3A94-03

REPORT TO THE ALASKA BOARD OF FISHERIES
KUSKOKWIM AREA, 1993

By:

R. Kim Francisco
Cindy Anderson
Charles Burkey
Doug Molyneaux

Regional Information Report[1] No. 3A94-03

Alaska Department of Fish and Game
Division of Commercial Fisheries Management
and Development, Arctic-Yukon-Kuskokwim Region
Bethel, Alaska

7 February 1994

---

1 The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse and ad hoc informational purposes or archive basic uninterpreted data. To accommodate timely reporting of recently collected information, reports in this series undergo only limited internal review and may contain preliminary data; this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the author or the Division of Commercial Fisheries.

OFFICE OF EQUAL OPPORTUNITY STATEMENT

AUTHORS

R. Kim Francisco is the Kuskokwim Area Management Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, P.O. Box 90, Bethel, AK 99559-0090.

Cindy Anderson is the Assistant Area Management Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, 333 Raspberry Road, Anchorage, AK 99518-1599.

Charles Burkey Jr. is the Assistant Area Management Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, P.O. Box 90, Bethel, AK 99559-0090.

Doug Molyneaux is the Salmon Research Project Leader for the Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, 333 Raspberry Road, Anchorage, AK 99518-1599.

ACKNOWLEDGMENTS

Many people contributed toward the collection and processing of the data used in this report. Alaska Department of Fish and Game employees worked long and irregular hours at various locations throughout the Kuskokwim Area collecting the data presented in this report. We thank Doug Bue, Karen Hyer, Robin Thompson, Joy Wintersteen, Doug Wade, Allen Glore, Mary Sattler, Robert Stewart, Victoria Baker, Philip Perry, Chris Schmierbach, Joshua Arnold, Richard Chapell, John Buchanon, Greg Christen, Roberta Lewando, Matt Niclai, Dave Vaska and Jon Becker. In addition, we would like to recognize Inna Rganimova, Valerie Bjornstad, Syma Ebbins, Patricia and Randy Burkey, and Marsha Francisco; the volunteers in the Kuskokwim Area. They provided valuable assistance by completing projects that were not funded. Mike Wade performed many useful tasks as a volunteer maintaining the bunkhouse. A special thanks goes to Bobbi Fisher, Fish and Game Field Office Assistant, for keeping the paper moving. Salmon processors contributed data, communications, transportation, and advice. We gratefully acknowledge the subsistence and commercial fishers who voluntarily provided their time, skill and knowledge. The Yukon Delta National Wildlife Refuge (United States Fish and Wildlife Service) provided valuable flight time, meeting space, sampling assistance, escapement data, and advice.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF TABLES (continued)

LIST OF FIGURES

INTRODUCTION

The Kuskokwim Area includes the Kuskokwim River drainage and all waters of Alaska that flow into the Bering Sea between Cape Newenham and the Naskonat Peninsula (Figure 1). Commercial salmon fishing takes place in four districts. District 1, Lower Kuskokwim River, is the portion of the Kuskokwim River upstream of Popokamiut to the regulatory markers located about one mile above the mouth of the Tuluksak River (Figure 2). District 2, Middle Kuskokwim River, is the Kuskokwim River upstream from regulatory markers approximately eight miles downstream of Lower Kalskag upstream to the regulatory markers at Chuathbaluk (Figure 3). District 4, Quinhagak, is in Kuskokwim Bay between the mouth of Weelung Creek and the South Mouth of the Arolik River (Figure 4). District 5, Goodnews Bay, is Goodnews Bay (Figure 5).

W is the letter code assigned to the Kuskokwim salmon fishery by the Commercial Fisheries Entry Commission. It precedes the district number on the figures and in news releases (eg. W-1). This helps the public differentiate between announcements for the Yukon Area districts (Y) and the Kuskokwim Area districts (W).

SUMMARY OF THE 1993 SEASON

The Alaska Department of Fish and Game's Division of Commercial Fisheries Management and Development manages the subsistence and commercial fisheries in the Kuskokwim Area. The Department's goal is to manage both fisheries on a sustained yield basis within the policies set forth by the Alaska Board of Fisheries (Board).

Escapement Monitoring

The Area's major spawning systems received provisional spawning escapement objectives in 1983. The objectives are the average escapement counts obtained under acceptable conditions in these systems since 1959. The objectives represent the minimum

escapement levels needed to maintain the salmon stocks at past levels of abundance. Continuing evaluation of the escapement data provided for refinements to the objectives.

Aerial surveys of "key" streams and lakes throughout the area, commercial and test fishery CPUE, weir projects on the Kogrukluk and Goodnews rivers, and a sonar project in the Aniak River provides an annual assessment of spawning escapement. The United States Fish and Wildlife Service (USFWS) operated a weir on the Tuluksak River for the third year in 1993. The USFWS ceased operation of the Kwethluk River weir after a single year of operation due to opposition from the village of Kwethluk.

Turbid water conditions and inclement weather often prevent accurate estimates of escapements by aerial survey. Timely escapement estimates for in-season management are difficult to obtain. Most spawning streams are many miles upstream of the commercial fishing districts. This results in a long delay between the commercial periods and their visible effects on escapement. Escapement estimates can be too late for adjustment of fishing time. In-season management depends heavily on commercial catch data, the test fisheries and escapement models. Escapement models predict the final escapement by extrapolating the in-season counts by the historical percentage of run passage for that date.

The test fishery near Eek was sponsored by processors from 1988 through 1990 (Figure 2). They were unable to provide funding for this project in 1991. The Department funded the project in 1992 and 1993. Funding for this project in 1994 is uncertain. The processor in Aniak funded two new test fisheries at Aniak and Chuathbaluk (Figure 3). Both began in 1992. The second year of the project went very well and provided useful information.

Development of a dual beam side-scanning sonar project in the Kuskokwim River near Bethel began in 1988. New equipment and procedures underwent a feasibility test in

1993. The project was successful in 1993 and will provide inseason run assessment in 1994.

A weir on the Middle Fork of the Goodnews River provides inseason escapement data for District 5. This project has allowed improved management of the District 5 fishery.

Subsistence Fishery

The priority use of the Kuskokwim Area salmon resource is subsistence. The Kuskokwim Area subsistence salmon fishery is a large and important fishery, with over 1,300 families participating. Subsistence catches of chinook salmon in the Kuskokwim River normally exceed the commercial catch of this species (Table 1). All districts have more time for subsistence fishing than commercial fishing. For example, during the 1993 salmon runs, despite the first ever closure for conservation reasons, in District 1, subsistence fishing was open for 57 days, while commercial fishing opened for portions of 11 days.

The subsistence fishery is subject to few restrictions. Some restrictions are necessary to deter illegal commercial fishing and ensure adequate escapement. Because most subsistence fishers fish commercially, there is a temptation to sell fish caught during commercial closures. Short closures before, during, and following commercial periods discourage illegal commercial fishing during the open subsistence fishing periods. In District 1 this subsistence closure includes the commercial fishing district, Kuskokuak Slough, and the Kuskokwim River between Districts 1 and 2, but not the spawning tributaries. In Districts 2, 4, and 5 the subsistence closures apply to the commercial districts and spawning tributaries.

The 1993 chum salmon return to the Kuskokwim River was poor. Test fishing at Aniak and Chuathbaluk was reduced beginning 3 July to conserve chum salmon. The sport fishery for chum salmon was closed in the entire Kuskokwim River drainage on 9 July. The Chuathbaluk and Aniak test fisheries showed that adequate numbers of chum salmon

were escaping to the upper Kuskokwim because of the commercial closure. No subsistence closures or restrictions occurred upstream of Chuathbaluk (Figure 1).

The Kuskokwim River and its tributaries closed to subsistence fishing downstream of Chuathbaluk at 6:00 p.m. 9 July until 8:00 a.m. 12 July. Compliance was excellent. F.W.P. seized three unattended nets containing rotten salmon. Several non-english speaking fishers were fishing. They were warned and the closure explained.

An emergency regulation adopted on 9 July gave the Department emergency order authority to restrict subsistence fishing gear to 5 inch or less mesh in Districts 1 and 2 and their tributaries. An emergency order issued on 9 July restricted subsistence fishing in District 1 and its salmon spawning tributaries to 5 inch or less mesh nets effective 8:00 a.m. 12 July. This approach allowed the subsistence harvest of other species, while providing conservation measures for chum salmon. Five inch gear does take chum salmon, predominately female chum salmon, it was felt most nets of this size would be whitefish nets. Typically whitefish nets are short set nets, not suitable for drifting in the main river, the salmon migratory path. Based on the phone calls we received this was the case. The tributary streams on the west bank; Tagayarak, Kialiak, Johnson, and Gweek Rivers, were exempted from this regulation since they support insignificant salmon populations. Catch calendar data from past years indicated that normally over 98 percent of the subsistence chinook and sockeye salmon catch was complete by 9 July in District 1. Approximately 25 percent of the chum harvest was taken after this date (Table 2). Chinook salmon are primarily used for human consumption, it was important to provide as much subsistence opportunity for this species as possible.

The Tuluksak River weir showed that acceptable numbers of chum salmon were escaping into the Lower Kuskokwim tributaries (Figure 2). On 14 July normal subsistence fishing resumed in the District 1 spawning tributaries; Eek, Kwethluk, Kasigluk, Kisaralik, and Tuluksak Rivers. The gear restriction continued in the Kuskokwim River and Kuskokuak

Slough due to the low escapement in the Aniak River. Test fishing at Aniak and Chuathbaluk was suspended entirely for 16 days to protect chum salmon.

On 16 July, the subsistence gear restriction extended to District 2, Aniak River, and the Kuskokwim River between District 1 and District 2. The delay in restricting fishing in this portion of the river allowed fishers an opportunity to catch the earlier running chinook and sockeye salmon. Catch calendar data from past years indicated that normally over 98 percent of the subsistence chinook and sockeye salmon catch was complete by 16 July in District 2. Approximately 22 percent of the chum harvest is taken after this date (Table 2).

Compliance was good and only one citation was issued. Several individuals reported their illegal catches in lobbying efforts to get commercial openings. In one case, a Working Group member reported their catch while fishing with 5 1/2 inch gear in the main river in a lobbying effort for a commercial period. A subsequent patrol in the area of this individual's activities resulted in the seizure of 3 unattended, unidentified, oversized nets.

Subsistence catch statistics for 1993 have not been analyzed at this time. The quantitative effect of the closure on the subsistence harvest is not known.

The closure and restriction resulted in many complaints. Most complaints centered on subsistence being the priority use and that the Department was violating its obligations by restricting subsistence opportunity. The next largest group of complaints concerned the data being wrong and that both commercial and subsistence fishing should be allowed to continue. One individual reported that their family had begun fishing late and would have trouble meeting their subsistence needs because of the closure.

Subsistence fishing downstream of Bethel returned to normal on 27 July. This was done because coho salmon dominated the test catch at Bethel since 25 July. Based on coho salmon migration rates the net restriction was lifted throughout District 1 on 30 July.

Normal subsistence fishing resumed upstream in a stepwise manner, based on coho salmon migration rates. Normal subsistence fishing resumed in the entire mainstem of the Kuskokwim River on 2 August. Aniak Slough and the Aniak River remained open only to subsistence fishing with 5 inch or less mesh nets until 23 August when most chum salmon had spawned and died.

On 19 July the subsistence fishing closure associated with District 5, Goodnews Bay was extended to Kuskokwim Bay outside of Goodnews Bay (Figure 1). A 16 July patrol by Fish and Wildlife Protection (F.W.P.) found 4 commercial permit holders fishing outside of the district in an area open to subsistence fishing. Since these fishers made deliveries, we believe they were illegally commercial fishing under the guise of subsistence fishing. The closure was necessary to halt this activity.

The Subsistence Division mailed 1993 subsistence "catch calendars" and household reply cards to over 1,500 Kuskokwim Area households. Calendar collection and interviews occur during house to house surveys in October and November. This timing provides more complete catch data, particularly for coho salmon. Data analysis is incomplete at this time. Preliminary catch figures will be available at the March Board meeting.

Commercial Fishery

The commercial fishery has expanded during the last ten years. This expansion is due to increased participation by individual fishers and improvements in fishing gear, tendering, and processing capabilities. In 1993, 807 of the 832 permit holders made at least one landing (Table 3). The number of permits fished in 1993 was above average (Table 3). Since the peak of 824 permits fished in 1989 and 1990, the number of active permits has declined slightly (Table 3).

The reduction in the number of permits fished and reduction in fishing time because of the weak chum salmon run in the Kuskokwim River reduced the number of permit-hours

in 1993 (Table 4). Permit-hours were below average in District 1 due to the long closure during the chum salmon fishery (Table 4). Permit holders transfer freely between districts. This caused the closure in District 1 to contribute to the increase in permit-hours in Districts 4 and 5.

Commercial fishing regulations set maximum gill net specifications of 6-inch or smaller mesh, 50 fathoms in length and 45 meshes in depth for 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 divide the extra time before 1:00 p.m. and after 7:00 p.m. In Districts 4 and 5 fishing periods are normally 12 to 24 hours in length. Fishers prefer daylight fishing hours so the periods are normally 9:00 a.m. until 9:00 p.m.

The total 1993 Kuskokwim Area commercial salmon catch (Districts 1, 2, 4 and 5) consisted of 26,636 chinook, 167,235 sockeye, 686,570 coho, 71 pink and 94,937 chum salmon (Table 10). In 1993, the average Kuskokwim permit holder earned $4,911, 28 percent below average (Table 3). The total amount paid to fishers was $3,962,890, excluding bonuses and other incentives (Table 3). Coho salmon were the most abundant and valuable species bringing fishers over two million dollars (Table 21).

Kuskokwim River (Districts 1 & 2)

The Kuskokwim River Salmon Management Working Group (Working Group) continued to work closely with the Department in 1993. Representatives of Kuskokwim River salmon users comprise the Working Group. Through uncommon dedication by all the concerned parties the Working Group provided in-season management recommendations that helped accomplish management objectives (Table 5). During the season the Working Group met 22 times to evaluate the status of the salmon runs and make recommendations to the Department.

Run assessment in early to mid June showed low chum salmon abundance. There were no recommendations to fish during the first four meetings of the salmon run (Table 5). At the fifth meeting the Working Group disagreed with the Department. They recommended fishing for 8 hours downstream of Bethel (Stat. Areas 335-11 & 335-12; Figure 2) in compliance with 5 AAC 07.365. KUSKOKWIM RIVER SALMON MANAGEMENT PLAN. The Working Group felt commercial catch data would improve run assessment. The Department allowed the period since previously the chum salmon run was always strong enough to support at least two commercial periods in June.

The chum salmon catch during the first period confirmed the other run indicators with the lowest catch per unit effort (CPUE) ever recorded on that date. Chinook and sockeye abundance appeared average.

The 1993 chum salmon return was expected to be below average. The five year old fish, spawned in 1988, were expected to be weak due to their poor return as four year olds in 1992. The four year old chum salmon from the strong 1989 escapement were expected to be average in abundance. The chum salmon run continued to appear weak in all projects during the subsequent Working Group meetings (Table 5). At the meeting on 2 July the Department announced that sport fishing for chum salmon would close and no further commercial openings were likely until coho salmon dominated in the river. The Department requested the Working Group's help in how to restrict the subsistence fishery (Table 5). The Working Group requested that the Commissioner of Fish and Game close the South Peninsula fishery (it was already closed under the post June salmon management). The Working Group advised the Department to use their data and knowledge to restrict the subsistence fishery. The Working Group adjourned until the Commissioner arrived to meet with them (Table 5).

On 30 July the Working Group met and the Department reported that normal subsistence fishing had resumed in District 1. The cumulative test fish index for coho salmon was the highest on record for this date. The Department recommended opening District 1 for 6

hours on 31 July. After much discussion, the Working Group didn't reach consensus by 12:59 p.m. The Kuskokwim River Salmon Management Plan (5 AAC 07.365) requires 24 hours advanced notice of commercial periods and that the periods be from 1:00 p.m. until 7:00 p.m. Because of these requirements the Department announced District 1 would open at 1:00 p.m. on 31 July. This caused much dissatisfaction with the Department. The Working Group continued their discussion. At 2:00 p.m. they reached consensus to fish from 1:00 p.m. to 7:00 p.m. downstream of Bethel on 31 July. The Department's 1:00 p.m. announcement opening all District 1 was the period allowed by emergency order.

Coho salmon continued to show average run strength and the Working Group's recommendations were used to manage the fishery for the remainder of the run. On 12 August the Kuskokwim River Salmon Management Working Group reached consensus to open for 6 hours from noon to 6:00 p.m.; contrary to 5 AAC 07.365.(b)(7), which requires the periods to be 1:00 p.m. to 7:00 p.m. The Kuskokwim River Salmon Management Working Group reached this consensus over the objections of the District 2 Subsistence representative and the Department. The Working Group felt that Thursday and Friday was enough notice of the change. Subsistence fishers would not accidently fish during the closure. The change in hours would allow for safer daylight travel for commercial fishers. The District 2 Subsistence representative and Department felt changing the time would be difficult for subsistence fishers. The Lower and Middle Kuskokwim Advisory Committee's spent a great deal of time in 1987 determining when the maximum amount of daylight would be available for travel and enforcement. That was why they recommended the 1:00 p.m. to 7:00 p.m. period to the Board for adoption as a regulation. The Department allowed the time change in the interest of cooperative management. The Department called 27 contacts in District 2, where there is poor radio reception, to try to insure that fishers were aware of the change. We received many complaints, in person and by phone, from fishers in District 1 concerning the change in time. The Kuskokwim Native Association's (nonprofit agency representing middle Kuskokwim villages) attorney wrote the Director complaining of the change in time.

No citations were issued for subsistence fishing during the closure. The Department informed the Working Group that due to the wide spread dissatisfaction in both districts, no more changes to the standard fishing time would be allowed. Fishing continued based on the Working Group's recommendations until the regulatory closure on 1 September.

Chinook Salmon

The combined commercial and subsistence chinook salmon harvest has increased from an average of 56,000 fish from 1960-1969 to 100,240 during 1983-1992 (Table 1). A conservation concern for Kuskokwim River chinook salmon occurred following a series of poor chinook salmon escapements in the mid 1980's (Figure 6). Besides the poor escapement, the low number of female chinook salmon in the escapement compounded the conservation concern (Table 7).

Beginning in 1984, the Board began restricting the commercial fishery since the Department was unable to correct the problem through inseason management measures. In 1985, a shift to 6-inch or smaller commercial gillnets reduced the harvest of larger female chinook salmon. This gear change was successful in shifting the sex ratio in the commercial catch from 60 percent female to 70 percent male. Total escapement continued to decline (Figure 6). To provide for the subsistence harvest and maintain average spawning escapements the directed commercial harvest of chinook salmon was prohibited in 1987. This action resulted in chinook salmon approaching or reaching the escapement objective in subsequent years (Figure 6). An unexpected benefit of this action was an increase in the commercial harvest of chinook salmon (Table 1). The subsistence fishery continues to target large chinook salmon with "king" gear (Table 1). Improved survival (perhaps related to reductions and most recently elimination of the directed high seas salmon fishery) played a role in the success of these management changes.

Chinook salmon escapement goals were generally achieved in 1993 (Figure 6). The dramatic reduction in commercial fishing during June and July did not cause a dramatic increase in escapement. This shows that no adjustment in the chinook salmon management plan is warranted at this time.

Sockeye Salmon

The sockeye salmon catch is incidental to the chum salmon fishery in Districts 1 and 2. Before 1981, sockeye and chum salmon were not accurately identified in commercial or subsistence catches. This prevented an accurate record of the sockeye and chum salmon harvest in the Kuskokwim River. Sockeye salmon comprised 5 to 33 percent of the sockeye-chum salmon catch since 1981. Before 1981, the reported sockeye salmon catch was less than 2 percent of the sockeye-chum salmon catch (Table 8). In 1993 the commercial harvest of 27,008 sockeye salmon was a record 38 percent of the sockeye-chum salmon catch (Table 8). Three factors contributed to this record sockeye salmon composition:

1. The single 25 June opening in the lower half of District 1 was four days after the sockeye salmon peak in the Eek Test Fishery and 1 day before the peak in the Bethel Test Fishery;
2. The extremely weak chum salmon run.
3. Average sockeye salmon abundance.

Sockeye salmon escapement is documented ancillary to the other species. The Kogrukluk weir escapement estimate of 29,358 sockeye salmon in 1993 was the highest ever recorded (Table 9). The lack of incidental harvest in 1993 increased sockeye salmon escapement.

Chum Salmon

Before 1971, chum salmon were an incidental catch during the chinook and coho salmon fisheries. The expansion of the commercial chum salmon fishery began in 1971. Based upon 1924 - 1943 subsistence harvest estimates, a total chum salmon harvest of 400,000 appeared to be consistent with the reproductive potential of the run (Table 10). A combined catch of 400,000 chum salmon was the management goal from 1971 to 1979 (Table 11). Subsistence catches for the entire river have declined since the inception of the commercial fishery in 1971 (Table 11). From 1971 to 1980 the average subsistence harvest was 173,680. The average harvest declined to 127,862 for the period 1981 to 1990 (Table 11). This is due to the decline in the use of dog teams for transportation, not the increased commercial harvest.

The commercial chum salmon harvest for the Kuskokwim River (Districts 1 and 2) has averaged 507,703 salmon in the last ten years (Table 11). The following guidelines manage the commercial harvest:

1. Test fishing indexes showing relative abundance of chum salmon is similar to years in which adequate escapement occurred.
2. Commercial catch per unit effort compares to previous years when escapement was adequate.
3. Subsistence fishers report adequate subsistence catches.
4. Chum salmon escapement projects projecting adequate escapements will occur.

Declining run strength normally results in a 2 to 3 week closure beginning in early to mid-July. Before 1985, only that portion of District 1 downstream of Bethel was open to commercial fishing during the chum salmon fishery. The Board instructed the Department to use the entire length of District 1 beginning in 1985. This increased the efficiency of the fleet and resulted in low chum escapements in 1986 and 1987. Returns in 1988 and

1989 were at record high levels, but to reach escapement objectives required more time between fishing periods. The 1990 and 1991 returns were smaller but 4 to 6 day spacing between periods resulted in approaching or reaching chum salmon escapement objectives.

In 1992, the early chum salmon stocks reached escapement objectives, while the later Aniak River stock had the worst escapement to date (Table 9). An extensive closure of the commercial fishery during July did not bring the Aniak chum salmon escapement up to its' objective. The poor survival of 4 year old chum salmon caused this failure.

The later running 4 year old chum salmon were weak in 1992, so their return early in the 1993 run as 5 year old chum salmon was expected to be weak. The 1993 chum salmon run was weak in June. Inseason age data showed that 5 year old chum salmon dominated the test fishery catch the entire month of June. Given the weakness of the 5 year old chum salmon, even an average return of 4 year old chum salmon should have dominated the run early in June.

The new test fisheries at Aniak and Chuathbaluk showed that most of the chum salmon in the mainstem Kuskokwim River were passing the Aniak River. The Kogrukluk Weir (the index stream for fish upstream of Aniak) reached its chum salmon objective (Table 9). The sonar project in the Aniak River continued to show record low escapement despite the total closure of the commercial, sport and subsistence fisheries. The final escapement for the Aniak Sonar was 6 percent of the objective (Table 9). In the District 1 spawning tributaries, the Tuluksak River weir was in its third year of operation. Comparison of aerial survey and weir results show that the chum salmon met escapement objectives in the lower Kuskokwim River tributaries.

Parent year escapements were excellent in both the 1988 and 1989 brood years. The poor return of 5 year old chum salmon in 1993 is coincidental with the record cold temperatures in January and February of 1989. We suspect that a freeze-down during

the 1988-89 winter caused increased mortality of chum salmon eggs resulting in the weak return of 5 year old fish in 1993. The poor survival of 4 year old chum salmon was unexpected and unexplained. The cause of the much poorer survival of Aniak River chum salmon, when compared to the rest of the drainage is also unknown. The two weak years back to back signals poor returns in 1996 through 1998 even with normal survival. The management of the mixed stock fishery in Districts 1 and 2 will be a challenge if the rest of the Kuskokwim drainage has normal survival.

Coho Salmon

Limited funding has resulted in only three primary indicators of coho salmon escapement in the Kuskokwim River: the Bethel Test Fishery, the Tuluksak Weir, and the Kogrukluk Weir. The test fisheries at Eek, Aniak and Chuathbaluk and the commercial catch data in Districts 1 and 2 also provide coho salmon run assessment information.

The objective at the Kogrukluk Weir is 25,000 coho salmon. Past years' commercial CPUE in District 2 showed that the weir reached 25,000 when the cumulative CPUE was at or above 37 coho per hour in District 2. The Central Kuskokwim Advisory Committee reports poor subsistence fishing in years when CPUE is less than 37 fish per hour. This is a useful tool in years when the weir washes out due to high water.

The Tuluksak River weir is now beginning to provide an index to coho salmon escapement in the lower Kuskokwim tributaries. USFWS is uncertain of future funding for this project.

Traditionally the subsistence fishery took few coho salmon due to poor drying conditions during August and September. Earlier migrating species normally met subsistence needs. This pattern has been changing gradually as the number of families with freezers increases. Coho salmon are a popular species for freezing, accounting in part for the increased subsistence use of coho salmon during the last five years. The Department

has emphasized collection of subsistence coho salmon catch data in recent years that has also accounted for some of the apparent increase.

The Kuskokwim River commercial fishery reopens when coho salmon predominate in the subsistence and test fisheries. An assessment of run strength, shown by test fishing, subsistence and commercial catches, and the escapement trend at the Kogrukluk Weir determines the amount of fishing time. Districts 1 and 2 close by regulation on 1 September. A strong run in 1984 and a late run in 1989 resulted in extending the season into September. The management strategy is similar to the strategy for chum salmon presented above.

Since statehood the commercial coho salmon catches for the entire river have ranged from 2,498 in 1960 to 666,000 fish in 1992 (Table 8). The previous ten year average (1983-1992) is 479,638 fish (Table 8). Effort in number of fishing permits has ranged from 83 in 1971 to 736 in 1990 (Table 12). In 1993, 717 fishers landed coho salmon in District 1 (Table 12).

Since 1988 and the beginning of cooperative management with the Working Group, the escapement objective has only been reached in two of the six years (Table 9). Overfishing has been the cause. Distrust of the test fish data by the Working Group and the long time lag before the weir escapement projections became useful contributed to the over fishing. The Department's uncertainty in how and which indexes to use has often delayed corrective measures in management of this fishery.

In 1993 the Kogrukluk Weir was washed out by high water at the peak of the run. Based on run timing in previous years, the total 1993 weir passage was estimated to be 20,500, which is below the escapement goal of 25,000 (Table 9). This estimate is probably low.

The cumulative CPUE in District 2 was 24, below the level of 37 (Table 23). Figure 7 shows the District 2 commercial CPUE. The periods on 14 and 17 August fell below years when escapements were made. The three periods after 21 August are only compared to the record 1992 return. District 2 was not opened this late in August in earlier years. The original calculation of the average 37 CPUE was based on fishing periods during the first 21 days of August. The 1993 cumulative CPUE through 21 August was 36, very close to the 37 CPUE objective. The three latter periods may have depressed the season CPUE.

The Bethel Test Fishery cumulative CPUE index was comparable to years when the escapement objective was reached. The Aniak Test Fishery CPUE in 1993 was greater than the 1992 CPUE. The escapement objective was reached at Kogrukluk Weir in 1992. The Tuluksak River had the highest coho salmon escapement in its three years of operation. There is no objective for this project yet.

It appears that in 1993 Cooperative Management was successful in approaching or reaching the Kuskokwim River coho salmon escapement objectives. Unfortunately high water prevented positive confirmation of the coho salmon escapement at the Kogrukluk River Weir.

Kuskokwim Bay

Quinhagak (District 4)

District 4 is located in the marine waters adjacent to the village of Quinhagak at the mouth of the Kanektok River, about 25 miles south of the Kuskokwim River (Figure 4). Commercial fishing occurs only in the marine waters of Kuskokwim Bay to ensure adequate escapement of salmon into the Kanektok and Arolik Rivers. Commercial fishing occurs primarily in the tidal channels that radiate out into the bay from the freshwater streams in the district.

Commercial fishing effort in this district has increased considerably in the last decade. Effort for the season has ranged from 117 permits in 1982 to a record high during the 1993 season of 409 permit holders (Table 13). The past 10 year average is 302 permit holders. Recent changes in the June Kuskokwim River commercial fishery have shifted effort to this district, which has a targeted chinook salmon fishery. In the Kuskokwim area fishers have unrestricted movement between commercial fishing districts.

District 4 opened on 14 June in compliance with 5 AAC 07.367. DISTRICT 4 SALMON MANAGEMENT PLAN, which requires an opening before 16 June. During the first two openings permit holders sat on the beach striking for higher prices. Following the strike settlement, the first commercial deliveries began on 21 June (Table 16). In 1993 fishing effort on a per period basis peaked at 219 permit holders in early July (Table 16). Whenever possible, coincidental openings with other districts helped to lower effort levels.

Aerial surveys are the only measure of escapement in District 4. Historical commercial catch levels and when possible, inseason aerial surveys, help managers assess run size and fishing time. Early surveys of the Kanektok River drainage were unsuccessful due to high turbid water. An aerial survey flown of the Kanektok River on 12 July provided index counts of 4,670 chinook, 23,128 sockeye and 1,285 chum salmon (Table 15). Chinook and sockeye salmon reached escapement objectives in 1993. The chum salmon index was only 1,285 during the peak survey (Table 15). This is only 4% of the 30,500 chum salmon objective and the worst chum salmon escapement ever recorded. The poor chum salmon escapement was a result of the weak chum salmon return and the near record sockeye salmon return. Sockeye salmon are the target species in District 4 and there was a heavy fishing schedule in response to the strong sockeye salmon return. Effort was at record high levels because of the closure of Districts 1 and 2. Despite the second largest sockeye salmon catch on record, sockeye salmon achieved their escapement objective. The incidental chum salmon catch was above average resulting in the record low chum salmon escapement.

The third commercial opening in this district had a normal chinook salmon catch for that date. Commercial fishing continued with the normal twelve hour period. On 24 June 212 permit holders had a below average chinook salmon catch and a record sockeye salmon catch. The total chinook catch in District 4 was 15,784 in 1993, the third lowest in the last decade (Table 14). This catch is well below the recent ten year average of 24,800 and probably is a direct result of the fishers's strike. Buyers paid an average price of $.62 per pound. The ex-vessel value of chinook salmon was $142,900, which was 16% of the total value of the commercial catch in this district (Table 21).

DISTRICT 4 SALMON MANAGEMENT PLAN (5 AAC 07.367.) requires management for sockeye salmon when sockeye salmon are more than 50 percent of the chinook-sockeye salmon catch in District 4. The strong sockeye salmon run resulted in this provision taking effect on 28 June in 1993 (Table 16).

Sockeye salmon catches on 28 June were a record 10,941 fish. Fishing time increased to 3 twelve hour periods per week during July (Table 16). The sockeye salmon catch peaked in this district on 5 July with a catch of 15,375 fish. Effort was above normal in 1993 because of closure of the Kuskokwim River fishing districts. The sockeye salmon catch of 80,934 is the second highest on record and 50,000 fish above the ten year average (Table 14). An aerial survey on 12 June provided an index count of 23,128 sockeye salmon in the Kanektok River drainage, which exceeds the objective of 15,000 (Table 15). The average price paid for sockeye salmon was $.70 per pound. A total of $402,910 was paid for this species, which was 45% of the total value of the commercial catch in this district (Table 21).

Chum salmon are an incidental catch in the chinook and sockeye salmon commercial fisheries in District 4. The 1993 chum salmon catch was 40,943; which is above the 10 year average of 37,636 fish (Table 14). Chum salmon brought an average of $.40 per pound, resulting in $104,347 in payment to fishers (Table 21). This was 12% of the total

value of the fishery in this district. The escapement objective for chum salmon is 30,500; only 1,285 chum salmon were seen in a good aerial survey (Table 15).

Coho salmon dominated the commercial catch on 30 July. During the first two weeks of August the fleet fished 2 twelve hour periods a week instead of the normal three. There are no escapement projects in this district and commercial catch figures were below normal for the period. When commercial catch figures climbed to average, the normal schedule of 3 twelve hour periods a week was resumed. The commercial coho salmon catch peaked at 9,516 fish on 18 August (Table 16). The commercial salmon fishing season closed by regulation on 8 September. The 1993 coho salmon harvest of 55,817 is almost equal to the ten year average of 57,449 (Table 14). In 1993 commercial fishers were paid $.58 per pound for coho salmon. Coho salmon sales totaled $245,982 which was 27% of the value of this district's commercial fishery (Table 21). Weather and water conditions prevented coho escapement assessment by aerial surveys, but sport fishing catches indicated coho salmon were well distributed throughout the drainage.

Goodnews Bay (District 5)

The Goodnews Bay fishing district is the southernmost salmon district in the Kuskokwim area (Figure 5). Fishing primarily is with drift gill nets in tidal channels in Goodnews Bay and a few set nets near the mouth of the bay. The 30-35 permit holders residing in the villages of Platinum and Goodnews Bay fish steadily during the season (Table 17). The 1993 effort increased to 114 permit holders due to closures in other Kuskokwim districts. Goodnews Bay effort peaked in 1988 at 125 permit holders and in the last decade has averaged 86 permit holders (Table 17).

A counting tower on the middle fork of the Goodnews River provided estimates of salmon escapement from 1981 through 1990. In 1991, a weir replaced the tower. This provided more accurate counts at a lower cost. The savings allowed the project to extend into the coho salmon return for the first time. The primary objective of this project is to provide

daily escapement information to improve management of the commercial fishery. The Goodnews River weir project also provides a calibration of aerial survey accuracy.

The Goodnews Bay district opened to commercial fishing on 28 June. Effort peaked at 80 permit holders on 16 July (Table 18). A chinook salmon management strategy in this district in the last 3 years has opened commercial fishing 5 to 7 days later than the normal historical opening date. This allows an increased escapement of chinook salmon into the Goodnews River drainage. This strategy helped achieve the escapement objective of 3,500 fish in 1990 but was not successful in 1991 and 1992 (Table 19). To correct this in 1993 the fishery opened later, 28 June, the date by which 50 percent of the chinook salmon run has passed through District 5. In 1993, an estimated 2,491 chinook salmon passed the weir, below the objective for the third year in a row. The catch of 2,117 chinook salmon, was below the 10 year average of 5,028 (Table 20). Fishers received $.62 per pound, which totaled $21,351 paid for this species. This was 4% of the total value of the commercial fishery in this district (Table 21).

Sockeye salmon catches in Goodnews Bay were above average the first commercial period. Sockeye salmon increased in abundance and the run remained strong. Three commercial fishing periods per week continued throughout the sockeye salmon run (Table 18). Sockeye catches peaked on 7 July at 6,200 fish. The season total of 59,293 sockeye salmon is more than twice the 10 year average of 25,700 fish (Table 20). Sockeye salmon prices averaged $.70 per pound resulting in $296,437 paid to fishers in 1993 (Table 21). This species was 67% of the 1993 total value of the Goodnews Bay District. The department's escapement project for this district is a weir on the Goodnews River. During the peak sockeye salmon escapement, the weir washed out. Using historical sockeye salmon run timing to estimate the total season escapement resulted in an estimate for 1993 of 26,044 sockeye salmon, which meets the escapement objective of 25,000 (Table 19).

The chum salmon catch is incidental to the sockeye salmon fishery in District 5. The 1993 catch of 10,657 chum salmon is below the ten year average of 15,059 fish (Table 19). Permit holders were paid $.40 per pound for this species, which totaled $28,304 or 6% of the total commercial fishery value in this district (Table 21). Chum salmon escapement of 14,287 at the Goodnews River weir nearly achieved the goal of 15,000 fish (Table 19).

The 1993 coho salmon catch of 20,014 is well below the 10 year average of 25,900 fish (Table 20). Fishers received $.58 per pound for coho salmon for a total of $95,043 (Table 21). This is 21% of the total fishery value in this district. A good aerial survey of a portion of the Goodnews River provided an index count of 8,800 coho salmon, which is below the escapement objective of 15,000 fish. Poor conditions in a portion of the drainage prevented a complete coho salmon escapement survey. Coho salmon escapement counts from the Goodnews River weir were not available because of a high water wash out during late August.

On 16 July, while patrolling a commercial period in District 5, the Division of Fish and Wildlife Protection found 4 boats fishing outside the district boundary in Kuskokwim Bay. They were unable to take action for two reasons:

1. the regulatory markers describing the outer boundary were moved to give the appearance that part of Kuskokwim Bay was open;
2. the area the boats were fishing in was open to subsistence fishing.

The Department returned the regulatory markers to the correct location on 17 July. Two emergency orders were issued on 19 July. One redescribed the outer district boundary

geographically instead of by reference to regulatory markers. The second, described above, closed a portion of Kuskokwim Bay to subsistence fishing before, during, and after commercial fishing periods in District 5.

OUTLOOK FOR 1994

Due to the limited information available, only broad harvest projections are made for the Kuskokwim Area based upon an evaluation of brood year escapements and recent harvest trends.

Chinook Salmon

Chinook salmon return to the Kuskokwim Area primarily as age 4, 5, and 6 fish. The primary brood years for 1993 will be 1988 through 1990.

Chinook salmon escapements reached objective levels in all the brood years in the Kuskokwim River drainage (Figure 6). Catch levels in the Bethel test fishery were average to above average in all brood years. An incidental chinook harvest in the lower half of the range of 9,000 to 56,000 is expected (Table 22). The slightly below average to critically low projection for chum salmon, the target species in the fishery, is expected to result in reduced fishing that will reduce the incidental catch of chinook salmon.

Quinhagak (District 4) has the only directed chinook salmon fishery in the Kuskokwim area. Chinook salmon escapement indexes were below objective levels in the Kanektok River in one of the three brood years (Table 15). A harvest in the lower half of the range of 9,000 to 46,000 chinook salmon will likely occur in 1993 (Table 22). Recent years' catch trends have been below average.

Goodnews River chinook salmon were below the escapement objectives in two of the three brood years (Table 19). The recent years' harvest trend has been below average,

due to weak returns and the chinook salmon rebuilding program being carried out in Goodnews Bay. The incidental catch probably will be in the lower part of the range of 1,000 to 8,600 chinook salmon (Table 22).

Sockeye Salmon

Sockeye salmon return primarily as 5 year old fish in the Kuskokwim area. Quinhagak (District 4) and Goodnews Bay (District 5) are the only fisheries in the Kuskokwim area that target on sockeye salmon.

The sockeye salmon escapement at the Kogrukluk weir, where sockeye escapement is monitored in the Kuskokwim River, was above average in 1989 (Table 9). Catches in the Bethel test fishery were below average in 1989. The sockeye salmon catch in the Kuskokwim River is incidental to the chum salmon fishery. The slightly below average to critically low projection for chum salmon, the target species in the fishery, may result in an incidental sockeye salmon catch in the lower half of the catch range of 27,000 to 137,000 (Table 22).

The 1989 brood year escapement index in the Kanektok River was 19,000 sockeye salmon, which is above the escapement objective of 15,000 (Table 15). Harvest ranges in recent years vary from 6,700 to a record high of 83,700 sockeye salmon. The sockeye harvest in District 4 will likely be within the top half of this range (Table 22).

The 1989 brood year escapement in the Goodnews River was 21,000, which just reached the objective of 20,000 to 30,000. This should result in an average number of sockeye salmon in District 5 (Table 22). The previous 10 year average catch is 25,700.

Chum Salmon

Chum salmon return to the Kuskokwim Area primarily as 4 and 5 year old fish. The Kuskokwim River fishery targets on chum salmon. The chum salmon catch is incidental in Districts 4 and 5.

Chum salmon spawning escapement to the Aniak River in 1990 was 50 percent above the escapement goal of 250,000, while the Kogrukluk River was about 11% below it's goal of 30,000 in 1990 (Table 9). The poor survival of the 1988 and 1989 brood year's seen in 1992 and 1993 returns may be a trend. Considering the expected poor return of 5 year old (1989) chum salmon, the outlook for Kuskokwim River chum salmon is slightly below average if the 1990 spawn has normal survival. Another profound production failure, such as occurred in 1993, could result in a critically low chum salmon return. The chum salmon harvest probably will be in the lower part of the recent 43,000 to 1,380,000 range (Table 22).

Escapement levels in 1989 and 1990 were poor in District 4 and District 5 (Table 15 & 20). The catch of chum salmon will likely be in the lower half of the recent 8,500 and 46,000 catch in District 4. District 5 will likely have an incidental catch in the lower half of the recent 5,000 to 33,000 catch range (Table 22).

Coho Salmon

Coho salmon return primarily as 4 year old fish in the Kuskokwim Area. There is very little information on which to base coho salmon run outlooks. The Kogrukluk River weir is the only coho salmon escapement project in the Kuskokwim River.

In 1990 the Kogrukluk River weir washed out for a long period and the total season escapement estimate of 5,100 is suspect. This estimate is based on only 46% of the run and is thought to be in error. The commercial CPUE in District 2 in 1990 was 34.6, just

below the target level of 37. The catch in the Bethel test fishery was slightly below average in 1990. A slightly below average run in 1994 should produce a catch in the lower half of the 196,000 to 666,000 range (Table 22). Recent years' survival trend for coho salmon has been above average, which could result in a larger than expected return.

The past years' harvest are the only guide to the coho salmon run in Districts 4 and 5. The coho harvest in 1990 was well below average in District 4 and District 5 (Tables 16 & 19). In the last five years coho catches have ranged from 27,000 to 86,400 in District 4 and from 7,800 to 31,800 in District 5. Catches in the lower half of these ranges are expected in 1994 (Table 22).

TABLES

Table 1. Utilizations of Kuskokwim River chinook salmon, 1960-1993.

Year	Commercial Harvest[a]	Estimated Subsistence Harvest[b]	Total Utilization
1960	5,969	20,361	26,330
1961	18,918	30,910	49,828
1962	15,341	14,642	29,983
1963	12,016	37,246	49,262
1964	17,149	29,017	46,166
1965	21,989	27,143	49,132
1966	25,545	49,606	75,151
1967	29,986	57,875	87,861
1968	34,278	30,230	64,508
1969	43,997	40,138	84,135
1970	39,290	69,204	108,494
1971	40,274	42,926	83,200
1972	39,454	40,145	79,599
1973	32,838	38,526	71,364
1974	18,664	26,665	45,329
1975	21,720	47,784	69,504
1976	30,735	58,185	88,920
1977	35,830	55,577	91,407
1978	45,641	35,881	81,522
1979	38,966	55,524	94,490
1980	35,881	59,900	95,781
1981	47,663	59,669	107,332
1982	48,234	53,310	101,544
1983	33,174	52,000	85,174
1984	31,742	57,000	88,742
1985	37,889	42,277	80,166
1986	19,414	51,019	70,433
1987	36,179	67,352	103,504
1988	55,716	53,877	109,593
1989	43,217	73,035	116,252
1990	53,504	71,281	124,785
1991	37,778	80,865	118,643
1992	46,872	58,239	105,111
1993	8,735	67,459[c]	76,194
Ten Year Average (1983-1992)	39,548	60,695	100,240

a District 1, 2 and 3.
b Estimated subsistence harvest expanded from villages surveyed.
c Previous 5 year average, subsistence catch not available at this time.

Table 2. Kuskokwim River, District W-1: Percent of subsistence harvest completed by 7/9 based on calendar returns.

District W-1	Eek → Tuluksak		
	Chinook	Sockeye	Chum
88	98%	87%	82%
89	93%	76%	79%
90	96%	80%	71%
91	97%	77%	75%
92	96%	78%	70%
Mean	96%	79.6%	75.4%

Kuskokwim River, District W-2: Percent of subsistence harvest completed by 7/16 based on calendar returns.

District W-2	Lower Kalskag → Chuathbaluk		
	Chinook	Sockeye	Chum
88	99.74%	99.4%	96.8%
89	98.23%	97.9%	96%
90	99.35%	93.5%	76%
91	99.96%	98.9%	85%
92	96.3%	94.3%	87%
Mean	98.7%	96.8%	88.2%

Table 3. Estimated dollar value of Kuskokwim Area commercial salmon fishery, 1964 - 1993.

Year	Gross Value of Catch to Fishers	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
1989	5,194,025	824	6,303
1990	4,895,070	824	5,941
1991	3,961,423	820	4,831
1992	5,295,912	814	6,506
1993	3,962,890	807	4,911
Ten Year Average (1983-1992)	$5,472,732	804[b]	7,189[b]

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

b Previous nine year (1984-1992) average due to unavailable data.

Table 4. Commercial Fishing Effort in Kuskokwim Area by Permit - Hour[a], 1960-1993.

Year	Dist. 1	Dist. 2	Dist. 3	Dist. 4	Dist. 5	Total
1960	5,136	960	648	4,368	Closed	11,112
1961	16,200	1,512	1,512	4,992	Closed	24,216
1962	14,274		0	8,434	Closed	22,708
1963	5,712	1,722	0	5,520	Closed	12,954
1964	6,468	1,140	0		Closed	7,608
1965	13,500	546	0	3,696	Closed	17,742
1966	18,270		Closed		Closed	18,270
1967	88,248	1,932		3,954	Closed	94,134
1968	77,466	720		7,986	4,704	90,876
1969	67,140	1,488		29,952	14,055	112,635
1970	56,646	3,414		22,080	9,756	91,896
1971	18,060	1,842				19,902
1972	47,802					47,802
1973	77,478	3,072		18,372	2,928	101,850
1974	124,569	4,950		18,984	8,148	156,651
1975	181,786	3,648		12,312	5,400	203,146
1976	82,788	3,894		14,784	4,848	106,314
1977	73,944	3,426		17,592	3,780	98,742
1978	71,856	1,892		14,952	3,672	92,372
1979	49,608	984		27,096	8,220	85,908
1980	33,370	714		21,636	9,504	65,224
1981	45,096	1,248		25,656	11,256	83,256
1982	46,108	1,128		22,656	14,556	84,448
1983	47,040	708		20,748	9,456	77,952
1984	62,643	1,050		31,488	14,004	109,185
1985	37,452	462		22,254	8,544	68,712
1986	48,744	606		25,740	10,572	85,662
1987	60,525	576		21,222	10,332	92,655
1988	81,724	912		27,440	14,064	124,140
1989	66,470	816		26,134	12,552	105,972
1990	50,642	1,051		44,520	10,548	106,761
1991	62,672	1,320		29,160	11,532	104,684
1992	54,288	1,164		35,380	15,180	106,012
1993	39,210	774		35,988	13,118	89,090
Ten Year Average (1983-92)	57,220	867		28,409	11,678	98,173

a The number of permits that made deliveries times the number of hours in the period.

Table 5. Executive summary of working group and department actions, 1993.

DATE	DEPT. RECOMMENDATIONS	WORKING GROUP RECOMMENDATIONS	ACTUAL
03 Feb		The Working Group will meet with Upriver subsistence representatives the first week of April in Aniak, the Working Group will seek funding for the Aniak meeting, the purpose of the meeting is to resolve our differences. A letter from the Upriver Subsistence Council was requested saying that they did not intend to sue the Working Group and are willing to meet with the Working Group to resolve the issues. The AVCP Mixed Stock Policy Board of Fisheries proposal was supported, pending review of the final draft of the policy. Requested that Kwethluk and USFWS present their positions on the Kwethluk River weir.	
19 Feb		Central Kuskokwim Advisory Committee passed resolution to meet with Working Group to resolve differences. CKAC nominated people to fill four seats on the Working Group; Upriver Commercial Fisher, Upper River Subsistence Fisher, Sportfisher, and District W-2 Subsistence Fisher. These nominations were placed on agenda for next meeting in Aniak.	
	That the Working Group should support the continued operation of Kwethluk Weir by USFWS.	That USFWS meet with Kwethluk and reach a compromise. Points of compromise to be 1. FWS maximize local hire. 2. FWS sample dead salmon on fence for spawning condition. 3. FWS sample salmon carcasses 2 miles up and down stream of weir. 4. FWS count at night. ADF&G attend as mediator.	Kwethluk refused compromise. Due to lack of public support weir was closed and removed.
03 April		Working Group voted unanimously to reactivate the inactive Sportfish and Upper River Subsistence Fisher positions. CKAC's nominees were seated in the four vacant seats. A request was sent to BSFA to locate grants and legislative funding to support Working Group.	
01 June	Presented Informational Letter explaining upcoming seasons management plan for approval.	A motion to take no action passed after motions to table and accept failed.	Informational Letter was distributed stamped DRAFT.
10 June	Meet again not enough information to set period.	A motion to meet again on 16 June passed.	Working Group met again on 16 June.

Table 5. 2 of 3

DATE	DEPT. RECOMMENDATIONS	WORKING GROUP RECOMMENDATIONS	ACTUAL
16 June	Meet again chinook salmon outnumber chum salmon in all test fisheries.	A motion to meet on 19 June passed.	Working Group met on 19 June.
19 June	Meet again due to weak chum salmon run.	A motion to meet on 21 June passed.	Working Group met on 21 June.
21 June	Meet again due to weak chum salmon run.	A motion to meet on 22 June passed.	Working Group met on 22 June.
22 June	Meet again due to weak chum salmon run.	A motion to fish downstream of Bethel (required by regulation) for eight hours on 25 June passed.	Fished District 1 downstream of Bethel noon to 8:00 p.m.
28 June	Meet again due to weak chum salmon run.	A motion to meet on 30 June passed.	Working Group met on 30 June.
30 June	Meet again due to weak chum salmon run.	A motion to meet on 2 July passed.	Working Group met on 2 July.
02 July	Drastic measures to conserve chum salmon are necessary. Sport and commercial fishing closed Test fishing reduced. Requested advice on subsistence fishery restrictions.	Motion directing Commissioner to close South Peninsula fishery until 23 July. Motion requesting Commissioner, BOF, and Department meet with Work Group ASAP. Prohibit power boats from Aniak River downstream of Salmon River. Department told to use their information to restrict subsistence fishery. Adjourn until Commissioner's party arrives or fish arrive.	South Peninsula closed by regulation until 20 July. Governor and Chum Disaster Task Force met with Work Group on 22 July. Data review showed effects of power boats uncertain, no action taken.
22 July		Meeting was an open forum chaired by AVCP. The public and Work Group testified and questioned Commissioners Blatchford and Rosier, Director Koenings, Regional Supervisor Hilsinger, and Area Biologist Francisco.	

Table 5. 3 of 3

DATE	DEPT. RECOMMENDATIONS	WORKING GROUP RECOMMENDATIONS	ACTUAL
30 July	Six hour fishing period in District 1 on 31 July.	A motion to accept the recommendation failed by a vote of 7 to 3.	The 24 hour notice required for commercial periods the Department to call the period without consensus of the Working Group.
		Debate continued for another hour and the Working Group reached consensus on a period downstream of Bethel on 31 July.	Department did not allow this motion because it did not provide the regulatory notice time.
02 August	Six hour period in W-1 & W-2 on 4 August.	Six hour period in W-1 on 4 August.	Six hours in W-1 on 4 4 August.
05 August	Six hour period in W-1	Eight hour period in W-1 & W-2 on 6	Eight hour period in W-1 and W-2 on 6 August.
07 August	Six hour period in W-1 W-2 on 9 August.	Six hour period in W-1 & W-2 on W-2 on 9 August.	Six hour period in W-1 &
10 August	Meet again due to decline in coho salmon catch.	Meet on 12 August.	Met again on 12 August.
12 August	Six hour period in W-1 & W-2 on 14 August.	Six hour period in W-1 & W-2 on 14 August.	Six hour period in W-1 & W-2 on 14 August.
16 August	Six hour period in W-1 & W-2 on 19 August.	Six hour period in W-1 & W-2 on 17 August.	Six hour period in W-1 & W-2 on 17 August. Dept. expressed reservations.
18 August	Six hour period in W-1 & W-2 on 21 August.	Six hour period in W-1 & W-2 on 21 August.	Six hour period in W-1 & W-2 on 21 August.
23 August	Six hour period in W-1 & W-2 on 25 August.	Six hour periods in W-1 & W-2 on 25 and 28 August and further periods at Dept. discretion.	Six hour periods in W-1 & W-2 on 25 and 28 August.
29 August			After data review Dept. announced 6 hour period in W-1 & W-2 for 1 Sept.

Table 6. Lower Kuskokwim River, District 1, commercial salmon harvest and fishing effort by period, 1993.

				CHINOOK		SOCKEYE		COHO		PINK		CHUM	
PERIOD	DATE	HOURS	PERMITS	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE
01	06/25	8	622	8,184	1.64	26,363	5.30					34,123	6.86
02	07/31	6	625	172	0.05	210	0.06	56,107	14.96	17		4,133	1.10
03	08/04	6	656	98	0.02	141	0.53	137,649	34.97	9		2,080	0.53
04	08/06	8	632	88	0.02	84	0.02	91,400	18.08	10		1,396	0.28
05	08/09	6	628	65	0.02	75	0.02	58,817	14.55	4		446	0.12
06	08/14	6	640	46	0.01	39	0.01	80,226	20.89	11		287	0.07
07	08/17	6	620	30	0.01	31	0.01	82,696	22.23	7		119	0.03
08	08/21	6	592	9		25	0.01	47,097	13.26	1		58	0.02
09	08/25	6	441	6		13		10,556	3.99			28	0.01
10	08/28	6	387	12	.01	19	.01	13,592	5.85	2		30	0.01
11	09/01	6	274	4		3		12,190	7.41			18	.01
TOTALS		70	739	8,714	0.17	27,003	0.52	586,330	11.33	64		42,718	0.83

Table 7. Chinook salmon sex ratios and proportion of females with gill net marks, Kogrukluk weir, 1979-1993.

Year	Actual Count	Number Females	Sex Ratio (% female)	% of females with gill net marks
1979	10,125	1,786	17.6	11.03
1980	676	136	20.1	a
1981	16,075	7,584	47.2	12.47
1982	5,325	2,431	45.7	12.99
1983	1,049	285	27.2	16.49
1984	4,928	1,146	23.3	11.08
1985	4,306	1,485	34.5	18.99
1986	2,968	705	23.8	19.43
1987 b	770			
1988	7,677	2,631	34.3	13.34
1989	4,911	1,884	38.4	16.46
1990	10,093	2,271	22.5	14.35
1991	6,132	2,860	46.6	19.26
1992	6,397	2,138	33.4	30.03
1993	10,516	2,961	28.2	11.25
1979-84 Average			30.2	10.68
1985-93 Average			32.7	17.89

a Gill net mark data was not reported

b Sample size to small to assess sex ratio and percentage of gill net marks

Table 8. Lower Kuskokwim River, District 1, and the middle Kuskokwim River, District 2, combined commercial salmon harvest, 1960-1993.

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
1989	43,217	42,747	479,856	464	749,182	1,315,466
1990	53,759	84,870	410,332	3,397	461,624	1,013,982
1991	37,778	108,946	500,935	378	431,802	1,079,839
1992	46,872	92,218	666,170	7,451	344,603	1,157,314
1993	8,735	27,008	610,739	64	43,337	689,883
Ten Year Average (1983-1992)	39,574	87,692	479,638	179[a]	514,333	1,124,158

a Odd years only.

Table 9. Historic salmon escapement data from current Kuskokwim Area projects, 1976-1993.

YEAR	Operating Period	SPECIES				
		Chinook	Sockeye	Coho	Pink	Chum
KOGRUKLUK WEIR[a] Objectives		**10,000**	**2,000**	**25,000**	**NA**	**30,000**
1976	06/29 to 07/31	5,579	2,326	b	-	8,105
1977	07/14 to 07/27	1,945	1,637	b	2	19,444
1978	06/28 to 07/31	13,667	1,670	b	2	48,051
1979	07/01 to 07/24	11,338	2,628	b	1	18,390
1980	07/01 to 07/11	6,572	3,200	b	1	41,777
1981	06/27 to 10/25	16,790	18,066	11,455	6	57,182
1982	07/09 to 09/14	10,993	17,297	42,354	19	63,890
1983	06/22 to 07/02	2,992	1,176	8,820	-	9,407
1984	06/19 to 09/15	4,934	4,133	27,185	-	41,492
1985	06/29 to 09/07	4,657	4,359	18,368	-	14,860
1986	07/06 to 10/05	5,038	4,224	25,240	-	14,630
1987	08/09 to 09/23	4,063	b	26,788	-	17,422
1988	07/05 to 09/17	8,505	4,397	13,315	-	39,447
1989	07/07 to 09/14	11,940	5,811	b	-	39,361
1990	06/28 to 09/07	10,218	8,406	5,093	1	26,764
1991	07/04 to 09/15	7,850	16,455	10,611	4	24,187
1992	07/01 to 08/21	6,755	7,540	26,057	11	34,105
1993	07/03 to 08/13	12,332	29,358	20,517	-	31,899
ANIAK SONAR[c] Objective						**250,000**
1980	06/22 to 07/30	56,469	-	-	-	1,169,470
	08/16 to 09/12	-	-	81,556	-	-
1981	06/16 to 08/06	42,060	-	-	-	589,286
1982	06/21 to 08/01	33,864	-	-	-	442,461
1983	06/18 to 07/28	4,911	-	-	-	129,367
1984	06/16 to 07/30	-	-	-	-	266,976
1985	06/22 to 07/28	-	-	-	-	253,051
1986	06/26 to 07/24	-	-	-	-	209,080
1987	06/22 to 07/31	-	-	-	-	193,013
1988	06/22 to 07/31	-	-	-	-	401,511
1989	06/21 to 07/24	-	-	-	-	243,936
1990	06/23 to 08/06	-	-	-	-	377,213
1991	06/29 to 07/29	-	-	-	-	314,166
1992	06/22 to 07/29	-	-	-	-	84,269
1993	06/24 to 07/28	-	-	-	-	14,157

-continued-

Table 9. (page 2 of 2)

YEAR	Operating Period	SPECIES Chinook	Sockeye	Coho	Pink	Chum
MIDDLE FORK GOODNEWS RIVER TOWER[d]						
Objectives		**3,500**	**25,000**	**NA**	**NA**	**15,000**
1981	06/13 to 08/15	3,688	49,108	357	1,327	21,827
1982	06/23 to 08/03	1,395	56,255	62	13,855	6,767
1983	06/11 to 07/28	6,027	25,816	0	34	15,548
1984	06/15 to 07/31	3,260	32,053	249	13,744	19,003
1985	06/27 TO 07/31	2,831	24,131	282	144	10,367
1986	06/16 TO 07/24	2,083	51,069	163	8,133	14,756
1987	06/22 to 07/30	2,274	28,871	62	62	17,519
1988	06/23 to 07/30	2,712	15,799	6	6,781	20,799
1989	06/29 to 07/31	1,915	21,196	145	246	10,380
1990	06/19 to 07/24	3,636	31,679	0	3,378	6,410
1991[e]	06/29 to 08/25	2,147	47,397	1,978	1,694	27,525
1992	06/21 to 08/04	1,899	27,267	150	23,030	22,023
1993	06/22 to 08/18	2,491	26,044	1,451	253	14,287

a Pink salmon can pass freely through the Kogrukluk Weir.

b No counts or incomplete count as project was not operated during the species' migration.

c Aniak sonar counts are adjusted to provide the total estimated escapements.

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

e The Goodnews River Tower was converted to a weir in 1991.

Table 10. Kuskokwim Area commercial, subsistence, and personal use salmon catches, 1913-1993.

	COMMERCIAL CATCH						SUBSISTENCE CATCH			COMBINED TOTAL
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Other[a]	Total	HARVEST
1913	7,800					7,800				7,800
1914		2,667				2,667				2,567
1915										
1916	949					949				949
1917	7,878					7,878				7,878
1918	3,055					3,055				3,055
1919	4,836					4,836				4,836
1920	34,853					34,853				34,853
1921	9,854					9,854				9,854
1922	8,944	6,120				15,064			180,000	195,064
1923	7,254					7,254				7,254
1924	19,253	900	7,167	7,167		34,487	17,700	203,148	220,848	255,335
1925	1,644	5,800				7,444	10,800	230,850	241,650	249,094
1926									738,576	738,576
1927									286,254	286,254
1928									481,090	481,090
1929									560,196	560,196
1930	7,626	2,448				10,074			538,650	548,724
1931	8,541					8,541			389,367	397,908
1932	9,339					9,339			746,415	755,754
1933							6,290	443,998	450,288	450,288
1934							20,800	597,132	617,932	617,932
1935	6,448		8,296			14,744	22,930	554,040	576,970	591,714
1936	624					624	33,500	549,423	582,923	583,547
1937	480					480			537,111	537,591
1938	624		828			1,452	10,153	400,242	410,395	411,847
1939	134					134	14,000	125,425	139,425	139,559
1940	247		500			747	8,000	415,523	423,523	424,270
1941	187		674			861	8,000	415,523	423,523	424,384
1942							6,400	325,339	331,739	331,739
1943							6,400	325,339	331,739	331,739
:::										
1946	2,288		674			2,962				2,962
1947	5,356					5,356				5,356
:::										
1951	4,210					4,210				4,210
:::										
1954	57					57				57
:::										
:::										
1959	3,760					3,760				3,760
1960	5,969	5,649	5,498		3	17,119	18,752	301,753	320,505	337,624
1961	23,246	2,308	5,090	91	18,864	49,599	27,457	179,529	206,986	256,585

- Continued -

Table 10. (page 2 of 2)

Year	COMMERCIAL CATCH						SUBSISTENCE CATCH						COMBINED TOTAL HARVEST
	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Coho[c]	Small[d]	Total			
1962	20,867	10,313	12,598	4,340	45,707	93,825	13,455	161,849	175,304	269,129			362,954
1963	18,571		15,660			34,231	33,180	137,649	170,829	205,060			239,291
1964	21,230	13,422	28,992	939	707	65,290	29,017	190,191	219,208	284,498			349,788
1965	24,965	1,886	12,191		4,242	43,284	24,697		250,878	275,575			318,859
1966	25,823	1,030	22,985	268	2,610	52,716	49,022		175,735	224,757			277,473
1967	29,986	652	58,239		8,235	97,112	60,919		214,468	275,387			372,499
1968	43,157	5,887	154,302	75,818	19,694	298,858	35,380		278,008	313,388			612,246
1969	64,777	10,362	110,473	1,251	50,377	237,240	40,208		204,105	244,313			481,553
1970	65,032	12,654	62,245	27,422	60,566	227,919	69,219	11,868	246,810	327,897			555,816
1971	44,936	6,054	10,006	13	99,423	160,432	42,926	6,899	116,391	166,216			326,648
1972	55,482	4,312	23,880	1,952	97,197	182,823	40,145	1,325	120,316	161,786			344,609
1973	51,374	5,224	152,408	634	184,207	393,847	38,526	23,746	179,259	241,531			635,378
1974	30,670	29,003	179,579	60,052	196,127	495,431	26,665	32,780	277,170	336,615			832,046
1975	27,799	17,535	109,814	899	223,532	379,579	47,569		176,389	223,958			603,537
1976	49,262	13,636	112,130	39,998	231,877	446,903	57,899	4,312	223,792	286,003			732,906
1977	58,256	18,621	263,728	434	298,959	639,998	57,925	12,193	203,397	273,515			913,513
1978	63,194	13,734	247,271	61,968	282,044	668,211	38,209	12,437	125,052	175,698			843,909
1979	53,314	39,463	308,683	574	297,167	699,201	57,031		163,451	220,482			919,683
1980	48,242	42,213	327,908	30,306	561,483	1,010,152	62,139	47,335	168,987	278,461			1,288,613
1981	79,378	105,940	278,587	463	485,635	950,003	63,248	28,301	163,554	255,103			1,205,106
1982	79,816	97,716	567,451	18,259	325,471	1,088,713	60,426	45,181	195,691	301,298			1,390,011
1983	93,676	90,834	249,018	379	306,554	740,461	51,020	2,834	149,172	203,026			943,487
1984	74,006	81,307	829,965	23,902	488,482	1,497,662	60,944	15,016	144,651	220,335			1,717,997
							Chinook	Sockeye	Coho	Pink	Chum	Total	
1985	74,083	121,221	382,096	111	224,680	802,191	45,720	33,631	24,667	1,062	96,791	201,871	1,004,062
1986	44,972	142,029	736,910	16,569	349,268	1,289,748	54,256		29,742		142,930[e]	226,928	1,516,676
1987	65,558	170,849	478,594	163	603,274	1,318,438	71,804	31,555	18,085	291	70,709	192,444	1,510,882
1988[d]	74,552	149,927	623,719	37,592	1,443,916	2,239,786	56,695	25,571	32,426		118,181	232,873	2,565,615
1989[d]	67,003	82,628	556,312	819	802,199	1,508,961	77,030	33,958	50,046		132,858	293,834	1,802,853
1990	84,706	203,374	445,062	16,082	522,535	1,272,759	77,328	32,218	44,519		108,557	262,622	1,535,381
1991	48,170	202,441	556,818	522	501,692	1,309,643	85,143	51,821	53,478		93,037	283,479	1,593,122
1992	67,597	192,341	772,449	85,978	436,506	1,554,871	61,499	31,497	40,155		87,954	221,105	1,775,956
1993	26,636	167,235	686,570	71	94,937	975,449							
Ten Year Average (1983-1992)	69,432	143,695	563,094	500[e]	567,911	1,353,451	64,144	34,322[f]	31,097		101,155[d]	233,852	1,596,603

a Primarily chum and coho salmon.
b Reported subsistence coho salmon harvest only. Coho salmon subsistence harvest is poorly documented with no Kuskokwim River estimate attempted prior to 1988.
c Includes sockeye, pink and chum salmon.
d The personal use catch is included with the subsistence catch.
e Even years only.
f Previous seven years excluding 1986 when the small salmon were not differentiated.

Table 11. Utilizations of Kuskokwim River chum salmon, 1960-1993.

Year	Commercial Harvest[a]	Estimated Subsistence Harvest[b]	Total Utilization
1960	0	301,753[c]	301,753
1961	0	179,529[c]	179,529
1962	0	161,849[c]	161,849
1963	0	137,649[c]	137,649
1964	0	190,191[c]	190.191
1965	0	250,878[c]	250,878
1966	0	175,735[c]	175,735
1967	148	208,445[c]	208,593
1968	187	275,008[c]	275,195
1969	7,165	204,105[c]	211,270
1970	1,664	246,810[c]	248,474
1971	68,914	116,391[c]	185,305
1972	78,619	120,316[c]	198,935
1973	148,746	179,259[c]	328,005
1974	171,887	277,170[c]	449,057
1975	181,840	176,389[c]	358,229
1976	177,864	223,792[c]	401,656
1977	248,721	198,355[c]	447,076
1978	248,656	118,809[c]	367,465
1979	261,874	161,239[c]	423,113
1980	483,211	165,172[c]	648,383
1981	418,677	157,306[c]	575,983
1982	278,306	190,011[c]	468,317
1983	267,698	146,876[c]	414,574
1984	423,718	142,542[c]	566,260
1985	199,478	95,542	295,020
1986	309,213	141,931[c]	451,144
1987	574,336	69,047	643,383
1988	1,381,674	117,008	1,498,682
1989	749,182	122,086	871,268
1990	461,624	96,273	557,897
1991	431,802	81,652	513,454
1992	344,603	85,203	444,607
1993	43,337	65,800[d]	109,119
Ten Year Average (1983-1992)	518,667	109,816	625,629

a District 1 and 2.

b Estimated subsistence harvest expanded from villages surveyed.

c Includes small numbers of small chinook, sockeye and coho salmon.

d Average of previous three years (87,709) minus 25 percent estimate reduced subsistence catch caused by in-season subsistence closure (21,927) rounded to nearest hundred since actual subsistence estimate not available at this writing.

Table 12. Lower Kuskokwim River, District 1, commercial effort, 1970 - 1993.

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	617	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

	Number of Permits Landing Each Species						
	Chinook	Sockeye	Coho	Pink	Chum	Roe	
1989	695	688	732	261	719	22	745
1990	724	722	714	526	736	1	744
1991	687	705	731	159	733	1	749
1992	711	706	706	520	722	0	741
1993	669	654	717	54	715	0	740
Ten Year Average (1983-1992)							710

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

Table 13. Quinhagak District commercial effort 1970-1993.

YEAR	EFFORT[a]
1970	88
1971	61
1972	107
1973	109
1974	196
1975	127
1976	181
1977	258
1978	200
1979	206
1980	169
1981	186
1982	117
1983	226
1984	263
1985	300
1986	324
1987	310
1988	288
1989	227
1990	390
1991	346
1992	349
1993	409
TEN YEAR AVERAGE (1983-1992)	302

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

Table 14. Quinhagak District commercial salmon harvest, 1960-1993.

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	13,872	21,534	68,591	21,258	29,183	154,438
1989	20,820	20,582	44,607	273	39,395	125,677
1990	27,644	83,681	26,926	12,056	47,717	198,024
1991	9,480	53,657	42,571	115	54,493	160,316
1992	17,197	60,929	86,404	64,217	73,383	302,130
1993	15,784	80,934	55,817	7	40,943	193,485
Ten Year Average (1983-1992)	24,831	30,375	57,449	207[a]	37,636	162,604

[a] Odd years only.

Table 15. Kanektok River peak aerial surveys by species, 1962 - 1993[a].

Year	SPECIES			
	Chinook	Sockeye	Coho	Chum
1962	935	43,108		
1963				
1964				
1965				
1966	3,718			28,800
1967				
1968	4,170	8,000		14,000
1969				
1970	4,112	3,028		80,100
1971				
1972				
1973	814			
1974				
1975		6,018		
1976		2,936		8,697
1977	5,787	6,304		32,157
1978[b]	19,180	44,215		229,290
1979				
1980	6,172	113,931	69,325	25,950
1981[c]	15,900	49,175		71,840
1982[d]	8,142	55,940		
1983	8,890	2,340		9,360
1984[e]	12,182	30,840	46,830	48,360
1985	13,465	16,270		14,385
1986	3,643	14,949		16,790
1987	4,223	51,753	20,056	9,420
1988	11,140	30,440		20,063
1989	7,914	14,735		6,270
1990	2,563	32,082		2,475
1991[d]	2,100	43,500	4,330	18,000
1992[f]	3,856	14,955		25,675
1993	4,670	23,128		1,285
10 YR. AVG:	6,997	25,186	23,738	17,079
OBJECTIVE:	5,000	15,000		30,500

a Peak aerial surveys are those rated fair or good surveys obtained between 20 July and 5 August for chinook and sockeye salmon, 20-31 July for chum salmon, and 20 August and 5 September for coho salmon. Some surveys which do not meet these criteria may be referenced in this table; text are footnoted.

b Chum salmon count excluded from escapement objective calculation due to exceptional magnitude.

c Poor survey for chinook, sockeye, chum salmon.

d Late Survey for chinook, sockeye salmon (after 5 August).

e Poor coho survey.

f Some chum may have been sockeye.

Table 16. Quinhagak, District 4, commercial salmon harvest and fishing effort by period, 1993.

				CHINOOK		SOCKEYE		COHO		PINK		CHUM	
PERIOD	DATE	HOURS	PERMITS	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE
01	06/14	12		NO COMMERCIAL FISHING - STRIKE									
02	06/16	12		NO COMMERCIAL FISHING - STRIKE									
03	06/21	12	163	6,194	3.17	2,322	1.19					868	0.44
04	06/24	12	206	2,419	0.98	3,271	1.32					1,238	0.50
05	06/28	12	146	1,772	1.01	10,941	6.24					3,200	1.83
06	06/30	12	210	1,272	0.50	7,574	3.01					2,501	0.99
07	07/02	12	191	1,105	0.48	5,229	2.28					3,348	1.46
08	07/05	12	155	611	0.33	15,375	8.27					4,475	2.41
09	07/07	12	219	620	0.24	3,837	1.46					3,380	1.29
10	07/09	12	154	441	0.24	9,824	5.32					3,846	2.08
11	07/12	12	190	306	0.13	6,696	2.94					3,864	1.69
12	07/14	12	174	328	0.16	7,490	3.59					5,131	2.46
13	07/16	12	150	220	0.12	3,209	1.78	4				2,124	1.18
14	07/19	12	71	105	0.12	1,426	1.67	3				1,577	1.85
15	07/21	12	65	90	0.12	1,331	1.71	19	0.02			1,780	0.02
16	07/23	12	66	66	0.08	715	0.92	96	0.12			1,261	1.62
17	07/26	12	46	42	0.08	394	0.71	122	0.22			603	0.22
18	07/28	12	32	31	0.08	363	0.95	294	0.77			428	0.77
19	07/30	12	56	49	0.07	379	0.56	535	0.80	6	0.01	535	0.82
20	08/02	12	42	24	0.05	87	0.49	1,789	3.55			246	0.49
21	08/06	12	64	19	0.02	143	0.19	4,978	6.48			242	0.32
22	08/09	12	62	11	0.01	113	0.15	3,574	4.80	1		107	0.14
23	08/11	12	91	17	0.02	93	0.09	4,686	4.29			51	0.05
24	08/16	12	70	12	0.01	18	0.02	6,926	8.25			38	0.05
25	08/18	12	69	12	0.01	27	0.03	9,516	11.49			23	0.03
26	08/20	12	61	7	0.01	34	0.05	5,529	7.55			4	0.01
27	08/23	12	77	5	0.01	17	0.02	3,564	3.86			10	0.01
28	08/25	12	53	4	0.01	10	0.02	3,174	4.99			2	
29	08/28	12	51	2		5	0.01	4,546	7.43			2	
30	09/01	12	18			2	0.01	1,916	8.87				
31	09/03	12	30			8	0.02	2,777	7.71			43	0.12
32	09/06	12	19			1		1,769	7.76				
TOTALS		384	409	15,784	0.11	80,934	0.55	55,817	0.38	7		40,943	0.28

Table 17. Goodnews Bay, District 5 commercial effort 1970-1993.

YEAR	EFFORT[a]
1970	35
1971	16
1972	14
1973	21
1974	49
1975	50
1976	40
1977	34
1978	35
1979	30
1980	48
1981	48
1982	48
1983	79
1984	77
1985	69
1986	86
1987	69
1988	125
1989	88
1990	82
1991	72
1992	111
1993	114
TEN YEAR AVERAGE (1983-1992)	86

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

Table 18. Goodnews Bay, District 5, commercial salmon harvest and fishing effort by period, 1993.

				CHINOOK		SOCKEYE		COHO		PINK		CHUM	
PERIOD	DATE	HOURS	PERMITS	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE
01	06/28	12	34	567	1.39	4,163	10.20					526	1.29
02	06/30	12	37	242	0.55	6,089	13.71					1,093	2.46
03	07/02	12	35	166	0.40	4,684	11.15					565	1.35
04	07/05	12	46	128	0.23	5,195	9.41					967	1.68
05	07/07	12	65	132	0.17	6,283	8.06					1,036	1.33
06	07/09	12	76	99	0.11	4,518	4.95					1,024	1.12
07	07/12	12	73	145	0.17	5,009	5.72					1,501	1.71
08	07/14	12	76	130	0.14	4,876	5.35					1,372	1.50
09	07/16	12	80	138	0.14	3,653	3.81					1,105	1.15
10	07/19	12	57	61	0.09	2,830	4.14					459	0.67
11	07/21	12	54	62	0.10	2,559	3.95	1				348	0.54
12	07/23	12	38	39	0.09	1,949	4.27	1				228	0.50
13	07/26	12	22	32	0.12	1,804	6.83	4	0.02			117	0.02
14	07/28	12	23	22	0.08	893	3.24	4	0.01			89	0.32
15	07/30	12	20	26	0.11	1,256	5.23	28	0.12			28	0.12
16	08/02	12	27	27	0.08	872	2.69	105	0.32			85	0.26
17	08/04	12	27	23	0.07	739	2.28	285	0.88			60	0.19
18	08/06	12	21	10	0.04	312	1.24	420	1.67			24	0.10
19	08/09	12	27	21	0.06	485	1.50	891	2.75			13	0.04
20	08/13	12	33	5	0.01	347	0.88	2,717	6.86			9	0.02
21	08/16	12	33	16	0.04	322	0.81	2,936	7.41			8	0.02
22	08/18	12	10	4	0.03	33	0.28	1,033	8.61			1	0.01
23	08/23	12	40	9	0.02	193	0.40	3,659	7.62			4	0.01
24	08/26	12	38	4	0.01	75	0.16	2,769	6.07			4	0.01
25	08/28	12	44	5	0.01	51	0.10	1,992	3.77			1	
26	09/01	12	30	2	0.01	54	0.15	2,002	5.56			2	0.01
27	09/03	12	27	2	0.01	49	0.15	1,167	3.60				
28	09/06	12	NO COMMERCIAL FISHING - NO BUYER										
TOTALS		336	114	2,117	0.06	59,293	1.61	20,014	0.29			10,657	0.54

Table 19. Historical estimated salmon run size and commercial exploitation rate, Goodnews River, 1981-1993.

Year	Species	Middle Fork Tower/Weir Estimate	Middle Fork Aerial Survey Count as a Percentage of Tower Est.	Goodnews River Escapement Estimate	Goodnews Bay Subsistence Harvest Estimate	Goodnews Bay Commercial Harvest	Total Run Size Estimate	Exploitation[a] Rate (% of Run)
1981	Chinook	3,688	-[b]	7,766[c]	1,409	7,190	16,365	53%
	Sockeye	49,108	-[b]	100,029[c]	3,511[d]	40,273	143,813	30%
	Chum	21,827	-[b]	53,799[c]	-	13,642	67,441	20%
1982	Chinook	1,395	-[b]	2,937[c]	1,236	9,476	13,649	78%
	Sockeye	56,255	-[b]	114,587[c]	2,754[d]	38,877	156,218	27%
	Chum	6,767	-[b]	16,679[c]	-	13,829	30,508	45%
1983	Chinook	6,027	36%	14,398	1,066	14,117	29,581	51%
	Sockeye	25,816	22%	69,955	1,518[d]	11,716	83,189	16%
	Chum	15,548	-[b]	38,323[c]	-	6,766	45,089	15%
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	Chinook	2,712	39%	5,419	310	4,964	10,693	49%
	Sockeye	15,799	30%	38,319	1065	36,368	75,752	49%
	Chum	20,799	21%	39,501	448	33,059	73,008	46%
1989	Chinook	1,915	67%	2,891	467	2,966	6,324	54%
	Sockeye	21,186	60%	35,476	869	19,299	55,644	36%
	Chum	10,380	28%	15,495	760	13,622	29,877	48%
1990	Chinook	3,636	-[b]	7,656[c]	682	3,303	11,641	34%
	Sockeye	31,679	-[b]	64,528[c]	905	35,823	101,256	36%
	Chum	6,410	-[b]	15,799[c]	342	13,194	29,335	46%
1991[e]	Chinook	2,147	-[b]	4,521[c]	682	912	6,115	26%
	Sockeye	47,397	-[b]	96,544[c]	900	39,838	137,228	30%
	Chum	27,525	-[b]	67,844[c]	106	15,892	83,842	19%
1992[e]	Chinook	1,899	53%	3,560	252	3,528	7,340	51%
	Sockeye	27,267	26%	67,681	905	25,696	94,282	28%
	Chum	22,023	14%	37,286	662	18,520	56,468	34%
1993[e]	Chinook	2,491	53%	4,700	478[f]	2,117	7,295	35%
	Sockeye	26,044	26%	100,169	928	59,293	160,390	38%
	Chum	14,287	14%	102,050	464	69,035	171,555	40%

a Commercial and subsistence exploitation
b Incomplete aerial survey results
c Average Middle Fork/Goodnews River escapement estimate ratio for 1983-1989 used to estimate Goodnews River escapement in years with no aerial survey data.
d Subsistence caught chum salmon is included in subsistence sockeye salmon harvest
e Goodnews Tower Project changed to weir project in 1991.
f Estimate based on recent 5 year average.

Table 20. Goodnews Bay District commercial salmon harvest, 1968-1993.

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
1989	2,966	19,299	31,849	82	13,622	67,818
1990	3,303	35,823	7,804	629	13,194	60,753
1991	912	39,838	13,312	29	15,892	69,983
1992	3,528	39,194	19,875	14,310	18,520	95,427
1993	2,117	59,293	20,014	0[a]	10,657	92,081
Ten year Average (1983-1992)	5,028	25,728	25,944	18[a]	15,091	74,769

a Odd years only.

Table 21. Ex-vessel Value of Kuskokwim Area Salmon Catch by District.

	Chinook	Sockeye	Coho	Pink	Chum	Total
Lower Kuskokwim River, District W-1						
			1993			
Fish	8,714	27,003	586,330	64	42,718	665,048
Value	$72,659	$140,789	$2,209,058	$59	$112,756	$2,535,321
			Ave. 1988-92			
Fish	45,833	83,841	497,141	4,457	651,445	1,280,718
Value	$503,909	$594,483	$2,256,827	$1,776	$1,462,472	$4,819,468
Middle Kuskokwim River, District W-2						
			1993			
Fish	21	5	24,456	0	619	25,132
Value	$153	$35	$88,714	$0	$1,371	$ 90,273
			Ave. 1988-92			
Fish	1,635	2,393	19,176	46	22,332	45,502
Value	$19,842	$15,426	$76,582	$25	$39,103	$150,978
Quinhagak, District W-4						
			1993			
Fish	15,784	80,934	55,817	7	40,943	188,725
Value	$142,918	$402,910	$245,982	$4	$104,347	$896,161
			Ave. 1988-92			
Fish	17,803	48,077	53,820	19,584	48,834	188,117
Value	$220,658	$310,941	$291,137	$6,204	$99,058	$927,998
Goodnews Bay, District W-5						
			1993			
Fish	2,117	59,293	20,014	0	10,657	92,081
Value	$21,351	$296,437	$95,043	$0	$28,304	$441,135
			Ave. 1988-92			
Fish	3,135	34,104	20,734	4,112	18,857	80,943
Value	$43,513	$254,514	$126,199	$1,171	$45,811	$471,208
Kuskokwim Area Total						
			1993			
Fish	26,636	167,235	686,570	71	94,937	975,449
Value	$237,081	$840,171	$2,638,797	$63	$246,778	$3,962,890
			Ave. 1988-92			
Fish	68,406	168,415	590,872	28,199	741,469	1,595,280
Value	$787,921	$1,175,365	$2,750,744	$9,176	$1,646,445	$6,369,653

Table 22. Preliminary projections of the 1993 Kuskokwim Area commercial salmon harvests in thousands of fish by species.

Total Species	Management Region: Kuskokwim River	Quinhagak	Goodnews Bay	Kuskokwim Area[a]
Chinook	9 - 56	9 - 46	1 - 14	19 - 112
Sockeye	27 - 137	6 - 84	7 - 59	40 - 280
Coho	196 - 666	27 - 135	8 - 71	231 - 872
Pink	2 - 11[b]	9 - 64[b]	1 - 14	12 - 89
Chum	43 - 1,382	9 - 73	5 - 33	57 - 1,488
Total	277 - 2,252	60 - 402	22 - 191	359 - 2,841

a Except as noted all the projections are based on the previous years (1984-93) catches in all districts.

b Kuskokwim Area pink salmon display a strong odd-even year cycle. This projection is based on the even year catch for the previous 10 years.

Table 23. Middle Kuskokwim River, District 2, commercial salmon harvest and fishing effort by period, 1993.

				CHINOOK		SOCKEYE		COHO		PINK		CHUM	
PERIOD	DATE	HOURS	PERMITS	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE
01	08/06	8	15	9	0.08	2	0.02	6,828	56.90			303	2.53
02	08/09	6	17	4	0.04	1	0.01	3,839	37.64			153	1.50
03	08/14	6	17	3	0.03	1	0.01	2,681	26.28			70	0.69
04	08/17	6	16	3	0.03			2,349	24.47			23	0.24
05	08/21	6	17					3,115	30.54			26	0.25
06	08/25	6	15			1	.01	3,008	33.42			24	0.27
07	08/28	6	14	1	0.01			1,798	21.40			11	0.13
08	09/01	6	13	1	0.01			791	10.14			9	0.01
TOTALS		50	20	21	0.02	5	0.02	24,409	24.41			619	0.62

FIGURES

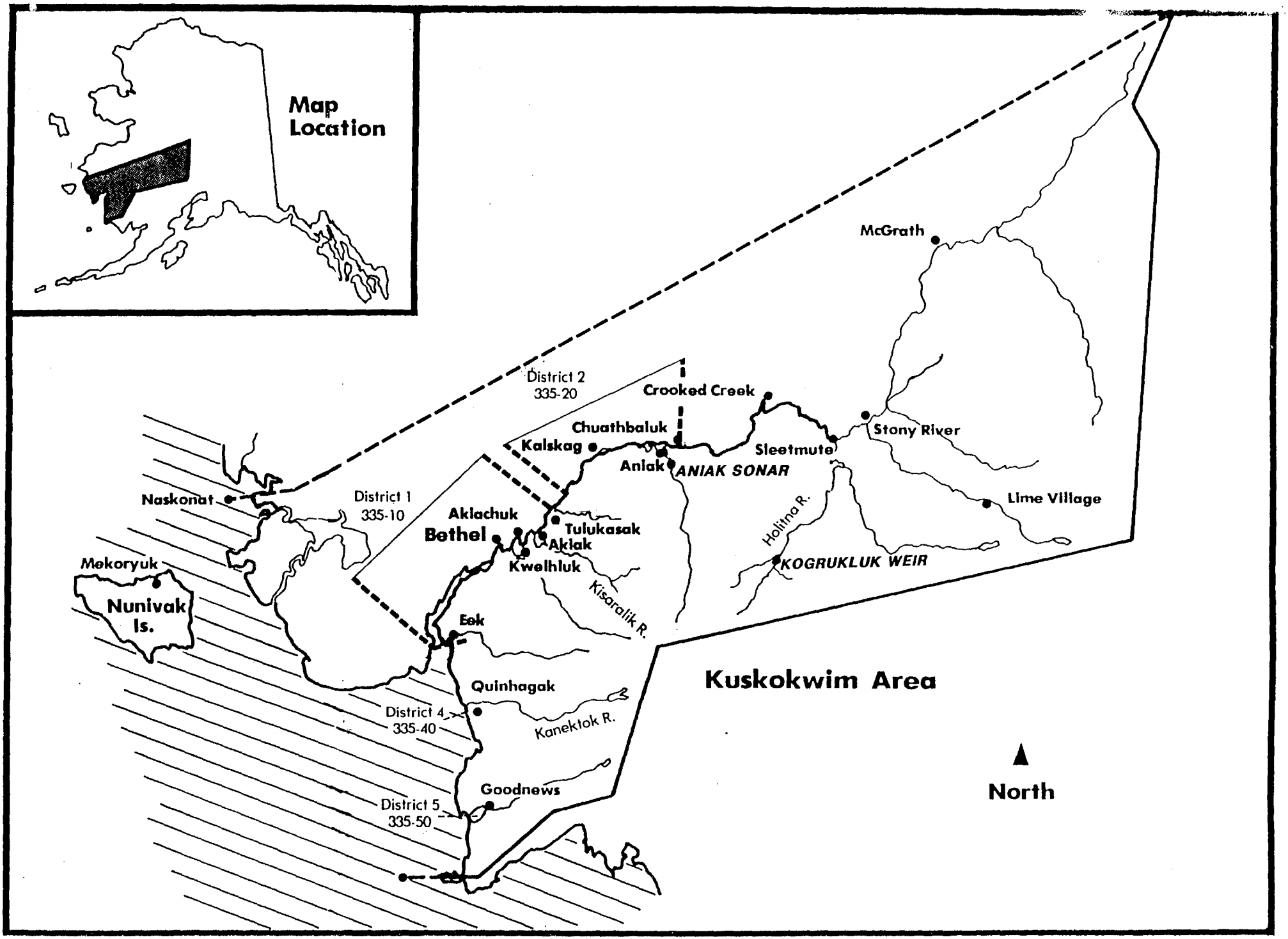


Figure 1. Kuskokwim Area Map.

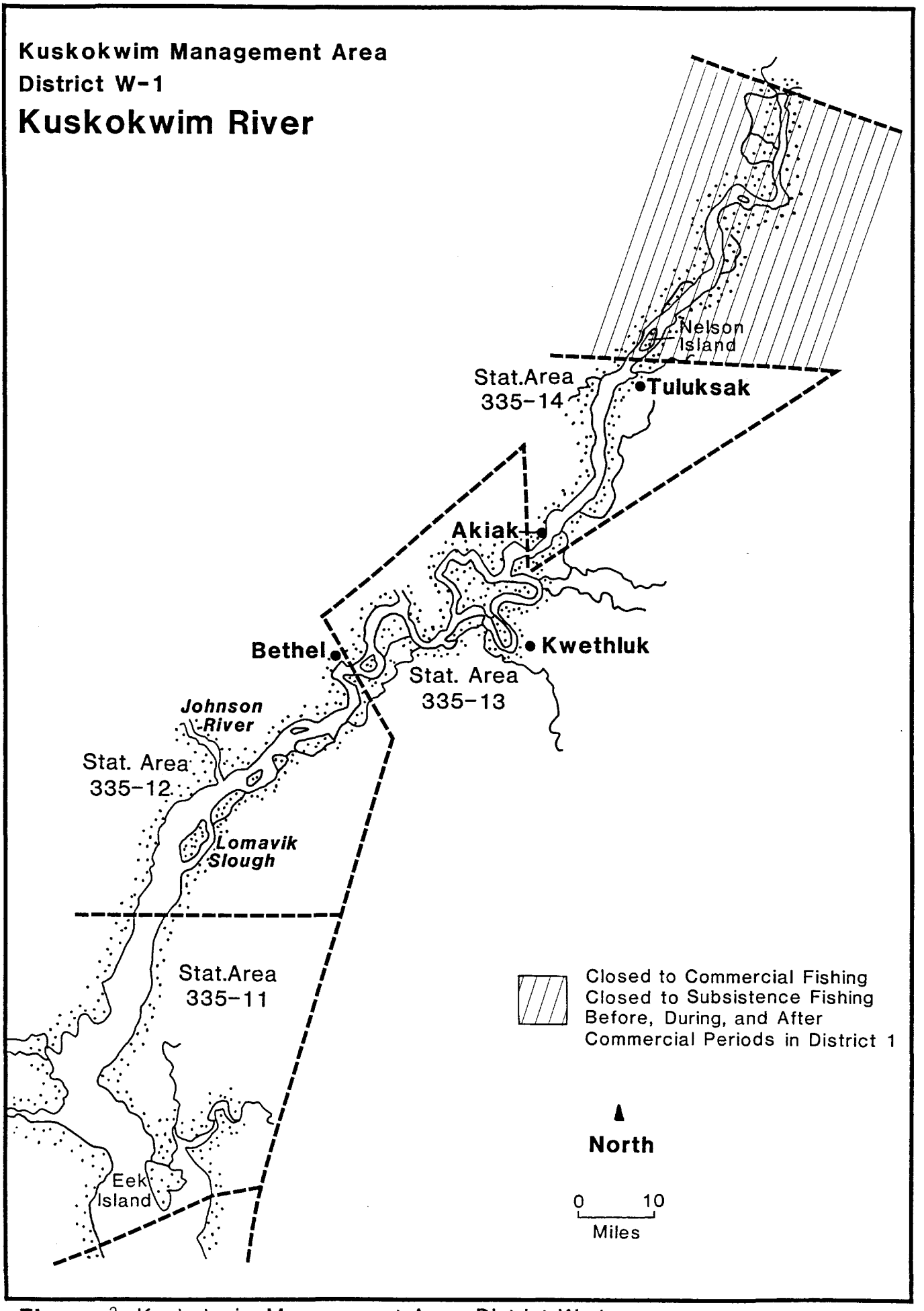


Figure [2]. Kuskokwim Management Area, District W-1

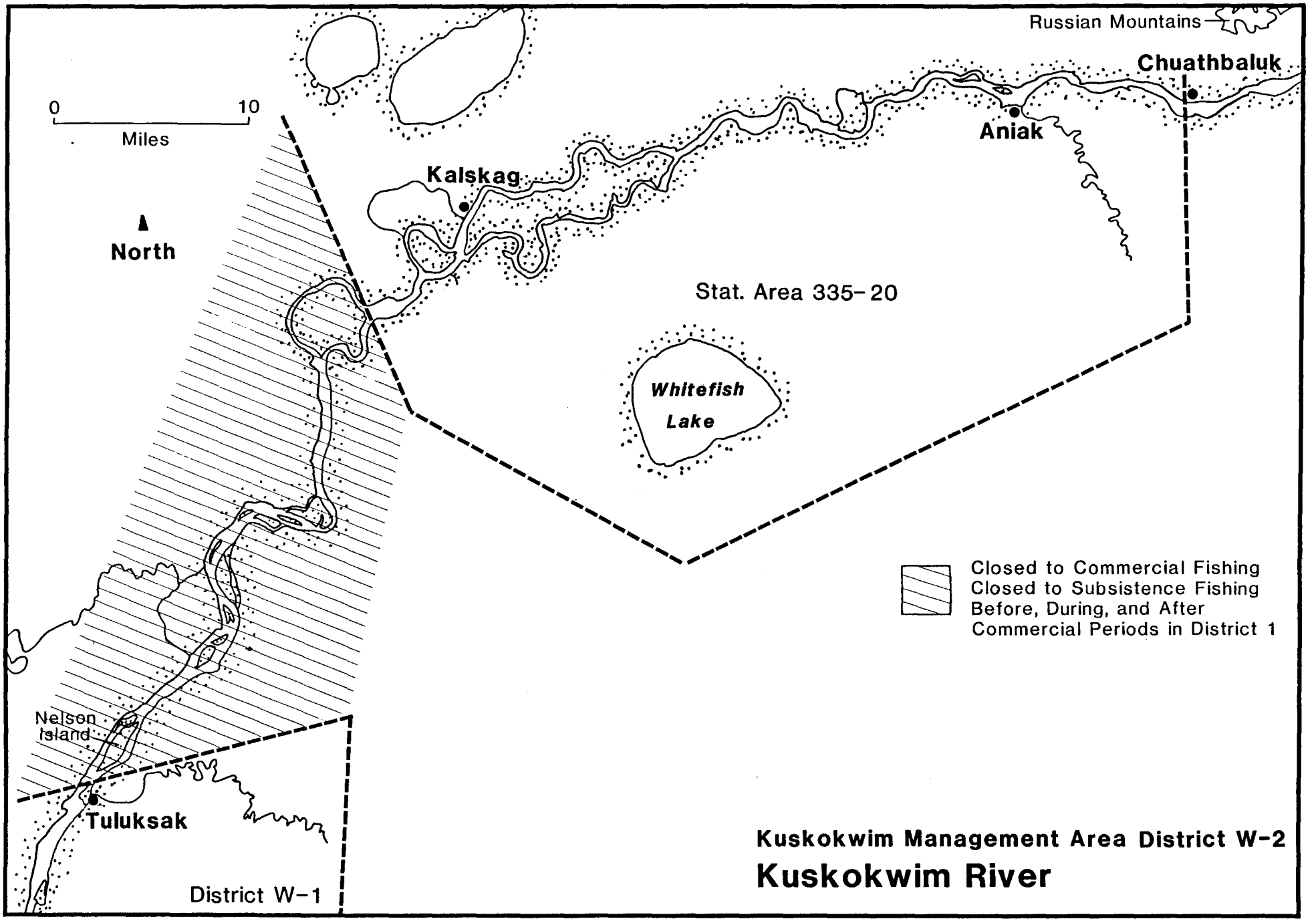


Figure 3. Kuskokwim Management Area, District W-2

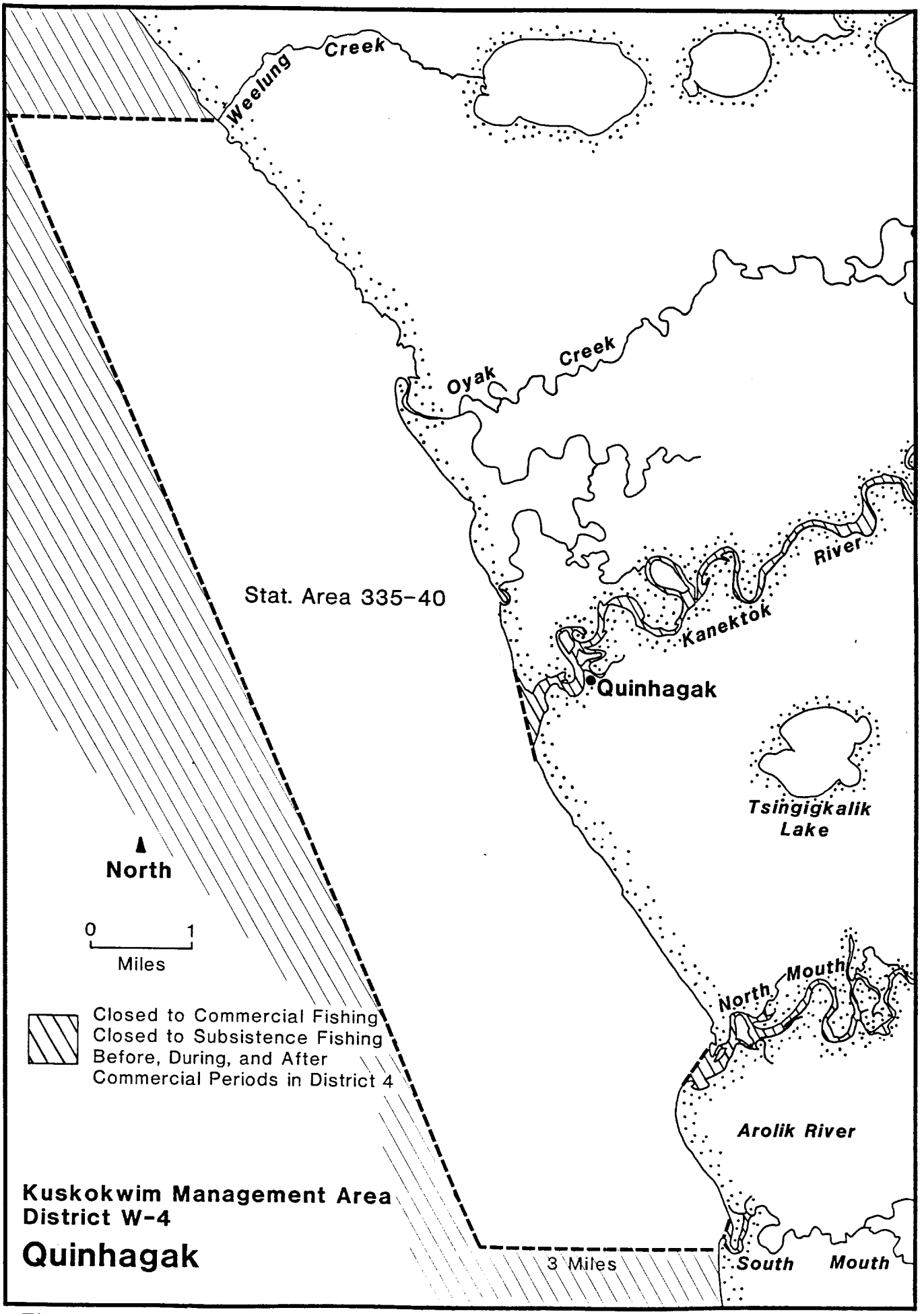


Figure 4. Kuskokwim Management Area, District W-4

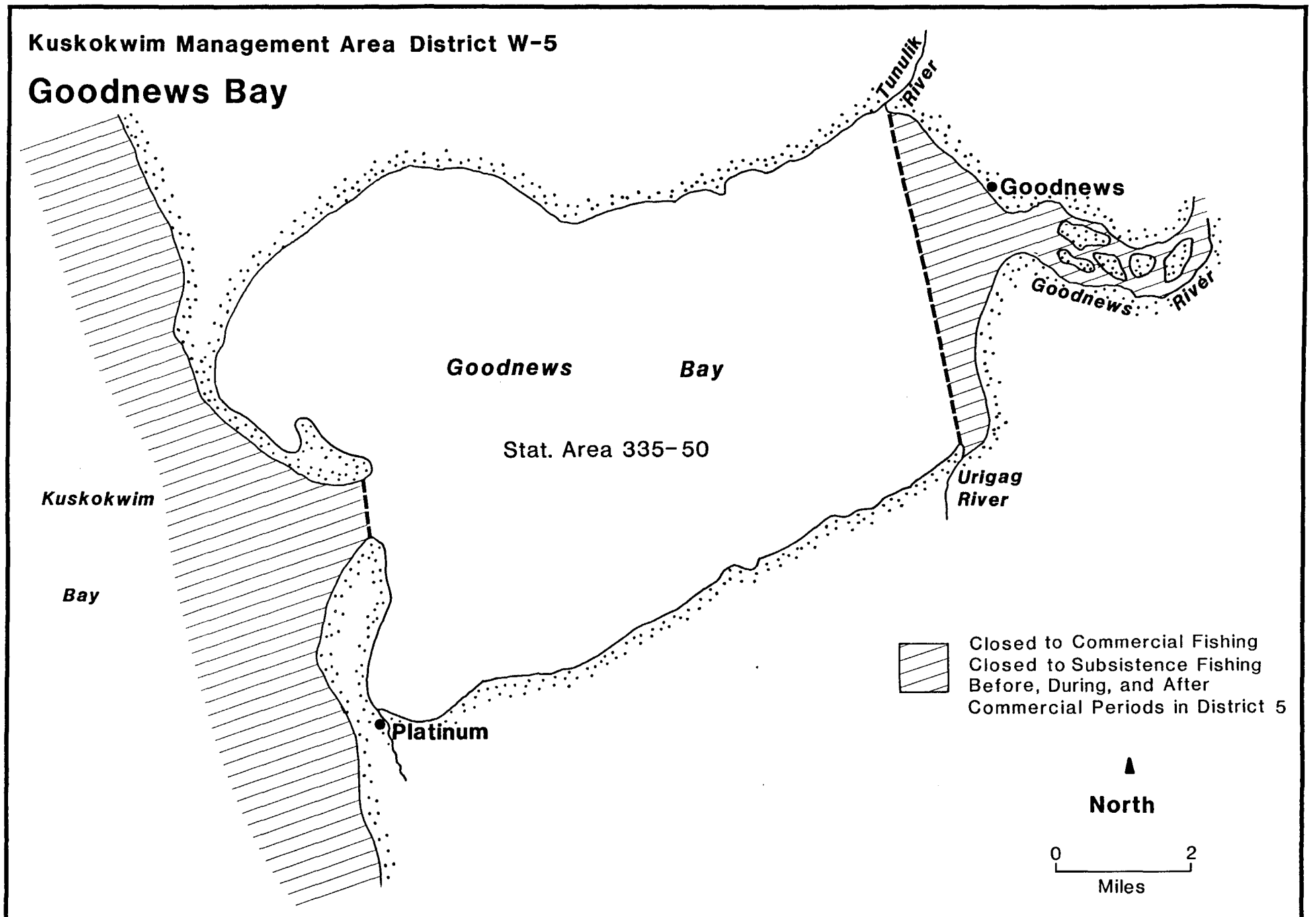


Figure 5. Kuskokwim Management Area, District W-5

Figure 6.

Kuskokwim River Aerial Index

Chinook Salmon, 1975 - 1993

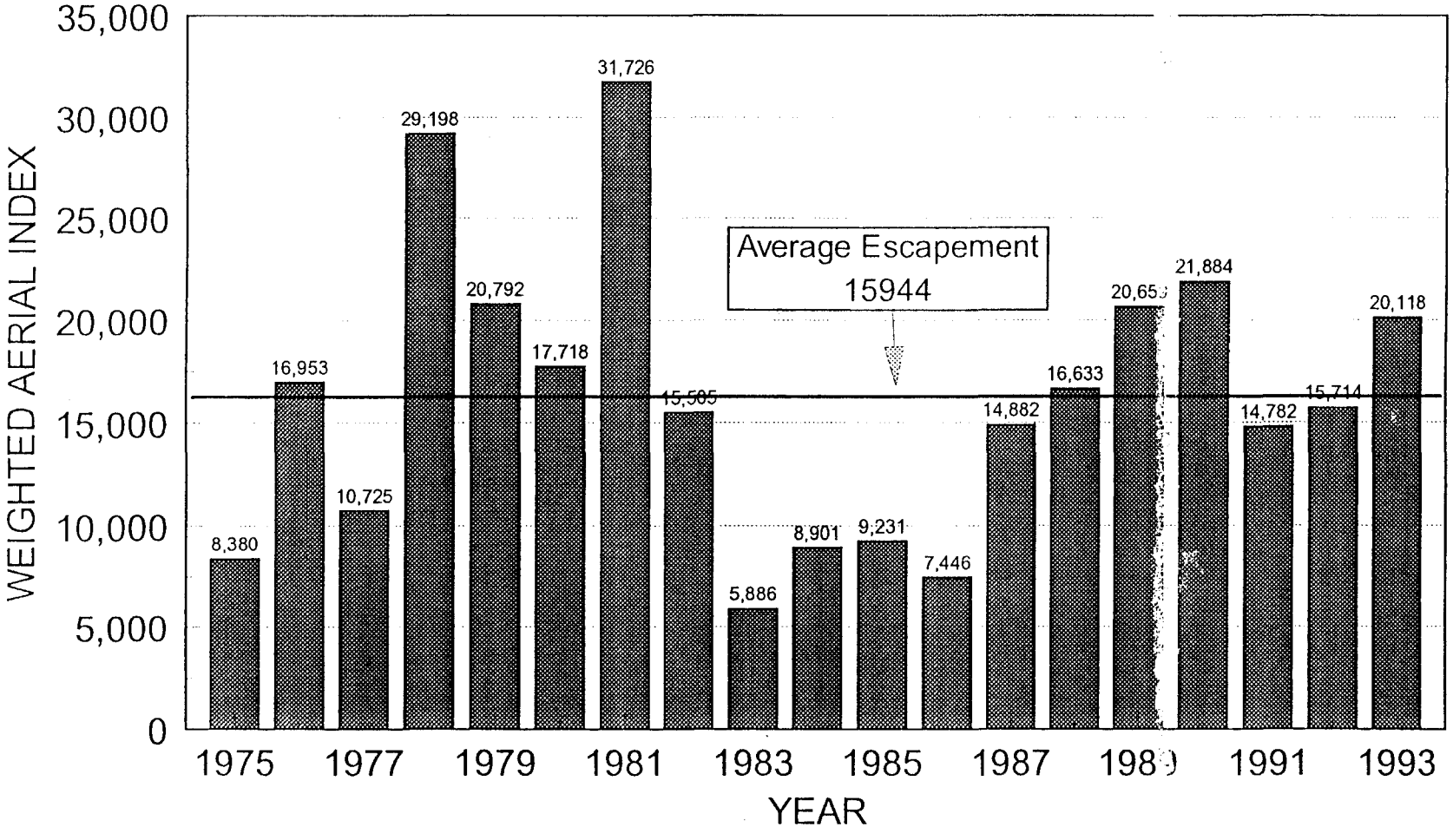
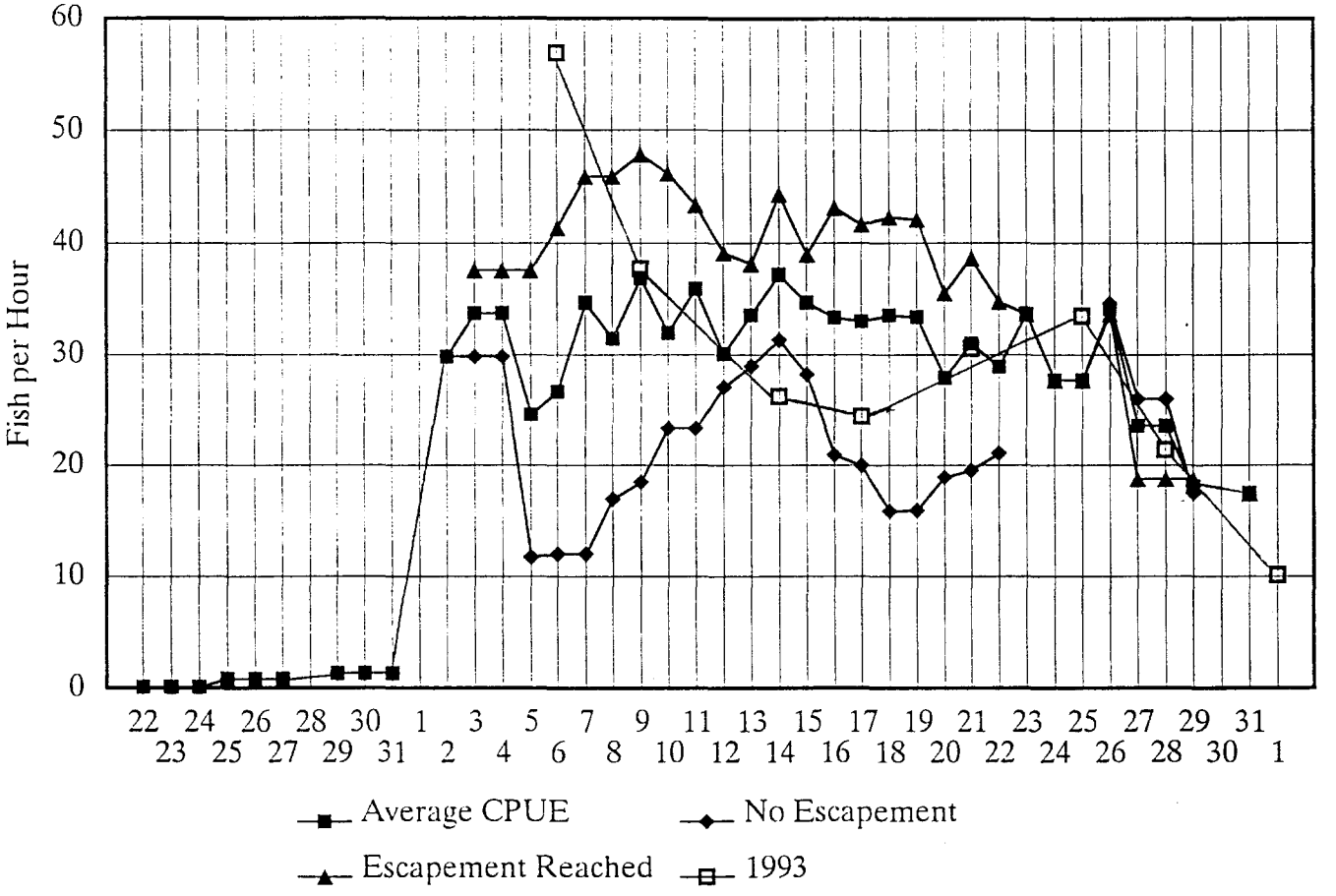


Figure 7. Commercial Coho CPUE

District 2, 1981–1993



DRAFT

INFORMATIONAL LETTER **STATE OF ALASKA** **DEPT. OF FISH & GAME**

To: Fishermen, processors, and Interested Persons

From: Commercial Fisheries and the Kuskokwim River Salmon Management Working Group
P.O. Box 90
Bethel, AK 99559
907-543-2433

Telephone recording of openings and closures 24 hours a day: 907-543-2598

1994 KUSKOKWIM AREA COMMERCIAL AND SUBSISTENCE SALMON FISHERIES

This informational letter will inform fishermen, processors, and other interested persons about the status of the 1994 Kuskokwim Area salmon runs and the Department's strategies to regulate the salmon fisheries. The Division of Commercial Fisheries Management and Development of the Alaska Department of Fish and Game is responsible for the management of commercial and subsistence fisheries in the Kuskokwim Area (Figure 1).

DISTRICTS 1 and 2, THE KUSKOKWIM RIVER

The Department manages the Kuskokwim River drainage cooperatively with the Kuskokwim River Salmon Management Working Group (Working Group). The Working Group and the Department have three goals in the following order of importance:

1. **To manage for sustained yield on all the spawning grounds for all species of salmon.**

2. **To manage for optimal sustained subsistence yield for all species of salmon.**

3. **To manage for the optimal economic yield for the commercial fishery after spawning ground and subsistence needs have been assured.**

DRAFT

Subsistence Fishery

Each subsistence fishermen must plainly inscribe their first initial, last name and address on a buoy attached to gillnets or other unattended gear. Violation of this regulation has resulted in the seizure of nets.

No subsistence fishing is allowed 16 hours before, during and 6 hours after each commercial fishing period in District 1 and in the Kuskokwim River between Districts 1 and 2. In Kuskokwak Slough subsistence fishing may resume at the closure of the commercial fishing period. In District 2 and its tributaries subsistence fishing is not allowed 16 hours before, during and 6 hours after each commercial fishing period. The boundaries of both districts changed in 1990 and fishermen should refer to Figures 2 and 3 before fishing. **Information on subsistence closures is available 24 hours a day by calling 543-2598.** The regulation summary after this letter contains a more complete listing of the subsistence salmon regulations.

Subsistence fishermen will receive salmon catch calendars, which the Department will collect in October and November. Please record your daily salmon catches on these calendars. Changing the calendar collection date to October or November has improved the accuracy of coho catch reporting.

Management Strategies
In 1993, the Kuskokwim River subsistence fishery was restricted by emergency regulation for the first time. Actions to restrict the subsistence chum harvest may be necessary in 1994 under the following conditions:

1. Chum salmon test fishing indices fall below CPUE thresholds.

2. The Kuskokwim River sonar projection of total passage is below 650,000 chum salmon.

3. Subsistence fishermen report inadequate subsistence catches.

4. Chum salmon escapement projects show inadequate escapements are occurring.

Measures to reduce subsistence chum salmon harvest could include restricting gillnet type, length, and mesh size, and closure of specific areas.

DRAFT

Commercial Fishery

District Boundaries
Commercial fishing in the Kuskokwim River is only allowed in Districts 1 and 2. District 1, the Lower Kuskokwim, includes the Kuskokwim River beginning at a line between Apokak Slough and Popokamiut upstream to a line located between Fish and Game regulatory markers located about 1 mile upstream of the mouth of the Tuluksak River just downstream of the southern tip of Nelson Island, also known as Big Island (Figure 2). During the first commercial period of the season fishing is only allowed downstream of regulatory markers located near Bethel.

PROCESSORS, TENDERS AND FISHERMEN: Statistical area 335-11 runs from Popokamiut upstream to the bluffs on the west bank upstream of the Kialik River (Figure 2). Statistical area 335-12, begins at the bluffs on the west bank upstream of the Kialik River and continues upstream to just above Bethel (Figure 2). Statistical area 335-13 begins at Bethel and runs upstream to the big fish camp downstream of Akiak (Figure 2). Statistical area 335-14 begins at the fish camp downstream of Akiak and continues upstream to the district boundary a mile upstream of the Tuluksak River (Figure 2). Please check Figure 2 and report the correct statistical area in which the catch was made on your fish tickets. This will aid the Working Group in determining where fish are and estimating their traveling speed.

District 2 includes the Kuskokwim River from ADF&G regulatory markers at the downstream mouth of the second slough on the west bank downstream of Kalskag upstream to Chuathbaluk (Figure 3).

The Kuskokwim River between District 1 and 2 and upstream of Chuathbaluk is not open to commercial fishing.

Management Projects
Commercial fishing time during the season varies in response to the magnitude of salmon returns shown by commercial and subsistence catch data, the Kuskokwim River sonar, test fishing, and spawning escapement monitoring. Table 1 shows the provisional spawning escapement objectives established for the area's major spawning systems. The "fisheries forum" provided by the Working Group allows the members and the public to provide their appraisal of the salmon runs. The Working Group uses traditional Yup'ik fishery knowledge, test fishery, Kuskokwim River sonar, historic and inseason commercial catch, Aniak Sonar, Kogrukluk Weir, and any other available source of information to appraise run strength.

In 1994, the Department will operate a dual beam sonar in the Kuskokwim River near Bethel to provide inseason estimates of fish passage. This is the first year in which data

from the Bethel sonar will be used to assist management inseason. Based on historical chum salmon passage data, the sonar may provide an acceptable assessment of chum salmon run strength by approximately June 20.

The fish passage estimated by the sonar will be apportioned to species using data from the Bethel Test Fishery (BTF). During sonar operation the BTF will supplement the standard 5 3/8 inch and 8 inch mesh nets with a 4 inch and 6 1/2 inch mesh net. The catch in the four nets will apportion the sonar count by species. The catch from the 5 3/8 inch and 8 inch mesh nets provides the normal BTF data for management.

The Department has developed minimal catch per unit effort (CPUE) thresholds for chum salmon in the Bethel and Aniak test fisheries. These thresholds are based on the minimum cumulative daily CPUE of the test fishery, adjusted to an entry pattern and daily magnitude, which should allow escapement and subsistence needs to be achieved upstream of the test fishery.

Outlook for 1994

The commercial chum salmon harvest for the Kuskokwim River has ranged from 43,000 to 1,382,000 salmon in the last ten years (Table 2). The catch in 1994 is expected to be in the lower part of this range. Escapements in the 1989 and 1990 parent years were considered to be adequate. The poor survival of the 1989 brood year seen in 1993 will weaken the 1994 return, particularly in June. If the 1990 brood year experiences a run failure similar to the 1989 brood year, the run outlook would change to critically low, necessitating complete closure or restriction of commercial, sport and possibly subsistence fisheries.

The guideline harvest level for incidental commercial king salmon catch in District 1 and 2 is 15,000 to 50,000 fish. The incidental king salmon catch has ranged from 8,700 to 56,000, averaging 37,000 (Table 2). The catch is expected to be in the lower half of this range in 1994 if fishing is restricted due to a weak chum salmon return.

The 10 year average incidental harvest of red salmon has been 83,500 (Table 2). The incidental red salmon catch has ranged from 27,000 to 136,000. The catch should be below average in 1994 if the fishery is restricted due to a weak chum salmon run.

The commercial coho salmon harvest in the Kuskokwim River has averaged 521,000 salmon in the last ten years (Table 2). In recent years the coho salmon catch has increased because of more effort and larger runs. In the last six years of cooperative management the escapement objectives are estimated to have been reached three times.

The 1990 brood year escapement indexes for coho salmon were below average. The catch of three year old coho salmon was below average in 1993. This suggests that a

below average return of the dominant four year old coho salmon may occur in 1994. Freshwater and marine survival will affect this projection.

Management Strategies

The Kuskokwim River commercial fishery in June and July is directed toward the harvest of chum salmon. The harvest of king, red and pink salmon is incidental to the chum salmon fishery. In August, the commercial fishery targets coho salmon.

During June and July, commercial fishing time in Districts 1 and 2 will be based on subsistence needs, and chum salmon escapement indexes, run timing, run strength, and quality. In consultation with the Kuskokwim River Salmon Management Working Group, the Department will provide at least 48 hours notice of the first commercial period in District 1. Only District 1 downstream of Bethel will be open during the first fishing period. District 2 will open after District 1 since salmon take longer to reach District 2. All openings are by emergency order based on escapement, subsistence catches, run timing, and run strength. A joint evaluation of available information by the Working Group and the Department determines run strength. Special actions may be required early in the fishery to insure adequate king salmon subsistence catches and escapement. Commercial fishing may be delayed or interrupted if escapement or subsistence needs are not being met. Commercial fishing may close if fish quality becomes unacceptable to processors. Gill nets may not exceed 50 fathoms in length, 45 meshes in depth or 6 inch stretch mesh.

To help avoid the need for subsistence fishery restrictions, the chum salmon commercial fishery will not begin until run strength assessment assures that chum salmon abundance is sufficient for subsistence and escapement needs. Commercial periods will be announced based on escapement indexes, subsistence needs, run timing, and run strength. A commercial fishery for chum salmon can occur under the following conditions:

1. Chum salmon test fishing indices exceed CPUE thresholds.

2. The Kuskokwim River sonar projection of total passage exceeds 697,000 chum salmon.

3. Subsistence fishermen report adequate subsistence catches.

4. Chum salmon escapement projects show adequate escapements are occurring.

If run strength is adequate to allow commercial fishing, commercial CPUE will provide additional information for assessing salmon run strength.

In 1994 the Department will receive the latest catch updates for chum and red salmon from the Shumagan and Unimak June salmon fisheries. The Department will present this data to the Working Group to aid in the determination of chum salmon run strength.

A 10 to 20 day closure usually begins in mid-July when the chum salmon run declines. This closure does not occur in years when the run is strong or late. The Kuskokwim River reopens, usually by 1 August, when coho salmon dominate in test fishing and subsistence catches.

Commercial periods for coho salmon will be announced based on run strength and escapement. The commercial harvest will not greatly exceed 300,000 coho salmon except under the following conditions:

1. Test fishing indices exceed historical average CPUE for years with adequate escapement of coho salmon.

2. Commercial CPUE, especially in District 2, is above average.

3. Subsistence fishermen report adequate subsistence catches.

4. Coho salmon escapement projects show adequate escapements are occurring.

In 1994 the Department will receive the latest coho and pink salmon catch updates from the Shumagin and Unimak Post June salmon fisheries. The Department will present this data to the Working Group to aid in the determination of coho salmon run strength.

DISTRICT 4, QUINHAGAK

Subsistence Fishery

All subsistence fishing must stop 24 hours before, during and 6 hours after each commercial fishing period in District 4 and in the Kanektok and Arolik Rivers. **Information on subsistence closures is available 24 hours a day by calling 543-2598.** The regulation summary after this letter contains a more complete listing of the subsistence salmon regulations.

Commercial Fishery

District Boundaries

District 4 includes the marine waters of Kuskokwim Bay between Weelung Creek and the south mouth of the Arolik River (Figure 4). The rivers are closed to commercial fishing.

DRAFT

Management Strategies

The commercial king salmon season in District 4, will open before June 16 as required by the District 4 Salmon Management Plan. The commercial fishing schedule is normally two 12-hour periods per week from mid-June to early July when the target species is king salmon. These periods are from 9:00 a.m. to 9:00 p.m. as requested by the fishermen in 1988. Gill nets may not exceed 50 fathoms in length, 45 meshes in depth, and may not be greater than 6 inch stretch mesh.

Comparing inseason catch with historical data is the primary means of assessing run strength. Commercial periods are regulated by emergency order in response to run strength shown by commercial catch. Except for a poor harvest from weak runs in 1988 and 1991, king salmon runs in this district have been stable since 1984. The commercial king salmon harvest in District 4 ranged from 9,000 to 27,000 fish in the last five years (Table 3). The 1994 return is expected to be below average to average.

The District 4 Salmon Management Plan requires the Department to manage for red salmon once they exceed 50 percent of the combined king and red salmon catch. Commercial catch information is the primary management tool. The commercial catch of red salmon has ranged from 6,500 to 83,700 (Table 3). The commercial catch should be average in 1994.

The chum salmon catch is incidental to the other species in District 4. The catch has ranged from 8,600-66,000; the 1994 catch should be similar (Table 3).

Commercial coho salmon harvests in District 4 have ranged from 27,000 to 135,300 in the last ten years (Table 3). Normally the fishing schedule is three (Monday, Wednesday, Friday) 12-hour fishing periods per week, unless inseason catch data shows a stronger or weaker than normal run. This schedule has in the past allowed commercial catches that still provide adequate spawning escapements and subsistence harvests. The three period per week schedule is frequent enough to compensate for any fishing time "lost" (because of weather). District 4 closes by regulation on September 8.

DISTRICT 5, GOODNEWS BAY

Subsistence Fishery

All subsistence nets must be out of the water for 24 hours before, during and 6 hours after every commercial opening in District 5 and in the Goodnews River. **Information on subsistence closures is available 24 hours a day by calling 543-2598.** The regulation summary after this letter contains a more complete listing of the subsistence salmon regulations.

DRAFT

Commercial Fishery

District Boundaries

Commercial salmon fishing in District 5 occurs in the marine waters of Goodnews Bay (Figure 5). The Goodnews River is closed to commercial fishing.

Management Projects

The salmon weir on the Middle Fork of the Goodnews River and commercial catch data provide most of the management information. The weir also allows accurate interpolation of the aerial survey escapement data collected in the Goodnews River drainage. The historical data base only allows the weir to be used for king, red and chum salmon management. We are attempting to extend operation through the coho salmon run. Comparison of inseason catch data with historical catch data is the main tool for coho salmon management.

Management Strategies

Commercial fishermen must use six inch or less stretched mesh nets, which may not exceed 50 fathoms in length or 45 meshes in depth. Fishing periods are usually 12 hours in length from 9:00 a.m. until 9:00 p.m. at the request of the fishermen. During strong runs the fishing periods may be increased in frequency and length.

The Goodnews River king salmon run has been below the escapement objective of 3,500 in 9 out of the last 10 years. The red salmon escapement objective of 25,000 has been reached every year but one since 1985. The run timing overlap makes it difficult to fish for red salmon without over harvesting king salmon. A delay in the opening has increased king salmon escapement without significantly reducing sockeye salmon catch. A similar delay is planned for 1994. If tendering problems occur in District 5, the Department will try to compensate by adjusting the fishing schedule. This may require new timing for fishing periods to provide markets for fishermen.

The red salmon catch has ranged from 6,700 to 59,300 in the last 10 years (Table 4). The 1989 parent year escapement met the objective and an average return of red salmon in 1994 should result. The incidental king salmon catch should range from 900 to 6,000 fish. The incidental chum salmon catch ranges from 4,800 to 33,000 fish (Table 4).

The management strategy in District 5 for coho salmon (three 12-hour periods per week) is similar to that used in District 4. Tendering problems may require a modified fishing schedule in 1994.

The 1990 parent year coho salmon run in this district was poor, and resulted in the lowest commercial harvest in 20 years. The 1994 coho salmon return will most likely range from

poor to below average. The coho salmon catch in Goodnews Bay should fall between 20,000 to 30,000 fish (Table 4). District 5 closes by regulation on September 8.

SUMMARY OF 1994 COMMERCIAL SALMON REGULATIONS, KUSKOKWIM AREA

This summary of regulations is for informational use only. This list of regulations is not complete or official. Copies of complete regulations are available at the Bethel Fish and Game office.

1. Commercial Fishing Districts

   A. District 1, the lower Kuskokwim River, is that portion of the Kuskokwim River upstream of a line from Apokak Slough (60' 08' N. lat. 162' 28'W. long.) to the southernmost tip of Eek Island to Popokamiut (60' 04' N. lat. 162' 28' W. long.) to a line between ADF&G regulatory markers located about 1 mile upstream of the mouth of the Tuluksak River just downstream of the southern tip of Nelson Island.

   B. District 2 is that portion of the Kuskokwim River from ADF&G regulatory markers at the downstream mouth of the second slough on the west bank downstream of Kalskag upstream to Chuathbaluk (Figure 3).

   C. District 4, Quinhagak is in Kuskokwim Bay between ADF&G regulatory markers placed at the mouth of Wheelung Creek and at the southernmost edge of the mouth of the Arolik River (Figure 4).

   D. District 5, Goodnews Bay is Goodnews Bay inside a line between Department of Fish and Game regulatory markers placed near the bay entrance and a line between Department of Fish and Game regulatory markers placed near the mouth of the Ukfigag River and on the opposite shore near the mouth of the Tunulik River (Figure 5).

   E. All other waters are closed to commercial salmon fishing.

2. Commercial Gill Net Specifications and Operation

   A. Only set and drift gill nets are legal gear.

   B. Fishermen shall fish or help in fishing only one type of gear, they cannot have set nets out while they are fishing with drift nets.

   C. The length of a set or drift gill net may not exceed 50 fathoms.

   D. Salmon may be taken only with gill nets of 6 inch or smaller mesh.

   E. Gill nets may not be more than 45 meshes deep.

F. No gill net may obstruct more than one-half the width of any waterway. In the intertidal zone this restriction applies at all stages of the tide.

G. All gill nets in operation must have a red keg, buoy or cluster of floats plainly and legibly marked with the fisherman's five digit CFEC permit serial number. There may not be any other numbers or letters on the buoy.

H. In District 5 no part of the set gill net may be set or operated within 300 feet of any part of another set gill net.

I. Gill net web must contain at least 30 filaments or the web must contain at least six filaments, each of which must be at least 0.20 millimeter in diameter.

3. Commercial Fishing Seasons and Periods

A. All districts open by emergency order.

B. KUSKOKWIM RIVER SALMON MANAGEMENT PLAN.

1. The objective of the Kuskokwim River Salmon Management Plan is to provide guidelines for the management of the Kuskokwim River commercial salmon fishery that will result in sustained yields of the salmon stocks large enough to provide for subsistence needs and an economically viable commercial fishery.

2. It is the intent of the Board of Fisheries that the Kuskokwim River king salmon stock be managed in a conservative manner consistent with sustained yield principles and the subsistence priority and, consistent with intent, that the available surpluses of other salmon stocks be taken. To accomplish these objectives the department shall manage the Kuskokwim River commercial salmon fishery as follows:

(a) there shall be no directed commercial king salmon fishery;

(b) deleted;

(c) only those waters of District 1 downstream of ADF&G regulatory markers at Bethel shall be open during the first period;

(d) there shall be at least three eight-hour fishing periods in June;

(e) although no directed fishery on king salmon is allowed, the incidental catch guideline harvest level for king salmon during fisheries directed on other species is 15,000 to 50,000 fish;

(f) to the extent possible, the department shall provide at least 24 hours advance opening of District 1 fishing periods;

(g) District 1 fishing periods are from 1:00 p.m. until 7:00 p.m.; during longer fishing periods, the extra time is to be divided before 1:00 p.m. and after 7:00 p.m.

C. Districts 1 and 2 will close on September 1.

D. District 4

1. Will open before 16 June.

2. There shall be at least one fishing period a week unless a severe conservation problem exists.

3. If the commercial salmon fishery is closed the department shall decide by the tenth day whether the sport fishery on the species of concern will close.

E. District 4 and 5 will close on 8 September.

F. Closed Waters

1. All waters of the Kuskokwim River drainage not included in Districts 1 and 2.

2. All waters of Kuskokwak Slough.

3. The Goodnews, Kanektok and Arolik Rivers.

4. All waters of the Kuskokwim Area not included in Districts 4, and 5.

JOINT STATEMENT ON THE MANAGEMENT OF THE KUSKOKWIM RIVER SALMON FISHERY

The Board of Fisheries, the Department of Fish and Game, the local Fish and Game advisory committees, and local subsistence and commercial fishermen agree to work together towards the goal of increasing the sustained yield of Kuskokwim River salmon stocks to provide for subsistence needs and an economically viable commercial fishery. To achieve that goal, the parties agree to the following:

1. The Kuskokwim River Salmon Management Group, formed in 1988, will continue to co-operate with the Department in the management of the Kuskokwim River fishery.

2. The local Department staff will meet with the Working Group to discuss preseason and inseason management of the fishery and evaluate items such as, historic and inseason data from, but not limited to, the following sources:

    a. test fisheries;

    b. CPUE results from commercial fisheries;

    c. inseason subsistence catch data;

    d. Aniak Sonar;

    e. Kogrukluk Weir;

3. It is understood that the purpose of these meetings shall be to arrive at a consensus, as defined by the rules of conduct of the Kuskokwim River Salmon Management Working Group, regarding recommendations on management of the Kuskokwim River fishery. Emergency Order authority continues to be at the Department's discretion;

4. The Department shall provide at least 48 hours notice of the first commercial fishing period;

5. The fishing periods may be separated by up to, but no more than, six days to assist king salmon passage;

6. The Department and the Working Group will continue working towards the development of a comprehensive management plan for all Kuskokwim River salmon stocks, and report to the Board on their progress.

7. Working Group/Staff meetings will be called at the discretion of the chair of the Working Group.

SUBSISTENCE SALMON FISHING REGULATIONS

A. IT IS UNLAWFUL TO BUY OR SELL SUBSISTENCE-TAKEN FISH OR THEIR PARTS, OR THEIR EGGS.

B. In District 1 and in those waters of the Kuskokwim River between Districts 1 and 2, excluding the Kuskokwak Slough, salmon may be taken anytime except **salmon may not be taken 16 hours before, during, and for six hours after each open commercial salmon fishing period for District 1.**

C. Kuskokwak Slough salmon may be taken at anytime except salmon may not be taken 16 hours before and during each open commercial salmon fishing period for District 1.

D. In District 2 and tributaries flowing into the Kuskokwim River salmon may be taken at any time except from June 1 through September 8 **salmon may not be taken 16 hours before, during, and for six hours after each open commercial salmon fishing period for District 2.**

F. In District 4 and 5 salmon may be taken at any time except from June 1 through September 8 **salmon may not be taken 24 hours before, during and 6 hours after each open commercial fishing period in the district.**

G. Only gill net, beach seine or fishwheel are legal gear for taking salmon, salmon also may be taken by spear in the Holitna River drainage.

H. All unattended fishing gear must have the fishermen's initial, last name, and address written on it legibly.

I. The length of set gill nets or drift gill nets in use by any individual for taking salmon may not exceed 50 fathoms.

J. In tributaries of the Kuskokwim River, set gill nets must connect to the bank and fish perpendicular to the bank and in a straight line.

K. In that portion of the Kuskokwim River drainage from the southern end of the Eek Island, upstream to the mouth of the Kolmakof River, no part of a set gill net located within the tributary of the Kuskokwim River may be set or operated within 150 feet of any part of another gill net.

L. A gill net may obstruct not more than one-half of the width of any fish stream. A stationary fishing device may obstruct not more than one-half the width of any salmon stream.

M. The maximum depth of gill nets is as follows;

(1) gill nets with 6 inch or smaller mesh may not be more than 45 meshes in depth.

(2) gill nets with greater than 6 inch mesh may not be more than 35 meshes in depth.

N. The Goodnews River is closed east of a line between ADF&G regulatory markers placed near the mouth 24 hours before, during and 6 hours after each commercial salmon fishing period.

O. The Kanektok River is closed upstream of ADF&G regulatory markers placed near the mouth 24 hours, before, during and 6 hours after each open commercial salmon fishing period.

YOU MAY OBTAIN THE CURRENT COMMERCIAL SALMON OPENINGS 24 HOURS A DAY BY CALLING 543-2598.

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

	Escapement Objectives[a]			
	Chinook	Sockeye	Coho	Chum
KUSKOKWIM RIVER:				
1. Kwethluk River				
a. 3-step Mt. to Canyon Cr.	1.0	-	-	7.0
b. Canyon Creek	0.2	-	-	-
2. Kisaralik River				
a. Airstrip to Kisaralik L.	1.0	-	-	8.0
b. Kasigluk R. (upper to lower)	0.1	-	-	4.0
3. Tuluksak R. (Fog R. to Bear Cr.)	0.4	-	-	5.0
4. Aniak River				
a. Buckstock R. to Aniak L.	1.5	-	-	10.0
b. Salmon River	0.6	-	-	3.0
c. Aniak Sonar Project[b]	-	-	-	250.0
5. Holitna River				
a. Nogamut to Kashegelgok[c]	2.0	1.0	-	49.0
b. Kogrukluk Weir[c]	10.0	2.0	25.0	30.0
6. Salmon River (Pitka Fork)	1.3	-	-	-
KUSKOKWIM BAY:				
1. Kanektok River to Kagati Lake	5.8	15.0	25.0	30.5
2. Goodnews River System				
a. Main Fork and lakes	1.6	15.0	15.0	17.0
b. Middle Fork and lakes	0.8	5.0	2.0	4.0
c. Middle Fork Weir Project[d]	3.5	25.0	-	15.0

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

Table 2. Lower Kuskokwim River, District 1, and the middle Kuskokwim River, District 2, combined commercial salmon harvest, 1960-1993.

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
1989	43,217	42,747	479,856	464	749,182	1,315,466
1990	53,759	84,870	410,332	3,397	461,624	1,013,982
1991	37,778	108,946	500,935	378	431,802	1,079,839
1992	46,872	92,218	666,170	7,451	344,603	1,157,314
1993	8,735	27,008	610,739	64	43,337	650,883
Ten Year Average (1983-1992)	39,574	87,692	479,638	234[a]	483,333	1,124,158

a Odd years only.

Table 3. Quinhagak District commercial salmon harvest, 1960-1993.

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	13,872	21,534	68,591	21,258	29,183	154,438
1989	20,820	20,582	44,607	273	39,395	125,677
1990	27,644	83,681	26,926	12,056	47,717	198,024
1991	9,480	53,657	42,571	115	54,493	160,316
1992	17,197	60,929	86,404	64,217	73,383	302,130
1993	15,784	80,934	55,817	7	40,943	193,485
Ten Year Average (1983-1992)	24,831	30,375	57,449	207[a]	37,636	162,604

a Odd years only.

Table 4. Goodnews Bay District commercial salmon harvest, 1968-1993.

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
1989	2,966	19,299	31,849	82	13,622	67,818
1990	3,303	35,823	7,804	629	13,194	60,753
1991	912	39,838	13,312	29	15,892	69,983
1992	3,528	39,194	19,875	14,310	18,520	95,427
1993	2,117	59,293	20,014	0	10,657	92,081
Ten year Average (1983-1992)	5,028	25,728	25,944	35[a]	15,091	74,769

a Odd years only.