

REPORT TO THE ALASKA BOARD OF FISHERIES
KUSKOKWIM AREA, 1994

By:

Cindy Anderson
Charles Burkey
Doug Molyneaux
R. Kim Francisco

Regional Information Report¹ No. 3A94-30

20 October 1994

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

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The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports.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

The Alaska Department of Fish and Game conducts all programs and activities free from discrimination on the basis of sex, color, race, religion, national origin, age, marital status, pregnancy, parenthood or disability. For information on alternative formats available for this and other department publications, please contact the department ADA Coordinator at (voice) 907-465-4120, (TDD) 1-800-478-3648, or (fax) 907-586-6596. Any person who believes that they have been discriminated against should write to: ADF&G, P.O. Box 25526, Juneau, AK 99802-5526; or O.E.O., U.S. Department of the Interior, Washington D.C. 20240.

AUTHORS

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 Kuskokwim Area Research Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, 333 Raspberry Road, Anchorage, AK 99518-1599

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.

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, Jennifer Chris, Joy Wintersteen, Allen Glore, Mary Sattler, Robert Stewart, Mary Ann Profita, Philip Perry, Don Rearden, Joseph Whittom, Chris Schmierbach, Joshua Arnold, Victoria Baker, Lucinda Alexie, Roberta Lewando, Matt Niclai, and Jon Becker. In addition, we would like to recognize Valerie Bjornstad, Syma Ebbin, Allen and Teddy Wintersteen, Rob MacDonald and Robbin Stratton, the volunteers in the Kuskokwim Area. They provided valuable assistance by helping complete projects that were not funded. 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. The Togiak National Wildlife Refuge provided flight time and assistance with escapement monitoring in Goodnews Bay.

TABLE OF CONTENTS

	<u>Page</u>
LIST OF TABLES	iii
LIST OF FIGURES	v
INTRODUCTION	1
SUMMARY OF THE 1994 SEASON	1
Escapement Monitoring	1
Subsistence Fishery	2
Commercial Fishery	3
Kuskokwim River (Districts 1 & 2)	4
Chinook Salmon	6
Sockeye Salmon	6
Chum Salmon	7
Coho Salmon	8
Kuskokwim Bay	9
Quinhagak (District 4)	9
Goodnews Bay (District 5)	11
OUTLOOK FOR 1995	12
Chinook Salmon	12
Sockeye Salmon	13
Chum Salmon	13
Coho Salmon	14
TABLES	16
FIGURES	46

LIST OF TABLES

		<u>Page</u>
Table 1.	Utilizations of Kuskokwim River chinook salmon, 1960-1994	17
Table 2.	Estimated dollar value of Kuskokwim Area commercial salmon fishery, 1964-1994	18
Table 3.	Commercial Fishing Effort in Kuskokwim Area by Permit - Hour, 1960-1994	19
Table 4.	Kuskokwim Area commercial, subsistence, and personal use salmon catches, 1913-1994	20
Table 5.	Mean salmon weights and prices paid to commercial permit holders in the Kuskokwim Area, 1967-1994	23
Table 6.	Executive summary of working group and department actions, 1994.	24
Table 7.	Lower Kuskokwim River, District 1, commercial salmon harvest and fishing effort by period, 1994.	28
Table 8.	Middle Kuskokwim River, District 2, commercial salmon harvest and fishing effort by period, 1994	29
Table 9.	District 1 and District 2 combined commercial salmon harvest, 1960-1994	30
Table 10.	Chinook salmon sex ratios and proportion of females with gill net marks, Kogrukluuk weir, 1979-1994	31
Table 11.	Historic salmon escapement data from current Kuskokwim Area projects, 1976-1994	32
Table 12.	Utilizations of Kuskokwim River chum salmon, 1960-1994.	34
Table 13.	Quinhagak District commercial effort 1970-1994	35
Table 14.	Quinhagak, District 4, commercial salmon harvest and fishing effort by period, 1994	36
Table 15.	Quinhagak District commercial salmon harvest, 1960-1994	37
Table 16.	Kanektok River peak aerial surveys by species, 1962-1994	38
Table 17	Ex-vessel Value of Kuskokwim Area Salmon Catch by District	39

LIST OF TABLES (continued)

	<u>Page</u>
Table 18. Goodnews Bay, District 5, commercial salmon harvest and fishing effort by period, 1994	40
Table 19. Goodnews Bay, District 5 commercial effort 1970-1994	41
Table 20. Goodnews Bay District commercial salmon harvest, 1968-1994.	42
Table 21. Historical estimated salmon run size and commercial exploitation rate, Goodnews River, 1981-1994	43
Table 22. Preliminary projections of the 1995 Kuskokwim Area commercial salmon harvests in thousands of fish by species	45

LIST OF FIGURES

	<u>Page</u>
Figure 1. Kuskokwim Area map	47
Figure 2. Kuskokwim Management Area, District W-1	48
Figure 3. Kuskokwim Management Area, District W-2	49
Figure 4. Kuskokwim Management Area, District W-4	50
Figure 5. Kuskokwim Management Area, District W-5	51
Figure 6. Kuskokwim River aerial chinook salmon escapement index, 1975-1994	52
Figure 7. Commercial Coho CPUE in District W-2, 1981-1994	53

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 on the southern tip of Nelson (aka Big) Island 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 1994 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, weir projects on the Kogruklu, Tuluksak and Goodnews rivers, and sonar projects in the Aniak and Kuskokwim rivers provide an annual assessment of spawning escapement (Figure 1). 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, the Kuskokwim River sonar 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.

Turbid water conditions and inclement weather often prevent accurate estimates of escapements by aerial survey. There are two weirs in the Kuskokwim River drainage in the Kogruklu and Tuluksak rivers. Despite their wide geographic

separation it appears that salmon travel time from District 1 to both weirs is about 20 to 25 days. The Kogruklu River weir is the oldest continuous escapement project, excluding aerial surveys, operated by the Department in the Kuskokwim Area. The United States Fish and Wildlife Service (USFWS) has operated the Tuluksak River weir since 1991.

A Department weir on the Middle Fork of the Goodnews River provides in-season escapement data for District 5. This project has allowed improved management of the District 5 fishery. The salmon travel time from the commercial fishing district is much shorter, which increases the usefulness of the in-season count and escapement model.

In the Kuskokwim River three test fisheries provide the in-season assessment of the salmon run strength by comparison of catch per unit effort (CPUE) data. 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 contracted a commercial fisherman beginning in 1992 to conduct this fishery. The Department's Bethel test fishery began in 1984 and is the oldest of the test fisheries (Figure 2). The processor in Aniak funded two new test fisheries at Aniak and Chuathbaluk beginning in 1992 (Figure 3). The Chuathbaluk Test Fishery was discontinued in 1994 due to inconsistencies in data collection and public complaints about the number of salmon being harvested in the test fisheries.

The commercial CPUE data provides an in-season assessment of run strength. Comparison of current year data within the river and with historical data is very important to the successful management of the fishery.

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 and was used to provide in-season run assessments for the first time in 1994.

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 1994 salmon were available for about 107 days in District 1; subsistence fishing was open for 88 days, while the subsistence closures associated with commercial fishing closed subsistence fishing for 19 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 subsistence caught fish during commercial periods. 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.

Subsistence catch statistics for 1994 have not been analyzed at this time. The Subsistence Division mailed 1994 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 but makes it impossible to present the Board with 1994 data in November. The previous three year average subsistence catch has been used in this report for comparative purposes, except for chum salmon. The disastrously weak run in 1993 resulted in a record low subsistence harvest. This low number was unrepresentative and would have dominated the average and so we used the 1990-1992 three year average for the chum salmon subsistence harvest estimate in 1994.

Commercial Fishery

The expansion in the commercial fishery that has occurred in the last ten years leveled off in 1994. In 1994, 797 of the 832 permit holders made at least one landing (Table 2). The number of permits fished in 1993 was below average for the first time since 1984 (Table 2). Since the peak of 824 permits fished in 1989 and 1990, the number of active permits has declined (Table 2). Economic factors are believed to be the cause but no data is available to support this hypothesis.

The reduction in the number of permits fished and reduction in fishing time in the Kuskokwim River reduced the number of permit-hours in 1994 (Table 3). Permit-hours were below average in Districts 1 and 2 due to the long closure during the chum salmon fishery (Table 3). Permit holders transfer freely between districts. This caused the closure in Districts 1 and 2 to contribute to the increase in permit-hours in District 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 36 hours in length. Permit holders prefer daylight fishing hours so the periods are normally 9:00 a.m. until 9:00 p.m.

The 1994 Kuskokwim Area salmon season opened by emergency order in District W-4, Quinhagak on 15 June. The salmon season closed by regulation on 8 September following the final fishing periods in Districts W-4, Quinhagak and W-5, Goodnews Bay on 7 September. Seven hundred and ninety seven (797) permit holders took 27,345 chinook, 191,169 sockeye, 856,100 coho, 84,870 pink and 360,893 chum salmon (Table 4).

The chinook salmon catch was similar to last year's catch and is below the ten year average (1984-1993) of 62,728 (Table 4). The average price per pound for chinook salmon was \$0.51, the lowest price since 1978 (Table 5). The sockeye salmon catch was above the average of 151,335 (Table 4). The \$0.53 price per

pound paid for sockeye salmon was the lowest since 1984 (Table 5). The coho salmon catch was the highest on record, breaking the previous 1984 record catch (Table 4). The price per pound for coho salmon increased steadily during the season from \$0.35 to \$0.70 per pound. The average price of \$0.57 was below the ten year average price of \$0.63 (Table 5). The pink salmon catch was the second highest on record, only the catch in 1992 of 85,978 was higher (Table 4). Pink salmon brought an average of \$0.08 a pound, the ten year average price (Table 5). The chum salmon catch was below the average catch of 546,749 (Table 4). The price of \$0.21 was the lowest since 1973 (Table 5).

Kuskokwim permit holders received \$5,201,611 for their catch (excluding bonuses and other incentives not reported on fish tickets). The value of the catch was \$400,000 below the previous ten year average of \$5,601,981 (Table 2). The average permit holder received \$6,526 (Table 2). This was the fourth highest value per permit holder but still below the average value of \$6,961.

Kuskokwim River (Districts 1 & 2)

The Kuskokwim River Salmon Management Working Group (Working Group) continued to work closely with the Department in 1994. 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 6). During the season the Working Group met 23 times to evaluate the status of the salmon runs and make recommendations to the Department.

In 1993, the chum salmon return to the Kuskokwim River drainage was well below the level necessary to meet escapement needs. As a result, there was only one commercial chum salmon fishing period, the chum salmon sport fishery was closed, and the subsistence fishery was restricted. This was the first time that restrictions were placed on the subsistence fishery other than the normal closures associated with commercial fishing.

The 1994 chum salmon return was expected to be below average. The five year old fish, spawned in 1989, were expected to be weak due to their poor return as four year old salmon in 1993. The four year old chum salmon from the 1990 escapement were expected to be average in abundance.

In order to minimize the possibility of subsistence fishing restrictions in 1994, the department's management of the commercial fishery was more conservative than in previous years. No commercial chum salmon fishing was allowed until a surplus of chum salmon above escapement and subsistence needs had been identified.

There were four commercial fishing periods during the chum salmon season in District W-1, the lower Kuskokwim River (Table 7). There were no commercial openings targeting chum salmon in District W-2, the middle Kuskokwim River (Table 8). A total of 271,115 chum salmon were harvested by approximately 720 permit holders (Table 9). This was the fourth lowest chum salmon harvest since 1983, when the fishery changed from harvest quota to escapement based management. The average price per pound for chum salmon was \$0.22 making the ex-vessel value of the catch worth \$348,942.

Run assessment through mid-June showed above average chum salmon abundance. The Working Group and the department agreed to open the commercial fishery on 24 June for eight hours downstream of Bethel in compliance with 5 AAC 07.365 KUSKOKWIM RIVER SALMON MANAGEMENT PLAN. The catch of 87,720 chum salmon was above the historical average for that date.

Immediately following the commercial period run strength indicators showed very weak chum salmon passage. At its next two meetings (27 June and 30 June) the Working Group did not recommend setting a commercial period but agreed to meet again to reassess the run. During the 2 July meeting, the Working Group recommended a four hour fishing period on 3 July for District W-1 downstream of Bethel and in District W-2. The department vetoed the recommendation due to the continued low level of chum salmon passage.

Starting on 6 July the chum salmon run showed dramatic improvement. Commercial fishing did not reopen until 14 July when processing capacity became available. This four hour commercial opening was the first period in the Kuskokwim Area under six hours in length. There were three commercial periods between 19 July and 26 July. After the 26 July opening, when the coho salmon catch exceeded that of chum salmon, management emphasis switched to coho salmon.

The department and the Working Group agreed to reopen the commercial fishery on 29 July for 6 hours in District 1. The opening was restricted to the lower portion of the Kuskokwim River until the processor sponsored testfishery located in District 2, indicated a predominance of coho salmon. This allowed the Working Group to open District 2 to commercial fishing on 4 August.

The Working Group set a total of 12 fishing periods in District 1 (Table 7) and 8 periods in District 2 (Table 8) during the 1994 coho salmon season. During the management of coho salmon, the Working group followed the recommendation of the department of 6 hours of fishing for 5 periods. The Working Group increased fishing from beyond the department's 6 hour recommendation to 8 hours for a total of 6 periods during the 1994 season. On one occasion the department recommended an opening, but the Working Group voted to set another meeting instead of fishing.

Coho salmon management during 1994 went smoothly since early indicators of abundance continued to predict making or exceeding escapement goals in the Kuskokwim River drainage. The department followed a conservative method of management in the early portion of the run, until testfishing, commercial catch statistics and the Kogrukluk River Weir, indicated that the coho run was strong. As the season progressed, and escapement indicators predicted making or exceeding project escapement needs, the Working Group recommended switching from 6 to 8 hour periods. This continued until nearly the end of the season.

One unusual aspect of this coho season was a Working Group recommendation to close fishing along the south side of the main stem Kuskokwim River from Aniak River to 1 mile below Crow village, during the period held on 19 August. This recommendation was made to reduce the harvest of coho salmon destined for the Aniak River drainage, based upon public concerns about lagging escapement. Usual coho season commercial fishing continued until the Working Group meeting of 29 August. Based on further input from Working Group members in the middle and

upper Kuskokwim River, during the last 2 periods only District 1 was open downstream of Bethel. This would allow uninterrupted subsistence fishing in District 2 and would decrease exploitation rates on the later portion of the coho salmon run.

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 10).

Beginning in 1984, the Board began restricting the commercial fishery since the Department was unable to correct the problem through in-season 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 of 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 achieved in 1994 (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 4). In 1994 the commercial harvest of 49,365 sockeye salmon was well below the recent ten year average of 83,507 (Table 9).

Sockeye salmon escapement is documented ancillary to the other species. The Kogrukluuk weir escapement estimate of 14,192 sockeye salmon in 1994 was above average (Table 11). The reduced harvest in 1994 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 12). A combined catch of 400,000 chum salmon was the management goal from 1971 to 1979 (Table 9). Subsistence catches for the entire river have declined since the inception of the commercial fishery in 1971 (Table 12). 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 12). 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 491,897 salmon in the last ten years (Table 9). 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.

The Eek test fishery was a very poor indicator of chum salmon run strength in 1994. The chum salmon index at Eek was the lowest on record, indicating that the chum salmon run was much weaker than it actually was. The Kuskokwim River has two major channels at the sight where the Eek test fishery occurs. The Eek test fishery operates in only the eastern channel. The most obvious explanation is that a higher than normal proportion of the chum salmon run entered the river via the western channel. The Bethel test fish index for chum salmon was the third highest on record. The Aniak test fishery (in its third year of operation) had record indices for chum salmon.

The Kogrukluik Weir (the index stream for fish upstream of Aniak) easily exceeded its chum salmon objective (Table 11). The final escapement for the Aniak Sonar was 55 percent above its objective (Table 11). In its fourth year of operation, the Tuluksak River weir (the index stream for District 1 spawning tributaries) had a record high escapement of chum salmon (Table 11).

Parent year escapements were good in the 1989 and slightly below objective in the 1990 brood years. The 5 year old return was higher than expected considering the extremely poor showing of 4 year olds in 1993. The 4 year old return was average in strength.

Coho Salmon

Kuskokwim River managers have several indicators of coho salmon escapement in the drainage: 3 testfisheries (at Eek, Bethel and Aniak), Kogrukluk River and Tuluksak River Weirs, commercial catch data, and partial funding of the mainstem sonar for part of the coho salmon run. They provide rough abundance indicators for management. The longest running escapement project in the Kuskokwim is the Kogrukluk Weir, which has a coho salmon escapement objective of 25,000 fish. Commercial catch per unit effort (CPUE) in District 2 during coho season has become a more recent tool for managers since the removal of harvest guidelines. In years when the CPUE through District 2 has been at or above 37, Kogrukluk Weir (an indicator of escapement in upper drainages) has reached its coho salmon escapement goal. This has also proven to be a useful tool when the weir data is unavailable.

The U.S. Fish and Wildlife Service has operated a weir on the Tuluksak River for 4 consecutive years. This project provides an indication of relative abundance of coho salmon in the lower portion of the Kuskokwim River drainage. Due to the rainy weather that is typical for August on the Kuskokwim Delta, aerial surveys are seldom available in-season for indicators of coho abundance.

Subsistence use of coho salmon has increased in areas where freezers are available to preserve fish. Traditionally in the lower portions of the Kuskokwim River drainage, coho salmon were not well utilized because of the poor drying conditions during the months of August and September. In recent years, Subsistence Division staff have started their surveys after coho salmon have completed migration to the upper river villages. This has probably increased numbers of coho salmon reported because subsistence users have completed their coho salmon catches by the time the survey data is collected in October and November.

Commercial fishing begins to target on coho salmon in the Kuskokwim River when coho salmon predominate in the commercial fishery. The strength of the coho salmon run is assessed by comparing testfishing catches throughout the drainage, CPUE of the commercial fleet, and escapement trends at Kogrukluk and Tuluksak River Weirs. Run strength determines the amount of fishing time for both districts. Districts 1 and 2 close by regulation on 1 September. Strong runs in 1984 and 1994 and a late run in 1989 resulted in extending the season into September. The management strategy is similar to chum salmon.

Since statehood the commercial coho salmon catches for the entire river have ranged from 2,498 in 1960 to the record catch of 724,689 in 1994 (Table 9). The previous ten year average (1984-1993) is 521,084 fish (Table 9). Commercial effort during coho season has ranged from 83 permit holders participating in 1971 to 732 permit holders delivering coho salmon in 1989. During the 1994 coho salmon season, 682 permit holders delivered fish in District 1. Since 1988, the inception of cooperative management with the Kuskokwim River Salmon Management

Working Group, the escapement objective has been reached in three of seven years (Table 11). Overfishing has been the cause. Distrust of the test fish data by the Working Group, lag time of useful data from the Kogrukluuk Weir and lack of mainstem passage data from the developing mainstem sonar at Bethel contributed to the overfishing. The Department's uncertainty during the early portions of the run often caused corrective action to be too late to make a significant difference in management of the fishery.

In 1994 the Kogrukluuk Weir had a few days of high water but generally the project was successful. Based on an early run timing model, an estimate of 34,695 coho salmon were enumerated, which exceeds the escapement goal of 25,000.

Commercial CPUE in District 2 has provided a rough estimate of escapement beyond the commercial fishing districts. Historically, if the CPUE was above 37 for the season, escapement goals were achieved at the Department's weir on the Kogrukluuk River. In 1994, prior to the period held on 18 August, the cumulative CPUE was 60. This was the highest historically, in comparison to years when the harvest guideline was still in effect in District 2 and fishing was limited. During the later portion of the coho salmon run, the CPUE dropped which resulted in an overall CPUE of 30.

The Bethel Test Fishery cumulative CPUE index was comparable to years when the escapement objective was reached. The Aniak Test Fishery CPUE in 1994 was greater than the previous 2 years of operation. The escapement objective was exceeded at Kogrukluuk Weir during the 1994 commercial coho season. The Tuluksak River Weir, which is operated by the U.S. Fish and Wildlife Service, has operated for the 4th consecutive year. The 1994 coho salmon escapement on the Tuluksak River appears to be average in comparison.

In 1994 the Kuskokwim River Cooperative Working Group succeeded in achieving escapement during the coho salmon season and provided the Kuskokwim River permit holders a record harvest of this commercially valuable species.

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 Kuskowkim 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 freshwater streams in the district.

Commercial fishing effort in this district has increased considerably in the last decade. Effort in the last two decades 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 321 permit holders (Table 13). In the Kuskokwim Area, permit holders have unrestricted movement between commercial fishing districts. Recent changes in the June Kuskokwim River commercial fishery have shifted effort to this district, which has a targeted chinook salmon fishery.

District 4 opened on 15 June in compliance with 5 AAC 07.367 DISTRICT 4 SALMON MANAGEMENT PLAN, which requires an opening before 16 June. This first opening resulted in a below average catch for chinook salmon (Table 14). Commercial fishing was delayed for 5 days to allow escapement into the Kanektok River drainage, and to provide uninterrupted subsistence fishing for chinook salmon. In 1994, early aerial surveys of the Kanektok River drainage were unsuccessful due to high turbid water. Since the commercial fleet had 2 consecutive poor chinook periods, and aerial survey data was not available, commercial fishing was postponed until 1 July. Commercial fishing resumed on a regular schedule of three 12 hour periods a week until 8 September when it closed by regulation. During the 1994 season, 308 permit holders made commercial deliveries (Table 14). The decrease in effort was probably due to the closure during the chinook salmon directed fishery in June.

The chinook salmon catch of 8,564 is the lowest catch in the last decade, well below the 10 year average of 21,771 (Table 15). Buyers paid an average price of \$.50 per pound. The ex-vessel value of chinook salmon was \$66,918, well below the 1988-93 average of \$207,701. An aerial survey flown of the Kanektok River drainage on 22 July documented 7,386 chinook salmon, which exceeds the escapement goal of 5,800 chinook salmon (Table 16).

When commercial fishing resumed on 1 July, after a closure of 10 days, an above average harvest of sockeye salmon resulted. The directed sockeye salmon fishery continued to fish 3 periods per week and peaked on 13 July at 13,450 sockeye salmon. The sockeye salmon catch of 72,314 is almost twice the ten year average of 37,442 fish (Table 15). An aerial survey on 22 June provided an index count of 30,090 sockeye salmon in the Kanektok River drainage, which exceeds the objective of 15,000 (Table 16). The average price paid for sockeye salmon was \$.54 per pound. The ex-vessel value for sockeye in District 4 was \$256,091, 30 per cent of the total value of the commercial catch (Table 17).

Chum salmon are an incidental catch in the chinook and sockeye salmon commercial fisheries in District 4. The 1994 chum salmon catch was 61,301; which is above the 10 year average of 39,421 fish (Table 15). Chum salmon brought an average of \$.20 per pound, resulting in \$84,351 in payment to permit holders (Table 17). This was 10% of the total value of the fishery in this district. The escapement objective for chum salmon is 30,500; an aerial survey on 22 July made a rough estimate of 10,000 fish during a chinook/sockeye directed survey that was flown prior to peak chum salmon escapement (Table 16).

Coho salmon dominated the commercial catch in this district on 1 August. Commercial catches, when compared with historical catches, indicated that the coho salmon run in this district was strong. Historical catches and escapements have shown that during strong runs fishing can continue uninterrupted for three 12 hour periods per week without jeopardizing escapement. This district had a peak catch of 12,298 fish on 8 August (Table 14). The commercial salmon fishing season closed by regulation on 8 September. The 1994 coho salmon harvest of 83,912 fish is above the 10 year average of 59,786 fish (Table 15). Permit holders were paid an average of \$.62 per pound. The ex-vessel value of coho salmon in District 4 was \$423,612, which was 50% of the total value of the fishery for 1994 (Table 17). 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, who reside in the villages of Platinum and Goodnews Bay, fished steadily during the season (Table 18). The 1994 effort increased to a peak of 116 permit holders due to closures in other Kuskokwim districts and extension of fishing periods in the Goodnews Bay district. Goodnews Bay effort peaked in 1988 at 125 permits and in the last decade has averaged 90 permit holders (Table 19). 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 has allowed the project to enumerate the coho salmon return. 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.

In 1994 the Goodnews Bay district opened to commercial fishing on 27 June and fished two periods a week until the majority of the chinook salmon run had passed the commercial fishery. In the last 4 years, the chinook salmon management strategy in this district has been to open the commercial fishery 5 to 7 days later than the normal historical opening date. This allows an increased escapement of chinook salmon into the Goodnews River drainage. In 1994, this strategy helped achieve an estimated passage of 3,856 chinook salmon through the Goodnews River Weir. This exceeds the escapement goal of 3,500 fish. The commercial harvest of 2,570 chinook salmon was below the ten year average of 3,828 fish (Table 20). Buyers in this district paid an average of \$.50 per pound, which totaled \$21,732 paid for this species. This was 3% of the total value of the commercial fishery in this district (Table 17).

Sockeye salmon catches in Goodnews Bay were above average the first commercial period this season. As the season progressed sockeye salmon increased in abundance in the district and escapement remained strong. When the department's weir on the Goodnews River began passing record numbers of sockeye, and it became apparent that the escapement goal was being approached, fishing time was increased from 12 to 36 hour periods for a week (Table 18). The commercial harvest in 1994 of 69,490 sockeye salmon was more than double the ten year average (Table 20). Sockeye salmon prices averaged \$.53 per pound resulting in \$309,577 paid to permit holders in 1994 (Table 17). This species was 47% of the 1994 total value of the Goodnews Bay District. The department's weir on the middle fork of the Goodnews estimated a sockeye salmon passage of 55,751, well beyond the escapement goal of 25,000 fish (Table 21).

The chum salmon catch is incidental to the sockeye salmon fishery in District 5. The 1994 catch of 28,477 fish was above the ten year average of 15,480 fish (Table 20). Permit holders were paid \$.21 per pound for this species, which totaled \$41,309. This represents 6% of the total commercial fishery value in

this district (Table 17). The chum salmon escapement of 34,849 fish at the Goodnews River Weir exceeded the goal of 15,000 fish (Table 21).

The 1994 coho salmon catch of 47,499 fish was the second highest catch on record. The 10 year average for this species is 25,980 fish (Table 20). Commercial permit holders received \$271,687 for this species (Table 17). This represents 41% of the value of the 1994 commercial harvest in this district. High water prevented the Goodnews River weir from completing enumeration of coho salmon. High water and poor flying conditions prevented any aerial surveys of the Goodnews River drainage.

OUTLOOK FOR 1995

The Kuskokwim Area has no formal forecast for salmon returns. Broad expectations are announced based on an evaluation of brood year escapements, trends in harvest, and trends in return-per-spawner information.

Chinook Salmon

Most chinook salmon return to the Kuskokwim Area at age 6, 5, or 4 so the primary brood years for 1995 will be 1989, 1990 and 1991.

Chinook salmon escapements in Districts 1 and 2 of the Kuskokwim River were generally good during these brood years, suggesting an average return in 1995. The Kuskokwim River Aerial Index, which is a composite of aerial surveys from 13 streams, was near average in all the brood years (Figure 6). In addition, the aerial index shows a marked improvement over the poor escapements which occurred throughout most of the 1980's. At the Kogruklu River weir the chinook escapement was above objective in 1989 and 1990, however in 1991 the count was 21% below objective (Table 11). Still, the overall parent year escapements were good and this leads us to expect chinook abundance will also be good in 1995. Coupling that with the expectation that effort in the chum directed commercial fishery will return to more normal levels, we also anticipate that the incidental commercial harvest of chinook salmon from the Kuskokwim River will be in the upper half of the 9,000 to 56,000 historic range (Table 22).

District 4, Quinhagak, has the only directed chinook salmon fishery in the Kuskokwim area. The chinook salmon escapement index was below objective levels in the Kanektok River in two of the three brood years (Table 16). The harvest trend in recent years has also been below average. A harvest in the lower half of the historic range of 9,000 to 30,000 chinook salmon will likely occur in the 1995 season (Table 22).

In District 5, Goodnews Bay, the chinook stocks have been depressed for most of the past several years. Escapement to the Goodnews River was below objective in two of the three brood years (Table 21). The harvest trend in recent years has been below average due to weak returns and the resultant reduction of commercial fishing time in June. For the 1995 season the incidental catch of chinook in District 5 will probably be toward the lower half of the historic range of 1,000 to 9,000 (Table 22).

Sockeye Salmon

Sockeye salmon return primarily at age 5 in the Kuskokwim area so the 1990 brood year will have the most influence on the 1995 returns. In the Kuskokwim River sockeye salmon harvest is incidental to the directed commercial fishery on chum salmon. Districts 4 and 5 of Kuskokwim Bay both support directed sockeye fisheries.

The return of sockeye salmon to the Kuskokwim River is expected to be about average in 1995. Escapement at KogrukluK River weir was above average in the 1990 brood year, but the KogrukluK Weir is probably not a good indicator of drainage wide production (Table 11). Sockeye salmon harvest in the Kuskokwim River will be driven by the intensity of the chum fishery in late June and early July. Given the average projection for 1995 chum salmon returns to the Kuskokwim River, the incidental sockeye harvest is expected to be toward the middle of the historic range of 27,000 to 137,000 (Table 22).

Sockeye salmon returns to District 4 are expected to be good in 1995. The 1990 brood year escapement as indexed by aerial surveys in the Kanektok River was 32,000 sockeye salmon, which is well above the escapement objective of 15,000 (Table 16). The 1990 return also supported a record commercial harvest of 83,700 sockeye (Table 15). In the last few years the trend has been toward record or near record commercial harvest while still achieving escapement objectives. The sockeye harvest in District 4 is again expected to be within the top half of the historic range of 6,000 to 84,000 (Table 22).

District 5 should also have a good sockeye return in 1995. The 1990 brood year escapement past the Goodnews River weir was 32,000, which exceeded the objective of 20,000 to 30,000. As in District 4, the commercial harvest in recent years has tended towards record or near record commercial harvest while still achieving escapement needs. The District 5 sockeye harvest should again be within the top half of the historic range of 7,000 to 69,000 (Table 22).

Chum Salmon

Chum salmon return to the Kuskokwim Area primarily at 5 and 4 years of age, so the main brood years will be 1990 and 1991. The commercial fisheries in Districts 1 and 2 of the Kuskokwim River target chum salmon. Chum salmon catches in Districts 4 and 5 of Kuskokwim Bay are incidental to the directed sockeye fisheries.

Near average numbers of chum salmon are expected to return to the Kuskokwim River in 1995. Returns for the early part of the season are best indexed by KogrukluK River weir. Brood year escapements at KogrukluK weir were 11 and 19 percent below objective (Table 11). This may result in below average abundance at the start of the 1995 season. However the bulk of chum salmon production for the Kuskokwim River is attributed to the Aniak River and its tributaries. Chum salmon escapement to the Aniak River in 1990 was 7 percent below objective while the 1991 escapement was 26% above objective. In recent years the Aniak River has demonstrated some widely fluctuating productivity in its chum salmon stocks. The cause of this volatility is unknown, but the effect is a heightened chance for

error in preseason predictions. With that in mind, the chum salmon harvest in 1995 is expected to be within the central 50 percent of the recent 43,000 to 1,380,000 range (Table 22).

In District 4, aerial surveys of the Kanektok River have shown chum salmon escapements to be well below objective for the past several years (Table 16). However, the incidental harvest of chum salmon taken during the sockeye directed fishery has been well above average (Table 15). The chum salmon harvest is driven by the level of commercial effort directed at sockeye salmon. Consequently, the above average abundance of sockeye salmon in recent years has resulted in an above average harvest of chum salmon. Oddly, the numbers of chum salmon harvested in District 4 has not yet shown the collapse expected from the history of apparently poor escapements into the Kanektok River. This suggests that aerial surveys of the Kanektok River may not be an adequate index of chum salmon escapement to the Kanektok River. Another alternative is that a significant portion of the District 4 chum salmon harvest is supported by non-Kanektok stocks. In either case, given the expected abundance of sockeye salmon in 1995, the chum salmon harvest in District 4 will probably be in the upper half of the historic range of 9,000 to 73,000 (Table 22).

In District 5, chum salmon escapement past the Goodnews River weir was 57 percent below objective in 1990, but 83 percent above objective in 1991 (Table 21). As in District 4, the incidental chum salmon harvest is driven by efforts to catch sockeye salmon. Still, management is generally successful at achieving or closely approaching the chum salmon escapement objective. Given the good outlook for sockeye salmon in 1995, the incidental chum salmon harvest in District 5 will probably be in the upper half of the historic range of 5,000 to 33,000 (Table 22).

Coho Salmon

Coho salmon return to the Kuskokwim Area primarily as 4 year old fish so 1991 will be the key brood year for 1995 returns. There is very little information on which to base the coho salmon run outlooks. The Kogrukluk River and Tuluksak River weirs are the only coho salmon escapement projects in the Kuskokwim Area and both these projects are located on Kuskokwim River tributaries.

Coho salmon escapement past the Kogrukluk River weir was 60 percent below objective in the 1991 brood year. The Tuluksak River weir was in its first year of operation in 1991 and total coho passage was the lowest yet observed at that project. These escapement results suggest a below average coho return in 1995, but that may not be the case. Poor escapements at Kogrukluk River weir in 1988 and 1990 failed to predict the record coho returns in 1992 and 1994. This apparent inconsistency in the ability to use escapement at Kogrukluk River weir to predict coho salmon abundance in the return year has not been the case historically. For reasons unknown, it appears that coho salmon survival has been well above average in recent years. As a result the 1995 return may be substantially larger than expected. Based on recent survival trends the 1995 coho salmon harvest from the Kuskokwim River may be in the upper half of the 196,000 to 725,000 range (Table 22).

Commercial harvest data are the only guide to forecasting coho salmon returns in Districts 4 and 5. In 1991 the coho harvests were below average in both Districts 4 and 5 (Tables 15 & 20). In the last five years coho catches have ranged from 27,000 to 86,000 in District 4 and from 8,000 to 47,000 in District 5. Based on brood year commercial catch data the 1995 harvest is expected to be in the lower half of these ranges (Table 22). However, the recent survival trends described for Kuskokwim River also applies to Kuskokwim Bay, especially District 4, and these trends suggest catches may be in the upper half of the historic range.

TABLES

Table 1. Utilizations of Kuskokwim River chinook salmon, 1960-1994.

<u>Year</u>	<u>Commercial Harvest^a</u>	<u>Estimated Subsistence Harvest^b</u>	<u>Total Utilization</u>	<u>Running 10 Year Average</u>
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	56,236
1970	39,290	69,204	108,494	64,452
1971	40,274	42,926	83,200	67,789
1972	39,454	40,145	79,599	72,751
1973	32,838	38,526	71,364	74,961
1974	18,664	26,665	45,329	74,877
1975	21,720	47,784	69,504	76,915
1976	30,735	58,185	88,920	78,291
1977	35,830	55,577	91,407	78,646
1978	45,641	35,881	81,522	80,347
1979	38,966	55,524	94,490	81,383
1980	35,881	59,900	95,781	80,112
1981	47,663	59,669	107,332	82,525
1982	48,234	53,310	101,544	84,719
1983	33,174	52,000	85,174	86,100
1984	31,742	57,000	88,742	90,442
1985	37,889	42,277	80,166	91,508
1986	19,414	51,019	70,433	89,659
1987	36,179	67,352	103,504	90,869
1988	55,716	53,877	109,593	93,676
1989	43,217	73,035	116,252	95,852
1990	53,504	71,281	124,785	98,753
1991	37,778	80,865	118,643	99,884
1992	46,872	58,239	105,111	100,240
1993	8,735	72,119	80,854	99,808
1994	16,211	70,408 ^c	86,619	99,596
Ten Year				
Average	37,130	62,706	99,808	
(1984-1993)				

a District 1, 2 and 3.

b Estimated subsistence harvest expanded from villages surveyed.

c Previous 3 year average, subsistence catch not available at this time.

Table 2. Estimated dollar value of Kuskokwim Area commercial salmon fishery, 1964-1994.

<u>Year</u>	<u>Gross Value of Catch to Fishermen</u>	<u>Permits Fished^a</u>	<u>Average Income</u>
1964	83,030		
1965	90,950		
1966	87,466		
1967	138,647		
1968	290,370		
1969	297,233		
1970	362,470		
1971	371,220		
1972	360,727		
1973	827,735		
1974	1,056,042		
1975	899,178		
1976	1,380,229		
1977	3,891,950		
1978	2,337,470		
1979	3,678,000		
1980	2,725,134		
1981	3,766,525		
1982	4,213,954		
1983	2,670,400		
1984	5,809,000	774	7,505
1985	3,248,089	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
1994	5,201,611	797	6,526
Ten Year Average (1984-1993)	\$5,601,981	804	7,961

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

Table 3. Commercial Fishing Effort in Kuskokwim Area by Permit-Hour^a, 1960-1994.

<u>Year</u>	<u>Dist. 1</u>	<u>Dist. 2</u>	<u>Dist. 3</u>	<u>Dist. 4</u>	<u>Dist. 5</u>	<u>Total</u>
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
1994	54,750	702		26,580	15,768	96,800
Ten Year Average (1984-93)	56,437	943		29,933	12,045	99,288

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

Table 4. Kuskokwim Area commercial, subsistence, and personal use salmon catches, 1913-1994.

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

- Continued -

Table 4. (page 2 of 3)

Year	COMMERCIAL CATCH						SUBSISTENCE CATCH				COMBINED TOTAL HARVEST
	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Coho ^b	Small ^c	Total	
1960	5,969	5,649	5,498		3	17,119	18,752	301,753	320,505		337,624
1961	23,246	2,308	5,090	91	18,864	49,599	27,457	179,529	206,986		256,585
1962	20,867	10,313	12,598	4,340	45,707	93,825	13,455	161,849	175,304	269,129	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

- Continued -

Table 4. (page 3 of 3)

Year	COMMERCIAL CATCH						SUBSISTENCE CATCH						COMBINED TOTAL
	Chinook	Sockeye	Coho	Pink	Chum	Total	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 ^a	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	75,466	41,323	28,848		48,235	193,872	1,169,321
1994	27,345	191,169	856,100	84,870	360,893	1,519,228							
Ten Year Average (1984-1993)	62,728	151,335	606,850	36,025 ^e	546,749	1,376,951	66,589	35,196 ^f	33,698		94,540 ^f	232,936	1,619,187

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 nine year average excluding 1986 when the small salmon were not differentiated.

Table 5. Mean salmon weights and prices paid to commercial fishers in the Kuskokwim Area, 1967-1994.

Year	Mean Weight - Pounds					Average Price - \$/Pound				
	Chinook	Sockeye	Coho	Pink	Chum	Chinook	Sockeye	Coho	Pink	Chum
1967	27.8	7.4	5.9	a	7.0	0.13	0.05	0.09	a	0.04
1968	23.8	6.2	7.2	4.0	7.9	0.16	0.10	0.09	0.05	0.04
1969	19.6	6.2	7.3	3.6	5.8	0.19	0.15	0.10	0.06	0.07
1970	18.9	5.4	7.3	3.3	6.1	0.20	0.21	0.14	0.08	0.08
1971 ^b	26.2	6.9	6.1	a	6.4	0.17	0.10	0.13	a	0.08
1972	a	a	a	a	a	0.20	a	0.16	a	0.08
1973	a	a	a	a	a	0.25	a	0.26	a	0.19
1974	a	a	a	a	a	0.46	0.34	0.27	0.23	0.25
1975	a	a	a	a	a	0.54	a	0.31	a	0.26
1976 ^c	17.0	6.7	7.8	3.5	7.0	0.64	0.43	0.40	0.25	0.27
1977	22.7	8.3	7.8	3.9	7.3	1.15	0.45	0.65	0.25	0.45
1978	24.2	6.5	7.1	3.9	8.9	0.50	0.49	0.40	0.12	0.32
1979	16.6	6.9	7.9	3.9	7.0	0.66	0.53	0.75	0.11	0.37
1980	14.1	6.7	6.9	3.6	6.4	0.47	0.31	0.64	0.12	0.24
1981	17.8	7.2	6.4	3.5	7.5	0.84	0.61	0.63	0.11	0.23
1982	19.3	7.2	7.3	3.6	7.3	0.82	0.41	0.53	0.05	0.22
1983	18.8	6.8	6.8	3.5	7.4	0.54	0.51	0.39	0.05	0.33
1984	16.4	6.6	7.7	3.2	6.7	0.89	0.52	0.55	0.07	0.28
1985	17.0	7.0	7.5	3.6	7.1	0.71	0.59	0.51	0.05	0.25
1986	17.0	7.2	6.4	3.4	6.8	0.80	0.70	0.60	0.05	0.25
1987	15.2	7.5	7.2	3.7	6.8	1.10	1.30	0.73	0.10	0.27
1988	15.1	7.3	7.5	3.4	8.1	1.30	1.42	1.25	0.15	0.40
1989	16.6	7.2	7.3	3.4	6.8	0.75	1.20	0.55	0.05	0.26
1990	15.1	6.7	6.5	3.2	6.9	0.56	1.05	0.75	0.12	0.26
1991	15.3	6.9	6.5	3.4	6.3	0.56	0.67	0.45	0.12	0.31
1992	13.4	7.0	7.3	3.9	6.8	0.66	0.90	0.45	0.06	0.32
1993	14.3	7.1	6.6	3.4	6.5	0.62	0.70	0.58	0.25	0.40
1994	15.6	6.9	7.6	3.6	6.6	0.51	0.53	0.57	0.08	0.21
Ten Year Average (1984-93)	15.5	7.0	7.1	3.5	6.9	0.80	0.91	0.64	0.10	0.30

a Information unavailable.

b Information was not available for district 5.

c Information was not available for district 4 and in W-1 & W-2 for 1 Sept.

Table 6. Executive summary of Working Group and Department actions, 1994.

<u>DATE</u>	<u>DEPT. RECOMMENDATIONS</u>	<u>WORKING GROUP RECOMMENDATIONS</u>	<u>ACTUAL</u>
10 March		The Working Group failed to achieve a quorum.	
19 March		The Working Group opposed the Department proposal to the Board of Fisheries for rebuilding A-Y-K chum salmon runs. They felt in-season in-river management by the Working Group and Department would provide the needed savings. They supported the proposal allowing seasons, gear, and areas open to commercial, personal use, sport, and subsistence fishing to be modified to improve chum salmon escapements in the Kuskokwim Area. This proposal also outlawed roe striping. The Working Group supported the proposal to minimize the incidental catch of chum salmon in the South Unimak and Shumigans Islands June Salmon management plan and recommended that the Board of Fisheries adopt a 300,000 chum salmon cap. In addition the Working Group passed a resolution encouraging the Board to adopt a resolution supporting full funding of Department projects in the Kuskokwim Area and increased funding for chum salmon research.	
25 April		Meeting canceled because Commissioner Rosier and Director Koenings unable to attend due to press of business in Juneau.	
26 May	Presented Informational Letter explaining upcoming season's management plan for approval.	Joe Lomack and Dr. John White were reelected as Co-chairs for 1994. Meeting was recessed until Work Session on 31 May to discuss Department's Informational letter. Meeting to reconvene on 2 June to make recommendations on the Informational Letter.	
31 May	Department explained how test fish and sonar thresholds would be used in the Kuskokwim River.	The Working Group took 2 1/2 hours of public testimony concerning management of the 1994 salmon fishery. A great deal of discussion centered on how and when the mesh size restriction in the subsistence fishery might be used. The Working Group found it impossible to participate in cooperative management without a management plan. A motion to the Commissioner requesting a management plan or that the Informational Letter be titled "Draft Management Plan" passed unanimously. The meeting on 2 June was canceled and the Working Group adjourned until the call of the Co-chairs or the release of a management plan by the Commissioner.	

- continued -

Table 6. (page 2 of 4)

<u>DATE</u>	<u>DEPT. RECOMMENDATIONS</u>	<u>WORKING GROUP RECOMMENDATIONS</u>	<u>ACTUAL</u>
02 June		Canceled on 31 May 1994 for lack of a management plan.	
21 June	Six hour period in District 1 downstream of Bethel on 24 June.	Eight hour period, downstream of Bethel on 24 June.	Eight hour period, downstream of Bethel on 24 June.
27 June	Meet again 29 June 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 improving but still weak chum salmon run.	A motion to meet on 02 July passed.	Working Group met on 02 July.
02 July	Meet again due to weak chum salmon run. 30 June.	Four hour period, downstream of Bethel & in District 2 on 3 July. A motion to meet on 04 July passed.	Vetoed by Department. Working Group met on 04 July.
04 July	Meet again on 6 July to reassess improving chum salmon run.	Working Group to meet at call of co-chair when Department indicates enough fish for commercial period.	Working Group met on 12 July.
12 July	Open Districts 1 & 2 on 14 July, length of period determined by available processing capacity.	Four hour period in District 1 on 14 July.	Four hour period in District 1 on 14 July.
15 July	Open commercial fishing as soon as processing capacity is available.	1. Districts 1 & 2 open for 6 hours 19 July, 2. next commercial period before 25 July based on processing capacity, 3. third commercial period to be allowed before 25 July if run strength and processing capacity allow.	Six hour period in District 1 on 19 July. Six hour period in District 1 on 23 July. District 2 and third period not opened due to lack of processing capacity.

- continued -

Table 6. (page 3 of 4)

<u>DATE</u>	<u>DEPT. RECOMMENDATIONS</u>	<u>WORKING GROUP RECOMMENDATIONS</u>	<u>ACTUAL</u>
25 July	Six hour fishing period in Districts 1 & 2 on 26 July.	Six hours in District 1 on 26 and 28 July. Six hours in District 1 on 26 July.	The Department accepted period on 26 July but felt increasing coho salmon catch prevented setting a period on 28th based on chum salmon.
27 July	Six hour fishing period in District 1 on 29	Six hours in District 1 on 29 July.	Six hour fishing period in District 1 on 29 July.
30 July	Six hour fishing period District 1 on 1 August.	Meet again on 01 August.	The Working Group met on 01 August.
01 August	Six hour period in Districts 1 & 2 on 4 August.	Six hour period in Districts 1 & 2 on 4 August.	Six hour fishing period in Districts 1 & 2 on 4 August.
05 August	Meet again 8 August.	Six hour period in Districts 1 & 2 on 6 August. Six hour period in Districts 1 & 2 on 8 August. Delay for data is a veto. Meet Monday 8 August.	Department vetoed the motion. Department said they would announce before noon 7 August. Working Group met 8 August.
08 August	Six hour fishing in Districts 1 & 2 on 9 August.	Six hour fishing period in Districts 1 & 2 on 9 August.	Six hour fishing period in Districts 1 & 2 on 9 August.
10 August	Six hour period in Districts 1 & 2 on 12 August.	Eight hour period in Districts 1 & 2 on 12 August.	Eight hour period in 1 & 2 on 12 August.
11 August		Co-chair White called special business meeting. He proposed that the Working Group use the \$10,000 allocated by legislature to the Working Group to hire a fisheries consultant. Processors agreed to provide matching funds. The consultant would: 1. Arrive ASAP to talk to Working Group members and fishing public. 2. Review information, biology, and group testimony. 3. Make recommendations to help Work Group process and find answers to current problems. 4. Prepare recommendations and report to the Board of Fisheries at November meeting. A motion approving this proposal passed unanimously.	

- continued -

Table 6. (page 4 of 4)

<u>DATE</u>	<u>DEPT. RECOMMENDATIONS</u>	<u>WORKING GROUP RECOMMENDATIONS</u>	<u>ACTUAL</u>
13 August	Six hour period in 1 & 2 on 15 August.	Eight hour period in 1 & 2 on 15 August.	Eight hour period in 1 & 2 on 15 August.
16 August	Six hour period in 1 & 2 on 18 August.	Eight hour periods in 1 & 2 on 18 August	Eight hour periods in 1 & 2 on 18 August.
19 August	Six hour period in 1 & 2 on 22 August.	Eight hour periods in 1 & 2 on 22 August, close south side of District 2 from Aniak River to 1 mile downstream of Crow Village.	Eight hour periods in 1 & 2 on 22 August with the south side of 2 closed from Aniak River to 1 mile downstream of Crow Village.
23 August	Six hour period in 1 & 2 on 25 August.	Eight hour periods in 1 & 2 on 25 August.	Eight hour periods in 1 & 2 on 25 August.
26 August	Six hour period in 1 & 2 on 29 August & 1. September.	Eight hour periods in 1 & 2 on 27 August.	Eight hour periods in 1 & 2 on 27 August.
29 August	Six hour period in 1 & 2 on 30 August & 2 September.	Six hour periods in 1, downstream of Bethel on 30 August & 2 September.	Six hour periods in 1, downstream of Bethel on 30 August & 2 September.

Table 7. Lower Kuskokwim River, District 1, commercial salmon harvest and fishing effort by period, 1994.

PERIOD	DATE	HOURS	PERMITS	CHINOOK		SOCKEYE		COHO		PINK		CHUM	
				NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE
1	6/24	8	576	14,221	3.09	38,958	8.45					87,214	18.93
2	7/14	4	496	578	.29	3,891	1.96	820	.41	1,431	.72	43,585	21.97
3	7/19	6	500	441	.15	4,475	1.49	7,027	2.34	3,715	1.24	60,104	20.03
4	7/23	6	506	313	.10	1,125	.37	24,213	7.98	5,845	1.93	38,149	12.57
5	7/26	6	552	225	.07	471	.14	39,901	12.05	7,414	2.24	22,460	6.78
6	7/29	6	577	204	.06	159	.05	52,090	15.05	5,910	1.71	11,252	3.25
7	8/04	6	606	88	.02	87	.02	75,514	20.77	3,835	1.05	3,983	1.10
8	8/09	6	530	29	.01	70	.02	129,570	40.75	1,222	.38	1,153	.36
9	8/12	8	606	34	.01	47	.01	117,753	24.29	497	.10	777	.16
10	8/15	8	595	22		33	.01	47,902	10.06	412	.09	321	.07
11	8/18	8	598	20		16		82,750	17.30	265	.06	212	.04
12	8/22	8	554	12		15		44,054	9.94	201	.05	104	.02
13	8/25	8	447	9		7		37,595	10.51	112	.03	63	.02
14	8/27	6	445	3		4		20,526	7.69	43	.02	30	.01
15	8/30	6	263	2		2		8,192	5.19	21	.01	16	.01
16	9/02	6	157			2		2,489	2.64	7	.01	3	
TOTALS			706	16,201	.22	49,362	.66	690,396	9.23	30,930	.41	269,426	3.60

Table 8. Middle Kuskokwim River, District 2, commercial salmon harvest and fishing effort by period, 1994.

PERIOD	DATE	HOURS	PERMITS	CHINOOK		SOCKEYE		COHO		PINK		CHUM	
				NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE
1	8/04	6	14	6	.07			4,040	48.1	12	.14	808	9.62
2	8/09	6	17	3	.03			5,790	56.8	3	.03	350	3.43
3	8/12	8	17					10,539	77.5			226	1.66
4	8/15	8	16			1	.01	7,190	56.2			151	1.18
5	8/18	8	15	1	.01			2,710	22.6	1	.01	106	.88
6	8/22	8	12			1	.01	1,855	19.3	3	.03	34	.35
7	8/25	8	7					1,492	26.6			12	.21
8	8/27	6	6			1	.03	677	18.8			2	.06
TOTALS			20	10	.01	3		34,293	29.6	19	.02	1,689	1.46

Table 9. Lower Kuskokwim River, District 1, and the middle Kuskokwim River, District 2, combined commercial salmon harvest, 1960-1994.

<u>Year</u>	<u>Chinook</u>	<u>Sockeye</u>	<u>Coho</u>	<u>Pink</u>	<u>Chum</u>	<u>Total</u>
1960	5,969	0	2,498	0	0	8,467
1961	18,918	0	5,044	0	0	23,962
1962	15,341	0	12,432	0	0	27,773
1963	12,016	0	15,660	0	0	27,676
1964	17,149	0	28,613	0	0	45,762
1965	21,989	0	12,191	0	0	34,180
1966	25,545	0	22,985	0	0	48,530
1967	29,986	0	56,313	0	148	86,447
1968	34,278	0	127,306	0	187	161,771
1969	43,997	322	83,765	0	7,165	135,249
1970	39,290	117	38,601	44	1,664	79,716
1971	40,274	2,606	5,253	0	68,914	117,047
1972	39,454	102	22,579	8	78,619	140,762
1973	32,838	369	130,876	33	148,746	312,862
1974	18,664	136	147,269	84	171,887	338,040
1975	21,720	23	81,945	10	181,840	285,538
1976	30,735	2,971	88,501	133	177,864	300,204
1977	35,830	9,379	241,364	203	248,721	535,497
1978	45,641	733	213,393	5,832	248,656	514,255
1979	38,966	1,054	219,060	78	261,874	521,032
1980	35,881	360	222,012	803	483,211	742,267
1981	47,663	48,375	211,251	292	418,677	726,258
1982	48,234	33,154	447,117	1,748	278,306	808,559
1983	33,174	68,855	196,287	211	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
1994	16,211	49,365	724,689	30,949	271,115	1,092,329
Ten Year Average (1984-1993)	37,130	83,707	521,084	5,607 ^a	491,897	1,136,524

a Even years only.

Table 10. Chinook salmon sex ratios and proportion of females with gill net marks, Kogrukluuk weir, 1979-1994.

<u>Year</u>	<u>Actual Count</u>	<u>Number Females</u>	<u>Sex Ratio (% female)</u>	<u>% of females with gill net marks</u>
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
1994	8,310	2,042	24.6	9.53
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 too small to assess sex ratio and percentage of gill net marks

Table 11. Historic salmon escapement data from current Kuskokwim Area projects, 1976-1994.

YEAR	Operating		SPECIES				
	Period	Objectives	Chinook	Sockeye	Coho	Pink	Chum
KOGRUGLUK WEIR ^a			10,000		25,000		30,000
1976	06/29 to 07/31		5,579	2,326	b	-	8,117
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	48,125
1979	07/01 to 07/24		11,338	2,628	b	1	18,599
1980	07/01 to 07/11		6,572	3,200	b	1	41,777
1981	06/27 to 10/25		16,655	18,066	11,455	6	57,365
1982	07/09 to 09/14		10,993	17,297	37,796	19	64,077
1983	06/22 to 07/02		2,992	1,176	8,538	-	9,407
1984	06/19 to 09/15		4,928	4,133	27,595	-	41,484
1985	06/29 to 09/07		4,619	4,359	16,441	-	15,005
1986	07/06 to 10/05		5,038	4,224	22,506	-	14,693
1987	08/09 to 09/23		4,063	b	22,821	-	17,422
1988	07/05 to 09/17		8,505	4,397	13,512	-	39,540
1989	07/07 to 09/14		11,940	5,811	b	-	39,548
1990	06/28 to 09/07		10,218	8,406	6,132	1	26,765
1991	07/04 to 09/15		7,850	16,455	9,933	4	24,188
1992	07/01 to 08/21		6,755	7,540	26,057	11	34,105
1993	07/02 to 09/06		12,332	29,358	20,517	0	31,899
1994	07/02 to 09/10		15,227	14,192	34,695	23	46,192
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		-	-	-	-	243,922
1990	06/23 to 08/06		-	-	-	-	232,260
1991	06/29 to 07/29		-	-	-	-	314,166
1992	06/22 to 07/29		-	-	-	-	84,269
1993	06/24 to 07/28		-	-	-	-	13,870
1994	06/28 to 07/28		-	-	-	-	388,163

- continued -

Table 11. (page 2 of 2)

YEAR	Operating Period	SPECIES				
		Chinook	Sockeye	Coho	Pink	Chum
<u>TULUKSAK RIVER WEIR</u>						
1991	06/12 to 09/18	697	34	4,651	391	7,675
1992	06/24 to 09/10	1,083	129	7,501	2,458	11,183
1993	06/17 to 09/10	2,218	88	8,328	210	13,804
1994	06/29 to 09/11	2,922	94	8,213	3,450	15,707
<u>KWETHLUK RIVER WEIR</u>						
1992	06/18 to 09/12	9,675	1,316	45,605	45,952	30,596
<u>MIDDLE FORK GOODNEWS RIVER TOWER/WEIR^d</u>						
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 08/24	2,147	47,397	92	1,694	27,525
1992	06/29 to 08/25	1,899	27,267	150	23,030	22,023
1993	06/22 to 08/18	2,491	26,044	1,451	253	14,287
1994	06/23 to 08/08	3,856	55,751	309	38,705	34,849

a Pink salmon can pass freely through the Kogrukluuk 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 tower was converted into a weir in 1991

Table 12. Utilizations of Kuskokwim River chum salmon, 1960-1994.

Year	Commercial Harvest ^a	Estimated Subsistence Harvest ^b	Total Utilization	Running 10 Year Average
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	209,264
1970	1,664	246,810 ^c	248,474	203,936
1971	68,914	116,391 ^c	185,305	204,514
1972	78,619	120,316 ^c	198,935	208,223
1973	148,746	179,259 ^c	328,005	227,258
1974	171,887	277,170 ^c	449,057	253,145
1975	181,840	176,389 ^c	358,229	263,880
1976	177,864	223,792 ^c	401,656	286,472
1977	248,721	198,355 ^c	447,076	310,320
1978	248,656	118,809 ^c	367,465	319,547
1979	261,874	161,239 ^c	423,113	340,732
1980	483,211	165,172 ^c	648,383	380,722
1981	418,677	157,306 ^c	575,983	419,790
1982	278,306	190,011 ^c	468,317	446,728
1983	267,698	146,876 ^c	414,574	455,385
1984	423,718	142,542 ^c	566,260	467,106
1985	199,478	95,542	295,020	460,785
1986	309,213	141,931 ^c	451,144	465,734
1987	574,336	69,047	643,383	485,364
1988	1,381,674	117,008	1,498,682	598,486
1989	749,182	122,086	871,268	643,301
1990	461,624	96,273	557,897	634,253
1991	431,802	81,652	513,454	628,000
1992	344,603	85,203	444,607	625,629
1993	43,337	46,295	89,632	593,135
1994	271,115	87,709 ^d	358,824	563,620
Ten Year Average (1984-1993)	491,896	99,758	593,135	

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 The 1990 - 1992 average, 1993 was excluded due to emergency closures which made this year unlike any other.

Table 13. Quinagak District commercial effort 1970-1994.

<u>YEAR</u>	<u>EFFORT^a</u>
1970	88
1971	61
1972	107
1973	109
1974	196
1975	127
1976	181
1977	258
1978	200
1979	206
1980	169
1981	186
1982	117
1983	226
1984	263
1985	300
1986	324
1987	310
1988	288
1989	227
1990	390
1991	346
1992	349
1993	409
1994	308
TEN YEAR AVERAGE (1984-1993)	321

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

Table 14. Quinhagak, District 4, commercial salmon harvest and fishing effort by period, 1994.

PERIOD	DATE	HOURS	PERMITS	CHINOOK		CHUM		PINK		COHO		SOCKEYE	
				NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE
1	6/15	12	111	1,165	.87	252	.19	2				62	.05
2	6/20	12	95	746	.65	287	.25					187	.16
3	7/01	12	118	2,534	1.79	13,544	9.56	66	.05			6,512	4.60
4	7/04	12	171	836	.41	3,120	1.52	688	.34			5,555	2.71
5	7/06	12	127	692	.45	4,094	2.69	1,114	.73			6,749	4.43
6	7/08	12	131	756	.48	8,296	5.28	1,122	.71			9,304	5.92
7	7/11	12	140	393	.23	2,313	1.38	3,023	1.80	3		5,800	3.45
8	7/13	12	111	362	.27	9,794	7.35	2,251	1.69	17	.01	13,450	10.10
9	7/15	12	80	279	.29	5,791	6.03	1,749	1.82	24	.03	6,687	6.97
10	7/18	12	93	187	.17	3,023	2.71	2,806	2.51	19	.02	5,842	5.23
11	7/20	12	63	159	.21	4,684	6.20	3,523	4.66	75	.10	4,611	6.10
12	7/22	12	83	131	.13	2,696	2.71	5,140	5.16	250	.25	3,537	3.55
13	7/25	12	52	103	.17	1,103	1.77	5,220	8.37	538	.86	1,545	2.48
14	7/27	12	43	40	.08	834	1.62	2,968	5.75	557	1.08	963	1.87
15	7/29	12	25	36	.12	190	.63	1,216	4.05	712	2.37	447	1.49
16	8/01	12	49	51	.09	334	.57	1,672	2.84	2,577	4.38	368	.63
17	8/03	12	51	23	.04	268	.44	1,039	1.70	1,294	2.11	288	.47
18	8/05	12	48	25	.04	277	.48	839	1.46	3,103	5.39	183	.32
19	8/08	12	72	15	.02	234	.27	684	.79	12,298	14.23	93	.11
20	8/10	12	19			9	.04	64	.28	1,237	5.43	10	.04
21	8/12	12	49	12	.02	51	.09	216	.37	2,710	4.61	46	.08
22	8/15	12	59	2		43	.06	94	.13	10,609	14.98	20	.03
23	8/17	12	42	1				18	.04	9,897	19.64	4	.01
24	8/19	12	74	9	.01	37	.04	185	.21	3,624	4.08	16	.02
25	8/22	12	63	3		18	.02	96	.13	8,437	11.16	17	.02
26	8/24	12	40	1		1		18	.04	6,399	13.33	1	
27	8/26	12	29	1		4	.01	4	.01	5,732	16.47	3	.01
28	8/29	12	54	1				31	.05	2,162	3.34	6	.01
29	8/31	12	50			3	.01	28	.05	7,145	11.91	4	.01
30	9/02	12	33			1		13	.03	933	2.36	4	.01
31	9/05	12	27	1				15	.05	2,243	6.92		
32	9/07	12	13							1,317	8.44		
TOTALS			308	8,564	.07	61,301	.52	35,904	.30	83,912	.71	72,314	.61

Table 15. Quinhagak District commercial salmon harvest, 1960-1994.

<u>Year</u>	<u>Chinook</u>	<u>Sockeye</u>	<u>Coho</u>	<u>Pink</u>	<u>Chum</u>	<u>Total</u>
1960	0	5,649	3,000	0	0	8,649
1961	4,328	2,308	46	90	18,864	25,636
1962	5,526	10,313	0	4,340	45,707	65,886
1963	6,555	0	0	0	0	6,555
1964	4,081	13,422	379	939	707	19,528
1965	2,976	1,886	0	0	4,242	9,104
1966	278	1,030	0	268	2,610	4,186
1967	0	652	1,926	0	8,087	10,665
1968	8,879	5,884	21,511	75,818	19,497	131,589
1969	16,802	3,784	15,077	953	38,206	74,822
1970	18,269	5,393	16,850	15,195	46,556	102,263
1971	4,185	3,118	2,982	13	30,208	40,506
1972	15,880	3,286	376	1,878	17,247	38,667
1973	14,993	2,783	16,515	277	19,680	54,248
1974	8,704	19,510	10,979	43,642	15,298	98,133
1975	3,928	8,584	10,742	486	35,233	58,973
1976	14,110	6,090	13,777	31,412	43,659	109,048
1977	19,090	5,519	9,028	202	43,707	77,546
1978	12,335	7,589	20,114	47,033	24,798	111,869
1979	11,144	18,828	47,525	295	25,995	103,787
1980	10,387	13,221	62,610	21,671	65,984	173,873
1981	24,524	17,292	47,557	160	53,334	142,867
1982	22,106	25,685	73,652	11,838	33,346	166,627
1983	46,385	10,263	32,442	168	23,090	112,348
1984	33,652	17,258	135,342	16,249	50,424	252,925
1985	30,401	7,876	29,992	28	20,418	88,715
1986	22,835	21,484	57,544	8,700	29,700	140,263
1987	26,022	6,489	50,070	66	8,557	91,204
1988	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
1994	8,564	72,314	83,912	35,904	61,301	261,995
Ten Year Average (1984-1993)	21,771	37,442	59,786	12,248 ^a	39,421	170,718

a Even years only.

Table 16. Kanektok River peak aerial surveys by species, 1962 - 1994^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
1994 ^g	7,386	30,090		10,000
10 YR. AVG:	6,575	27,265	23,738	16,272
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; test 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.

g Chum count not at peak, estimate made during chinook survey.

Table 17. Ex-vessel Value of Kuskokwim Area Salmon Catch by District, 1994.

<u>Lower Kuskokwim River, District W-1</u>						
	<u>Chinook</u>	<u>Sockeye</u>	<u>Coho</u>	<u>Pink</u>	<u>Chum</u>	<u>Total</u>
			<u>1994</u>			
Fish	16,201	49,362	690,396	30,930	269,426	1,055,668
Pounds	248,807	362,868	5,135,363	112,095	1,734,722	
Price	0.51	0.52	0.56	0.08	0.22	
Value	\$126,892	\$188,691	\$2,875,803	\$8,967	\$381,639	\$3,581,992
			<u>Ave. 1988-93</u>			
Fish	39,647	72,701	512,006	3,725	549,991	1,178,070
Value	\$427,563	\$518,868	\$2,248,866	\$1,490	\$1,237,520	\$4,434,306
<u>Middle Kuskokwim River, District W-2</u>						
			<u>1994</u>			
Fish	10	3	34,293	19	1,689	36,014
Pounds	178	21	243,430	63	9,956	
Price	0.39	0.62	0.52	0.10	0.20	
Value	\$69	\$13	\$126,584	\$6	\$1,991	\$128,663
			<u>Ave. 1988-93</u>			
Fish	1,366	1,929	20,056	38	18,713	42,102
Value	\$16,560	\$12,861	\$78,604	\$21	\$32,815	\$140,861
<u>Quinhagak, District W-4</u>						
			<u>1994</u>			
Fish	8,564	72,314	83,912	35,904	61,301	261,995
Pounds	133,836	474,242	683,245	127,960	421,756	
Price	0.50	0.54	0.62	0.08	0.20	
Value	\$66,918	\$256,091	\$423,612	\$10,237	\$84,351	\$841,209
			<u>Ave. 1988-93</u>			
Fish	17,466	53,553	54,153	16,321	47,519	189,012
Value	\$207,701	\$326,269	\$283,611	\$5,171	\$99,940	\$922,692
<u>Goodnews Bay, District W-5</u>						
			<u>1994</u>			
Fish	2,570	69,490	47,499	18,017	28,477	166,053
Pounds	43,545	477,411	433,660	68,020	196,708	
Price	0.50	0.53	0.62	0.08	0.21	
Value	\$21,732	\$309,577	\$271,687	\$5,442	\$41,309	\$649,747
			<u>Ave. 1988-93</u>			
Fish	2,965	38,303	20,614	3,427	17,491	82,799
Value	\$39,819	\$261,502	\$121,006	\$976	\$42,893	\$466,196
<u>Kuskokwim Area Total</u>						
			<u>1994</u>			
Fish	27,345	191,169	856,100	84,870	360,893	1,519,228
Pounds	426,366	1,314,542	6,495,698	308,138	2,363,142	
Price	0.51	0.53	0.57	0.08	0.21	
Value	\$215,611	\$754,372	\$3,697,686	\$24,652	\$509,290	\$5,201,611
			<u>Ave. 1988-93</u>			
Fish	61,444	166,485	606,830	23,511	633,713	1,491,983
Value	\$691,644	\$1,119,500	\$2,732,087	\$7,657	\$1,413,167	\$5,964,054

Table 18. Goodnews Bay, District 5, commercial salmon harvest and fishing effort by period, 1994.

PERIOD	DATE	HOURS	PERMITS	CHINOOK		SOCKEYE		PINK		COHO		CHUM	
				NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE
1	6/27	12	41	388	.79	2,795	5.68	112	.23			2,364	4.80
2	6/30	12	53	349	.55	4,651	7.31	216	.34			2,907	4.57
3	7/04	12	40	637	1.33	7,674	15.99	501	1.04			4,075	8.49
4	7/06	12	43	243	.47	7,886	15.28	735	1.42			4,076	7.90
5	7/08	12	52	139	.22	6,261	10.03	931	1.49			2,669	4.28
6	7/12	36	88	313	.10	16,753	5.29	2,755	.87	1		5,498	1.74
7	7/15	36	78	138	.05	8,860	3.16	2,423	.86	2		3,296	1.17
8	7/18	12	0	NO COMMERCIAL		FISHING		- NO BUYER					
9	7/19	12	42	71	.14	2,693	5.34	1,551	3.08	11	.02	1,470	2.92
10	7/21	12	29	53	.15	2,385	6.85	1,109	3.19	9	.03	563	1.62
11	7/23	12	27	26	.08	1,273	3.93	927	2.86	19	.06	446	1.38
12	7/25	12	25	16	.05	1,206	4.02	1,453	4.84	188	.63	281	.94
13	7/27	12	18	19	.09	1,057	4.89	887	4.11	96	.44	138	.64
14	7/29	12	24	26	.09	810	2.81	895	3.11	343	1.19	166	.58
15	8/01	12	0	NO COMMERCIAL		FISHING		- NO BUYER					
16	8/02	12	31	13	.03	969	2.60	826	2.22	1,491	4.01	153	.41
17	8/03	12	25	18	.06	761	2.54	793	2.64	1,136	3.79	100	.33
18	8/05	12	28	19	.06	849	2.53	653	1.94	1,146	3.41	77	.23
19	8/08	12	35	13	.03	749	1.78	342	.81	3,090	7.36	60	.14
20	8/10	12	31	14	.04	391	1.05	211	.57	1,854	4.98	44	.12
21	8/12	12	24	26	.09	288	1.00	161	.56	2,699	9.37	31	.11
22	8/15	12	31	14	.04	422	1.13	177	.48	3,724	10.01	23	.06
23	8/17	12	29	7	.02	151	.43	47	.14	4,248	12.21	11	.03
24	8/19	12	29	8	.02	195	.56	89	.26	4,522	12.99	11	.03
25	8/22	12	33	6	.02	131	.33	36	.09	6,126	15.47	2	.01
26	8/24	12	32	2	.01	41	.11	19	.05	5,520	14.38		
27	8/26	12	2	(No Buyer)		1	.04			147	6.13		
28	8/29	12	30	9	.03	90	.25	66	.18	2,557	7.10	5	.01
29	8/31	12	24			50	.17	35	.12	3,097	10.75	4	.01
30	9/02	12	29			44	.13	65	.19	2,149	6.18	2	.01
31	9/05	12	21	2	.01	37	.15	1		1,014	4.02	4	.02
32	9/07	12	23	1		17	.06	1		2,310	8.37	1	
TOTALS			116	2,570	.05	69,490	1.47	18,017	.38	47,499	1.00	28,477	.60

Table 19. Goodnews Bay, District 5 commercial effort, 1970-1994.

<u>YEAR</u>	<u>EFFORT^a</u>
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
1994	116
TEN YEAR AVERAGE (1984-1993)	90

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

Table 20. Goodnews Bay District commercial salmon harvest, 1968-1994.

<u>YEAR</u>	<u>CHINOOK</u>	<u>SOCKEYE</u>	<u>COHO</u>	<u>PINK</u>	<u>CHUM</u>	<u>TOTAL</u>
1968			5,458			5,458
1969	3,978	6,256	11,631	298	5,006	27,169
1970	7,163	7,144	6,794	12,183	12,346	45,630
1971	477	330	1,771	0	301	2,879
1972	264	924	925	66	1,331	3,510
1973	3,543	2,072	5,017	324	15,781	26,737
1974	3,302	9,357	21,340	16,373	8,942	59,314
1975	2,156	9,098	17,889	419	5,904	35,466
1976	4,417	5,575	9,852	8,453	10,354	38,651
1977	3,336	3,723	13,335	29	6,531	26,954
1978	5,218	5,412	13,764	9,103	8,590	42,087
1979	3,204	19,581	42,098	201	9,298	74,382
1980	2,331	28,632	43,256	7,832	11,748	93,799
1981	7,190	40,273	19,749	11	13,642	80,865
1982	9,476	38,877	46,683	4,673	13,829	113,538
1983	14,117	11,716	19,660	0	6,766	52,259
1984	8,612	15,474	71,176	4,711	14,340	114,313
1985	5,793	6,698	16,498	8	4,784	33,781
1986	2,723	25,112	19,378	4,447	10,355	62,015
1987	3,357	27,758	29,057	54	20,381	80,607
1988	4,964	36,368	30,832	5,509	33,059	110,732
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
1994	2,570	69,490	47,499	18,017 ^a	28,477	166,053
Ten year Average (1984-1993)	3,828	30,486	25,980	5,921 ^a	15,480	78,751

a Even years only.

Table 21. Historical estimated salmon run size and commercial exploitation rate, Goodnews River, 1981-1994.

<u>Year</u>	<u>Species</u>	Middle Fork	Middle Fork	Goodnews	Goodnews	Goodnews	<u>Total Run Size Estimate</u>	<u>Exploitation^a Rate (% of Run)</u>
		<u>Estimate</u>	Aerial Survey Count as a Percentage of Tower Est.	River Escapement Estimate	Bay Subsistence Harvest Estimate	Bay Commercial Harvest		
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%

- continued -

Table 21. (page 2 of 2)

<u>Year</u>	<u>Species</u>	<u>Middle Fork Tower Estimate</u>	<u>Middle Fork Aerial Survey Count as a Percentage of Tower Est.</u>	<u>Goodnews River Escapement Estimate</u>	<u>Goodnews Bay Subsistence Harvest Estimate</u>	<u>Goodnews Bay Commercial Harvest</u>	<u>Total Run Size Estimate</u>	<u>Exploitation^a Rate (% of Run)</u>
1992	Chinook	1,899	53%	3,560	252	3,528	7,340	51%
	Sockeye	27,267	26%	67,681	905	39,194	94,282	37%
	Chum	22,023	35%	37,286	662	18,520	81,442	24%
1993	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	35%	40,820	464	10,657	51,941	17%
1994	Chinook	3,856	-b	7,275	478 ^f	2,570	10,323	25%
	Sockeye	55,751	-b	214,426	928	69,490	284,844	24%
	Chum	34,849	-b	130,335	464	28,477	159,276	18%

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 22. Preliminary projections of the 1995 Kuskokwim Area commercial salmon harvest in thousands of fish by species and management district.*

	MANAGEMENT DISTRICT									KUSKOKWIM AREA TOTAL		
	KUSKOKWIM RIVER			QUINHAGAK			GOODNEWS BAY					
CHINOOK	9	-	56	9	-	30	1	-	1	19	-	87
SOCKEYE	27	-	137	6	-	84	7	-	69	40	-	290
COHO	336	-	725	27	-	86	8	-	47	371	-	858
PINK	<1 ^b			<1 ^b			<1 ^b			<1 ^b		
CHUM	43	-	1,382	9	-	73	5	-	33	57	-	1,488
TOTAL	415	-	2,300	51	-	273	22	-	150	487	-	2,723

a Except as noted all the projections are based on catches from 1985 through 1994.

b Kuskokwim Area pink salmon display a strong odd-even year cycle; the 1995 projections are based on the odd year catches only.

FIGURES

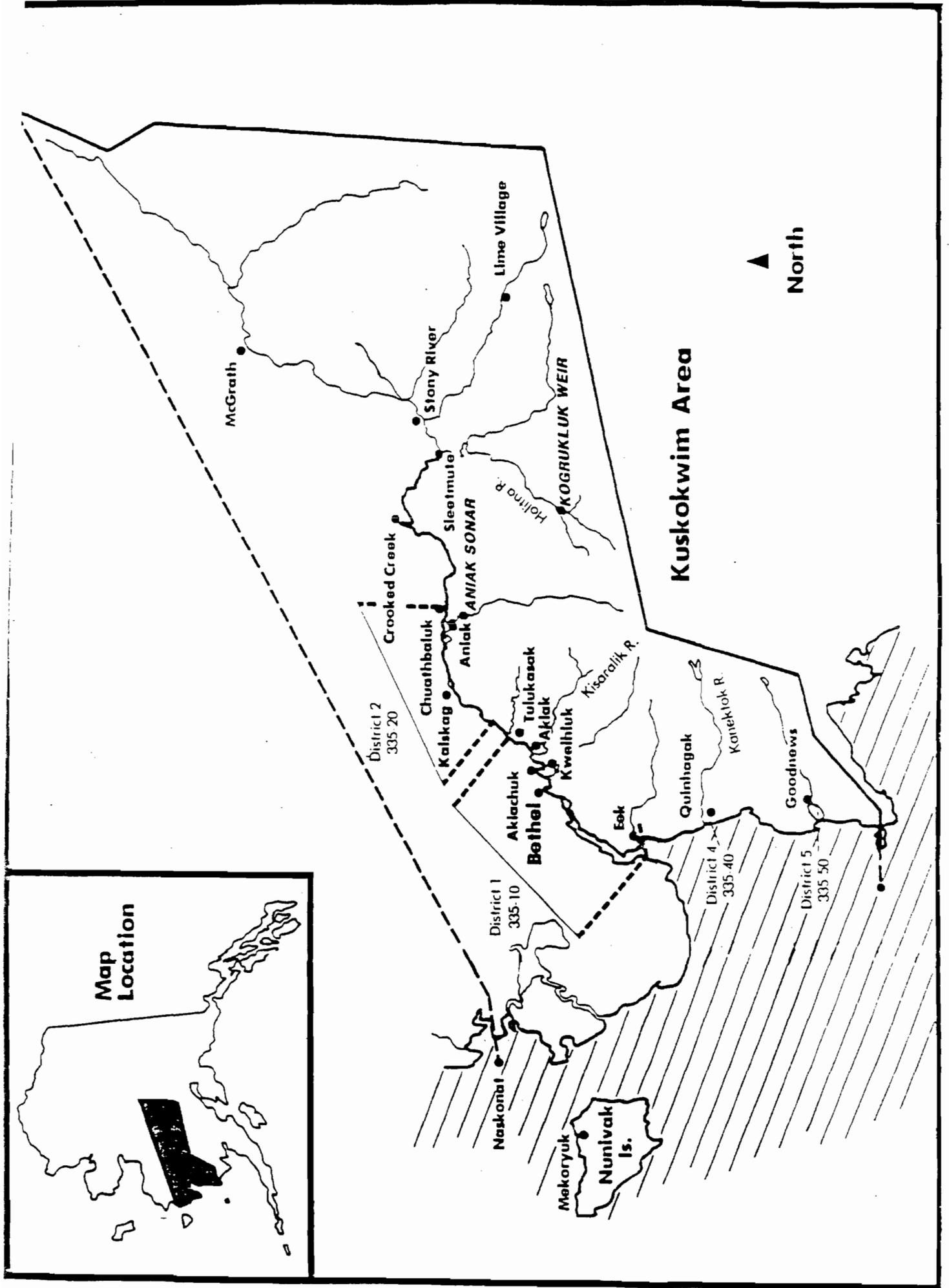


Figure 1. Kuskokwim Area Map.

**Kuskokwim Management Area
District W-1
Kuskokwim River**

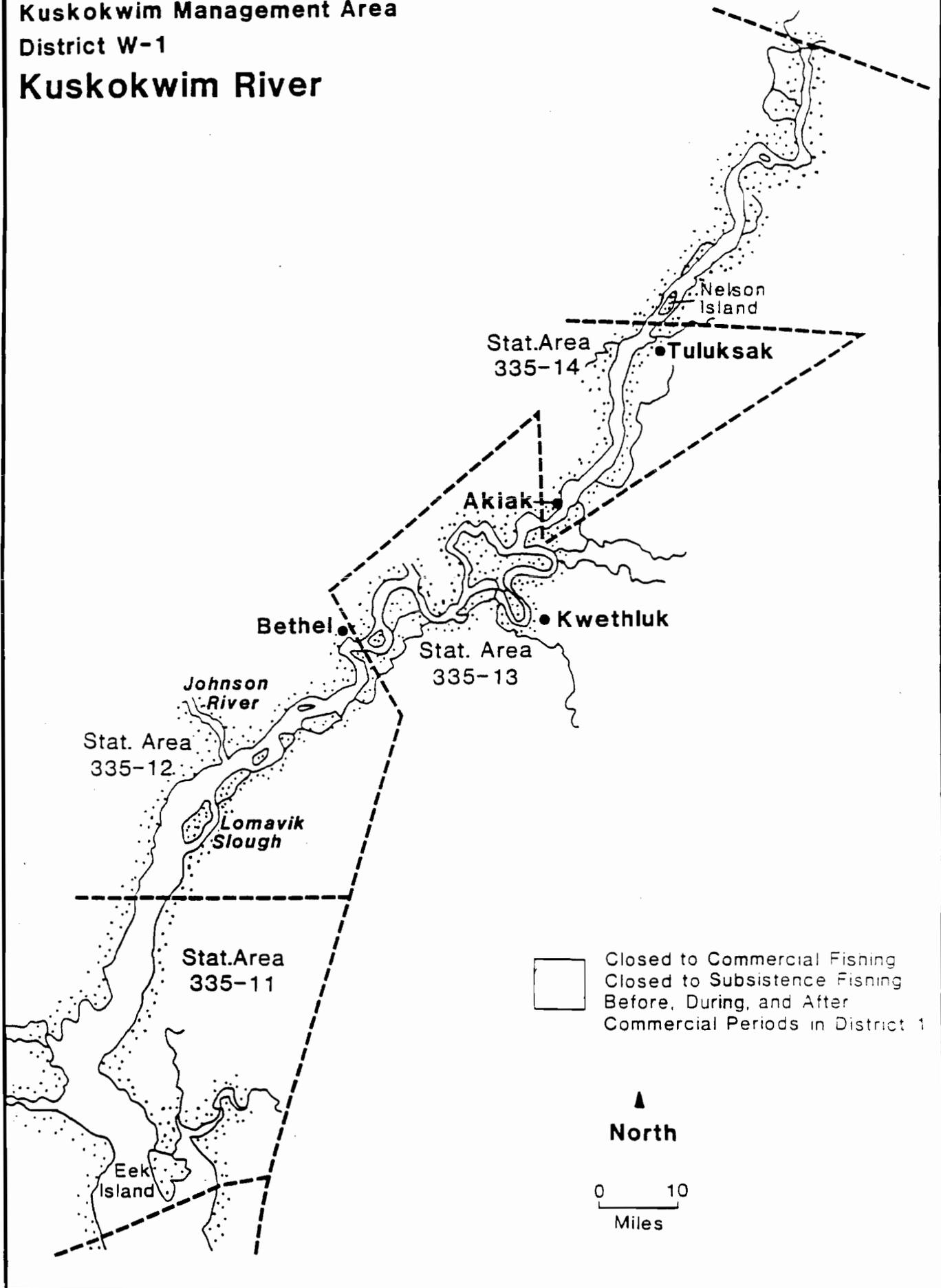


Figure 2 . Kuskokwim Management Area, District W-1

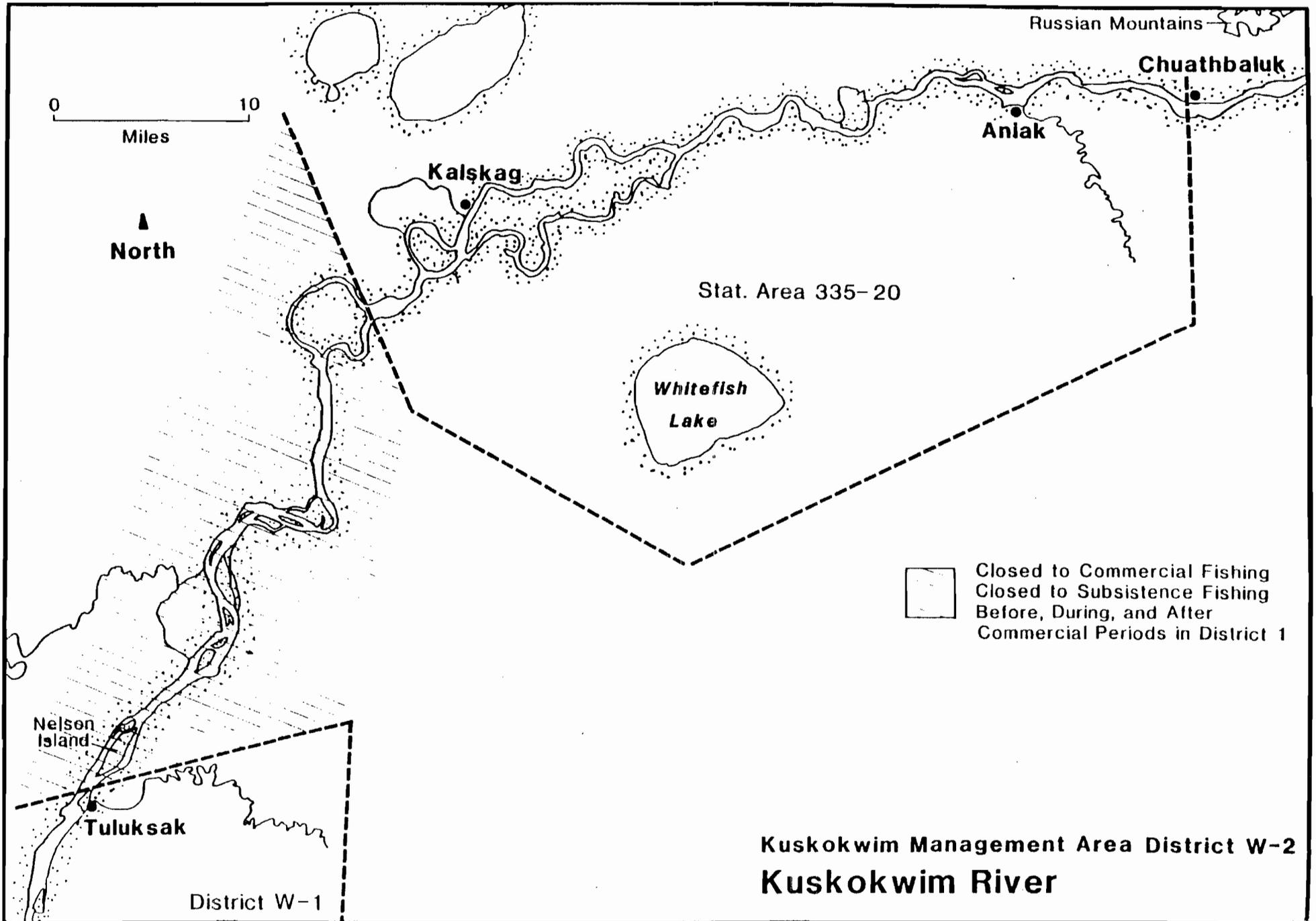


Figure 3. Kuskokwim Management Area, District W-2

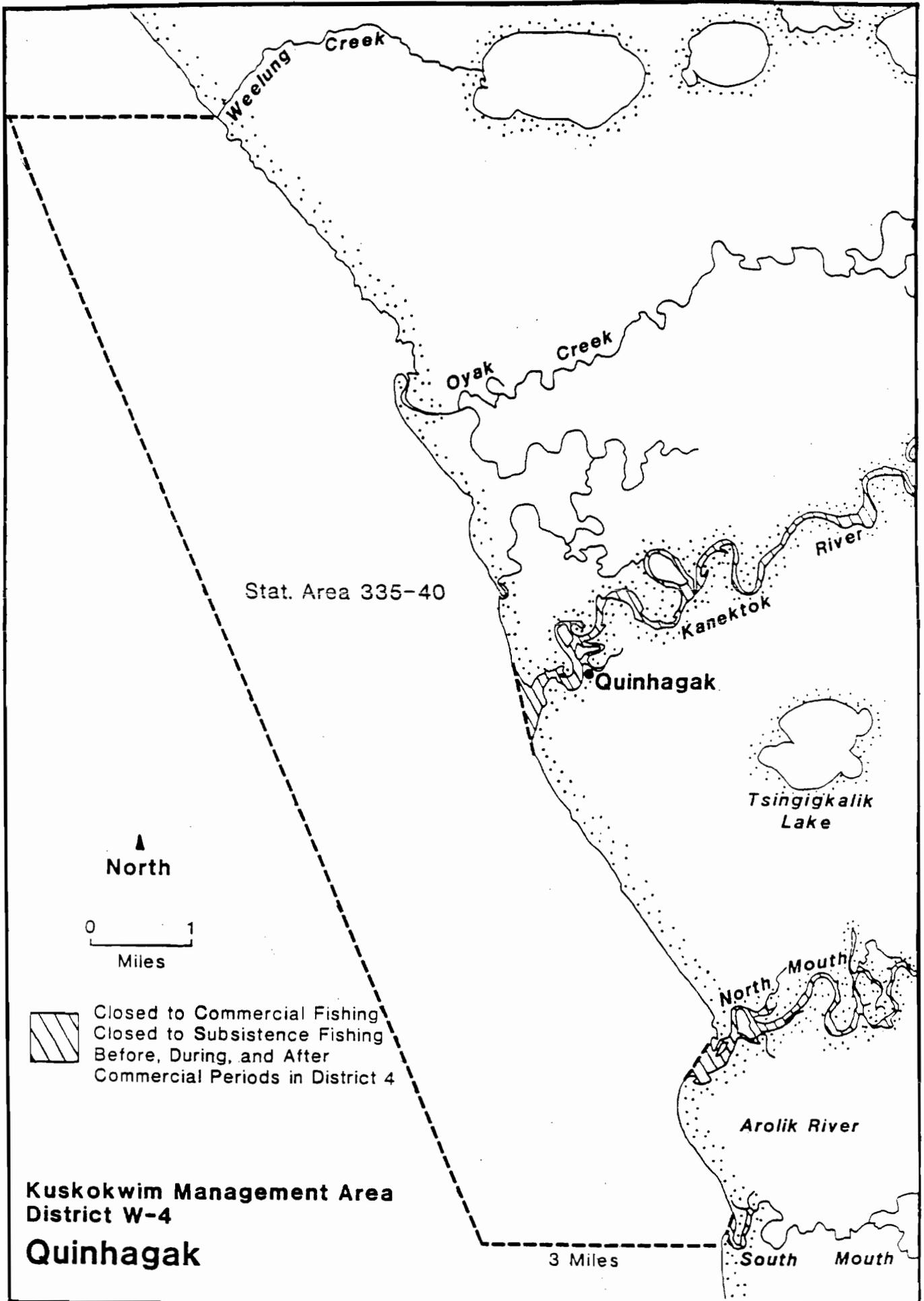


Figure 4 . Kuskokwim Management Area, District W-4

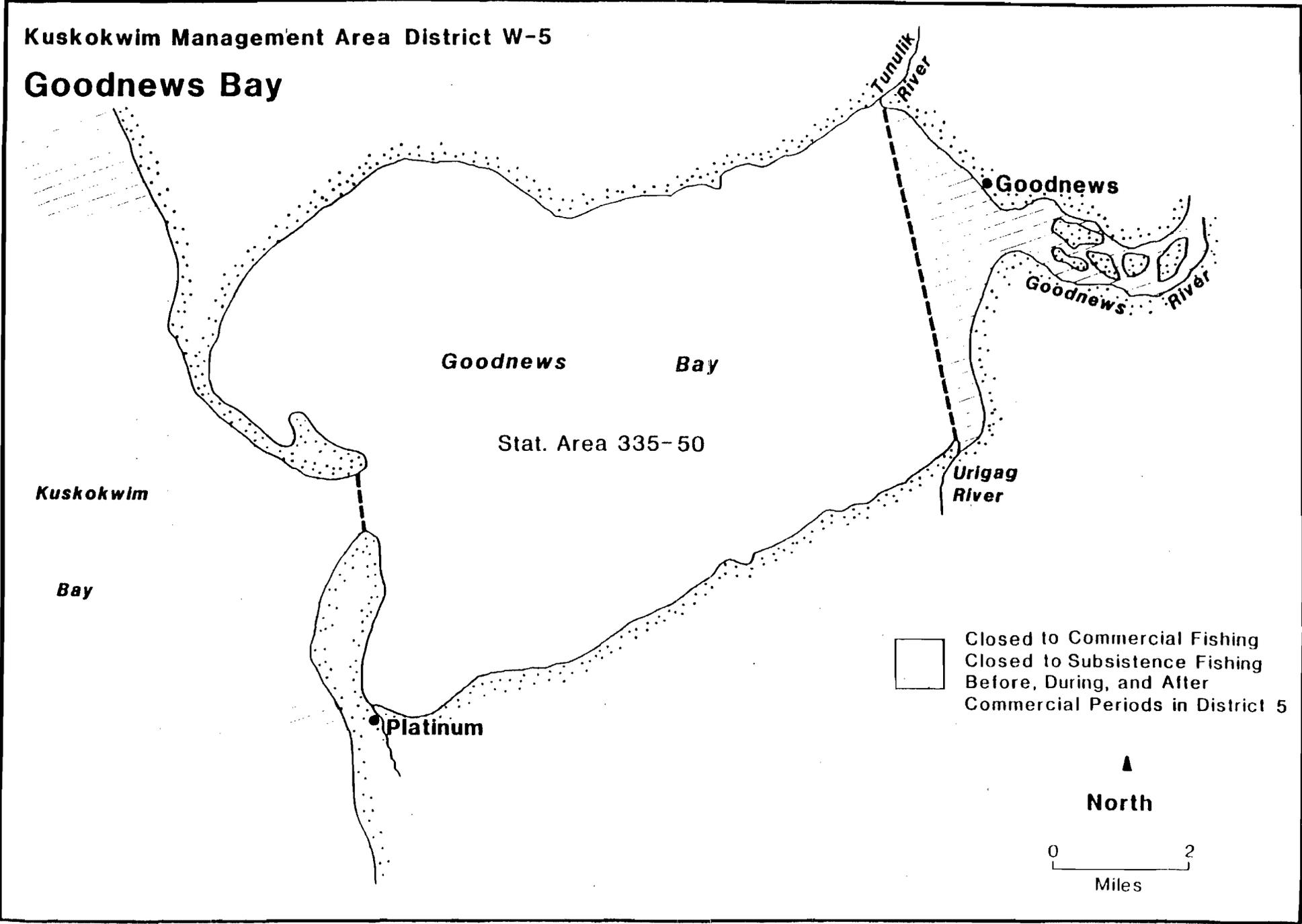


Figure 5. Kuskokwim Management Area, District W-5

51

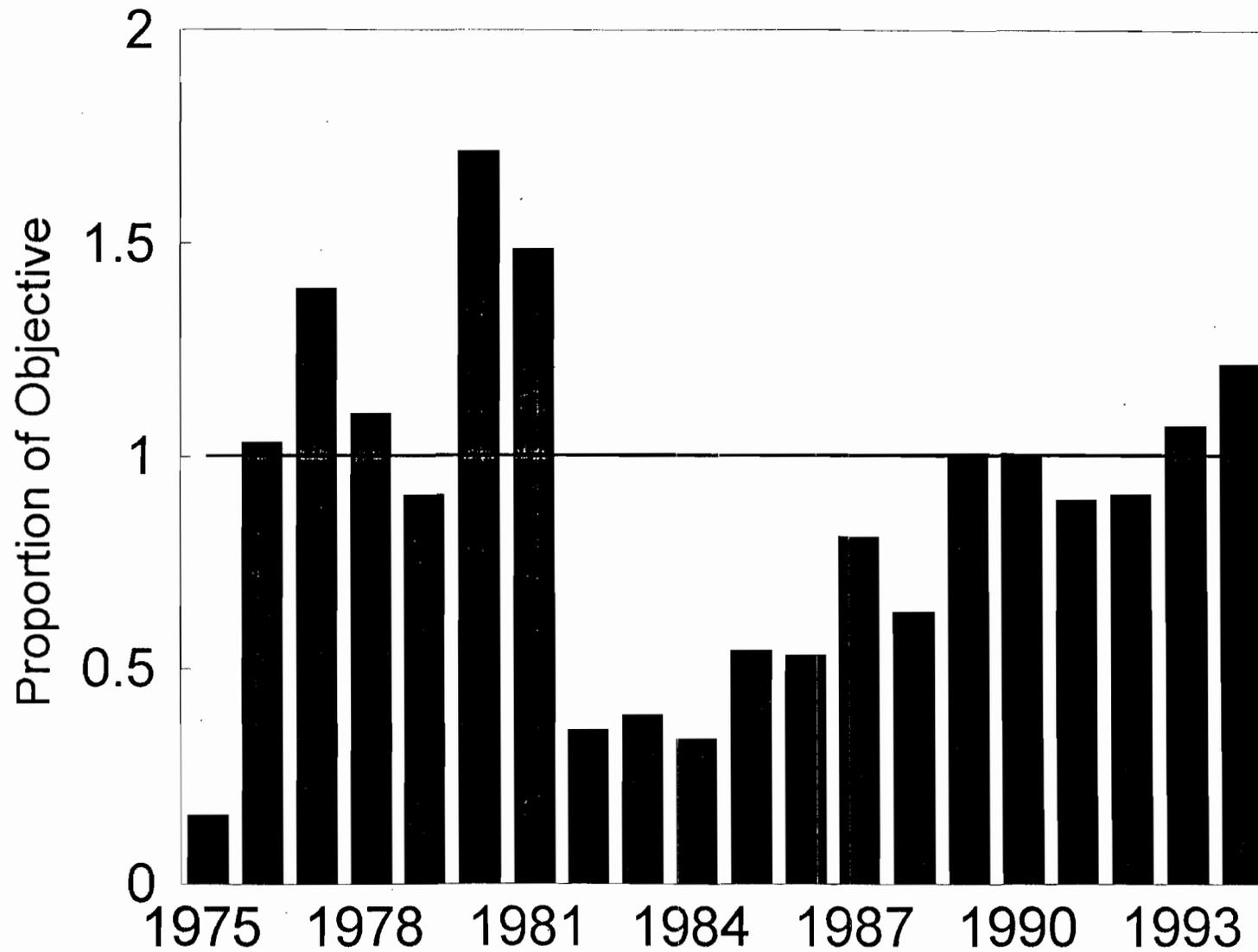


Figure 6. Estimated proportion of chinook salmon escapement goal achieved for Kuskokwim River drainage. Based on median escapement goal proportion for streams sampled by aerial surveys, and Kogruklu River weir.

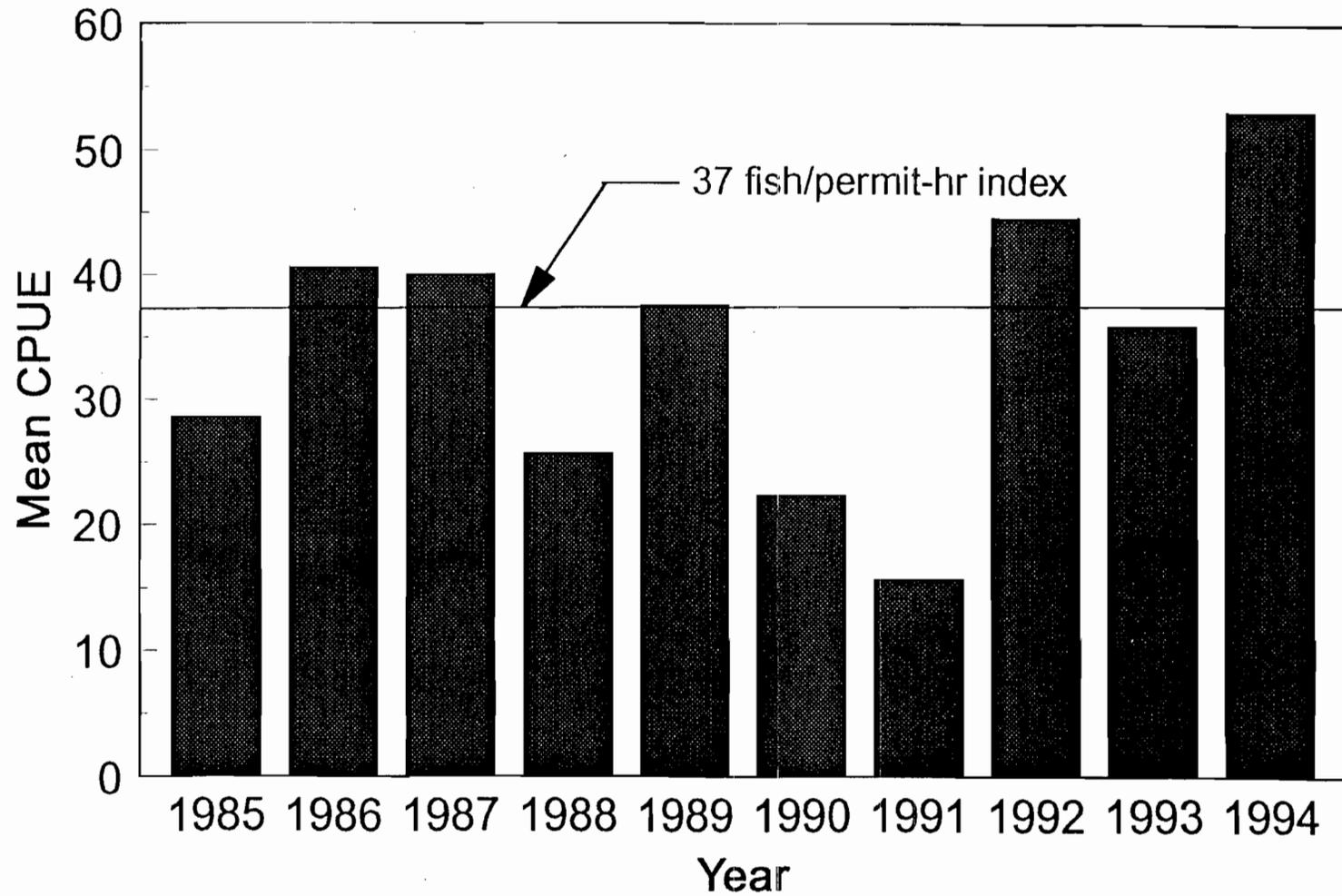


Figure 7. Mean commercial CPUE for coho salmon in district W-2 for the period 1-21 August. Index line of 37 fish/permit-hr corresponds roughly to 25,000 coho salmon escapement goal at Kogrukluk River Weir.