REPORT TO THE ALASKA BOARD OF FISHERIES
KUSKOKWIM AREA SALMON, 1991

By:

R. Kim Francisco
Cindy Anderson
Charles Burkey
Doug Molyneaux

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AUTHORS

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

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

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

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

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INTRODUCTION

The Kuskokwim Area includes the Kuskokwim River drainage and all waters of Alaska between Cape Newenham and the Naskonat Peninsula (Figure 1). Commercial salmon fishing takes place in four districts: the Lower Kuskokwim River, District 1, is the portion of the Kuskokwim River upstream of Popokamiut to the regulatory markers located about one mile above the mouth of the Tuluksak River (Figure 2). The Middle Kuskokwim River, District 2, is the Kuskokwim River upstream from regulatory markers at the upstream entrance to the second slough on the west bank downstream of Lower Kalskag to the regulatory markers at Chuathbaluk (Figure 3). Quinhagak, District 4, is in Kuskokwim Bay between the mouth of Weelung Creek and the South Mouth of the Arolik River (Figure 4). Goodnews Bay, District 5, is Goodnews Bay (Figure 5). On the figures and in news releases the district number is preceded by W (eg. W-1). This helps the public differentiate between announcements for the Yukon River districts (Y) and the Kuskokwim River (W) districts. W is the letter code assigned to the Kuskokwim by the Commercial Fisheries Entry Commission.

MANAGEMENT OBJECTIVES AND PROJECTS

Subsistence and commercial fisheries in the Kuskokwim Area are managed by the Alaska Department of Fish and Game's Division of Commercial Fisheries. 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.

Subsistence Fishery

The priority use of the Kuskokwim Area salmon resource is subsistence. The Kuskokwim Area subsistence salmon fishery is one of the largest and most important in the state, with over 1,300 families participating. Subsistence catches of chinook salmon in the Kuskokwim River normally exceed the commercial catch of this species (Table 1). There is substantially more time for subsistence fishing than commercial fishing in all areas. For example, during the 1991 fishing season in District 1, fishermen could subsistence fish for 83 days while there were 16 days with commercial fishing periods.

Regulations

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

The Kuskokwim River between Districts 1 and 2 was added to the subsistence closure by the Board in 1988. This change has been very successful. Prior to enactment of this regulation only 1 to 3 boats were observed fishing in this area during subsistence fishing periods. Preceding and during commercial openings, when this area remained open to subsistence fishing, the effort would increase to as many as 20 boats. Closing this area appeared to solve the problem since only 4 closed water citations have been issued there since 1988.

Harvest Surveys

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

1. To obtain estimates of the subsistence salmon catch, by species, for 32 Kuskokwim Area communities.

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

3. To identify issues affecting subsistence.

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

The Subsistence Division mailed 1991 subsistence "catch calendars" and household reply cards to over 1500 Kuskokwim Area households. Fishermen were interviewed and calendars were collected during house to house surveys conducted in October and November. This timing provides more complete catch data, particularly on coho salmon.

Commercial Fishery

The commercial fishery has expanded during the last ten years. This expansion is due to increased participation by individual fishermen and improvements in fishing gear, tendering, and processing capabilities. In 1991, 820 of the 832 permit holders made at least one landing (Table 2). This is the first time in the history of the fishery that the number of permits used has declined. The peak of 824 permits fished in 1990 was 99 percent of the total available permits. The number of fishermen will probably stabilize near this level.

Commercial fishing regulations set maximum gill net specifications of 6-inch or smaller mesh, 50 fathoms in length and 45 meshes depth in all districts. Fishing periods in District 1 and 2 are usually six hours in duration from 1:00 p.m. until 7:00 p.m., as required by the management plan. Longer fishing periods have the extra time divided before 1:00 p.m. and after 7:00 p.m. In Districts 4 and

5 fishing periods are normally 12 to 24 hours in length. Fishermen prefer daylight fishing hours so the periods are normally 9:00 a.m. until 9:00 p.m.

Permit holders transfer freely between districts. Increased mobility by the fleet resulted in a record 749 permits being fished in District 1 in 1991 (Table 3). Commercial harvest guidelines and gear restrictions have offset increases in fishing effort and efficiency so that adequate subsistence harvests and average spawning escapements are maintained.

In 1987 the Board of Fisheries adopted the JOINT STATEMENT ON THE MANAGEMENT OF THE KUSKOKWIM RIVER SALMON FISHERY. The Department, local Fish and Game advisory committees, subsistence and commercial fishermen, and processors joined the Board of Fisheries in drafting the statement. The statement's goal is to increase the sustained yield of Kuskokwim River salmon stocks so that they can provide for subsistence needs and an economically viable commercial fishery. To achieve this goal the Kuskokwim River salmon users formed a working group with two purposes:

1. To arrive at a consensus regarding the openings and closures of the Kuskokwim River commercial fishery.

2. To work towards the development of a comprehensive management plan for all Kuskokwim River salmon stocks.

Escapement Monitoring

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

Annual spawning escapements are indexed by; aerial surveys of "key" streams and lakes throughout the area, a weir project on the Kogrukluk River, sonar counter in the Aniak River, and a weir project on the Goodnews River (this was a counting tower project from 1981 through 1990).

Turbid water conditions and inclement weather often prevent accurate estimates of escapements. Timely escapement estimates for in-season management are difficult to obtain. Most spawning streams are located many miles upstream of the commercial fishing districts. Therefore, escapement estimates are often obtained too late for adjustment of fishing time. In-season management depends heavily on commercial catch data, the Department test fishery and escapement projects. The industry sponsored Eek test fishery and the Subsistence Test Fishery were not available in 1991. They formerly contributed daily Catch Per Unit Effort information from the river mouth to Chuathbaluk for in-season management. The Working Group test fishery had been sponsored by the processors since 1988. They were unable to provide for the fishery in 1991. The Subsistence Test Fishery was conducted for the state under contract since 1988, but was lost to budget reductions in 1991.

Development of a dual beam side-scanning sonar project in the Kuskokwim River began in 1988. A suitable location about three miles above Bethel was found in 1988. In 1989 and 1990 data to allow accurate interpretation of the sonar signal was collected. The primary objective in 1991 was to test operation to determine if it could, in conjunction with a species apportionment test fishery, estimate the total number of salmon passing that point in the river. In-season data from the sonar could not be used because of an attenuation problem. The data was corrected post season and provided the first total population estimates for chinook, sockeye, and chum salmon in the Kuskokwim River. Next season may see the sonar data playing an active roll during in-season management.

Kuskokwim River

Chinook Salmon

The combined commercial and subsistence chinook salmon harvest has increased from an average of 56,000 fish for the 10 year period 1960-1969 to 105,112 during 1981-1990 (Table 1). A commercial harvest target of 30,000 to 40,000 was in effect from 1973-1984 to stabilize catches until the result of such a harvest could be evaluated. Experience showed that the harvest range was too high during weak runs. In 1984 the Board of Fisheries reduced the range to 17-32,000 chinook salmon.

Beginning in 1985 the commercial fishery was restricted to gill nets of 6-inch or smaller mesh size to reduce the harvest of the larger female chinook salmon and increase the harvest of the smaller "jack" chinooks. This action did not stop the decline in total escapement in 1985 and 1986. The 1985 chinook salmon catch of 37,889 exceeded the harvest guideline while escapements were less than half the desired objective. The catch remained within the harvest guideline in 1986 and chinook salmon escapements were less than one third the objective.

The Board stated in 5 AAC. 07.365 KUSKOKWIM RIVER SALMON MANAGEMENT PLAN that no directed commercial harvest of chinook salmon will take place to provide for a subsistence harvest that averages 64,000 chinook salmon and to maintain average spawning escapements (Table 1). This action, in 1987, followed earlier attempts to correct the declining escapements of Kuskokwim River chinook salmon.

The strategy used in 1987 continued to require the use of 6-inch or smaller mesh nets. In addition the plan provided for three eight hour fishing periods in June separated by six days. This insured that chinook salmon not caught during an opening would have adequate time to travel through District 1 before the next opening. During the first commercial opening, fishing was only allowed downstream of Bethel (Subdistricts 335-11 & 12, Figure 2). This prevented the harvest of earlier running chinook salmon in the upstream portion of the district while allowing the harvest of the later running sockeye and chum salmon. One final provision limited the sale of chinook salmon in June to 14,000 fish.

This final provision was meant to encourage commercial fishermen to take home chinook salmon caught incidental to the commercial chum salmon fishery and decrease their subsistence catch of chinook salmon. The 1987 strategy resulted in chinook salmon reaching escapement objectives in the Kuskokwim River for the first time since 1981. The prohibition of sale of incidentally caught chinook salmon resulted in a large number of unsalable fish and widespread dissatisfaction with the plan.

Dissatisfaction with the 1987 plan resulted in a new management plan. The new management plan, 5 AAC 07.365. KUSKOKWIM RIVER SALMON MANAGEMENT PLAN, replaced the chinook harvest cap by instructing that there will not be a directed chinook salmon fishery. The management plan also retained the required three 8 hour periods in June and that fishing only be allowed in the portion of District 1 below Bethel during the first period. The new management strategy included formation of the Kuskokwim River Salmon Working Group. This new approach allowed chinook salmon to reach or closely approach escapement objectives in 1988 through 1991 (Figure 6).

Chinook salmon escapement objectives were achieved from 1987 and 1988. Harvests in 1987 and 1988 exceeded the 17,000-32,000 harvest guideline. An increase in run size was primarily responsible for the increase in catch and escapement during this period.

In 1989, the Board increased the upper end of the incidental harvest guideline to 50,000 chinook salmon following the record 56,000 catch in 1988, which also achieved escapement objectives (Figure 6). The chinook escapement objective was achieved in 1990 along with a near record catch of 53,500.

In 1991, the commercial catch was only 37,778 and escapement was below objective (Figure 6). This shows that the excellent catch and escapement from 1987-1990 was due to larger runs. Weak chinook salmon runs are still overharvested by a commercial harvest greater than 30,000.

The Kuskokwim River sonar provided the first estimate of total run size for chinook salmon in 1991. This showed an estimated exploitation rate of 67 percent (Table 1). Based on production estimates of other chinook salmon stocks from the Columbia to Nushagak Rivers, chinook salmon can sustain exploitation rates of 65% to 72% (Brannian 1990).

It is unlikely that a directed commercial fishery for chinook salmon will be possible unless the total run size increases dramatically. The weak chum salmon return in 1991 resulted in the fewest number of fishing hours during the chinook salmon return since 1960 and still the incidental catch resulted in the maximum allowable harvest. It appears that during years of weak returns even the incidental catch in the commercial fishery may threaten the maximum sustained yield of Kuskokwim River chinook salmon.

The six-inch mesh restriction has resulted in an improvement in quality of the escapement. The percent of females with gill net marks at the Kogrukluk weir has notably increased (Table 12). This appears to indicate a higher net survival rate among females. The commercial catch is showing an increase in the number of males and a decrease in the number of females. From 1982 - 1984 while using

large mesh gear the commercial catch was 30 to 60 percent female. During the similar 1985 - 1991 period with the gear restrictions the commercial catch was 20 to 40 percent female. The gear change may also be responsible for the increased chinook salmon harvest since the commercial fishery is now targeting the smaller male fish that escape the large mesh subsistence nets. The increase in net marked females has not resulted in a corresponding improvement in the sex ratio at the weir. We hypothesize that this is a result of the continued use of large mesh in the subsistence fishery combined with the increase in the subsistence harvest (Table 1). All age classes are being fully utilized through this combination of gear types. The commercial and subsistence catch (Table 1) combined with the escapement index (Figure 6) shows that the chinook salmon run is being fully exploited.

The requirement to close the fishery above Bethel during the first period has improved escapements in the District 1 spawning tributaries. The Kwethluk, Kasigluk, and Kisaralik River are all tributaries to Kuskokuak Slough (Figure 2). The closing of the upper half of the district to commercial fishing in 1987 reversed the trend of below objective escapements that began in 1982 (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 identified in commercial or subsistence catches. This prevented an accurate record of the sockeye and chum salmon harvest in the Kuskokwim River. In 1981, fishermen, processors and the Department began to accurately identify each species in the commercial harvest. Sockeye salmon have comprised 5 to 33 percent of the chum-sockeye salmon catch since 1981. Before 1981, the reported sockeye salmon catch was less than 2 percent of the chum-sockeye salmon catch (Table 5). In 1991 the commercial harvest was 108,946 sockeye salmon which was 20 percent of the chum-sockeye salmon catch (Table 5). Sockeye salmon escapement is documented incidentally to the other species. The Kogrukluk weir escapement estimate of 16,458 sockeye salmon in 1991 was the third largest on record and above the objective of 2,000 adults (Table 13).

Chum Salmon

Before 1971, chum salmon were harvested incidentally during the chinook and coho salmon fisheries. Expansion of the commercial chum salmon fishery began in 1971, when it was apparent that a moderate increase in the chum salmon catch would be biologically sound. Based upon past subsistence harvest estimates (1924-1943 levels), a combined commercial and subsistence chum salmon harvest of 400,000 appeared to be consistent with the reproductive potential of the run (Table 14). A combined catch of 400,000 chum salmon was the management goal during the early 1970's. Subsistence catches for the entire river have declined since the inception of the commercial fishery in 1971 (Table 15). From 1971 to 1980 the average subsistence harvest was 173,680. The average harvest declined to 127,862 for the period 1981 to 1990 (Table 15). This appears to be due to the decline in the use of dog teams for transportation, not the increased commercial harvest.

Escapement objectives were approached or achieved from 1981-1984. Chum salmon escapement objectives were not achieved in 1985 through 1987. Escapement

objectives were achieved from 1988 to 1990. In 1991 escapement objectives were not achieved in the systems contributing to the early part of the run (Table 13, Kogrukluk Weir). The systems contributing to the latter portion of the run achieved their escapement objectives (Table 13, Aniak Sonar).

The commercial chum salmon harvest for the Kuskokwim River (Districts 1 and 2) has averaged 506,391 salmon in the last ten years (Table 5). The commercial harvest strategy in-season is based on:

1. Test fishing indexes showing relative abundance of chum salmon is similar to years in which adequate escapement occurred.

2. Commercial catch per unit effort compare to previous years when escapement was adequate.

3. Subsistence fishermen report adequate subsistence catches.

4. Chum salmon escapement projects projecting adequate escapements will occur.

Declining run strength normally results in a 2 to 3 week closure beginning in early to mid-July. Before 1985, only the lower half of District 1 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. Although returns in 1988 and 1989 were at record levels, more time was needed between fishing periods to achieve escapement objectives. The 1990 and 1991 returns were smaller but spacing the periods every 4 to 7 days resulted in approaching or achieving chum salmon escapement objectives.

Coho Salmon

Since statehood, the commercial coho salmon catches for the entire river have ranged from 2,498 in 1960 to 660,000 fish in 1986 (Table 5). The previous ten year average (1981-1990) is 428,764 fish. Effort in number of fishing permits has ranged from 83 in 1971 to 736 in 1990 (Table 3). In 1991, 733 fishermen landed coho salmon in District 1 (Table 3).

The subsistence fishery took few coho salmon due to poor drying conditions during August and September. Subsistence needs normally were met by earlier migrating species. This pattern has been changing gradually as the number of families with freezers increases. Coho salmon are the preferred species for freezing, accounting in part for the increased subsistence use of coho salmon during the last five years. For this reason, the Department has emphasized collection of subsistence coho salmon catch data in recent years.

The Kuskokwim River commercial fishery reopens when coho salmon predominate in the subsistence and test fisheries. An assessment of run strength, as shown by test fishing, subsistence and commercial catches, and the escapement trend at the Kogrukluk weir is used to determine the amount of fishing time. Districts 1 and 2 close by regulation on 1 September. A strong run in 1984 and a late run in

1989 resulted in extending the season into September. The management strategy is identical to the strategy for chum salmon presented above.

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 mouth (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. Fishermen fish primarily in the tidal channels that radiate out into the bay from the freshwater streams in the district.

Commercial fishing effort in this district has increased considerably in the last decade. Effort has ranged from 117 permits in 1982 to a record high during the 1990 season of 390 permit holders (Table 6). The past 10 year average is 263 permit holders. Recent changes in the June Kuskokwim River commercial fishery has shifted effort to this district, which has a targeted chinook fishery. In the Kuskokwim area fishermen have unrestricted movement between commercial fishing districts.

Chinook Salmon

Commercial harvests of chinook salmon in the past ten years peaked at 46,400 chinook salmon in 1983 (Table 7). The 1991 harvest of 9,500 chinook is the lowest this decade and well below the ten year average of 26,800 chinook salmon. The escapement objective into the Kanektok River for this species is 5,000. Aerial surveys (including poor surveys) indicate that escapement has been achieved in 6 out of the last 10 years (Table 8).

Sockeye Salmon

Sockeye salmon harvests have ranged from 6,500 in 1987 to 83,700 in 1990 (Table 7). The sockeye salmon escapement index of 15,000 has been surpassed every year with the exception of 1983 (Table 8). The objective was lowered from 30,000 to 15,000 in 1990. The past decade of aerial surveys documented an average escapement index of 30,000 sockeye salmon to this drainage.

Chum Salmon

Chum salmon harvests in this district for the past 10 years have ranged from 8,600 to 50,400 (Table 7). The escapement goal for this species of 30,500 was achieved in 1984 and 1991, but the 10 year average of 22,100 chum salmon is below the objective. This species is caught incidentally during harvest of sockeye salmon.

Coho Salmon

Commercial harvest of coho salmon in this district has ranged from 26,900 in 1990 to the record catch of 135,000 in 1984 (Table 7). The average of the past 10

years is 56,672 coho salmon. Escapement of coho salmon into the Kanektok River is extremely difficult to monitor because weather during the month of September is typically rainy and stormy.

Goodnews Bay (District 5)

The Goodnews Bay fishing district is the southernmost salmon district in the Kuskokwim area. The majority of the commercial fishing fleet resides in the villages of Platinum and Goodnews Bay. Effort in this district peaked at 125 permit holders in 1988 and averages 77 (Table 9). Fishing primarily is with drift gill nets in tidal channels and a few set nets near the mouth of the bay.

A counting tower was established in 1981 on the middle fork of the Goodnews River to provide estimates of salmon escapement for this district. The primary objective of this project is to provide daily escapement information to improve management of the commercial fishery. In 1991 this project was changed to a weir and was run a longer period of time. This was done to improve escapement data and to try and extend the project through the coho salmon run. The Goodnews River escapement project data provides a useful means of assessing aerial survey accuracy.

Chinook Salmon

Chinook salmon catches peaked in 1983 at 14,100 and have decreased every year with the 1991 catch of 900 being well below the ten year average of 6,200 (Table 10). Escapement objectives for chinook salmon have were achieved at the tower most recently during 1990 season. Delaying the commercial fishery opening to target sockeye salmon allowed a chinook escapement of 3,600. Table 11 presents historical estimates of chinook salmon exploitation for this district.

Sockeye Salmon

Sockeye salmon are the target species in June and July in the Goodnews Bay district. The commercial catch of sockeye salmon peaked in 1981 at 40,000 (Table 10). The previous 10 year average catch is 25,573. Since 1983, sockeye salmon escapement have approached or exceeded escapement objectives, except 1985 and 1988 (Table 11). Estimations of run exploitation appear low and a review of the five years of total run size of sockeye salmon resulted in a decrease of the escapement objective from 25,000-35,000 to 20,000-30,000.

Chum Salmon

Chum salmon are taken incidentally to the sockeye salmon fishery in District 5. The chum salmon catch averaged 14,397 in the last ten years (Table 10).

Coho Salmon

The Goodnews River weir only provided a partial count of the coho salmon escapement in 1991 due to inadequate funding. Aerial surveys to monitor this

species are usually prevented by weather and water conditions in late August and early September. The commercial catch of coho salmon peaked at 71,000 in 1984 and dropped to the low of 7,700 in 1990 (Table 10). The 10 year average commercial catch for this species is 29,300 for this district.

SEASON SUMMARY

The total 1991 Kuskokwim Area commercial salmon catch (Districts 1, 2, 4 and 5) consisted of 48,319 chinook, 202,824 sockeye, 558,006 coho, 588 pink and 503,201 chum salmon (Table 14). In 1991 the average Kuskokwim permit holder earned $4,831 (Table 2). The total amount paid to fishermen was $3,961,423, excluding bonuses and other incentives (Table 2). This is $1,383,624 less than the previous ten year average. Below average weight for all species and below average prices for all species, except pink and chum salmon, were responsible for the low value of the catch (Table 16). Coho salmon were the most abundant and valuable species bringing fishermen over two million dollars (Table 17).

Kuskokwim River (District 1 and 2)

The Kuskokwim River Salmon Management Working Group (Working Group) continued to work closely with the Department in 1991. Through uncommon dedication by all the concerned parties the Working Group provided in-season management recommendations that helped accomplish management objectives (Table 4). The Working Group is composed of representatives of the Kuskokwim River salmon users. During the course of the season the Working Group met 28 times to evaluate the status of the salmon runs and make recommendations to the Department concerning commercial fishing periods. The Working Group dealt with most fishing periods individually, that is recommended one period at a time so that any unexpected changes in run strength could be dealt with. This strategy provided the maximum harvest and adequate escapement for chum salmon. In spite of the lowest amount of fishing time during the chinook salmon run since 1960, they failed to reach the escapement objective. Coho salmon were over-fished and the Department's two vetos on 9 and 29 August failed to correct the situation (Table 4).

The Working Group recommended that the first fishing period be on 20 June in District 1, downstream of Bethel (Stat. Areas 335-11 & 335-12; Figure 2) in compliance with 5 AAC 07.365. KUSKOKWIM RIVER SALMON MANAGEMENT PLAN. Six hundred and one fishermen participated in the first opening (Table 18). The sockeye salmon catch of 19,732 exceeded the chum catch for the first time in the history of the fishery. The chinook and sockeye salmon catch appeared normal. The chum salmon catch was very weak. The commercial catch and test fishery results showed the same patterns of abundance.

We could not determine if the chum salmon run was weak or late. Sockeye salmon are available to the fishery relatively briefly and the chinook salmon run appeared to be of normal strength. The Department recommended to the Working Group that the fishery reopen downstream of Bethel on 24 June. We felt this

would provide an opportunity to harvest the surplus sockeye salmon while protecting the chinook and chum salmon which had already been exposed to the earlier opening. It would also provide information on the strength and timing of the chum salmon run.

The Working Group recommended that the entire length of District 1 be used. The chinook salmon run appeared at this time to be average and we felt it was early enough in the chum salmon run to correct over fishing by later reductions in fishing so we allowed a whole district opening on 24 June (Table 4).

The chum salmon catch on 24 June was one of the worst on record and the test fishery continued to show the weakest chum salmon return since the test fishery began in 1985. The Department and the Working Group agreed that a serious chum salmon conservation problem existed and set the next fishing period for 1 July. This meant forgoing one of the three June fishing periods guaranteed by the Kuskokwim River Management Plan. District 2 also opened for the first time on 1 July (Table 19).

A weak chum salmon run continued to be evidenced by poor commercial and test fishing catches. Fishing periods were allowed only every 5 to seven days until 18 July. In normal years a dwindling chum salmon run results in a closure until coho salmon dominate in the river at this time. The chum salmon catch peaked on the 18 July period; 18 days latter than the usual peak on 1 July (Table 18).

In light of the improved catch and moderate improvements at the Aniak sonar and Kogrukluk Weir projects the Department recommended the next period be in 4 days on 22 July. The Working Group disagreed and recommended that the next period be on 20 July. The Department refused to allow a period on 20 July and the Working Group then accepted the Department recommendation for 22 July.

Chum catches began to decline but were at record levels for that late in July. District 2 catches indicated good escapement occurring as did Aniak Sonar. Coho salmon catches were also increasing, showing normal run timing. The Working Group recommended an 8 hour period on 25 and 29 July and the Department allowed the periods. Chum salmon dominated the catch on 25 July and coho salmon dominated the catch on 29 July causing the management to shift to coho salmon (Table 18). This resulted in District 2 closing for one period on 1 August due to the lack of coho salmon and the poor quality of the chum salmon.

Chinook Salmon

The incidental chinook salmon catch was 37,778 in 1991, just below the average of 40,699 (Table 5). For the first time since 1988 chinook salmon failed to reach escapement objective (Figure 6). Two out of three of the contributing brood years were below escapement objective. A decrease in the run size over recent years contributed to the low escapement. The average incidental catch in spite of the lowest fishing time since 1960 indicates that the fleet is very effective at catching chinook salmon.

Sockeye Salmon

The incidental sockeye salmon catch of 109,000 was the third highest on record in spite of the reduced fishing time to protect chum salmon (Table 5). Sockeye salmon management is incidental to other species in the Kuskokwim River, the third largest sockeye salmon escapement on record at the Kogrukluk Weir combined with the large catch show that the sockeye salmon run was above average in 1991.

Chum Salmon

The chum salmon catch of 431,802 fish was 75,000 fish below average levels (Table 5). The chum salmon escapement objective was reached in the Aniak drainage but the Kogrukluk Weir was below objective (Table 13). A comprehensive review of chum salmon exploitation rates was not found in the literature such as for chinook salmon. Beacham's review of 30 years of chum salmon data from British Columbia found that the sustainable exploitation rates ranged from as low as 25 percent to as high as 75 percent depending on the system. Most systems supported sustained exploitation rates of 55 percent. Our estimate of exploitation in 1991 was 55 percent, which seems a reasonable level to maintain until more information on a sustainable exploitation rate in the Kuskokwim River is known (Table 15).

District 2 had the most fishing hours in the history of the fishery in 1991. This was the result of the removal of the district's harvest guidelines by the Board of Fisheries in 1990. District 2 and 1 now have the same fishing periods except when the management plan would be violated (Tables 19 & 20). For example District 2 opens later than District 1 to allow the latter running chum salmon to arrive in the district so that there is not a directed chinook salmon fishery.

Coho Salmon

The catch during the period on 29 July was dominated by coho salmon (Table 18). The catch of 38,284 coho salmon was the second highest recorded on that date. The chum salmon catch was the highest ever recorded on that date. The large catch and the test fish indexes suggested that the run was average or strong. The Department recommended a six hour period on 1 August which the Working Group also felt was appropriate (Table 4).

The commercial catch and test fish data on 2 August showed the coho salmon run most similar to 1985 and 1988. Both of these years failed to reach escapement objectives, but it was still to early to draw a firm conclusion about the 1991 run. The Department recommended a six hour period on 5 August and again on 8 August (the traditional Monday Thursday schedule) following the 5 August period. The Working Group felt eight hours was correct on both occasions. The Department had no reason to object to 8 hour periods and allowed them (Table 4).

Following these two periods, the test fishery showed a run most similar to 1990, which did not reach escapement objective. The commercial catch in District 1 continued to be most similar to 1985 and 1988. The District 2 catches, which have proven to be a good indicator of escapement through the lower district, were the lowest on record. The Department recommended that the next period be on 12 August for six hours due to conservation concerns. The Working Group felt the District 2 numbers were misleading because of high water and that the coho salmon were late like the chum salmon had been. They recommended the next period should be for 6 hours on 10 August (Table 4). The Department refused to allow this

period. Ultimately the Working Group recommended a period on 12 August for 8 hours which the Department allowed.

The District 1 catch on 12 August was 114,000, the second highest single period catch on record (Table 12). The District 2 catch continued to be poor as did the test fishery. The Working Group felt that the District 2 catch would improve with the next opening once the fish had traveled that far and that the large catch clearly showed that the test fishery was mistaken. The Department recommended remaining on schedule, with a six hour period on 15 August. The Working Group recommended an 8 hour period on 14 August so that there would be time for a third period that week if coho salmon abundance increased. The Department allowed the period since the large catch seemed to indicate the run might be late.

The District 1 catch on 14 August was most similar to 1988. The District 2 CPUE was the lowest on record and the Kogrukluk Weir escapement was half of what it should have been during a late run. The Bethel Test Fishery was the lowest ever recorded. The Working Group meeting was very contentious and resulted in a two day adjournment. Another contentious meeting resulted in a two day recess. Upon returning from recess the Department recommended a six hour period on 21 August. The Working Group recommended 6 hours on 19 August. The Department expressed their concerns for the run strength and escapement based on the commercial catch data, test fishery, and Kogrukluk Weir results. This was countered with numerous reports of excellent subsistence catches by the Working Group and members of the public. The Department allowed the Working Group recommendation to stand with reservations.

The catch in District 1 on 19 August was most similar to 1990; a year which did not reach escapement objectives. District 2 continued to be the poorest catch on record. The test fishery and weir also continued to show a weak run. After a heated discussion, the meeting on 20 August resulted in a recess until 22 August. After three motions to open the commercial fishery failed to reach consensus, the 22 August meeting also recessed until 24 August. The Department recommended a recess until 26 August but the Working Group recommended an 8 hour fishing period on 26 August. They also announced that if the catch was not "extraordinary" the season would be closed. The Department allowed the period.

There was no quorum at the meeting on 27 August following the period.

On 29 August the Department recommended letting the season close. The Working Group recommended fishing for 6 hours on 30 August. The Department refused to allow the period and the season closed by regulation on 1 September following a final 1 September meeting of the Working Group.

The total coho salmon catch of 500,935 was the fourth highest on record (Table 5). Since 1979 - 80 the even year coho salmon runs have been larger than the odd year runs. The 1991 catch was the largest odd year catch in the history of the fishery (Table 5). The test fisheries and the lowest commercial catch per unit effort ever recorded in District 2 suggest that escapement levels were below normal. The Kogrukluk Weir escapement estimate of 9,963 was the third lowest ever recorded and well below the objective of 25,000 (Table 13).

Pink Salmon

Pink salmon harvest is incidental to the chum and coho salmon fishery in the Kuskokwim River. Pink salmon have a strong odd - even year cycle in the Kuskokwim River and 378 pink salmon is a normal odd year catch (Table 5). There is no pink salmon escapement program for the Kuskokwim River.

Roe Sales

One catcher seller sold eggs to a local processor. The fish were sold through other outlets.

Enforcement

A total of 107 citations were issued during the 1991 salmon season by Fish and Wildlife Protection. The break down by district was:

District	Number of Citations
1	86
2	13
4	8
5	0

The break down by type of citation was:

Violation	Number of Citations
Commercial Fishing Closed Season	36
Unmarked Commercial Gear	21
Vessel Registration	15
No Crewmember License	10
Misc.	8
No Photo ID	8
Employment of Unlicensed Crew	5
Buyer Reporting Requirements	4

Over 15 unmarked subsistence nets were pulled during the subsistence closures in District 1. Most of these nets were pulled in Kuskokuak Slough and contained over 200 chinook salmon, which were so rotten they could not be salvaged. The nets also contained other fish but only the chinook salmon were counted.

Quinhagak (District 4)

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. Effort was light since the majority of the fishing fleet were on strike for higher prices. Fishing effort peaked at 227 permit holders and remained high until mid-July. A total of 346 permit holders participated in the fishery in 1991 in this district (Table 19). Whenever possible coincidental openings were held with other districts to keep effort levels down.

Aerial surveys are the only in-season measure of escapement in District 4. Management is based on historical commercial catch levels and when possible, aerial surveys.

Chinook Salmon

Chinook salmon catches were below normal in 1991 and commercial fishing time remained on the normal two 12 hour periods per week schedule (Table 20). DISTRICT 4 SALMON MANAGEMENT PLAN (5 AAC 07.367.) requires management be for sockeye salmon when sockeye salmon are more than 50 percent of the chinook-sockeye salmon catch in District 4. The weak chinook salmon run and the strong sockeye salmon run resulted in this provision taking effect on 24 June in 1991, the earliest sockeye salmon have ever outnumbered chinook salmon (Table 20). This resulted in a normal fishing schedule despite the chinook salmon run's weakness. The total chinook catch in District 4 was 9,480 in 1991, which was well below the ten year average of 26,800 and the lowest catch since 1975 (Table 7). Chinook salmon were worth 16% of the total value of the fishery, an average price of $.56 per pound resulting in a total $95,800 for this species (Table 17). Poor quality aerial surveys were flown during the chinook season with a late August survey documenting 2,100 chinook salmon (Table 8).

Sockeye Salmon

As stated above on 24 June sockeye salmon outnumbered chinook salmon and per 5 AAC 07.367 sockeye salmon management began. Sockeye salmon catches were steady and fishing was increased to the normal 3 twelve hour periods per week during the month of July. The sockeye salmon catch is the second highest on record at 53,657. Post season aerial surveys documented 43,500 sockeye salmon in the Kanektok River drainage, which exceeds the objective of 15,000 (Table 8). The average price paid for sockeye salmon was $.67 per pound for a total of $247,117, which is 47% of the total value of the commercial catch in this district (Table 17).

Chum Salmon

Chum salmon are caught incidentally to the chinook and sockeye salmon commercial fishery. The 1991 chum salmon catch was 54,493; which is the highest chum salmon catch in the last 10 years and the second highest catch on record (Table 7). Chum salmon brought an average of $.29 per pound, resulting in $107,227 in payment to fishermen (Table 17). This is 18% of the total value of the fishery. The escapement index for chum salmon is 30,000; 18,000 chum salmon were documented in a poor aerial survey (Table 8).

Coho Salmon

Coho salmon dominated the commercial catch on 2 August. Fishing continued for 3 twelve hour periods a week, with a record high catch of 11,957 on 23 August (Table 20). The total coho salmon catch of 42,571 is below the 10 year average of 56,672 (Table 7). The commercial value of this species was 24% of the season's total. The average price of $.47 per pound resulted in $144,454 paid to commercial fishermen (Table 17). Weather prevented late coho enumeration by aerial surveys, but sport fishing catches indicated coho salmon well distributed

throughout the drainage. An early aerial survey documented 4,330 coho salmon on 14 August (Table 8); weather and water conditions prevented any further coho surveys.

Pink Salmon

Pink salmon are incidentally caught during the season; 115 were caught in the 1991 season.

The commercial salmon fishing season closed by regulation on 8 September. There were no buyers present during the last commercial fishing period on 5 September.

Goodnews Bay (District 5)

The Goodnews Bay district opened to commercial fishing on 20 June. Effort remained fairly steady with 35-45 permit holders participating during most of the season. Effort peaked at 50 permit holders on 13 July (Table 21). This was probably due to fishermen in Kuskokwim River districts transferring because fishing time was increased to enable the fleet to harvest a strong sockeye run.

Management of chinook salmon mirrored the 1990 season when the escapement objective of 3,500 was achieved. The special management strategy for this species was brought about because of the below escapement objectives in the brood years. The chinook salmon catch of 912 is the lowest on record since 1974 (Table 10). The 10 year average commercial catch for this species is 6,250. The Goodnews River Weir escapement project enumerated 2,147 chinook, which is well below the escapement objective of 3,500 (Table 11). Management was successful in reducing the chinook salmon catch but the run was too small to reach the escapement objective.

Sockeye Salmon

Sockeye salmon catches in Goodnews Bay crept above average in the second week of the fishery. When the escapement indicated that the higher end of the escapement goal was going to be met, fishing time was increased. Sockeye salmon periods were increased to 24 hour periods 3 times a week for almost 3 weeks. Unfortunately during the peak of the run, buyers were not able to get tenders to cover the district (Table 21). The 1991 commercial catch of 39,800 sockeye salmon is only 400 fish shy of the record catch set in 1981. The ten year average for this species is 25,739 salmon. Sockeye salmon escapement at the Goodnews River weir passed the escapement objective of 25,000 with the final count of 47,400 sockeye salmon (Table 11).

Chum Salmon

The chum salmon catch is incidental to the sockeye salmon fishery in District 5. The 1991 catch of 15,892 is above the ten year average of 14,397 (Table 10). Chum salmon escapement of 27,500 at the Goodnews River weir exceeded the 17,000 objective goal.

Coho Salmon

The 1991 coho salmon catch of 13,312 was only 45% of the 10 year average and followed the poor run of 1990 (Table 10). Poor aerial survey conditions prevented a total coho salmon escapement count and the count of 1,694 coho salmon at the Goodnews River weir was from only the first part of the run. The weir had to close early because of insufficient funds.

Pink Salmon

Pink salmon peak during even years and only 29 were caught during the 1991 season (Table 10).

OUTLOOK FOR 1992

The Department is in the process of developing a program that will allow forecasting salmon returns in the Kuskokwim Area. Presently, only broad range harvest projections are possible. Projections are made by examining brood year escapements and recent harvest trends.

Chinook Salmon

Chinook salmon return to the Kuskokwim Area primarily as age 4, 5, and 6 fish. The brood years for 1992 will be 1986 through 1988.

Chinook salmon escapements were below objective levels in two of the brood years in the Kuskokwim River drainage (Figure 6). The weak run in 1990 shows poor survival for the contributing year classes. This should result in an incidental chinook harvest similar to recent years of 19,000 to 56,000 (Table 22).

Quinhagak (District 4) has the only directed chinook salmon fishery in the area. Chinook salmon escapement indexes were below objective levels in the Kanektok River in two of the three brood years (Table 8). A below average to average harvest of 14,000 to 34,000 chinook salmon should occur in 1992 (Table 22).

Goodnews River chinook salmon were below the escapement objectives in all three of the brood years. The recent years' harvest trend has been below average. The harvest in 1992 will probably be below average. The incidental catch probably will be 1,000 to 8,600 chinook salmon (Table 22).

Sockeye Salmon

The sockeye salmon catch in the Kuskokwim River is incidental to the chum salmon fishery. The incidental catch is expected to be 33,000 to 137,000 sockeye salmon in 1991 (Table 22).

Quinhagak and Goodnews Bay (District 5) are the only fisheries in the Kuskokwim Area that target on sockeye salmon. Most sockeye salmon return at five years of age in the Kuskokwim Area.

The 1987 brood year escapement index in the Kanektok River was 51,000 sockeye salmon; well above the escapement objective of 15,000 (Table 8). Harvest ranges in recent years' vary from 6,700 to a record high of 83,700. The sockeye harvest in District 4 should fall between these ranges (Table 22).

The 1987 brood year escapement index was 52,000 in the Goodnews River. This was above the objective of 20,000 to 30,000. This should result in a harvest range of 6,700 to 40,000 sockeye salmon in District 5 (Table 22).

Chum Salmon

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

The escapement index in the Kuskokwim River was below objective in 1987 and above objective in 1988. An average chum salmon run is expected in 1991 and the harvest should be between 199,000 to 1,380,000 (Table 22).

The catch of chum salmon should be between 8,500 and 54,500 in District 4 and from 5,000 to 33,000 in District 5 (Table 22).

Coho Salmon

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

The parent year (1988) escapement in the Kogrukluk River of 12,800 was below the objective of 25,000. The commercial CPUE in District 2 in 1987 was also below average. An average to below average run in 1992 should produce a catch of 196,000 to 660,000 coho salmon (Table 22).

In Districts 4 and 5, past years catches are the only guide to the coho salmon catch in 1992. In the last five years coho catches have ranged from 27,000 to 68,600 in District 4 and from 7,800 to 31,800 in District 5. Catches within these ranges are expected in 1992 (Table 22).

TABLES

Table 1. Utilization of Kuskokwim River chinook salmon, 1960-1991.

YEAR	COMMERCIAL HARVEST[a]	ESTIMATED SUBSISTENCE HARVEST[b]	TOTAL UTILIZATION	ESTIMATED TOTAL RUN SIZE	EXPLOITATION RATE
1960	5,969	20,361	26,330		
1961	18,918	30,910	49,828		
1962	15,341	14,642	29,983		
1963	12,016	37,246	49,262		
1964	17,149	29,017	46,166		
1965	21,989	27,143	49,132		
1966	25,545	49,606	75,151		
1967	29,986	57,875	87,861		
1968	34,278	30,230	64,508		
1969	43,997	40,138	84,135		
1970	39,290	69,204	108,494		
1971	40,274	42,926	83,200		
1972	39,454	40,145	79,599		
1973	32,838	38,526	71,364		
1974	18,664	26,665	45,329		
1975	21,720	47,784	69,504		
1976	30,735	58,185	88,920		
1977	35,830	55,577	91,407		
1978	45,641	35,881	81,522		
1979	38,966	55,524	94,490		
1980	35,881	59,900	95,781		
1981	47,663	59,669	107,332		
1982	48,234	53,310	101,544		
1983	33,174	52,000	85,174		
1984	31,742	57,000	88,742		
1985	37,889	42,277	80,166		
1986	19,414	51,019	70,433		
1987	36,179	67,352	103,504		
1988	55,716	53,877	109,593		
1989	43,217	73,035	116,252		
1990	53,504	71,281	124,785		
1991	37,778	63,312[c]	101,090	150,424[d]	67%[d]
Ten Year Average (1981-1990)	40,699	64,413	105,112		

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

Table 2. Estimated dollar value of Kuskokwim Area commercial salmon fishery, 1964-1991.

YEAR	GROSS VALUE OF CATCH TO FISHERMAN	PERMITS FISHED[a]	AVERAGE INCOME
1964	83,030		
1965	90,950		
1966	87,466		
1967	138,647		
1968	290,370		
1969	297,233		
1970	362,470		
1971	371,220		
1972	360,727		
1973	827,735		
1974	1,056,042		
1975	899,178		
1976	1,380,229		
1977	3,891,950		
1978	2,337,470		
1979	3,678,000		
1980	2,725,134		
1981	3,766,525		
1982	4,213,954		
1983	2,670,400		
1984	5,809,000	774	7,505
1985	3,248,089	781	4,159
1986	4,746,089	789	6,015
1987	6,392,822	798	8,011
1988	12,514,492	811	15,431
1989	5,194,025	824	6,303
1990	4,895,070	824	5,941
1991	3,961,423	820	4,831
TEN YEAR AVERAGE (1981-1990)	$5,345,047	800[b]	7,624[b]

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

b Previous seven year (1984-1990) average due to unavailable data.

Table 3. Lower Kuskokwim River, District 1, commercial effort 1970-1991.

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

	Number of Permits Landing Each Species						
	Chinook	Sockeye	Coho	Pink	Chum	Roe	
1989	695	688	732	261	719	22	745
1990	724	722	714	526	736	1	744
1991	687	705	731	159	733	1	749
Ten Year Average (1981-1991)							698

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

Table 4. Executive summary of department and working group actions, 1991.

DATE	DEPT. RECOMMENDATIONS	WORKING GROUP RECOMMENDATIONS	ACTUAL
03-14	NO QUORUM		
04-28	Reorganization and discussion of 1991 Kuskokwim River Salmon Management Plan.		
05-19	Discussion of in-season data and evaluation of in-season data.		
06-02	Approval of 1990 and 1991 minutes.		
06-16	District 1 for 6 hours on 20 June.(below Bethel required by regulation)	District 1 for 6 hours on 20 June.(below Bethel required by regulation)	District 1 for 6 hours on 20 June.(below Bethel required by regulation)
06-22	District 1, below Bethel for 6 hours 24 June.	District 1 for 6 hours on 24 June.	District 1 for 6 hours on 24 June.
06-26	Districts 1 and 2 for 6 hours on 1 July.	Districts 1 and 2 for 6 hours on 1 July.	Districts 1 and 2 for 6 hours on 1 July.
07-02	Districts 1 and 2 for 6 hours on 8 July.	Recess until 5 July.	Recess until 5 July.
07-05	Districts 1 and 2 for 6 hours on 8 July.	Districts 1 and 2 for 6 hours on 6 July.	Districts 1 and 2 for 6 hours on 6 July.
07-08	Meet again on 10 July.	Meet again on 10 July.	Meet again on 10 July.
07-10	Meet again on 12 July.	Districts 1 and 2 for 6 hours on 13 July and recess until 12 July.	Announcement of period delayed until 12 July.
07-12	Announced Districts 1 and 2 for 6 hours on 13 July.	Meet again on 16 July.	Districts 1 and 2 for 6 hours on 13 July.

-Continued-

Table 4. (page 2 of 3)

DATE	DEPT. RECOMMENDATIONS	WORKING GROUP RECOMMENDATIONS	ACTUAL
07-16	Districts 1 and 2 for 6 hours on 19 July.	Districts 1 and 2 for 6 hours on 18 July.	Districts 1 and 2 for 6 hours on 18 July.
07-19	Districts 1 and 2 for 6 hours 22 July.	Districts 1 and 2 for 6 hours on 20 July. Vetoed by Department. Districts 1 and 2 for 6 hours on 22 July.	Districts 1 and 2 for 6 hours on 22 July.
07-23	Districts 1 and 2 for 6 hours on 25 July.	Districts 1 and 2 for 8 hours on 25 July and 29 July.	Districts 1 and 2 for 8 hours on 25 July and 29 July.
07-31	Districts 1 for 6 hours on 1 August.	Districts 1 for 6 hours on 1 August.	Districts 1 for 6 hours on 1 August.
08-02	Districts 1 and 2 for 6 hours on 5 August.	Districts 1 and 2 for 8 hours on 5 August.	Districts 1 and 2 for 8 hours on 5 August.
08-04	NO QUORUM		
08-06	Districts 1 and 2 for 6 hours on 8 August.	Districts 1 and 2 for 8 hours on 8 August.	Districts 1 and 2 for 8 hours on 8 August.
08-08	Meeting with Commercial Fisheries Division Director Lloyd.		Request for in-season management needs list.
08-09	Districts 1 and 2 for 6 hours on 12 August.	Districts 1 and 2 for 6 hours on 10 August. Vetoed by Department. Vetoed again after reconsideration motion. Districts 1 and 2 for 6 hours on 11 August withdrawn for lack of support. Districts 1 and 2 8 hours on 12 August.	Districts 1 and 2 for 8 hours 12 August.

-Continued-

Table 4. (page 3 of 3)

DATE	DEPT. RECOMMENDATIONS	WORKING GROUP RECOMMENDATIONS	ACTUAL
08-13	Districts 1 and 2 for 6 hours 15 August.	Districts 1 and 2 for 8 hours 14 August.	Districts 1 and 2 for 8 hours 14 August.
08-15	Meet again on 17 August.	Meet again on 16 August.	Meet again on 16 August.
08-16	Meet again on 19 August.	Recess until 18 August.	Recess until 18 August
08-18	Districts 1 and 2 for 6 hours on 21 August.	Districts 1 and 2 for 6 hours on 19 August.	Districts 1 and 2 for 6 hours on 19 August.
08-20	Recess until 22 August.	Recess until 22 August.	Recess until 22 August.
08-22	Meet again 24 August.	Recess until 24 August. Three motions for fishing periods failed.	Recess until 24 August.
08-24	Recess until 26 August.	Districts 1 and 2 for 8 hours on 26 August.	Districts 1 and 2 for 8 hours on 26 August.
08-27	NO QUORUM		
08-29	Let season close by regulation on 1 September.	Districts 1 and 2 for 6 hours on 30 August. Vetoed by Department. Recess until 1 September.	Recess until 1 September.
09-01	Let season closed by regulation.	Let season close by regulation.	Season closed by regulation.

Table 5. Lower Kuskokwim River, District 1, and the middle Kuskokwim River, District 2, combined commercial salmon harvest, 1960-1991.

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
Ten Year Average (1981-1990)	40,699	75,728	428,764	217[a]	506,391	1,053,924

a Odd years only.

Table 6. Quinhagak District commercial effort 1970-1991.

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

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

Table 7. Quinhagak District commercial salmon harvest, 1960-1991.

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[a]	54,493	160,316
Ten Year Average (1981-1990)	26,826	23,214	56,672	139[b]	33,516	147,309

[a] Odd years only.

Table 8. Kanektok River peak aerial surveys by species, 1959-1991[a].

Year	SPECIES			
	Chinook	Sockeye	Coho	Chum
1960	6,047	34,900		36,100
1961				
1962	935	43,108		
1963				
1964				
1965				
1966	3,718			28,800
1967				
1968	4,170	8,000		14,000
1969				
1970	4,112	3,028		80,100
1971				
1972				
1973	814			
1974				
1975		6,018		
1976		2,936		8,697
1977	5,787	6,304		32,157
1978[b]	19,180	44,215		229,290
1979				
1980	6,172	113,931	69,325	25,950
1981[c]	15,900	49,175		71,840
1982[d]	8,142	55,940		
1983	8,890	2,340		9,360
1984[e]	12,182	30,840	46,830	48,360
1985	13,465	16,270		14,385
1986	3,643	14,949		16,790
1987	4,223	51,753	20,056	9,420
1988	11,140	30,440		20,063
1989	7,914	14,735	1,755	6,270
1990	2,563	32,082		2,475
1991[d]	2,100	43,500	4,330	18,000
AVERAGE:	8,806	29,852	18,242	22,107
OBJECTIVE:	5,000	15,000		30,500

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

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

c Poor survey for chinook, sockeye, chum salmon.

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

e Poor coho survey.

Table 9. Goodnews Bay, District 5 commercial effort 1970-1991.

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

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

Table 10. Goodnews Bay District commercial salmon harvest, 1968-1991.

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
Ten year Average (1981-1990)	6,250	25,573	29,269	31[a]	14,397	77,668

a Odd years only.

Table 11. Historical estimated salmon run size and commercial exploitation rate, Goodnews River, 1981 - 1991.

YEAR	SPECIES	MIDDLE FORK TOWER ESTIMATE	MIDDLE FORK AERIAL SURVEY COUNT AS A PERCENTAGE OF TOWER EST.	GOODNEWS RIVER ESCAPEMENT ESTIMATE	GOODNEWS BAY SUBSISTENCE HARVEST ESTIMATE	GOODNEWS BAY COMMERCIAL HARVEST	TOTAL RUN SIZE ESTIMATE	EXPLOITATION[a] RATE (% OF RUN)
1981	Chinook	3,688	-[b]	7,766[c]	1,409	7,190	16,365	53%
	Sockeye	49,108	-[b]	100,029[c]	3,511[d]	40,273	143,813	30%
	Chum	21,827	-[b]	53,799[c]	-	13,642	67,441	20%
1982	Chinook	1,395	-[b]	2,937[c]	1,236	9,476	13,649	78%
	Sockeye	56,255	-[b]	114,587[c]	2,754[d]	38,877	156,218	27%
	Chum	6,767	-[b]	16,679[c]	-	13,829	30,508	45%
1983	Chinook	6,027	36%	14,398	1,066	14,117	29,581	51%
	Sockeye	25,816	22%	69,955	1,518[d]	11,716	83,189	15%
	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[e]	682	3,303	11,641	34%
	Sockeye	31,679	-[b]	64,528[e]	905	35,823	101,256	36%
	Chum	6,410	-[b]	15,799[e]	342	13,194	29,335	46%
1991[e]	Chinook	2,147	-[b]	4,521[e]	486[f]	912	5,919	24%
	Sockeye	47,397	-[b]	96,544[e]	946[f]	39,838	137,328	30%
	Chum	27,525	-[b]	67,844[e]	517[f]	15,892	84,253	19%

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 Average of 1988-1990

Table 12. Chinook salmon sex ratios and proportion of females with gill net marks, Kogrukluk weir, 1979-1991.

Year	Escapement Estimate	Females	Sex Ratio (% female)	% of females with gill net marks
1979	11,299	1,786	17.6	11.03
1980	6,572	1,045	15.9	a
1981	16,820	7,905	47.0	12.47
1982	12,185	5,995	49.2	12.99
1983	2,992	865	28.9	16.49
1984	4,928	1,119	22.7	11.08
1985	4,438	1,429	32.2	18.99
1986	4,296	987	23.0	19.43
1987[b]	4,063			
1988	11,194	3,848	34.4	13.34
1989	11,940	4,127	34.6	16.46
1990	10,219	2,289	22.5	14.35
1991	7,850	3,658	44.6	19.26
1979-84 Average			30.2	10.68
1985-90 Average			29.3	16.51

a Gill net mark data was not reported
b Sample size to small to assess sex ratio and percentage of gill net marks

Table 13. Historic salmon escapement data from current Kuskokwim Area projects, 1976-1991.

YEAR	Operating Period	SPECIES				
		Chinook	Sockeye	Coho	Pink	Chum
KOGRUKLUK WEIR[a] Objectives		10,000	2,000	25,000	NA	30,000
1976	06/29 to 07/31	5,818	2,366	b	-	8,417
1977	07/14 to 07/27	1,945	1,637	b	2	19,444
1978	06/28 to 07/31	13,601	1,699	b	2	47,010
1979	07/01 to 07/24	11,420	476	b	1	4,836
1980	07/01 to 07/11	6,572	3,200	b	1	41,777
1981	06/27 to 10/25	16,820	18,077	11,532	6	57,373
1982	07/09 to 09/14	12,185	22,156	38,961	19	79,580
1983	06/22 to 07/02	2,992	1,176	8,327	-	9,407
1984	06/19 to 09/15	4,928	4,130	29,824	-	41,484
1985	06/29 to 09/07	4,438	4,366	16,536	-	17,181
1986	07/06 to 10/05	4,296	4,179	26,230	-	15,511
1987	08/09 to 09/23	b	b	24,238	-	b
1988	07/05 to 09/17	11,194	6,158	12,799	-	41,881
1989	07/07 to 09/14	11,940	5,810	b	-	39,548
1990	06/28 to 09/07	10,219	8,406	b	1	26,765
1991	07/04 to 09/15	7,280	16,458	9,963	4	24,193
ANIAK SONAR[c] Objective						250,000
1980	06/22 to 07/30	56,469	-	-	-	1,091,286
	08/16 to 09/12	-	-	81,556	-	-
1981	06/16 to 08/06	42,060	-	-	-	526,320
1982	06/21 to 08/01	33,864	-	-	-	389,226
1983	06/18 to 07/28	4,911	-	-	-	114,869
1984	06/16 to 07/30	-	-	-	-	275,261
1985	06/22 to 07/28	-	-	-	-	253,048
1986	06/26 to 07/24	-	-	-	-	209,080
1987	06/22 to 07/31	-	-	-	-	193,464
1988	06/22 to 07/31	-	-	-	-	401,511
1989	06/21 to 07/24	-	-	-	-	243,936
1990	06/23 to 08/06	-	-	-	-	300,408
1991	06/29 to 07/29	-	-	-	-	282,475
MIDDLE FORK GOODNEWS RIVER TOWER[d]						
Objectives		3,500	25,000	NA	NA	15,000
1981	06/13 to 08/15	3,688	49,108	357	1,327	21,827
1982	06/23 to 08/03	1,395	56,255	62	13,855	6,767
1983	06/11 to 07/28	6,027	25,816	0	34	15,548
1984	06/15 to 07/31	3,260	32,053	249	13,744	19,003
1985	06/27 TO 07/31	2,831	24,131	282	144	10,367
1986	06/16 TO 07/24	2,083	51,069	163	8,133	14,756
1987	06/22 to 07/30	2,274	28,871	62	62	17,519
1988	06/23 to 07/30	2,712	15,799	6	6,781	20,799
1989	06/29 to 07/31	1,915	21,196	145	246	10,380
1990	06/19 to 07/24	3,636	31,679	0	3,378	6,410
1991[e]	06/29 to 08/25	2,147	47,397	1,978	1,694	27,525

a Pink salmon can pass freely through the Kogrukluk Weir.

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

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

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

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

Table 14. Kuskokwim Area commercial, subsistence, and personal use salmon catches, 1913-1991.

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

- Continued -

Table 14. (page 2 of 2)

Year	COMMERCIAL CATCH						SUBSISTENCE CATCH						COMBINED TOTAL HARVEST
	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Coho[b]	Small[d]	Total			
1962	20,867	10,313	12,598	4,340	45,707	93,825	13,455	161,849	175,304	269,129			362,954
1963	18,571		15,660			34,231	33,180	137,649	170,829	205,060			239,291
1964	21,230	13,422	28,992	939	707	65,290	29,017	190,191	219,208	284,498			349,788
1965	24,965	1,886	12,191		4,242	43,284	24,697		250,878	275,575			318,859
1966	25,823	1,030	22,985	268	2,610	52,716	49,022		175,735	224,757			277,473
1967	29,986	652	58,239		8,235	97,112	60,919		214,468	275,387			372,499
1968	43,157	5,887	154,302	75,818	19,694	298,858	35,380		278,008	313,388			612,246
1969	64,777	10,362	110,473	1,251	50,377	237,240	40,208		204,105	244,313			481,553
1970	65,032	12,654	62,245	27,422	60,566	227,919	69,219	11,868	246,810	327,897			555,816
1971	44,936	6,054	10,006	13	99,423	160,432	42,926	6,899	116,391	166,216			326,648
1972	55,482	4,312	23,880	1,952	97,197	182,823	40,145	1,325	120,316	161,786			344,609
1973	51,374	5,224	152,408	634	184,207	393,847	38,526	23,746	179,259	241,531			635,378
1974	30,670	29,003	179,579	60,052	196,127	495,431	26,665	32,780	277,170	336,615			832,046
1975	27,799	17,535	109,814	899	223,532	379,579	47,569		176,389	223,958			603,537
1976	49,262	13,636	112,130	39,998	231,877	446,903	57,899	4,312	223,792	286,003			732,906
1977	58,256	18,621	263,728	434	298,959	639,998	57,925	12,193	203,397	273,515			913,513
1978	63,194	13,734	247,271	61,968	282,044	668,211	38,209	12,437	125,052	175,698			843,909
1979	53,314	39,463	308,683	574	297,167	699,201	57,031		163,451	220,482			919,683
1980	48,242	42,213	327,908	30,306	561,483	1,010,152	62,139	47,335	168,987	278,461			1,288,613
1981	79,378	105,940	278,587	463	485,635	950,003	63,248	28,301	163,554	255,103			1,205,106
1982	79,816	97,716	567,451	18,259	325,471	1,088,713	60,426	45,181	195,691	301,298			1,390,011
1983	93,676	90,834	249,018	379	306,554	740,461	51,020	2,834	149,172	203,026			943,487
1984	74,006	81,307	829,965	23,902	488,482	1,497,662	60,944	15,016	144,651	220,335			1,717,997
							Chinook	Sockeye	Coho	Pink	Chum	Total	
1985	74,083	121,221	382,096	111	224,680	802,191	45,720	33,631	24,667	1,062	96,791	201,871	1,004,062
1986	44,972	142,029	736,910	16,569	349,268	1,289,748	54,256		29,742		142,930[e]	226,928	1,516,676
1987	65,558	170,849	478,594	163	603,274	1,318,438	71,804	31,555	18,085	291	70,709	192,444	1,510,882
1988[e]	74,552	149,927	623,719	37,592	1,443,916	2,239,786	56,695	25,571	32,426		118,181	232,873	2,565,615
1989[e]	67,003	82,628	556,312	819	802,199	1,508,961	77,030	33,958	50,046		132,858	293,834	1,802,853
1990	84,706	203,374	445,062	16,082	522,535	1,272,759	77,328	32,218	44,519		108,557	262,622	1,535,381
1991	48,319	202,824	558,006	588	503,201	1,312,938							
Ten Year Average (1981-1990)	73,775	124,582	514,771	387[c]	555,201	1,270,872	61,847					239,033	1,519,207

a Primarily chum and coho salmon.
b Reported subsistence coho salmon harvest only. Coho salmon subsistence harvest is poorly documented with no Kuskokwim River estimate attempted prior to 1986.
c Includes sockeye, pink and chum salmon.
d The personal use catch is included with the subsistence catch.
e Odd years only.

Table 15. Utilization of Kuskokwim River chum salmon, 1960-1991.

YEAR	COMMERCIAL HARVEST[a]	ESTIMATED SUBSISTENCE HARVEST[b]	TOTAL UTILIZATION	ESTIMATED TOTAL RUN SIZE	EXPLOITATION RATE
1960	0	301,753[c]	301,753		
1961	0	179,529[c]	179,529		
1962	0	161,849[c]	161,849		
1963	0	137,649[c]	137,649		
1964	0	190,191[c]	190.191		
1965	0	250,878[c]	250,878		
1966	0	175,735[c]	175,735		
1967	148	208,445[c]	208,593		
1968	187	275,008[c]	275,195		
1969	7,165	204,105[c]	211,270		
1970	1,664	246,810[c]	248,474		
1971	68,914	116,391[c]	185,305		
1972	78,619	120,316[c]	198,935		
1973	148,746	179,259[c]	328,005		
1974	171,887	277,170[c]	449,057		
1975	181,840	176,389[c]	358,229		
1976	177,864	223,792[c]	401,656		
1977	248,721	198,355[c]	447,076		
1978	248,656	118,809[c]	367,465		
1979	261,874	161,239[c]	423,113		
1980	483,211	165,172[c]	648,383		
1981	418,677	157,306[c]	575,983		
1982	278,306	190,011[c]	468,317		
1983	267,698	146,876[c]	414,574		
1984	423,718	142,542[c]	566,260		
1985	199,478	95,542	295,020		
1986	309,213	141,931	451,144		
1987	574,336	69,047	643,383		
1988	1,381,674	117,008	1,498,682		
1989	749,182	122,086	871,268		
1990	461,624	96,273	557,897		
1991	431,802	109,269[d]	543,591	995,266[e]	55%
Ten Year Average (1981-1990)	506,391	127,862	634,253		

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 Previous five year average harvest since subsistence catch not available at this time.
e Preliminary figures since 1991 subsistence harvest not available at this time.

Table 16. Mean salmon weights and prices paid to commercial fisherman in the Kuskokwim Area, 1967-1991.

	Mean Weight - Pounds					Average Price - $/Pound				
Year	Chinook	Sockeye	Coho	Pink	Chum	Chinook	Sockeye	Coho	Pink	Chum
1967	27.8	7.4	5.9	a	7.0	0.13	0.05	0.09	a	0.04
1968	23.8	6.2	7.2	4.0	7.9	0.16	0.10	0.09	0.05	0.04
1969	19.6	6.2	7.3	3.6	5.8	0.19	0.15	0.10	0.06	0.07
1970	18.9	5.4	7.3	3.3	6.1	0.20	0.21	0.14	0.08	0.08
1971[b]	26.2	6.9	6.1	a	6.4	0.17	0.10	0.13	a	0.08
1972	a	a	a	a	a	0.20	a	0.16	a	0.08
1973	a	a	a	a	a	0.25	a	0.26	a	0.19
1974	a	a	a	a	a	0.46	0.34	0.27	0.23	0.25
1975	a	a	a	a	a	0.54	a	0.31	a	0.26
1976[c]	17.0	6.7	7.8	3.5	7.0	0.64	0.43	0.40	0.25	0.27
1977	22.7	8.3	7.8	3.9	7.3	1.15	0.45	0.65	0.25	0.45
1978	24.2	6.5	7.1	3.9	8.9	0.50	0.49	0.40	0.12	0.32
1979	16.6	6.9	7.9	3.9	7.0	0.66	0.53	0.75	0.11	0.37
1980	14.1	6.7	6.9	3.6	6.4	0.47	0.31	0.64	0.12	0.24
1981	17.8	7.2	6.4	3.5	7.5	0.84	0.61	0.63	0.11	0.23
1982	19.3	7.2	7.3	3.6	7.3	0.82	0.41	0.53	0.05	0.22
1983	18.8	6.8	6.8	3.5	7.4	0.54	0.51	0.39	0.05	0.33
1984	16.4	6.6	7.7	3.2	6.7	0.89	0.52	0.55	0.07	0.28
1985	17.0	7.0	7.5	3.6	7.1	0.71	0.59	0.51	0.05	0.25
1986	17.0	7.2	6.4	3.4	6.8	0.80	0.70	0.60	0.05	0.25
1987	15.2	7.5	7.2	3.7	6.8	1.10	1.30	0.73	0.10	0.27
1988	15.1	7.3	7.5	3.4	8.1	1.30	1.42	1.25	0.15	0.40
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
Ten Year Average (81-90)	16.8	7.1	7.1	3.5	7.1	0.83	0.83	0.65	0.08	0.28

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

Table 17. 1991 Kuskokwim Area commercial salmon fishery final calculated value by district and area.[a]

	CHINOOK	SOCKEYE	COHO	PINK	CHUM	DISTRICT TOTAL
LOWER KUSKOKWIM DISTRICT 1						
TOTAL FISH	36,706	105,420	486,245	332	394,334	1,023,037
TOTAL POUNDS	545,141	732,944	3,094,435	1,144	2,433,100	6,806,764
TOTAL DOLLARS	$310,730	$498,402	$1,392,496	$137	$788,592	$2,990,357
AVERAGE WEIGHT	14.85	6.95	6.36	3.40	6.17	
MIDDLE KUSKOKWIM DISTRICT 2						
TOTAL FISH	1,072	3,526	14,690	46	37,468	56,802
TOTAL POUNDS	17,246	23,698	89,727	169	226,439	357,279
TOTAL DOLLARS	$10,003	$14,456	$39,480	$20	$47,552	$111,511
AVERAGE WEIGHT	16.09	6.72	6.11	3.67	6.04	
QUINHAGAK DISTRICT 4						
TOTAL FISH	9,480	53,657	42,571	115	54,493	160,316
TOTAL POUNDS	171,072	368,832	307,351	303	369,751	1,217,309
TOTAL DOLLARS	$95,800	$247,117	$144,455	$36	$107,228	$594,636
AVERAGE WEIGHT	18.05	6.87	7.22	2.63	6.79	
GOODNEWS BAY DISTRICT 5						
TOTAL FISH	912	39,838	13,312	29	15,892	69,983
TOTAL POUNDS	14,685	280,033	103,302	118	108,256	506,394
TOTAL DOLLARS	$8,370	$187,622	$47,519	$14	$31,394	$274,919
AVERAGE WEIGHT	16.10	7.03	7.76	4.07	6.81	
TOTAL ALL DISTRICTS						
TOTAL FISH	48,170	202,441	556,818	522	502,187	1,310,138
TOTAL POUNDS	748,144	1,405,507	3,594,815	1,734	3,137,546	8,887,746
TOTAL DOLLARS	$424,903	$947,597	$1,623,950	$207	$974,766	$3,961,423
AVERAGE WEIGHT	15.53	6.94	6.45	3.36	6.25	
AVERAGE PRICE/LB	$0.56	$0.67	$0.45	$0.12	$0.31	
PRICE/FISH	$8.70	$4.65	$2.90	$0.40	$1.94	
ROE SALES					$85	
GRAND TOTAL FOR AREA						$3,961,508

a Does not include test fish sales.

Table 18. Lower Kuskokwim River, District 1, commercial salmon harvest and fishing effort by period, 1991.

				CHINOOK		SOCKEYE		COHO		PINK		CHUM	
PERIOD	DATE	HOURS	PERMITS	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE
01	06/20-06/20	6	601	13,813	3.83	19,732	5.47					13,266	3.68
02	06/24-06/24	6	616	12,612	3.41	19,262	5.21					30,632	8.29
03	07/01-07/01	6	629	5,966	1.58	24,428	6.47					50,121	13.28
04	07/06-07/06	6	589	2,102	.59	24,219	6.85			1		40,060	11.34
05	07/13-07/13	6	571	904	.26	6,458	1.88	16		21	.01	52,552	15.34
06	07/18-07/18	6	568	452	.13	5,128	1.50	977	.29	9		78,797	23.12
07	07/22-07/22	6	543	233	.07	3,085	.95	2,655	.81	19	.01	49,788	15.28
08	07/25-07/25	8	533	186	.04	1,526	.36	4,871	1.14	86	.02	30,083	7.06
09	07/29-07/29	8	534	134	.03	732	.17	37,141	8.69	49	.01	24,026	5.62
10	08/01-08/01	6	602	125	.03	624	.17	38,284	10.60	30	.01	13,098	3.63
11	08/05-08/05	8	643	56	.01	96	.02	56,262	10.94	32	.01	6,091	1.18
12	08/08-08/08	8	634	33	.01	40	.01	72,037	14.20	24		3,194	.63
13	08/12-08/12	8	662	42	.01	31	.01	114,581	21.64	40	.01	1,586	.30
14	08/14-08/14	8	601	18		23		58,393	12.14	15		634	.13
15	08/19-08/19	6	590	24	.01	24	.01	57,364	16.20	4		313	.09
16	08/26-08/26	8	512	6		12		43,664	10.66	2		93	.02
	TOTALS	110	749	36,706	.45	105,420	1.28	486,245	5.90	332		394,334	4.79

Table 19. Middle Kuskokwim River, District 2, commercial salmon harvest and fishing effort by period, 1991.

PERIOD	DATE	HOURS	PERMITS	CHINOOK		SOCKEYE		COHO		PINK		CHUM	
				NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE
01	07/01-07/01	6	17	483	4.74	1,200	11.76					3,043	29.83
02	07/06-07/06	6	16	341	3.55	613	6.39					2,381	24.80
03	07/09-07/13	6	18	112	1.04	981	9.08					4,384	40.59
04	07/14-07/18	6	17	49	.48	365	3.58			5	.05	6,534	64.06
05	07/22-07/22	6	19	28	.25	117	1.03	17	0.15	14	.12	7,154	62.75
06	07/25-07/25	8	17	20	.15	177	1.30	115	.85	13	.10	7,686	56.51
07	07/29-07/29	8	16	21	.16	70	.55	177	1.38	6	.05	3,452	26.97
08	08/05-08/05	8	17	6	.04			1,596	11.74	4	.03	1,245	9.15
09	08/08-08/08	8	17	4	.03	3	.02	2,381	17.51	2	.01	835	6.14
10	08/12-08/12	8	16	2	.02			1,829	14.29			340	2.66
11	08/14-08/14	8	15	4	.03			2,461	20.51			227	1.89
12	08/19-08/19	6	19	2	.02			1,689	14.82			138	1.21
13	08/26-08/26	8	16					4,425	34.57			49	.38
	TOTALS	92	23	1,072	.51	3,526	1.67	14,690	10.79	46	.02	37,468	17.71

Table 20. Quinhagak, District 4, commercial salmon harvest and fishing effort by period, 1991.

				CHINOOK		SOCKEYE		COHO		PINK		CHUM	
PERIOD	DATE	HOURS	PERMITS	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE
01	06/13-06/13	12	4	33	.69	4	.29					14	.29
02	06/20-06/20	12	71	3,031	3.56	411	.48					563	.66
03	06/24-06/24	12	81	1,403	1.44	1,643	1.69					732	.75
04	06/27-06/27	12	227	1,849	.68	4,923	1.81					2,722	1.00
05	07/01-07/01	12	76	657	.72	3,498	3.84					1,836	2.01
06	07/04-07/04	12	172	508	.25	5,743	2.78					2,612	1.27
07	07/06-07/06	12	73	273	.31	3,951	4.51					2,192	2.50
08	07/08-07/08	12	96	465	.40	8,229	7.14					3,050	2.65
09	07/11-07/11	12	210	406	.16	7,195	2.86					9,329	3.70
10	07/13-07/13	12	70	205	.24	4,241	5.05					4,799	5.71
11	07/15-07/15	12	114	230	.17	4,505	3.29	4				7,852	5.74
12	07/17-07/17	12	120	130	.09	3,725	2.59	6				5,988	4.16
13	07/19-07/19	12	86	97	.09	2,391	2.32	49	.05			4,960	4.81
14	07/22-07/22	12	60	35	.05	1,055	1.47	7	.01			990	1.47
15	07/24-07/24	12	62	33	.04	588	.79	21	.03			2,254	3.03
16	07/26-07/26	12	44	27	.05	529	1.00	82	.16			1,446	2.74
17	07/29-07/29	12	47	21	.04	356	.63	367	.65	46	.08	1,412	2.50
18	07/31-07/31	12	44	15	.03	183	.35	410	.78	18	.03	665	.35
19	08/02-08/02	12	34	14	.03	138	.34	390	.96	14	.03	288	.71
20	08/05-08/05	12	21	6	.02	92	.37	387	1.54	12	.05	218	.87
21	08/09-08/09	12	62	7	.01	67	.09	1,831	2.46	8	.01	265	.36
22	08/14-08/14	12	56	6	.01	34	.05	2,963	4.41	2		98	.15
23	08/16-08/16	12	79	5	.01	38	.04	5,599	5.91	3		96	.10
24	08/19-08/19	12	69	10	.01	26	.03	6,099	7.37	1		54	.07
25	08/21-08/21	12	105	4		28	.02	4,073	3.23	1		21	.02
26	08/23-08/23	12	111	1		13	.01	11,957	8.98	6		22	.02
27	08/26-08/26	12	77	6	.01	27	.03	2,644	2.86	2		10	.01
28	08/29-08/29	12	76	2		11	.01	2,508	2.75	1		1	
29	08/31-08/31	12	43			6	.01	1,427	2.77				
30	09/02-09/02	12	40	1		7	.01	1,747	3.64	1		4	.01
31	09/05-09/05	12	0	NO BUYER - NO COMMERCIAL FISHING									
	TOTALS	372	346	9,480	.08	53,657	.43	42,571	.34	115		54,493	.44

Table 21. Goodnews Bay, District 5, commercial salmon harvest and fishing effort by period, 1991.

PERIOD	DATE	HOURS	PERMITS	CHINOOK		SOCKEYE		COHO		PINK		CHUM	
				NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE	NUMBER	CPUE
01	06/20-06/20	12	25	139	.46	523	1.74					137	.46
02	06/27-06/27	12	34	173	.42	3,040	7.45					758	1.86
03	07/01-07/01	12	34	77	.19	3,376	8.27					850	2.08
04	07/06-07/06	12	38	100	.22	6,093	13.36					1,162	2.55
05	07/08-07/08	12	38	93	.20	5,916	12.97					1,837	4.03
06	07/11-07/11	12	43	53	.10	3,898	7.55					1,971	3.82
07	07/13-07/14	24	50	73	.06	5,080	4.23					2,288	1.91
08	07/15-07/16	24	0	NO BUYER - NO COMMERCIAL FISHING									
09	07/17-07/18	24	40	65	.07	2,978	3.10					2,019	2.10
10	07/19-07/20	24	32	33	.04	2,151	2.80					1,465	1.91
11	07/22-07/23	24	31	19	.03	2,056	2.76	1				1,177	1.58
12	07/24-07/25	24	27	20	.03	1,502	2.32	5	.01	2		874	1.35
13	07/26-07/27	24	26	10	.02	963	1.54	9	.01	6	.01	608	.97
14	07/29-07/30	24	23	15	.03	605	1.10	35	.06	8	.01	223	.40
15	07/31-08/01	24	12	7	.02	344	1.19	24	.08	1		121	.42
16	08/02-08/02	12	10	6	.05	204	1.70	96	.80			110	.92
17	08/05-08/05	12	18	6	.03	308	1.43	207	.96	4	.02	165	.76
18	08/09-08/09	12	24	7	.02	209	.73	516	1.79	1		63	.22
19	08/14-08/14	12	26	4	.01	164	.53	1,641	5.26	2	.01	42	.13
20	08/16-08/16	12	28	3	.01	109	.32	2,226	6.63	3	.01	16	.05
21	08/19-08/19	12	33	4	.01	117	.30	1,938	4.89	2	.01	5	.01
22	08/21-08/21	12	36	2		96	.22	2,688	6.22			1	
23	08/26-08/26	12	1					15	1.25				
24	08/28-08/28	12	40			42	.09	1,784	3.72				
25	08/31-08/31	12	33			51	.13	1,551	3.92				
26	09/02-09/02	12	18			13	.06	576	2.67				
27	09/05-09/05	12	0	NO BUYER - NO COMMERCIAL FISHING									
	TOTALS	432	72	912	.03	39,838	1.40	13,312	.47	29		15,892	.56

Table 22. Preliminary projections of the 1992 Kuskokwim Area commercial salmon harvests in thousands of fish by species.

Species	Management Region			Total Kuskokwim Area[a]
	Kuskokwim River	Quinhagak	Goodnews Bay	
Chinook	19 - 56	14 - 46	3 - 14	36 - 116
Sockeye	33 - 137	6 - 84	7 - 40	46 - 261
Coho	196 - 660	27 - 135	8 - 71	231 - 866
Pink	1 - 11[b]	8 - 21[b]	1 - 5	10 - 37
Chum	199 - 1,382	9 - 53	5 - 33	213 - 1,468
Total	448 - 2,246	64 - 339	24 - 163	536 - 2,748

a Except as noted all the projections are based on the previous (1981-90) average catches in all districts.

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

FIGURES

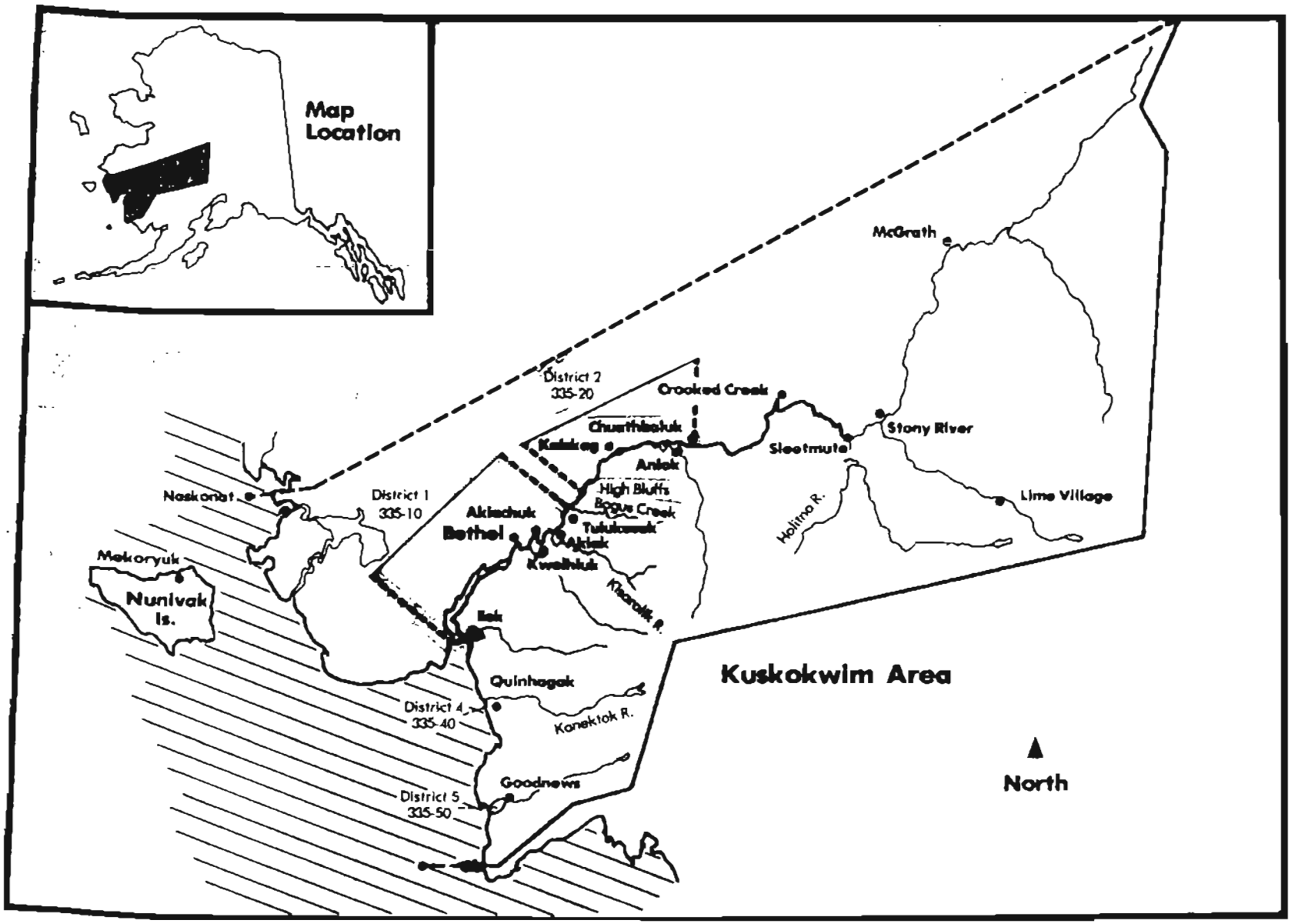
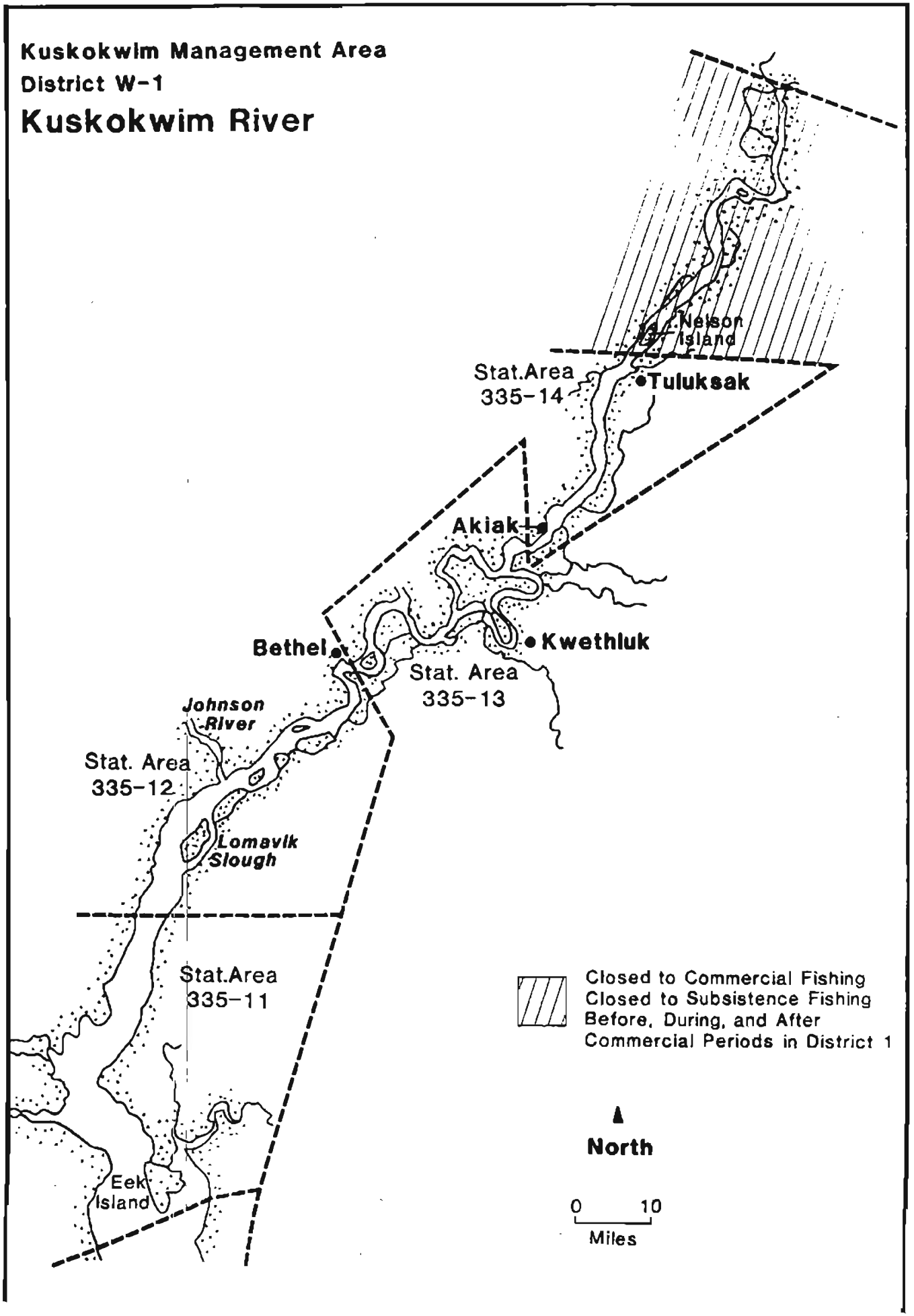


Figure 1. Kuskokwim Area Map.


Kuskokwim Management Area
District W-1
Kuskokwim River
Nelson Island
Stat.Area 335-14
Tuluksak
Akiak
Bethel
Kwethluk
Stat. Area 335-13
Johnson River
Stat. Area 335-12
Lomavik Slough
Stat.Area 335-11
Eek Island
Closed to Commercial Fishing
Closed to Subsistence Fishing
Before, During, and After
Commercial Periods in District 1
North
0 10
Miles

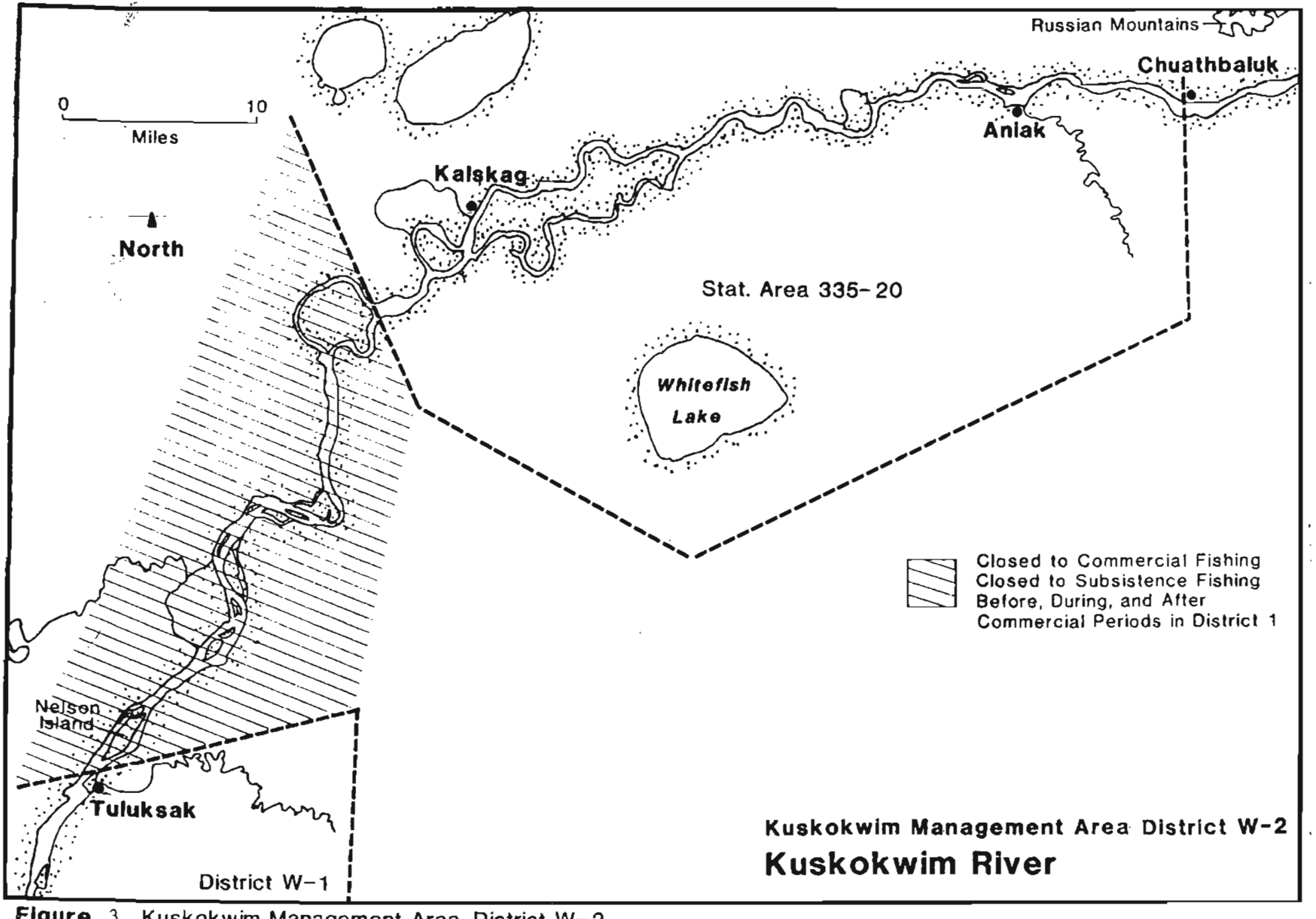
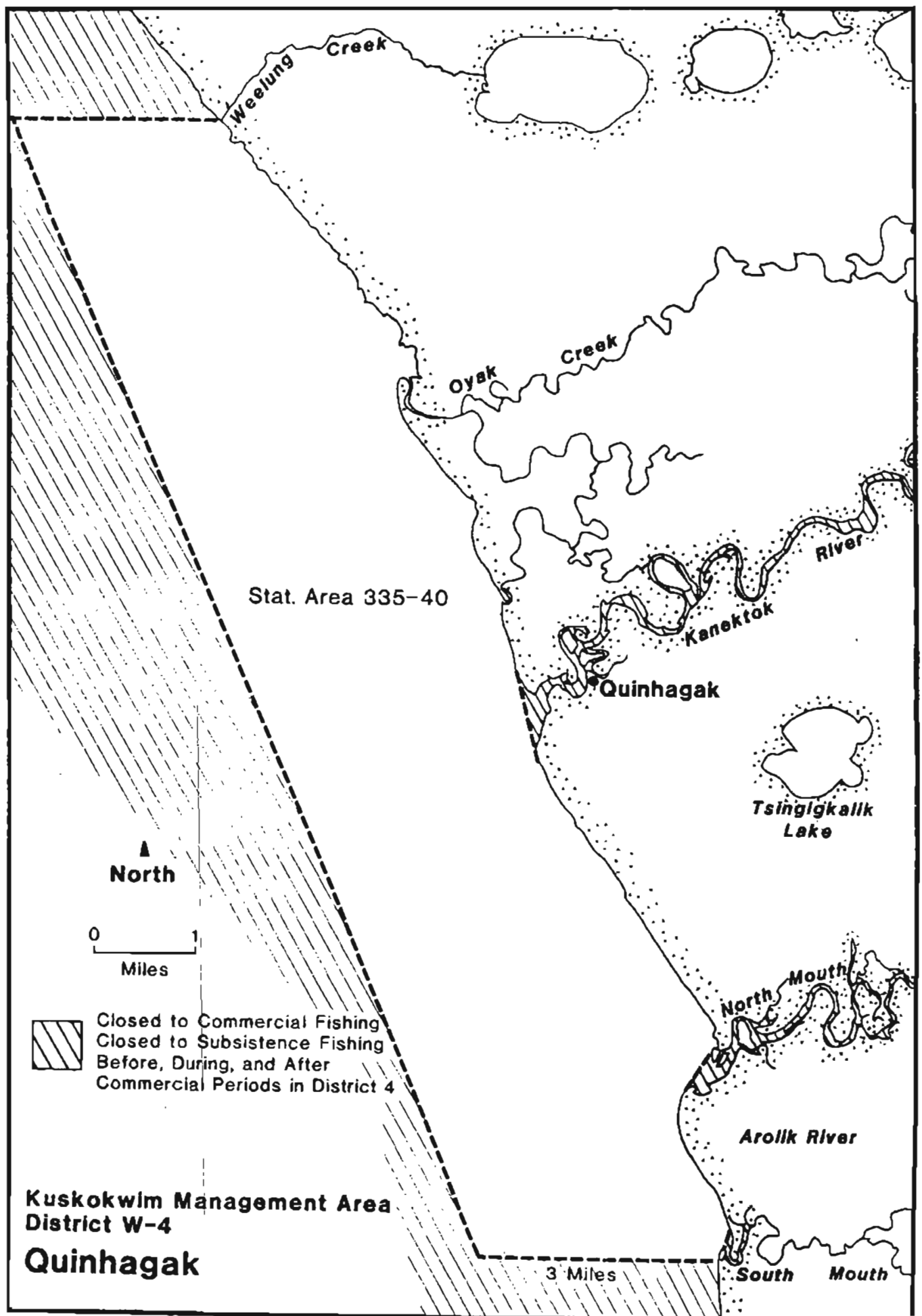


Figure 3. Kuskokwim Management Area, District W-2


Weelung Creek
Oyak Creek
Stat. Area 335-40
Kanektok River
Quinhagak
Tsingigkallk Lake
North
0
1
Miles
Closed to Commercial Fishing
Closed to Subsistence Fishing
Before, During, and After
Commercial Periods in District 4
North Mouth
Arolik River
Kuskokwim Management Area
District W-4
Quinhagak
3 Miles
South Mouth

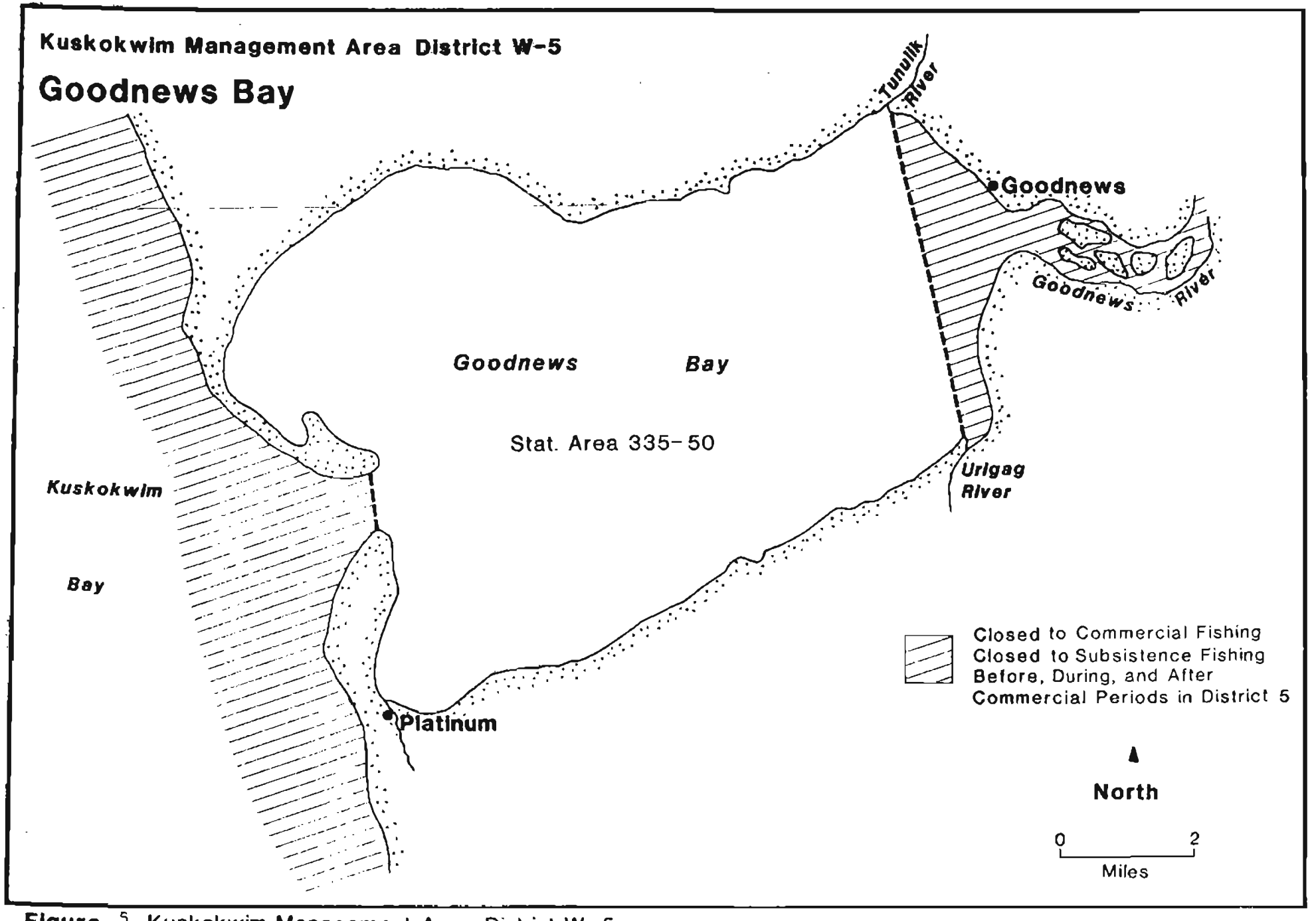


Figure 5. Kuskokwim Management Area, District W-5

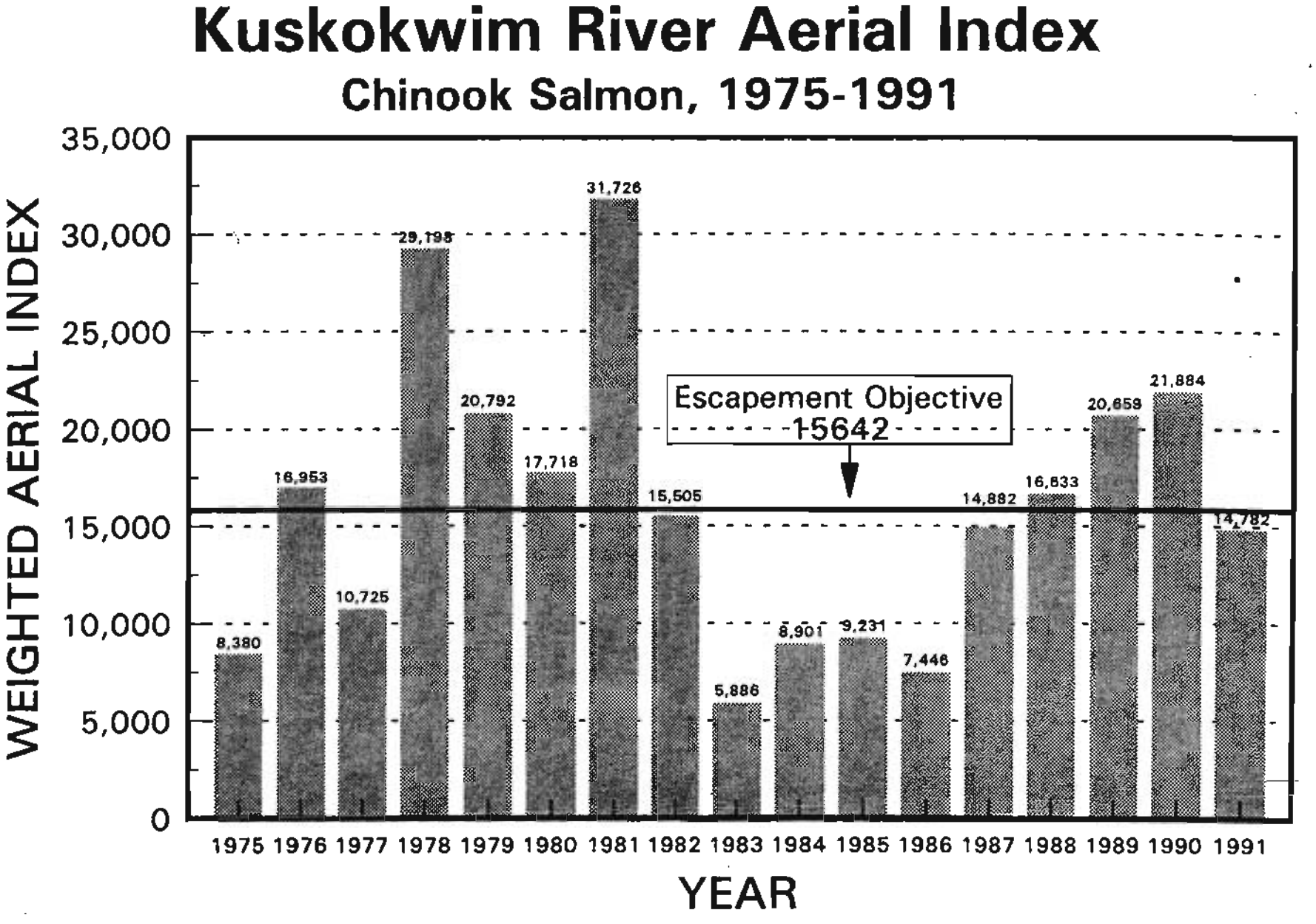


Figure 6. Kuskokwim River aerial chinook salmon escapement index.

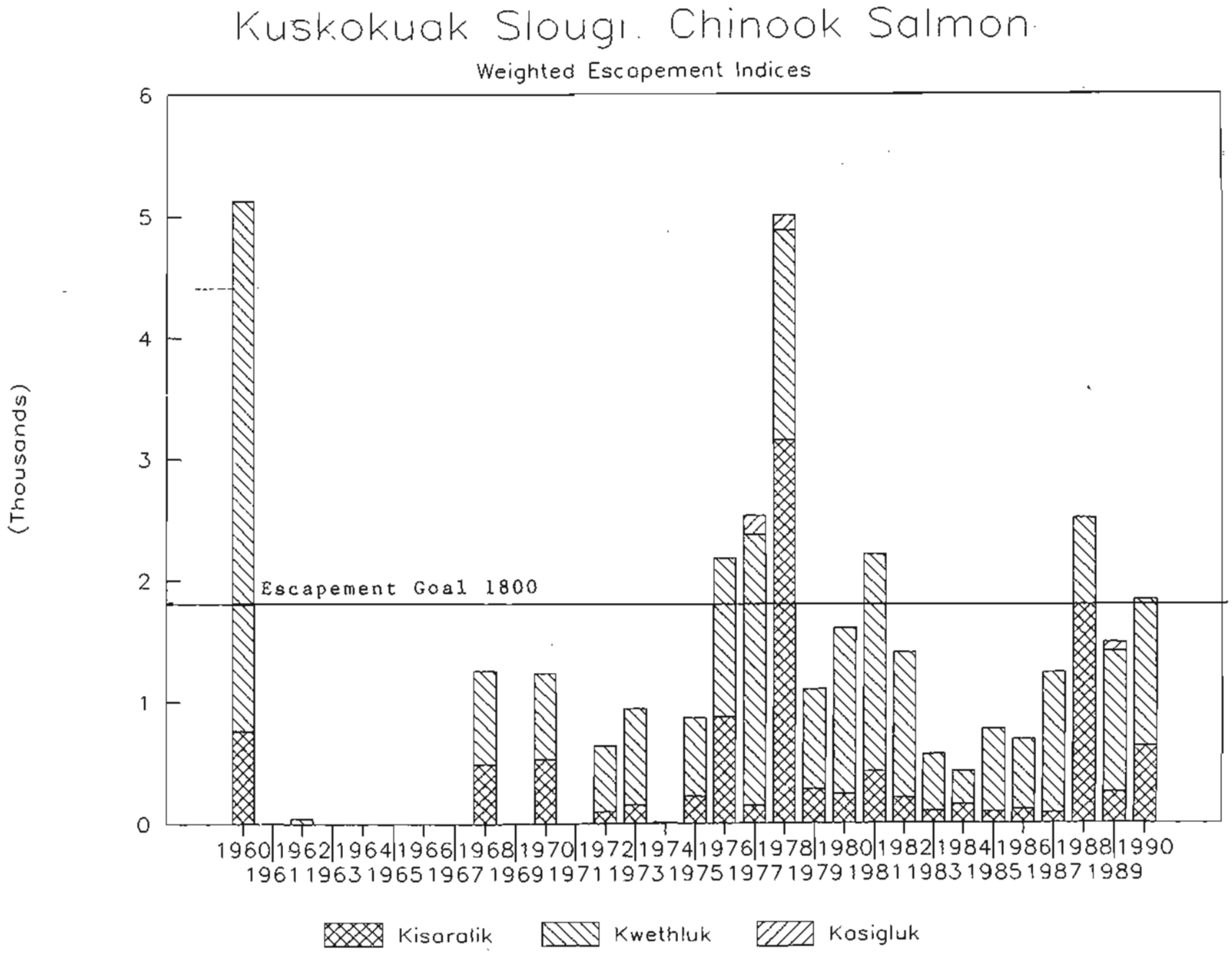


Figure 7. Kuskokuak Slough Chinook Salmon escapement indicies.

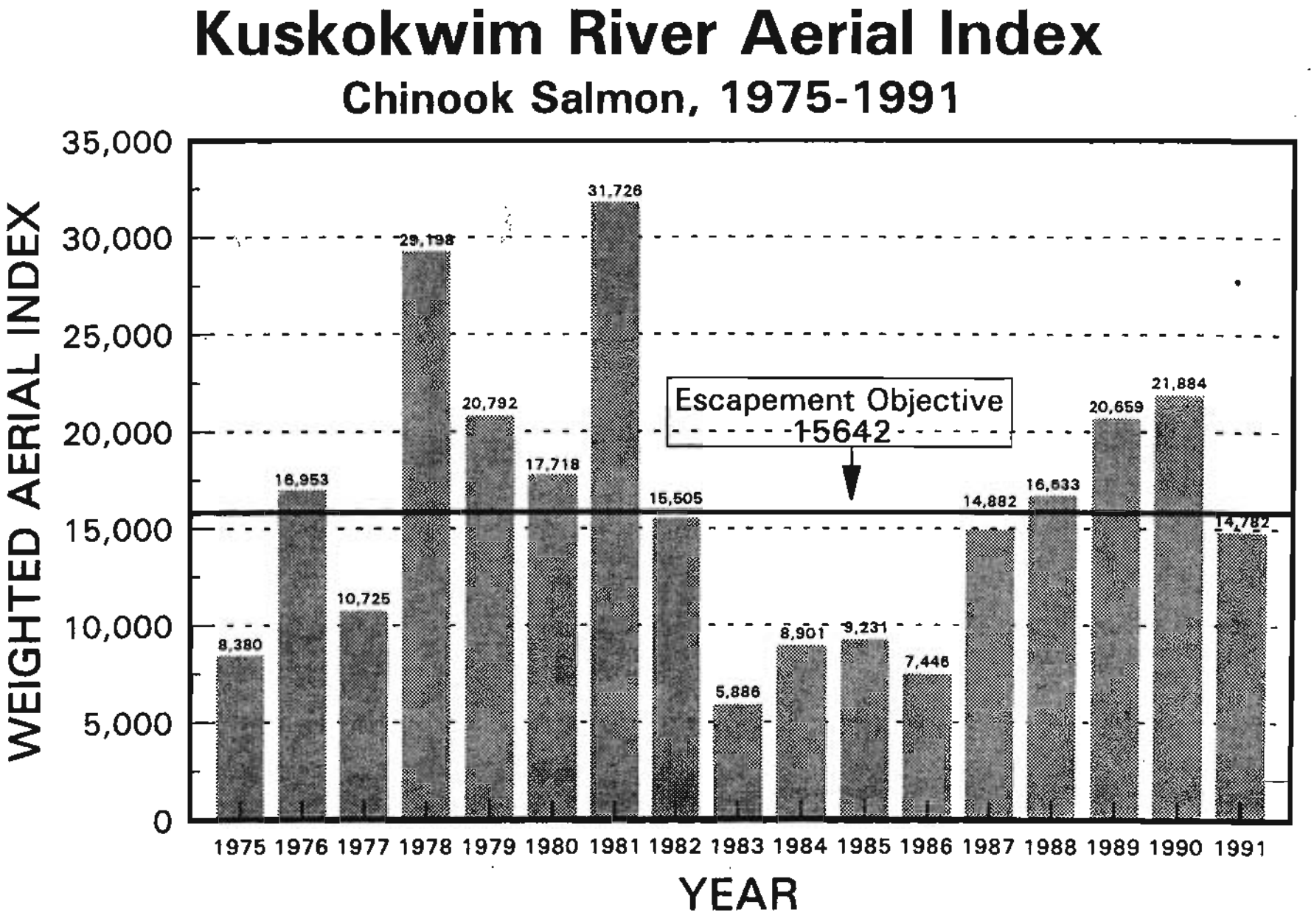


Figure 6. Kuskokwim River aerial chinook salmon escapement index.

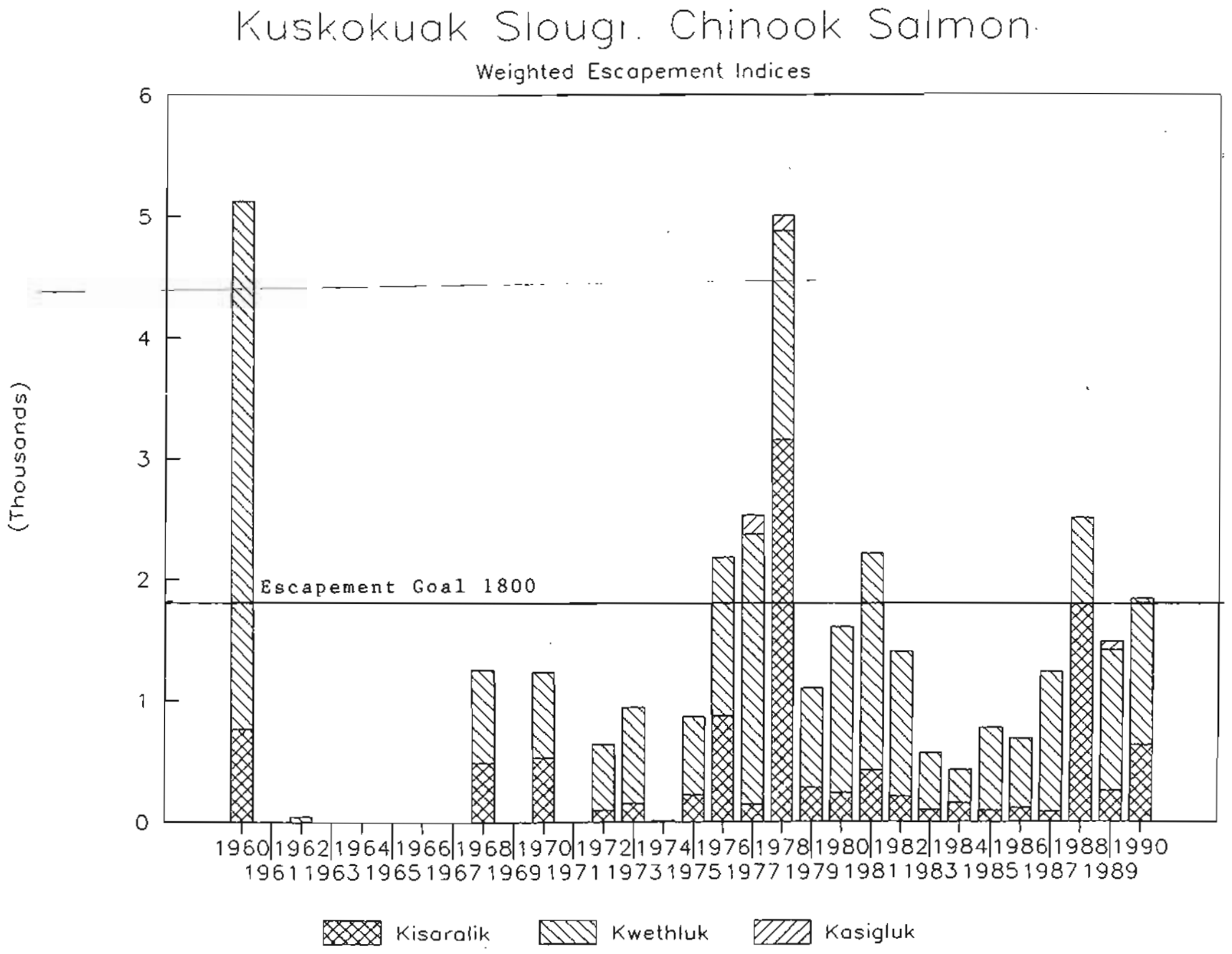


Figure 7. Kuskokuak Slough Chinook Salmon escapement indicies.

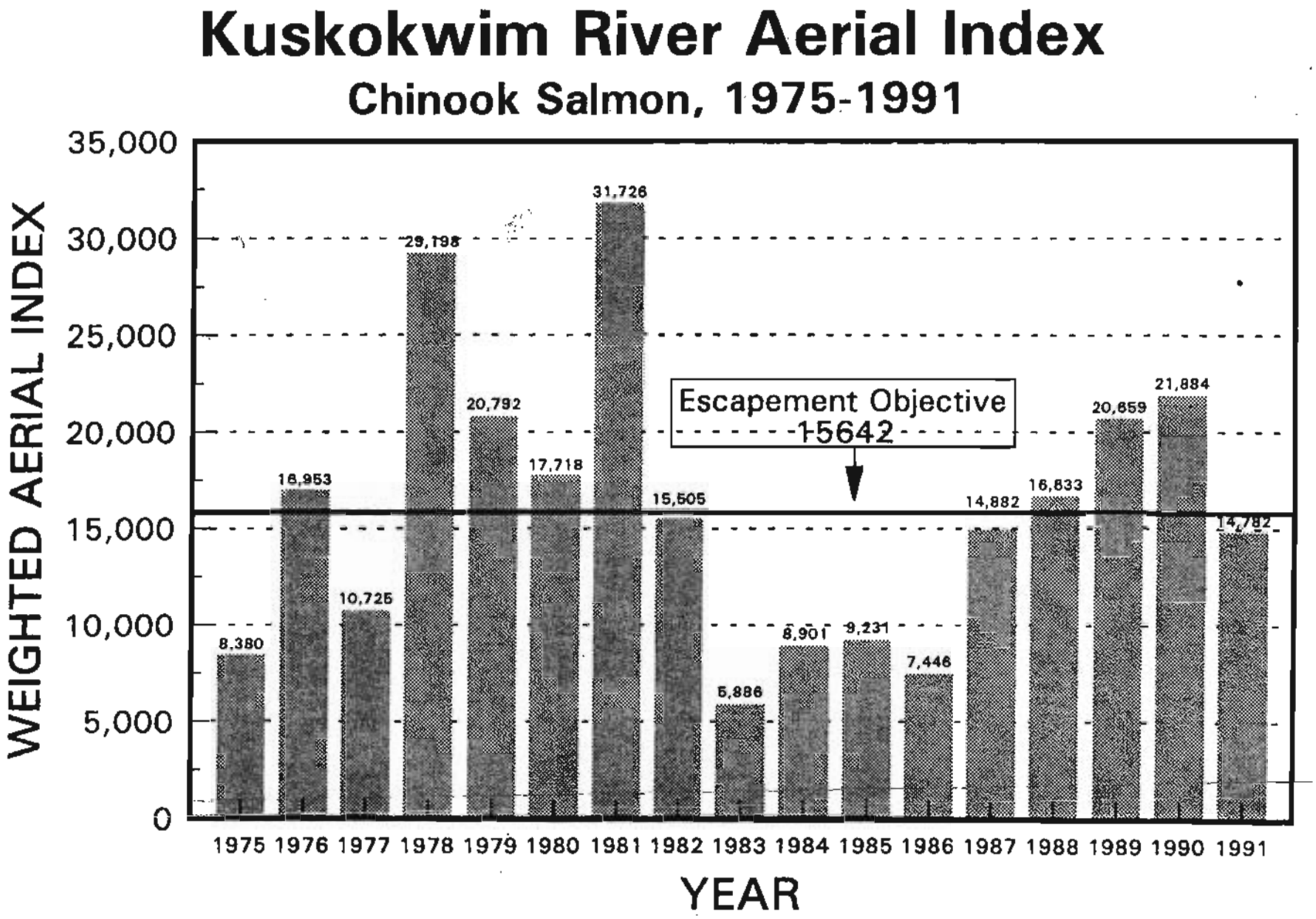


Figure 6. Kuskokwim River aerial chinook salmon escapement index.

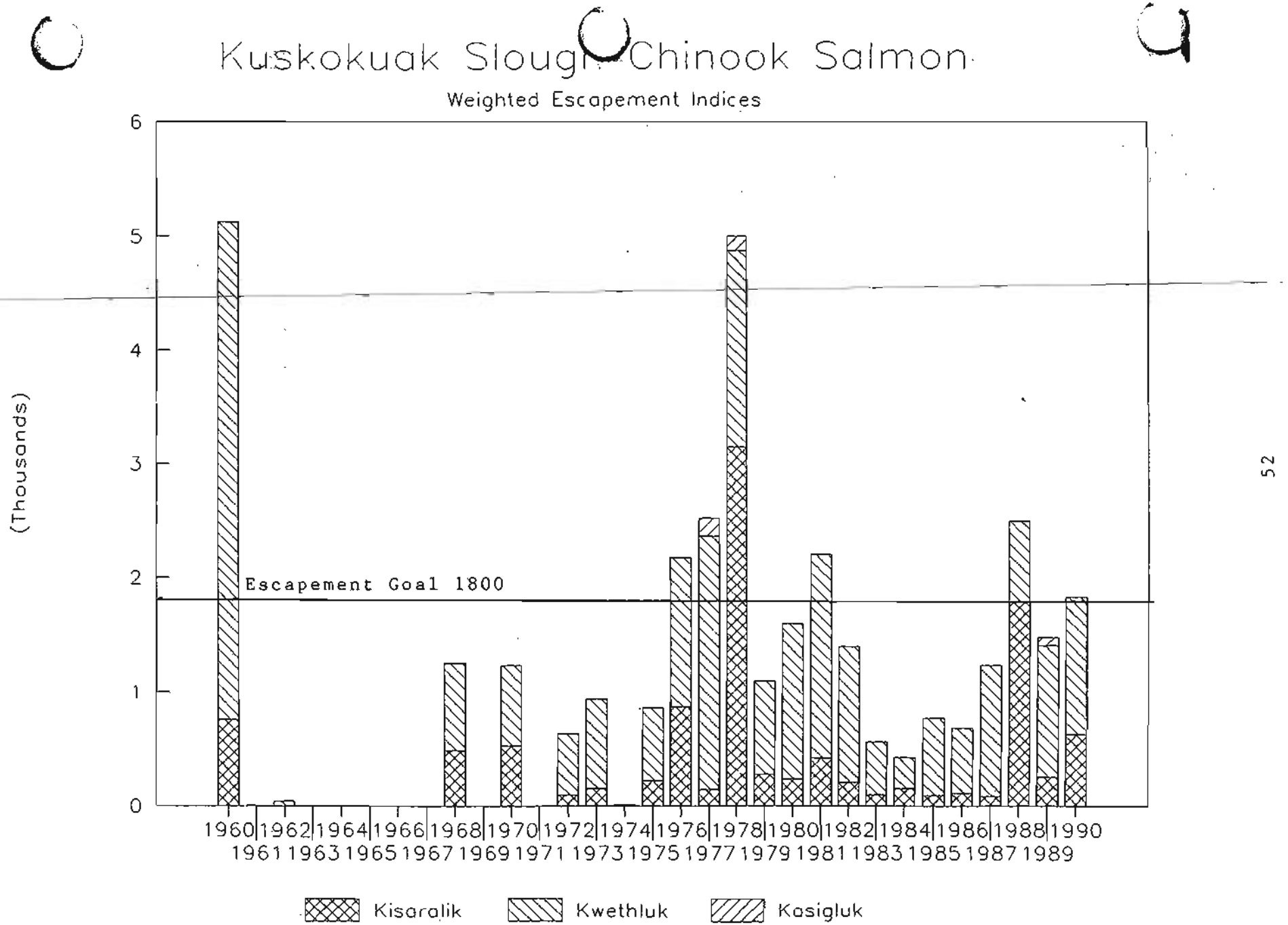


Figure 7. Kuskokuak Slough Chinook Salmon escapement indicies.