year average catches for Norton Sound.

The Norton Sound Salmon District has 201 CFEC salmon permits, of which 86 actually fished during the 1996 season (Table 2). The number of participating fishermen this season was 30% below the previous 5 year average and 42% below the previous 10 year average. There was a significant drop in effort in all subdistricts due primarily to poor market conditions. This was the second year in a row that fishing participation has set a record low.

Two primary salmon buyers cooperated in Norton Sound during the 1996 season. One buyer operated during the chinook and coho salmon seasons while the other buyer was interested in pink salmon. The chinook and coho salmon were delivered to Unalakleet from other subdistricts using tenders and aircraft. The fish were headed and gutted then shipped airfreight to markets. The other buyer, which purchased pink salmon, tendered fish throughout Norton Sound to their processing vessel located along the eastern coast. The processing vessel processed the pink salmon into frozen blocks which were stored onboard through the season. Some of the product from the chinook and coho salmon purchased by the shore based company was also held on the freezer vessel. In addition, a few individual fishermen sold their catch of fresh salmon locally and to wholesale distributors, as permitted under catcher-seller status. Management actions taken in the fisheries were designed to avoid harvesting chum salmon as much as practical due to the poor markets and conservation concerns. Chum salmon caught incidentally to the chinook, pink, and coho salmon fisheries were purchased in the round. The average price paid for chinook was \$.54 per pound, \$.13/lb for sockeye, \$.28/lb for coho, \$.10/lb for pink, and \$.08/lb for chum salmon. The total value of the raw fish, \$340,347, was 30% below the previous 5 year (1991-1995) average (Table 3).

Subsistence Fishery Summary

The department monitors subsistence salmon harvests in the Norton Sound and Port Clarence Areas using two methods: 1) household surveys are conducted in ten of the eleven mainland communities, with the exception of Nome, and 2) subsistence fishing permits are required of fishers using the streams in the vicinity of Nome (Table 2). The communities of Gambell and Savoonga on St. Lawrence Island are not surveyed. The seasonal community of Council located on the Fish River system is not surveyed either. Council is peopled by mostly Nome residents, but the salmon harvested there are returning to rivers of Subdistrict 2 where conservation actions have not been as severe as in the Nome Subdistrict. Household subsistence surveys are primarily funded by the Commercial Fisheries Management and Development Division and were conducted by the Division of Subsistence during the fall of 1996 in Norton Sound villages. Subsistence harvest estimates for the district are generated from the data gathered by the survey project.

Subsistence fishing permits are required by regulation for each household that fishes in the Nome Subdistrict. These permits identify the body of water to be fished, the type of gear used, and the bag limit which is specific to that body of water. In addition the permit contains a catch calendar where the permit holder records catches in numbers of each species of fish for each day fished. If the subsistence fishers have filled their bag limits or would like to fish another location, they can be issued another permit for another area after the previous one has been returned. These permits are important to management because they identify users and bag limits, but the actual catch information cannot be compiled until well after the season when the permits are returned to the Department of Fish and Game.

The Nome permit data record 123 households obtaining permits, 71 returning their permits and 48 of those returned permits reporting a catch (Table 2). Effort was concentrated in marine waters as were harvests for all species. Different rivers are utilized by those who prefer freshwater caught salmon for each species. The Nome River produced 35 percent of the pink salmon harvest, the

Eldorado River produced 15 percent of the chum salmon harvest, and the Eldorado and Flambeau both produced 20 percent of the coho salmon harvest.

Household surveys are conducted in smaller communities where researchers can contact the entire community in two or three days. Communities surveyed in the Norton Sound District were Brevig, Teller, White Mountain, Golovin, Elim, Koyuk, Shaktoolik, Unalakleet, St. Michael, and Stebbins. A two page survey instrument is used to standardize the questions asked of the respondents. When possible, the same interviewers have surveyed the same communities in successive years. When a household was unavailable for an interview the instrument, including a postage paid envelope was mailed to them. Overall, 89 percent of all households were surveyed in the Norton Sound District (Table 9).

The subsistence harvest in the Norton Sound District in 1996 was 134,050 fish. Of these, 5.4 percent were chinook, 25.8 percent were chum, 48.3 percent were pink salmon, 0.9 percent were sockeye, and 19.6 percent were coho. The abundance of pink salmon on even years influenced the pink proportion. Estimated mean salmon harvest in the Norton Sound District was 156 salmon per household, which included 8.5 chinook, 40.3 chum, 75.4 pink, 1.4 sockeye, and 30.7 coho. Subdistrict 5 (Shaktoolik) accounted for the largest mean household harvest of salmon, an estimated 325 fish. The mean household harvests in the other subdistricts were 102 salmon in Subdistrict 1, 201 salmon in Subdistrict 2, 191 salmon in Subdistrict 3, 128 salmon in Subdistrict 4, and 136 salmon in Subdistrict 6 (including St. Michael and Stebbins). After Shaktoolik, the communities reporting the largest mean household harvests of salmon were White Mountain (224 fish) and Elim (191 fish).

In the Norton Sound District, about 72 percent of households subsistence fished for salmon and 12 percent assisted other households in processing subsistence-caught salmon. About seven percent of the salmon harvest in Norton Sound District (excluding Nome), were harvested for dog food.

Rod and reel was used by about 72 percent of households to harvest salmon, followed by set gillnets (53 %), seines (22 %), and drift nets (less than 1 %). Although rod and reel was the most widely used gear type, it accounted for only 12 percent of the total salmon harvest reported in the surveyed communities in the Norton Sound District. Coho salmon was the primary target of rod and reel fishing, accounting for about 47 percent of the surveyed communities' rod and reel salmon harvest.

In the Norton Sound District, 79 percent or more of fishing households responded that their fishing season was very good or average for chinook, chum, pink, and coho salmon. Pink and coho salmon fishing was particularly productive with 57-59 percent of fishing households responding that their season was very good.

Season Summary by Subdistrict

Nome - Subdistrict 1. The commercial salmon season in the Nome Subdistrict was managed by Emergency Order (E.O.) which opened the subdistrict on August 5. This management action which

delayed the season was taken in order to avoid the harvest of chum and pink salmon that were expected to return in low numbers and to assure subsistence priority. Sport fishing for chum salmon is closed by regulation in the subdistrict. Subsistence fishing was closed prior to the beginning of the chum salmon return for nearly the entire area except in marine waters East of Cape Nome which actually had increased fishing time over recent years. Subsistence fishing restrictions were incrementally relaxed on a stream-by-stream basis as chum salmon escapements appeared certain to be met. On July 9, all marine waters, Safety Sound, and Eldorado, Flambeau, and Bonanza Rivers were opened. In addition, the mouth areas of the Nome and Sinuk Rivers were opened to beach seining with the condition that all chum salmon were to be released. This was done in an effort to utilize the abundant pink salmon while protecting the weak chum salmon returns to those streams. The entire Nome Subdistrict was reopened to subsistence fishing on the standard fishing schedule beginning August 1 since most chum and pink salmon had moved past the fishery, continued restrictions would have little effect to those species, and the coho salmon appeared normal.

As stated above, the Nome Subdistrict opened for a directed commercial fishery on coho salmon beginning August 5. Salmon markets were very limited in the subdistrict and only one fisherman reported sales. The total commercial harvest for the subdistrict included 9 coho, 13 pink, and 3 chum salmon (Table 1 and 4). One hundred twenty-three subsistence permits were issued for the Nome area.

Golovin Bay-Subdistrict 2. Over the last seven years, chum salmon stocks in the Golovin Bay Subdistrict have received little or no commercial exploitation and still have not made spawning escapements in some years. The 1996 Salmon Management Plan informed fishermen that the Golovin Bay Subdistrict commercial harvest would be limited to a maximum of 10,000 chum salmon before July 10 in an attempt to protect the chum salmon stocks. By that date, the chum salmon run would be assessed and fishing time would be adjusted accordingly. The subdistrict was unable to attract a chum salmon buyer due to poor market conditions and the expected low volume of fish.

Commercial fishing in the Golovin Bay Subdistrict opened on August 5 to a standard schedule of two 48 hour periods per week. An interested buyer began operating on August 8 after the peak of the coho salmon run had migrated through the fishery. Four fishermen harvested a total of 638 coho salmon for the season and the salmon were tendered to Unalakleet for processing (Table 1, Table 5).

Moses Point-Subdistrict 3. The Moses Point Subdistrict chum salmon return has also experienced a decrease in size in recent years despite conservative management actions. The salmon management plan stated that there was to be no chum salmon directed fishery with the possibility of a subsistence closure during the run if the chum escapement levels were likely to fall short of the Kwiniuk River counting tower goal of 19,500 chum salmon. Commercial fishing was to remain closed through June and July to protect the chum salmon stocks with the exception of a possible pink salmon directed fishery. If the chum salmon return was weak, attempts would be made to minimize the impact on the subsistence harvest by allowing directed fishing on other salmon

species. The escapement was closely monitored throughout the run by the Department's Kwiniuk River counting tower.

The chum salmon return arrived early and strong, but as a result of conservative management and lack of market, no directed fishery occurred. The pre-season management plan prescribed a pink salmon directed fishery in the subdistrict where the return was expected about average for an even year return. On July 7, an E.O. opened the subdistrict to a pink salmon directed fishery which ran continuously through July 25. The liberal fishing schedule was actually established by a salmon buyer who had limited processing and tendering capacities. The salmon buyer would announce openings and closures which were typically 12 hours each day based on their ability to handle the catch. The pink salmon were tendered to a processing vessel which skinned and filleted then froze the flesh in blocks. By the time the salmon buyer was ready to buy, the compressed first half of the run was past. Consequently, pink salmon catches and effort were low.

The Moses Point Subdistrict reopened on August 5 by E.O. for a coho salmon directed fishery. Fishery periods were scheduled for two 48 hour periods per week. The coho salmon catch was tendered to Unalakleet for processing. The last day fished was August 24 when the salmon buyer ceased operations.

The Moses Point total harvest taken by 12 fishermen included 1,915 coho and 68,609 pink salmon (Table 1 and 6). The coho salmon catch was 43% below the previous 5 year average (1991-1995) and 30% below the previous 10 year average (1986-1995). Verbal reports indicated a slightly larger harvest. That difference between fish tickets and the verbal reports has yet to be reconciled.

Norton Bay-Subdistrict 4. The Norton Bay Subdistrict has had difficulty attracting a buyer due to its remoteness and its reputation for water-marked fish. Consequently, a regulatory change became effective in 1995 that moved the western boundary from Six Mile Point to Isaac's Point with the intent to improve fish quality. Due to lack of timely salmon escapement information the Norton Bay Subdistrict is managed similar to the Shaktoolik and Unalakleet Subdistricts because they reflect similar trends in salmon return strength and timing. There were no open commercial fishing periods in the Norton Bay Subdistrict for 1996 due to lack of market. This was the sixth time in the last eleven years that no landings had been made in the Norton Bay Subdistrict and the last significant harvest was taken in 1988.

Shaktoolik and Unalakleet-Subdistricts 5 and 6. Both the Shaktoolik and Unalakleet Subdistricts, which share a common boundary, consistently attract commercial markets due to larger fish volumes and better availability of transportation services. Management actions typically encompass both subdistricts because salmon tend to intermingle and the harvest in one subdistrict affects the movement of fish in the adjacent subdistrict. As stated earlier the department's test net in the Unalakleet River and subsistence interviews at Unalakleet are used to set early fishing periods in both subdistricts. As the season progresses, the test net and commercial catch indices are used to assess return strengths of each salmon species. Aerial surveys are frequently not obtained in either subdistrict due to poor survey conditions and are used as a late assessment check because of the long travel time between the fishery and the spawning grounds.

Commercial fishing is typically only allowed after chinook salmon have been observed entering the Unalakleet River in increasing numbers for a week's time to assure the harvest is directed on actively migrating stock and not on milling fish. The chinook salmon return began early and strong. The first fishing period in both subdistricts opened on June 13 and ran 48 hours which was an increase in fishing time over the typical 24 hour period length for chinook (Table 7 and 8). It was directed at chinook salmon using a minimum mesh size restriction of 7.5 inches. The chinook salmon return continued to be strong with escapements well ahead of schedule. On June 17, both subdistricts went to a standard schedule of two 48 hour periods per week. The run dwindled and even though the entire return was above average, the chinook salmon harvest was below average because the buyer and fishermen were not prepared to fish during the peak of the migration. The market for chum salmon was poor, but the fish buyer agreed to purchase those chum salmon caught incidentally during the chinook salmon fishery.

Pink salmon fishing began in the Shaktoolik and Unalakleet Subdistricts on June 24 for a single 24 hour period to test the run. It ran coincidentally with the chinook salmon commercial period and it was up to the fisherman to decide which species to target using gear restrictions. Most fishermen at Unalakleet targeted chinook salmon, while those at Shaktoolik pursued pink salmon. Pink salmon commercial catches suggested that stocks were not severely impacted by the catastrophic flood of two years ago. Run abundance appeared close to normal for an even year return. On June 26, both subdistricts were opened to a continuous pink fishing period to run through July 20. This schedule was at the request of the buyer who had limited tendering and processing capacities. The buyer would direct fishing dates and times from his processing vessel to maximize his operations which resulted in typical fishing periods of 12 hours each day in both subdistricts. Catches were larger near Shaktoolik primarily because Unalakleet fishermen initially targeted chinook salmon, but later when they focused on pink salmon, they were hampered by weather. Unalakleet stopped fishing for pink salmon on July 12 and Shaktoolik stopped on July 18.

Since the chum salmon market was poor, coho salmon fishing was delayed until coho salmon outnumbered chum salmon in the department's test net at Unalakleet. On July 25, both subdistricts were opened to a schedule of two 48 hour periods per week because the coho to chum ratio had increased and the buyer assured the Department that chum caught incidental to the directed coho fishery would be purchased. The coho salmon run was building with commercial catches above average and escapement well above average as indicated by the department's Unalakleet test net catch data. Commercial fishing time was extended by one day on August 7 in both subdistricts. On August 14, commercial fishing was changed to a fishing schedule of 5 continuous days per week in response to the continued strong coho salmon return. The salmon buyer ceased operations on August 24, but commercial fishing persisted at a lower level involving catcher/sellers. The opening and closure times were shifted on August 26 so that fishermen could make better use of the air freight schedule out of Unalakleet. The fishing season typically ends by regulation on September 7 in the Unalakleet and Shaktoolik Subdistricts. The season was extended this year to end September 10 because the coho salmon harvest was above average, the Unalakleet test net indicated escapements were double the average, aerial surveys of both the Unalakleet and Shaktoolik Rivers were near record levels, only a few fishermen remained, and a market still existed.

Commercial catches in the Shaktoolik Subdistrict included 1,340 chinook, 0 sockeye, 14,065 coho, 304,982 pink, and 3,237 chum salmon (Table 1 and 7). The chinook salmon harvest was 8% below the previous 5 year average and 12% below the previous 10 year average. The coho salmon harvest was 4% below the previous 5 year average and 31% above previous 10 year average. The pink salmon harvest varies widely from year to year due to markets and the cyclic nature of the species. The 1996 harvest of pink salmon was 136% above the 5 year average and 369% above the 10 year average. Chum salmon were only caught incidentally during other directed fisheries. The total chum salmon harvest was 84% below the 5 year average and 83% below the 10 year average harvest.

The Unalakleet Subdistrict had similar catches and trends. The harvest included 3,644 chinook, 0 sockeye, 52,027 coho, 113,837 pink, and 7,369 chum salmon (Table 1 and 8). The chinook salmon catch was 30% below the previous 5 year average and 21% below the previous 10 year average. The coho salmon harvest in the subdistrict was 2% below the previous 5 year average and 26% above the previous 10 year average. The pink salmon harvest was 1% above the 5 year average and 93% above the 10 year average. The total chum salmon harvest in the Unalakleet Subdistrict was low at 77% and 73% below the previous 5 and 10 year averages respectively.

Escapement

Table 3 lists aerial survey escapement counts for the major index streams of Norton Sound and the Kwiniuk River tower counts. Survey conditions were fair to good throughout most of the district in 1996 except peak counts for chinook, chum, and pink salmon in the eastern subdistricts. Large returns of pink salmon made species identification difficult which required surveys to be flown early before the pink salmon accumulated. The Nome Subdistrict streams received the most intensive survey efforts because salmon stocks local to the Nome area are limited, easily accessed by road system, and are exposed to intensive subsistence and sport fishing pressure.

Department escapement projects in the Norton Sound District include counting towers on the Kwiniuk, Niukluk, and Shaktoolik Rivers, a test net operated on the Unalakleet River, and a weir on the Nome River. Both the Unalakleet test net and the Kwiniuk tower projects have been in operation for many years. They provide comparable and timely information which is used as a basis for inseason salmon management decisions. The Nome River Escapement Project began as a tower late in 1993 and was operational as a tower in 1994 and 1995 before switching to a weir in 1996. The Niukluk tower became functional in 1995. Both the Nome and Niukluk River projects have limited data that can be used when making comparisons, but will become more valuable the longer they operate. This was the first season the Shaktoolik tower operated. The project modifications will be made next season, but there is a chance that a tower is not suitable for the river conditions.

Three additional counting tower projects were also operated in the Norton Sound District this season. The Snake, Eldorado, and North River projects were setup and operated by Kawarak Corporation. The projects ran as cooperative ventures with the Department of Fish and Game who

supplied technical advice and purchased equipment. The projects supplied daily information to the Department that was very useful to management of local salmon resources.

Chinook Salmon

The Unalakleet and Shaktoolik Subdistricts are the primary chinook salmon producers in Norton Sound. Although on a smaller scale, the Norton Bay, Moses Point and Golovin Subdistricts have experienced a gradually increasing trend of chinook salmon returns in recent years. Daily subsistence fishermen interviews conducted at Unalakleet, the Department's test fish project in the Unalakleet River, and comparative commercial catch data all indicated that chinook salmon escapements were above average in the Unalakleet and Shaktoolik Subdistricts. The Kwiniuk River counting tower had an average chinook salmon passage.

Chum Salmon

As stated earlier, chum salmon escapements were typically above average throughout Norton Sound in 1996. Some streams in the Nome Subdistrict fell below their escapement goals; however, this represents an improvement over escapements observed from 1989 through 1983. The Sinuk, Snake, Nome, and Solomon Rivers were believed to be close to their escapement goals, while the Flambeau River doubled its goal. The Eldorado River had an unexpectedly high record count which was nearly 5 times its escapement goal. Tower or weir passage goals have not been developed for any of the fish monitoring projects in the Nome Subdistrict yet, but they are useful in identifying species run timing.

The Golovin Bay Subdistrict is primarily a one river system with escapement goals set for individual tributaries. Aerial surveys flown early this season due to species identification problems, assessed the chum salmon escapement at 30% below the escapement goal for the combined system. This assessment was probably biased low due to species identification problems encountered during the peak of the pink salmon migration. The Niukluk River counting tower does not have an escapement goal, but this year's chum salmon tower passage was roughly the same as in 1995. The 1995 aerial survey without the species identification problems, assessed the return to be well above the escapement goal. Therefore, chum salmon escapement to the subdistrict was assumed to be at least adequate in 1996.

The Moses Point Subdistrict achieved above average chum salmon escapements as documented by the Kwiniuk River counting tower which had a preliminary expanded count of 27,256 chum salmon pass the tower. This was 40% above the tower passage goal of 19,500 chum salmon. The aerial escapement survey count Tubutulik River, which is also a major stream in the Moses Point Subdistrict was slightly below the escapement goal; however, difficulty in distinguishing chum salmon intermingled with large numbers of pink salmon likely caused undercounting of chum salmon. Only one stream in the Norton Bay Subdistrict was surveyed and it was assessed at twice its goal. Therefore, both the Moses Point and Norton Bay Subdistricts were assumed to have had good chum salmon escapements.

Aerial surveys in the Unalakleet and Shaktoolik Subdistricts are not consistently obtained each year due to inclement weather and poor water clarity. Aerial survey counts in 1996 were of little use due to poor survey conditions. In the past, commercial catch data had been used as an indicator of run strength, but that tool is no longer useful due to inconsistent fishing effort and patterns. However, the test net in the Unalakleet River had the highest chum salmon catch total on record. Therefore it is believed that both the Unalakleet and Shaktoolik Subdistricts had adequate chum salmon escapements, likely well above average.

Coho Salmon

Coho salmon are found in nearly all of the chum salmon producing streams throughout Norton Sound with the primary commercial contributors being the Unalakleet and Shaktoolik Rivers. Because inclement weather is normally experienced in this area during August and September, escapement data for all subdistricts can be somewhat sketchy. Streams in the northern subdistricts of Norton Sound are typically surveyed and the Unalakleet River test net has the best data set to compare coho salmon escapement in eastern Norton Sound. The newer assessment projects are intended to monitor coho as well as chum salmon, but still lack the historic data base necessary to establish specific escapement goals. Nearly all escapement monitoring projects had gaps in their operation of varying degrees due to high water in 1996.

Overall, coho salmon escapements appeared to be above average. The Nome Subdistrict coho salmon escapements were slightly above average. The Golovin Bay and Moses Point Subdistricts were above average. The Shaktoolik River had a record high coho salmon survey. And the Unalakleet test net caught a record three times the average season total for coho salmon. The Norton Bay Subdistrict was not surveyed, but since no commercial fishery occurred with only limited subsistence harvest, it is assumed that escapement was adequate.

Pink Salmon

During recent years, pink salmon returns to Norton Sound have followed an odd/even year cycle with the even years building in size and typically much larger than the odd years. The 1994 record pink salmon return was followed by a major flood event that potentially could have devastated salmon eggs deposited in the stream bed. This season's pink salmon return was generally half of the size of its 1994 parent year, but still about average for an even year return. However, the smaller streams of the Nome Subdistrict had well below the average even year levels of return, but still not as low as an odd year return.

Management Concerns

Chum salmon stocks have been depressed throughout Norton Sound over the past eight years with escapements in the northern subdistricts continuing to be a major concern. Chum salmon escapement goals are generally being met, but the cost in many instances has been a drastic reduction in all forms of harvest. The Nome Subdistrict was closed in 1996 during nearly the entire chum salmon run to sport and commercial fishing. Subsistence fishing management actions

included requiring intense management on a stream-by-stream basis. The Golovin Bay and Moses Point Subdistricts both exceeded their escapement goals and could have each supported conservative commercial harvests levels of 20,000 chum salmon. The Shaktoolik and Unalakleet Subdistricts had practically negligible commercial catches with high escapements. The total chum salmon return to the Unalakleet and Shaktoolik Subdistricts may have been only slightly below average, but a reasonable commercial harvest could have been taken had a commercial market been available. Both the 1995 and 1996 chum salmon returns were better than expected, but less than average historical total returns. Even though escapement goals were obtained for most index streams, chum salmon harvests will continue to be managed conservatively as returns are expected to be low for the next several years since those fish will be coming from low parent years.

The renewed interest in Norton Sound pink salmon commercial fishing has proven feasible and manageable on strong year classes, but is questionable during weak return years. Management Plans will have to be developed that set exploitation levels and escapement needs, gear and harvest requirements, and consider incidental weak stock impacts.

Salmon marketing conditions have become significant factors for consideration when scheduling fishing periods. Market conditions have caused more restrictive limitations than biological factors in recent years for many species. Fish buyers frequently notify the Department of Fish and Game that they can only handle a limited quantity with a high quality standard and at a specific rate to optimize their operations. The manager must not only monitor the salmon returns and harvest rates, but must coordinate schedules with the salmon buyers to protect the limited markets available for Norton Sound salmon.

1997 Norton Sound Salmon Outlook

Salmon forecasts and harvest projections for the 1997 commercial salmon season are based on qualitative assessments of brood year returns, subjective determinations of freshwater overwintering and ocean survival, and projections of local market conditions. Salmon buyers will probably operate in only some of the Norton Sound subdistricts during 1997. The chinook return is expected to be average with a commercial harvest ranging from 5,000 to 8,000 fish. The pink salmon market is uncertain in 1997. However, the pink salmon escapements during 1995 were weak in most index streams. Consequently, pink salmon harvests are likely to quite limited. The 1997 chum salmon return is expected to be about average while the market for Norton Sound chum will likely be weak. The commercial harvest of chum salmon will be managed conservatively to provide a potential harvest between 40,000 and 80,000. The 1993 coho salmon commercial harvest and escapements indicate that the 1997 coho return will be average and the commercial harvest is expected to range from 40,000 to 70,000 fish.

Table 1. Norton Sound commercial salmon catch by subdistrict, 1996.

Subdistrict	Chinook	Sockeye	Coho	Pink	Chum	Total
Nome	0	0	9	13	3	25
Golovin	0	0	638	0	0	638
Moses Point	0	0	1,915	68,609	0	70,524
Norton Bay	0	0	0	0	0	0
Shaktoolik	1,340	1	13,444	304,982	3,237	323,004
Unalakleet	3,644	0	52,027	113,837	7,369	176,877
District Totals	4,984	1	68,033	487,441	10,609	571,068

Table 2. Nome area subsistence salmon catches, Norton Sound, 1996.

	Number of Permits			Number of Salmon Harvested					
	Issued	Returned	Fished	Chinook	Sockeye	Coho	Pink	Chum	Total
Marine Waters	71	40	25	7	161	247	1,838	1,707	3,960
Nome River	22	13	10	1	19	143	1,195	107	1,465
Snake River	1	1	1	0	0	1	2	0	3
Eldorado River	14	9	6	0	4	169	367	414	954
Flambeau River	6	6	5	0	1	268	89	39	397
Bonanza River	3	2	1	1	0	0	19	20	40
Safety Sound	0	0	0	0	0	0	0	0	0
Solomon River	0	0	0	0	0	0	0	0	0
Penny River	1	1	0	0	0	0	0	0	0
Cripple Creek	0	0	0	0	0	0	0	0	0
Sinuk River	0	0	0	0	0	0	0	0	0
Feather River	0	0	0	0	0	0	0	0	0
Fish River	0	0	0	0	0	0	0	0	0
Niukluk River	1	0	0	0	0	0	0	0	0
Port Clarence	0	0	0	0	0	0	0	0	0
Kuzitrin River	1	0	0	0	0	0	0	0	0
Pilgrim River	3	0	0	0	0	0	0	0	0
Unknown River	0	0	0	0	0	0	0	0	0
Total	123	72	48	9	185	828	3,510	2,287	6,819

Table 3. Salmon survey counts of Norton Sound streams and associated chum salmon escapement goals, 1996.

Stream Name	Chinook	Coho	Sockeye	Pink	Chum	Chum Goal
Salmon L.			4,110			
Grand Central R.			770			
Pilgrim R.	81	1,131	1,800	9,030 ^c	6,870 ^b	
Glacial L.			1,852 ^a			
Sinuk R.	5	367	300	74,100 ^b	1,815 ^b	4,500
Cripple R.		41				
Penny R.		8				
Snake R.		398		4,140	405 ^b	1,000
Nome R.		723	11	34,520 ^b	799 ^b	2,000
Flambeau R.					5,390 ^b	3,250
Eldorado R.	21	254		40,100 ^b	23,820 ^b	5,250
Bonanza R.	1			40,510 ^b	1,980 ^b	1,500
Solomon R.	7	262		15,230	323	550
Fish R.	189			684,780 ^b	5,840 ^{cf}	17,500
Boston Cr.	133			35,980 ^b	3,505 ^{cf}	2,500
Niukluk R.	25	2,047		153,150 ^b	9,732 ^{cf}	8,000
Ophir Cr.		1,271				
Kwiniuk R.	567 ^d	1,410		937,735 ^d	27,256 ^d	19,500 ^e
Tubutulik R.	439			226,750 ^b	10,790 ^b	12,000
Inglutalik R.						8,500
Ungalik R.	35			60,000 ^f	5,540 ^b	2,500
Shaktoolik R.	206 ^{ab}	3,821		150,310 ^{ab}	7,337 ^{af}	11,000
Unalakeet R.						
North R.	106 ^b	917		125,500 ^b	220 ^{cf}	2,000
Old Woman R.	55 ^b	925		16,390 ^b	296 ^{cf}	100

Note: A multitude of factors affect escapement estimates. The numbers above are strict values that instantaneous counts which may not truly represent the strength of the return. Chum Goals to aerial surveys in all cases except for Kwiniuk River which has counting tower goal. Refer to for an evaluation of the return.

^a Counts should be considered minimums due to counting conditions.

^b Early count.

^c Late count.

^d Preliminary expanded tower counts.

^e Chum goal for tower count.

^f Pink abundance obscured chum recognition.

Table 4 Commercial salmon set gillnet catches from Nome, Subdistrict 1, Norton Sound, 1996

Period Number	Period Dates	Hours Fished	No. of Fishermen	Period Catch and Catch Per Unit Effort								Cumulative Catch and Catch Per Unit Effort							
				Chinook	Sockeye	Coho	CPUE	Chum	CPUE	Pink	CPUE	Chinook	Sockeye	Coho	CPUE	Chum	CPUE	Pink	CPUE
1 Coho	8/05-8/16	24	1	0	0	5	0.21	3	0.13	13	0.54	0	0	0	0.00	0	0.00	13	0.54
2 Coho	8/08-8/09	24	0	No deliveries															
3 Coho	8/12-8/13	24	0	No deliveries															
4 Coho	8/15-8/16	24	0	No deliveries															
5 Coho	8/19-8/20	24	0	No deliveries															
6 Coho	8/22-8/23	24	1	0	0	4	0.17	0	0.00	0	0.00	0	0	0	0.16	3	0.06	13	0.27
7 Coho	8/26-8/27	24	0	No deliveries															
8 Coho	8/29-8/30	24	0	No deliveries															

Total Hours fished = 48

Total number of permits used = 1

Table 5. Commercial salmon set gillnet catches from Golovin, Subdistrict 2, Norton Sound, 1996

Period Number	Period Dates	Hours Fished	No. of Fishermen	Period Catch and Catch Per Unit Effort								Cumulative Catch and Catch Per Unit Effort						
				Chinook	Sockeye	Coho	CPUE	Chum	CPUE	Pink	CPUE	Chinook	Sockeye	Coho	CPUE	Chum	Pink	
1 Coho	8/05-8/07	48	0	No deliveries														
2 Coho	8/08-8/10	48	2	0	0	481	5.01	0	0.00	0	0.00	0	0	481	5.01	0	0	0
3 Coho	8/12-8/14	48	3	0	0	87	0.60	0	0.00	0	0.00	0	0	568	2.37	0	0	0
4 Coho	8/15-8/17	48	0	No deliveries														
5 Coho	8/19-8/21	48	2	0	0	70	0.73	0	0.00	0	0.00	0	0	638	1.90	0	0	0
6 Coho	8/22-8/24	48	0	No deliveries														
7 Coho	8/26-8/28	48	0	No deliveries														
8 Coho	8/29-8/31	48	0	No deliveries														

Total Hours fished = 144

Total number of permits used = 4

Table 6 Commercial salmon set gillnet catches from Moses Point, Subdistrict 3, Norton Sound, 1998

Period Number	Period Dates	Hours Fished	No of Fishermen	Period Catch and Catch Per Unit Effort						Cumulative Catch and Catch Per Unit Effort							
				Chinook	Sockeye	Coho	CPUE	Chum	CPUE	Pink	CPUE	Chinook	Sockeye	Coho	CPUE	Chum	Pink
1 Pink	7/07-7/07	12	11	0	0	0	0.00	0	0.00	4573	34.64	0	0	0	0	4573	34.64
1 Pink	7/8-7/9	10	7	0	0	0	0.00	0	0.00	4027	57.53	0	0	0	0	8600	122.86
2 Pink	7/9-7/10	10	12	0	0	0	0.00	0	0.00	13090	109.08	0	0	0	0	21690	114.18
3 Pink	7/10-7/11	16	6	0	0	0	0.00	0	0.00	4254	44.31	0	0	0	0	25944	90.71
4 Pink	7/11-7/12	12	6	0	0	0	0.00	0	0.00	5626	0.00	0	0	0	0	31470	87.91
5 Pink	7/14-7/14	17	10	0	0	0	0.00	0	0.00	9447	0.00	0	0	0	0	40917	77.49
6 Pink	7/15-7/16	40	10	0	0	0	0.00	0	0.00	13755	0.00	0	0	0	0	54672	58.91
7 Pink	7/16-7/17	24	8	0	0	0	0.00	0	0.00	4107	0.00	0	0	0	0	58779	52.48
8 Pink	7/17-7/18	28	9	0	0	0	0.00	0	0.00	9830	0.00	0	0	0	0	68609	50.01
1 Coho	8/12-8/14	48	8	0	0	353	0.92	0	0.00	0	0.00	0	0	353	0.20	0	68609
2 Coho	8/15-8/17	48	8	0	0	442	1.15	0	0.00	0	0.00	0	0	795	0.37	0	68609
3 Coho	8/19-8/21	48	10	2	0	778	1.62	0	0.00	0	0.00	2	0	1573	0.60	0	68609
4 Coho	8/22-8/24	48	8	0	0	342	0.88	0	0.00	0	0.00	2	0	1915	0.64	0	68609

Total Hours fished = 361

Total number of permits used = 12

Actual fishing period length was continuous from July 7 through July 25. The salmon buyer set the fishing schedule.

Table 7 Commercial salmon set gillnet catches from Shaktoolik, Subdistrict 5, Norton Sound, 1986

Period Number	Period Dates	Hours Fished	No of Fishermen	Period Catch and Catch Per Unit Effort								Cumulative Catch and Catch Per Unit Effort											
				Chinook	CPUE	Sockeye	Coho	CPUE	Chum	CPUE	Pink	CPUE	Chinook	CPUE	Sockeye	Coho	CPUE	Chum	Pink	CPUE			
1 King	6/13-6/15	48	15	469	0.65	0	0			185	0.26	0			469	0.65	0	0			185	0	
2 King	6/17-6/19	48	13	356	0.57	0	0			163	0.26	0			825	0.61	0	0			348	0	
3 King	6/20-6/22	48	12	322	0.54	0	0			265	0.46	0			1,147	0.60	0	0			613	0	
1 Pink	6/24-6/25	24	11	0		0	0				0.00	14531	55.04		1,147		0	0			813	14,531	55.04
4 King	6/24-6/26	48	13	174	0.28	1	0			938	1.50	0			1,321	0.52	1	0			1,552	14,531	
2 Pink	6/26-6/28	35	13	4		0	0				0.00	26874	59.06		1,325		1	0			1,552	41,405	57.58
5 King	6/27-6/29	48	9	11	0.03	0	0			122	0.28	0			1,336	0.45	1	0			1,674	41,405	
3 Pink	6/28-6/29	24	15	0		0	0				0.00	15182	42.17		1,336		1	0			1,674	56,587	52.44
6 King	7/01-7/03	48	9	0	0.00	0	0			0	0.00	0			1,336	0.39	1	0			1,674	56,587	
4 Pink	7/01-7/03	51	10	0		0	0			0	0.00	19445	38.13		1,336		1	0			1,674	76,032	47.85
5 Pink	7/03-7/04	24	12	0		0	0			0	0.00	24450	84.90		1,336		1	0			1,674	100,482	52.53
6 Pink	7/05-7/06	12	14	0		0	0			0	0.00	33754	200.92		1,336		1	0			1,874	134,236	65.64
7 Pink	7/07-7/07	12	15	0		0	0			0	0.00	39516	249.64		1,336		1	0			1,874	173,754	78.09
8 Pink	7/08-7/08	10	16	0		0	0			0	0.00	18258	114.11		1,336		1	0			1,674	192,012	80.51
9 Pink	7/09-7/10	10	18	0		0	0			0	0.00	44857	232.54		1,336		1	0			1,674	233,899	91.18
10 Pink	7/10-7/11	16	7	0		0	0			0	0.00	9952	88.86		1,336		1	0			1,674	243,821	91.08
11 Pink	7/11-7/12	12	19	0		0	0			0	0.00	16555	91.92		1,336		1	0			1,674	260,376	91.14
12 Pink	7/12-7/13	30	10	0		0	0			0	0.00	15829	52.76		1,336		1	0			1,674	276,205	87.49
13 Pink	7/13-7/14	14	7	0		0	0			0	0.00	6304	56.29		1,336		1	0			1,674	282,509	86.42
14 Pink	7/15-7/16	40	12	0		0	0			0	0.00	18096	37.70		1,340		1	0			1,674	300,605	80.18
15 Pink	7/16-7/18	48	7	0		0	0			0	0.00	4377	13.03		1,340		1	0			1,674	304,982	74.66
1 Coho	7/28-7/27	48	4	0		0	471	2.45		138	0.72	0			1,340		1	471	0.07		1,812	304,982	
2 Coho	7/28-7/31	48	15	1	0.00	0	3896	5.13		380	0.53	0			1,340		1	4,167	0.57		2,192	304,982	
3 Coho	8/01-8/03	48	9	0		0	27	0.56		0	0.00	0			1,340		1	4,194	0.58		2,192	304,982	
4 Coho	8/05-8/07	54	19	0		0	2279	2.81		278	0.34	0			1,340		1	6,473	0.89		2,470	304,982	
5 Coho	8/08-8/10	68	6	1	0.00	0	751	1.90		177	0.45	0			1,340		1	7,224	1.00		2,647	304,982	
6 Coho	8/12-8/17	120	11	2	0.00	0	1986	1.50		415	0.32	0			1,340		1	9,210	1.27		3,065	304,982	
7 Coho	8/19-8/24	120	12	0		0	4369	2.97		172	0.12	0			1,340		1	13,419	1.05		3,237	304,982	
8 Coho	8/26-8/31	120	1	0		0	25	0.21		0	0.00	0			1,340		1	13,444	1.05		3,237	304,982	
9 Coho	9/02-9/07	120	0	No Deliveries		0	0	0.00		0	0.00	0			1,340		1	13,444	1.05		3,237	304,982	
10 Coho	9/08-9/10	54	0	No Deliveries		0	0	0.00		0	0.00	0			1,340		1	13,444	1.05		3,237	304,982	

Total Hours Fished = 1276

Total number of permits used = 20

Actual fishing period length was continuous from June 26 through July 20. The salmon buyer set the fishing schedule.

Table 8 Commercial salmon net gillnet catches from Unalakleet, Subdistrict 6, Nelson Sound, 1996

Period Number	Period Dates	Hours Fished	No. of Fishermen	Period Catch and Catch Per Unit Effort								Cumulative Catch and Catch Per Unit Effort							
				Chinook	CPUE	Sockeye	Coho	CPUE	Chum	CPUE	Pink	CPUE	Chinook	CPUE	Sockeye	Coho	CPUE	Chum	Pink
1 King	6/13-6/15	48	27	545	0.42	0	0	0	0	243	0.19	0	0	545	0.42	0	0	243	0
2 King	6/17-6/19	48	26	170	0.62	0	0	0	0	255	0.28	0	0	1,315	0.52	0	0	298	0
3 King	6/20-6/22	48	31	862	0.58	0	0	0	0	595	0.40	0	0	2,177	0.54	0	0	1,193	0
1 Pink	6/24-6/25	24	7	0	0	0	0	0	0	0	0.00	5489	32.67	2,177	0	0	0	1,193	5,489
4 King	6/24-6/26	48	32	825	0.54	0	0	0	0	1235	0.80	0	0	3,002	0.54	0	0	2,428	5,489
2 Pink	6/26-6/28	35	1	0	0	0	0	0	0	0	0.00	1166	33.34	3,002	0	0	0	2,408	6,655
5 King	6/27-6/29	48	18	432	0.50	0	0	0	0	547	0.63	0	0	3,434	0.53	0	0	2,975	6,655
3 Pink	6/28-6/29	24	2	0	0	0	0	0	0	0	0.00	2247	94.81	3,434	0	0	0	2,975	8,902
6 King	7/01-7/03	48	24	210	0.18	0	0	0	0	735	0.64	0	0	3,644	0.48	0	0	3,710	8,902
4 Pink	7/01-7/03	51	13	0	0	0	0	0	0	0	0.00	20100	30.32	3,644	0	0	0	3,710	29,002
6 Pink	7/03-7/04	24	13	0	0	0	0	0	0	0	0.00	16872	54.08	3,644	0	0	0	3,710	45,874
6 Pink	7/05-7/06	12	7	0	0	0	0	0	0	0	0.00	17802	211.93	3,644	0	0	0	3,710	63,670
7 Pink	7/07-7/07	12	12	0	0	0	0	0	0	0	0.00	25347	176.02	3,644	0	0	0	3,710	69,023
8 Pink	7/08-7/09	10	12	0	0	0	0	0	0	0	0.00	9088	75.73	3,644	0	0	0	3,710	98,111
9 Pink	7/09-7/10	10	6	0	0	0	0	0	0	0	0.00	4845	80.75	3,644	0	0	0	3,710	102,956
10 Pink	7/10-7/11	16	8	0	0	0	0	0	0	0	0.00	5064	38.56	3,644	0	0	0	3,710	108,020
11 Pink	7/11-7/12	12	6	0	0	0	0	0	0	0	0.00	5817	86.79	3,644	0	0	0	3,710	113,837
12 Pink	7/12-7/13	30	0	No Deliveries	0	0	0	0	0	0	0.00	0	0	3,644	0	0	0	3,710	113,837
13 Pink	7/13-7/14	16	0	No Deliveries	0	0	0	0	0	0	0.00	0	0	3,644	0	0	0	3,710	113,837
14 Pink	7/15-7/16	40	0	No Deliveries	0	0	0	0	0	0	0.00	0	0	3,644	0	0	0	3,710	113,837
15 Pink	7/16-7/18	48	0	No Deliveries	0	0	0	0	0	0	0.00	0	0	3,644	0	0	0	3,710	113,837
1 Coho	7/25-7/27	48	13	0	0	5748	6.07	679	1.09	0	0	0	0	3,644	0	3,749	0.27	4,389	113,837
2 Coho	7/29-7/31	48	38	0	0	6313	5.54	729	0.40	0	0	0	0	3,644	0	13,962	0.94	4,138	113,837
3 Coho	8/01-8/03	48	5	0	0	1588	6.28	59	0.25	0	0	0	0	3,644	0	15,370	0.89	5,177	113,837
4 Coho	8/05-8/07	54	34	0	0	11594	6.31	469	0.26	0	0	0	0	3,644	0	26,964	1.56	5,646	113,837
5 Coho	8/08-8/10	66	25	0	0	5287	3.20	320	0.20	0	0	0	0	3,644	0	32,251	1.87	5,972	113,837
6 Coho	8/12-8/17	120	21	0	0	7827	2.33	850	0.23	0	0	0	0	3,644	0	40,173	2.33	6,822	113,837
7 Coho	8/19-8/24	120	29	0	0	8927	2.57	422	0.12	0	0	0	0	3,644	0	49,100	2.84	7,244	113,837
8 Coho	8/26-8/31	128	21	0	0	2396	0.95	125	0.05	0	0	0	0	3,644	0	51,496	2.98	7,369	113,837
9 Coho	8/02-8/07	120	6	0	0	447	0.62	0	0.00	0	0	0	0	3,644	0	51,943	3.01	7,969	113,837
10 Coho	8/08-8/10	56	1	0	0	84	1.50	0	0.00	0	0	0	0	3,644	0	52,027	3.01	7,369	113,837

Total Hours fished = 1,318

Total number of permits used = 54

Actual fishing period length was continuous from June 26 through July 20. The salmon buyer set the fishing schedule.

Table 9. 1996 Norton Sound area subsistence salmon harvests.

			Chinook		Chum		Pink		Sockeye		Coho		Total	
	Total HH's Contacted	HH's	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total
Nome Permits**	123	71	9	19	2,287	4,333	3,510	5,802	185	353	828	1,317	6,819	11,824
Subdistrict 1	123	71	9	19	2,287	4,333	3,510	5,802	185	353	828	1,317	6,819	11,824
Golovin	46	37	49	56	819	952	4,621	5,661	61	70	935	1,077	6,485	7,815
Nukluk R Permits**	1	0	0	0	0	0	0	0	0	0	0	0	0	0
White Mountain	70	68	29	30	1,877	1,915	11,506	11,738	63	64	1,900	1,937	15,375	15,684
Subdistrict 2	117	105	78	86	2,696	2,867	16,127	17,399	124	134	2,835	3,014	21,860	23,500
Elim	73	61	366	417	2,034	2,319	8,280	9,442	46	52	1,508	1,720	12,234	13,951
Subdistrict 3	73	61	366	417	2,034	2,319	8,280	9,442	46	52	1,508	1,720	12,234	13,951
Koyuk	71	70	290	295	4,094	4,161	3,866	3,929	3	3	665	676	8,918	9,064
Subdistrict 4	71	70	290	295	4,094	4,161	3,866	3,929	3	3	665	676	8,918	9,064
Shaktolik	54	49	1,019	1,114	4,048	4,425	7,651	8,370	28	31	3,307	3,615	16,053	17,555
Subdistrict 5	54	49	1,019	1,114	4,048	4,425	7,651	8,370	28	31	3,307	3,615	16,053	17,555
Unalakleet	226	211	2,721	2,894	2,565	2,728	14,955	15,904	170	181	9,943	10,576	30,354	32,282
Stebbins	113	99	896	1,030	6,427	7,401	2,062	2,375	368	424	3,255	3,746	13,008	14,975
St. Michael	88	79	1,288	1,400	5,827	6,352	1,378	1,503	3	3	1,499	1,641	9,995	10,899
Subdistrict 6	427	389	4,905	5,324	14,819	16,481	18,395	19,782	541	608	14,697	15,963	53,357	58,157
NORTON SOUND	865	745	6,667	7,255	29,978	34,585	57,829	64,724	927	1,182	23,840	26,304	119,241	134,050

* If less than 30 or 50% of households in a community were contacted, then reported harvest is used for estimated harvest

** Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, permit returns, 1997 Expansion is by drainage

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, household surveys, 1996.

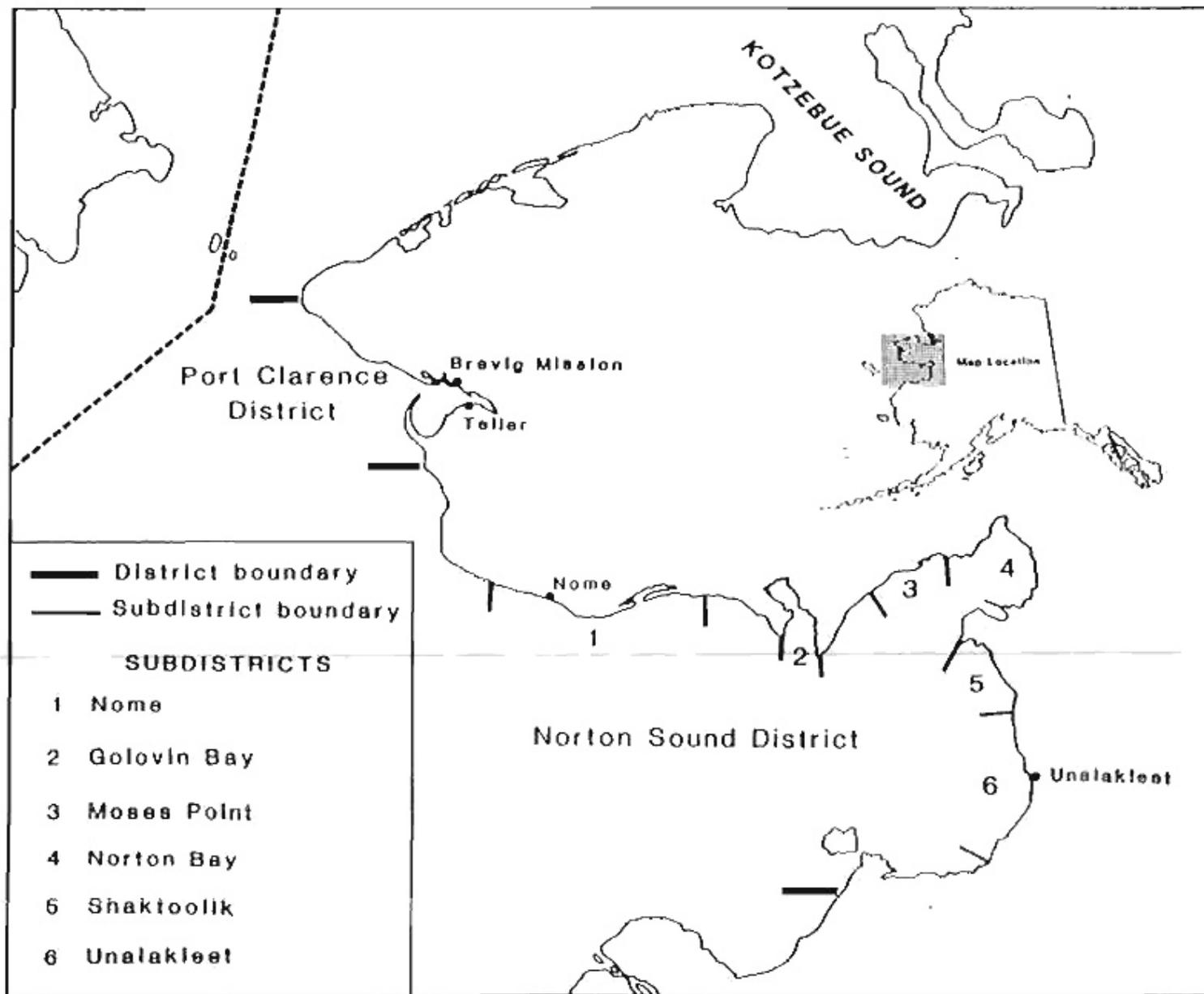


Figure 1. Norton Sound commercial salmon fishery subdistricts.

Appendix Table A1. Number of commercial salmon fishermen fishing in Norton Sound 1970-1996.

Year	SUBDISTRICT						District ^a Totals
	1	2	3	4	5	6	
1970	6	33	21	0	12	45	^b
1971	7	22	45	6	19	72	^b
1972	20	20	48	32	20	71	^b
1973	21	34	57	30	27	94	^b
1974	25	25	60	8	23	53	^b
1975	24	42	67	42	39	61	^b
1976	21	22	54	27	37	60	^b
1977	14	25	52	24	30	45	164
1978	16	24	44	26	26	51	176
1979	15	21	41	22	29	63	175
1980	14	17	26	13	26	66	159
1981	15	19	33	10	26	73	167
1982	18	17	28	10	32	68	164
1983	19	21	39	15	34	72	170
1984	8	22	25	8	24	74	141
1985	9	21	34	12	21	64	155
1986	13	24	34	9	30	73	163
1987	10	21	34	12	39	65	164
1988	5	21	36	13	21	69	152
1989	2	0	13	0	26	73	110
1990	0	15	23	0	28	73	128
1991	0	16	24	0	25	75	126
1992	2	1	21	9	25	71	110
1993	1	8	26	15	37	66	153
1994	1	5	21	0	39	71	119
1995	2	7	12	0	26	58	105
1996	1	4	12	0	20	54	86

^a District total is the number of fishermen that actually fished in Norton Sound; Some fishermen may have fished more than one subdistrict.

^b Data not available

Appendix Table A2 Commercial and subsistence salmon catches by species, by year at Nome Subdistrict, Norton Sound District, 1964-1996

NOME (SUBDISTRICT 1)																		
Commercial							Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1964	5	-	-	1	1194	1200	-	-	-	-	-	-	5	-	-	1	1194	1200
1965	1	-	-	193	1941	2135	-	-	780	1825	2605	-	1	-	-	973	3766	4740
1966	1	-	32	1	581	615	12	-	192	1794	1762	3760	13	-	224	1795	2343	4375
1967	-	-	-	72	406	478	11	-	36	349	627	1023	11	-	36	421	1033	1501
1968	-	-	-	50	102	152	7	-	108	6507	621	7243	7	-	108	6557	723	7395
1969	-	-	63	330	601	994	7	-	27	3649	508	4186	2	-	90	3079	1109	5180
1970	-	-	6	55	960	1021	-	-	35	5001	458	5494	0	-	41	5056	1418	6515
1971	11	-	-	14	2315	2340	-	-	122	5457	2900	6479	11	-	122	5471	5215	10819
1972	15	-	-	12	2643	2670	19	-	52	4684	315	5070	34	-	52	4696	2958	7740
1973	-	-	-	321	1132	1453	14	-	120	5108	1863	7105	14	-	120	5429	2995	8558
1974	19	-	123	7722	10431	18295	8	-	5	3818	183	4014	27	-	128	11540	10814	22309
1975	2	-	319	2163	8364	10848	2	-	97	6267	2858	9224	4	-	416	8430	11222	20072
1976	2	10	26	4331	7620	8089	13	-	189	5492	1705	7398	15	10	215	6823	9325	16388
1977	8	-	58	65	15998	16129	35	-	498	2773	12192	15498	43	-	556	2638	28190	31627
1978	19	-	-	22868	8782	31670	35	-	225	13063	4295	17618	54	-	225	36932	13077	49288
1979	0	-	29	5800	5391	11289	11	-	1120	6353	3273	10757	20	-	1149	12213	8664	22046
1980	8	-	-	10007	13922	23937	129	-	2157	22246	5983	30515	137	-	2157	32253	19905	54452
1981	4	-	508	3202	16666	22380	35	14	1726	5584	8579	15938	39	14	2234	8786	27245	38318
1982	20	-	1183	18512	13447	33162	21	6	1829	19202	4831	25889	41	6	3012	37714	18278	59051
1983	23	-	261	308	11691	12283	74	53	1911	8086	7091	17215	97	53	2172	8394	18782	29498
1984	7	-	820	-	3744	4571	81	10	1795	17182	4883	23959	90	16	2615	17182	8627	26530
1985	21	-	356	-	6219	6596	56	114	1054	2117	5667	9008	77	114	1410	2117	11886	15604
1986	6	-	50	-	8160	8216	150	107	688	8720	8085	17750	158	107	738	8720	18245	25966
1987	3	-	577	-	5646	6226	200	107	1100	1251	8394	11082	203	107	1677	1251	14040	17278
1988	2	-	54	182	1828	1866	63	133	1076	2159	5952	9383	65	133	1130	2341	7580	11249
1989	2	-	-	123	492	617	24	131	469	924	3399	4947	26	131	469	1047	3891	5564
1990	0	-	0	0	0	0	58	234	510	2203	4246	7281	58	234	510	2233	4246	7281
1991	0	0	0	0	0	0	83	168	1279	194	3715	5437	83	168	1279	194	3715	5437
1992	1	2	693	185	881	1762	152	163	1481	7351	1694	10831	153	165	2174	7538	2965	12593
1993	0	2	611	0	132	745	52	80	2070	873	1766	4841	52	82	2681	873	1898	5580
1994	0	1	287	0	66	354	23	69	983	6556	1673	9304	23	70	1270	6556	1739	9658
1995	0	1	369	0	122	492	36	211	1897	486	5344	7974	36	212	2266	486	5466	8466
1996	0	0	9	13	3	25	19	353	1317	5802	4333	11824	19	353	1326	5815	4338	11849
5-year avg ^a	0	1	394	40	241	676	56	175	1550	4214	2960	8955	57	176	1943	4253	3201	9630
10-year avg ^b	1	1	260	50	897	1209	73	165	1218	2783	4051	8287	72	165	1478	2833	4948	9496

^a 1992-1996^b 1986-1996

GOLOVIN BAY (SUBDISTRICT 2)

Year	Commercial					Subsistence						Combined						
	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1962	45	11	264	10,276	68,720	79,316	-	-	-	-	-	-	45	11	264	10,276	68,720	79,316
1963	40	40	-	13,677	49,850	63,507	-	-	118	5,702	9,319	15,139	40	40	118	25,379	59,169	84,746
1964	27	40	3	7,238	58,301	65,607	-	-	-	-	-	-	27	40	3	7,238	58,301	65,607
1965	-	-	-	-	-	-	2	-	49	1,523	3,847	5,421	2	-	49	1,523	3,847	5,421
1966	17	14	584	4,665	29,791	35,071	4	-	176	1,573	3,520	5,273	21	14	760	6,238	33,311	40,344
1967	10	-	747	5,790	31,193	37,740	3	-	185	2,774	4,803	7,765	13	-	932	8,564	35,996	45,505
1968	12	-	205	18,428	10,011	28,656	4	-	181	4,955	1,744	6,884	16	-	395	23,383	11,755	35,540
1969	28	-	1,224	23,208	20,949	45,409	2	-	190	2,780	2,514	5,466	30	-	1,414	25,968	23,463	50,875
1970	13	-	3	18,721	20,566	39,303	4	-	353	2,048	2,614	5,017	17	-	358	20,767	23,180	44,320
1971	37	-	197	2,735	33,824	36,793	7	-	191	1,544	1,036	3,678	44	-	388	4,279	35,760	40,471
1972	36	-	20	6,562	27,097	33,715	4	-	82	1,735	2,028	3,829	40	-	82	8,297	29,125	37,544
1973	70	-	183	14,145	41,889	56,087	1	-	48	9	74	132	71	-	231	14,154	41,763	56,219
1974	30	-	3	28,340	30,173	58,546	3	-	-	967	205	1,175	33	-	3	29,307	30,378	59,721
1975	17	-	206	10,770	41,761	52,754	-	-	1	2,011	2,025	4,037	17	-	207	12,781	43,786	56,791
1976	12	-	1,311	24,051	30,219	55,593	-	-	-	1,995	1,128	3,123	12	-	1,311	26,048	31,347	58,716
1977	26	-	426	7,928	53,912	62,292	3	-	80	703	2,915	3,701	29	-	506	8,631	58,827	65,993
1978	22	-	94	72,023	41,462	113,611	1	-	-	2,470	1,061	3,532	23	-	94	74,503	42,523	117,143
1979	75	49	1,606	45,948	30,261	77,879	-	-	845	2,546	2,840	6,231	75	49	2,451	48,494	33,041	84,110
1980	38	36	328	10,774	52,600	63,783	12	-	692	10,727	4,057	15,488	48	36	1,020	21,501	56,866	79,271
1981	23	5	19	49,755	58,323	108,119	8	-	1,520	5,158	5,543	12,229	31	5	1,533	54,913	63,866	120,348
1982	78	5	4,281	39,510	51,970	95,844	7	-	1,288	4,752	1,868	7,916	85	5	5,570	44,262	53,838	103,760
1983	52	10	295	17,414	48,283	66,054	-	-	-	-	-	-	-	-	-	-	-	-
1984	31	-	2,462	88,588	54,153	145,234	-	-	-	-	-	-	-	-	-	-	-	-
1985	193	113	1,196	3,019	55,781	60,302	12	2	430	1,904	9,577	11,925	205	115	1,626	4,923	65,358	72,227
1986	81	8	958	25,425	69,725	96,197	-	-	-	-	-	-	-	-	-	-	-	-
1987	166	51	2,203	1,579	44,334	48,333	-	-	-	-	-	-	-	-	-	-	-	-
1988	108	921	2,149	31,559	33,348	68,085	-	-	-	-	-	-	-	-	-	-	-	-
1989	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1990	52	21	-	-	15,993	16,066	-	-	-	-	-	-	-	-	-	-	-	-
1991	49	1	-	-	14,839	14,889	-	-	-	-	-	-	-	-	-	-	-	-
1992	6	9	2,085	-	1,002	3,102	-	-	-	-	-	-	-	-	-	-	-	-
1993	1	4	2	8,480	2,803	11,290	-	-	-	-	-	-	-	-	-	-	-	-
1994	-	-	3,424	-	111	3,535	253	168	733	8,410	1,337	10,901	253	168	4,157	8,410	1,448	14,436
1995	-	-	1,616	4,266	1,987	7,869	165	34	1,649	7,818	10,373	20,039	165	34	3,205	12,114	12,360	27,838
1996	-	-	638	-	-	638	86	134	3,014	17,399	2,867	23,506	86	134	3,052	17,399	2,867	24,138
5-year avg. ^a	1	3	1,553	2,555	1,181	5,293	-	-	-	-	-	-	-	-	-	-	-	-
10-year avg. ^b	38	101	1,212	4,591	11,442	17,384	-	-	-	-	-	-	-	-	-	-	-	-

^a 1992-1996^b 1987-1996^c Subsistence survey not conducted.^d Harvest estimated from Div. of Subsistence survey.

Appendix Table A4. Commercial and subsistence salmon catches by species, by year in Moses Point Subdistrict, Norton Sound District, 1962-1996.
Replaces page 34 in 1996 AMR

MOSES POINT (SUBDISTRICT 3)																		
Year	Commercial					Subsistence						Combined						
	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1962	27	-	-	11,100	50,683	61,810	-	-	-	-	-	-	27	-	-	11,100	50,683	61,810
1963	15	-	-	2,549	46,274	48,838	5	-	-	5,808	8,316	14,129	20	-	-	8,357	54,590	62,967
1964	32	3	-	3,372	28,568	31,975	-	-	-	63	348	411	32	3	-	3,435	28,916	32,386
1965	-	-	-	-	-	-	16	-	72	1,325	9,857	11,270	16	-	72	1,325	8,857	11,270
1966	17	-	-	2,745	24,741	27,503	14	-	250	2,511	5,409	8,184	31	-	250	5,256	30,150	35,687
1967	-	-	-	-	-	-	39	-	119	1,322	9,813	11,390	39	-	119	1,322	9,813	11,390
1968	12	-	1	9,012	17,908	26,933	2	-	80	8,135	2,527	8,744	14	-	81	15,147	20,435	35,677
1969	29	-	-	11,807	26,594	38,430	9	-	109	1,790	1,003	3,211	38	-	109	13,597	27,897	41,641
1970	30	-	-	13,052	29,726	42,817	16	-	180	4,661	8,980	11,797	55	-	160	17,713	36,888	54,614
1971	95	-	4	922	43,801	44,822	16	-	271	1,048	2,227	3,560	111	-	275	1,968	46,056	48,412
1972	190	-	11	5,866	30,919	36,988	44	-	108	1,579	2,070	3,801	234	-	119	7,445	32,989	40,787
1973	134	-	-	10,603	31,389	42,126	2	-	-	-	298	300	136	-	-	10,603	31,687	42,426
1974	198	-	9	12,821	55,276	68,304	3	-	-	2,062	1,723	4,108	201	-	9	15,203	66,999	72,412
1975	16	-	-	4,407	48,689	51,122	2	-	6	1,260	508	1,795	18	-	6	5,687	47,207	52,916
1976	24	-	232	5,072	10,890	16,218	22	-	-	5,016	1,548	6,588	46	-	232	10,088	12,438	22,804
1977	96	-	6	9,443	47,455	57,000	22	-	225	1,145	1,170	2,562	118	-	231	10,588	48,825	59,562
1978	444	-	244	39,594	44,595	84,977	38	-	407	1,995	1,229	3,669	482	-	651	41,689	45,824	88,648
1979	1,035	-	177	40,811	37,123	79,146	16	-	890	6,578	1,195	8,179	1,051	-	1,067	46,889	38,318	87,325
1980	502	-	-	1,435	14,755	16,692	131	-	229	4,232	1,393	5,955	633	-	229	5,667	16,148	22,677
1981	198	-	5	26,417	29,325	56,945	32	-	2,345	6,530	2,819	11,726	230	-	2,350	32,947	32,144	67,671
1982	253	-	318	8,849	40,000	50,450	1	-	1,835	3,765	3,537	9,158	254	-	2,153	13,634	43,567	59,608
1983	254	-	-	17,027	65,778	80,057	-	-	-	-	-	-	-	-	-	-	-	-
1984	-	-	5,959	28,035	9,477	43,471	-	-	-	-	-	-	-	-	-	-	-	-
1985	816	32	1,803	559	24,466	27,676	67	-	1,389	1,212	947	3,615	883	32	3,192	1,771	25,413	31,291
1986	500	41	5,874	15,795	20,669	42,978	-	-	-	-	-	-	-	-	-	-	-	-
1987	907	15	64	568	17,278	18,832	-	-	-	-	-	-	-	-	-	-	-	-
1988	653	93	3,974	13,703	18,585	37,018	-	-	-	-	-	-	-	-	-	-	-	-
1989	52	-	-	-	167	229	-	-	-	-	-	-	-	-	-	-	-	-
1990	202	-	-	501	3,723	4,426	-	-	-	-	-	-	-	-	-	-	-	-
1991	161	-	-	-	804	965	312	-	2,153	3,555	2,680	8,680	473	-	2,153	3,555	3,464	9,045
1992	-	-	3,531	-	6	3,537	100	-	1,281	6,152	1,260	8,793	100	-	4,812	6,152	1,266	12,330
1993	3	-	4,065	-	167	4,235	368	-	1,217	1,728	1,635	4,346	371	-	5,282	1,728	1,802	9,181
1994	-	-	5,345	-	414	5,759	322	104	1,180	9,345	3,476	14,427	322	-	5,525	9,345	3,890	20,188
1995	4	44	3,742	2,062	1,171	7,923	294	17	1,353	2,046	3,774	7,474	288	81	5,095	5,008	4,345	15,397
1996	-	-	1,815	68,609	-	70,524	417	52	1,720	9,442	2,319	13,951	417	52	3,635	78,051	2,319	84,475
5-year avg. ^a	1	9	3,720	14,314	352	18,398	298	-	1,350	5,742	2,483	9,918	300	-	5,070	20,058	2,844	28,314
10-year avg. ^b	200	15	2,264	8,634	4,232	15,345	-	-	-	-	-	-	-	-	-	-	-	-

^a 1992-1996

^b 1987-1996

^c Subsistence survey not conducted

^d Harvest estimated from Div. of Subsistence survey

NORTON BAY (SUBDISTRICT 4)

Year	Commercial						Subsistence						Combined					
	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1962	387	7	40	4402	24380	29216	-	-	-	-	-	-	387	7	40	4402	24380	29216
1963	137	2	-	17876	12469	30284	-	-	5097	-	5097	5097	137	2	-	27773	12469	35381
1964	50	3	-	988	5916	6957	-	-	-	-	-	-	50	3	-	988	5916	6957
1965	-	-	-	-	-	-	4	-	22	252	3032	3310	4	-	22	252	3032	3310
1966	-	-	-	-	-	-	7	-	41	929	3812	4589	7	-	41	929	3812	4589
1967	-	-	-	-	-	-	12	-	14	1097	2945	4068	12	-	14	1097	2945	4068
1968	-	-	-	-	-	-	28	-	71	1916	1872	3887	28	-	71	1916	1872	3887
1969	28	-	-	4849	3974	8849	59	-	189	2115	3855	6218	85	-	189	6964	7829	15067
1970	-	-	-	-	-	-	3	-	10	840	3500	4353	3	-	10	840	3500	4353
1971	-	-	-	-	-	-	5	-	47	92	2819	2763	5	-	47	92	2819	2763
1972	43	-	-	1713	7799	9555	30	-	44	2089	2022	4185	73	-	44	3802	9821	13740
1973	28	-	-	1845	4672	6345	1	-	-	10	130	141	29	-	-	1655	4802	6486
1974	21	-	-	654	3826	4501	-	-	-	17	908	917	21	-	-	671	4726	5418
1975	68	-	89	1137	17385	18679	1	-	-	93	361	455	69	-	89	1230	17748	19134
1976	102	-	35	4458	7161	11814	2	-	-	41	236	279	104	-	35	4437	7397	12093
1977	158	-	1	2495	13993	16717	14	-	-	420	2055	2489	172	-	1	2915	15618	18706
1978	470	-	144	8471	21873	31058	12	-	21	1210	1060	2303	482	-	165	9681	23033	33361
1979	858	-	2547	6201	15899	25203	12	-	697	735	1408	2844	868	-	3244	6936	16998	28047
1980	340	-	-	47	7855	8242	22	-	33	4275	1132	5482	362	-	33	4322	8987	13704
1981	63	-	-	177	3111	3351	7	-	82	2314	3515	5918	70	-	82	2491	6626	9269
1982	96	-	2332	2535	7128	12091	7	-	484	2400	2485	5570	97	-	2816	5135	9613	17661
1983	215	-	284	3935	17157	21511	-	-	-	-	-	-	-	-	-	-	-	-
1984	-	-	-	1102	3442	4504	-	-	-	-	-	-	-	-	-	-	-	-
1985	528	-	384	68	9948	10928	-	-	-	-	-	-	-	-	-	-	-	-
1986	139	2	1512	40	1994	3687	-	-	-	-	-	-	-	-	-	-	-	-
1987	544	-	145	16	3586	4291	-	-	-	-	-	-	-	-	-	-	-	-
1988	434	2	709	1719	2527	10415	-	-	-	-	-	-	-	-	-	-	-	-
1989	0	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-
1990 ^a	0	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-
1991 ^a	0	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-
1992	27	0	0	0	1287	1314	-	-	-	-	-	-	-	-	-	-	-	-
1993	287	0	0	290	1378	1955	-	-	-	-	-	-	-	-	-	-	-	-
1994	0	0	0	0	0	0	308	1	370	6049	4581	11309	308	1	370	6049	4581	11309
1995	0	0	0	0	0	0	475	46	985	3514	5828	10848	475	46	985	3514	5828	10848
1996	0	0	0	0	0	0	295	3	576	3929	4161	9064	295	3	576	3929	4161	9064
5-year avg ^b	59	0	0	58	633	750	-	-	-	-	-	-	-	-	-	-	-	-
10-year avg ^c	127	0	85	206	1427	1845	-	-	-	-	-	-	-	-	-	-	-	-

^a 1992-1996

^b 1987-1996

^c Subsistence survey not conducted

^d No commercial harvest reported

^e Harvest estimated from Div. of Subsistence survey

Appendix Table A6. Commercial and subsistence salmon catches by species, by year in Shaktoolik Subdistrict, Norton Sound District, 1961-1996

SHAKTOOLIK (SUBDISTRICT 5)																		
Year	Commercial						Subsistence						Combined					
	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1961	140	-	-	29075	24746	53061	-	-	-	-	-	-	140	-	-	29075	24746	53061
1962	1738	-	2113	640	8718	13209	-	-	-	-	-	-	1738	-	2113	640	8718	13209
1963	480	11	563	5138	19153	25345	-	-	-	-	-	-	480	11	563	5138	19153	25345
1964	631	79	16	1969	35272	37967	77	-	340	2132	5412	7961	708	79	356	4101	40684	45928
1965	127	30	-	3	8356	8516	31	-	107	3763	3420	7321	158	30	107	3766	11776	15837
1966	310	-	956	344	8292	9902	142	-	762	1445	4183	6532	452	-	1718	1789	12475	16434
1967	43	-	88	1050	1655	2838	262	-	387	2010	4438	7095	305	-	475	3060	6091	9931
1968	61	-	130	2205	2504	4900	10	-	458	6355	1915	8738	71	-	588	8560	4419	13638
1969	33	-	276	6197	8645	15151	40	-	193	4018	3439	7690	73	-	669	10215	12084	22841
1970	197	-	155	2381	15753	18406	43	-	210	2474	2016	4743	240	-	365	4775	17769	23148
1971	284	-	238	28	13399	13949	87	-	329	494	5060	5970	371	-	567	522	18459	19919
1972	419	-	11	2798	12022	15250	64	-	235	939	3399	4637	483	-	246	3737	15421	19887
1973	289	-	177	6450	14500	21416	51	-	130	3410	1397	4988	340	-	307	9860	15897	26404
1974	583	-	179	5650	26391	32803	93	-	353	1901	358	2705	676	-	532	7551	26749	35508
1975	651	2	812	1774	49536	52775	18	-	14	1394	334	1760	669	2	826	3168	49870	54535
1976	892	-	129	15803	15798	32622	24	-	121	1188	269	1602	916	-	250	16991	18067	34224
1977	1521	4	418	7743	36591	46277	49	-	170	585	2190	2994	1570	4	588	8328	38781	49271
1978	1339	7	1116	46236	35388	84096	81	-	15	3275	1170	4541	1420	7	1131	49511	36558	88027
1979	2377	-	3383	18944	22030	46734	67	-	1605	2575	1670	5912	2439	-	4988	21519	23700	52644
1980	1086	-	8001	1947	27453	38487	57	-	756	3227	1827	5867	1143	-	8757	5174	29280	44354
1981	1484	4	1191	29695	21097	53471	8	-	525	2225	3490	6248	1492	4	1716	31920	24587	59719
1982	1677	3	22233	17019	26240	67122	68	-	2138	3865	1165	7236	1745	3	24371	20884	27405	74408
1983	2742	4	12877	12031	67310	94964	-	-	-	-	-	-	-	-	-	-	-	-
1984	1613	-	10730	1596	32309	46248	-	-	-	-	-	-	-	-	-	-	-	-
1985	5312	-	2808	-	33403	21523	298	-	1379	24	298	1999	5610	-	4187	24	13701	23522
1986	1075	29	6626	-	16126	23856	-	-	-	-	-	-	-	-	-	-	-	-
1987	2214	-	6193	-	14088	22495	-	-	-	-	-	-	-	-	-	-	-	-
1988	671	29	8096	3681	21521	32048	-	-	-	-	-	-	-	-	-	-	-	-
1989	1241	43	8066	-	19641	28991	-	-	-	-	-	-	-	-	-	-	-	-
1990	2644	49	4695	-	21748	29136	-	-	-	-	-	-	-	-	-	-	-	-
1991	1324	55	11614	-	31679	44672	-	-	-	-	-	-	-	-	-	-	-	-
1992	1098	59	14660	-	27867	43681	-	-	-	-	-	-	-	-	-	-	-	-
1993	2756	20	11130	106743	20864	141513	-	-	-	-	-	-	-	-	-	-	-	-
1994	885	8	22065	502231	5411	530600	1175	1	2777	9133	1221	14307 ^a	2080	9	24842	511364	6632	544907
1995	1229	5	10856	37377	14775	64252	1275	2480	2626	7024	2480	15885 ^a	2514	2485	13482	44401	17256	80137
1996	1340	1	13444	304982	3237	323004	1114	31	3615	8378	4425	17555 ^a	2454	32	17059	313352	7662	340559
5-year avg ^a	1464	18	14431	190267	14431	228610	-	-	-	-	-	-	-	-	-	-	-	-
10-year avg ^a	1541	32	10882	56501	18077	126033	-	-	-	-	-	-	-	-	-	-	-	-

^a 1992-1996^a 1987-1996^a Subsistence survey not conducted^a Harvest estimated from Div. of Subsistence survey

UNALAKLEET (SUBDISTRICT 6)

Year	Commercial					Subsistence						Combined						
	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook-Sockeye	Coho	Pink	Chum	Total	
1961	5,160	35	13,807	5,162	23,566	47,750	-	-	-	-	-	-	5,160	35	13,807	5,162	23,566	47,750
1962	5,080	-	4,730	4,769	30,283	44,860	-	-	-	-	-	-	5,080	-	4,730	4,769	30,283	44,860
1963	5,044	19	16,202	1,140	27,003	50,304	-	-	-	-	-	-	5,044	19	16,202	1,140	27,000	50,304
1964	1,275	1	79	1	19,811	20,865	480	-	2,227	7,000	6,728	14,471	1,761	1	2,308	7,031	28,337	37,438
1965	1,221	-	2,030	24	28,498	28,874	521	-	4,562	11,488	9,791	25,362	1,842	-	6,592	11,512	38,289	55,235
1966	1,208	-	4,183	5,023	16,940	27,254	80	-	790	6,083	3,387	10,349	1,298	-	4,972	11,106	20,227	37,609
1967	1,251	-	1,544	21,961	8,503	33,758	490	-	484	9,954	-	10,938	2,241	-	2,028	31,925	8,502	44,694
1968	960	-	6,549	41,474	14,885	63,868	186	-	1,493	11,044	2,889	15,708	1,146	-	8,042	52,815	17,647	78,889
1969	2,278	-	5,275	40,558	22,032	70,139	324	-	1,683	4,230	4,198	10,233	2,800	-	4,788	44,788	28,229	80,372
1970	1,604	-	4,291	30,778	40,029	76,673	465	-	3,907	10,104	7,214	21,720	2,000	-	8,188	49,880	47,243	99,303
1971	2,168	-	2,688	1,198	37,543	43,593	911	-	3,127	2,230	7,075	13,281	3,077	-	5,825	3,428	44,818	54,344
1972	2,330	-	412	28,231	20,448	51,318	543	-	1,818	3,132	4,152	9,725	2,878	-	2,230	31,363	24,572	61,043
1973	1,397	-	6,922	13,338	25,719	48,376	323	-	213	6,233	3,426	10,105	1,720	-	9,135	19,868	29,142	59,565
1974	2,100	-	1,778	93,332	36,170	133,380	315	-	790	7,041	566	8,546	2,413	-	2,464	100,873	38,758	142,328
1975	1,638	-	8,167	12,137	48,740	69,682	183	-	74	4,758	2,038	7,033	1,801	-	3,241	18,885	50,778	72,715
1976	1,211	1	5,141	37,205	24,288	67,824	142	-	689	4,316	2,832	7,884	1,350	1	5,835	41,818	27,100	75,808
1977	2,621	1	2,761	21,001	32,306	58,410	723	-	1,557	6,870	4,065	17,205	3,414	1	4,338	29,471	39,021	76,645
1978	7,525	5	5,737	138,200	37,079	188,548	1,044	-	2,538	10,268	3,442	20,292	8,560	5	8,275	140,466	40,821	206,838
1979	8,254	8	23,696	49,647	30,445	112,050	840	-	3,330	6,940	1,507	12,527	6,894	8	27,028	58,607	32,042	122,677
1980	4,330	1	21,532	203,142	64,198	293,194	1,048	-	4,754	19,071	5,280	30,105	5,585	3	24,270	222,213	69,428	323,299
1981	6,157	17	29,885	123,233	39,188	198,468	869	24	8,809	5,750	4,235	16,686	7,028	71	35,852	128,983	43,421	215,154
1982	3,768	2	41,543	142,854	44,520	252,489	813	2	7,037	20,045	4,604	32,691	4,681	4	68,380	162,001	46,214	286,180
1983	7,022	13	38,098	24,188	108,220	179,551	1,368	31	6,888	13,808	4,401	24,998	8,890	48	42,068	40,008	113,431	200,540
1984	4,804	4	47,304	-	43,317	95,031	1,650	1	4,875	17,418	3,848	29,027	8,454	7	54,579	17,418	46,885	127,123
1985	12,621	21	18,421	1	25,114	53,175	1,397	3	2,244	55	1,968	5,667	14,018	24	17,665	60	27,078	68,842
1986	4,484	153	20,580	-	30,230	55,488	-	-	-	-	-	-	-	-	-	-	-	-
1987	3,246	141	15,087	97	17,525	36,108	-	-	-	-	-	-	-	-	-	-	-	-
1988	2,219	157	24,232	23,730	25,343	75,707	-	-	-	-	-	-	-	-	-	-	-	-
1989	4,402	222	36,025	-	20,825	61,474	-	-	4,681	17,600	1,366	-	-	-	-	-	-	-
1990	5,899	358	52,015	-	23,659	82,070	2,476	-	-	-	-	-	-	-	-	-	-	-
1991	4,524	147	52,033	-	39,609	96,323	-	-	-	-	-	-	-	-	-	-	-	-
1992	3,400	229	24,449	5,281	52,517	136,518	-	-	-	-	-	-	-	-	-	-	-	-
1993	5,044	251	28,290	42,061	28,158	103,702	-	-	-	-	-	-	-	-	-	-	-	-
1994	4,400	71	71,018	480,158	12,288	647,836	5,294	819	16,081	31,572	12,732	64,498	6,404	890	87,100	511,730	25,020	834,434
1995	7,617	29	31,280	37,000	24,843	100,827	5,049	807	15,110	17,246	13,460	46,672	12,888	885	44,390	54,255	38,303	150,489
1996	3,644	-	52,200	113,837	7,389	177,050	5,324	608	15,083	18,782	16,481	58,187	8,958	006	58,182	133,819	23,850	235,207
5-year avg ^a	5,003	128	53,048	136,870	25,041	216,987	-	-	-	-	-	-	-	-	-	-	-	-
10-year avg ^b	4,541	165	44,484	70,318	25,216	144,707	-	-	-	-	-	-	-	-	-	-	-	-

* 1992-1994

^a 1987-1994

^b Subsistence catches from 1988-92 includes fish taken at St. Michael

^a Subsistence surveys not conducted

^b In-depth survey by Subsistence Division

^c Harvest estimate from Div. of Subsistence survey. Includes harvest in Sitka and St. Michael

Appendix Table A4. Commercial and subsistence salmon catches by species, by year for all subdistricts in Norton Sound District, 1961-1999.
Replaces page 38 in 1994 AMR

ALL SUBDISTRICTS																		
Year	Commercial						Subsistence						Combined					
	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1961	5,300	35	13,607	34,327	48,332	101,601	-	-	-	-	-	-	5,300	35	13,607	34,327	48,332	101,601
1962	7,286	18	9,158	33,187	182,784	232,431	-	-	-	-	-	-	7,286	18	9,158	33,187	182,784	232,431
1963	8,613	71	16,795	55,625	154,789	293,863	5	-	118	18,607	17,635	34,385	6,618	71	16,860	72,232	172,424	268,228
1964	2,018	126	98	13,567	148,862	164,671	965	-	2,567	9,229	12,498	24,543	2,583	126	2,685	22,792	161,348	189,514
1965	1,449	30	2,035	220	36,795	40,524	574	-	4,612	19,131	30,772	55,289	2,029	30	6,842	19,381	87,597	85,813
1966	1,553	14	3,755	12,779	80,248	100,349	269	-	2,210	14,335	21,873	38,687	1,822	14	7,865	27,113	102,118	130,032
1967	1,804	-	2,379	29,479	41,756	74,615	817	-	1,222	17,518	22,724	42,279	2,621	-	3,601	44,305	84,480	117,097
1968	1,045	-	5,685	71,170	45,300	124,400	237	-	2,591	30,912	11,681	51,201	1,262	-	9,276	108,091	66,981	175,410
1969	2,392	-	6,876	86,949	82,705	178,912	494	-	2,191	18,562	15,615	36,954	2,828	-	8,027	105,611	88,410	215,779
1970	1,553	-	4,423	64,898	107,034	176,218	545	-	4,875	26,127	22,783	54,126	2,414	-	9,098	91,035	129,797	232,344
1971	2,593	-	3,127	4,886	131,262	141,977	1,029	197	4,097	10,883	21,618	37,601	3,619	197	7,224	13,758	162,980	179,778
1972	2,938	-	454	45,142	100,920	149,494	804	93	2,310	14,158	13,873	31,247	3,742	-	2,773	52,340	114,793	160,741
1973	1,918	-	9,282	46,489	119,098	176,797	392	-	520	14,770	7,165	22,657	2,310	-	9,802	61,269	128,293	190,644
1974	2,561	-	2,092	148,619	182,287	315,829	429	-	1,084	18,426	9,058	21,888	3,371	-	3,156	184,945	166,225	337,697
1975	2,393	2	4,593	32,388	212,485	251,661	189	11	192	15,830	8,119	24,305	2,579	13	4,785	48,191	220,388	275,166
1976	2,243	11	6,934	87,513	85,356	193,063	203	-	1,004	18,048	7,718	26,973	2,446	11	7,929	105,987	103,674	220,036
1977	4,500	5	9,699	48,475	202,455	257,325	846	-	2,630	14,299	24,697	44,279	5,346	5	6,220	82,971	227,062	301,604
1978	9,819	12	7,335	325,503	189,279	631,948	1,211	-	2,081	35,281	12,257	61,739	11,030	12	10,318	360,784	201,539	683,878
1979	10,709	57	31,438	167,411	148,789	350,401	747	-	8,487	25,247	11,975	46,456	11,453	57	29,925	192,658	152,764	498,857
1980	6,311	40	29,842	227,352	180,792	484,337	1,397	-	8,625	63,778	18,622	93,422	7,708	40	36,487	291,100	200,414	537,759
1981	7,829	56	31,562	232,479	160,708	441,734	2,021	38	13,416	28,741	32,866	77,982	9,950	84	44,978	281,220	202,574	519,914
1982	5,892	10	91,680	236,281	183,335	511,208	1,011	8	14,612	54,240	18,580	88,460	8,993	18	108,392	284,530	201,916	699,689
1983	10,308	27	49,735	78,919	319,497	498,420	-	-	-	-	-	-	-	-	-	-	-	-
1984	8,455	8	67,875	119,341	146,442	342,159	-	-	-	-	-	-	-	-	-	-	-	-
1985	10,491	166	21,348	3,847	134,928	190,200	-	-	-	-	-	-	-	-	-	-	-	-
1986	6,395	230	35,800	41,200	148,912	210,499	-	-	-	-	-	-	-	-	-	-	-	-
1987	7,089	207	24,279	2,360	102,457	146,289	-	-	-	-	-	-	-	-	-	-	-	-
1988	4,096	1,252	27,214	74,804	107,060	225,132	-	-	-	-	-	-	-	-	-	-	-	-
1989	5,707	265	44,091	123	42,825	92,811	-	-	-	-	-	-	-	-	-	-	-	-
1990	4,899	434	58,712	501	63,193	136,655	-	-	-	-	-	-	-	-	-	-	-	-
1991	6,068	205	63,647	-	86,871	154,789	-	-	-	-	-	-	-	-	-	-	-	-
1992	4,541	296	105,418	6,284	83,304	199,933	-	-	-	-	-	-	-	-	-	-	-	-
1993	8,972	279	43,280	167,174	83,562	293,670	-	-	-	-	-	-	-	-	-	-	-	-
1994	5,285	80	102,140	692,399	18,290	1,108,184	7,374	1,141	22,124	71,086	25,020	128,765	12,659	1,241	124,264	1,059,455	48,210	1,234,629
1995	3,860	125	47,882	81,614	42,808	181,392	7,766	1,222	23,915	38,594	43,014	115,611	18,628	1,350	70,877	109,238	85,912	295,003
1996	4,864	1	65,200	487,441	10,609	671,241	7,255	1,182	26,304	64,724	34,585	134,050	12,239	1,163	94,810	552,165	45,194	705,291
8-year avg. ^a	6,328	157	71,382	343,068	41,751	484,884	-	-	-	-	-	-	-	-	-	-	-	-
10-year avg. ^b	8,449	315	89,265	178,282	81,388	306,710	-	-	-	-	-	-	-	-	-	-	-	-

^a 1992-1996

^b 1987-1996

^c These figures also include data from Hebbins and St. Michael.

^d Subsistence surveys not conducted.

^e Harvest estimate from Div. of Subsistence survey.

Appendix Table A9. Mean salmon weights, Norton Sound District, 1962-1996.

Year	Mean Round Weight in Pounds ^a			
	Chinook	Coho	Pink	Chum
1962	-	-	-	-
1963	-	-	-	-
1964	-	-	-	7.0
1965	-	-	2.3	7.1
1966	-	-	3.5	7.8
1967	23.7	7.0	3.6	7.2
1968	20.0	7.0	4.0	7.5
1969	19.3	7.5	3.6	6.4
1970	20.0	7.0	3.5	7.8
1971	23.7	7.0	3.6	7.2
1972	20.0	7.3	2.8	6.9
1973	20.3	6.8	3.9	7.1
1974	18.2	6.7	3.4	6.6
1975	10.8	7.4	2.9	6.5
1976	15.2	7.2	3.1	7.0
1977	22.7	7.6	3.3	7.0
1978	22.8	6.9	3.6	7.4
1979	22.9	7.1	3.6	7.2
1980	21.5	6.8	3.2	7.2
1981	20.7	6.7	3.5	7.6
1982	16.5	7.1	2.9	7.3
1983	17.4	7.2	3.6	7.4
1984	20.0	7.7	2.9	7.0
1985	21.5	7.7	3.1	7.0
1986	20.8	6.9	3.2	6.9
1987	20.0	7.3	3.0	7.1
1988	16.4	7.5	3.0	7.1
1989	18.4	7.6	3.6	7.0
1990	19.0	7.5	-	7.4
1991	17.7	7.4	-	6.9
1992 ^b	12.7	7.8	2.9	7.1
1993	16.9	6.6	2.6	6.5
1993	18.6	7.5	2.2	6.7
1995	19.7	7.4	2.4	6.7
1996	19.2	8.4	2.4	7.9

^a Based on age-weight-length samples or fish tickets.

^b Low chinook weight due to restricted mesh size.

Appendix Table A10.

Estimated mean prices paid to commercial
salmon fishermen, Norton Sound District,
1962 - 1996.

Year	Chinook	Coho	Pink	Chum
Price Per Fish				
1962	\$3.85	\$0.60	\$0.25	\$0.35
1963	\$3.85	\$0.60	\$0.25	\$0.35
1964	\$4.50	-	\$0.25	\$0.40
1965	\$3.75	\$0.45	-	\$0.40
1966	\$4.80	\$1.05	\$0.25	\$0.65
Price Per Pound				
1967	\$0.20	\$0.14	\$0.07	\$0.09
1968	\$0.25	\$0.14	\$0.06	\$0.10
1969	\$0.22	\$0.14	\$0.06	\$0.11
1970	\$0.25	\$0.14	\$0.06	\$0.10
1971	\$0.25	\$0.14	\$0.07	\$0.10
1972	\$0.27	\$0.16	\$0.06	\$0.11
1973	\$0.40	\$0.16	\$0.07	\$0.32
1974	\$0.40	\$0.16	\$0.13	\$0.32
1975	\$0.40	\$0.16	\$0.13	\$0.24
1976	\$0.50	\$0.32	\$0.17	\$0.30
1977	\$0.65	\$0.40	\$0.16	\$0.30
1978	\$0.65	\$0.35	\$0.20	\$0.30
1979	\$0.88	\$0.66	\$0.16	\$0.41
1980	\$0.74	\$0.63	\$0.07	\$0.23
1981	\$1.25	\$0.62	\$0.13	\$0.26
1982	\$1.25	\$0.57	\$0.12	\$0.32
1983	\$1.13	\$0.39	\$0.11	\$0.28
1984	\$1.20	\$0.45	\$0.11	\$0.24
1985	\$1.08	\$0.48	\$0.20	\$0.31
1986	\$0.88	\$0.52	\$0.15	\$0.27
1987	\$1.11	\$0.57	\$0.20	\$0.33
1988	\$1.26	\$1.13	\$0.19	\$0.39
1989	\$0.73	\$0.43	\$0.10	\$0.18
1990	\$1.01	\$0.50	\$0.75 ^a	\$0.23
1991	^b \$0.87	\$0.36	-	\$0.27
1992	^c \$0.66	\$0.33	\$0.16	\$0.22
1993	^d \$0.72	\$0.22	\$0.15	\$0.24
1994	\$1.02	\$0.52	\$0.15	\$0.29
1995	\$0.66	\$0.43	\$0.18	\$0.18
1996	\$0.54	\$0.28	\$0.10	\$0.08

^a Price paid per pound of roe.

^b Price paid for coho and chum roe was \$3.00 per pound.

^c Price paid for coho roe was \$1.50 per pound.

^d Price paid for coho roe was \$1.76 per pound and \$0.40 per pound for sockeye.

Appendix Table A11.

Dollar estimates of Norton Sound District
commercial salmon fishery, 1961 - 1996.

Year	Gross Value of Catch to Fishermen	Wages Earned ^b	License and Tax Revenues to State (License Fees Only)
1961	^a	^a	\$2,010.00
1962	\$105,800.00	^a	\$16,341.00
1963	\$104,000.00	^a	\$18,009.00
1964	\$51,000.00	^a	\$11,305.00
1965	\$21,483.00	^a	\$5,084.00
1966	\$68,000.00	^a	\$4,680.00
1967	\$44,038.00	\$58,000.00	\$3,500.00
1968	\$63,700.00	^a	\$4,000.00
1969	\$95,297.00	\$72,145.00	^a
1970	\$99,019.00	\$55,100.00	\$5,595.00
1971	\$101,000.00	\$65,500.00	\$5,730.00
1972	\$102,225.00	\$68,700.00	\$7,000.00
1973	\$308,740.00	\$81,000.00	\$15,400.00
1974	\$437,127.00	\$129,600.00	\$20,028.00
1975	\$413,255.00	\$172,800.00	\$28,230.00
1976	\$285,283.00	^a	\$10,133.00
1977	\$528,610.00	^a	\$11,386.00
1978	\$814,221.00	^a	\$12,002.00
1979	\$876,547.00	^a	\$11,780.00
1980	\$583,388.00	^a	\$11,640.00 ^c
1981	\$758,471.00	^a	\$11,940.00
1982	\$988,588.00	^a	\$7,155.00 ^{c,d}
1983	\$1,038,967.00	^a	\$10,700.00 ^c
1984	\$721,055.00	^a	\$9,690.00 ^c
1985	\$822,056.00	^a	\$5,820.00 ^e
1986	\$539,576.00	^a	\$5,970.00 ^e
1987	\$504,631.00	^a	\$5,940.00 ^e
1988	\$754,751.00	^a	\$10,050.00 ^{e,f}
1989	\$274,817.00	^a	\$10,300.00 ^e
1990	\$497,623.00	^a	\$10,350.00 ^e
1991	\$425,430.00	^a	\$10,250.00 ^e
1992	\$448,395.00	^a	\$10,200.00 ^e
1993	\$322,117.00	^a	\$8,835.00 ^e
1994	\$864,882.00	^a	\$10,000.00 ^e
1995	\$356,912.00	^a	\$5,250.00 ^e
1996	\$340,347.00	^a	\$4,300.00 ^e

^a Information not available.^b Includes wages paid to tender boat operators, processing plant employees in district.^c Includes only permit renewals and vessel license fees.^d The Alaska state legislature lowered all resident permit renewal fees and vessel license fees to poverty level fees for 1982.^e Includes only permit renewal fees.^f The Alaska state legislature raised resident permit renewal fee to \$50.00 in 1988.

Appendix Table A12. Round weight of commercially caught salmon by species, Norton Sound District, 1961 - 1996.

Year	Pounds Caught (Round Wt. in Lbs)				Salmon Roe (lbs)
	Chinook	Coho	Pink	Chum	
1961	120,405	96,649	102,711	347,990	
1962 ^a	157,000	-	10,569	221,645	
1963 ^a	89,700	51,750	-	-	
1964 ^a	39,169	686	-	249,890	
1965	33,327	14,210	660	264,924	^b
1966	35,259	40,285	38,334	577,764	16,901
1967	41,854	15,944	100,913	289,473	21,429
1968 ^c	22,954	50,665	250,044	306,871	20,381
1969 ^d	51,441	50,461	312,836	529,235	5,578
1970	38,103	25,000	156,313	610,588	1,345
1971	43,112	22,078	15,377	857,014	1,122
1972	57,675	3,257	133,389	710,853	1,083
1973	38,935	63,812	185,799	845,596	^b
1974	54,433	15,023	511,737	1,082,575	39,876
1975	25,964	32,345	87,586	1,318,111	46,470
1976	34,095	49,822	271,867	669,728	^b
1977	102,341	28,044	162,457	1,415,981	^b
1978	222,974	50,872	1,164,174	1,389,806	^b
1979	231,988	251,129	598,785	1,001,548	^b
1980	135,646	204,498	719,368	1,301,693	^b
1981	164,182	212,065	719,102	1,284,193	^b
1982	97,255	648,212	659,171	1,338,788	95
1983	179,666	360,264	274,568	2,352,104	239
1984	169,104	523,310	343,685	1,020,635	0
1985	419,331	169,413	11,458	939,885	0
1986	133,161	247,333	133,319	1,011,824	0
1987	141,494	177,569	6,691	731,597	0
1988	67,148	280,658	226,966	767,168	0
1989	104,829	336,652	439	297,156	0
1990	168,745	426,902	-	482,060	75
1991	107,541	469,495	-	597,272	221
1992	57,571	820,406	18,230	595,345	2,641
1993	151,504	287,702	406,820	347,072	2,608
1994	98,492	102,140	2,185,066	122,540	0
1995	174,771	356,190	198,121	290,445	0
1996	95,794	573,372	1,196,115	84,349	0

^a Does not include canned salmon cases (48#)
 1962: 29 chinook, 883 coho, 927 pink, 12459 chum
 1963: 604 chinook, 808 coho, 1,918 pink, 13,308 chum
 1964: 75 chinook, 452 pink, 9,357 chum

^b Information not available.

^c Includes about 48,000 lbs of salted coho, about 150,000 lbs. of salted pink, and 150,000 lbs of salted chum

^d Includes about 598 lbs. of salted chinook, about 48,092 lbs. of salted pink and about 117,664 lbs. salted chum.

Appendix Table A13. Comparative salmon escapement indices of Norton Sound streams, 1961-1996^a.

Year	Chinook	Chum	Pink	Pink & Chum ^b	Coho
Sisuk River					
1975	-	4,662	5,390	-	-
1977	-	5,207	1,302	-	-
1978	-	8,766	22,438	-	-
1980	3	2,022	199,000	-	1,002
1981	-	5,579	350	-	-
1982	-	638	148,800	-	-
1983	48	2,150	10,770	-	96
1984	7 ^c	493 ^d	284,400 ^e	-	192
1985	4	1,910	8,860	-	33
1986	4	1,960	28,690	-	-
1987	5	4,540	30	-	230
1988	3	2,070	4,652	-	563
1989	-	1,025	26,850	-	75
1990	-	95	29,040	-	161
1991	3	5,420	14,680	-	701
1992	-	470	292,400	-	422
1993	7	1,570	5,120	-	104
1994	10	1,140	492,000	-	307
1995	-	3,110	1,250	-	290
1996	5	1,815	74,100	-	367
Nome River					
1971	-	75	7,765	-	-
1972	-	710	14,950	-	-
1973	6	1,760	14,940	-	-
1974	-	854	17,832	-	-
1975	1	2,161	3,405	-	-
1977	5	3,046	1,726	-	-
1978	2	5,242	34,900	-	-
1980	5	-	-	-	920
1981	15	1,195	12,565	-	-
1982	-	700	327,570	-	-
1983	2	198	9,170	-	360
1984	-	2,084 ^h	178,870	-	829
1985	7	1,967	2,250	-	242
1986	2	1,150	13,580	-	-
1987	3	1,646	1,400	-	419
1988	3	973	2,490	-	1,280 ⁱ
1989	2	72	1,365	-	375
1990	-	541	13,085	-	617
1991	9	3,520	4,650	-	611
1992	3	813	255,700	-	691
1993	8	1,520	8,941	-	276 ^j
1994	2	360	265,450	-	631 ^k
1995	-	1,855	182	-	517
1996	-	799	34,520	-	723
Fiambeau River					
1976	-	375	1,994	-	-
1977	-	1,275	10	-	-
1978	-	7,110	-	-	-
1979	-	283	291	-	-
1980	-	-	-	29,190	-
1981	1	12,031	2,710	-	-
1982	1	5,097	25,001	-	-
1983	2	1,195	200	-	-
1984	1	3,150 ^l	20,200 ^m	-	-
1985	1	3,215	260	-	-
1986	2	3,075	300	-	-
1987	0	115	0	-	-
1988	3	765	10	-	-
1989	-	-	-	-	-
1990	-	-	-	-	-
1991	2	1,564	570	-	-
1992	-	606	180	-	-
1993	-	1,590	-	-	-
1994	1	4,960	290	-	-
1995	-	6,465	350	-	68
1996	-	5,390	-	-	-

-Continued-

Appendix Table A13. (page 2 of 5)

Year	Chinook	Chum	Pink	Pink & Chum *	Coho
Eldorado River					
1974	13	2,143	6,185	-	-
1977	-	1,835	125	-	-
1978	-	10,125	12,800	-	-
1980	6	9,900	85,520	-	-
1981	-	15,605	495	-	-
1982	2	1,095	163,300	-	-
1983	11	994	270	-	100
1984	14	4,361 *	1,924,935 *†	-	261
1985	8	8,090	150	-	67
1986	9	3,490	18,200	-	-
1987	6	3,860	0	-	108
1988	17	2,645	1,045	-	78
1989	-	350	1,550	-	87
1990	17	884	2,050	-	44
1991	76	5,755	1,590	-	98
1992	-	4,887	6,615	-	113
1993	38	2,885	120	-	110
1994	2	5,140	53,890	-	242
1995	-	9,025	50	-	247
1996	21	23,820	40,100	-	254
Fish River					
1961	1	-	-	14,100	-
1962	48	-	-	28,918	-
1963	21	-	-	25,728	-
1964	-	18,670	10,935	14,550	-
1966	7	-	-	17,955	-
1967	20	-	-	13,610	-
1968	10	-	-	164,000	-
1969	-	2,080	124,000	-	-
1970	33	78,550	198,000	-	-
1971	1	13,185	1,670	-	-
1972 †	-	3,616	13,050	-	-
1973	31	6,887	15,564	-	-
1974	7	10,945	15,690	-	-
1975	25	20,114	15,840	-	-
1976	1	8,390	15,850	8,550	-
1977	9	9,664	2,430	-	-
1978	29	26,797	140,640	-	-
1979	11	6,893	9,132	-	-
1980	-	19,100	33,500	-	-
1981	90	24,095	450	-	-
1982	-	-	-	241,700	-
1983	87	20,037	300	-	-
1984	42	-	-	293,245	-
1985	303	21,080	7,365	-	-
1986	200	25,190	140	-	-
1987	193	7,866	0	-	-
1988	36	1,240	29,950	-	-
1989	-	-	-	-	-
1990	-	-	-	-	-
1991	58	10,190	51,190	-	-
1992	4	390	1,387,000	-	-
1993	48	12,695	13,440	-	-
1994	55	16,500	910,000	-	-
1995	40	13,433	760	-	1,829
1996	189	5,840	684,780	-	-
Kachavik Creek					
1963	-	16,000	16,000	-	-
1964	-	5,284	3,675	-	-
1966	-	758	1,768	-	-
1967 †	-	-	-	1,780	-
1969	-	600	4,525	-	-
1970	-	500	-	-	-
1971	-	1,000	5,323	-	-
1972	-	3,100	16,950	-	-
1973	-	10,325	22,275	-	-
1974	-	1,645	2,723	-	-
1975	-	1,735	23,360	-	-
1977 †	-	9,564	30,432	-	-
1978 †	-	3,481	26,533	-	-
1979	-	2,850	23,850	-	-
1982	-	1,111	72,235	-	-
1988	-	1,440	3,130	-	-

-Continued-

Appendix Table A13. (page 3 of 5)

Year	Chinook	Chum	Pink	Pink & Chum ^b	Coho
Boston Creek					
1963	67	1,669	-	-	-
1964	10	3,315	-	-	-
1966 ^c	153	761	-	-	-
1968	7	2,500	2,500	-	-
1969	100	7,000	16,000	-	-
1970	246	8,200	12,900	-	-
1971	42	7,045	80	-	-
1972	57	4,252	3,950	-	-
1973	153	3,014	3,213	-	-
1974	231	2,426	749	-	-
1975	147	1,885	2,556	-	-
1977	76	1,325	385	-	-
1978	136	2,655	74,221	-	-
1979	58	882	271	-	-
1980	16	2,450	1,510	-	-
1982	10	1,730	22,020	-	-
1983	154	704	-	-	-
1984	35	-	-	47,850	-
1985	243	3,450	-	-	-
1986	2	220	0	-	-
1987	583	3,640	0	-	-
1988	163	1,040	7,400 ^f	-	-
1989	-	-	-	-	-
1990	-	1,458	8,440	-	-
1991	152	2,560	3,210	-	-
1992	68	1,540	803,200	-	-
1993	227	4,513	1,930	-	-
1994	95	4,270	355,600	-	-
1995	78	4,221	-	-	230
1996	133	3,505 ^l	35,980	-	-
Nukluk River					
1962	11	-	-	27,879	-
1963	1	13,687	4,103	-	-
1964	-	8,395	10,495	-	-
1966	-	21,300	8,600	4,700	-
1967	-	20,546	-	-	-
1968	-	-	-	87,085	-
1969	-	10,240	92,650	-	-
1970	-	7,300	60,350	-	-
1971	-	22,605	8,370	-	-
1972 ^e	-	10,500	22,600	-	-
1973	-	14,365	14,790	-	-
1974	1	8,720	8,915	-	-
1975	-	10,089	16,258	-	-
1976	-	4,130	7,190	-	-
1977	19	10,456	4,150	-	-
1978	2	14,365	208,300	-	-
1979 ^d	8	10,127	30,147	-	-
1980	-	8,915	75,770	-	-
1981	-	7,249	-	-	-
1982	20	2,557	227,540	-	-
1983	54	6,666	50	-	-
1984 ⁱ	6	-	-	57,208	3,072
1985	25	11,140	-	-	332 ^k
1986	2	2,442	0	-	-
1987	10	4,145	0	-	257 ^k
1988	18	6,501	8,160 ^l	-	1,095 ^k
1989	-	-	-	-	182
1990	-	6,200	-	-	170
1991	24	10,660	37,410	-	1,783
1992	-	7,770	803,200	-	812
1993	15	19,910	2,840	-	2,104
1994	7	16,470	1,294,100	-	274
1995	48	25,358	200	-	2,136
1996	25	9,732 ^l	153,150	-	2,047

-Continued-

Appendix Table A13 (page 4 of 5)

Year	Chinook	Chum	Pink	Pink & Chum ^b	Coho
Kwiniuk River					
1962	3	-	-	23,249	-
1963	2	11,340	3,779	-	-
1964	-	14,533	-	-	-
1965 ^d	14	26,634	8,301	-	-
1966 ^d	7	32,786	10,629	-	-
1967 ^d	13	24,444	3,508	-	-
1968 ^d	27	18,813	126,764	-	-
1969 ^d	12	19,687	56,683	-	-
1970 ^d	-	68,004	235,131	-	-
1971 ^d	37	39,046	16,742	-	-
1972 ^d	65	30,686	62,461	-	-
1973 ^d	57	28,617	38,420	-	-
1974 ^e	62	35,899	40,816	-	-
1975 ^c	44	14,344	57,317	-	-
1976 ^d	12	6,977	29,471	-	-
1977 ^d	84	22,757	46,234	-	-
1978 ^{c,d}	74	14,408	72,270	-	-
1979 ^d	107	12,355	167,492	-	-
1980 ^d	177	19,374	320,389	-	-
1981 ^d	136	34,561	566,417	-	-
1982 ^d	138	44,036	469,674	-	-
1983 ^d	267	56,907	251,965	-	-
1984 ^e	736	54,043	736,544	-	983 ^f
1985 ^d	712	9,912	22,548	-	673 ^f
1986 ^e	553	24,704	241,446	-	421
1987 ^e	314	16,134	5,567	-	819 ^f
1988 ^d	321	13,301	187,904	-	444 ^f
1989 ^d	282	13,689	30,275	-	-
1990 ^d	744	13,735	404,452	-	746 ^f
1991 ^c	567	18,802	54,591	-	809 ^f
1992 ^d	479	12,077	1,464,717	-	532 ^f
1993 ^d	565	15,823	43,065	-	1,238
1994 ^d	627	33,910	2,303,112	-	2,841
1995 ^d	468	42,161	17,573	-	1,625
1996 ^d	567	27,256	937,735	-	1,410
Tubunuk River					
1962	3	-	-	16,690	-
1963	9	16,069	4,355	-	-
1964	-	15,465	10,043	3,420	-
1965	-	5,514	26,000	-	-
1967	1	-	-	22,475	-
1969	3	12,040	12,788	3,045	-
1970	-	53,290	136,590	-	-
1971	-	16,820	7,500	5,065	-
1972 ^c	-	8,070	21,100	-	-
1973	131	5,383	15,665	-	-
1974	136	9,560	17,940	-	-
1975	7	17,141	38,003	-	-
1976	-	1,095	6,095	2,600	-
1977	-	8,540	4,685	-	-
1978	2	5,865	1,364	-	-
1979	-	812	1,624	-	-
1980 ^e	405	21,616	663,937	-	-
1982 ^c	49	2,044	53,605	-	-
1983	135	16,345	40,790	-	-
1984	139	56,210	93,600	-	-
1985	472	13,645	6,940	-	-
1986	453	5,975	35,680	-	-
1987	474	9,605	580	-	-
1988	561	4,660	114,450	-	-
1989 ^c	-	-	-	-	-
1990	397	4,350	166,400	-	-
1991	661	7,085	26,870	-	-
1992	260	2,595	138,600	-	-
1993	1,061	8,740	18,650	-	1,395
1994	No survey due to poor conditions				-
1995	377	16,158	4,020	-	930
1996	439	10,790	226,750	-	-

-Continued-

Appendix Table A13. (page 5 of 5)

Year	Chinook	Chum	Pink	Pink & Chum ^b	Coho
North River					
1962	162	-	-	16,087	-
1963 ^c	287	-	-	73,274	-
1964	23	-	-	5,981	-
1965	153	-	-	16,600	-
1970 ^c	1	20,655	12,400	-	-
1971 ^c	256	-	-	1,047	-
1972 ^d	561	2,332	54,934	-	-
1973 ^e	298	4,332	26,542	-	-
1974 ^d	220	861	154,285	-	-
1975 ^c	60	5,237	17,885	-	-
1976 ^c	66	196	10,606	-	-
1977	1,275	8,139	4,565	-	-
1978	321	9,349	21,813	-	-
1979	735	1,130	9,500	-	-
1980	61	2,300	127,900	-	204
1981	68	405	575	-	263
1982	8	599	173,352	-	4,145
1983	347	4,135	4,980	-	-
1984 ^d	2,844	2,915	458,387	-	152 ^f
1985 ^g	1,426	4,567	4,360	-	2,045
1986 ^g	1,613	3,738	236,487	-	-
1987	445	392	0	-	680
1988	202	30	112,770 ^h	-	240
1989 ^c	-	-	-	-	-
1990	255	510	25,685	-	-
1991	656	2,435	118,720	-	2,510
1992	329	-	631,140	-	398
1993	900	445	13,570	-	1,397
1994	No survey due to poor conditions				
1995	622	1,370	18,300	-	690 ^c
1996	106	220 ⁱ	125,500	-	917

^a Represents "high count" for season.

^b Surveyor unable to distinguish between the two species.

^c Poor survey conditions or partial survey, poor counting tower conditions.

^d Total counts obtained from counting tower.

^e Combined tower and aerial survey counts below the tower.

^f Aerial survey; not tower count.

^g Helicopter survey.

^h Boat survey.

ⁱ Foot survey.

^j Includes counts from Casadepaga and Ophir Creeks.

^k Includes counts from Ophir Creek.

^l Numerous pink salmon made enumerating of chum salmon difficult; pink count may include some chum.

PORT CLARENCE DISTRICT

District Boundaries

The Port Clarence district encompasses all waters from Cape Douglas north to Cape Prince of Wales including the Salmon Lake and Pilgrim River drainage (Figure 2). Salmon, saffron cod, whitefish and herring are the major subsistence species; however, other fishery resources are also utilized.

Commercial Fishery

Commercial salmon fishing in this district has been prohibited since 1967. In 1966 a total of 1,216 salmon consisting of 93 sockeye, 131 pinks and 922 chums was taken commercially in the Grantley Harbor/Tuksuk Channel area. A few salmon are sold or bartered each year in Teller and Nome. Due to the relatively small runs in this area and the existence of an important subsistence fishery, commercial salmon fishing has not been reopened.

Subsistence Fishery

A traditional subsistence salmon fishery has probably occurred within this district for centuries; however, subsistence fishing has only been reported or monitored at Salmon Lake since the 1930's and upper Pilgrim River since 1962. Data collected by Department personnel has indicated a majority of the fishermen of Brevig Mission fish the northern and northeastern sections of Port Clarence, while Teller fishermen utilize Grantley Harbor and Tuksuk Channel. Interviews with local residents have also indicated substantial fishing effort within the Agiapuk River. Village subsistence surveys had been conducted annually by the Division of Commercial up until 1983 (Appendix Table B1). Subsistence Division conducted a partial survey of Brevig Mission in 1989 and have conducted a full scale survey of both villages since 1994. Personal interviews with fishermen seem to indicate a decline in subsistence fishing effort, due primarily to the absence of younger fishermen entering the fishery. A majority of the subsistence fishing effort appears to be conducted by elder residents who gather fish for an entire family.

A summary of the subsistence salmon harvest estimates by community is presented in Table 10. The estimated subsistence harvest of salmon in the Port Clarence District in 1996 was 11,029 fish. Of these, 194 were chinook salmon, 4,707 were chum, 2,236 were pink, 2,634 were sockeye, and 1,258 were coho. The estimated mean harvest was 84 salmon per household. Brevig Mission harvested a total of 5,408 salmon, with a mean of 92 fish per household. Teller had a total subsistence harvest of 5,621 salmon, or 77 fish per household. About 52 percent of Port Clarence households fished for subsistence salmon in 1996. Set gillnets were the most commonly used gear for harvesting salmon, used by about 77 percent of the households that subsistence fished. Less than one percent of the salmon harvested was for dog food. In the Port Clarence District, 78 percent or more of the fishing households responded that their fishing season was very good or average for

chum, pink, sockeye, and coho salmon. Fifty six percent of households said their chinook fishing season was very good or average.

Salmon Lake and Pilgrim River stocks have been utilized primarily by Nome residents. The Alaska Board of Fisheries adopted a regulation in 1972 which closed Salmon Lake and its tributaries to subsistence salmon fishing from July 15 through August 31 to conserve declining sockeye salmon stocks. Subsistence fishing permits are required for the Pilgrim and Kuzitrin Rivers. Beginning in the 1991 season, a dramatic increase in the number of subsistence permits issued to Nome residents intending to fish in the area was observed. This was due in part to a strong sockeye salmon return. Another reason was the extensive subsistence fishing closures in the Nome area which made the Pilgrim River an alternative location to obtain their subsistence needs. In 1996, only 3 households requested permits for this area, in part because of the abundance of salmon in the Nome area as a result of a strong pink salmon run.

Escapement

Aerial surveys are not typically flown in this district, with the exception of Salmon Lake, due to the low priority assigned to areas which do not support commercial fisheries. Aerial surveys show an increasing trend of sockeye returns to Salmon Lake since 1986 (Appendix Table B2). The 1996 aerial survey count of 6,610 red salmon is the highest on record since 1963. Recent year counts are in the upper end of the range and reflect an increasing population of red salmon.

Table 10. 1996 Port Clarence subsistence salmon harvests.

			Chinook		Chum		Pink		Sockeye		Coho		Total	
	Total HH's Contacted	HH's	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total
Brevig Mission	59	56	12	13	2,242	2,350	1,513	1,584	695	727	701	734	5,163	5,408
Pilgrim R. Permits**	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Teller	73	65	178	182	2,308	2,357	638	652	1,867	1,907	513	524	5,504	5,621
PORT CLARENCE	135	121	190	194	4,550	4,707	2,151	2,236	2,562	2,634	1,214	1,258	10,667	11,029

* If less than 30 or 50% of households in a community were contacted, then reported harvest is used for estimated harvest.

** Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, permit returns, 1997. Expansion is by drainage.

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, household surveys, 1996.

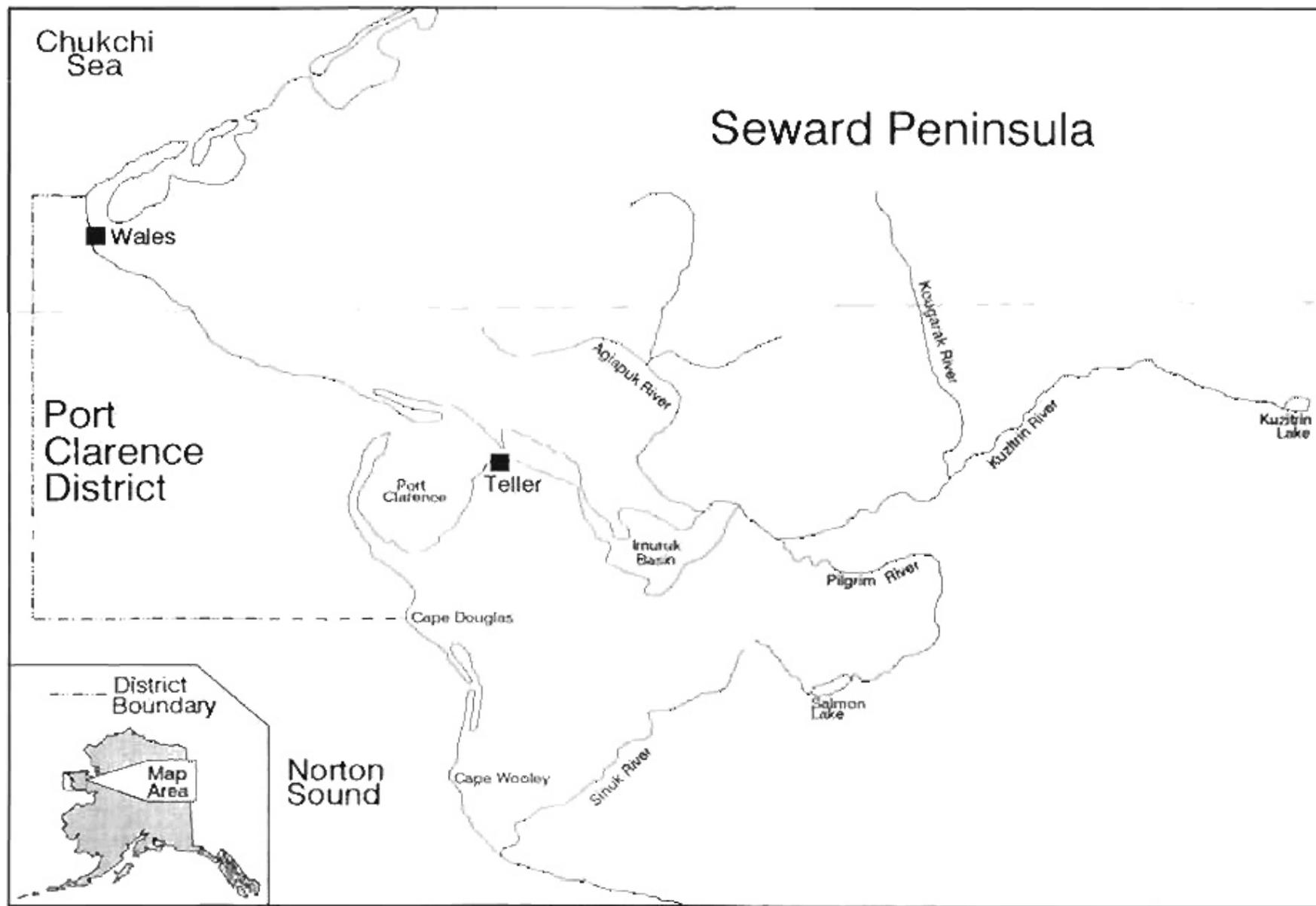


Figure 2. Port Clarence District.

Appendix Table B1. Subsistence surveys conducted in Port Clarence District.

Year	Number of Fishing Families Interviewed	Chinook	Sockeye	Coho	Pink	Chum	Total
1963	19	9	4,866	25	1,061	1,279	7,240
1964	22	17	1,475	227	371	1,049	3,139
1965	29	36	1,804	639	1,854	1,602	5,935
1966	26	10	1,000	896	859	2,875	5,640
1967	19	12	2,068	232	767	1,073	4,152
1968	24	40	688	133	1,906	904	3,671
1969	13	2	180	27	548	932	1,689
1970	18	4	588	1,071	1,308	4,231	7,202
1971	22	31	850	959	1,171	3,769	6,780
1972	8	4	68	388	75	2,806	3,341
1973	4	22	46	280	424	1,562	2,334
1974	13	-	28	62	14	2,663	2,767
1975	17	-	244	5	743	1,589	2,581
1976	15	7	291	20	436	6,026	6,780
1977 ^a	13	-	-	-	-	-	5,910
1978	26	1	392	-	7,783	705	8,881
1979	26	-	320	35	741	1,658	2,754
1980	22	7	3,195	5	3,170	1,715	8,092
1981	10	8	255	110	765	5,845	6,983
1982	27	23	405	100	4,345	684	5,557
1983 ^b	3	17	261	-	615	299	1,192
1984 - 1988 ^c							
1989 ^d	15	28	535	472	395	410	1,840
1990 - 1993 ^e							
1994 ^f	127	181	1,979	1,692	3,849	2,042	9,743
1995 ^g	122	76	4,481	1,739	3,293	6,011	15,600
1996 ^h	117	195	4,558	2,079	2,587	1,264	10,684

^a Species composition estimated at 75% chum, 10% pink, 10% sockeye and 5% chinook and coho combined.

^b Data collected from returned catch calendars. Due to low return of calendars and absence of household surveys, the resultant catches are incomplete and not comparable to past years.

^c Surveys not conducted.

^d Survey conducted by Subsistence Division and contacted 15 of 43 households in Brevig Mission.

^e Harvest estimate from Div. of Subsistence survey.

Appendix Table B2. Comparative sockeye salmon aerial survey indices, Port Clarence District, 1963 -1996.

Year	Salmon Lake	Grand Central River	Total
1963	866	620	1,486
1964 ^c	76	590	666
1965	250	160	410
1966	1,120	370	1,490
1967	129	280	409
1968 ^c	830	645	1,475
1969	24	171	195
1970 ^a	-	-	-
1971	538	512	1,050
1972 ^c	680	300 ^b	980
1973	1,747	607	2,354
1974	820	-	820
1975	537	123	660
1976	132	22	154
1977	317	235	552
1978	822	280	1,102
1979	1,250	261	1,511
1980 ^c	512	175	687
1983	970	-	970
1984	445	30	475
1985	730	250	980
1986	2,125	160	2,285
1987	4,040	530	4,570
1988	1,195	6	1,201
1989	3,055	525	3,591
1990	2,834	926	3,760
1991	3,790	1,570	5,360
1992	1,500	^a	1,500
1993	2,885	216	3,092
1994	3,740	1,230	4,970
1995	5,433	628 ^d	6,061
1996	6,610	770	7,380

^a No survey made.

^b Boat survey.

^c Poor survey.

^d Early count

KOTZEBUE SOUND DISTRICT

History

The Kotzebue Sound District supports the northernmost commercial salmon fishery in Alaska (Figure 3). The Kotzebue District is divided into three subdistricts. Subdistrict 1 has six statistical areas where the commercial salmon fishing occurs (Figure 4).

The recent commercial fishery opened under state management in 1962. Salmon harvests consist of primarily chum salmon although limited amounts of Dolly Varden and a few chinook salmon are harvested as well. There are 215 commercial permit holders, of which an average of 146 were active over the ten year period 1986 to 1995. Eighty-seven percent of the permittees are residents of the district and 99 percent are residents of the state. Each commercial fisherman is limited to 150 fathoms of gear. These gillnets are generally operated as a single unit of gear, although the nets are occasionally broken down to single 50 fathom shackles. Most gillnets are made of 5-7/8 inch stretched measure multifilament web.

The earliest documented sales of salmon in the Kotzebue District were in 1909 when Lockhart's store purchased 21,906 pounds of salmon from local Native Alaskans and resold it at \$0.05/lb. Of that, 21,366 pounds were sold to gold miners on the Kobuk River drainage and 540 pounds were sold to a company in Seattle. A commercial fishery occurred from 1914 to 1918. Salmon were canned and the bulk of the harvest was thought to have been sold to miners working in the upper Kobuk River Drainage. The next organized commercial fishery began under state management in 1962 and continues to the present. The current fishery became fully developed in the mid- 1970s. The fishery displayed a gradually declining pattern of overall run strength with four year cycles of stronger returns followed by weaker returns. In 1987, the fisheries managers began a rebuilding program with an emphasis on attaining escapement goals. Prior to 1987, harvest had been proportional to total return. During the last few years, poor market conditions have caused harvests to fall short of their potential and consequently escapements have been very strong.

General Information

The Commercial harvest in the Kotzebue District (Figure 3) during 1996 consisted of 79,910 chum salmon, 3 chinook salmon, and 188 Dolly Varden (Table 11). This commercial chum harvest was substantially below the projected harvest of 250,000-350,000 salmon due to poor market conditions. It was also well below the 17 year (1979-1995) average of 283,000. There were 55 permits that fished this year. This is the lowest number of participants since 1969 (52). The low fishing effort is attributed to construction related employment opportunities available in the region and the lowest price for salmon since 1965.

Gear is limited to set nets with an aggregate of no more than 150 fathoms per fisherman. Fishermen generally operate with one end on or near shore and with all three shackles connected.

Fishermen also set in deeper channels in the mud flats further out from shore. Most gear used in the district is 5-7/8 in (14.9 cm) or 6 in (15.2 cm) stretch multifilament gill net.

From the onset of the commercial season, the district's only buyer requested a limited amount of fishing time because of poor chum salmon market conditions. All commercial openings were coordinated with the buyer so that fish in excess of his market's limitations would not be taken and the harvest could be shipped for processing in a timely manner. This procedure maintained the salmon catch at a high quality which enabled processors to market Kotzebue chum salmon. The processor indicated that he was working with a narrow margin of profit and a single delivery of poor quality fish could end the commercial fishery. A total of nineteen openings were fished in 1996 for a total of 132 hours. This is the fewest hours fished since the fisheries inception in 1962 and less than one-third of the historical average of 421. Commercial fishing periods varied from 4 hours to 24 hours in length during the 1996 season. As a result of short openings and low salmon prices, fishermen concentrated their efforts close to Kotzebue (Statistical Area 331-01) to minimize the costs of fuel and oil (Table 12, Figure 4).

The buyer purchased a total of 639,624 pounds of chum salmon (average weight 8.0) at \$.09 per pound, 51 pounds of chinook salmon (average weight 17.0) at an average of \$1.00 per pound, and 1,153 pounds of Dolly Varden (average weight 6.1) at an average of \$.25 per pound. The total ex-vessel value was \$56,273 to Kotzebue area fishermen with an average of \$1.023 for each participating permit holder. The lone buyer packed the fish in ice and flew them out in the round to Anchorage for processing.

Inseason Management

Primary fishery management objectives were to provide adequate chum salmon escapement through the commercial fishery: (1) to ensure sustained runs by allowing adequate natural escapement, and (2) to meet subsistence harvest needs. Fishery management depended on comparing period and cumulative season catch rates to that of previous years. A comparison of catch rates over the history of the fishery has shown a close relationship to the total run strength. The lack of experienced sonar project leaders resulted in the Noatak River sonar not being operated in 1996. Noatak R. sonar escapement counts had been used with strong consideration in the management of the final third of the season.

Age composition of the catch was also closely monitored to determine the strength of age classes in the return. Older salmon tend to migrate into freshwater first, a fact that affects catch rate as the season progresses and influences the fishery managers evaluation of the catch statistics. Weak 4 year old age class contribution will tend to depress mid-season catches (Table 14, Figure 7).

A preseason meeting was held with fishermen to discuss inseason management. The buyer warned fishermen of the poor market conditions for chum salmon. Fishermen were told that periods would be shorter but more frequent as long as escapements were being achieved. This

would ensure a marketable quality that would allow the fishery to continue. The buyer warned that a single period of poor quality fish could end the fishery in Kotzebue because of the narrow profit margins processors were working with. Because of the strong run and influence by markets, no other meeting was held by the department.

Contact with the Kobuk River subsistence fishermen with nets near Kiana was maintained throughout the season. A test fishery occurred for the fourth year on the Kobuk River, however, test fish indices were not used for management purposes because of the lack of historical data. Information from the Kobuk River test fishery will be available in report form on a later date. Because the Noatak River drift test net fishery in 1995 proved to be a misleading index of escapement, no project was conducted in 1996.

Commercial Season Summary

The Kotzebue Sound commercial salmon season was opened July 8 by emergency order as established by regulation. Generally, the first three periods are scheduled to be 24 hours in length. Trends in catch are used to assess the early portion of the run as there are no other indicators. There are normally two openings per week beginning on Monday and Thursday. However, with limited markets for chum salmon and only one buyer, these openings were shortened as requested by the buyer. Commercial openings were coordinated between the processor, local buyer and the Fish and Game office. Once a fishing period was decided on, the department would fax or call in a Public Service Announcement (PSA) to the local radio station which then would air the announcement. Fishermen were told that announcements would be made before 9:00 a.m. PSA's were made on a daily basis announcing openings and hours. Announcements were made even if there was no fishing.

Prior to the season the buyer contacted the department concerning the possibility of using an average weight as the basis to determine total catch of all chum salmon by individual permit holders. The processor and local buyer were working with a narrow profit margin and were using any means available to reduce the cost of handling fish. The buyer began using an average weight during the second opening of 8 pounds from the first opening. According to Alaska Statute 16.10.270 (a), averaging the individual salmon can be done if the "primary fish buyer and the seller agree in writing upon a sample weighing technique that will fairly determine the average weight of the fish purchased". Fishermen agreed to this and the buyer continued purchasing fish in this manner for the remainder of the season.

Commercial catch statistics from openings on Monday, Tuesday and Wednesday were combined to compare historical data for the first opening of the week. Statistics from openings on Thursday, Friday and Saturday were combined to compare historical data for the second opening of the week (Table 14, Figure 6). This was done to compare this year's more frequent openings to historical bi-weekly period data. Even with drastically reduced fishing time and few permits fishing, the first week's catches were at or above the 17 year average. Catch rates were 4 and 10 times the 17 year average. As the fishing season continued with a low number of fishermen and significantly reduced hours, commercial catches remained well below the historical average.

Catch rates however, remained well above the average for the duration of the season. The length of openings ranged from 4 hours to 24 hours with most being 6 hours or 8 hours in length. Only the final opening was 24 hours but began as a 6 hour opening and was extended to 24 hours.

On July 22, the buyer held a fishermen's meeting to discuss worsening market conditions. He explained that there was a significant amount of fish placed on the market from hatcheries in Southeast Alaska. With the high freight costs from Kotzebue to Anchorage, the processor could not compete with fish harvested in other areas of the state which could deliver fish to markets at a much lower cost. The local representative explained that the only way his processor could continue buying fish from Kotzebue fishermen was to reduce the price from \$1.00 per fish (\$.125/lb) to \$.60 per fish (\$.075/lb). Fishermen discussed the issue and agreed they would continue to fish as long as periods remained frequent. The department had little concern with escapement as all indications were that the run was at least average and most likely well above average. The final opening was held on August 23.

Age-5 salmon tend to dominate the earlier commercial openings with the younger age classes moving through during the middle and latter portion of the fishery. In 1996, Age-5 salmon dominated the first two-thirds of the season while Age-4 salmon dominated the final third of the season. The presence of age-6 salmon was significantly higher than the historical average throughout the season. Historical comparisons indicate that age-6 salmon were almost five times more abundant than the historic average contribution with only 1987 having a greater abundance with 11 percent. There were also numerous 7 year old chum salmon sampled which are normally quite rare. Age-3 salmon remained well below average the entire season. This may be the result of a continuing trend of older fish returning to spawn (Table 14). Commercial fishermen were contracted to test fish for age and sex composition during closed periods.

In recent years, the department has made an effort to estimate the subsistence salmon harvest. Harvest information on sheefish and Dolly Varden were collected in some communities in conjunction with this effort. Two methods were used to generate these estimates: 1) post-season household surveys were conducted in Noatak, Noorvik, Kiana, Ambler, Shungnak, and Kobuk, and 2) a postcard survey was used in Kotzebue. The communities of Shishmaref, Wales, Diomede, Deering, Buckland, Selawik, Kivalina, and Point Hope were not surveyed.

The post-season household surveys are used to generate estimates of total harvest in communities small enough to be surveyed door to door. These communities were chosen on the basis of their dependence on chum salmon. Kotzebue is also known to utilize many chum salmon on a per capita basis, but the size of the community makes it impractical to conduct household surveys in the same manner. A postcard survey was deemed the most practical method given the logistical and budgetary constraints of the situation. An average of 90 percent of the households in each community were contacted using the household survey method. In Kotzebue, postcards were mailed to 710 households, of which 171 responded (24 percent). An undetermined number of households, especially those who have recently moved to Kotzebue, were missed by the postcard survey. These newer households, however, were less likely to be major subsistence harvesters than more stable, long term households.

Subsistence fishers of the Kotzebue District were estimated to have harvested 102,029 salmon, of which 99,740 (97.6%) were chum salmon (Table 16). The community of Kotzebue had the largest estimated harvest of 51,876 salmon and an estimated chum salmon harvest of 50,573. The estimated mean salmon harvest was about 86 salmon per household, which included 0.5 chinook, 84 chum, 0.8 pink, 0.4 sockeye, and 0.3 coho. The large harvest from Kotzebue is closely tied to the size of the community. Shungnak had the highest mean household harvest (154 salmon), followed by Noorvik, Noatak and Ambler (ranging from 117 to 111 fish).

In the Kotzebue Sound District, 54 percent of households subsistence fished for salmon in 1996. Set gillnets were the most commonly used gear for harvesting salmon, used by 68 percent of households that subsistence fished. Two and one half percent of the salmon catch in surveyed communities was caught with rod and reel. In the Kotzebue Sound District, about 34 percent of the estimated salmon harvest in the surveyed communities (excluding Kotzebue) was used for dog food. Approximately two-thirds of the fishing households responded that their households subsistence salmon fishing was "very good".

Enforcement

This was the first year since 1993 that a Fish and Wildlife Protection enforcement was stationed in Kotzebue. Patrols were conducted via airplane during openings and closures. A total of three citations and two warnings were issued. Two citations were for fishing late and one for wanton waste. One warning was given for fishing late and another warning for unmarked gear.

Sikusuilag Hatchery

The total predicted return of hatchery salmon was 90,000. Sixty-nine percent of the commercial catch was sampled with a total of 17 adipose clipped chum salmon found. From the 17 heads sent in, only 5 were found with tags. Three of the tags were from the 1990 brood year and two were from 1991. Using the confirmed tag data, the estimated contribution of hatchery salmon to the commercial catch was 495. This number does not include salmon from the brood year of 1992 as those fry were not tagged.

Escapement

A test fishing project located in Kiana monitored salmon run strength and timing into the Kobuk River. The test fish crews in Kiana also interviewed subsistence fishermen to monitor subsistence catches. No inseason salmon escapement monitoring project was operated on the Noatak River in 1996.

The test fish index from the Kobuk River was the highest since 1993, the inception of the project (Table 15, Figure 9). Water conditions varied from low and clear to high and muddy. Clear water net avoidance was significantly buffered because of the tannic stained water of the Kobuk River. In the past three years, water conditions have ranged from high and muddy to low and clear. Test fish indices have remained stable inseason, no matter the water condition, for the past three years. In 1993, a cumulative index of 494 was achieved. That same year, escapement goals by aerial survey overall were just met. In 1995, the cumulative test fish was two times the index achieved in 1993. That same year, escapement goals by aerial survey were doubled as well. This year the cumulative test fish index was 5 times the 1993 index. Escapements by aerial survey were roughly 4 to 5 times greater than established goals. This indicates that this project is consistent and viable for use in management decisions.

Aerial survey conditions were more typical this year than most. Normal dry weather early in the season allowed preliminary surveys to be flown on tributaries with early runs. Clear late fall weather allowed peak surveys on tributaries with later spawning salmon. In general, escapement goals by aerial survey were exceeded on all tributaries by four times the published goals with the exception of the Squirrel River. That tributary's escapement was twice the goal by aerial survey (Figure 8).

Subsistence catches of chum salmon by numerous fishermen were some of the earliest recorded. However, spawn timing of salmon by aerial survey was normal. This would indicate that the run was protracted. The Kobuk River test fishing data suggested a protracted run timing as well with a near linear line without an incline at the beginning or a decline at the end of the run. The department again missed an opportunity to compare aerial survey counts to sonar counts and to enumerate a near total escapement in the Noatak River drainage.

Dolly Varden

Dolly Varden (locally called trout) typically migrate along the northern shore of Kotzebue Sound. Because of reduced hours, few fishermen and a concentration of effort near Kotzebue, the incidental catch of trout was significantly reduced. Only 188 Dolly Varden were sold, even though the average price for trout was \$.25, three times that of chum salmon. The incidental harvest has been as much as 7,700 in previous years but averages around 2,000. Spawners and over-wintering Dolly Varden normally migrate through the northern side of the district during the third week of August.

Freshwater Fisheries

Limited commercial harvest of miscellaneous finfish has been allowed since statehood, normally under the auspices of a permit which delineates harvest levels, open areas, legal gear, etc. There was no reported commercial harvest of whitefish, pike, or burbot during the 1996 commercial season. Sheefish are caught and sold predominantly between mid-November and late March. There were eight permit holders, of which four were registered with the Fish and Game office.

Two of those reported a harvest of 308 fish weighing 3,002 pounds (9.7 lb. average) with a value of \$1,308.50.

1997 Outlook

The outlook for the 1997 season is based on the returning age classes of the 1996 season. During the 1997 season, the four year component of the return is expected to be near average, while the five and six year old components are expected to be above average. The three year old component is generally small, and it too is likely to be near average. The commercial harvest is expected to fall within the range of 250,000 to 350,000 chum salmon, if market conditions can accept that level of harvest.

Table 11. Commercial catches of chum salmon, chinook salmon and Dolly Varden by period in the Kotzebue District, 1996.

Period	Date	Hours Fished	Number of Fishermen	Chum			Chinook			Dolly Varden		
				Number	Pounds	Avg. Wt.	Number	Pounds	Avg. Wt.	Number	Pounds	Avg. Wt.
1	08-Jul-96	4	6	841	7,055	8.4						
2	09-Jul-96	6	8	2,192	17,536	8.0 ^b	1	20	20.0			
3	10-Jul-96	8	8	2,831	22,648	8.0 ^b						
4	11-Jul-96	8	15	4,872	38,976	8.0 ^b						
5	17-Jul-96	4	28	3,590	28,720	8.0 ^b						
6	18-Jul-96	4	33	5,722	45,776	8.0 ^b						
7	23-Jul-96	6	13	3,561	28,488	8.0 ^b				1	7	7.0
8	24-Jul-96	8	16	4,859	38,888	8.0 ^b						
9	25-Jul-96	8	8	2,357	18,856	8.0 ^b	1	6	6.0			
10	26-Jul-96	8	24	7,830	62,640	8.0 ^b						
11	29-Jul-96	6	15	4,811	38,488	8.0 ^b						
12	05-Aug-96 ^a	6	24	10,322	82,576	8.0 ^b				3	17	5.7
13	06-Aug-96	6	18	9,779	78,233	8.0 ^b				7	42	6.0
14	14-Aug-96	4		Buyer did not purchase fish								
15	16-Aug-96	4	12	4,679	37,432	8.0 ^b				41	214	5.2
16	19-Aug-96	6	10	1,283	10,264	8.0 ^b				7	51	7.3
17	20-Aug-96	6	11	2,700	21,600	8.0 ^b				45	270	6.0
18	21-Aug-96	6	2	394	3,152	8.0 ^b				2	15	7.5
19	23-Aug-96	24	14	7,287	58,296	8.0 ^b	1	25	25.0	82	537	6.5
Totals		132	55	79,910	639,624	8.0	3	51	17.0	188	1,153	6.1

^a Does not include 2,200 chum salmon that were commercially caught but not sold or harvested for subsistence.

^b No salmon were weighed. An average weight of 8 pounds was assumed.

Table 12. Kotzebue District commercial chum salmon, chinook salmon, and Dolly Varden catch by statistical area, 1996.

Statistical Area	Chum CPUE	Number of Fishermen	Chum			Chinook			Dolly Varden		
			Number	Pounds	Avg. Wt.	Number	Pounds	Avg. Wt.	Number	Pounds	Avg. Wt.
331-01 ^a	9.5	50	62,459	500,000	8.01	2	26	13.0	133	814	6.1
331-02	7.5	8	7,873	63,000	8.00				41	268	6.5
331-03	7.9	6	6,270	50,160	8.00						
331-04	2.8	5	1,866	14,928	8.00	1	25	25.0			
331-05	1.1	1	146	1,168	8.00				14	71	5.1
331-06	3.3	3	1,296	10,368	8.00						
Totals	11.0	55	79,910	639,624	8.00	3	51	17.00	188	1,153	6.13

^a Does not include 2,200 chum salmon that were commercially caught but not sold or used for subsistence.

Table 13. Kotzebue Sound chum salmon 1996 commercial and 17 year average catch statistics (1979-1995).

17 Year Avg.					Cumulative			
Period	Hours	Number Permits	Catch	CPUE	Prop. Catch	Catch	CPUE	Prop. Catch
1	24	39	3,103	3.6	0.011	2,921	3.6	0.011
2	24	65	5,402	4.1	0.019	8,323	3.9	0.030
3	24	89	10,520	5.7	0.037	18,842	4.7	0.076
4	25	109	18,863	7.0	0.067	37,705	5.6	0.144
5	26	121	23,174	8.8	0.082	60,880	6.4	0.229
6	28	128	30,658	14.2	0.108	87,931	7.1	0.321
7	34	131	36,978	11.8	0.131	122,734	7.8	0.459
8	35	136	38,869	14.0	0.137	159,306	8.1	0.582
9	38	128	38,295	11.7	0.135	197,611	8.5	0.730
10	36	130	42,662	15.8	0.151	235,254	8.8	0.828
11	39	120	24,710	8.5	0.087	255,603	8.7	0.906
12	40	105	15,337	6.8	0.054	268,233	8.5	0.950
13	40	80	10,418	4.1	0.037	276,813	8.1	0.980
14	37	61	7,186	4.3	0.025	281,040	7.9	0.994
15	37	37	3,297	4.7	0.012	282,785	7.8	1.000

1996					Cumulative			
Period	Hours	Number Permits	Catch	CPUE	Prop. Catch	Catch	CPUE	Prop. Catch
1	26	13	5,864	17.3	0.073	5,864	17.3	0.073
2	8	15	4,872	40.6	0.061	10,736	23.4	0.134
3	4	28	3,590	32.1	0.045	14,326	25.1	0.179
4	4	33	5,722	43.3	0.072	20,048	28.6	0.251
5	14	21	8,420	28.6	0.105	28,468	28.6	0.356
6	16	24	10,187	26.5	0.127	38,655	28.0	0.484
7	6	15	4,811	53.5	0.060	43,466	29.6	0.544
8			Commercial Test Fish			43,466		0.544
9 ^a	28	12	20,101	59.8	0.252	63,567	35.2	0.795
10			Commercial Test Fish			63,567		0.795
11			Commercial Test Fish			63,567		0.795
12	4	12	4,679	97.5	0.059	68,246	36.8	0.854
13	12	13	4,377	28.1	0.055	72,623	36.1	0.909
14	24	14	7,287	21.7	0.091	79,910	34.1	1.000
15			Commercial Test Fish			79,910		1.000

^a Does not include 2,200 chum salmon commercially caught but not sold or taken for subsistence.

Table 14. Historical average age composition by period for the recent 17 years (1979-1995) and 1996.

17 Year Avg.		Percent				Catch by Age			
Period	Catch	3	4	5	6	3	4	5	6
1	3,103	0.4	33.9	61.3	4.4	12	1,052	1,902	137
2	5,402	0.8	40.3	54.5	4.3	43	2,177	2,944	232
3	10,520	1.4	41.4	51.4	5.7	147	4,355	5,407	600
4	18,863	1.3	49.8	45.5	3.4	245	9,394	8,583	641
5	23,174	1.5	48.5	45.6	4.5	348	11,239	10,567	1,043
6	30,658	1.8	54.8	40.9	2.5	552	16,801	12,539	766
7	36,978	2.7	58.3	37.0	2.1	998	21,558	13,682	777
8	38,869	4.4	61.9	32.0	1.8	1,710	24,060	12,438	700
9	38,295	5.5	59.9	32.4	2.3	2,106	22,939	12,408	881
10	42,662	5.7	62.8	30.1	1.4	2,432	26,792	12,841	597
11	24,710	11.2	65.5	22.7	1.1	2,768	16,185	5,609	272
12	15,337	11.5	60.4	26.2	2.0	1,764	9,264	4,018	307
13	10,418	11.2	62.8	24.5	1.5	1,167	6,543	2,552	156
14	7,186	9.7	61.4	27.8	1.1	697	4,412	1,998	79
15	3,297	4.7	67.6	26.6	1.2	155	2,229	877	40

1996		Percent				Catch by Age			
Period	Catch	3	4	5	6	3	4	5	6
1	5,864	0.1	17.8	68.0	12.4	6	1,044	3,988	727
2	4,872	0.0	27.4	54.7	17.9	0	1,335	2,665	872
3	3,590	0.0	24.0	67.4	8.2	0	862	2,420	294
4	5,722	0.0	27.0	61.8	11.2	0	1,545	3,536	641
5	8,420	0.0	29.6	57.3	12.8	0	2,492	4,825	1,078
6	10,187	1.1	41.6	51.3	5.5	112	4,238	5,226	560
7	4,811	0.8	33.9	48.3	16.9	38	1,631	2,324	813
8	"	0.6	45.9	45.9	7.6				
9	20,101	0.7	45.0	47.0	6.7	141	9,045	9,447	1,347
10	"	0.5	53.0	42.2	4.3				
11	"	1.3	47.7	45.1	5.9				
12	4,679	4.0	59.1	35.6	1.3	187	2,765	1,666	61
13	4,377	3.1	57.6	30.1	9.2	136	2,521	1,317	403
14	7,287	1.4	58.9	32.9	6.8	102	4,292	2,397	496
15	"	1.5	54.5	40.3	3.7				

^a No commercial fishing occurred. Percent age composition is from commercial test gillnets.

Table 15. Kobuk River drift test fish historical mean daily CPUE and cumulative CPUE, 1993-1996

Date	1993		1994		1995		1996	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
5-Jul-96								
6-Jul-96								
7-Jul-96								
8-Jul-96								
9-Jul-96							12.77	12.77
10-Jul-96							15.00	27.77
11-Jul-96							98.38	126.15
12-Jul-96	11.18	11.18			0.00	0.00	45.54	171.69
13-Jul-96	14.22	25.40	0.00	0.00	0.93	0.93	74.29	245.98
14-Jul-96	20.57	45.97	2.68	2.68	2.80	3.73	*	245.98
15-Jul-96	35.08	81.05	2.58	5.26	2.77	6.50	83.75	329.73
16-Jul-96	13.19	94.24	11.35	16.61	*	6.50	71.35	401.08
17-Jul-96	17.27	111.51	*	16.61	0.00	6.50	55.49	456.57
18-Jul-96	*	111.51	7.16	23.77	1.81	8.31	89.86	546.43
19-Jul-96	10.71	122.22	12.40	36.17	9.89	18.20	54.74	601.17
20-Jul-96	2.76	124.98	3.65	39.82	16.30	34.50	63.70	664.87
21-Jul-96	3.20	128.18	7.30	47.12	38.54	73.04	52.12	716.99
22-Jul-96	5.52	133.70	3.56	50.68	21.18	94.22	50.97	767.96
23-Jul-96	27.15	160.85	16.49	67.17	50.58	144.80	91.36	859.32
24-Jul-96	9.06	169.91	*	67.17	28.46	173.26	91.89	951.21
25-Jul-96	*	169.91	14.38	81.55	40.16	213.42	76.80	1,028.01
26-Jul-96	15.22	185.13	47.85	129.20	35.15	248.57	55.68	1,083.69
27-Jul-96	8.06	193.19	40.66	169.86	63.94	312.51	29.79	1,113.48
28-Jul-96	16.36	209.55	57.83	227.69	62.49	375.00	49.06	1,162.54
29-Jul-96	0.93	210.48	33.62	261.31	46.11	421.11	70.13	1,232.67
30-Jul-96	0.92	211.40	69.21	330.52	57.86	478.97	36.20	1,267.96
31-Jul-96	12.58	223.98	*	330.52	29.89	508.86	82.27	1,350.23
1-Aug-96	*	223.98	62.16	412.68	72.91	581.77	167.67	1,517.90
2-Aug-96	6.74	230.72	65.12	477.80	48.71	630.48	62.02	1,579.92
3-Aug-96	54.49	285.21	71.79	549.59	48.40	678.88	48.70	1,628.62
4-Aug-96	44.23	329.44	108.98	658.57	53.00	731.88	65.93	1,694.55
5-Aug-96	89.30	418.74	59.74	718.31	49.95	781.83	60.33	1,754.88
6-Aug-96	18.60	437.34	102.66	820.87	*	781.83	60.47	1,835.35
7-Aug-96	20.52	457.86	*	820.87	46.39	828.22	90.99	1,926.34
8-Aug-96	*	457.86	62.75	883.62	44.02	872.24	146.94	2,073.28
9-Aug-96	1.84	459.70	96.86	980.48	68.22	940.46	106.11	2,179.39
10-Aug-96	12.63	472.33	45.83	1,026.31	56.33	996.79	56.95	2,236.34
11-Aug-96	18.11	490.44	57.02	1,083.33	37.95	1,034.74	*	2,236.34
12-Aug-96	3.74	494.18	90.54	1,173.87	63.92	1,098.66	72.29	2,308.63
13-Aug-96			11.36	1,185.23	*	1,098.66	114.63	2,423.26
14-Aug-96			*	1,185.23	29.35	1,128.01	158.13	2,581.39
15-Aug-96			5.13	1,190.36	25.26	1,153.27		
16-Aug-96			16.23	1,206.59	35.04	1,188.31		
17-Aug-96			0.00	1,206.59				
18-Aug-96			0.00	1,206.59				
19-Aug-96			3.12	1,209.71				
20-Aug-96			0.00	1,209.71				
21-Aug-96			*	1,209.71				
22-Aug-96			0.00	1,209.71				
23-Aug-96			0.00	1,209.71				
24-Aug-96			0.00	1,209.71				
25-Aug-96			0.91	1,210.62				
26-Aug-96			5.56	1,216.18				
27-Aug-96			1.86	1,218.04				
28-Aug-96			0.93	1,218.97				
29-Aug-96			0.00	1,218.97				
30-Aug-96			0.00	1,218.97				

* Regular day off

The "*" indicate the first and third quartiles and "*" indicates the mid-way point

Table 16. 1996 Kotzebue Sound subsistence salmon harvests.

			Chinook		Chum		Pink		Sockeye		Coho		Total	
	Total HH's	HH's Contacted	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total	Reported Harvest	Est.* Total
Ambler	82	80	1	1	8,873	9,062	64	65	2	2	6	6	8,946	9,137
Kiana ¹	103	88	5	6	3,238	5,935	0	0	0	0	10	12	3,253	5,953
Kobuk	24	22	0	0	1,622	1,819	0	0	0	0	1	1	1,623	1,821
Kotzebue***	710	170	121	505	12,109	50,573	69	288	112	468	10	42	12,421	51,876
Noorvik	124	111	31	38	12,659	13,611	567	597	0	0	243	256	13,700	14,501
Noatak	88	74	0	0	8,996	10,091	0	0	1	1	0	0	8,997	10,092
Shungnak	56	51	0	0	7,806	8,649	0	0	0	0	0	0	7,806	8,649
KOTZEBUE SOUND	1,187	596	158	550	55,503	99,740	700	951	115	471	270	317	56,746	102,029

* If less than 30 or 50% of households in a community were contacted, then reported harvest is used for estimated harvest.

*** Alaska Department of Fish and Game, Division of Subsistence, postcard survey, 1996

¹ Kiana estimated chum harvest includes 2,053 chum from the ADF&G test net fishery in addition to the survey results.

SOURCE: Alaska Department of Fish and Game, Division of Subsistence, household surveys, 1996

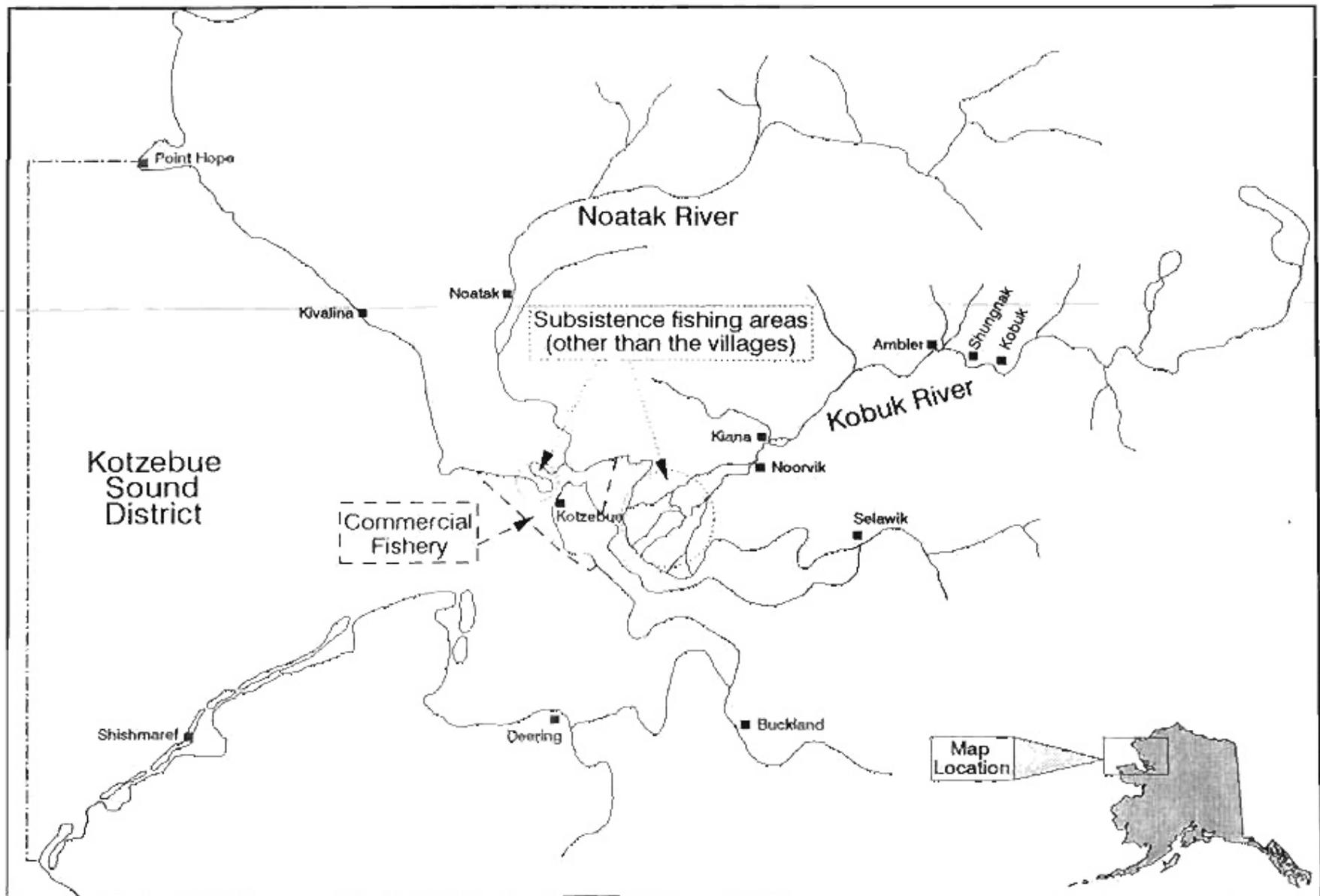


Figure 3. Kotzebue Sound commercial fishing district, villages and subsistence fishing areas.

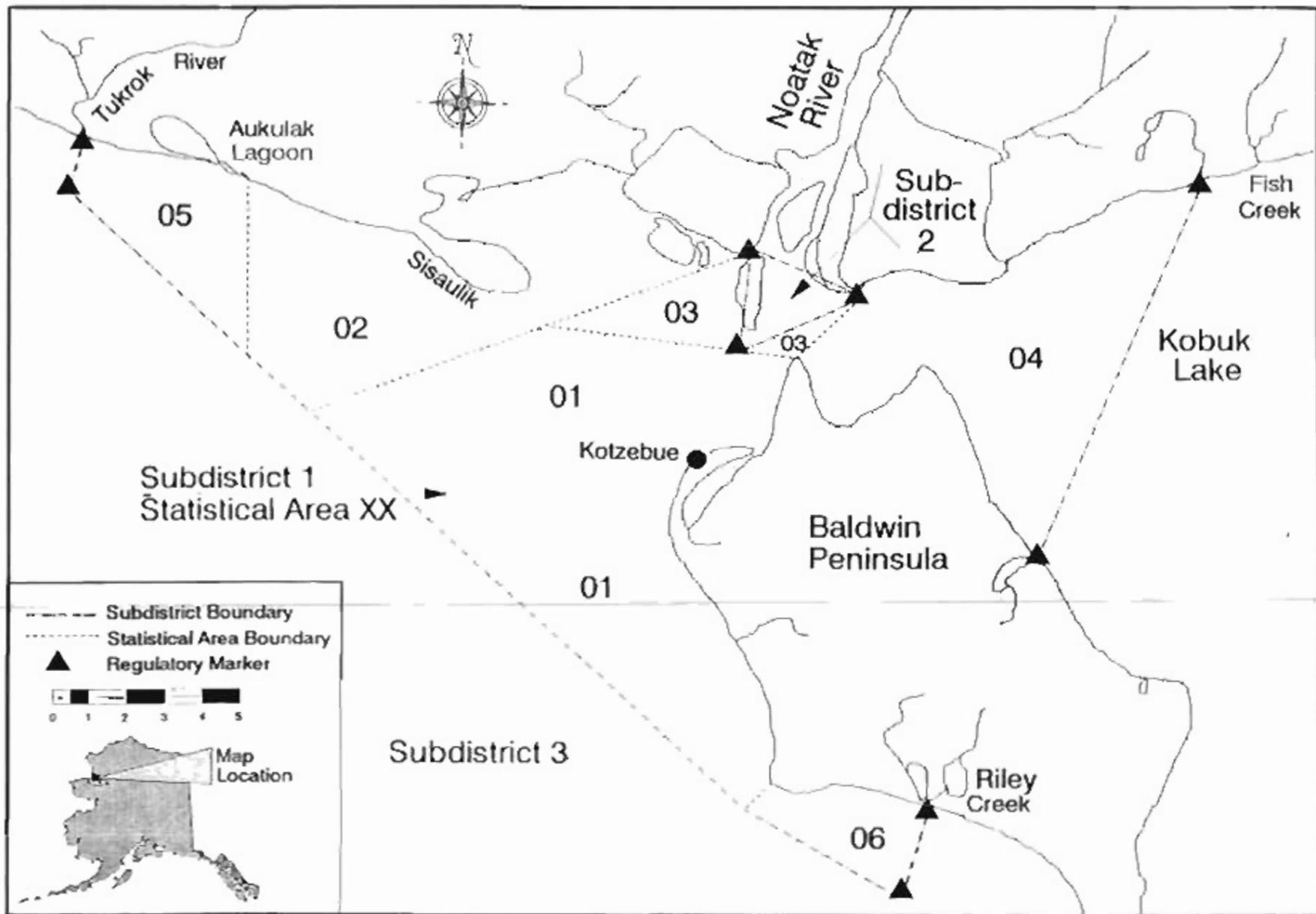


Figure 4. Kotzebue Sound commercial fishing subdistricts and statistical areas.

Kotzebue District Chum Salmon

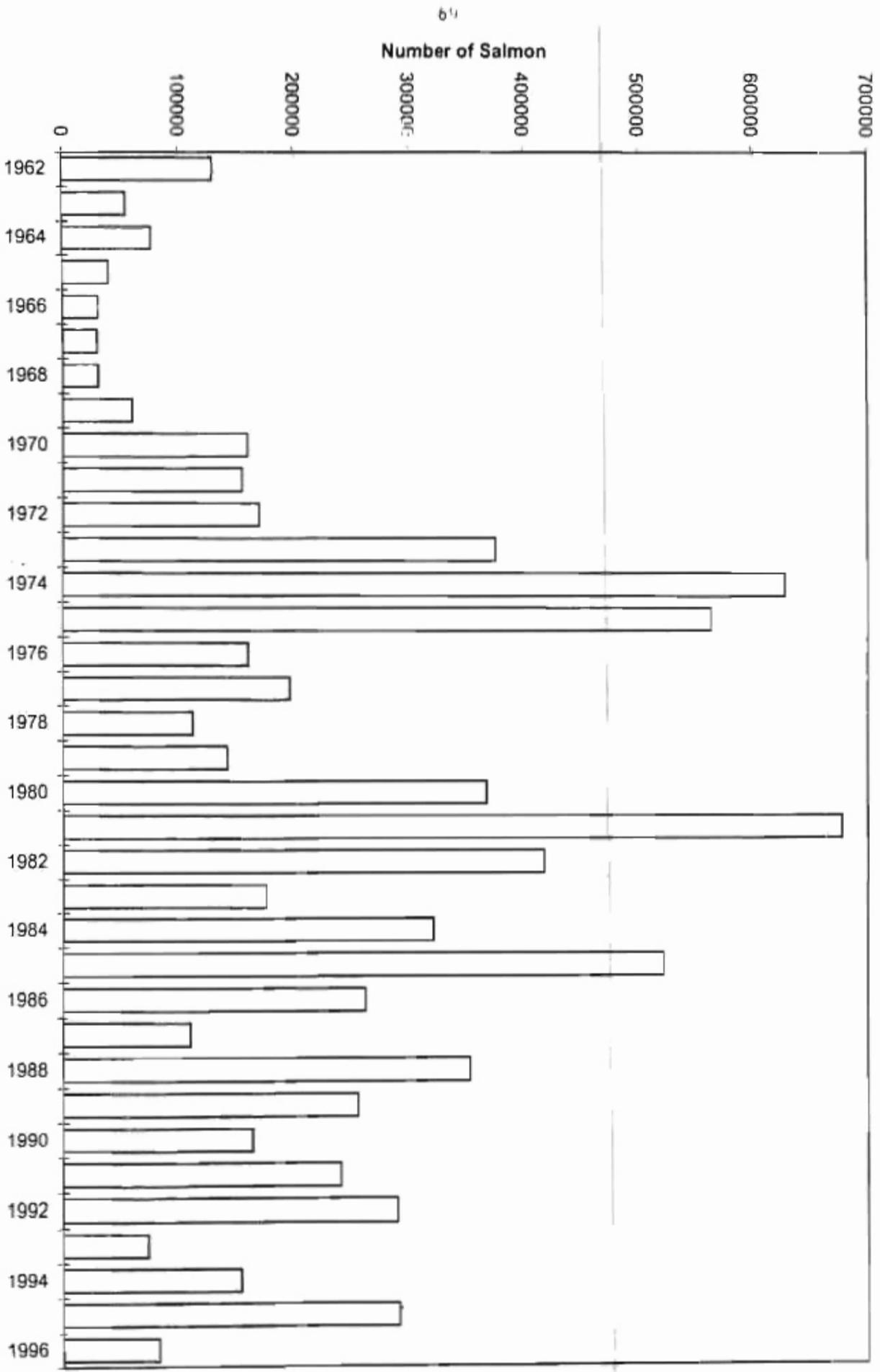


Figure 5. Kotzebue District historical chum salmon commercial catch.

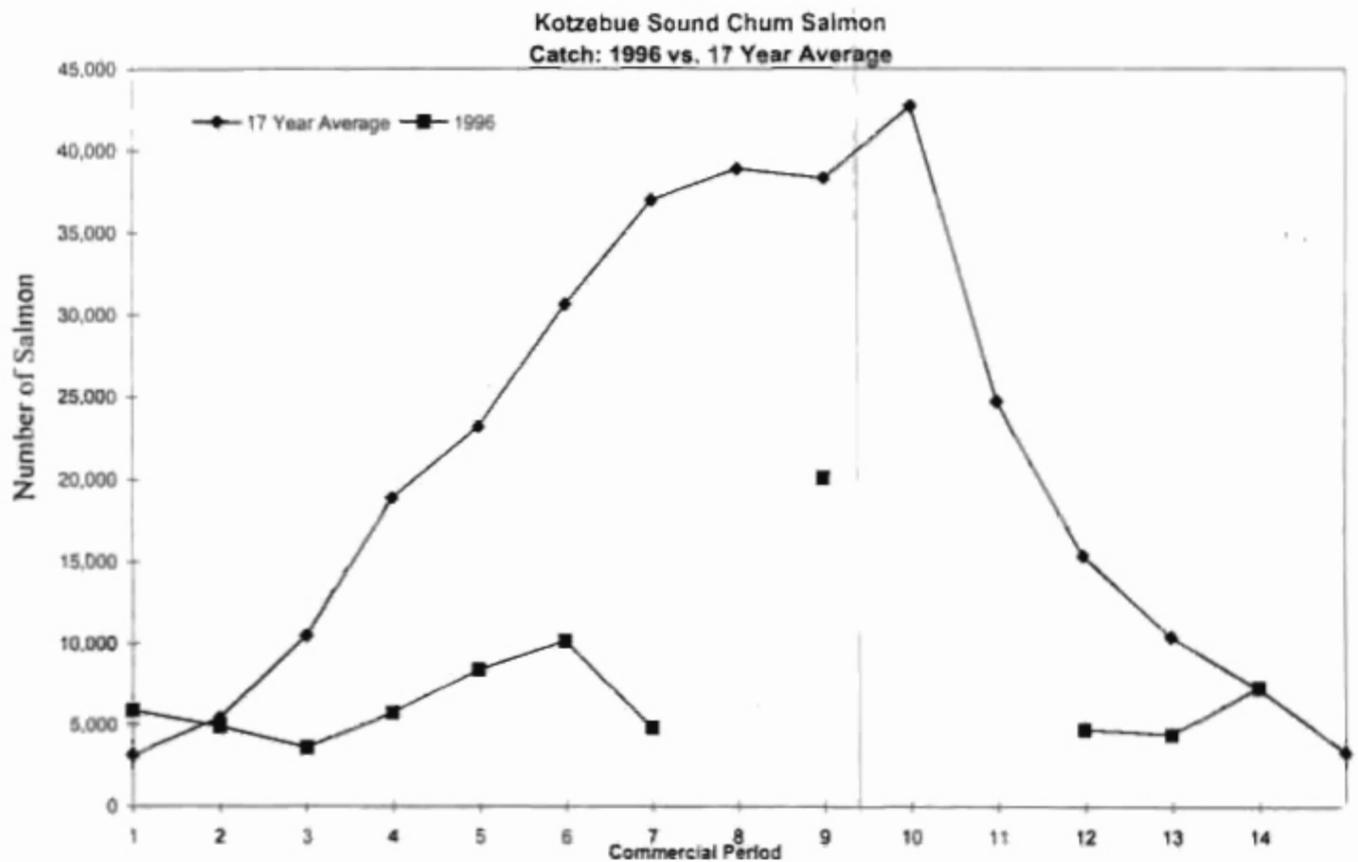
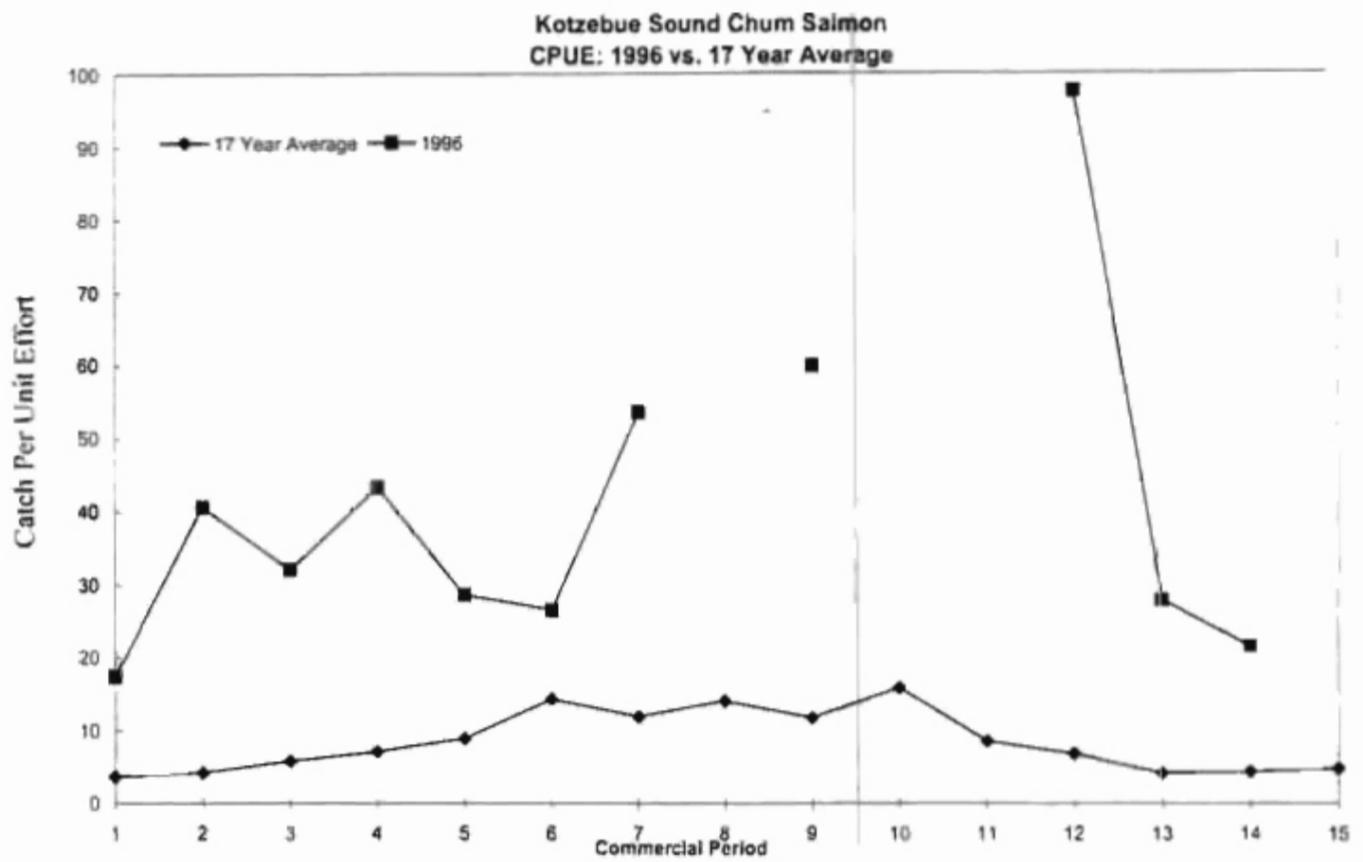


Figure 6. Kotzebue District previous 17 year average (1979-1995) and 1996 catch and catch per unit comparisons.

Kotzebue Sound Commercial Chum Salmon

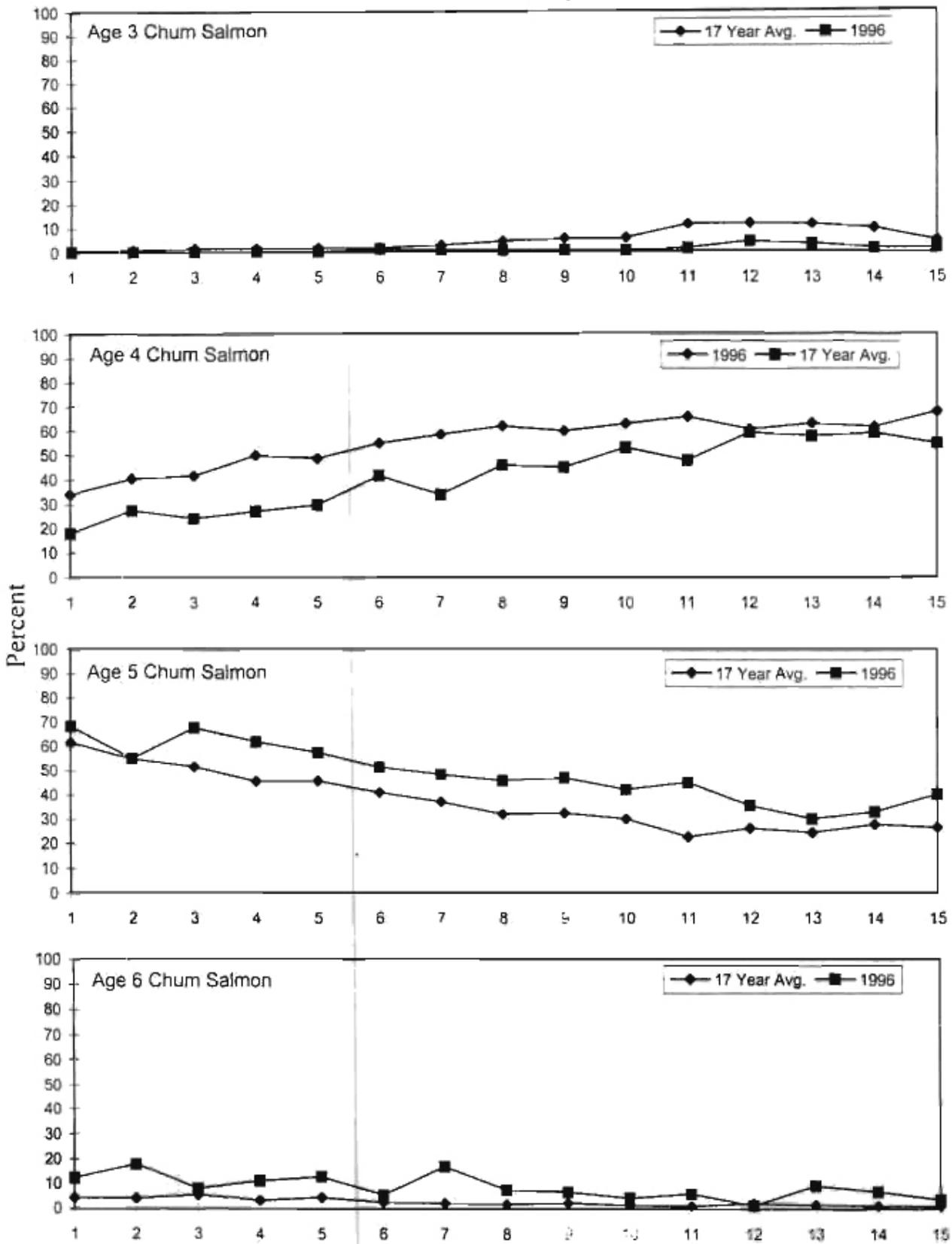


Figure 7. Kotzebue District commercial chum salmon percent age composition, comparing 1996 to the 17 year historical average (1979-1995).

Kotzebue District Historical Chum Salmon Aerial Surveys

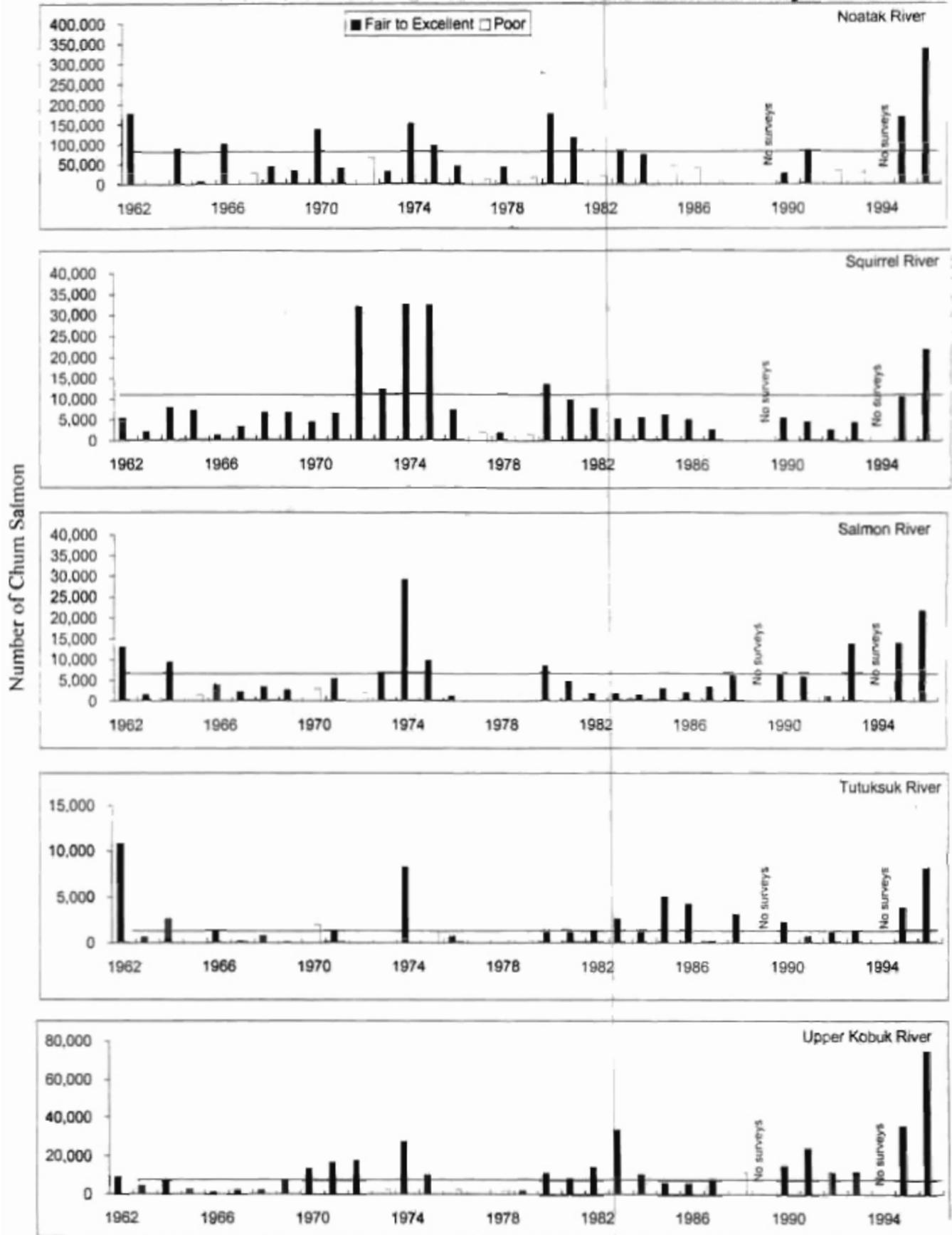


Figure 8. Kotzebue District peak aerial surveys of chum salmon in the Noatak, Squirrel, Salmon, Tutuksuk and Upper Kobuk Rivers. (The horizontal line indicates the escapement goals for these rivers. These goals were established in the mid-1980's using limited information. No aerial surveys were conducted in 1989 or 1994 due to poor weather.)

Kobuk River Drift Test Fish
Cumulative CPUE

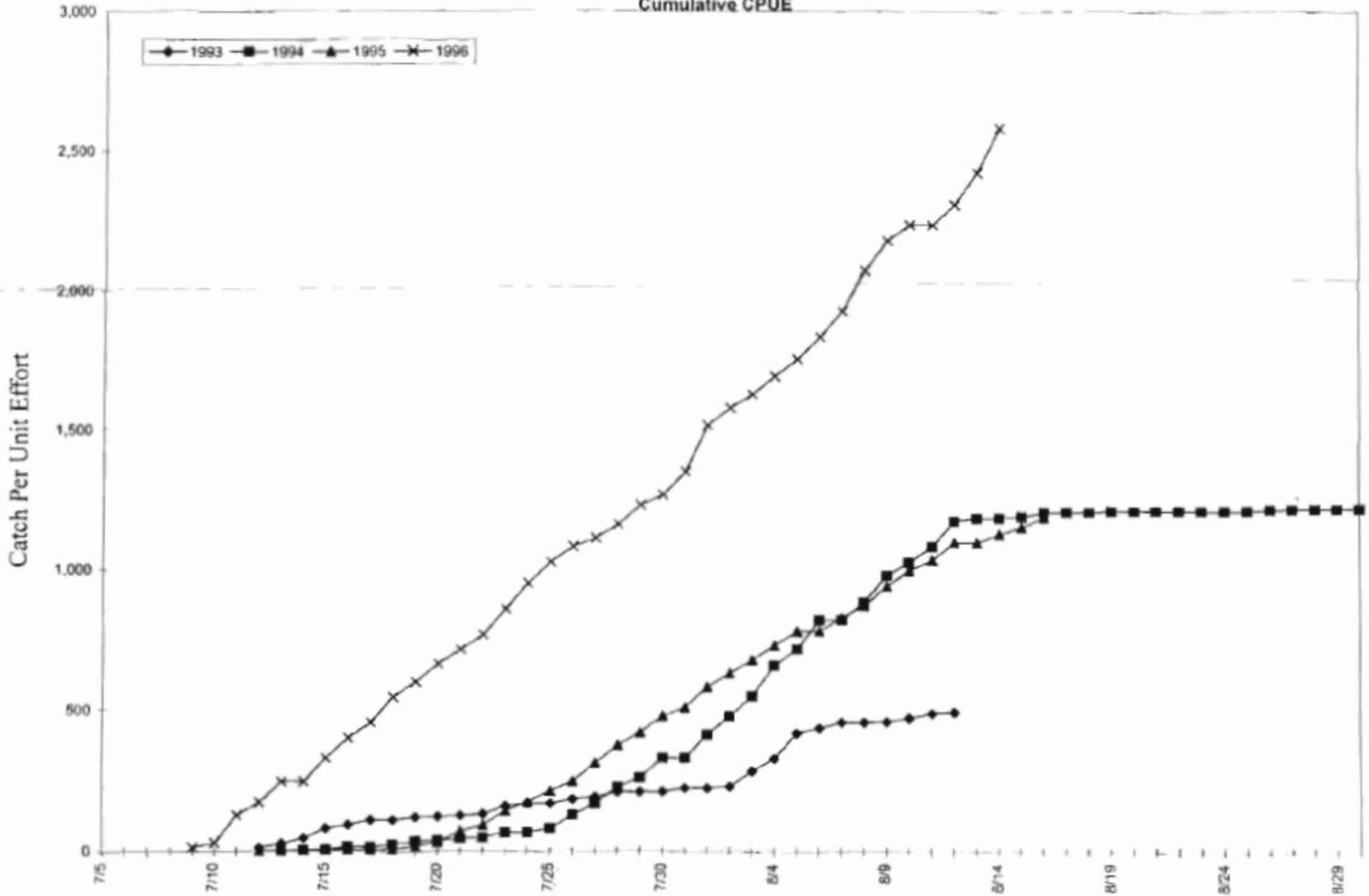


Figure 9. Kobuk River chum salmon drift test fish cumulative CPUE, 1993-1996.

Appendix Table C.1. Kotzebue District chum salmon commercial catch statistics, 1962-1996.

Year	Total Catch	Total Days ^a	Total Boat Days ^b	Average Catch per Boat Day	Number of Fishermen ^c	Average Seasonal Catch per Fishermen
1962	129,948	21.0	793	164	84	1,547
1963	54,445	20.0	693	79	61	893
1964	76,449	27.0	560	137	52	1,470
1965	40,025	32.0	410	98	45	889
1966	30,764	35.0	548	56	44	699
1967	29,400	33.0	556	53	30	980
1968	30,212	34.0	858	35	59	512
1969	59,335	40.0	798	74	52	1,141
1970	159,664	32.0	1,368	117	82	1,947
1971	154,956	29.0	1,468	106	91	1,703
1972	169,664	35.0	2,095	81	104	1,631
1973	375,432	25.0	2,217	169	148	2,537
1974 ^d	627,912	32.0	3,769	167	185	3,394
1975 ^e	563,345	39.0	4,301	131	267	2,110
1976	159,796	16.0	2,236	71	220	726
1977	195,895	21.0	2,353	83	224	875
1978	111,494	23.0	2,738	41	208	536
1979	141,623	21.0	2,462	58	181	782
1980	367,284	27.0	2,559	144	176	2,087
1981	677,239	27.0	3,336	203	187	3,622
1982	417,790	23.5	3,115	134	199	2,099
1983	175,762	12.5	1,557	113	189	930
1984	320,206	19.5	2,432	132	181	1,769
1985	521,406	25.5	3,376	154	189	2,759
1986	261,436	15.5	2,049	128	187	1,398
1987	109,467	11.5	1,160	94	160	684
1988	352,915	21.5	2,761	128	193	1,829
1989	254,617	22.2	1,961	130	165	1,543
1990	163,263	11.5	1,760	93	153	1,067
1991	239,923	22.5	1,795	134	142	1,690
1992	289,184	17.0	1,513	191	149	1,941
1993 ^f	73,071	7.0	431	170	114	641
1994 ^g	153,452	9.8	426	361	109	1,408
1995	290,730	9.7	282	1,033	92	3,160
1996 ^{hh}	82,110	6	76	1,079	55	1,493

a Day = 24 hours of open fishing time.

b Boat days standardized in 1983 for all prior years. Boat days = number of boats fishing times period length in hours divided by 24. Total boat days = total season boat hours divided by 24.

c During 1962-1966 and 1968-1971 figures represent the number of vessels licensed to fish in the Kotzebue District, not the number of fishermen.

d Includes 6,567 chum salmon from the Deering experimental fishery.

e Includes 10,704 chum salmon from the Deering experimental fishery.

f Includes 2,000 chum salmon from the Sikusuilaq Springs Hatchery terminal fishery.

g Includes 4,000 chum salmon commercially caught but not sold on July 29.

h Includes 2,200 chum salmon commercially caught but not sold on July 29.

Appendix Table C.2. Kotzebue District chum salmon type of processing and weights, 1962-1996.

Year	Chum Salmon		Other ^a	Fresh Frozen Salmon Roe (pounds)	Cured Pounds
	Cases (48lbs)	Fresh Frozen (Round weight in pounds)			
1962	14,500				
1963	5,396				
1964	5,421	202,993			
1965	1,929	207,350			
1966		310,716		13,600	3,065
1967		273,420			11,488
1968		288,500			11,850
1969		455,013			8,183
1970		1,240,000			48,377
1971		1,264,753			27,542
1972		1,547,041			55,376
1973		3,416,431			144,768
1974		5,361,130 ^b			
1975		4,877,313 ^c			
1976		1,415,549	487		
1977		1,846,340	1,075		
1978		1,009,121	32,419		
1979		1,236,429	6,155		
1980		3,160,948	7,828		
1981		6,139,518	2,210		
1982		3,833,051	790	100	
1983		1,647,160	2,449		
1984		2,631,582	1,593		
1985		4,528,379	1,106		
1986		2,271,320	1,691		
1987		900,405	597		
1988		3,060,292	2,120		
1989		2,163,174	1,426		
1990		1,453,040	538		
1991		1,951,041	714		
1992		2,397,302	2,714		
1993 ^d		613,968	1,507	1,000	
1994 ^e		1,166,494	73		
1995		2,329,898	93		
1996 ^f		97,510	51		

^a Chinook and pink salmon.

^b Includes 36,775 pounds from the experimental commercial fishery at Deering.

^c Includes 80,801 pounds from the experimental commercial fishery at Deering.

^d Includes 11,160 pounds from the Sikusuilag Springs Hatchery terminal fishery. Pounds of roe stripped are from a verbal report.

^e Includes 31,500 pounds commercially caught but not reported on fish tickets.

^f Includes 17,600 pounds commercially caught but not sold on fish tickets.

Appendix Table C3. Kotzebue District commercial fishery dollar value estimates, 1962-1996. ^a

Year	Gross Value of Catch to Fishermen	Wholesale Value of Pack ^b	License and Tax Revenue to State
1962	\$4,500	\$304,500	\$11,635
1963	\$9,140	\$113,316	\$6,040
1964	\$34,660	\$158,020	\$5,279
1965	\$18,000	\$83,294	\$2,952
1966	\$25,000	\$84,630	\$2,820
1967	\$28,700	\$100,450	\$4,245
1968	\$46,000	\$62,000	\$2,800
1969	\$71,000	†	
1970	\$186,000	†	\$5,520
1971 ^c	\$200,000	†	\$5,970
1972 ^d	\$260,000	†	
1973	\$925,000	†	
1974	\$1,822,784	†	\$18,121
1975	\$1,365,648	†	\$16,955
1976	\$580,375	†	\$15,364
1977	\$1,033,950	†	\$19,960
1978	\$575,260	†	\$9,913 ^e
1979	\$990,263	†	\$18,302 ^e
1980	\$1,446,633	†	\$11,820 ^e
1981	\$3,246,793	†	\$11,220 ^e
1982	\$1,961,518	†	\$7,085 ^e
1983	\$420,736	†	\$24,097 ^e
1984	\$1,148,884	†	\$39,696 ^e
1985	\$2,137,368	†	\$6,720 ^g
1986	\$931,241	†	\$6,840 ^g
1987	\$515,000	†	\$6,930 ^g
1988	\$2,581,333	†	\$11,490 ^g
1989	\$613,823	†	\$11,250 ^g
1990	\$438,044	†	\$11,370 ^g
1991	\$437,948	†	\$10,920 ^g
1992	\$533,731	†	\$10,565 ^g
1993 ^h	\$235,061	†	\$10,645 ^g
1994	\$233,512	†	\$10,520 ^g
1995	\$316,031	†	\$10,315 ^g
1996	\$56,310	†	\$10,565 ^g

^a Some estimates between 1962 and 1981 include only chum value which in figures represent over 99% of the total value. Figures after 1981 represent the chum value as well as incidental species such as char, whitefish and other salmon.

^b Based on type of processing when fish were shipped out of the district.

^c Includes \$9,193 from the experimental commercial fishery at Deering.

^d Includes \$17,776 from the experimental commercial fishery at Deering.

^e Includes permit and vessel fees only.

^f Information not available.

^g Includes permit renewal fees only; vessels were not required.

^h Includes \$3,648 from the Sikusuilaq Springs Hatchery terminal fishery.

Appendix Table C.4. Kotzebue District mean prices paid per pound to salmon fishermer species, 1962-1996 ^a

Year	Chum Salmon		Chinook Salmon	Pink Salmon	Inconnu	Dolly Varden
	Average Weight	Average Price				
1962		\$0.35 ^c				
1963		\$0.35 ^c				
1964	8.3	\$0.45 ^c				
1965	9.0	\$0.45			\$1.30 ^c	
1966	10.1	\$0.11			\$1.40 ^c	\$0.55
1967	9.3	\$0.11			\$1.50 ^c	\$0.75
1968	9.7	\$0.14			\$0.91 ^c	\$0.98
1969	7.5	\$0.15			\$1.30 ^c	\$2.84
1970	8.1	\$0.15				
1971	8.1	\$0.16			\$0.16	\$0.17
1972	9.1	\$0.17			\$0.20	\$0.17
1973	9.1	\$0.25			\$0.30	\$0.16
1974 ^b	8.5	\$0.34			\$0.30	\$0.16
1975 ^b	8.6	\$0.28			\$0.30	\$0.30
1976	8.9	\$0.41			\$0.30	\$0.30
1977	9.6	\$0.56			\$0.30	
1978	9.1	\$0.57			\$0.30	\$0.25
1979	8.8	\$0.80				\$0.25
1980	8.6	\$0.46			\$0.10	\$0.20
1981	9.1	\$0.53			\$0.75	\$0.17
1982	9.3	\$0.51	\$1.25	\$0.15	\$0.75	\$0.20
1983	9.4	\$0.25	\$1.08	\$0.13		\$0.20
1984	8.2	\$0.44	\$1.03			\$0.25
1985	8.7	\$0.47	\$1.25			\$0.25
1986	8.7	\$0.41	\$1.25			\$0.20
1987	8.2	\$0.57	\$1.25			\$0.30
1988	8.7	\$0.85	\$1.98			\$0.35
1989	8.5	\$0.28	\$1.72			\$0.28
1990	8.9	\$0.31	\$2.00			\$0.25
1991	8.1	\$0.22	\$1.64		\$0.50	\$0.18
1992	8.3	\$0.22	\$1.89		\$0.58	\$0.10
1993	8.5	\$0.38	\$2.37		\$0.50	\$0.10
1994	7.8	\$0.20	\$1.14			\$0.17
1995	8.0	\$0.13	\$1.00		\$0.50	\$0.20
1996	8.0	\$0.09	\$1.00		\$0.44	\$0.25

^a Information not available for some species in some years.

^b Includes price paid to fisherment of Deering during the experimental commercial fishery.

^c Price per fish.

Appendix Table C.5. Kotzebue District commercial and subsistence salmon catches, 1914-1996.

Year ^a	Commercial Catch			Subsistence Chum Catch			
	Chum ^b	Other ^c	Total	Chum	Number of Fishermen Interview	Average Catch per Fishermen	Total Documented Catch
1914	8,550		8,550				
1915	4,750		4,750				
1916	19,000		19,000				
1917	44,612		44,612				
1918	27,407		27,407				
1957				298,430 ^d			
1962	129,948	27	129,975	70,283	81	868	200,258
1963	54,445	143	54,588	31,069	67	464	85,657
1964	76,499	5	76,504	29,762	58	513	106,266
1965	40,034		40,034	30,500	89	343	70,534
1966	30,764	1	30,765	35,588	121	294	66,353
1967	29,400		29,400	40,108	135	297	69,508
1968	30,384 ^e		30,384	20,814	65	320	51,198
1969	59,335	48	59,383	29,812	99	301	89,195
1970	159,664		159,664	28,486	164	174	188,150
1971	154,958	1	154,957	23,959	152	158	178,916
1972	169,664	3	169,667	11,085	96	115	180,752
1973	375,432	5	375,437	18,942	101	188	394,379
1974	634,479 ^f	48	634,527	26,729	88	304	661,256
1975	563,682 ^g	36	563,718	27,605	95	291	591,323
1976	159,798	2	159,798	15,765	91	173	175,563
1977	195,895		195,895	9,752	83	117	205,647
1978	111,494	7,007	118,501	12,864	85	151	131,365
1979	141,623	910	142,533	14,605	97	151	157,138
1980	367,284	1,654	368,938	10,945	111	99	379,883
1981	677,239	237	677,476	17,766	71	250	695,242
1982	417,790	57	417,847	30,133	204	148	447,980
1983	175,762	229	175,991	8,262 ^h	46	180	184,253
1984	320,206	107	320,313	15,508 ^h	66	235	335,821
1985	521,406	63	521,469	13,494 ⁱ	243	56	534,963
1986	261,436	106	261,542	36,311	837	43	297,853
1987	109,467	44	109,511				109,511
1988	352,915	152	353,067				353,067
1989	254,617	87	254,704				254,704
1990	163,263	32	163,295				163,295
1991	239,923	44	239,967				239,967
1992	289,184	204	289,388				289,388
1993	73,071 ^k	131	73,202				73,202
1994	153,452 ^l	3	153,455				153,455
1995	290,730	5	290,735	102,881	582	177	393,616
1996	82,110 ^m	3	82,113	102,029	596	171	184,142
1979-96							
Average	271,749	226	271,975		159	84	

^a There was no commercial fishing during 1919-1961.

^b Catches for 1914-1918 are from pack data only. Number of chum salmon estimate at 9.5 per case (#48) and 34 per barrel.

^c Includes pink, chinook, and sockeye salmon.

^d Estimated mean annual catches prior to 1957 (study by Raleigh).

^e Corrected from 1968 annual report due to addition of late catches.

^f Includes 6,567 chum salmon from the Deering experimental fishery.

^g Includes 10,704 chum salmon from the Deering experimental fishery.

^h Partial survey.

ⁱ Does not include harvest from the villages of Noatak and Kivalina.

^j Not surveyed.

^k Includes 2,000 chum salmon from the Sikusuliaq Springs Hatchery terminal fishery.

^l Includes 4,000 chum salmon commercially harvested on August 5 but not sold.

^m Includes 2,200 chum salmon commercially harvested on July 29 but not sold.

Appendix 1. 6. Kotzebue District subsistence chum salmon catches by village, 1962-1996.

Year	Village							Village						District Total
	Noorvik	Kiana	Ambler ^b	Shungnak	Kobuk	Kobuk River	Noatak Village	Kotzebue	Deering	Kivalina	Buckland	Candle	Shishmaref	
1962	15,934	3,139			2,321	21,394	48,890							70,284
1963	4,304	1,973	755	1,240	200	8,472	16,762	5,635						31,069
1964	2,167	783	2,142	3,134	1,020	9,246	12,763	7,753						29,762
1965	5,596	1,598	1,340	2,160	877	11,571	5,671	8,058	5,200					30,500
1966	3,141	433	912	899	625	6,010	19,700	3,640	6,238					35,588
1967	2,350	1,489	679	1,500	175	6,193	26,512	4,032	3,098		162	11	100	40,108
1968	2,424	2,488	457	1,600	1,030	7,999	5,490	4,324	2,838		37	89	37	20,814
1969	1,301	2,458	3,525	2,550	1,655	11,469	14,458	1,768	1,897			200		29,812
1970	6,077	3,457	2,899	3,460	600	16,483	4,120	6,814	1,242		344	113		29,116
1971	7,144	5,177	2,299	2,653	1,931	19,204	9,919	1,737	763		155	50	131	31,959
1972	1,744	1,435	1,469	2,605	2,119	9,432	741	1,151	369		59	113	29	11,804
1973	2,312	4,470	1,529	4,406	1,917	14,634	216	1,172	1,098		1,722	50	100	18,992
1974	6,809	2,726	1,651	6,243	2,251	19,680	4,330		1,880		639	15	200	26,744
1975	4,820	4,320	3,390	9,060	1,755	23,145	1,515		1,175		1,540		230	27,605
1976	1,565	1,579	2,000	4,213	562	9,909	4,448		1,358					15,716
1977	891	766	385	1,760	325	4,127	2,125		3,500					9,752
1978	2,034	1,493	2,224	4,766	852	11,369	1,495					50		12,914
1979	2,155	1,225	2,400	2,947	651	9,378	2,227		2,000		1,000			14,605
1980	2,229	2,551	660	2,704	350	8,494	2,135							10,629
1981	3,488	1,439	782	2,800	950	9,459	5,465	2,387	295	110	50			17,700 ^{a,c}
1982	7,433	4,918	2,506	4,191	600	19,648	5,479	4,099	807	210				30,243 ^a
1983 ^{a,d}	277	223	1,062	3,556	368	5,486	4,035	347	219	200				10,287
1984 ^{a,e}			2,990	4,241		7,231	6,049	88	1,940	200				15,508
1985	7,015	3,494	3,487	3,115	300	17,411		13,494	573					31,478
1986	8,418			4,483		12,901	1,246	36,311						50,458
1987	5,082			1,975		7,057	2,921							9,988
1988	7,500			6,223		13,723								13,723
1989				3,894		3,894	1,595							5,489
1990	4,353					4,353	3,915							8,268
1991	6,855			4,248		11,103	3,637							14,740
1992	8,370			3,890		12,260	2,043							14,303
1993	8,430			3,730		12,160	3,270							15,430
1994	8,157	1,891	2,860	7,982	5,722	26,612	6,126		3,488					36,226
1995	15,485	5,985	8,558	5,880	2,959	38,867	6,350	50,708					6,947	102,881
1996	13,811	5,935	9,062	8,649	1,819	39,076	10,091	50,573						98,740

^a No household survey, information is from return of mail questionnaires.^b Not surveyed.^c Does not include 310 chum salmon taken in Selawik.^d Household surveys were conducted in Noatak, Kivalina, and Shungnak only. Other harvest information is from limited return of mail-in calendars.^e Household surveys were conducted in Noatak, Kivalina, Ambler, and Deering. Other harvest information is from limited return of mail-in questionnaires.

Appendix Table C.7. Kotzebue District mean subsistence chum salmon catch per fisherman by village, 1962-1996.

Year	Kotzebue	Noatak	Noorvik	Kiana	Ambler	Shungnak	Kobuk	Deering
1962	^a	1190	665	350	^a	^a	335	^a
1963	650	800	160	^b	94	^b	67	^a
1964	515	710	220	260	310	^a	205	^a
1965	400	810	220	265	190	220	145	^a
1966	158	820	137	62	76	45	104	^a
1967	202	914	90	68	49	125	35	^a
1968	135	220	84	96	33	114	206	^a
1969	98	760	163	223	235	318	206	^a
1970	187	242	132	138	242	182	150	^a
1971	53	148	223	207	177	133	386	^a
1972	63	74	84	84	244	266	302	^a
1973	195	36	121	178	305	489	273	^a
1974	^a	393	324	181	165	891	450	^a
1975	^a	138	210	288	282	647	293	^a
1976	^a	212	259	79	250	281	70	^a
1977	^a	425	56	38	55	104	41	^a
1978	^a	79	88	71	131	265	142	^a
1979	^a	114	98	68	160	184	108	^a
1980	^a	164	318	213	132	246	88	^a
1981	213	579	388	131	129	233	317	^a
1982	84	189	323	246	167	262	200	81
1983 ^c	50	269	139	223	531	254	368	44
1984	44	173	^a	^a	214	303	^a	194
1985	107	^a	206	116	152	195	50	72
1986	47	69 ^d	271	^a	^a	195	^a	^a
1987	^a	225 ^d	189	^a	^a	329	^a	^a
1988	^a	^a	300	^a	^a	389	^a	^a
1989	^a	133	^a	^a	^a	216	^a	^a
1990	^a	135	198	^a	^a	^a	^a	^a
1991	^a	145	311	^a	^a	283	^a	^a
1992	^a	89	310	^a	^a	243	^a	^a
1993	^a	136	312	^a	^a	196	^a	^a
1994 ^e	^a	90	133	32	99	154	260	92
1995	71	69	123	59	110	111	110	^a
1996	73	115	117	58	111	154	76	^a

^a Not Surveyed.

^b Number of fishermen not known.

^c Means based on very limited number of mail-in calendars except for the villages of Noatak and Shungnak where interviews were conducted.

^d Partial harvest, fishermen were just beginning to fish.

^e Preliminary information based on interviews conducted by Division of Subsistence.

Appendix Table C.8. Chum salmon aerial survey counts for the Kotzebue District, 1962-1996^a. (p. 1 of 4)

Stream	1962	1963	1964	1965	1966	1967	1968	1969	1970
Noatak Drainage									
Noatak River below Kelly River	168,000 ^d	1,970 ^{bc}	89,798	6,152 ^{bc}	101,640	29,120 ^b	39,394	33,945	
Eli River	9,080 ^a	35			120		5,502 ^f	68 ^f	138,145
Kelly River & Lake	1,818 ^d	600		3,155	570	225	375	150	
Noatak River System Total	178,898	2,605	89,798	9,307	102,330	29,345	45,271	34,163	
Kobuk Drainage									
Kobuk to Pah River		400		1,750	266		530		
Pah River to just below Selby River		1,530		500			50		1,753
Selby River mouth & Slough		1,045		500	630	1,625	70		20
y R. mouth to just below Beaver C.		1,095				75	170		4,820
Beaver Creek mouth					460	795	1,550		2,385
Above Beaver Creek		465			118				4,930
Upper Kobuk River Total	9,224 ^a	4,535	7,985 ^b	2,750	1,474	2,495	2,370	7,500 ^c	13,908
Squirrel River	5,834 ^d	2,200	8,009	7,230	1,350	3,332	6,746	6,714	
Salmon River	12,936 ^d	1,535	9,353	1,500 ^b	3,957	2,116	3,367	2,561	4,418
Tutuksuk River	10,841 ^d	670	2,685		1,383	169	823 ^a	159	3,000 ^b
Kobuk River System Total	38,835^e	8,940	28,032	11,480	8,164	8,112^e	13,306	16,934	2,000^a

(continued)

Appendix Table C.8. (p. 2 of 4)

Stream	1971	1972 *	1973 *	1974	1975	1976	1977 *	1978	1979	1980
Noatak Drainage										
Noatak River below Kelly River	41,056	64,315	32,144	129,640	96,509	44,574	11,221	37,817	15,721 *	164,474
Eli River		3,286		22,249	1,302	1,205	742	5,525	1,794	10,277
Kelly River & Lake			2,590 *	1,381 *	3,937	217 *	290 *	168 *	3,200 *	7,416
Noatak River System Total	41,056	64,315 *	34,734	153,270	101,748	45,996	12,253 *	43,510	20,715	182,167
Kobuk Drainage										
Kobuk to Pah River	4,953			2,255	1,873	485		269	75	1,694
Pah River to just below Selby River	2,039	1,865		4,710	3,968	2,037		1,448	183	2,069
Selby River mouth & Slough	3,490	7,400		7,380				211	1,110	
by R. mouth to just below Beaver C.	4,720	3,170	920	13,775 *	4,861 *			53	640	6,925 *
Beaver Creek mouth	2,000	3,000	850							784
Above Beaver Creek		2,720	700							
Upper Kobuk River Total	17,202	18,155	2,470 *	28,120	10,702	2,522 *		1,981 *	2,008	11,472
Squirrel River	6,628	32,126	12,345	32,523	32,256	7,229	1,964 *	1,863 *	1,500 *	13,563
Salmon River	5,453	2,073 *	6,891	29,190	9,721	1,161		814 *	674 *	8,456
Tutuksuk River	1,384 *			8,312	1,344 *	758		368 *	382 *	1,165
Kobuk River System Total	30,667	52,354	21,706	98,145	54,023	11,670	1,964	5,026	4,564	34,656

(continued)

Stream	1981 [*]	1982 [*]	1983	1984	1985 [*]	1986 [*]	1987 [*]	1988 [*]	1989 [*]	1990 [*]
Noatak Drainage										
Noatak River below Kelly River	118,352	20,682	79,773	67,873	45,525	37,227	5,515 ^{**}	45,930 ^{**}		23,345 [*]
Eli River		189	3,044	5,027	855	4,308	2,780	8,639		3,000
Kelly River & Lake	13,770	11,604	12,137	3,499	1,200	839	950	1,460		325 [*]
Noatak River System Total	130,122	32,475	94,954	76,399	47,580	42,374	9,245	56,029		26,670
Kobuk Drainage										
Kobuk to Pah River	18	2,643 [*]	2,147	402	2,048 [*]	531	—			4,610
Pah River to just below Selby River	309	598 [*]	2,433	257	241 [*]	511	2,250	1,135 [*]		305
Selby River mouth & Slough	8,321 ^{**}	2,454	11,683		711 [*]	673	1,470	820 [*]		420
y R. mouth to just below Beaver C.		7,268	13,011	5,910	3,278 [*]	3,282	1,350	6,890 [*]		7,505
Beaver Creek mouth		1,711	3,059							
Above Beaver Creek			1,413	4,052		1,018	3,140	3,050 [*]		2,515
Upper Kobuk River Total	8,648	14,674	33,746	10,621	6,278	6,015	8,210	11,895 [*]		15,355
Squirrel River	9,854	7,690	5,115	5,473	6,160	4,982	2,708 [*]	4,848 [*]		5,500
Salmon River	4,709	1,821 [*]	1,677	1,471	2,884	1,971	3,333	6,208		6,335
Tuluksuk River	1,114	1,322	2,637	1,132	5,098	4,257	206	3,122		2,275
Kobuk River System Total	24,325	25,507	43,175	18,697	20,420	17,225	14,457	26,073		29,465

(continued)

Appendix Table C.6. (p. 4 of 4)

Stream	1991	1992 ^a	1993	1994 ^b	1995	1996	Aerial Escapement Goals
Noatak Drainage							
Noatak River below Kelly River	82,750	34,335	25,415		147,260	306,900	
Eli River	2,940	701	4,795		7,880	30,040	
Kelly River & Lake	654	726	9		8,384	1,427	
Noatak River System Total	86,344	35,762	30,219		163,504	338,367	84,000
Kobuk Drainage							
Kobuk to Pah River	9,840	1,030	3,896		12,190	20,700	
Pah River to just below Selby River	2,780	3,820	1,535		4,537	4,600	
Selby River mouth & Slough	1,040	1,500	1,800		1,250	4,100	
Selby River	1,460	868	824		3,364	14,950	
by R. mouth to just below Beaver C.	5,250	3,845	929		10,898	15,480	
Beaver Creek mouth							
Above Beaver Creek	4,155	740	3,174		3,486	14,940	
Upper Kobuk River Total	24,525	11,803	12,158		35,725	74,770	10,000
Squirrel River	4,606	2,765	4,463		10,605	10,740	11,500
Salmon River	5,845	1,345	13,880		13,988	23,790	7,000
Tutuksuk River	744	1,162	1,196		3,901	21,805	2,000
Kobuk River System Total	35,720	17,075	31,697		64,219	131,105	30,500

^a Three aerial surveys are attempted yearly at different intervals for each tributary to assess escapements prior to the peak, at the peak and after the peak of the run. Indices listed in this table are the largest survey observed for each tributary during the given year.

^b Poor survey conditions or incomplete, early or late survey.

^c Survey by foot or boat.

^d These fish are unidentified salmon, mostly chums.

^e This figure includes fish observed from just above Selby Slough to the mouth of the Reed River.

^f Unresolvable discrepancies in historical data put this figure in question.

^g Unclear where these fish were observed.

^h The figures in this table have been corrected and supercede figures in previous reports.

ⁱ Surveyed within peak of migration.

^j Unacceptable millions.

Appendix Table C. 9. Kotzebue District commercial age and sex composition of chum salmon, 1962-1996.

Year	Sample Size	Percent		Percent Age Class				
		Males	Females	Age-3	Age-4	Age-5	Age-6	Age-7
1962	89	26.1	73.9	7.2	63.8	27.5	1.4	0.0
1963	255	34.9	65.1	30.2	51.0	18.4	0.4	0.0
1964	463	43.6	56.4	52.9	44.9	1.7	0.4	0.0
1965	480	42.1	57.9	2.3	91.0	6.7	0.0	0.0
1966	430	40.2	59.8	10.0	67.2	22.8	0.0	0.0
1967	1,865	37.3	62.7	8.8	72.2	18.5	0.5	0.0
1968	1,989	48.2	51.8	21.2	58.1	19.8	0.9	0.0
1969	1,125	53.7	46.3	36.8	58.3	4.9	0.0	0.0
1970	267	45.3	54.7	3.7	91.0	5.2	0.0	0.0
1971	1,105	54.6	45.4	7.1	66.8	26.1	0.0	0.0
1972	980	50.9	49.1	15.8	59.5	24.1	0.6	0.0
1973	598	46.0	54.0	16.7	69.4	13.9	0.0	0.0
1974	350	47.1	52.9	28.6	63.4	7.7	0.3	0.0
1975	340	46.5	53.5	2.6	86.8	10.6	0.0	0.0
1976	566	47.9	52.1	11.1	51.4	37.3	0.2	0.0
1977	446	49.3	50.7	6.7	72.9	18.6	1.8	0.0
1978	579	49.9	50.1	10.5	57.5	31.8	0.2	0.0
1979 ^b	658	53.3	46.7	30.5	53.2	15.2	1.1	0.0
1980 ^c	710	56.3	43.7	15.1	78.2	6.6	0.1	0.0
1981 ^d	1,167	52.4	47.6	2.4	67.1	30.5	0.0	0.0
1982	983	48.8	51.2	5.9	48.3	40.3	5.5	0.0
1983 ^e	1,979	43.4	56.6	5.8	57.7	34.2	2.3	0.0
1984 ^f	2,933	50.2	49.8	14.6	64.4	19.7	1.3	0.0
1985 ^g	3,293	47.8	52.2	0.4	83.7	15.5	0.4	0.0
1986 ^h	3,095	46.0	54.0	0.3	18.6	78.9	2.2	0.0
1987 ⁱ	1,967	52.0	48.0	15.0	43.0	31.0	11.0	0.0
1988	3,324	48.0	52.0	6.5	74.8	16.9	1.7	0.1
1989	3,336	49.3	50.7	0.7	77.9	20.4	1.0	0.0
1990 ^j	2,497	49.4	50.6	2.3	45.6	50.7	1.4	0.0
1991	3,262	46.4	53.6	2.9	60.4	35.8	0.9	0.0
1992 ^k	3,706	39.0	61.0	0.9	58.5	37.5	3.1	0.0
1993 ^l	3,707	50.9	49.1	2.9	26.3	66.5	4.2	0.1
1994 ^m	3,744	44.8	55.2	3.3	63.0	30.8	2.9	0.0
1995	4,621	50.9	49.1	2.3	59.8	36.0	1.9	0.0
17 Year Avg. (1979-1995)		47.6	52.4	7.0	59.0	32.0	2.0	0.0
1996 ⁿ	2,386	50.9	49.1	0.9	36.9	52.3	9.5	0.4

^a Commercial periods not sampled for years 1962 to 1978 are unknown.

^b Commercial openings 1 and 10 not sampled due to period closure.

^c Commercial openings 8, 13, and 15 not sampled due to period closure.

^d Commercial openings 8, 10, 12, and 14 not sampled due to period closure.

^e Commercial openings 11, 13, 14, and 15 not sampled due to period closure.

^f Commercial openings 14 and 15 not sampled due to period closure.

^g Commercial openings 1, 3, 5, 7, 9, 11, and 13 not sampled due to period closure.

^h Commercial opening 15 not sampled due to period closure.

ⁱ Commercial openings 1, 2, 4, 6, 7, 8, 10, 11, 14, and 15 not sampled due to period closure.

^j Commercial openings 11 to 15 not sampled due to period closure.

^k Commercial opening 12 was not sampled due to period closure.

^l Commercial openings 6, 8, 10, 11, 12, 13, 14 and 15 were closed periods. Closed periods were sampled for age and sex composition from commercial test nets and are included in the 1993 data.

Commercial openings 14 and 15 were closed periods. Closed periods were sampled for age and sex composition from commercial test nets and are included in the 1994 data.

^m The equivalent of commercial periods 8, 10, 11 and 15 were closed periods. These periods were sampled for age composition from commercial test nets and are included in the 1996 data.

Section 2: PACIFIC HERRING

(Includes Norton Sound and
Port Clarence/Kotzebue Districts)

SECTION 2 - PACIFIC HERRING

INTRODUCTION

Boundaries

The Norton Sound District consists of all waters of Alaska between the latitude of the western most tip of Cape Douglas and the latitude of Canal Point Light (Figures 10). The Port Clarence District consists of all waters of Alaska between the latitude of Cape Douglas and the latitude of Cape Prince of Wales. The Kotzebue Sound District consists of all waters of Alaska between the latitude of Cape Prince of Wales and the latitude of Point Hope (Figure 11).

Spawning Areas and Timing

The arrival of Pacific herring on the spawning grounds is greatly influenced by climate and oceanic conditions, particularly the extent and distribution of the Bering Sea ice pack. Most herring spawning populations appear near the eastern Bering Sea coast immediately after ice breakup between mid-May and mid-June. Spawning progresses in a northerly direction and may continue into July or August along portions of the Seward Peninsula or within the Chukchi Sea.

The primary spawning areas within Norton Sound have been from Stuart Island to Tolstoi Point. When sea ice has remained in this area into June, spawning has been more extensive along Cape Denbigh and several locations along the northern shore of Norton Sound between Bald Head and Bluff. More northerly spawning areas have been more difficult to identify due to small herring stock sizes and limited investigations. Likely spawning areas include Imuruk Basin, Shishmaref, Deering-Kiwalik, and Hotham Inlet.

NORTON SOUND DISTRICT

Fishing History

Pacific herring (*Clupea harengus pallasii*) have been utilized for subsistence purposes by coastal residents prior to the mid-1800's when their use was first documented by early explorers. The earliest American commercial effort on Bering Sea herring apparently took place in the early part of this century at Golovin Bay in Norton Sound (Appendix Table D1).

Food Herring

Early records indicate that about 3,200 short tons of "fall herring" were processed in Norton Sound from 1916 to 1941 (Appendix Table D1). This fishery was dependent on salt curing and declined because of poor marketing conditions arising from foreign competition. The Japanese began gillnetting in Norton Sound during 1968 with three vessels. Effort was concentrated about 12 miles offshore between St. Michael and Golovin. Approximately 40 Japanese vessels reported harvesting a record 1,400 short tons (st) of herring during 1969 (Appendix Table D2). An average annual harvest of approximately 440 st was reported in Norton Sound by the Japanese during 1968-1974. The Japanese gillnet fishery was prohibited in 1977.

Sac Roe

Domestic commercial effort resumed in Norton Sound in 1964 near Unalakleet and continued on a sporadic basis until 1979. Between 1964 and 1978 the fishery averaged about 14 short tons of herring annually and targeted on "spring herring" for sac roe extraction (Appendix Table D1). In 1979, a domestic herring fishery for sac roe began on a larger scale in Norton Sound when approximately 1,292 short tons (st) of herring were taken by 63 fishermen (13 purse seiners, 50 gillnetters). Purse seiners took 70% of the total catch.

After the 1979 season, the Alaska Board of Fisheries adopted a public proposal which made gillnets and beach seines the only legal commercial herring fishing gear within Norton Sound. A purse seine fishery could only be opened if the gillnet fleet could not take the allowable harvest. This regulation was an attempt to encourage involvement of local fishermen in this developing fishery. During the 1980 season, 294 gillnet fishermen harvested 2,452 short tons of herring (Appendix Table D3). Because gillnet fishermen demonstrated that they were capable of taking the available harvest, a regulation was passed in 1981 which prohibited any purse seine gear within Norton Sound.

Prior to the 1984 season, the harvest by beach seine fishermen was negligible. During 1984, ten beach seine fishermen harvested 327 st. During their 1984 fall meeting, the Board of Fisheries set a beach seine gear limit of 100 fathoms and limited the harvest to "not exceed 10 percent of the total herring sac roe harvest projection as published by the department." During the fall 1987 Board of Fisheries meetings, beach seine gear was further restricted to a limit of 75 fathoms. Beach seine harvests since 1985 have averaged 6.3% of the total reported harvest.

As with any developing fishery, fishing effort increased with each successive season. In 1984 Norton Sound became a Super-Exclusive Use herring fishing district in order to slow growth and bolster local involvement, but with only limited success. The 1987 season had the highest level of fishing effort on record with a total of 564 fishermen making at least one delivery, where 559 gillnet and 22 beach seine permits recorded landings. This was more than twice the average effort from 1980 through 1986. Local Norton Sound area residents accounted for 36% of the effort and 29% of the total harvest.

A public proposal to the Fall 1987 Board of Fish was adopted that changed the Norton Sound Herring Fishing District to Limited Entry status. Beginning with the 1988 season, a moratorium was placed on Norton Sound where no new entrants were allowed into the fishery. The Limited Entry Commission is reviewing and awarding limited entry permits to fishermen based on fishing history and will eventually reduce the total number to 301 gillnet and 4 beach seine permits as directed by the Board of Fish. Currently, some fishermen have already received limited entry permits and others are still fishing with interim-use permits while their eligibility is being evaluated on a case-by-case basis.

Commercial harvests from 1981-1984 averaged 4,137 st, and ranged from a low of 3,662 st in 1984 to 4,582 st in 1983 (Appendix Table D3). From 1985-1988, commercial herring harvests averaged 4,374 st, ranging from a low of 3,548 st in 1985 to a high of 5,194 st in 1986. And most recently, from 1989-1991, harvests have averaged 5,596 st, ranging from 4,743 st in 1989 to 6,373 st in 1990. Level of commercial harvest is influenced by stock status, product value and climatic factors.

Spawn on Kelp

A small scale spawn-on-kelp (*Fucus*) fishery existed in Norton Sound from 1977 to 1984. Harvests during the 1977-1984 period ranged from less than one ton (1977) to approximately 46 st (1981). In addition, during the 1984 season, one ton of macrocystus kelp was imported into Norton Sound resulting in a harvest of approximately 3 st of product. In response to a public proposal, a Board of Fisheries action prior to the 1985 season resulted in the closure of all spawn-on-kelp fisheries in Norton Sound.

Management Strategies

The overall statewide management strategy is to annually harvest 0-20% of the herring biomass. The upper end of the exploitation range is applied to stocks in good condition. The lower end of the exploitation range is applied to stocks that are exhibiting a trend of decreasing abundance and poor recruitment. If a minimum threshold level is not achieved, 7,000st for Norton Sound, no commercial fishery will be allowed.

Typically herring are long lived fish and will usually remain harvestable for at least 5 years after recruiting into the fishery. Harvesting only a percentage of the biomass ensures that some fish will be held over for following years. This type of strategy helps mitigate population fluctuations caused by successive years of poor recruitment, a common occurrence in marine spawning fish. Prior to 1983, harvests in Norton Sound were regulated on a subdistrict basis so harvests would be dispersed over the entire fishing grounds. This was to prevent harvest efforts from concentrating in one area on what was then thought to be a distinct stock of fish.

Since methods to reliably forecast herring returns are still being developed and estimates of recruitment are not available, in-season assessments of biomass supersede the projected biomass for management of the Norton Sound herring fishery. The herring biomass is managed for a 20% exploitation rate if the in-season aerial biomass surveys and age class composition information indicate the run will achieve at least the preseason biomass projection. If the run does not materialize as projected, the harvest exploitation rate may be reduced to a lower level.

Generally, the fisheries management staff has tried to set fisheries openings to allow gillnetters to fish the flood tide as it crests. The belief that the ripe females approach the beach at that time to spawn figures heavily in that strategy. The Norton Sound fishery covers a large area with varying tides. Because the large gillnet fleet can not "fit" into individual subdistricts, opening at the optimal time throughout the district is not always possible. The fishing fleet must be flexible to maximize catches.

The beach seine openings are dependent on herring abundance near the beach and favorable weather conditions for spotters and fishing. Beach seiners prefer to work flood tides similar to those gillnetters favor, however, fisheries managers frequently provide less optimal fishing times. The beach seiners have shown the ability to harvest their allotment of 10% of the preseason harvest goal in a single three hour opening under ideal conditions. By the nature of the gear, beach seiners have the potential to wrap up large numbers of fish which could potentially exceed their allocation. Therefore, the management staff have often chosen to reduce the beach seine efficiency by allowing a gillnet opening to occur before the beach seine opening in order to break up school size and reduce the likelihood of excessive harvests. Occasionally, the beach seine fleet has been used to test the roe quality of herring newly arrived in nearshore waters prior to a gillnet opening where the potential for waste would have been great had the entire gillnet fleet fished on poor quality herring.

1996 SEASON SUMMARY

The 1996 Norton Sound herring fishery opened by emergency order on May 24. A total of two gill net openings occurred for 14 hours of fishing and one beach seine opening for 3 hours of fishing. An educational opening was announced this year, but never occurred. The total harvest based on fish ticket data was 6,170 short tons (st) of herring. Overall roe recovery was 10.6 % (Appendix Table D3). There were 287 fishermen who made at least one delivery during the season.

During the 1996 season, gillnet fishermen landing a total of 5,581.1 st. The average sac roe recovery for gill net caught herring was 10.7 %. This includes 108.7 st of bait. Nine fishermen participated in the beach seine fishery, but only 6 fishermen made deliveries, landing 588.9 st of herring. The average sac roe recovery for beach seine caught herring was 9.2 %. An effort was made to separate beach seiners from the gill net fleet to prevent gear conflicts and to enable the Department to better monitor the beach seine fishery.

There were 9 companies present on the grounds during the season to purchase herring. These 9 companies registered processors and tenders totaling 75 vessels .

The average sac roe recovery for all gear types was 10.6 %. Based on final operations reports, it appears the average price advanced for a short ton of 10% roe herring was approximately \$800.00. Of the 6,170 st harvested, 108.7 st were purchased as bait herring (roe % less than 7.0%) for which fishermen received an average of \$50.00 per ton. The total value of the herring harvest to the fishermen was approximately \$4,569,275.00.

Conditions for aerial observation of herring biomass were generally fair to poor for the season (Table 17). The allowable harvest was 5,461 st. The Norton Sound biomass was exploited at 23.4%.

Aerial surveys were flown on a regular basis from May 13 until June 13. The peak aerial survey occurred on May 27. Abandoned gillnets and pile of dead fish from a beach seine were sighted. Roughly 50 tons of wastage could be attributed to these sighting. No wastage was added to the harvest values or biomass estimates.

Fishery Management/Emergency Orders

The Norton Sound Herring Management Plan stated that the Department would attempt to manage the fishery for marketable roe recovery. During 1996, industry standards called for 9.0% roe, as opposed to the Department standard of 8.5 in past years. State of Alaska statutes direct that the resource should be managed so as to maximize the return to the State and the industry.

The 1996 Norton Sound Herring Management Plan also stated a projected biomass of 27,307 st was expected to return this season. This projected return was based upon the 1995 escapement estimate, using a schedule of increasing natural mortality with age. The 1996 spawning biomass was expected to be dominated by age 8 and 10 and older age herring. If aerial survey observations and age class composition indicated a return of 27,307 st, then 20% or 5,461 st (4,915 st by gill nets, 546 st by beach seines) could be harvested.

The 1996 Norton Sound field season got underway May 13, with the hiring of seasonal employees and the opening of the Unalakleet field office. Norton Sound sea ice cleared early this season. The first herring were sighted on an aerial survey May 16 . The biomass was slow to build but, ripened quickly.

The fleet was put on two hour notice effective 6:15 p.m. May 24. The first opening in Subdistricts 1, 2, and 3 ran 5 hours. A beach seining period allowed on May 25, in Subdistricts 1, 2, 3, and 5. A second 9 hour gillnet opening was allowed May 25 in Subdistrict 1, 2, and 3.

The staff continued the test fishing operations and aerial surveys until June.

Catch Reporting and Enforcement

Buyers registered for the 1996 season were required to report herring purchases daily (8:30 a.m.) and three hours following the closure of each period. As in past years, due to the scheduling of successive openings by gear type, clean-up catch reports were requested as soon as catch figures could become available. In general, compliance with requested catch reports was very good. The VHF radio turned out to be the communication equipment of choice due to the range of the SSB radio equipment. Communications with the field camps was accomplished with marine VHF, SSB or by aircraft radio from the aerial survey plane.

Protection efforts in Norton Sound consisted of three single engine aircraft (one super cub on wheels, one super cub on floats and a C-185 on wheels), one helicopter on floats and a small boat. Personnel consisted of 4 permanent, full-time State Fish and Wildlife Protection officers and one U.S. Fish and Wildlife officer.

Fish and Wildlife Protection officers patrolled the grounds during each opening and closure.

Abundance and Research

Two Department field crews were operational during the 1996 season. One crew operated from Cape Denbigh and the second crew operated from KLIKITARIK. The test fish crews presence and sampling efforts on the herring grounds are critical to the proper management of the fishery and biological documentation of the stocks.

Unalakleet field office personnel during the season consisted of the area management biologist, the Norton Sound and Kotzebue assistant area management biologists, a seasonal fishery biologist who acts as catch monitor and the Nome administrative clerk. In addition, three fisheries technician were hired to fulfill the commercial sampling requirements. The regional herring biometrician and a fisheries biologist from the anchorage office were present to provide overall quality control of herring sampling and assistance with sample collection and procedures. Also present was the regional management biologist whom assisted the staff in nearly every facet of the operation, a graduate student volunteer, and a fishery biologist from the Anchorage office.

At the time of this report preparation, field data and herring scales collected during the season are being analyzed. The data will be formalized and presented in separate project and management reports later this season.

Biomass Determination

A complete listing of the aerial surveys flown in Norton Sound this season is found in Table 17. Historically, the season biomass has been the peak aerial survey combined with the harvest as of the

day the peak aerial survey was flown. This is essentially what was done in 1996. The peak aerial surveys of Subdistricts 1, 2, and 3 were flown May 27.

1997 Outlook

The 1997 Norton Sound herring biomass return is projected to be 19,675 tons (Hamner and Gray, 1997). A 20% exploitation rate would result in a harvest of 3,935 tons. Age 9 herring are expected to comprise 36% of the returning biomass while age 9 and older herring are expected to comprise nearly two-thirds of the biomass.

Table 17 Daily observed peak biomass estimates of Pacific herring, Norton Sound District, 1996

Date	Flight No.	Observer Initials	Survey		Spawn		Estimated Biomass (ST) By Index Area								
			Hours	Rating	No.	Length (mi)	KLK	UNK	CDB	NTB	ELM	GOL	NOM	TOTAL	
13-May-96	1	FB	0.8	ice	0	0.0	0.0	0.0							0.0
16-May-96	2A	CL	0.0	4	0	0.0	0.0	0.0	38.7						38.7
16-May-96	2B	TL	1.5	4	0	0.0	0.0	0.0	38.7						38.7
20-May-96	3A	CL	0.0	5	0	0.0	0.0	0.0	41.3						41.3
20-May-96	3B	TL	1.5	5	0	0.0	0.0	0.0	154.8						154.8
21-May-96	4A	FB	2.3	4	0	0.0	0.0	0.0	185.6	ice	1064.4				1250.0
21-May-96	4B	TL	0.0	4	0	0.0	0.0	0.0	344.6	ice	967.8				1312.4
22-May-96	5A	CL	3.3	4	15	0.6	812.4	38.7	7182.5	ice	116.1	ice			8149.7
22-May-96	5B	FB	0.0	4	a3j	a0.7	1823.7	38.7	3678.9	ice	154.8	ice			5606.1
23-May-96	6A	CL	0.0	4	76	10.0	1173.4	258.6	2652.9	ice	104.3	ice			4189.2
23-May-96	6B	TL	0.0	4	a121	a9.3	1473.8	247.1	2758.8	ice	132.9	ice			4610.6
24-May-96	7A	FB	4.8	4	99	16.6	770.1	419.4	3851.7	25.8	452.0	0.0			5519.0
24-May-96	7B	TL	0.0	4	a110	a11.3	1187.3	715.3	5745.2	72.2	417.7	0.0			8137.7
25-May-96	8A	CL	3.3	4	57	2.4	6771.5	30.4	11339.8	0.0	503.1	0.0			18644.8
25-May-96	8B	FB	0.0	0	a53	a4.5	3655.6	60.9	5114.3	ice	671.2	ice			9502.0
26-May-96	9A	CL & TL	3.5	5	15	0.2	8427.8	1574.1	3780.7	0.0	192.4				13975.0
27-May-96	10A	TL	3.5	5	25	2.6	16566.3	1259.6	2147.5	0.0	51.6	350.7			20375.7
27-May-96	10B	FB	3.5	4	a19	a1.5	14303.5	768.6	2264.2	ice	265.6	133.4			17735.3
28-May-96	11	CL & FB	1.9	5	1	0.0	16357.8	2854.7	0.0	0.0	0.0				19212.5
29-May-96	12	CL & TL	0.0	5	5	0.2	5083.9	11365.7	783.9	ice	0.0				17233.5
30-May-96	13	CL	0.0	5	86	6.8	679.5	46.4	0.0	0.0	1064.6	0.0	0.0	0.0	1790.5
4-Jun-96	14	CL	3.5	4	0	0.0	0.0	0.0	287.7	0.0	917.2	0.0	0.0	0.0	1204.9
10-Jun-96	15	CL	2.6	5	0	0.0	0.0	0.0						0.0	0.0
13-Jun-96	16	FB	1.8	5	0	0.0	0.0	0.0						0.0	0.0
Sum	-	-	29.9	4	379	39.4	16566.3	1259.6	2147.5	50.0	0	51.6	6170.0	350.7	6220
									Waste				Total Harvest		20375.7
													Survey		26595.7
													Biomass		
													Exploit%		23.387%

Survey Flights #14, 15 & 16 surveyed the Port Clarence District and observed no Herring

Total Harvest includes 108.7 st of bait

Biomass includes combined Total Harvest, Waste, and Peak Survey Estimate

Table 18 Norton Sound herring spawn estimates by subdistrict (s.d.), 1996

Date	s.d. 1		s.d. 2		s.d. 3		s.d. 4		s.d. 5		s.d. 6		s.d. 7		Totals	
	#	Miles														
5/13	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
5/16	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
5/20	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
5/21	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
5/22	15	0.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	15	0.6
5/23	76	10.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	76	10.0
5/24	87	15.7	0	0.0	11	1.0	0	0.0	1	0.1	0	0.0	0	0.0	99	16.8
5/25	39	1.5	0	0.0	5	0.3	0	0.0	13	0.6	0	0.0	0	0.0	57	2.4
5/26	15	0.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	15	0.2
5/27	25	2.6	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	25	2.6
5/28	1	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	0.0
5/29	5	0.2	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	5	0.2
5/30	85	6.7	0	0.0	1	0.1	0	0.0	0	0.0	0	0.0	0	0.0	86	6.8
6/4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
6/10	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
6/13	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Totals	348	37.5	0	0	17	1.4	0	0	14	0.7	0	0	0	0	379	39.6

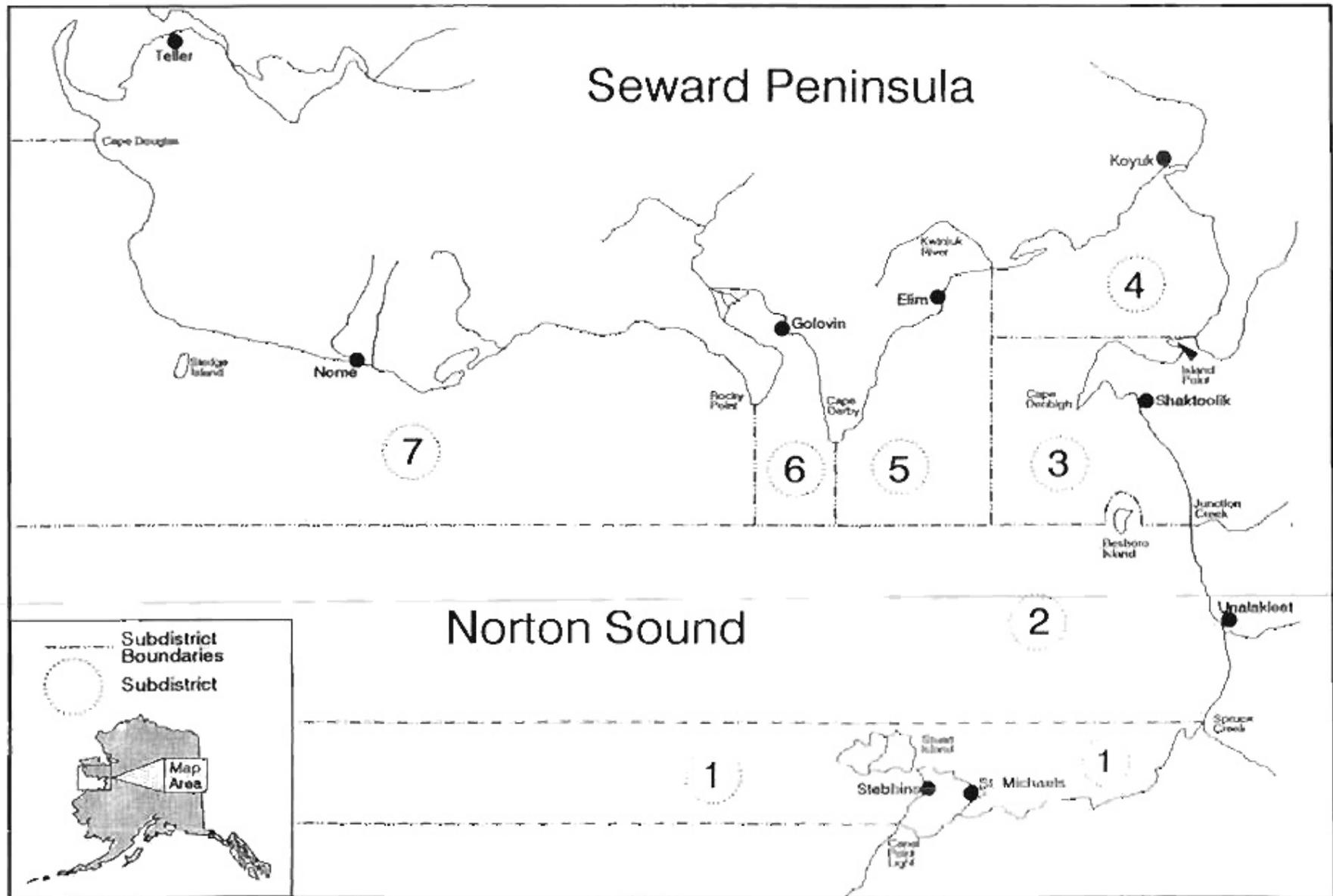


Figure 10. Norton Sound commercial herring district (373) and statistical boundaries.

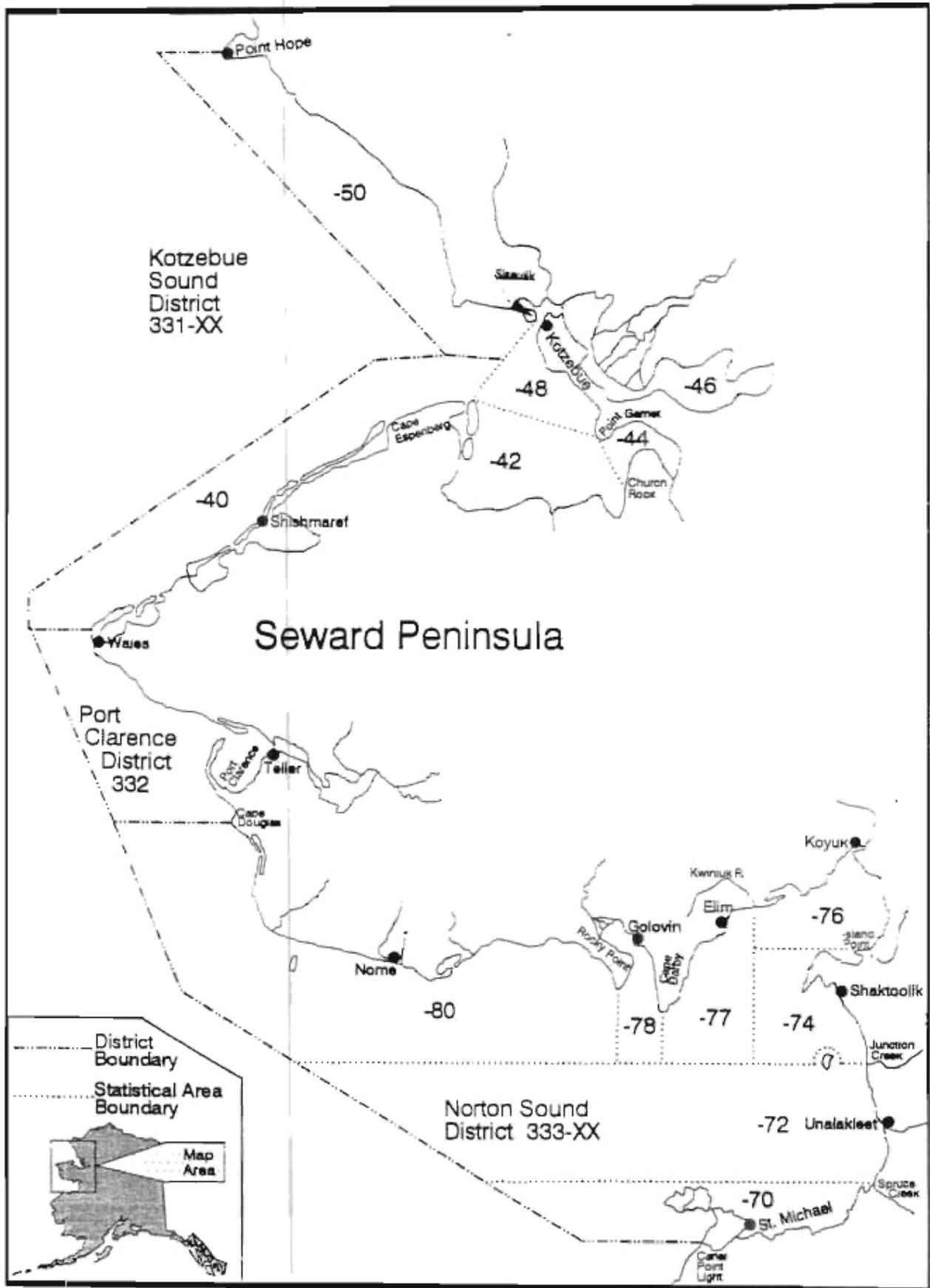


Figure 11. Statistical areas of the Norton Sound, Port Clarence and Kotzebue commercial herring fishing districts.

Norton Sound District
Age Composition of Commercial Gear Combined

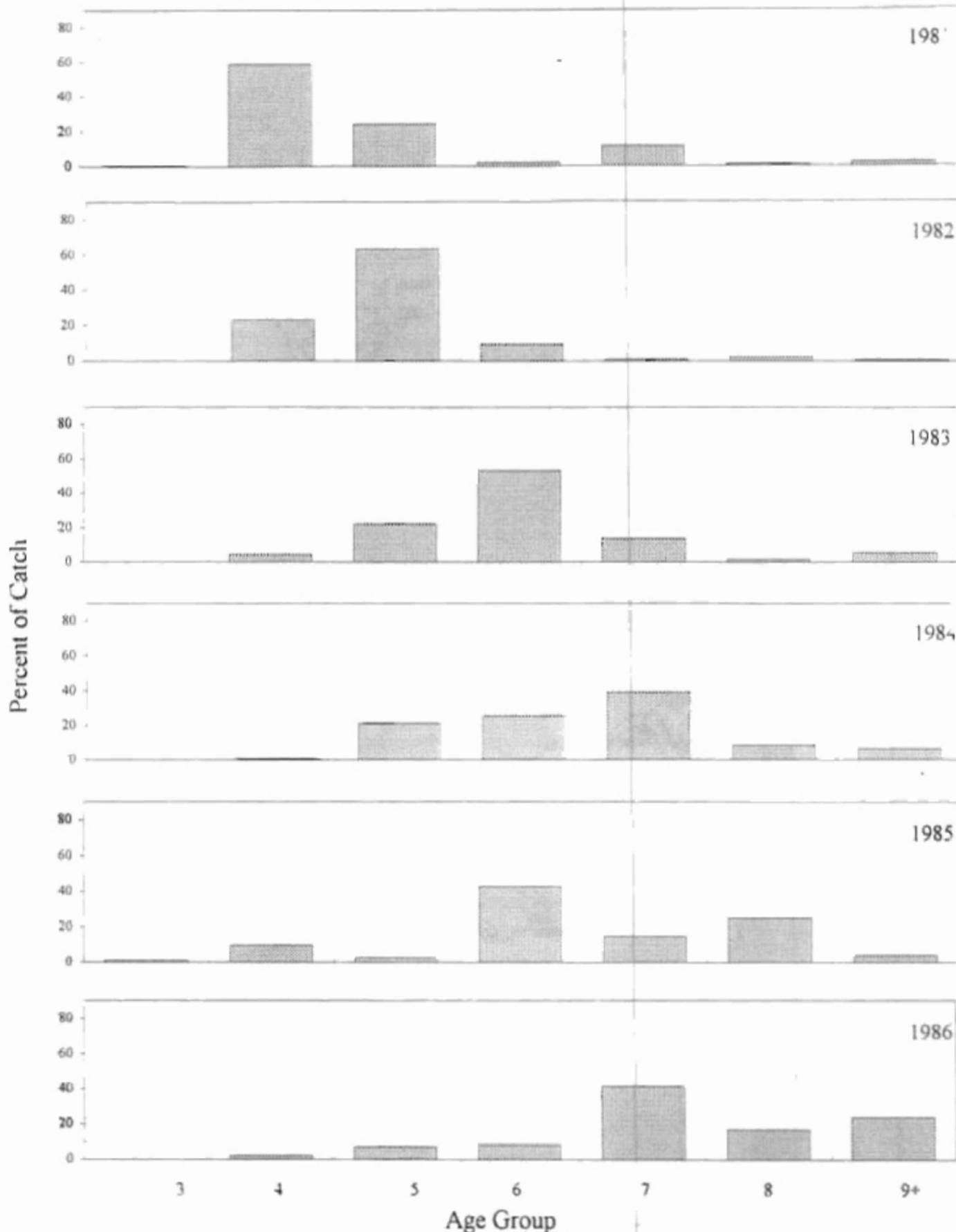


Figure 12. Norton Sound herring age class composition by percentage of commercial catch, commercial gear combined (beach seine and gill nets), 1981-1995. No commercial fishing occurred in 1992.

Norton Sound District
Age Composition of Commercial Gear Combined

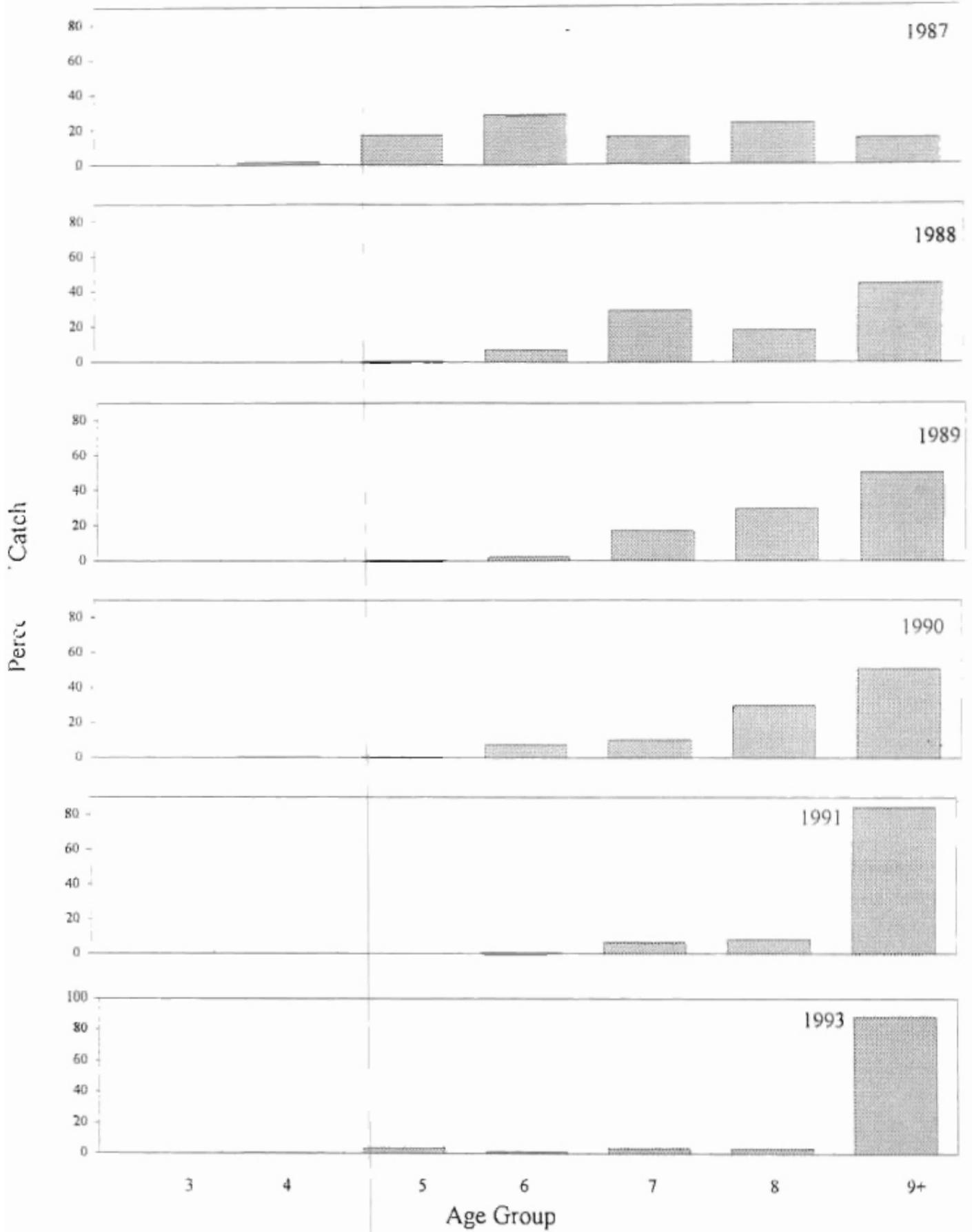


Figure 12. (page 2 of 3)

Norton Sound District
Age Composition of Commercial Gear Combined

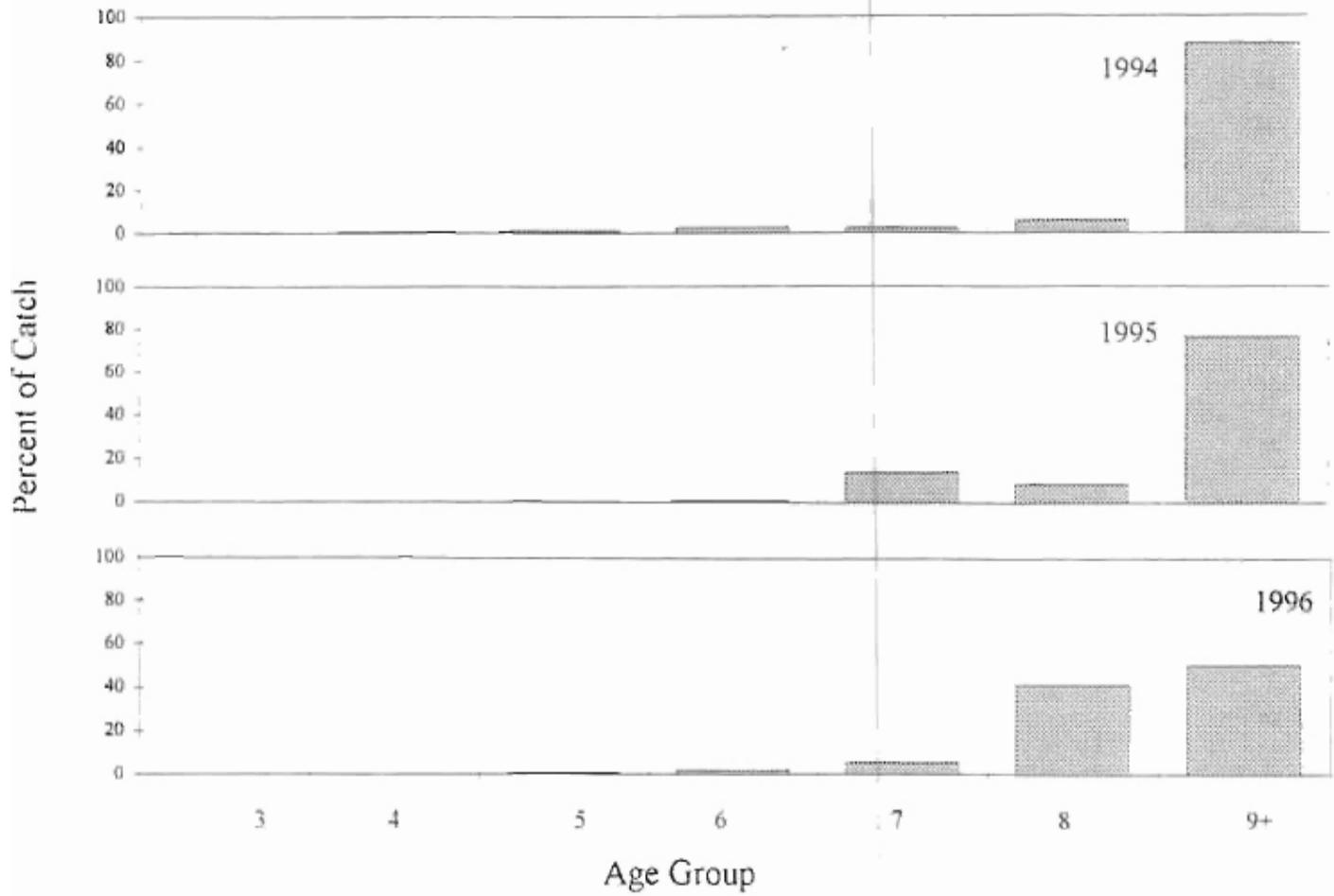


Figure 12. (page 3 of 3)

Norton Sound District
Age Composition of Variable Mesh Gill Nets

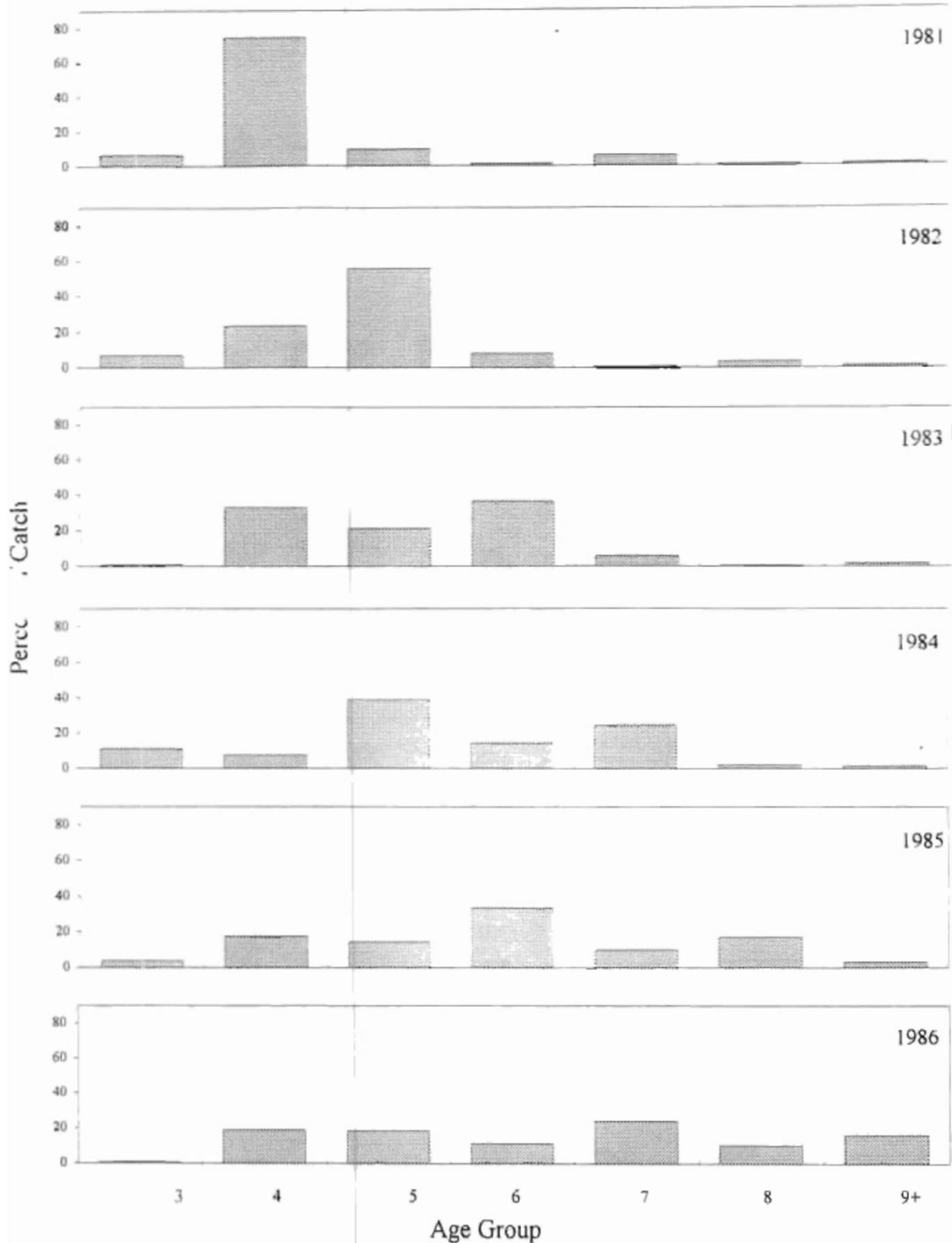


Figure 13. Norton Sound herring age class composition by percentage of total catch, variable mesh gill nets, 1981-1996.

Norton Sound District
Age Composition of Variable Mesh Gill Nets

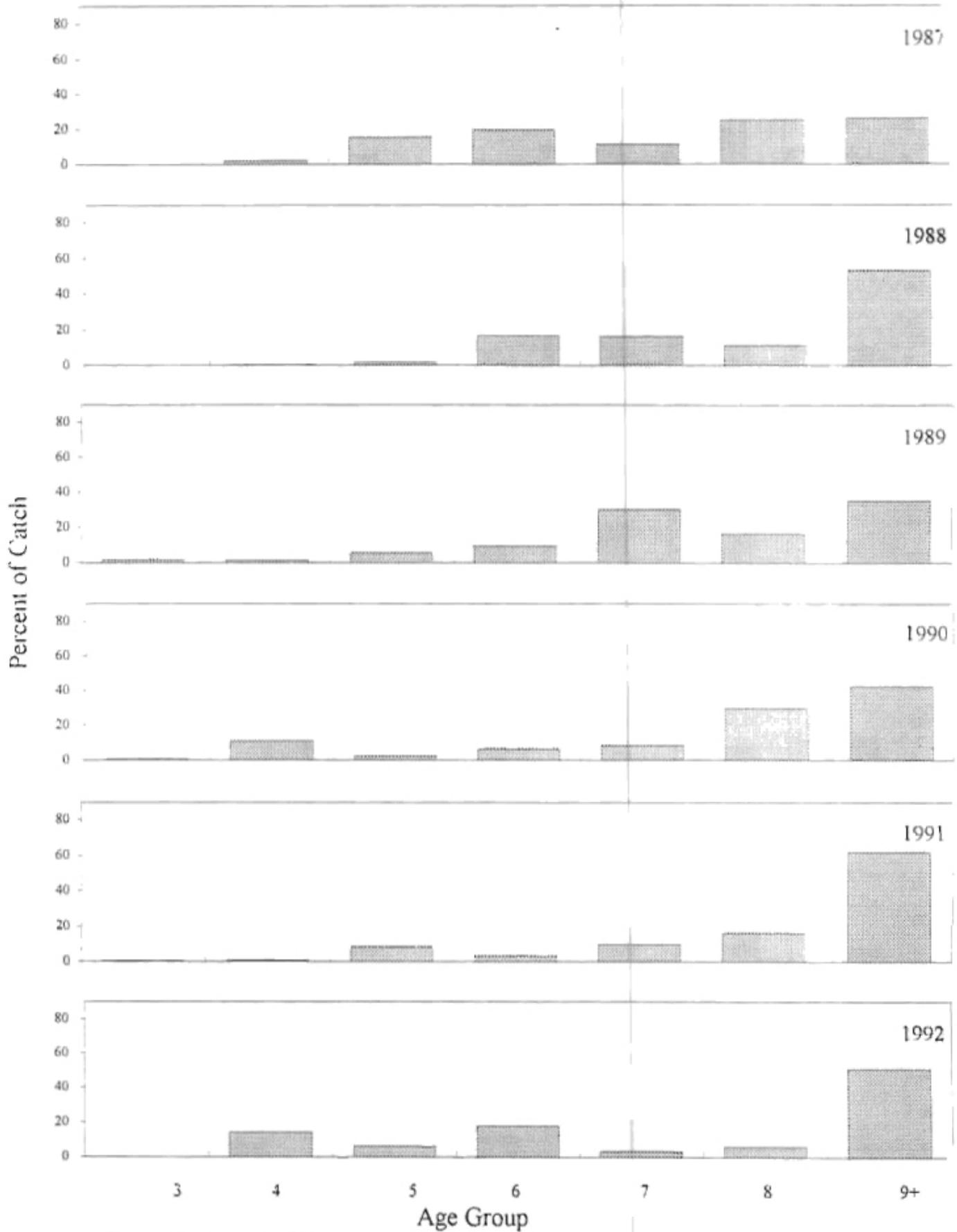


Figure 13. (page 2 of 3)

Norton Sound District Age Composition of Variable Mesh Gill Nets

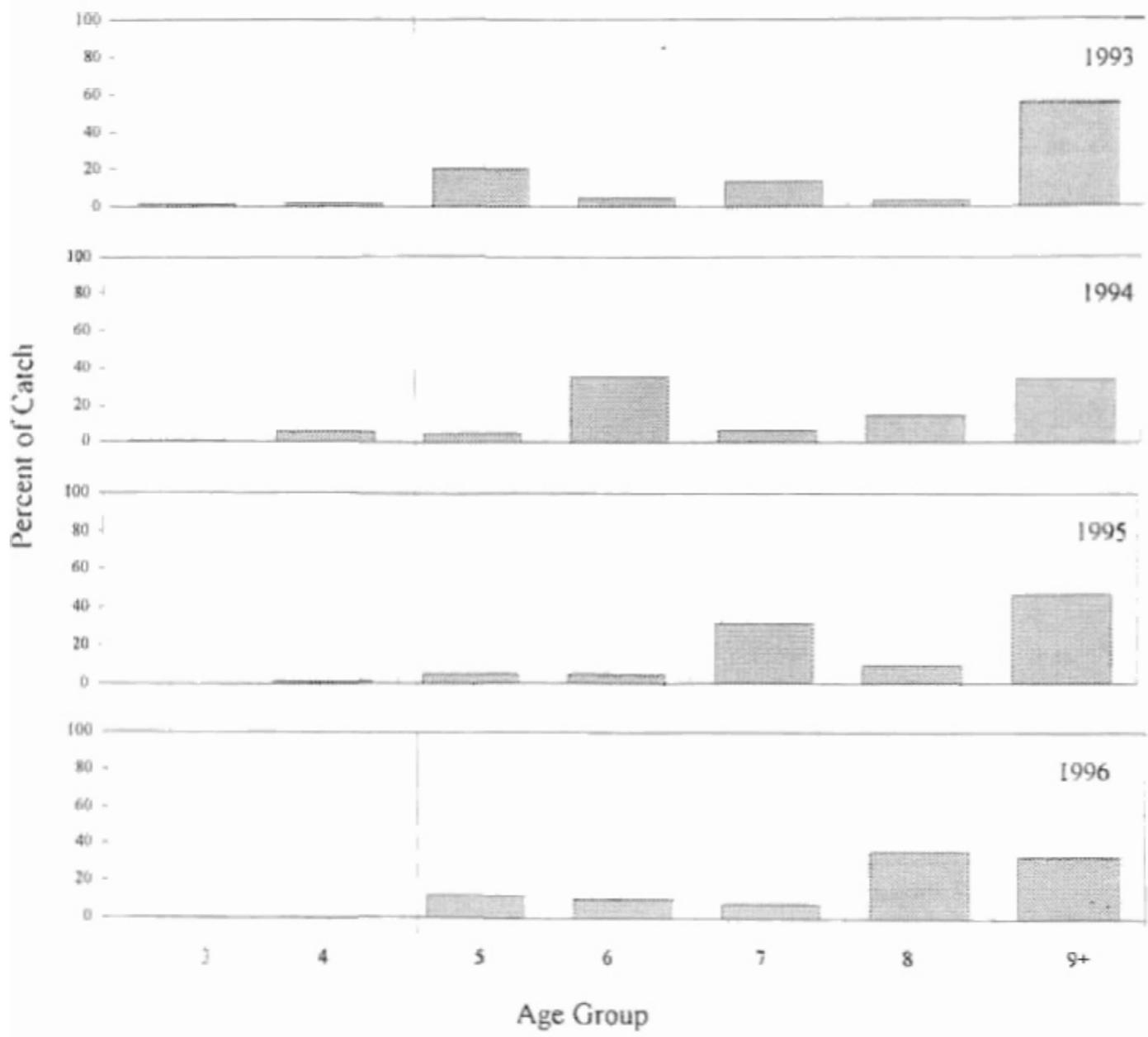


Figure 13. (page 3 of 3)

NORTON SOUND HERRING

1996 Catch and the 1997 Projection

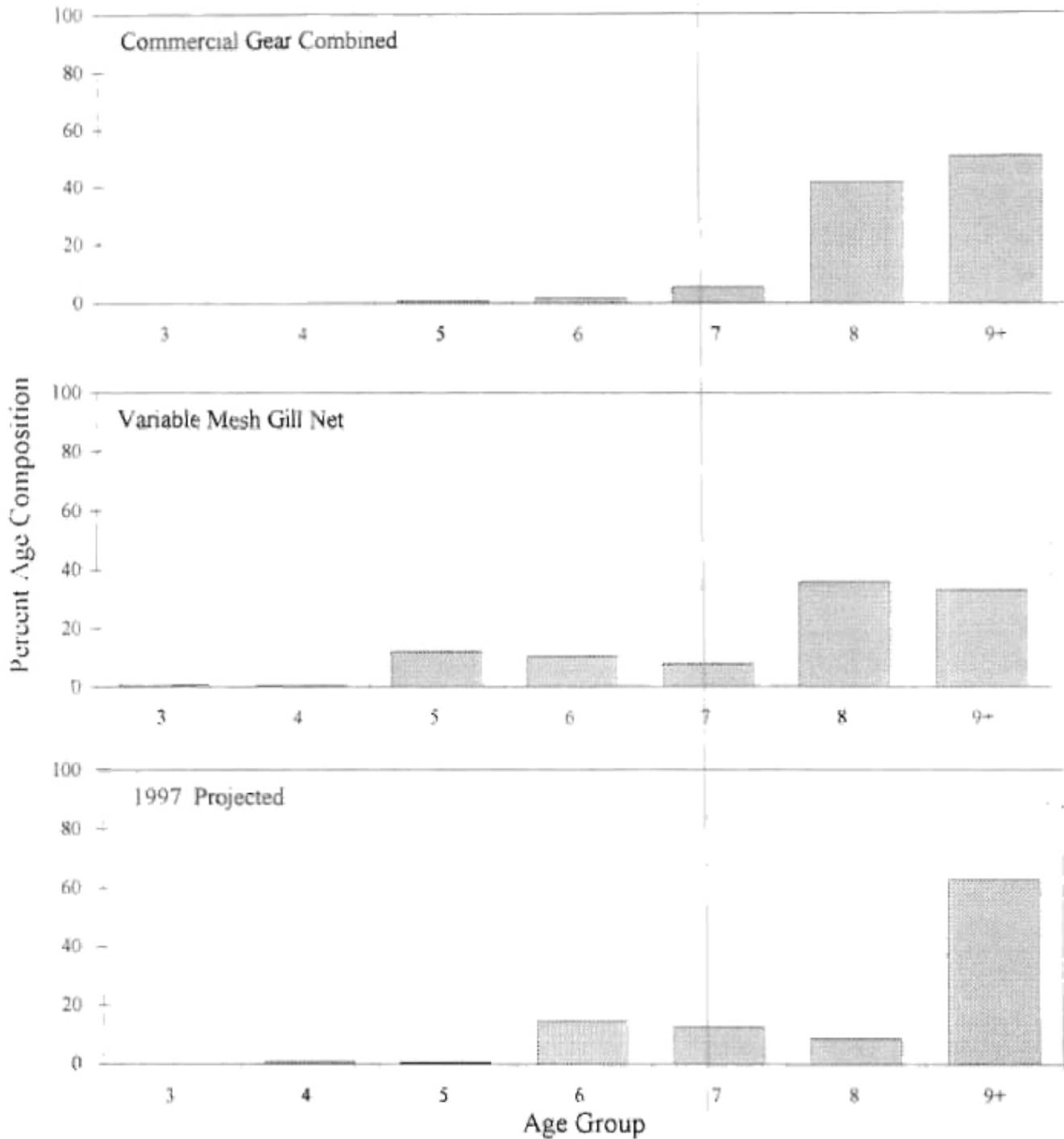


Figure 14. Norton Sound Pacific herring age composition comparison by 1996 commercial gear combined (gillnet and beach seine), and the projected age composition of the 1997 return

Appendix Table D1. Norton Sound herring and spawn-on-kelp harvests
(in short tons) by U.S. commercial fishermen, 1909-1996.

Year	Sac Roe ¹ Herring	Food or Bait Herring	Total	Spawn-on-kelp
1909-1916 ^a	-	-	-	-
1916-1928	-	1881	1881	-
1929	-	166	166	-
1930	-	441	441	-
1931	-	86	86	-
1932	-	529	529	-
1933	-	31	31	-
1934	-	4	4	-
1935	-	15	15	-
1936	-	-	-	-
1937	-	6	6	-
1938	-	10	10	-
1939	-	6	6	-
1940	-	14	14	-
1941	-	3	3	-
1942-1963	-	-	-	-
1964	20	-	-	-
1965	-	-	-	-
1966	12	-	-	-
1967	-	-	-	-
1968	-	-	-	-
1969	2	-	-	-
1970	8	-	-	-
1971	20	-	-	-
1972	17	-	-	-
1973	35	-	-	-
1974	2	-	-	-
1975	-	-	-	-
1976	9	-	-	-
1977	11	-	-	trace
1978	15	-	-	4
1979	1292	-	-	13
1980	2451	1	2452	24
1981	4371	-	-	47 ^b
1982	3864	69	3933	38
1983	4181	401	4582	29 ^c
1984	3298	274	3572	19 ^d
1985	3420	128	3548	- ^e
1986	4926	268	5194	-
1987	3779	303	4082	-
1988	4256	416	4672	-
1989	4494	247	4741	-
1990	5253	1026	6279	-
1991	5465	207	5672	-
1992 ^f	-	-	-	-
1993	4713	321	5034	-
1994	958	2	960	-
1995	6647	116	6763	-
1996 ^g	6061	109	6220	-

^a Fishery occurred some years, but harvest unavailable.
Fishery from 1909-1941 occurred near Golovin; 1964 to present has occurred in southeast Norton Sound.

^b Does not include approximately 6 st of wastage.

^c Does not include approximately 2 st of wastage.

^d Includes 3 st of spawn on *Macrocystus* kelp.

All spawn-on-kelp fisheries closed by regulation prior to the 1985 season.

No commercial fishery took place in 1992.

^e Total includes an estimate 50 st of wastage.

Appendix Table D2 Japanese gillnet herring catches in Norton Sound, 1968-1977.
(North of 63 N. Latitude and East of 167 W. Longitude)

Year	Gillnet Catch (st)	Remarks
1968	131	First foreign effort on herring in Norton Sound
1969	1400	Peak catch with large effort (about 40 ships). Two vessels apprehended.
1970	69	
1971	703	
1972	15	
1973	38	
1974	764	
1975	0	
1976	-	Data unavailable.
1977	-	Herring fishery closed to foreign nations.
Total	3120	Excludes 1976 catches.

Appendix Table D3.

Herring biomass estimate and commercial fisheries data for the Norton Sound District, 1979 -1996.^m

Year	Biomass ^a (st)	Harvest ^b (st)	Percent ^c Exploitation	Roe %	Dollar Value (millions)	Number of Fishermen
1979	7,700	1,292	16.8	7.0	0.6	67
1980 ^d	8,400	2,452	29.2	8.1	0.5	294
1981	25,100	4,371	17.3	8.8	1.5	332
1982 ^d	17,400	3,933	22.6	8.8	1.0	237
1983	28,100	4,582	16.3	8.6	1.4	272
1984	23,100	3,662 ^e	15.8	10.3	0.9	194
1985	20,000	3,548	17.7	9.9	1.4	277
1986	28,062	5,194	18.5	9.6	2.9	323
1987	32,370	4,082	12.6 ^f	8.6	2.6	564
1988	33,924	4,672	13.8 ^g	9.0	3.9	348
1989	23,857	4,771 ^f	20.0 ^h	9.2	2.3	357
1990	35,522 ^h	6,439 ⁱ	18.0	8.7	3.6	365
1991	42,854	5,796 ^k	13.5 ^f	9.3	2.4	279
1993	46,549	5,034 ^l	10.9	9.9	1.5	264
1994	37,829	960	2.5	10.3	0.3	215
1995	37,778	6,773	18.0	10.4	4.2	215
1996	26,596	6,220 ⁿ	23.4	10.6	4.5	287

^a Methods of calculating biomass have varied over the years. Biomass estimates listed follow methods used during that year.

^b Includes both bait and cas roe harvests.

^c Represents total District exploitation. During many years southern subdistricts are closed because exploitation of the local biomass reaches 20%, while northern subdistricts have remained open because little or no harvest has occurred.

^d Minimal biomass estimates due to poor survey conditions.

^e Includes an estimated 90 st of wastage.

^f Peak estimate made after the commercial fishery; the fishery was not re-opened due to the high probability of spawnouts present after two consecutive days of heavy spawning.

^g Peak biomass was sighted prior to arrival of the commercial buying fleet.

^h Biomass spotting conditions very poor throughout herring season; peak biomass represents minimum estimates; exploitation rate based on observed biomass.

ⁱ Includes an estimated 30 st of wastage.

^j Includes an estimated 60 st of wastage.

^k Includes an estimated 125 st of wastage.

^l Does not include an estimated 45 st of wastage.

^m No herring fishery occurred in 1992.

ⁿ Includes an estimated 50 st of wastage.

Appendix Table D4. Norton Sound commercial herring harvest (st) by subdistrict, by year, 1979 - 1996.^a

Year	Subdistricts							Totals
	s.d. 1	s.d. 2	s.d. 3	s.d. 4	s.d. 5	s.d. 6	s.d. 7	
1979	319	405	555	-	-	-	14	1293
1980	1176	632	632	5	-	7	-	2452
1981	3068	831	471	1	-	-	-	4371
1982	2062	946	925	-	-	-	-	3933
1983	434	1265	2733	-	65	85	-	4582
1984	-	-	3572	-	-	-	-	3572
1985	1538	188	1675	-	147	-	-	3548 ^b
1986	2559	-	2450	-	185	-	-	5194
1987	2218	174	1690	-	-	-	-	4082
1988	3260	99	1307	-	6	-	-	4672
1989	3256	60	1425	-	-	-	-	4741 ^c
1990	4498	950	931	-	-	-	-	6379 ^d
1991	-	880	4792	-	-	-	-	5672 ^e
1992 ^f	-	-	-	-	-	-	-	0
1993	2288	587	1881	-	278	-	0.2	5034 ^g
1994	250	36	634	-	40	-	-	960
1995	2359	604	1524	-	2108	167	-	6762
1996	3074	111	2831	-	153	-	-	6170 ^h

^a Includes herring taken for sac roe and bait.

^b Does not include an estimated 90 st of wastage.

^c Does not include an estimated wastage of 30 st in abandoned gillnets.

^d Does not include an estimated wastage of 60 st in abandoned gillnets.

^e Does not include an estimated wastage of 125 st in abandoned gillnets.

^f No commercial fishery in 1992.

^g Does not include an estimated wastage of 45 st in abandoned beach seine sets.

^h Does not include an estimated 50 st of wastage.

Appendix Table D5. Norton Sound commercial spawn-on-kelp (*Fucus*) harvest, 1978-1984 ^a

Year	st	Number of Fishermen
1978	4	9
1979	13	19
1980	24	20
1981	47	22
1982	38	44
1983	29	35
1984	19	32

^a Norton Sound commercial spawn-on-kelp harvest closed by regulation prior to the 1985 season.

PORT CLARENCE / KOTZEBUE DISTRICTS

Introduction

The regulation book states that in the Port Clarence and Kotzebue Districts, herring may be taken from April 15 through November 15, except that herring may not be taken during the open commercial salmon fishing season. However, prior to the 1987 season, no spring sac roe commercial fisheries had ever occurred within these districts. Interest in exploring these stocks has been expressed in recent years by industry personnel operating in the Norton Sound District. However, no large scale effort to develop the fishery has occurred due to the late ice breakup and fishery timing in the Port Clarence and Kotzebue Districts.

The Port Clarence and Kotzebue commercial herring fisheries have been in regulation since 1982. The 1983 and 1984 regulation books set a guideline harvest of 150 mt (165 st) for each district. Since the guideline harvest has never been changed or repealed by the Board of Fisheries, it is assumed 165 st guideline harvest is still in effect. Presently purse seines, beach seines, and gillnets are legal commercial gear within these districts.

Local fishermen from Teller, Shishmaref, and Kotzebue have also expressed increasing interest in exploiting these stocks. While small harvests of herring for food/bait have occurred during the fall, the fisheries in these districts have been limited by lack of markets. Local fishermen and fishery operators in Kotzebue, Brevig Mission and Nome have also expressed interest in developing a spawn-on-kelp fishery within these districts.

Resource Investigations

Resource investigations of Port Clarence and Kotzebue Sound area herring stocks were conducted by ADF&G from March 1976-September 1978 (Barton 1978). These studies indicated that herring populations from Golovin Bay (Norton Sound) northward differed significantly in size and behavioral characteristics from herring populations occurring in the southern Bering Sea. Differences between populations were summarized as follows (Barton, 1978).

Seward Peninsula Populations

Smaller herring at age with lower vertebral counts.

Lower abundance.

Subtidal spawning (3m) in shallow bays, inlets and lagoons.

Zosteria sp. primary spawning substrate.

More euryhaline.

Overwinter in shallow bays; water is warmed by river discharge under ice cover.

Fall (non-spawning) runs documented.

Larval development in brackish water.

Southern Norton Sound to Southern Bering Sea Pelagic Populations

Larger herring with probable higher vertebral counts.

Higher abundance.

Intertidal and shallow subtidal spawning along exposed rocky headlands.

Fucus sp. primary spawning substrate.

Less euryhaline.

Overwinter in deep ocean layers near the Pribilof Islands.

No fall runs documented.

Larval development probable in more saline water.

Data collected from herring populations along the Seward Peninsula strongly indicated that a separate stock of herring occurs in the Port Clarence and Kotzebue Sound areas. This does not preclude the possibility of the occurrence of more southern stocks from utilizing this region, i.e., stocks which winter near the Pribilof Islands and migrate to the western Alaska coast to spawn. It is unlikely however, that herring stocks along the western Seward Peninsula migrate to the central Bering Sea for wintering, but rather remain in coastal lagoons, bays or inlets which are warmed by river discharge under the ice (Barton 1978). This may be a major factor in explaining size differences, i.e., environmental conditions. Water temperatures and feeding conditions in deep ocean waters are probably more favorable for growth than those in herring winter habitats along the Seward Peninsula, which apparently have become adapted to Arctic conditions (Barton 1978).

Aerial surveys are very difficult in the Port Clarence District due to organic coloring of the waters of Imuruk Basin, Tuksuk Channel, Grantley Harbor and to a lesser extent, Port Clarence. Aerial surveys were impractical in Imuruk Basin and Tuksuk Channel. Additionally, the presence of other species of fish caught in test commercial gear sets indicate the need for verifying any biomass

sighted. A further complicating factor within Port Clarence is the spring ice conditions. The Port is a very sheltered body of water which becomes stained to a high degree over the winter and takes some time to clear once the ice melts. Typically, the outside waters are significantly warmer than the inside waters which are covered by ice longer thereby slowing solar gain and water mixing. Soon after the ice begins to shift the herring move into the warm shallow lagoons to spawn. The herring are invisible to aerial observation once they enter the stained water. The best aerial survey conditions exist just outside the entrance to the Port, where the herring mass just prior to the ice moving. One or two surveys have been flown each of the past several years, but virtually no herring have been observed because the narrow window of time for seeing the fish has been missed.

Spring/Fall Food/Bait Fishery

Although a fall fishery has probably existed for subsistence use within these areas for many years, a commercial venture has only been attempted recently. The primary use of those fish are for crab bait and dog food. The fishery typically occurs during September and the ice free portion of October. The harvest has been facilitated by a fish buyer located at Nome in 1994 and 1995 who provided a ready crab bait market and transportation for the fish.

Sac Roe Fishery

The Port Clarence fishermen have been unable to attract a sac roe buyer for their relatively late fishery. During 1991, one individual imported *macrocyclus* kelp and attempted an open pound. No herring spawned on the imported kelp, although ripe herring were found in close proximity and very light spawn was found on blades of *Zosteria* sp. nearby.

The spring fishery is usually thought of as a sac roe fishery, however, in 1996 those herring harvested were purchased as bait for the Norton Sound King Crab fishery. In spring of 1996, three gillnetters harvested 3,463 lb. of herring and one beachseiner harvested 2,083 lb. (Table 19). Price for both was \$.40 per pound for a total value of \$2,218.00.

Table 19. Port Clarence District commercial herring fishing history.

Year	Fishery	Effort	Harvest	Price	Value
1986	Fall Bait	1 Permit (G/N)	130 lbs.	\$1.00/lb	\$ 130
1987	Sac Roe	3 Purse Seiners 3 Gillnetters	145.5 st	\$800/st@10%	\$ 77,466
1987	Fall Bait	? Permits (G/N)	1,100 lbs	\$.30/lb	\$ 330
1988	Sac Roe	3 Purse Seiners 3 Gillnetters Combined Total	56.4 st @7.6% 23.6 st @8.9% 80.0 st @8.2%	\$1000/st @10%	\$ 57,500
1994	Fall Bait	4 Permits (G/N)	8,706 lbs	\$.45/lb	\$ 3,917
1995	Spring Bait Fall Bait	8 Permits (G/N) 2 Permits (G/N) Combined Total	19,193 lbs 9,119 lbs 28,312 lbs	\$.61/lb \$.37/lb \$.53/lb	\$ 11,625 \$ 3,393 \$ 15,018
1996	Spring Bait	3 Permits (G/N) 1 Permit (BS) Combined Total	3,463 lbs 2,083 lbs 5,546 lbs	\$.40/lb \$.40/lb \$.40/lb	\$ 1,385 \$ 833 \$ 2,218

SECTION 3: KING CRAB
(Includes Norton Sound,
Port Clarence and Kotzebue Districts)

SECTION 3 - KING CRAB

INTRODUCTION

Norton Sound

The Norton Sound Section of the Northern Bering Sea District consists of all waters in statistical area Q that are north of the latitude of Cape Romanzof, east of 168 west longitude, and south of the latitude of Cape Prince of Wales (Figures 15 and 16). A large vessel summer commercial red king crab (*Paralithodes camtschatica*) fishery has existed in the Norton Sound Section from 1977 through 1992 (Appendix Table E3). No summer commercial fishery occurred in 1991 due to a lack of staff necessary to manage the fishery. The budget had been cut the previous winter. In 1992, the large vessel summer commercial fishery resumed. Regulation changes adopted during the March 1993 Board of Fisheries meeting changed the character of the fishing fleet to that of a small boat fleet. A superexclusive designation went into effect for the Norton Sound commercial crab fishery June 27, 1994. A vessel registered for the Norton Sound crab fishery may not be used to take king crab in any other registration area during that registration year.

The National Marine Fisheries Service conducted their most recent trawl survey to examine the abundance of Norton Sound red king crab in late August 1991 (Appendix Table E5). The results of that survey as compared to the 6 previous trawl surveys show a gradual trend of increasing abundance since the low recorded in 1982. The 1991 survey found 3.4 million pounds of legal king crab in the commercial fishing district. NMFS has not made a survey of Norton Sound since 1991. The quota for the Norton Sound Section for the 1996 season was set at 340,000 pounds, to approximate an exploitation rate of 10%. The Alaska Department of Fish and Game conducted a trawl survey to examine the abundance of Norton Sound red king crab from August 7 - 18, 1996. A population estimate from this survey will not be available until March 1997.

St. Lawrence Island

The St. Lawrence Island Section lies immediately west and north of the Norton Sound Section. Because the Bering Sea crab fleet bases in Dutch Harbor, the St. Lawrence Island Section has been managed by ADF&G's Westward Region's Dutch Harbor office. Until recently, the Dutch Harbor fishing fleet has been the primary commercial group interested in that area. The only reported commercial catches to date in the St. Lawrence Island Section were made in 1983 when 52,557 pounds of blue king crab were delivered from 13 landings, in 1989, when 3,603 pounds of red king crab and 984 pounds of blue king crab were delivered from 8 landings, in 1992 when 53 pounds of blue crab were landed and in 1995 when 7,913 pounds were delivered from three landings.

In 1983, the commercial crab fleet concentrated near the southeast shore of St. Lawrence Island. The following year a regulation proposal to close the waters within 10 miles of all inhabited islands within the section was adopted in an attempt to protect stocks targeted by local fishermen and reduce

impacts on subsistence marine mammal harvests during the winter. During the 1989 season, three fishing vessels prospecting in that section found relatively few blue king crab near rocks and shoals still open to commercial fishing, but red king crab were discovered in low densities near Kivalina, the northern boundary of the section. The villagers of Little Diomed Island have also traded and sold winter caught blue king crab with residents of Nome and other villages for years. The Department has not been able to obtain an accurate estimate of the magnitude of this trade. The remoteness of this village is also a factor contributing to the lack of catch records. Current regulation allows the commercial harvest and sale of king crab near shore during the winter. The Board provided the same provisions in the regulation as are in effect for Norton Sound to allow a commercial winter fishery. However, local residents of St. Lawrence Island have decided not to export any of their winter catch for commercial sale.

1996 COMMERCIAL FISHERY

Norton Sound Summer Commercial Fishery

The 1996 summer commercial red king crab fishery opened at 12 noon, July 1 in the Norton Sound Section. Fishermen did not set pots until July 9 due to a fishermen's strike. A total of 51 catcher vessels were registered for the summer commercial crab season. Beginning in 1996, a moratorium on new vessels, greater than 32 feet, entering the fishery was put in place. All but 9 of these vessels were 32 feet or less. These 9 larger vessels ranged from 40 feet to 58 feet. Forty-one vessels actually made deliveries and 50 permits were fished. There were three land based processors that took part in the fishery. No floating crab processors or catcher/processors operated in Norton Sound during the 1996 summer fishery. Therefore, no independent observer was placed on board a commercial vessel. One ADF&G fishery biologist was stationed in Nome to monitor the fishery, act as onboard observer/sampler on catcher vessels and sample legal crab delivered to buyers in Nome. This was the only person dedicated to collecting essential biological and management data, which is necessary in determining the magnitude and location of the commercial harvest and tracking the status of the stock. The observer also provides the means to enforce size and sex restriction regulations that protect the resource. Public concern for declining nearshore catches and the apparent shift in crab distribution caused managers to announce their intent not to relax the nearshore closure line as their practice had been in recent years. As a result of crab distribution and the proximity to the closure line, roughly one-half the crab fleet chose to operate from the port of Golovin. Since the department has no staff stationed at Golovin, the decision was made to conduct the sampling onboard the trawl vessel on contract to gather population data. The sampler became a crew member for the 1996 Norton Sound king crab trawl survey conducted in August.

Catch reporting logs were kept by buyers and by skippers of catcher vessels for each statistical area fished. Buyers verbal reports were relayed daily by 9:00 a.m. to the ADF&G office in Nome. Fish tickets were due in to the ADF&G office on Friday of each week throughout the duration of the fishery. Vessel reports from fishermen and Catcher/Seller fish tickets were required every Monday

for the duration of the fishery. Compliance with reporting requirements was good. Daily catch statistics can be found in Table 1 and Figure 3. During the final two weeks of the commercial fishery, various fishermen reported anywhere from 10% to 50% of their legal catch in a soft shell, newly molted condition.

Fourteen percent of the total harvest was caught by Norton Sound fishermen, 43% of the harvest was caught by Yukon Delta fishermen, and 43% was caught by fishermen based in other parts of the state and outside of Alaska.

Four landings were made by fishermen registered as catcher sellers. Two land based processing companies operated out of Nome. Another company bought live crab, and one delivery was made to a company on St. Paul Island. This was due to the fact that a catcher vessel left the grounds of the Norton Sound District with crab on board. During the 1996 fishery, one tender was used to transport live crab from Eastern Norton Sound.

Board of Fisheries regulations specific to Norton Sound Section are:

- 1) SAAC 34.915, which directs the Department to manage the Norton Sound summer king crab fishery for a harvest of one half the exploitation rate determined under SAAC 34.080.
- 2) SAAC 34.935, which established a closed area with a defined boundary approximating 15 miles from the beach in the Norton Sound section, to protect a long established winter subsistence fishery.
- 3) SAAC 34.925 (i) and (j), requiring pot tags and limiting vessels of 125 feet in length or less to 40 pots each and larger vessels are limited to 50 pots.

Early results from the trawl survey and catch per unit effort data from the fishery indicated a significant decline in the legal crab biomass by late August. Fishermen reported the greatest proportion of molting crab in their catch since the earliest years of the fishery. There was speculation the season would be extended because the harvest was well short of the guideline, but managers felt the decline and molt were both reasons to close the fishery on the scheduled date.

Statistical Summary

A total of 50 permit holders on 41 catcher vessels made 264 landings in the 1996 Norton Sound summer commercial red king crab fishery. The total number of crab caught was 75,695 and the total number of pots pulled was 10,570 (Table 20). The CPUE was 7.1 crab/pot. Total harvest was 226,721 pounds of king crab. The harvest goal was 340,000 pounds. The exvessel price for crab was \$2.29 per pound. The value of the 1996 fishery is estimated at \$519,000. This is the lowest summer commercial harvest since the Norton Sound crab fishery transition to a small vessel fishery in 1993 (Appendix Tables E3). During the final two weeks of the fishery, reports by commercial fishermen of double shell and newly molted, soft shell crab increased.

Fish ticket records show that the 1996 season's largest fishing effort (46.2%) and harvest (51.6%) occurred in statistical areas 636401 and 626401 (Table 20) just south of Golovin Bay. Prior to 1995, the fishery had typically concentrated in statistical areas south of Nome. In 1995, fishing started in the usual areas, but catches were low and fishermen spread their effort. Late in the season the best catch rates were found in the statistical areas south of Golovin Bay. During the 1996 season, fishing concentrated in the same areas that produced the best catches at the close of the 1995 season. Comparisons of the annual summer commercial harvest of crab by statistical area can be found in Appendix Table E1.

Based on fish ticket data, statistical area 646301 had the greatest CPUE of 17.4 crab/pot (Table 20). Overall CPUE for the 1996 season was 7.1 crab/pot. Appendix Table E3 equate previous commercial crab harvest, effort, and value to the 1996 season. During the 1996 fishery, there were approximately 1,640 pots on the fishing grounds. The mean CPUE of the previous seven years with a similar number of pots deployed on the grounds is 10.5.

Statistical area 676300 had the greatest average weight of 3.55 pounds per crab according to fish ticket data (Table 20). Overall average weight per crab for the 1996 season was 3.0 pounds. This compares to the combined average weight of 3.03 pounds of the previous seven years.

Commercial Catch Sampling

Carapace length measurement and shell age were collected from 787 legal male red king crab throughout the duration of the 1996 summer fishery. Carapace age was classified as new (11 months old) or old (at least 23 months old). Overall mean carapace length of the legal male red king crab sampled was 117.1mm. The 1996 season's legal male new shell/ old shell ratio was 64% new shell to 36% old shell. This compares to the previous seven year average of 71% new shell to 29% old shell. Generally, the 1996 proportion of new shelled crab is down. The recent average was affected by the 1994 ratio when the normal ratio was reversed and only 29% of the sampled crab had new shells.

Recruit king crab made up 30% of the harvested stock sampled during the 1996 commercial season (Appendix Table E2). Total post recruits made up 70% of the harvested stock sampled. The 1996 and 1995 commercial crab fishery showed a great improvement in recruitment compared to the 1994 season (Appendix Table E2). The 1995 season showed the highest recruitment since the 1986 summer fishery and was probably due in part to a rebounding affect from the previous year.

No sublegal male or female king crab information was collected from commercial vessels during the 1996 summer commercial king crab fishery. Biological sampling was conducted aboard the chartered trawl vessel, Peggy Jo and those results are provided later in this report.

1996 Norton Sound King Crab Trawl Survey

The Department conducted a king crab trawl survey August 7 through August 18, 1996. There were 485 measurable red king crab caught. The composition of the crab catch was 67 legal male, 250 sublegal male, and 168 female red king crab (Appendix Table E5). A population estimate using data gathered during the trawl survey will be available January 1997. Length frequency, shell age, and ovigerity information was collected and analyzed for the purpose of this report.

A total of 317 male red king crab were caught during the survey. The length frequency distribution of a sample of 314 male crab captured during the 1996 trawl survey was 79% prerecruit, 7% recruit, and 14% postrecruit. During the 1996 winter crab study the distribution of male crab was 64.3% prerecruit, 10.1% recruit, and 25.5% postrecruit (Rob, 1996, Appendix Table E6). The length frequency distribution of male crab in both surveys are comparable. Approximately 10% of the male red king crab caught during the 1996 survey had soft shells or new-pliable shells. These crab had molted just before being caught. A number of double shell male crab were also observed. This along with fishermen reports, indicate that the male red king crab had begun their seasonal molt in mid August. It is believed that male red king crab in Norton Sound molt from late August to October (Brannian, 1987). It seems that male crab began to molt earlier in August this year than has been seen in the past.

One hundred and sixty-five female red king crab were captured during the survey. Juvenile female crab composed 66% and adult female crab 34% of the catch. Juvenile crab had carapace lengths that ranged from 23 mm to 72 mm. Mean length for juvenile crab was 63 mm. Adult female crab had carapace lengths ranging from 68 mm to 110 mm. Mean length for adult female crab was 81.3 mm. Nineteen percent of the adult female crab had a clutch size of 90-100%. 42% had a clutch size between 60-89%, 14% had a clutch size between 30-59%, and 5% had a clutch size between 1-29%. Twenty percent of adult female crab captured had no clutch present. Some of those barren females are undoubtedly juvenile crab. For the adult female crab examined, egg color was observed to be purple or purple brown. No eyed eggs were observed.

Tagged Crab

During the 1996 summer commercial crab fishery, a new concept for rewarding the return of tagged crab was used. Baseball caps picturing a crab and the words "Norton Sound" and "Tag Reward" were used to entice commercial fishermen to report and return tagged crab to the ADF&G office. This replaced a \$3.00 reward. Twenty four tagged crab were returned during the summer fishery. Only three of these returned crab had no information available. In 1995 fishery, ten of 23 tagged crab were returned with no useful information. This is a great improvement, and most fishermen reported that they would return tagged crab to get a hat. Of the crab recaptured during 1996, mean growth per molt was 13mm. One sublegal crab tagged in the 1996 winter crab project and captured during the 1996 summer fishery appeared to have molted just prior to being caught. This crab had a newly molted, hard shell at least 1 month old. It had grown 19 mm. One

crab tagged in the 1990 winter study and caught during the 1996 summer fishery grew 34 mm in 6 years. This indicated that the crab had molted 3 times and skip molted 3 times.

Enforcement

The Fish and Wildlife Protection officer was able to patrol the fishery using a chartered vessel once during the fishery. Surveillance using a twin engine airplane was conducted twice during the 1996 fishery. Good weather allowed for tank inspections and registrations of all vessels. Fishermen violations included: fishing with no permit holder (1), falsified fish tickets (2), illegal tendering (4), overlimit of gear (1), and failure to report (2).

Norton Sound Winter Commercial Fishery

Regulation allows a winter commercial fishery in the Norton Sound Section from November 15 through May 15, the fishery typically takes place near Nome. The winter commercial fishery is required to take place from the ice, not from vessels. During the winter of 1995-1996, nine commercial fishermen reported selling a total of 1,778 red king crab (Appendix Table E4). The villages east of Nome reported only limited harvests of crab. Ice conditions were generally unfavorable throughout Norton Sound. Other than the community of Nome, only Unalakleet reported a very small harvest. Several fishermen from Nome moved their gear 25 miles to the east in an attempt to find more stable ice. They reported taking 11% of the commercial harvest from that statistical area. This was the first time Nome fishermen ranged that far from the community with that level of effort.

The harvest is divided between local residents who buy crab directly from the fishermen and other non-local markets such as Anchorage. Crab are sold in Nome for six dollars per crab, roughly \$2.00 per pound, while in Anchorage the price was approximately \$3.50 per pound. The resulting average season price was \$3.19 per pound for all the commercial product. The 1995-1996 winter catch of 5,181 pounds was estimated to be worth about 16,431 dollars.

The winter crab fishermen generally use crab pots but some use handlines to "prospect". Deploying pots through sea ice is laborious, but hand lines can be dropped through a large ice auger hole in a short period of time. The other advantage of hand lines is that during periods of favorable weather hand lines may be deployed from new, less stable ice without the risk of losing more expensive crab pots. Most fishermen consider commercial crabbing a sideline and hold other jobs. Usually, two or three of the winter crab fishermen sell the majority of the crab. Because the volume of crab involved is low, no processor has found it profitable to operate locally. The crab sold locally are all sold fresh as are those shipped to Anchorage or other non local markets. During the mid-winter months, fishermen find it difficult keeping the crab from freezing. Many Nome residents prefer to buy frozen crab since they are able to extract the meat prior to cooking. Fresh frozen crab are easily marketed in Nome, but are not accepted in Anchorage markets.

SUBSISTENCE FISHERY

Red king crab are utilized by Norton Sound residents mainly during the winter. Fishing occurs through cracks or holes cut in the ice with the use of handlines and pots. In order to document trends in the subsistence harvest, the Board of Fisheries enacted a regulation in 1977 requiring subsistence fishermen in Norton Sound to obtain a permit prior to fishing and to record daily effort and catches on these permits (Appendix Table E4).

The first year subsistence permits were required had the highest number of permits issued to date and a relatively high harvest rate were recorded. The fishery declined sharply the following year and remained at very depressed levels throughout the 1981-82 season. The lack of success in the winter crab fishery during some past years has been attributed to a declining crab population caused by the removal of crab in the summer commercial fishery together with low recruitment, low effort due to poor ice conditions, and changes in the nearshore winter distribution of crab. All these factors probably had some effect on the success of the winter fishery in varying degrees. During the 1978-79 winter fishery, the king crab population was still in relatively high abundance. Despite this relatively large population, winter catches were the poorest on record indicating that the major factors limiting winter catches were probably poor ice conditions and the distribution of crab. During the winter of 1981-82, poor winter catches could more reasonably be attributed to a declining crab population since the crab population was at its lowest documented level. Subsistence fishing success during the winters of 1982-83 through 1986-87 had improved due to a rebuilding of the population and increased use of more efficient gear (pots instead of handlines). Unstable ice conditions and record snowfalls adversely effected the 1987-88, 1988-89, and 1992-93 catches. During years of stable ice conditions, approximately 100 fishermen have averaged 100 crab each.

The 1995-1996 season was beset with poor ice conditions. Frequent storms limited the extent of the shorefast ice and fishers had difficulty keeping their pots and finding suitable locations to fish. Of the 44 permits returned 35 reported fishing. Twenty-one fishers reported using pots, 8 reported using handlines, and 5 reported using a combination of the two gears. Permit data indicates the subsistence harvest consisted of 1,675 male crab and four female crab. Those fishermen reported harvesting 65% of the male crab the caught and 1% of the females caught.

STOCK STATUS / RESEARCH

There has been a change in the character of the summer commercial fishery since 1993 due to regulation changes affecting pot limits, opening dates and a regulation making Norton Sound a superexclusive registration area. The quality and quantity of data collected since the 1993 summer crab fishery has differed greatly from previous years due to the nature of the small vessel fishery. No floating processor or catcher processor took part in the 1996 fishery, therefore no independent observers were onboard commercial vessels.

The ADF&G fishery monitor did not have the opportunity to make observations on small catcher vessels during the 1996 fishery. No information was collected on observed pot lifts, sublegal male

and female length frequencies, and catch rates of legal and sublegal crab during the commercial fishery. However, sampling of the commercial catch did occur on some deliveries made in Nome. This is important to ensure size limits are being enforced, and to assist management biologists in determining recruitment and health of the crab population.

In 1976, when monitoring of the Norton Sound king crab population first began, the population was mainly composed of prerecruit and recruit crab. The initial population assessment survey by the NMFS estimated the legal male king crab population at 8.1 million pounds (Appendix Table E5). The legal male crab population peaked in 1978 at an estimated 11 million pounds. During the 4 years following 1978, recruitment into the legal male crab population was very low. Subsequent NMFS surveys in 1979 and 1982 documented a population of predominantly postrecruit crab, and estimated the population had declined to 2.6 million pounds by 1982. Beginning in 1981, sublegal crab abundance began to increase, and by 1983 recruitment into the legal male population also began to increase. No assessment work was conducted in 1983 or 1984. However, samples of the commercial catches indicated a significant increase of recruit crab into the legal male population; from a historic low of 10% in 1981 to 59% in 1984.

In 1985, both NMFS and ADF&G conducted population assessment surveys in Norton Sound (Appendix Table E5). After the commercial fishery in 1985, NMFS conducted a population assessment survey using trawl gear over a slightly larger area than that surveyed by the Department. Male king crab sampled in NMFS trawls were in the process of or had just molted with the result being that their estimate of 3.4 million pounds of legal male king crab included some recruitment. Adjusting this estimate for molting, and including the summer commercial harvest, an estimated three million pounds were present prior to the 1985 August fishery. Both surveys documented relatively substantial numbers of recruit crab and a healthy percentage of prerecruit crab.

During September of 1988 NMFS conducted a fifth population assessment with trawl gear. They sampled an area roughly the same size as in 1985, but increased sampling frequency in the proposed mineral lease area near Nome. The timing of the study, which occurred during the male molt, was almost a month earlier than similar surveys in the past. Nearly all the 1988 catch was in pre-molt condition. NMFS estimated 3.0 million pounds of legal male and 1.0 million pounds of prerecruit-one male red king crab; totaling 4.0 million pounds. Annual mortality was estimated at approximately 20% or 0.8 million pounds. Ignoring growth and the winter harvests, the population prior to the 1989 summer fishery would have been 3.2 million pounds, very close to the 1985 trawl estimate of 3.4 million pounds.

NMFS conducted a sixth trawl survey of Norton Sound during late August 1991 with a reduced number of tows. Each station had only a single sampling tow, as compared to each station having both a day and night tows during previous surveys. This reduction in sampling had the effect of introducing more variability into the estimate. The legal crab biomass in the summer fishing area was estimated to be 3,400,000 pounds and the total Norton Sound legal biomass was estimated to be 4,009,000 pounds. Since the survey occurred prior to the molt, a mortality of 10% was assumed for the year following the estimate. With no summer or winter fishery data to compare with the survey results, a conservative biomass of 3,400,000 pounds was used as the basis for the 1994 harvest

guideline. The Norton Sound red king crab population was thought to be stable with harvest set near 10%.

FUTURE INVESTIGATIONS

The trawl survey which occurred during the summer of 1996 in Norton Sound was made possible by a budget increment passed by the legislature. A qualitative survey summary report will be final in early December. A red king crab population estimate will be available in early January. Population estimates of halibut and some other potentially valuable species will be attempted using data collected from that survey and will be made available during early 1997. Both funding for a sustained winter research program and a triennial trawl survey to evaluate Norton Sound crab populations were provided for in that legislation. A winter pot survey is planned during February, March, and April 1997 and the next trawl survey to generate a population estimate is planned for 1999.

OUTLOOK FOR 1997

The outlook for 1997 is not yet complete. The trawl survey results are not fully analyzed; but, a reduced harvest guideline is the most likely result of that work. The biomass of legal male red king crab is down dramatically from the 1991 survey. The number of sublegal males and female king crab also seem to have declined, but not as dramatically. The staff will attempt to complete the population estimate in January of 1997 and a meeting to set the exploitation rate and harvest strategy for the next several years is tentatively scheduled for March.

Table 20 Commercial harvest of red king crab from Norton Sound Section by statistical area, Northern Bering Sea District, 1996 (summer fishery only).

Statistical Area	# Vessels	Total Harvest Number	Total Harvest Pounds	Total Pots Lifted	Average Crab/Pot	Average Weight
626331	1	20	61	10	2.0	3.05
626401	15	15,226	45,045	1,694	9.0	2.96
636330	2	1,485	4,560	120	12.4	3.07
636401	18	24,317	70,677	3,142	7.7	2.91
646301	1	4,859	13,888	280	17.4	2.86
646330	2	969	2,894	239	4.1	2.99
646401	13	7,795	22,834	1,144	6.8	2.93
656330	8	4,938	15,446	862	5.7	3.13
656401	13	3,286	9,985	863	3.8	3.04
666330	9	7,597	25,519	1,201	6.3	3.36
666401	4	914	3,001	368	2.5	3.28
676300	1	154	546	37	4.2	3.55
676400	6	3,192	9,775	493	6.5	3.06
Totals *		74,752	224,231	10,453	7.2	3.05

* Does not include approximately 2,490 lbs of deadloss not reported on fish tickets.

Table 21. Winter 1995-96 subsistence red king crab catches and effort by gear type, Norton Sound area.^a

Gear Type	# Permits Fished	# Males Caught	# Males Kept	# Females Caught	# Females Kept	Total Crab Captured	Total Crab Kept	Average Harvest per Fisherman
Pots	21	2,044	1,232	267	3	2,311	1,235	59
Handlines	8	144	129	17	1	161	130	16
Both	5	395	306	61	0	456	306	61
Unknown	1	8	8	0	0	8	8	0
Totals	35	2,591	1,675	345	4	2,936	1,679	48

^a A total of 84 permits issued. As of 7/8/96 : 44 permits returned.

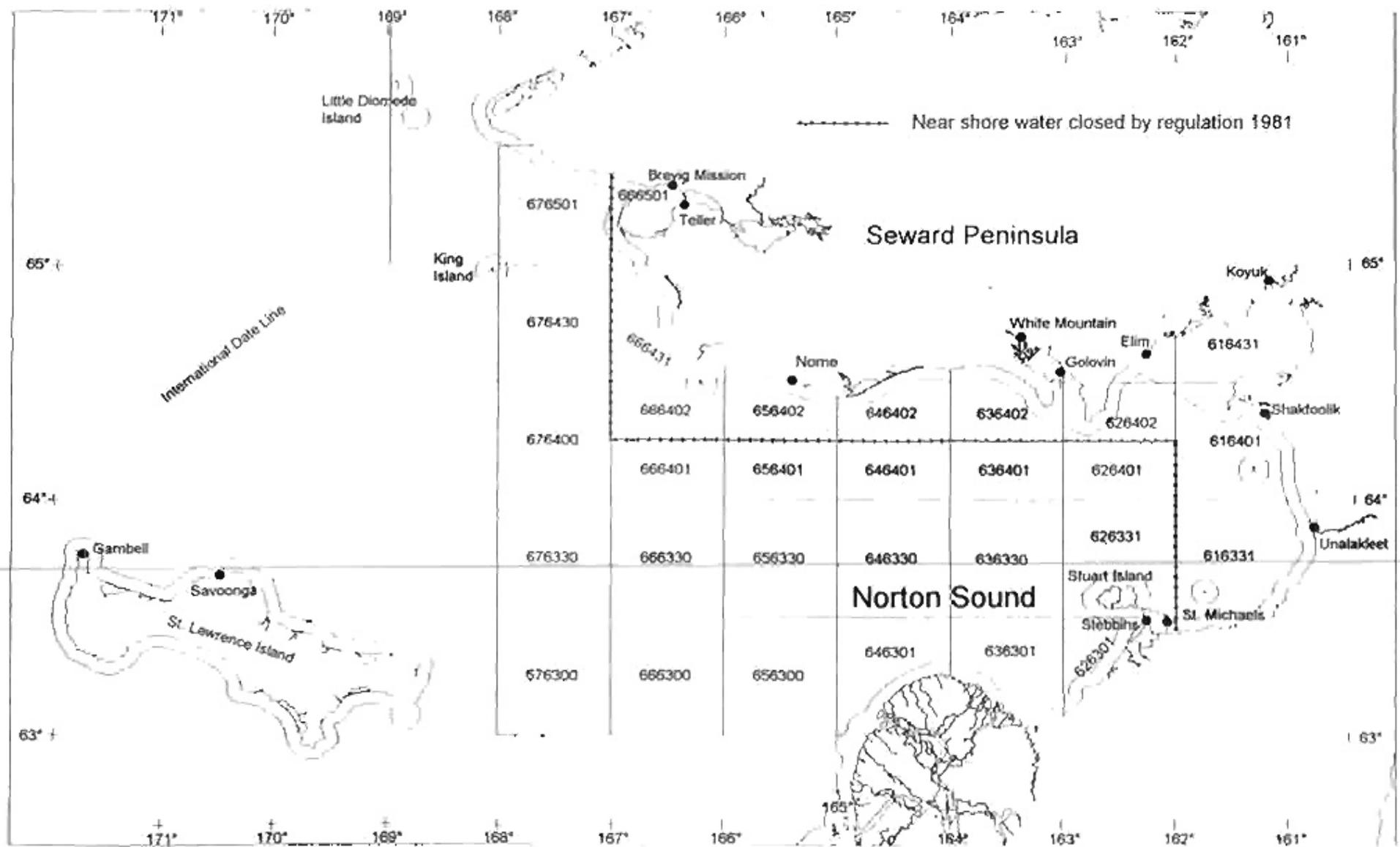


Figure 15. Statistical areas for the Norton Sound red king crab fishery

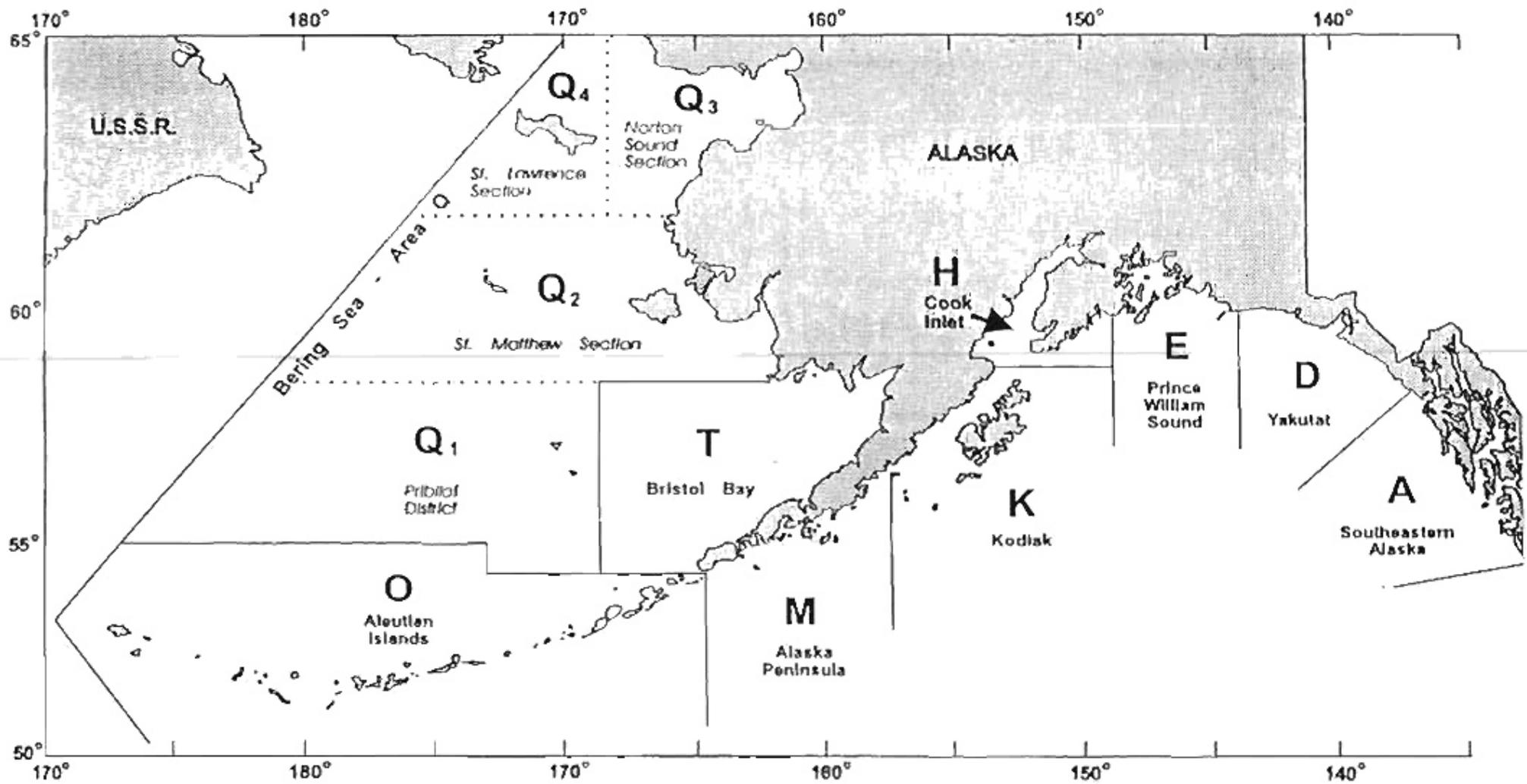


Figure 16. King crab fishing districts and sections of Statistical Area Q.

Norton Sound Red King Crab

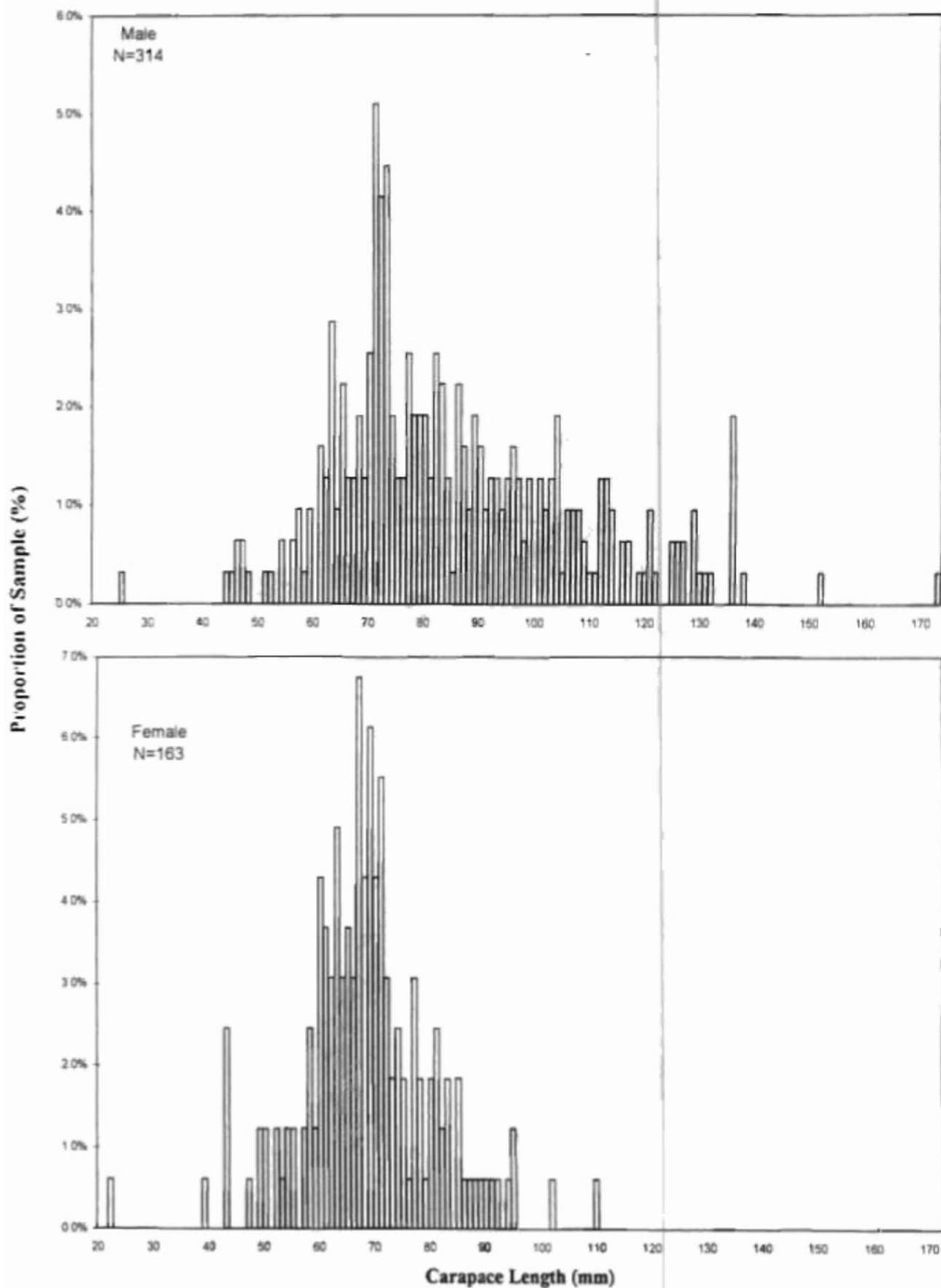


Figure 17. Norton Sound male and female red king crab size distribution from a trawl assessment survey conducted by ADF&G, 1996.

Norton Sound Red King Crab

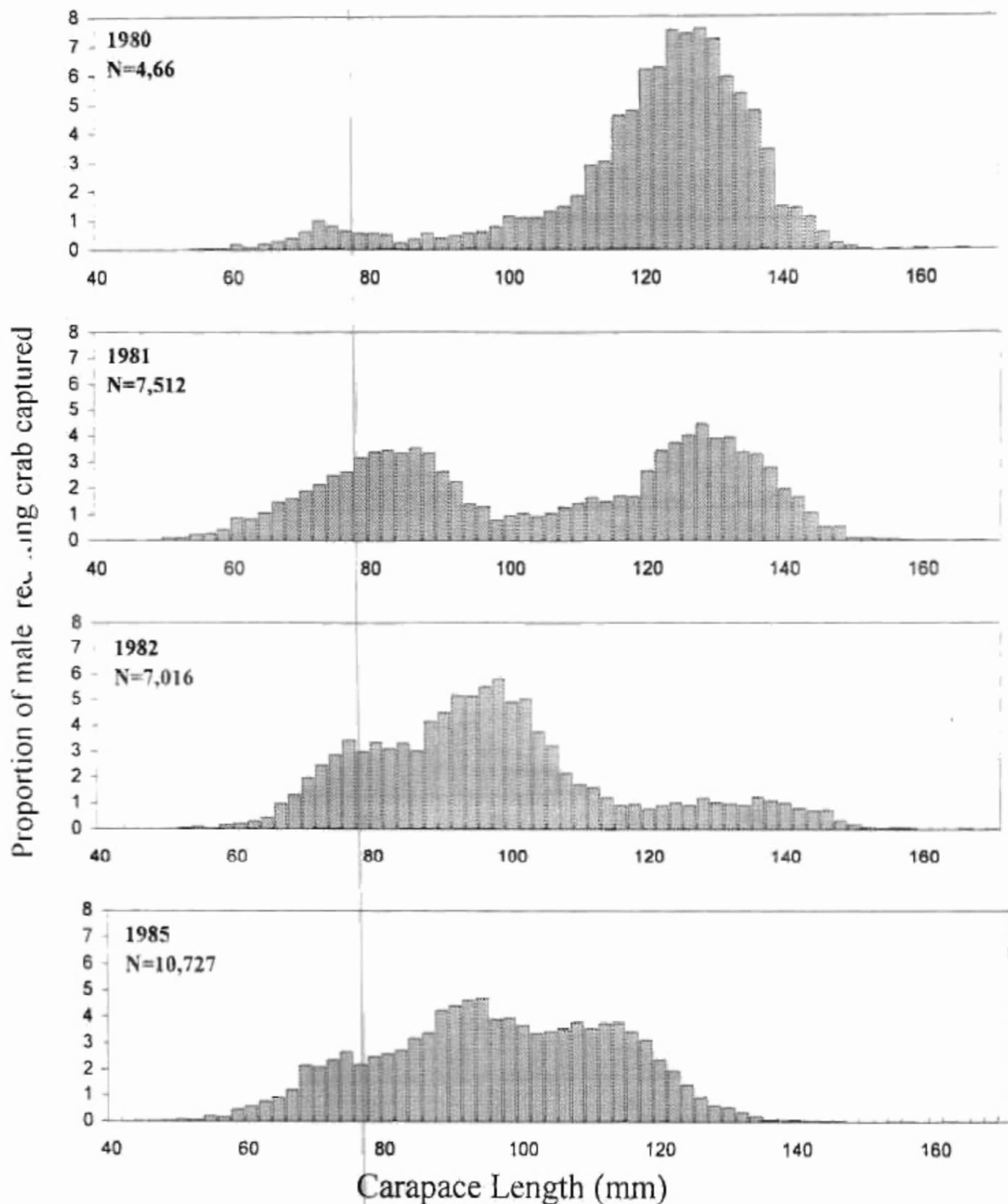


Figure 18. Norton Sound male red king crab size distribution from pot assessment surveys conducted by the Alaska Department of Fish and Game, 1980, 1981, 1982, and 1985.

Norton Sound Red King Crab

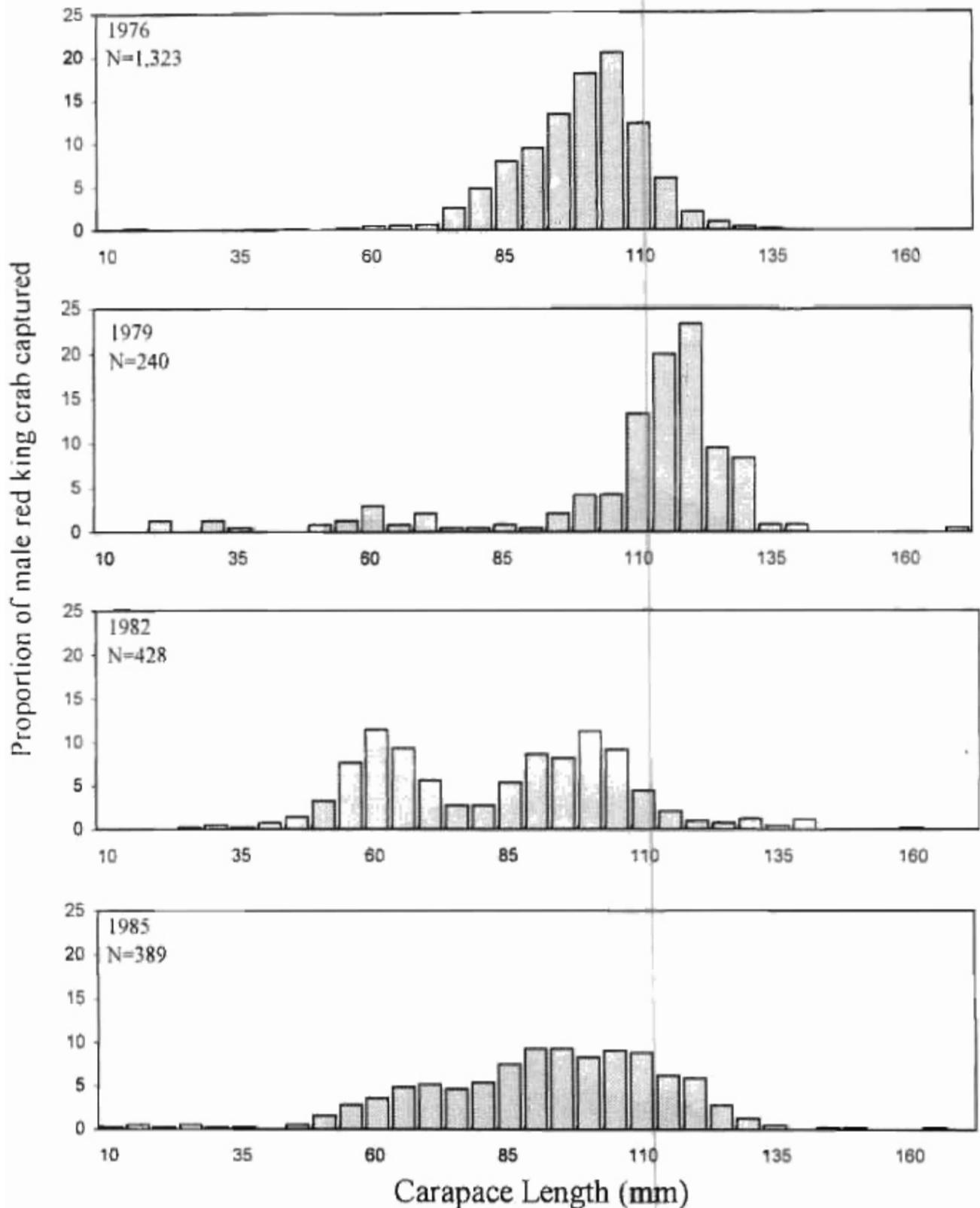


Figure 19. Norton Sound male red king crab size distribution from trawl assessment surveys conducted by the National Marine Fisheries Service, 1976, 1979, 1982, 1985, 1988, 1991, and by ADF&G in 1996.

Norton Sound Red King Crab

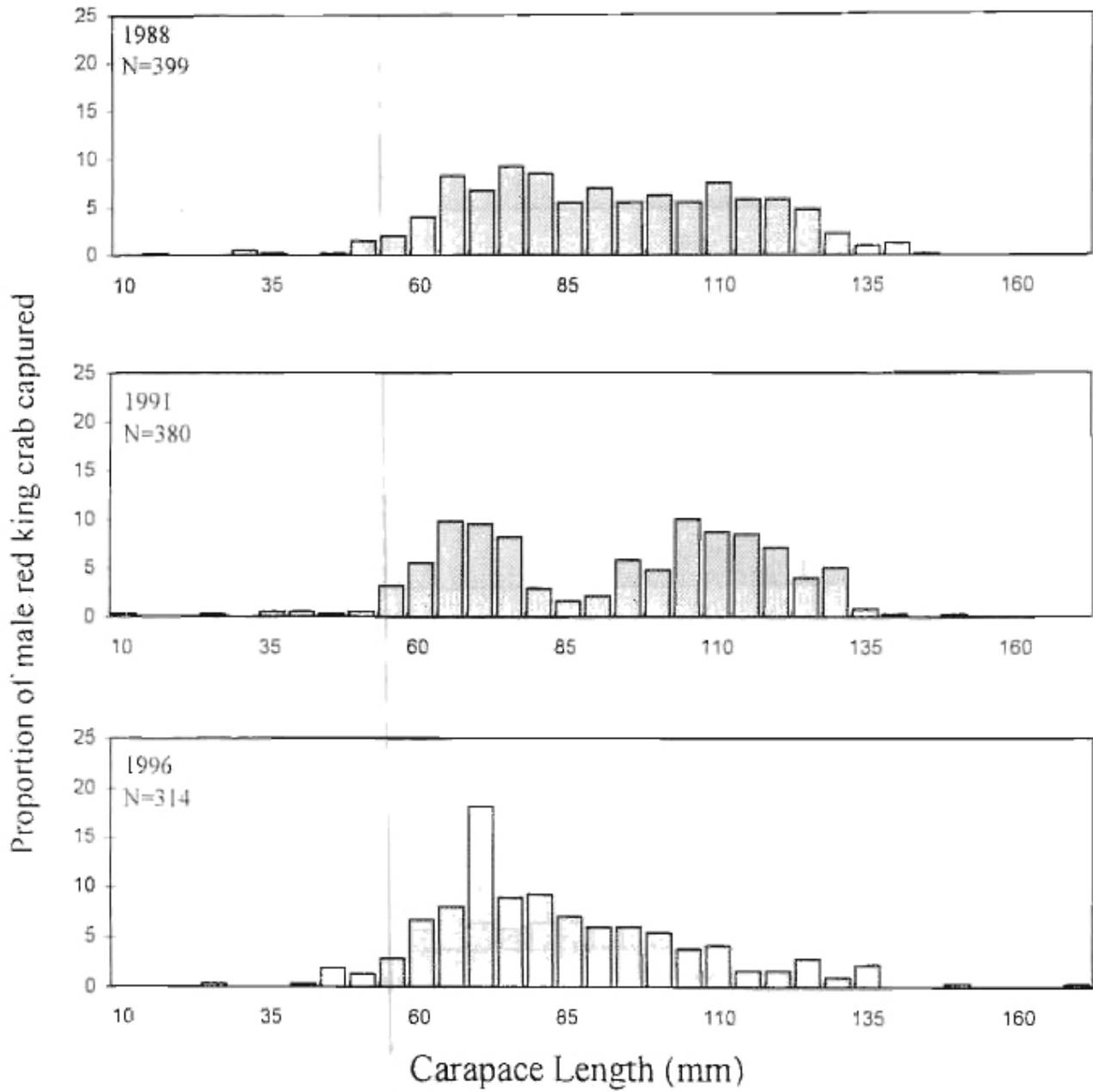


Figure 19. (Page 2 of 2)

Norton Sound Red King Crab

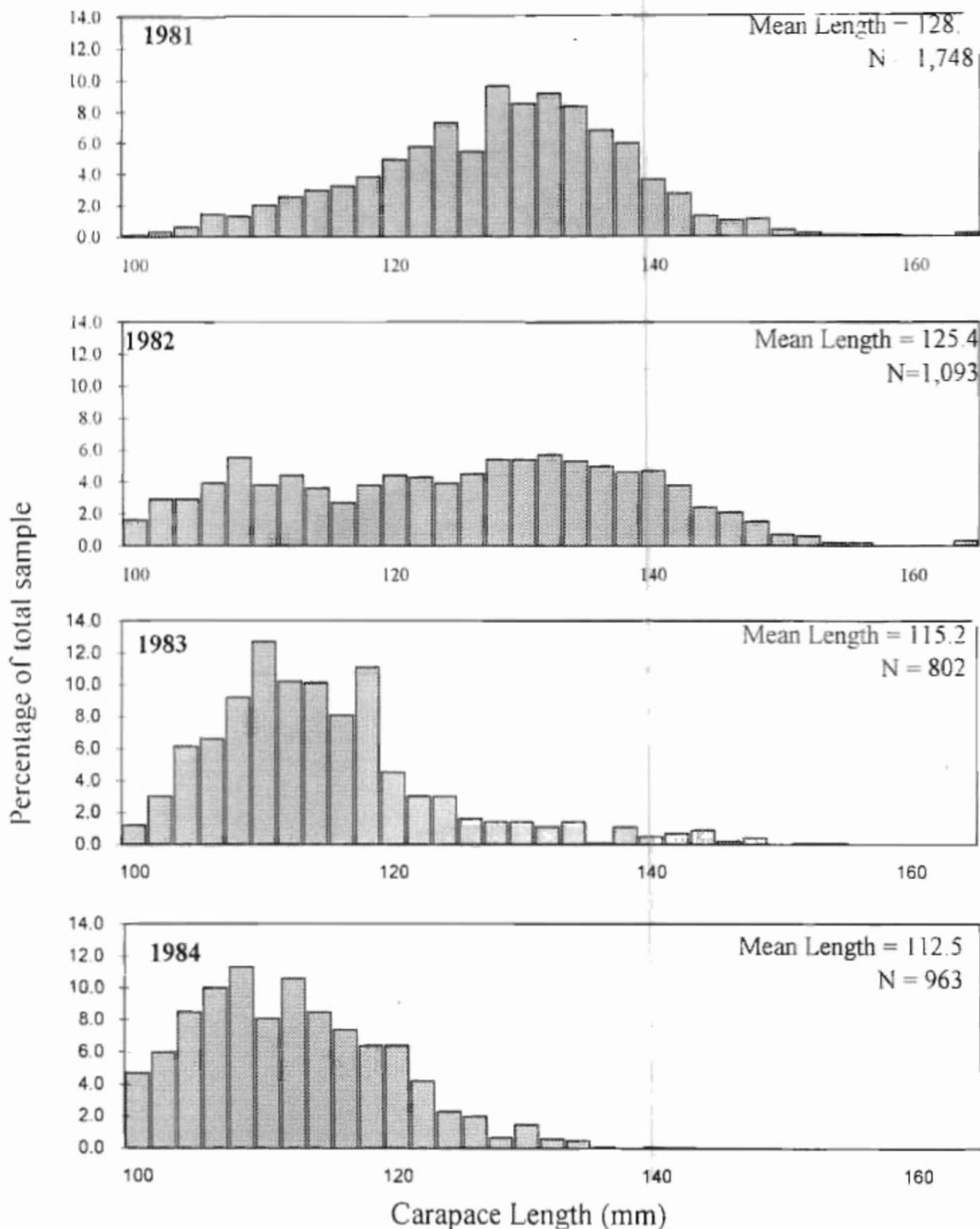


Figure 20. Norton Sound red king crab summer commercial catch samples, 1981-1996 (There was no fishery in 1991).

Norton Sound Red King Crab

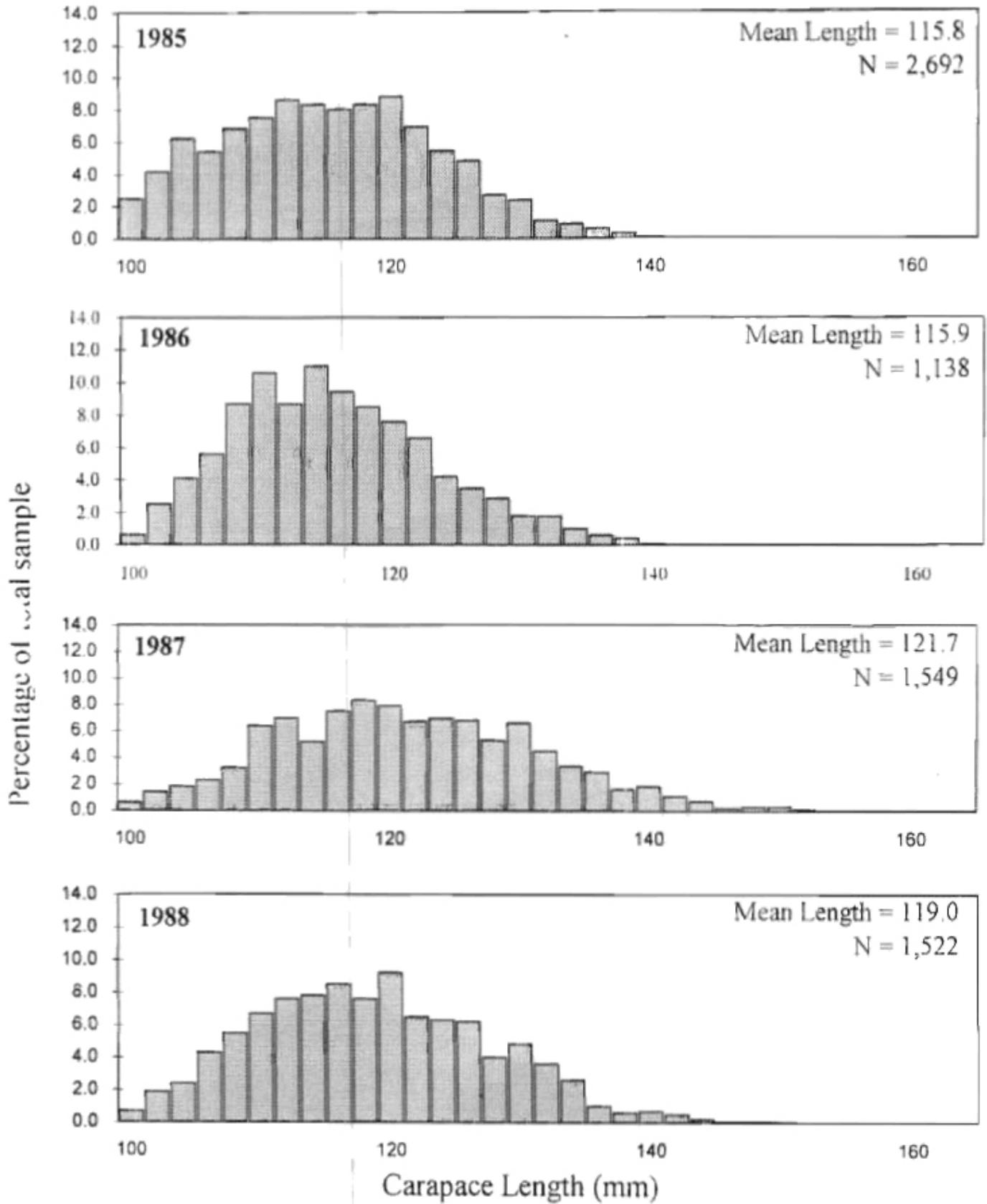


Figure 20. (page 2 of 4)

Norton Sound Red King Crab

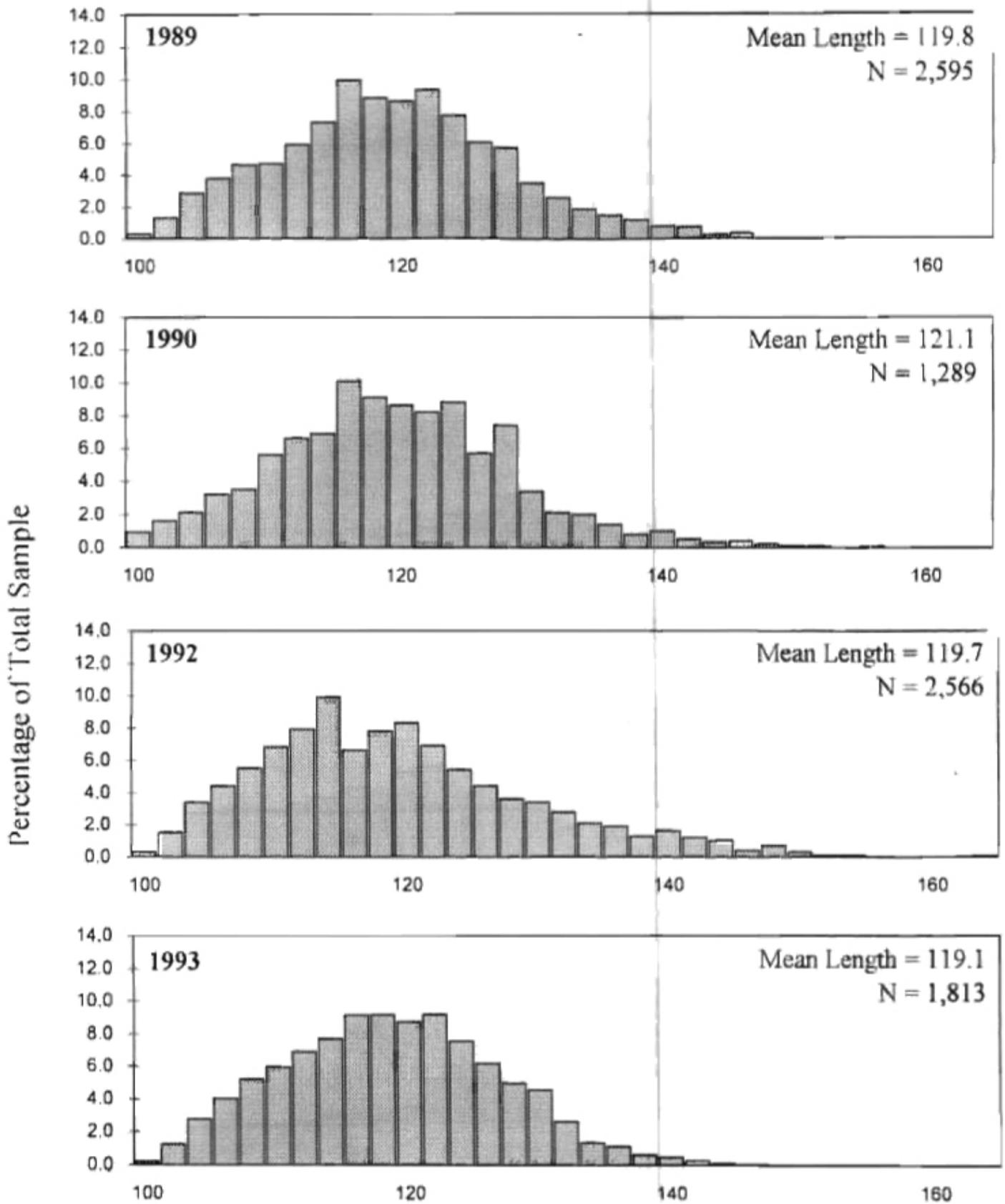


Figure 20. (page 3 of 4)

Norton Sound Red King Crab

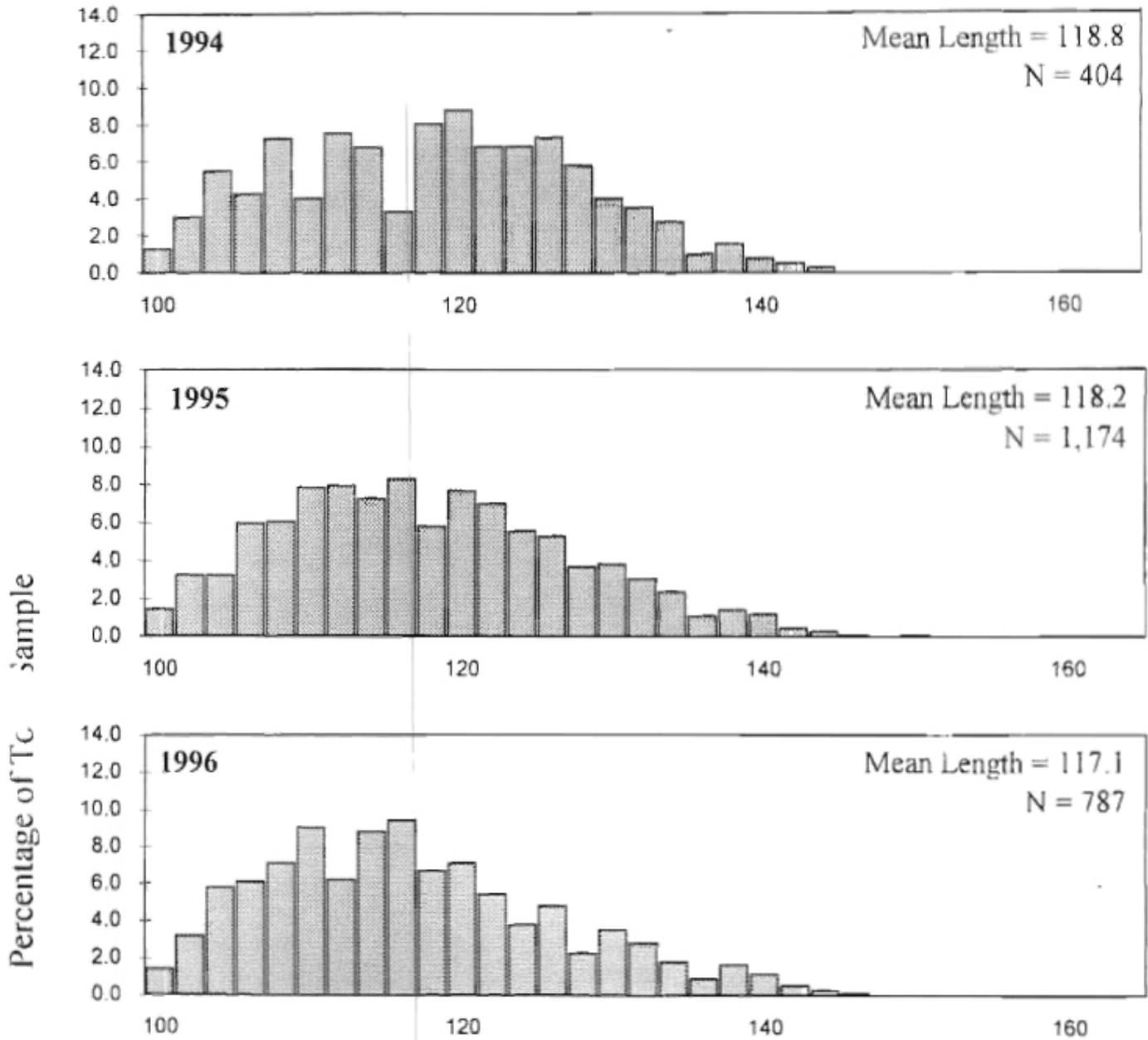


Figure 20. (page 4 of 4)

Appendix Table E1 Comparison of annual summer commercial harvest of red king crab from Newton Sound Section, Eastern Bering Sea, by statistical areas, 1977-1996 (catch in pounds)^a

Statistical Area	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1992	1993	1994	1995	1996 ^b	Totals	
616311	7,893																48			7,941	
616401																		55		55	
626311	40,020					22													61	40,103	
626401	31,572			4,830	399													58,911	45,045	100,817	
626402	38,995																			38,995	
636330																			4,560	4,560	
636401				12,398	61,823	32,246	5,680	41	891				22,080		1,159	1,373	8,087	24,329	70,677	290,934	
636402																	1,754	1,466		5,220	
646301																		4,628	13,888	18,516	
646330						4,716							5,212					3,493	2,894	14,315	
646401			155,972		1,319	17,532										1,963	37,222	105,045	22,834	341,887	
646402	80,969					748										730	143,511	66,821		292,779	
656300			161,699		15,174															176,873	
656330			123,518	72,735	795,662	3,283	24,246	85,479	7,632		79,006	36,129	1,253			4,814	265		19,745	15,446	1,008,417
656401			138,011	121,147	252,387	60,480	11,422	383,119	246,200		194,408	165,644	100,956	171	55,119	105,341	29,566	32,289	9,985	1,701,245	
656402	306,302	90,187	288,869	938	3,098	2,832										193,079	106,053	44,000		1,167,701	
666230		55,490			77															55,567	
666300		162,795	60,816	34,874	9,167	93		4,534											25,509	347,800	
666330		353,016	505,050	367,446	141,513	8,990	1,192			30,615	2,564	13,020	1,275	27,185	4,305	31,758		708		1,529,447	
666401		179,212	486,947	205,400	181,510	79,580	325,045	116,254	5,341	408,848	50,744	21,895	115,267	162,264	10,637	746	396		3,007	2,553,071	
666402	12,036	515,778	534,928	183,581		17,585										635	1,221			1,298,666	
666431			140,029																1,124		147,153
676300		13,238		126,231																546	140,015
676330		51,304	81,798	5,762	18,734																158,598
676400		667,130	33,856	274	92,026	1,315	347		32											9,775	807,867
676430		3,811	12,309		173	3,513			1,171												21,177
676501					36																36
686330			1,860																		1,860
Totals	517,787	2,091,961	2,931,672	1,186,596	1,379,014	228,921	368,932	107,427	427,611	479,465	327,121	236,688	246,487	192,831	74,029	335,780	327,858	322,676	254,291	12,285,595	

^aNo commercial fishery occurred in 1991

^bDoes not include approximately 2,490 lbs not reported on fish tickets

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Appendix Table E2. Percent recruit and postrecruit size male red king crab from commercial catch samples by year, Norton Sound Section, Bering Sea.

Year	Recruits ^a	Postrecruits ^b
1977	53	47
1978	29	71
1979	33	67
1980	15	85
1981	10	90
1982	27	73
1983	55	45
1984	59	41
1985	45	55
1986	49	51
1987	22	78
1988	25	75
1989	23	77
1990	21	79
1991 ^c	-	-
1992	28	72
1993	31	69
1994	20	80
1995	36	64
1996	30	70

^a Percent Recruits = All new shell, legal size, male king crab of carapace length <116mm.

^b Percent Postrecruits = All other, legal size, male king crab.

^c No Summer Commercial Fishery in 1991.

Appendix Table E3 Historic summer commercial red king crab economic performance, Norton Sound Section, Bering Sea, 1977 - 1996

Year	Guideline	Legal Male	Commercial	Number of			Number of Pots		Exvessel Price/lb	Fishery Value (millions \$)	Season Length	
	Harvest Level (lbs) ^b	Pop. Est (lbs) ^b	Harvest (lbs) ^{a,b}	Vessels	Permits	Landings	Registered	Pulls			Days	Dates
1977	^c	10.0	0.52	7	7	13	^d	5,457	0.75	0.229	60	^e
1978	3.00	11.0	2.09	8	8	54	^d	10,817	0.95	1.897	60	6/7-8/15
1979	3.00	5.4	2.93	34	34	76	^d	34,773	0.75	1.878	16	7/15-7/31
1980	1.00	6.6	1.19	9	9	50	^d	11,199	0.75	0.890	16	7/15-7/31
1981	2.50	4.7	1.38	36	36	108	^d	33,745	0.85	1.172	38	7/15-8/22
1982	0.50	1.3	0.23	11	11	33	^d	11,230	2.00	0.405	23	8/9-9/1
1983	0.30	2.1	0.37	23	23	26	3,583	11,195	1.50	0.537	3.8	8/1-8/5
1984	0.40	2.7	0.39	8	8	21	1,245	9,706	1.02	0.395	13.6	8/1-8/15
1985	0.45	2.4	0.43	5	5	72	1,116	13,209	1.00	0.427	21.7	8/1-8/23
1986	0.42	2.8	0.48	3	3	^d	578	4,284	1.25	0.600	13	8/1-8/25 ^f
1987	0.40	2.2	0.33	9	9	^d	1,430	10,258	1.50	0.491	11	8/1-8/12
1988	0.20	3.2	0.24	2	2	^d	360	2,350	^d	^d	9.9	8/1-8/11
1989	0.20	3.2	0.25	10	10	^d	2,555	5,149	3.00	0.739	3	8/1-8/4
1990	0.20	3.2	0.19	4	4	^d	1,388	3,172	^d	^d	4	8/1-8/5
1991	^c	3.4										
1992	0.34	3.4	0.07	27	27	^d	2,635	5,746	1.75	0.130	2	8/1-8/3
1993	0.34	3.4	0.33	14	20	208	560	7,063	1.28	0.430	52	7/1-8/28 ^g
1994	0.34	3.4	0.32	34	52	407	1,360	11,729	2.02	0.646	31	7/1-7/31
1995	0.34	3.4	0.32	48	81	665	1,900	18,782	2.87	0.926	67	7/1-9/5
1996	0.34	3.4	0.22	41	50	254	1,640	10,453	2.29	0.519	57	7/1-9/3 ^h

^a Deadloss included in total^b Millions of pounds^c No summer commercial fishery^d Information not available^e Fishing actually began 8/12^f Fishing actually began 7/8^g Fishing actually began 7/9 due to fishermen's strike

Appendix Table E4. Winter commercial and subsistence red king crab harvests, Norton Sound, Bering Sea, 1978-1996

COMMERCIAL			SUBSISTENCE						
Year ^a	Number of Fishermen	# Crab Harvested	Winter ^b	Permits Issued	Permits Returned	Permits Fished	Total Crab Captured ^c	Total Crab Harvested ^d	Average Harvest/fm
1978	37	9,625	1977 -78	290	206	149	^e	12,506	84
1979	1	221	1978 -79	48	43	38	^e	224	6
1980	1	22	1979 -80	22	14	9	^e	213	24
1981	0	0	1980 -81	51	39	23	^e	360	16
1982	1	17	1981 -82	101	76	54	^e	1,288	24
1983	5	549	1982 -83	172	106	85	^e	10,432	123
1984	8	856	1983 -84	222	183	143	15,923	11,220	78
1985	9	1,168	1984 -85	203	166	132	10,757	8,377	63
1986	5	2,168	1985 -86	136	133	107	10,751	7,052	66
1987	7	1,040	1986 -87	138	134	98	7,406	5,772	59
1988	10	425	1987 -88	71	58	40	3,573	2,724	68
1989	5	403	1988 -89	139	115	94	7,945	6,126	65
1990	13	3,626	1989 -90	136	118	107	16,635	12,152	114
1991	11	3,800	1990 -91	119	104	79	9,295	7,366	93
1992	13	7,478	1991 -92	158	149	105	15,051	11,736	112
1993	8	1,788	1992 -93	88	79	37	1,193	1,097	30
1994	25	5,753	1993 -94	118	95	71	4,894	4,113	58
1995	42	7,538	1994 -95	166	131	97	7,777	5,426	56
1996	9	1,778	1995 -96	84	44	35	2,936	1,679	48

^a Prior to 1985 the winter commercial fishery occurred from January 1 thru April 30; as of March 1985, the winter commercial season was open by regulation from November 15 thru May 15.

^b The winter subsistence fishery occurs during months of two calendar years (as early as December, thru May).

^c The number of crab actually caught; some crab may have been released.

^d The number of crab "Harvested" is the number of crab caught and kept.

^e Data unavailable.

Appendix Table E5. Results of the population assessment surveys conducted for red king crab in Norton Sound since 1976.

Year	Date	Research Agency	Vessel	Gear Effort	Number of Red King Crab Captured ^a			Population Estimates of Legal Male Crab ^b	
					Sublegal Males	Legal Males	Females	Numbers	Pounds
1976	9/02 - 9/05 9/16 - 10/07	NMFS	Miller-Freeman	Trawl 158 tows	768	555	180	3,119,800	8,111,480
1979	7/26 - 8/05	NMFS	Miller-Freeman	Trawl 71 tows	46	194	40	837,241	2,511,723
1980	7/04 - 7/14	ADF&G	Altair	Pots 397 lifts	443	3,290	158	1,900,000	8,600,000 ^d
1981	6/28 - 7/14	ADF&G	Altair	Pots 718 lifts	4,097	3,415	1,933	1,285,195	4,755,221
1982	7/06 - 7/20	ADF&G	Aleutian #1	Pots 689 lifts	5,019	2,001	424	353,273	1,271,783
1982	9/05 - 9/11	NMFS	Miller-Freeman	Trawl 50 tows	322	107	265	970,646	2,620,744
1985	7/01 - 7/14	ADF&G	Arctic Sea	Pots 642 lifts	6,086	4,645	181	907,579	2,414,644
1985	9/16 - 10/01	NMFS	Argosy	Trawl 76 tows	268	163	151	1,203,000	3,369,000
1988	8/16 - 8/30	NMFS	Miller-Freeman	Trawl 82 tows	258	141	218	1,037,000	3,038,000
1991	8/22 - 8/30	NMFS	Ocean Hope	Trawl 53 tows	202	178	105	1,384,000	4,069,000 ^e
1996	8/7 - 8/18	ADF&G	Peggy Jo	Trawl 89 tows	250	67	168	534,446	1,603,339

^a Number of crab captured on ADF&G surveys represent data standardized for a 24 hour soak.

^b Legal male red king crab were defined as at least 106mm in carapace length for the 1976 NMFS survey; 105mm for the 1979 and 1985 NMFS survey; and at least 121mm in carapace width for all ADF&G surveys.

^c Population estimates are valid for the date of the survey, ie either before or after the summer commercial fishery.

^d The 1980 estimate has been revised from the original estimate of 13.4 million pounds. The original estimate was thought inaccurate due to under-reporting of recovered tagged crab.

^e The population estimate for the entire sound is recorded here, but only 3,400,000 pounds were estimated in waters open to the summer commercial fishery.

Appendix Table E6. Size composition by percent of red king crab from winter research pots near Nome, Norton Sound, Bering Sea, 1983-1996.^a

Year	SUBLEGAL			LEGAL		
	Prerecruit Twos	Prerecruit Ones	Totals	Recruits	Post-Recruits	Totals
1983	26	38	64	26	10	36
1984	35	31	66	19	16	35
1985	25	45	70	20	10	30
1986	26	35	61	22	17	39
1987	13	31	44	11	45	56
1988 ^b	-	-	-	-	-	-
1989	27	15	42	27	31	58
1990	16	33	49	25	26	51
1991	5	30	35	34	31	65
1992 ^c	-	-	-	-	-	-
1993	3	9	12	17	71	88
1994 ^c	-	-	-	-	-	-
1995	10	11	23 ^d	32	45	77
1996	22	33	64 ^d	10	26	36

^a Sublegals = male crab less than 4 3/4" carapace width.
 Pre-recruit Ones = Sublegals greater than 89mm in carapace length.
 Pre-recruit Twos = Sublegals smaller than 90mm in carapace length.

Legals = male king crab greater than 4 3/4" carapace width.
 Recruits = Legal new shell crab smaller than 116mm in carapace length.
 Post-recruits = all non-recruit legal males.

^b No data collected in 1988 due to poor ice conditions.

^c No winter crab research study in 1992 or 1994.

^d Includes prerecruit threes.

SECTION 4: MISCELLANEOUS SPECIES
(Includes Norton Sound,
Port Clarence and Kotzebue Districts)

SECTION 4 - MISCELLANEOUS SPECIES

INTRODUCTION

Several species other than salmon, crab and herring are utilized for commercial and subsistence purposes in the Norton Sound, Port Clarence and Kotzebue Districts. Primary species include inconnu or "sheefish" (Stenodus leucichthys), whitefish (Coregonus laurettae, Coregonus pidschian, Coregonus sardinella, Coregonus nasus, and Prosopium cylindraceum), (Coregonus sp., Prosopium sp.), Dolly Varden (Salvelinus malma) and saffron cod (Eleginus gracilis).

The fish are taken by set gillnets, beach seines, "jigging" through the ice, and rod and reel. Subsistence catches taken during the summer months are normally air dried, while winter catches are stored frozen. Fish are utilized both for human consumption and for dog feed. Fish taken for commercial purposes are mainly sold locally, although some are shipped from the area.

Subsistence harvest of most species is not limited by regulation. Commercial harvest may be prohibited in some freshwater areas, but limited commercial endeavors are allowed in many areas under terms of a permit.

INCONNU (Sheefish)

Introduction

The distribution of inconnu includes the Kobuk-Selawik River drainages, and Hotham Inlet of Kotzebue Sound and some Norton Sound drainages, but the largest populations and harvests occur within the former area (Figure 21). In the Kotzebue Sound area, adult fish migrate to upriver spawning areas after ice breakup and to wintering areas within the Hotham Inlet/Selawik Lake area during October-November. Although inconnu are capable of consecutive spawning, most fish spawn every two to three years. Inconnu mature slowly with males reaching maturity at 5-7 years of age and females at 7-11 years.

The inconnu's spawning and overwintering migration behavior makes them available for harvest by the various fisheries throughout their life cycle, and increases their vulnerability to overharvest. In addition, the inconnu's slow maturation rate increases the time required to restore depleted populations.

During the 1960's, age, sex and length data indicated stocks were being overharvested by the commercial and subsistence fisheries in the Kotzebue district. Consequently, an annual area commercial harvest quota of 25,000 pounds of inconnu was instituted, although subsistence catches remained unrestricted.

Commercial Fishery

Most of the commercial fishing effort occurs near Kotzebue in Hotham Inlet. Fishermen use gillnets ranging from 5 1/2 inch - 7 inch stretched mesh which are set under the ice. Recorded commercial catches have remained relatively small; however, undocumented catches are believed to be significant and therefore, harvest totals should be considered minimum estimates. Restricted markets outside northwestern Alaska limits commercial activity greatly and most individuals who normally participate in the winter commercial fishery also fish for subsistence purposes. During some years, incidentally caught inconnu are also sold by commercial salmon fishermen when there is a market, but only in small amounts. The 1996 directed commercial harvest of sheefish was reported to be 308 fish totaling 3,002 pounds. The average weight per fish was 9.7 pounds, the average price was \$.44 per pound, and the total fishery value was \$1,321 (Appendix Table F1).

Subsistence Fishery

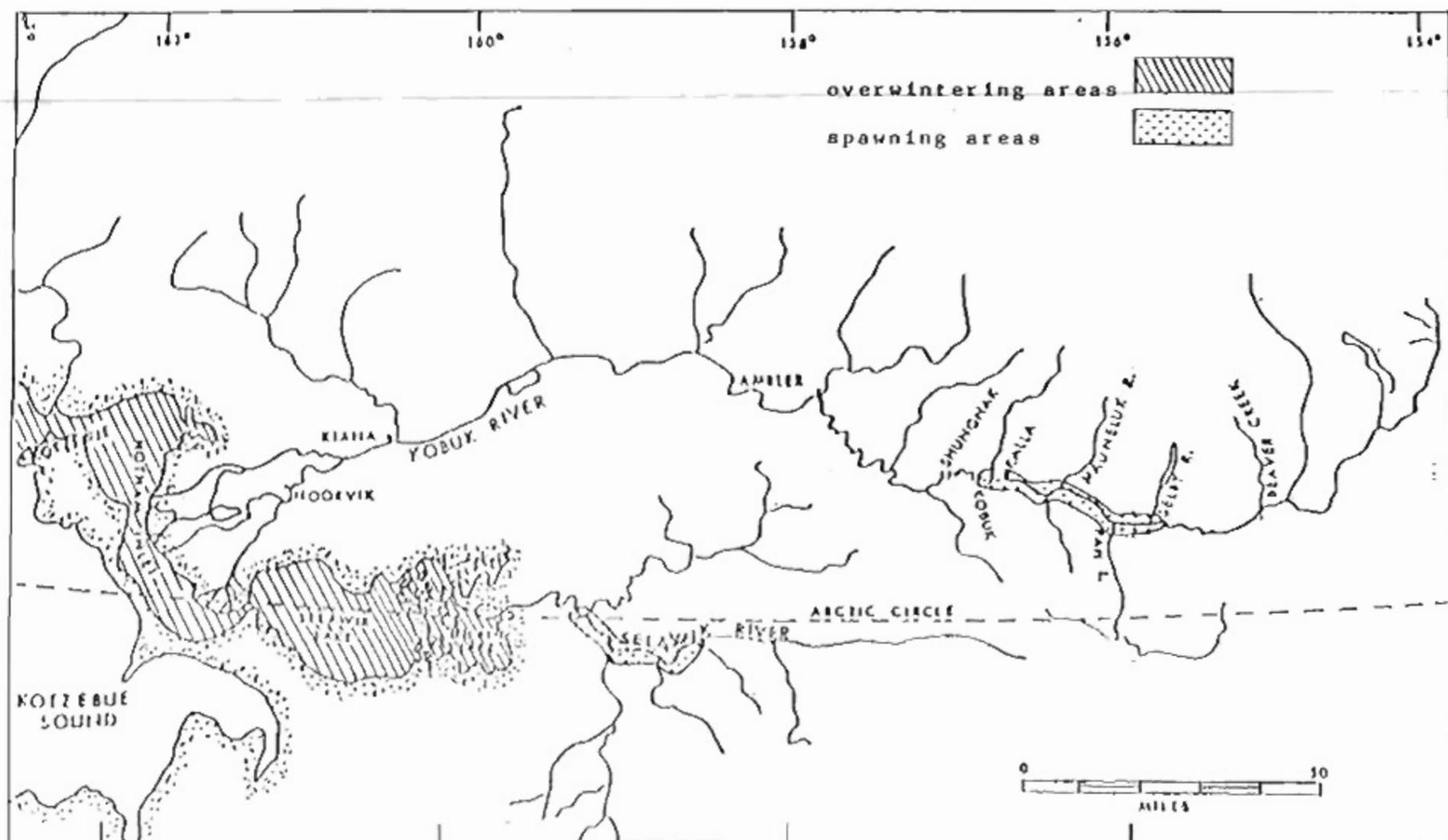
Inconnu have long been utilized for subsistence purposes throughout the Kotzebue Basin. Fishermen along the upper Kobuk River fish for inconnu during June through October, while the lower Kobuk and Selawik River residents fish during April through June. Kotzebue and Selawik fishermen fish in the Hotham Inlet and Selawik Lake during the winter months.

Villages were not surveyed for subsistence sheefish harvest specifically. Appendix Table F2 estimates catches reported during the fall chum salmon subsistence surveys conducted by Subsistence Division, and may include summer as well as winter catches. In 1996, 352 fishermen were interviewed in surrounding villages who reported 6,953 sheefish harvested which averaged out to 20 fish per fishermen. Kotzebue city residents were not interviewed nor were Kobuk Lake gillnet catches.

Escapement

In recent years aerial surveys have been conducted on key inconnu spawning areas incidental to the effort of enumerating salmon. These surveys have primarily been conducted along the upper Kobuk River in September. Survey conditions historically result in either very few or no inconnu being observed (Appendix Table F3). During these surveys, species identification has been a problem in some years. Surveys were not conducted in 1985 through 1990 due to high, turbid water, poor weather conditions, or lack of personnel. Incomplete escapement and catch data provide little basis for assessing the current population status of inconnu in the Kotzebue district, however there is some local concern that the inconnu stocks are declining.

Figure 21. Kotzebue and Kohuk River Valley villages and their spatial relationship with Inconnu spawning and overwintering areas.



Appendix Table F 1 Kotzebue District winter commercial Sheefish harvest statistics, 1967-1996 ^a

Year ^b	No. of Fishermen	No of Fish	Pounds		Price/Pound	Estimated Value
			Total	Average		
1967 ^c		4,000	26,000	6.5	\$0.20	\$5,200
1968	10	792	4,752	6.0	\$0.22	\$1,045
1969	17	2,340	15,209	6.5	\$0.25	\$3,802
1970 ^c		2,206			\$0.14	
1971	4	73	720	9.9	\$0.13	\$95
1972	5	456	4,071	8.9	\$0.16	\$651
1973	11	2,322	15,604	6.7	\$0.20	\$3,121
1974	6	1,080 ^d	6,265	5.8	\$0.30	\$1,880
1975	^e	2,543 ^d	24,161	9.5	\$0.30	\$7,248
1976	14	2,633	19,484	7.4	\$0.30	\$5,845
1977	2	566	5,004	8.8	\$0.30	\$1,501
1978	11	2,879	26,200	9.1	\$0.40	\$10,480
1979 ^c						
1980	4	1,175	8,225	7.0	\$0.50	\$4,113
1981	1	278	1,836	6.6	\$0.75	\$1,377
1982	11	2,629 ^f	17,376	6.6	\$0.75	\$13,032
1983	8	1,424	13,395	9.4	\$0.50	\$6,698
1984	5	927 ^d	10,403	11.2	\$0.55	\$5,722
1985	4	342 ^d	3,902	11.4	\$0.51	\$1,990
1986	2	26	312	12.0	\$0.75	\$234
1987	3	670	5,414	8.1	\$0.49	\$2,653
1988	3	943	7,373	7.8	\$0.45	\$3,318
1989	8	2,335	16,749	7.2	\$0.51	\$8,542
1990 ^a	6	687	5,617	8.2		
1991	5	852	8,224	9.7	\$0.50	\$4,112
1992	3	289	2,850	9.9	\$0.65	\$1,853
1993	1	210 ^d	1,700	8.1	\$0.50	\$850
1994 ^e						
1995	1	226	2,240	9.9	\$0.50	\$1,120
1996	2	308	3,002	9.7	\$0.44	\$1,321

^a Data is not exact. in some instances total catch poundage was determined from average weight and catch data. Similarly, various price/pound figures were determined from price/fish and average weight data.

^b Season was from October 1 to September 30. Year indicated would be the year the commercial season ended. For example, the year 1980 would represent October 1, 1979 to September 30, 1980.

^c Data unavailable or incomplete

^d Number of fish not always reported. Estimates were based on average weight from reported sales which documented the number of fish.

^e No reported commercial catches.

^f Estimate based on historical average weight.

Appendix Table F.2. Kotzebue District reported subsistence harvests of sheefish, 1966-1996.^a

Year	Number of Fishermen Interviewed	Reported Harvest	Average Catch per Fisherman
1966-1967	135	22,400	166
1967-1968	146	31,293	214
1968-1969	144	11,872	82
1970	168	13,928	83
1971	155	13,583	88
1972	79	3,832	49
1973	65	4,883	75
1974	58	1,062	18
1975	69	1,637	24
1976	57	966	17
1977	95	1,810	19
1978	95	1,810	19
1979	75	3,985	53
1980	74	3,117	42
1981	62	6,651	107
5/82-4/83 ^{b,c}	130	4,704	36
5/83-4/84 ^{b,c}	27	764	28
5/84-9/84 ^b	30	2,803	93
1985 ^d	2	60	30
1986 ^{b,d}	72	721	10
1987 ^d	46	276	6
1988 ^d	-	-	-
1989	-	-	-
1990	-	-	-
1991	40	2,180	55
1992	43	2,821	66
1993	46	2,441	53
1994	171 ^f	3,181	19 ^e
1995 ^e	314 ^f	9,465	30 ^e
1996 ^e	352 ^f	6,953	20 ^e

^a To obtain individual village catches during years previous to 1982, refer to the 1982 Annual Management Report. Due to limited effort during many years, total catch and effort should be regarded as minimum figures only and are not comparable year to year.

^b Catch by village for these years are presented in separate tables in respective year annual management reports.

^c Summer catches only; winter catches were not documented.

^d Villages were not surveyed for subsistence sheefish harvests from 1985 to present; figures shown are catches reported during the fall chum salmon subsistence surveys and may include summer as well as winter harvests.

^e Subsistence sheefish harvests are from villages on Kobuk River.

^f Number of households interviewed.

^g Average catch per household.

Appendix Table F.3. Peak annual aerial survey counts of sheefish in the Kobuk and Selawik Rivers, 1966-1995. ^a

Year	Kobuk River	Mark-Recapture Estimate In Kobuk Lake	Selawik River	Total
1966	1,200		^c	1,200
1967	1,025		^c	1,025
1968	4,973		1,234	6,207
1969	3,654		^c	3,654
1970	3,220		^c	3,220
1971	8,166		1,196	9,362
1972	^b		^c	-
1973	^c		^c	-
1974	^b		^c	-
1975	^b		^c	-
1976	73		^c	73
1977	^c		^c	-
1978	2,824		^c	2,824
1979	1,772		^c	1,772
1980	250 ^d		^c	250
1981	^b		^c	^b
1982	1,009 ^d		^c	1,009
1983	2,604		^c	2,604
1984	^c		^c	-
1985	^c		^c	-
1986	^c		^c	-
1987	^c		^c	-
1988	^c		^c	-
1989	^c		^c	-
1990	^c		^c	-
1991	17,335		^c	17,335
1992	3,310		^c	3,310
1993	^c		^c	-
1994	^c		^c	-
1995	1,840		^c	1,840
1996	43,036 ^e	15,161	^c	58,197

^a Counts are considered minimal as conditions ranged from poor to good.

^b No fish reported.

^c Not surveyed.

^d Probably more sheefish than listed; species identification problems.

^e Mark-recapture estimate for sheefish spawning in Kobuk River, Sport Fish Div., 1996.

DOLLY VARDEN

Introduction

Dolly Varden (*Salvelinus malma*) are distributed throughout the Norton Sound, Port Clarence, and Kotzebue districts. Although taxonomists have disagreed on the distinguishing Dolly Varden characteristics and distribution of Arctic Char and Dolly Varden, most now agree that char in this area are the northern form of Dolly Varden. In order to eliminate confusion, in this report these fish will be referred to as Dolly Varden, the common name for this species complex.

Dolly Varden in this area are primarily nonconsecutive spawners and spawn throughout the late summer and fall. Fry emerge in the spring and migrate to the ocean during early summer after spending from 1 to 6 (generally 2-5) years in freshwater. Since Dolly Varden are a late-maturing fish (generally age 6-7), they are susceptible to overfishing by commercial, subsistence, and/or sport fisheries. Consequently, commercial fisheries have been maintained at low levels or prohibited to both reduce the potential of overharvest and provide for reproductive and subsistence fishery needs.

Commercial Fishery

Dolly Varden are taken as a non-target species in the directed Kotzebue commercial chum salmon fishery (Tables 11 and 12). Regulation changes in 1976, which closed the commercial salmon fishery on August 31, have reduced the harvest of Dolly Varden since Dolly Varden typically pass through the harvest area during September. Dolly Varden generally appear in commercial catches during the last three weeks of August. Reported Dolly Varden catches are dependent upon available markets. The typical season catch when buyers are purchasing Dolly Varden is between 1,000 to 3,000 fish (Appendix Table F4). In 1996, 188 Dolly Varden were caught and sold during the commercial salmon fishery. The total weight was 1,153 pounds for a 6.1 pound average per fish and the average price was \$0.25 per pound. (The 1991 commercial harvest was significantly higher at 6,136 due to a high Dolly Varden return with a strong pulse of fish that moved through the fishery during an open period.) Historically two-thirds of the catch is taken on the north side of the district near Sisaulik.

Subsistence Fishery

Dolly Varden are an important component in the diet of subsistence users in the Norton Sound-Kotzebue Sound areas. Subsistence fishermen catch Dolly Varden with seines in the fall, hook and line through the ice in the winter, and gillnets in the spring. The fall seine fishery contributes the greatest number of fish to the annual subsistence Dolly Varden harvest. Since 1962, seine catches made by the residents of Kivalina, within the Kotzebue District, have ranged from 7,000 to 49,000 Dolly Varden annually (Appendix Table F5).

In the Kotzebue District Fall seine fishing is a group effort with several households comprising a fishing group. The catch is stored and allowed to freeze in willow cribs located near the seining site. These fish are used throughout the winter by the fishing group. It should be pointed out that the

historical subsistence Dolly Varden catches that are summarized in Appendix Table F5 are very minimal figures due to the timing of the surveys conducted. Most Dolly Varden harvest take place prior to or just after freeze-up. The village of Noatak usually fishes prior to freeze-up, while the Kobuk River villages of Shungnak and Noorvik fish for Dolly Varden throughout the winter.

Most villagers in the Norton Sound District report incidental catches of Dolly Varden in their subsistence salmon nets. However, the bulk of the catch is taken by seining in the late fall, after Department subsistence surveys had been completed which made it difficult to estimate subsistence catches in the Norton Sound District

Sport Fishery

Residents of the Kotzebue area and nonlocal residents on wilderness boating trips on the Kobuk and Noatak Rivers are the primary participants in the Dolly Varden sport fishery in the Kotzebue area watershed. Approximately 1,500 Dolly Varden are taken in this fishery annually (Sport Fish Division surveys).

Overwintering Counts

Aerial survey counts of overwintering Dolly Varden on the Wulik River have ranged from 297,257 Dolly Varden in 1969 to 30,923 Dolly Varden in 1984 (Appendix Table F6). Weather and water conditions have precluded flying aerial surveys during many years. When weather permits, the Division of Sport Fisheries conduct aerial surveys of the spawning grounds on the Noatak River in the summer and the overwintering areas of the Kivalina and Wulik Rivers in the fall. During the fall of 1996, 61,005 overwintering Dolly Varden were counted on a survey of the Wulik River and 624 were counted in the Kivalina River (Sport Fish Division survey). Additional surveys were not conducted on the Noatak and Kivalina Rivers as in previous years.

Appendix Table F.4. Kotzebue District incidental caught and sold Dolly Varden during the salmon fishery, 1966-1996.

Year	Number of Fish Sold	Estimated Total Catch ^e	Pounds Sold	Average Weight ^d	Average Price
1966	3,325		-	-	0.55 ^f
1967	367		2,606	7.1	0.11
1968	3,181		21,949	6.9	0.14
1969	1,089 ^a		-	-	2.84 ^f
1970	2,095		-	-	-
1971	3,828 ^b		23,353	6.1	0.16
1972	7,746		56,545	7.3	0.17
1973	640		4,608	7.2	0.16
1974	2,605 ^c		20,580	7.9	0.16
1975	-		-	-	-
1976	-		-	-	-
1977	-		-	-	-
1978	1,229		9,094	7.4	0.15
1979	2,523		12,523	5.0	0.25
1980	3,049		17,015	5.6	0.20
1981	3 ^e		16	5.3	0.17
1982	3,447		23,648	6.9	0.20
1983	190 ^e	845	1,108	5.8	0.20
1984	347 ^e	1,090	2,104	6.1	0.25
1985	454	3,600	3,177	7.0	0.25
1986	5 ^e	2,373	34	6.8	0.20
1987	1,261	^h	8,704	6.9	0.30
1988	752	^h	4,967	6.6	0.35
1989	3,093	^h	20,293	6.6	-
1990	604	^h	4,219	7.0	0.25
1991	6,136	^h	40,747	6.6	0.18
1992	1,977	^h	11,951	6.0	0.10
1993	76	^h	540	7.1	0.10
1994	149	^h	767	5.1	0.17
1995	2,090	^h	13,195	6.3	0.20
1996	188	^h	1,153	6.1	0.25

^a Includes 269 taken by permit.

^b Includes 179 taken by permit.

^c Includes 234 taken during commercial sheefish fishery.

^d Some data extrapolated from average reported weight.

^e Limited Dolly Varden market, many fish were taken home or dumped.

^f Price per fish.

^g Estimate includes fish caught but not soled based on interviews of fishermen.

^h Estimate of Dolly Varden caught (but not sold) not made.

Appendix Table F.5. Subsistence harvests of Dolly Varden from the villages of Kivalina and Noatak, 1959-1996.

Year	Kivalina		Noatak
	Number	Pounds	Number ^d
1959 ^a	34,240	85,600	-
1960 ^a	49,720	124,300	-
1962	-	-	27,623
1963	-	-	4,130
1968	49,512	120,214	*
1969	64,970	152,750	32,350
1970	33,820	79,420	3,700
1971	29,281	68,518	5,320
1972	48,807	114,637	1,492
1973 ^b	-	-	-
1979	14,600 ^c	-	9,060
1980	-	-	7,220
1981	15,000-18,000	-	3,056
1982	18,438 ^e	-	2,676 ^{b,f}
1983	16,270 ^c	-	4,545
1984	12,000 ^c	-	2,542
1985	10,500 ^c	-	g
1986	7,436 ^c	-	46 ^h
1987	g	-	1,376 ^h
1988	g	-	g
1989	g	-	g
1990	g	-	g
1991	g	-	4,814
1992	g	-	4,395
1993	g	-	4,275
1994	g	-	g
1995	g	-	5,762
1996	g	-	5,692

^a From Saario, Doris J. and Brian Kessel. 1966. Environment of Cape Thompson Region, Alaska. U.S. Atomic Commission.

^b Storm and ice conditions prevented fall harvest.

^c Harvest data from Division of Sport Fish surveys.

^d No data available on poundage.

^e Harvest data from Stephen Braund and Associates.

^f Expanded estimates (see text on subsistence fishery in the 1982 Annual Management Report).

^g Not surveyed.

^h Subsistence fishermen just beginning to beach seine at the time of this survey.

Appendix Table F.6. Aerial survey counts of overwintering and spawning Dolly Varden in the Kotzebue District 1968-1996 ^a

Year	Noatak River Spawner Survey ^b	Overwintering	
		Wulik River ^c	Kivalina River ^c
1968	-	90,236	27,640
1969	-	297,257	-
1976	-	68,300	12,600
1977 ^d	-	-	-
1978 ^d	-	-	-
1979	-	55,030	15,744
1980	-	113,553	39,692
1981	7,922	101,826	45,355
1982	8,275	65,581	10,932
1983	2,924 ^e	^d	^d
1984	9,130	30,923	5,474
1985	10,979	-	-
1986	^f	5,590	5,030
1987	^f	^f	^f
1988	^f	80,000 ^c	^f
1989	^f	56,384	^f
1990	7,261	^f	^f
1991	9,605	126,985	35,275
1992	^f	135,135	^d
1993	9,560	144,138	16,534
1994	^f	66,752	^f
1995	6,500	128,705	28,870
1996	12,184	61,005	624 ^g

^a Counts are considered minimal as data listed includes both poor and good surveys.

^b Includes spawner count on the Kelly, Kugurorok and Nimiuktuk Rivers, tributaries of the Noatak River.

^c Incomplete survey.

^d Poor weather hampered or prevented survey.

^e Surveys conducted by Division of Sport Fish since 1979.

^f Not surveyed

^g Foot survey of small spring area on the Kivalina River.

WHITEFISH

Introduction

Although inconnu belong to the whitefish family, this section deals with several smaller species of the genera Coregonus and Prosopium. The genus Coregonus contains the "broad" and "humpback" whitefish or C. nasus and C. pidschian, respectively. In addition, three whitefish species known as "ciscoes" belong to this genera; ie., the least cisco (C. sardinella), Arctic cisco (C. autumnalis) and Bering cisco (C. laurettae). "Round" whitefish (Prosopium cylindraceus) are the sole representatives of the genus Prosopium in this area. All species normally spawn in the fall in freshwater.

Whitefish occur throughout most bodies of freshwater in the Norton Sound/Port Clarence/Kotzebue areas and can also be found in inshore marine waters at various times of the year. Whitefish are harvested to a very limited extent by the commercial and sport fisheries within the area, but are uniformly important to the various subsistence fisheries. Recently, there has been increasing interest in commercial development of this resource, especially in the Kotzebue District.

Commercial Fishery

Limited commercial whitefish harvests have been allowed since statehood, normally under the auspices of a permit which delineated harvest levels, open areas, legal gear, etc. Commercial whitefish fisheries have generally been limited to large open water areas (e.g. Grantley Harbor in the Port Clarence District) or ocean waters. Beach seines have been stipulated as legal gear in some instances in order to reduce the number of incidental species taken. Little comparative commercial catch and effort data have been recorded, but harvest levels have historically been low. A majority of the commercial catches have been made in Golovin Bay within the Norton Sound District, in the Kuzitrin River of the Port Clarence District, and in Hotham Inlet and Selawik River in the Kotzebue District. The fish have been sold to local markets for human consumption, dog food, or more recently, crab bait.

Subsistence Fishery

Whitefish have been taken mainly by beach seine or set gillnets. Catches are usually dried and used for human consumption or dog food. In some areas fish are "gutted" and dried early in the summer, while later in the summer the fish are filleted and dried with the eggs and viscera intact.

Subsistence catch enumeration is difficult since fishermen do not count fish individually, but by "tubs", "bags", "strings" or any other estimators of gross abundance. Additionally, many fish have been dried and consumed or stored in caches prior to the survey period. Reported subsistence harvests are the result of a limited and sporadic survey effort and should be regarded as minimum figures and not comparable from year to year. Recent and historical subsistence harvest figures for the Kotzebue District are presented in Appendix Table F7 by year.

Escapement

Whitefish escapements have not been monitored in the past, but there have been no indications from limited Department observations or fishermen interviews of declining populations.

SAFFRON COD

Saffron cod, or tomcod as they are called locally, are extensively utilized as a subsistence resource in the Norton Sound, Port Clarence and Kotzebue Districts. Tomcod are taken through the ice by jigging as well as with gillnets in open water.

There has never been an extensive commercial fishery on tomcod in the Norton Sound, Port Clarence or Kotzebue areas. During 1980, one fisherman caught and sold 89 pounds (98 tomcod) in the Nome Subdistrict. There were no commercial landings during 1982. In 1983, one Nome area fisherman caught and sold 2,548 pounds (4,348 tomcod) and in 1989 one fisherman sold 1,800 pounds locally. These fish were used for dog food, crab bait and human consumption. No commercial deliveries were reported in during 1984-1993.

In 1994, Norton Sound Economic Development Corporation (N.S.E.D.C.) had provided a market for several fish species that had not been commercially utilized in the past. The need for crab bait was the primary factor in initiating the fishery at Unalakleet, where 1402 pounds were sold in seven deliveries in January and February of 1994. In 1995, the NSEDC market was not present which was likely a factor in the reduced harvest. The 1995 harvest totaled 52 pounds which sold for \$.50 per pound with a total value of \$26.00. No harvests were reported in 1996.

MISCELLANEOUS FINFISH SPECIES

Other finfish species taken for subsistence in the Norton Sound-Port Clarence-Kotzebue area include: rainbow smelt (boreal smelt), capelin, northern pike, starry flounders, yellow fin sole, arctic flounder, Alaska plaice, grayling, burbot, Pacific herring in the Fall time, and halibut (Appendix G1).

Subsistence utilization of these species has been documented although effort and catch vary widely in scale and importance with locality. Some of these species are important to the subsistence community in certain localities during specific seasons of the year.

Rainbow smelt, like saffron cod, had a limited commercial harvest at Unalakleet. During the January, February and March of 1994, 631 pounds of rainbow smelt were reported sold in nine deliveries for bait. The smelt and cod harvests from Unalakleet both occur in estuarine areas. The Smelt were reported to be higher in the water column the cod. Either species could often be harvested from the same jigging site. Burbot, or freshwater cod, have been sold intermittently in the past in the Kotzebue, Port Clarence and Norton Sound Districts.

Appendix Table .F7. Subsistence whitefish catch and effort in the Kotzebue District, 1970-1996 ^a

Year	Number of Fishermen Interviewed	Number of Whitefish Harvested
1970		58,165
1971		36,012
1977		30,810
1978		77,474
1979	123	43,653
1980	67	49,106
1981	71	37,746
1982	^b	^b
1983	47	16,389
1984	79	28,614
1985 ^c	46	5,229
1986 ^d	72	11,854
1987 ^d	46	20,020
1988 ^e	38	14,000
1989	^b	^b
1990	^b	^b
1991 ^d	63	16,015
1992 ^d	66	17,485
1993 ^d	70	19,060
1994 ^f		
1995 ^f		
1996 ^f		

^a Whitefish harvest information was collected during chum salmon subsistence surveys and is to be considered a small fraction of the annual catch.

^b Data unavailable.

^c Subsistence harvest information from Kiana and Shungnak villages only.

^d Subsistence interviews from Noatak, Noorvik and Shungnak villages only.

^e Subsistence harvest information from Noorvik and Shungnak villages only.

^f No surveys were conducted.

Appendix G1. List of comon and scientific names of finfish species of the Norton Sound, Port Clarence, and Kotzebue Districts.

Common Name	Scientific Name
Arctic lamprey	<i>Lampetra japonica</i>
Arctic char	<i>Salvelinus alpinus</i>
Arctic cod	<i>Boreogadus saida</i>
Arctic flounder	<i>Liopsetta glacialis</i>
Arctic grayling	<i>Thymallus arcticus</i>
Alaska plaice	<i>Pleuronectes quadrituberculatus</i>
Burbot	<i>Lota lota</i>
Bering cisco	<i>Coregonus laurettae</i>
Bering poacher	<i>Ocella dodecaedria</i>
Bering wolfish	<i>Anarjicas orientalis</i>
Blackfish	<i>Dallia pectoralis</i>
Boreal smelt (rainbow-toothed)	<i>Osmerus mordax</i>
Broad whitefish	<i>Coregonus nasus</i>
Capelin	<i>Mallotus villosus</i>
Dolly Varden	<i>Salvinus malma</i>
Pond smelt	<i>Hypomesus olidus</i>
Humpback whitefish	<i>Coregonus pidschian</i>
Inconnu (sheefish)	<i>Stenodus leucichthys</i>
Lake trout	<i>Salvelinus namaycush</i>
Least cisco	<i>Coregonus sardinella</i>
Longhead dab	<i>Liranda probiscidea</i>
Ringtail snailfish	<i>Liparis rutteri</i>
Northern Pike	<i>Esox lucius</i>
Longnose sucker	<i>Casostomus catostomus</i>
Pricklebacks	<i>Stichaeidae</i>
Pacific herring	<i>Clupea harengus pallasii</i>
Rock flounder	<i>Lepidsetta bilineata</i>
Rock greenling (terpug)	<i>Hexagrammus lagocephalus</i>
Round whitefish	<i>Prosopium cylindraceum</i>
Sculpins	<i>Cottidae</i>
Pink salmon	<i>Oncorhynchus gorbuscha</i>
Chum salmon	<i>Oncorhynchus keta</i>
Coho salmon	<i>Oncorhynchus kisutch</i>
Sockeye salmon	<i>Oncorhynchus nerka</i>
Chinook salmon	<i>Oncorhynchus tshawytscha</i>
Saffron cod	<i>Eleginus gracilis</i>
Starry flounder	<i>Platichthys stellatus</i>
Sandlance	<i>Amrodytes hexapterus</i>
Sturgeon poacher	<i>Angonus acipenserinus</i>
Threespine stickleback	<i>Gasterosteus aculeatus</i>
Ninespine stickleback	<i>Pungitius pungitius</i>
Tubenose poacher	<i>Pallasina barbata aix</i>
Whitespotted greenling	<i>Hexagrammus stelleri</i>
Yellowfin sole	<i>Limanda aspera</i>

Appendix G2. Studies conducted within the Norton Sound, Port Clarence, and Kotzebue Districts, 1996

HERRING

Herring Test Fishing

- a)Location: Norton Sound ocean waters; camps located at Cape Denbigh and Klikitarik; a third test fish crew operated out of Unalakleet.
- b)Description: To determine age class composition of the Norton Sound herring return through test fishing with variable mesh gill nets.

SALMON

Unalakleet Salmon Escapement Studies

- a)Location: Unalakleet River
- b)Description: To maintain an index of salmon migration up the Unalakleet River using test gill nets.

Shaktoolik River Salmon Counting Tower

- a)Location: Approximately 5 miles upstream from the mouth of the Shaktoolik River in Norton Sound.
- b)Description: To determine daily and seasonal timing and magnitude of the spawning salmon runs. Compare aerial survey totals with tower counts in order to improve survey accuracy. As time and personnel allow, collect age and sex data through escapement sampling of subsistence catches, beach seining or carcass sampling.

Kwiniuk River Salmon Counting Tower

- a)Location: Approximately five miles upstream from the mouth of the Kwiniuk River in Norton Sound.
- b)Description: Determine daily and seasonal timing and magnitude of chum and pink salmon runs. Determine age, sex and size of chinook and chum salmon of the commercial harvest in Moses Point Subdistrict and in the Kwiniuk River escapement.

Niukluk River Salmon Counting Tower

- a)Location: About five miles upstream from the mouth of the Niukluk River in Norton Sound.
- b)Description: Determine daily and seasonal timing and magnitude of the spawning salmon runs.

Appendix G2. (continued)

Nome River Salmon Counting Tower

a) Location: Nome River, approximately 4 miles east of Nome, Norton Sound.

b)Description: Determine daily and seasonal timing and magnitude of the spawning salmon runs. Compare aerial survey totals with tower counts in order to improve survey accuracy. As time and personnel allow, collect age and sex data through escapement sampling of subsistence catches, beach seining or carcass sampling.

Northwest Salmon Biological / Rehabilitation Projects

1. Hobson Creek Instream Incubation Project

a)Location: A spring fed tributary to the Nome River

b)Description: Experimental instream incubator boxes for supplemental chum salmon production.

2. Boulder Creek Instream Incubation Project

a)Location: A spring fed tributary to the Snake River

b)Description: Experimental instream incubator boxes for supplemental chum salmon production.

3. Shovel Creek Instream Incubation Project

a)Location: A spring fed tributary to the Solomon River

b)Description: Experimental instream incubator boxes for supplemental chum salmon production.

4. Salmon Lake Limnology Project

a)Location: A 1,851 acre lake at the headwaters of the Pilgrim River which drains into Port Clarence.

b)Description: To obtain limnological and biological data to evaluate the potential to restore the sockeye population to historic levels.

5. Glacial Lake Limnology Project

a)Location: A 986 acre lake at the headwaters of the Snake River which drains into the Bering Sea.

b)Description: To obtain limnological and biological data to evaluate the potential to restore the sockeye population to historic levels.

Appendix G2.(continued)

Kobuk River Test Fish Project

a)Location: Lower Kobuk River

b)Description: 1)To continue to evaluate the feasibility of indexing chum salmon abundance in the Kobuk River using systematic drift net catches. 2)Describe the migratory timing of chum salmon in the lower Kobuk River. 3) Sample for age, sex, and size data.

Subsistence Salmon Fishing Surveys

a)Location: Norton Sound, Port Clarence, and Kotzebue Districts.

b)Description: Determine subsistence utilization of salmon for formulating management procedures and goals. House-to-house surveys were conducted in the Norton Sound, Port Clarence, and Kotzebue District surrounding villages by the State of Alaska Division of Subsistence. Subsistence salmon permits were issued in the Nome Subdistrict.

CRAB

King Crab Trawl Survey

a)Location: Norton Sound

b)Description: To survey a portion of Norton Sound for red king crab and associated marine life for spatial distribution, abundance and population characteristics using a 400 eastern otter trawl. A population estimate of red king crab was made using the area-swept technique.

Nearshore Winter King Crab Study

a)Location: Ocean waters of Norton Sound, 1 to 1.5 miles south of Nome.

b)Description: Document the abundance and distribution of red king crab in nearshore Nome waters. Tag all male new shell red king crab with carapace length \leq 100 mm.

Appendix G3. Emergency Orders issued during 1996.

Emergency Order Number	Effective Date	Action Taken	Comments
3-Z-S-2-96	6:00 p.m. ADT June 13, 1996	This emergency order opens the Shaktoolik, and Unalakleet Subdistricts to commercial king salmon fishing for a standard 48 hour period at 6:00 p.m. Thursday, June 13. The fishing period will run from 6:00 p.m. Thursday until 6:00 p.m. Saturday. Only nets with a mesh size of seven and one-half inches or larger will be allowed.	Subsistence catch data and the Unalakleet test fishing data both indicate a strong king salmon migration is now moving into the rivers. King salmon have been present in nearshore waters for at least ten days. King salmon were caught in the Unalakleet test net on its first day of operation, June 5. This would appear to be earliest king migration in the history of the project. Chum salmon catches in the Unalakleet test net are also early, making the 1996 return the second earliest migration in the history of the project. This indicates a good start on both chum and king escapement. The first pink salmon are now entering the Unalakleet River. This is very early and may indicate a strong pink salmon return as well. Escapements have been strong for the past week. The test net at Unalakleet indicates that more than one-half the annual average king salmon escapement is now in the river. A longer than normal commercial opening is now warranted because the migration may be compressed and the window of opportunity for the fishery may be shortened. Escapement and subsistence requirements have been addressed by delaying the commercial fishery. Commercial fishermen are reminded that unsold salmon caught in commercial gear must be reported on fish tickets.
3-Z-S-3-96	6:00 p.m. ADT June 15, 1996	This emergency order closes the Nome Subdistrict to subsistence salmon fishing in the Sinuk, Cripple, Penny, Snake, Nome, Flambeau, Eldorado, Bonanza, and Solomon Rivers. In addition, the waters of Safety Sound and Bonanza Channel inside the barrier spit and Safety Bridge, as well as ocean waters from the Cape Nome jetty west to the Sinuk River mouth are closed to salmon fishing from 6:00 p.m. June 15 through July 30.	During the four year period, 1987 to 1990 salmon escapements in the immediate Nome area were well below historic levels and the levels the department staff believes are needed to maintain the salmon runs. This is particularly true of the chum salmon stocks. During the next four years, the trend of declining chum salmon escapements was broken. Many streams in the Nome area were judged to have adequate chum escapement levels. A similar management technique to what was used in 1994 is planned for the 1996 season. Subsistence fishing will reopen as pink salmon become abundant and as chum salmon escapement goals are met. Various locations and streams will be judged individually and opened on the basis of their individual chum salmon escapement and pink salmon abundance. The staff will be flying frequent surveys and boating some of the rivers to track the salmon migration's strength and progress. The counting towers on the Nome, Snake, and Eldorado rivers will also be used to track the various salmon migrations. If a stream appears to have adequate escapement, restrictions will be lifted in that area; otherwise, the restrictions will remain in place until they no longer benefit the species of concern. Subsistence fishers of the Nome Subdistrict are reminded of the regulatory change that occurred in 1995. That change is that a maximum of 50 fathoms of net may be used in saltwater and that only 50 feet of net may be used in freshwater. The fishing period in saltwater has been extended, the periods now begin 6:00 p.m. Monday and close 6:00 p.m. Saturday. Freshwater openings will continue to be the two 48 hour openings beginning at 6:00 p.m. on Mondays and Thursdays, once freshwater reopens.

Appendix G3. Emergency Orders issued during 1996.

Emergency Order Number	Effective Date	Action Taken	Comments
3-Z-S-4-96	6:00 p.m. ADT June 17, 1996	This emergency order opens the Shaktoolik, and Unalakleet Subdistricts to commercial salmon fishing on a standard schedule of two 48 hour periods each week beginning 6:00 p.m. Monday, June 17. The fishing periods will run from 6:00 p.m. Monday until 6:00 p.m. Wednesday and from 6:00 p.m. Thursday until 6:00 p.m. Saturday. Only nets with a mesh size of seven and one-half inches or larger will be allowed.	The test net at Unalakleet indicates the annual average king salmon escapement has now entered the river. Both the commercial harvest and the testnet indicate the run has peaked, but a significant portion of the run is still expected to be present in the fishery for the next week. Given the already adequate escapement and a salmon market that will accept both the targeted king salmon and the incidental chum salmon, the commercial fishery will be allowed to continue on the regular scheduled basis until further notice. Commercial fishermen are reminded that unsold salmon caught in commercial gear must be reported on fish tickets.
3-Z-S-5-96	6:00 p.m. ADT June 24, 1996	This emergency order opens the Shaktoolik, and Unalakleet Subdistricts to commercial pink salmon fishing for a single 24 hour period beginning 6:00 p.m. Monday, June 24. The fishing period will run from 6:00 p.m. Monday until 6:00 p.m. Tuesday. Only nets with a mesh size of four to four and one-half inches will be allowed. This opening will run coincidentally with a king salmon opening. Fishers are restricted to two 50 fathom nets per card holder, it will be their choice whether to use king or pink salmon gear or a combination of the two.	The test net at Unalakleet indicates a better than average annual king salmon escapement has now entered the river and that the chum salmon return is of normal strength and a few days early. The pink salmon indices indicate the pink salmon return will be of normal strength as compared to even year returns since 1980. A pink salmon market now exists in eastern Norton Sound. The processing vessel needs to tune its production facility and a short opening will help the managers to better judge the strength of the pink salmon return and the rate of incidental harvest. Commercial fishermen are reminded that unsold salmon caught in commercial gear must be reported on fish tickets.
3-Z-S-6-96	9:00 p.m. ADT June 26, 1996	This emergency order opens the Shaktoolik, and Unalakleet Subdistricts to commercial pink salmon fishing beginning 9:00 p.m. June 26 and will remain open for continuous fishing through 6 p.m. July 20. Only gillnets with a mesh size of four to four and one-half inches will be allowed. This opening will run coincidentally with regularly scheduled king salmon fishing periods. Fishers are restricted to two 50 fathom nets per card holder, it will be their choice whether to use king or pink salmon gear or a combination of the two. The pink salmon buyer will direct daily fishing activities based on harvest rates and processing limitations.	The test net at Unalakleet indicates a better than average annual king salmon escapement has now entered the river. The chum salmon return is of normal strength and a few days early with the expected chum salmon harvest likely to be the lowest on record due to poor market conditions. As a result, the chum salmon escapement should be well above average. The pink salmon indices indicate the pink salmon return will be of normal strength as compared to the even year returns since 1980. A recent commercial fishing period targeting pink salmon supported the previous pink return assessment and allowed the salmon processing vessel to tune its production facility. The only pink salmon buyer's daily processing capacity will likely limit harvest rates. By opening fishing time to a continuous 7-day per week schedule, the pink salmon buyer will direct fishing activities in order to best maximize his operations. Fisheries managers will continue to monitor all salmon returns though escapement indices and daily catch reports. The incidental bycatch from the directed pink salmon fishery is expected to have minimal impact on king and chum salmon escapements. Commercial fishermen are reminded that unsold salmon caught in commercial gear must be reported on fish tickets.

Appendix J. Emergency Orders issued during 1996.

Emergency Order Number	Effective Date	Action Taken	Comments
3-Z-S-7-96	12:00 noon ADT July 7, 1996	This emergency order opens the Moses Point Subdistrict to commercial pink salmon fishing beginning noon Sunday, July 7 and will remain open for continuous fishing through 6 p.m. Thursday, July 25. Only gillnets with a mesh size of four to four and one-half inches will be allowed. Fishers are restricted to two 50 fathom nets per card. The pink salmon buyer will direct daily fishing activities based on harvest rates and processing limitations.	The Kwjniuk River counting tower indicates the chum and pink salmon escapements in the Moses Point Subdistrict will be adequate to meet the goals that have been set to insure returns which can sustain normal harvests and the reproductive needs of the resource. Pink salmon are approaching the mid-point of their return and chum salmon are now approaching the 75th percentile of their migration into fresh water. Fisheries managers will continue to monitor all salmon returns though escapement indices and daily catch reports. A small tender will serve as the buying station. Fishers are advised to deliver frequently and keep in close contact with the tender, so they will not be caught with a load that can not be sold. By opening fishing time to a continuous 7-day per week schedule, the pink salmon buyer will direct fishing activities in order to best maximize his operations. The incidental bycatch from the directed pink salmon fishery is expected to have minimal impact on the king and chum salmon escapements. Commercial fishermen are reminded that unsold salmon caught in commercial gear must be reported on fish tickets.
3-Z-S-8-96	12:00 noon ADT July 9, 1996	This emergency order amends the Nome Subdistrict closures to subsistence salmon fishing. The Cripple, Penny, Snake, and Solomon Rivers remain closed to subsistence fishing. In addition, the waters of the Nome and Sinuk Rivers below the markers are open to beach seining, however chum salmon must be returned to the water. Ocean waters including Safety Sound and Bonanza Channel west of the Solomon River and the Eldorado, Flambeau and Bonanza Rivers are open to subsistence fishing as the regulations published by the department allow.	Aerial surveys flown July 8 indicate escapement goals for chum salmon on the Bonanza, Eldorado, and Flambeau Rivers have been met. The same surveys indicate an adequate pink salmon escapement has occurred on the Bonanza, Eldorado, Nome, and Sinuk Rivers. Chum salmon escapements on the Solomon, Nome, Snake, and Sinuk Rivers are all about one-half the goal set for those rivers at a time when there is still a possibility of attaining the goal for this season. Given the current escapement levels the department staff believes subsistence fishing can be allowed on some of the Nome subdistrict streams while still allowing salmon to migrate without harvest to spawning areas on other watersheds. This management strategy is intended to bring all the Nome Subdistrict salmon stocks to a level that can support local harvests at a higher level. Subsistence fishing will reopen as pink salmon become abundant and as chum salmon escapement goals are met. Various locations and streams will be judged individually and opened on the basis of their individual chum salmon escapement and pink salmon abundance. The staff will be flying frequent surveys and boating some of the rivers to track the salmon migration's strength and progress. The counting towers on the Nome, Snake, and Eldorado rivers will also be used to track the various salmon migrations. If a stream appears to have adequate escapement, restrictions will be lifted in that area; otherwise, the restrictions will remain in place until they no longer benefit the species of concern. Subsistence fishers of the Nome Subdistrict are reminded of the regulatory change that occurred in 1995. That change is that a maximum of 50 fathoms of net may be used in saltwater and that only 50 feet of net may be used in freshwater. The fishing period in saltwater has been extended, the periods now begin 6:00 p.m. Monday and close 6:00 p.m. Saturday. Freshwater openings will continue to be the two 48 hour openings beginning at 6:00 p.m. on Mondays and Thursdays, once freshwater reopens.

Appendix G3. Emergency Orders issued during 1996.

Emergency Order Number	Effective Date	Action Taken	Comments
3-Z-S-9-96	6:00 p.m. ADT July 25, 1996	This emergency order opens the Shaktoolik, and Unalakleet Subdistricts to commercial silver salmon fishing on a standard schedule of two 48 hour periods each week beginning 6:00 p.m. Thursday, July 25. The fishing periods will run from 6:00 p.m. Monday until 6:00 p.m. Wednesday and from 6:00 p.m. Thursday until 6:00 p.m. Saturday. Only nets with a mesh size of six inches or smaller will be allowed.	The test net at Unalakleet indicates the silver salmon migration has begun to enter the rivers of Norton Sound. The number of silver salmon is expected to equal the number of chum salmon by late this week. Typically, this is the time the transition from chum to silver salmon occurs. The silver salmon migration frequently builds rapidly to its peak in early August, and then gradually declines in strength over the remainder of the month into September. The counting towers at North, Shaktoolik, Kwiniuk and Nome Rivers indicate a similar timing of the transition between salmon runs. The market for chum salmon is poor and may not accept all the chum salmon that will be caught during the remainder of the season. None of the escapement indices indicate that more than ten percent of the silver salmon escapement has passed the various projects at this time. The history of a rapid transition from chum to silver salmon does suggest the recent rise in silver salmon escapement will rapidly build to a peak in seven to ten days. With those expectations, a standard schedule of commercial silver salmon openings are announced to begin Thursday at 6:00 p.m. Commercial fishermen are reminded that unsold salmon caught in commercial gear must be reported on fish tickets.
3-Z-S-10-96	6:00 p.m. ADT August 5, 1996	This emergency order opens the Golovin, and Moses Point Subdistricts to commercial silver salmon fishing on a standard schedule of two 48 hour periods each week beginning Monday, August 5. In Golovin, the periods will run from noon Monday until noon Wednesday and from noon Thursday until noon Saturday and in the Moses Point Subdistrict the fishing periods will run from 6:00 p.m. Monday until 6:00 p.m. Wednesday and from 6:00 p.m. Thursday until 6:00 p.m. Saturday.	The test net at Unalakleet and the commercial fishery at Unalakleet and Shaktoolik indicate the silver salmon migration entering the rivers of Norton Sound is well underway. The counting tower at Kwiniuk River indicated the silver salmon return was early and possibly strong prior to the project's closure in late July. The silver salmon migration frequently builds rapidly to its peak in early August, and then gradually declines in strength over the remainder of the month into September. A silver salmon market is scheduled to open in both the Golovin and Moses Point Subdistricts on Monday. The market for chum salmon is poor and may not accept all the chum salmon that will be caught during the remainder of the season. However, silver salmon are expected to exceed 90% of the catch by next week. Chum salmon wastage will be minimized because the silver migration is peaking and the chum migration is nearly over. The buyer has requested the fishing periods be staggered to accommodate the tender as it makes its way from fishery to fishery to purchase salmon. This schedule does not affect the total time allowed for fishing but does allow for a more efficient operation. Commercial fishermen are reminded that unsold salmon caught in commercial gear must be reported on fish tickets

Appendix G. Emergency Orders issued during 1996.

Emergency Order Number	Effective Date	Action Taken	Comments
3-Z-S-11-96	6:00 p.m. ADT August 5, 1996	This emergency order opens the Nome Subdistrict to commercial silver salmon fishing on a standard schedule of two 24 hour periods each week beginning Monday, August 5. The fishing periods will run from 6:00 p.m. Monday until 6:00 p.m. Tuesday and from 6:00 p.m. Thursday until 6:00 p.m. Friday.	The test net at Unalakleet and the commercial fishery at Unalakleet and Shaktoolik indicate the silver salmon migration entering the rivers of Norton Sound is well underway. The commercial fishery in the Nome Subdistrict is restricted to the waters east of Cape Nome; the chum and pink salmon returns in most of the streams in that portion of the subdistrict are thought to be adequate. The chum salmon migration is virtually over, further closures will serve little purpose. The subsistence salmon fishing closures have been lifted in the subdistrict and the subsistence fishery is now operating under the regulations as they are published in the regulation book. Two commercial fishermen have requested openings so they could harvest salmon. Early indicators of the coho return are strong. Poor weather in recent days is thought to have allowed unimpeded escapement for the past week. This will help to insure an adequate silver salmon escapement. Commercial fishermen are reminded that unsold salmon caught in commercial gear must be reported on fish tickets.
3-Z-S-12-96	6:00 p.m. ADT August 7, 1996	This emergency order extends the Shaktoolik, and Unalakleet Subdistrict's commercial silver salmon fishing schedule until Saturday 6:00 p.m.	The test net at Unalakleet indicates the silver salmon escapement is adequate for the entire season at this time. The rate of commercial catch is high in both subdistricts. Poor weather over the past two weeks has limited the success of the commercial fishery. There is an adequate market for the salmon harvest in these two subdistricts and no biological reason to curtail the harvest. The current commercial opening is being extended to allow additional harvest while salmon quality is still good and when harvest is not expected to strongly affect future year's returns. The weather forecast predicts strong winds beginning early on Thursday. Fishermen are advised to keep a close watch on the weather. Commercial fishermen are reminded that unsold salmon caught in commercial gear must be reported on fish tickets.
3-Z-S-13-96	6:00 p.m. ADT August 14, 1996	This emergency order extends the Shaktoolik and Unalakleet Subdistrict's commercial silver salmon fishing schedule to a continuous open period of 5 days each week. Periods will run from 6 p.m. Monday through 6 p.m. Saturday each week.	Commercial silver salmon harvests in the Unalakleet and Shaktoolik Subdistricts continue to be above average even though poor weather has limited fishing effort. The Department's test fish project in the Unalakleet River indicates unusually high silver salmon escapements, nearly double the average end of season total for the project. Salmon quality remains good and there is adequate market for the additional fish. Commercial fishing time is being increased in the Unalakleet and Shaktoolik Subdistricts because the silver salmon escapements appear to be more than adequate to assure future returns and to take advantage of the available market.

Appendix G3. Emergency Orders issued during 1996.

Emergency Order Number	Effective Date	Action Taken	Comments
3-Z-S-14-96	12:00 noon ADT August 14, 1996	This emergency order shifts the Shaktoolik and Unalakleet Subdistrict's commercial silver salmon fishing schedule to an open period of 5 days each week running from noon Monday through noon Saturday each week	Commercial silver salmon harvests in the Unalakleet and Shaktoolik Subdistricts continue to be above average even though poor weather has limited fishing effort. The Department's test fish project in the Unalakleet River indicates unusually high silver salmon escapements, nearly double the average end of season total for the project. Salmon quality is beginning to decline and the market will soon diminish. Commercial fishing time is being shifted in the Unalakleet and Shaktoolik Subdistricts to best utilize the markets that still exist. The local buyer is planning to cease buying salmon by mid-week. A few fishermen have expressed an interest in continuing to fish and sell their catch in Anchorage by transporting their fish via air freight. This new fishing period is intended to help meet the airline schedule.
3-Z-S-15-96	1:00 p.m. ADT September 7, 1996	This emergency order extends the Shaktoolik and Unalakleet Subdistrict's commercial silver salmon fishery to Tuesday September 10 at 6:00 p.m. Fishing will be allowed continuously through the weekend.	Commercial silver salmon harvests in the Unalakleet and Shaktoolik Subdistricts continue to be above average even though poor weather has limited fishing effort. The Department's test fish project in the Unalakleet River indicates unusually high silver salmon escapements, nearly double the average end of season total for the project. Aerial surveys of both the Unalakleet and Shaktoolik rivers also indicate near record levels of silver salmon escapement. Salmon quality is declining and the market has diminished. Commercial fishing time is being extended in the Unalakleet and Shaktoolik Subdistricts to best utilize the markets that still exist. The management budget is limited and seasonal staff will soon be placed on seasonal leave. There will be no further extensions beyond the September 10.
3-PC-S-1-96	6:00 p.m. ADT July 2, 1996	This emergency order opens the Port Clarence District, except the waters of the Pilgrim and Kuzitrin Rivers to subsistence fishing seven days per week. Subsistence fishing in the Kuzitrin and Pilgrim Rivers may only be taken from 6:00 p.m. Thursday until 6:00 p.m. Tuesday	The regulation this emergency order amends has its origin during the brief commercial fishery that occurred nearly thirty years ago. This weekly closure has not been enforced for a number of years in much of the district. The majority of the salmon stocks have been maintained at healthy levels under the regime of no weekly closures and those stocks that were depressed have shown steady progress at rebuilding recently. The sockeye and chum salmon stocks of the Pilgrim and Kuzitrin Rivers are well below historic levels. Subsistence fishing has a significant impact on those species particularly where the rivers are road accessible. This mid-week window of escapement is thought to insure a certain level of escapement throughout the migration. This weekly closure also encourages fishers to more closely tend their nets. Other salmon producing rivers in the district are thought to be sustaining runs at a more historic level.

Appendix C. Emergency Orders issued during 1996.

Emergency Order Number	Effective Date	Action Taken	Comments
3-Z-SH-1-96	12:00 p.m. ADT July 1, 1996	This emergency order closes portions of Norton Sound to shrimp fishing, such that the waters open to king crab and shrimp commercial fisheries in the Norton Sound area are the same. Shrimp fishermen are required to register. A vessel may fish both crab and shrimp pots simultaneously, but a commercial king crab fisherman may not fish any pots 14 days before or after a king crab opening.	Several commercial king crab fishermen have expressed an interest in prospecting for shrimp while they participate in the Norton Sound commercial king crab fishery. Shrimp pots will exclude king crab and are not an avenue to circumvent the pot limit regulation. On the other hand, shrimp pots fishing inside the closed waters would significantly hamper enforcement of the king crab refuge of northern Norton Sound. This emergency order attempts to strike a balance between responsible management of the king crab resource while encouraging development of a potential new commercial fishery. Commercial fishermen are reminded that unsold shrimp caught in commercial pots must be reported on fish tickets.
3-Z-H-1-96	12:00 p.m. ADT May 24, 1996	This emergency order opens a Norton Sound herring gillnet commercial fishing period in Subdistrict 1, 2, and 3 beginning at noon, May 24 until 5:00 p.m. Friday May 24. Each vessel may operate 100 fathoms of gillnet.	Commercial gillnet samples indicate excellent roe quality at both Cape Denbigh and central Subdistrict 1. Very few immature or spawned-out fish are present in the samples. Recent sampling by department staff indicates all age classes are now present. Roe quality is unlikely to improve from today's situation. Significant spawn has been reported at both Subdistrict 1 and 2, which indicates roe quality will soon decline. This period has been timed to coincide with the daily high tide in an attempt to harvest a high proportion of females. The length of the period has been set to harvest the entire gill net guideline harvest if the catch rate is high. No extension is likely.
3-Z-H-2-96	7:00 a.m. ADT May 25, 1996	This emergency order opens a Norton Sound herring beach seine commercial fishing period in Subdistricts 1, 2, 3, and 5 beginning at 7:00 a.m., until 10:00 a.m. Saturday, May 25.	The commercial gillnet harvest indicates excellent roe quality at both Cape Denbigh and central Subdistrict 1. The number of immature or spawned-out fish seem to be declining in recent variable mesh net samples. Recent sampling by department staff indicates all age classes are now present. Roe quality may still improve from today's beach seine situation. This period has been timed to coincide with a rising tide in an attempt to provide an opportunity for the fishers to work the sets before they become stranded by the rededing tide. No extension is likely.
3-Z-H-3-96	11:00 a.m. ADT	This emergency order opens a Norton Sound herring gillnet commercial fishing period in Subdistricts 1, 2, 3, beginning at 11:00 a.m. until 2:00 p.m. Saturday, May 25. Each vessel may operate 100 fathoms of gillnet. An announcement regarding the possibility of a short extension will be made at 1:00 p.m.	The commercial gillnet harvest totaled over 2,900 st. with an average roe percentage of 10.6%. This leaves roughly 2,000 st yet to be harvested by gillnetters this season. Roe quality is unlikely to improve from today's situation. Significant spawn has been reported at both Subdistrict 1 and 3, which indicates roe quality will soon decline. This period has been timed to coincide with the daily high tide in an attempt to harvest a high proportion of females. The length of the period has been set to harvest the entire gillnet guideline harvest at the catch rate of May 24. A short extension may be announced to completely harvest the pre-season guideline harvest.

Appendix G3. Emergency Orders issued during 1996.

Emergency Order Number	Effective Date	Action Taken	Comments
3-Z-H-4-96	2:00 p.m. ADT May 25, 1996	This emergency order extends the Norton Sound herring gillnet commercial fishing period in Subdistricts 1, 2, and 3 that began at 11:00 a.m. until 2:00 p.m. for 3 hours, Saturday, May 25. This opening will now be extended from 2:00 p.m. until 5:00 p.m. Each vessel may operate 100 fathoms of gillnet. An announcement regarding the possibility of a further extension will be made at 4:00 p.m.	Early reports of the current commercial opening indicate catch rates are well below yesterday's levels in all subdistricts. The few reports of quality from Subdistrict 1 are mixed ranging from substandard to well above marketable quality. An aerial survey found spent fish moving offshore in that subdistrict indicating the peak of the run has passed in southern Norton Sound. Reports from Subdistrict 3 indicate that quality remains above industry standards. Catch rates in that subdistrict have decreased from yesterday due to a doubling of effort. Today's department test fishing at Cape Denbigh shows a slight trend towards smaller fish indicating that the older targeted fish are moving out of that subdistrict. With larger fish moving out of the district and smaller fish moving in, this may be the last opportunity to harvest the quota without significant catches of younger age herring. A second extension may be announced to finish harvesting the preseason guideline quota.
3-Z-H-5-96	5:00 p.m. ADT May 25, 1996	This emergency order extends the Norton Sound herring gillnet commercial fishing period in Subdistricts 1, 2 and 3 that began at 11:00 a.m. until 8:00 p.m. Each vessel may operate 100 fathoms of gillnet.	Reports of the current commercial period extension indicate catch rates continue to drop in Subdistrict 3. Catch rates have increased in Subdistrict 1 as fishermen have found small pockets of ripe fish. Roe quality in Subdistrict 3 has decreased slightly but still remains above industry standards while quality in Subdistrict 1 has increased. Catch rates overall remain low enough that the gillnet harvest is not expected to exceed the harvest guideline.
3-Z-H-6-96	8:00 a.m. ADT May 29, 1996	This emergency order opens Subdistricts 2 and 3 to the educational permit fishery beginning 8:00 a.m. May 29, 1996. Each vessel may operate 100 fathoms of gillnet.	A ten ton harvest has been allowed annually since 1989 for the educational permit held by the Bering Strait School District. This fishery can be used to judge the quantity and quality of the herring available in that subdistrict as well as providing an educational opportunity for the vocational class. This small harvest will not affect the potential of any future gillnet opening.
3-X-S-1-96	2:00 p.m. ADT July 8, 1995	This emergency order opens the Kotzebue District to a 4 hour opening. The period will begin at 2:00 p.m. Monday, July 8 and end at 6:00 p.m. Monday, July 8.	In keeping with the management plan published prior to the season, the commercial fishery will open July 8. Subsistence catches of chum salmon in mid-June is the earliest arrival of chum salmon local residents can remember. With the chum salmon earlier than normal, the first opening will occur before July 10 as per regulation. With only one buyer and a limited market, openings will be shorter but more frequent. This will allow a better product as all salmon sold are iced whole and flown out. The most reliable index of chum salmon run strength is the commercial catch rate. Management using comparisons of catch rate trends will not be possible with the shorter, more frequent openings. Age composition and test fisheries will be a factor in management decisions as periods are shortened. With an average return expected, a limited market and a reduced number of participating fishermen, achieving escapement goals is not expected to be a problem.

Appendix C. Emergency Orders issued during 1996

Emergency Order Number	Effective Date	Action Taken	Comments
3-X-S-2-96	12:00 p.m. ADT July 9, 1996	This emergency order opens the Kotzebue District to a 6 hour opening. The period will begin at 12:00 p.m. Tuesday, July 9 and end at 6:00 p.m. Tuesday, July 9.	Because of state wide salmon markets, processing capacities for Kotzebue salmon are limited. Processors are accepting only so many pounds from the district for each opening. The department is in daily contact with the only buyer, discussing fishing periods for the immediate future. With an average return expected and a reduced number of participants, there is little concern at this time for an adequate escapement. Therefore, the department is allowing shorter but more frequent daily fishing periods as requested by the processor. Opening and closure times are adjusted to fit airline schedules in order to maintain a better quality product.
3-X-S-3-96	10:00 a.m. ADT July 10, 1996	This emergency order opens the Kotzebue District to a 8 hour opening. The period will begin at 10:00 a.m. Wednesday, July 10 and end at 6:00 p.m. Wednesday, July 10.	Because of state wide salmon markets, processing capacities for Kotzebue salmon are limited. Processors are accepting only so many pounds from the district for each opening. The department is in daily contact with the only buyer, discussing fishing periods for the immediate future. With an average return expected and a reduced number of participants, there is little concern at this time for an adequate escapement. Therefore, the department is allowing shorter but more frequent daily fishing periods as requested by the processor. Opening and closure times are adjusted to fit airline schedules in order to maintain a better quality product.
3-X-S-4-96	10:00 a.m. ADT July 11, 1996	This emergency order opens the Kotzebue District to a 8 hour opening. The period will begin at 10:00 a.m. Thursday, July 11 and end at 6:00 p.m. Thursday, July 11.	Because of state wide salmon markets, processing capacities for Kotzebue salmon are limited. Processors are accepting only a limited poundage from the district for each opening. The department is in daily contact with the only buyer, discussing fishing periods for the immediate future. With an average return expected and a reduced number of participants, there is little concern at this time for an adequate escapement. Therefore, the department is allowing shorter but more frequent daily fishing periods as requested by the processor. Opening and closure times are adjusted to fit airline schedules in order to maintain a better quality product.
3-X-S-5-96	2:00 p.m. ADT July 17, 1996	This emergency order opens the Kotzebue District to a 4 hour opening. The period will begin at 2:00 p.m. Wednesday, July 17 and end at 6:00 p.m. Wednesday, July 17.	Because of state wide salmon markets, processing capacities for Kotzebue salmon are limited. Processors are accepting only so many pounds from the district for each opening. The department is in daily contact with the only buyer, discussing fishing periods for the immediate future. With an average return expected and a reduced number of participants, there is little concern at this time for an adequate escapement. Therefore, the department is allowing shorter but more frequent daily fishing periods as requested by the processor. Opening and closure times are adjusted to fit airline schedules in order to maintain a better quality product.
3-X-S-6-96	2:00 p.m. ADT July 18, 1996	This emergency order opens the Kotzebue District to a 4 hour opening. The period will begin at 2:00 p.m. Thursday, July 18 and end at 6:00 p.m. Thursday, July 18.	Because of state wide salmon markets, processing capacities for Kotzebue salmon are limited. Processors are accepting only so many pounds from the district for each opening. The department is in daily contact with the only buyer, discussing fishing periods for the immediate future. With an average return expected and a reduced number of participants, there is little concern at this time for an adequate escapement. Therefore, the department is allowing shorter but more frequent daily fishing periods as requested by the processor. Opening and closure times are adjusted to fit airline schedules in order to maintain a better quality product.

Appendix G3. Emergency Orders issued during 1996.

Emergency Order Number	Effective Date	Action Taken	Comments
3-X-S-7-96	12:00 p.m. ADT July 23, 1996	This emergency order opens the Kotzebue District to a 6 hour opening. The period will begin at 12:00 p.m. Tuesday, July 23 and end at 6:00 p.m. Tuesday, July 23.	Because of state wide salmon markets, processing capacities for Kotzebue salmon are limited. Processors are accepting only so many pounds from the district for each opening. The department is in daily contact with the only buyer, discussing fishing periods for the immediate future. With an average return expected and a reduced number of participants, there is little concern at this time for an adequate escapement. Therefore, the department is allowing shorter but more frequent daily fishing periods as requested by the processor. Opening and closure times are adjusted to fit airline schedules in order to maintain a better quality product.
3-X-S-8-96	10:00 a.m. ADT July 24, 1996	This emergency order opens the Kotzebue District to an 8 hour opening. The period will begin at 10:00 a.m. Wednesday, July 24 and end at 6:00 p.m. Wednesday, July 24.	Because of state wide salmon markets, processing capacities for Kotzebue salmon are limited. Processors are accepting only so many pounds from the district for each opening. The department is in daily contact with the only buyer, discussing fishing periods for the immediate future. With an average return expected and a reduced number of participants, there is little concern at this time for an adequate escapement. Therefore, the department is allowing shorter but more frequent daily fishing periods as requested by the processor. Opening and closure times are adjusted to fit airline schedules in order to maintain a better quality product.
3-X-S-9-96	10:00 a.m. ADT July 25, 1996	This emergency order opens the Kotzebue District to an 8 hour opening. The period will begin at 10:00 a.m. Thursday, July 25 and end at 6:00 p.m. Thursday, July 25.	Because of state wide salmon markets, processing capacities for Kotzebue salmon are limited. Processors are accepting only so many pounds from the district for each opening. The department is in daily contact with the only buyer, discussing fishing periods for the immediate future. With an average return expected and a reduced number of participants, there is little concern at this time for an adequate escapement. Therefore, the department is allowing shorter but more frequent daily fishing periods as requested by the processor. Opening and closure times are adjusted to fit airline schedules in order to maintain a better quality product.
3-X-S-10-96	10:00 a.m. ADT July 26, 1996	This emergency order opens the Kotzebue District to an 8 hour opening. The period will begin at 10:00 a.m. Friday, July 26 and end at 6:00 p.m. Friday, July 26.	Because of state wide salmon markets, processing capacities for Kotzebue salmon are limited. Processors are accepting only so many pounds from the district for each opening. The department is in daily contact with the only buyer, discussing fishing periods for the immediate future. With an average return expected and a reduced number of participants, there is little concern at this time for an adequate escapement. Therefore, the department is allowing shorter but more frequent daily fishing periods as requested by the processor. Opening and closure times are adjusted to fit airline schedules in order to maintain a better quality product.

Appendix C. Emergency Orders issued during 1996.

Emergency Order Number	Effective Date	Action Taken	Comments
3-X-S-11-96	12:00 p.m. ADT July 29, 1996	This emergency order opens the Kotzebue District to a 6 hour opening. The period will begin at 12:00 a.m. Monday, July 29 and end at 6:00 p.m. Monday, July 29.	Because of state wide salmon markets, processing capacities for Kotzebue salmon are limited. Processors are accepting only a limited number of salmon from the district for each opening. The department is in daily contact with the only buyer, discussing fishing periods for the immediate future. Age composition, subsistence reports and test fish indices indicate the run strength is at least average. To date, the test net index on the Kobuk River has more than doubled the 1993 cumulative index when escapements by aerial survey into that river were met. The number of participating fishermen remains well below the average. Therefore, the department is continuing to allow shorter but more frequent daily fishing periods as requested by the processor. Opening and closure times are adjusted to fit airline schedules in order to maintain a better quality product.
3-X-S-12-96	12:00 p.m. ADT August 5, 1996	This emergency order opens the Kotzebue District to a 6 hour opening. The period will begin at 12:00 p.m. Monday, August 5 and end at 6:00 p.m. Monday, August 5.	Because of state wide salmon markets, processing capacities for Kotzebue salmon are limited. Processors are accepting only a limited number of salmon from the district for each opening. The department is in daily contact with the only buyer, discussing fishing periods for the immediate future. Age composition, subsistence reports and test fish indices indicate the run strength is at least average. To date, the test net index on the Kobuk River has more than doubled the 1993 cumulative index when escapements by aerial survey into that river were met. The number of participating fishermen remains well below the average. Therefore, the department is continuing to allow shorter but more frequent daily fishing periods as requested by the processor. Opening and closure times are adjusted to fit airline schedules in order to maintain a better quality product.
3-X-S-13-96	12:00 p.m. ADT August 6, 1996	This emergency order opens the Kotzebue District to a 6 hour opening. The period will begin at 12:00 p.m. Tuesday, August 6 and end at 6:00 p.m. Tuesday, August 6.	Because of state wide salmon markets, processing capacities for Kotzebue salmon are limited. Processors are accepting only a limited number of salmon from the district for each opening. The department is in daily contact with the only buyer, discussing fishing periods for the immediate future. Age composition, subsistence reports and test fish indices indicate the run strength is at least average. To date, the test net index on the Kobuk River has more than doubled the 1993 cumulative index when escapements by aerial survey into that river were met. The number of participating fishermen remains well below the average. Therefore, the department is continuing to allow shorter but more frequent daily fishing periods as requested by the processor. Opening and closure times are adjusted to fit airline schedules in order to maintain a better quality product.

Appendix G3. Emergency Orders issued during 1996.

Emergency Order Number	Effective Date	Action Taken	Comments
3-X-S-14-96	2:00 p.m. ADT August 14, 1996	This emergency order opens the Kotzebue District to a 4 hour opening. The period will begin at 2:00 p.m. Wednesday, August 14 and end at 6:00 p.m. Wednesday, August 14.	Because of state wide salmon markets, processing capacities for Kotzebue salmon are limited. Processors are accepting only a limited number of salmon from the district for each opening. The department is in daily contact with the only buyer, discussing fishing periods for the immediate future. Age composition, subsistence reports and test fish indices indicate the run strength is at least average. To date, the test net index on the Kobuk River has more than doubled the 1993 cumulative index when escapements by aerial survey into that river were met. The number of participating fishermen remains well below the average. Therefore, the department is continuing to allow shorter but more frequent daily fishing periods as requested by the processor. Opening and closure times are adjusted to fit airline schedules in order to maintain a better quality product.
3-X-S-15-96	2:00 p.m. ADT August 16, 1996	This emergency order opens the Kotzebue District to a 4 hour opening. The period will begin at 2:00 p.m. Friday, August 16 and end at 6:00 p.m. Friday, August 16.	Because of state wide salmon markets, processing capacities for Kotzebue salmon are limited. Processors are accepting only a limited number of salmon from the district for each opening. The department is in daily contact with the only buyer, discussing fishing periods for the immediate future. Age composition, subsistence reports and test fish indices indicate the run strength is at least average. To date, the test net index on the Kobuk River has more than doubled the 1993 cumulative index when escapements by aerial survey into that river were met. The number of participating fishermen remains well below the average. Therefore, the department is continuing to allow shorter but more frequent daily fishing periods as requested by the processor. Opening and closure times are adjusted to fit airline schedules in order to maintain a better quality product.
3-X-S-16-96	12:00 p.m. ADT August 19, 1996	This emergency order opens the Kotzebue District to a 6 hour opening. The period will begin at 12:00 p.m. Monday, August 19 and end at 6:00 p.m. Monday, August 19.	Because of state wide salmon markets, processing capacities for Kotzebue salmon are limited. Processors are accepting only a limited number of salmon from the district for each opening. The department is in daily contact with the only buyer, discussing fishing periods for the immediate future. Recent aerial surveys indicate escapements into the lower Kobuk River tributaries are two to four times the escapement goals. Poor conditions have precluded aerial surveys on the Noatak River but it is expected that escapements are well above average. The number of participating fishermen remains well below the average. Therefore, the department is continuing to allow shorter but more frequent daily fishing periods as requested by the processor. Opening and closure times are adjusted to fit airline schedules in order to maintain a better quality product.

Appendix C.3. Emergency Orders issued during 1996.

Emergency Order Number	Effective Date	Action Taken	Comments
3-X-S-17-96	12:00 p.m. ADT August 20, 1996	This emergency order opens the Kotzebue District to a 6 hour opening. The period will begin at 12:00 p.m. Tuesday, August 20 and end at 6:00 p.m. Tuesday, August 20.	Because of state wide salmon markets, processing capacities for Kotzebue salmon are limited. Processors are accepting only a limited number of salmon from the district for each opening. The department is in daily contact with the only buyer, discussing fishing periods for the immediate future. Recent aerial surveys indicate escapements into the lower Kobuk River tributaries are two to four times the escapement goals. Poor conditions have precluded aerial surveys on the Noatak River but it is expected that escapements are well above average. The number of participating fishermen remains well below the average. Therefore, the department is continuing to allow shorter but more frequent daily fishing periods as requested by the processor. Opening and closure times are adjusted to fit airline schedules in order to maintain a better quality product.
3-X-S-18-96	12:00 p.m. ADT August 21, 1996	This emergency order opens the Kotzebue District to a 6 hour opening. The period will begin at 12:00 p.m. Wednesday, August 21 and end at 6:00 p.m. Wednesday, August 21.	Because of state wide salmon markets, processing capacities for Kotzebue salmon are limited. Processors are accepting only a limited number of salmon from the district for each opening. The department is in daily contact with the only buyer, discussing fishing periods for the immediate future. Recent aerial surveys indicate escapements into the lower Kobuk River tributaries are two to four times the escapement goals. Poor conditions have precluded aerial surveys on the Noatak River but it is expected that escapements are well above average. The number of participating fishermen remains well below the average. Therefore, the department is continuing to allow shorter but more frequent daily fishing periods as requested by the processor. Opening and closure times are adjusted to fit airline schedules in order to maintain a better quality product.
3-X-S-19-96	12:00 p.m. ADT August 23, 1996	This emergency order opens the Kotzebue District to a 6 hour opening. The period will begin at 12:00 p.m. Friday, August 23 and end at 6:00 p.m. Friday, August 23.	Because of state wide salmon markets, processing capacities for Kotzebue salmon are limited. Processors are accepting only a limited number of salmon from the district for each opening. The department is in daily contact with the only buyer, discussing fishing periods for the immediate future. Recent aerial surveys indicate escapements into the lower Kobuk River tributaries are two to four times the escapement goals. Poor conditions have precluded aerial surveys on the Noatak River but it is expected that escapements are well above average. The only buyer has announced that this would be the last time he would be purchasing fish this year.
3-X-S-20-96	3:00 p.m. ADT August 23, 1996	This emergency order extends the current opening in the Kotzebue District from a 6 hour opening to a 24 hour opening. The period will now close at 12:00 p.m. Saturday, August 24.	Because of few fishermen participating and low catch rates associated with final opening of the season, the lone buyer has requested the extension. Aerial surveys on the lower Kobuk River tributaries found escapement levels to be two to four times the goal. Weather has hampered aerial surveys on the Noatak River but with few participants and reduced fishing time, escapement levels are most likely well above the goal.

Appendix G4. Norton Sound, Port Clarence, Kotzebue Sound processors and associated data, 1996.

Company	Address	Type of Processing	District
Aqua Tech	P.O. Box 10119 Anchorage, Ak 99510	Fresh Crab	Norton Sound
Capilano Pacific Inc	1709 Edgewater Lane Bellingham, Wa 98226	Frozen Herring	Norton Sound
Glacier Fish Co. (Co-op herring with Trident and NSEDC)	1200 West Lake Ave Suite 900 Seattle, Wa 98109	Frozen Salmon Frozen Herring	Norton Sound Norton Sound
Icicle Seafoods	4019-21st Ave West Seattle, Wa 98199	Frozen Herring	Norton Sound
New West	601 West Chestnut Bellingham, Wa 98226	Frozen Herring	Norton Sound
Nome Crab Co.	P.O. Box 1004 Nome, Ak 99762	Frozen Crab	Norton Sound
North Alaska Fisheries	P.O. Box 92737 Anchorage, Ak 99509	Fresh Salmon Dolly Varden	Kotzebue
Norton Sound Crab Co.	P.O. Box 906 Nome, Ak. 99762	Frozen Crab Frozen Salmon Misc Bait Fish	Norton Sound Norton Sound Norton Sound
Norton Sound Economic Dev. Corp. (Co-op herring with Glacier & Trident)	P.O. Box 30089 Elim, Ak 99739	Frozen Herring	Norton Sound
Norquest	4225 23rd Ave West Seattle, Wa 98199	Frozen Herring	Norton Sound
North Alaska Fisheries	Kotzebue	Fresh Salmon	Kotzebue

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Company	Address	Type of Processing	District
Pan Pacific Seafood	150 Nickerson St. Suite 103 Seattle, Wa 98109	Frozen Herring	Norton Sound
Snopac	5053 E. Marginal Way S. Seattle, Wa 98134-2407	Frozen Herring	Norton Sound
Trident (co-op herring with Clacier & NSEDC)	5303 Shilshole Ave Nw Seattle, Wa 98107	Frozen Herring	Norton Sound
Unisea/Wards Cove	P.O. Box 97019 Redmond, Wa 98073-9719	Frozen Herring	Norton Sound
Whitney Foods	4401 W Intl Airport Rd Anchorage, Ak 99502	Fresh Salmon	Norton Sound
Yard Arm Knot	123 Northwest 36th #230 Seattle, Wa 98109	Frozen Herring	Norton Sound

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