YUKON RIVER SALMON SEASON REVIEW FOR 1994 AND TECHNICAL COMMITTEE REPORT

Prepared by

THE UNITED STATES/CANADA
YUKON RIVER JOINT TECHNICAL COMMITTEE

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1.0 INTRODUCTION

The U.S./Canada Yukon River Joint Technical Committee (JTC) typically meets in the fall to exchange and review information on the current year fishing season, status of the stocks, and briefly summarize some of the project activities. However, there were very tight time constraints this year subsequent to a 3 November 1994 government meeting and prior to a 5-9 December 1994 negotiation session on a Yukon River interim agreement. The chief negotiators for the U.S. and Canada directed the JTC to compile this written report for distribution to the delegations at the December 1994 negotiations. In making this assignment, however, the need for a JTC meeting was waived so as to expedite completion of this report and preparations for the negotiation session in December 1994 in the short time frame provided.

This report is organized into six sections and one attachment. The various sections summarize the 1994 fishing season in the Yukon River drainage, the status of the spawning stocks, and selected project activities. Attachment I provides an update of historical Yukon River salmon catch and escapement data in graphic and tabular form. Note that the Alaska commercial catch information in Attachment I is in numbers of salmon, with roe sales converted to the number of salmon estimated to have been caught to produce the reported roe sales.

2.0 1994 COMMERCIAL FISHERY - ALASKA

Preliminary estimates of commercial sales total 196,707 salmon and 111,533 pounds of unprocessed salmon roe for the Alaskan portion of the Yukon River drainage (Figure 1) in 1994. Note that this review of the 1994 commercial fishing season in the Alaska portion of the Yukon River drainage is in terms of numbers of salmon sold in the round and pounds of salmon roe sold. Total sales were composed of 113,125 chinook, 79,831 summer chum, 3,631 fall chum, and 120 coho salmon sold in the round (Table 1). Roe sales by species totalled 1,945 pounds for chinook, 100,724 pounds for summer chum, 3,276 pounds for fall chum, and 5,588 pounds for coho salmon. Commercial fisheries for fall chum and coho salmon were only opened in the upper portion of the mainstem Yukon River (upper portion of Subdistrict 5-D) and the upper portion of the Tanana River (upper portion of Subdistrict 6-B and Subdistrict 6-C) in 1994.

With regards to fish sold in the round, the chinook salmon catch was 9% above the 1989-93 average, the summer chum salmon catch was only one-fifth of the average, and the fall chum and coho salmon catches were only small fractions of the average (Table 2). Roe sales were three-quarters of the 1989-93 average for summer chum salmon and one-third of the average for fall chum salmon. Roe sales data were not available for chinook and coho salmon prior to 1990.

Yukon River fishermen in Alaska received an estimated $4.8 million for their catch in 1994, approximately one-half of the recent 5-year average of $8.6 million. Five buyer-processors operated in the Lower Yukon Area, and 8 buyer-processors and 10 catcher-sellers operated in the Upper Yukon Area of Alaska.

Lower Yukon fishermen received an average landed price per pound of $2.07 for chinook salmon and $0.21 for summer chum salmon. Upper Yukon commercial fishermen received an estimated per-pound average price of $0.71 for chinook salmon, $3.04 for chinook salmon roe, $0.18 for summer chum salmon, $3.69 for summer chum salmon roe, $0.14 for fall chum salmon, $1.50 for fall chum salmon roe, $0.43 for coho salmon, and $1.50 for coho salmon roe.

2.1 Chinook and Summer Chum Salmon

The 1994 preseason outlook was for an average chinook salmon run based on parent year escapements. The summer chum salmon outlook was for a below average to critically low run. The commercial harvest for the Alaskan portion of the drainage was anticipated to be between 88,000 and 99,000 chinook salmon with a minimal harvest of summer chum salmon.

The Lower Yukon Area was generally free of ice by 22 May. The first chinook salmon catches were reported on 24 May near Sheldon's Point by a subsistence fisherman. ADF&G test fishing projects recorded the first chum and chinook salmon catches on 28 and 29 May, respectively. Chinook salmon migratory timing was average and similar to run timing in 1989. Summer chum salmon migratory timing appeared to be near average. Chinook and summer chum salmon entered the river primarily through the south and middle mouths.

Comparative lower river test fishing cumulative CPUE from 8.5 inch mesh size set gillnet sites indicated above average abundance of chinook salmon in 1994, similar to the large returns in 1980, 1981 and 1987. Approximately 50% of the 1994 chinook salmon run had entered the lower river by 19 June. Chinook salmon test fish catches in 5.5 inch mesh size set gillnets were about average.

Comparative test net indices suggested the 1994 summer chum salmon run was above average in abundance. Approximately 50% of the summer chum salmon return had entered the lower river by 26 June according to test fishing CPUE data.

Because of the projection of a below average to critically low summer chum salmon run in 1994, ADF&G managed the Yukon River summer chum salmon run very conservatively to reduce the mortality of summer chum salmon. The first management priority was to achieve spawning escapement goals. To the extent that escapement goals would be achieved and there was a harvestable surplus identified, the subsistence fishery had priority. The management

plan prescribed that no directed commercial fishing for summer chum salmon would be allowed until it could be determined that a harvestable surplus above escapement and subsistence needs existed. Directed chinook salmon commercial fishing periods were regulated to reduce summer chum salmon mortality by adjusting the timing, length and frequency of fishing periods and by requiring fishermen to use gillnet mesh size of 8 inch or larger. Preseason, fishermen were informed that the commercial harvest of chinook salmon might be lower than anticipated due to management actions that might be necessary to conserve summer chum salmon.

The management plan identified the need for a total run size of 1.1 million summer chum salmon above Pilot Station to provide for escapement (900,000 fish) and subsistence catches (200,000 fish). A total run size of 1,250,000 summer chum salmon above Pilot Station would be necessary to provide for escapement (500,000 fish for the Anvik River and 500,000 fish for non-Anvik areas), subsistence catches (200,000 fish), and incidental harvests during the chinook salmon directed commercial fishery (50,000 fish) prior to allowing a directed commercial fishery for summer chum salmon.

The Pilot Station sonar project was used as the primary indicator of summer chum salmon run strength. Inseason, the total run projection at Pilot Station was based on the earliest run timing observed at the project (the 1986 season) and average run timing. It was anticipated that a reliable projection of total run passage by the sonar would be possible between 21 and 27 June (the average 25% and 50% point of the run). Post-season analysis showed that this was indeed the case. In an effort to be very conservative, through the month of June, the run projection based on the earliest run timing was used to assess the run. However, it became apparent that the projection based on average run timing was much more accurate.

Since 1993, the Pilot Station sonar project has utilized lower frequency sonar equipment which allowed the sonar range to be increased compared to previous years, and avoids the attenuation problems encountered with the former equipment. Total season passage estimates of 141,000 chinook and 1,997,000 summer chum salmon were obtained in 1994. The summer chum salmon passage estimate was the largest since the project became operational in 1986. However, passage estimates for 1994 may not be comparable to estimates obtained in years prior to 1993 because of the use of the new equipment.

The Anvik River sonar escapement estimate was compared to the Pilot Station sonar estimate inseason. This comparison was made to assess whether or not the distribution of spawners was appropriate such that the minimum escapement goal of 500,000 would be achieved in the Anvik River and that escapements to non-Anvik River tributaries would be adequate. On 30 June it was determined that escapements would likely be achieved river wide and that the

surplus greater than escapement and subsistence needs would be assessed on a daily basis.

The 1994 commercial chinook salmon fishing season was opened by emergency order after approximately eight days of increasing subsistence and test net catches. The chinook salmon directed fishery was opened on a staggered basis: 13 June in District 1, 15 June in District 2, and 22 June in District 3.

Initially, only gillnets of 8 inch or greater mesh size were allowed in the directed chinook salmon commercial fishery in order to reduce the mortality of chum salmon. It was anticipated that the combined incidental harvest of summer chum salmon in Districts 1 and 2 would be no more than 35,000 fish, if the summer chum salmon run was very poor as in 1993.

In addition, fishermen were requested to attempt to use their commercially caught summer chum salmon for subsistence purposes during the first two periods in District 1 and 2. This management strategy was used to reduce the overall harvest of summer chum salmon by substituting chum salmon caught while commercial fishing for fish that would have been caught during subsistence fishing. On 21 June it was determined that the summer chum salmon run was greater than 1.1 million fish and fishermen were notified that there was no need to retain chum salmon caught during commercial fishing.

Because of the relatively slow increase in test fishing cumulative CPUE through 10 June the first periods in Districts 1 and 2 were 6 hours in duration. The next two periods in both districts were 9 hours in duration. The harvest of 18,222 chinook salmon taken during the second period in District 2 on 21 June was the second largest period harvest on record. Fishing periods were less than the expected 12 hours in order to lower the incidental harvest of summer chum salmon and to spread out the chinook salmon harvest. Additionally, to further spread out the chinook salmon harvest, the second commercial period in District 2 and the third commercial period in District 1 were delayed from 19 to 21 June and from 20 to 22 June, respectively. Unrestricted mesh size gillnets were allowed during the fourth opening in each district as summer chum salmon abundance reached an acceptable level.

The last commercial fishing period occurred on 4 and 5 July in District 1 and was the only opening restricted to gillnets of 6 inch or less mesh size. A total of 15,369 summer chum salmon were harvested during this period. No additional commercial fishing periods were allowed after 6 July because of poor market conditions.

The total harvest of 103,933 chinook salmon for Districts 1 and 2 was 13% above the midpoint of the guideline harvest range of 90,000 fish and 10% above the 1989-1993 average harvest of 94,255 fish.

A total of 87,981 chinook salmon were harvested during 8 inch or greater mesh size fishing periods and 15,344 chinook salmon were harvested during the two unrestricted mesh size fishing periods in Districts 1 and 2. A total of 608 chinook salmon were harvested during the single period in District 1 restricted to 6 inch maximum mesh size gillnets. The average weight of chinook salmon harvested during 8 inch or greater mesh size fishing periods, unrestricted mesh size periods, and 6 inch maximum mesh size fishing periods was 20.1, 21.4 and 17.5 pounds, respectively.

The total commercial summer chum salmon harvest in District 1 and 2 was 55,201 fish, which was 86% below the recent 5-year average harvest of 384,748 fish. The harvest was 22% of the lower end of the guideline harvest range of 251,000 summer chum salmon for Districts 1 and 2. A total of 30,189 summer chum salmon were harvested during fishing periods restricted to 8 inch or greater mesh size and 9,643 summer chum salmon were harvested during the two unrestricted mesh size fishing periods in Districts 1 and 2 combined. The average weight of chum salmon harvested during 8 inch or greater mesh size fishing periods, unrestricted mesh size periods, and 6 inch maximum mesh size fishing periods was 6.7 pounds, 6.5 and 6.2 pounds, respectively.

In District 3, two 12-hour fishing periods with gillnets restricted to 8 inch or greater mesh size were allowed. The initial delay in opening District 3 allowed the first segment of the chinook salmon run to pass through the district and allowed a majority of the subsistence harvest to be taken prior to the commercial fishery. A total of 1,114 chinook salmon were harvested, which was 38% below the lower end of the guideline harvest range and 42% below the recent five-year average. A total of 35 summer chum salmon were sold, which was well below the recent five-year average of 3,532 fish. Because of the relatively poor quality of chum salmon in this district, chum salmon caught during commercial fishing are generally used for subsistence purposes.

All chinook salmon sales in District 4 occurred in Subdistricts 4-B and 4-C. The commercial fishing season opened on 22 June in these subdistricts. The first four fishing periods in Subdistricts 4-B and 4-C were primarily directed toward chinook salmon. District 4 fishermen sold 2,204 chinook salmon and 124 pounds of chinook salmon roe, which was below the midpoint of the District 4 guideline harvest range. The last two fishing periods in Subdistricts 4-B and 4-C were directed at summer chum salmon. A total of 3,471 summer chum salmon and 7,780 pounds of roe were sold, which, taken together, was just above the low end of the guideline harvest range.

Four summer chum salmon directed fishing periods were allowed in Subdistrict 4-A; three 24-hour periods and one 18-hour period. These fishing periods were delayed until early-July when it was determined that a surplus of summer chum salmon was available for

commercial harvest. Subdistrict 4-A fishermen sold 65,496 pounds of summer chum salmon roe. No fish were purchased in the round in Subdistrict 4-A. The postseason estimate is that 136,345 male and female summer chum salmon were harvested to produce the roe sold in Subdistrict 4-A. The total estimated harvest was just above the lower end of the guideline harvest range.

In March 1994, the Alaska Board of Fisheries adopted the Anvik River Chum Salmon Fishery Management Plan, which established regulations allowing for a commercial summer chum salmon fishery within the Anvik River. During June, an experimental fishery was conducted in cooperation with the Bering Sea Fishermen's Association (BSFA) to collect information on gear types, potential areas to be opened for commercial fishing, and incidental harvest of other species. Because of the projected poor summer chum salmon run, ADF&G did not anticipate allowing a commercial fishery in the Anvik River in 1994. Accordingly, buyers and commercial fishermen were not prepared for a commercial fishery.

In early July it was projected that the Anvik River summer chum salmon escapement would be close to one million fish, well above the minimum escapement goal of 500,000 fish. To provide for an orderly commercial fishery, emergency regulations were adopted on short notice, based upon input from local fishermen and fishery managers. The emergency regulations allowed the sale of summer chum salmon roe, included the option of permit holders using a single gillnet not to exceed 25 fathoms in length and not larger than 5-1/4 inch mesh, and a catch limit of no more than 400 chum salmon or 400 pounds of chum salmon roe for each permit holder during each commercial fishing period. Local fishermen suggested the catch limit as a method of controlling the harvest to prevent wastage. As processors did not have any equipment or facilities to process fish in-the-round, the sale of summer chum salmon roe was allowed in 1994.

The experimental fishery conducted prior to the commercial fishery indicated that beach seines were an efficient gear type, which would allow male chum salmon and chinook salmon to be released. A majority of fishermen that participated in the fishery purchased beach seines on short notice. The lower 12 miles of the Anvik River were opened to commercial fishing for a total of six fishing periods. A total of 19,532 pounds of roe were sold from an estimated harvest of 22,434 female summer chum salmon. Incidental catches of chinook salmon appeared to be minimal. Overall, this fishery proved to be successful through the cooperative effort of fishermen and ADF&G.

In District 5, chinook salmon is the primary species of commercial value during the early season. Summer chum salmon do not contribute significantly to the commercial harvest because of the timing of the fishery, distribution of the stocks, and poor flesh quality. The commercial fishing season was opened in Subdistricts

5-A, 5-B, and 5-C on 6 July when it was estimated that the chinook salmon run was well distributed throughout the subdistricts. There was one 24-hour and one 12-hour period. The total estimated harvest was 3,289 chinook salmon for Subdistricts 5-A, 5-B, and 5-C. This harvest was above the upper end of the guideline harvest range of 2,600 to 2,800 fish. A total of 96 summer chum salmon and 88 pounds of roe were sold. There were two fishing periods allowed in Subdistrict 5-D on 12 and 18 July. A total of 450 chinook salmon were sold in Subdistrict 5-D.

District 6 had one 42-hour period directed toward the harvest of chinook salmon, which began on 11 July. The next commercial fishing period was delayed until 22 July when preliminary escapement information indicated that chinook salmon spawning escapement goals in the Chena and Salcha Rivers would be achieved and summer chum salmon run abundance indicated there was a surplus available for commercial harvest. Commercial fishing was allowed during one 42-hour period per week from 22 July through 10 August in order to balance the harvest of summer chum salmon with achieving adequate spawning escapements. Because of an above average chinook salmon return to the Tanana River, as documented by tower counts on the Chena and Salcha Rivers, the guideline harvest range was exceeded in District 6. Commercial sales totalled 2,135 chinook salmon and 1,821 pounds of chinook salmon roe. A total of 21,028 summer chum salmon and 7,828 pounds of roe were sold, which was within the guideline harvest range of 13,000 to 38,000 summer chum salmon.

2.2 Fall Chum and Coho Salmon

The Yukon River Drainage Fall Chum Salmon Management Plan was adopted in March of 1994 by the Alaska Board of Fisheries. The plan identified the need for 400,000 fall chum salmon for spawning escapement and approximately 200,000 fall chum salmon to provide for Alaskan subsistence and Canadian harvests. The preseason projection of 605,000 fall chum salmon suggested that the run would be sufficient to allow for escapement and rebuilding needs throughout the drainage and still provide for normal subsistence salmon harvest levels. A commercial harvest in the Alaskan portion of the Yukon River drainage was not anticipated for 1994.

The preseason projection was primarily used for management during the early portion of the fall chum salmon run. On average 25 percent of the run passes the Pilot Station sonar site by 1 August. From 1 August until 20 August inseason projections of the final season Pilot Station sonar estimate, based on counts to date and historical timing, were used for fall chum salmon management decisions. Consistent with the guidelines laid out in the Yukon River Drainage Fall Chum Salmon Management Plan, when the inseason projection of final sonar estimate fell below 600,000 fall chum salmon, sport and personal use fisheries closures and subsistence

salmon fishing restrictions were implemented.

Based primarily on the Pilot Station sonar run assessment, the directed fall chum salmon subsistence fishing schedule in Districts 1, 2, 3, Subdistrict 4-A, and the Coastal District was reduced to five days a week on 6 August, not including the tributaries below the Koyukuk River. Sport fishing for Yukon River chum salmon below the Koyukuk River was also closed on 6 August. The directed fall chum salmon subsistence fishing schedule was then reduced to 48-hours per week in Districts 1 through 4, and Subdistricts 5-B and 5-C, on 13 August; except for the Yukon River tributaries below the Koyukuk River. Sport fishing for chum salmon was also closed for the remaining portion of the Yukon River drainage, including the Tanana River drainage, on 13 August. The directed fall chum salmon subsistence fishery was further restricted on 18 August. Districts 1 through 4 were closed and Districts 5 and 6 were reduced to 24-hours per week; Districts 4, 5, and 6 were allowed to fish with liveboxes or livechutes for an additional 24-hours per week. The District 6 personal use fishery was also closed on 18 August.

The Pilot Station sonar assessment of the fall chum salmon run was significantly different from subsistence fishermen catch rate reports in 1994. A diagnostic trip was made to the Pilot Station sonar site by AYK regional and Sonar Technical Services personnel of ADF&G on 20 to 23 August to conduct further evaluations before further fishery management actions were to be taken. During this evaluation a deficient aim was discovered. At the time of this discovery the new aim was detecting 2.3 times more fish than the previous aim.

Comparing the relationship between the sonar passage estimate and the lower river test fishing catch rates suggested that the sonar project may have under estimated the run size since 9 August by approximately 70,000 fall chum salmon. From 21 August until 4 September ADF&G used this adjusted sonar count in the management of the fisheries. The adjusted sonar count indicated that continued subsistence restrictions were still needed in order to meet escapement objectives. However, with the adjusted sonar passage projection, the restrictions in District 4 were relaxed by reopening it for one 24-hour period per week on 29 August.

By early September, as preliminary spawning escapement information became available, it became obvious that the sonar project under estimated the run by significantly more than 70,000 fish. On 4 September normal subsistence salmon fishing schedules were allowed, as well as reopening the personal use fishery. Sport fishing for salmon was reopened on 6 September. Some subsistence fishermen expressed concerns over not being able to meet their subsistence salmon needs due to the earlier restrictions. Most reports were from the Old Minto area in the Tanana River drainage and the Fort Yukon area in the upper Yukon River drainage. In response to these reports, the normal subsistence schedule of five days a week in the

Old Minto area was increased to seven days a week on 16 September. As additional information from the spawning grounds and estimates of Canadian border passage became available, it became evident that there was a commercially harvestable surplus of fall chum salmon available from the 1994 run. Because of the concerns in the Old Minto area and in the Fort Yukon area, the limited commercial fisheries were only allowed upstream of those areas.

Commercial fishing was allowed above Fort Yukon in the upper portion of Subdistrict 5-D. Three 48-hour commercial fishing periods were allowed on 19 September, 22 September, and 26 September. A total of 3,630 fall chum salmon were sold, which approached the upper end of the Subdistrict 5-D guideline harvest range of 1,000 to 4,000 fall chum salmon. In the upper Tanana River, escapement information is not available until post-season foot surveys on the spawning grounds are completed in late October to mid-November. A limited commercial fishery was allowed above the Old Minto area in Subdistrict 6-B and Subdistrict 6-C, based on the overall run strength of the Yukon River drainage. During a 24-hour commercial fishing period beginning on 19 September, a total of one fall chum salmon and 3,276 pounds of fall chum salmon roe were sold. The estimated harvest of fall chum salmon to produce the roe sold totaled 8,500 males and females. This level of harvest exceeded the low end of the District 6 Guideline Harvest Range of 2,750 to 20,500 fall chum salmon. Without specific escapement information from the spawning grounds in the upper Tanana River, management of the District 6 commercial fishery was very conservative and no more commercial periods were announced.

The test fishing project in the lower river was concluded on 18 August in 1994, which was earlier than normal. This action was taken to further reduce fall chum harvests given the poor inseason projection from Pilot Station sonar and to maintain consistency with subsistence closures. Through 18 August the cumulative test fishing CPUE for fall chum salmon was 30.40, which was above the mean cumulative CPUE of 19.80 through 18 August for the years 1980 to 1993. The cumulative CPUE for 1994 indicates a better than average run of fall chum salmon, although several factors complicate comparisons of cumulative CPUE between years. Wind direction, bank orientation of migrating salmon, water levels, and fish size are known to affect test fishing catches. Historical lower river test fishery indices are also affected by commercial removal below the test fishing sites.

Coho and fall chum salmon run timing overlaps considerably. Because of this overlap and the management plan in place for rebuilding fall chum salmon, the harvest of coho salmon is a function of management strategies directed towards fall chum salmon. Given the concern for conserving fall chum salmon and lack of information necessary to manage coho salmon separately, no commercial harvest of coho salmon was anticipated for the 1994 season.

As mentioned above, a limited commercial salmon fishery was opened in the upper portion of Subdistrict 6-B, above the Old Minto area, and in Subdistrict 6-C in the upper Tanana River drainage. During the one 24-hour commercial fishing period beginning on 19 September a total of 120 coho salmon and 5,588 pounds of coho salmon roe were sold.

Coho salmon test fishing data indicated the run was above average in magnitude. The run timing of coho salmon appeared to be near average. The cumulative test fishing CPUE of 24.75 in the lower river was the highest on record through 18 August, when the test fishery was terminated. The average season cumulative CPUE through 18 August from 1980 through 1993 is 7.46. It should be noted that the entire coho salmon return is not indexed, because the migration continues into September after the test fishery is terminated. The Yukon River sonar project at Pilot Station estimated a total passage of 191,115 coho salmon through 8 September. This is considered a minimum passage estimate for coho salmon.

3.0 1994 COMMERCIAL FISHERY - CANADA

The management plans for the Canadian chinook and chum salmon fisheries on the Yukon River in 1994 were formulated to generally reflect the understandings reached through the Yukon Salmon Treaty Negotiations (YSTN). Accordingly, the guideline harvest ranges, and the border and spawning escapement goals for upper Yukon chinook and chum salmon, tentatively agreed to in the YSTN, provided the foundation for the 1994 management plans.

A preliminary total of 42,065 salmon including 12,028 chinook salmon, 30,035 chum salmon and 2 coho salmon was harvested in the 1994 Canadian Yukon River commercial fishery (Table 3). The chinook catch was 9% above the recent chinook cycle average (1988-1993) catch of 11,077 chinook and the chum catch was 41% above the recent cycle average (1990-1993) of 21,320 chum.

A total of 30 commercial licenses was issued in 1994, the same number as in 1993. The maximum number of commercial fishers active during any one week of the chinook salmon season was 19 fishers. During the chum season, the highest number of fishers present in any one opening was 16 fishers. Most of the commercial chinook harvest was taken by gill nets set in eddies; only three fish wheels were in use during the chinook season. However, during the chum season, more than 25% of the catch was estimated to have been taken in the nine fish wheels that were in operation.

3.1 Chinook Salmon

With the preseason expectation of a total run size of about 131,900 Canadian-origin mainstem Yukon River chinook salmon, which was

approximately 4% above average, the elements of the chinook management plan adopted for 1994 included:

i) a minimum escapement goal of 18,000 chinook as per the stabilization plan developed within the YSTN;

ii) a total upper Yukon guideline harvest range for all users of 16,800 to 19,800 chinook salmon which was the range tentatively agreed to in the YSTN;

iii) a commercial guideline harvest range of 9,100 to 12,100 chinook with a preseason target of 10,600 chinook. Based on the preseason forecast for a slightly above average return, it was expected the catch would fall towards the mid-point of the range; and

iv) a one day per week fishery for the initial two weeks of the season, followed by a three day opening subject to run assessments. The duration of subsequent fishing periods was to be determined inseason based on run strength and harvest guidelines.

This fishing plan was similar to the plan developed for 1993.

The commercial fishery opened on Monday, 4 July 1994 (statistical week 27) for 48 hours, one week later than scheduled. According to the fishing plan, the fishery was to have opened the Monday following the capture of the first fish in the DFO fishwheels. However, a delay in notification of the date the first fish was captured, 24 June, resulted in the opening on 27 June being postponed for a week; compensatory time was added (24 hours) to the second week of the season. The date of chinook arrival at the fishwheels was one day later than in 1993 when the first fish appeared on 23 June, the earliest date on record.

The catch in the 4 July opening of the commercial fishery was below average consisting of 141 chinook for 13 fishers.

Consistent with the management plan, fishing time was extended to three days exactly two weeks after the run had begun. The official beginning date of the run was determined to be 29 June through the examination of the trend in the three-day moving average of the catch of chinook salmon in the DFO fish wheels early in the season. The commercial catch during the 13-16 July opening, statistical week 29, was slightly above average although the catch-per-unit-effort (CPUE) was approximately 28% below the recent cycle average. The cumulative catch through week 29 was 1,913 chinook, 923 fish below the guideline to that point in the season. Cumulative weekly commercial guideline harvests were established during the fishing season based on historical run timing and the 1994 commercial harvest objective for the season.

The first inseason border escapement forecast, approximately 43,000 chinook, was made at the end of week 29 based on current year CPUE applied to linear regression analyses of historical weekly cumulative CPUE and corresponding annual border escapement estimates.

Commencing week 30, a staggered opening was implemented to better distribute the catch throughout the commercial fishing area. The topic of staggered openings had been raised by some commercial fishers at the pre-season management meeting. It was agreed that the issue would be examined by DFO and possibly activated on an experimental basis in 1994. A new fishing boundary was established just upstream from the confluence of the Forty Mile and Yukon rivers; the upstream area opened 24 hours before the lower area in each staggered opening.

Above average CPUE after the first two days of fishing in week 30 (week commencing 20 July) and a shortfall in the cumulative catch compared to the weekly guideline harvest prompted a twenty-four hour extension over the scheduled three day openings in each fishing area. The peak commercial catch and CPUE (22% above average) of the season occurred this opening, approximately ten days later than the peak combined catch of chinook observed on 13 July at the DFO fish wheels. The week ended with the cumulative catch being 424 chinook (8%) above the weekly guideline cumulative catch of 5,310 chinook.

Prior to the opening in week 31 (30 July) a border escapement forecast of approximately 42,000 was generated based on inseason mark-recapture data. As a result of the forecast being in excess of 37,800 chinook for the second consecutive week, which was the upper end of the U.S. border escapement management goal range, the season commercial catch target was increased to 12,100 chinook, i.e. the upper end of the overall Canadian commercial guideline harvest range. The target remained at this level throughout the remainder of the chinook season.

The CPUE ranged from slightly below average in week 31 to slightly above average in week 32. Fishing times for each of these weeks were initially scheduled for three days in each fishing area; however, twenty-four hour extensions were given to keep the catch in line with the guideline harvest. By the end of week 32 (3 August) the cumulative catch was within 1% of the weekly guideline harvest and the border escapement forecast had increased to approximately 49,000 chinook.

Over the next two weeks, fishing times were reduced to three days/area in week 33, then to two days/area in week 34 as chinook abundance declined and the chinook season came to an end. CPUE during these weeks remained above average and the cumulative catch was 88 chinook below the guideline of 11,744 chinook through week 34. The final inseason border escapement forecast was

approximately 51,000 chinook.

The total commercial chinook catch of 12,028 fish was 9% above average and was 0.6% below the inseason target of 12,100 chinook, i.e. the upper end of the guideline harvest range of 9,100 to 12,100 chinook. For comparison, the recent six-year average commercial catch was 11,077 chinook (1988 to 1993); the lowest catch in this period occurred in 1989 with a catch of 9,789 chinook, whereas, a record catch of 13,217 occurred in 1988. The preliminary postseason estimate of the border escapement indicated a Canadian commercial harvest rate of 26% on chinook salmon in 1994 which was similar to the recent cycle average harvest rate (1988-1993). Approximately 97% of the catch was harvested in the lower fishing area, i.e. downstream from the Sixty Mile River.

Comparisons of the commercial chinook CPUE with previous years indicated the run was about average in magnitude and slightly late in timing. The cumulative CPUE through week 34 was 204 chinook/boat/day compared to the recent cycle average of 203 chinook/boat/day. Fishing effort during the chinook season, i.e. through week 34, was 10% above average: 330 boat-days versus an average of 301 boat-days.

3.2 Fall Chum Salmon

The chum salmon run to the upper Yukon was expected to be below average in 1994 due to the below average spawning escapement of 51,750 chum in 1990 and the very poor escapement of 35,750 chum in 1989, one of the lowest escapements on record. As a result of the below average run outlook, the chum salmon management plan was developed to address both the conservation concern for the 1994 return, and the objectives of the three cycle rebuilding plan that had been tentatively agreed to in the YSTN. Accordingly, the plan included the following components:

i) an escapement goal of 65,900 upper Yukon chum salmon. This goal, developed by the Canada/U.S. Joint Technical Committee, represented the number of spawners required to rebuild the 1990 brood escapement of 51,750 chum to the long term goal of greater than 80,000 spawners in three cycles;

ii) a guideline harvest range for all Canadian upper Yukon fisheries of 23,600 to 32,600 chum as agreed to within the YSTN;

iii) a commercial guideline harvest range of 20,700 to 29,700 chum salmon with a preseason target of 20,700 chum; the lower end of the range was recommended in view of the below average expected return. However, given the expectation for a below average run size, it was emphasized that conservation actions could preclude the achievement of the preseason target, albeit

near the lower end of the guideline harvest range. It was expected the U.S. would manage to a border escapement of at least 89,500 chum salmon in spite of the U.S. border escapement management range of 84,600 to 112,600 chum that had been established in the YSTN. A border escapement of this magnitude would achieve the 1994 escapement goal and the lower end of the Canadian guideline harvest range; and

iv) reduced fishing time (1-2 days) for the initial weeks of the chum season, followed by potentially longer openings commencing early September depending on assessments of run strength and the guideline harvest ranges.

In early August, ADF&G was projecting a below average drainage-wide fall chum salmon return of approximately 550,000 fish based on Pilot Station sonar data. This resulted in postponement of the U.S. commercial fall chum salmon season and reductions in fishing time in the U.S. subsistence fishery. Canadian fishers were notified by DFO prior to the middle of August of the poor run outlook. At that time, fishers were put on notice that the commercial fishery would likely be required to be scaled back from the preseason target of 20,700 chum, to an allowable commercial harvest of approximately 7,200 chum salmon.

By 19 August the outlook in Alaska had deteriorated with the drainage-wide fall chum projection falling to about 400,000 fish. Chum salmon had not yet reached the Canadian section of the upper Yukon in any magnitude and as such, stock assessment indices in Canada were not yet available. It was suggested that if the Pilot Station data was representative of the upper Yukon chum return, a border escapement of approximately 58,000 fish (12% below the spawning escapement goal) could be expected. This estimate was based on a comparison of the 1993 Pilot Station sonar estimate (306,000 fish) and the upper Yukon border escapement estimate (45,000 fish) relative to the 1994 sonar data. As a result of this revised outlook, the commercial fishery in Canada was closed until further notice. Notice of closure in the domestic fishery was given a week later.

Weekly conference calls were scheduled with U.S. managers to exchange data and discuss revised run outlooks. By early September, it was becoming clear that upriver indicators were not corroborating the Pilot Station sonar data. For example, ADF&G had revised the Sheenjek escapement projection on 5 September indicating that the escapement goal for that system would likely be exceeded by more than 100%; U.S. test fisheries on the upper Yukon and in the Tanana River were beginning to indicate sustained run strength; and in Canada, DFO fishwheel catches had picked up substantially to near record levels. Furthermore, confidence in the sonar data had been seriously eroded after a diagnostic trip by ADF&G sonar experts to Pilot Station in late August discovered serious technical problems indicating the likelihood that the sonar

counts were erroneously low.

The Canadian commercial fishery remained closed from 20 August to 8 September. During this period, run assessment activities in Canada had been intensified with the continuation of the tagging program at the DFO fishwheels, and implementation of a live-capture program employing three commercial fishers to sample and recapture tagged fish using commercial fishwheels. On 5 September a border escapement forecast of approximately 84,000 chum salmon was generated based on preliminary tag recovery data from the live-capture program.

The initial border escapement forecast indicated a total allowable catch of more than 18,000 chum salmon. This contributed to the decision to schedule a two day commercial fishery opening commencing 8 September. Additional factors considered in the decision to re-open the fishery included the improvements in other upriver run indices in Alaska, and the above average DFO fishwheel catches which had exceeded the previous ten-year daily averages by approximately 100% since 29 August.

Record daily commercial catches and a CPUE that was approximately 74% above average prompted a twenty-four hour extension to the 8 September opening. Concurrently, the combined DFO fishwheel catch peaked (for the first time) in this week on 11 September. Following the opening 8-11 September, i.e. statistical week 37, the border escapement forecast increased to 130,500 chum based on additional mark-recapture data from the live-capture program (which was suspended on 8 September) and from the commercial opening.

DFO fishwheel catches remained strong through the beginning of week 38 (the cumulative catch was approximately 55% above average) and a two day fishery was scheduled for 14-16 September. The border escapement forecast increased to 138,000 chum salmon, the peak inseason forecast, and the overall commercial chum harvest objective was moved to 29,700 chum salmon for the duration of the season, i.e. the top end of the commercial guideline harvest range. The guideline harvest for week 38 was approximately 8,000 chum. With the catch after two days projected to be roughly 4,000 fish, a twenty-four hour extension was given. The week ended with the cumulative catch lagging the guideline harvest by approximately 1,500 chum. Over the three day opening, the commercial catch per day was about average and the CPUE was approximately 18% below average; conversely, the daily DFO fishwheel catches were about 20% above average.

In week 39, a two day fishery was scheduled to commence 20 September with a weekly target also of about 8,000 chum salmon. The border escapement forecast leading into this opening had decreased 6% over the previous forecast to 129,000 chum salmon. However, according to DFO fishwheel data, the run strength appeared to be building once again and the peak combined fishwheel catch of

the season (161 chum) occurred on 20 September. The commercial catch after the first 24 hours in this week was about 19% above average and this, combined with the increasing trend in the fishwheel catches, resulted in a twenty-four hour extension. The extension brought the commercial catch to within 7% of the weekly guideline.

The commercial fishery was open for three days in each of the next two weeks, week 40 (25-28 September) and week 41 (2-5 October). The CPUE in each week was at or near record levels and ranged from 48% above average in week 40, to 114% above average in week 41. The fishery closed for the season on 5 October. The final inseason border escapement forecast was 135,000 chum salmon with a spawning escapement forecast of a record 102,000 chum salmon.

The preliminary total commercial chum harvest of 30,035 fish was 1.1% above the upper end of the commercial guideline harvest range of 20,700 to 29,700 chum. For comparison, the recent four-year cycle average commercial catch was 21,320 (1990-1993) ranging from 7,762 chum in 1993, to 31,404 chum salmon in 1991. Based on preliminary tag recovery data, the harvest rate in the commercial fishery was approximately 22%, compared to the 1990-1993 cycle average of 27%.

Total fishing effort during the chum season (from week 35 on) was 201 boat-days in 1994, 28% above the 1990-1993 average of approximately 157 boat-days. The total number of days fished during this period, i.e. after week 35, was 15 days compared to the 1990-1993 average of 14 days.

The run strength based on cumulative commercial fishery CPUE was about 20% above average, whereas the cumulative DFO fish wheel catch was the second highest on record and was 35% above the previous cycle average. The preliminary mark-recapture estimate, as discussed in Section 6.2.2 of this report, was a record and was approximately 75% above average. Run timing in the commercial fishery was bimodal with a protracted second mode. A true indication of the magnitude of the first mode could not be ascertained from commercial catch data due to the closure at the beginning of the chum season. However, the DFO fish wheel catches indicated that a significant group of fish had passed through the commercial fishing area during the late August - early September closure.

4.0 1994 SUBSISTENCE, PERSONAL USE, ABORIGINAL, DOMESTIC, AND SPORT FISHERIES

4.1 Alaska

4.1.1 Subsistence Fishery

Subsistence "catch calendars" were mailed to each fishing household in all Yukon River drainage communities in Alaska in May for use during the fishing season. Direct interviews were conducted with fishermen immediately following the season. Subsistence fishermen in portions of District 5 and all of District 6 were required to obtain subsistence fishing permits and record harvest data. Fishermen not contacted by other means were contacted by mail. Analysis of 1994 subsistence harvest data will not be completed for several months.

Data for 1993 were not available for inclusion in the November 1993 JTC report, and are therefore summarized here. Estimates of the 1993 subsistence harvest in the Alaska portion of the Yukon River drainage totalled approximately 63,000 chinook, 105,000 summer chum, 77,000 fall chum, and 16,000 coho salmon. These estimates do not include commercially caught summer chum salmon retained for subsistence purposes in District 4.

4.1.2 Personal Use Fishery

Regulations were in effect from 1988 until July 1990 that prohibited non-rural residents from participating in subsistence fishing. In those years, non-rural residents harvested salmon under personal use fishing regulations. The Alaska Supreme Court ruled, effective July 1990, that every resident of the State of Alaska was an eligible subsistence user, making the personal use category essentially obsolete. From July 1990 through 1992 all Alaskan residents qualified as subsistence users.

In 1992, the legislature passed a subsistence law during a special session which allowed the Alaska Boards of Fisheries and Game to designate subsistence and non-subsistence zones. The only non-subsistence zone in the Yukon Area which the Boards of Fisheries and Game created was the Fairbanks Non-Subsistence Use Zone, which basically included the Fairbanks North Star Borough. In October 1993, a Superior Court ruled that this 1992 subsistence law was unconstitutional. The State was immediately granted a stay, which had allowed for status quo fishing regulations to remain in effect until April 1994, when the Alaska Supreme Court vacated the State's motion for a stay. All Alaskan residents were again qualified as subsistence users during the 1994 fishing season, once again making the personal use category essentially obsolete.

4.1.3 Sport Fishery

Approximately ninety percent of the sport fishing effort in the Alaskan portion of the Yukon River drainage occurs in the Tanana River drainage, mostly along the road system. Only a small portion of the effort is directed toward anadromous salmon, although sport fisheries targeting anadromous salmon take place annually in the Chena, Salcha, Chatanika, and other Interior Alaska river systems. Sport fishing effort and harvests are annually monitored through a state-wide sport fishery survey. Some on-site fishery monitoring also takes place at locations where more intense sport fishing occurs. Overall Yukon River drainage sport harvest estimates for recent years (1989-93) have averaged about 900 chinook salmon, 1,100 chum salmon, and 1,800 coho salmon. It is estimated that most of these harvests have occurred within the Tanana River drainage. Harvest information for 1994 is not yet available.

4.2 Canada

4.2.1 Aboriginal Fishery

A comprehensive survey of the Aboriginal fishery was conducted in 1994 involving both inseason and post season interviews. The preliminary estimate of the total chinook catch was 8,411 fish comprised of 7,983 chinook taken in the upper Yukon area and 428 chinook harvested in the Porcupine River. The previous six-year average catches in these areas were 7,051 chinook and 213 chinook, respectively. Updated estimates of the Aboriginal harvest in 1993 included 5,576 chinook in the upper Yukon and 142 in the Porcupine River.

The preliminary estimate of the 1994 chum salmon harvest was 3,648 fish including 2,990 chum caught in the upper Yukon area and 658 chum harvested in the Porcupine River. Catches in these areas have averaged 2,769 chum and 1,897 chum, respectively, over the previous four-year period. Revised catches for 1993 included 4,660 chum in the upper Yukon River and 1,668 chum in the Porcupine River.

4.2.2 Domestic Fishery

A preliminary total of 373 chinook salmon was taken in the domestic fishery in 1994 compared to a previous six-year cycle average of 279 chinook. No chum catches were reported.

4.2.3 Sport Fishery

As in previous years, no sport fishery harvest data was collected in 1994. In the past, it has been assumed that approximately 300

chinook were harvested annually by sport fishermen in Canadian sections of the Yukon River basin. However, there are concerns that actual catches have significantly exceeded this level.

5.0 STATUS OF SPAWNING STOCKS

5.1 Chinook Salmon

5.1.1 Alaska

The overall Yukon River chinook salmon run was considered above average in 1994. Chinook salmon escapement goals were believed to have been achieved throughout the Alaska portion of the Yukon River drainage. Reliable aerial surveys of the East Fork and West Fork of the Andreafsky River were not possible due to poor weather conditions. Aerial survey minimum escapement goals are 1,500 and 1,400 chinook salmon for the East and West Forks, respectively. However, a total of 7,801 chinook salmon were counted through a weir operated by the USFWS on the East Fork Andreafsky River, which indicated that the escapement goal was met. An aerial survey conducted on the Anvik River on 23 July under poor conditions provided a count of 913 chinook salmon within the index area. The minimum aerial survey escapement goal for the Anvik River index area is 500 chinook salmon.

Minimum aerial survey escapement goals are 800 chinook for the North Fork of the Nulato River and 500 for the South Fork. An aerial survey estimate could not be obtained for the Nulato River due to poor weather conditions. However, a new counting tower project on the mainstem of the Nulato River (both forks combined) operated cooperatively by BSFA, the Tanana Chiefs Conference (TCC), and ADF&G, provided a count of 1,633 chinook salmon. Given that the project start up was delayed by high water and counting conditions were hampered by turbid water conditions, the tower count is considered a conservative estimate, and the escapement goal was likely met. An aerial survey count of 2,775 chinook salmon for the Gisasa River in the Koyukuk River drainage was the highest on record, and well above the aerial survey escapement goal minimum of 600 chinook. A new weir project on the Gisasa River operated by the USFWS provided a count of 2,888 chinook salmon.

Aerial surveys of the Chena and Salcha Rivers in the Tanana River drainage indicated that the escapement goals were met in 1994. Most notable was the Salcha River aerial survey count of 11,189 for the index area, which has an aerial survey escapement goal minimum of 2,500 chinook. Inseason assessment of chinook salmon escapement to the Tanana River drainage was improved in 1993 and 1994 compared to prior years through the operation of counting towers on the Chena and Salcha Rivers by the Sport Fish Division of ADF&G. The 1994 tower count escapement estimates were 12,006 chinook salmon for the Chena River and 18,376 for the Salcha River. These

estimates greatly exceeded the average total population escapement estimates obtained by mark and recapture methods in prior years. The tower count estimates for 1993 were 12,241 chinook for the Chena River and 10,007 for the Salcha River.

5.1.2 Canada

The Little Salmon River, Big Salmon River, Ross River, Wolf River Nisutlin River, Tincup Creek and Tatchun Creek index areas were surveyed in 1994 to assess chinook spawning escapement. Counts are given in Appendix Table 10. Results relative to the previous cycle average are summarized below:

Index	1994 Relative to 1988-1993 Average	Survey Rating
Little Salmon River	64% above	good
Big Salmon River	50% above	excellent
Ross River	40% above	fair
Wolf River	87% above	excellent
Nisutlin River	11% below	good
Tatchun Creek	101% above	fair
Tincup Creek	10% below	poor

The timing of all chinook surveys appeared to be close to peak spawning.

The sex ratio of chinook spawners may have been significantly biased towards males in 1994. The proportions of females observed at the Whitehorse Fishway and Michie Creek weir (see Sections 6.2.3 and 6.2.5) were 17% and 18% respectively. Also, some Aboriginal fishers reported catching more males than females. The DFO fishwheel catch at the Canada/U.S. border was 25% female; however, it is not unusual to see a predominance of males in the fishwheel catches (see section 6.2.1). The sex ratio was not determined during the stream surveys but during the Tatchun Creek ground survey it was noted that most chinook were in large groups - few pairs or lone females were seen.

The preliminary tagging estimate of the total spawning escapement for the Canadian portion of the upper Yukon drainage was approximately 25,027 chinook salmon, 7% below the 1988-1993 average of 26,778. Results of the DFO tagging programme are discussed in greater detail in Section 6.2.2 of this report.

5.2 Summer Chum Salmon

Although a below average overall summer chum salmon run was anticipated for the Yukon River in 1994, the run was about average in magnitude. Escapement goals appear to have been met throughout the Yukon River drainage. The preliminary Anvik River sonar escapement estimate of 1,128,924 summer chum salmon was more than double the sonar escapement goal minimum of 500,000. USFWS weir projects were operated on the East Fork Andreafsky and Gisasa Rivers. Although high water delayed start up of these projects, the results indicate that escapement goals were achieved. A total of 200,981 and 51,116 summer chum salmon were counted at the East Fork Andreafsky and Gisasa Rivers, respectively.

Counting tower projects were operated on Kaltag Creek and the Nulato, Chena, and Salcha Rivers. The Kaltag Creek tower project was primarily organized and funded by the Alaska Cooperative Extension 4-H program with partial funding by BSFA. The escapement count of 47,615 summer chum salmon into Kaltag Creek was the highest count on record for this tributary. The tower project on the mainstem of the Nulato River (both forks combined) was operated cooperatively by BSFA, TCC, and ADF&G. The Nulato River tower count of 144,552 summer chum salmon indicates that the escapement goal was likely met, given that the project start up was delayed by high water and counting conditions were hampered by turbid water conditions. The tower projects on the Chena and Salcha Rivers operated by the Sport Fish Division of ADF&G provided counts of 10,108 and 39,343 summer chum salmon, respectively. The Chena River count for 1994 was nearly double the 1993 tower count, and the Salcha River count for 1994 was seven times greater than the 1993 tower count.

5.3 Fall Chum Salmon

5.3.1 Alaska

Although an overall run of 605,000 fall chum salmon was anticipated for the Yukon River drainage in 1994, the run was likely in excess of 750,000 fall chum salmon in magnitude. Fall chum salmon escapements were well above average in 1994, with escapement goals being achieved for all stocks in the same year for the first time since the goals were established.

The preliminary sonar estimate in the Sheenjek River, in the Porcupine River drainage, of 153,000 fall chum salmon was more than double the minimum escapement goal of 64,000 fall chum salmon. The preliminary total escapement estimate for the Toklat River, in the Kantishna-Tanana River drainage, was 73,867 fall chum salmon based upon an expanded ground survey count conducted in mid-October. This was the largest escapement estimate for the Toklat River since 1979, and well above the minimum escapement goal of 33,000 fall

chums. A sonar project was operated in the Toklat River for the first time in 1994, and results from that project were similar to the estimate provided by the expanded ground survey method. The preliminary total escapement estimate for the Delta River, in the upper Tanana River drainage, was 23,300 fall chum salmon based upon an expanded ground survey count conducted in late October. This is approximately double the minimum escapement goal of 11,000 fall chums.

5.3.2 Canada

Chum salmon aerial surveys were conducted on the Kluane River, the mainstem Yukon River and the Teslin River in 1994. Due to budgetary and time constraints the Koidern River was not flown by DFO staff; however, a helicopter pilot with prior experience surveying this river reported seeing 20 chum during a cursory fly-over. Counts from the other index areas are given in Appendix Table 12.

The Kluane River count was 77% above the 1991-1993 average (1990 is excluded from the cycle average due to a poor survey rating). The mainstem Yukon River count was 56% below the 1990-1993 average and the Teslin River count was 62% below average. However, due to high water levels and turbidity, the fish countability during both the Teslin and mainstem Yukon surveys was poor. Hence, the value of using the 1994 counts from these two index areas for interannual comparisons is questionable.

As in previous years, the Fishing Branch River index was flown to continue to examine the relationship between aerial counts and known weir counts. The date of the survey was 27 September; 67% (44,126 chum salmon) of the run had passed through the weir by this date. The aerial count was 15,730 which was 36% of the weir count prior to 27 September. Results of the Fishing Branch weir programme are presented in Section 6.2.6 of this report.

The preliminary mark-recapture estimate of the total chum spawning escapement for the Canadian portion of the upper Yukon drainage was a record 104,676 chum salmon, 100% above the 1990-1993 average of 52,255. Results of the DFO tagging programme are discussed in greater detail in Section 6.2.2 of this report.

5.4 Coho Salmon

Coho salmon run and escapement assessment is very limited in the Yukon River drainage due to funding limitations and escapement survey conditions at that time of year. Most of the escapement information that has been collected is from the Tanana River drainage. The only escapement goal established for coho salmon thus far is for the Delta Clearwater River, which is a minimum of

9,000 coho salmon. In 1994 the Sport Fish Division of ADF&G conducted a boat survey of the Delta Clearwater River index area, and counted 62,675 coho salmon. That is the highest coho salmon escapement on record for this index area. It also appears that coho salmon spawning escapements in other portions of the Tanana River drainage were above average, although most not to the extent of the Delta Clearwater River.

6.0 PROJECT SUMMARIES

6.1 Alaska

Results for most projects are incorporated in the fishery and stock status portions of this report, and are reported in the tables of catch and escapement data. For this reason the following projects conducted by ADF&G in 1994 will not be discussed in further detail here: Anvik River and Sheenjek River sonar projects, Chena River and Salcha River tower projects, lower Yukon River test fishing with set gill nets, Tanana River test fishing with fish wheels, commercial fishery monitoring, subsistence harvest surveys, aerial and ground surveys of salmon escapements, and sampling of fishery catches and escapements for age-sex-length data. However, several projects warrant discussion here since they are either new or are of particular interest. These projects are: (1) Yukon River salmon stock identification research conducted by ADF&G, USFWS, and the National Biological Survey (NBS), (2) the Yukon River sonar project at Pilot Station conducted by ADF&G, (3) the Andreafsky River weir project conducted by USFWS, (4) the Kaltag Creek tower project conducted by the Alaska Cooperative Extension 4-H program with partial funding by BSFA, (5) the Nulato River tower project conducted cooperatively by BSFA, TCC, and ADF&G, (6) the Gisasa River weir project conducted by USFWS, (7) the Chandalar River sonar project conducted by USFWS, (8) the Toklat River sonar project conducted by ADF&G, (9) Yukon River salmon restoration and enhancement planning conducted by ADF&G and the Yukon River Drainage Fisheries Association (YRDFA), and (10) a Toklat River fall chum salmon restoration feasibility study conducted by ADF&G.

6.1.1 Salmon Stock Identification

A combined analysis using scale patterns, age compositions, and geographic distribution of catches and escapements is used by ADF&G on an annual basis to estimate stock composition of chinook salmon in Yukon River fishery harvests. DFO contributes scale samples from tagging project fish wheels in Canada for use as the standard for the upper run stock. Data have not yet been analyzed for 1994. Prior year analyses have provided the following estimates of stock composition for the total Yukon River drainage chinook salmon harvest (commercial and non-commercial harvests in Alaska and Canada combined):

Year	Lower Run Stock	Middle Run Stock	Upper Run Stock
1982	15%	23%	62%
1983	12%	39%	49%
1984	29%	36%	35%
1985	31%	20%	49%
1986	26%	6%	68%
1987	17%	19%	64%
1988	27%	12%	61%
1989	26%	16%	58%
1990	19%	22%	59%
1991	26%	28%	46%
1992	18%	23%	59%
1993	22%	13%	65%

Note that the lower and middle run stocks spawn in the Alaska portion of the drainage, and the upper run stock spawns in the Canadian portion of the drainage.

Genetic stock identification (GSI) research on Yukon River salmon was initiated with a small scale feasibility study on chum salmon in the mid-1980's by DFO. In 1987 this research was taken up by the USFWS and expanded to include chinook salmon, with ADF&G providing support for field sampling. In recent years this research has been conducted by both the USFWS and ADF&G.

A progress report by the USFWS for the 1987-1990 spawning stock baseline and District 1 commercial and test fishery sampling was completed and presented to the JTC in 1992. A completion report incorporating results from 1991 sampling efforts will be provided to the JTC by the spring 1995 meeting. Annual summaries and 5-year averages will be presented in the completion report.

Sampling of the District 1 commercial and test fisheries was suspended beginning in 1992 in order to collect additional spawning stock samples for improving the baseline. This should provide for improved accuracy of fishery sample analyses in the future. Lab analysis of baseline samples collected by ADF&G and the USFWS in 1992 has been concluded. In addition to baseline sampling, the USFWS sampled 2,352 fall chum salmon from the subsistence fishery

near the village of Tanana in 1992. The subsistence fishery samples are currently being analyzed. Results will be presented at the fall 1995 JTC meeting.

Sampling of chum salmon spawning stocks was conducted at various locations throughout the Yukon River drainage in 1994 to continue to improve the GSI baseline. ADF&G sampled chum salmon for GSI analysis from the Melozitna (100 fish), Chena (100 fish), Salcha (100 fish), Delta (150 salmon) and Toklat Rivers. Differences in allele frequency estimates among Toklat River chum salmon samples collected during prior years prompted further sampling within that drainage. Therefore, four specific spawning sites within the Toklat River drainage were sampled in 1994 to further refine the Toklat River GSI baseline. These included: the Sushana River, Geiger Creek, and two mainstem Toklat River spawning sites. One hundred chum salmon were sampled at each location.

Personnel working on a cooperatively funded and operated tower project on the Nulato River collected 100 chum salmon samples for GSI analysis. Chum salmon samples for GSI analysis were also collected by USFWS in conjunction with a salmon-counting weir project on the Gisasa River (100 salmon). In Canada, DFO sampled 100 chum salmon from the Fishing Branch River and 76 chum salmon from the Donjek River.

Of the twelve chum salmon spawning populations recommended by the JTC to be sampled during the 1994 season, four were not. These include: the Kaltag, Chandalar, Black, and Upper Koyukuk Rivers.

During the past year personnel from the National Biological Survey, Alaska Science Center Molecular Ecology Laboratory have been actively involved in the development of new nuclear and mitochondrial DNA markers for use in Pacific salmon. Each marker is currently being tested across 12 salmonid species to determine the utility of these markers for population-level research.

To date, thirty chinook salmon from each of four spawning areas in the Yukon River drainage have been surveyed using six loci. Four of the six loci were found to be polymorphic, with two to five alleles segregating within each population. Significant differences in allele frequency were observed among the four spawning regions, suggesting that these loci may prove informative for future stock identification purposes.

Several mitochondrial DNA primer pairs have been used to amplify large regions of the salmon mitochondrial DNA genome. Mitochondrial DNA analysis will be incorporated into ongoing salmon research in the Yukon River drainage.

6.1.2 Yukon River Sonar

The Yukon River sonar project at Pilot Station has been estimating the daily upstream passage of chinook, summer chum, fall chum, and coho salmon annually since 1986, except for 1992, when the project was operated for experimental purposes only. Sonar equipment is used to estimate fish passage, and test fishing with a range of different mesh size drift gill nets is used to estimate species composition of those passage estimates. Beginning in 1993, sonar equipment which operates at a frequency of 120 kHz was used that provides greater insonification range and avoids the attenuation problems encountered with the former 420 kHz frequency equipment, thereby reducing bias that affected prior year estimates. The new equipment was field tested in 1993 using standard targets and was verified to perform very well. Data collected in 1993 proved to be valuable in assessing salmon run strength and timing for fisheries management purposes.

The sonar project was operated from 4 June through 8 September in 1994. Salmon passage estimates, most notably during the fall season, were low relative to post-season reconstructions of run size. The poor performance of the sonar project during the fall season had a significant negative impact on management of the fall chum salmon fisheries, as discussed in a previous section of this report. Because the JTC did not meet this fall, it has not yet had an opportunity to discuss the performance of the sonar project in 1994. Although ADF&G has announced that it will conduct a review of the project, the scope and timeframe of the review are not known at this time.

The salmon passage estimates at Pilot Station are based upon a sampling design in which sonar equipment is typically operated for 7.5 hours each day. On four occasions in August 1993 the sonar equipment was operated 24 hours per day. The resulting 24-hour and expanded 7.5-hour estimates were not significantly different. The two methods provided daily passage estimates that were within 3% to 12% of each other, and the sum of the passage estimates for the four days was within 5% between the two methods. The 24-hour estimates were slightly but consistently lower than the expanded 7.5-hour estimates. The sonar equipment was operated 24 hours per day on five occasions in 1994. These data are not yet ready for dissemination.

Estimates of annual fish passage, rounded to the nearest one thousand fish for each species category, for the period 1986-1991, using the 420 kHz sonar equipment, were as follows:

Yr	Chinook	S. Chum	F. Chum	Coho	Other Fish[a]
86	169,000	1,933,000	583,000	210,000	1,414,000
87	116,000	826,000	596,000	228,000	104,000
88	121,000	1,773,000	424,000	263,000	817,000
89	92,000	1,604,000	606,000	169,000	324,000
90	156,000	931,000	546,000[b]	241,000[b]	327,000[b,c]
91	76,000	1,233,000	597,000[d]	71,000[d]	351,000[d,c]

[a] "Other Fish" may include pink salmon (which are substantially more abundant in even-numbered years), whitefish, sheefish, northern pike, and other species.

[b] Includes an estimate of fish passage offshore beyond the range of side-looking shore based sonar beams based upon down-looking sonar transects conducted across the width of the river and onshore gill net test fishing data.

[c] Does not include fish passing near shore on the left (south) bank.

[d] Includes an estimate of fish passage offshore beyond the range of side-looking shore based sonar beams based upon down-looking sonar transects conducted across the width of the river and offshore gill net test fishing data.

Estimates of annual fish passage, rounded to the nearest one thousand fish for each species category, for the period 1993-1994, using the 120 kHz sonar equipment, were as follows:

Yr	Chinook	S. Chum	F. Chum	Coho	Other Fish[a]
93	135,000	947,000	292,000	42,000	351,000[b]
94	141,000	1,997,000	407,000	191,000	271,000[b]

[a] "Other Fish" may include pink salmon (which are substantially more abundant in even-numbered years), whitefish, sheefish, northern pike, and other species.

[b] Does not include fish passing near shore on the left (south) bank.

6.1.3 Andreafsky River Weir

The Andreafsky River, a lower Yukon River tributary, drains a wilderness area of the Yukon Delta National Wildlife Refuge and supports major summer chum and chinook salmon spawning stocks. ADF&G operated a salmon escapement project on the East Fork of the Andreafsky River from 1981 to 1988, using sonar equipment from 1981 to 1985, and tower counting from 1986 to 1988. Annual escapement estimates from those projects ranged from 45,000 to 181,000 summer chum salmon. Aerial escapement surveys have also been conducted by

ADF&G on the Andreafsky River for many years, although these only provide an index of relative abundance and are often hampered by poor weather conditions. The low summer chum salmon escapement aerial survey indices for the Andreafsky River in recent years and the widespread failure of chum salmon returns in 1993 prompted the USFWS to initiate a 5-year weir project on the East Fork of the Anfreafsky River in 1994.

A 280 foot weir was installed at approximately river mile 20 on the East Fork Andreafsky River at the former ADF&G project site. The weir was operational from 27 June through 1 August. A total of 200,981 chum, 7,801 chinook, and 316,530 pink salmon were counted. During the first full day of operations 19,254 chum salmon were counted. The high first day count and sex ratios indicated that the beginning of the run was missed. A complete pink salmon count was not obtained because picket spacing on the weir was designed to allow operation in higher water flows and facilitated the passage of smaller fish through the wider picket spacing. Chum salmon were primarily four year old fish, while chinook salmon were primarily ages five and six, with an overall chinook salmon sex composition of only 29% female. Weir counts were relayed to ADF&G inseason for fishery management purposes. Chinook salmon scale samples were collected and forwarded to ADF&G for age-sex-length and stock identification analysis.

Construction delays in 1994 delayed weir installation. Weir installation in 1995 is planned to begin by the middle of June, with the intention of monitoring the beginning of the chum salmon run.

6.1.4 Kaltag Creek Tower

A counting tower project was operated on Kaltag Creek by the Alaska Cooperative Extension 4-H program, with partial funding by BSFA, from 21 June through 28 July in 1994. Kaltag Creek is a tributary located at mile 450 of the Yukon River. Tower counts were conducted by students from Kaltag High School.

A preliminary, expanded estimate of 250 chinook and 47,615 summer chum salmon passed the tower site during this period. High, turbid water interfered with counting on 7 of the 38 days of operation. Salmon were not sampled for age, sex, and length data. Salmon escapement goals have not been established for Kaltag Creek.

Although 1994 was not the first year of operation for this project, 1994 was the first year that counting began at the beginning of the salmon run into Kaltag Creek. This project was important in assessing spawning distribution of summer chum salmon in the middle portion of the Yukon River drainage during the 1994 season.

6.1.5 Nulato River Tower

A counting tower project was operated for the first time on the mainstem of the Nulato River in a cooperative effort by BSFA, TCC, and ADF&G from 29 June through 23 July in 1994. The Nulato River is a tributary located at mile 483 of the Yukon River, and it has a North and South Fork which join to form the mainstem Nulato River.

A preliminary, expanded estimate of 1,633 chinook and 144,552 summer chum salmon passed the tower site during this period. High, turbid water delayed initial operations by approximately 10 days and interfered with counting on 6 of the 25 days of operation. Although poor survey conditions precluded an aerial assessment of the Nulato River, the minimum escapement goals of 1,300 chinook salmon and 53,000 summer chum salmon for the North Fork of the Nulato River were likely achieved based on the expanded, but abbreviated, tower counts on the mainstem of the Nulato River. This project was important in assessing spawning distribution of chinook and summer chum salmon in the middle portion of the Yukon River drainage during the 1994 season.

Summer chum salmon were captured using beach seine gear and sampled for age, sex, and length data. Preliminary age and sex composition data indicate that age-5 summer chum salmon dominated the sample, accounting for 64% of the 551 fish sampled. Age-4 salmon accounted for 35%, while age-3 and age-6 salmon accounted for less than 1% each. Male salmon slightly outnumbered female salmon in the sample, 288 to 263. However, these data have not yet been weighted by passage counts.

6.1.6 Gisasa River Weir

A weir was operated by the USFWS on the Gisasa River during late June through early August in 1994 to help meet the need for summer chum and chinook salmon escapement information in the middle portion of the Yukon River drainage. This was the first year of a 5-year study. The Gisasa River is located in the Koyukuk National Wildlife Refuge and is a tributary of the lower Koyukuk River.

Gisasa River aerial survey escapement estimates have been highly variable over the years, and at best represent a general index of spawning escapement; i.e. they are not estimates of total spawning escapement. Aerial survey escapement estimates for summer chum salmon in the Gisasa River were highest between 1974 and 1976, averaging 33,400. Between 1985 and 1992, for those years when survey conditions were rated fair to good, summer chum escapements averaged 8,800 fish. Aerial survey escapement estimates for chinook salmon for these years averaged approximately 1,000 fish.

The weir was operational 11 July through 10 August. A total of

51,116 chum and 2,888 chinook salmon were counted. Also passing through the weir were pink salmon, whitefish, Arctic grayling, longnose sucker, and burbot. Daily escapement counts were radioed to the refuge office and the counts were relayed to ADF&G.

Weir installation was late this first year, primarily because of barge shipment delays. As a consequence, the early portions of the chinook and chum salmon runs were missed. In 1995, the weir will be installed by the end of the second week of June in order to provide a complete spawning escapement count.

6.1.7 Chandalar River Sonar

The Chandalar River is located in Interior Alaska on the Yukon Flats National Wildlife Refuge. The Chandalar River supports one of the major fall chum salmon spawning stocks in the Alaska portion of the Yukon River drainage. Past aerial surveys were indices of abundance and as such did not provide an estimate of the total size of the spawning population, in contrast to single-beam sonar estimates obtained by USFWS from 1986 to 1990. Because of the importance of the Chandalar River fall chum salmon stock as a refuge and subsistence resource, USFWS re-established the sonar site in 1994 previously operated by the USFWS during 1986-1990.

Split-beam sonar is being investigated as a method to estimate total spawning escapement of Chandalar River fall chum salmon. Split-beam sonar is designed to provide three-axis target position in the beam. This allows estimation of acoustic size and, when targets are tracked through the beam, it provides direction of travel (upstream or downstream) information. Because of the large amount of data associated with split-beam technology, data were permanently stored on site for post season processing and analysis. Software currently being developed is intended to allow most future data analyses to occur inseason.

Elliptical transducers were deployed near shore from each bank; a 2.9° x 11.5° transducer on the right bank and a 4.6° x 10.9° transducer on the left bank. Weirs were installed from both banks to move fish off shore into the detectable range of each transducer. Approximately 80 percent of the river width was ensonified. Both sonar units were operated 24-hr per day for about three weeks (9-27 August). Systems were calibrated on site using techniques developed in the field, and involved suspending a 38.1 mm tungsten carbide sphere approximately 7 m from the transducer. Both on- and off-axis target strengths were recorded and were generally within 2 dB from the predicted value. A major flood event in late August caused the project to terminate three weeks early. Water levels increased approximately 3.5 m, causing a hurried evacuation of the site.

Preliminary results suggest that most fish were oriented close to

the bottom, near to shore and travelling upstream. Gill-netting during sonar operation verified that the target species, chum salmon, was the only fish species migrating past the sonar site. The acoustic size of upstream fish appear, on average, larger than would be predicted from the literature. Detailed acoustic analyses will take place this winter and a progress report will be available in the spring. The goal for the 1995 field season, barring major floods, is to provide an accurate estimate of total spawning escapement.

6.1.8 Toklat River Sonar

A two person crew operated from a field camp at approximately river mile 15 of the Toklat River, near the confluence of Barton Creek, from mid-August to early October in 1994. The sonar equipment used for this project was an older generation type available from existing ADF&G inventories.

A small weir was installed on Barton Creek and a sonar counter was operated on the west bank of the mainstem Toklat River immediately upstream of Barton Creek. The weir was operational from 18 August through 4 October, while the sonar system was operational from 19 August through 4 October. Preliminary weir counts totalled 38 fall chum salmon and 298 coho salmon counted through the weir on Barton Creek up until the final day of operation. An additional 1,500 to 2,000 coho salmon were estimated passing the weir site in a 24-hr period on the final day the weir was operational. Passage of approximately 65,000 fish was estimated by sonar on the west bank of the mainstem Toklat River. Preliminary information indicates that passage during this period on the east bank of the mainstem Toklat River approximated an additional 6,000 fish. Species apportionment sampling was not conducted at the sonar site. However, most of the fish passing the site were likely fall chum salmon. Some inferences of this were obtained from the subsequent ground survey of the upriver spawning area.

The typical ground survey of the Toklat River spawning area, located approximately 15 river miles above the sonar site, was conducted in mid-October in 1994, consistent in methodology with former years. The ground survey count of 71,504 fall chum salmon was subsequently expanded to a preliminary total population estimate of 73,867 fall chum salmon. In addition, 617 coho salmon were counted on the ground survey. The coho salmon estimate will remain an unexpanded ground count, since residence time data are not readily available for coho salmon in this area.

These results indicate that the biological escapement goal of 33,000 or more fall chum salmon for the Toklat River, established based upon the expanded ground survey method, was achieved in 1994, and in fact that the Toklat River escapement in 1994 was the largest since 1979. The data, although preliminary, further

indicate that coho salmon likely accounted for only a small portion of the Toklat River sonar counts. The preliminary sonar estimate and preliminary expanded ground survey estimate of fall chum salmon escapement population size were very similar to each other in magnitude. This suggests that other "major" fall chum salmon spawning areas in the upper Toklat River are unlikely, aside from the area already identified and monitored. Further, the preliminary results indicate that the historical estimates of total fall chum salmon spawning escapement to the Toklat River based upon the expanded survey method are likely reasonable estimates.

6.1.9 Salmon Restoration and Enhancement Planning

ADF&G is conducting a salmon restoration and enhancement planning process for the U.S. portion of the Yukon River drainage. This is a process involving user groups, various government agencies, and other interested parties with the goal of developing a comprehensive plan for the U.S. portion of the Yukon River drainage. The intent of the plan is to define goals and objectives, provide reference information on the stocks and fisheries, identify potential opportunities and concerns, recommend appropriate procedures, and evaluate priorities. ADF&G has entered into a cooperative agreement with YRDFA on the planning process. The plan is scheduled to be completed in the summer of 1995.

6.1.10 Toklat River Fall Chum Restoration Feasibility Study

There has been ongoing concern regarding the status of the Toklat River fall chum salmon stock. Spawning escapements to the Toklat River have not met the minimum escapement goal for most recent years despite conservative fishery management actions. As a result, there is growing public interest in investigating restoration options for this stock. ADF&G is conducting a feasibility analysis to provide information useful for future planning.

A small experimental egg-take was conducted in 1992 to test field logistics under the challenging Interior winter conditions that occur at the location and time when these fish spawn. In October 1992, 130,500 fall chum salmon eggs were collected from the Toklat River. Mortalities were kept to a minimum by making use of fish for both the egg-take and other sampling objectives to the extent possible. Fish were sampled for genetic analysis and disease screening. Incubation was carried out at the Clear Hatchery facility. All of the resulting 92,000 surviving fry were coded wire tagged, fin-clipped, and released back into the Toklat River in May 1993. Recovery of the marked fish at adult return is expected to provide statistically significant information on their contribution to proximal fisheries. Results from the various components of this study should significantly improve our informa-

tion base for this stock.

The second Toklat River fall chum salmon egg-take was conducted in October 1993. A total of 208,200 fall chum salmon eggs were collected. All of the resulting 194,900 surviving fry were released back into the Toklat River in May 1994, with 150,000 of the fry coded wire tagged and fin-clipped. The third Toklat River fall chum salmon egg-take was conducted in October 1994. A total of 388,000 fall chum salmon eggs were collected. The intent is that all of the surviving fry will be coded wire tagged, fin-clipped, and released back into the Toklat River in the spring of 1995.

In conjunction with the Toklat River fall chum salmon restoration feasibility study, a habitat study was initiated on the Toklat River fall chum salmon spawning grounds in October 1994. The objectives of the habitat study are to (1) determine the quantity and quality of fall chum salmon spawning habitat on the Toklat River and evaluate the biological basis for the current escapement goal, and (2) evaluate opportunities to stabilize and improve the spawning habitat. Results from the first year of field work are not yet available.

6.2 Canada

6.2.1 Upper Yukon River Salmon Test Fishing (Yukon Territory)

Run timing and relative abundance data were again collected by DFO for both chinook and chum salmon at two fishwheels located near the Canada/U.S. border. Although the primary purpose of the fishwheels is to capture salmon for the mark-recapture programme, consistency in the site selection and fishing time since 1982 does provide the opportunity for some interannual and inseason comparisons. However, because historical fishwheel catches are poorly correlated with estimates of border escapement, fishwheel data is used cautiously until inseason forecasts are developed based on mark-recapture data.

As in 1993, a protracted chinook run with a strong early component was observed at the fishwheels. The first fish was caught on 24 June, one day later than the date of first capture in 1993. On average (1988-1993) the first fish is captured on 30 June. Two peaks were observed in the White Rock fishwheel - the first and larger peak occurred in the second week of July and the second peak followed in the final week of July. The Sheep Rock fishwheel exhibited only the first peak. The peak combined catch of 72 chinook was 24% lower than average. It was observed on 13 July, nine days earlier than average. The 1988-1993 average combined total catch of the fishwheels is 1,376; the 1994 total was 7% below this, 1,290 chinook.

As observed in 1992 and 1993, there were significantly more males than females captured in the fishwheels; the proportion of females in 1994 was 25%. It is probable that the fishwheels are selective for smaller fish and in years when there is a high proportion of age-3 and age-4 fish, the male:female ratio may be biased high. However, age and size data has not yet been analyzed for 1994 so it is not possible to determine to what degree the fishwheel sex ratio was reflective of that of the actual run.

The chum run as observed at the fishwheels was bimodal with a strong early component; distinct peaks occurred on 11 September and on 20 September. The cumulative catch of 3,803 chum, which includes an interpolation for 9 September when one fishwheel was inoperable, was the second highest on record and was 40% above the 1990-1993 average of 2,711 chum salmon.

6.2.2 Upper Yukon River Tagging Program

DFO has conducted a salmon tagging programme on salmon stocks in the Canadian section of the drainage since 1982 (excluding 1984). The objectives of the study have been to estimate the total return of chinook and fall chum salmon to Canada (excluding the Porcupine drainage which is partially enumerated by the Fishing Branch weir or by aerial surveys) and to obtain estimates of total escapement, harvest rates, migration rates and run timing. Spaghetti tags are applied to salmon live-captured in the test fish wheels and subsequent recoveries are made in the various fisheries upstream. Population estimates are derived from those tags recovered in the commercial fishery downstream of the mouth of the Stewart River.

The preliminary 1994 chinook salmon border population estimate is 45,711 fish (95% C.I. = 40,743 to 51,283), within 1% of the 1988-1993 average of 45,543. Approximately 25,027 chinook are estimated to have reached the various spawning grounds.

The preliminary population estimate of Yukon River chum salmon migrating into Canada (excluding the Porcupine River) in 1994 is a record 137,701 fish (95% C.I. = 127,903 to 148,247), 80% above the cycle average of 76,344. Approximately 104,676 chum are estimated to have reached the various spawning grounds. The escapement goal for 1994 was 65,900.

6.2.3 Whitehorse Rapids Fishway Chinook Enumeration

The Whitehorse Fishway cumulative chinook count in 1994 was 1,577 fish. Only 274 (17%) of the enumerated chinook were female. The total number of adipose-clipped chinook observed was 895 fish, comprising 57% of the total count. These fish likely originated from releases in 1989, 1990 and 1991. Approximately 89%, 56% and 44% of the hatchery fry released in these respective years were

adipose-clipped. Of the adipose-clipped chinook returning in 1994, 118 were female and 777 were male. Five percent of the males had a fork length less than 500 mm, and 32% of these were adipose-clipped.

Run timing appeared consistent with that observed between 1988 and 1993, with the first fish appearing on 29 July and the mid-point occurring on 15 August. On average the first fish arrives at the fishway on 27 July and the run mid-point occurs on 14 August.

Although the 1994 count was a record and was 87% above the previous cycle average of 842, it is being viewed with caution as some adipose-clipped fish were observed passing up the ladder more than once. It is postulated that these fish migrated upstream through the fishway then descended through the spillway to end up downstream of the fishway; some fish obviously ascended again. It is possible that these were hatchery chinook which had been released into the fishway as fry in 1989, 1990 or 1991. A number of fish were sacrificed for CWT reading. Results are not yet available.

At least 45 chinook that passed through the fishway migrated into Wolf Creek in 1994, the highest number observed to date.

6.2.4 Whitehorse Hatchery Operations

A total of 310,040 chinook fry was released in 1994, representing a fertilized egg-to-fry survival of 82%. As in previous years, approximately 150,000 of the fry were coded-wire tagged and released in equal proportions into Michie Creek, Wolf Creek and in the Whitehorse Fishway. The remainder of the fry was released untagged into Michie Creek.

In August 1994, 78 females and 118 males were selected from the fishway for broodstock. Six females and two males exhibited adipose-clips. High water temperatures (approximately 20°C) and the immature state of a large proportion of the chinook passing through the fishway caused significant problems in acquiring viable eggs in 1994. Forty females and 16 males were lost during the time that they were held for ripening in the hatchery or in the fishway itself. Five immature females which had been held in the hatchery and which appeared unlikely to survive in captivity were released without being spawned.

Thirty-three females were spawned providing an estimated 150,000 green eggs. Below average fertilization and pre-hatch survival rates have left 91,000 eggs currently incubating in the hatchery.

6.2.5 Michie Creek Weir and Juvenile Study

For the second consecutive year a weir was in operation on Michie Creek, a tributary of the McClintock River which joins the Yukon River approximately 50 km (31 miles) upstream of the Whitehorse Rapids Fishway.

In 1994 a total of 586 adult chinook salmon was enumerated at the weir. The sex ratio (18% female) was similar to that observed at the fishway. The number of adipose-clipped adults observed was 183, comprising 31% of the total count. The proportion of males identified as jacks was 10%.

The fry trapping program initiated in 1993 as part of the overall study was expanded in 1994. The results of this two year study will be available in March 1995.

6.2.6 Fishing Branch River Chum Salmon Weir

A weir to enumerate chum salmon escapements to the Fishing Branch River has operated annually (except for 1990) since 1985; prior to this, the weir operated during the 1972-1975 period. Since 1991 the weir program has been managed cooperatively between the Vuntut Gwitchin First Nation of Old Crow and DFO. Escapement estimates (including aerial count expansions) have ranged from approximately 16,000 in 1973 to 353,000 in 1975 (Appendix Table 12).

In 1994, the weir was operated from 26 August to 25 October. The cumulative count of 65,247 was the highest escapement estimate since 1979, 111% higher than the cycle average of 30,990 and 79% higher than the 1985-1993 average. The run was estimated to be 56% female which is consistent with sex ratios observed in previous years.

The following table presents the weir counts since 1985 for comparative purposes:

Year	Period of Weir Operation	Total Count	Female Count (% of total)
1985	Sep 06 - Oct 20	56,016	56%
1986	Sep 01 - Oct 19	31,723	54%
1987	Aug 29 - Oct 18	48,956	58%
1988	Sep 05 - Oct 16	23,597	58%
1989	Aug 30 - Oct 17	43,834	49%
1990	no weir	35,000*	
1991	Sep 01 - Oct 15	37,733	59%
1992	Aug 30 - Oct 18	22,517	54%
1993	Aug 31 - Oct 25	28,709	53%
1990-93 avg		30,990	55%
1994	Aug 26 - Oct 25	65,247	56%
* note: estimated by aerial survey expansion.			

6.2.7 Community Development and Education Program

As part of a community education and public demonstration program, three incubation boxes are in operation in the following locations: McIntyre Creek, Whitehorse; Mayo River; and North Klondike River. The objectives of the incubation box program include: development, education and demonstration of remote/isolated small scale incubation systems; production of sufficient numbers of fry in specific locations for coded-wire tag releases; and provision of local schools with a supply of eyed eggs for small (50-100 egg capacity) classroom incubators.

The McIntyre box, with a capacity of 120,000 eggs, is located in Whitehorse on a groundwater supply which flows into McIntyre Creek. Previous year's activities are summarized in the following table:

McIntyre Creek Incubation Box			
Brood Year	Stock	# Fry released without CWT's	# Fry released with CWT's.
1989	Kluane River	35,000 chum	
1990	Takhini River		20,000 chinook
1991	Takhini River	7,000 chinook	30,000 chinook
1992	Takhini River		58,500 chinook
1993	Takhini River	1,500 chinook	72,000 chinook

There are currently approximately 60,000 eggs in the McIntyre Creek incubation box.

The North Klondike River incubation box is located on a small stream which flows into a side slough of the North Klondike River. This project is currently being conducted jointly by the Dawson First Nation and the Yukon River Commercial Fishers Association with technical assistance from DFO. The box, with a capacity of 60,000 eggs, was first installed in 1989. All eggs destined for this incubation box are first incubated in a moist air incubator for about 1.5 months in a school in Dawson City. The numbers of fry released since inception of the project are given below.

Klondike River Incubation Box			
Brood Year	Stock	# Fry released without CWT's	# Fry released with CWT's.
1989	Minto	11,000 chum	
1990	Tatchun Creek		30,000 chinook
1991	Tatchun Creek mainstem Yukon	7,000 chinook 1,500 chinook	31,000 chinook
1992	North Klondike River Tatchun Creek	500 chinook	20,000 chinook 5,000 chinook
1993	North Klondike River Tatchun Creek		62,000 chinook 34,000 chinook

In 1994, 38,000 Tatchun Creek chinook eggs and 35,500 Klondike River eggs were taken for the North Klondike incubation box.

The first Mayo River incubation box, with a capacity of 60,000 eggs, was installed in 1991 adjacent to the Mayo hydro plant

(approximately 10 km from the town of Mayo). A second, 60,000 egg capacity box was installed in 1992, along with rearing tanks. In 1992, 13,000 unmarked Mayo River chinook fry were reared and released back into the Mayo River. Since then, there have been no releases due to difficulties obtaining broodstock and technical problems. However, there are at present approximately 15,000 chinook fry incubating. This project is currently being conducted by the Stewart Valley Salmon Society with technical support from DFO. The Society has also undertaken construction of an adult weir on the Mayo River. In 1993, this operated as a carcass weir. In 1994, upstream migrants were enumerated, and a count of 642 adult chinook reported.

In conjunction with DFO, the Yukon Department of Education has continued the classroom educational unit entitled "Salmon in the Classroom". This project, undertaken initially in 1989, involves a Yukon adaptation of "Salmonids in the Classroom", an educational package which was developed previously in British Columbia. As part of the program, classroom incubators (100 egg capacity) have been distributed to most schools in the Yukon. The classroom incubators are supplied with eyed eggs from the incubation boxes (described above) or from local spawning areas. Fry resulting from the program are transported back to the stream of origin and released by school children.

6.3 U.S./Canada Yukon River Border Sonar

As planned during the spring 1994 Yukon River JTC meeting, the Yukon River border sonar project operated for an abbreviated season in 1994 and data acquisition was limited to the right bank. As much of the complex right bank cross-section as possible was acoustically sampled using both available transducers. Staff from ADF&G and DFO collected data, closely following all objectives detailed in the 1994 project operational plan except that no test fishing was conducted. USFWS provided the split-beam sonar equipment used for the project in 1994.

Staff arrived in Eagle on 24 August and began setting up operations. A single wall tent was erected on the right bank sonar tent platform and electronic equipment set-up was complete on 27 August. On the same date numerous bottom profiles were collected in the immediate vicinity of the historic sonar site using a commercial fathometer to gain knowledge of current year bottom characteristics and to determine the exact locations to place the transducers. The complex nature of the right bank bottom was similar to that documented in previous years except that the water was relatively low in 1994, exposing most of the nearshore shelf area. Calculated bottom slopes were 8.1° on the nearshore shelf-break and 1.0° on the offshore shelf, which compared favorably with more precise depth at range data collected later in the field season using parallax-based range finding equipment.

On 28 August a 7.3° x 11.1° half power beamwidth elliptical transducer was deployed near the shelf-break along shore and staff began resolving hardware and software malfunctions. On 31 August a 4.5° x 10.8° beamwidth elliptical transducer was deployed at a range of 40 m from the inshore transducer and at a depth of 5 m. Throughout most of the season the total range ensonified was approximately 85 m. Inshore and offshore transducer sampling ranges were each set at 45 m with the offshore transducer located 40 m from the inshore transducer.

Acoustic data were collected 24 hours per day, seven days per week from 1 through 22 September. Inshore and offshore strata were alternately sampled for 30 minutes because an equipment malfunction left the ability to operate only one complete sounding system for most of the season. Acoustic data acquisition typically involved collecting standard target and beam mapping data from 10:00 AM to 6:00 PM, and sampling free swimming fish during the remainder of the day. At least 2 hours of raw acoustic data were opportunistically recorded onto Digital Audio Tape (DAT) media each day. The equipment was monitored from 6:00 AM to 10:00 PM daily, and operated unmonitored during the remaining hours. Chart recordings were evaluated for target traces, marked, and tallied during daily shifts. In all, 15,884 traces were marked and tallied during 1994 operations; approximately 60 % were recorded within 20 m of shore and roughly 15 % were detected by the offshore transducer.

Ancillary data collected at regular intervals throughout the field season included daily maximum and minimum ambient and interior sonar tent air temperature, water temperature, and water velocity at both transducers and at 20 m offshore. Water velocities varied from 0.3 m/s to 0.4 m/s onshore, and 1.2 m/s to 1.3 m/s at both 20 m and 40 m offshore. In addition, periodic aiming sweeps were conducted to identify aims which best detected passing fish within a total 60° arc, centering on an aim perpendicular to water flow. No test fishing data were collected in 1994 due to anticipated critically weak chum salmon run strength and the plan to focus attention on examining system performance.

Standard target data were collected on site using a variety of targets and installations to examine: 1) target strength magnitude and consistency, 2) target position in the beam (beam mapping), and 3) signal-to-noise induced detection bias. A 38.1 mm stainless steel sphere and a 10.2 cm hollow plastic sphere were used as targets. The installations used to position the spheres included suspending freely from a fixed line above the water, suspending horizontally at fixed vertical position on a rigid frame, and suspending freely from a pole attached to a boat at anchor. These data were collected at several ranges from 5 m to 40 m from the transducer face, and they will be analyzed during the winter for later consideration by the JTC.

Data collection in 1994 was hampered by several hardware and software malfunctions. One Digital Echo Processor and one hand-held terminal were inoperable for most of the field season. In addition, current version controlling and processing software did not accompany acoustic hardware during the transfer of custodianship to ADF&G. All necessary software was received from the manufacturer by 1 September. At that time, corrected calibration data for the sounding systems being used was also received. As the season progressed, programming problems continued to be identified, which were largely resolved by the manufacturer inseason.

Much of the raw data collected during the 1994 field season will be analyzed later. However, based on data collected during the 1992-1994 field seasons, it is clear that bank-to-bank ensonification of the Yukon River at the Eagle sonar site will require a suite of at least four transducers and an alternative method of estimating abundance in the unensonified area. Total horizontal coverage afforded by three transducers on the right bank (120 m) and one on the left bank (60 m) would result in approximately 150 m of horizontal river distance not sampled by side-looking equipment. Based on knowledge gained during the 1994 field season, it seems unlikely that additional transducers could be placed further from shore without significant risk of loss.

FIGURES AND TABLES

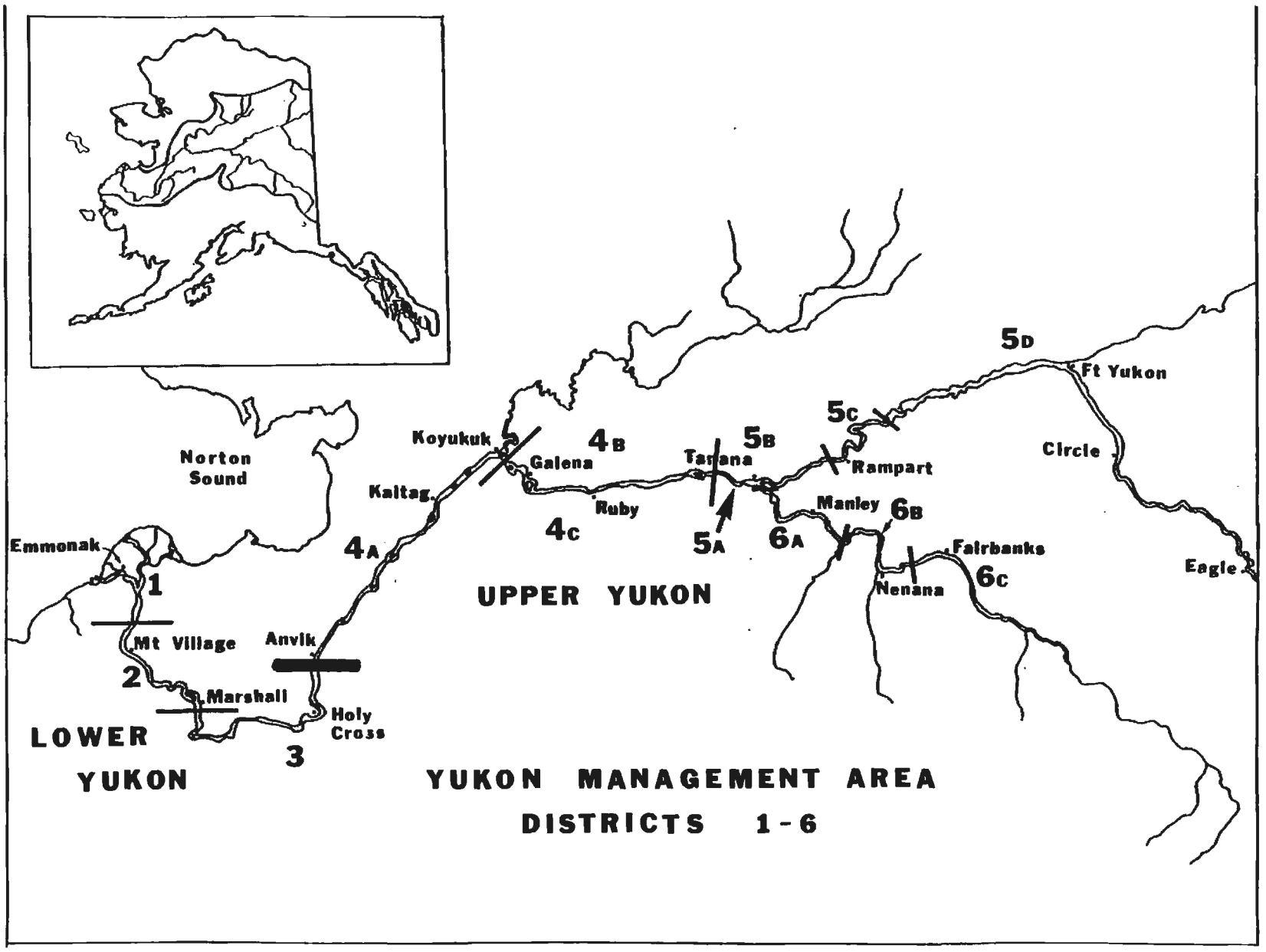

Figure 1. Map of the Alaskan portion of the Yukon River, showing fishing district boundaries.

Table 1. Preliminary estimates of commercial sales of salmon and salmon roe in the Alaska portion of the Yukon River drainage, 1994. a

District Subdist.	No. of Fishermen b	Chinook		Summer Chum		Fall Chum		Coho		Total Salmon	
		Numbers	Roe (lbs)	Numbers	Roe (lbs)	Numbers	Roe (lbs)	Numbers	Roe (lbs)	Numbers	Roe (lbs)
1	414	62,241	–	42,332	–	0	–	0	–	104,573	–
2	250	41,692	–	12,869	–	0	–	0	–	54,561	–
Subtotal	657	103,933	–	55,201	–	0	–	0	–	159,134	–
3	7	1,114	–	35	–	0	–	0	–	1,149	–
Total Lower Yukon	659	105,047	–	55,236	–	0	–	0	–	160,283	–
Anvik River		0	0	0	19,532	0	0	0	0	0	19,532
4–A		0	0	0	65,496	0	0	0	0	0	65,496
4–B,C		2,204	124	3,471	7,780	0	0	0	0	5,675	7,904
Subtotal District 4		2,204	124	3,471	92,808	0	0	0	0	5,675	92,932
5–A,B,C		3,289	0	96	88	0	0	0	0	3,385	88
5–D		450	0	0	0	3,630	0	0	0	4,080	0
Subtotal District 5		3,739	0	96	88	3,630	0	0	0	7,465	88
District 6		2,135	1,821	21,028	7,828	1	3,276	120	5,588	23,284	18,513
Total Upper Yukon		8,078	1,945	24,595	100,724	3,631	3,276	120	5,588	36,424	111,533
Total Yukon Area		113,125	1,945	79,831	100,724	3,631	3,276	120	5,588	196,707	111,533

a Commercial sales reported in numbers of fish sold in the round and pounds of unprocessed roe sold by fishermen.
b Upper Yukon fish tickets have not yet been processed, so number of fishermen not yet available, and catch numbers are based on verbal reports.

Table 2. Commercial sales of salmon and salmon roe in the Alaska portion of the Yukon River drainage, 1961–1994. a

Year	Chinook		Summer Chum		Fall Chum		Coho	
	Numbers	Roe	Numbers	Roe	Numbers	Roe	Numbers	Roe
1961	119,664	–	0	–	42,461	–	2,855	–
1962	94,734	–	0	–	53,116	–	22,926	–
1963	117,048	–	0	–	0	–	5,572	–
1964	93,587	–	0	–	8,347	–	2,446	–
1965	118,098	–	0	–	23,317	–	731	–
1966	93,315	–	0	–	71,045	–	19,254	–
1967	129,656	–	10,935	–	38,274	–	11,047	–
1968	106,526	–	14,470	–	52,925	–	13,303	–
1969	91,027	–	61,966	–	131,310	–	15,720	–
1970	79,145	–	137,006	–	209,595	–	13,778	–
1971	110,507	–	100,090	–	189,594	–	13,226	–
1972	92,840	–	135,668	–	152,176	–	23,465	–
1973	75,353	–	285,509	–	232,090	–	49,644	–
1974	98,089	–	589,892	–	289,776	–	16,777	–
1975	63,838	–	710,295	–	275,009	–	2,546	–
1976	87,776	–	600,894	–	156,390	–	5,184	–
1977	96,757	–	534,875	–	257,986	–	38,863	–
1978	99,168	–	1,052,226	25,761	236,383	10,628	26,152	–
1979	127,673	–	779,316	40,217	359,946	18,466	17,165	–
1980	153,985	–	928,609	139,106	293,430	5,020	8,745	–
1981	156,706	–	1,003,556	189,068	466,451	11,285	23,651	–
1982	123,174	–	460,167	152,819	224,187	805	36,895	–
1983	146,904	–	742,463	149,999	302,598	5,064	13,157	–
1984	118,815	–	586,375	167,224	207,938	2,328	81,826	–
1985	145,476	–	514,900	248,625	267,302	2,525	57,521	–
1986	99,268	–	719,234	271,691	138,688	577	47,162	–
1987	133,558	–	439,854	121,968	0	0	0	–
1988	100,364	–	1,148,650	256,535	133,320	3,227	86,187	–
1989	104,198	–	955,806	288,549	266,206	14,749	81,548	–
1990	95,247	1,731	303,858	109,376	122,010	10,944	41,032	4,042
1991	104,878	3,829	349,113	141,976	230,852	19,395	103,180	4,299
1992	120,245	3,164	332,313	112,996	15,721	2,806	6,556	1,680
1993	93,550	2,014	96,522	22,962	0	0	0	0
1994 b	113,125	1,945	79,831	100,724	3,631	3,276	120	5,588
1989–93 Avg	103,624	–	407,522	135,172	126,958	9,579	46,463	–

a Commercial sales reported in numbers of fish sold in the round and pounds of unprocessed roe sold by fishermen.

b Data for 1994 are preliminary.

Table Canadian weekly commercial catches of chinc and chum salmon in the Yukon River in 1994.

Statistical Week	Week Ending	Start Date	Finish Date	Days Fished	Number Fishing	Boat* Days	Chinook Salmon	Chum Salmon	Coho Salmon
27	02–Jul	27–Jun	27–Jun	0	0	0.0	0	0	
28	09–Jul	04–Jul	06–Jul	2	13	26.0	141	0	
29	16–Jul	13–Jul	16–Jul	3	19	57.0	1772	0	
30	23–Jul	20–Jul	25–Jul *	5	15	75.0	3821	1	
31	30–Jul	27–Jul	01–Aug *	5	14	68.0	2782	8	
32	06–Aug	03–Aug	08–Aug *	5	13	65.0	2225	16	
33	13–Aug	10–Aug	14–Aug *	4	8	31.0	797	9	
34	20–Aug	17–Aug	20–Aug	3	3	7.5	118	13	
35	27–Aug			closed					
36	03–Sep			closed					
37	10–Sep	08–Sep	11–Sep	3	15	45.0	3	7608	
38	17–Sep	14–Sep	17–Sep	3	16	48.0	3	6814	
39	24–Sep	20–Sep	23–Sep	3	13	39.0	2	7032	2
40	01–Oct	25–Sep	28–Sep	3	10	30.0	2	5394	0
41	08–Oct	02–Oct	04–Oct	3	10	30.0	0	3140	
42	15–Oct			closed					
Dawson area subtotal				42		521.5	11666	30035	2
Upriver commercial subtotal							362	0	
Total Commercial Harvest							**12028**	**30035**	**2**
Domestic Harvest							**373**	**0**	**0**
Estimated Recreational Harvest							**300**	**0**	**0**
Aboriginal Harvest (updated Nov. 09)							**7983**	**2990**	**0**
TOTAL UPPER YUKON HARVEST							***20684***	***33025***	***2***
Old Crow AF (updated Nov. 09)							428	658	0

note:

* staggered opening: area upstream of Fourtymile open on "Start Date" indicated and closed day before "Finish Date"; area downstream of Fourtymile open day after "Start Date" and closed on "Finish Date".

ATTACHMENT I
HISTORICAL YUKON RIVER SALMON CATCH AND ESCAPEMENT DATA

Appendix Table 1. Alaskan and Canadian total utilization of Yukon River chinook, chum, and coho salmon, 1903-1994.

	Alaska[a, b]			Canada[c]			Total		
Year	Chinook	Other Salmon	Total	Chinook	Other Salmon	Total	Chinook Salmon	Other Salmon	Total
1903				4,666		4,666	4,666		4,666
1904									
1905									
1906									
1907									
1908				7,000		7,000	7,000		7,000
1909				9,238		9,238	9,238		9,238
1910									
1911									
1912									
1913				12,133		12,133	12,133		12,133
1914				12,573		12,573	12,573		12,573
1915				10,466		10,466	10,466		10,466
1916				9,566		9,566	9,566		9,566
1917									
1918	12,239	1,500,065	1,512,304	7,066		7,066	19,305	1,500,065	1,519,370
1919	104,822	738,790	843,612	1,800		1,800	106,622	738,790	845,412
1920	78,467	1,015,655	1,094,122	12,000		12,000	90,467	1,015,655	1,106,122
1921	69,646	112,098	181,744	10,840		10,840	80,486	112,098	192,584
1922	31,825	330,000	361,825	2,420		2,420	34,245	330,000	364,245
1923	30,893	435,000	465,893	1,833		1,833	32,726	435,000	467,726
1924	27,375	1,130,000	1,157,375	4,560		4,560	31,935	1,130,000	1,161,935
1925	15,000	259,000	274,000	3,900		3,900	18,900	259,000	277,900
1926	20,500	555,000	575,500	4,373		4,373	24,873	555,000	579,873
1927		520,000	520,000	5,366		5,366	5,366	520,000	525,366
1928		670,000	670,000	5,733		5,733	5,733	670,000	675,733
1929		537,000	537,000	5,226		5,226	5,226	537,000	542,226
1930		633,000	633,000	3,660		3,660	3,660	633,000	636,660
1931	26,693	565,000	591,693	3,473		3,473	30,166	565,000	595,166
1932	27,899	1,092,000	1,119,899	4,200		4,200	32,099	1,092,000	1,124,099
1933	28,779	603,000	631,779	3,333		3,333	32,112	603,000	635,112
1934	23,365	474,000	497,365	2,000		2,000	25,365	474,000	499,365
1935	27,665	537,000	564,665	3,466		3,466	31,131	537,000	568,131
1936	43,713	560,000	603,713	3,400		3,400	47,113	560,000	607,113
1937	12,154	346,000	358,154	3,746		3,746	15,900	346,000	361,900
1938	32,971	340,450	373,421	860		860	33,831	340,450	374,281
1939	28,037	327,650	355,687	720		720	28,757	327,650	356,407
1940	32,453	1,029,000	1,061,453	1,153		1,153	33,606	1,029,000	1,062,606
1941	47,608	438,000	485,608	2,806		2,806	50,414	438,000	488,414
1942	22,487	197,000	219,487	713		713	23,200	197,000	220,200
1943	27,650	200,000	227,650	609		609	28,259	200,000	228,259
1944	14,232		14,232	986		986	15,218		15,218
1945	19,727		19,727	1,333		1,333	21,060		21,060
1946	22,782		22,782	353		353	23,135		23,135
1947	54,026		54,026	120		120	54,146		54,146
1948	33,842		33,842				33,842		33,842
1949	36,379		36,379				36,379		36,379
1950	41,808		41,808				41,808		41,808
1951	56,278		56,278				56,278		56,278
1952	38,637	10,868	49,505				38,637	10,868	49,505
1953	58,859	385,977	444,836				58,859	385,977	444,836
1954	64,545	14,375	78,920				64,545	14,375	78,920
1955	55,925		55,925				55,925		55,925
1956	62,208	10,743	72,951				62,208	10,743	72,951
1957	63,623		63,623				63,623		63,623
1958	75,625	337,500	413,125	11,000	1,500	12,500	86,625	339,000	425,625
1959	78,370		78,370	8,434	3,098	11,532	86,804	3,098	89,902
1960	67,597		67,597	9,653	15,608	25,261	77,250	15,608	92,858

continued

Appendix Table 1. (page 2 of 2).

Year	Alaska [a,b]			Canada [c]			Total		
	Chinook	Other Salmon	Total	Chinook	Other Salmon	Total	Chinook Salmon	Other Salmon	Total
1961	141,152	461,597	602,749	13,246	9,076	22,322	154,398	470,673	625,071
1962	105,844	434,663	540,507	13,937	9,436	23,373	119,781	444,099	563,880
1963	141,910	429,396	571,306	10,077	27,696	37,773	151,987	457,092	609,079
1964	109,818	504,420	614,238	7,408	12,187	19,595	117,226	516,607	633,833
1965	134,706	484,587	619,293	5,380	11,789	17,169	140,086	496,376	636,462
1966	104,887	309,502	414,389	4,452	13,192	17,644	109,339	322,694	432,033
1967	146,104	352,397	498,501	5,150	16,961	22,111	151,254	369,358	520,612
1968	118,632	270,818	389,450	5,042	11,633	16,675	123,674	282,451	406,125
1969	105,027	424,399	529,426	2,624	7,776	10,400	107,651	432,175	539,826
1970	93,019	585,760	678,779	4,663	3,711	8,374	97,682	589,471	687,153
1971	136,191	547,448	683,639	6,447	16,911	23,358	142,638	564,359	706,997
1972	113,098	461,617	574,715	5,729	7,532	13,261	118,827	469,149	587,976
1973	99,670	779,158	878,828	4,522	10,135	14,657	104,192	789,293	893,485
1974	118,053	1,229,678	1,347,731	5,631	11,646	17,277	123,684	1,241,324	1,365,008
1975	76,883	1,307,037	1,383,920	6,000	20,600	26,600	82,883	1,327,637	1,410,520
1976	105,582	1,026,908	1,132,490	5,025	5,200	10,225	110,607	1,032,108	1,142,715
1977	114,494	1,090,758	1,205,252	7,527	12,479	20,006	122,021	1,103,237	1,225,258
1978	129,988	1,632,232	1,762,220	5,881	9,566	15,447	135,869	1,641,798	1,777,667
1979	159,232	1,631,450	1,790,682	10,375	22,084	32,459	169,607	1,653,534	1,823,141
1980	197,665	1,730,960	1,928,625	22,846	22,218 [d]	45,064	220,511	1,753,178	1,973,689
1981	188,477	2,097,871	2,286,348	18,109	22,281 [d]	40,390	206,586	2,120,152	2,326,738
1982	152,808	1,265,457	1,418,265	17,208	16,091 [d]	33,299	170,016	1,281,548	1,451,564
1983	198,436	1,678,597	1,877,033	18,952	29,490 [d]	48,442	217,388	1,708,087	1,925,475
1984	162,683	1,548,101	1,710,784	16,795	29,267 [d]	46,062	179,478	1,577,368	1,756,846
1985	187,327	1,657,984	1,845,311	19,301	41,265 [d]	60,566	206,628	1,699,249	1,905,877
1986	146,004	1,758,825	1,904,829	20,364	14,543 [d]	34,907	166,368	1,773,368	1,939,736
1987	188,386	1,246,176	1,434,562	17,614	44,480 [d]	62,094	206,000	1,290,656	1,496,656
1988	148,737	2,316,293	2,465,030	21,427	33,565 [d]	54,992	170,164	2,349,858	2,520,022
1989	157,606	2,274,437	2,432,043	17,944	23,020 [d]	40,964	175,550	2,297,457	2,473,007
1990	149,433	1,046,774	1,196,207	19,238	33,622 [d]	52,860	168,671	1,080,396	1,249,067
1991	154,651	1,319,448	1,474,099	20,607	35,418 [d]	56,025	175,258	1,354,866	1,530,124
1992	168,190	861,291	1,029,481	17,903	20,815 [d]	38,718	186,093	882,106	1,068,199
1993 [f]	160,289	341,494	501,783	16,611	14,090 [d]	30,701	176,900	355,584	532,484
1994 [f,g]	115,274	277,649	392,923	21,112	33,683	54,795	136,386	311,332	447,718

[a] Catch in number of salmon. Includes estimated number of salmon harvested for the commercial production of salmon roe.
[b] Commercial, subsistence, personal-use, and sport catches combined.
[c] Catch in number of salmon. Commercial, Aboriginal, domestic, and sport catches combined.
[d] Includes the Old Crow Aboriginal fishery harvest of coho salmon.
[f] Preliminary.
[g] Does not include Alaskan subsistence, personal-use and sport fish harvests. These harvest numbers are unavailable at this time.

Appendix Table 2. Alaskan and Canadian total utilization of Yukon River chinook and fall chum salmon, 1961-1994.

	Chinook			Fall Chum		
Year	Canada [a]	Alaska [b, c]	Total	Canada [a]	Alaska [b, c]	Total
1961	13,246	141,152	154,398	9,076	144,233	153,309
1962	13,937	105,844	119,781	9,436	140,401	149,837
1963	10,077	141,910	151,987	27,696	99,031 [d]	126,727
1964	7,408	109,818	117,226	12,187	128,707	140,894
1965	5,380	134,706	140,086	11,789	135,600	147,389
1966	4,452	104,887	109,339	13,192	122,548	135,740
1967	5,150	146,104	151,254	16,961	107,018	123,979
1968	5,042	118,632	123,674	11,633	97,552	109,185
1969	2,624	105,027	107,651	7,776	183,373	191,149
1970	4,663	93,019	97,682	3,711	265,096	268,807
1971	6,447	136,191	142,638	16,911	246,756	263,667
1972	5,729	113,098	118,827	7,532	188,178	195,710
1973	4,522	99,670	104,192	10,135	285,760	295,895
1974	5,631	118,053	123,684	11,646	383,552	395,198
1975	6,000	76,883	82,883	20,600	361,600	382,200
1976	5,025	105,582	110,607	5,200	228,717	233,917
1977	7,527	114,494	122,021	12,479	340,757	353,236
1978	5,881	129,988	135,869	9,566	331,250	340,816
1979	10,375	159,232	169,607	22,084	593,293	615,377
1980	22,846	197,665	220,511	22,218	466,087	488,305
1981	18,109	188,477	206,586	22,281	654,976	677,257
1982	17,208	152,808	170,016	16,091	357,084	373,175
1983	18,952	198,436	217,388	29,490	495,526	525,016
1984	16,795	162,683	179,478	29,267	383,055	412,322
1985	19,301	187,327	206,628	41,265	474,216	515,481
1986	20,364	146,004	166,368	14,543	303,485	318,028
1987	17,614	188,386	206,000	44,480	361,663 [d]	406,143
1988	21,427	148,737	170,164	33,565	320,666	354,231
1989	17,944	157,606	175,550	23,020	511,225	534,245
1990	19,238	149,433	168,671	33,622	321,060	354,682
1991	20,607	154,651	175,258	35,418	396,565	431,983
1992	17,903	168,190	186,093	20,815	125,747	146,562
1993 [f]	16,611	160,289 [h]	176,900	14,090	76,860 [d]	90,950
1994 [f]	21,112	115,274 [j]	136,386	33,683	7,999 [j]	41,682
Average						
1961-83	8,967	130,073	139,039	14,334	276,395	290,730
1984-88	19,100	166,627	185,728	32,624	368,617	401,241
1989-93	18,461	158,034 [h]	176,494	25,393	286,291	311,684

[a] Catch in number of salmon. Includes commercial, Aboriginal, domestic, and sport catches combined.
[b] Catch in number of salmon. Includes estimated number of salmon harvested for the commercial production of salmon roe (See 1990 Yukon Area AMR.).
[c] Commercial, subsistence, personal-use, and sport catches combined.
[d] Commercial fishery did not operate.
[f] Preliminary.
[g] Commercial fishery operated only in District 6, the Tanana River.
[h] Does not include sport fish harvest.
[j] Includes only commercial fishery harvest.

Appendix Table 3. Alaskan catch of Yukon River chinook salmon, 1961-1994.

Year	Estimated Subsistence Use[a]	Harvest			
		Subsistence[b]	Commercial[c]	Sport[d]	Total
1961	21,488	21,488	119,664		141,152
1962	11,110	11,110	94,734		105,844
1963	24,862	24,862	117,048		141,910
1964	16,231	16,231	93,587		109,818
1965	16,608	16,608	118,098		134,706
1966	11,572	11,572	93,315		104,887
1967	16,448	16,448	129,656		146,104
1968	12,106	12,106	106,526		118,632
1969	14,000	14,000	91,027		105,027
1970	13,874	13,874	79,145		93,019
1971	25,684	25,684	110,507		136,191
1972	20,258	20,258	92,840		113,098
1973	24,317	24,317	75,353		99,670
1974	19,964	19,964	98,089		118,053
1975	13,045	13,045	63,838		76,883
1976	17,806	17,806	87,776		105,582
1977	17,581	17,581	96,757	156	114,494
1978	30,297	30,297	99,168	523	129,988
1979	31,005	31,005	127,673	554	159,232
1980	42,724	42,724	153,985	956	197,665
1981	29,690	29,690	158,018	769	188,477
1982	28,158	28,158	123,644	1,006	152,808
1983	49,478	49,478	147,910	1,048	198,436
1984	42,428	42,428	119,904	351	162,683
1985	39,771	39,771	146,188	1,368	187,327
1986	45,238	45,238	99,970	796	146,004
1987	53,124	53,124	134,760[f]	502	188,386
1988	46,348	46,348	101,445	944	148,737
1989	51,062	51,062	105,491	1,053	157,606
1990	51,594	51,181	97,708	544	149,433
1991	48,311	46,773	107,105	773	154,651
1992	46,552	45,626	122,133	431	168,190
1993[g]	63,472	62,912	95,682	1,695	160,289
1994[g]	[h]	[h]	115,274	[h]	115,274
Average					
1961-83	22,100	22,100	107,755	716	130,073
1984-88	45,382	45,382	120,453	792	166,627
1989-93	52,198	51,511	105,624	899	158,034

[a] Includes salmon harvested solely for subsistence, plus an estimate of the number of salmon carcasses harvested for the commercial production of salmon roe and used for subsistence. These data are only available since 1990.
[b] Includes salmon harvested solely for subsistence and personal use.
[c] Includes ADF&G test fish sales, fish sold in the round, and estimated numbers of female salmon commercially harvested for the commercial production of salmon roe. (See 1990 Yukon Area AMR).
[d] Sport fish harvest for the Alaskan portion of the Yukon River drainage. The majority of this harvest is believed to have been taken within the Tanana River drainage. (See 1992 Yukon Area AMR).
[f] Includes 653 and 2,136 chinook salmon illegally sold in District 5 and 6 (Tanana River), respectively.
[g] Preliminary.
[h] Data are unavailable at this time.

Appendix Table 4 Canadian catch of Yukon River chinook salmon, 1961-1994

Year	Mainstem Yukon River Harvest						Porcupine River Aboriginal Fishery Harvest	Total Canadian Harvest
	Commercial	Domestic	Aboriginal Fishery	Sport[a]	Combined Non-Commercial	Total		
1961	3,446		9,300		9,300	12,746	500	13,246
1962	4,037		9,300		9,300	13,337	600	13,937
1963	2,283		7,750		7,750	10,033	44	10,077
1964	3,208		4,124		4,124	7,332	76	7,408
1965	2,265		3,021		3,021	5,286	94	5,380
1966	1,942		2,445		2,445	4,387	65	4,452
1967	2,187		2,920		2,920	5,107	43	5,150
1968	2,212		2,800		2,800	5,012	30	5,042
1969	1,640		957		957	2,597	27	2,624
1970	2,611		2,044		2,044	4,655	8	4,663
1971	3,178		3,260		3,260	6,438	9	6,447
1972	1,769		3,960		3,960	5,729		5,729
1973	2,199		2,319		2,319	4,518	4	4,522
1974	1,808	406	3,342		3,748	5,556	75	5,631
1975	3,000	400	2,500		2,900	5,900	100	6,000
1976	3,500	500	1,000		1,500	5,000	25	5,025
1977	4,720	531	2,247		2,778	7,498	29	7,527
1978	2,975	421	2,485		2,906	5,881		5,881
1979	6,175	1,200	3,000		4,200	10,375		10,375
1980	9,500	3,500	7,546	300	11,346	20,846	2,000	22,846
1981	8,593	237	8,879	300	9,416	18,009	100	18,109
1982	8,640	435	7,433	300	8,168	16,808	400	17,208
1983	13,027	400	5,025	300	5,725	18,752	200	18,952
1984	9,885	260	5,850	300	6,410	16,295	500	16,795
1985	12,573	478	5,800	300	6,578	19,151	150	19,301
1986	10,797	342	8,625	300	9,267	20,064	300	20,364
1987	10,864	330	6,069	300	6,699	17,563	51	17,614
1988	13,217	282	7,178	650	8,110	21,327	100	21,427
1989	9,789	400	6,930	300	7,630	17,419	525	17,944
1990	11,324	247	7,109	300	7,656	18,980	258	19,238
1991	10,906	227	9,011	300	9,538	20,444	163	20,607
1992	10,877	277	6,349	300	6,926	17,803	100	17,903
1993 [b]	10,350	243	5,576	300	6,119	16,469	142	16,611
1994 [b]	12,028	373	7,983	300	8,656	20,684	428	21,112
Average								
1961-83	4,127	803	4,246	300	4,647	8,774	221	8,967
1984-88	11,467	338	6,704	370	7,413	18,880	220	19,100
1989-93	10,649	279	6,995	300	7,574	18,223	238	18,461

[a] Sport fish harvest unknown prior to 1980.
[b] Preliminary.
[c] Data are unavailable at this time

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Appendix Table 5. Alaska catch of Yukon River summer chum salmon, 1961-1994.

Year	Estimated Subsistence Use [a]	Harvest			
		Subsistence [b]	Commercial [c]	Sport [d]	Total
1961	305,317 [f]	305,317 [f]	0		305,317
1962	261,856 [f]	261,856 [f]	0		261,856
1963	297,094 [f]	297,094 [f]	0		297,094
1964	361,080 [f]	361,080 [f]	0		361,080
1965	336,848 [f]	336,848 [f]	0		336,848
1966	154,508 [f]	154,508 [f]	0		154,508
1967	206,233 [f]	206,233 [f]	10,935		217,168
1968	133,880 [f]	133,880 [f]	14,470		148,350
1969	156,191 [f]	156,191 [f]	61,966		218,157
1970	166,504 [f]	166,504 [f]	137,006		303,510
1971	171,487 [f]	171,487 [f]	100,090		271,577
1972	108,006 [f]	108,006 [f]	135,668		243,674
1973	161,012 [f]	161,012 [f]	285,509		446,521
1974	227,811 [f]	227,811 [f]	589,892		817,703
1975	211,888 [f]	211,888 [f]	710,295		922,183
1976	186,872 [f]	186,872 [f]	600,894		787,766
1977	159,502	159,502	534,875	316	694,693
1978	197,144	188,303	1,077,987	451	1,266,741
1979	196,187	191,287	819,533	328	1,011,148
1980	272,398	167,705	1,067,715	483	1,235,903
1981	208,284	117,629	1,279,701	612	1,397,942
1982	260,969	117,413	717,013	780	835,206
1983	240,386	149,180	995,469	998	1,145,647
1984	230,747	166,630	866,040	585	1,033,255
1985	264,828	157,744	934,013	1,267	1,093,024
1986	290,825	182,337	1,188,850	895	1,372,082
1987	275,914	174,940	622,541	846	798,327
1988	311,724	202,914	1,620,269	1,037	1,824,220
1989	249,582	168,849	1,463,345	2,131	1,634,325
1990	201,839 [g]	117,811	513,906	472	632,189
1991	275,673 [g]	118,509	653,517	1,037	773,063
1992	231,853 [g]	125,497	545,544	1,308	672,349
1993 [h]	149,010 [g]	105,416	141,985	564	247,965
1994 [h]	[j]	[j]	265,198	[j]	265,198
Average					
1961-83	216,585	197,287	397,349	567	594,808
1984-88	274,808	176,913	1,046,343	926	1,224,182
1989-93	221,591	127,216	663,659	1,102	791,978

[a] Includes salmon harvested solely for subsistence, plus an estimate of the number of salmon carcasses harvested for the commercial production of salmon roe and used for subsistence.
[b] Includes salmon harvested solely for subsistence.
[c] Includes ADF&G test fish sales, fish sold in the round, plus an estimate of the number of salmon commercially harvested for the commercial production of salmon roe. (See 1990 Yukon Area AMR.)
[d] Sport fish harvest for the Alaskan portion of the Yukon River drainage. The majority of this harvest is believed to have been taken within the Tanana River drainage.
[f] Catches of summer chum salmon estimated for 1961-1976 since catches other than chinook salmon were not differentiated by species.
[g] Subsistence harvest plus estimated number of summer chum salmon fed to dogs by District 4 subsistence fishing households.
[h] Preliminary.
[j] Data are unavailable at this time.

Appendix Table 6. Alaska catch of Yukon River fall chum salmon, 1961-1994.

Year	Estimated Subsistence Use[a]	Harvest		
		Subsistence[b]	Commercial[c]	Total
1961	101,772 [f, g]	101,772 [f]	42,461	144,233
1962	87,285 [f, g]	87,285 [f]	53,116	140,401
1963	99,031 [f, g]	99,031 [f]	0	99,031
1964	120,360 [f, g]	120,360 [f]	8,347	128,707
1965	112,283 [f, g]	112,283 [f]	23,317	135,600
1966	51,503 [f, g]	51,503 [f]	71,045	122,548
1967	68,744 [f, g]	68,744 [f]	38,274	107,018
1968	44,627 [f, g]	44,627 [f]	52,925	97,552
1969	52,063 [f, g]	52,063 [f]	131,310	183,373
1970	55,501 [f, g]	55,501 [f]	209,595	265,096
1971	57,162 [f, g]	57,162 [f]	189,594	246,756
1972	36,002 [f, g]	36,002 [f]	152,176	188,178
1973	53,670 [f, g]	53,670 [f]	232,090	285,760
1974	93,776 [f, g]	93,776 [f]	289,776	383,552
1975	86,591 [f, g]	86,591 [f]	275,009	361,600
1976	72,327 [f, g]	72,327 [f]	156,390	228,717
1977	82,771 [g]	82,771 [g]	257,986	340,757
1978	94,867 [g]	84,239 [g]	247,011	331,250
1979	233,347	214,881	378,412	593,293
1980	172,657	167,637	298,450	466,087
1981	188,525	177,240	477,736	654,976
1982	132,897	132,092	224,992	357,084
1983	192,928	187,864	307,662	495,526
1984	174,823	172,495	210,560	383,055
1985	206,472	203,947	270,269	474,216
1986	164,043	163,466	140,019	303,485
1987	361,663	361,663 [h]	0	361,663
1988	159,703	156,476	164,190	320,666
1989	224,046	209,297	301,928	511,225
1990	188,941	177,658	143,402	321,060
1991	161,777	138,411	258,154	396,565
1992	108,619	105,318	20,429 [k]	125,747
1993 [j]	76,860	76,860	0	76,860
1994	[m]	[m]	7,999	7,999
Average				
1961-83	99,595	97,366	179,029	276,395
1984-88	213,341	211,609	157,008	368,617
1989-93	152,049	141,509	144,783	286,291

[a] Includes salmon harvested solely for subsistence, plus an estimate of the number of salmon carcasses harvested for the commercial production of salmon roe and used for subsistence.
[b] Includes salmon harvested solely for subsistence.
[c] Includes ADF&G test fish sales, fish sold in the round, plus an estimate of the number of female salmon commercially harvested for the commercial production of salmon roe. (See 1990 Yukon Area AMR).
[d] Does not include sport-fish harvest. The majority of the sport-fish harvest is believed to be taken in the Tanana River drainage. Sport fish division does not separate the chum salmon harvest into summer or fall chum salmon. The majority of this harvest is believed to be summer chum salmon.
[f] Catches of fall chum salmon estimated for 1961-1976 since catches other than chinook salmon were not differentiated by species.
[g] Minimum estimates of fall chum salmon for 1961-1978 because surveys were conducted prior to the end of the fishing season.
[h] Includes an estimated 95,768 and 119,168 fall chum salmon illegally sold in Districts 5 and 6 (Tanana River), respectively.
[j] Preliminary.
[k] Commercial fishery operated only in District 6, the Tanana River.
[m] Data are unavailable at this time.

Appendix Table 7. Canadian catch of Yukon River fall chum salmon 1961-1994.

Year	Mainstem Yukon River Harvest					Porcupine River Aboriginal Fishery Harvest	Total Canadian Harvest
	Commercial	Domestic	Aboriginal Fishery	Combined Non-Commercial	Total		
1961	3,276		3,800	3,800	7,076	2,000	9,076
1962	936		6,500	6,500	7,436	2,000	9,436
1963	2,196		5,500	5,500	7,696	20,000	27,696
1964	1,929		4,200	4,200	6,129	6,058	12,187
1965	2,071		2,183	2,183	4,254	7,535	11,789
1966	3,157		1,430	1,430	4,587	8,605	13,192
1967	3,343		1,850	1,850	5,193	11,768	16,961
1968	453		1,180	1,180	1,633	10,000	11,633
1969	2,279		2,120	2,120	4,399	3,377	7,776
1970	2,479		612	612	3,091	620	3,711
1971	1,761		150	150	1,911	15,000	16,911
1972	2,532			0	2,532	5,000	7,532
1973	2,806		1,129	1,129	3,935	6,200	10,135
1974	2,544	466	1,636	2,102	4,646	7,000	11,646
1975	2,500	4,600	2,500	7,100	9,600	11,000	20,600
1976	1,000	1,000	100	1,100	2,100	3,100	5,200
1977	3,990	1,499	1,430	2,929	6,919	5,560	12,479
1978	3,356	728	482	1,210	4,566	5,000	9,566
1979	9,084	2,000	11,000	13,000	22,084		22,084
1980	9,000	4,000	3,218	7,218	16,218	6,000	22,218
1981	15,260	1,611	2,410	4,021	19,281	3,000	22,281
1982	11,312	683	3,096	3,779	15,091	1,000	16,091
1983	25,990	300	1,200	1,500	27,490	2,000	29,490
1984	22,932	535	1,800	2,335	25,267	4,000	29,267
1985	35,746	279	1,740	2,019	37,765	3,500	41,265
1986	11,464	222	2,200	2,422	13,886	657	14,543
1987	40,591	132	3,622	3,754	44,345	135	44,480
1988	30,263	349	1,882	2,231	32,494	1,071	33,565
1989	17,549	100	2,462	2,562	20,111	2,909	23,020
1990	27,537	0	3,675	3,675	31,212	2,410	33,622
1991	31,404	0	2,438	2,438	33,842	1,576	35,418
1992	18,576	0	304	304	18,880	1,935	20,815
1993 [a]	7,762	0	4,660	4,660	12,422	1,668	14,090
1994 [a]	30,035	0	2,990	2,990	33,025	658	33,683
Average							
1961-83	4,924	1,689	2,624	3,244	8,168	6,447	14,334
1984-88	28,199	303	2,249	2,552	30,751	1,873	32,624
1989-93	20,566	20	2,708	2,728	23,293	2,100	25,393

[a] Preliminary.
[b] Data are unavailable at this time.

Appendix Table 8. Alaska catch of Yukon River coho salmon, 1961-1994.

Year	Estimated Subsistence Use[a]	Harvest			
		Subsistence[b]	Commercial[c]	Sport[d]	Total
1961	9,192 [f,g]	9,192 [f,g]	2,855		12,047
1962	9,480 [f,g]	9,480 [f,g]	22,926		32,406
1963	27,699 [f,g]	27,699 [f,g]	5,572		33,271
1964	12,187 [f,g]	12,187 [f,g]	2,446		14,633
1965	11,789 [f,g]	11,789 [f,g]	350		12,139
1966	13,192 [f,g]	13,192 [f,g]	19,254		32,446
1967	17,164 [f,g]	17,164 [f,g]	11,047		28,211
1968	11,613 [f,g]	11,613 [f,g]	13,303		24,916
1969	7,776 [f,g]	7,776 [f,g]	15,093		22,869
1970	3,966 [f,g]	3,966 [f,g]	13,188		17,154
1971	16,912 [f,g]	16,912 [f,g]	12,203		29,115
1972	7,532 [f,g]	7,532 [f,g]	22,233		29,765
1973	10,236 [f,g]	10,236 [f,g]	36,641		46,877
1974	11,646 [f,g]	11,646 [f,g]	16,777		28,423
1975	20,708 [f,g]	20,708 [f,g]	2,546		23,254
1976	5,241 [f,g]	5,241 [f,g]	5,184		10,425
1977	16,333 [g]	16,333 [g]	38,863	112	55,308
1978	7,787 [g]	7,787 [g]	26,152	302	34,241
1979	9,794	9,794	17,165	50	27,009
1980	20,158	20,158	8,745	67	28,970
1981	21,228	21,228	23,680	45	44,953
1982	35,894	35,894	37,176	97	73,167
1983	23,905	23,905	13,320	199	37,424
1984	49,020	49,020	81,940	831	131,791
1985	32,264	32,264	57,672	808	90,744
1986	34,468	34,468	47,255	1,535	83,258
1987	84,894	84,894 [h]	0	1,292	86,186
1988	69,080	69,080	99,907	2,420	171,407
1989	41,583	41,583	85,493	1,811	128,887
1990	47,896	44,641	46,937	1,947	93,525
1991	40,894	37,388	109,657	2,775	149,820
1992	53,344	51,921	9,608 [k]	1,666	63,195
1993 [j]	15,772	15,772	0	897	16,669
1994 [j]	[m]	[m]	4,452	[m]	4,452
Average					
1961-83	14,410	14,410	15,944	109	30,392
1984-88	53,945	53,945	57,355	1,377	112,677
1989-93	39,898	38,261	50,339	1,819	90,419

[a] Includes salmon harvested solely for subsistence, plus an estimate of the number of salmon carcasses harvested for the commercial production of salmon roe and used for subsistence. These data are available only since 1990.
[b] Includes salmon harvested solely for subsistence.
[c] Includes ADF&G test fish sales, fish sold in the round, plus an estimate of the numbers of female salmon commercially harvested for the commercial production of salmon roe. (See 1990 Yukon Area AMR).
[d] Sport fish harvest for the Alaskan portion of the Yukon River drainage. The majority of this harvest is believed to have been taken within the Tanana River drainage.
[f] Catches of coho salmon estimated for 1961-1976 since catches other than chinook salmon were not differentiated by species.
[g] Minimum estimates of coho salmon for 1961-1978 because surveys were conducted prior to the end of the fishing season.
[h] Includes an estimated 5,015 and 31,276 coho salmon illegally sold in Districts 5 and 6 (Tanana River), respectively.
[j] Preliminary.
[k] Commercial fishery operated only in District 6, the Tanana River.
[m] Data are unavailable at this time.

Appendix Table 9. Chinook salmon escapement counts for selected Alaskan spawning stocks in the Yukon River drainage, 19[a]

	Andreafsky River			Anvik River		Nulato River			Gisasa River		Chena River			Salcha River		
	East Fork		West	Aerial		Aerial		Mainstem			Pop. Est.	Aerial		Pop. Est	Aerial	
Year	Aerial	Tower or Weir Cnt	Fork Aerial	River[b]	Index Area[b]	North Fork[c]	South Fork	Tower Counts	Aerial	Weir	or Tower Counts	River	Index Area[d]	or Tower Counts	River	Index Area[f]
1961	1,003			1,226		376 g	167		266 g						2,878	
1962	675 g		762 g									61 g h			937	
1963												137 g				
1964	867		705												450	
1965			344 g	650 g											408	
1966	361		303	638											800	
1967			276 g	336 g												
1968	380		383	310 g											739	
1969	274 g		231 g	296 g											461 g	
1970	665		574 g	368								6 g			1,882	
1971	1,904		1,682									193 g h			158 g	
1972	798		582 g	1,198								138 g h			1,193	1,034
1973	825		788	613								21 g			391	352 j
1974			285	471 g		55 g	23 g		161			1,016 h	959 h		1,857	1,620
1975	993		301	730		123	81		385			316 h	262 h		1,055	950 j
1976	818		643	1,053		471	177		332			531	496		1,641	1,473
1977	2,008		1,499	1,371		286	201		255			563			1,202	1,052
1978	2,487		1,062	1,324		498	422		45 g			1,726			3,499	3,258
1979	1,180		1,134	1,484		1,093	414		484			1,159 g			4,789	4,310 j
1980	958 g		1,500	1,330	1,192	954 g	369 g		951			2,541			6,757	6,126
1981	2,146 g		231 g	807 g	577 g		791					600 g			1,237	1,121
1982	1,274		851						421			2,073			2,534	2,346
1983				653 g	376 g	526	480		572			2,553	2,336		1,961	1,803
1984	1,573 g		1,993	641 g	574 g							501	494		1,031	906
1985	1,617		2,248	1,051	720	1,600	1,180		735			2,553	2,262		2,035	1,860
1986	1,954	1,530 k	3,158	1,118	918	1,452	1,522		1,346		9,065 m	2,031	1,935		3,368	3,031 j
1987	1,608	2,011 k	3,281	1,174	879	1,145	493		731		6,404 m	1,312	1,209	4,771 m	1,898	1,671
1988	1,020	1,339 k	1,448	1,805 l	1,449	1,061	714		797		3,346 m	1,966	1,760	4,562 m	2,761	2,553
1989	1,399		1,089	442 g	212 g						2,666 m	1,280	1,185	3,294 m	2,333	2,136
1990	2,503		1,545	2,347	1,595	568 g	430 g, n		884 g		5,603 m	1,436	1,402	10,728 m	3,744	3,429
1991	1,938		2,544	875 g	625 g	767	1,253		1,690		3,025 m	1,277 g	1,277 g	5,608 m	2,212 g	1,925 g
1992	1,030 g		2,002 g	1,536	931	348	231		910		5,230 m	825 g	799 g	7,862 m	1,484 g	1,436 g
1993	5,855		2,765	1,720	1,526	1,844	1,181		1,573		12,241 k	2,943	2,660	10,007 k	3,636	3,562
1994 v	300 g	7,801 p, r	213 g		913 g			1,633 s	2,775	2,888 p t	12,006 k	1,570	1,570	18,376 k	11,823	11,189
E.O.w	>1,500		>1,400	>1,300x	>500x	>800	>500		>600				>1,700			>2,500

[a] Data obtained by aerial survey unless otherwise noted. Only peak counts are listed. Survey rating is fair to good, unless otherwise noted. Latest table revision: November 16, 1994.
[b] From 1961-1970, river count data are from aerial surveys of various segments of the mainstem Anvik River. From 1972-1979, counting tower operated; mainstem aerial survey counts below the tower were added to tower counts. From 1980-present, aerial survey counts for the river are best available minimal estimates for the entire Anvik River drainage. Index area counts are from the mainstem Anvik River between the Yellow River and McDonald Creek.
[c] Includes mainstem counts below the confluence of the North and South Forks, unless otherwise noted.
[d] Chena River index area for assessing the escapement objective is from Moose Creek Dam to Middle Fork River.
[f] Salcha River index area for assessing the escapement objective is from the TAPS crossing to Caribou Creek.
[g] Incomplete and/or poor survey conditions resulting in minimal or inaccurate counts.
[h] Boat survey.
[j] Data unavailable for index area. Calculated from historic (1972-91) average ratio of index area counts to total river counts (0.90:1.0).
[k] Tower Counts.
[m] Population estimate.
[n] Mainstem counts below the confluence of the North and South Forks Nulato River included in the South Fork counts.
[p] Weir Counts.
[r] Weir installed on June 29; first full day of counts June 30.
[s] Tower counts delayed until June 29 because of high, turbid water. First full day of counts occurred on June 30.
[t] Weir installed on July 11; first full day of counts July 12.
[v] Preliminary.
[w] Interim escapement objectives. Established March, 1992.
[x] Interim escapement objective for the entire Anvik River drainage is 1,300 salmon. Interim escapement objective for mainstem Anvik River between the Yellow River and McDonald Creek is 500 salmon.

Appendix Table 10. Chinook salmon escapement counts for selected spawning areas in the Canadian portion of the Yukon River drainage, 1961-1994.

Year	Tincup Creek	Tatchun River[a,b]	Little Salmon River	Big Salmon River[c]	Nisutlin River[d]	Ross River[f]	Wolf River[g]	Whitehorse Fishway[h]	Canada Mainstem Tagging Estimate[j]
1961								1,068	
1962								1,500	
1963								483	
1964								595	
1965								903	
1966		7[k]						563	
1967								533	
1968			173[k]	857[k]	407[k]	104[k]		414	
1969			120	286	105			334	
1970		100		670	615		71[k]	625	
1971		130	275	275	650		750	856	
1972		80	126	415	237		13	391	
1973		99	27[k]	75[k]	36[k]			224	
1974		192		70[k]	48[k]			273	
1975		175		153[k]	249		40[k]	313	
1976		52		86[k]	102			121	
1977		150	408	316[k]	77			277	
1978		200	330	524	375			725	
1979		150	489[k]	632	713		183[k]	1,184	
1980		222	286[k]	1,436	975		377	1,383	
1981		133	670	2,411	1,626	949	395	1,555	
1982		73	403	758	578	155	104	473	19,790
1983	100	264	101[k]	540	701	43[k,n]	95	905	28,989
1984	150	153	434	1,044	832	151[k]	124	1,042	27,616[m]
1985	210	190	255	801	409	23[k]	110	508	10,730
1986	228	155	54[k]	745	459[k]	72[n]	109	557	16,415
1987	100	159	468	891	183	180[k]	35	327	13,260
1988	204	152	368	765	267	242	66	405	23,118
1989	88	100	862	1,662	695	433[p]	146	549	25,201
1990	83	643	665	1,806	652	457[k]	188	1,407	37,699
1991			326	1,040		250	201[r]	1,266	20,743
1992	73	106	494	617	241	423	110[r]	758	25,497
1993		183	184	572	339	400	168[r]	668	28,558
1994[s]	101[k]	477	726	1,764	389	506	393[r]	1,577	25,027
E.O.									33,000 - 43,000[t]

[a] Data obtained by aerial survey unless otherwise noted. Only peak counts are listed. Survey rating is fair to good, unless otherwise noted. Latest table revision: November 23, 1994.
[b] All foot surveys except 1978 (boat survey) and 1986 (aerial survey).
[c] For 1968, 1970, and 1971 counts are from mainstem Big Salmon River. For all other years counts are from the mainstem Big Salmo River between Big Salmon Lake and the vicinity of Souch Creek.
[d] One Hundred Mile Creek to Sidney Creek.
[f] Big Timber Creek to Lewis Lake.
[g] Wolf Lake to Red River.
[h] Includes 50, 90, 292, 506, 243, 288 fin-clipped hatchery-origin salmon in 1988, 1989, 1990, 1991, 1992, and 1993, respectively.
[j] Estimated total spawning escapement excluding Porcupine River (estimated border escapement minus the Canadian catch).
[k] Incomplete and/or poor survey conditions resulting in minimal or inaccurate counts.
[m] Estimate derived by dividing the annual 5-area (Whitehorse Fishway, Big Salmon, Nisutlin, Wolf, Tatchun) count by the average proportion of the annual 5-area index count to the estimated spawning escapements from the DFO tagging study for years 1982, 1983, and 1985-1989.
[n] Information on area surveyed is unavailable.
[p] Counts are for Big Timber Creek to Sheldon Lake.
[r] Counts are for Wolf Lake to Fish Lake outlet.
[s] Preliminary. Area surveyed unknown.
[t] Interim escapement objective. Stabilization escapement objective for years 1990 - 1995 is 18,000 salmon.

Appendix Table 11. Summer chum salmon escapement counts for selected spawning areas in the Yukon River drainage, 1973-1994

Year	Andreafsky River East Fork Aerial [a]	Andreafsky River East Fork Sonar, Tower, or Weir Cnts	Andreafsky River West Fork [a]	Anvik River Tower & Aerial [b]	Anvik River Sonar	Rodo River [a]	Kaltag Cr. Tower Counts	Nulato River Aerial South Fork	Nulato River Aerial North Fork [c]	Nulato River Mainstem Tower Counts	Gisasa River Aerial	Gisasa River Weir	Hogatza River [a] (Clear & Caribou Creeks)	Tozitna River [a]	Chena River Aerial	Chena River Tower	Salcha River Aerial	Salcha River Tower
1973	10,149 [d]		51,835	86,665 [d]											79 [d]		290	
1974	3,215 [d]		33,578	201,277		16,137		29,016	29,334		22,022			1,823	4,349		3,510	
1975	223,485		235,954	845,485		25,335		51,215	87,280		56,904		22,355	3,512	1,670		7,573	
1976	105,347		118,420	406,166		38,258		9,230 [d]	30,771		21,342		20,744	725 [d]	685		6,484	
1977	112,722		63,120	262,854		16,118		11,385	58,275		2,204 [d]		10,734	761 [d]	610		677 [d]	
1978	127,050		57,321	251,339		17,845		12,821	41,659		9,280 [d]		5,102	2,262	1,609		5,405	
1979	66,471		43,391	81,830 [d]	280,537			1,506	35,598		10,962		14,221		1,025 [d]		3,060	
1980	36,823 [d]		114,759		492,676			3,702 [d]	11,244 [d]		10,388		19,786	580	338		4,140	
1981	81,555	147,312 [g]			1,486,182			14,348							3,500		8,500	
1982	7,501 [d]	181,352 [g]	7,267 [d]		444,581						334 [d]		4,984 [d]	874	1,509		3,756	
1983		110,608 [g]			362,912			1,263 [d]	19,749		2,356 [d]		28,141	1,604	1,097		716 [d]	
1984	95,200 [d]	70,125 [g]	238,565		891,028								184 [d]		1,861		9,810	
1985	66,146		52,750		1,080,243	24,576		10,494	19,344		13,232		22,566	1,030	1,005		3,178	
1986	83,931	167,614 [h]	99,373		1,189,602			16,848	47,417		12,114			1,778	1,509		8,028	
1987	6,687 [d]	45,221 [h]	35,535		455,876			4,094	7,163		2,123		5,669 [d]		333		3,657	
1988	43,056	68,937 [h]	45,432		1,125,449	13,872		15,132	26,951		9,284		6,890	2,983	432		2,889 [d]	
1989	21,460 [d]				636,906										714 [d]		1,574 [d]	
1990	11,519 [d]		20,426 [d]		403,627	1,941 [d]		3,196 [d, i]	1,419 [d]		450 [d]		2,177 [d]	36	245 [d]		450 [d]	
1991	31,886		46,657		847,772	3,977		13,150	12,491		7,003		9,947	93	115 [d]		154 [d]	
1992	11,308 [d]		37,808 [d]		775,626	4,465		5,322	12,358		9,300		2,986	794	848 [d]		3,222	
1993	10,935 [d]		9,111 [d]		517,409	7,867		5,486	7,698		1,581			970	168	5,487	212	5,563
1994 [y]		200,981 [n, p]			1,128,924		47,615			144,552 [f]	6,827	51,116 [s]			1,137	10,108	4,679	39,343
E.O. [t]	>109,000		>116,000		>500,000 [v]				>53,000 [x]				>17,000 [x]				>3,500	

[a] Data obtained by aerial survey unless otherwise noted Only peak counts are listed. Latest table revision November 16, 1994.
[b] From 1972-1979 counting tower operated; mainstem aerial survey counts below the tower were added to tower counts
[c] Includes mainstem counts below the confluence of the North and South Forks, unless otherwise noted
[d] Incomplete survey and/or poor survey timing or conditions resulted in minimal or inaccurate count.
[f] Boat survey
[g] Sonar count.
[h] Tower count.
[j] Mainstem counts below the confluence of the North and South Forks Nulato River included in the South Fork counts.
[k] Tower Count
[n] Weir Count
[p] Weir installed on June 29. First full day of counts occurred on June 30.
[r] Tower counts delayed until June 29 because of high, turbid water. First full day of counts occurred on June30
[s] Weir installed on July 11. First full day of counts occurred on July 12
[t] Interim escapement objective.
[v] The Anvik River Escapement Objective was rounded upward to 500,000 from 487,000 in March, 1992
[w] Interim escapement objective for North Fork Nulato River only
[x] Consists of Clear and Caribou Creeks interim escapement objectives of 9,000 and 8,000, respectively
[y] Preliminary.

Appendix Table 12. Fall chum salmon escapement counts for selected spawning areas in Alaskan and Canadian portions of the Yukon River drainage, 1971-1994 [a]

Year	Alaska				Canada					
	Toklat River[b]	Delta River[c]	Chandalar River[d]	Sheenjek River[d,f]	Fishing Branch River[g]	Mainstem Yukon River Index[g,h]	Koidern River[g]	Kluane River[g,j]	Teslin River[g,k]	Mainstem Tagging Estimate[m]
1971					312,800					
1972		5,384			35,125 [n]			198 [p,r]		
1973		10,469			15,989 [s]	383		2,500		
1974	41,798	5,915		89,966 [t]	32,525 [s]			400		
1975	92,265	3,734 [v]		173,371 [t]	353,282 [s]	7,671		362 [r]		
1976	52,891	6,312 [v]		26,354 [t]	36,584			20		
1977	34,887	16,876 [v]		45,544 [t]	88,400			3,555		
1978	37,001	11,136		32,449 [t]	40,800			0 [r]		
1979	158,336	8,355		91,372 [t]	119,898			4,640 [r]		
1980	26,346	5,137		28,933 [t]	55,268			3,150		
1981	15,623	23,508		74,560	57,386 [w]			25,806		
1982	3,624	4,235		31,421	15,901	1,020 [x]		5,378		31,958
1983	21,869	7,705		49,392	27,200	7,560		8,578 [r]		90,875
1984	16,758	12,411		27,130	15,150	2,800 [y]	1,300	7,200	200	56,633 [z]
1985	22,750	17,276 [v]		152,768	56,016 [s]	10,760	1,195	7,538	356	62,010
1986	17,976	6,703 [v]	59,313	84,207 [aa]	31,723 [s]	825	14	16,686	213	87,940
1987	22,117	21,180	52,416	153,267 [aa]	48,956 [s]	6,115	50	12,000		80,776
1988	13,436	18,024	33,619	45,206 [aa]	23,597 [s]	1,550	0	6,950	140	36,786
1989	30,421	21,342 [v]	69,161	99,116 [aa]	43,834 [s]	5,320	40	3,050	210 [p]	35,750
1990	34,739	8,992 [v]	78,631	77,750 [aa]	35,000 [ab]	3,651	1	4,683	739	51,755
1991	13,487	32,905 [v]		86,496 [ac]	37,733 [s]	2,426	53	11,675	468	78,461
1992	14,070	8,893 [v]		78,808 [ac]	22,517 [s]	4,438	4	3,339	450	49,082
1993	27,838	19,857		42,922 [ac]	28,798 [s]	2,620	0	4,610	555	29,868
1994 [ad]	73,867	23,300 [af]		153,000 [ac]	65,247 [s]	1,429 [p]	20 [p]	10,734	209 [p]	104,676
E.O. [ag]	> 33,000	> 11,000		> 64,000 [ah]	50,000 - 120,000					> 80,000

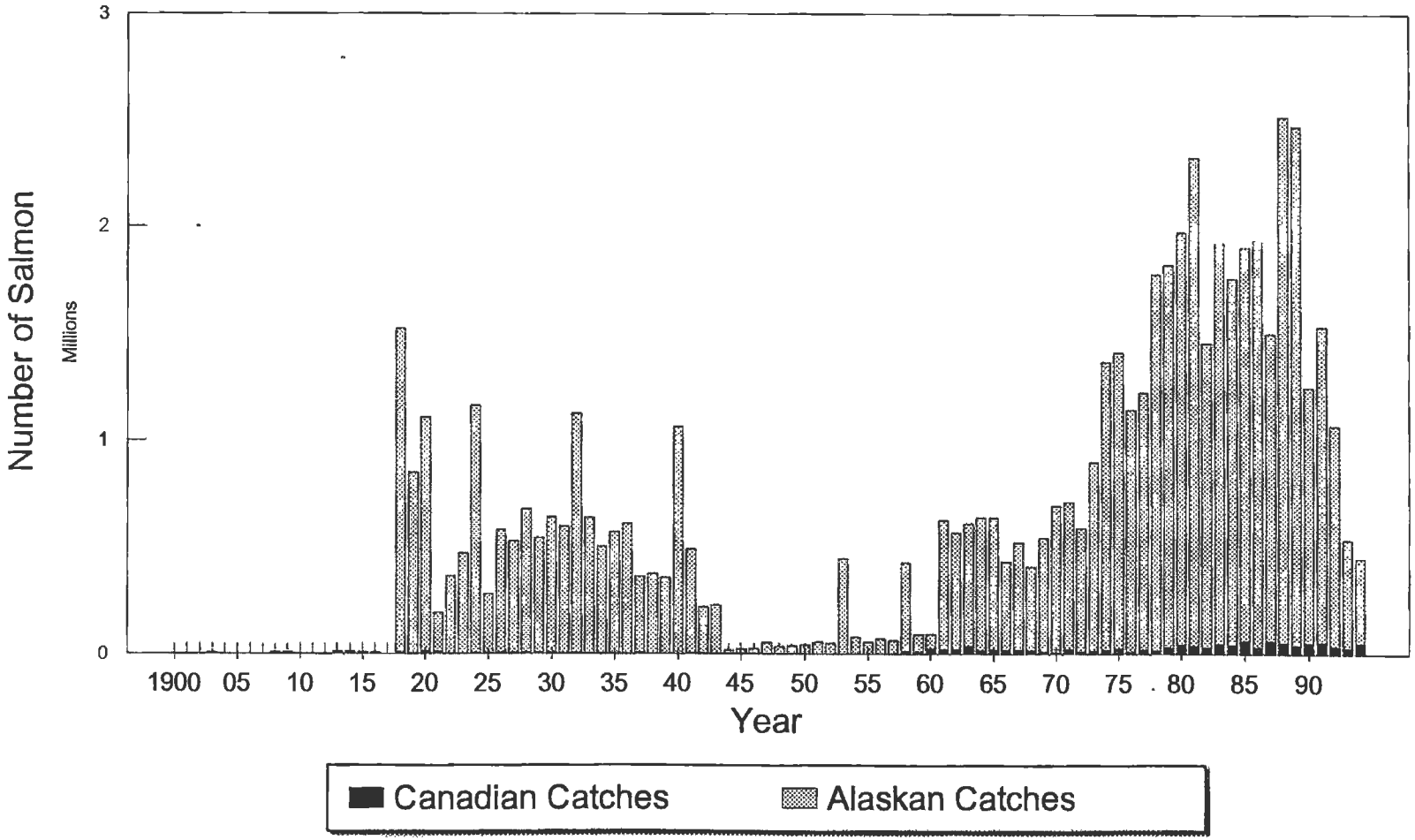
continued

[a] Latest table revision November, 22 1994.
[b] Expanded total abundance estimates for upper Toklat River index area using stream life curve (SLC) developed with 1987-1993 data. Index area includes Geiger Creek, Sushana River, and mainstem floodplain sloughs from approximately 0.25 mile upstream of roadhouse to approximately 1.25 mile downstream of roadhouse.
[c] Estimates are a total spawner abundance, generally from using spawner abundance curves and streamlife data.
[d] Side-scan sonar estimate, unless otherwise indicated.
[f] Within the Canadian Porcupine River drainage. Total escapement estimated using weir to aerial survey expansion factor of 2.72, unless otherwise indicated.
[g] Aerial survey count unless otherwise indicated.
[h] Tatchun Creek to Fort Selkirk.
[j] Duke River to end of spawning sloughs below Swede Johnston Creek.
[k] Boswell Creek area (5 km below to 5 km above confluence).
[m] Excludes Fishing Branch River escapement (estimated border passage minus Canadian removal).
[n] Weir installed on September 22. Estimate consists of a weir count of 17,190 after September 22, and a tagging passage estimate of 17,935 prior to weir installation.
[p] Incomplete and/or poor survey conditions resulting in minimal or inaccurate counts.
[r] Foot survey
[s] Weir count.
[t] Total escapement estimate using sonar to aerial survey expansion factor of 2.22.
[v] Population estimate from replicate foot surveys and stream life data.
[w] Initial aerial survey count was doubled before applying the weir/aerial expansion factor of 2.72 since only half of the spawning area was surveyed.
[x] Boat survey.
[y] Total index area not surveyed. Survey included the mainstem Yukon River between Yukon Crossing to 30 km below Fort Selkirk.
[z] Escapement estimate based on mark-recapture program unavailable. Estimate based on assumed average exploitation rate.
[aa] Expanded estimates for period approximating second week August through middle fourth week September, using Chandalar River run timing data.
[ab] Weir was not operated. Although only 7,541 chum salmon were counted on a single survey flown October 26, a population estimate of approximately 27,000 fish was made through date of survey, based upon historic average aerial-to-weir expansion of 28%. Actual population of spawners was reported by DFO as between 30,000 - 40,000 fish considering aerial survey timing.
[ac] Total abundance estimates are for the period approximating second week August through middle fourth week of September . Comparatively escapement estimates prior to 1986 are considered more conservative; approximating the period of end of August through middle week of September.
[ad] Preliminary.
[af] Preliminary final estimate using Delta River MTD curve; based upon a ground count of 16,131 chums observed on October 25, 1994.
[ag] Interim escapement objective.
[ah] Based on escapement estimates for years 1974-1990.

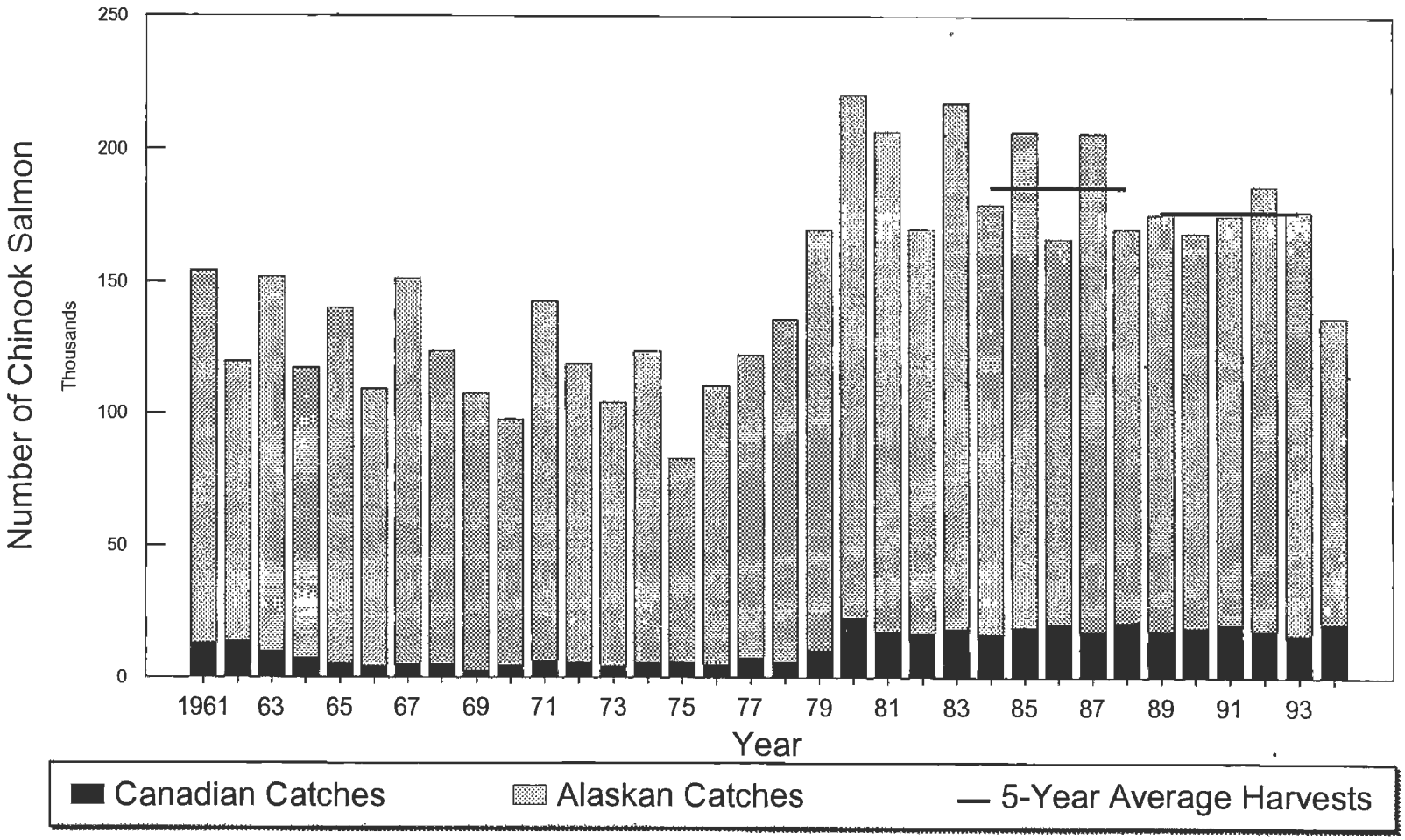
Appendix Table 13. Coho salmon escapement counts for selected spawning areas in the Yukon River drainage, 1972-1994 [a]

	Andreafsky River			Kantishna River		Nenana River Drainage						
Year	East Fork	West Fork	Anvik River	Geiger Creek	Barton Creek	Lost Slough	Nenana Mainstem [b]	Wood Creek [c]	Seventeen Slough	Delta Clearwater River [f, g]	Clearwater Lake and Outlet	Richardson Clearwater River
1972										630	417	454 [k]
1973										3,322	551 [l]	375 [f]
1974						1,388			27	3,954 [j]	560	652 [f]
1975						943			956	5,100	1,575 [f, h]	4 [k]
1976			467 [k]	25 [j]		118			281	1,920	1,500 [f, h]	80 [k]
1977			81 [k]	60		524		310 [b]	1,167	4,793	730 [f, h]	327
1978						350		300 [b]	466	4,798	570 [f, h]	
1979						227			1,987	8,970	1,015 [f, h]	372
1980				3 [j]		499		1,603 [b]	592	3,946	1,545 [f, h]	611
1981	1,657 [k]					274		849 [n, r]	1,005	8,563 [p]	459 [k]	550
1982				81				1,436 [n, r]		8,365 [p]		
1983				42		766		1,042 [n]	103	8,019 [p]	253	88
1984				20 [j]		2,677		8,826 [n]		11,061	1,368	428
1985				42 [j]		1,584		4,470 [n]	2,081	5,358	750	
1986				5	496	794		1,664 [n]	218 [d, h]	10,857	3,577	146 [k]
1987				1,175		2,511		2,387 [n]	3,802	22,300	4,225 [f, h]	
1988	1,913	830	1,203	159	437	348		2,046 [n]		21,600	825 [f, h]	
1989				155	12 [k]			412 [n]	824 [k]	11,000	1,600 [f, h]	483
1990				211		688	1,308		15 [k]	8,325	2,375 [f, h]	
1991				427	467 [k]	564	447		52	23,900	3,150 [f, h]	
1992				77	55 [k]	372			490	3,963	229 [f, h]	500 [f]
1993				138	141	484	419	666 [n, s]	581	10,875	3,525 [f, h]	
1994 [l]				410	2,000 [n, w]	944	1,647	1,317 [n, x]	2,909	62,675 [y]	3,425 [f, h]	5,800 [f]
E.O.										>9,000 [u]		

[a] Only peak counts presented. Survey rating is fair to good, unless otherwise noted. Latest table revision: November 29, 1994.
[b] Foot survey.
[c] Mainstem Nenana River between confluences of Lost Slough and Teklanika River.
[d] Surveyed by F.R.E.D.
[f] Surveyed by Sport Fish Division.
[g] Boat survey counts in the lower 17.5 river miles, unless otherwise indicated.
[h] Boat Survey.
[j] Aerial survey.
[k] Poor survey.
[n] Weir count.
[p] Expanded estimate based on partial survey counts and historic distribution of spawners from 1977-1980.
[r] Coho weir was operated at the mouth of Clear Creek (Shores Landing).
[s] Weir project terminated on October 4. Weir normally operated until mid to late October.
[l] Preliminary.
[u] Interim escapement objective established March, 1993, based on boat survey counts of coho salmon in the lower 17.5 river miles during the period October 21-27.
[w] A total of 298 coho salmon were passed between September 11 and October 4. However, it was estimated that 1,500 to 2,000 coho salmon passed the weir site within a 24-hour period beginning at approximately noon on October 4. Weir operated from August 18 through morning of October 5, 1994.
[x] Weir project terminated September 27. Weir normally operated until mid-October.
[y] An additional 17,565 coho salmon were counted by helicopter in the Delta Clearwater outside of the normal mainstem index area.



Appendix Figure 1. Total utilization of chinook, chum, and coho salmon, Yukon River, 1900-1994. The 1994 Alaskan harvest only includes commercial catch data.



Appendix Figure 2. **Total utilization of chinook salmon, Yukon River, 1961-1994. The 1994 Alaskan harvest only includes commercial catch data. Horizontal lines indicate 5-year average harvests.**

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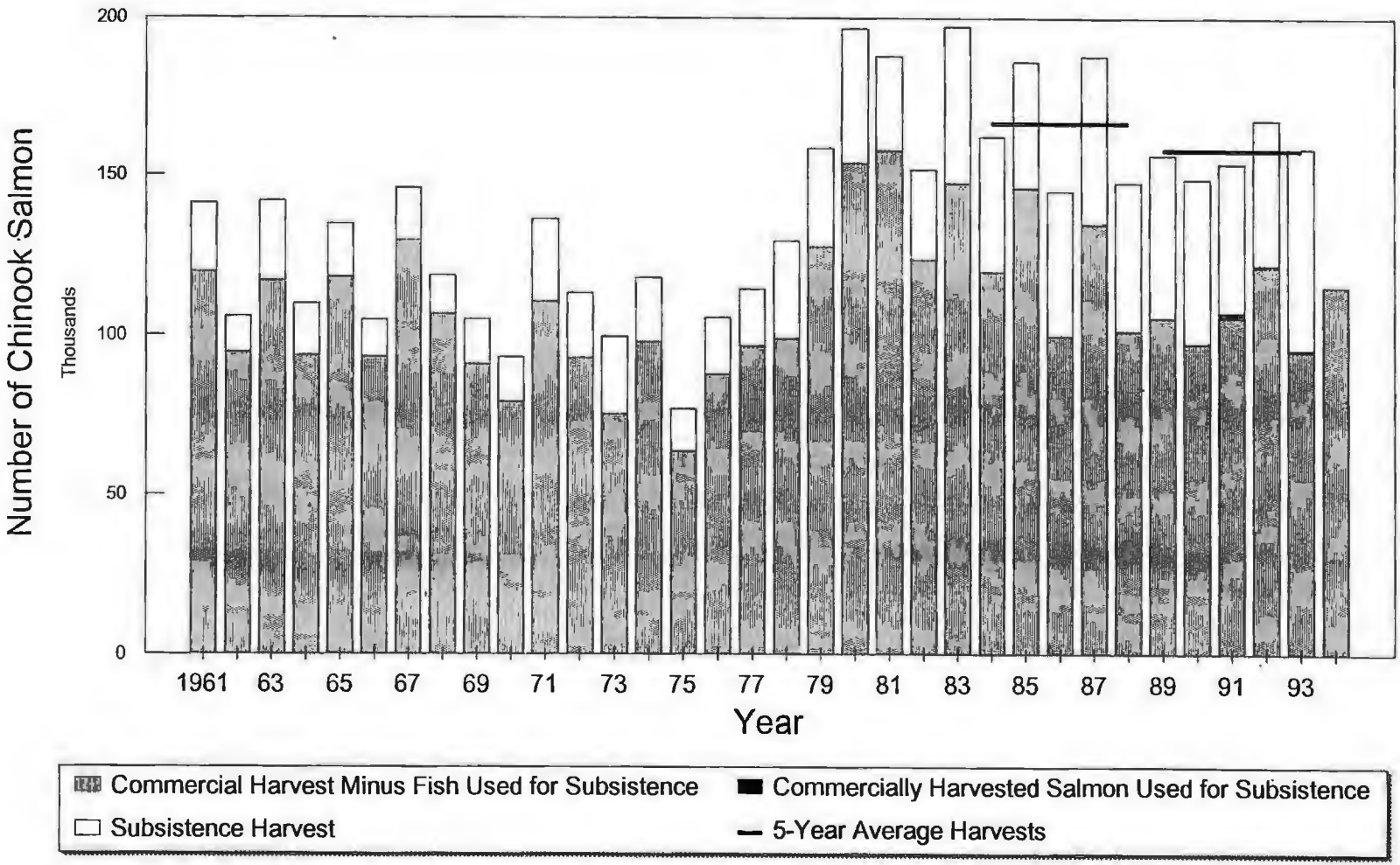

Appendix Figure 3. Alaskan harvest of chinook salmon, Yukon River, 1961-1994. The 1994 harvest only includes commercial catch data. Horizontal lines indicate 5-year average harvests.

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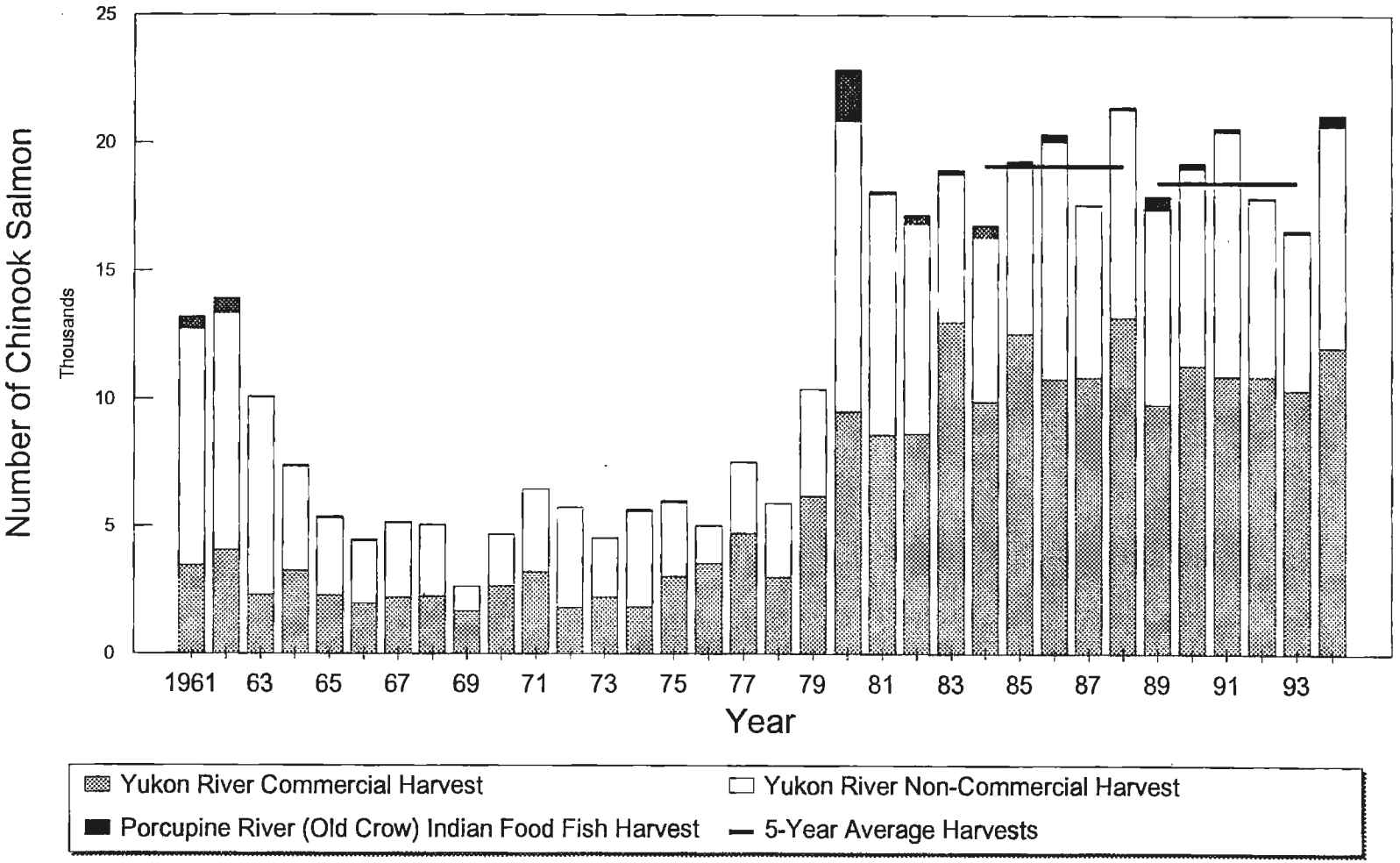
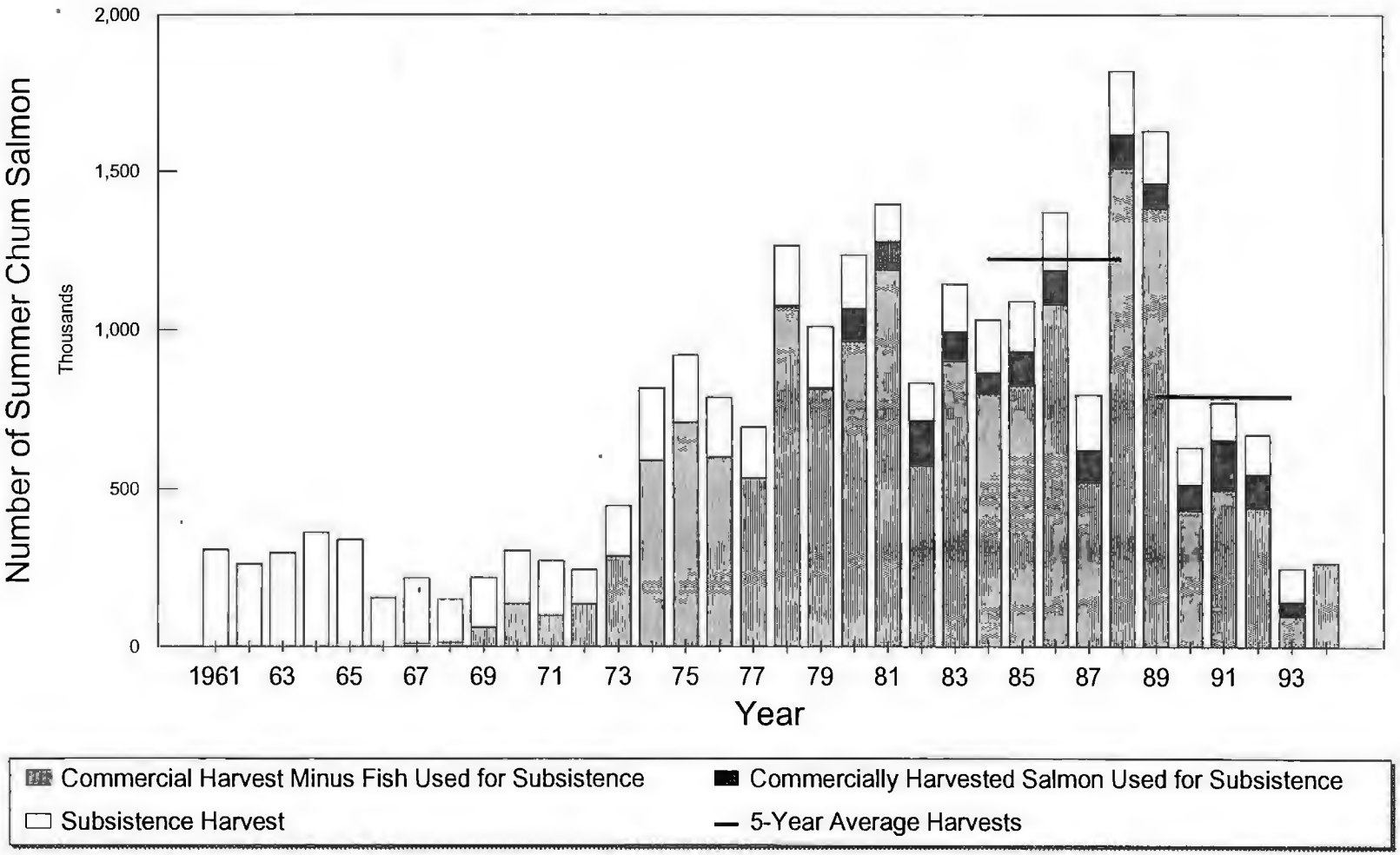


Appendix Figure 4. Canadian harvest of chinook salmon, Yukon River, 1961-1994. Horizontal lines indicate 5-year average harvests.



Appendix Figure 5. Alaskan harvest of summer chum salmon, Yukon River, 1961-1994. The 1994 harvest only includes commercial catch data. Horizontal lines indicate 5-year average harvests.

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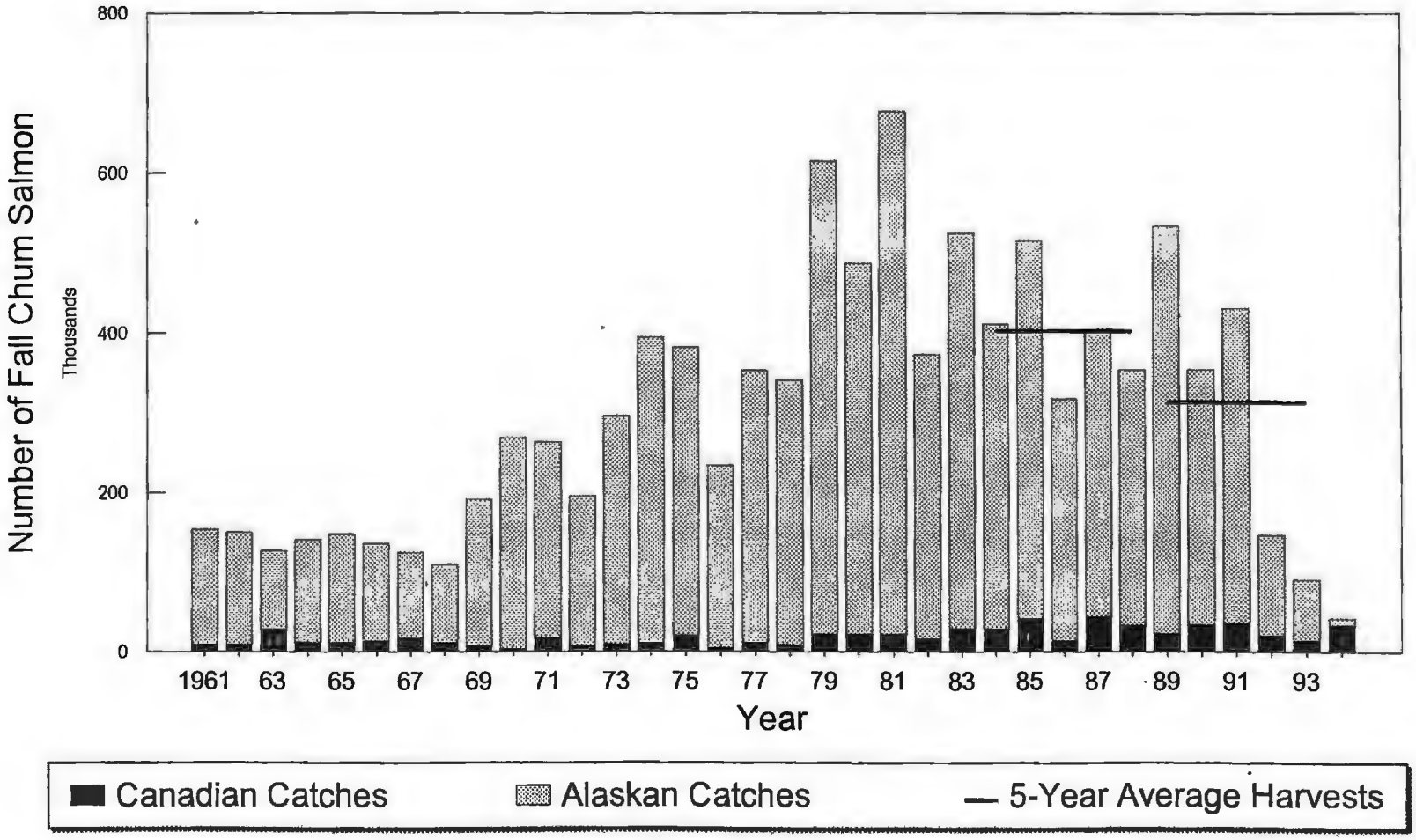
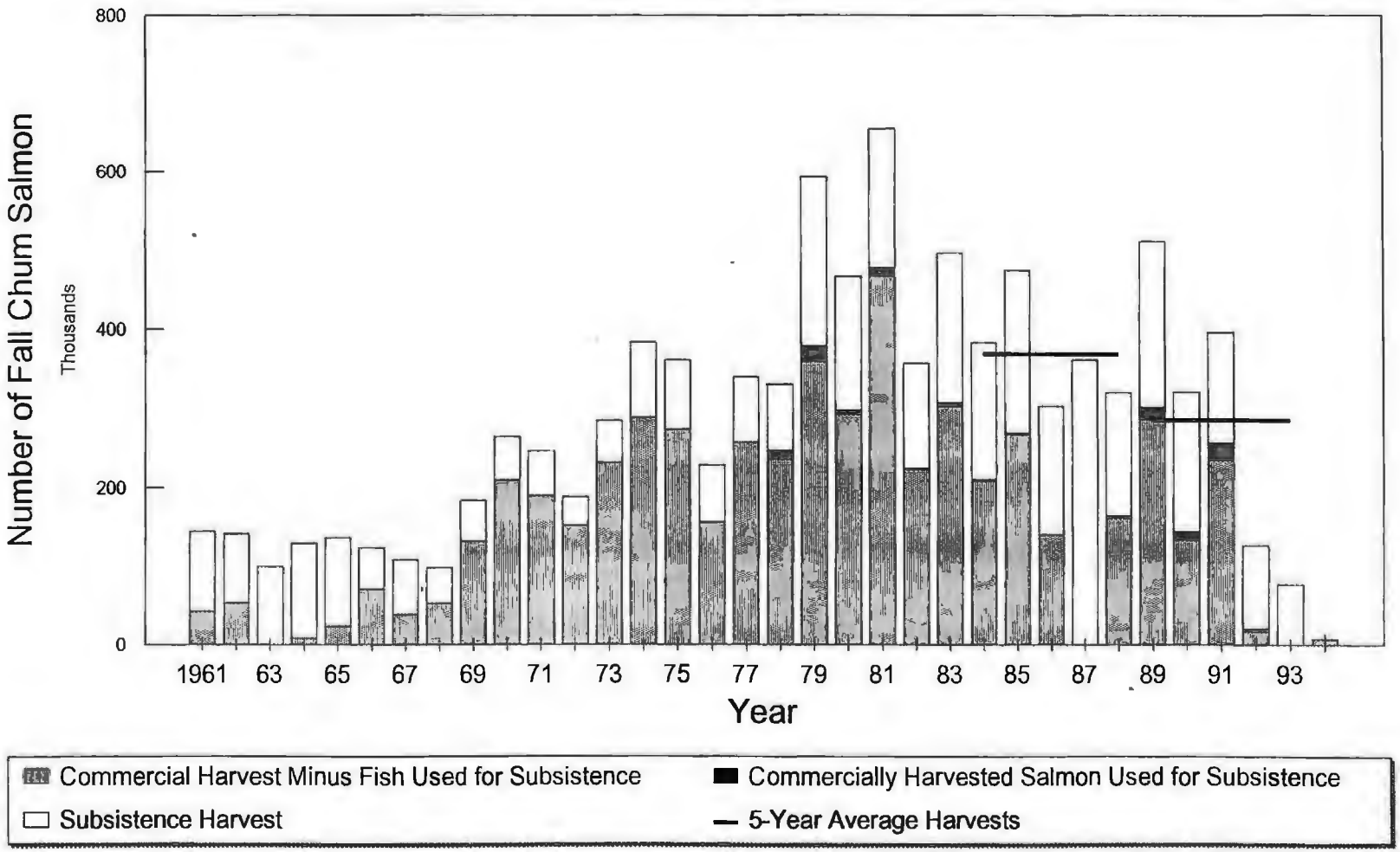


Appendix Figure 6. Total utilization of fall chum salmon, Yukon River, 1961-1994. The 1994 Alaskan harvest only includes commercial catch data. Horizontal lines indicate 5-year average harvests.



Appendix Figure 7. Alaskan harvest of fall chum salmon, Yukon River, 1961-1994. The 1994 harvest only includes commercial catch data. Horizontal lines indicate 5-year average harvests.

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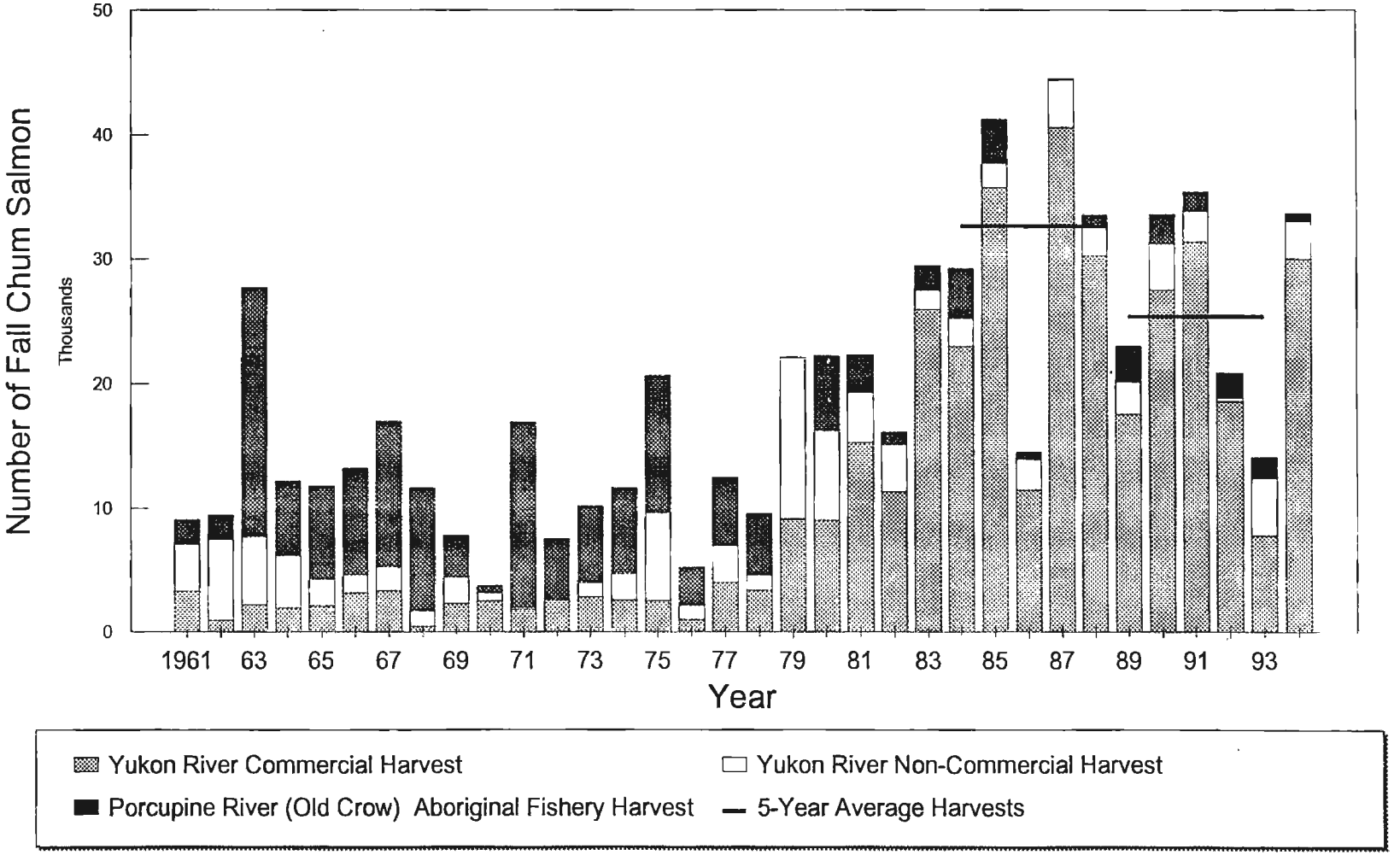
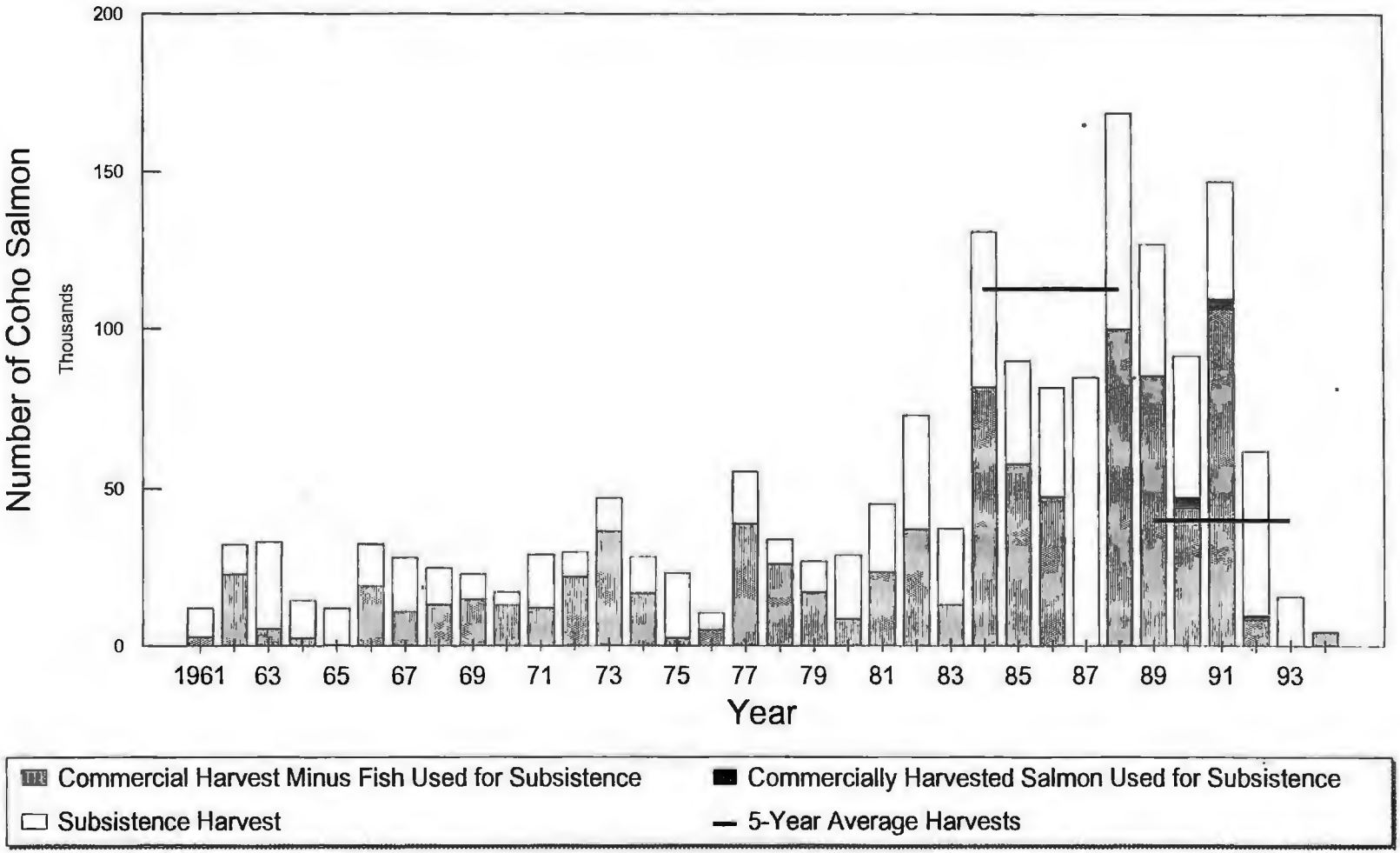


Appendix Figure 8. Canadian harvest of fall chum salmon, Yukon River, 1961-1994. Horizontal lines indicate 5-year average harvests.



Appendix Figure 9. Alaskan harvest of coho salmon, Yukon River, 1961-1994. The 1994 harvest only includes commercial catch data. Horizontal lines indicate 5-year average harvests.

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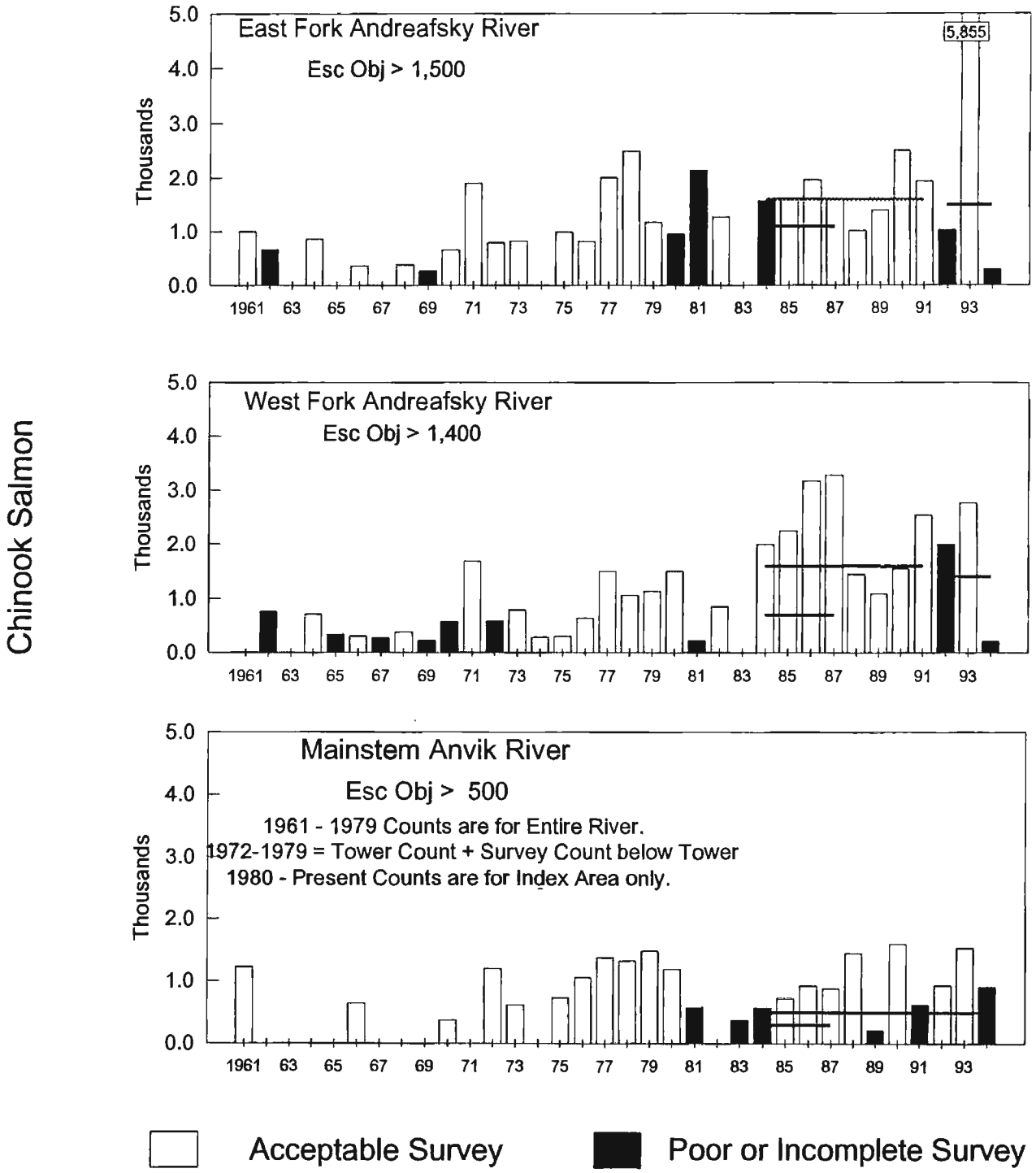
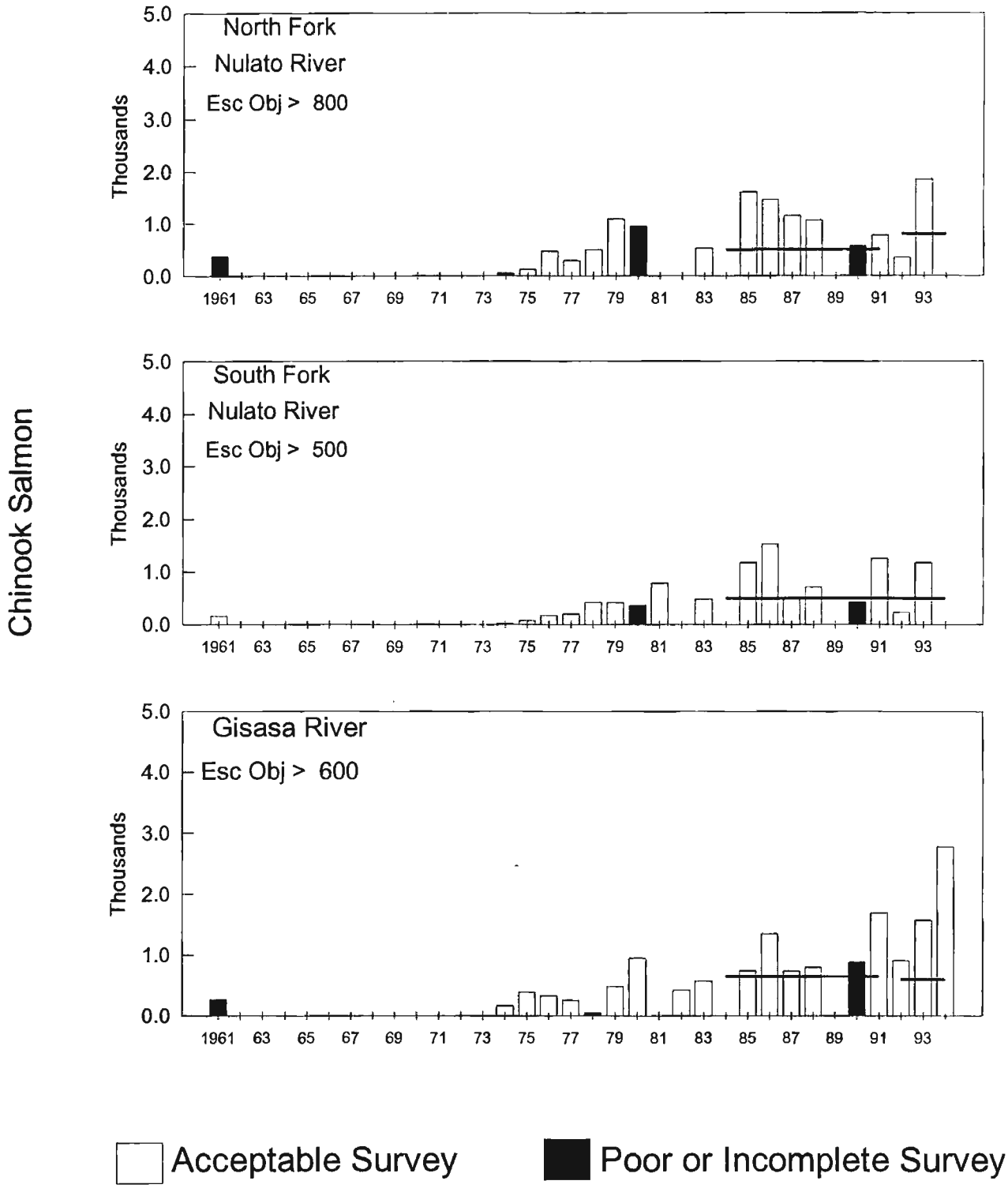


Appendix Figure 10. Chinook salmon escapement counts for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1961-1994. Horizontal lines represent interim escapement goals.



Appendix Figure 10. (Page 2 of 3).

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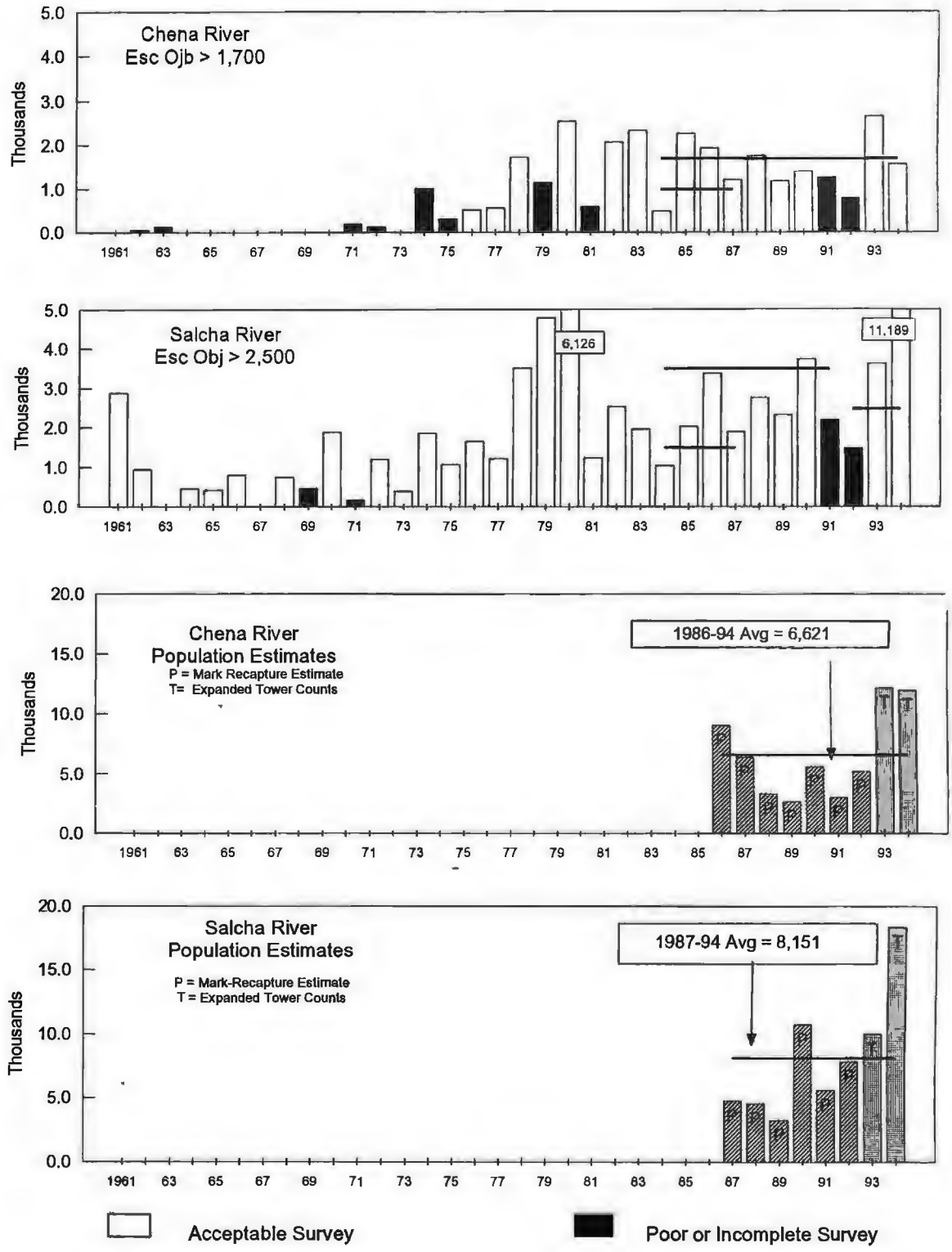
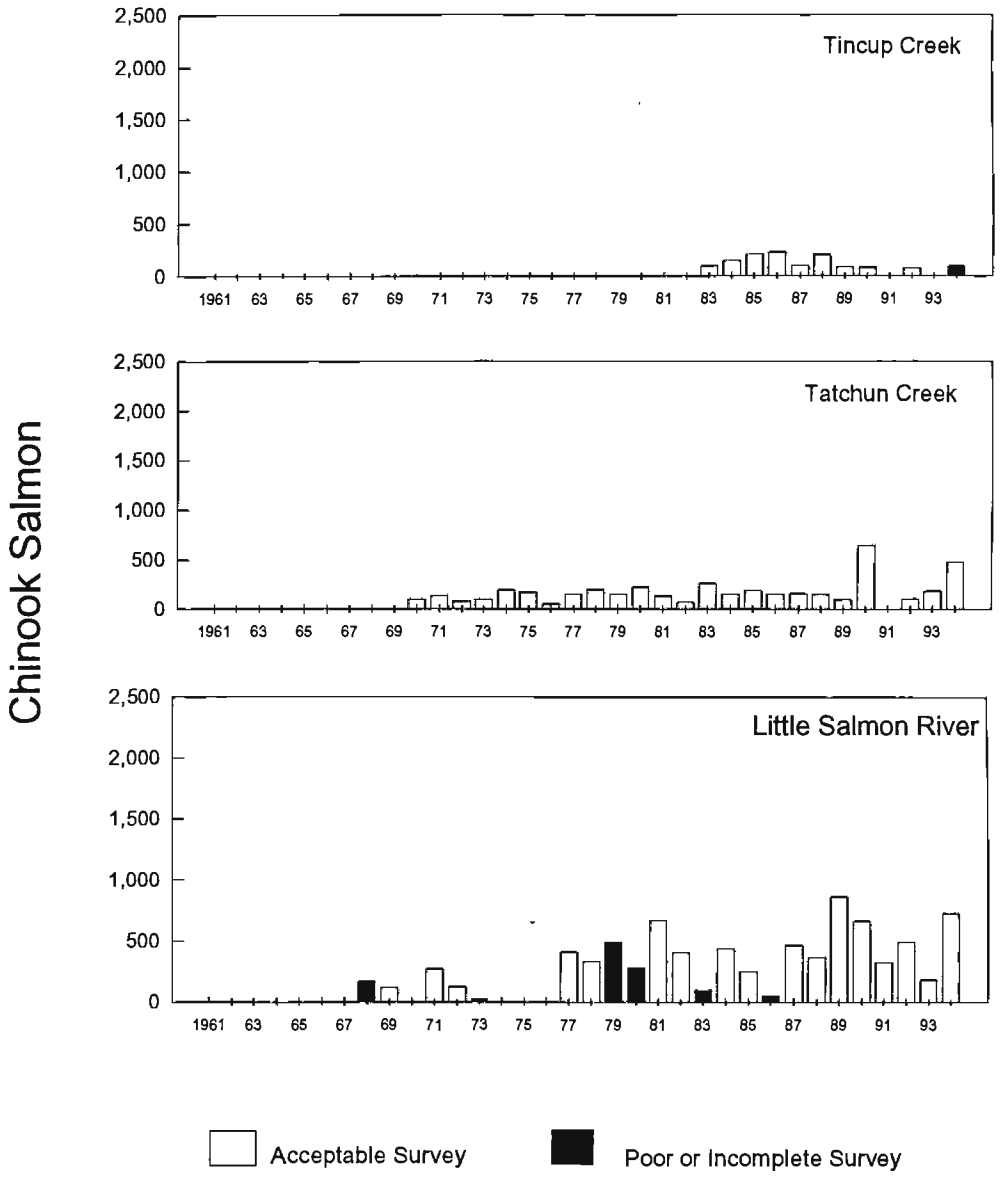
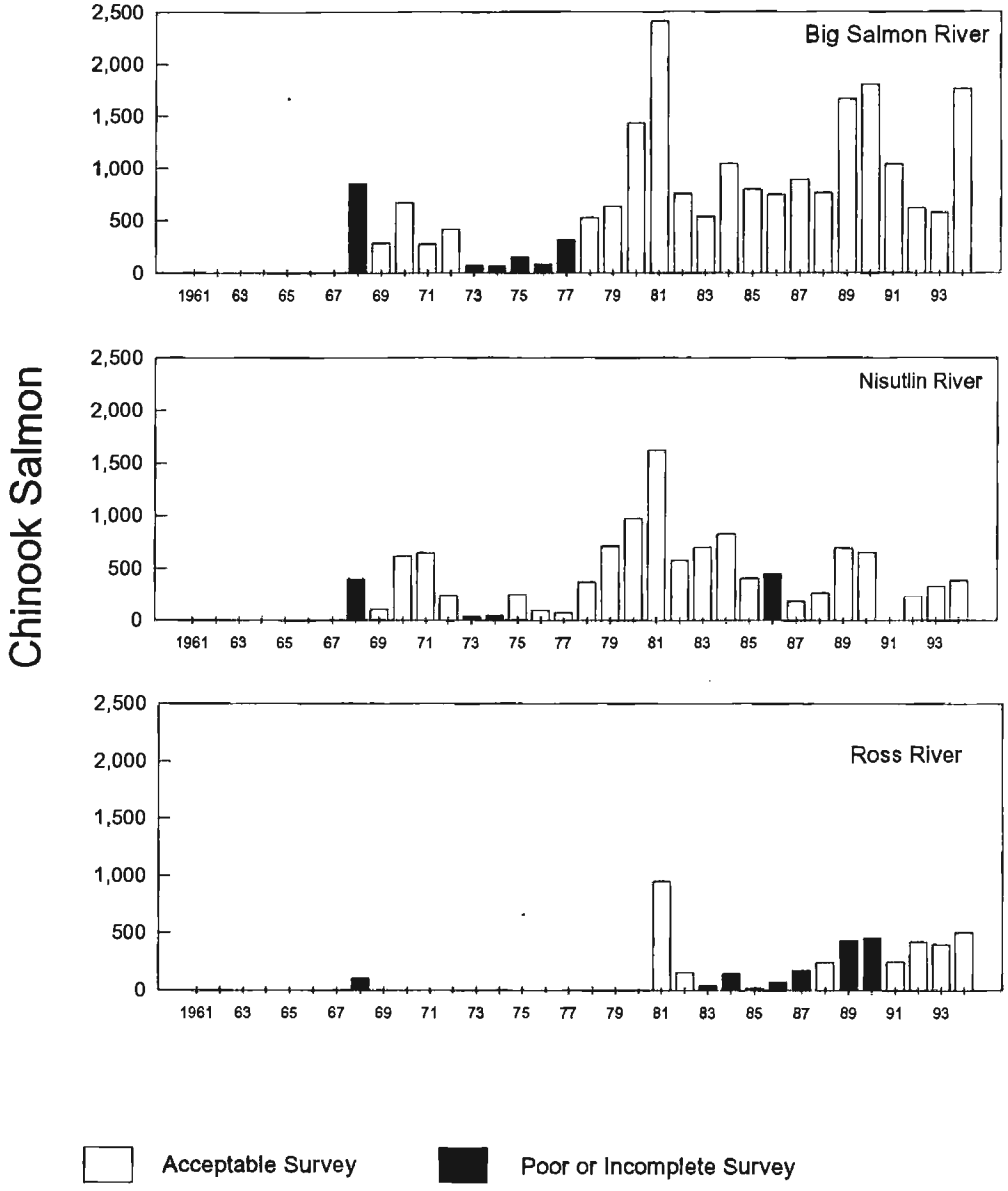
Chinook Salmon



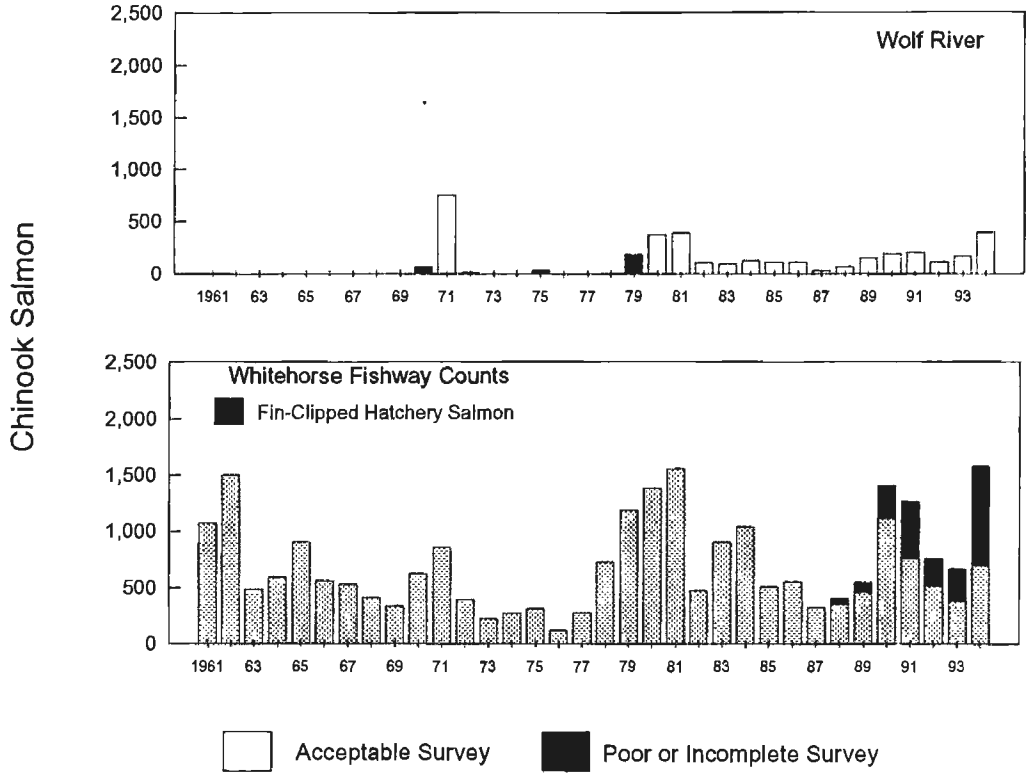
Appendix Figure 10. **(p 3 of 3).**



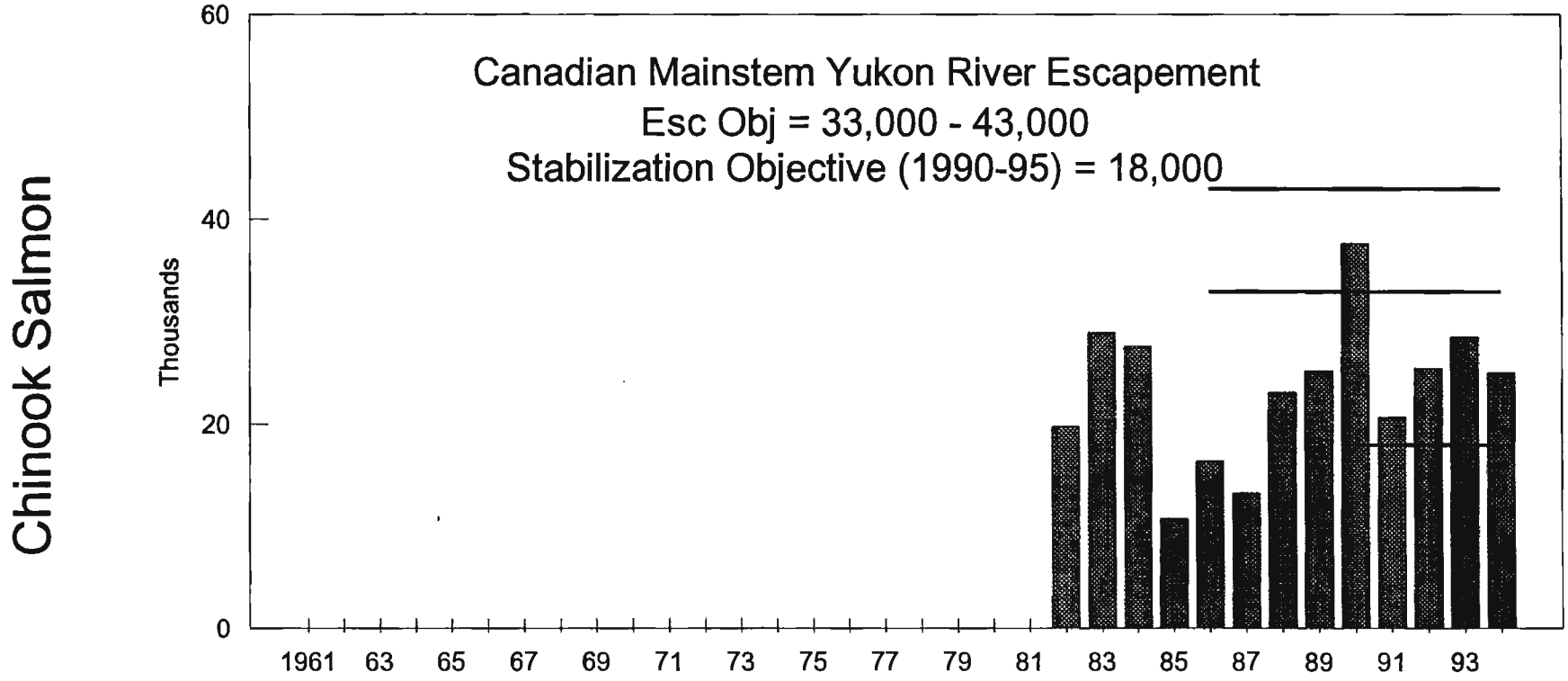
Appendix Figure 11. **Chinook salmon escapement counts for selected spawning areas in the Canadian portion of the Yukon River drainage, 1961-1994.**



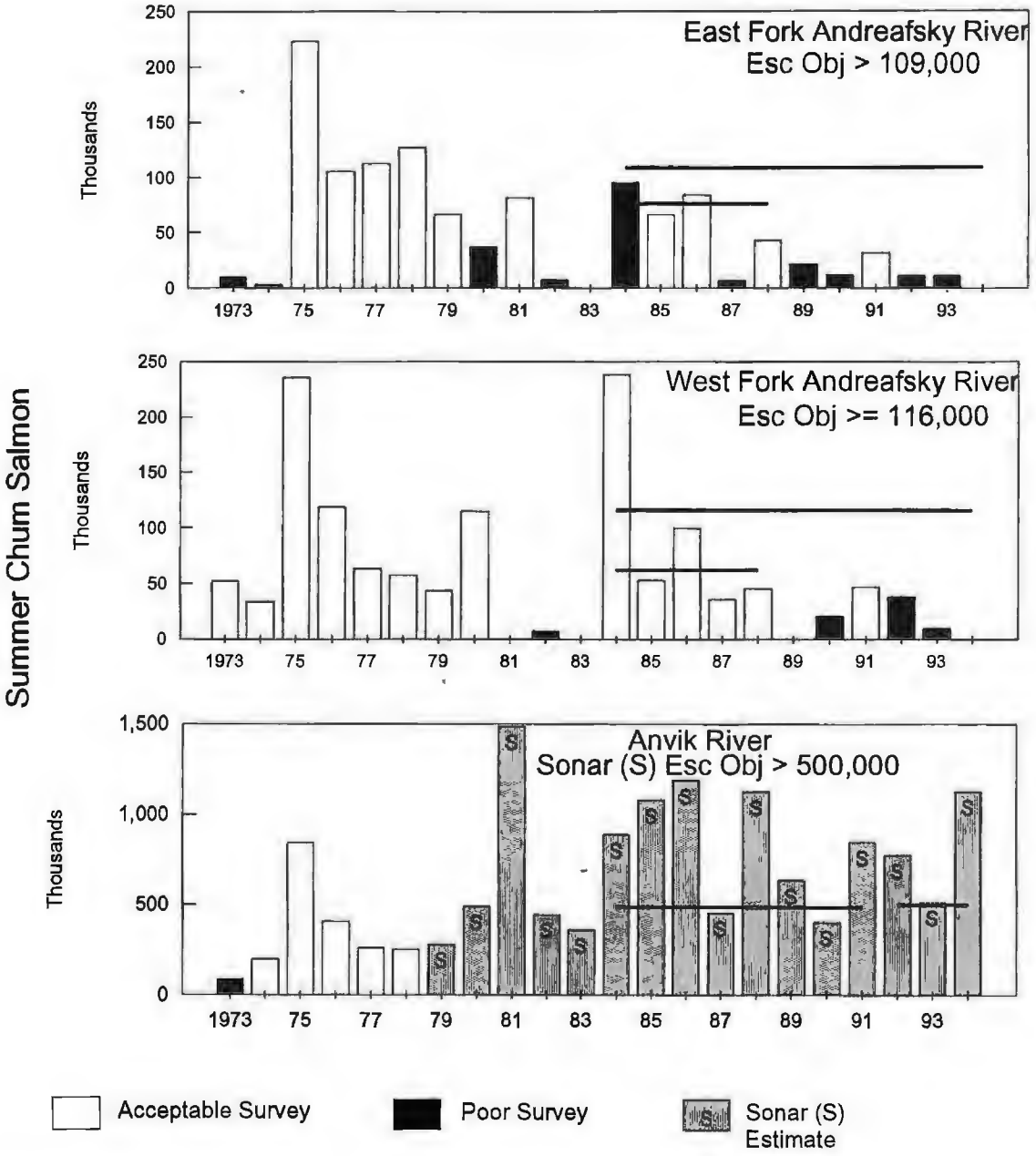
Appendix Figure 11. **(page 2 of 3).**



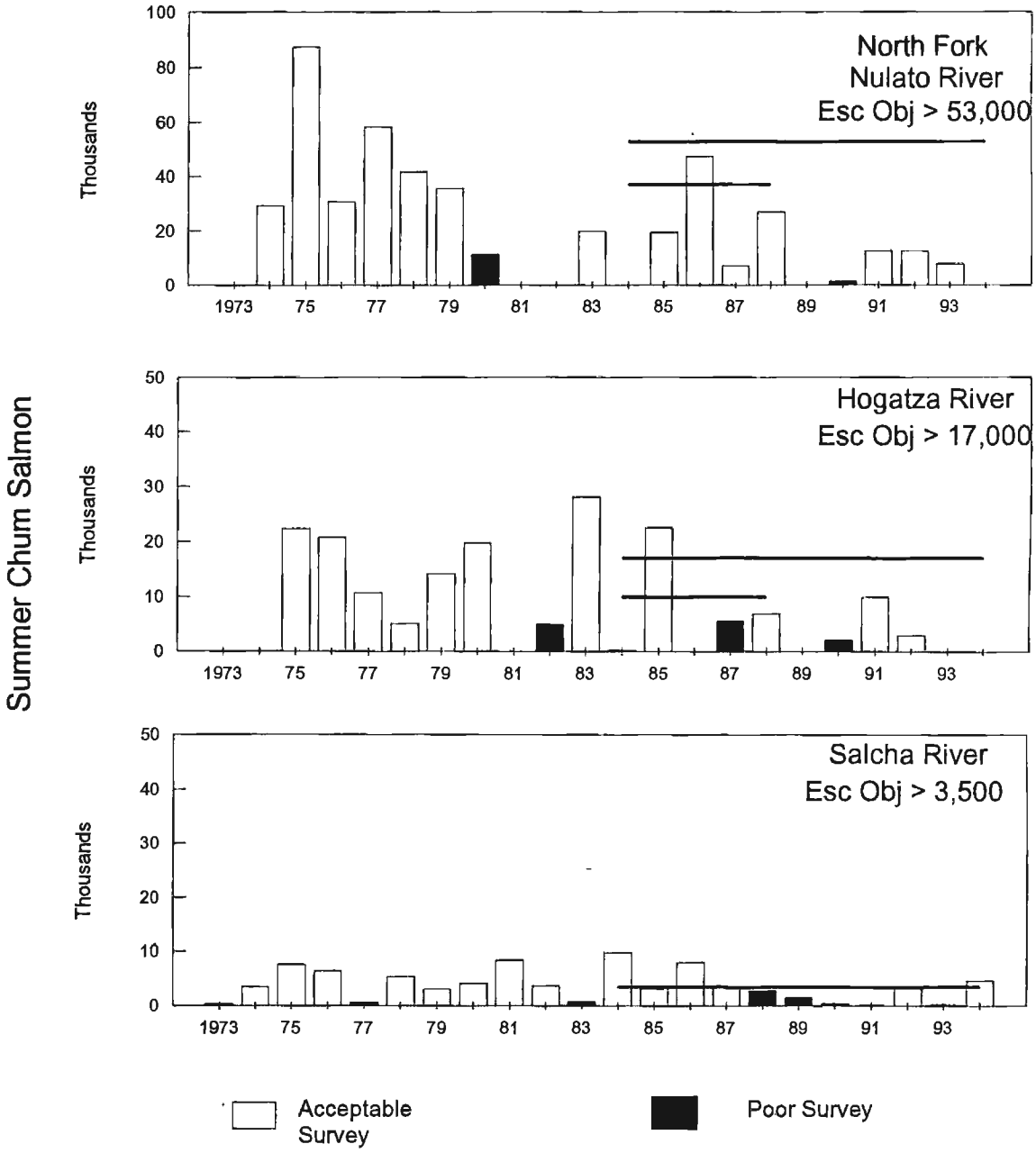
Appendix Figure 11. (page 3 of 3).



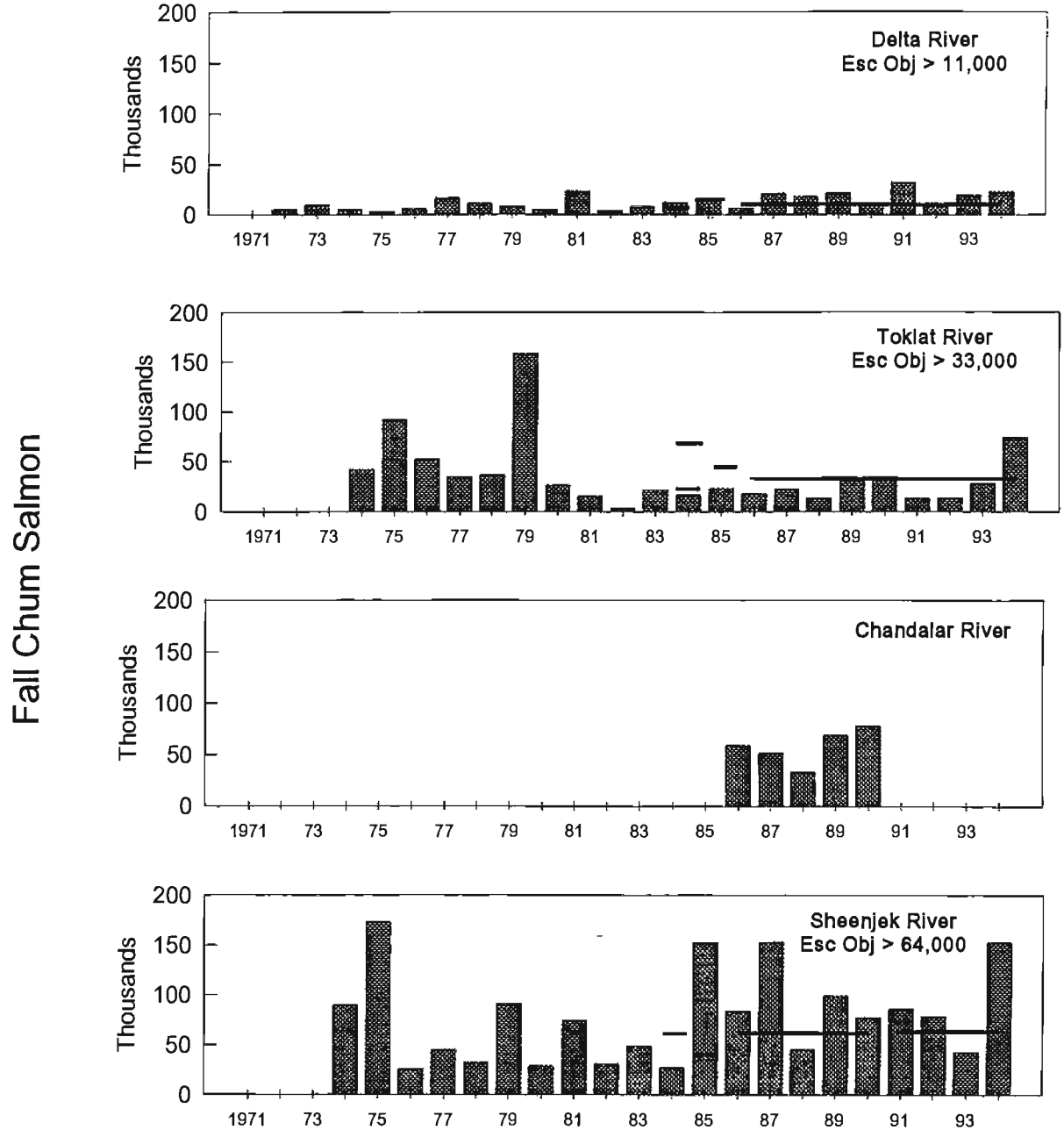
Appendix Figure 12. Estimated total chinook salmon escapement to the Canadian portion of the mainstem Yukon River, 1982-1994. Horizontal lines represent the interim escapement goal range, 33,000-44,000 salmon, and the stabilization objective, 18,000 salmon.



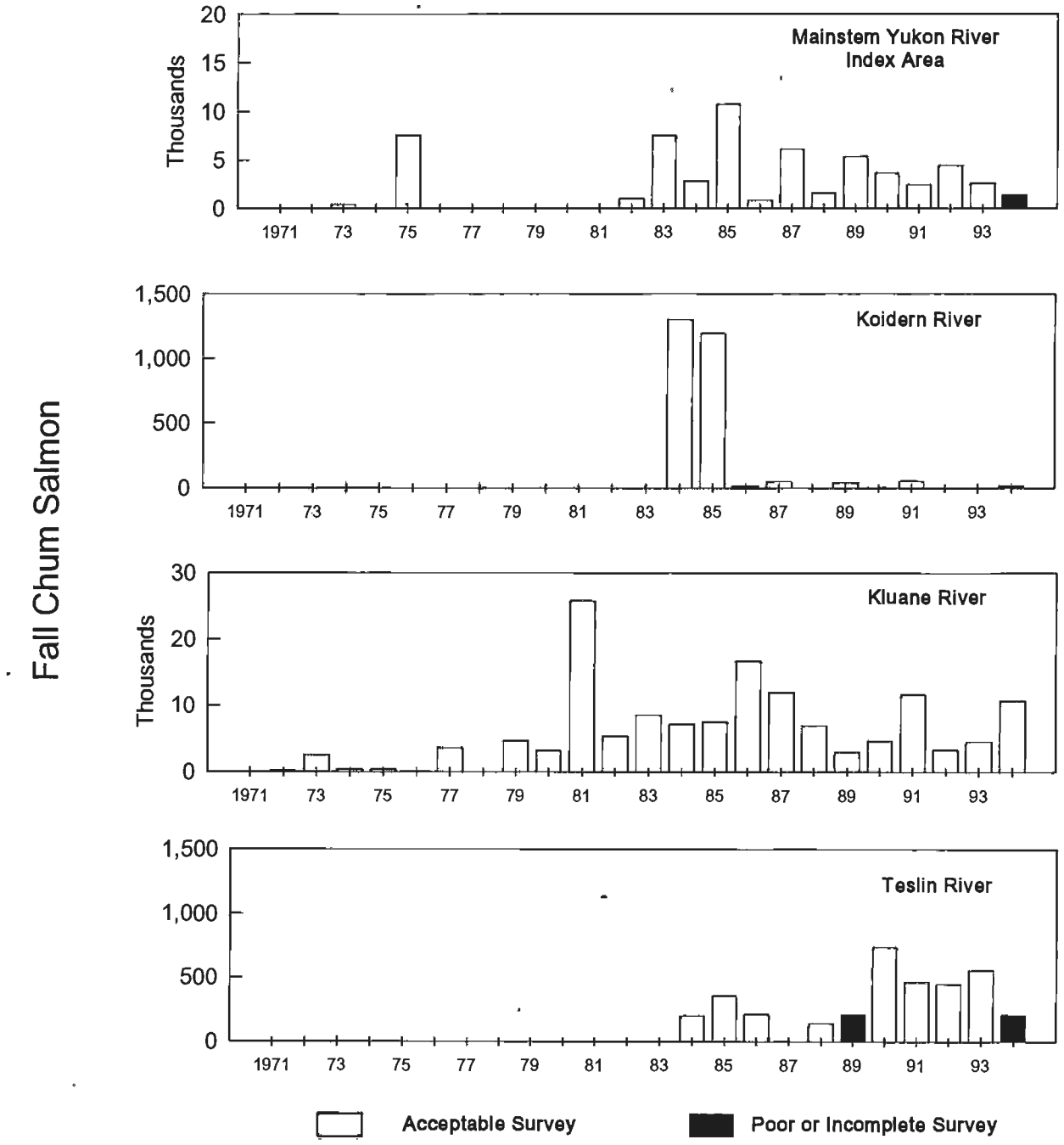
Appendix Figure 13. **Summer chum salmon escapement counts for selected spawning areas in the Yukon River drainage, 1973-1994. Horizontal lines represent interim escapement objectives .**



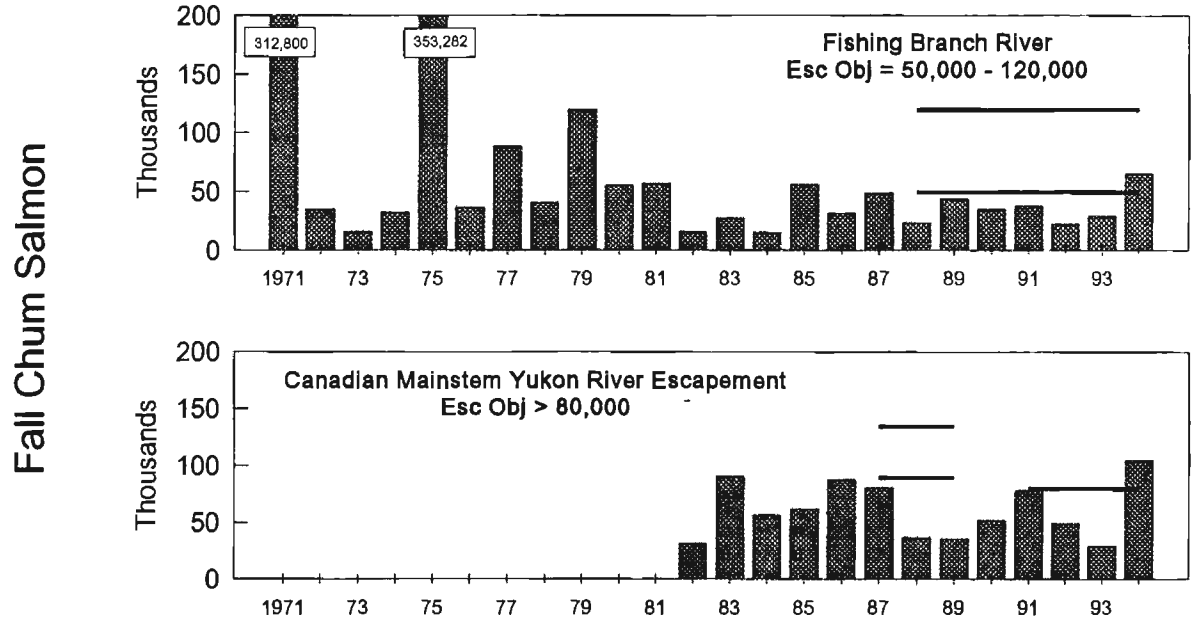
Appendix Figure 13. (page 2 of 2).



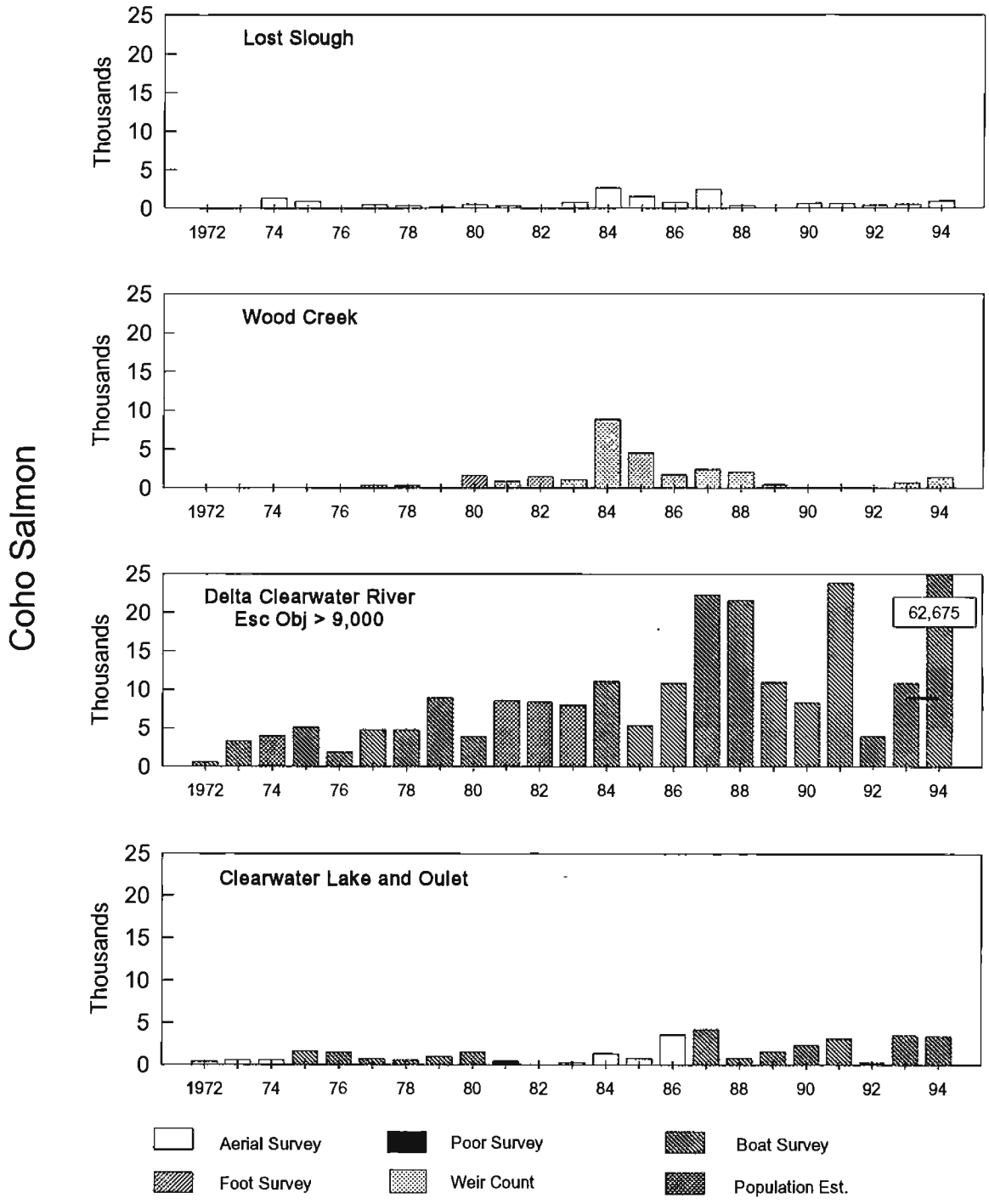
Appendix Figure 14. Fall chum salmon escapement estimates for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1971-1994. Horizontal lines represent interim escapement goals.



Appendix Figure 15. Fall chum salmon escapement counts for selected spawning areas in the Canadian portion of the Yukon River drainage, 1971-1994. Note that the y-axis scale is variable.



Appendix Figure 16. **Fall chum salmon escapement estimates for spawning areas in the Canadian portion of the Yukon River drainage, 1971-1993. Horizontal lines represent interim escapement goals.**



Appendix Figure 17. Coho salmon escapement counts for selected spawning areas in the Yukon River drainage, 1972-1994. Horizontal line indicates the interim escapement goal.