Report to the Alaska Board of Fisheries

KUSKOKWIM AREA SALMON, 1988

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INTRODUCTION

Area and District Boundaries

The Kuskokwim Area includes the Kuskokwim River drainage and all waters of Alaska between Cape Newenham and the Naskonat Peninsula (Figure 1). Commercial salmon fishing takes place in four districts: District 1, the Lower Kuskokwim River consisting of the portion of the Kuskokwim River upstream of Popokamiut to the regulatory markers located just upstream of the mouth of Bogus Creek (Figure 2). District 2, the Middle Kuskokwim River consisting of the Kuskokwim River upstream from regulatory markers at the High Bluffs to the regulatory markers at Chuathbaluk (Figure 3). District 4, Quinhagak consisting of Kuskokwim Bay between the mouth of Oyak Creek and the South mouth of the Arolik River (Figure 4). District 5, Goodnews Bay consisting of the waters of Goodnews Bay (Figure 5).

MANAGEMENT OBJECTIVES AND STRATEGIES

The Division of Commercial Fisheries of the Alaska Department of Fish and Game is responsible for the management of commercial and subsistence fisheries in the Kuskokwim Area. The main objective of the Department's program is to manage both fisheries on a sustained yield basis by the policies set forth by the Alaska Board of Fisheries.

The area's commercial fishery has expanded during the last ten years as a result of increased participation by individual fishermen and improvements in fishing gear, tendering, and processing capabilities. In 1988, a record 811 of the 832 permit holders made at least one landing (Table 1). Kuskokwim Area permit holders transfer freely between districts. Total effort counts began in 1984 by making cross-district comparisons of landings by permit to prevent double counting.

There were 838 permanent and interim salmon permits issued in the Kuskokwim Area in 1976 by the Limited Entry Commission. Later adjudication has resulted in a total of 829 permanent and 3 interim permits being available in 1988. Commercial harvest guidelines and gear restrictions have offset increases in fishing effort and efficiency so that adequate subsistence harvests and average spawning escapements could be maintained.

The area's major spawning systems received provisional spawning escapement objectives in 1983 (Table 2). Objectives were the average escapement counts obtained in these systems since 1959. The objectives represent the escapement levels needed to maintain the salmon stocks at past levels of abundance. Continuing assessment of the escapement data has required adjustment of the objectives to present the most accurate index of escapement available.

The Kuskokwim River subsistence salmon fishery is one of the largest and most important in the state, with over 1,300 families participating. Subsistence catches of chinook salmon in the Kuskokwim River often exceed the commercial catch of this species. Technological improvements in commercial fishing gear have increased efficiency of the subsistence fishery since the same units of gear often fish in both fisheries.

In 1987 the Board of Fisheries, Department of Fish and Game, local Fish and Game Advisory Committees, and the local subsistence and commercial fishermen agreed to work together to increase the sustained yield of Kuskokwim River salmon stocks in the JOINT STATEMENT ON THE MANAGEMENT OF THE KUSKOKWIM RIVER SALMON FISHERY. To achieve this goal the Kuskokwim River salmon users formed a working group with two purposes:

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

The Department and the Working Group worked closely together beginning in February of 1988 to manage the commercial salmon fishery. Through uncommon dedication by all the concerned parties (and a little good luck) the working group developed new tools with which to manage and provided in-season management recommendations that accomplished the management objectives. The management objectives were achieved with the acceptance and support of the users.

The index of annual spawning escapements is accomplished through aerial surveys of "key" streams and lakes throughout the area, a weir project in the Kogrukluk River, the sonar counter in the Aniak River and a counting tower on the Goodnews River. Because of turbid water conditions and inclement weather, accurate aerial estimates of escapement often are not obtained in all streams.

Timely escapement estimates for in-season management are difficult to obtain. Most spawning streams are many miles upstream from the commercial fishing districts. Often escapement estimates are to late for adjustment of fishing time because of these distances.

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

The subsistence fishery is subject to very few restrictions in order to give preference to subsistence users. In all commercial fishing areas most of the

fishermen take salmon for BOTH commercial and subsistence uses. Subsistence fishing restrictions, in the form of short closures before, during, and following the commercial periods in all districts discourages illegal commercial fishing under the guise of subsistence fishing. These closures help to provide for adequate spawning escapements. In Districts 2, 4 and 5, the spawning tributaries are also closed. In District 1 subsistence fishing closes only in the commercial fishing district within the main stem of the Kuskokwim River and between Districts 1 and 2.

The inclusion of the Kuskokwim River upstream of commercial fishing District 1 in the subsistence closure was new in 1988. This appeared to be a very successful regulation change. In the past, during overflights of subsistence fishing periods, only 1 to 3 boats were observed in this area. Preceding and during commercial openings, when this area remained open to subsistence fishing the effort would increase to as many as 20 boats. Closing this area appeared to solve the problem. One fishermen was ticketed for fishing during the closure. The Working Group and Department did receive a complaint, following the second opening in District 1, from Kwethluk asking that subsistence fishing be opened if commercial fishing remained closed.

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

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

1. To obtain estimates of community harvest of subsistence caught salmon by species for 32 Kuskokwim Area communities.

2. To achieve a total (expanded) harvest estimate for subsistence-caught salmon by species for the Kuskokwim River drainage.

3. To identify issues affecting subsistence.

4. To update community household lists and identify fishing households in Kuskokwim Area communities.

In May and June subsistence "catch calendars" were mailed to Kuskokwim Area households by the Commercial Fisheries Division.

During the period 12 August to 31 October, project staff visited Kuskokwim River drainage communities to update household lists, identify fishing households, collect catch calendars, and administer a brief survey to all fishing households. Additional catch calendars were received through the mail.

Approximately 1,344 fishing households were identified in 32 Kuskokwim Area communities. As of 31 October project staff had completed visits to 28 communities, obtained updated household lists in all 28, and had received calendar returns or survey information from approximately 897 households or 67% of the fishing households identified. The communities of Kipnuk and Kwigillingok did not want to participate in the post-season survey and therefore no community surveys were made. The communities of Platinum and Goodnews Bay were visited in November.

Additional work accomplished in November included revisits by Subsistence and Commercial Fisheries personal to five communities (Aniak, Chuathbaluk, Sleetmute, Eek, and Tuntutuliak) where the contact rates for fishing households during initial visits were particularly low. Revisits to these communities should result in harvest data from an additional 80-100 households. A phone and mail-out questionnaire to Bethel households not yet contacted may result in an additional 100-150 contacts for that community.

We anticipate that by November 30 we will have received harvest data from approximately 1100 or 82% of the fishing households identified in 32 Kuskokwim Area communities.

Calendar and survey data collected will be entered by the Division of Subsistence during November and December. Compilation and analysis of these data will be done by Commercial Fisheries Division during early 1989.

Chinook salmon

The Board stated in 5 AAC. 07.365 KUSKOKWIM RIVER SALMON MANAGEMENT PLAN that no directed commercial harvest of chinook salmon take place. This was done to provide for a subsistence harvest that has averaged 54,000 (Figure 6) chinook salmon during the past five years and to maintain average spawning escapements. This action in 1987 followed earlier attempts to correct the declining escapements of Kuskokwim River chinook salmon. Beginning in 1985, the commercial fishery used gill nets of 6-inch or smaller mesh size. This action, to reduce the harvest of the larger female chinook salmon, did not stop the decline in total escapement in 1985 and 1986. The strategy used in 1987 continued to require the use of 6-inch or smaller mesh nets to concentrate the incidental harvest on the smaller "jack" chinook salmon. In addition the plan provided for three eight hour fishing periods scheduled 6 days apart. This insured that chinook salmon not caught during the opening would have adequate time to travel through District 1 before the next opening. This schedule also guaranteed the fishermen and processors that there would be an average 24 hours of commercial fishing in June in which to harvest sockeye and chum salmon. During the first commercial opening on 18 August commercial fishing was downstream of Bethel (half the length of the district). This provision prevented the harvest of earlier running chinook salmon in the upstream portion of the district when the latter running sockeye and chum salmon had not yet reached this part of the district. The final change in the strategy allowed the sale of 14,000 chinook salmon during the June. This provision encouraged commercial fishermen to not subsistence fish for chinook salmon and to instead take home the chinook salmon caught incidental to the chum salmon fishery. The 1987 strategy resulted in chinook salmon reaching the escapement objectives in

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

Maximum gill net specifications are for 6-inch or smaller mesh, 50 fathoms in length and 45 meshes depth in all districts. Fishing periods in District 1 and 2 are usually six hours in duration. From 1:00 p.m. until 7:00 p.m. as required by the management plan, longer fishing periods have the extra time equally divided before 1:00 p.m. and after 7:00 p.m. The Management Plan also authorized three 8 hour periods in June. Following the first 8 hour period many fishermen appeared at the Working Group meeting to express their unhappiness with 8 hour periods. As a result the Working Group recommended that the fishing periods all be from 1:00 p.m. until 7:00 p.m. for the remainder of the season in the Kuskokwim River Districts.

The commercial chinook salmon season in the District 4, Quinhagak opens before 16 June as prescribed under 5 AAC 07.367. DISTRICT 4 SALMON MANAGEMENT PLAN which was adopted by the Board in 1987. Based on catch reports by subsistence and sport fishermen fishing in the Kanektok River and past years' run timing District 4 opened on, 13 June in 1988. The commercial chinook salmon harvest level in District 4 is about 15,000 unless the Department escapement projects determine adequate escapement.

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

Sockeye Salmon

Sockeye salmon are harvested incidentally to chinook and chum salmon in Districts 1 and 2. Historically, fishermen have not accurately identified sockeye and chum salmon in their commercial or subsistence catches in the Kuskokwim River. For this reason, the true accounting of the sockeye and chum salmon harvest in the main Kuskokwim River is not known. Fishermen, processors, and the Department have worked since 1981, to accurately identify each species in the commercial harvest. Sockeye salmon have comprised 6 to 24 percent of the chum-sockeye salmon catch since 1981. Before 1981, the reported sockeye salmon catch was less than 2 percent of the chum-sockeye salmon catch (Table 3). The limited sockeye salmon database and interviews with lifelong residents of the drainage suggest that the recent increase in catch is partly a result of an improvement in the size of the sockeye salmon returns.

Sockeye salmon become the target species when chinook salmon are less than 50 percent of the chinook-sockeye salmon catch in District 4, as required by the Management Plan. District 5, Goodnews Bay is managed for sockeye salmon in June and July. Commercial fishing time often is scheduled for three 12-hour periods per week once the less abundant chinook salmon have passed through the districts. Weak escapements of sockeye salmon result in a reduction of fishing time.

Chum salmon

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

1) Main river test fishing catches show adequate escapement of chum salmon is occurring.

2) Commercial catch per unit effort (especially in early and middle July) is above average.

3) Subsistence fishermen report adequate subsistence catches.

4) Chum salmon escapement projects in spawning tributaries indicate adequate escapements are occurring.

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

Chum salmon are taken incidentally to the sockeye salmon fishery in District 4, Quinhagak and District 5, Goodnews Bay. No special management actions for chum salmon are necessary unless their abundance is unusual.

Coho Salmon

The Kuskokwim River reopens when coho salmon predominate in subsistence and test fisheries. Fishing periods are from 1:00 p.m. until 7:00 p.m. as required by the Management Plan discussed above. Run strength as shown by test fishing, subsistence and commercial catches, and the escapement trend at the Krogrukluk weir are used to establish fishing time.

The commercial coho salmon harvest range for the Kuskokwim River normally has been 150-250,000 fish. In recent years catches have ranged from 200,000 to 660,000 coho salmon (Table 3). The test fishery and escapement data from the weir have allowed a more timely assessment of run strength and an increased catch of the coho salmon. The coho salmon harvest guideline for District 2 is 2,000 to 4,000. Strong runs in recent years have resulted in this guideline being exceeded. Districts 1 and 2 close by regulation on 1 September. A strong

run in 1984 and a late run in 1988 resulted in extending the season into September.

Commercial coho salmon harvests in District 4 have ranged from 11,000 to 135,000 fish (Table 3). The commercial harvest of coho salmon in District 5 has ranged from 10,000 to 71,000 fish. Intermittent aerial escapement surveys along with commercial catch data provide the only in-season hint of run strength. A three (Monday, Wednesday, Friday) 12-hour (0600 to 1800 hours) fishing periods per week schedule has allowed commercial catches that provide adequate spawning escapements and subsistence harvests. Inclement weather often disrupts the fishing effort in District 4 and District 5 during the coho salmon return. The three period per week schedule is normally frequent enough to compensate for any "lost" (due to weather) fishing time. District 4 and District 5 close by regulation on 8 September.

STATUS OF FISHERY AND STOCKS

During the period 1983-1987 the average annual catch value to the salmon fishermen was $4.6 million (Table 1). In 1988 the value of the catch was $12.5 million. Increased prices and catches were responsible for the increased value of the catch. The 1988 value is a minimum figure. It is based on the value paid to fishermen reported on the Department's copy of the fish tickets. During the 1988 season there were a large number of incentive programs available to fishermen in the Kuskokwim Area. These ranged from free round-trip airline tickets to Anchorage to loyalty bonuses. Each individual fishermen had a different actual value received for his catch, depending on which of the programs s\he participated in. The actual value received for the catch is unknown but probably was 20 to 30 percent greater than reported. Table 3 summarizes the commercial and subsistence catches in the Kuskokwim Area since 1913.

Kuskokwim River Chinook Salmon

The combined commercial and subsistence chinook salmon harvest has increased from an average of 56,000 fish for the 10 year period 1960-1969 to 85,600 during 1983-1987 (Figure 6). A commercial harvest target of 30,000 to 40,000 was in effect from 1973-1984 to stabilize catches until the result of such a harvest could be evaluated. Experience showed that the 30,000 to 40,000 harvest range was too high during weaker runs. In 1984 the Board of Fisheries reduced the range to 17-32,000 chinook salmon. The 1985 chinook salmon catch of 37,889 exceeded the harvest guideline and escapements were 25 to 43 percent of the desired objectives. The catch remained in the harvest guideline in 1986 and chinook salmon escapements were still 28 to 32 percent of the objectives. Conservative actions by the Board in 1986 resulted in escapement objectives being achieved in 1987 and 1988 for the first time since 1981. This occurred in spite large harvests, suggesting that an increase in run size was primarily responsible (Figure 6).

The six-inch mesh restriction appeared to result in an improvement in quality of the escapement with an increase in the proportion of females at the Kogrukluk weir. However, the female sex ratio since 1985 is within the range of recorded sex ratios before the gear change in 1985 (22 to 49 percent female). The

commercial catch is showing an increase in the number of males and a decrease in the number of females. From 1982 - 1984 while using large mesh gear the commercial catch was 35 to 40 percent female. During the similar 1985 - 1987 period with the gear restrictions the commercial catch was 23 to 35 percent female. The number of years of data available is to small to provide a significant comparison but the trend appears promising.

Kuskokwim River Sockeye Salmon

Sockeye salmon are harvested incidentally to other salmon in Districts 1 and 2. In 1988 the commercial harvest was 92,025 sockeye salmon, which was 6.2 percent of the chum-sockeye salmon catch (Table 3). Sockeye salmon escapement is documented incidentally to the other species. The Kogrukluk weir estimated an escapement of 6,415 sockeye salmon in 1988. Well above the 2,000 sockeye salmon objective.

Kuskokwim River Chum Salmon

Before 1971, the very small numbers of commercial chum salmon harvested represented fish taken incidentally during the chinook and coho salmon fisheries. Expansion of the commercial chum salmon fishery began in 1971, when it was apparent that a moderate increase in the chum salmon catch would be biologically sound. Based upon past subsistence harvest estimates (1924-1943 levels), a 400,000 combined commercial and subsistence chum salmon harvest appeared to be consistent with the reproductive potential of the run. The 400,000 combined catch of chum salmon was a stated management goal during the early 1970's. Subsistence catches for the entire river have declined steadily since the inception of the commercial fishery in 1971. This appears to be due to the decline in the use of dog teams for transportation not the increased commercial harvest. Escapement objectives were approached or achieved from 1981-1984. Escapement objectives were not achieved in 1985 through 1987 for this species.

Before 1979, commercial fishing occurred in the lower 49 miles of District 1. In 1979, the Board of Fisheries expanded the area open to the lower 78 miles of District 1 (downstream of Bethel). The Board opened the entire length of District 1 for the first time in 1985. In 1988 another 16 miles were added to District 1 by a change in the upstream boundary. The longer district has increased the efficiency of the fleet. When using the traditional Monday-Thursday schedule salmon are in two commercial periods before departing the district. This appears to be a contributing
feature in the failure to achieve escapement objectives for chum salmon from 1985 to 1987. The large run in 1988 and a flexible fishing schedule recommended by the Working Group allowed a record harvest along with escapement objectives being met or exceeded for the first time since the parent year.

Kuskokwim River Coho Salmon

Since statehood the commercial coho salmon catches for the entire river have ranged from 2,498 in 1960 to 660,000 fish in 1986 (Table 3). The recent five year average (1983-1987) is 442,959 fish. Effort in number of fishing permits has ranged from 83 in 1971 to 694 in 1987 (Table 7).

Traditionally, few coho salmon were taken in the subsistence fishery due to poor drying conditions and subsistence needs were met by earlier migrating species. This pattern has been changing gradually since increasing numbers of families own freezers. Coho salmon is the preferred species for freezing, accounting in part for the increased documented subsistence use of coho salmon during the last five years. The Department has emphasized collection of subsistence coho salmon catch data in recent years. Subsistence Division's survey this year attempts to place a greater emphasis on the collection of coho salmon catch data. Preliminary results from individual villages suggest that the coho salmon harvest is much greater than previously documented.

Quinhagak District 4, All Salmon Species

The Quinhagak District is in Kuskokwim Bay about 25 miles' south of District 1 (Figure 1). Commercial fishing occurs only in the marine waters of Kuskokwim Bay (Figure 4). This restriction is necessary to ensure escapement of adequate numbers of salmon up the narrow Kanektok River. The fishery primarily consists of fishing drift gill nets in tidal channels radiating out into Kuskokwim Bay from the mouths of the streams in the district.

It appears that chinook salmon abundance has been decreasing since the peak commercial harvest of 46,385 chinook salmon in 1983. By reducing the commercial fishing time chinook salmon escapement objectives have been achieved. Sockeye and chum salmon escapements were below escapement objectives in 1985 and 1986. In 1987 sockeye salmon exceeded escapement objectives while the chum salmon only reached 17 percent of the objective.

The stock status of coho salmon is difficult to determine as aerial surveys are the only form of escapement monitoring present in the district. Aerial surveys are often impossible due to weather conditions in late August and September. The commercial coho salmon catch data seem to suggest a trend of increasing abundance or there is an increased efficiency and effort by the commercial fishermen.

Goodnews Bay, District 5, All Salmon Species

Commercial salmon fishing began in 1968 in Goodnews Bay and has occurred annually since that time. The prevailing commercial gear employed consists of drift gill nets that are fished in tidal channels radiating from the Goodnews River. Migration timing of chinook, sockeye and chum salmon overlap in Goodnews Bay.

A counting tower on the middle fork of the Goodnews River estimates salmon escapement. Use of the tower began in 1981. Chinook, sockeye and chum salmon are in migration during the time the tower is in operation. The project termination date precludes adequate assessment of the escapement of coho and pink salmon. The primary objective of the project is to provide daily escapement information to assist management of the commercial salmon fishery in Goodnews Bay. The tower also allows the accurate interpolation of the aerial survey escapement data collected in the Goodnews River drainage. This interpolation provides an estimate of total escapement. Total run size can then

be estimated by adding the escapement estimate to the commercial and subsistence catches.

It appears that chinook salmon abundance has been decreasing since the peak commercial harvest of 14,117 chinook salmon in 1983 (Table 5). However, escapement objectives have been achieved or approached by reducing the commercial harvest. The estimates of chinook salmon exploitation seem appropriate given the accuracy of the estimate (Table 8).

Sockeye and chum salmon escapements have approached or exceeded escapement objectives since 1983 except for 1985 when both species were below the objectives. The five years of run size data base
is very limited. However the estimate of exploitation appears to be low (Table 8). The Department will be reviewing the present escapement objectives (which as mentioned above are simple averages of prior years) with the total run size estimates to determine if adjustments are appropriate. The limited data base will of course require that changes be approached cautiously.

The stock status of coho salmon is difficult to determine as aerial surveys are the only form of escapement monitoring available at present. Aerial surveys are often impossible due to weather conditions in late August and September. The commercial coho salmon catch data do not indicate any clear trend of abundance.

SEASON SUMMARY

The total 1988 Kuskokwim Area commercial salmon catches (District 1, 2, 4 and 5) consisted of 74,552 chinook, 149,927 sockeye, 623,719 coho, 37,592 pink and 1,443,916 chum salmon (Table 9). The total amount paid to fishermen was $12,514,000 (excluding bonuses and other incentives). In 1988 the average Kuskokwim permit holder earned $15,431 (Table 1). This is the highest value catch and income per fisherman in the history of the fishery (Table 1). Record prices for all species except chum and pink salmon and the largest harvest in history were responsible for the high value of the catch. The average price of $1.30 a pound for chinook salmon was 15 cents higher than the previous record price of $1.15 per pound in 1977 (Table 6). Sockeye salmon also exceeded the 1987 record price of $1.30 per pound by bringing 1.42 per pound in 1988. The average price per pound for coho salmon of $1.25 was 50 cents higher than the previous 1979 record price of $0.75 a pound. The chum and pink salmon prices exceeded the previous five year average but were lower than the record prices paid in 1977 (Table 6).

Kuskokwim River; District 1, Lower Kuskokwim and District 2, Middle Kuskokwim

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

District 1 downstream of Bethel in compliance with 5 AAC 07.365, KUSKOKWIM RIVER SALMON MANAGEMENT PLAN.

On 17 June, following the first period, the Working Group had a difficult decision. The commercial catch and test fisheries confirmed that an exceptional chum salmon run was occurring but that the chinook salmon run was only average. Another opening in the entire district to harvest the chum salmon could over harvest the chinook salmon. After much discussion of the past and present data the group recommended that another fishing period be held in District 1 downstream of Bethel on 20 June. The group felt that this would allow increased escapement of the earlier running chinook salmon while allowing the harvest of the abundant chum salmon. The harvest guideline for chinook salmon was being approached and run strength was unclear following the second opening. The chum salmon run was large and further harvest was appropriate. The entire length of District 1 opened for the first time on 24 June. District 2 opened for the first time coincidentally with District 1 on 24 June (Table 11). Chinook salmon catches began a rapid decline with the third period making it clear that any efforts to conserve chinook salmon would be futile. The management emphasis concentrated on harvesting chum salmon without over taxing processor capacity.

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

District 2 reopened on 8 August when the new in-season subsistence catch program showed that most of the fish available were coho salmon (Table 11). By 9 August it was clear that a strong coho salmon run was occurring and fishing periods became more frequent. The Working Group found clear evidence in the subsistence, commercial, and test fishing catches that the fishing schedule was to intense on 19 August. The meeting on 19 August adjourned without setting any openings (an opening for 20 August was already set). At the next meeting the Working Group recommended that the
fishery remain closed for the rest of the week to allow improvement of coho salmon escapement.

Two final fishing periods occurred in District 1 on 27 and 31 August. These two openings confirmed the data from the two test fisheries that showed the coho salmon run was declining. These periods also allowed a harvest of the later coho salmon stocks which may not yet have been harvested. The coho salmon catch of 524,296 fish is the third largest on record for the Kuskokwim River (Table 3).

Chum salmon in the Kuskokwim River provided a record catch of 1.38 million, while achieving the escapement objectives for this species. The Kuskokwim River Salmon Working Group used the new industry test fishery near Eek and the new in-season subsistence effort program, in combination with the Department's established programs, to determine early on that the chum salmon run was larger than normal. By fishing steadily through out the run the Working Group allowed a record harvest. The same strategy did not over harvest any individual spawning stocks of fish. As a result, fishing continued through out the month of July in District 1 for the first time in the history of the fishery (Table 10).

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

A record 55,716 chinook salmon were harvested incidentally to the chum salmon fishery in Kuskokwim River (Table 10). For the second time since 1981 chinook salmon reached escapement objectives. An increase in the run size over recent years certainly contributed to the improvement in catch and escapement. The Kuskokwim River Salmon Working Group's recommendation to have an extra fishing period downstream from Bethel was crucial to the achievement of the chinook salmon escapement objectives.

Sockeye salmon are also taken incidentally to chum salmon in the Kuskokwim River Districts. The 1988 catch of 92,000 barely exceeded the previous 5 year average of 91,100 sockeye salmon (Table 3). Sockeye salmon escapements are incidental to other species in the Kuskokwim River and there are no escapement objectives.

Fishing through out the month of July caused a slight increase in the coho salmon catch. In the past the early portion of the coho salmon run entered the river during the closure in July. Only 7600 coho salmon were taken during the fishing periods on 21 and 25 July (Table 10). Coho salmon dominated the catch beginning on 28 July (Table 10) when the fishery normally reopens.

Pink salmon are taken incidentally to the chum and coho salmon fishery in the Kuskokwim River. A record 10,825 pink salmon were taken in 1988 (Table 3). There is not a pink salmon escapement program in the Kuskokwim River.
Coho salmon escapement counts could not be conducted because of weather and stream conditions. Residents of the lower river report that adequate numbers of coho salmon are being seen in drainage spawning streams. Residents in the Aniak drainage reported the number of spawners seemed down. The estimated coho salmon escapement at the Department's weir was 13,700. This escapement index is 11,300 coho salmon less than the desired 25,000 objective for this project. Daily passage rate increased at the weir and remained somewhat higher than in previous years. This improvement began about 20 days following commercial fishery closure which matches the estimate of travel time from District 1.
The Working Group and other member's of the public continued to express their concern over the growing enforcement problems in the commercial salmon fishery. Fishing before and after fishing periods, fishing in closed waters, and fishing without a permit are the areas of greatest concern.

Quinhagak, District 4:

District 4 opened on 13 June in compliance with 5 AAC 07.367. DISTRICT 4 SALMON MANAGEMENT PLAN. Later periods coincided with openings in the other districts whenever possible. This strategy came out of the discussion with fishermen to reduce effort transfer between districts. Coincidental openings were successful in limiting large scale effort transfers (Table 12). No other districts were open on 13 June and effort in District 4 was 202 boats the highest of the season (Table 13). Effort remained less than 100 boats for the remainder of the season except for the period on 17 August when District 1 was closed (Table 13).

District 4 had the largest coho salmon catch of the season on the preceding period (15 August). As a result of the strong catch and the District 1 closure, a significant effort shift occurred on the 17 August period.

Chinook salmon catches were very weak and became smaller with each fishing period through 20 June (Table 13). Normally catches would be increasing. Fishing closed from 21 June to 28 June due to the unexpected weakness of the run. On 24 June large numbers of chinook salmon were reported entering the Kanektok River by subsistence and sport fishermen, and the Department catch monitor in Quinhagak. A fishing period on 28 June which was opened to check the status of the run had good catches. The twice a week fishing schedule resumed based on the improvement in the run. Sockeye salmon dominated the catch beginning 2 July and management for sockeye salmon began (Table 13).

The total chinook catch in District 4 was 13,873 in 1988 well below the previous 5 year average of 31,900 (Table 3). Chinook salmon were the second most valuable fish in the district producing $289,100 for the fishermen (Table 9). The aerial survey index of 11,100 chinook salmon exceeded the escapement objective of 5,800.
The chinook salmon run was weaker than expected in 1988. Fishing time and effort was similar to previous years with comparable escapement indexes. However, most of those years' catches were well above average suggesting that the total run size was greater. The outlook for 1988 had been good since parent years' escapements were good and recent years' survival trends were good in the district. Fishermen reported beluga whales present in the district as a possible cause, since they normally are absent. However, the numbers of beluga (~20) make predation an unlikely cause of the run's weakness (Frost personal communication).

Sockeye salmon catches were above average in July. Aerial surveys of the Kanektok River showed that sockeye salmon escapements were below average. In response, the two period a week schedule continued until 27 July, when coho salmon became the dominate species in the district (Table 13). This strategy resulted in the largest sockeye salmon catch (21,534) in the district's history (Table 3) and an escapement index of 30,400 sockeye salmon, 1600 less than the 32,000 objective.

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

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

The coho salmon catch of 68,591 was slightly above the previous 5 year average of 61,100 (Table 3). No escapement surveys have been possible because of

weather conditions. Coho salmon were the most valuable fish in the Quinhagak district bringing the fishermen $688,206 (Table 9).

Pink salmon are taken incidentally to the sockeye and coho fishery in District 4. The 1988 catch of 21,258 was nearly identical to the previous 5 even years average of 21,100 (Table 3).

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

Goodnews Bay, District 5:

Goodnews Bay opened on 16 June. Fishing periods coincided with openings in the other districts whenever possible. Coincidental openings were successful in limiting large scale effort transfers (Table 12). The highest effort period was on 23 June when District 4 closed and transfers resulted in 68 boats fishing in District 5 (Table 14). There were fewer than 50 boats in the district during most of the season (Table 14).

Chinook salmon receive special management consideration in District 5 during June due to their small stock size and run timing coinciding with the more abundant sockeye and chum salmon. The chinook salmon catch of 4,964 fish in 1988, was about 2,000 fish less than the previous 5 year average of 6,920 (Table 5). The 1988 catch was higher than the previous 2 years. Aerial survey escapement indexes were at objective levels. The tower objective of 3,000 was approached with a count of 2,600 chinook salmon.

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

Chum salmon are taken incidentally to sockeye salmon in District 5. The 1988 catch of 33,059 is the largest on record and nearly three times the previous 5 year average of 11,300 (Table 5). Catches and escapement trends indicated that the chum salmon run was very large. A difficult management problem was created

by the concurrent strong chum salmon and weak sockeye salmon runs. The tower count of chum salmon escapement, 20,000, exceeded the objective of 15,000.

On 1 August coho and pink salmon dominated the catch and a three 12 hour periods per week schedule to provide coincidental openings with District 4 began (Table 14). This schedule in the past has allowed adequate escapement. The fishery continued this schedule until 9 September. The fishery closes by regulation on 8 September. The season extension until the 9th allowed the fishery to close on a Friday. There was no catch or effort on the 9th because the processors left the district.

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

OUTLOOK FOR 1989

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

Chinook Salmon

The brood year escapement for Kuskokwim River chinook salmon was 70 to 42 percent below objective levels in 1983 and 1984. The improved run strength in 1987 and 1988 makes a projection difficult. The trend of declining chinook salmon escapement that occurred from 1982-1986 may result in smaller returns. However, the improved survival evidenced by the 1987 and 1988 runs may provide an average chinook salmon run in 1989. This should result in an incidental commercial harvest of 19,000 to 56,000 chinook salmon (Table 15).

Chinook salmon escapements in the Kanektok River were above objective levels in the brood years for 1989. An average to above average return in 1989 should result from those escapements. The cause of the poor return in 1988 may cause 1989 to weaker than normal. The commercial harvest should be between 14,000 and 34,000 (Table 15).

In the Goodnews River chinook salmon achieved the escapement objectives during the 1983 and 1984 brood years. An average return of chinook salmon is expected in 1989 in the Goodnews Bay District. The commercial harvest in Goodnews Bay should be 2,800 to 8,600 chinook salmon (Table 15).

Sockeye Salmon

Quinhagak (District 4) and Goodnews Bay (District 5) are the only fisheries within the Kuskokwim area which target on sockeye salmon. Most sockeye salmon return at five years of age with a few maturing at four years. Sockeye salmon approached the escapement objective in 1984 and which should result in an average return to both districts. The commercial catch should be from 6,500 to 22,000 in District 4. The return in 1989 is expected to be average. The commercial catch should be 6,700 to 36,000 in District 5 (Table 15).

Chum Salmon

Kuskokwim River chum salmon return primarily as four and five year old fish. The 1989 return will be from the 1984 and 1985 brood year escapements. The escapements in those two years were at objective levels in most systems. The strong 1988 return should also result in a strong return of 5 year old fish in 1989. Therefore, the chum salmon return is expected to be above average in 1989. The Kuskokwim River districts should catch 200,000 to 574,000 chum salmon (Table 15).

The Kuskokwim Bay districts (Districts 4 and 5) do not have directed chum salmon fisheries. The incidental chum salmon catch in District 4 should be between 8,500 and 50,000. In District 5, the incidental catch normally ranges from 4,700 to 33,000 (Table 15).

Coho Salmon

Little information is available to assess coho salmon abundance in 1989. Escapement at the Kogrukluk River Weir in 1985 (the primary brood year) was below objective levels. The trend of stronger returns continued in 1987 and the Kuskokwim River coho salmon have displayed weaker odd year return since 1979. An average to above average odd year run is expected in 1989. The commercial harvest should be 200,000 to 574,000 salmon (Table 15).

The coho salmon catches were the poorest in the last 10 years in Quinhagak and Goodnews Bay in 1985. No escapement surveys were done in 1985 do to poor conditions. Below average to average runs, based on the poor catch in the primary brood year, should occur in 1989. This should mean a catch 30,000 to 50,000 in Quinhagak (District 4) in 1989. The coho salmon catch in Goodnews Bay (District 5) may be 19,000 to 42,000 (Table 15).

TABLES

Table 1. Estimated dollar value of Kuskokwim Area commercial salmon fishery, 1964 - 1988.

YEAR	GROSS VALUE OF CATCH TO FISHERMAN	PERMITS FISHED[a]	AVERAGE INCOME
1964	83,030		
1965	90,950		
1966	87,466		
1967	138,647		
1968	290,370		
1969	297,233		
1970	362,470		
1971	371,220		
1972	360,727		
1973	827,735		
1974	1,056,042		
1975	899,178		
1976	1,380,229		
1977	3,891,950		
1978	2,337,470		
1979	3,678,000		
1980	2,725,134		
1981	3,766,525		
1982	4,213,954		
1983	2,670,400		
1984	5,809,000	774	7,505
1985	3,248,089	781	4,159
1986	4,746,089	789	6,015
1987	6,392,822	798	8,011
1988	12,514,492	811	15,431
FIVE YEAR AVERAGE (1983-1987)	$4,573,280		

[a] Permit holders who made at least one delivery. Information not available prior to 1983.

Table 2. Salmon escapement estimates in Kuskokwim spawning tributaries by species, 1988.

	Location	Date	Chinook	Sockeye	Coho	Chum
	KUSKOKWIM RIVER:					
1	Aniak R.[a]	24-Jul	945	1,675	b	24,538
	Aniak Sonar[c]	31-Jul				401,511
2	Cheeneetnuk[a]	4-Aug	417	0	b	82
3	Chineekluk[a]	20-Jul	0	0	b	0
4	Chukowan R.[a]	23-Jul	1,120	170	b	940
5	Eek R.[a]	23-Jul	2,459	304	b	3,920
6	Mdl. Fk. Eek R.[a]					
7	Holitna R[bd]	27-Jul	10,317		b	
8	Holokuk R.[a]	20-Jul	149	0	b	4,781
9	Kisaralik R.[a]	2-Aug	1,793	0	b	1,505
10	Kogrukluk R.[e]	17-Sep	11,309	6,077	11,722	33,417
11	Kwethluk R.[a]	2-Aug	711	35	b	1,684
12	Oskawalik R.[a]	20-Jul	80	0	b	4,110
13	Salmon R.[af]	18-Jul	244	0	b	310
14	Salmon R.[ag]	25-Jul	501	0	b	0
15	Tuluksak R.[a]	28-Jul	286	0	b	1,445
	KUSKOKWIM BAY:					
16	Goodnews River[ah]	3-Aug	3,731	10,581	b	8,716
17	Goodnews Tower[i]	30-Jul	2,674	15,591	b	21,221
18	Kanektok River[a]	21-Jul	11,140	30,440	b	20,063

[a] Peak aerial salmon escapement index count. Aerial index counts do not represent total escapement, but do reflect annual spawner abundance trends when made using standard survey methods under acceptable conditions.

[b] Poor survey conditions.

[c] Adjusted sonar count.

[d] Aerial survey downstream from Ignatti Weir on the Holitna River.

[e] Weir count.

[f] Aniak River system.

[g] Pitka Fork System.

[h] North and Middle Forks.

[i] Expanded tower count.

Table 3. Lower Kuskokwim River, District 1, and the middle Kuskokwim River, District 2, combined commercial salmon harvest, 1960 - 1988.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1960	5,969	0	2,498	0	0	8,467
1961	18,918	0	5,044	0	0	23,962
1962	15,341	0	12,432	0	0	27,773
1963	12,016	0	15,660	0	0	27,676
1964	17,149	0	28,613	0	0	45,762
1965	21,989	0	12,191	0	0	34,180
1966	25,545	0	22,985	0	0	48,530
1967	29,986	0	56,313	0	148	86,447
1968	34,278	0	127,306	0	187	161,771
1969	43,997	322	83,765	0	7,165	135,249
1970	39,290	117	38,601	44	1,664	79,716
1971	40,274	2,606	5,253	0	68,914	117,047
1972	39,454	102	22,579	8	78,619	140,762
1973	32,838	369	130,876	33	148,746	312,862
1974	18,664	136	147,269	84	171,887	338,040
1975	21,720	23	81,945	10	181,840	285,538
1976	30,735	2,971	88,501	133	177,864	300,204
1977	35,830	9,379	241,364	203	248,721	535,497
1978	45,641	733	213,393	5,832	248,656	514,255
1979	38,966	1,054	219,060	78	261,874	521,032
1980	35,881	360	222,012	803	483,211	742,267
1981	47,663	48,375	211,251	292	418,677	726,258
1982	48,234	33,154	447,117	1,748	278,306	808,559
1983	33,174	68,855	196,287	211	267,698	566,225
1984	31,742	48,575	623,447	2,942	423,718	1,130,424
1985	37,889	106,647	335,606	75	199,478	679,695
1986	19,414	95,433	659,988	3,422	309,213	1,087,470
1987	36,179	136,602	399,467	43	574,336	1,146,627
1988	55,716	92,025	524,296	10,825	1,381,674	2,064,536
Five Year Average (1983-1987)	31,680	91,222	442,959	1,339	354,889	922,088

Table 4. Quinhagak District commercial salmon harvest, 1967-1988.

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

[a] Preliminary harvest figures.

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

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

Table 6. Mean salmon weights and prices paid to commercial fisherman in the Kuskokwim Area, 1967 - 1988.

	Mean Weight - Pounds					Average Price - $/Pound				
Year	Chinook	Sockeye	Coho	Pink	Chum	Chinook	Sockeye	Coho	Pink	Chum
1967	27.8	7.4	5.9	a	7.0	0.13	0.05	0.09	a	0.04
1968	23.8	6.2	7.2	4.0	7.9	0.16	0.10	0.09	0.05	0.04
1969	19.6	6.2	7.3	3.6	5.8	0.19	0.15	0.10	0.06	0.07
1970	18.9	5.4	7.3	3.3	6.1	0.20	0.21	0.14	0.08	0.08
1971[b]	26.2	6.9	6.1	a	6.4	0.17	0.10	0.13	a	0.08
1972	a	a	a	a	a	0.20	a	0.16	a	0.08
1973	a	a	a	a	a	0.25	a	0.26	a	0.19
1974	a	a	a	a	a	0.46	0.34	0.27	0.23	0.25
1975	a	a	a	a	a	0.54	a	0.31	a	0.26
1976[c]	17.0	6.7	7.8	3.5	7.0	0.64	0.43	0.40	0.25	0.27
1977	22.7	8.3	7.8	3.9	7.3	1.15	0.45	0.65	0.25	0.45
1978	24.2	6.5	7.1	3.9	8.9	0.50	0.49	0.40	0.12	0.32
1979	16.6	6.9	7.9	3.9	7.0	0.66	0.53	0.75	0.11	0.37
1980	14.1	6.7	6.9	3.6	6.4	0.47	0.31	0.64	0.12	0.24
1981	17.8	7.2	6.4	3.5	7.5	0.84	0.61	0.63	0.11	0.23
1982	19.3	7.2	7.3	3.6	7.3	0.82	0.41	0.53	0.05	0.22
1983	18.8	6.8	6.8	3.5	7.4	0.54	0.51	0.39	0.05	0.33
1984	16.4	6.6	7.7	3.2	6.7	0.89	0.52	0.55	0.07	0.28
1985	17.0	7.0	7.5	3.6	7.1	0.71	0.59	0.51	0.05	0.25
1986	17.0	7.2	6.4	3.4	6.8	0.80	0.70	0.60	0.05	0.25
1987	15.2	7.5	7.2	3.7	6.8	1.10	1.30	0.73	0.10	0.27
1988	15.1	7.3	7.5	3.4	8.1	1.30	1.42	1.25	0.15	0.40
Five Year Average (1982-86)	16.8	7.0	7.1	3.5	7.0	0.81	1.01	0.56	0.06	0.28

[a] Information unavailable.
[b] Information was not available for district 5.
[c] Information was not available for district 4.

Table 7. Lower Kuskokwim River, District 1, commercial effort 1970 - 1988.

YEAR	UNRESTRICTED MESH SEASON	RESTRICTED MESH SEASON	COHO SALMON SEASON	TOTAL
1970	361	[a]	266	387
1971	418	216	83	422
1972	405	176	245	425
1973	456	341	411	530
1974	606	467	516	666
1975	472	540	533	737
1976	561	517	516	674
1977	563	522	572	653
1978	615	61	597	723
1979	591	617	613	685
1980	553	579	586	663
1981	589	613	586	679
1982	610	576	596	686
1983	544	619	577	679
1984	520	587	619	654
1985	[b]	598	627	654
1986	[b]	631	663	688
1987	[b]	680	694	703
1988	[b]	[c]	[c]	746
Five Year Average (1983-1987)		622	636	676

[a] No commercial salmon season.
[b] No unrestricted mesh season.
[c] Fishery continued without interruption

Table 8. Historical estimated run size and commercial exploitation rate, Goodnews River, 1981 - 1988.

Year	Species	Middle Fork Tower Estimate	Middle Fork Aerial Survey Count as a Percentage of Tower Estimate	Goodnews River Escapement Estimate	Goodnews Bay Subsistence Harvest Estimate	Goodnews Bay Commercial Harvest	Goodnews Bay Total Run Size Estimate	Exploitation Percentage of Run Size
1981[a]	Chinook	3,688	-	-	1,409	7,190	-	-
	Sockeye	49,108	-	-	3,511[b]	40,273	-	-
	Chum	21,827	-	-	-	13,642	-	-
1982[a]	Chinook	1,395	-	-	1,236	9,476	-	-
	Sockeye	56,255	-	-	2,754[b]	38,877	-	-
	Chum	6,767	-	-	-	13,829	-	-
1983	Chinook	6,027	36 %	14,398	1,066	14,117	29,581	51 %
	Sockeye	25,816	22 %	69,955	1,518[b]	11,716	83,189	16 %
	Chum	15,548	-	-	-	6,766	-	-
1984	Chinook	3,260	35 %	8,743	629	8,612	17,984	51 %
	Sockeye	32,053	27 %	67,213	964	15,474	83,651	20 %
	Chum	19,003	35 %	117,739	189	14,340	132,268	11 %
1985	Chinook	2,831	70 %	7,979	426	5,793	14,198	44 %
	Sockeye	24,131	11 %	50,481	704	6,698	57,883	13 %
	Chum	10,367	32 %	25,025	348	4,784	30,157	17 %
1986	Chinook	2,083	57 %	4,094	555	2,723	7,372	44 %
	Sockeye	51,069	28 %	93,228	942	22,608	116,778	20 %
	Chum	14,765	38 %	51,910	191	10,355	62,456	17 %
1987	Chinook	2,274	100 %	4,490	816	3,357	8,663	48 %
	Sockeye	28,871	85 %	51,989	955	27,758	80,702	36 %
	Chum	17,519	58 %	37,802	578	20,381	58,761	36 %
1988[c]	Chinook	2,674	39 %	4,642		4,964		
	Sockeye	15,591	30 %	33,457		36,368		
	Chum	21,221	21 %	46,640		33,059		

[a] Incomplete aerial survey results.
[b] Subsistence caught chum salmon is included in subsistence sockeye salmon harvest.
[c] Preliminary figures.

Table 9. 1988 Kuskokwim Area commercial salmon fishery final calculated value by district and area.

	KINGS	REDS	CHUMS	SILVERS	PINKS	DISTRICT TOTAL
DISTRICT 1						
(LOWER KUSKOKWIM)						
TOTAL FISH	53,810	89,764	1,361,982	508,417	10,805	2,024,778
TOTAL POUNDS	722,747	653,418	9,316,606	3,549,342	36,574	14,278,687
TOTAL DOLLARS	$939,571	$927,853	$3,726,642	$4,436,677	$5,486	$10,036,230
AVERAGE WEIGHT	13.43	7.28	6.84	6.98	3.38	
DISTRICT 2						
(MIDDLE KUSKOKWIM)						
TOTAL FISH	1,906	2,261	19,692	15,879	20	39,758
TOTAL POUNDS	26,995	15,724	137,018	107,063	63	286,863
TOTAL DOLLARS	$35,093	$22,328	$54,807	$133,828	9.45	$246,066
AVERAGE WEIGHT	14.16	6.95	9.96	6.74	3.15	
DISTRICT 4						
(QUINHAGAK)						
TOTAL FISH	13,872	21,534	29,183	68,591	21,258	154,438
TOTAL POUNDS	222,372	156,355	214,344	550,565	77,900	1,221,536
TOTAL DOLLARS	$289,083	$222,024	$85,737	$688,206	$11,685	$1,296,736
AVERAGE WEIGHT	16.03	7.26	7.34	8.03	3.66	
DISTRICT 5						
(GOODNEWS BAY)						
TOTAL FISH	4,964	36,368	33,059	30,832	5,509	110,732
TOTAL POUNDS	82,308	281,405	267,709	255,297	17,714	904,433
TOTAL DOLLARS	$107,000	$399,595	$107,083	$319,121	$2,657	$935,457
AVERAGE WEIGHT	16.58	7.74	8.1	8.28	3.22	
TOTAL ALL DISTRICTS						TOTAL ALL AREAS
WT. AVE. PRICE/LB	$1.30	$1.42	$0.40	$1.25	$0.15	
TTL $/SPECIES	$1,370,748	$1,571,800	$3,974,270	$5,577,833	$19,837	$12,514,491
PRICE/FISH	$19.57	$10.38	$3.22	$9.38	$0.50	
AVERAGE WEIGHT	15.05	7.31	8.06	7.51	3.35	

Table 10. 1988 Lower Kuskokwim (W-1) final seasonal summary.

			CATCH									
			CHINOOK		SOCKEYE		COHO		PINKS		CHUMS	
Date	Permits	LNDGS	NO.	LBS.	NO.	LBS.	NO.	LBS.	NO.	LBS.	NO.	LBS.
6/16	602	750	12,640	178,442	7,408	56,090					72,219	544,885
6/20	612	826	11,708	156,290	14,502	105,525					113,628	841,214
6/24	644	838	9,710	129,524	19,894	144,337			3	13	119,808	860,750
6/28	609	821	5,350	69,587	17,628	127,556			4	12	154,027	1,090,059
7/02	580	835	3,531	46,286	15,102	109,485			28	89	187,916	1,305,711
7/05	579	756	2,340	32,326	7,284	53,210	9	60	18	54	163,971	1,119,347
7/08	604	705	1,891	26,121	3,623	26,230	1	10	49	165	138,772	929,156
7/11	598	693	1,628	20,988	2,467	17,411	24	162	123	411	137,450	900,939
7/14	597	655	1,751	21,723	822	6,187	141	939	402	1,315	116,930	746,689
7/18	567	575	1,107	13,869	396	2,754	502	3,322	503	1,722	57,749	363,594
7/21	539	543	621	8,093	164	1,197	1,278	8,239	1,022	3,512	39,643	251,082
7/25	494	508	329	4,152	109	795	6,323	40,339	1,488	4,886	24,893	154,863
7/28	552	561	333	4,192	70	519	20,970	138,485	1,572	5,211	16,028	95,889
8/01	594	607	201	2,710	32	214	33,954	229,343	1,869	6,318	6,967	40,316
8/04	639	684	206	2,382	105	713	76,576	516,342	1,235	4,285	5,152	30,661
8/08	640	701	114	1,738	92	698	76,345	528,226	835	2,839	2,890	17,497
8/10	596	645	73	921	9	74	53,874	380,976	517	1,811	1,376	8,268
8/12	624	677	115	1,359	11	77	84,700	601,202	469	1,668	1,422	8,544
8/15	613	625	76	874	14	116	59,724	426,945	215	757	663	4,056
8/18	620	641	37	529	8	61	37,415	269,673	175	602	230	1,527
8/20	577	586	29	332	5	39	24,046	170,665	84	260	121	722
8/27	532	549	14	199	8	65	22,683	163,115	109	362	93	607
8/31	412	435	56	803	520	3,862	12,264	88,483	111	360	2,585	18,980
Total	746	15,216	53,860	723,440	90,273	657,215	510,829	3,566,526	10,831	36,652	1,364,533	9,335,356
Average				13.43		7.28		6.98		3.38		6.84

1988 Lower Kuskokwim (W-1) confiscated landings.

			CATCH									
			CHINOOK		SOCKEYE		COHO		PINKS		CHUMS	
Date	Permits	LNDGS	NO.	LBS.	NO.	LBS.	NO.	LBS.	NO.	LBS.	NO.	LBS.
7/08	1	1	4	50	5	35					86	565
7/18	1	1									1	7
Total	1	2	4	50	5	35					87	572
Average				12.50		7.00						6.57

Table 11. 1988 Middle Kuskokwim (W-2) final seasonal summary.

			CATCH									
			CHINOOK		SOCKEYE		COHO		PINK		CHUM	
Date	Permits	Lndgs.	NO.	LBS.	NO.	LBS.	NO.	LBS.	NO.	LBS.	NO.	LBS.
6/24	13	14	669	8,718	1,041	7,179					4,232	30,169
6/28	17	21	76	10,604	639	4,436					6,087	43,290
7/02	19	20	468	7,320	579	4,099					8,155	56,106
8/08	14	14	6	119			1,465	9,880	3	9	308	1,983
8/10	16	16	10	120			3,823	25,401	6	18	312	1,826
8/12	20	20	3	50			5,216	34,959	5	16	244	1,444
8/15	21	21	1	20	2	10	2,317	15,621	4	12	144	861
8/18	15	15	2	20			1,485	10,210	1	3	116	737
8/20	17	17	1	24			1,573	10,992	1	5	94	602
Total	29	158	1,906	26,995	2,261	15,724	15,879	107,063	20	63	19,692	137,018
Average				14.16		6.95		6.74		3.15		6.96

Table 12. Kuskokwim area district transfers, 1988.

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

Table 13. 1988 Quinhagak (W-4) final seasonal summary.

			CATCH									
			CHINOOK		SOCKEYE		COHO		PINK		CHUM	
Date	Permits	Lndgs.	NO.	LBS.	NO.	LBS.	NO.	LBS.	NO.	LBS.	NO.	LBS.
6/13	202	207	1,716	28,791	151	1,085					1,092	8,533
6/16	94	102	1,179	21,555	277	2,143					847	6,552
6/20	88	99	803	13,722	367	2,545			2	10	746	5,617
6/28	69	127	4,089	65,394	2,413	18,564					5,449	42,133
7/02	98	134	1,891	32,264	3,121	23,826					4,337	32,819
7/05	62	76	967	15,023	2,295	16,849			5	15	3,303	25,102
7/08	71	94	918	13,567	2,453	17,685			38	123	3,672	26,536
7/11	66	83	621	8,250	3,369	23,974			67	197	2,940	20,968
7/14	64	93	596	9,134	3,465	24,956			159	554	1,748	12,336
7/18	73	80	202	2,599	1,454	10,162	1	6	760	2,805	1,310	9,097
7/21	79	79	162	2,433	769	5,260	15	94	1,709	6,215	1,380	9,449
7/25	61	63	135	1,703	393	2,674	519	3,565	2,865	10,719	813	5,366
7/27	49	54	93	1,196	253	1,573	273	1,808	1,972	7,619	320	2,146
7/29	55	61	104	1,216	212	1,392	565	3,929	2,943	11,112	353	2,360
8/01	69	75	54	712	129	815	1,315	9,554	2,231	8,335	246	1,480
8/03	72	73	74	898	81	530	2,793	20,055	1,809	6,586	247	1,510
8/05	60	70	40	612	46	351	4,517	35,114	1,133	3,721	98	607
8/08	67	72	59	684	94	608	2,991	22,772	1,597	5,721	106	656
8/10	57	87	19	385	10	77	5,298	42,939	278	924	43	273
8/12	73	86	45	689	64	537	3,033	24,210	1,168	4,530	47	297
8/15	77	118	36	561	31	183	15,733	129,037	594	1,925	53	320
8/17	107	112	24	391	18	115	2,775	21,827	415	1,397	15	93
8/19	75	82	14	186	13	94	4,373	35,078	257	945	15	99
8/22	86	91	11	152	6	40	4,502	36,657	329	1,171	13	87
8/24	84	112	5	60	16	112	8,673	72,060	389	1,431	7	42
8/26	86	99	17	255	14	100	4,825	39,357	242	887	8	52
8/29	70	74	4	33	6	42	2,701	22,512	118	457	3	19
8/31	56	66	3	37	11	69	1,524	12,176	99	314	3	19
9/02	40	41			4	38	558	4,472	50	142		
9/05	34	37	2	25	16	93	1,012	8,286	58	166	5	33
9/07	29	31			5	28	609	5,142	23	94	1	8
9/09	0	0	NO COMMERCIAL FISHING -- NO BUYERS									
Total	288	2,678	13,883	222,527	21,556	156,520	68,605	550,650	21,310	78,115	29,220	214,609
Average				16.03		7.26		8.03		3.67		7.34

1988 Quinhagak (W-4) confiscated landings.

			CATCH									
			CHINOOK		SOCKEYE		COHO		PINK		CHUM	
Date	Permits	Lndgs.	NO.	LBS.	NO.	LBS.	NO.	LBS.	NO.	LBS.	NO.	LBS.
7/18	1	1	10	120	18	130			1	3	27	200
Total	1	1	10	120	18	130			1	3	27	200
Average				12.00		7.22				3.00		7.41

Table 14. 1988 Goodnews Bay (W-5) final seasonal summary.

			CATCH									
			CHINOOK		SOCKEYE		COHO		PINKS		CHUM	
Date	Permits	Lndgs.	NO.	LBS.	NO.	LBS.	NO.	LBS.	NO.	LBS.	NO.	LBS.
6/16	22	25	251	4,613	696	5,549					1,091	9,197
6/20	32	37	404	6,620	1,989	16,056					3,501	28,882
6/23	68	107	1,639	28,056	2,701	20,760			1	5	7,833	67,118
6/28	48	63	1,307	22,168	2,932	23,370			5	17	8,369	70,021
7/02	42	49	234	3,514	2,657	21,026			16	50	3,434	26,435
7/05	36	49	467	7,751	3,328	25,572			44	135	3,193	25,348
7/08	47	53	147	2,427	3,600	27,534			4	12	1,894	14,492
7/11	54	60	124	1,800	2,851	21,624			35	103	1,525	10,718
7/14	48	55	89	1,253	3,173	24,582			110	362	1,019	7,167
7/18	48	51	71	961	3,049	24,031			172	568	649	4,546
7/25	39	41	30	425	1,534	11,986	24	166	440	1,612	227	1,584
7/29	35	37	32	482	1,312	10,167	91	653	530	1,590	72	493
8/01	33	34	27	356	811	6,030	171	1,263	683	2,049	55	401
8/03	23	23	13	185	578	4,297	192	1,478	471	1,413	33	221
8/05	25	26	12	196	527	4,097	752	5,887	517	1,896	63	385
8/08	30	35	19	319	926	7,183	1,343	11,108	531	1,766	23	165
8/10	31	33	10	151	659	4,853	1,340	10,091	240	783	20	142
8/12	34	38	7	57	564	4,147	1,766	13,926	339	1,158	9	67
8/15	32	33	5	62	398	3,033	2,338	17,958	177	540	4	28
8/17	35	38	16	202	498	3,777	3,237	25,491	133	399	7	43
8/19	36	40	10	147	360	2,677	4,180	34,731	73	219	6	36
8/22	41	53	10	120	353	2,646	4,520	38,033	175	590	5	38
8/24	52	53	17	159	244	1,836	3,467	30,089	237	711	5	31
8/26	52	62	8	70	204	1,494	2,868	24,854	255	765	7	58
8/29	61	61	4	49	155	1,207	1,675	14,434	112	339	3	26
8/31	52	52	6	56	88	603	1,125	9,551	80	240	5	30
9/02	39	40	2	44	57	392	792	7,229	49	150	4	20
9/05	28	28	2	40	61	429	525	4,618	46	140	2	12
9/07	24	24	1	25	63	447	426	3,737	34	102	1	5
9/09	0	0	NO COMMERCIAL FISHING - NO BUYERS									
Total	125	1,300	4,964	82,308	36,368	281,405	30,832	255,297	5,509	17,714	33,059	267,709
Average				16.58		7.74		8.28		3.22		8.10

Table 15. Preliminary projections of the 1989 Alaska commercial salmon harvests in thousands of fish by management region and species.

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

a Except as noted all the projections are based on the previous (1983-87) average catches in all districts.

b The chinook salmon catches in Kuskokwim Bay have declined in recent years. The projection is based on the recent 5 year average (1984-88) to exclude the record catches made in 1983.

c Kuskokwim River coho salmon have displayed a strong odd-even cycle in recent years. This projection is based on the average odd year catch for the previous 10 years.

d The 1984 coho salmon catches were the largest on record and 40% above average. The projection is based on the recent (1985-88) four years to exclude the unusually high 1984 catches.

e Pink salmon catches are typically less than 100 in both the river and the bay during odd years.

FIGURES

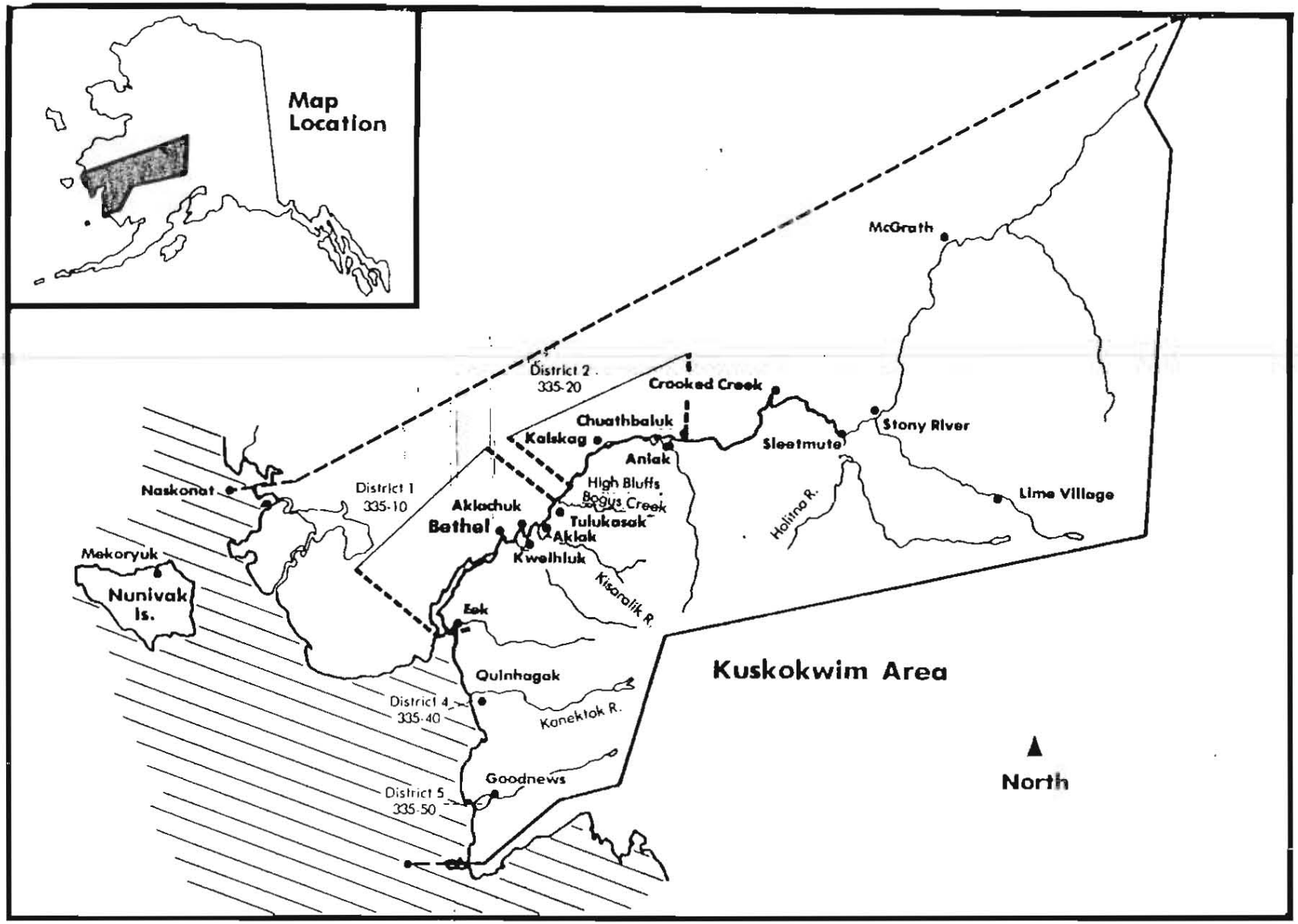

Figure 1. Kuskokwim Areo Mop.

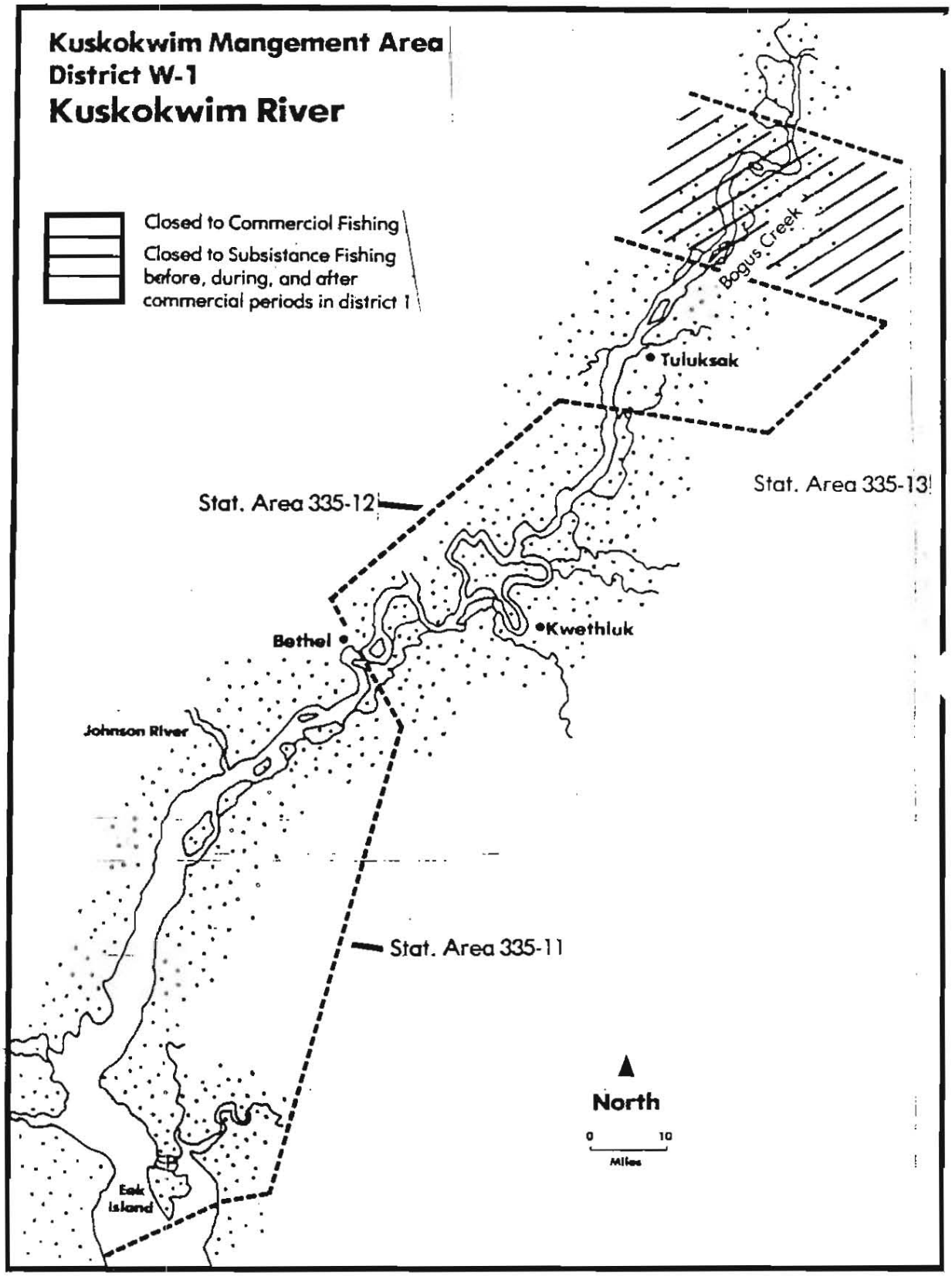

Figure 2. Kuskokwim Management Area, District W-1

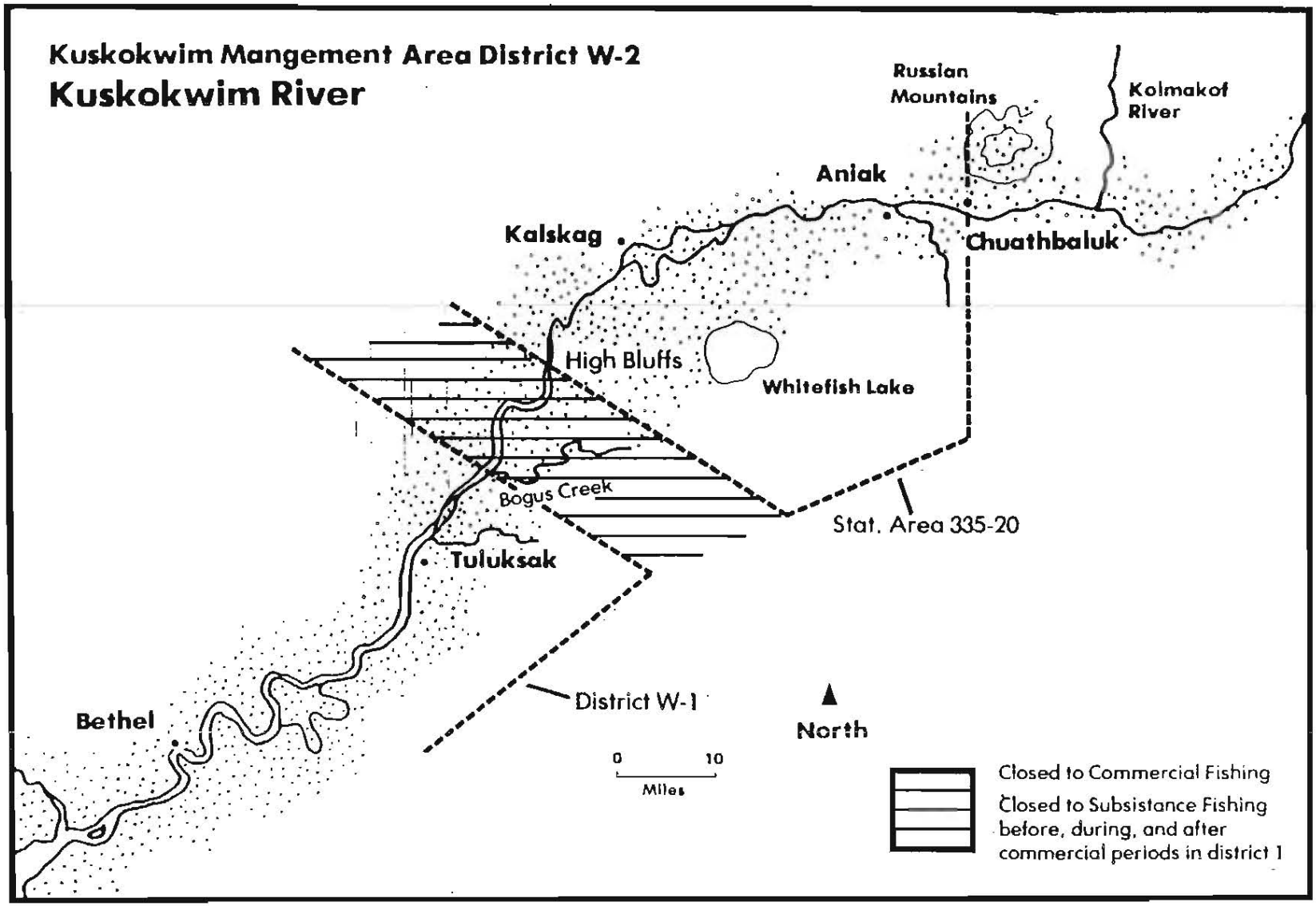

Figure 3. Kuskokwim Management Area, District W-2

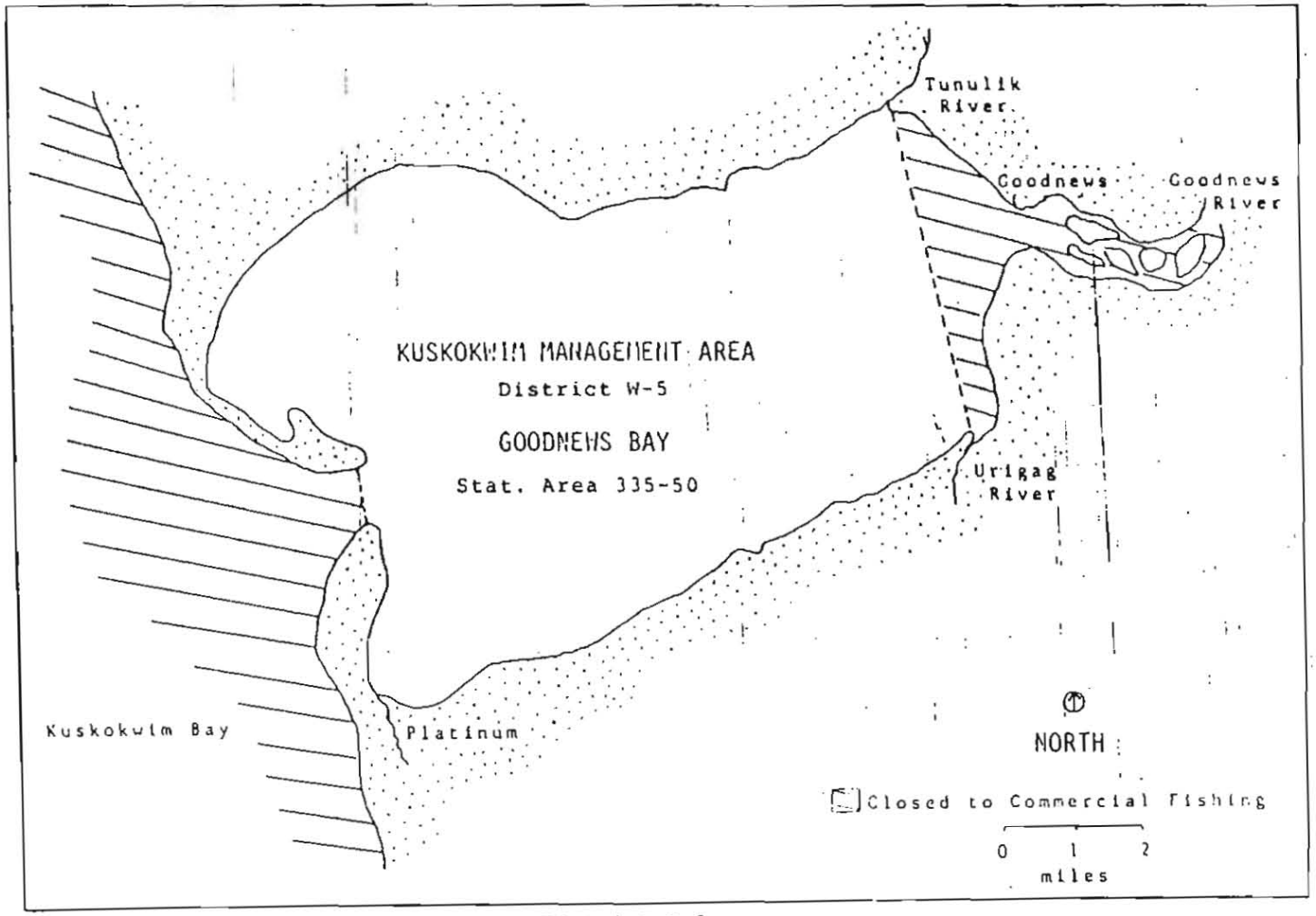

Figure 5. Kuskokwim Management Area, District W-5

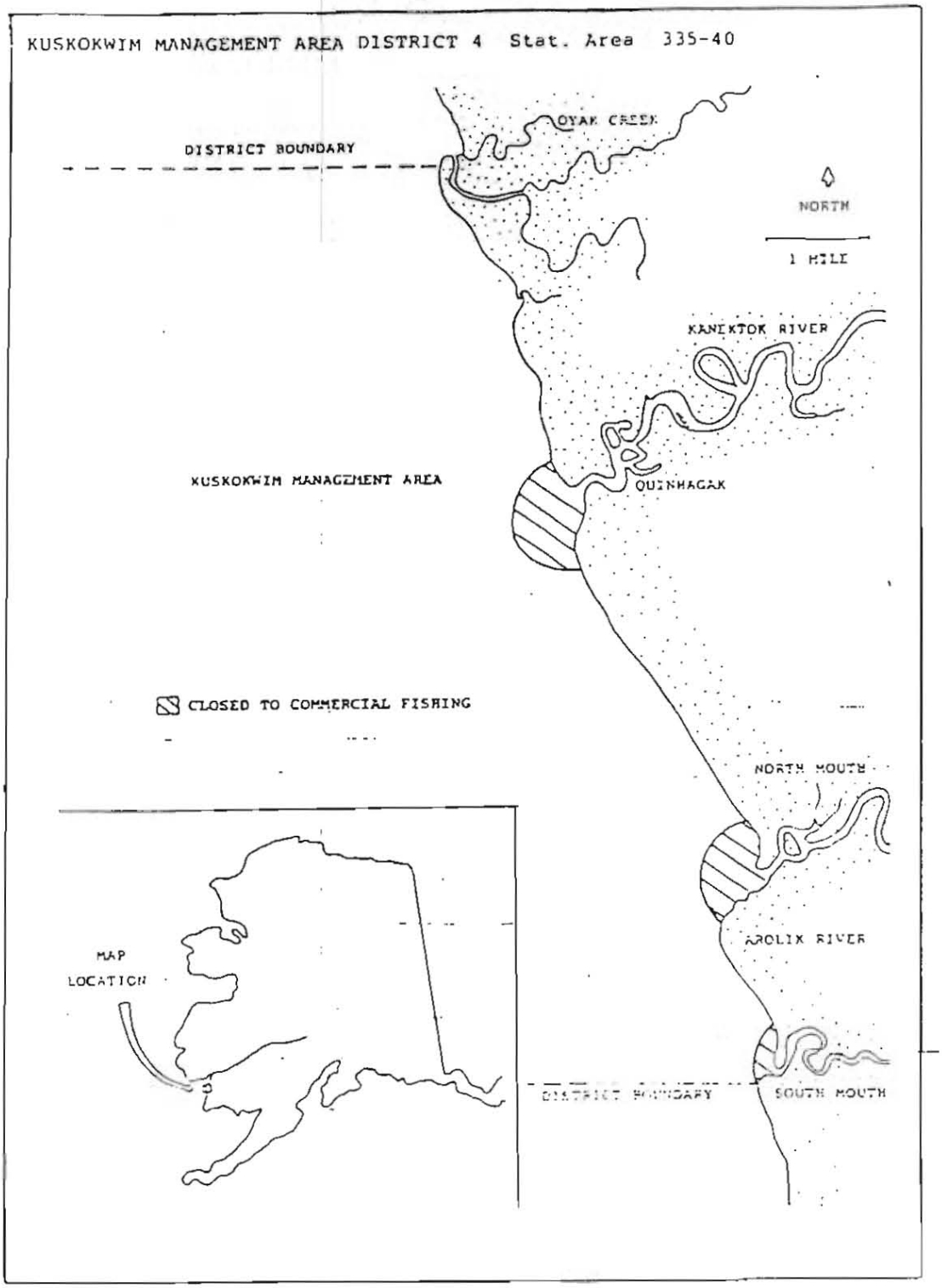

Figure 4. Kuskokwim Management Area, District W-4

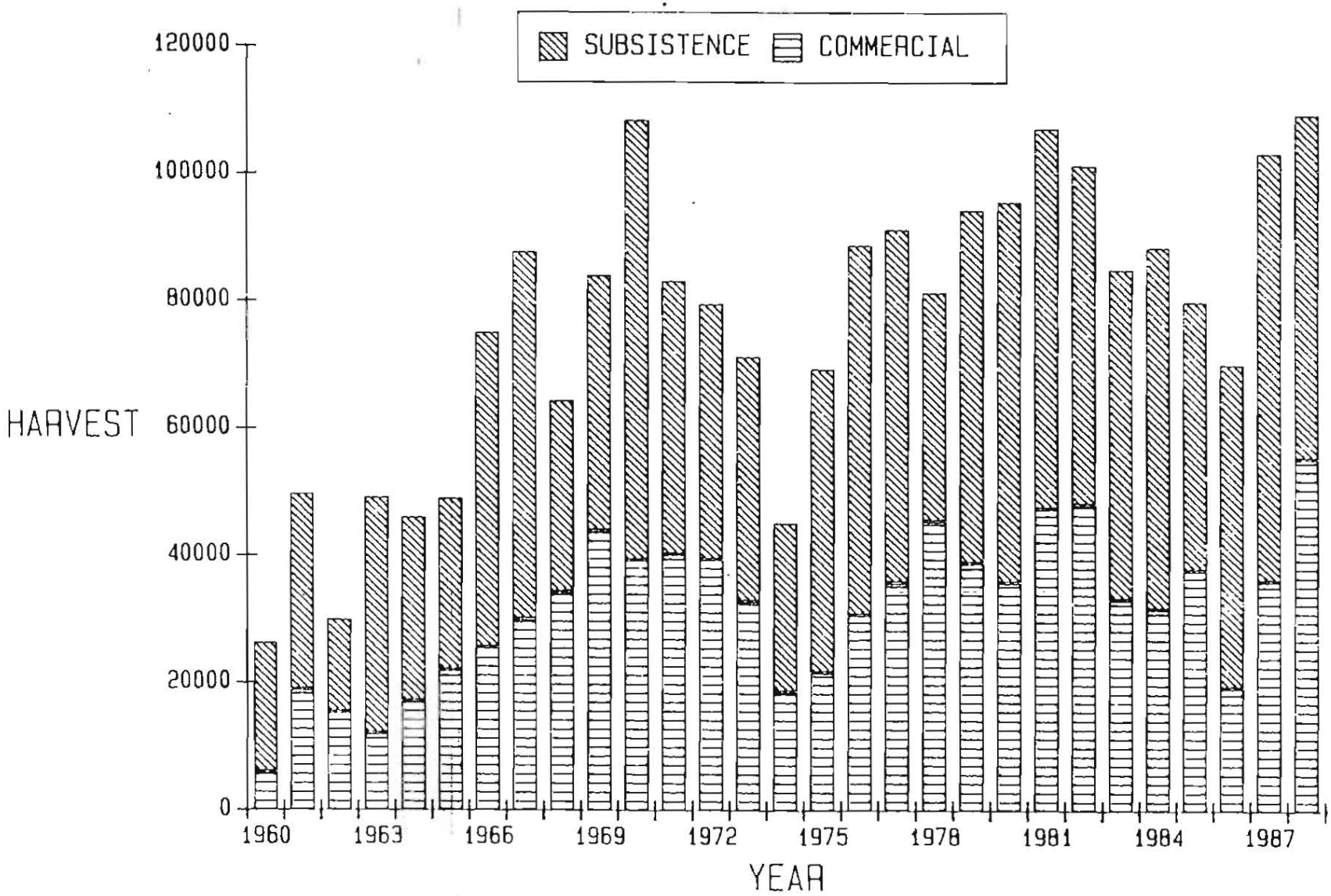

Figure 6. Utilization of Kuskokwim River chinook salmon, 1960 - 1988.