

REVISED
REPORT TO THE ALASKA BOARD OF FISHERIES
KUSKOKWIM AREA
1995

By:

Charles Burkey Jr.
Douglas B. Molyneaux
Cindy Anderson

Regional Information Report¹ No. 3A96-~~15~~ 15

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

April, 1996

¹ The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports.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 Commercial Fisheries Management and Development Division.

AUTHORS

Charles Burkey Jr. is the Kuskokwim Area Management Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development, P.O. Box 1467, Bethel, AK 99559

Douglas B. 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

Cindy Anderson is the Assistant Kuskokwim 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.

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.

TABLE OF CONTENTS

	<u>Page</u>
LIST OF FIGURES.....	iii
LIST OF TABLES.....	iv
INTRODUCTION.....	1
ESCAPEMENT MONITORING AND RUN ABUNDANCE ASSESSMENT	1
SUBSISTENCE FISHERY.....	3
COMMERCIAL FISHERY.....	3
SUMMARY OF THE 1995 SEASON.....	4
Kuskokwim River (Districts 1 and 2).....	4
Chinook Salmon.....	6
Sockeye Salmon	7
Chum Salmon	7
Coho Salmon	8
Kuskokwim Bay	9
Quinhagak (District 4).....	9
Goodnews Bay (District 5)	10
OUTLOOK FOR 1996	11
Chinook Salmon	11
Districts 1 and 2.....	11
District 4.....	12
District 5.....	12
Sockeye Salmon.....	12
Districts 1 and 2.....	12
District 4.....	12
District 5.....	13
Chum Salmon.....	13
Districts 1 and 2.....	13
District 4.....	13
District 5.....	14
Coho Salmon.....	14
Districts 1 and 2.....	14
Districts 4 and 5.....	14
FIGURES.....	15
TABLES.....	23

LIST OF FIGURES

	<u>Page</u>
1. Kuskokwim salmon management area	16
2. Kuskokwim Management Area, District W-1	17
3. Kuskokwim Management Area, District W-2	18
4. Kuskokwim Management Area, District W-4	19
5. Kuskokwim Management Area, District W-5	20
6. Historic cumulative estimated chum salmon passage at Kuskokwim River sonar and the cumulative Bethel test fish chum salmon index for 1995	21
7. Kuskokwim River chinook salmon escapement index, 1975-1995.....	22
8. Relationship between annual coho salmon escapement at Kogruklu River weir and the annual commercial CPUE in District 2 between August 1 and August 21	23

LIST OF TABLES

	<u>Page</u>
1. Utilization of Kuskokwim River chinook salmon, 1960-1995.....	25
2. Kuskokwim Area commercial, subsistence, and personal use salmon catches, 1913-1995	26
3. A sustained yield scenario for Kuskokwim River chum salmon	28
4. Estimated dollar value of Kuskokwim Area commercial salmon fishery, 1964-1995.....	29
5. Mean salmon weights and prices paid to commercial permit holders in the Kuskokwim Area, 1967-1995	30
6. Commercial fishing effort in Kuskokwim Area by permit-hour, 1960-1995.....	31
7. Executive summary of working group and department actions, 1995.....	32
8. Lower Kuskokwim River, District 1, commercial salmon harvest and fishing effort by period, 1995.	35
9. Middle Kuskokwim River, District 2, commercial salmon harvest and fishing effort by period, 1995.....	36
10. Lower Kuskokwim River, District 1 and middle Kuskokwim River, District 2, combined commercial salmon harvest, 1960-1995	37
11. Selected historic District 1 commercial chum salmon catches (number of fish) by date	38
12. Cumulative mean tidal CPUE for chum catches in the Bethel test fishery, 1985-1995	39
13. Historic mean daily CPUE for chum salmon caught in the Aniak test fishery.....	41
14. Kuskokwim River chum salmon run reconstruction estimate for 1995	43
15. Historic salmon escapement data from selected Kuskokwim Area projects, 1976-1995	44
16. Chinook salmon sex ratios and proportion of females with gill net marks, Kogrukluuk weir, 1979-1995	46
17. Peak aerial survey estimates for chinook salmon escapements in select Kuskokwim River spawning tributaries, 1975-1995	47
18. Historic cumulative salmon passage estimates at the Kuskokwim River sonar site	48
19. Utilization of Kuskokwim River chum salmon, 1960-1995.....	50
20. Quinagak District commercial permits, 1970-1995	51
21. Quinagak, District 4, commercial salmon harvest and fishing effort by period, 1995	52
22. Quinagak District commercial salmon harvest, 1960-1995.....	53

LIST OF TABLES (continued)

	<u>Page</u>
23. Ex-vessel value of Kuskokwim Area salmon catch by district, 1995.....	54
24. Goodnews Bay, District 5 commercial permits, 1970-1995.....	55
25. Goodnews Bay, District 5, commercial salmon harvest and fishing effort by period, 1995.....	56
26. Goodnews Bay District commercial salmon harvest, 1968-1995.	57
27. Historical estimated salmon run size and commercial exploitation rate, Goodnews River, 1981-1995	58
28. Preliminary projections of the 1996 Kuskokwim Area commercial salmon harvests in thousands of fish by species	59
29. Kanektok River peak aerial surveys by species, 1962-1995.....	60

The 1995 Kuskokwim Area Report to the Alaska Board of Fisheries, RIR 3A96-04, provided to the Board in January 1996 has been revised based on additional staff review and comment. Discussion of the Kuskokwim River chum salmon run reconstruction based on Bethel sonar run passage estimates (not included in the earlier version) has been included in this revision. In addition, a reassessment of 1995 Kuskokwim River chum salmon fisheries management and stock status has been performed and the results reported to the Board in this revision.

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, the Lower Kuskokwim River, is the portion of the Kuskokwim River upstream of Popokamiut to the regulatory markers located at Bogus Creek about nine miles above the mouth of the Tuluksak River (Figure 2). District 2, the 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 the waters inside of Goodnews Bay (Figure 5).

Six species of Pacific salmon occur in the Kuskokwim Area, with chum and coho salmon being the most abundant. Chinook, sockeye and chum salmon generally begin entering area streams during late May and early June. Since 1984, the mid-point of the run at Bethel has averaged 23 June for chinook, 27 June for sockeye and 3 July for chum salmon. Coho salmon generally begin entering area streams in late July with entry continuing into September. Pink salmon occur throughout the area, however, there has been little data collected about the pink salmon population in the Kuskokwim Area because of the lack of commercial markets and the lack of interest by subsistence fishers.

ESCAPEMENT MONITORING AND RUN ABUNDANCE ASSESSMENT

The major spawning systems in the Kuskokwim Area received provisional spawning escapement objectives in 1983. The objectives were typically the average escapement counts obtained under acceptable conditions in these systems using available data. The objectives represented the minimum escapement levels needed to maintain salmon stocks at historic levels of abundance. Continuing evaluation of the escapement data provided for refinements to the objectives. Annual assessment of spawning ground escapement is provided by aerial surveys, weirs and sonar projects.

Aerial surveys are conducted in "key" streams and lakes throughout the Kuskokwim Area. The surveys are best suited for indexing chinook and sockeye escapements. Surveys are typically conducted when these species are at peak abundance on the spawning grounds. The success and accuracy of aerial surveys are often hampered by turbid water conditions and inclement weather.

In addition to aerial surveys, Kuskokwim River spawning ground escapements are also monitored at Kogrukluk River weir and Aniak River sonar (Figure 1). Kogrukluk River weir began operation in 1976 and is the oldest continuous escapement project operated by the Department in the Kuskokwim Area, excluding aerial surveys. Tagging studies conducted near Tuluksak in 1961 suggest that travel time of chum and chinook salmon migrating from the upper end of District 1 to the Kogrukluk River weir is approximately 25 days. Travel time to Aniak River sonar is about 9 days. The Aniak River is thought to be the single largest producer of chum salmon in the Kuskokwim drainage. The chum salmon biological escapement goal (BEG) for the Aniak River is 250,000 and the BEG for the Kogrukluk River weir is 30,000. Aniak River sonar was established in 1980 and is typically only operated during the chum salmon season. Aniak sonar counts are not apportioned by species and all sonar targets were assumed to be chum salmon. A spatial expansion factor of 1.6 is used to adjust sonar counts for that part of the

river not counted by the sonar. A redesign of the Aniak sonar project, to be initiated during the 1996 season, will provide full coverage of the river and net sampling to evaluate species composition.

Escapement projection models have been developed for both the Kogrukluuk and Aniak projects. The projections help provide a more timely estimate of the final escapement by extrapolating the inseason counts by the historical percentage of run passage through the most recent date. Daily percentage of run passage from the projection models are used to estimate escapement during periods when the projects are not operating.

In District 4, aerial surveys are the only means currently employed to assess spawning ground escapement. District 5, escapements are assessed by means of the Goodnews River weir (Figure 1) as well as by aerial surveys. Salmon migration time from the fishing district to the weir on the Middle Fork of the Goodnews River is just a few days and timely enough to be used for inseason management.

Except for District 5, inseason spawning ground escapement estimates for use by management are difficult to obtain in the Kuskokwim Area. In District 4, timely estimates are limited to an occasional aerial survey. Consequently, inseason management in District 4 emphasizes the use of commercial catch data. In the Kuskokwim River most spawning streams are many miles upstream of the commercial fishing district so there is a long delay between commercial fishing periods and the observed fish passage at escapement projects. The delay is typically too late to adjust fishing effort during the early part of the season. The escapement projection models described earlier have only had modest usefulness for inseason management needs. Therefore, inseason salmon management on the Kuskokwim River depends primarily on commercial catch data, test fisheries and Kuskokwim River sonar.

When using commercial harvest information managers compare current year catch numbers and commercial catch-per-unit-effort data (defined as catch per boat-hour) with historic data in order to provide an inseason assessment of run strength. However, the usefulness of this approach can be confounded by inconsistencies in the number of participating fishers, the duration of commercial fishing periods and other variables that might influence catch or the actual "effort" applied by fishers. The practicality of this approach is also limited by the need to have a commercial fishing period in order to make an assessment.

Daily inseason assessment of run strength was also available from three drift gillnet test fisheries operated on the Kuskokwim River. The Lower Kuskokwim Test Fishery (river mile 25) was operated as a partnership between the Association of Village Council Presidents, the Bering Sea Fishermen's Association, and the Department. This was the first year of operation for the Lower Kuskokwim Test Fishery. It was essentially a redesign of its precursor, the Eek Test Fishery (1988-1994), however, the design changes were significant enough to make data from the two projects not comparable. The Department's Bethel test fishery (river mile 80) began in 1984 and has been the oldest operating and most useful test fishery in the area. The Aniak test fishery (river mile 220) began in 1992 and was operated as a partnership between the processor in Aniak and the Department. The Aniak test fishery was operated nearly every day during the 1995 season, however in past years operation was discontinuous with frequent and sometimes prolonged periods during which no test fishing occurred.

The Kuskokwim River sonar is a more recently developed run assessment tool. This project is located on the Kuskokwim River near Bethel (river mile 80). Sonar is used to estimate total fish passage which is then apportioned to species with data from an intensive gillnetting program. Development of this sonar project began in 1988. Significant changes and innovations were tested in 1992 and incorporated into the program in 1993. In 1995, the project provided daily estimates of salmon passage by species through 20 July, which precluded assessment of coho salmon.

SUBSISTENCE FISHERY

By Alaska statute (AS 16.05.258) subsistence fishers have priority use of the salmon resource. The Kuskokwim Area subsistence salmon fishery is a large and important fishery, with over 4,000 families participating. Subsistence catches of chinook salmon in the Kuskokwim River normally exceed the commercial catch of this species (Table 1). In all districts there is more time allowed for subsistence fishing than commercial fishing. For example, in 1995 salmon were available in District 1 for about 100 days, beginning with chinook salmon in late May and continuing through the end of the coho run in early September. During this time subsistence fishing was open for 80 days, while the subsistence closures associated with commercial fishing were operative for only 20 days.

The subsistence fishery is subject to few restrictions, however some restrictions are imposed to deter illegal commercial fishing. 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 tributary streams. In Districts 2, 4, and 5 the subsistence closures apply to the commercial districts and spawning tributaries. Subsistence restrictions may also be employed to insure adequate escapement when stocks are especially weak; however such occasions are rare in the Kuskokwim Area.

The Subsistence Division mailed 1995 subsistence "catch calendars" and household reply cards to over 1,500 Kuskokwim Area households. Calendar collection and interviews occurred during house to house surveys in October and November. This timing provides more complete catch data, particularly for coho salmon.

The estimated subsistence catch for the Kuskokwim Area in 1995 was 104,290 chinook, 29,945 sockeye, 43,387 coho and 72,443 chum salmon. The subsistence take of chinook salmon was the highest on record while the coho salmon catch was 9% above the most recent 10 year average. The chum and sockeye salmon subsistence catches were 33% and 19% below their respective 10 year averages (Table 2).

COMMERCIAL FISHERY

The Alaska Department of Fish and Game, 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).

The department has developed a sustained yield scenario for Kuskokwim River chum salmon (Table 3). The scenario is used to establish inseason management triggers for the commercial and subsistence fisheries. The scenario requires the Bethel sonar to project a total escapement of 506,000 chum salmon. The average subsistence chum salmon harvest above the sonar is 51,000 fish. The sonar projection should be 557,000 chum salmon plus the commercial catch to date above the sonar and the average commercial catch for that day before a commercial period will be allowed.

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. In Districts 4 and 5 fishing periods are normally 12 hours in length. There are 832 limited entry permits issued for the Kuskokwim Area. Permit holders can transfer freely between any Kuskokwim Area districts.

SUMMARY OF THE 1995 SEASON

The 1995 Kuskokwim Area salmon season opened by emergency order in District 4, Quinhagak, on 13 June. The salmon season closed by regulation on 8 September following the final fishing period in District 4 on 6 September.

In 1995, 829 of the 832 Kuskokwim Area permit holders made at least one landing. This is a record for the number of permits fished in the Kuskokwim Area (Table 4). The total commercial catch was 72,352 chinook, 198,045 sockeye, 555,539 coho, 318 pink and 707,212 chum salmon (Table 2).

Overall the 1995 Kuskokwim Area commercial salmon harvest of 1.5 million was about 11 percent above the 1985-1994 average (Table 2). The average prices paid per pound, however, were generally low (Table 5). The chinook salmon catch of 72,352 was 25 percent above average, but the price per pound of \$0.60 was \$0.16 below the ten year average. Likewise, the sockeye salmon catch of 198,045 was 22 percent above average, but the \$0.71 paid per pound was \$0.20 below average. The coho salmon catch of 555,539 was about 9 percent below average. The price in 1995 of \$0.41 per pound was \$0.23 below the average coho value. It was also the lowest price paid to fishers since 1983. The pink salmon catch of 318 was average for an odd year and brought a price of \$0.12 a pound, \$0.02 above average. The chum salmon catch of 707,212 was 32 percent above average. The \$0.18 per pound paid to fishers, however was \$0.11 below average and the lowest since 1973.

Kuskokwim Area permit holders received \$4,209,752 for their catch, excluding bonuses and other incentives not reported on fish tickets. The value of the catch was 24 percent below the previous ten year average of \$5,538,242 (Table 4). The average permit holder earned \$5,078 from the commercial salmon harvest in 1995. This is 26 percent below the ten year average of \$6,860.

Weak chum salmon markets limited the processing capacity available in the Kuskokwim Area in 1995. The Kuskokwim River fisheries were impacted most. During June and July managers restricted the duration of nearly all openings in the Kuskokwim River to 4 hours so as not to exceed the processing limits. Fishers in District 2 were substantially impacted because they generally had to transport their catches to District 1 to find a buyer for their catch. In August additional processing capacity became available for the coho season and the length of the fishing periods reverted to the more normal 6 hour duration. During past years 8 hour periods have also been allowed, but not in 1995.

The poor chum salmon markets prompted some Kuskokwim River fishers to redirect their efforts to the more lucrative chinook and sockeye fisheries in Districts 4 and 5. The above average number of fishers participating in these Kuskokwim Bay Districts has been a trend in recent years (Tables 13 and 14). The trend is a result of poor markets and concerns about chum salmon stocks in the Kuskokwim River coupled with higher profitability and stronger salmon returns in Kuskokwim Bay. Permit-hours were below average in Districts 1 and 2 due to shorter than normal openings during the chum salmon fishery. Effort was above average in Districts 4 and 5 due to strong salmon runs (Table 6).

Kuskokwim River (Districts 1 and 2)

The Kuskokwim River Salmon Management Working Group (Working Group) continued to work closely with the department in 1995 to help manage the Kuskokwim River salmon fisheries. The Working Group is comprised of representatives from several Kuskokwim River salmon user groups. Through uncommon dedication by all the concerned parties the Working Group provided inseason management recommendations that served as a cooperative approach to management with the department (Table 7). During the season the Working Group met 20 times to evaluate the status of the salmon runs and make recommendations to the Department.

The 1995 preseason outlook was for an average size chum salmon run. The return of five year old fish, spawned in 1990, were expected to be average based on their return as age four salmon in 1994. The

return of four year old chum salmon from the 1991 escapement were also expected to be near average in abundance based on parent year escapement.

There were nine commercial fishing periods in District 1 during the chum salmon season (Table 8). District 2 had eight openings (Table 9). A total of 605,918 chum salmon were harvested by approximately 720 permit holders (Table 10). This was the third highest chum salmon harvest on record. The average price per pound for chum salmon was \$0.18 making the ex-vessel value of the catch worth \$742,478.

With one exception, all openings during the commercial chum salmon fishery were 4 hours in length instead of the more typical 6 or 8 hours. The shorter periods were necessary because of limited processing capacity and the need to improve the quality of the catch. The reduced duration of fishing periods likely confounded the common management practice of comparing current year and historical commercial catch statistics, particularly CPUE, to evaluate run strength.

Run assessment through mid-June showed weak chum salmon abundance. Consequently, during the 18 June meeting the Working Group and the Department decided not to set a commercial fishing period. By 20 June, indicators showed increasing chum salmon run strength. The Working Group reconvened and recommended that a 4 hour commercial fishing period be set for 22 June. The department concurred. In compliance with 5 AAC 07.365 KUSKOKWIM RIVER SALMON MANAGEMENT PLAN this first period only included the lower half of District 1. The upper half of District 1 and all of District 2 remained closed. The catch of 49,157 chum salmon was about 30 percent below historical catches that occurred near that same date in 1989 and 1992 (Table 11). The below average catch on 22 June was attributed to the reduced hours fished. Staff agreed that the delay of the first opening, coupled with the reduction in the hours fished, was adequately conservative in allowing a sufficient number of chum salmon to pass through the commercial fishing district through 22 June.

For the remainder of the chum salmon season, run strength indicators generally improved and suggested an average run size. A normal fishing schedule was allowed consisting of essentially two commercial fishing periods per week through 21 July. Of the resulting nine commercial fishing periods, eight were 4 hours in duration and one was 6 hours (Table 8). In all instances the short hours were a result of the limited processing capacity. Staff generally viewed the short hours as a conservative measure which would benefit spawning escapement, so there were generally no initial concerns of over-harvesting the chum salmon run. On 24 July the Working Group and the Department agreed to stop fishing until the coho salmon run was strong enough to resume commercial fishing.

The first commercial fishing period in District 2 occurred on 26 June. This was the only commercial period in which there was a processor available to buy fish in the district. Following the 26 June opening, the number of permit holders in District 2 dropped from 16 to an average of 7 per period for the balance of the chum salmon season (Table 9). Low prices and a relatively long run to the tenders located in District 1 made fishing unprofitable for many District 2 permit holders.

There is a significant difference between the 1995 Kuskokwim River inseason assessment of chum salmon run strength on which management was based and the run reconstruction. Comparison of Bethel test fishery cumulative CPUE to target test fishery thresholds was the primary run assessment tool used to manage the Kuskokwim River chum salmon fishery in 1995 (Table 12). The Bethel test fishery cumulative CPUE was above threshold throughout the season (Figure 6). Catches and CPUE in the commercial fishery was generally good and suggested a strong run inseason. A test fish project on the Kuskokwim River at Aniak suggested adequate abundance (Table 13). After the first week of July the Aniak sonar and Kogrukluk weir data were an important part of inseason run assessment. We did not use inseason run reconstruction data from the Bethel sonar project to manage the Kuskokwim River fishery in 1995.

Interannual comparisons of Bethel sonar and Bethel test fish data between 1995 and 1993, taking into account water level for the test fishery, indicated close agreement between the two projects. Both projects showed remarkable agreement in describing the timing and magnitude of the run. There was an

unusually large commercial catch above the Bethel test fishery and sonar site in 1995. However, we did not make the necessary adjustments in our inseason assessment of the test fish data. There have been concerns about the 1995 field data from the Aniak sonar escapement project. We do not know if we achieved the Aniak River BEG in 1995. However, based on weir counts the BEG for Kogrukluk River was achieved in 1995.

Based on our reevaluation of the 1995 season for the Kuskokwim River, the department believes that the chum salmon run was probably over-harvested. The total run of chum salmon into the Kuskokwim River in 1995 is estimated to be $982,000 \pm 24,000$ fish (95% confidence interval) based on run reconstruction data from the Bethel sonar project (Table 14). The total commercial and subsistence catch of chum salmon in the Kuskokwim River was $676,000 \pm 7,000$ fish (variance is a result of the subsistence survey component). The resulting escapement estimate of 283,000-330,000 is below the minimum desired drainage wide escapement level of 506,000 chum salmon.

In August the processing capacity in the Kuskokwim River fishery increased. Based on the strength of the coho salmon run, the department and the Working Group agreed to reopen the commercial fishery on 4 August for 6 hours in Districts 1 and 2. Many permit holders did not participate in this opening to protest the low prices paid for coho salmon. Even though prices did not increase, the number of permit holders fishing in District 1 increased to normal levels during subsequent periods. The number of permit holders fishing in District 2 continued to be about half historical levels due to the lack of a buyer in the district.

The department recommended a total of 9 fishing periods in District 1 (Table 8) and District 2 (Table 9) during the 1995 coho salmon season. The Working Group agreed with the department's recommendations. Coho salmon abundance, coupled with improved processing capacity, allowed all 9 commercial fishing periods to be 6 hours in duration. The Kuskokwim River was closed to commercial fishing after the last period on 1 September.

There is no drainage wide escapement level set for coho salmon. The only means to assess achievement of such a level would be by using the Bethel sonar, but the sonar is not operated through the coho season. In 1995 the sonar project was concluded on 20 July. The only tool managers have to assess coho salmon escapement is Kogrukluk River weir. The minimum escapement goal for coho salmon passage at Kogrukluk River weir is 25,000. The estimated passage for 1995 was 27,856 (Table 15).

Chinook Salmon

The combined commercial and subsistence chinook salmon harvest has increased from an average of 56,000 fish from 1960-1969 to 100,524 during 1985-1994 (Table 1). A conservation concern for Kuskokwim River chinook salmon arose following a series of years with poor chinook salmon escapements in the mid 1980's (Figure 7). Besides the poor escapements, the low number of female chinook salmon in the escapement compounded the conservation concern (Table 16).

Beginning in 1984, the Board began restricting the commercial fishery because the Department was unable to correct the problem through inseason management measures. In 1985, a shift to 6-inch or smaller commercial gillnets reduced the harvest of larger female chinook salmon. This gear change was successful in reducing the sex ratio of the commercial catch from 43 percent to 29 percent female. However, total escapement continued to be below acceptable levels (Figure 7). 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 improved chinook salmon escapements in subsequent years (Figure 7). An unexpected benefit of the improved status of chinook salmon in the Kuskokwim River was an increase in the commercial harvest of chinook salmon (Table 1). The subsistence fishery continues to target large chinook salmon with "king" gear. Improved survival, perhaps related to elimination of the directed high seas salmon fishery, played a role in the success of these management changes.

Since 1987 the chinook salmon catch has been incidental to the chum salmon fishery in Districts 1 and 2. In 1995 the commercial harvest of 30,846 was below the recent ten year average of 35,577 (Table 10). This is likely due in part to the delayed start of the commercial fishery.

Chinook salmon escapement goals were achieved at the Kogrukluik weir (Table 15) and in all nine aerial survey index streams flown in 1995 (Table 17). The estimated chinook salmon passage of 208,282 at the Bethel sonar was a record for that project (Table 18). A strong run of chinook salmon, the relatively late start of the commercial fishery and shorter openings produced the highest escapement index on record (Figure 7).

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 differentiated 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 10). In 1995 the commercial harvest of 92,500 sockeye salmon was above the recent ten year average of 83,786 (Table 10).

Sockeye salmon escapement is documented ancillary to the other species. The Kogrukluik weir escapement estimate of 10,996 sockeye salmon in 1995 was above average (Table 15). Estimated sockeye salmon passage at the Bethel sonar was 161,631, the lowest in the three years of project operation (Table 18).

Chum Salmon

Before 1971, chum salmon were an incidental catch during the chinook and coho directed 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 2). A combined commercial and subsistence catch of 400,000 chum salmon was the management goal from 1971 to 1979. Subsistence catches for the entire river have declined since the inception of the commercial fishery in 1971 (Table 19). From 1971 to 1980 the average subsistence harvest was 173,689. The average harvest declined to 136,203 for the period 1981 to 1990 (Table 19). This is thought to be 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 476,637 salmon in the last ten years (Table 10).

The following guidelines manage the commercial harvest:

1. Chum salmon run assessment projects indicate that escapements will be adequate.
2. Commercial catch per unit effort compares to previous years when escapement was adequate.
3. Subsistence fishers report adequate subsistence catches.

Declining run strength normally results in a 1 to 2 week closure beginning in the last half of 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. Runs in 1988 and 1989 were at record high levels, but in order to reach escapement objectives more time was required between fishing periods. The 1990 and 1991 runs were smaller but a 4 to 6 day spacing between periods resulted in approaching or reaching chum salmon escapement objectives.

The Kuskokwim River has two major channels at the site where the Eek test fishery occurred. The Eek test fishery, which operated in only the eastern channel, was a very poor indicator of chum salmon run strength in 1994. In 1995 the project was redesigned to include drift stations in both channels. The redesigned project, renamed the Lower Kuskokwim test fishery, was a good predictor of the commercial catch below Bethel in 1995. The Bethel test fish index for chum salmon was an accurate indicator of commercial catches above Bethel. The Aniak River sonar escapement estimate for 1995 is not considered reliable due to lack of documentation and difficulties with project operation. Escapement estimates from the Kogrukluk Weir indicated that the chum salmon escapement objective was met for this system, possibly due to the relatively late start of commercial fishing on the Kuskokwim River (Table 15).

Coho Salmon

Kuskokwim River managers have a limited number of indicators of coho salmon abundance in the drainage: three test fisheries (Lower Kuskokwim, Bethel and Aniak), Kogrukluk River weir, commercial catch data and an informal collection of subsistence data. Kogrukluk River weir has a coho salmon escapement objective of 25,000 fish. Commercial catch per unit effort (CPUE) in District 2 during coho season is being assessed as an indicator of abundance of coho salmon above District 1. The CPUE in District 2 has been useful when weir data are unavailable.

Traditionally, coho salmon (locally called "rain fish") were not well utilized because of poor drying conditions during the delta's rainy fall weather. Subsistence use of coho salmon has increased in areas where freezers are available to preserve fish. 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 fishery management in the Kuskokwim River is based on coho salmon abundance when that species dominates the commercial catch. Run strength is assessed by evaluating catches in the test fisheries, CPUE of the commercial fleet, and escapement trends at Kogrukluk River weir. Fishing periods are simultaneous in Districts 1 and 2 throughout the season which closes by regulation on September 1. Record runs in 1984 and 1994 as well as a late run in 1989 resulted in extensions of the season into September. The management strategy is similar to that for chum salmon.

In the most recent 20 years of fishing for this species, catches have ranged from the 1983 catch of 196,000 coho salmon to the record harvest in 1994 of 724,689 fish (Table 10). The most recent ten year average harvest is 531,000 fish. Since 1985 when both districts have had buyers, permits have ranged from 650 to 775. In 1995 a total of 721 permit holders harvested 471,461 coho salmon in the Kuskokwim River districts.

Under cooperative management of the commercial fishery with the Kuskokwim River Management Working Group, the coho salmon escapement goal at the Kogrukluk River weir has been achieved in three out of eight years. Distrust by the public of the Bethel test fishery, lag time of Kogrukluk River weir escapements, and lack of sufficient additional data contributed to the over-fishing. The Department's uncertainty during the early portions of the run often caused corrective actions to come too late to make a significant difference in escapement needs to the upper drainage as indexed by Kogrukluk River weir. Escapement at Kogrukluk Weir in the last few years has increased and appears to be closer to achieving or exceeding escapement goals.

In 1995, Kogrukluk River weir operated for a portion of the coho migration period. Based on an early run timing model, an estimate of 27,856 coho salmon escaped, which meets the escapement goal of 25,000 fish (Table 15). Use of the early run timing model provides the most conservative estimate of escapement.

In the last decade, when buyers have been present in District 2, commercial fishing has been simultaneous with District 1. The commercial fishing effort in District 2 has been fairly consistent and this has provided a CPUE that has correlated with escapement monitored at the department's weir on the Kogrukluk River. An average CPUE for periods between 1 August and 21 August of 43 or greater has resulted in the escapement goal being reached (Figure 8). The 1995 cumulative CPUE was 54. This may be artificially high due to the lower than normal participation in the fishery.

The Bethel Test Fishery cumulative CPUE index in 1995 was comparable to years when Kogrukluk Weir achieved escapement. The delayed opening of coho salmon fishing probably allowed a number of coho salmon to escape the commercial fishery.

Kuskokwim Bay

Quinhagak (District 4)

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

Commercial fishing effort in this district has increased considerably in the last decade. The number of permit holders in the last two decades has ranged from 117 in 1982 to a record high during the 1993 season of 409 (Table 20). The previous 10 year average is 326 permit holders (Table 20). In the Kuskokwim Area, permit holders have unrestricted movement between commercial fishing districts. Recent changes in the June, Kuskokwim River commercial fishery have resulted in a shift in effort to this district, which has a directed chinook salmon fishery.

District 4 opened on 13 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 an above average catch for chinook salmon (Table 21). Commercial fishing continued two times a week until sockeye salmon dominated the catch during the 29 June opening. Above average chinook salmon catches in the commercial and subsistence fisheries suggested an above average run. Commercial fishing remained on a regular schedule of three 12 hour periods per week until 8 September when it closed by regulation. In 1995, early aerial surveys of the Kanektok River drainage were unsuccessful due to high turbid water. During the 1995 season, 382 permit holders made commercial deliveries (Table 21).

The chinook salmon catch of 38,584 is the second highest catch on record, well above the 10 year average of 19,262 (Table 22). Buyers paid an average price of \$0.60 per pound. The ex-vessel value of chinook salmon was \$417,000 (Table 23).

The directed sockeye salmon fishery peaked on 10 July at 9,894 sockeye salmon. The sockeye salmon catch of 68,194 is above the ten year average of 42,948 fish (Table 22). Poor aerial survey conditions continued during the sockeye salmon migration and escapement estimates are unavailable. The average price paid for sockeye salmon was \$0.71 per pound. The ex-vessel value for sockeye in District 4 was \$326,700.

Chum salmon are an incidental catch in the chinook and sockeye salmon commercial fisheries in District 4. The 1995 chum salmon catch was 81,463; which is twice the 10 year average of 40,509 fish (Table 22). Chum salmon brought an average of \$0.18 per pound, resulting in \$106,000 in payment to permit holders (Table 23). Escapement for chum salmon is unknown due to poor aerial survey conditions.

Coho salmon dominated the commercial catch in this district on 31 July. Commercial catches, when compared with historical catches, suggests that the coho salmon run in this district was above average. Using historical catch comparisons, if the data suggests a strong coho salmon runs in District 4, fishing can continue uninterrupted for three 12 hour periods per week without jeopardizing escapement. The coho catch peaked with a period catch of 9,133 fish on 9 August (Table 21). The commercial salmon fishing season closed by regulation on 8 September. The 1995 coho salmon harvest of 66,203 fish is above the 10 year average of 54,643 fish (Table 22). Permit holders were paid an average of \$0.41 per pound. The ex-vessel value of coho salmon in District 4 was \$207,900. 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 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 number of commercial fishermen peaked in 1988 when 125 permits holders fished and over the last decade has averaged 94 permit holders (Table 24). In 1995, participation in the district was above average at 118 permit holders due to extension of fishing periods in the Goodnews Bay district.

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 a portion of the coho salmon escapement. 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 1995 the Goodnews Bay district opened to commercial fishing on 29 June (Table 25). Two 12 hour periods a week were allowed until the majority of the chinook salmon run had passed the commercial fishery. Over 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 1995, this strategy helped achieve an estimated passage of 4,836 chinook salmon through the Goodnews River weir, exceeding the escapement goal of 3,500 fish. The commercial harvest of 2,922 chinook salmon was below the ten year average of 3,224 fish (Table 26). Buyers in this district paid an average of \$0.60 per pound, which totaled \$31,339 paid for this species (Table 23).

The sockeye salmon catch in Goodnews Bay was above average during 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 good numbers of sockeye, and it became apparent that the escapement goal was being approached, fishing time was increased from 12 to 36 hour periods between 10 July to 20 July (Table 25). This was the longest fishing time allowed during the peak of the sockeye salmon season. The commercial harvest in 1995 of 37,351 sockeye salmon was slightly above the ten year average of 35,887 fish (Table 26). Sockeye salmon prices averaged \$0.71 per pound resulting in \$175,552 paid to permit holders in 1995 (Table 23). The department's weir on the middle fork of the Goodnews estimated a sockeye salmon passage of 39,009, well above the escapement goal of 25,000 fish (Table 27).

The chum salmon catch is incidental to the sockeye salmon fishery in District 5. The 1995 catch of 19,832 fish was above the ten year average of 16,984 fish (Table 26). Permit holders were paid \$0.18

per pound for this species, for a total value of \$21,427 (Table 23). The chum salmon escapement of 33,699 fish at the Goodnews River weir exceeded the goal of 15,000 fish (Table 27).

The 1995 coho salmon catch of 17,875 fish was below the ten year average of 23,612 fish (Table 26). Commercial permit holders received \$0.39 per pound for this species resulting in a total of \$58,061 paid (Table 23). The Goodnews River weir enumerated 5,415 coho salmon in 1995. This is a minimal estimate because the weir concluded operation well before the peak of the coho migration. High water and poor flying conditions prevented any aerial surveys of the Goodnews River drainage in 1995.

OUTLOOK FOR 1996

The Kuskokwim Area has no formal forecast for salmon returns. Broad expectations are developed based on an evaluation of brood year escapements, trends in harvest, and approximate trends in productivity.

Chinook Salmon

Most chinook salmon return to the Kuskokwim Area at age 6, 5, or 4 so the primary brood years for 1996 will be 1990, 1991 and 1992. Chinook salmon escapement in the Kuskokwim River drainage is monitored by aerial surveys of selected streams and at Kogrukluk River weir. Escapement data is also available from the Tuluksak River (operated 1991 through 1994) and Kwethluk River weirs (operated 1992) which were U.S. Fish and Wildlife Service projects. In Kuskokwim Bay, chinook escapement is monitored by aerial surveys of Kanektok and Goodnews Rivers and at Goodnews River weir.

Districts 1 and 2

The return of chinook salmon to the Kuskokwim River in 1996 is expected to be at average or below average abundance. In 1990 chinook salmon passage at Kogrukluk River weir was 2 percent above the minimum objective (Table 15) and the objectives were achieved in 4 of 9 aerial survey streams (Table 17). In 1991 chinook passage at Kogrukluk weir was 22 percent below the minimum objective and aerial survey objectives were achieved in 2 of 6 streams. In 1992 Kogrukluk escapement was 32 percent below objective and 4 of 8 aerial survey objectives were achieved. In addition, for the past three years chinook abundance in the Kuskokwim River has been bolstered by strong survival of the 1989 brood year. The offspring from this brood year returned to the Kuskokwim River in 1993, 1994 and 1995 at ages 4, 5 and 6. This cohort was the dominant age group in the commercial catch during each of these years. The cohort will return as 7 year olds in 1996, but this age class usually constitutes less than 10 percent of the commercial catch.

The incidental commercial harvest of chinook salmon in the Kuskokwim River is driven by the intensity of the chum salmon directed fishery. Chum salmon abundance is expected to be below average, therefore the incidental chinook catch is also expected to be below average. Still, the chinook harvest may approach average levels if a proposed management plan is adopted which allows a commercial fishery on early run chum salmon stocks. The intent of this plan is to allow for a normal commercial harvest level of chinook salmon with minimal impact on the chum salmon population. This goal would be pursued by attempting to take advantage of run timing differences between the two species. The plan would allow commercial fishing to occur in mid-June, before the bulk of the chum salmon begin to arrive. If the plan is accepted, the commercial harvest of chinook salmon is expected to be between 20,000 and 45,000 which is average to below average. If the plan is not accepted the harvest will likely be well below 20,000 (Table 28).

District 4

District 4, Quinhagak, currently has the only directed commercial chinook salmon fishery in the Kuskokwim Area. The Kanektok River chinook salmon escapement index was well below objective levels in all three brood years (Table 29). The harvest trend in recent years has also been below average, except for 1995. As in the Kuskokwim River, the bulk of the 1995 commercial chinook harvest in District 4 was attributed to age 6 fish. The 1995 commercial harvest will likely be between 10,000 to 20,000 which is the lower half of the historic range (Table 28).

District 5

In District 5, Goodnews Bay, the chinook stocks have been depressed for most of the past several years and a rebuilding program has been underway. Escapement to Goodnews River was below objective in two of the three brood years (Table 27). The harvest trend has also generally been below average due to low returns and the impact of the chinook salmon rebuilding program. For the 1996 season the incidental catch of chinook salmon in District 5 will probably be between 2,000 and 3,000 which is in the central range of the past 10 years (Table 28).

Sockeye Salmon

Sockeye salmon return primarily at age 5 in the Kuskokwim Area, so the 1991 brood year will have the most influence on the 1996 returns. In the Kuskokwim River, sockeye salmon harvest is incidental to the directed commercial fishery on chum salmon. Kuskokwim Bay districts support directed sockeye fisheries.

Districts 1 and 2

Sockeye salmon are harvested incidentally during the chum directed commercial fishery on the Kuskokwim River. The return of sockeye salmon to the Kuskokwim River is expected to be above average in 1996. The 1991 brood year escapement at Kogrukluk River weir was well above average (Table 15), but it is only a small, second order tributary in the Kuskokwim River drainage and additional sockeye salmon escapement data is very limited. The quantity of sockeye salmon harvested in the Kuskokwim River will be driven by the intensity of the chum fishery in late June and early July. Given the poor outlook for the 1996 chum salmon return to the Kuskokwim River, and the temporal overlapping of the two species, the incidental sockeye harvest is expected to be between 30,000 and 60,000 (Table 28).

District 4

Sockeye salmon returns to District 4 are expected to be good in 1996. The 1991 brood year escapement as indexed by aerial surveys in the Kanektok River was 43,000 sockeye salmon, which is well above the escapement objective of 15,000 and the ten year average of 27,000 (Table 29). The 1991 return supported an average commercial harvest of 53,657 sockeye (Table 22). In the last few years the trend has been toward above average commercial harvests while still achieving escapement objectives. The sockeye harvest in District 4 is again expected to be between 50,000 and 80,000, which is above average (Table 28).

District 5

District 5 is expected to have a good sockeye return in 1996. The 1991 brood year escapement past the Goodnews River weir was 47,000, which exceeded the objective of 20,000 to 30,000. The District 5 commercial harvest has been above average in recent years and the escapement objective has been achieved or exceeded. The harvest in 1995 returned to more normal levels, but sockeye escapement remained high at 39,000. The District 5 sockeye harvest is again expected to be average to above average, perhaps 35,000 to 70,000 (Table 28).

Chum Salmon

Chum salmon return to the Kuskokwim Area primarily at 5 and 4 years of age, so the main brood years will be 1991 and 1992. 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.

Districts 1 and 2

Below average numbers of chum salmon are expected to return to the Kuskokwim River in 1996. Spawning escapements for early running stocks are thought to be indexed by Kogrukluk River weir. Brood year escapement at Kogrukluk weir was 19 percent below objective in 1991, but 14 percent above objective in 1992 (Table 15). This may result in average abundance at the start of the 1996 season. However, the bulk of chum salmon production for the Kuskokwim River is attributed to the Aniak River drainage. Chums salmon timing in the Aniak River suggests this stock enters the Kuskokwim River a little later than the stocks indexed by Kogrukluk River weir. Chum salmon escapement to the Aniak River in 1991 was 26 percent above objective, while the 1992 escapement was 66 percent below objective. Conservation actions will likely be necessary to ensure escapement needs at Aniak River are achieved. 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 introduces a wider margin for error in the pre-season outlook. The 1996 chum salmon harvest in the Kuskokwim River is expected to be below average, perhaps in the range of 100,000 to 300,000 (Table 28).

District 4

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 29). However, the incidental harvest of chum salmon taken during the sockeye directed fishery has been well above average (Table 22). The chum salmon harvest is driven by the level of commercial effort targeting sockeye salmon. Consequently, the above average abundance of sockeye salmon in recent years has resulted in a higher than normal harvest of chum salmon. The increased harvests also correspond to an expansion in the number of permit holders participating in the District 4 fishery. This trend may continue in 1996 given the limited commercial fishing expected in the Kuskokwim River. The numbers of chum salmon harvested in District 4 has not shown the decline that would be expected from the aerial survey record. Escapement assessment in the Kanektok River is limited to aerial surveys which may be an inadequate index of chum salmon escapement to that river. Since the chum salmon commercial harvest is related to the directed sockeye salmon harvest, the chum salmon harvest in District 4 will likely be above average with a harvest of 60,000 to 90,000 (Table 28).

District 5

In District 5, chum salmon escapement past the Goodnews River weir was 83 percent above objective in 1991 and 47 percent above objective in 1992 (Table 27). The chum salmon harvest is incidental to the sockeye directed fishery. Given the outlook of average sockeye salmon abundance in 1996, the incidental chum salmon harvest in District 5 is expected to be 10,000 to 20,000, which is near average (Table 28).

Coho Salmon

Coho salmon return to the Kuskokwim Area primarily as 4 year old fish, so 1992 will be the key brood year for 1996 returns. There is very little information on which to base the coho salmon run outlooks. The Kogrukluk River and Tuluksak River weirs were the only coho salmon escapement projects in the Kuskokwim Area in 1992 and both these projects are located on small to moderate sized tributaries of the Kuskokwim River.

Districts 1 and 2

Coho salmon escapement past Kogrukluk River weir in the 1992 brood year was 4 percent above objective. Tuluksak River weir was in its second year of operation in 1992 and total coho passage was 61 percent above the previous year. This compares to coho passage at Kogrukluk weir which was 62 percent better than the previous year. These escapement results suggest at least an average coho return in 1996. However, it appears that coho salmon survival has been well above average in recent years. As a result the 1996 return may be larger than the limited parent year escapement data would suggest. Given this uncertainty, the outlook for the Kuskokwim River coho return ranges from average to above average. Harvest is expected to be between 500,000 and 700,000 (Table 28).

Districts 4 and 5

Commercial harvest data are the only guide to anticipating coho salmon returns in Districts 4 and 5. In 1992 the coho harvest in District 4 was well above average (Table 22). In the last five years coho salmon catches have been above average, ranging from 43,000 to 86,000. Based on brood year commercial catch data and the recent trend towards above average returns, the 1996 harvest is expected to be average to above average, in the range of 50,000 to 90,000 (Table 28).

In District 5 the coho harvest in the 1992 brood year was near average (Table 26). Harvest in the past five years has been volatile ranging from 13,000 to 47,000. The 1996 coho harvest in District 5 is expected to be within the range of 15,000 to 30,000 (Table 28).

FIGURES

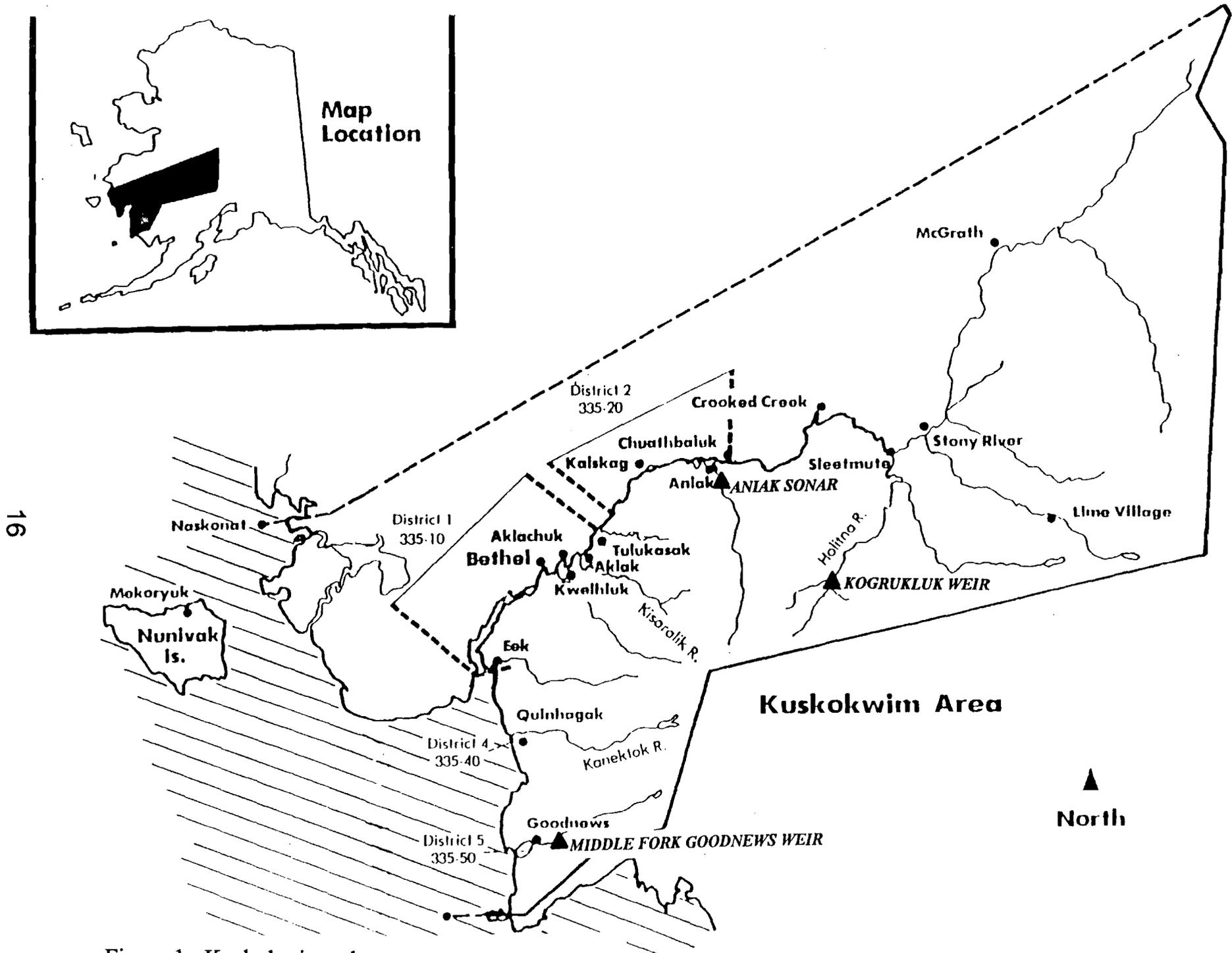


Figure 1. Kuskokwim salmon management area.

KUSKOKWIM MANAGEMENT AREA DISTRICT W-1

KUSKOKWIM RIVER

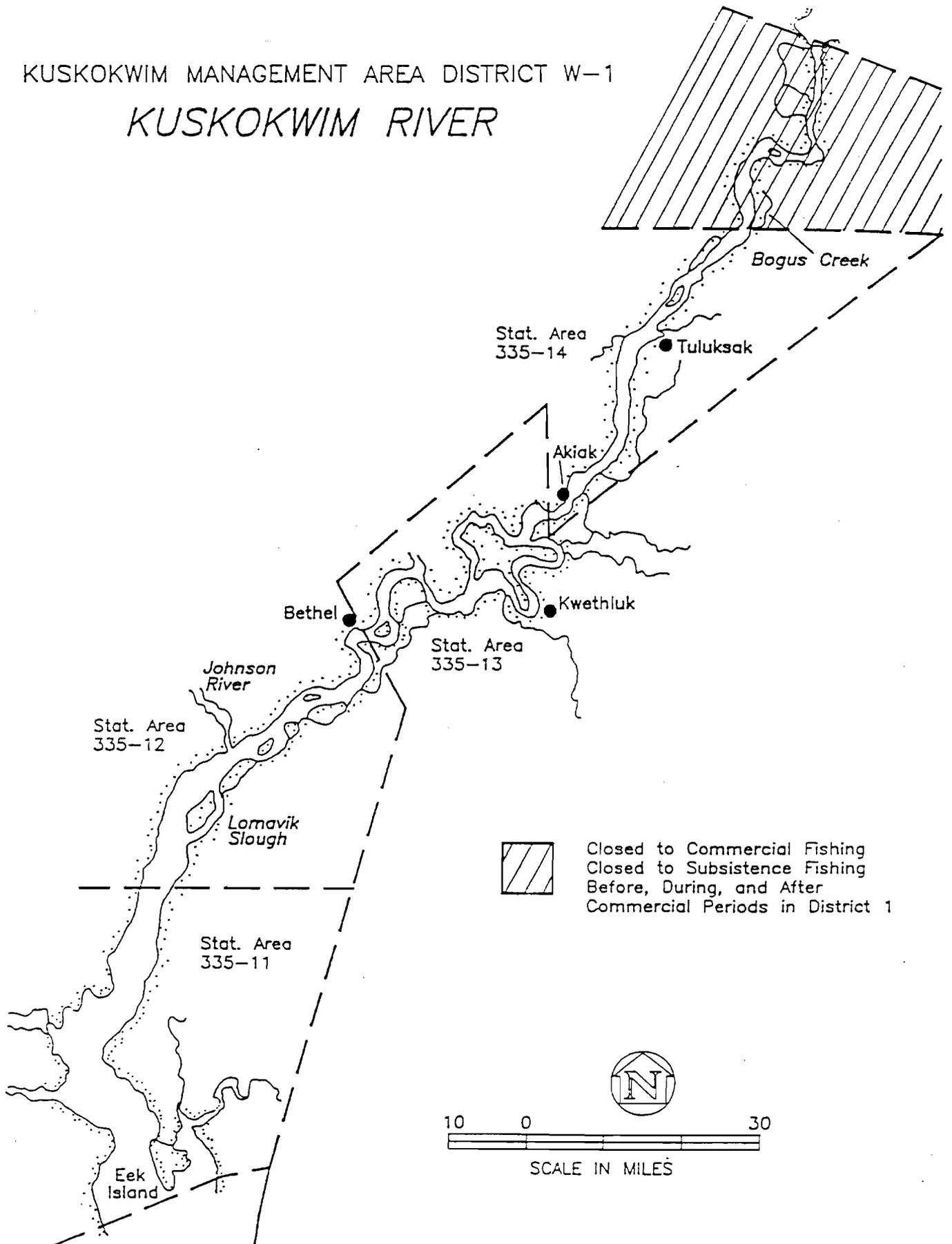
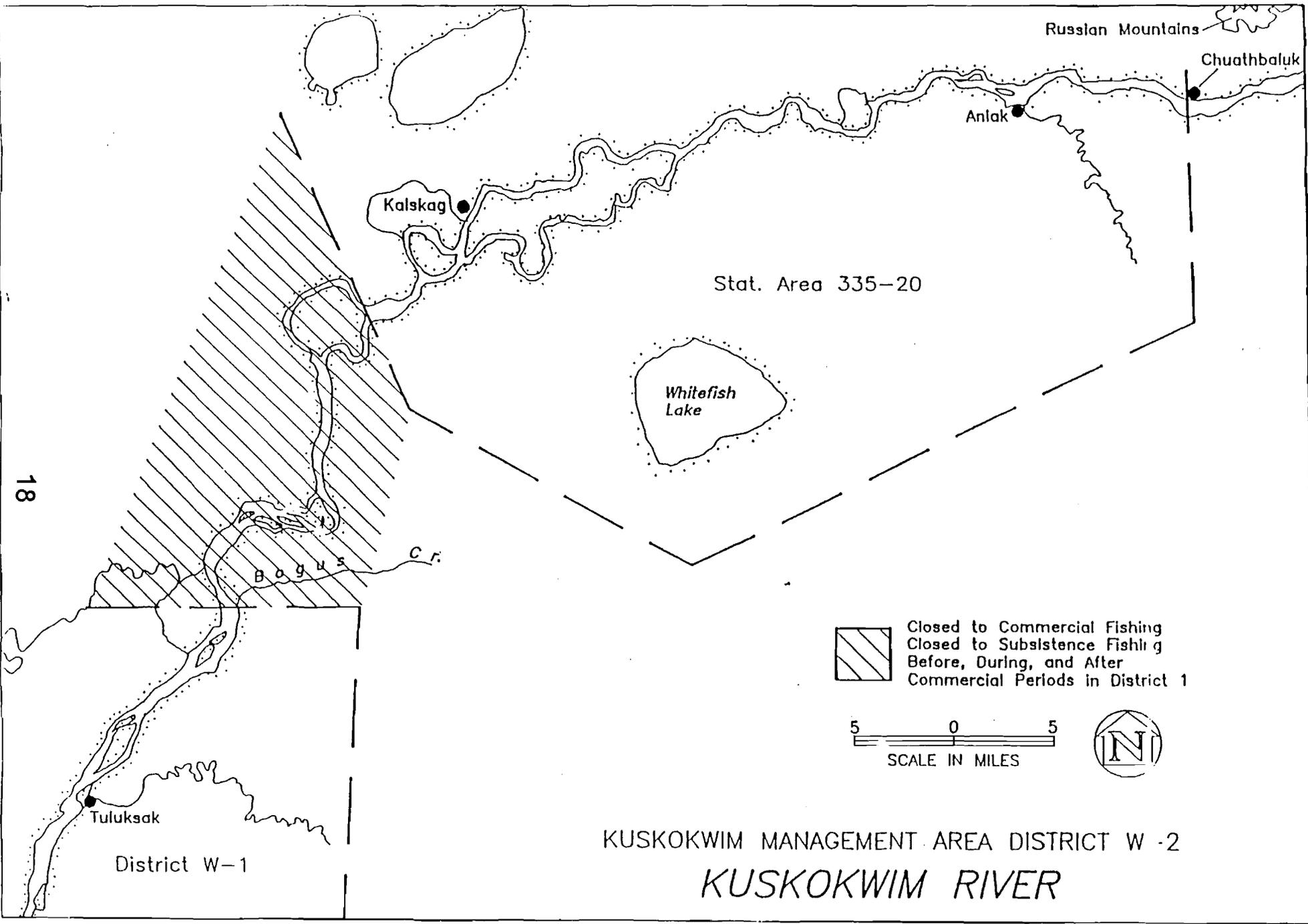


Figure 2. Kuskokwim Management Area, District W-1



KUSKOKWIM MANAGEMENT AREA DISTRICT W-2
KUSKOKWIM RIVER

Figure 3. Kuskokwim Management Area, District W-2

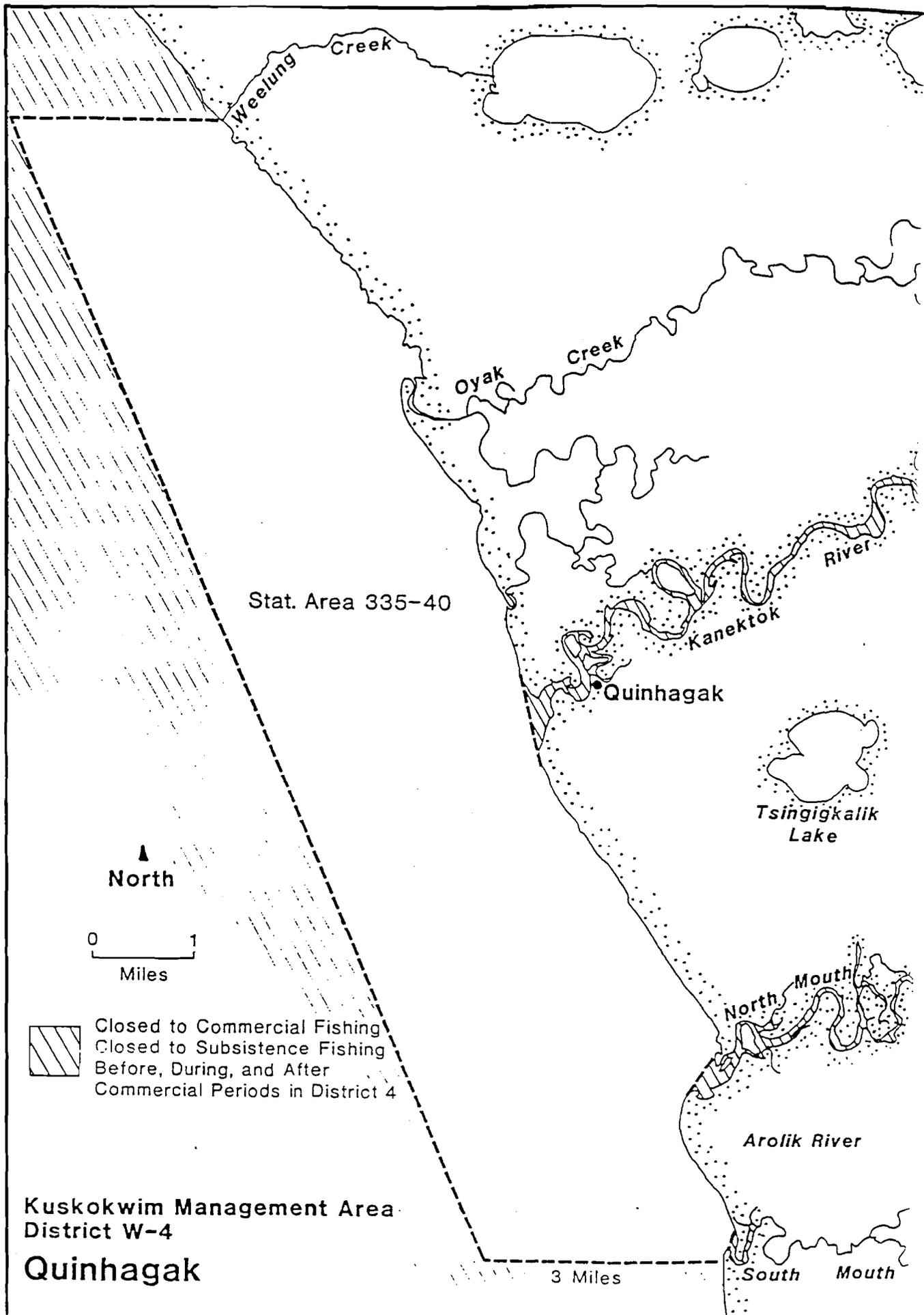


Figure 4 . Kuskokwim Management Area, District W-4

Kuskokwim Management Area District W-5

Goodnews Bay

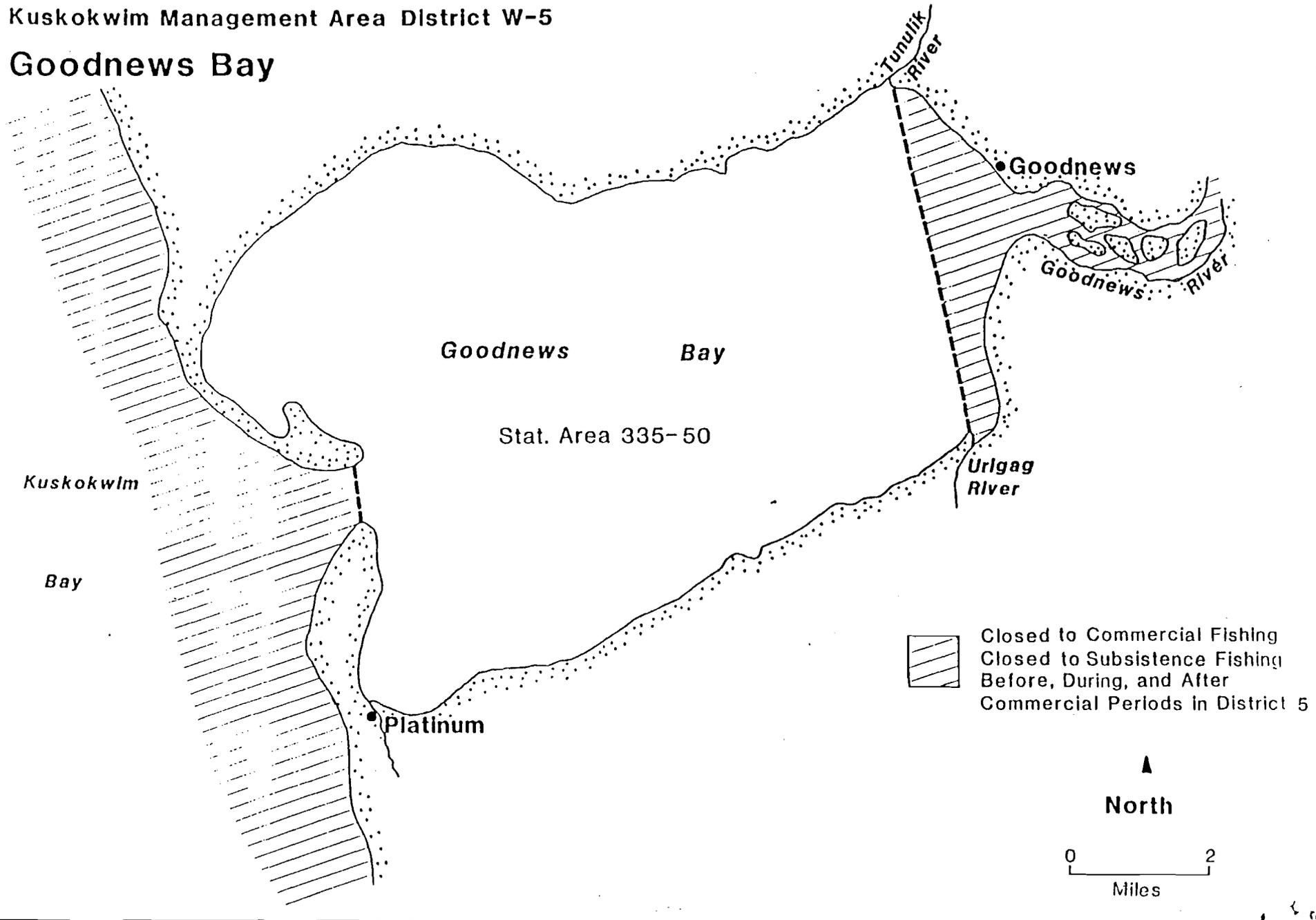


Figure - . Kuskokwim Management Area, District W-5

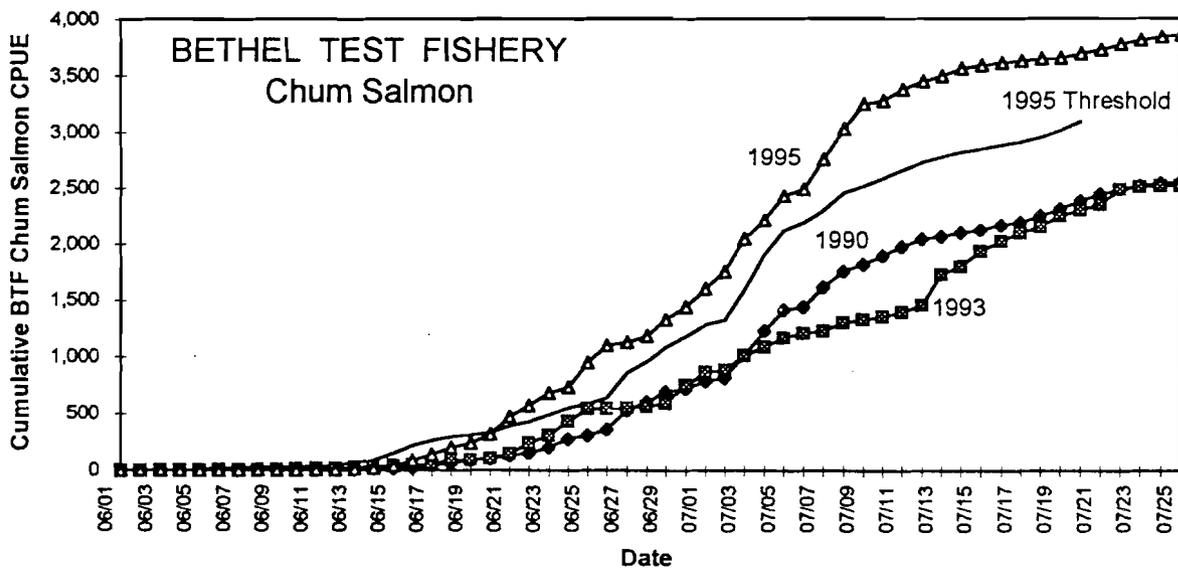
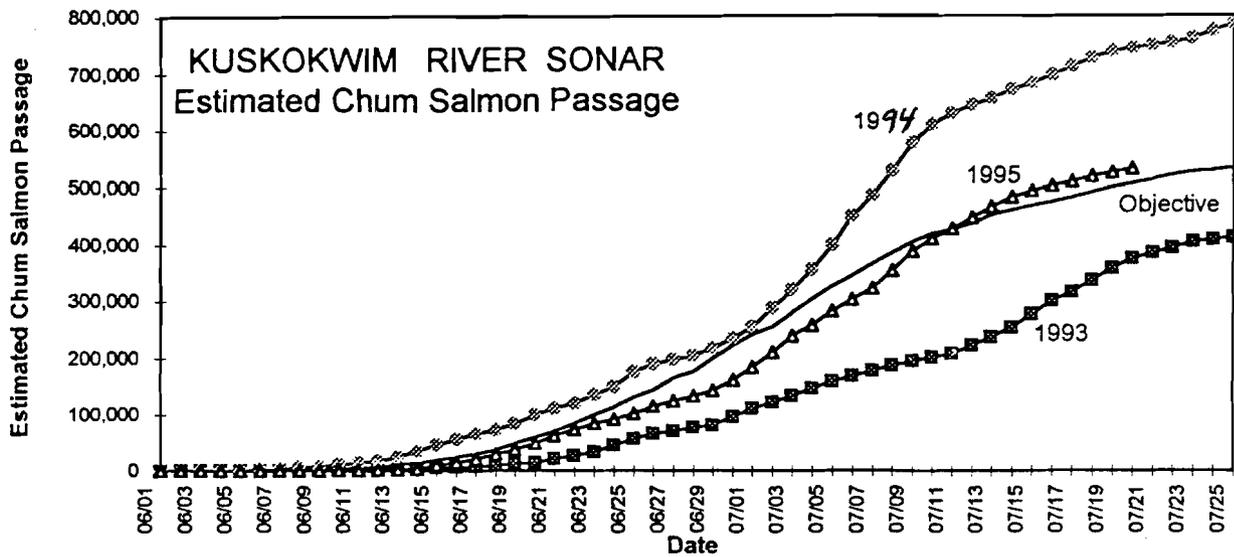


Figure 6. Historic cumulative estimated chum salmon passage at Kuskokwim River sonar passage and the cumulative Bethel test fish chum salmon index for 1995. The sonar graph also shows the minimum objective needed to achieve escapement and subsistence needs upriver of the sonar site. The Bethel test fish graph also shows the 1995 threshold and two additional years which had water levels comparable to 1995.

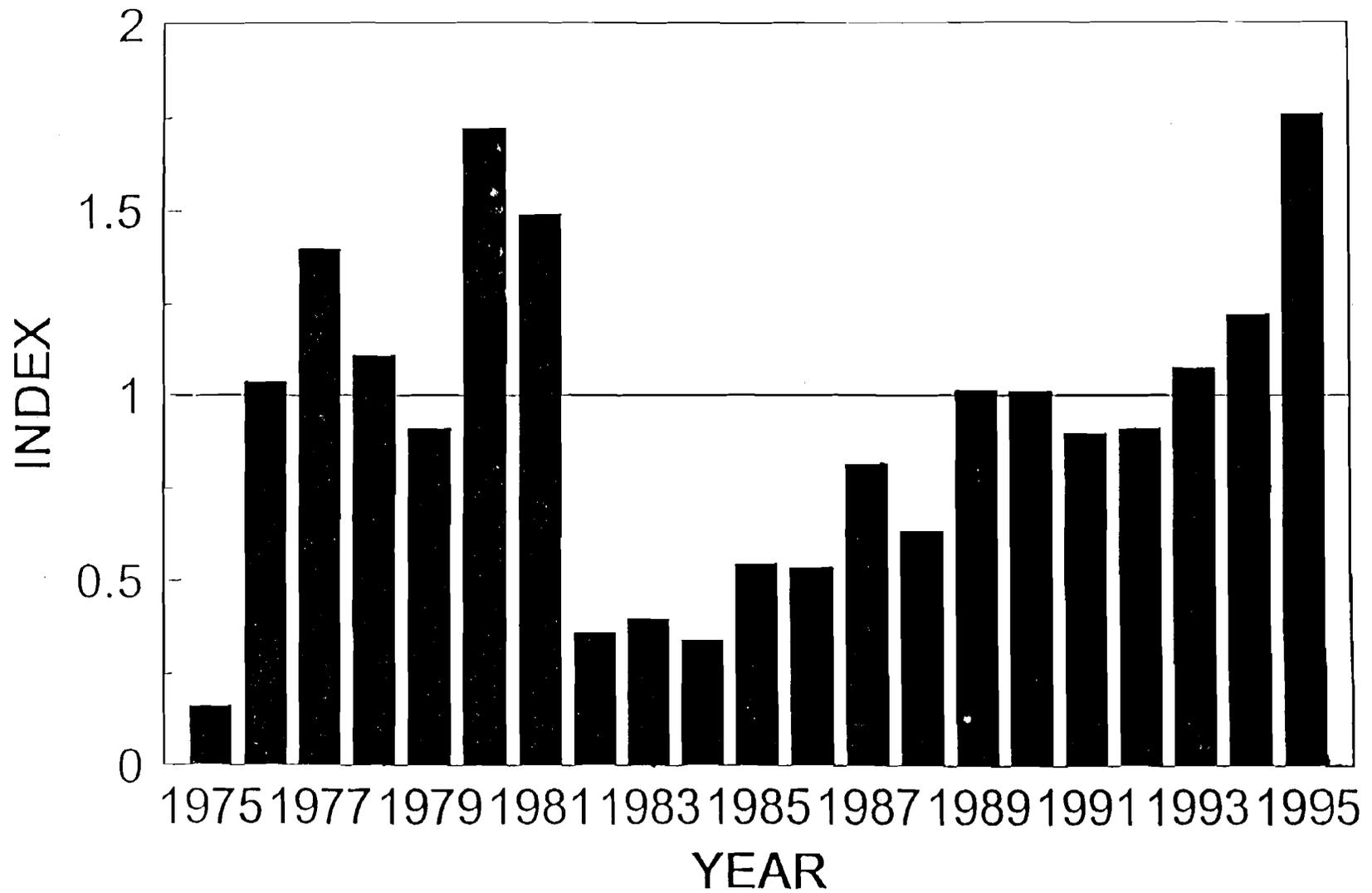


Figure 7. Kuskokwim River chinook salmon escapement index, 1975-1995. The index is computed as the median relative escapement of all systems for which data of adequate quality is available. The relative escapement for a system is the proportion of the Biological Escapement Goal (BEG) achieved, if a BEG has been established, and the proportion of the median historic escapement achieved otherwise.

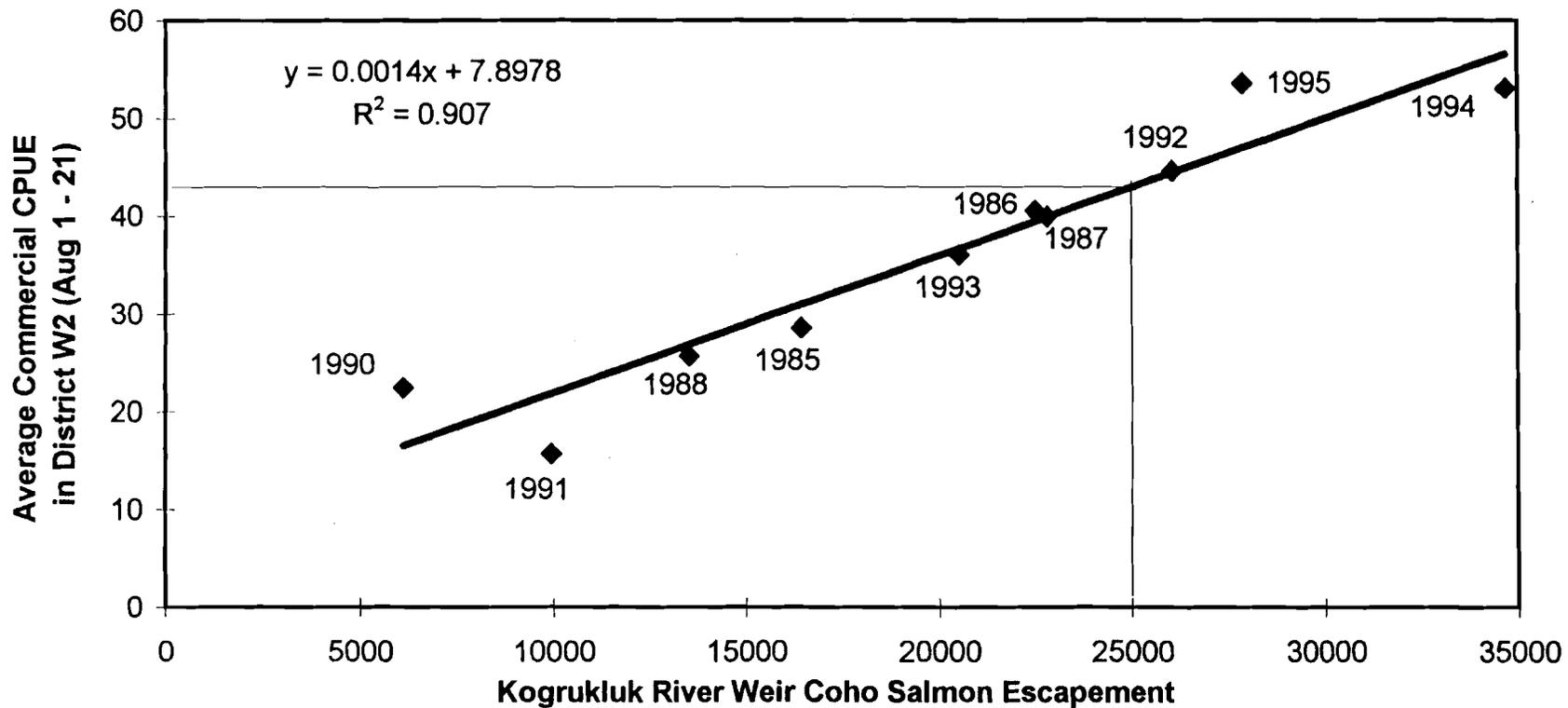


Figure 8. Relationship between annual coho salmon escapement at Kogrukluk River weir and the annual average commercial CPUE in District 2 between August 1 and August 21.

TABLES

Table 1. Utilization of Kuskokwim River chinook salmon, 1960-1995.

Year	Commercial Harvest ^a	Estimated Subsistence Harvest ^b	Total Utilization	Running 10 Year Average
1960	5,969	18,887	24,856	
1961	18,918	28,934	47,852	
1962	15,341	13,582	28,923	
1963	12,016	34,482	46,498	
1964	17,149	29,017	46,166	
1965	21,989	24,697	46,686	
1966	25,545	49,325	74,870	
1967	29,986	59,913	89,899	
1968	34,278	32,942	67,220	
1969	43,997	40,617	84,614	55,758
1970	39,290	69,612	108,902	64,163
1971	40,274	43,242	83,516	67,729
1972	39,454	40,396	79,850	72,822
1973	32,838	39,093	71,931	75,365
1974	18,664	27,139	45,803	75,329
1975	21,720	48,448	70,168	77,677
1976	30,735	58,606	89,341	79,124
1977	35,830	56,580	92,410	79,376
1978	45,641	36,270	81,911	80,845
1979	38,966	56,283	95,249	81,908
1980	35,881	59,892	95,773	80,595
1981	47,663	61,329	108,992	83,143
1982	48,234	58,018	106,252	85,783
1983	33,174	47,412	80,586	86,649
1984	31,742	56,930	88,672	90,935
1985	37,889	43,874	81,763	92,095
1986	19,414	51,019	70,433	90,204
1987	36,179	67,325	103,504	91,314
1988	55,716	70,944 ^c	126,660	95,788
1989	43,217	82,098 ^c	125,315	98,795
1990	53,504	85,351 ^c	138,855	103,103
1991	37,778	85,628 ^c	123,406	104,545
1992	46,872	64,724 ^c	111,596	105,079
1993	8,735	87,297 ^c	96,032	106,624
1994	16,211	93,416 ^c	109,627	108,719
1995	30,846	100,426 ^c	131,272	113,670
10 Year Average (1985-1994)	35,552	73,168	108,719	

^a District 1, 2 and 3.

^b Estimated subsistence harvest expanded from villages surveyed.

^c Beginning in 1988, estimates are based on a new formula so data since 1988 is not comparable with previous years.

Table 2. Kuskokwim Area commercial, subsistence and personal use salmon catches, 1913-1995.

Year	Commercial Catch						Subsistence Catch				Total Harvest
	Chinook	Sockeye	Coho	Pink	Chum	Subtotal	Chinook	Coho	Other	Subtotal	
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	537,111	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
1944						-				-	-
1945						-				-	-
1946	2,288		674			2,962				-	2,962
1947	5,356					5,356				-	5,356
1948						-				-	-
1949						-				-	-
1950						-				-	-
1951	4,210					4,210				-	4,210
1952						-				-	-
1953						-				-	-
1954	57					57				-	57
1955						-				-	-
1956						-				-	-
1957						-				-	-
1958						-				-	-
1959	3,760					3,760				-	3,760
1960	5,969	5,649	5,498		3	17,119	18,887		301,753	320,640	337,759
1961	23,246	2,308	5,090	91	18,864	49,599	28,934		179,529	208,463	258,062

- continued -

Table 2. (page 2 of 2)

Year	Commercial Catch						Subsistence Catch					Total Harvest	
	Chinook	Sockeye	Coho	Pink	Chum	Subtotal	Chinook	Coho ^b	small ^c	Subtotal			
1962	20,867	10,313	12,598	4,340	45,707	93,825	13,582	161,849	175,304	350,735	444,560		
1963	18,571		15,660			34,231	34,482	137,649	170,829	342,960	377,191		
1964	21,230	13,422	28,992	939	707	65,290	29,017	190,191	219,208	438,416	503,706		
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	49,325		175,735	225,060	277,776		
1967	29,986	652	58,239		8,235	97,112	61,262		214,468	275,730	372,842		
1968	43,157	5,887	154,302	75,818	19,694	298,858	35,698		278,008	313,706	612,564		
1969	64,777	10,362	110,473	1,251	50,377	237,240	40,617		204,105	244,722	481,962		
1970	65,032	12,654	62,245	27,422	60,566	227,919	69,612	11,868	246,810	328,290	556,209		
1971	44,936	6,054	10,006	13	99,423	160,432	43,242	6,899	116,391	166,532	326,964		
1972	55,482	4,312	23,880	1,952	97,197	182,823	40,396	1,325	120,316	162,037	344,860		
1973	51,374	5,224	152,408	634	184,207	393,847	39,093	23,746	179,259	242,098	635,945		
1974	30,670	29,003	179,579	60,052	196,127	495,431	27,139	32,780	277,170	337,089	832,520		
1975	27,799	17,535	109,814	899	223,532	379,579	48,448		176,389	224,837	604,416		
1976	49,262	13,636	112,130	39,998	231,877	446,903	58,606	4,312	223,792	286,710	733,613		
1977	58,256	18,621	263,728	434	298,959	639,998	59,166	12,193	203,397	274,756	914,754		
1978	63,194	13,734	247,271	61,968	282,044	668,211	38,598	12,437	125,052	176,087	844,298		
1979	53,314	39,463	308,683	574	297,167	699,201	58,041		163,451	221,492	920,693		
1980	48,242	42,213	327,908	30,306	561,483	1,010,152	62,522	47,335	168,987	278,844	1,288,996		
1981	79,378	105,940	278,587	463	485,635	950,003	65,300	28,301	163,554	257,155	1,207,158		
1982	79,816	97,716	567,451	18,259	325,471	1,088,713	61,656	45,181	195,691	302,528	1,391,241		
1983	93,676	90,834	249,018	379	306,554	740,461	51,020	2,834	149,172	203,026	943,487		
1984	74,006	81,307	829,965	23,902	488,482	1,497,662	60,668	15,016	144,651	220,335	1,717,997		
							Chinook	Sockeye	Coho	Pink	Chum		
1985	74,083	121,221	382,096	111	224,680	802,191	46,641	33,632	24,524	1,062	95,999	201,858	1,004,049
1986	44,972	142,029	736,910	16,569	349,268	1,289,748	54,256	20,239	29,742		142,930 ^c	247,167	1,536,915
1987	65,558	170,849	478,594	163	603,274	1,318,438	71,804	25,180	18,085	291	70,709	186,069	1,504,507
1988 ^{de}	74,552	149,927	623,719	37,592	1,443,916	2,329,706	74,944	33,101	43,865		153,978	305,888	2,635,594
1989 ^{de}	67,003	82,628	556,312	819	802,199	1,508,961	86,244	37,209	58,394		145,748	327,595	1,836,556
1990 ^e	84,706	203,374	445,062	16,082	522,535	1,271,759	92,126	39,433	50,524		130,550	312,633	1,584,392
1991 ^e	48,170	202,441	556,818	522	501,692	1,309,643	90,295	56,402	56,479		96,197	299,373	1,609,016
1992 ^e	67,597	192,341	772,449	85,978	436,506	1,554,871	68,568	33,884	44,329		99,089	245,870	1,800,741
1993 ^e	26,636	167,235	686,570	71	94,937	975,449	91,506	51,210	35,170		61,589	239,475	1,214,924
1994 ^e	27,345	191,169	856,100	84,870	360,893	1,520,377	98,584	39,378	36,630		77,212	251,804	1,772,181
1995 ^e	72,352	198,045	555,539	318	707,212	1,533,466	104,290	29,945	43,387		72,443	250,065	1,783,531
10 Year Average (1985-1994)	58,062	162,321	609,463	337 ^f	533,990	1,388,114	77,497	36,967 ^g	39,774		107,400	261,773	1,649,888

^a Primarily chum and coho salmon.

^b Reported subsistence coho salmon harvest only. Coho salmon subsistence harvest is poorly documented with no Kuskokwim River estimates attempted prior to 1988.

^c Includes sockeye, pink and chum salmon.

^d The personal use catch is included with the subsistence catch.

^e Beginning in 1988, estimates are based on a new formula therefore data since 1988 is not comparable with previous years.

^f Odd years only.

^g Previous ten year average excluding 1986 when small salmon were not differentiated.

Table 3. A sustained yield scenario for Kuskokwim River chum salmon.

1983-1992 Median Commercial <u>Catch</u>	1983-1992 ^a Median Subsistence <u>Catch</u>	Mediun Total <u>Catch</u>	2 R/S ^b Spawning <u>Escapement</u>	Total <u>Run</u>
424,000	82,000	506,000	506,000	1,012,000
	Median Subsistence Catch above <u>Sonar</u>		Minimum Run Size for Escapement and Subsistence	
	506,000		51,000 ^c	

- a Chum salmon were separated from other small salmon in the subsistence catch beginning in 1985, 1986-1987 are excluded due to incomplete data.
- b Productivity level typical for chum salmon.
- c Excludes 1993 from above database due to closure and mesh restriction

Table 4. Estimated dollar value of Kuskokwim Area commercial salmon fishery, 1964-1995.

Year	Gross Value of Catch to Fishermen	Permits Fished ^a	Average Income
1964	83,030		
1965	90,950		
1966	87,466		
1967	138,647		
1968	290,370		
1969	297,233		
1970	362,470		
1971	371,220		
1972	360,727		
1973	827,735		
1974	1,056,042		
1975	899,178		
1976	1,380,229		
1977	3,891,950		
1978	2,337,470		
1979	3,678,000		
1980	2,725,134		
1981	3,766,525		
1982	4,213,954		
1983	2,670,400		
1984	5,809,000	774	7,505
1985	3,248,089	781	4,159
1986	4,746,089	789	6,015
1987	6,392,822	798	8,011
1988	12,514,492	811	15,431
1989	5,194,025	824	6,303
1990	4,865,070	824	5,904
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
1995	4,209,752	829	5,078
Ten year Average (1985-1994)	\$5,538,242	807	\$6,860

^a Number of permits that made at least one delivery.

Table 5. Mean salmon weights and prices paid to commercial permit holders in the Kuskokwim Area, 1967-1995.

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
1995	17.3	6.9	7.2	3.7	6.9	0.60	0.71	0.41	0.12	0.18
Ten Year Average (1985-94)	15.5	7.1	7.0	3.5	6.9	0.76	0.91	0.64	0.10	0.29

a Information unavailable.

b Information was not available for district 5.

c Information was not available for district 4.

Table 6. Commercial fishing effort in the Kuskokwim Area by permit-hour^a, 1960-1995.

Year	Dist. 1	Dist. 2	Dist. 3	Dist. 4	Dist. 5	Total
1960	5,136	960	648	4,368	Closed	11,112
1961	16,200	1,512	1,512	4,992	Closed	24,216
1962	14,274		0	8,434	Closed	22,708
1963	5,712	1,722	0	5,520	Closed	12,954
1964	6,468	1,140	0		Closed	7,608
1965	13,500	546	0	3,696	Closed	17,742
1966	18,270		Closed		Closed	18,270
1967	88,248	1,932		3,954	Closed	94,134
1968	77,466	720		7,986	4,704	90,876
1969	67,140	1,488		29,952	14,055	112,635
1970	56,646	3,414		22,080	9,756	91,896
1971	18,060	1,842				19,902
1972	47,802					47,802
1973	77,478	3,072		18,372	2,928	101,850
1974	124,569	4,950		18,984	8,148	156,651
1975	181,786	3,648		12,312	5,400	203,146
1976	82,788	3,894		14,784	4,848	106,314
1977	73,944	3,426		17,592	3,780	98,742
1978	71,856	1,892		14,952	3,672	92,372
1979	49,608	984		27,096	8,220	85,908
1980	33,370	714		21,636	9,504	65,224
1981	45,096	1,248		25,656	11,256	83,256
1982	46,108	1,128		22,656	14,556	84,448
1983	47,040	708		20,748	9,456	77,952
1984	62,643	1,050		31,488	14,004	109,185
1985	37,452	462		22,254	8,544	68,712
1986	48,744	606		25,740	10,572	85,662
1987	60,525	576		21,222	10,332	92,655
1988	81,724	912		27,440	14,064	124,140
1989	66,470	816		26,134	12,552	105,972
1990	50,642	1,051		44,520	10,548	106,761
1991	62,672	1,320		29,160	11,532	104,684
1992	54,288	1,164		35,380	15,180	106,012
1993	39,210	774		35,988	13,118	89,090
1994	54,750	702		26,580	15,768	96,800
1995	42,784	602		34,020	14,844	92,250
Ten Year Average (1985-94)	55,648	908		29,442	12,221	98,050

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

Table 7. Executive summary of working group and department actions, 1995.

DATE	Comment
17 June	Phil Mundy presented his report, "Recommendations for strengthening the cooperative management process of the Kuskokwim River Salmon Management Working Group." Short presentations were made on the 1995 salmon run outlook (ADF&G), a Kuskokwim chum salmon radio tagging study (BSFA), new test fisheries (AVCP), upriver issues and concerns (KNA) and Marketing issues (Inlet Salmon). Public testimony affecting management was heard.
18 June	The Working Group elected Joe Lomack and Stuart Currie Co-Chairs and amended their by-laws to establish the position of Vice-Chair. The Vice-Chair was defined as the Co-Chairs alternate with duties to act as Chair in the absence or at the pleasure of the Co-Chairs. New members were seated: Angela Morgan, mid-river subsistence, Francine Brown, sport fish, and Henry Hill, upriver commercial. <u>Dept. recommendation:</u> Meet again on 20 June <u>Working Group recommendation:</u> Meet again on 20 June <u>Actual outcome:</u> Working Group met on 20 June
20 June	<u>Dept. recommendation:</u> Four hour period in District W-1, downstream of Bethel on 22 June <u>Working Group recommendation:</u> Four hour period in District W-1, downstream of Bethel on 22 June <u>Actual outcome:</u> Four hour period in District W-1, downstream of Bethel on 22 June
23 June	<u>Dept. recommendation:</u> Four hour period in Districts W-1 and W-2 on 26 June <u>Working Group recommendation:</u> Four hour period in Districts W-1 and W-2 on 26 June <u>Actual outcome:</u> Four hour period in Districts W-1 and W-2 on 26 June
27 June	<u>Dept. recommendation:</u> Four hour period in Districts W-1 and W-2 on 29 June <u>Working Group recommendation:</u> Four hour period in Districts W-1 and W-2 on 29 June <u>Actual outcome:</u> Four hour period in Districts W-1 and W-2 on 29 June
30 June	The Working Group failed to make a quorum. The Working Group agreed to leave responsibility for management for the Kuskokwim River salmon fishery to the Department until another Working Group Meeting could be called. Next meeting to be at call of the Chairs. <u>Actual outcome:</u> Four hour period in Districts W-1 and W-2 on 3 July
5 July	<u>Dept. recommendation:</u> Four hour period in Districts W-1 and W-2 on 6 July <u>Working Group recommendation:</u> Six hour period in Districts W-1 and W-2 on 6 July - MOTION FAILED. Four hour period in Districts W-1 and W-2 on 6 July <u>Actual outcome:</u> Four hour period in Districts W-1 and W-2 on 6 July

- continued -

Table 7. (page 2 of 3)

DATE	Comment
7 July	<u>Dept. recommendation:</u> Four hour period in Districts W-1 and W-2 on 10 July <u>Working Group recommendation:</u> Four hour period in Districts W-1 and W-2 on 10 July <u>Actual outcome:</u> Four hour period in Districts W-1 and W-2 on 10 July
8 July	The Department presented a report on escapement and run assessment projects used for management of the Kuskokwim River commercial and subsistence salmon fishery. The meeting was held in Bethel.
10 July	The Department presented a report on escapement and run assessment projects used for management of the Kuskokwim River commercial and subsistence salmon fishery. The meeting was held in Aniak.
11 July	<u>Dept. recommendation:</u> Four hour period in Districts W-1 and W-2 on 14 July <u>Working Group recommendation:</u> Four hour period in Districts W-1 and W-2 on 14 July <u>Actual outcome:</u> Four hour period in Districts W-1 and W-2 on 14 July
17 July	<u>Dept. recommendation:</u> Six hour period in Districts W-1 and W-2 on 18 July <u>Working Group recommendation:</u> Six hour period in Districts W-1 and W-2 on 18 July <u>Actual outcome:</u> Six hour period in Districts W-1 and W-2 on 18 July
19 July	<u>Dept. recommendation:</u> Six hour period in Districts W-1 and W-2 on 21 July <u>Working Group recommendation:</u> Four hour period in Districts W-1 and W-2 on 21 July <u>Actual outcome:</u> Four hour period in Districts W-1 and W-2 on 21 July
24 July	<u>Dept. recommendation:</u> Meet again at the call of the Chair <u>Working Group recommendation:</u> Meet again at the call of the Chair <u>Actual outcome:</u> The Working Group met again on 2 August
2 August	<u>Dept. recommendation:</u> Meet again on 4 August <u>Working Group recommendation:</u> Six hour period in Districts W-1 and W-2 on 4 August <u>Actual outcome:</u> Six hour period in Districts W-1 and W-2 on 4 August
5 August	<u>Dept. recommendation:</u> Six hour period in Districts W-1 and W-2 on 8 August <u>Working Group recommendation:</u> Six hour period in Districts W-1 and W-2 on 8 August <u>Actual outcome:</u> Six hour period in Districts W-1 and W-2 on 8 August
7 August	Meeting in Bethel to discuss Kuskokwim River chum salmon management in 1996 and 1997. Based on very poor chum salmon escapements to the Aniak River in 1992 and 1993, commercial fishing in the Kuskokwim River may have to be severely restricted. The Working Group discussed ways to maximize the commercial salmon catch while protecting Aniak chum salmon.

- continued -

Table 7. (page 3 of 3)

DATE	Comment
9 August	<u>Dept. recommendation:</u> Meet again on 11 August <u>Working Group recommendation:</u> Six hour period in Districts W-1 and W-2 on 11 August <u>Actual outcome:</u> Department will announce if they will accept the Working Group's recommendation by 1200 on 10 August. The Department vetoed the Working Group's recommendation.
11 August	<u>Dept. recommendation:</u> Six hour period in Districts W-1 and W-2 on 13 August <u>Working Group recommendation:</u> Six hour period in Districts W-1 and W-2 on 12 August <u>Actual outcome:</u> Six hour period in Districts W-1 and W-2 on 12 August
14 August	<u>Dept. recommendation:</u> Six hour period in Districts W-1 and W-2 on 16 August <u>Working Group recommendation:</u> Six hour period in Districts W-1 and W-2 on 16 August <u>Actual outcome:</u> Six hour period in Districts W-1 and W-2 on 16 August
17 August	<u>Dept. recommendation:</u> Six hour period in Districts W-1 and W-2 on 18 August <u>Working Group recommendation:</u> Six hour period in Districts W-1 and W-2 on 19 August <u>Actual outcome:</u> Six hour period in Districts W-1 and W-2 on 19 August
21 August	<u>Dept. recommendation:</u> Six hour period in Districts W-1 and W-2 on 23 August <u>Working Group recommendation:</u> Six hour period in Districts W-1 and W-2 on 22 August <u>Actual outcome:</u> Six hour period in Districts W-1 and W-2 on 22 August
24 August	<u>Dept. recommendation:</u> Six hour period in Districts W-1 and W-2 on 25 August or 26 August <u>Working Group recommendation:</u> Six hour period in Districts W-1 and W-2 on 26 August <u>Actual outcome:</u> Six hour period in Districts W-1 and W-2 on 26 August
28 August	<u>Dept. recommendation:</u> Six hour periods in Districts W-1 and W-2 on 29 August and 1 September <u>Working Group recommendation:</u> Six hour periods in Districts W-1 and W-2 on 29 August and 1 September and to close the season on 1 September <u>Actual outcome:</u> Six hour periods in Districts W-1 and W-2 on 29 August and 1 September Season closed on 1 September

Table 8. Lower Kuskokwim River, District 1, commercial salmon harvest and fishing effort by period, 1995.

PERIOD	DATE	HOURS	PERMITS	CHINOOK		SOCKEYE		COHO		PINK		CHUM	
				NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE
1	6/22	4	569	6895	3.03	4420	1.94					49157	21.60
2	6/26	4	567	9452	4.17	17867	7.88					88091	38.84
3	6/29	4	566	4972	2.20	19770	8.73					88641	39.15
4	7/03	4	475	2847	1.50	17078	8.99			2		89427	47.07
5	7/06	4	481	1521	.79	14765	7.67					81246	42.23
6	7/10	4	494	906	.46	7100	3.59	21	.01	2		86368	43.71
7	7/14	4	435	546	.31	4219	2.42	221	.13	5		43137	24.79
8	7/18	6	336	366	.18	2482	1.23	671	.33	9		37294	18.50
9	7/21	4	368	202	.14	940	.64	1272	.86	6		21039	14.29
10	8/04	6	234	64	.05	123	.09	48665	34.66	5		1072	.76
11	8/08	6	611	95	.03	363	.10	98548	26.88	8		1229	.34
12	8/12	6	617	50	.01	359	.10	102421	27.67	8		899	.24
13	8/16	6	593	52	.01	147	.04	65713	18.47	12		208	.06
14	8/19	6	555	28	.01	87	.03	41057	12.33	8		133	.04
15	8/22	6	497	16	.01	113	.04	43978	14.75	7		157	.05
16	8/26	6	477	25	.01	117	.04	29129	10.18	10		101	.04
17	8/29	6	355	15	.01	45	.02	17790	8.35	8		39	.02
18	9/01	6	219	2		31	.02	5783	4.40	3		12	.01
TOTALS			712	28054	.43	90026	1.37	455269	6.95	93		588250	8.98

Table 9. Middle Kuskokwim River, District 2, commercial salmon harvest and fishing effort by period, 1995.

PERIOD	DATE	HOURS	PERMITS	CHINOOK		SOCKEYE		COHO		CHUM	
				NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE
1	6/26	4	16	1656	25.88	535	8.36			3628	56.69
2	6/29	4	13	707	13.60	620	11.92			3577	68.79
3	7/03	4	9	284	7.89	456	12.67			2200	61.11
4	7/06	4	8	74	2.31	331	10.34			2372	74.13
5	7/10	4	6	32	1.33	293	12.21			1874	78.08
6	7/14	4	2	7	.88	51	6.38			480	60.00
7	7/18	6	6	9	.25	44	1.22	6	.17	1638	45.50
8	7/21	4	5	4	.20	132	6.60	13	.65	899	44.95
9	8/04	6	6	10	.28	4	.11	1321	36.69	484	13.44
10	8/08	6	9	2	.04	6	.11	2816	52.15	379	7.02
11	8/12	6	8	5	.10	1	.02	2643	55.06	79	1.65
12	8/16	6	12	1	.01			4398	61.08	41	.57
13	8/19	6	5	1	.03			1679	55.97	4	.13
14	8/22	6	8			1	.02	1750	36.46	9	.19
15	8/26	6	3					712	39.56		
16	8/29	6	3					660	36.67	4	.22
17	9/01	6	1					194	32.33		
TOTALS			21	2792	1.51	2474	1.34	16192	8.76	17668	9.56

Table 10. Lower Kuskokwim River, District 1, and the middle Kuskokwim River, District 2, combined commercial salmon harvest, 1960-1995.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1960	5,969	0	2,498	0	0	8,467
1961	18,918	0	5,044	0	0	23,962
1962	15,341	0	12,432	0	0	27,773
1963	12,016	0	15,660	0	0	27,676
1964	17,149	0	28,613	0	0	45,762
1965	21,989	0	12,191	0	0	34,180
1966	25,545	0	22,985	0	0	48,530
1967	29,986	0	56,313	0	148	86,447
1968	34,278	0	127,306	0	187	161,771
1969	43,997	322	83,765	0	7,165	135,249
1970	39,290	117	38,601	44	1,664	79,716
1971	40,274	2,606	5,253	0	68,914	117,047
1972	39,454	102	22,579	8	78,619	140,762
1973	32,838	369	130,876	33	148,746	312,862
1974	18,664	136	147,269	84	171,887	338,040
1975	21,720	23	81,945	10	181,840	285,538
1976	30,735	2,971	88,501	133	177,864	300,204
1977	35,830	9,379	241,364	203	248,721	535,497
1978	45,641	733	213,393	5,832	248,656	514,255
1979	38,966	1,054	219,060	78	261,874	521,032
1980	35,881	360	222,012	803	483,211	742,267
1981	47,663	48,375	211,251	292	418,677	726,258
1982	48,234	33,154	447,117	1,748	278,306	808,559
1983	33,174	68,855	196,287	211	267,698	566,225
1984	31,742	48,575	623,447	2,942	423,718	1,130,424
1985	37,889	106,647	335,606	75	199,478	679,695
1986	19,414	95,433	659,988	3,422	309,213	1,087,470
1987	36,179	136,602	399,467	43	574,336	1,146,627
1988	55,716	92,025	524,296	10,825	1,381,674	2,064,536
1989	43,217	42,747	479,856	464	749,182	1,315,466
1990	53,759	84,870	410,332	3,397	461,624	1,013,982
1991	37,778	108,946	500,935	378	431,802	1,079,839
1992	46,872	92,218	666,170	7,451	344,603	1,157,314
1993	8,735	27,008	610,739	64	43,337	689,883
1994	16,211	49,365	724,689	30,949	271,115	1,092,329
1995	30,846	92,500	471,461	93	605,918	1,200,818
Ten Year Average (1985-1994)	35,577	83,786	531,208	223 ^a	476,637	1,132,715

^a Odd years only.

Table 11. Selected historic District 1 commercial chum salmon catches (number of fish) by date.

Date Range ^a			Year										Average (1985-1994)
			1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	
June	21	23					65,650			74,429		49,157	70,040
	25	27	47,433	68,947		119,808	32,373	58,944		55,114		88,091	63,770
	28	30		60,780	112,963	154,027	131,629	74,911		80,213		88,641	102,421
July	2	4	28,581	65,839	66,783	187,916	91,345					89,427	88,093
	5	7		55,983	103,059	163,971	85,727	86,825	40,060	84,196		81,246	88,546
	9	11		48,990	72,118	137,450	78,053	91,411				86,368	85,604
	13	15			71,953	116,930	44,401	79,803	52,552		43,585	43,137	68,204
	17	19				57,749	26,407		78,797		60,104	37,294	55,764
	20	22			62,044	39,643			49,788			21,039	50,492

^a Dates correspond to \pm 1 day of commercial fishing periods which occurred in 1995.

Table 12. Cumulative mean tidal CPUE for chum salmon catches in the Bethel test fishery, 1985-1995.

Date	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	Threshold 1995
05/30	0	0	0	0								
05/31	0	0	0	0								
06/01	0	0	0	0	3	0		0	0	0	0	0
06/02	0	0	0	0	3	0	0	0	0	10 *	0	0
06/03	0	0	0	0	3	0	0	0	0	18 *	0	0
06/04	0	0	0	0	3	0	0	0	0	21	0	0
06/05	0	6	3	9	6	0	0	0	0	21	0	6
06/06	0	16	16	9	6	3	0	7	3	28	0	22
06/07	0	16	22	12	11	3	0	10	3	31	0	26
06/08	0	24	30	23	22	3	0	13	3	31	0	28
06/09	0	53	45	61	30	3	0	16	3	41	0	30
06/10	0	59	52	90	42	3	0	22	9	41	0	33
06/11	0	68	72	153	45	3	0	34	17	44	6	40
06/12	0	77	86	244	62	6	3	43	17	57	6	47
06/13	3	77	105	331	82	6	3	87	27	86	10	72
06/14	3	86	108	350	90	18	9	108	33	142	16	91
06/15	5	124	117	395	126	18	9	212	46	285	42	151
06/16	8	170	159	421 c	150	21	9	328	49	343	90	218
06/17	16	290	281	477	154	43	9	383	59	395	141	262
06/18	25	398	322 c	671	203	63	9	426 c	93	416	204	298
06/19	90	549	328	832	271 c	91	9	426	93	678	240	314
06/20	205 c	613	388	881 c	315	100 c	34 c	460	105	705	320	338
06/21	207	700	412	1025	391	130	37	518	149	983	473	388
06/22	232	804	613	1276	446	152	46	567 c*	244	1107	567 c	429
06/23	260	1007	715	1522	525 c	205	60	620	310	1297	678	489
06/24	263 c	1119	763 c	1608 c	692	282	66 c	649	436	1408 c	729	550
06/25	315	1579	829	1624	900	314 c	74	688 c*	543 c	1419	948	590
06/26	380	1756 c	928	1687	1011 c	363	106	732	543	1435	1105 c	643
06/27	438 c	1865	1015	1993	1145	531	163	943	550	1451	1130	859
06/28	463	1901	1120	2101 c	1223	603	213	1050	563	1458	1190	961
06/29	643	1907	1389	2210	1345	690 c	277	1180 c*	594	1569	1335 c*	1085
06/30	820	2012 c	1635 c	2298	1452 c	722	285	1316	746	1575	1447	1180

- continued -

Table 12. (page 2 of 2)

Date	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	Threshold 1995
07/01	896 c	2015	1787	2680	1567	789	315 c	1440	866	1585	1610	1289
07/02	928	2085	1906	2868 c	1633	817	406	1483	885	1604	1755	1329
07/03	952	2277 c	1941 c	3306	1711 c	1017	427	1750	1010	1796	2045 c	1596
07/04	957 c	2401	2003	3775	1768	1231	461	2072	1092	1937	2213	1901
07/05	997	2709	2180	3966 c	1950 c	1419 c	466	2261	1170	2025	2427	2116
07/06	1022	2850	2569	4086	2009	1445	478 c	2366 c*	1209	2408	2485 c	2191
07/07	1115	2912 c	3032 c	4114	2126	1618	490	2379	1233	2653	2759	2297
07/08	1118	2979	3070	4148 c	2190 c	1754	499	2518	1304	3385	3029	2453
07/09	1123	3225	3342	4240	2247	1815 c	559	2567	1335	3779	3248	2516
07/10	1123	3260 c	3550	4388	2314	1896	605	2613	1363	4031	3275 c	2588
07/11	1123	3347	3612 c	4471 c	2317 c	1975	631	2661	1400	4100	3373	2660
07/12	1126	3510	3665	4536	2324	2048	674	2719	1461	4133	3446	2736
07/13	1137	3644	3752	4599	2379	2071	695 c	2770	1731	4241	3495	2778
07/14	1137	3669	4007	4637 c	2414 c	2104 c	723	2820	1798	4298 c	3561 c	2824
07/15	1137	3679	4068 c	4706	2424	2128	743	2846	1938	4336	3591	2853
07/16	1142	3696	4101	4788	2445	2165	755	2867	2026	4368	3608	2887
07/17	1174	3739	4208	4852	2462	2190	770	2890	2101	4383	3623	2914
07/18	1183	3782	4333	4909 c	2485 c	2249	821 c	2915	2154	4431	3645 c	2961
07/19	1202	3831	4535	4925	2501	2315	837	2944	2248	4457 c*	3653	3016
07/20	1209	3867	4706 c	4954	2530	2388	853	2948	2299	4465 *	3690	3094
07/21	1214	3919	4729	4990 c	2543	2445	894	2952	2350	4465 *	3725 c	
07/22	1225	3953	4740	4999	2551	2485	951 c	2952	2484	4547	3767	
07/23	1231	3979	4748	5005	2564	2520	983	2975	2512	4585 c*	3810	
07/24	1233	4008	4776	5030	2564	2544	995	2981	2521	4641	3837	
07/25	1243	4019	4817	5045 c	2568	2552	1051 c	2991	2521	4666	3853	
07/26	1249	4021	4837	5058	2568	2554	1059	2999	2523	4675 c	3879	
07/27	1251	4023	4841	5075	2568 c	2572	1108	3006	2530	4684	3897	
07/28	1255	4031	4847	5085 c	2568	2607	1126	3015	2534	4702	3920	
07/29	1265	4042	4852	5098	2570	2643	1162 c	3019	2539	4712 c	3929	
07/30	1269	4047	4854	5120	2570	2651	1175	3025	2541	4719	3931	
07/31	1270	4047 c	4856	5126	2584	2653	1199	3025	2547 c	4732	3942	
08/01	1270	4051	4860	5131 c	2590	2659 c	1207 c	3025	2552	4748	3950	

"c" indicates days when commercial fishing periods occurred in District 1.

* indicates the CPUE is estimated; one or more tides were not fished by the test-fish crew.

Table 13. Historic mean daily CPUE for chum salmon caught in the Aniak test fishery.

Date	South Shore (Aniak)				North Shore			
	1992	1993	1994	1995	1992	1993	1994	1995
05/31		0				0		
06/01		0				0		
06/02		0				0		
06/03		1				1		
06/04		1				1		
06/05		0				3		
06/06		0				1		
06/07		1				1		
06/08		0				3		
06/09		1				1		
06/10		0				0		
06/11		2				2		
06/12		0				11		
06/13		3	14			9	54	
06/14		0	10			10	71	
06/15	11	4	9			28	58	
06/16	33	7	8		86	29	45	
06/17	23	10	7		162	44	49	
06/18	35 c	12	9		60 c	47	77	
06/19	56	7	52		124	18	36	
06/20	21	12	107		156	25	173	
06/21	25	72	49		56	117	108	
06/22	102 c	89	57	c	150 c	143	89	c
06/23	59	113	42		247	162	170	
06/24	146	149	45 c	67	134	204	168 c	
06/25	85 c	105 c	58	129	39 c	105 c	229	
06/26	35	140	8	191 c	88	169	136	c
06/27	74	182	134	253	155	116	264	484
06/28	44	110	107	198	14	269	207	298
06/29	58 c	120	143	174 c	100 c	347	302	600 c
06/30	83	129	208	167	42	243	199	452
07/01	59	161	353	282	402	172	444	750
07/02	182	106	229	166	336	220	484	409
07/03	156	77	76	281 c	149	233	142	467 c
07/04	151	77	223	360 *	253	233	405	511 *
07/05	258	86	236	440	178	480	459	555
07/06	447 c*	185	236	355 c	255 c*	547	451	425 c
07/07	447 *	230	237	411 *	255 *	508	696	538 *
07/08	637	161	*	466	332	392	453	651
07/09	698	223	*	391	355	483	*	519
07/10	461 *	210 *	*	619 c	242 *	393 *	*	573 c
07/11	224	210 *	*	438	128	393 *	*	620
07/12	164	198	*	610	94	304	*	496
07/13	254	226	*	473	370	261	*	760
07/14	703	261	c	339 c	206	141	c*	617 c
07/15	601	261	*	392	218	261	*	452
07/16	468	267	*	538	296	278	*	321
07/17	380	*	*	386	400	*	*	477
07/18	283	*	*	704 c	350	*	*	149 c
07/19	171	*	c	502	248	*	c*	237
07/20	245	*	*	453	397	*	*	315
07/21	198	*	*	481 c	383	*	*	325 c

- continued-

Table 13. (page 2 of 2)

Date	South Shore (Aniak)				North Shore			
	1992	1993	1994	1995	1992	1993	1994	1995
07/22	277	*	*	393	488	*	*	220
07/23	156	*	c	200	185	*	c*	126
07/24	193	*	*	276	191	*	*	249
07/25	104	*	349	297	216	*	442	132
07/26	108	*	287 c	316 *	250	*	93 c	132 *
07/27	185	*	251	336	200	*	271	132
07/28	93	*	206	255	210	*	250	168
07/29	92	*	97 c	198	205	*	76 c	236
07/30	268	*	197	166	397	*	107	114
07/31	104	c*	135	202	142	c*	83	231
08/01	118	*	124	129	149	*	102	143
08/02	78	67	97	138	65	31	106	162
08/03	85 c	90	134	148	58 c	49	86	196
08/04	69	142 c	51 c	115 c*	48	6 c	80 c	178 c*
08/05	22	44	41	82	6	14	55	159
08/06	39 c	38 c	46	73	46 c	19 c	39	61
08/07	10	72	42	101	24	22	36	115
08/08	15	36	23	72 c	7	6	32	119 c
08/09	15	17 c	18	54	4	13 c	15	39
08/10	7	5	10	32	5	14	27	39
08/11	12 c	2	15	31	16 c	7	24	66
08/12	5	0	12	26	5	7	12	51
08/13	2	8	8	15	9	14	12	27
08/14	7 c	1 c	14	12	6 c	5 c	21	27
08/15	2	0	14	18	0	3	11	35
08/16	3	0	6	17	5	5	5	38
08/17	2 c	0 c	11	7	2 c	0 c	12	15
08/18	0	0	13	6	4	0	7	20
08/19	2	3	3	4 *	2	2	6	15 *
08/20	1 c	0	7	2 *	2 c	0	5	10 *
08/21	1	0 c	3	0	0	1 c	5	5
08/22	0	3	0	3	0	0	5	3
08/23	0	0	6	0	0	0	10	1
08/24	0 c	2	0	0	0 c	0	2	0
08/25	0	0 c	0 *	0	0	0 c	1 *	4
08/26	0	0	0 *	2	2	3	0 *	0
08/27	0 c	0	0	3	1 c	0	0	2
08/28	0	0 c	1	0	2	0 c	0	1
08/29	0	0		0	2	0		3
08/30	0	1		0	0	0		0
08/31	0 c	0			0 c	0		
09/01	0	1 c			0	1 c		
09/02	0	0			0	0		
09/03	0	0			0	0		
09/04	0	0			0			
09/05	0				0			
09/06	0				0			
09/07	0				0			
09/08	0				0			
09/09	0				0			
09/10	0				0			

"c" indicates days when commercial fishing periods occurred in District 1.

* CPUE estimated; no test fishing.

Table 14. Kuskokwim River chum salmon run reconstruction estimate for 1995.

	Lower 95% CI ^a	Number of Fish (X1000)	Lower 95% CI ^a
Total Run ^b	958	982	1006
Total Catch ^c	669	676	683
Escapement ^d	283	306	330

^a Because only sonar and subsistence estimates have estimates of confidence intervals, the confidence interval values shown here are maxima and minima.

^b The Total Run is the sum of the sonar estimate, the commercial catch down river of the sonar site and the subsistence catch down river of the sonar site.

^c The Total Catch is the sum of the commercial catch above and below the sonar site, and the subsistence catch above and below the sonar site.

^d The Escapement is the Total Run minus the Total Catch. Note that the 95% CI's for Escapement are not calculated by simple arithmetic differences of the CI values for the Total Run and Total Catch.

Table 15. Historic salmon escapement data from selected Kuskokwim Area projects, 1976-1995.

YEAR	Operating Period	SPECIES				
		Chinook	Sockeye	Coho	Pink	Chum
KOGRUKLUK WEIR ^a Objectives		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
1995	07/02 to 09/06	20,630	10,996	27,856	2	31,265
ANIAC 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
1995	06/23 to 07/23	-	-	-	-	d

- continued -

Table 15. (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^e</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	21,186	145	246	10,380
1990	06/19 to 07/24	3,636	31,679	0	3,378	6,410
1991 ^f	06/29 to 08/24	2,147	47,397	1,978	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	1,374	253	14,472
1994	06/23 to 08/08	3,856	55,751	309	38,705	35,134
1995	06/19 to 08/28	4,836	39,009	5,415	330	33,699

^a Pink salmon can pass freely through the Kogrukluk Weir.

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

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

^d Reliable escapement estimates are not available from Aniak River Sonar for 1995.

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

^f The Goodnews tower was converted into a weir in 1991.

Table 16. Chinook salmon sex ratios and proportion of females with gill net marks, Kogrukluuk weir, 1979-1995.

Year	Actual Passage	Number of Females	Sex Ratio (% female)	% of females with gill net marks
1979	10,125	1,786	17.6	11.03
1980	676	136	20.1	a
1981	16,075	7,584	47.2	12.47
1982	5,325	2,431	45.7	12.99
1983	1,049	285	27.2	16.49
1984	4,928	1,146	23.3	11.08
1985	4,306	1,485	34.5	18.99
1986	2,968	705	23.8	19.43
1987 ^b	770			
1988	7,677	2,631	34.3	13.34
1989	4,911	1,884	38.4	16.46
1990	10,093	2,271	22.5	14.35
1991	6,132	2,860	46.6	19.26
1992	6,397	2,138	33.4	30.03
1993	10,516	2,961	28.2	11.25
1994	8,310	2,042	24.6	9.53
1995	18,876	8,687	46.0	12.32
1979-84 Average			30.2	10.68
1985-94 Average			31.8	16.96

^a Gill net mark data was not reported

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

Table 17 . Peak aerial survey estimates for chinook salmon escapements in select Kuskokwim River spawning tributaries, 1975-1995.^a

Year	Aniak	Cheeneetnuk	Eek	Holitna	Holokuk	Kipchuk	Kisaralik	Kwethluk	Oskawalik	Salmon (Aniak)	Salmon (Pitka)	Tuluksak
1975				1,114	17	94	118		71			
1976		1,197		2,571	126	177			204		1,146	139
1977		1,399			60			2,290	276	562	1,978	291
1978		267	1,613	2,766			2,417	1,732		289	1,127	403
1979					113			911			699	
1980			2,378		250				123	1,186	1,177	725
1981	9,074						672	1,783		894	1,474	
1982	2,645		230	521	42				120	185	419	
1983	1,909	243	188	1,069	33		731	471	52	231	586	129
1984	1,409	1,177		299			157	273			577	93
1985		1,002	1,118		135			629	61		625	135
1986	909	381		650	100					336		
1987		317	1,739	813	208	193		975	193	516		60
1988	945		2,255		57		840	766	80	244	501	188
1989	1,880		1,042			994	152	1,157		631	446	
1990	1,255		1,983		143	537	631	1,295	113	596		166
1991	1,564		1,312			885		1,002		583		342
1992	2,284	1,050		1,822	64	670			91	335	2,555	
1993	2,687	678		1,573	114	1,248			103	1,082	1,012	
1994	1,848	1,206				1,520	1,021	848		1,218	1,010	
1995	3,174	1,565		2,787	181	1,215	1,243		289	1,442	1,911	
Goal ^b	1,500	1,000	1,700	2,000	100	700	700	1,000	100	600	1,300	400

^a All estimates are from "peak" aerial surveys conducted between 20 and 31 July under fair, good or excellent viewing conditions.

^b Biological escapement goal or median historic escapement.

Table 18. Historic cumulative salmon passage estimates at the Kuskokwim River sonar site. Note that the 1995 chum salmon projection is based on average historic percent passage as opposed to the actual percent passage observed in 1995

Date	Chinook			Sockeye			Chum						
	1993	1994	1995	1993	1994	1995	1993	1994	1995	Objective ^a	Ave. % Passage ^b	1995 Projection ^c	1995 Surplus Above Sonar ^d
06/01	0	0	0	0	0	0	0	0	0	56	0		
06/02	0	0	0	0	0	0	0	0	0	169	0		
06/03	651	0	0	105	0	0	17	0	0	264	0		
06/04	2,000	0	3,738	323	0	17	51	0	10	302	0		
06/05	3,297	5,007	7,739	532	0	38	84	1,160	22	581	0	21,098	(535,902)
06/06	4,759	9,067	11,529	768	0	55	122	1,939	32	1,176	0	15,152	(541,848)
06/07	6,625	12,612	16,795	1,069	0	80	169	2,754	46	1,499	0	17,088	(539,912)
06/08	7,198	17,104	23,123	1,162	0	106	184	5,075	61	2,108	0	16,119	(540,881)
06/09	12,145	21,406	26,251	1,623	0	773	1,286	7,668	411	3,429	1	66,766	(490,234)
06/10	14,263	26,544	29,411	1,821	0	1,418	1,758	11,258	793	4,385	1	100,726	(456,274)
06/11	17,636	31,257	34,877	2,136	17	2,519	2,509	14,398	1,469	5,910	1	138,448	(418,552)
06/12	19,311	36,910	43,735	4,009	38	4,367	3,006	18,150	1,897	8,043	1	131,370	(425,630)
06/13	21,360	46,398	62,182	6,300	78	7,939	3,612	24,763	2,726	11,072	2	137,140	(419,860)
06/14	23,343	51,592	76,702	8,518	833	10,936	4,200	34,435	3,405	13,287	2	142,739	(414,261)
06/15	28,587	57,602	86,597	16,616	1,685	12,940	5,378	45,453	9,507	19,130	3	276,811	(280,189)
06/16	32,393	63,067	94,636	22,495	2,492	14,720	6,233	55,596	14,744	24,060	4	341,332	(215,668)
06/17	39,142	65,521	105,818	32,919	3,810	17,043	7,750	66,024	21,740	30,390	5	398,462	(158,538)
06/18	43,998	67,539	114,556	40,788	4,865	19,659	10,061	73,912	29,779	37,963	7	436,926	(120,074)
06/19	48,622	70,050	123,049	48,278	6,272	22,207	12,261	85,189	37,836	49,629	9	424,646	(132,354)
06/20	53,376	73,060	135,393	55,982	9,617	25,861	14,523	100,397	48,912	59,924	11	454,645	(102,355)
06/21	56,246	75,056	141,610	63,853	12,107	29,890	20,679	111,411	62,205	70,642	13	490,475	(66,525)
06/22	59,111	76,669	146,836	71,713	14,339	33,764	26,827	120,119	73,497	84,507	15	484,430	(72,570)
06/23	62,116	79,157	151,856	79,958	25,727	37,757	33,276	135,836	84,821	100,225	18	471,391	(85,609)
06/24	64,403	81,165	156,426	93,130	35,667	41,806	45,985	149,508	92,799	113,290	20	456,253	(100,747)
06/25	66,440	85,492	162,023	104,859	55,644	46,748	57,302	175,737	102,563	131,322	24	435,019	(121,981)
06/26	67,994	92,426	169,268	113,811	79,294	53,096	65,939	189,374	115,100	144,040	26	445,090	(111,910)
06/27	69,948	96,280	174,061	127,385	92,926	62,968	70,470	197,213	123,920	165,279	30	417,617	(139,383)
06/28	72,549	99,871	179,100	145,460	105,854	73,698	76,502	204,598	133,317	176,775	32	420,069	(136,931)
06/29	74,800	102,499	184,622	161,103	114,770	84,853	81,723	217,843	143,079	200,135	36	398,206	(158,794)
06/30	75,500	105,824	186,979	187,448	126,114	90,342	97,317	234,609	162,181	221,847	40	407,195	(149,805)
07/01	76,151	109,475	189,695	211,926	138,757	96,811	111,805	253,967	183,859	241,063	43	424,824	(132,176)
07/02	76,612	111,263	192,917	229,274	176,235	104,306	122,073	287,174	209,215	254,107	46	458,597	(98,403)
07/03	76,934	112,967	195,914	233,507	212,001	114,697	133,119	318,810	238,556	279,351	50	475,658	(81,342)
07/04	77,304	114,893	197,892	238,358	252,585	121,509	145,778	354,594	257,550	303,326	54	472,942	(84,058)
07/05	77,701	115,721	200,424	243,549	267,561	130,372	159,326	399,943	283,446	327,411	59	482,206	(74,794)
07/06	78,210	116,844	201,364	251,473	284,072	135,340	169,354	449,840	303,163	345,637	62	488,553	(68,447)
07/07	78,647	117,330	202,349	258,284	295,799	140,267	177,974	485,215	322,931	366,102	66	491,318	(65,682)
07/08	79,108	117,832	203,776	265,449	300,529	148,216	187,043	527,796	354,111	385,060	69	512,231	(44,769)

- continued -

Table 18. (page 2 of 2)

Date	Chinook			Sockeye			Chum						
	1993	1994	1995	1993	1994	1995	1993	1994	1995	Objective ^a	Ave. % Passage ^b	1995 Projection ^c	1995 Surplus Above Sonar ^d
07/09	80,236	118,351	204,314	267,869	305,769	153,006	193,734	576,405	387,290	403,950	73	534,028	(22,972)
07/10	81,368	118,756	204,648	270,296	309,504	156,431	200,448	609,718	409,757	417,888	75	546,163	(10,837)
07/11	82,523	119,257	204,891	272,772	315,608	159,087	207,294	629,278	427,019	425,960	76	558,385	1,385
07/12	82,670	119,642	205,757	274,630	320,290	159,516	222,342	643,860	446,063	435,947	78	569,924	12,924
07/13	82,814	119,954	206,647	276,451	324,124	159,925	237,079	656,366	464,855	450,445	81	574,819	17,819
07/14	82,975	120,152	207,496	278,485	325,618	160,298	253,547	670,741	482,317	459,735	83	584,360	27,360
07/15	83,226	120,343	207,662	279,653	326,727	160,547	277,211	681,330	491,507	466,833	84	586,440	29,440
07/16	83,466	120,515	207,861	280,763	328,269	160,820	299,702	695,810	500,607	472,913	85	589,618	32,618
07/17	83,624	120,575	208,069	281,500	331,891	161,097	314,627	711,678	508,683	480,500	86	589,670	32,670
07/18	83,752	120,788	208,151	281,500	335,233	161,292	334,680	726,217	517,440	489,605	88	588,667	31,667
07/19	83,883	120,968	208,222	281,500	337,915	161,467	355,455	738,753	524,659	498,805	90	585,870	28,870
07/20	83,997	120,968	208,282	281,500	338,050	161,631	373,412	744,290	530,937	505,949	91	584,510	27,510
07/21	84,081	120,968		281,684	338,140		384,007	748,525		511,872	92		
07/22	84,152	120,968		281,838	338,254		392,887	753,861		520,400	93		
07/23	84,235	121,399		282,021	338,637		403,417	761,211		525,050	94		
07/24	87,072	122,227		282,021	339,372		407,322	774,281		528,078	95		
07/25	89,782	122,922		282,021	339,988		411,051	785,313		532,440	96		
07/26	93,019	122,922		282,021	339,988		415,506	790,159		533,770	96		
07/27	93,205	122,922		282,186	339,988		417,280	794,335		537,063	96		
07/28	93,355	122,922		282,319	339,988		418,702	799,155		539,481	97		
07/29	93,515	122,922		282,461	339,988		420,229	800,915		542,874	97		
07/30	93,515	122,922		282,461	339,988		421,005	802,798		544,383	98		
07/31	93,515	122,922		282,461	339,988		421,679	804,416		546,197	98		
08/01	93,515	123,079		282,461	339,988		422,378	807,073		547,235	98		
08/02	93,515	123,302		282,461	339,988		422,583	810,682		548,432	98		
08/03	93,515	123,561		282,461	339,988		422,843	814,844		549,546	99		
08/04	93,515	123,561		282,461	339,988		423,093	815,689		550,803	99		
08/05	93,515	123,561		282,461	339,988		423,288	816,350		551,112	99		
08/06	93,515	123,561		282,461	339,988		423,512	817,155		552,196	99		
08/07	93,515	123,561		282,461	339,988		423,688	817,408		552,950	99		
08/08	93,515	123,561		282,461	339,988		423,688	817,832		553,310	99		
08/09	93,515	123,561		282,461	339,988		423,688	818,147		553,766	99		
08/10	93,515	123,561		282,461	340,006		423,688	818,147		555,554	100		
08/11	93,515	123,561		282,461	340,022		423,832	818,147		555,913	100		
08/12	93,515	123,561		282,461	340,032		423,986	818,147		556,262	100		
08/13	93,515	123,561		282,461	340,032		424,097	818,147		556,337	100		
08/14	93,515	123,561		282,461	340,032		424,097	818,147		556,364	100		
08/15	93,515	123,561		282,461	340,032		424,097	818,147		556,565	100		

^a The Objective is the product of the average daily proportion of passage and 557,000. The 557,000 is the minimum number of chum salmon needed for escapement (506,000), plus the historic median subsistence harvest above the sonar site (51,000).

^b The Average Percent Passage is based on the 1985 -1994 average chum salmon passage observed from the Bethel test fishery; the post-season run reconstruction in Table 14 uses 1995 run timing only.

^c The 1995 Projection is the product of the proportion passage and the cumulative passage to date.

^d The 1995 Surplus Above Sonar is the estimated surplus for commercial harvest ;i.e., the 1995 Projection minus the Objective.

Table 19. Utilization of Kuskokwim River chum salmon, 1960 - 1995.

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	94,750	294,228	460,706
1986	309,213	141,931 ^c	451,144	465,654
1987	574,336	70,709	645,045	485,451
1988	1,381,674	151,943 ^d	1,533,617	602,066
1989	749,182	140,349 ^d	889,531	648,708
1990	461,624	125,610 ^d	587,234	642,593
1991	431,802	93,003 ^d	524,805	637,476
1992	344,603	96,081 ^d	440,684	634,712
1993	43,337	59,259 ^d	102,596	603,514
1994	271,115	72,267 ^d	343,382	581,227
1995	605,918	71,348 ^d	677,266	619,530
10 Year Average (1985-1994)	476,636	104,590	581,227	

^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 Estimates since 1988 are based on a new formula and are not comparable with previous years.

Table 20. Quinhagak District commercial permits 1970-1995.

YEAR	PERMITS FISHED ^a
1970	88
1971	61
1972	107
1973	109
1974	196
1975	127
1976	181
1977	258
1978	200
1979	206
1980	169
1981	186
1982	117
1983	226
1984	263
1985	300
1986	324
1987	310
1988	288
1989	227
1990	390
1991	346
1992	349
1993	409
1994	308
1995	382
TEN YEAR AVERAGE (1985-1994)	326

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

Table 21. Quinhagak, District 4, commercial salmon harvest and fishing effort by period, 1995.

PERIOD	DATE	HOURS	PERMITS	CHINOOK		SOCKEYE		COHO		PINK		CHUM	
				NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE
1	6/13	12	116	7621	5.47	55	.04					182	.13
2	6/17	12	239	8190	2.86	356	.12					1916	.67
3	6/20	12	215	7341	2.85	485	.19					2760	1.07
4	6/24	12	173	6073	2.93	3266	1.57					5990	2.89
5	6/26	6	70	1506	3.59	805	1.92					2851	6.79
6	6/29	12	70	2048	2.44	4765	5.67					8231	9.80
7	7/03	12	37	1096	2.47	7045	15.87					8074	18.18
8	7/05	12	107	1073	.84	4366	3.40					7481	5.83
9	7/07	12	57	676	.99	4812	7.04					7138	10.44
10	7/10	12	85	804	.79	9894	9.70					5667	5.56
11	7/12	12	98	516	.44	6827	5.81					9074	7.72
12	7/14	12	112	438	.33	5738	4.27					5381	4.00
13	7/17	12	127	287	.19	5166	3.39			2		4193	2.75
14	7/19	12	79	140	.15	3532	3.73	2				3184	3.36
15	7/21	12	57	162	.24	2523	3.69	7	.01	4	.01	2086	3.05
16	7/24	12	52	156	.25	2610	4.18	93	.15	13	.02	2713	4.35
17	7/26	12	52	71	.11	1404	2.25	116	.19	9	.01	1279	2.05
18	7/28	12	43	63	.12	879	1.70	390	.76	19	.04	975	1.89
19	7/31	12	51	54	.09	730	1.19	954	1.56	26	.04	715	1.17
20	8/02	12	59	30	.04	583	.82	3706	5.23	16	.02	459	.65
21	8/04	12	65	37	.05	387	.50	4293	5.50	1		262	.34
22	8/07	12	100	49	.04	481	.40	4614	3.85	23	.02	260	.22
23	8/09	12	79	36	.04	307	.32	9133	9.63	10	.01	166	.18
24	8/11	12	90	31	.03	192	.18	5471	5.07	4		110	.10
25	8/14	12	112	25	.02	194	.14	4252	3.16	12	.01	98	.07
26	8/16	12	48	10	.02	133	.23	2515	4.37	3	.01	47	.08
27	8/18	12	68	10	.01	146	.18	5879	7.20	8	.01	49	.06
28	8/21	12	82	11	.01	139	.14	4816	4.89	3		26	.03
29	8/23	12	75	11	.01	102	.11	8588	9.54	1		27	.03
30	8/25	12	77	3		114	.12	2440	2.64	7	.01	25	.03
31	8/28	12	67	4		68	.08	4176	5.19	6	.01	17	.02
32	8/30	12	67	9	.01	58	.07	2193	2.73	8	.01	18	.02
33	9/01	12	41	3	.01	32	.07	2565	5.21	11	.02	8	.02
34	9/04	12	NO COMMERCIAL FISHING - NO BUYER										
35	9/06	12	NO COMMERCIAL FISHING - NO BUYER										
TOTALS			382	38584	.26	68194	.46	66203	.44	186		81462	.55

Table 22. Quinhagak District commercial salmon harvest, 1960-1995.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1960	0	5,649	3,000	0	0	8,649
1961	4,328	2,308	46	90	18,864	25,636
1962	5,526	10,313	0	4,340	45,707	65,886
1963	6,555	0	0	0	0	6,555
1964	4,081	13,422	379	939	707	19,528
1965	2,976	1,886	0	0	4,242	9,104
1966	278	1,030	0	268	2,610	4,186
1967	0	652	1,926	0	8,087	10,665
1968	8,879	5,884	21,511	75,818	19,497	131,589
1969	16,802	3,784	15,077	953	38,206	74,822
1970	18,269	5,393	16,850	15,195	46,556	102,263
1971	4,185	3,118	2,982	13	30,208	40,506
1972	15,880	3,286	376	1,878	17,247	38,667
1973	14,993	2,783	16,515	277	19,680	54,248
1974	8,704	19,510	10,979	43,642	15,298	98,133
1975	3,928	8,584	10,742	486	35,233	58,973
1976	14,110	6,090	13,777	31,412	43,659	109,048
1977	19,090	5,519	9,028	202	43,707	77,546
1978	12,335	7,589	20,114	47,033	24,798	111,869
1979	11,144	18,828	47,525	295	25,995	103,787
1980	10,387	13,221	62,610	21,671	65,984	173,873
1981	24,524	17,292	47,557	160	53,334	142,867
1982	22,106	25,685	73,652	11,838	33,346	166,627
1983	46,385	10,263	32,442	168	23,090	112,348
1984	33,652	17,258	135,342	16,249	50,424	252,925
1985	30,401	7,876	29,992	28	20,418	88,715
1986	22,835	21,484	57,544	8,700	29,700	140,263
1987	26,022	6,489	50,070	66	8,557	91,204
1988	13,872	21,534	68,591	21,258	29,183	154,438
1989	20,820	20,582	44,607	273	39,395	125,677
1990	27,644	83,681	26,926	12,056	47,717	198,024
1991	9,480	53,657	42,571	115	54,493	160,316
1992	17,197	60,929	86,404	64,217	73,383	302,130
1993	15,784	80,934	55,817	7	40,943	193,485
1994	8,564	72,314	83,912	35,904	61,301	261,995
1995	38,584	68,194	66,203	186	81,462	254,629
Ten Year Average (1985-1994)	19,262	42,948	54,643	98 ^a	40,509	171,625

^a Odd years only.

Table 23. Ex-vessel value of Kuskokwim Area salmon catch by district, 1995.

	Chinook	Sockeye	Coho	Pink	Chum	Total
<u>Lower Kuskokwim River, District W-1</u>						
			<u>1995</u>			
Fish	28,054	90,026	455,269	93	588,250	1,161,692
Pounds	459,487	631,732	3,204,249	335	4,023,741	
Price	0.61	0.71	0.41	0.15	0.18	
Value	\$280,287	\$448,530	\$1,313,742	\$50	\$724,273	\$2,766,883
			<u>Ave. 1988-94</u>			
Fish	36,298	69,367	537,490	7,611	509,910	1,160,676
Value	\$384,610	\$471,700	\$2,338,428	\$2,558	\$1,115,251	\$4,312,548
<u>Middle Kuskokwim River, District W-2</u>						
			<u>1995</u>			
Fish	2,792	2,474	16,192	0	17,668	39,126
Pounds	48,002	17,789	109,547	0	123,359	
Price	0.60	0.70	0.41		0.18	
Value	\$28,801	\$12,452	\$44,914	\$0	\$22,205	\$108,372
			<u>Ave. 1988-94</u>			
Fish	1,172	1,654	22,090	35	16,281	41,232
Value	\$14,204	\$11,026	\$85,458	\$19	\$28,412	\$139,118
<u>Quinhagak, District W-4</u>						
			<u>1995</u>			
Fish	38,584	68,194	66,203	186	81,462	254,630
Pounds	695,048	460,161	507,085	689	589,118	
Price	0.60	0.70	0.40	0.12	0.18	
Value	\$417,029	\$322,113	\$202,834	\$83	\$106,041	\$1,048,099
			<u>Ave. 1988-94</u>			
Fish	16,194	56,233	58,404	19,119	49,488	199,438
Value	\$187,589	\$316,244	\$303,611	\$5,895	\$97,713	\$911,052
<u>Goodnews Bay, District W-5</u>						
			<u>1995</u>			
Fish	2,922	37,351	17,875	39	19,832	78,019
Pounds	52,231	250,789	148,874	143	142,848	
Price	0.60	0.70	0.39	0.13	0.15	
Value	\$31,339	\$175,552	\$58,061	\$19	\$21,427	\$286,398
			<u>Ave. 1988-94</u>			
Fish	2,909	42,758	24,455	5,511	19,060	94,693
Value	\$37,235	\$268,370	\$142,532	\$1,614	\$42,667	\$492,418
<u>Kuskokwim Area Total</u>						
			<u>1995</u>			
Fish	72,352	198,045	555,539	318	707,212	1,533,467
Pounds	1,254,768	1,360,471	3,969,755	1,167	4,879,066	
Price	0.60	0.70	0.41	0.13	0.18	
Value	\$757,456	\$958,647	\$1,619,551	\$152	\$873,946	\$4,209,752
			<u>Ave. 1988-94</u>			
Fish	56,573	170,012	642,439	32,277	594,740	1,496,040
Value	\$623,638	\$1,067,339	\$2,870,030	\$10,086	\$1,284,043	\$5,855,135

Table 24. Goodnews Bay, District 5 commercial permits, 1970-1995.

YEAR	PERMITS FISHED ^a
1970	35
1971	16
1972	14
1973	21
1974	49
1975	50
1976	40
1977	34
1978	35
1979	30
1980	48
1981	48
1982	48
1983	79
1984	77
1985	69
1986	86
1987	69
1988	125
1989	88
1990	82
1991	72
1992	111
1993	114
1994	116
1995	118
TEN YEAR AVERAGE (1985-1994)	94

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

Table 25. Goodnews Bay, District 5, commercial salmon harvest and fishing effort by period, 1995.

PERIOD	DATE	HOURS	PERMITS	CHINOOK		SOCKEYE		COHO		PINK		CHUM	
				NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE
1	6/26	12	NO COMMERCIAL FISHING - NO BUYER										
2	6/29	12	30	914	2.54	1412	3.92					1242	3.45
3	7/03	12	32	264	.69	1427	3.72					2540	6.61
4	7/05	12	33	229	.58	2380	6.01					1324	3.34
5	7/07	12	38	274	.60	2476	5.43					2207	4.84
6	7/08	12	43	202	.39	4362	8.45					2090	4.05
7	7/10	36	59	326	.15	8140	3.83			2		4835	2.28
8	7/13	36	68	182	.07	4291	1.75					1361	.56
9	7/17	36	57	156	.08	3642	1.77					2115	1.03
10	7/20	36	36	109	.08	2601	2.01	1		1		1187	.92
11	7/24	12	26	54	.17	829	2.66	4	.01	4	.01	355	1.14
12	7/26	12	30	41	.11	852	2.37	6	.02	5	.01	226	.63
13	7/28	12	16	22	.11	578	3.01	3	.02	1	.01	81	.42
14	7/31	12	23	17	.06	667	2.42	30	.11	1		77	.28
15	8/02	12	23	20	.07	634	2.30	109	.39	4	.01	66	.24
16	8/07	12	23	17	.06	692	2.51	520	1.88	4	.01	62	.22
17	8/11	12	21	20	.08	146	.58	1289	5.12	2	.01	11	.04
18	8/14	12	26	13	.04	353	1.13	2455	7.87			15	.05
19	8/16	12	29	17	.05	310	.89	1290	3.71	3	.01	14	.04
20	8/18	12	30	10	.03	318	.88	2378	6.61			9	.03
21	8/21	12	34	11	.03	373	.91	2147	5.26	3	.01	5	.01
22	8/25	12	35	11	.03	353	.84	2039	4.85	3	.01	8	.02
23	8/28	12	29	11	.03	186	.53	2322	6.67	2	.01	1	
24	8/30	12	31	1		171	.46	2173	5.84				
25	9/01	12	25	1		158	.53	1109	3.70	4	.01	1	
TOTALS			118	2922	.06	37351	.82	17875	.39	39		19832	.44

Table 26. Goodnews Bay District commercial salmon harvest, 1968-1995.

YEAR	CHINOOK	SOCKEYE	COHO	PINK	CHUM	TOTAL
1968			5,458			5,458
1969	3,978	6,256	11,631	298	5,006	27,169
1970	7,163	7,144	6,794	12,183	12,346	45,630
1971	477	330	1,771	0	301	2,879
1972	264	924	925	66	1,331	3,510
1973	3,543	2,072	5,017	324	15,781	26,737
1974	3,302	9,357	21,340	16,373	8,942	59,314
1975	2,156	9,098	17,889	419	5,904	35,466
1976	4,417	5,575	9,852	8,453	10,354	38,651
1977	3,336	3,723	13,335	29	6,531	26,954
1978	5,218	5,412	13,764	9,103	8,590	42,087
1979	3,204	19,581	42,098	201	9,298	74,382
1980	2,331	28,632	43,256	7,832	11,748	93,799
1981	7,190	40,273	19,749	11	13,642	80,865
1982	9,476	38,877	46,683	4,673	13,829	113,538
1983	14,117	11,716	19,660	0	6,766	52,259
1984	8,612	15,474	71,176	4,711	14,340	114,313
1985	5,793	6,698	16,498	8	4,784	33,781
1986	2,723	25,112	19,378	4,447	10,355	62,015
1987	3,357	27,758	29,057	54	20,381	80,607
1988	4,964	36,368	30,832	5,509	33,059	110,732
1989	2,966	19,299	31,849	82	13,622	67,818
1990	3,303	35,823	7,804	629	13,194	60,753
1991	912	39,838	13,312	29	15,892	69,983
1992	3,528	39,194	19,875	14,310	18,520	95,427
1993	2,117	59,293	20,014	0	10,657	92,081
1994	2,570	69,490	47,499	18,017	28,477	166,053
1995	2,922	37,351	17,875	39	19,832	78,019
Ten year Average (1985-1994)	3,224	35,888	23,612	35 ^a	16,894	83,925

^a Odd years only.

Table 27. Historical estimated salmon run size and commercial exploitation rate, Goodnews River, 1981-1995.

Year	Species	Middle Fork Middle Fork Tower Estimate	Aerial Survey Counts as a Percentage of Tower Est.	Goodnews River Escapement Estimate	Goodnews Bay Subsistence Harvest Estimate	Goodnews Bay Commercial Harvest	Total Run Size Estimate	Exploitation ^a Rate (% of Run)
1981	Chinook	3,688	-b	7,766 ^c	1,409	7,190	16,365	53%
	Sockeye	49,108	-b	100,029 ^c	3,511 ^d	40,273	143,813	30%
	Chum	21,827	-b	53,799 ^c	-	13,642	67,441	20%
1982	Chinook	1,395	-b	2,937 ^c	1,236	9,476	3,649	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 ^d	14,117	29,581	51%
	Sockeye	25,816	22%	69,955 ^c	1,518 ^d	11,716	83,189	16%
	Chum	15,548	-b	38,323 ^c	-	6,766	45,089	15%
1984	Chinook	3,260	35%	8,743	629	8,612	17,984	51%
	Sockeye	32,053	27%	67,213	964	15,474	83,651	20%
	Chum	19,003	35%	117,739	189	14,340	132,268	11%
1985	Chinook	2,831	70%	7,979	426	5,793	14,198	44%
	Sockeye	24,131	11%	50,481	704	6,698	57,883	13%
	Chum	10,367	32%	25,025	348	4,784	30,157	17%
1986	Chinook	2,083	57%	4,094	555	2,723	7,372	44%
	Sockeye	51,069	28%	93,228	942	22,608	116,778	20%
	Chum	14,765	38%	51,910	191	10,355	62,456	17%
1987	Chinook	2,274	100%	4,490	816	3,357	8,663	48%
	Sockeye	28,871	85%	51,989	955	27,758	80,702	36%
	Chum	17,519	58%	37,802	578	20,381	58,761	36%
1988	Chinook	2,712	39%	5,419	310	4,964	10,693	49%
	Sockeye	15,799	30%	38,319	1065	36,368	75,752	49%
	Chum	20,799	21%	39,501	448	33,059	73,008	46%
1989	Chinook	1,915	67%	2,891	467	2,966	6,324	54%
	Sockeye	21,186	60%	35,476	869	19,299	55,644	36%
	Chum	10,380	28%	15,495	760	13,622	29,877	48%
1990	Chinook	3,636	-b	7,656 ^c	682	3,303	11,641	34%
	Sockeye	31,679	-b	64,528 ^c	905	35,823	101,256	36%
	Chum	6,410	-b	15,799 ^c	342	13,194	29,335	46%
1991 ^e	Chinook	2,147	-b	4,521 ^c	682	912	6,115	26%
	Sockeye	47,397	-b	96,544 ^c	900	39,838	137,228	30%
	Chum	27,525	-b	67,844 ^c	106	15,892	83,842	19%
1992	Chinook	1,899	53%	3,560 ^c	252	3,528	7,340	51%
	Sockeye	27,267	26%	67,681 ^c	905	25,696	94,282	37%
	Chum	22,023	35%	62,922 ^c	662	18,520	81,442	24%
1993	Chinook	2,491	53%	4,700 ^c	488	2,117	7,295	36%
	Sockeye	26,044	26%	100,169 ^c	572	59,293	160,390	28%
	Chum	14,287	35%	40,820 ^c	133	10,657	51,941	21%
1994	Chinook	3,856	-b	7,275 ^c	657	2,570	10,323	29%
	Sockeye	55,751	-b	214,426 ^c	652	69,490	284,844	25%
	Chum	34,849	-b	130,335 ^c	402	28,477	159,276	18%
1995	Chinook	4,836	-b	9,091	552	2,922	12,565	28%
	Sockeye	39,009	-b	149,794	787	37,351	187,932	20%
	Chum	33,699	-b	124,686	329	19,832	144,847	14%

^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 28. Preliminary projections of the 1996 Kuskokwim Area commercial salmon harvest in thousands of fish by species and management district.^a

	MANAGEMENT DISTRICT						KUSKOKWIM AREA TOTAL
	KUSKOKWIM RIVER ^b		QUINHAGAK		GOODNEWS BAY		
CHINOOK	20	- 45	10	- 20	2	- 3	32 - 68
SOCKEYE	30	- 60	50	- 80	35	- 70	115 - 210
COHO	500	- 700	50	- 90	15	- 30	565 - 820
PINK ^c	30	- 3	10	- 60	1	- 18	41 - 81
CHUM	100	- 300	60	- 90	10	- 20	170 - 410
TOTAL	680	- 1108	180	- 340	63	- 141	923 - 1589

^a Except as noted, all catches are based on catches from 1985 through 1995.

^b Kuskokwim River includes Districts W1 and W2.

^c Kuskokwim Area pink salmon display a strong odd-even year cycle; the 1996 projections are based on the even years catches only.

Table 29. Kanektok River peak aerial surveys by species, 1962-1995. ^a

Year	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	19,180	44,215		
1979				
1980	6,172	113,931	69,325	25,950
1981				
1982				
1983	8,890	2,340		9,360
1984	12,182	30,840	46,830	
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			4,330	18,000
1992	3,856	14,955		25,675
1993	4,670	23,128		1,285
1994	7,386	30,090		
1995				
10 Year Average (1985-1994)	6,540	25,378		12,707
Objective:	5,800	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, 20-31 July for chum salmon, and 20 August and 5 September for coho salmon.