YUKON RIVER SALMON SEASON REVIEW FOR 1996 AND TECHNICAL COMMITTEE REPORT

Prepared by

THE UNITED STATES/CANADA
YUKON RIVER JOINT TECHNICAL COMMITTEE

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1.0 INTRODUCTION

The fall meeting of the Yukon River Joint Technical Committee (JTC) was held in Whitehorse on 23-24 October 1996. The agenda for the JTC meeting was to: 1) prepare the standard post-season summary report for the 1996 season for the information of the Yukon River Panel; 2) as assigned by the Yukon River Panel in April 1996, describe rebuilding options for Canadian Yukon River mainstem fall chum salmon for the 1993 parent year within the framework of the Interim Agreement (i.e. rebuilding to be completed by 2001); 3) continue discussions on the Restoration and Enhancement Fund proposal review process; and 4) other business, which included discussion of a stock identification report outline and development of a chinook salmon brood table. This report summarizes the work of the JTC on these agenda items. Participants in the meeting included the following persons:

Canadian Department of Fisheries and Oceans (DFO)
- Sandy Johnston (co-chair)
- Ian Boyce
- Gail Faulkner
- Gordon Zealand

Contractors (Canada)
- Mary Ellen Jarvis
- Darryl Otto
- Trix Tanner

Alaska Department of Fish and Game (ADF&G)
- Larry Buklis (co-chair)
- Elizabeth Andrews
- Louis Barton
- Dan Bergstrom
- Jeff Bromaghin
- Rich Cannon
- Matt Evanson
- Russ Holder
- Bob Paulus
- Keith Schultz

United States Fish and Wildlife Service (USFWS)
- Steve Klosiewski
- Brian Lebinski
- Monty Millard

National Marine Fisheries Service (NMFS)
John Eiler
Joe Greenough

Bering Sea Fishermen's Association (BSFA)
Jude Henzler

Tanana Chiefs Conference (TCC)
Paul Headlee

Attachment IV provides the updated historical Yukon River salmon catch and escapement data in graphic and tabular form. Note that the Alaska commercial catch information in Attachment IV is in numbers of salmon. Salmon roe sales have been converted to the number of salmon estimated to have been caught to produce the reported weight of roe sold.

2.0 1996 COMMERCIAL FISHERY - ALASKA

Preliminary estimates of commercial sales totaled 376,249 salmon and 335,729 pounds of unprocessed salmon roe (Table 1) for the Alaskan portion of the Yukon River drainage (Figure 1) in 1996. Note that the 1996 Alaskan commercial harvest is expressed as the number of salmon sold in the round, pounds of salmon roe sold, and estimated harvest which includes the estimated number of salmon harvested to produce roe sold. Total sales were composed of 89,671 chinook, 145,593 summer chum, 88,342 fall chum, and 52,643 coho salmon sold in the round (Table 1). Roe sales by species totaled 1,470 pounds for chinook, 314,759 pounds for summer chum, 14,671 pounds for fall chum, and 4,829 pounds for coho salmon. The total estimated commercial harvest was 930,293 salmon; 90,176 chinook, 676,774 summer chum, 107,718 fall chum, and 54,624 coho salmon.

Declining salmon markets, particularly for chum salmon flesh, and early run timing had a major impact on the commercial fishery in Alaska, resulting in limited harvests in some districts and lower exvessel value. With regards to fish sold in the round, the chinook salmon harvest was 19% below the 1991-95 average; the summer chum salmon harvest was 35% below the average; the fall chum salmon harvest was 12% below the average; and the coho salmon harvest was 69% above the average (Table 2). Chinook salmon roe sales were 56% below the 1991-95 average; summer chum salmon roe sales were 136% above the average; fall chum roe sales were 27% above the average; and coho salmon roe sales were 75% above the average. Higher chum salmon roe sales reflected the average to above average summer chum and fall chum salmon runs during the 1996 season in the Yukon River. The chinook salmon commercial harvest was the lowest since 1976 because of the early run timing and no better than average overall run size. Note that salmon roe sales data were not available for chinook and coho salmon prior to 1990 (Table 2).

Fishing effort was lower than normal because of declining salmon markets and corresponding lower prices. A total of 763 permit holders participated in the fishery during 1996, which was 5% below the recent five-year-average of 804 permit holders. A total of 628 permit holders fished in the Lower Yukon in 1996; the lowest effort since 1977. A total of 135 permit holders fished in the Upper Yukon Area, which was near the recent average of 131 permits.

Yukon River fishermen in Alaska received an estimated $4.9 million for their catch in 1996, approximately 36% below the recent 5-year average of $7.6 million. Seven buyer-processors operated in the Lower Yukon Area, and nine 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 $1.94 for chinook, $0.08 for summer chum, $2.96 for summer chum roe, $0.10 for fall chum, and $0.26 for coho salmon. Upper Yukon commercial fishermen received an estimated per-pound average price of $0.95 for chinook salmon, $2.56 for chinook salmon roe, $0.07 for summer chum salmon, $3.08 for summer chum salmon roe, $0.11 for fall chum salmon, $1.71 for fall chum salmon roe, $0.25 for coho salmon, and $2.16 for coho salmon roe.

The department sold a total of 1,698 chinook, 7,309 summer chum, 1,717 fall chum and 1,728 coho salmon in District 1 test fisheries in 1996. These fish are not included in commercial sales.

2.1 Chinook and Summer Chum Salmon

The 1996 preseason outlook was for an average chinook salmon run based on parent year escapements and the below average return of 5-year-old fish in 1995. The summer chum salmon outlook was for an average size run based on parent year escapements. The commercial harvest in the Alaskan portion of the drainage was anticipated to be between 88,000 and 108,000 chinook and 400,000 to 800,000 summer chum salmon.

The lower river test fishery indicated the chinook salmon run had the earliest migratory timing on record. Only the 1981 and 1983 runs approximated this early run timing. Summer chum salmon migratory timing was also early. Only the 1983 summer chum run exhibited similar early timing according to the lower river test fishery. The first chinook salmon catches were reported on 24 May near Sheldon's Point by a subsistence fisherman. The department's test fishing projects recorded the first chinook and summer chum salmon catches on 28 May. Approximately 50% of the chinook salmon run had entered the lower river by 10 June, which was ten days earlier than average.

The cumulative catch per unit effort (CPUE) of 30.7 for chinook salmon from Big Eddy and Middle Mouth 8.5 inch mesh size set gillnet sites indicated above average abundance in 1996. However, this indication of a strong run was viewed cautiously, as water levels were well below normal, which may have resulted in increased efficiency of the test fishery. Postseason analysis

indicated that the chinook salmon run was no better than average based on comparative commercial harvest and escapement data. Chinook salmon test fishing catches in 5.5 inch mesh size set gillnets were below average.

A record test net cumulative CPUE of 162.9 for summer chum salmon indicated the 1996 run was above average in abundance and similar to the very large runs in 1981 and 1995. Again, this indication of a strong run was viewed cautiously, as water levels were well below normal, which may have resulted in increased efficiency of the test fishery. Preliminary postseason analysis of comparative commercial harvest and escapement data indicated the summer chum salmon run was average to above average in magnitude. It appeared that summer chum salmon spawning stocks from the Koyukuk River drainage and upstream, including the Tanana River drainage were very strong, whereas the return of spawning stocks downstream of the Koyukuk River drainage were generally lower than that observed in 1994 and 1995. Approximately 50% of the summer chum salmon return had entered the lower river by 12 June according to test fishing CPUE data, which was eleven days earlier than average.

Based on large test fishing catches in early June and unusually early run timing, the department announced that the commercial fishing season would open in the Lower Yukon Area between 8 and 14 June. However, a number of buyers were not fully ready to handle large numbers of fish until 9-10 June. In addition, although several buyers reported that they did not plan to operate in District 2 prior to the opening of the fishery, a majority of buyers did participate in the lower portion of District 2. The 1996 Lower Yukon Area commercial salmon fishing season was opened by emergency order after approximately eight days of increasing subsistence and test net catches. District 2 was opened first with a 6-hour commercial period on 9 June. District 1 followed on schedule with a 12-hour period on 10 June. Both districts continued fishing on schedule (Monday, Thursday for District 1 and Sunday, Wednesday for District 2) through 25 June with unrestricted mesh size gillnets.

After 13 June, commercial harvests and test fishing CPUE were generally lower than average. Based on this information and concern regarding the below average return of 6-year-old chinook salmon, fishing period duration was reduced to nine and six hours duration in District 2 beginning on 23 June and no further commercial fishing was allowed in District 1 after 28 June. In addition, one normally scheduled fishing period in District 2 was pulled on 26-27 June. The last commercial fishing period in District 2 was on 1 July.

Because of the declining salmon flesh markets, District 3 was opened to commercial fishing for the taking of summer chum salmon for the sale of roe after interest was expressed by fishermen and buyers (Table 1). District 3 opened with a 6 hour commercial period on 5 July and ended with a 12 hour commercial period on 12 July. A total of 935 pounds of summer chum salmon roe was sold from an estimated harvest of 1,534 fish. No chinook salmon were sold in District 3.

The total combined harvest of 86,851 chinook salmon for Districts 1 and 2 (Table 1) was 3% below the midpoint of the guideline harvest range of 90,000 fish and 16% below the 1991-1995 average

harvest of 103,203 fish. All of the chinook salmon harvest was taken during twelve unrestricted mesh size fishing periods in Districts 1 and 2, except for six chinook sold during the fall season. The average weight of chinook salmon was 20.6 pounds.

Preliminary age composition data from the Lower Yukon Area indicated age-6 fish accounted for approximately 38% of the pooled chinook salmon samples from commercial harvest. This lower than normal percentage, and corresponding number, of age-6 chinook salmon in 1996 was consistent with the below average return of age-5 fish in 1995, but inconsistent with the above average escapements documented in the 1990 parent year. Correspondingly, the percentage of 5 and 7-year old chinook salmon in the commercial harvest was higher than average. Approximately 54% of the commercial harvest in District 1 and 2 was females Only one fin-clipped chinook salmon was recovered during commercial catch sampling activities and none were recovered from the test fishery. A total of 4,316 chinook salmon were sampled from the commercial harvest in Districts 1 and 2.

Because of the poor summer chum salmon flesh market, the Lower Yukon Area summer chum harvest was below the lower end of the guideline harvest range. Preseason, several buyers had a chum salmon market and were interested in purchasing summer chum salmon. The department made an attempt to establish a fishing period with six inch or less mesh size as early as 11-12 June to target summer chum salmon. However, declining market conditions precluded targeting summer chum salmon for the entire fishing season. The total combined commercial summer chum salmon harvest in District 1 and 2 of 123,233 fish (Table 1) was 39% below the recent 5-year average harvest of 202,870 fish and 51% below the lower end of the guideline harvest range of 251,000 summer chums for Districts 1 and 2. All of the summer chum were harvested during twelve unrestricted mesh size fishing periods. The average weight of summer chum salmon was 7.8 pounds.

Summer chum salmon commercial harvests in the Lower Yukon Area were dominated by age-5 fish. Age-5 summer chum salmon comprised approximately 59% of the pooled samples taken from the commercial harvest. Age-6 summer chum salmon accounted for an unusually large proportion of the harvest during early June ranging from 7% to 12% of the pooled samples collected from the harvest from 9 June through 14 June.

District 4 was opened to commercial salmon fishing on 23 June. Three 12-hour fishing periods were scheduled for the first week in Subdistrict 4-A. A total of 18 hours of additional subsistence fishing time was allowed that week by emergency order. This was the second season during which a three 12-hour period per week fishing schedule was established. This schedule worked well for fishers and buyers. However, because of the early run timing of chinook salmon, subsistence fishermen requested more fishing time. Therefore, two commercial fishing periods per week were allowed the remainder of the season in order to increase subsistence fishing time. Because of the large summer chum salmon run and low harvest in the Lower Yukon Area, a large harvestable surplus of summer chum salmon was available in Subdistrict 4-A and in the Anvik River Management Area. Because of this large surplus of summer chum salmon, the sale of roe in

Subdistrict 4-A and the Anvik River Management Area were allowed to reach near the roe caps. A total of 76,318 pounds of summer chum salmon roe were sold in the Anvik River Management Area and 181,050 pounds of summer chum salmon roe were sold in Subdistrict 4-A. Prior to the fishing season, the Alaska Board of Fisheries increased the roe cap for the Anvik River Management Area to 100,000 pounds, while the roe cap for Subdistrict 4-A remains 183,000 pounds.

This was the third consecutive year that commercial fishing was allowed within the Anvik River. In the Anvik River Management Area, a three 12-hour period per week fishing schedule was maintained throughout the entire season. Additionally, fishing periods were scheduled concurrently with Subdistrict 4-A openings. Permit holders fishing in the Anvik River were not limited to the amount of chum salmon in the round or pounds of roe per period. The management strategy to divert fishing effort from the mainstem Yukon River in Subdistrict 4-A to the Anvik River seemed to work well. The number of permit holders that fished in the Anvik River during concurrent periods with Subdistrict 4-A ranged from 3 to 16 and averaged 9.

The sale of 37,822 pounds of summer chum salmon roe in Subdistricts 4-B and 4-C (Table 1) was the second largest on record. The total estimated harvest of 71,991 fish was allowed to exceed the guideline harvest range based on the summer chum salmon escapements documented in the Anvik, Nulato, and Gisasa Rivers and Kaltag and Clear Creeks, and reports of atypically large harvests of summer chum salmon in Subdistricts 5-A, 5-B and 5-C. Early run timing and poor fishing conditions led to a below average total estimated harvest of 133 chinook salmon in Subdistricts 4-B and 4-C. A total of four 48-hour fishing periods were allowed.

The commercial fishing season was opened in Subdistricts 5-A, 5-B, and 5-C on 26 June, after the chinook salmon run was believed to be well distributed throughout these subdistricts. Only two fishing periods were allowed in these subdistricts because of the below average harvest taken during the second period and requests by fishermen to allow more subsistence fishing time for meeting their subsistence needs. It appeared that the early run timing, low water conditions, and presence of large numbers of summer chum salmon affected fishing success for chinook salmon in Subdistricts 5-A, 5-B, and 5-C. The total estimated chinook harvest of 2,303 fish in Subdistricts 5-A, 5-B, and 5-C was slightly below the lower end of the chinook salmon guideline harvest range of 2,400 to 2,800 fish. Commercial fishing in Subdistrict 5-D commenced on 2 July. Three 36-hour fishing periods were allowed in Subdistrict 5-D. The Subdistrict 5-D harvest of 488 chinook salmon was within the guideline harvest range of 300 to 500 chinook salmon. Additionally, 302 pounds of summer chum salmon roe were sold in District 5.

A total estimated harvest of 442 chinook salmon was taken for commercial purposes in District 6. The total estimated harvest of 46,932 summer chum salmon exceeded the upper end of the guideline harvest range of 13,000 to 38,000 fish. Management of the fishery was primarily based on Chena and Salcha River tower counts and aerial survey results. Seven 42-hour fishing periods were allowed. The first period was directed at chinook salmon and the remaining periods were

directed at summer chum salmon. It was apparent that because of the early run timing of chinook salmon, the majority of the run had passed prior to the commercial fishery in District 6.

2.2 Fall Chum and Coho Salmon

There are a limited number of tools available to assess the fall chum salmon return inseason in the lower Yukon River. Under the current management plan which identifies run passage levels at which specific management actions are triggered, the Pilot Station sonar project has served as the primary tool for inseason management of the fall season, and provided daily and cumulative passage estimates for fall chum and coho salmon. In 1996, the Pilot Station sonar project, located at river mile 123, was operated to provide technical training, and passage estimates were not made. The absence of Pilot Station sonar as an inseason passage estimate tool in 1996 required a more conservative management strategy in the lower Yukon River.

The preseason projection was primarily used for management purposes during the early portion of the fall chum salmon run (16-31 July), and no fall season commercial fishing was allowed during this time period. However, as of August 3, the department's test set gillnets, located near the mouth of the Yukon River, had a cumulative catch per unit effort (CPUE) of 16.4, which was above the historical average CPUE of 11.4 for this date. Based on average run timing, nearly half of the fall chum salmon return would have passed the Lower Yukon Area test fishery by this date.

The timing of the 1996 fall chum salmon run was unusual. The department's Lower Yukon Area test set gillnet cumulative CPUE only includes chum salmon that enter the Yukon River after July 15 as fall chum salmon. Chum salmon that enter prior to July 16 are considered summer chum salmon, although it is recognized that some fall chum salmon enter the Yukon River prior to that date, and some summer chum salmon enter after July 15. Analysis of subsistence catch reports and information from escapement monitoring projects, however, made it apparent that in 1996, fall chum salmon had entered the Yukon River in greater abundance prior to July 16 than typical. When reviewing the lower Yukon River set gillnet test fishery information inseason, managers took into account the early component of the fall chum salmon run that had entered prior to July 16, but was not reflected in the cumulative test fishery CPUE.

By early August, based on lower Yukon River set gillnet test fishery information, the early component of the fall chum salmon run that had entered prior to July 16, and favorable subsistence catch reports and age composition information, it was decided that the 1996 fall chum salmon return was above preseason projection. It was also determined that the 1996 fall chum salmon return could provide for a fall chum salmon commercial harvest toward the lower end of each district's guideline harvest range.

As the run progressed, additional escapement and monitoring information became available. In 1996, indicators suggested that individual escapement goals and subsistence needs in some districts or subdistricts would be achieved. In these areas the targeted commercial harvest was raised to a higher level than the lower end of their respective guideline harvest range. However, in 1996 as in 1995, marketing difficulties, a lack of buyers, limited processing or tendering capacities, limitations on when or where processors could handle fish, the very limited flesh market, low prices, and low effort contributed to a low salmon harvest in many areas.

A total of approximately 89,600 fall chum salmon were sold in the round and 14,700 pounds of fall chum salmon roe were sold for an estimated harvest of approximately 107,000 fall chum salmon in 1996. The 1996 estimated harvest was slightly below the recent (1991 to 1995) five-year average of 113,000 fall chum salmon. All districts or subdistricts harvested at least to the low end of their respective guideline harvest range except for Subdistricts 4-B and 4-C. In Subdistricts 4-B and 4-C, with approximately 3,000 fall chum salmon sold, the harvest was 42% below the low end of the guideline harvest range of 5,000 fall chum salmon. Low effort and limited processing capacity were the primary reasons for the low fall chum salmon harvest in Subdistricts 4-B and 4-C.

Coho salmon have a later, but overlapping run timing with that of fall chum salmon. Comprehensive coho salmon escapement information is lacking within the Yukon River drainage. Coho salmon return primarily as age-4 fish. Based on limited coho salmon escapement surveys in 1992, and assuming average survival rates, a below average return of coho salmon was projected in 1996. No guideline harvest ranges have been established for coho salmon. Coho salmon are incidentally harvested in the directed commercial fall chum salmon fishery. A total of approximately 51,500 coho salmon were sold in the round and 4,700 pounds of coho salmon roe were sold for an estimated harvest of approximately 55,000 coho salmon in 1996. The majority (approximately 89%) of the coho salmon were harvested in Districts 1 and 2. The 1996 Yukon Area coho salmon harvest was 65% above the recent five-year average. A normal subsistence harvest is anticipated for 1996.

3.0 1996 COMMERCIAL FISHERY - CANADA

The management plans for the Canadian chinook and chum salmon fisheries on the Yukon River in 1996 were formulated to reflect the understandings reached in the Interim Yukon River Salmon Agreement (IYRSA). Accordingly, the guideline harvest ranges, and the border and spawning escapement goals for upper Yukon chinook and chum salmon, that were established in the IYRSA, provided the foundation for the 1996 management plans.

A preliminary total of 30,233 salmon including 10,164 chinook salmon and 20,069 chum salmon was harvested in the 1996 Canadian Yukon River commercial fishery (Table 3). The chinook catch was 8% below the recent chinook cycle average (1990-1995) catch of 11,105 chinook and the chum catch was 16% below the recent cycle average (1992-1995) of 23,846 chum.

A total of 28 commercial licenses was issued in 1996, two less than in 1995. 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 only 9 fishers. Most of the commercial chinook harvest was taken by gill nets set in eddies; three fishwheels were in use during the chinook season and, during the chum season, four fishwheels were in operation.

3.1 Chinook Salmon

With the preseason expectation of a total run size of about 141,000 Canadian-origin mainstem Yukon River chinook salmon in 1996, which was close to the recent cycle average of approximately 135,000, the elements of the chinook management plan adopted for 1996 included:

i) a minimum escapement goal of 28,000 chinook as agreed by the Yukon River Panel in the spring of 1996. This new goal, established for the 1996-2001 period as part of an upper Yukon chinook rebuilding plan, replaced the 1990-1995 stabilization goal of a minimum 18,000 chinook salmon;

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

iii) a commercial guideline harvest range of 8,900 to 11,900 chinook, with a preseason target of 10,400 chinook. Based on the preseason forecast for an average return, the catch was expected to be close to 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.

This fishing plan was similar to the plan developed for 1995.

The commercial fishery opened on Monday, 1 July, 1996 (statistical week 27) for 24 hours. According to the fishing plan, the fishery was to have opened the Monday following the capture of the first fish in the DFO fishwheels or Aboriginal fishery; the first chinook was caught in DFO fishwheels 24 June, just one day later than the earliest date of capture on record (1993).

The catch in the 1 July opening of the commercial fishery, consisting of 143 chinook for 6 fishers, was 81% above the previous cycle average catch for this week of 79 chinook and the catch per unit of effort (CPUE) of 24 chinook/fisher/day was about four times the cycle average for this week.

Consistent with the management plan, the weekly fishing time was extended to three days, two weeks after the run had begun. The official beginning date of the run was determined to be 25 June through the examination of the trend in the three-day moving average of the catch of chinook

salmon in the DFO fishwheels early in the season. The commercial catch in the 9-12 July opening, statistical week 28, was the second highest catch for this week on record and the CPUE of 41 chinook/fisher/day was approximately twice the recent cycle average. This proved to be the peak CPUE of the chinook season. The cumulative catch through week 28 was 1,966 chinook, 753 fish above 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 1996 commercial harvest objective for the season.

By the end of week 28 (mid-July), information from ADF&G indicated the chinook run timing appeared to be one week to ten days early. This trend was already becoming apparent in the upper river: DFO fishwheel catches were at record levels and were more than 250% above average for this point of the season; the peak fishwheel catch of the season occurred 5 July , the earliest peak on record and 17 days earlier than the average peak timing. The first, and very preliminary, inseason run forecast based on mark-recapture data was made at the end of week 28. The projected border escapement ranged from 46,300 chinook, assuming the run timing was one week early, to 105,000 chinook assuming average run timing. A wide range such as this was to be expected early in the season when projections are more sensitive to run timing factors. Considering the run appeared to be early and that the lower end of the run forecast range was the most likely scenario, i.e. 46,300 chinook, which was similar to the preseason expectation, no changes were made to the total season commercial guideline harvest that was established at 10,400 chinook in the management plan.

The opening in week 29 (15-20 July), originally posted for four days, was extended by 24 hours to keep the Dawson area commercial catch in line with the weekly cumulative guideline harvest of 3,200 - 5,500 chinook through week 29. This range was derived from the seasonal target of 10,400 apportioned by two run timing scenarios: the lower end of the range was based on average run timing over the previous six-year cycle; the upper end of the range was based on an assumption the run timing was one week early.[1]

By the end of this opening, the cumulative catch was 4,747 chinook which was in the upper half of the target range for this week. The peak weekly catch of the chinook season occurred this week, although the chinook CPUE of 36 chinook/fisher/day was down from the previous week and was 20% below average for statistical week 29. The border escapement forecast range derived from week 29 mark-recapture data dropped to 41,000 to 70,000 chinook. The cumulative catch in the DFO fishwheels was still at record levels (118% above average) although daily catches had progressively dropped to about one half the peak value of 94 chinook recorded in early July.

In week 30, the fishing time was kept to four days, 22 July - 26 July. Daily catch rates of 597 chinook/day and the CPUE of 35 chinook/fisher/day were similar to values recorded for the

[1] Although the total commercial guideline harvest goal was 10,400 chinook, for inseason management purposes an allowance of 300 chinook was reserved to accommodate commercial catches taken further up-river which are compiled later in the season.

previous week. However, both the daily catch rate and the CPUE were below respective cycle averages for this week of 830 chinook/day and 51 chinook/fisher/day. The cumulative catch of 7,145 chinook tracked towards the upper end of the weekly cumulative guideline harvest range of 5,500 - 7,400 for week 30. Daily DFO fishwheel catches had increased somewhat over the 18-25 July period which resulted in the lower end of the border escapement forecast range increasing to approximately 45,000 chinook.

The weekly cumulative guideline harvest range increased to 7,400 - 8,900 chinook for week 31. After two days of fishing, it was estimated that the catch would be well below the upper end of the range if the opening remained at the scheduled four days, 29 July - 3 August. Considering the run timing was early and opportunities to adjust the commercial catch relative to the upper end of the weekly guideline range (which was based on the early run timing scenario) were becoming increasingly rare, the fishery was extended for twenty-four hours. The catch through 4 August totaled 8,891 chinook and the border escapement forecast increased marginally to 46,000 chinook.

Effort levels dropped from an average of 16 fishers in week 31, to 12 fishers in the four-day opening from 5-9 August. Fishing time was kept to four days to keep within the harvest guideline range for the week. Daily catch rates and CPUE continued to decline and were below average. DFO fishwheel catches showed a similar trend with daily catches consistently falling below average from 26 July on.

With chinook abundance decreasing, effort levels declined to 5 fishers in week 33, then to two fishers in week 34; fishing times were restricted to three days in week 33 (12-15 August) and week 34 (19-22 August). Through 22 August, the Dawson area commercial catch totaled 9,826 chinook, 254 fish below the weekly cumulative guideline harvest. The final in-season border escapement forecast range was 46,000 - 50,000 chinook.

The preliminary total commercial chinook catch of 10,164 fish was 8% below average and was 2% below the inseason target of 10,400 chinook, i.e. the mid-point of the commercial guideline harvest range of 8,900 to 11,900 chinook; this was also the pre-season expected harvest. For comparison, the recent six-year average commercial catch was 11,105 chinook (1990 to 1995); during this period the catch ranged from 10,350 chinook in 1993 to 12,028 chinook in 1994. The preliminary postseason estimate of the border escapement indicated a Canadian commercial harvest rate of 21% on chinook salmon in 1996 compared to the recent cycle average harvest rate of 24% (1990-1995).

Based on fishery prerformance indicies, i.e. commercial chinook CPUE, the run appeared to be below average in magnitude and one to two weeks early in timing. The cumulative CPUE was 187 chinook/fisher/day, 18% below the recent cycle average of 228 chinook/fisher/day. Fishing effort during the chinook season, i.e. through week 34, was 28% above average (341 boat-days versus an average of 265 boat-days).

Normally, fishery performance indices of lower catches, lower CPUE yet higher effort levels would be indicative of below average run strength. However, based on preliminary mark-recapture

analysis and spawning escapement survey results, this did not appear to hold true in 1996. The reason for this was likely related to a combination of early run timing and disproportionate fishing effort relative to stock abundance; stock abundance and fishing effort were somewhat skewed in opposite directions. This situation was compounded by the fishery opening schedule adopted in the management plan which purposely limits fishing effort early in the season. The result of this regime was that only 15% of total commercial fishing effort during the chinook season occurred during the first quarter of the run. Based on lagged catch data from DFO fishwheels, it is estimated that approximately 25% of the run had passed upstream of the Dawson area fishery by the end of the second fishing period. The cumulative fishing effort to 12 July, i.e. the end of the second fishing period, was 50 boat-days which accounted for 15% of the total fishing effort for the chinook fishery of 341 boat-days. Poor fishing conditions may also have contributed to below average catch rates in the fishery. It was reported by some fishers that severe "stick storms" , i.e. high debris load periods, frequently occurred during the chinook openings. However, whether the incidence of high debris loading was higher than normal is not known.

3.2 Fall Chum Salmon

The chum salmon run to the upper Yukon was expected to be below average in 1996 due to the below average spawning escapement of 49,100 chum in 1992. The return of five-year-olds was expected to be above average based on the above average escapement of 78,500 chum in 1991. The 1996 chum salmon management plan was developed to address the expectation of a below average run and the objectives of the three-cycle rebuilding plan that has been agreed to in the IYRSA. Accordingly, the plan included the following components:

i) an escapement goal of 65,000 upper Yukon chum salmon. This goal was developed by the Canada/U.S. JTC to reflect a three-cycle rebuild of the principal brood year escapement of 49,100 chum in 1992 to a long term goal of >80,000 chum;

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

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. It was expected that the U.S. would manage for a border escapement of at least 88,600 chum salmon which was the lower end of the U.S. border escapement management range of 88,600 to 112,600 chum that had been established in the IYRSA for 1996. A border escapement of this magnitude would achieve the 1996 escapement goal and the lower end of the Canadian guideline harvest range; and

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

In most years, the third week of August (through week 34) marks the transition from the chinook season to the chum season. Prior to this, chum salmon abundance is generally low although there is some indication of a small early run which peaks in early August. In 1996, the commercial catches of chum salmon prior to week 35 were far above average. For example, the cumulative catch through week 34 in 1996 totaled 1,098 chum compared to the previous ten-year average catch for the same period of 201 chum. The cumulative CPUE through week 34 in 1996 was 67 chum/fisher/day, approximately 4.5 times the ten-year average of 15 chum/fisher/day. The first chum salmon was caught during the 9-12 July opening (week 28), the earliest on record. Similarly, chum salmon catches in the Porcupine River were first reported at about the same time, the earliest any of the Vuntut Gwitchin elders could remember. At the DFO fishwheels, the first chum appeared on 6 July. Usually chum salmon are not caught in the fishwheels until 21 July; prior to 1996, the earliest date of capture on record was 15 July. Through week 34 (24 August) a record total of 845 chum had been caught in the fishwheels compared to the previous ten-year average of 132 chum; the previous record was 276 chum in 1989.

The strong early showing of chum salmon spelled the beginning of what should have been an excellent chum salmon fishery. However, market conditions were dismal resulting in reduced effort throughout most of the chum season. Weekly fishing times remained at three days per week from 26 August through 5 September with five fishers fishing each week. The CPUE values during this period ranged from 95% to 201% above respective weekly averages and the DFO fishwheel catch through 5 September was 243% above average.

The first inseason chum salmon border escapement forecast was made the end of August after the fishing period in week 35. As expected from the strong early run indicators in the upper Yukon and from discussions with ADF&G and USFWS, the run forecast range was much higher than the pre-season forecast; the initial inseason forecast ranged from 154,000 to 278,000 chum salmon. This forecast was felt to be somewhat optimistic given the unusually strong early run of chum salmon to date and the fact that it was still early in the season.

Given the indications of a good run, the fishery was increased to four days per week for the remainder of the season. However, weekly effort levels remained low (maximum of nine fishers) and management intensity decreased. Weekly CPUE values continued to be well above average through mid-September then dropped to slightly below average values through the end of the month. The 30 September - 4 October opening produced below average catches and CPUE; no fishing occurred in the last opening, 7-11 October. The final inseason border escapement forecast was 166,000 - 198,000 from data inputs through 27 September.

The preliminary total commercial chum harvest of 20,069 fish was 3% below the lower end of the commercial guideline harvest range of 20,700 to 29,700 chum salmon. For comparison, the recent four-year cycle average commercial catch was 23,846 (1992-1995) ranging from 7,762 chum in 1993, to 39,012 chum salmon in 1995. Based on preliminary tag recovery data, the harvest rate in the commercial fishery was approximately 14% compared to the 1992-1995 cycle average of 22%.

Total fishing effort during the chum season (from week 35 on) was 128 boat-days in 1996, the second lowest on record and 12% below the 1992-1995 average of approximately 145 boat-days. The total number of days fished during this period, i.e. after week 35, was 22 days compared to the 1992-1995 average of 12 days.

The run strength based on cumulative commercial fishery CPUE was the third highest on record and was 18% above the previous cycle average. The cumulative DFO fishwheel catch of 4,525 chum salmon was the second highest on record, and was 76% above the average over the previous two cycles. The preliminary mark-recapture estimate, as discussed in Section 6.2.2 of this report, was the second highest on record and was approximately 27% above average. Run timing in the commercial fishery appeared about one week early and was slightly bimodal with peaks in weeks 36 and 39. Run timing based on DFO fishwheel catches also appeared to be earlier than normal with the peak catch occurring on 5 September. Normally, the peak catch doesn't occur until 14 September.

4.0 1996 SUBSISTENCE, PERSONAL USE, ABORIGINAL, DOMESTIC, AND SPORT FISHERIES

4.1 Alaska

4.1.1 Subsistence Fishery

Subsistence "catch calendars" were mailed in May, for use during the fishing season, to non-permitted households in Yukon River drainage rural communities in Alaska. Catch calendars are collected during the personal interviews that are conducted with fishermen immediately following the season in September, October, and November. Subsistence fishermen in portions of District 5 (upper portion of the Yukon River drainage) and District 6 (Tanana River drainage) are required to obtain subsistence fishing permits and record harvest data on the permit. Personal use permits are required for fishermen who fish in the Fairbanks non-subsistence area. Additionally, attempts are made to contact fishermen by telephone or mail. Preliminary analysis of 1996 subsistence harvest data will not be completed until early 1997. The estimated 1995 subsistence salmon harvest in the Alaska portion of the Yukon River drainage totaled approximately 51,000 chinook, 136,000 summer chum, 131,000 fall chum, and 28,000 coho salmon. These estimates do not include personal use catches in the Fairbanks non-subsistence use area and do not include commercially-caught salmon carcasses retained for subsistence purposes.

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, during a special session of the legislature, a subsistence law was passed which allowed the Alaska Joint Boards of Fisheries and Game to designate non-subsistence areas. This law allowed the boards, acting jointly, to identify an area or community in which subsistence is not a principal characteristic of the economy, culture, and way of life. The Fairbanks Non-Subsistence Area was the only non-subsistence area identified by the Joint Boards of Fisheries and Game. This area includes 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 allowed for status quo fishing regulations to remain in effect until April 1994. At that time, the Alaska Supreme Court vacated the State's motion for a stay. This action resulted in all Alaskan residents being eligible to fish for subsistence purposes during the 1994 fishing season.

In 1995, the Joint Board of Fisheries and Game again adopted the Fairbanks Nonsubsistence Area. Subsistence fishing is not allowed within non-subsistence areas. This new regulation primarily affected salmon fishermen within Subdistrict 6-C, which falls entirely within the Fairbanks Nonsubsistence Area. During 1995 and 1996, the Subdistrict 6-C salmon fishery was managed under personal use regulations. Personal use salmon harvest in this subdistrict is limited to 750 chinook salmon, 5,000 summer chum salmon, and 5,200 fall chum and coho salmon combined. Preliminary data compilation for the 1996 fishing season will not be completed until early 1997. In 1995, 138 fishermen were issued personal use salmon fishing permits. Fishermen fishing under personal use regulations harvested approximately 400 chinook, 780 summer chum, 860 fall chum, and 420 coho salmon.

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 (1990-95) have averaged about 1,400 chinook salmon, 1,000 chum salmon, and 1,800 coho salmon. Note that

the chum salmon sport harvest information is not apportioned to the summer and fall runs, but reported as chum salmon. Therefore, the harvests of each run of chum salmon are unknown. Although some fall chum salmon are taken by sport fishers, the majority of the harvest of that species probably comes from the summer run which is much more abundant, and because the chum harvest is typically incidental to effort directed at chinook salmon which overlap in timing with the summer chum. Therefore, for purposes of this report the total chum salmon sport harvest is reported as summer chum salmon. Harvest information for 1996 is not yet available. Sport harvest of salmon in the Alaskan portion of the Yukon River drainage in 1995 was estimated to total 2,525 chinook salmon, 1,174 chum salmon, and 1,278 coho salmon.

4.2 Canada

4.2.1 Aboriginal Fishery

In 1996, a multi-year comprehensive survey of the Aboriginal fishery was initiated as part of the implementation of the Yukon Comprehensive Land Claim Umbrella Final Agreement. The project entitled: *The Yukon River Drainage Basin Harvest Study*, is being conducted by LGL Ltd. Environmental Research Associates, and primarily involves intensive inseason surveys of catch and effort in the fishery throughout the upper Yukon drainage, excluding the Porcupine drainage. Catches from the Old Crow area were determined from locally conducted, post season interviews.

The preliminary estimate of the 1996 total upper Yukon chinook salmon catch in the Aboriginal fishery was 8,866 fish (se = 436), 20% above the 1991-1995 cycle average of 7,394 chinook. For 1995, the final estimate of chinook harvest in the upper Yukon area has been updated to 7,945 fish. The preliminary estimate of the chinook harvest at Old Crow in 1996 is 374 fish, 15% above the previous cycle average of 326 chinook salmon.

The preliminary estimate of the 1996 harvest of upper Yukon chum salmon is 1,001 fish (se = 92) compared to the recent cycle average of 2,764 chum salmon. However, catch reports from some areas (e.g. Burwash) are still being compiled. Chum salmon catch information from Old Crow is not yet complete. A total of 1,386 chum salmon had been harvested through 6 September. The average catch from this area is approximately 2,700 chum salmon.

Coho catches in Canada are generally limited to the Porcupine River where they are taken in the Old Crow fishery in late October and November. An estimated 100 coho salmon had been harvested through 6 September.

4.2.2 Domestic Fishery

Effort level was low in the 1996 domestic fishery with only five fishers reporting catches. The preliminary total harvest was 141 chinook salmon which was well below the previous cycle average of 278 chinook salmon. No chum salmon were reported caught in the fishery in 1996; chum salmon have not been recorded in the domestic fishery catch since 1989.

4.2.3 Sport Fishery

Prior to 1995, it was assumed that approximately 300 chinook were harvested annually by sport fishers in Canadian sections of the Yukon River basin. The estimate for 1995 was increased to 700 chinook based on a number of observations by Fishery Officers that fishing pressure was much higher than in previous years. This was primarily due to the excellent return of chinook salmon in 1995.

In 1996, a creel census was initiated at a well established sport fishery located at the confluence of Tatchun Creek and the Yukon River. This was the first year that a specific sport fishery data collection program has been conducted within the Canadian section of the Yukon River basin.

The creel census covered the period from 27 July to 25 August and included 19 weekdays and 11 weekend days and/or holidays. A total of 780 angler interviews were completed during the course of the creel census, representing a cumulative fishing effort of 3,731 rod hours.

Preliminary results from the creel census included a harvest estimate of 846 chinook salmon of which 395 fish were kept; the remaining 451 chinook , or 53% of the fish caught, were released. It was estimated that an additional 30 chinook were kept that were unaccounted for in the census. The total harvest was therefore estimated to be 425 chinook. The mean CPUE of 0.23 chinook per rod-hour in this fishery was very high when compared to other Canadian in-river chinook sport fisheries.

Since there was no creel census previously conducted at Tatchun Creek, it is not possible to determine how catch and effort in 1996 compares with previous years. A national sport fishing survey, conducted in 1990, included information about the distribution of salmon fishing effort in the Yukon. Unpublished results indicated that the Tatchun Creek sport fishery accounted for approximately 50% of the total recreational catch of chinook salmon in the Yukon River watershed in Canada. If a similar catch distribution occurred in 1996, the total recreational harvest of chinook salmon in the Canadian section of the Yukon drainage was approximately 850 fish.

5.0 STATUS OF SPAWNING STOCKS

5.1 Chinook Salmon

5.1.1 Alaska

Yukon River chinook salmon run strength in 1996 was assessed as no better than average based on commercial harvest and escapement estimates from selected tributaries. There was a below average return of age-6 chinook salmon. The estimated commercial harvest of 90,177 chinook salmon was 8% below the midpoint of the combined guideline harvest ranges within the Alaska portion of the Yukon River drainage of 98,250 fish. Chinook salmon escapement goals were achieved in the Tanana River drainage. However, a majority of chinook salmon escapements in the lower portion of the drainage below the Tanana River did not appear to reach minimum goals. It is possible that early run timing combined with the timing of the commercial fishery in the lower river resulted in a higher harvest proportionally on lower river chinook salmon stocks. The percent female composition of the lower river escapements, below the Tanana River, was lower than average. Sex composition for the Tanana River and upper portion of the Yukon River drainage is not yet available. Minimum escapement goals have been established in the East and West Fork Andreafsky, Anvik, North and South Fork Nulato, Gisasa, Chena and Salcha Rivers within the Alaska portion of the Yukon River drainage. These minimum escapement goals are based on aerial survey index counts which do not represent the total escapement.

Chinook salmon escapement to the Andreafsky River appeared to be below the escapement goal level. An aerial survey count of 624 chinook salmon in the West Fork Andreafsky, was 55% below the minimum escapement goal of 1,400 salmon. The East Fork Andreafsky River was not surveyed because of poor weather. The USFWS provided an estimate of chinook salmon escapement for the East Fork from counts of chinook salmon passing through a weir. The weir count of 2,955 chinook salmon was only 49% of the 1995 weir count. Estimated age composition of the samples of chinook salmon collected at the East Fork Andreafsky River weir site was 7% age-4, 74% age-5, and 13% age-6 salmon. Males were more numerous than females, accounting for 58% of the sample.

An aerial survey of the Anvik River on 22 July, conducted under good conditions, resulted in a count of 709 chinook salmon within the escapement index area. This count exceeded the minimum aerial survey escapement goal for this area, 500 salmon, by 42%. The entire Anvik River survey including the tributaries was 839 chinook salmon compared to the minimum escapement objective of 1,300. A sample of 262 chinook salmon carcasses were sampled for age, sex, and size information, and for scale pattern analysis baseline information. Age-5 salmon dominated these samples, accounting for 55% of the total sample. Males were more numerous than females, accounting for 65% of the sample.

An aerial survey was conducted on the Nulato River on 20 July under fair conditions. On this survey, 100 chinook salmon were counted in the mainstem below the confluence of the North and

South Forks and in the South Fork Nulato River. The North Fork Nulato River was not surveyed because of poor weather. The aerial survey count was well below the minimum aerial survey escapement goal for the South Fork. Minimum escapement goals are 800 chinook salmon for the North Fork and 500 for the South Fork Nulato River. Additionally, an independent estimate of chinook salmon escapement was provided from a salmon counting-tower project, operated by the Nulato Village Tribal Council. The tower count was 808 chinook salmon, which was 43% below the 1995 tower count of 1,412 fish. As expected, too few chinook salmon were captured during beach-seining activities to describe the age and sex composition of the escapement.

No aerial survey was conducted on the Gisasa River, a tributary to the Koyukuk River, because of poor weather. The USFWS counted 1,939 chinook salmon migrating through the Gisasa River weir, which was approximately one-half the 1995 weir count. Additionally, the chinook salmon escapement was sampled at the weir for age and sex composition throughout the migration. Age-5 salmon dominated the sample, accounting for 60% of the total salmon sampled. Males were considerably more numerous than females, accounting for 80% of the total sample.

A weir was operated on the South Fork of the Koyukuk River in 1996 from 2 July through 19 September by the USFWS. There was a period between 30 July and 16 August when the weir was inoperable due to high water. Chinook salmon counts ended on 6 September with a total of 1,232 fish. The female-male ratio was 31% female. Peak passage for chinook salmon was 3 July through 6 July.

Since 1993, inseason assessment of chinook salmon escapement to the Tanana River drainage has been based on tower counts of chinook salmon passing the Chena and Salcha River tower sites. These tower projects are operated by Sport Fish Division of ADF&G. High, turbid water hampered the operations on both the Chena and Salcha Rivers during the 1996 season. The towers were only operational for 17 days during the period of 8-28 July on the Chena River and 16 days during the same period on the Salcha River. Estimates of passage during these days were 1,953 chinook on the Chena River and 3,487 on the Salcha River. As a result of the incomplete tower estimates, post-season mark-recapture experiments were conducted to estimate spawner abundance in index areas of both rivers. Preliminary estimates of escapement were 6,833 and 7,958 chinook salmon for the Chena and Salcha Rivers, respectively, which were 23% and 19%, respectively, below the 1991-1995 average total escapements. The index areas in both rivers were similar to the index areas of the aerial surveys. The minimum aerial survey escapement goal for the Chena River index area is 1,700 chinook salmon; the minimum aerial survey escapement goal for the Salcha River index area is 2,500 salmon. Aerial surveys of the Chena and Salcha Rivers were conducted on 19 July under fair conditions, and both indicated that the escapement goals were met in 1996. Chinook salmon counts of 2,112 and 4,800 fish in the index areas of the Chena and Salcha Rivers were 31% and 95%, respectively, above the minimum escapement goals for these index areas. The Salcha River aerial survey count was the third largest on record. Age and sex composition samples were collected in 1996 from carcass surveys on both rivers. Analysis of these data are not yet complete.

In 1996, the U.S. Department of the Interior, Bureau of Land Management (BLM) operated a weir on Beaver Creek. From 8 July through 24 September the weir passage of chinook salmon was 192 fish. No sex ratio information was collected at that site. The project started later than anticipated in 1996 due to fire in the interior of Alaska, and some interruptions were experienced in August due to high water.

5.1.2 Canada

Aerial surveys were conducted of index areas on the Little Salmon River, Big Salmon River, Ross River, Wolf River, Nisutlin River, and Tincup Creek. As in previous years, aerial surveys were conducted only once per index. The Tatchun Creek index was surveyed twice on foot with the higher count being documented in this report. Visibility was good for all indices except the Ross River index which had poor visibility and the Nisutlin River index, which was given a fair - good rating. Results relative to the previous cycle average are presented below. Actual counts are documented in Attachment IV, along with historical data.

Index	1996 Relative to 1990-1995 Average
Little Salmon River	117% above
Big Salmon River	116% above
Ross River	73% below (poor viewing conditions)
Wolf River	228% above
Nisutlin River	90% above
Tatchun Creek	17% above
Tincup Creek	59% above

The timing of all chinook salmon surveys appeared to be close to peak spawning conditions. Note that single surveys do not capture the entire escapement, since runs are usually protracted with early spawners disappearing before the late ones arrive. Weather and water conditions, spawner density, as well as observer experience and bias also affect accuracy.

The Whitehorse Fishway chinook salmon count was a record for the second consecutive year, with 2,958 fish ascending the fish ladder. The sex ratio observed at the Fishway was 31% female. Further details are given in Section 6.2.4.

A weir that operated on Wolf Creek, upstream of the Whitehorse Fishway, provided a count of 92 chinook salmon, 45% of which were female (see Section 6.2.5). No weir count was obtained from Blind Creek in 1996.

A limited amount of sampling was conducted at spawning grounds on the Takhini River, Teslin River, Little Salmon River and Tatchun Creek. Out of a total of 194 chinook salmon sampled, 55 (28%) were female.

The preliminary tagging estimate of the total spawning escapement for the Canadian portion of the upper Yukon drainage is 27,934 chinook salmon, near the 1990-1995 average of 28,397 chinook. Results of the DFO tagging programme are discussed in greater detail in Section 6.2.2 of this report.

5.2 Summer Chum Salmon

An average summer chum salmon run was anticipated for the Yukon River in 1996. Based on commercial harvests and escapements to selected tributaries, the summer chum salmon run was average to above average in magnitude. It appeared that summer chum salmon spawning stocks from the Koyukuk River drainage and upstream, including the Tanana River drainage were very strong, whereas the return of spawning stocks downstream of the Koyukuk River drainage were generally lower than that observed in 1994 and 1995. In general, escapement goals appear to have been met throughout the Yukon River drainage for the third consecutive year.

Minimum aerial-survey based escapement goals for chum salmon have been established in the East and West Fork Andreafsky River, Anvik River, North Fork Nulato River, Clear and Caribou Creeks of the Hogatza-Koyukuk River drainage, and the Salcha River. Because these minimum escapement goals are based on aerial survey index counts, they do not represent the total escapement to the spawning tributary. A sonar-estimate based goal for chum salmon has also been established for the Anvik River, and has replaced the aerial survey-based goal for that tributary.

The preliminary Anvik River sonar-based escapement estimate of 933,000 summer chum salmon was approximately 87% above the minimum escapement goal of 500,000. Summer chum salmon were sampled by beach seine in the vicinity of the sonar site for age, sex, and size information. Age-4 salmon dominated the sample, accounting for 55% of the sample. Preliminary weighted sex ratio analysis indicated the run into the Anvik River was 47% females, the second lowest percent females since 1978. Additional analysis of the data is in progress.

Fish weir projects were operated by USFWS on the East Fork Andreafsky and Gisasa Rivers. A total of 108,856 summer chum salmon were counted passing through the weir on the East Fork Andreafsky River, which was 37% below the 1995 weir count. The summer chum salmon minimum escapement goal for the East Fork Andreafsky River is 109,000 aerial survey counts. The minimum escapement goal for the West Fork Andreafsky River is 116,000 aerial survey

counts. However, aerial surveys were not conducted on the Andreafsky River for summer chum salmon during the 1996 season. Although the weir count indicated the minimum escapement goal for the East Fork Andreafsky River was not met, it should be noted that the aerial survey escapement goals for the Andreafsky River are under further review. Summer chum salmon were sampled for age, sex, and size information at the weir site. Total sample size was 1,277 salmon. Age-4 salmon accounted for 58% of the estimated escapement passage. The pooled sex ratio samples indicated 51% females.

A total of 157,253 summer chum salmon were counted passing through the Gisasa River weir. A summer chum salmon escapement goal has not been established for this river. However, the 1996 weir count was 17% higher than the 1995 weir count. Additionally, summer chum salmon were sampled for age, sex and length information. Age-5 salmon dominated the pooled sample of 765 chums accounting for 50% of the sample, with 43% age-4. Male salmon were slightly more numerous than females, accounting for 51% of the sample.

Counting-tower projects were operated on Kaltag Creek, Nulato River, Clear Creek, and the Chena and Salcha Rivers. The Kaltag Creek tower project was operated by the City of Kaltag and funded by the Alaska Cooperative 4-H Extension Service and BSFA. During 1996, the Nulato Village Tribal Council conducted salmon-counting tower operations on the Nulato River and USFWS operated a counting tower on Clear Creek, a tributary of the Hogatza River within the Koyukuk River drainage. Sport Fish Division of ADF&G operated salmon-counting projects on the Chena and Salcha Rivers.

The estimated summer chum salmon escapement into Kaltag Creek in 1996, 51,284 salmon, was 32% less than the 1995 escapement estimate. No escapement goal has been established for Kaltag Creek. Additionally, summer chum salmon were collected by beach seine gear and sampled for age, sex and length information. Age-5 salmon dominated the small pooled sample of 52 chums, accounting for 63% of the total. Male salmon were more numerous than female salmon, accounting for 75% of the sample.

The estimated summer chum salmon escapement into the Nulato River (both forks combined) was 136,781 salmon, based on expanded tower counts. This tower count was 42% below the 1995 tower count. An aerial survey of the South Fork Nulato River and mainstem below the forks on 20 July under fair conditions, resulted in a count of only 8,490 summer chum salmon. Although this count was below the minimum escapement goal of 53,000 summer chum salmon, the survey was conducted well after the peak of spawning, and the North Fork was not surveyed because of poor weather. Summer chum salmon were sampled for age, sex, and length information. Age-4 and age-5 salmon were equally represented in the sample of 523 chums, each accounting for 47% of the pooled sample. The sex ratio of the sample was 52% female.

Escapement counts at the Clear Creek tower on the Hogatza River were completed on 20 July after operating for slightly more than a month. This is the second year of operation for this project.

Summer chum salmon passage was estimated at 101,250, of which 57% were female. Peak of the run occurred on 3 July. Escapement in 1996 was similar to the escapement level in 1995.

The USFWS weir project operated on the South Fork of the Koyukuk River from 2 July through 19 September. High water flooded the weir during the period 30 July to 16 August, interrupting counting. During the period of operation, 37,450 summer chum salmon were counted. The run peaked between 20 July and 26 July, and the sex ratio was 51% females.

Tower-counting operations were conducted on the Chena River during the period 8-28 July by Sport Fish Division of ADF&G. However, frequent interruptions, because of high, turbid waters, precluded an accurate estimate of the total escapement to this tributary. Counting was conducted successfully during 17 days during this period. During this period, 12,162 chum salmon were counted, the highest count on record. This count is more than double the average count (4,810) for the same time period from the previous three years. An aerial survey was conducted on the Chena River on 19 July. However, the survey was rated "poor" for observing summer chum salmon because it was conducted prior to peak spawning. During this survey, 2,061 summer chum salmon were counted. Unlike Chena River chinook salmon, a post-season estimate of the total spawning population was not made for summer chum salmon. Summer chum salmon were sampled for age, sex, and length information, but data analysis is not yet complete.

Similarly, tower-counting operations were conducted on the Salcha River by Sport Fish Division of ADF&G during the period 8-28 July, but frequent interruptions, because of high, turbid waters, precluded an accurate estimate of the total escapement to this tributary. Counting was conducted successfully during 16 days during this period. During this period an estimated 74,912 summer chum salmon escaped into the Salcha River, which is the highest on record. This count is more than six times greater than the average count (11,089) for the same time period from the previous three years. An aerial survey was conducted on the Salcha River on 19 July. However, the survey was rated "poor" for observing summer chum salmon because it was conducted prior to peak spawning. A total of 9,722 summer chum salmon were observed in this aerial survey index area, which is the largest count on record. The aerial survey-based minimum escapement goal for the Salcha River is 3,500 salmon. Summer chum salmon were sampled for age, sex, and length information, but data analysis is not yet complete.

The weir operated on Beaver Creek by the BLM counted fish from 8 July until 24 September, and recorded a passage of 654 summer chum salmon. Maximum passage rates were between 22 July and 29 July. No sex ratio data have been reported from that site.

5.3 Fall Chum Salmon

5.3.1 Alaska

The overall run of Yukon River fall chum salmon in 1996 was evaluated inseason to be substantially greater than the preseason projection of 631,000 fish. While a more quantitative assessment of overall run size is not yet available, inseason assessment of lower and upper river test fish data and escapement information suggested that the non-Tanana river fall chum run component in particular, was similar in magnitude to that realized in 1995. Preliminary fall chum salmon escapement estimates made for the Chandalar River (>200,000) and the Sheenjek River (≈ 250,000), were both similar in magnitude to the large escapement estimates made in 1995. By comparison however, test fishery results from the south bank Yukon River near Tanana as well as those in the Tanana River, suggested Tanana River fall chum salmon run size to be comparatively smaller. Although fall chum salmon spawning ground surveys are still being conducted at selected locations throughout the Tanana River drainage, preliminary results from intensive ground surveillance of the Toklat River spawning area indicate that the minimum objective of 33,000 fall chum salmon was not achieved to that stream in 1996.

For the upper Tanana River (upstream of the Kantishna River), a preliminary total abundance estimate of approximately 127,000 fall chum salmon was made from a second-year, feasibility mark-and-recapture study. Although this preliminary estimate is approximately half of the abundance estimate made in 1995 (268,000 chum salmon), ground surveys of the Delta River conducted through mid-October reveal that the minimum escapement objective of 11,000 fall chum salmon will likely be achieved to that stream. On that survey, approximately 9,600 chum salmon were counted on 15 October, with more fish schooled at the mouth. Final assessment of Tanana River fall chum salmon escapements will not be available prior to the end of November.

On the South Fork of the Koyukuk River, the weir was submerged by flooding conditions between 30 July and 16 August. Chum salmon counted after operation resumed on 17 August were considered to be fall run fish. A total of 21,651 fall chums were counted, with peak passage 23-26 August. Chum salmon were counted into the South Fork of the Koyukuk by a sonar project conducted by the USFWS in 1990. A total chum passage of 19,485 was estimated in that year, with peak passage on 13 August.

5.3.2 Canada

Chum salmon aerial surveys were again conducted on the Kluane River, the mainstem Yukon River and the Teslin River. Actual counts and historical data are given in Attachment IV.

The Kluane River count was 64% above the 1992-1995 average while the mainstem Yukon River count was 27% above average. The 1994 mainstem Yukon River count is excluded from the cycle average because of poor fish countability. Visibility for the Kluane River survey was good; the

mainstem Yukon River survey was only fair because some areas, which have in the past contained significant numbers of spawners, were obscured by ice and snow. The survey of the Teslin River index was also done under fair viewing conditions, however it is felt that the comparability with previous years' counts is good. The 1996 Teslin River index count was 58% of the recent cycle average (with 1994 excluded due to poor viewing conditions). A channel which in the past has been utilized by significant numbers of spawners, contained little water in 1996 and was devoid of chum salmon; this may explain the low count relative to average.

The Fishing Branch River weir count of 77,278 chum salmon was the highest since the 1970's. The count was 52% female. Details are presented in Section 6.2.6.

The preliminary mark-recapture estimate of the total chum salmon spawning escapement for the Canadian portion of the upper Yukon drainage is 122,688 chum. This is 46% above the 1992-1995 average of 83,819 chum salmon. 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 escapement assessment is very limited in the Yukon River drainage due to funding limitations and survey conditions generally encountered during periods of peak coho salmon spawning activity. Most of the escapement information that has been collected on coho salmon is from the Tanana River drainage. The only escapement goal established is for the Delta Clearwater River (DCR), which has a minimum goal of 9,000 fish. This goal is based on the number of coho salmon observed from a boat survey of the DCR index area during peak spawning activity, which occurs in late October. Consequently, coho salmon escapement estimates are not yet available to this river or most other spawning streams throughout the Tanana River drainage. Spawning ground surveys of selected areas are currently underway. Among the surveys being conducted are those by the Tanana Chiefs Conference, Inc. (TCC) in the Nenana River drainage, with funding from the BSFA. This new initiative for this season was to better understand the range, abundance, and timing of fall chum and coho salmon within the Nenana River drainage. In addition to surveying the Nenana River proper, 16 additional tributaries to the Nenana River were surveyed. Aerial, foot, and boat survey techniques were used between 17 September and 14 October with 13,596 coho and 70 chum salmon counted. A report will be prepared by TCC which will describe each survey conducted.

Through a cooperative agreement between the USFWS and BSFA, 1996 marked the second consecutive year that East Fork Andreafsky weir operations were extended into September to collect coho salmon escapement data. Normally, timing of the weir operation is planned to count chinook and summer chum salmon, terminating in late July or early August. A total of 8,075 coho salmon were passed through 16 September, the last day of operation in 1996. This compares to 10,901 coho salmon counted past the weir through 12 September in 1995.

The USFWS also operated a weir in the South Fork Koyukuk River in 1996 to monitor salmon escapements. The weir became operable on 2 July. Although operations were suspended during the first half of August as a result of high water conditions, the weir was back in operation for the period 16 August through 19 September. No coho salmon were passed.

6.0 PROJECT SUMMARIES

6.1 Alaska

In addition to projects operated and funded by state and federal agencies, several fishery-related projects were conducted by local organizations within the Yukon River drainage, funded from a U.S. congressional appropriation through the Bureau of Indian Affairs (BIA). A list of all projects conducted within the Alaskan portion of the Yukon River drainage, including project location, objectives, and responsible agencies or organizations, is provided in Table 4. Results from most projects are incorporated in the fishery and stock status portions of this report. Historic project results can be found in the attached database tables and figures. Because of the relatively large number of projects conducted within the Alaskan portion of the drainage, only new projects, or projects of particular interest, are presented in detail here. These specific projects are: (1) Yukon River (Alaskan portion) comprehensive salmon planning, conducted by ADF&G and the Yukon River Drainage Fisheries Association (YRDFA); (2) Yukon River salmon stock identification research, conducted by ADF&G, USFWS, and the United States Geological Survey-Biological Resources Division (USGS-BRD); (3) Yukon River sonar, conducted by ADF&G; (4) South Fork Koyukuk River weir, conducted by USFWS; (5) Beaver Creek weir, conducted by the United States Department of the Interior, Bureau of Land Management (BLM); (6) Chandalar River sonar, conducted by USFWS; (7) Black River weir, conducted by CATG; (8) Tanana River fall chum salmon tagging project, conducted by ADF&G and BSFA; (9) Yukon River fall chum salmon ecology studies, conducted by USGS-BRD; (10) Toklat River sonar, conducted by ADF&G; and (11) Toklat River fall chum salmon restoration study, conducted by ADF&G.

6.1.1 Yukon River (Alaskan Portion) Comprehensive Salmon Plan

ADF&G is in the process of developing a Yukon River comprehensive salmon plan 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 restoration and enhancement 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 1997.

6.1.2 Yukon River Salmon Stock Identification

Scale Pattern Analysis. A combined analysis using scale patterns, age composition estimates, and geographic distribution of catches is used by ADF&G on an annual basis to estimate the stock composition of chinook salmon in Yukon River fishery harvests. Three region-of-origin run groupings of chinook salmon, or runs, have been identified within the Yukon River drainage. 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.

Scale pattern analysis (SPA) is used to apportion the major age group(s) of the District 1, 2, 3, and 4 chinook salmon harvest to region of origin, or stock. The minor age groups in these harvests are apportioned to run based on presence of those age classes in the run-specific escapement relative to the other run-specific escapements. The District 5 harvest, as well as the Canadian harvest, are apportioned entirely to the upper run stock based on geographical location of the harvest. Likewise, the District 6 harvest is apportioned to the middle run stock also based on geography.

During 1996, stock standards for the lower river run were obtained from chinook salmon escapements to the Andreafsky, Anvik and Gisasa Rivers. Middle river stock standards were obtained from chinook salmon escapements to the Chena and Salcha Rivers of the Tanana River drainage. DFO contributed scale samples from tagging project fish wheels and from the commercial fishery in Canada for use as the standard for the upper run stock. Data have not yet been analyzed for 1996. The results presented below for 1995 are still considered to be preliminary. 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):

Chinook Salmon

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%
1994	16%	24%	60%
1995	12%	13%	75%

A pilot study evaluating additional molecular markers for fall-run chum salmon conducted by staff from USGS-BRD, ADF&G, and USFWS has been completed and a manuscript for publication is currently being prepared. The objectives of this study were 1) to assay levels of genetic variability and inter-population differentiation for U.S. and Canadian stocks of fall-run chum using four classes of genetic markers, and 2) to conduct simulations to ascertain the accuracy and precision of each marker class in assigning country of origin for mixed stock fall-run chum fisheries. Analyses using allozymes, mitochondrial (mt)DNA, microsatellites, and gene introns focused on eight fall-run chum stocks (Delta River, Chandalar River, Sheenjek River, Fishing Branch, Big Creek, Minto Slough, Tatchun River, and Kluane River).

The majority of loci assayed (13 of 25 loci across all marker types) showed significant heterogeneity in gene frequency among the eight populations; 10 of 25 loci surveyed showed significant variation between United States and Canadian stocks. Genetic relationships among populations were generally concordant among all marker types and were in agreement with earlier allozyme work by Wilmot et al. (1992) and with the allozyme results described above.

Simulation studies were conducted to determine the accuracy and precision of estimates of fall-run chum allocation based on country-of-origin. Artificial mixtures were evaluated at 20% incremental increases in Canadian contributions (i.e., 0% Canadian, 20% Canadian, 40% Canadian, etc.). Simulations were conducted assuming that total U.S. and Canadian proportions of the simulated mixture comprised equal contributions of stocks from the respective countries. Bias in the estimates occurred at the extreme in the simulations, 0% Canadian or 100% Canadian, partially due to the properties of the algorithm itself to overestimate stocks with low contributions. Accuracy graphs revealed that Canadian stocks were consistently over represented up to contributions of less than approximately 50% and under represented at higher contributions. This bias was consistent regardless of the marker type used in the analysis. Greater precision was realized when using all four classes of genetic markers as compared to simulations conducted using each marker type separately. These results were consistent in terms of accuracy and precision with those of earlier studies using similar reporting groups.

These studies will be summarized in a special report by the JTC on the status of stock identification research for Yukon River chum salmon and chinook salmon. A draft of this report is targeted for completion in the spring of 1997. The intent is to review the current capability of scale pattern analysis and GSI for stock identification, including reporting units and power, and to make recommendations on how these databases may be used.

6.1.3 Yukon River Sonar

The Yukon River sonar project was operated for training purposes only during the 1996 field season with a reduced staff and on an abbreviated schedule. Normal operation of this project for management quality data was not possible due to the unanticipated separation of the region's sonar

program supervisor just prior to the start of the field season. In contrast to prior years, data collection activities were not geared toward producing daily or seasonal passage estimates. Instead, they were designed to facilitate training of the region's largely new field supervisory staff who have responsibility for ensuring that normal data collection activities are conducted in strict accordance to the project operational plan.

Field staff were present at the Yukon River sonar project from 10 June through 28 August in 1996. Training was conducted in all areas of acoustic and non-acoustic data collection, analysis, and processing. Representative elements of all essential data sets were collected during training, though typically not simultaneously. In addition, staff received training in electronic and radio telemetry hardware, software, and project environmental diagnostic procedures necessary to identify detection and estimation difficulties. Finally, staff received training in both acoustic and non-acoustic field repair procedures common to large river sonar projects.

6.1.4 South Fork Koyukuk River Weir

A resistance board weir was installed by USFWS on the South Fork of the Koyukuk River about 32 km above the confluence of the mainstem and 2 km above Fish Creek. This was the first year of a multi-year escapement study. The weir was in operation from 2 July through 19 September; however there was an 18-day hiatus between 30 July and 16 August and a 4-day break 27-30 August, when the weir was inoperable due to high flows that submerged the weir panels and trap. A total of 1,232 chinook salmon were counted between 2 July and 6 September. However a number were obviously missed during the high water events. The female-male ratio was 31% female. Summer chum escapement between 2-28 July was 37,450 fish. The run peaked between 20-26 July. The female-male ratio for the escapement was 51% female. When counting was resumed 17 August, chum salmon passing through the weir were assumed to be the fall component. A total of 21,651 chums were counted between 17 August and 19 September. A peak in the passage occurred during a four day period (23-26 August) and accounted for almost 50% of the fall chum salmon escapement count. The female-male ratio was 48% female. Chum salmon were sampled weekly (140 fish/week) for length, sex, and age information. Additionally, tissue samples from 100 fish were collected 10-12 July and 10-12 September for GSI analysis.

6.1.5 Beaver Creek Weir

In 1996, BLM set up a weir to estimate passage of salmon into the upper portion of the Beaver Creek drainage, tributary of the Yukon River downstream of Fort Yukon at approximately RM 950. The project was located approximately 200 river miles upriver of the Yukon River and 5.5 river miles above the confluence of Victoria Creek. Fish counts started on 8 July and terminated on 24 September. The camp set up and subsequent counting were started later than anticipated in 1996 due to the interior Alaska fire season. High water levels during August resulted in some incomplete counts during this period. It is anticipated that the project will run annually through 2000. In 1997,

counting will begin in early June and sampling of scales, sex ratios, length and weights will be conducted..

6.1.6 Chandalar River Sonar

Due to the importance of Chandalar River (RM 996) fall chum salmon as a refuge and subsistence resource a five-year sonar study was initiated in 1994 to reassess the population status using split-beam hydroacoustics. The developmental phase of the study continued during the 1996 season. The initial year, 1994, was used to develop site-specific operational methods, evaluate site characteristics, and describe possible data collection biases. In 1995, a post-season estimate of total chum salmon escapement and in situ target strength evaluations were completed. Objectives for 1996 included providing daily in-season counts. During this third year of the study, one elliptical-beam transducer was deployed near shore from both the left and right banks of the river (4° x 10° and 2° x 10° respectively). Weirs were installed on each bank directing fish offshore into the detectable range of each transducer. Approximately 80 percent of the river width was ensonified. Both sonar units were operated essentially continuously, 24 hours per day, from 8 August through 22 September. Both systems were calibrated throughout the season using techniques developed in the field. In situ calibration results were within 1.4 dB of factory-calibrated values. All targets were hand-tracked from the raw hydroacoustic data and electronically written to file. Upstream fish were separated from downstream targets. Daily upstream counts for the entire 1996 field season were provided in-season to the USFWS and ADF&G. Chart recordings and hydroacoustic data were compared daily to insure target strength thresholds did not affect target acquisition. Preliminary results were a total escapement estimate of fall chum salmon from 8 August through 22 September of 208,170. Detailed acoustic analyses and a seasonal total will be completed this winter and a progress report provided by June 1997. The USFWS considers the feasibility stage of this project complete. The Chandalar sonar study should be fully operational for the 1997 season.

6.1.7 Black River Weir

In 1996, as in 1995, the Council of Athabascan Tribal Governments (CATG) attempted to set up a weir to estimate the passage of salmon into the upper portion of the Black River drainage, tributary to the Porcupine. The project was to be located near the village of Chalkyitsik (RM 1,084). Several possible weir sites were identified in 1995, and the project's operational plan directed that the weir was to be operational from early August until late September. Unfortunately, high water levels prevented the deployment of the weir in both 1995 and 1996. It is anticipated that weir materials will be moved further upstream in1997.

6.1.8 Tanana River Fall Chum Salmon Tagging Project

A cooperative fall chum salmon stock assessment project by ADF&G and BSFA was conducted on the Tanana River for the second consecutive year in 1996. The primary objective of the study was to determine the feasibility of estimating the abundance of fall chum salmon in the Tanana River upstream of the Kantishna River using mark and recapture techniques. Secondary objectives were to estimate the migration rates of fall chum salmon within the Tanana River and determine the timing of selected stocks (e.g., the Delta River) as they pass the tagging site. The feasibility of continuing the project on an annual basis for use as a reliable inseason management indicator of Tanana River fall chum salmon run strength and timing will also be evaluated.

A single fish wheel was operated in the Tanana River approximately 6 km above the mouth of the Kantishna River to capture chum salmon for tagging. The wheel was equipped with a live box and a three-person crew tagged chum salmon during a 10-hour daily deployment schedule. Chum salmon were tagged with individually numbered spaghetti tags and each tagged fish had its right pectoral fin clipped as a secondary mark. A total of 4,016 chum salmon were tagged and released from 16 August through 30 September.

Two additional fish wheels, which operated approximately 60-70 km upstream of the tagging wheels, were used to recapture tagged chum salmon. The two recovery wheels, each equipped with a live box, were fished 24 hours per day on opposite sides of the river and within 2 km of each other. A total of 6,242 chum salmon were captured in the recovery wheels from 18 August through 2 October, of which 187 were marked. Additional recoveries of tagged chum salmon were voluntarily made by commercial and subsistence fishermen, as encouraged by a $200 lottery. Tag recoveries are also being made at this time from spawning ground surveys to provide stock specific run timing information where possible.

The preliminary total abundance estimate of the number of fall chum salmon which passed the tagging site in 1996 is approximately 127,000 fish, and is approximately 47% of the 1995 estimate ($\approx$ 268,000). Diagnostic data analyses are still being conducted.

6.1.9 Yukon River Chum Salmon Ecology Studies

Significant progress was made in 1996 on several aspects of chum salmon ecology research being conducted by the Alaska Science Center, USGS - Biological Resources Division (formerly NBS). This research on factors limiting chum salmon production is being conducted in response to requests from the USFWS, and in cooperation with ADF&G, and has been discussed previously by the JTC.

In one component of the studies, broad-scale fisheries data (usually escapement estimates) are being related to environmental factors in the brood years to provide clues as to possible limiting factors. Initial evaluations for Chena and Salcha summer chum show an inverse relationship

between low summer water temperatures in the brood year and adult returns. There may also be an effect of snowfall and flows at the time of egg deposition. Of course data is limited so conclusions drawn from this work are tentative. However, results may provide guidance for future, more detailed research. This work is expected to continue for several more months before a manuscript is prepared for publication.

In a second component of more detailed field research, intensive study sites have been established on one specific spawning area in each of the Chena and Salcha rivers and Bluff Cabin Slough of the Tanana River. Detailed analysis of escapements, fecundity, sex ratio, age structure, progression of redd building, and intragravel egg densities have been completed. Fry densities and emigration will be assessed in the spring at each site. Additionally, extensive surveys of spawner abundance and distribution were also conducted throughout the Chena and Salcha rivers and Bluff Cabin Slough to assess the degree to which survival estimates made in intensive study sites apply to other spawning areas in each system. This field work is expected to continue for 4 more years and a site will be added for the Toklat River.

6.1.10 Toklat River Sonar

Most fall chum salmon spawning in the Toklat River is conjectured to occur at Toklat Springs, a prominent area of upwelling springs in the upper river. Population estimates of fall chum escapement to this river have historically been made from expanded aerial or ground survey counts conducted during periods of peak spawning at the Toklat Springs, using stream residence data collected from another Tanana River fall chum stock (Delta River). However, since 1994, more comprehensive assessment of escapement to the Toklat River has been made annually using hydroacoustic techniques.

In 1996, a preliminary sonar passage estimate of approximately 89,000 salmon was obtained for the upper Toklat River during the period 14 August through 1 October. By comparison, ground surveys conducted of Toklat Springs during mid-October resulted in a count of only 16,206 chum and 276 coho salmon. The chum salmon count expanded to a total abundance estimate of approximately 18,800 fish; the coho salmon count will not be expanded. An aerial survey of the Toklat River floodplain between Toklat Springs and the sonar counting site in late October estimated only an additional 5,170 chum and 358 coho salmon.

Although estimates of abundance using hydroacoustic techniques were higher than those generated from subsequent ground surveys in all three years, preliminary results indicate the variation between the two estimates among years has been substantial. Thus, the hydroacoustic assessment studies remain in a developmental stage until a better understanding of inriver salmon run timing and spawner distribution (by species) is obtained. Such will be essential in qualifying the relationship of sonar passage estimates of abundance with estimates obtained from subsequent spawning ground surveys.

6.1.11 Toklat River Fall Chum Salmon Restoration Study

Fall chum salmon restoration activities began within the Toklat River springs spawning area in 1992. This pilot project was precipitated by the Toklat River having only reached its escapement objective of greater than 33,000 spawners once (in 1990) in the previous 12-year period of 1980 through 1991. From 1992 to 1995, fall chum salmon eggs were collected from Toklat River fall chum salmon, reared at Clear Hatchery, and nearly all of the fry were tagged with coded wire tags and released within the Toklat River springs spawning area each following spring. In 1996 ADF&G began the evaluation phase of this pilot study. The recovery of tagged adult fish, and a four-component recovery program was initiated. The first component was to evaluate the proportion of the Toklat River fall chum salmon return consisting of hatchery-reared fish. Components two and three were to evaluate the contribution and timing of Toklat River fall chum salmon in the proximal fisheries, and the fourth component was to evaluate the homing of Toklat River fall chum salmon within the Toklat River springs spawning ground area.

With the assistance of ADF&G, TCC has continued to investigate the quality of spawning habitat on the Toklat River spawning grounds. This project was initiated in 1994 by BSFA and continues with their funding support. Preliminary data indicate adequate to good intra-gravel water temperatures within the incubation environment for each of three habitat types being studied. A progress report will be prepared describing methods, results, and conclusions for information collected during 1994-1996.

6.2 Canada

6.2.1 Upper Yukon River Salmon Test Fishing (Yukon Territory)

DFO has collected run timing and relative abundance data for chinook and chum salmon using fishwheels situated near the Canada/U.S. border since 1982 (excluding 1984). Consistency in the fishwheel sites and fishing methods permits some inter-annual and in-season comparisons, although the primary purpose of the fishwheels is to live-capture salmon for the mark-recapture programme. Fishwheel catches tend to correlate poorly with mark-recapture estimates of border escapement; therefore, catch data is used cautiously when assessing abundance. Test fishing results are presented in this section and are also referred to in Sections 3.1 and 3.2.

The 1996 chinook run as indicated by the fishwheels had a very early peak followed by a gradual, and then rapid, decline. This peak occurred on 5 July. On average, the run peaks at the fishwheels on approximately 21 July. The mid-point of the run was 15 July, significantly earlier than the 1990-1995 average mid-point, 22 July. The first chinook salmon was captured on 24 June, the same as or within one day of the dates of first capture during the previous three years. The date of first capture of chinook salmon in the fishwheels has ranged from 23 June to 18 July in the years

1985 through 1995; the long term average date is 1 July, however during the most recent cycle the average has been 29 June. The combined total fishwheel catch of chinook salmon in 1996 was 1,749 fish, 8% above the recent cycle average. The sex ratio as observed in the fishwheel catches was 24% female. This is lower than the annual proportion of females averaged over the years 1990 through 1995 (30% female). Note that existing information suggests that chinook salmon sex ratio estimates based on fishwheel harvests may be biased in favor of males because of differential capture probabilities between sexes. However, a drop in the percent female observed in the fishwheels has been noticed since 1991.

The chum salmon run at the fishwheels in 1996 was also early, with the first one being captured on 6 July. Significant catches were observed throughout July and early August (up to 38/day during the later part of this period) which is unusual. The run mid-point occurred on 5 September; the mid-point has generally occurred around 15 September during the recent cycle. The peak count (198 chum salmon) also occurred on 5 September. The catch curve for one fishwheel ("Sheep Rock") was bimodal (or trimodal, with a day separating the later two peaks). The catch curve for the other fishwheel ("White Rock") was unimodal, with catches declining precipitously after its peak on 8 September. For both fishwheels combined, catches declined to below average levels after the middle of September. The fishwheels were pulled somewhat early due to river icing and low catches during the first few days of October. The total catch was 4,525 chum salmon which is 7% above the recent cycle average (note, however that the record catch of approximately 9,500 chum salmon in 1995 strongly influences this average).

6.2.2 Upper Yukon River Tagging Program (Yukon Territory)

DFO has conducted a tagging programme on salmon stocks in the Canadian section of the upper Yukon River drainage since 1982 (excluding 1984). The objectives of the programme are to provide inseason estimates of the upper Yukon border escapement of chinook and chum salmon for management purposes and to provide postseason estimates of the total spawning escapements, harvest rates, migration rates and run timing. Spaghetti tags are applied to salmon live-captured in the fishwheels and subsequent recoveries are made in the different fisheries located upstream, and infrequently in those located downstream. Population estimates are developed using spaghetti tag recoveries from the Canadian commercial fishery downstream from the Stewart River where intensive weekly/daily catch monitoring is conducted.

The preliminary 1996 chinook salmon border escapement estimate is 47,955 fish (95% confidence interval =43,009 to 53,469). Using the mark-recapture results, 27,934 chinook salmon are estimated to have reached the various spawning grounds, which essentially equaled the rebuilding step goal of 28,000 established by the Yukon Panel in 1996 for the 1996-2001 return years. Comparative border and spawning escapement estimates from the tagging programme for 1990 through 1996 are as follows:

Year	Border Escap't M/R Estimate	Total Upper Yukon Cdn Chinook Salmon Catch	Estimated Spawning Escapement
1990	56,679	18,980	37,699
1991	41,187	20,444	20,743
1992	43,300	17,953	25,497
1993	45,027	16,469	28,558
1994	46,680	20,790	25,890
1995	52,088	20,091	31,997
Average	47,494	19,093	28,426
1996*	47,955	20,021	27,934
*:	Preliminary		

The preliminary chum salmon population estimate is 143,758 fish (95% confidence interval = 132,411 to 156,076). Approximately 122,688 of these fish are estimated to have reached the various spawning grounds. The rebuilding step escapement goal for 1996 was 65,000, while the goal of rebuilding is an escapement level of more than 80,000 chum salmon. Comparative border and spawning escapement estimates from the tagging programme for 1992 through 1996 are as follows:

Year	Border Escap't M/R Estimate	Total Upper Yukon Cdn. Chum Salmon Catch	Estimated Spawning Escapement
1992	67,962	18,880	49,082
1993	42,165	12,422	29,743
1994	133,712	35,354	98,358
1995	198,203	40,111	158,092
Average	110,511	26,655	83,856
1996*	143,758	21,070	122,688
*:	Preliminary		

6.2.3 Harvest Sampling

Sampling of the commercial chinook and chum salmon harvests was conducted in 1996. Age, length and sex data were obtained from approximately 1,600 chinook salmon and 1,100 chum salmon over the course of their respective runs. An additional 1,000 chum salmon was sampled for length and sex only. Chinook salmon were also examined for missing adipose fins in order to recover coded-wire tags (CWT's). The unweighted sex ratio observed in the chinook sample was 38% female; in the unweighted chum sample the percent female was 47%. These compare with 1995 unweighted sex ratios of 48% female for chinook salmon and 42% female for chum salmon. Age and length analysis has not yet been completed. Six CWT's were recovered from the sample of 1,600 chinook. Additional CWT's were recovered but are not presently linked to a sample size.

Age, length, and sex samples were also obtained from the Aboriginal harvest by LGL consultants as a corollary to the Aboriginal harvest study. Sampling was limited in scope in 1996 and may be increased in future years.

Significant sampling effort was directed at the Tatchun Creek chinook sport fishery in 1996. Age, length and sex data was obtained from 395 harvested chinook salmon. Of these fish, 16% were female.

6.2.4 Whitehorse Rapids Fishway Chinook Enumeration

A record number of 2,958 chinook salmon was observed at the Whitehorse Fishway in 1996. The percent female was 31% (917 fish), which is below the 1990-1995 average of 38%. (Note: 1991 through 1994 percentages do not include adipose - clipped fish due to reasons outlined below). Four hundred and twenty-two (422) adipose-clipped fish were observed (243 males and 179 females), comprising 14% of the run. Adipose-clipped counts have not yet been expanded for a hatchery contribution estimate.

As has been observed since 1994, some of the chinook ascended the fishway more than once. CWT results from 1994 and 1995 sampling programs showed that the fish which exhibited this behaviour had been released into the fishway as fry, after rearing in the hatchery. The fishway was first used as a release site for adipose-clipped hatchery fry in 1989; hence, it is possible that the number of adipose-clipped fish may be exaggerated somewhat in annual counts beginning in 1991, when the first three-year-olds would have returned. Adjustments have not been made to 1991 - 1994 adipose-clip tallies. Starting in 1995, all adipose-clipped chinook salmon ascending the fishway were marked with a caudal punch. In 1995, approximately 11% of the marked fish re-ascended the fishway; however they were included in the cumulative count only once.

Preliminary results suggest that the 1996 proportion is similar, however the value is not available at this time. Of the fish which ascended the fishway more than once in 1996, 52 males and 5 females were sacrificed for CWT's. In addition to these fish and the fish taken for broodstock (see section 6.2.6), a random CWT sample was removed from the fishway; this comprised 25 adipose-clipped males and 23 adipose-clipped females, four of which were used for broodstock. The purpose of the random CWT sample is to evaluate the different release strategies on return rates, and to estimate run composition, including the overall hatchery component. As well as the fish removed for the above reasons, there were at least 52 mortalities in the fishway itself. Some of the female mortalities were used for broodstock, however egg survival was low.

The peak of the run occurred over four days (9-12 August) and was slightly earlier than the recent cycle average (14 August). Similarly, the run mid-point and the arrival of the first fish at the fishway were earlier than average. The run mid-point was 8 August and the first fish arrived on 22 July. On average during the previous chinook cycle, the first fish arrived on 26 July and the run mid-point was 14 August.

6.2.5 Wolf Creek Chinook Salmon Weir

An enumeration weir was again operated by the Yukon Fish and Game Association on Wolf Creek in 1996. Chinook salmon fry from the Whitehorse Hatchery have been released into Wolf Creek since 1985. Prior to 1995, chinook were enumerated in the creek through foot surveys. In 1995, 242 adult chinook salmon were counted through the weir. The 1996 count was 92 chinook salmon, of which forty-two (45%) were females. The number of adipose-clipped fish was 73 (79% of total). The unclipped fish may have been returns from untagged releases, or possibly, progeny of Wolf Creek spawners.

6.2.6 Whitehorse Hatchery Operations

From approximately 425,000 chinook salmon fry on hand at the Whitehorse Hatchery in May 1996, 320,000 fry were coded-wire tagged and released into the Yukon River system upstream of Whitehorse. The remaining 105,000 fry were released into three Yukon Territory pothole lakes; Long Lake (60,000 fry), Scout Lake (30,000 fry) and Coffee Lake (15,000 fry). The stocking of fry into pothole lakes was done in order to reduce the number of fish rearing in the hatchery, which was beyond its capacity, and to reduce the number of fish released without CWT's into the Yukon River system. The fry releases into the Yukon River system were as follows: 10,000 into Wolf Creek; 210,000 into Michie Creek; 50,000 into Judas Creek, a Marsh Lake tributary and 50,000 into the McClintock River above the confluence of Michie Creek. The Michie Creek fry were released into three sites; upstream of Michie Lake, at the outlet of Michie Lake and in Byng Creek.

In July and August 1996, 68 females were removed from the run at the Whitehorse Fishway and used for broodstock, providing an estimated 357,000 eggs. Four of these females were known to be

of hatchery origin; the rest lacked adipose-clips. An additional nine fishway mortalities were stripped of their eggs; however egg survival from these fish has been low, with only 5,000 eyed eggs surviving to date. The annual target number of males in the broodstock program was increased starting in 1995, to increase the genetic diversity of the hatchery-reared stock. In 1996, 215 males were used to supply milt; adipose-clipped males were purposely avoided. Currently there are approximately 340,000 eyed eggs incubating at the hatchery.

6.2.7 Fishing Branch River Chum Salmon Weir

A weir to enumerate chum salmon escapement to the Fishing Branch River has operated annually since 1985, except for 1990. Prior to 1985, 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 (Attachment Table 12).

Due to the run timing of fall chum salmon reported from the middle and lower Yukon River in Alaska, the project was initiated early in 1996. The weir was operational on the evening of 18 August. The run showed exceptionally strong early and mid-components, but dropped off significantly after a peak of almost 5,000 fish, on 19 September. The final cumulative count was 77,278 fall chum salmon. This is the highest weir count since 1975 and lies within the interim escapement goal range of 50,000 - 120,000 established in the IYRSA.

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	weir did not operate	35,000*	
1991	Sep 01 - Oct 15	37,733	59%
1992	Aug 30 - Oct 18	22,517	54%
1993	Aug 31 - Oct 25	28,707	53%
1994	Aug 26 - Oct 25	65,247	56%
1995	Aug 27 - Oct 16	51,971	51%
1992-95 average		42,111	56%
1996**	Aug 18 - Oct 22	77,278	52%

*: Estimated by aerial survey expansion.
**: Preliminary.

Generally a small number of chinook and coho salmon are observed at the weir each year. However, the weir is not in place early or late enough to obtain quantitative information on the chinook salmon or coho salmon runs, respectively. In 1996, four chinook salmon and twelve coho salmon were counted passing the weir site.

6.2.8 Community Development and Education Program

In 1989, a community based incubation box program was initiated with the following objectives: to develop remote/isolated small scale incubation systems for future use in public education and demonstration projects; to produce sufficient numbers of fry in specific locations for coded-wire tag releases; and to provide local schools with a supply of eyed eggs for small (50-100 egg

capacity) classroom incubators. The incubators were intended primarily for chinook salmon. A 120,000-egg capacity box was constructed on MacIntyre Creek in Whitehorse, and a 60,000-egg capacity box was constructed on the North Klondike River near Dawson City. In 1991 and 1992, two 60,000-egg capacity boxes were installed on the Mayo River. The Mayo incubation boxes have been idle since 1994.

Releases of fry from the McIntyre incubation box are summarized in the following table, and additional information is available in previous JTC reports regarding specific year operations. The release sites for the Takhini River chinook stock have been Flat Creek, a small, north bank tributary of the Takhini River and/or the mainstem Takhini River, close to the outlet of Kusawa Lake. In August 1996, approximately 25,000 chinook salmon fry were released into the mainstem Takhini River, 24,000 fry with CWT's and 1,000 fry without. The remainder, approximately 11,000 fry, were tagged and released into Flat Creek, also in August 1996. In addition to the Takhini broodstock, chinook salmon eggs from Tatchun Creek were incubated in a modified fish tote at MacIntyre Creek and the resulting 28,500 fry were released back into Tatchun Creek in June. Approximately 28,000 of these possessed CWT's.

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
1994	Takhini River	1,500 chinook	52,500 chinook
1995	Takhini River	1,000 chinook	35,000 chinook
1995	Tatchun Creek	500 chinook	28,000 chinook

Forty-six thousand Takhini eggs and 15,000 Tatchun eggs are currently being incubated at MacIntyre Creek.

The weir at Flat Creek was operated again in 1996 (as in 1995), for ten days in mid-August. Two male chinook reached the weir- one was adipose-clipped, and the head of this fish was recovered. Four other salmon were seen at the confluence with the Takhini River but they were not observed moving into Flat Creek.

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 has been 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 public school in Dawson City. In order to achieve taggable size resulting fry have been transferred temporarily to the MacIntyre Creek facility as there is no rearing tank on the North Klondike River. The number of fry released since inception of the project is given below. From a 1995 take of approximately 35,000 Klondike River chinook eggs, approximately 13,000 were tagged and released into the North Klondike River. The number was lower than anticipated due to problems with transporting fry to Whitehorse.

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		4,000 chinook 34,000 chinook
1994	Klondike River Tatchun Creek	1,000 chinook	4,000 chinook 29,000 chinook
1995	Klondike River		13,000 chinook

Eggs were not taken from the Klondike River in 1996; rather focus was placed on escapement enumeration, and restoration and enhancement planning. Alternate approaches to producing coded-wire tagged Klondike River chinook fry (including an assessment of rearing options that did not include lengthy transportation) were also examined. The escapement enumeration was actually a redd count, and was conducted from a fixed wing aircraft. Two-hundred and twenty-two (222) redds were reported downstream of the Little South Fork.

The educational programme "Salmon in the Classroom" was continued successfully in 1996. In this program, eggs (approximately 100/incubator) are placed in classroom incubators and the

resultant fry released to their stream of origin. There are currently 27 schools participating in the programme.

6.3 Upper Yukon River Fall Chum Salmon Tagging Project

Mark-recapture (mass tagging), radio telemetry, and studies combining both methods have been discussed by the JTC as a means for providing fisheries managers with information on total and stock specific run abundance, stock composition and timing, and the location of undocumented spawning areas. At the Spring 1996 Yukon River Panel meeting, the JTC presented an inter-agency proposal to the Panel for mass tagging and telemetry studies on fall chum salmon returns in the upper Yukon River basin. The Panel endorsed plans for feasibility work in 1996, and the following information is available to date.

Adult fall chum salmon were captured with fish wheels located in the Yukon River 84 km upriver from the Yukon-Tanana River confluence -- an area commonly referred to as the Rapids. This area was selected to limit the study area to the upper Yukon and Porcupine River drainages, and because of the existence of productive fish wheel sites. Fish wheels were located on both river banks, and operated for 517 hr (north bank) and 497 hr (south bank) from 1 August to 20 September.

Fish captured by the fish wheels were typically held in live boxes for 4-8 hr prior to tagging. Fish in good condition were placed in a tagging cradle submerged in a trough of fresh water, and marked with colored spaghetti tags attached below the dorsal fin; white tags on the north bank, and yellow tags on the south bank. Information on sex, length and condition was also collected. Less than 5% of the fish captured were unsuitable for tagging.

Based on run size projections and sample size requirements, it was determined that 18,000-20,000 marks would be needed to obtain adequate numbers of recaptures for population estimates. To accomplish this objective, 450 fish were tagged per day during the peak of the run and 375 fish during periods of lesser abundance. A total of 17,791 fall chum salmon were captured and marked with spaghetti tags; 7,494 (42%) on the north bank and 10,297 (58%) on the south bank. Daily catch rates ranged from 3 to 33 fish/hr on the north bank, and 6 to 47 fish/hr on the south bank.

Recovery fish wheels were located 51 km upriver from the tagging site near the village of Rampart. These wheels were operated 24 hr/day on both river banks from 1 August to 24 September (55 consecutive days). Fall chum salmon captured by the recovery wheels were examined for tags and released.

A total of 44,999 fall chum salmon was captured by the recovery wheels and examined; 31,728 (71%) on the north bank and 13,271 (29%) on the south bank. Three percent (1,347 fish) of the fish captured in the recovery wheels were marked, representing 7.5% of the fish tagged. Recaptures

totaled 901 (67%) on the north bank and 446 (33%) on the south bank. Daily catch rates ranged from 3 to 54 fish/hr on the north bank, and 2 to 20 fish/hr on the south bank.

Migration rates for 234 fish recaptured in the recovery wheels averaged 25 km/day and ranged from 8 to 70 km/day. Over 60 marked fish were recaptured at other sites (i.e., fisheries, weirs) during the study. Migration rates for these fish averaged 35 km/day, and ranged from 12 to 63 km/day.

Fifty fall chum salmon were tagged with pulse-coded radio transmitters equipped with motion sensors and activity monitors in the 150-151 MHz frequency range. The fish were placed in a tagging cradle submerged in a trough of fresh water; anesthesia was not used during the tagging procedure. The transmitters were inserted through the mouth of the fish and placed in the stomach. The fish were also marked externally with grey spaghetti tags attached below the dorsal fin. Information on sex, length and condition was also collected. Two handling procedures were used during the study; the fish were either tagged immediately after capture and released, or held in the fish wheel live box for 3-6 hours prior to tagging and release.

Radio-tagged fish that moved upriver were recorded by remote tracking stations placed 11 km upriver from the tagging site, or located during boat surveys in the immediate study area (i.e., 14 km upriver or downriver from the tagging site). A remote tracking station was also installed in the Porcupine River drainage near the Fishing Branch River weir.

Forty-eight radio-tagged fish (96.0%) moved upriver after tagging. One radio-tagged fish was not located upriver after release, and one fish regurgitated its transmitter when recaptured at the tagging site. Radio-tagged fish took an average of 49 hr to resume upriver movements and travel past the tracking stations located 11 km upriver from the tagging site. Fish held for 3-6 hr took significantly longer to reach the tracking stations (average travel time 77 hr) than fish tagged and released immediately after capture (average travel time 19 hr).

Of the 48 radio-tagged fish that moved upriver, three (6.3%) fish were caught in subsistence fisheries; one near the Yukon-Nation River confluence, one near Eagle, Alaska, and one near Old Crow, Yukon Territory. One fish was also captured and released at the recovery wheels near Rampart. Travel time from the tracking stations to the recapture location for these four fish averaged 37 km/day, and ranged from 23 to 49 km/day.

7.0 CANADIAN YUKON MAINSTEM FALL CHUM SALMON REBUILDING OPTIONS FOR THE 1993 PARENT YEAR

In 1993, the Canadian mainstem escapement of approximately 30,000 fall chum salmon was only 59 percent of the rebuilding program's escapement goal of 51,000 chum salmon for that year. Paragraph 12 of the Interim Yukon River Salmon Agreement (Agreement) provides the flexibility for the Yukon River Panel (Panel) to revisit the rebuilding plan for a brood year in the event a

rebuilding escapement goal is not reached. The Panel assigned the JTC to develop options for rebuilding the 1993 brood year Canadian mainstem fall chum salmon within the constraints of the Agreement and to report back to the Panel during the fall 1996 meeting.

During the JTC meeting in Whitehorse, four options were developed for consideration by the Panel that addressed adjusting the 1997 escapement goal (Table 6 and Figure 3). The proposed options continue the original rebuilding concept which, for simplicity, assumed that all fall chum salmon return as age-4 fish even though it is recognized that age-5 fish also contribute to the escapement. Given the good escapement experienced in 1996, it may be that age-5 fish could provide a significant contribution to the 2001 return; however, such a 'bonus', should it occur, has not been factored into the current analysis. Additionally, in developing these options, the JTC continued to use the 2.5 return-per-spawner used in establishing the original rebuilding escapement goal steps. It is recognized that, in years of low escapement such as in 1993, production may be above the return-per-spawner used in these options.

As per the rebuilding plan described in the Agreement, all options are to complete the rebuilding program by the year 2001. In summary the options include:

Option 1, noted as the Scheduled Plan, continues with the rebuilding escapement goal step as established in 1992 and indicates a goal of 66,000 chum salmon in 1997 which is the mid-point between the planned goal of 51,000 in 1993 and the rebuilding goal of greater than 80,000 chum salmon, i.e. the planned second step.

Option 2, noted as the Fixed Escapement Target, evenly splits the difference between the fall chum salmon escapement observed in 1993 and the escapement goal of greater than 80,000 chum salmon for the year 2001. The goal for 1997 under this option is 55,000 fish.

Option 3, noted as the Fixed Harvest Rate Target, allocates the same percent of the estimated production in 1997 and in the year 2001 for harvest. In both 1997 and 2001, approximately 35 percent of the estimated production would be considered as harvestable surplus. It is expected that the escapement would be 49,000 chum salmon for 1997 under this option.

Option 4, noted as the Fixed Catch Target, provides for similar harvests in both 1997 and 2001. In this option, the harvest rate is allowed to be higher in 1997 (40%) than in 2001 (27%) although the catch would be the same in each year. A greater proportion of the stock in 2001 would go into the rebuilding effort (i.e. when the stock size is larger) than in 1997 when a poor run is expected. The expected escapement under this option for 1997 is 44,300.

It was recognized by the JTC that all of these options would have management implications for fisheries on both sides of the border. The possible management strategies that would be necessary to implement these various options were not addressed while developing these options since it was felt that all of the strategies will involve domestic and international allocation discussions which go

beyond the bounds of JTC deliberations. The JTC felt that presenting the goal along with the predicted harvestable surplus as in Table 6, would serve as a starting point for these discussions by the Panel, and eventually by the respective Parties' management organizations.

8.0 RESTORATION AND ENHANCEMENT FUND PROPOSAL REVIEW PROCESS

The JTC received a brief summary of the five Canadian and two Alaskan projects which were funded during the 1996 field season with the $140,000 (USD) in Restoration and Enhancement (R&E) Fund special seed money. Panel members had agreed to fund these projects during the April 1996 Panel meeting in Whitehorse. The Panel agreed to initiate a call for R&E proposals in 1996 (for 1997 work) as soon as the JTC could finalize the application forms and the Panel co-chairs could finalize the application packet cover letter.

JTC members finalized the R&E application forms during the 1-2 May, 1996, JTC meeting in Anchorage, and the Panel co-chairs signed the explanatory cover letter dated 18 June, 1996. R&E proposal application packets became available to the public at that time. The application packets contained: 1) the cover letter; 2) instructions for submitting funding requests; 3) Part A - Funding Summary Request Form; and 4) Part B - Project Work Plan, Format, and Instructions (Attachment I).

At the fall JTC meeting, there was some discussion regarding the due date of 30 September for proposals in 1996, the extension to 15 October in Canada, and the potential for a special extension in Alaska to complement the Canadian extension, as these relate to time-frames for the technical review work by the JTC this winter.

The JTC agreed that the Yukon River Restoration and Enhancement Fund Proposal Review Form attached to this report should be considered final for the purpose of reviewing 1996 applications (Attachment II). It is expected that some changes to the review form will occur in the future once JTC members use the form to review submitted proposals during this first round of proposal technical evaluation. The focus of discussion then shifted to concentrate on the process for the JTC technical review. JTC members agreed that a JTC subcommittee of four individuals, two from each country, would be delegated responsibility for leading the JTC technical review. Alternate membership for the subcommittee was not formalized. The subcommittee would initially meet to quickly inventory and review the proposals received and to return to the Panel co-chairs any proposals that appeared incomplete or unclear. Feedback to the submitters of such proposals would be done by the Panel (or its staff, should a secretariat be established). For the remainder of the proposals, the subcommittee would assign reviews to other JTC members and/or solicit outside expertise for technical reviews to distribute the review workload and provide for a technically sound review process. Subcommittee members were not designated during the meeting. The JTC

developed a review schedule for a typical 30 September to 1 April R&E fund proposal review process timeline (Attachment III). It was observed that the compressed review period for winter 96-97 was cause for concern.

The JTC noted several functions which would be necessary as part of the R&E funding process but they fall outside of the technical review role of the JTC. Considerable work needs to be undertaken for, or by, the Panel to ensure adequate management, administration, tracking and oversight of the project proposals submitted to the Panel and those projects which receive funding.

The JTC identified the following operational and administrative functions associated with the proposal process: (1) log in proposals and determine if there are any obvious information deficiencies; (2) transmit proposals to the co-chairs of the JTC subcommittee for technical review; (3) receive the JTC subcommittee technical reviews on proposals; (4) make available to the public the proposals and technical reviews for a public comment period; (5) receive public comments; (6) transmit proposals, JTC technical reviews, and public comments to the Panel; (7) document Panel decisions for each proposal; and (8) notify applicants of Panel funding decisions.

In addition, the JTC identified the following management and audit functions associated with projects that are funded: (1) financial oversight which includes tracking the budget and reviewing quarterly (?) audits for each project and preparing financial and/or operational summaries as required by the Panel; (2) compliance with specified project interim and final deadlines; (3) provide or obtain comments from technical oversight; (4) track, distribute, and archive draft and final project reports; (5) receive and distribute any JTC comments and project reports to the Panel; and (6) document any Panel comments on reports.

The JTC noted these functions are similar to that of a program manager or administrator for the R&E funding process. The JTC noted that these functions could potentially be combined with those duties of a "secretariat" for the Panel. Both components would involve communication with essentially the same groups, that is, the Panel, the JTC, and the public.

9.0 LITERATURE CITED

Wilmot, R. L, R. Everett, W. J. Spearman, and R. Baccus. 1992. Genetic stock identification of Yukon River chum and chinook salmon 1987 to 1990. Progress Report, U.S. Fish and Wildlife Service, Anchorage, AK. 132 p.

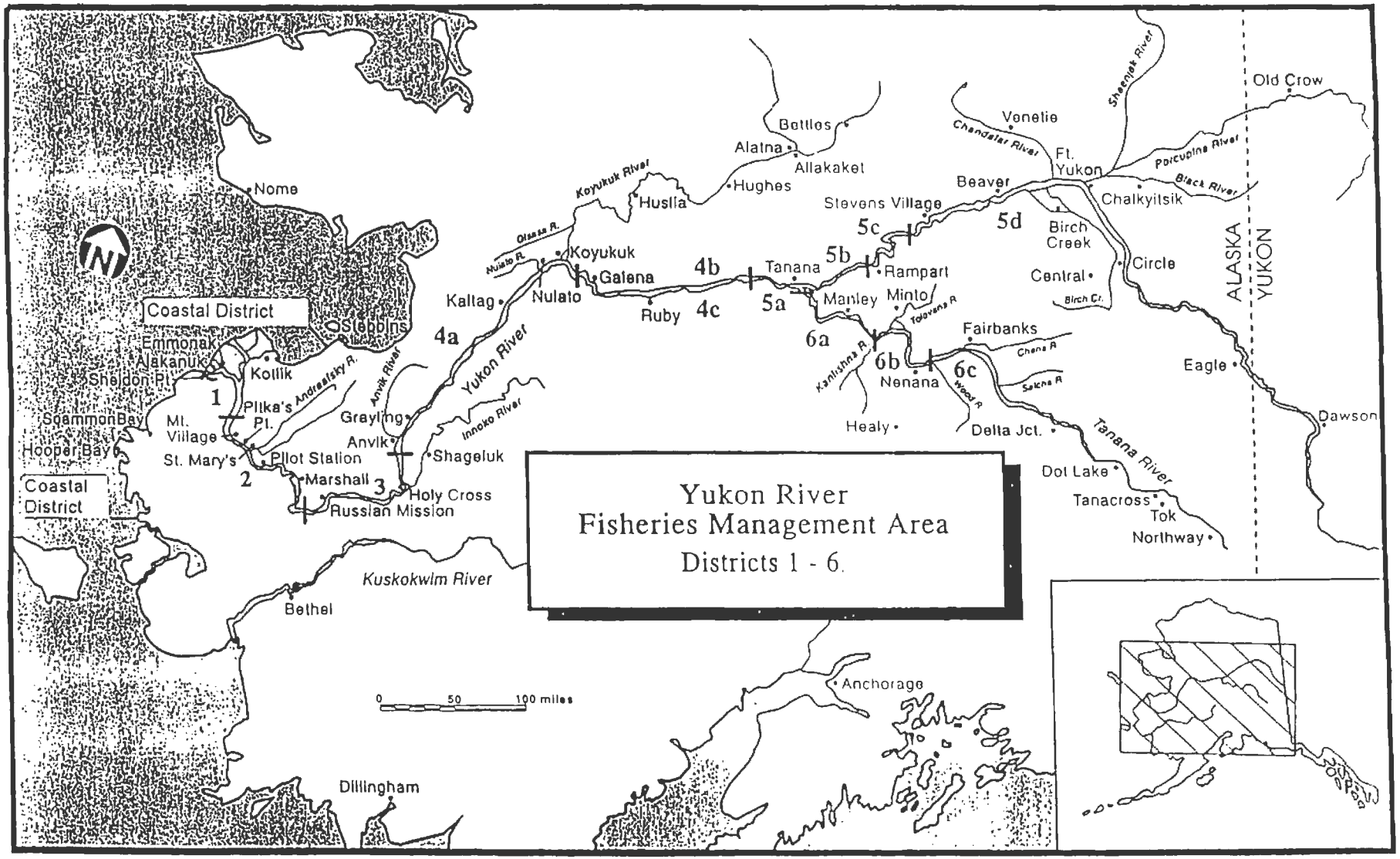

Figure 1. Map of Alaskan portion of the Yukon River drainage, showing communities and fishing districts

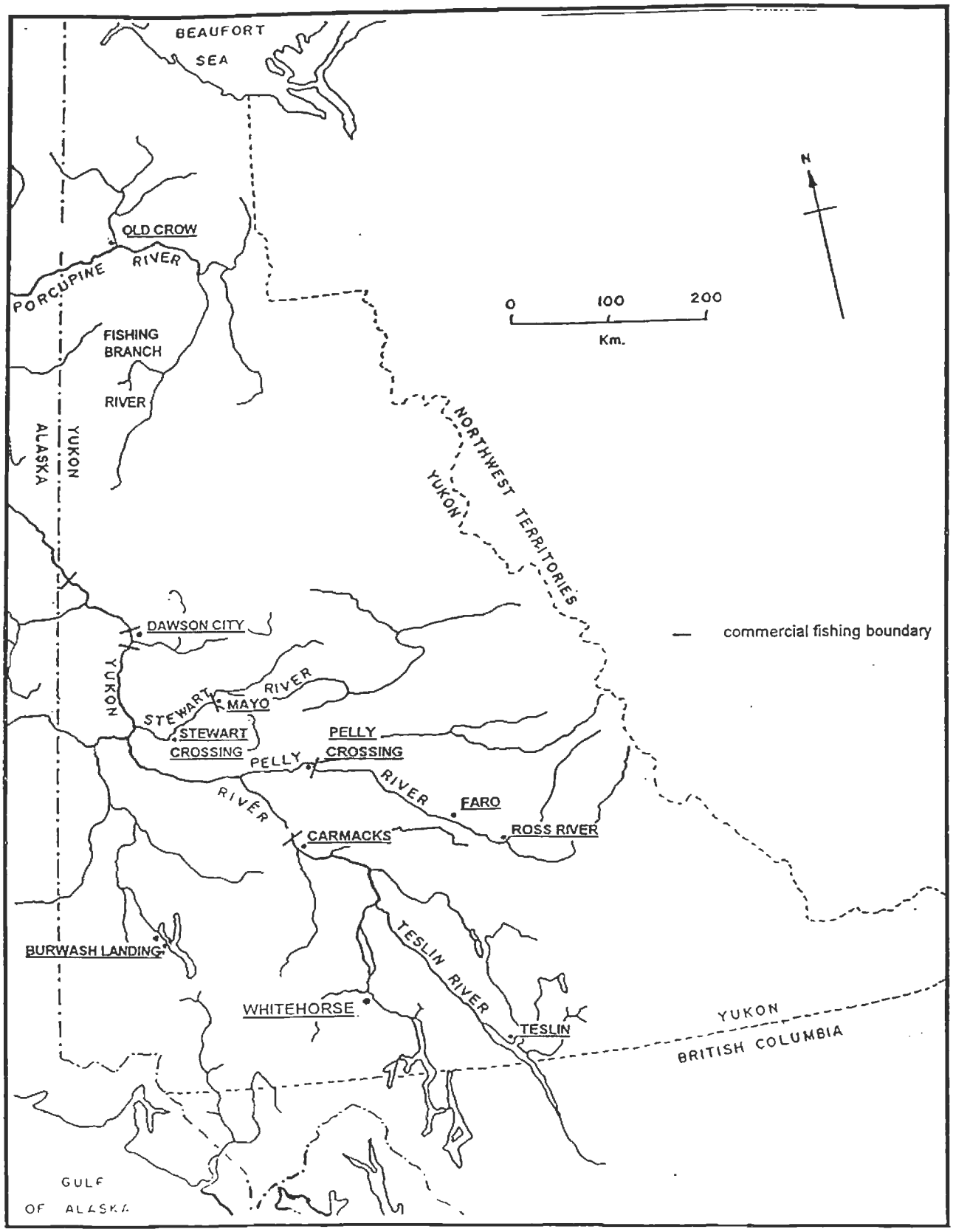

Figure 2. Map of the Canadian portion of the Yukon River, showing commercial fishing boundaries.

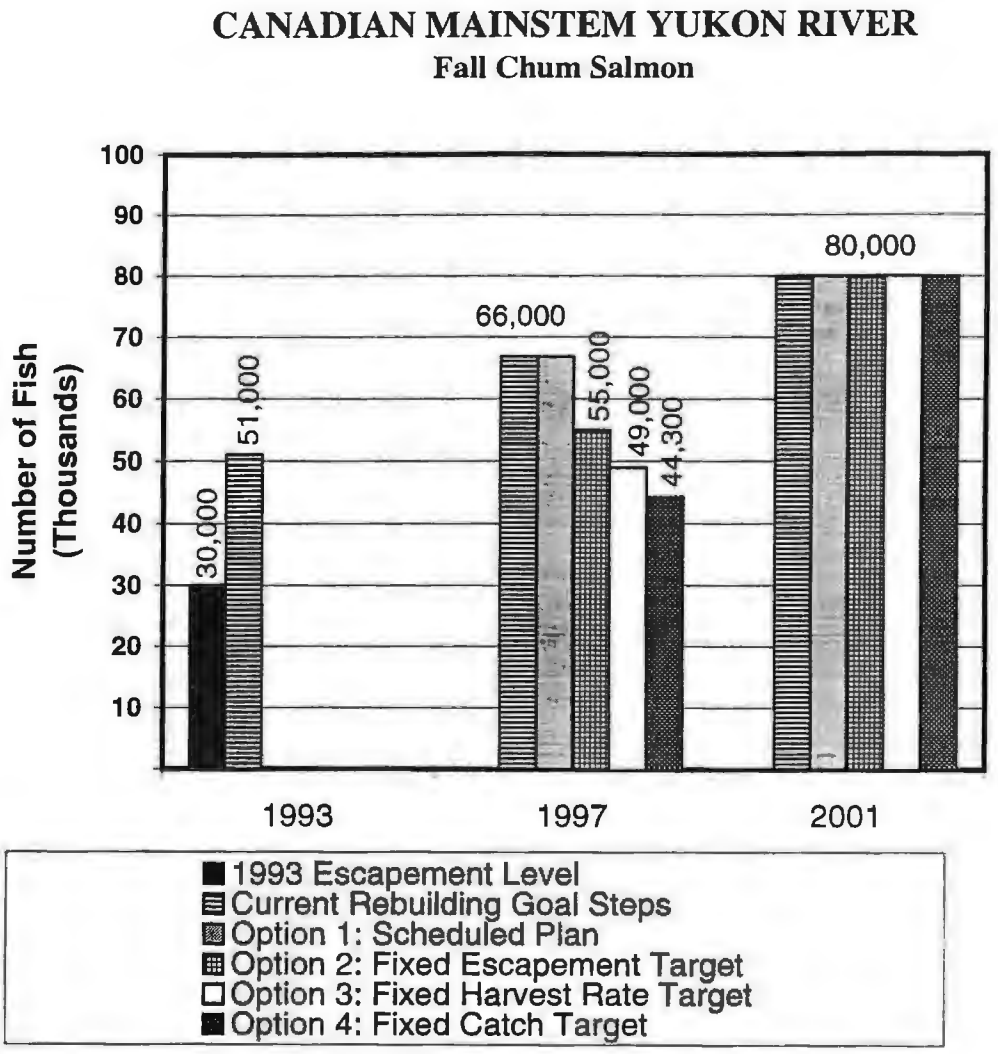

Figure 3. Canadian mainstem escapement level for 1993, and the targeted escapement goal steps for the rebuilding periods 1993, 1997 and 2001. Includes various options for 1997 escapement rebuilding goal step.

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Table 1. Preliminary estimates of commercial salmon sales and estimated harvests in the Alaska portion of the Yukon River drainage, 1996.[a,b]

District Subdist.	No. of Fishermen[c]	Chinook			Summer Chum			Fall Chum			Coho			Total		
		Numbers	Roe	Estimated	Numbers	Roe	Estimated	Numbers	Roe	Estimated	Numbers	Roe	Estimated	Numbers	Roe	Estimated
1	455	56,642	0	56,642	92,506	0	92,506	33,629	0	33,629	27,705	0	27,705	210,482	0	210,482
2	217	30,209	0	30,209	30,727	0	30,727	29,651	0	29,651	20,974	0	20,974	111,561	0	111,561
Subtotal	627	86,851	0	86,851	123,233	0	123,233	63,280	0	63,280	48,679	0	48,679	322,043	0	322,043
3	9	0	0	0	0	935	1,534	0	0	0	0	0	0	0	935	1,534
Total Lower Yukon	628	86,851	0	86,851	123,233	935	124,767	63,280	0	63,280	48,679	0	48,679	322,043	935	323,577
Anvik Rive	23	0	0	0	0	76,318	84,663							0	76,318	84,663
4-A	62	0	0	0	0	181,050	348,085 d							0	181,050	348,085
4-B,C	22	45	202	133	0	37,822	71,991 d	2,918	0	2,918	161	0	161	3,124	38,024	75,203
Subtotal District 4	*87*	*45*	*202*	*133*	*0*	*295,190*	*504,739*	*2,918*	*0*	*2,918*	*161*	*0*	*161*	*3,124*	*295,392*	*507,951*
5-A,B,C	27	2,049	518	2,303	0	188	209	7,481	8,498	17,460	0	0	0	9,530	9,204	19,972
5-D	2	448	0	448	0	114	127	4,397	0	4,397	0	0	0	4,845	114	4,972
Subtotal District 5	*29*	*2,497*	*518*	*2,751*	*0*	*302*	*336*	*11,878*	*8,498*	*21,857*	*0*	*0*	*0*	*14,375*	*9,318*	*24,944*
District 6	19	278	750	442	22,360	18,332	46,932	10,266	6,173	19,663	3,803	4,829	6,784	36,707	30,084	73,821
Total Upper Yukon	135	2,820	1,470	3,326	22,360	313,824	552,007	25,062	14,671	44,438	3,964	4,829	6,945	54,206	334,794	606,716
Total Yukon Area	763	89,671	1,470	90,177	145,593	314,759	676,774	88,342	14,671	107,718	52,643	4,829	55,624	376,249	335,729	930,293

a Commercial sales reported in numbers of fish sold in the round and pounds of unprocessed roe sold by fishermen. Unless otherwise noted, estimated harvest is the number of fish sold in the round plus the estimated number of females harvested to produce the roe sold.

b Does not include Department test fish sales.

c Number of unique permits fished by district, subdistrict, or area. Area totals may not add up due to transfers between districts or subdistricts

d Estmated number of male and female salmon harvested to produce roe sold.

Table 2. Commercial sales of salmon and salmon roe in the Alaska portion of the Yukon River drainage, 1961-1996. [a]

Year	Chinook		Summer Chum		Fall Chum		Coho	
	Numbers	Roe (lbs.)	Numbers	Roe (lbs.)	Numbers	Roe (lbs.)	Numbers	Roe (lbs.)
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	113,137	2,394	80,284	97,757	3,631	3,276	120	5,588
1995	122,728	5,357	259,774	290,737	250,733	32,502	45,939	2,229
1996 [b]	89,671	1,470	145,593	314,759	88,342	14,671	52,643	4,829
1991-95 Avg.	110,908	3,352	223,601	133,286	100,187	11,596	31,159	2,759

a Commercial sales reported in numbers of fish sold in the round and pounds of unprocessed roe sold by fishermen.
b Data for 1996 are preliminary.

Table 3. Canadian weekly commercial catches of chinook and chum salmon in the Yukon River in 1996.

Statistical Week	Week Ending	Start Date	Finish Date	Days Fished	Number Fishing	Boat Days	Chinook Salmon	Chum Salmon	Coho Salmon
27	06-Jul	01-Jul	02-Jul	1	6	6.0	143	0	0
28	13-Jul	09-Jul	12-Jul	3	15	44.0	1,823	10	0
29	20-Jul	15-Jul	20-Jul	5	15	77.0	2,781	66	0
30	27-Jul	22-Jul	26-Jul	4	17	69.0	2,398	119	0
31	03-Aug	29-Jul	03-Aug	5	16	81.0	1,746	138	0
32	10-Aug	05-Aug	09-Aug	4	12	46.0	814	332	0
33	17-Aug	12-Aug	15-Aug	3	5	15.0	110	206	0
34	24-Aug	19-Aug	22-Aug	3	2	6.0	11	227	0
35	31-Aug	26-Aug	29-Aug	3	5	15.0	5	1,250	0
36	07-Sep	02-Sep	05-Sep	3	5	16.0	0	3,003	0
37	14-Sep	09-Sep	13-Sep	4	8	33.3	2	5,699	0
38	21-Sep	16-Sep	20-Sep	4	8	30.7	0	4,485	0
39	28-Sep	23-Sep	27-Sep	4	6	24.0	0	4,062	0
40	05-Oct	30-Sep	04-Oct	4	2	9.3	0	412	0
41	12-Oct	07-Oct	11-Oct	4	0	0.0	0	0	0
42	19-Oct	closed		closed					
Dawson area subtotal				54		472.3	9,833	20,009	0
Upriver commercial subtotal							331	60	
Total Commercial Harvest							10,164	20,069	0
Domestic Harvest (season estimate)							141	0	
Estimated Recreational Harvest (season estimate)							850	0	
Aboriginal Harvest (updated Nov. 07 - incomplete)							8,866	1,001	
Total Upper Yukon Harvest (preliminary)							20,021	21,070	0
Old Crow AF (updated Sept 6 report)							374	1386	100

Table 4. Salmon fishery projects conducted in the Alaskan portion of the Yukon River drainage in 1996.

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Commercial Catch and Effort Assessment	Alaskan portion of the Yukon River drainage	document and estimate the catch and associated effort of the Alaskan Yukon River commercial salmon fishery via receipts (fish tickets) of commercial sales of salmon or salmon roe.	June - Sept.	ADF&G	all aspects
Commercial Catch Sampling and Monitoring	Alaskan portion of the Yukon River drainage	determine age, sex, and size of salmon harvested in Alaskan Yukon River commercial fisheries; monitor Alaskan commercial fishery openings and closures.	June - Sept.	ADF&G ADPS	all aspects enforcement
Subsistence Catch and Effort Assessment	Alaskan portion of the Yukon River drainage	document and estimate the catch and associated effort of the Alaskan Yukon River subsistence salmon fishery via interviews, catch calendars, mail-out questionnaires, telephone interviews, and subsistence fishing permits.	post-season	ADF&G	all aspects
Sport Catch, Harvest and Effort Assessment	Alaskan portion of the Yukon River drainage	document and estimate the catch, harvest, and associated effort of the Alaskan Yukon River sport fishery via post-season mail-out questionnaires.	post-season	ADF&G	all aspects
Yukon River (Alaskan Portion) Comprehensive Salmon Plan	Alaskan portion of the Yukon River drainage	develop a comprehensive plan for restoration and enhancement of salmon stocks of the Alaskan portion of the Yukon River drainage; define goals and objectives; identify potential opportunities and concerns; recommend appropriate procedures; evaluate priorities	ongoing	ADF&G , YRDFA, & USFWS	all aspects
Yukon River Salmon Stock Identification	Yukon River drainage	estimate chinook salmon stock composition of the various Yukon River drainage harvests through analyses of scale patterns, age compositions, and geographical distribution of catches and escapements;	ongoing	ADF&G DFO & USFWS	all aspects provides scale samples
		develop and improve genetic stock identification (GSI) techniques for identification of chum salmon harvests to region of origin;		ADF&G DFO & USFWS	all aspects provides samples
		estimate stock compositions of mixed-stock salmon harvests collected in previous years;		USFWS ADF&G	all aspects assisted in Distr 1 sampling
		investigate the utility of mtDNA, microsatellite, and intron markers in identifying U.S./Canada fall chum salmon stocks.		USGS-BRD USFWS & ADF&G	lead agency in pilot study participating in pilot study
Yukon River Salmon Escapement Surveys and Sampling	Alaskan portion of the Yukon River drainage Nenana River drainage	estimate population size, or index the relative abundance, of chinook, chum, and coho salmon spawning escapements by aerial, foot, and boat surveys; estimate age, sex and size of selected tributary chinook, chum, and coho salmon spawning populations.	July - Nov. Sept.-Oct.	ADF&G TCC/BSFA	all aspects conduct surveys
Lower Yukon Set Gillnet Test Fishing	South, Middle, and North mouths of the Yukon River delta, RM 20	index chinook, summer and fall chum, and coho salmon run timing and abundance using set gillnets. sample captured salmon for age, sex, size composition information.	June - Aug.	ADF&G	all aspects
Mountain Village Drift Gillnet Test Fishing	mainstem Yukon River, RM 87	determine feasibility of using drift gillnets to index timing and relative abundance of fall chum and coho salmon runs	Aug -Sept.	Asa'carsarmiut Trad. Council & ADF&G	all aspects implementation with BSFA funding
East Fork Weir Andreafsky River	mile 20 East Fork RM 124	estimate daily escapement, with age, sex and size composition, of chinook, summer chum and coho salmon into the East Fork of the Andreafsky River.	June - Sept.	USFWS Yupiit of Andreafsky Algaaciq Tribal Council	all aspects partial funding from BSFA Aug -Sept

continued

able 4. (page 2 of 3).

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Yukon River Sonar	Pilot Station, RM 123	Provide staff training.	June - Aug	ADF&G AVCP BSFA	all aspects partial funding
Anvik River Sonar	mile 40 Anvik River, RM 358	estimate daily escapement of summer chum salmon into the Anvik River; estimate age, sex, and size composition of the summer chum salmon escapement	June - July	ADF&G	all aspects
Kaltag Creek Tower	mile 1 Kaltag Creek, RM 451	estimate daily escapement of chinook and summer chum salmon into Kaltag Creek; estimate age, sex, and size composition of the summer chum salmon escapement	June - July	City of Kaltag ACE BSFA	all aspects provided funding
Nulato River Tower	mile 3 Nulato River, RM 486	estimate daily escapement of summer chum and chinook salmon into the Nulato River; estimate age, sex, and size composition of the summer chum salmon escapement.	June - July	NTC BSFA ADF&G	all aspects provide funding
Gisasa River Weir	mile 3 Gisasa River, Koyukuk River drainage, RM 567	estimate daily escapement of chinook and summer chum salmon into the Gisasa River; estimate age, sex, and size composition of the chinook and summer chum salmon escapements.	June - July.	USFWS	all aspects
Clear Creek Tower	mile 0 Clear Creek, Hogotza River drainage, Koyukuk River drainage, RM - 780	estimate daily escapement of chinook and summer chum salmon into Clear Creek; estimate age, sex, and size composition of the summer chum salmon escapement.	June-Aug	USFWS BSFA	all aspects
South Fork Koyukuk River Weir	South Fork Koyukuk River near mouth of Fish Creek RM > 1,117	estimate daily escapement of chinook, summer chum and fall chum salmon to the South Fork Koyukuk River estimate age, sex, and size composition of the salmon escapement.	July-Sept	USFWS	all aspects
Upper Yukon-Porcupine River Radio Telemetry and mark-recaplure	mainstem Yukon River, near Rampart, RM 763	Evaluate feasibility of using radio-telemetry and mark-recapture in a combined approach to estimating stock composition and timing of fall chum salmon in upper Yukon-Porcupine River drainages	Aug -Sept.	USFWS, USGS-BRD ADFG, NMFS, TCC, DFO co-op. project	all aspects
Chandalar River Sonar	mile 14 Chandalar River, RM 996	investigate feasibility of using split-beam sonar equipment to estimate fall chum salmon escapement.	Aug. - Sept.	USFWS	all aspects
Fort Yukon Fish Wheel Test Fishing	mainstem Yukon River, RM 1,002	index the timing of the chum salmon run in the mainstem Yukon River; investigate the feasibility of detecting differences in run timing of Porcupine and mainstem Yukon River fall chum salmon stocks based on fish wheel placement; provide educational opportunities for area students in the operation of a salmon run-timing project	Aug. - Sept	CATG BSFA	all aspects provide funding
Black River Weir	mile 60 Black River, Porcupine River drainage, RM 1,086	estimate daily escapement of fall chum salmon, and other fish species, which pass through the weir on the Black River; estimate age, sex, and size composition of the fall chum salmon escapement, and of other fish species which pass through the weir; provide educational opportunities for area students in the operation of a salmon escapement-monitoring project	Aug - Sept	CATG USFWS BLM	all aspects technical support and training
Sheenjek River Sonar	mile 6 Sheenjek River, Porcupine River drainage, RM 1,060	estimate daily escapement of fall chum salmon into the Sheenjek River; estimate age, sex, and size composition of the fall chum salmon escapement	Aug - Sept	ADF&G	all aspects

continued

Table 4. (page 3 of 3).

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Tanana Village North and South banks Yukon River Fish Wheels, Test Fishing	Mainstem Yukon River Tanana, RM 695	index the timing of fall chum salmon on the north bank of the Yukon River; and index the timing of chum and coho salmon on the south bank of the Yukon River bound for the Tanana River drainage, using test fish wheels. South bank test fish wheel also used for Toklat CWT tag recovery.	Aug. - Sept	ADF&G BSFA	all aspects partial funding
Tanana River Fish Wheel Test Fishing	mainstem Tanana River Nenana, RM 860	index the timing of summer chum, and / or fall chum, and coho salmon runs using test fish wheels.	June - Sept.	BSFA	all aspects
Tanana River Tagging	mainstem Tanana River between RM 793 and 860.	estimate the population size of the Tanana River fall chum salmon run above the confluence of the Kantishna River using mark-recapture methodology;	Aug - Sept	ADF&G BSFA	all aspects provided partial funding
Beaver Creek Weir	mile 200 Beaver Creek Yukon River, RM 932	estimate daily escapement of chinook and chum salmon into the upper portion of Beaver Creek.	July - Sept	BLM	all aspects
Toklat River Sonar & Barton Creek Weir Toklat River Foot Survey	mile 15 Toklat River, Kantishna River drainage, Tanana River drainage, RM 853	estimate daily escapement of salmon into the Toklat River; estimate age, sex, and size composition of fall chum salmon escapement.	Aug - Oct	ADF&G	all aspects
Toklat River Fall Chum Salmon Restoration Feasibility Study	5-A Test Fish Wheel RM 690 Manley Recovery RM 765 Toklat River Recovery RM 848 Toklat Spawning Ground RM 878	Estimate proportion of Toklat River fall chum salmon return consisting of hatchery reared fish. Estimate the proportion and timing of Toklat River fall chum salmon migrating through and/or harvested in Sudistricts 5-A and 6-A. Estimate the precision of tagged fish homing within the Toklat River springs area.	Aug -Oct.	ADF&G BSFA	all aspects provided funding for Subdistrict 5-A recovery wheel assistance
Chena River Tower	mile 1 Chena River, Tanana River drainage, RM 921	estimate daily escapement of chinook and summer chum salmon into the Chena River, mark-recapture for chinook salmon only in 1996.	July - Aug	ADF&G	all aspects
Salcha River Tower	mile 2 Salcha River, Tanana River drainage, RM 967	estimate daily escapement of chinook and summer chum salmon into the Salcha River, mark-recapture for chinook salmon only in 1996.	July - Aug	ADF&G	all aspects

Agency Acronyms:

ACE	= Alaska Cooperative Extension
ADF&G	= Alaska Department of Fish and Game
ADPS	= Alaska Department of Public Safety
AVCP	= Association of Village Council Presidents, Inc.
BSFA	= Bering Sea Fishermen's Association
BLM	= Borough of Land Management
CATG	= Council of Athabascan Tribal Governments
DFO	= Department of Fisheries and Oceans (Canada)
NMFS	= National Marine Fisheries Service
NTC	= Nulato Tribal Council
TCC	= Tanana Chiefs Conference, Inc.
USFWS	= United States Fish and Wildlife Service
USGS - BRD	= United States Geological Survey - Biological Resource Division
YRDFA	= Yukon River Drainage Fisheries Association

Table 5. salmon harvest, escapement monitoring, and fry marking projects ucted in the Canadian portion of the Yukon River drainage in 199.

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Yukon Mark-Recapture	approx. 5 miles above Canada/U.S. border	- determine population, escapement and harvest rate estimates of chinook and chum salmon entering the Canadian section of the upper Yukon River; - inseason run forecasting.	June 15 - Oct 15	DFO	All aspects
Commercial Catch Monitoring	Dawson City	- determine weekly catches in the Canadian commercial fishery; - recovery of tags.	July 1 - Oct 15	DFO	All aspects
Aboriginal Catch Monitoring	Yukon communities	- determine weekly catches in the Aboriginal fishery; recovery of tags; - implementation of Land Claims Agreement;	July 1 - Oct 15	DFO, LGL, Yukon First Nations	Joint project
Escapement Sampling	various tributaries	- to obtain age, size, sex composition of chinook and chum spawning escapement;	Oct 15 - Nov 1	DFO	All aspects
Commercial Catch Sampling	Dawson City	- to obtain age, size, sex composition of commercial catch; - to sample for coded wire tags.	July 1 - Oct 15	DFO	All aspects
Aerial surveys	chinook & chum index streams	- to obtain escapement counts in index spawning areas.	Aug 15 - Nov 1	DFO	All aspects
Fishing Branch Chum Weir	Fishing Br. River	- to enumerate chum salmon returning to the Fishing Branch River and obtain age, size and sex composition data.	Sept 1 - Nov 1	Vuntut Gwitchin	Field work
				DFO	Administration
Whitehorse Hatchery CK CWT	Whitehorse	- to coded-wire tag the fry produced at the Whitehorse Hatchery.	May 15 - June 1	DFO	Administration
				Hatchery staff	Technical support
MacIntyre Incubation Box	Whitehorse	- incubate 100K CK eggs and apply coded wire tags to resulting fry.	year round	DFO	Technical support
				Whse Correctional Centre (WCC)	Field work, project monitoring
North Klondike Incubation Box	N. Klondike River	- incubate 100K CK eggs and apply coded wire tags to resulting fry.	year round	Trondek Hwechin	Administration
				Yukon R. Com. Fish. Assoc.	Field work, project monitoring
				DFO	Technical support
Flat Creek Weir	Whitehorse	- enumerate adult CK CWT returns to the Takhini River.	Aug 1 - Sept 1	DFO	All aspects
Wolf Creek Weir	Whitehorse	- enumerate Whitehorse Hatchery CK returns.	Aug 1 - Sept 1	Yukon Fish & Game Assoc.	All aspects

Table 6 Rebuilding options for the 1993 brood year, Canadian mainstem, fall chum salmon, as developed by the Yukon Joint Technical Committee in Whitehorse, Canada, 23-24 October, 1996.a

1993 Escapement:	30,000					
1997 Estimated Return: b	75,000					
		1997		2001		
Options:		Escapement Goal	U.S./Canada Harvestable Surplus	Estimated Return b	Escapement Goal	U.S./Canada Harvestable Surplus
Option 1: Scheduled Plan.		66,000	9,000	165,000	80,000	85,000
Option 2: Fixed Escapement Target.		55,000	20,000	137,500	80,000	57,500
Option 3: Fixed Harvest Rate Target.		49,000	26,000	122,500	80,000	42,500
Option 4: Fixed Catch Target.		44,300	30,700	110,700	80,000	30,700

a The proposed options continue the original rebuilding concept that all fall chum salmon return as age-4 fish and assumes a constant return-per-spawner at all escapement levels. All options continue to complete the rebuilding program by the year 2001. All numbers are rounded to the nearest 100 fish.

b Assumed Return-per-Spawner: 2.50

File: RFBUILDTAB Sheet: Work Sheet

ATTACHMENT I:

R&E PROPOSAL APPLICATION PACKET

Yukon River Panel

Alaska Department of Fish and Game
Subsistence Division
P.O. Box 25526
Juneau, AK 99802-5526
Phone: (907) 465-4147
Fax: (907) 465-2066

Fisheries and Oceans Canada
200 Range Road
Whitehorse, Yukon Y1A 3V1
Phone: (403) 393-6717
Fax: (403) 393-6738

June 18, 1996

Dear Proposal Applicant:

The Yukon River Salmon Restoration and Enhancement Fund was established as part of the U.S./Canada Interim Yukon River Salmon Agreement which was signed by both governments on February 3, 1995. These funds are to be used for programs that are directly associated with Yukon River research and management activities in the U.S. and Canada for restoration and enhancement of **Canadian origin salmon stocks**. To be considered for funding, proposals must have a clear tie to **Canadian origin salmon** and to the three priorities outlined in the attached proposal instructions. Proposals inconsistent with these priorities will not be considered for funding.

Proposal application packets will be available to the public as of the date of this letter. The application deadline is September 30, 1996, for projects proposed to be conducted in 1997. Proposal applications must be delivered to one of the addresses listed below by the close of the business day on September 30; note that this is a delivery deadline, not a postmark deadline. The Yukon River Joint Technical Committee review will likely be conducted between November 1996 and February 1997. This will be followed by a public review period. The Joint Canada/U.S. Yukon River Panel funding decisions should be finalized in March or April 1997. Applicants are advised that notification in March or April of funding decisions will allow little time for permits and license applications before the upcoming field season.

Submission of a complete and thorough proposal containing all available information pertaining to your project will allow reviewers to address potential biological risks, technical soundness, and social concerns. Incomplete or poorly documented proposals will not allow a complete review, may force delay and may be less likely to receive funding. You may be contacted for further details during the review process, so please ensure that a contact person and telephone number is included on your application.

For further information, please contact either one of the Yukon River Panel Co-Chairs at the numbers listed below.

Sincerely,

Ms. Mary C. Pete
U.S. Co-Chair, Yukon River Panel
Alaska Department of Fish and Game
Subsistence Division
P.O. Box 25526
Juneau, AK 99802-5526

Phone: (907) 465-4147
Fax: (907) 465-2066

Mr. Burt Hunt
Canada Co-Chair, Yukon River Panel
Fisheries and Oceans Canada
200 Range Road
Whitehorse, Yukon Y1A 3V1

Phone: (403) 393-6717
Fax: (403) 393-6738

Yukon River Salmon Restoration and Enhancement Fund
Instructions For Submitting Funding Requests

Requests for funding from the Yukon River Salmon Restoration and Enhancement Fund administered by the Yukon River Panel consist of two components, **Part A** (Funding Summary Request Form), and **Part B** (Project Work Plan). Part A, and an example of the information required in, and the format for, Part B, are attached to these instructions. Both Part A and Part B must be fully completed and sent to one of the following addresses by the deadline identified in the cover letter from the Panel co-chairs:

Ms. Mary C. Pete
U.S. Co-Chair, Yukon River Panel
Alaska Department of Fish and Game
Subsistence Division
P.O. Box 25526
Juneau, AK 99802-5526

Phone (907) 465-4147
Fax (907) 465-2066

Mr. Burt Hunt
Canada Co-Chair, Yukon River Panel
Fisheries and Oceans Canada
200 Range Road
Whitehorse, Yukon Territory Y1A 3V1

Phone (403) 393-6717
Fax (403) 393-6738

The priorities for implementing projects with the R&E Fund will be in this order: (a) restoring habitat and wild stocks; (b) enhancing habitat; and (c) enhancing wild stocks. The Yukon River Joint Technical Committee (JTC) will initially evaluate proposals based upon their technical merit. The technical merit evaluation is to include consideration of the merits of the proposal, when appropriate, evaluation of the ecological and genetic risks, socioeconomic impacts, and to identify alternative actions (including, but not restricted to, fishery management actions). The proposal and the JTC evaluation will then be released for public review and comment. The proposal, along with the JTC evaluation and public comments, will then be forwarded to the Panel for review and funding consideration.

Part A (Funding Summary Request Form) is a single page describing the proposed activity and is designed to provide an overview of the information fundamental to the request. The following instructions are intended as an aid for completing each section of Part A.

Name and Address. Complete this section in detail so that you can be contacted concerning your funding request. If an agency or organization is making the request, please provide the name of an appropriate individual to contact regarding the request, as well as the name of the agency or organization.

Project Name and Location. Provide an accurate and descriptive name for the proposed project, and indicate the river or area where the project is to occur.

Objectives Summary. Provide a brief summary of the objectives and expected benefits of the proposal.

Proposal Summary. Provide a brief summary of the activity to be funded. Include an indication of the stock(s) of salmon of interest, and the methods by which the objectives are to be accomplished.

Schedule and Costs. Indicate the year work is to begin, and if applicable, how many years the work will be conducted. Include critical timeframes for project activities. Examples would be; the requirement for open water, frozen ground for access, or calendar concerns for funding by other sources. Similarly, indicate the cost of the proposed project in the first year, as well as the total projected cost of the project over its intended duration. Please clearly identify total cost of the project (including all sources) and the R&E Fund amount being applied for.

Part A
Yukon River Salmon Restoration and Enhancement Fund
Funding Summary Request Form

Contact Name:_____

Organization:_____

Phone Number:_____ Fax Number:_____

Mailing Address:_____

_____

_____

Project Name:_____

Project Location:_____

_____

Objectives Summary:_____

_____

_____

_____

Proposal Summary:_____

_____

_____

_____

_____

_____

Start Date:_____ Anticipated Project Duration (years):_____

YEAR	R&E FUNDS REQUESTED	OTHER SOURCES OF FUNDS	
	Amount	Amount	Specify Source Name
1			
2			

DO NOT WRITE IN THIS SPACE

Request Number: _____ Date Received: _____

Revised: 05/02/96

Part B
Yukon River Salmon Restoration and Enhancement Fund
Project Work Plan
Format and Instructions

Request Number: *Leave Blank*

Title: Provide a brief descriptive title for the project. The title should be identical to the title given on Part A (Funding Summary Request Form).

Objectives: State the specific objectives of the project beginning with the highest priority. Specifically state what data needs, fish or habitat problem, etc. your project will address. The objectives should specifically relate to the priorities of the Yukon River Salmon Restoration and Enhancement Fund. The priorities for funding projects will be in this order: (a) restoring habitat and wild stocks; (b) enhancing habitat; and (c) enhancing wild stocks.

Introduction: The Introduction should clearly present the rationale for funding the proposed project and highlight the expected benefits. Supply all existing information pertinent to the project proposal, including findings from previous work and local or traditional knowledge. Provide references for this information where possible. For ongoing projects, annual reports from earlier stages of the project must be cited. Photographs of project location or activities should be included if available.

Study Area: Describe the area in which the project is to be conducted and the salmon stocks of interest. Attach a 1:250,000 scale map with the location(s) of the proposed work area clearly marked. Identify on the map the location of potential conflicts relating to, but not limited to; human development, resident or migratory wildlife, access concerns, easement corridors, and land status.

Licenses and Permits: Describe license and permit applications which will be required, the probable timeframe for receipt, and a realistic assessment of being approved or denied. These may include land use, water, collection, and/or research permits or licenses.

Methods: Describe the methods to be used in the project. All methods should support the stated objectives. Include, if appropriate, descriptions of equipment to be used, data collection procedures or other field activities, statistical methods by which data will be analyzed, and expected products. The Methods section may be divided into subheadings that represent different phases of the project.

Personnel: This section should describe who will be involved in the project. If applicable, the number and size of field crews, and the number of project leaders and other supervisory personnel are to be listed. The names and credentials of project leaders and other supervisory staff should be included. The role of government, other organizations,

public interest groups, private sector consultants, or technical staff of organizations should be described.

Schedules: A schedule for all activities should be provided in summary form, including projected dates of field activities, analyses, and any other primary component of the project. Whenever appropriate, the individual responsible for each component should be listed. Funded proposal applicants will be required to submit, at minimum, an annual report. Other reporting requirements (fiscal or technical) may be stipulated by the Panel as a condition of funding.

Proposed Budget: Funds requested should be provided for the following categories:

I. Personnel costs, including benefits.

II. Operating Costs:
   1. Administration (financial record keeping, communications, photo-copying, office supplies, computing supplies, etc.).
   2. Travel (commercial, charter, per diem, mileage, etc.).
   3. Materials, Supplies, and Maintenance (fuel, groceries, sampling and camp supplies, etc.).

III. Major Equipment Items (The proposed disposition of major equipment items purchased by R&E funds upon project completion, if not back to the funding source, should be indicated).

IV. Other (Please include indirect costs, if applicable).

Other Sources of Funding, Assistance, and/or Information: If appropriate, use this section to detail resources necessary to the success of the project, but that are not paid for by the R&E Fund. This includes, but is not limited to, vessel time, use of volunteers or personnel not funded by the project, data collection activities by other projects, and personal equity to be invested in the project. Indicate on a separate sheet by similar budget categories as those previously listed, the project costs being funded outside of the R&E Fund.

Literature Cited: If appropriate, include a complete list of all publications cited in the work plan using a standard format.

Consultation and Public Support: Applicants are encouraged to coordinate with any government, public, or other parties to solicit support for the proposed project. All such information should be held by the applicant until the proposal becomes available for public comment.

ATTACHMENT II:

YUKON RIVER RESTORATION AND ENHANCEMENT FUND PROPOSAL REVIEW FORM

YUKON RIVER RESTORATION AND ENHANCEMENT FUND
PROPOSAL REVIEW FORM

Proposal #_____ Title:_____

_____

_____

Fish Stock or Sub-basin: _____

Part 1. Interim Agreement Criteria

This proposal is for
_____1) restoring habitat or wild stocks
_____2) enhancing habitat, or
_____3) enhancing wild stocks
_____4) other, specify _____

1. Sub-basin priority (circle one): low medium high
2. Is the recommended stock level consistent with natural habitat capacity? (circle one)
   yes / no / not applicable
3. Is this proposal consistent with existing Yukon River basin wide stock rebuilding and restoration salmon plan? (circle one) yes / no / not applicable

Part 2. Risks

The following should be evaluated with respect to applicability, low, medium or high risk. This assessment is general in nature and does not constitute a regulatory review. (circle one)

- Ecological risks n/a low medium high
  Comments:

- Disease risks n/a low medium high
  Comments:

- Genetic risks n/a low medium high
  Comments:

Part 3. Technical Review Rate the following on scale of 1 – 5 with 1 being poor and 5 being excellent.

1. How well do the proposal objectives meet the R&E Fund objectives and criteria?
   1 2 3 4 5
   Comments:

2. What is the ability and likelihood of the applicant in achieving the objectives as stated in the proposal?
   1 2 3 4 5
   Comments:

3. Do the objectives of this proposal compliment other previous, existing or proposed projects?
   1 2 3 4 5
   Comments:

4. Is the methodology sound (methodology includes statistical design, where applicable)?
   1 2 3 4 5
   Comments:

5. How well does the proposal provide for gathering necessary data, project analysis
   and reporting?
   1 2 3 4 5
   Comments:

Part 4. Impacts

Rate the following to reflect the potential impacts of the project, with -5 being the greatest negative impact, and +5 being the greatest positive impact.

1. Does the proposal impact existing wild salmon stocks and habitats?
   -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5
   Comments:

2. Are there fishery management impacts associated with this proposal?
   -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5
   Comments:

Part 5. Other information

Although this information is not a component of the technical review, the information may be used by the Yukon Panel members in their deliberations.

- Potential ability of applicant to conduct the project

- Potential positive and negative socioeconomic impacts

- Potential alternative actions (including, but not limited to, fishery management actions)

- Educational or public involvement component

- Additional technical referrals required. If so, list.

ATTACHMENT III:

R&E FUND PROPOSAL REVIEW PROCESS TIMETABLE

PROPOSED P N SCHEDULE

Activity	Proposal Deadline for Panel co-chair receipt of proposals	Proposals provided to JTC	JTC review by subcommittee designees and experts	Compilation	Public review and comment Suggest 30 days	Compile information and send panel members proposals, JTC review, and public comments.	Spring Panel meeting to decide which proposals to fund.	Proposal applicant notification of funding
Typical timeframe	September 30	October 15	October 16 to January 10	4 Days	January 15 to February 15	February 16 to March 12	March 13 & 14	April 1
Activity Performed by	Applicants & Panel Co-Chairs	Panel Co-Chairs	JTC & Technical Experts	Secretariat	Secretariat & Public	Secretariat	Panel	Secretariat
Notes	Secretariat could return inappropriate proposals or request more information for incomplete proposals before JTC receipt	Present plan is to return incomplete or inappropriate proposals to Panel Co-Chairs	JTC finalize proposal review Subcommittee meeting late October to decide on proposal distribution for review. Meet again in early January to finalize review comments. Time allocation to compile review and present one review for Panel.		Timelines and the definition of "public review" needs to be determined by the Panel.	Panel homework.		This might be pushed to April 15 but applicants need lead time for projects, especially if specialized equipment needs to be manufactured or ordered.

a:timeline.xls

ATTACHMENT IV:

HISTORICAL YUKON RIVER SALMON CATCH AND ESCAPEMENT DATABASE

Attachment Table 1. Alaskan and Canadian total utilization of Yukon River chinook, chum, and coho salmon, 1903-1996.

Year	Alaska[a, b]			Canada[c]			Total		
	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

Attachment 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	1,615,312	1,745,300	5,881	9,566	15,447	135,869	1,624,878	1,760,747
1979	159,232	1,596,133	1,755,365	10,375	22,084	32,459	169,607	1,618,217	1,787,824
1980	197,665	1,730,960	1,928,625	22,846	23,718 [d]	46,564	220,511	1,754,678	1,975,189
1981	188,477	2,097,871	2,286,348	18,109	22,781 [d]	40,890	206,586	2,120,652	2,327,238
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	29,767 [d]	46,562	179,478	1,577,868	1,757,346
1985	187,327	1,657,984	1,845,311	19,301	41,515 [d]	60,816	206,628	1,699,499	1,906,127
1986	146,004	1,758,825	1,904,829	20,364	14,843 [d]	35,207	166,368	1,773,668	1,940,036
1987	188,386	1,246,176	1,434,562	17,614	44,786 [d]	62,400	206,000	1,290,962	1,496,962
1988	148,421	2,311,196	2,459,617	21,427	33,915 [d]	55,342	169,848	2,345,111	2,514,959
1989	157,606	2,281,566	2,439,172	17,944	23,490 [d]	41,434	175,550	2,305,056	2,480,606
1990	149,433	1,053,351	1,202,784	19,238	34,302 [d]	53,540	168,671	1,087,653	1,256,324
1991	154,651	1,335,111	1,489,762	20,607	35,653 [d]	56,260	175,258	1,370,764	1,546,022
1992	168,191	863,575	1,031,766	17,903	21,310 [d]	39,213	186,094	884,885	1,070,979
1993	163,078	342,871	505,949	16,611	14,150 [d]	30,761	179,689	357,021	536,710
1994	172,315	577,250	749,565	21,218	38,340	59,558	193,533	615,590	809,123
1995	177,663	1,437,837	1,615,500	20,887	45,600	66,487	198,550	1,483,437	1,681,987
1996 [f]	91,869 [g]	850,870 [g]	942,739	19.781	22,456	42,237	111,650	873,326	984,976

[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. As these harvest numbers are unavailable at this time.

Attachment Table 2. Alaskan and Canadian total utilization of Yukon River chinook and fall chum salmon, 1961-1996.

	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	148,421	169,848	33,565	319,677	353,242
1989	17,944	157,606	175,550	23,020	518,157	541,177
1990	19,238	149,433	168,671	33,622	316,478	350,100
1991	20,607	154,651	175,258	35,418	403,678	439,096
1992	17,903	168,191	186,094	20,815	128,031 [g]	148,846
1993	16,611	163,078	179,689	14,090	76,925 [d]	91,015
1994	21,218	172,315	193,533	38,008	131,217	169,225
1995 [f]	20,887	177,663	198,550	45,600	415,547	461,147
1996 [f]	20,395	91,869 [h]	112,264	22,456	109,435 [h]	131,891
Average						
1961-85	9,693	133,667	143,361	16,009	288,575	304,584
1986-90	19,317	157,970	177,287	29,846	363,892	393,738
1991-95	19,445	167,180	186,625	30,786	231,080	261,866

[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 Bergstrom et al. 1992: 1990 Yukon Area AMR.

[c] Commercial, subsistence, personal-use, and sport catches combined.

[d] Commercial fishery did not operate within the Alaskan portion of the drainage.

[f] Preliminary.

[g] Commercial fishery operated only in District 6, the Tanana River.

[h] Does not include Alaskan subsistence, personal use and sport fish harvests. As these harvest numbers are unavailable at this time.

Attachment Table 3. Alaskan catch of Yukon River chinook salmon, 1961-1996.

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	46,032	46,032	101,445	944	148,421
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	46,553	45,626	122,134	431	168,191
1993	66,261	65,701	95,682	1,695	163,078
1994	55,266	54,563	115,471	2,281	172,315
1995	50,258	48,934	126,204	2,525	177,663
1996 [g]	[h]	[h]	91,869	[h]	91,869
Average					
1961-85	23,620	23,620	109,778	748	133,667
1986-90	49,410	49,327	107,875	768	157,970
1991-95	53,330	52,319	113,319	1,541	167,180

[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 Bergstrom et al. 1992: 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 Schultz et al. 1993: 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] Does not include Alaskan subsistence, personal use and sport fish harvests. As these harvest numbers are unavailable at this time.

Attachment Table 4. Canadian catch of Yukon River chinook salmon, 1961-1996.

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	10,350	243	5,576	300	6,119	16,469	142	16,611
1994	12,028	373	8,089	300	8,762	20,790	428	21,218
1995	11,146	300	7,945	700	8,945	20,091	796	20,887
1996 [b]	10,164	141	8,866	850	9,857	20,021	374	20,395
Average								
1961-85	4,930	701	4,536	300	4,967	9,897	235	9,293
1986-90	11,198	320	7,182	370	7,872	19,071	225	19,330
1991-95	11,061	284	7,394	380	8,058	19,119	326	19,445

Sport fish harvest unknown prior to 1980.

Attachment Table 5. Alaskan catch of Yukon River summer chum salmon, 1961-1996.

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	171,383	1,077,987	451	1,249,821
1979	196,187	155,970	819,533	328	975,831
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	198,806	1,620,269	1,037	1,820,112
1989	249,582	169,046	1,463,345	2,131	1,634,522
1990	201,839 [g]	117,436	525,440	472	643,348
1991	275,673 [g]	118,540	662,036	1,037	781,613
1992	261,448 [g]	125,497	545,544	1,308	672,349
1993	139,541 [g]	106,728	141,985	564	249,277
1994	245,973 [g]	132,510	261,953	350	394,813
1995	221,308 [g]	119,503	824,487	1,174	945,164
1996 [h]	[j]	[j]	684,083	[j]	684,083
Average					
1961-85	219,081	192,390	437,563	647	630,185
1986-90	265,977	168,513	1,084,089	1,076	1,253,678
1991-95	228,789	120,556	487,201	887	608,643

[a] Includes salmon harvested solely for subsistence and personal use, 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 and personal use.
[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 Bergstrom et al. 1992: 1990 Yukon Area AMR.)
[d] Includes both summer and fall chum salmon sport fish harvest within 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 commercially-harvested summer chum salmon for roe production in District 5 and 6, plus the estimated subsistence use of commercially-harvested summer chum salmon in District 4.
[h] Preliminary.
[j] Does not include Alaskan subsistence, personal use and sport fish harvests. As these harvest numbers are unavailable at this time.

Attachment Table 6. Alaskan catch of Yukon River fall chum salmon, 1961-1996.

Year	Estimated Subsistence Use[a]	Harvest		
		Subsistence[b]	Commercial[c]	Total[d]
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	158,694	155,467	164,210	319,677
1989	230,978	216,229	301,928	518,157
1990	185,244	173,076	143,402	316,478
1991	168,890	145,524	258,154	403,678
1992	110,903	107,602	20,429 [k]	128,031
1993	76,925	76,925	0	76,925
1994	127,586	123,218	7,999	131,217
1995	163,693	131,369	284,178	415,547
1996 [j]	[m]	[m]	109,435	109,435
Average				
1961-85	106,879	100,497	180,343	280,840
1986-90	220,124	213,980	149,912	363,892
1991-95	129,599	116,928	114,152	231,080

[a] Includes salmon harvested solely for subsistence and personal use, 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 and personal use.

[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 Bergstrom et al. 1992: 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 differentiate between the two races of chum salmon. However, 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.

Attachment Table 7. Canadian catch of Yukon River fall chum salmon 1961-1996.

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	7,762	0	4,660	4,660	12,422	1,668	14,090
1994	30,035	0	5,319	5,319	35,354	2,654	38,008
1995	39,012	0	1,099	1,099	40,111	5,489	45,600
1996 *	20,069	0	1,001	1,001	21,070	1,386	22,456
Average							
1961-85	7,027	1,475	2,499	3,132	10,159	6,405	16,298
1986-90	25,481	161	2,768	2,929	28,410	1,436	29,846
1991-95	25,358	0	2,764	2,764	28,122	2,664	30,786

* Preliminary.

Attachment Table 8. Alaskan catch of Yukon River coho salmon, 1961-1996.

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	15,772	15,772	0	897	16,669
1994	48,926	44,594	4,452	2,174	51,220
1995	29,716	28,642	47,206	1,278	77,126
1996[j]	[m]	[m]	57,352	[m]	57,352
Average					
1961-85	16,814	16,814	20,978	279	37,896
1986-90	55,584	54,933	55,918	1,801	112,653
1991-95	37,730	35,663	34,185	1,758	71,606

[a] Includes salmon harvested solely for subsistence and personal use, 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 and personal use.

[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 Bergstrom et al. 1992: 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.

Attachment Table 9. Chinook salmon escapement counts for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1961-1996 [a]

Year	Andreafsky River			Anvik River		Nulato River			Gisasa River		Chena River			Salcha River		
	East Fork		West Fork	Aerial		Aerial		Mainstem			Pop. Est.	Aerial		Pop. Est.	Aerial	
	Aerial	Tower or Weir Cnt	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	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	300 [g]	7,801 [p,r]	213 [g]		913 [g]	843	952	1,795 [s]	2,775	2,888 [p,t]	11,881 [k]	1,570	1,570	18,404 [k]	11,823	11,189
1995	1,635	5,841	1,108	1,996	1,147	968	681	1,412	410	4,023	9,680 [m]	3,575	3,039	13,643 [k]	3,978	3,734
1996 [v]		2,955	624	839	709		100 [n]	808		1,945	6,833 [m]	2,233	2,112	7,958 [m]	4,866	4,800
E.O.[w]	>1,500		>1,400	>1,300[x]	>500[x]	>800	>500		>600				>1,700			>2,500

continued

[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 31-Oct-96
[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.
[i] 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] Manistem 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 goals. Established March, 1992.
[x] Interim escapement goal 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

Attachment Table 10. Chinook salmon escapement counts for selected spawning areas in the Canadian portion of the Yukon River drainage, 1961-1996.

Year	Tincup Creek[a]	Tatchun River[a, b]	Little Salmon River[a]	Big Salmon River[a, c]	Nisutlin River[a, d]	Ross River[a, f]	Wolf River[a, 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	101[k]	477	726	1,764	389	506	393[r]	1,577[t]	25,890
1995	121	397	781	1,314	274	253[k]	229[r]	2,103	31,997
1996[s]	150	423	1,150	2,565	719	102[k]	705[r]	2,958	27,934
E.O.									33,000 - 43,000[q]

continued

[a] Data obtained by aerial survey unless otherwise noted. Only peak counts are listed. Survey rating is fair to good, unless otherwise noted. Preliminary table revisions, Sept 30,1996.
[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 Salmon 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, 879, 757 and 422 fin-clipped hatchery-origin salmon in 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995 and 1996 respectively. Note that the 1994 count is presently under review because a number of fin-clipped fish were double-counted.
[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 escapement from the DFO tagging study for years 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.
[t] Under review; a number of fin-clipped fish were double-counted.
[q] Interim escapement objective. Stabilization escapement objective for years 1990 - 1995 is 18,000 salmon. Rebuilding step escapement objective for years 1996-2001 is 28,000 salmon.

Attachment Table 11. Summer chum salmon escapement counts for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1973-1996.

Year	Andreafsky River			Anvik River		Rodo River[a]	Kaltag Cr. Tower Counts	Nulato River			Gisasa River		Hogatza River		Tozitna River[a]	Chena River		Salcha River	
	East Fork							Aerial		Mainstem			Clear & Caribou Cr	Clear Creek					
	Aerial[a]	Sonar, Tower, or Weir Cnts	West Fork[a]	Tower & Aerial[b]	Sonar			South Fork	North Fork[c]	Tower Counts	Aerial	Weir	Aerial	Tower Counts		Aerial	Tower	Aerial	Tower
1973	10,149 [d]		51,835	249,015												79 [d]		290	
1974	3,215 [d]		33,578	411,133		16,137		29,016	29,334		22,022				1,823	4,349		3,510	
1975	223,485		235,954	900,967		25,335		51,215	87,280		56,904		22,355		3,512	1,670		7,573	
1976	105,347		118,420	511,475		38,258		9,230 [d]	30,771		21,342		20,744		725 [e]	685		6,484	
1977	112,722		63,120	358,771		16,118		11,385	58,275		2,204 [d]		10,734		761 [d]	610		677 [d]	
1978	127,050		57,321	307,270		17,845		12,821	41,659		9,280 [d]		5,102		2,262	1,609		5,405	
1979	66,471		43,391		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 [f]			1,486,182			14,348								3,500		8,500	
1982	7,501 [d]	181,352 [f]	7,267 [d]		444,581						334 [d]		4,984 [d]		874	1,509		3,756	
1983		110,608 [f]			362,912			1,263 [d]	19,749		2,356 [d]		28,141		1,604	1,097		716 [d]	
1984	95,200 [d]	70,125 [f]	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 [g]	99,373		1,189,602			16,848	47,417		12,114				1,778	1,509		8,028	
1987	6,687 [d]	45,221 [g]	35,535		455,876			4,094	7,163		2,123		5,669 [d]			333		3,657	
1988	43,056	68,937 [g]	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, h]	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		200,981 [j, k]			1,124,689		47,295			148,762 [m]	6,827	51,116 [n]	8,247 [o]			1,137	9,984	4,916	39,450
1995		172,148 [l]			1,339,418	12,849	77,193	10,875	29,949	236,890	6,458	136,886		116,735	4,985	185 [d]	3,519 [q]	934 [d]	30,784
1996 [w]		108,856 [l]			933,240	4,380	51,284	8,490 [d, h]		136,781		157,459	27,090 [o]	101,250	2,310	2,061	12,162	9,722	74,912
E.O.[r]	>109,000		>116,000		>500,000[s]				>53,000[t]				>17,000[v]					>3,500	

[a] Data obtained by aerial survey unless otherwise noted. Only peak counts are listed. Latest table revision :December 12, 1996.
[b] From 1972-1979 counting tower operated; escapement estimate listed is the tower counts plus expanded aerial survey counts below the tower (see Buklis 1982).
[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] Sonar count.
[g] Tower count.
[h] Mainstem counts below the confluence of the North and South Forks Nulato River included in the South Fork counts.
[j] Weir Count
[k] Weir installed on June 29. First full day of counts occurred on June 30.
[m] Tower counts delayed until June 29 because of high, turbid water. First full day of counts occurred on June30.
[n] Weir installed on July 11. First full day of counts occurred on July 12.
[o] BLM helicopter survey.
[q] Tower operations were severly hampered because of high, turbid water which prohibited observations from the tower. Tower operated during the periods July 10 - 15 and from July 19 - 30, 1995.
[r] Interim escapement objective.
[s] The Anvik River Escapement Objective was rounded upward to 500,000 from 487,000 in March, 1992.
[t] Interim escapement objective for North Fork Nulato River only
[v] Consists of Clear and Caribou Creeks interim escapement objectives of 9,000 and 8,000, respectively.
[w] Preliminary.

Attachment Table 12. Fall chum salmon escapement counts for selected spawning areas in Alaskan and Canadian portions of the Yukon River drainage, 1971-1996. [a]

Year	Alaska				Canada					
	Toklat River[b]	Delta River[c]	Chandalar River[d]	Sheenjek River[d]	Fishing Branch River[f,g]	Mainstem Yukon River Index[g,h]	Koidern River[g]	Kluane River[g,i]	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]	28,707[s]	2,620	0	4,610	555	29,743
1994	76,057	23,777[v]		153,000[ac,ad]	65,247[s]	1,429[p]	20[p]	10,734	209[p]	98,358
1995	54,513[ah]	20,587	280,999	235,000[ac]	51,971[s,aj]	4,701	0	16,456	633	158,092
1996[ad]	15,900	12,328	203,683	247,965[ac]	77,278[s]	4,977	0	14,431	315	122,688
E.O.[af]	> 33,000	> 11,000		> 64,000[ag]	50,000 - 120,000					> 80,000

continued

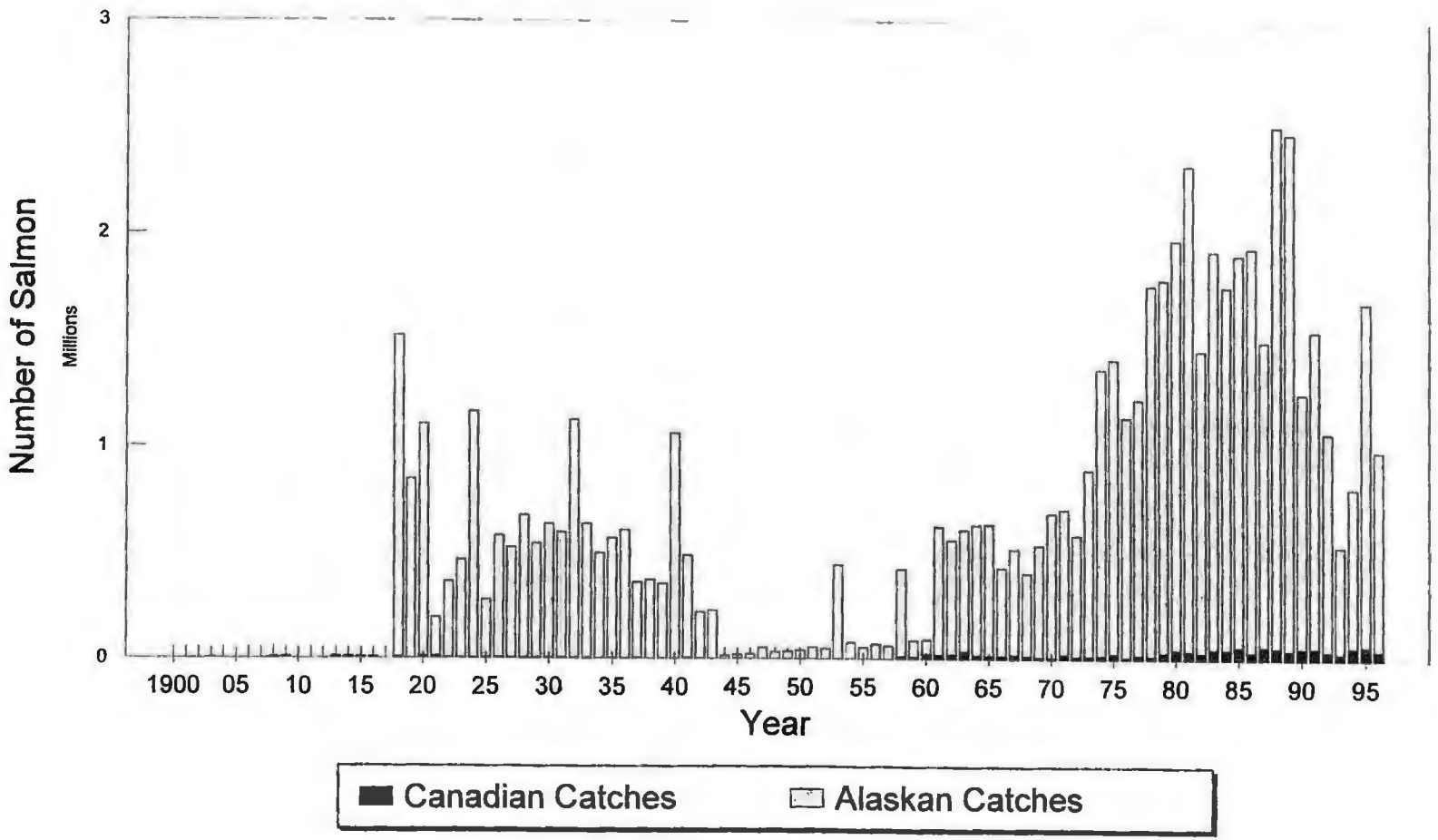
[a] Latest table revision November 6,1996.
[b] Expanded total abundance estimates for upper Toklat River index area using stream life curve (SLC) developed with 1987-1993 data. Index area includes Geiger Creek, Sushana River, and mainstem floodplain sloughs from approximately 0.25 mile upstream of roadhouse 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 1986-1990, split beam sonar estimate 1995-1996.
[f] Located within the Canadian portion of the 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.
[i] 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] Interim escapement objective.
[ag] Based on escapement estimates for years 1974-1990.
[ah] Minimal estimate because of late timing of ground surveys with respect to peak of spawning.
[aj] Minimal count because weir was submerged, but closed, during the period 31 August- 8 September because of high water.

Attachment Table 13. Coho salmon escapement counts for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1972-1996. [a]

Year	Andreafsky River		Anvik River	Kantishna River		Nenana River Drainage				Delta Clearwater River[f,g]	Clearwater Lake and Outlet	Richardson Clearwater River
	East Fork	West Fork		Geiger Creek[b]	Barton Creek	Lost Slough	Nenana Mainstem[c]	Wood Creek[d]	Seventeen Slough			
1972										630	417	454 [k]
1973										3,322	551 [f]	375 [f]
1974						1,388			27	3,954 [l]	560	652 [f]
1975						943			956	5,100	1,575 [f,h]	4 [k]
1976			467 [k]	25 [l]		118			281	1,920	1,500 [f,h]	80 [k]
1977			81 [k]	60		524 [k]		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 [l]		499 [k]		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 [l]		2,677		8,826 [n]		11,061	1,368	428
1985				42 [l]		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				410	2,000 [n,w]	944	1,648	1,317 [n,x]	2,909	62,675 [y]	3,425 [f,h]	5,800 [f]
1995	10,901			142	192 [n,z]	4,169	2,218	500 [n]	2,972 [k]	20,100	3,625	
1996 [t]	8,034			136	0 [n]	2,040 [j]	2,171 [j]	201 [j]	3,668 [h,j]	11,975 [aa]	1,025 [f,j]	
E.O.										>9,000[u]		

continued

[a] Only peak counts presented. Survey rating is fair to good, unless otherwise noted. Latest table revision: November 3,1995.
[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.
[i] 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.
[t] 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.
[z] An additional 1,000 coho salmon were estimated pooled downstream of weir on October 2, just prior to weir removal.
[aa] An additional 3,300 coho salmon were counted by helicopter in the Delta Clearwater outside of the normal mainstem index area.



Attachment Figure 1. **Total utilization of chinook, chum, and coho salmon, Yukon River, 1900-1996. The 1996 Alaskan harvest includes only commercial catch data. Other Alaskan harvest estimates are unavailable at this time.**

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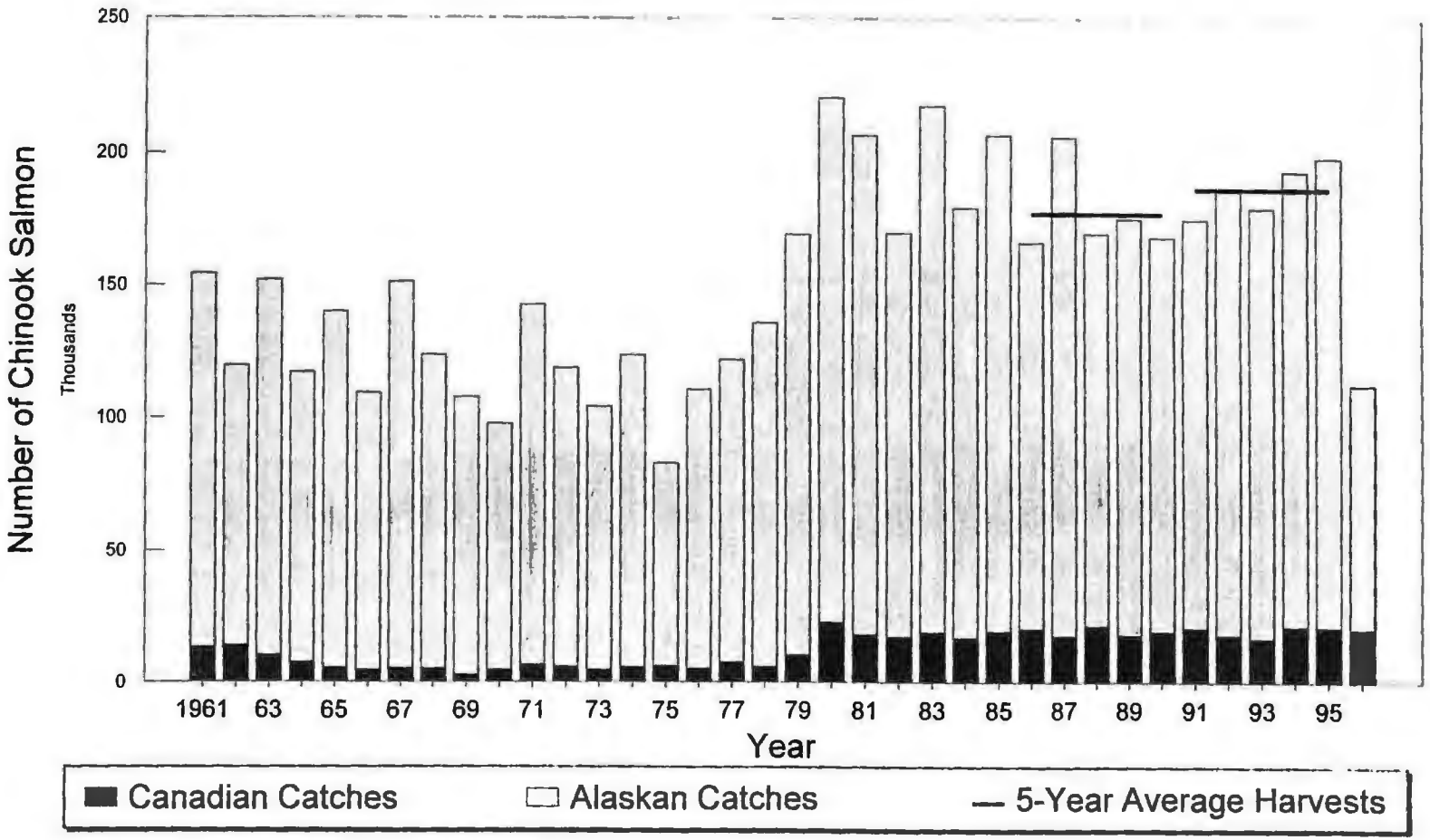

Attachment Figure 2. **Total utilization of chinook salmon, Yukon River, 1961-1996. The 1996 Alaskan harvest includes only commercial catch data. Other Alaskan harvest estimates are unavailable at this time. Horizontal lines indicate 5-year average harvests.**

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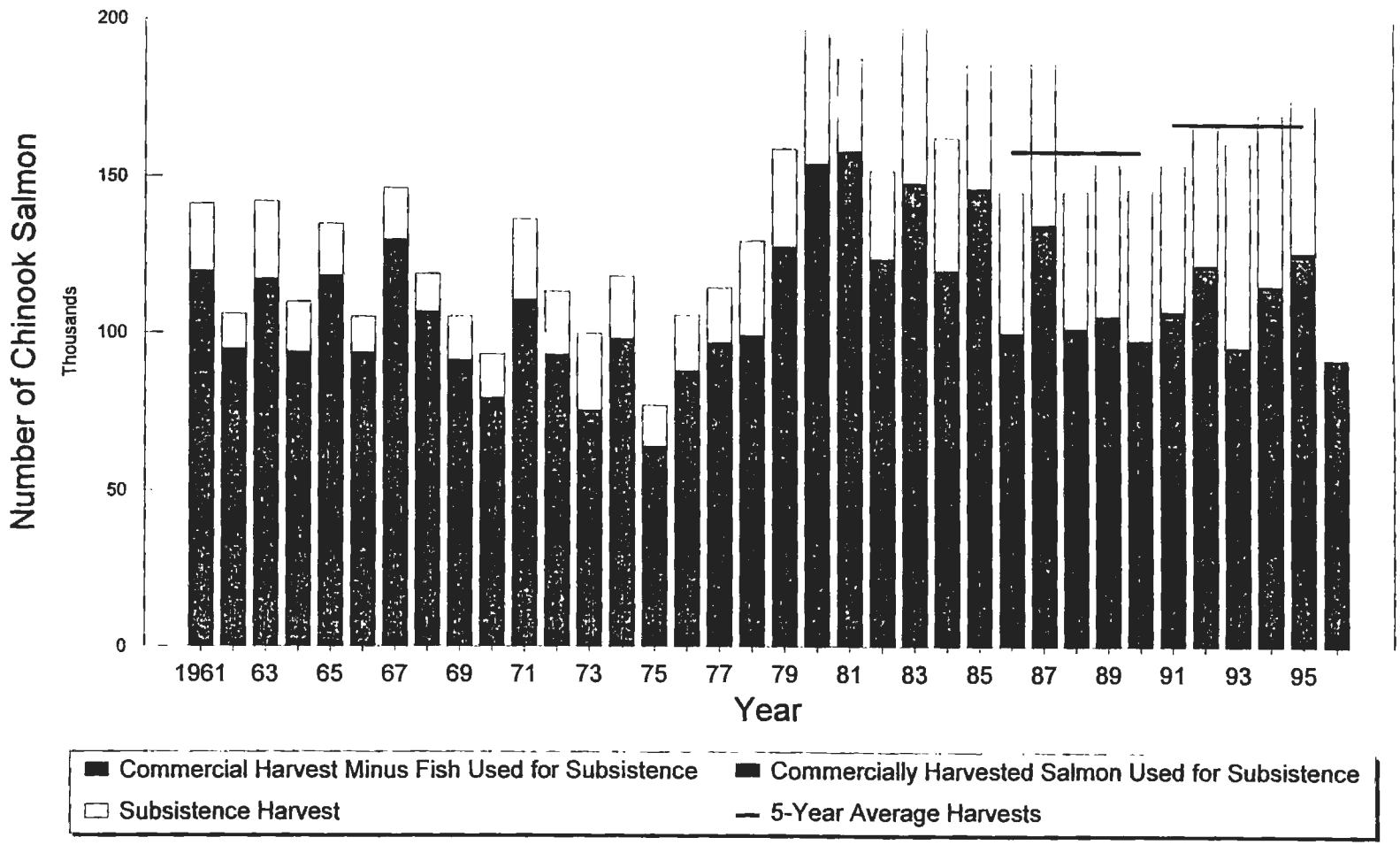
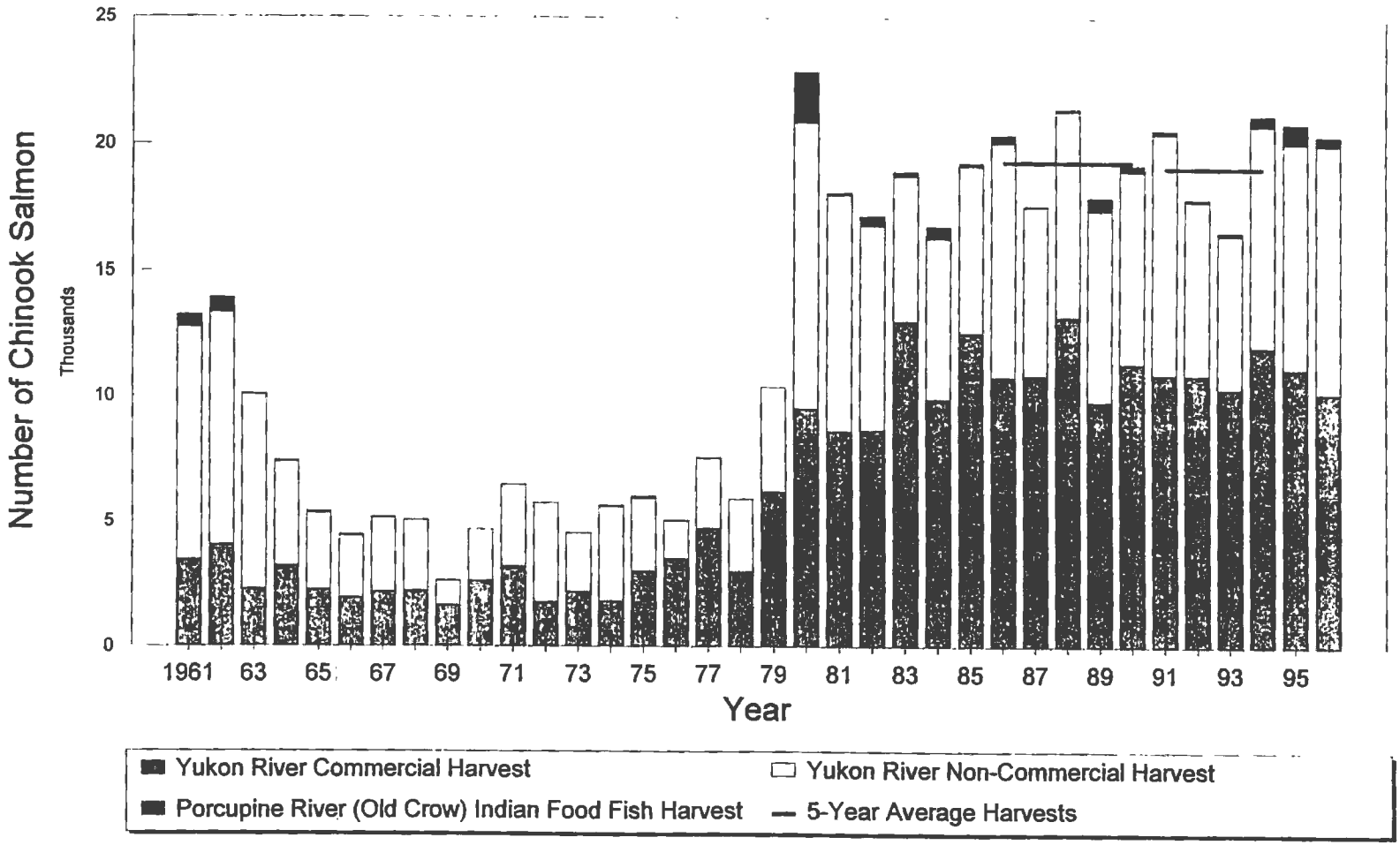
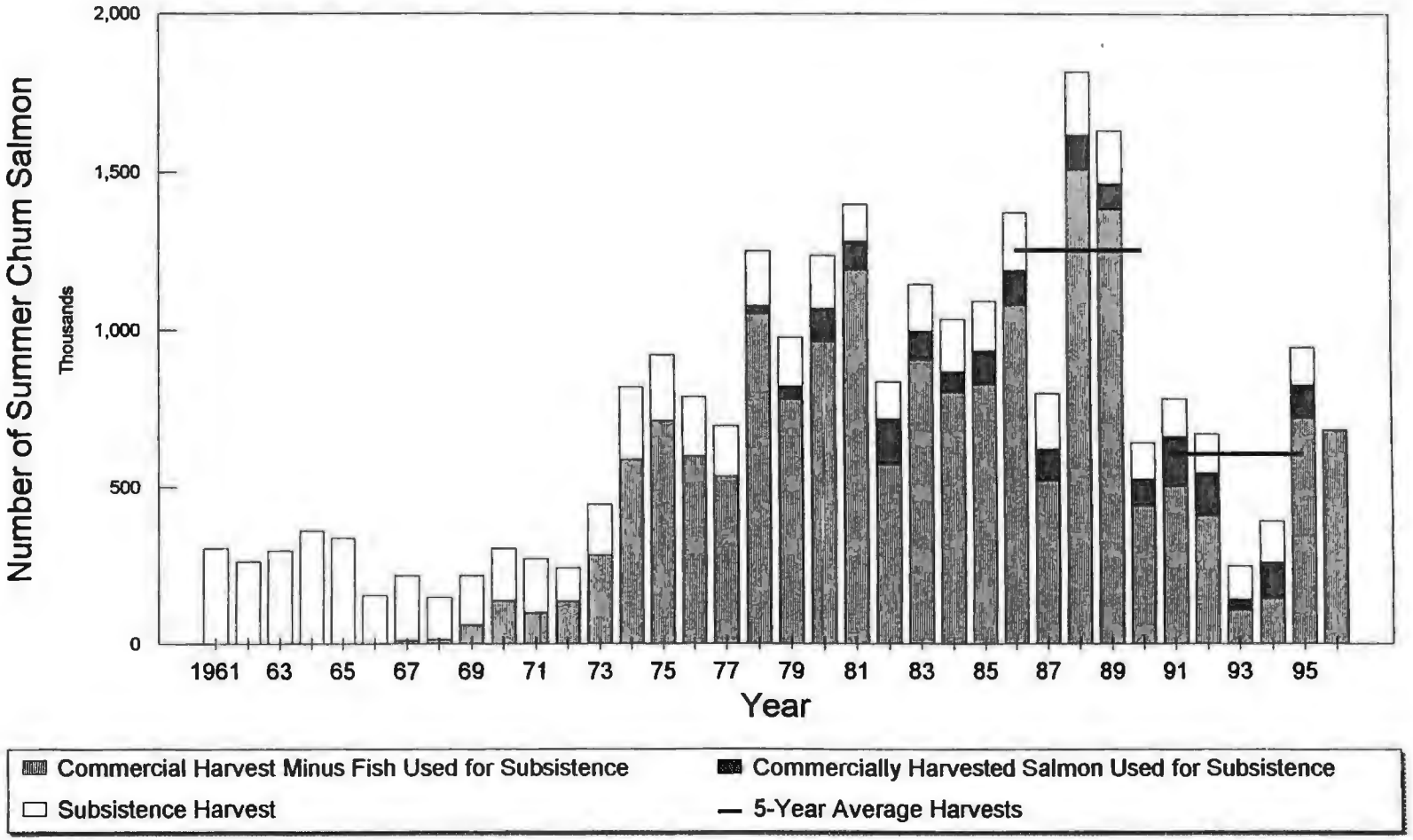


Attachment Figure 3. Alaskan harvest of chinook salmon, Yukon River, 1961-1996. The 1996 harvest includes only commercial catch data. Other Alaskan harvest estimates are unavailable at this time. Horizontal lines indicate 5-year average harvests.



Attachment Figure 4. Canadian harvest of chinook salmon, Yukon River, 1961-1996. Horizontal lines indicate 5-year average harvests.



Attachment Figure 5. Alaskan harvest of summer chum salmon, Yukon River, 1961-1996. The 1996 harvest includes only commercial catch data. Other Alaskan harvest estimates are unavailable at this time. Horizontal lines indicate 5-year average harvests.

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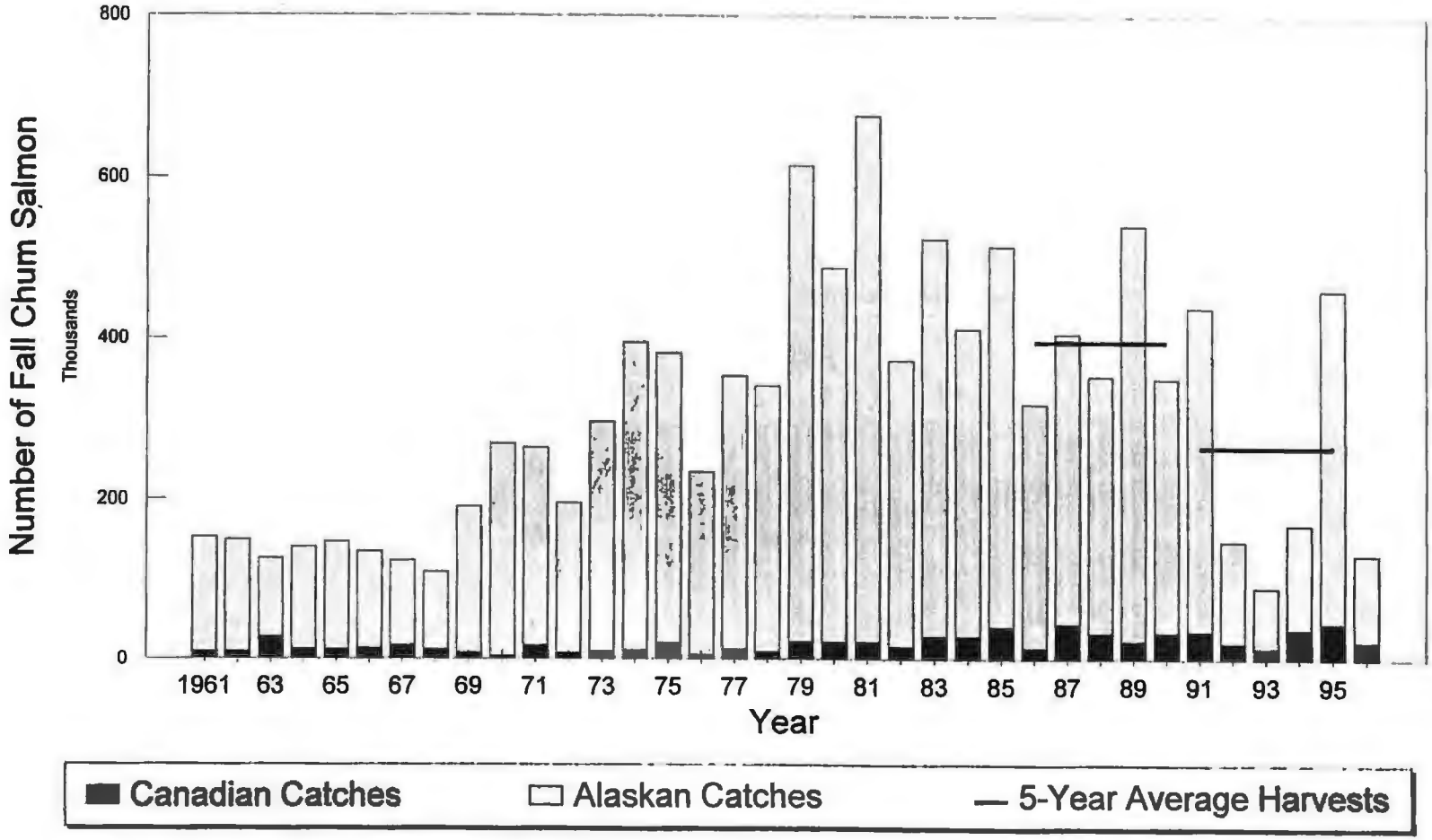

Attachment Figure 6. Total utilization of fall chum salmon, Yukon River, 1961-1996. The 1996 Alaskan harvest includes only commercial catch data. Other Alaskan harvest estimates are unavailable at this time. Horizontal lines indicate 5-year average harvests.

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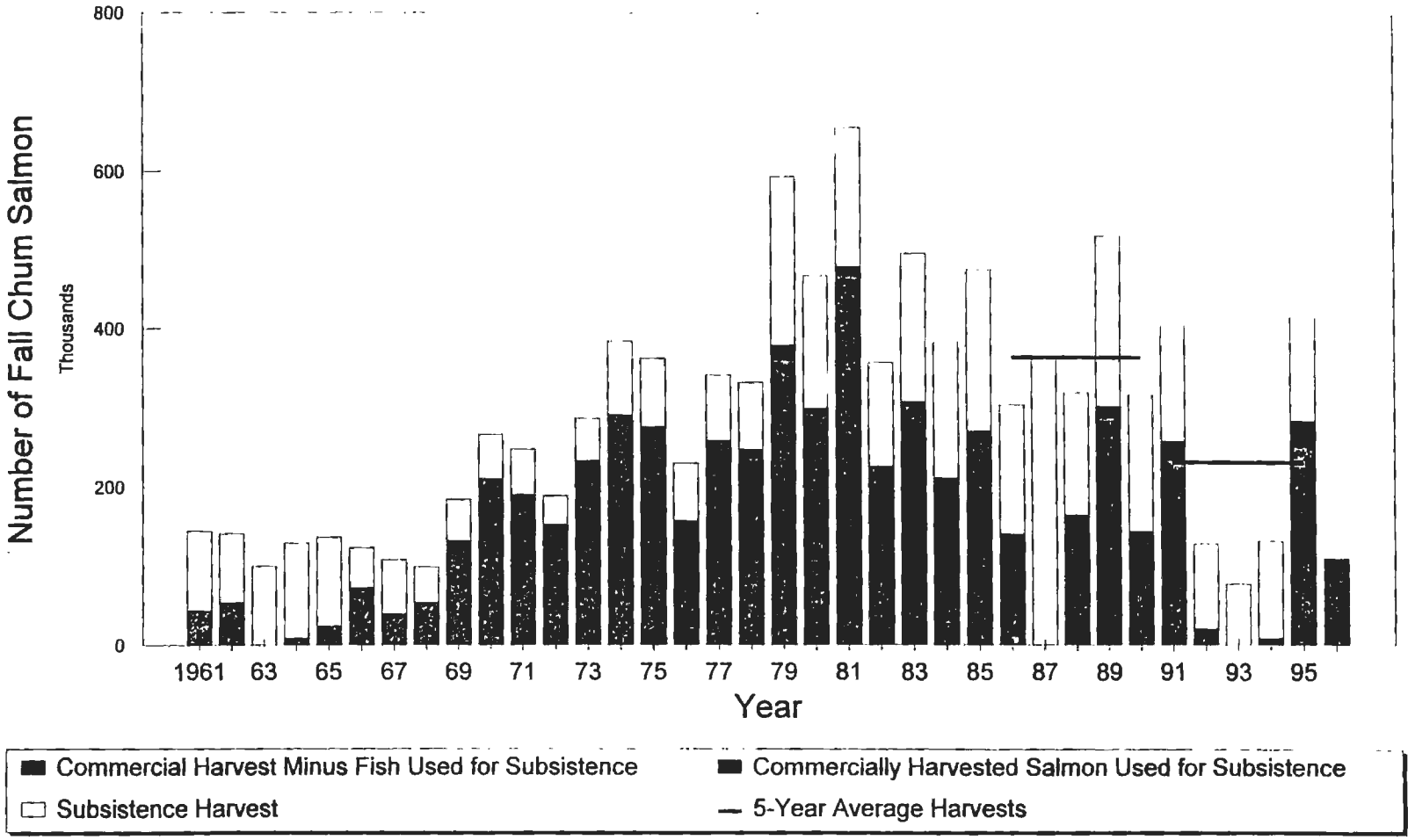

Attachment Figure 7. Alaskan harvest of fall chum salmon, Yukon River, 1961-1996. The 1996 harvest includes only commercial catch data. Other Alaskan harvest estimates are unavailable at this time. Horizontal lines indicate 5-year average harvests.

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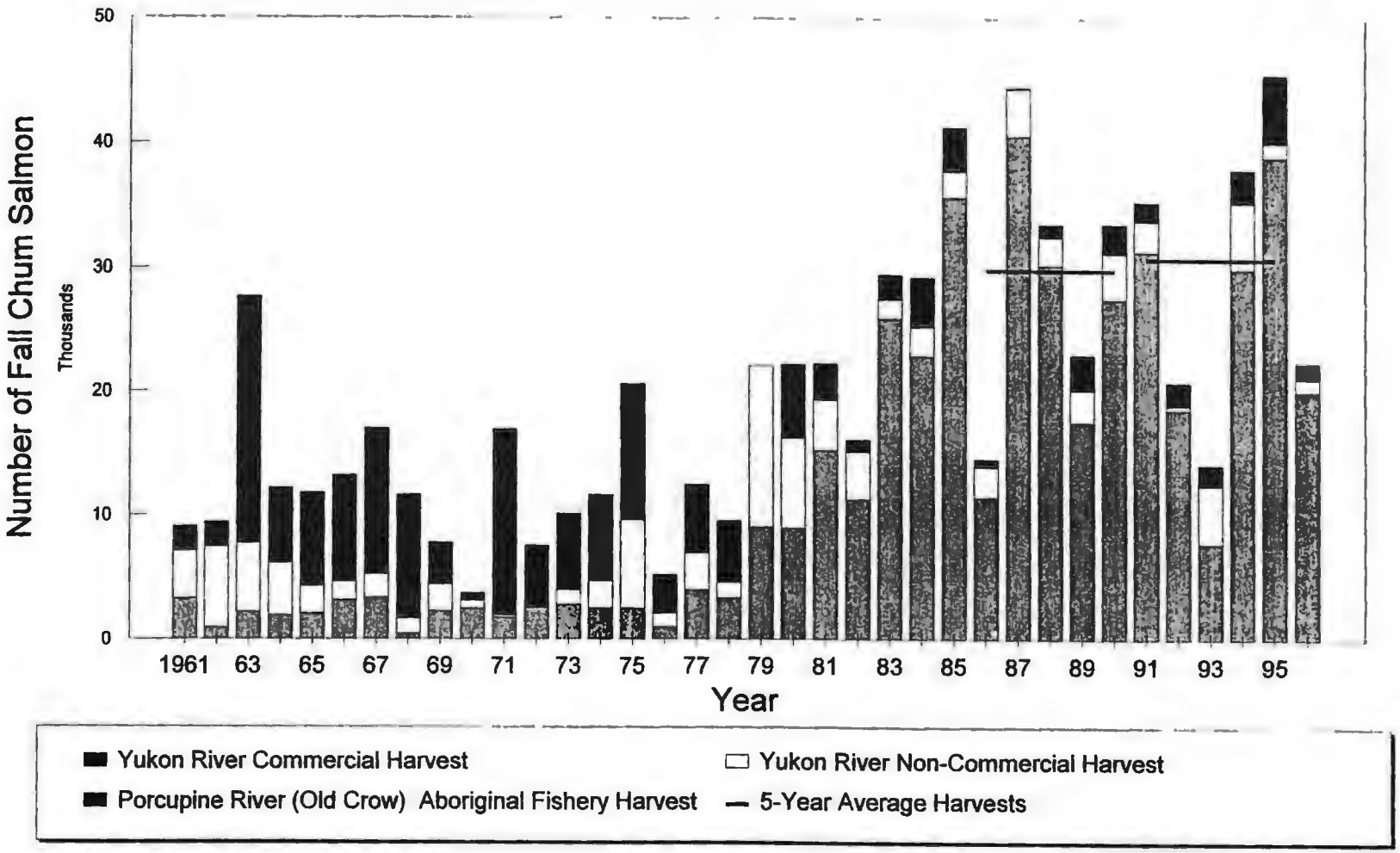
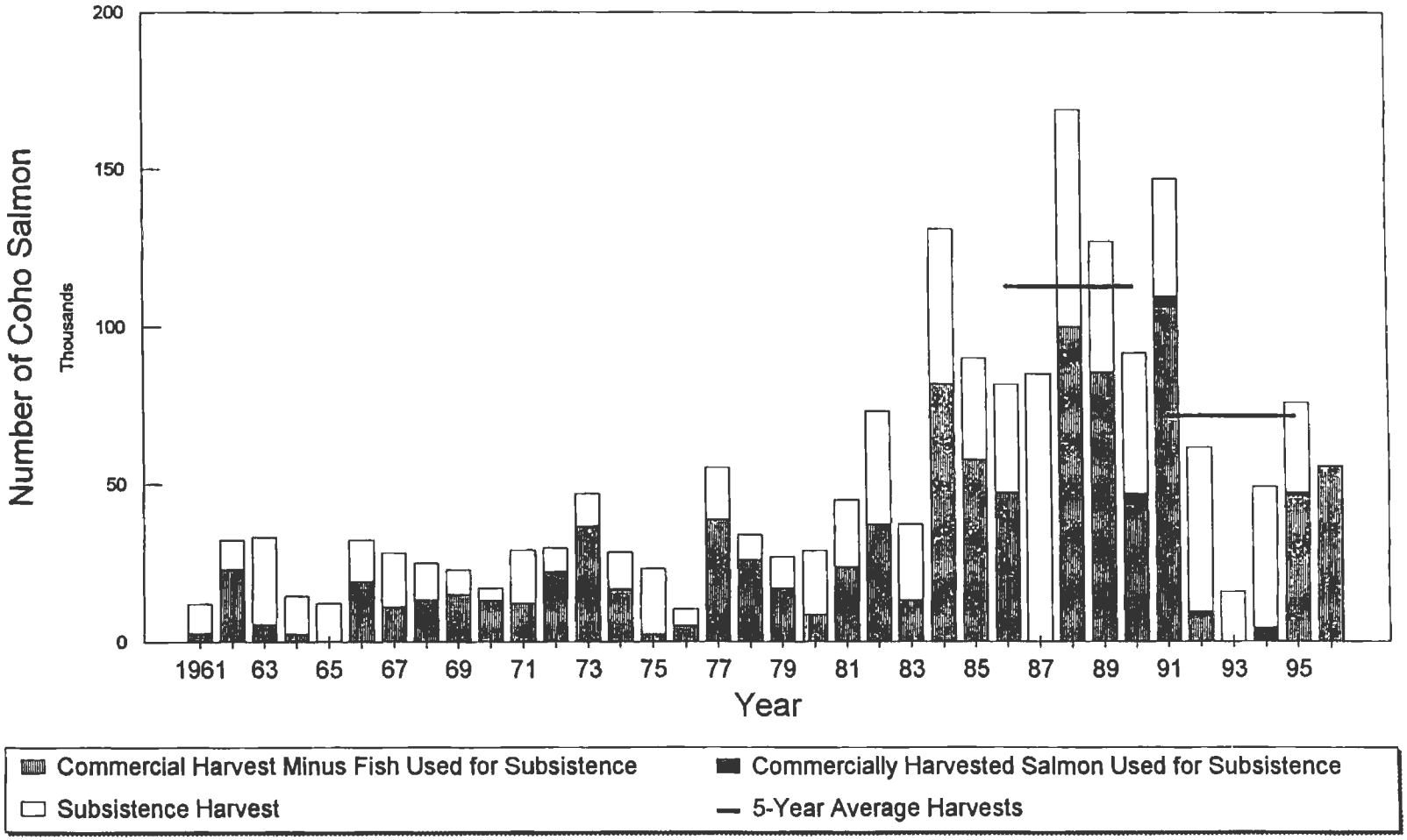


Attachment Figure 8. Canadian harvest of fall chum salmon, Yukon River, 1961-1996. Horizontal lines indicate 5-year average harvests.



Attachment Figure 9. Alaskan harvest of coho salmon, Yukon River, 1961-1996. The 1996 harvest includes only commercial catch data. Other Alaskan harvest estimates are unavailable at this time. Horizontal lines indicate 5-year average harvests.

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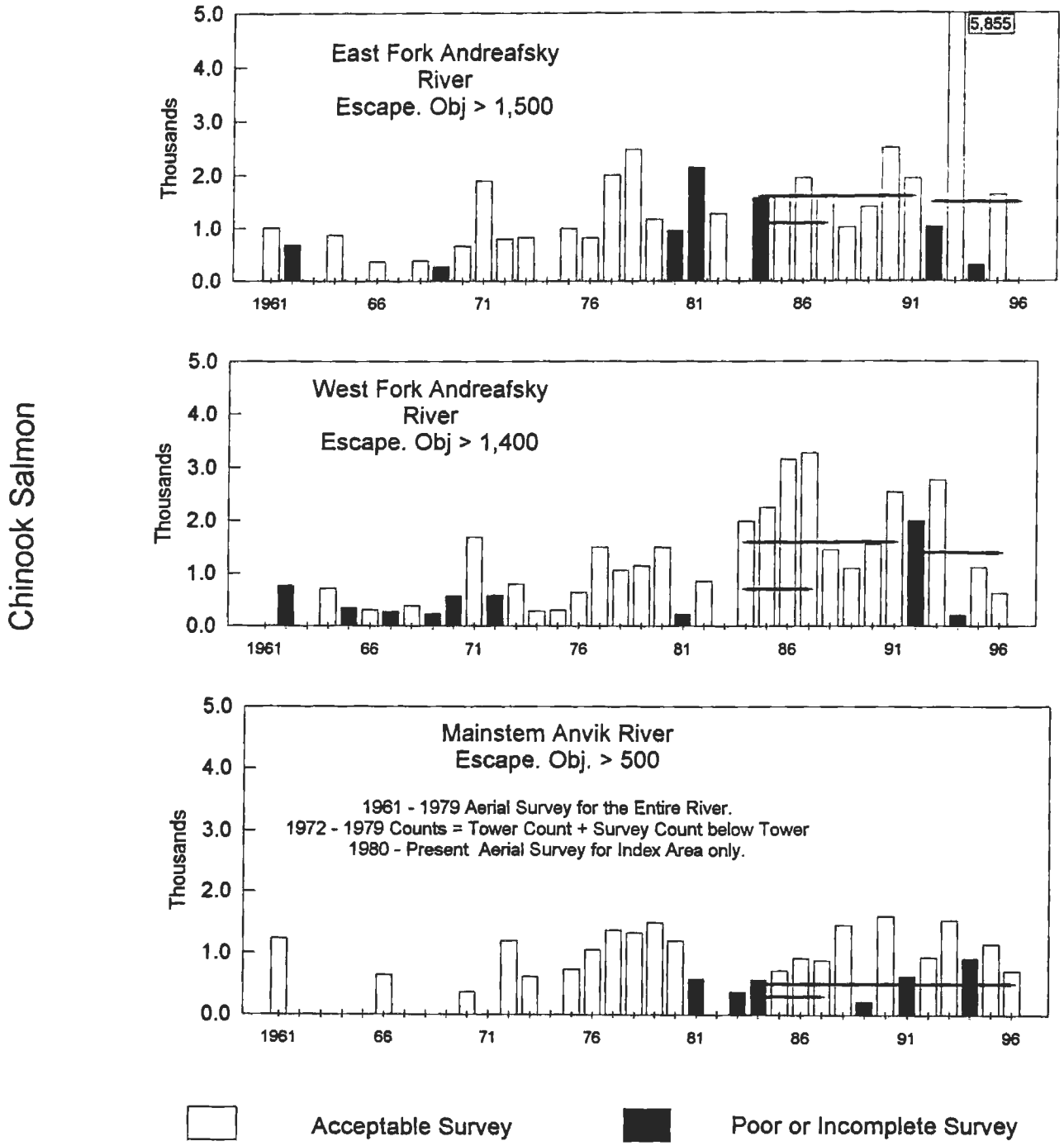
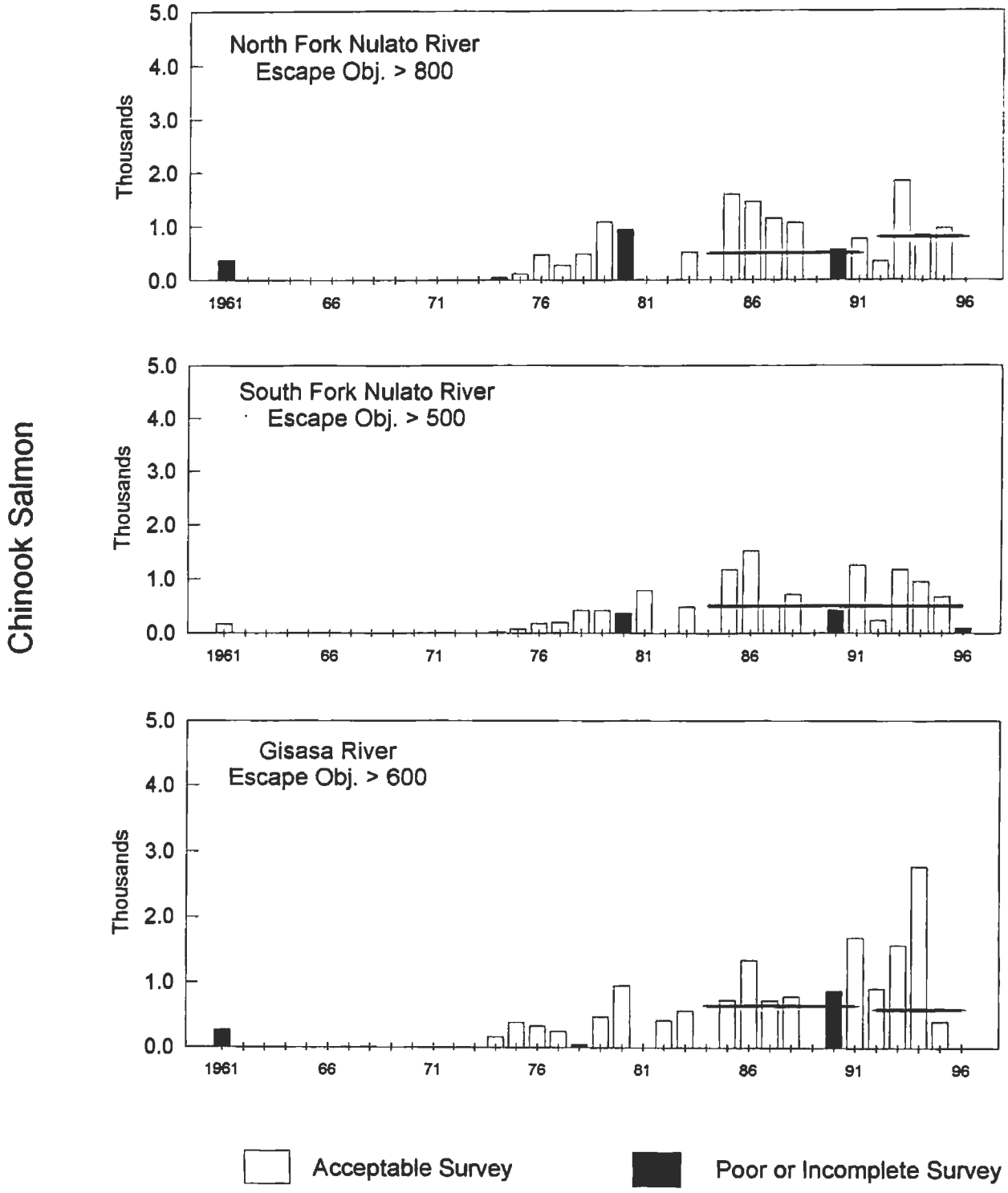
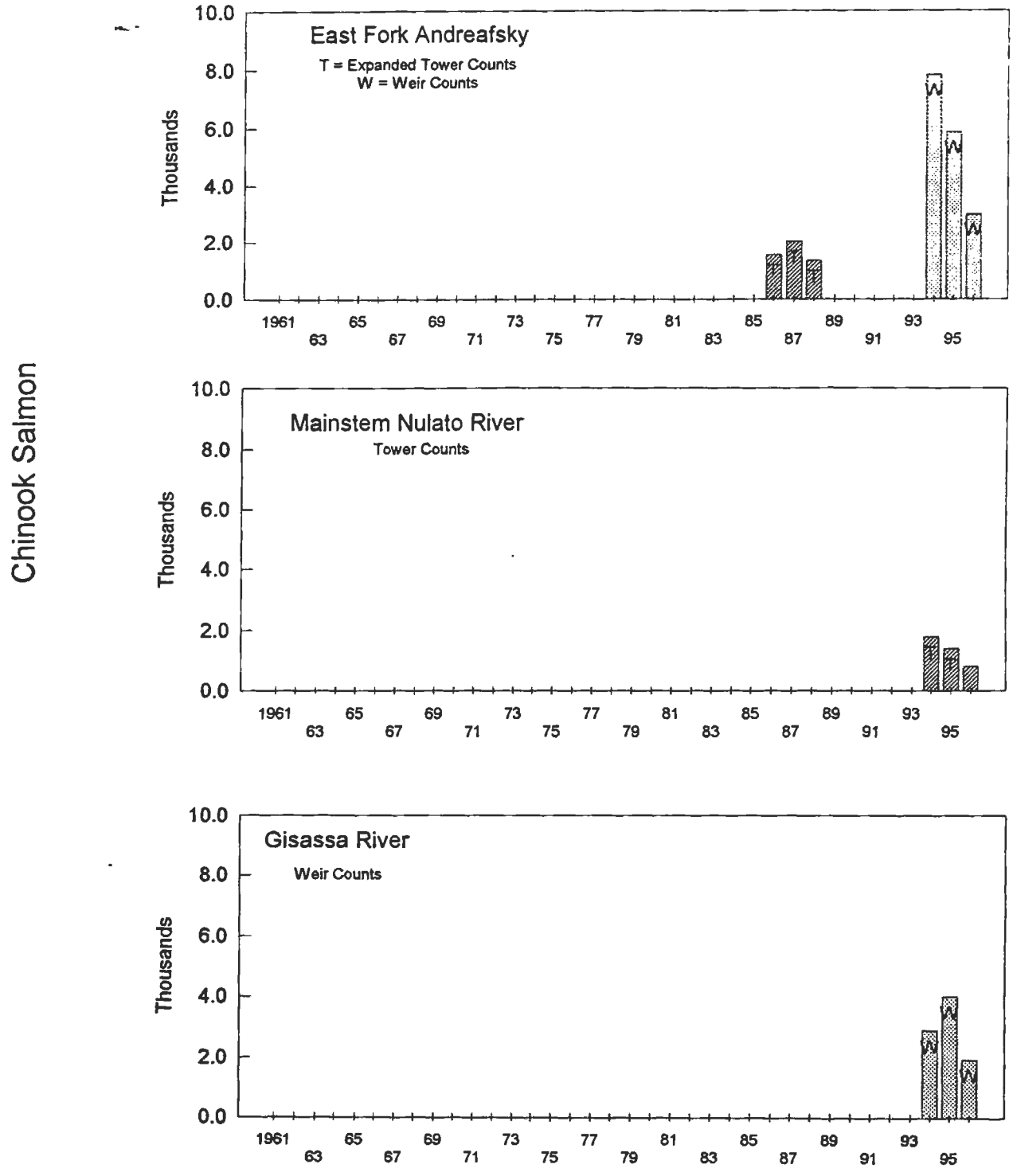


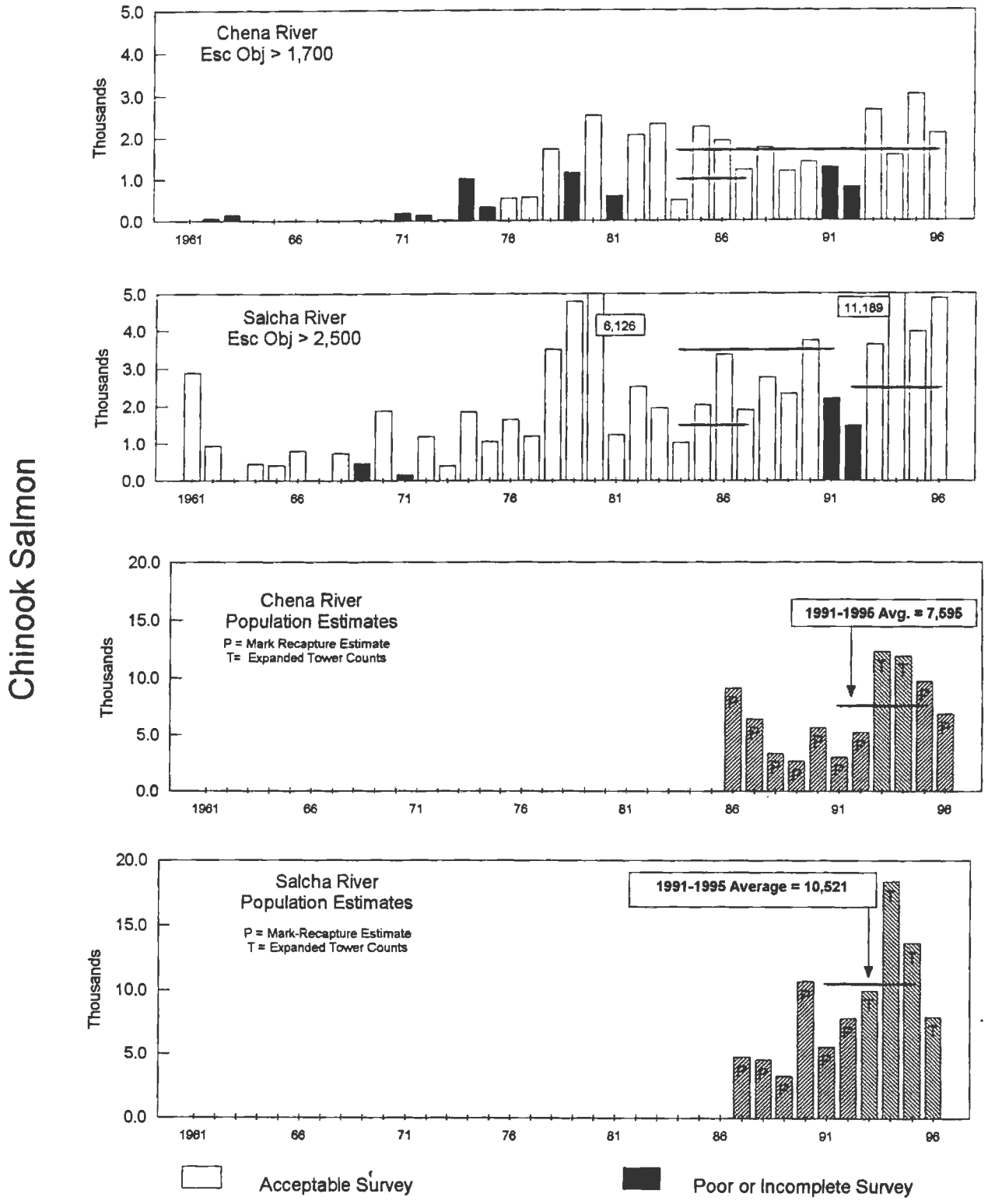
Attachment Figure 10. **Chinook salmon escapement counts for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1961-1996. Data are aerial surveys unless noted otherwise. Horizontal lines represent interim escapement goals unless otherwise noted.**



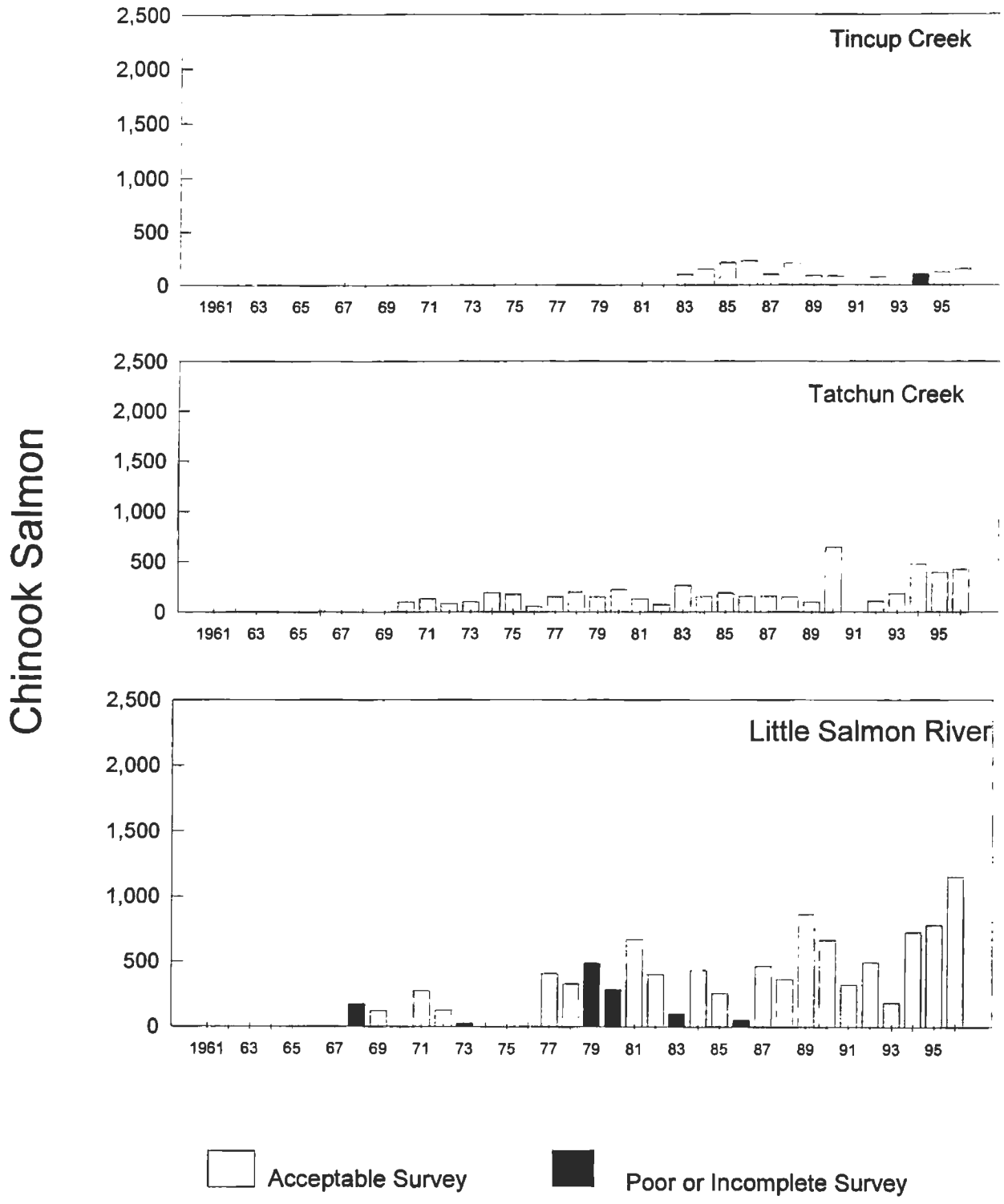
Attachment Figure 10. **(Page 2 of 4).**



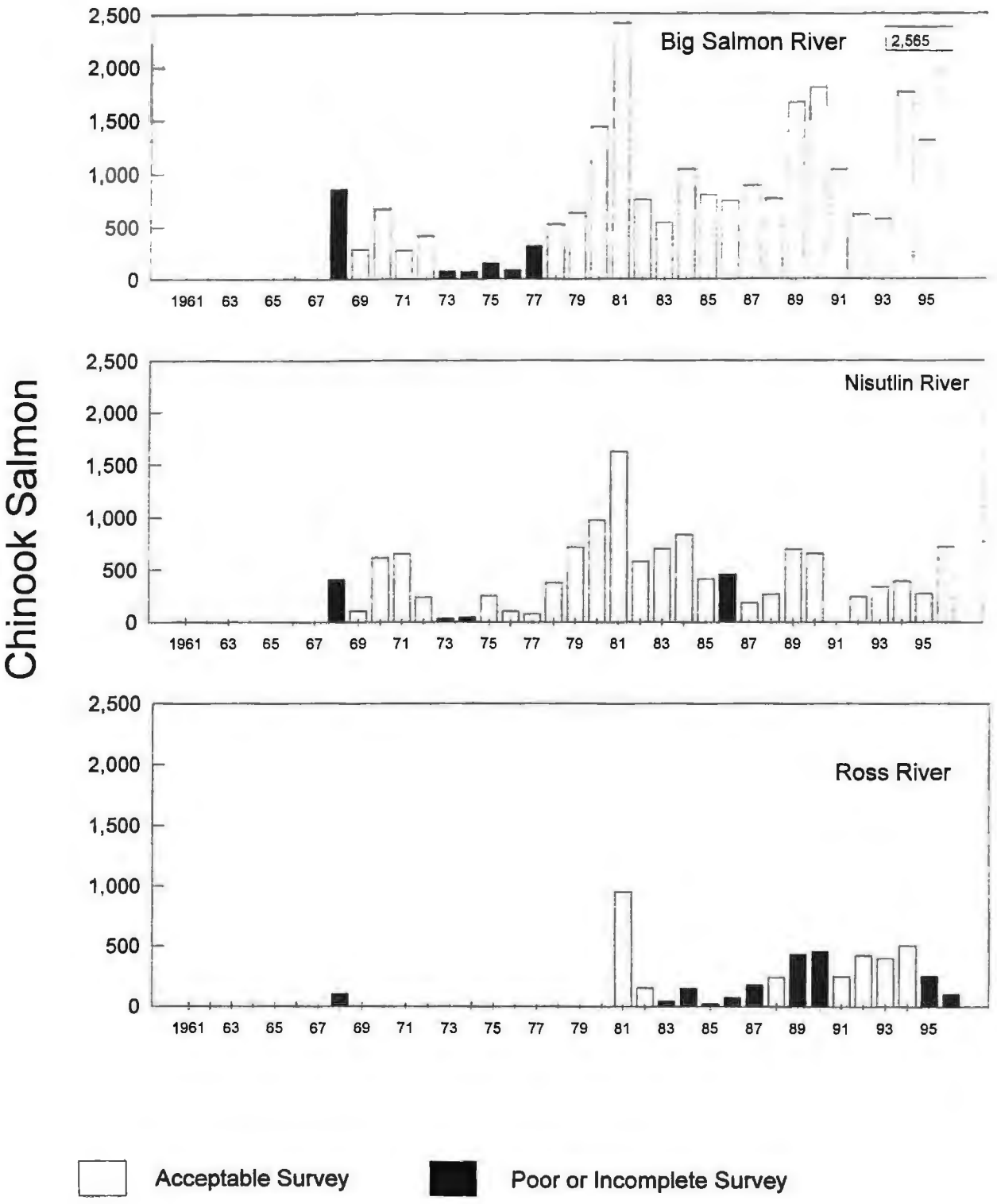
Attachment Figure 10. **(Page 3 of 4).**



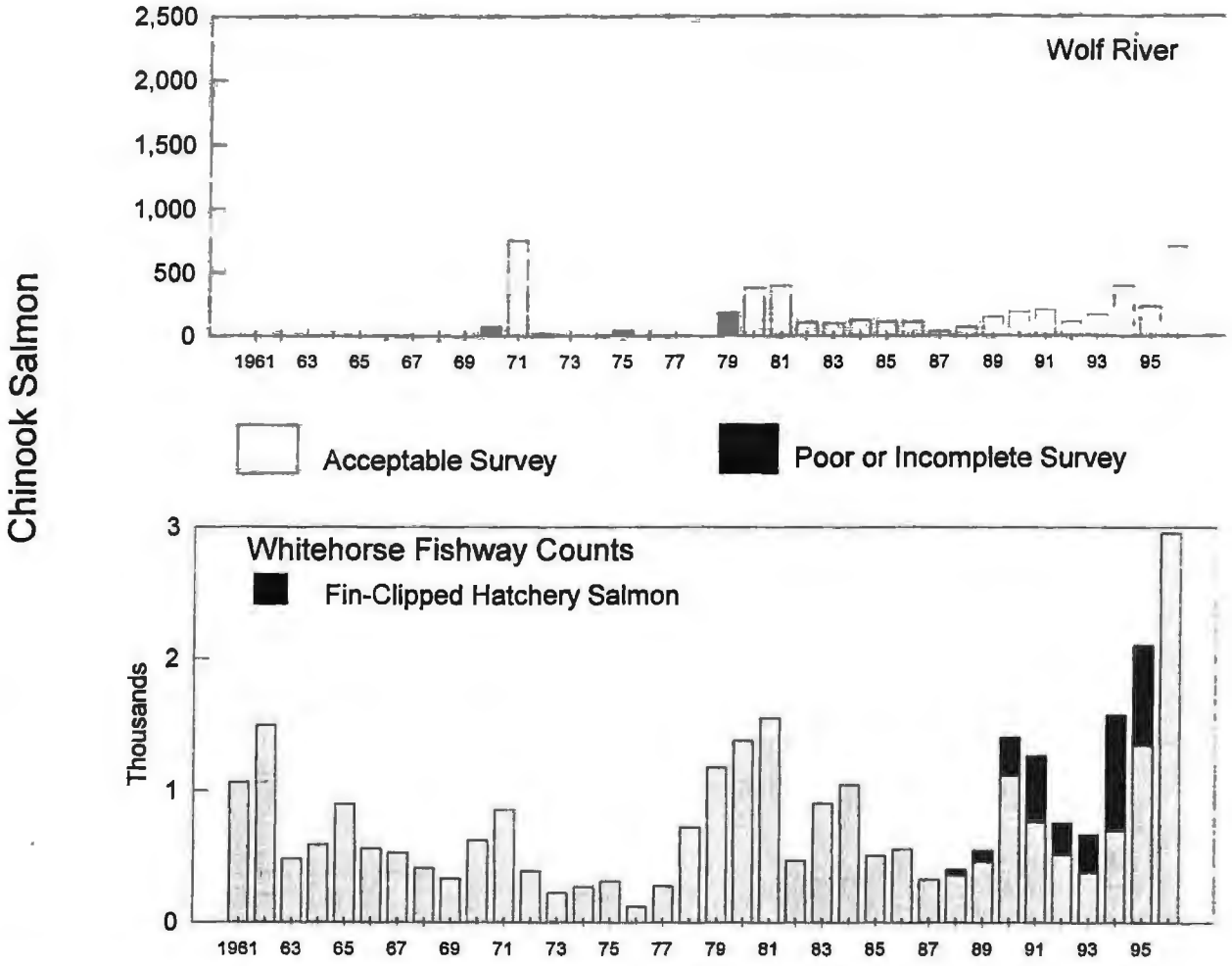
Attachment Figure 10. **(page 4 of 4).**



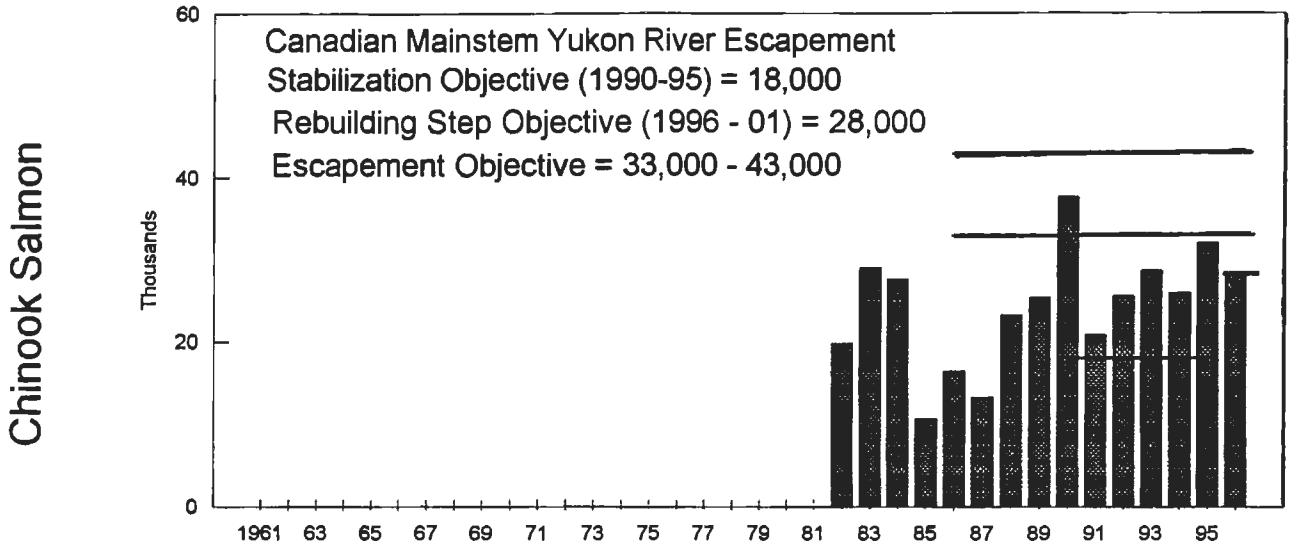
Attachment Figure 11. **Chinook salmon escapement counts for selected spawning areas in the Canadian portion of the Yukon River drainage, 1961-1996. Data are aerial surveys unless noted otherwise.**



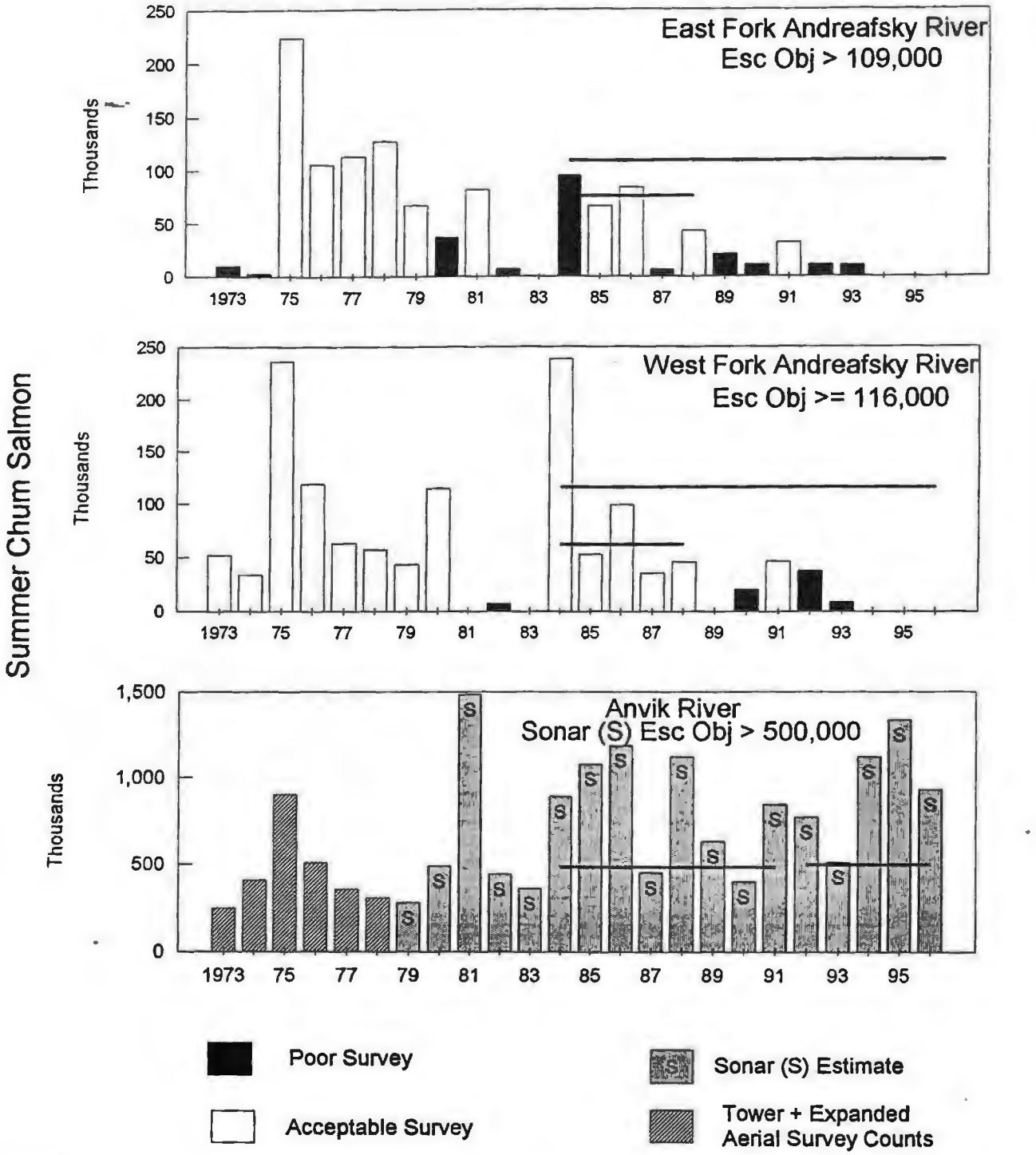
Attachment Figure 11. (page 2 of 3).



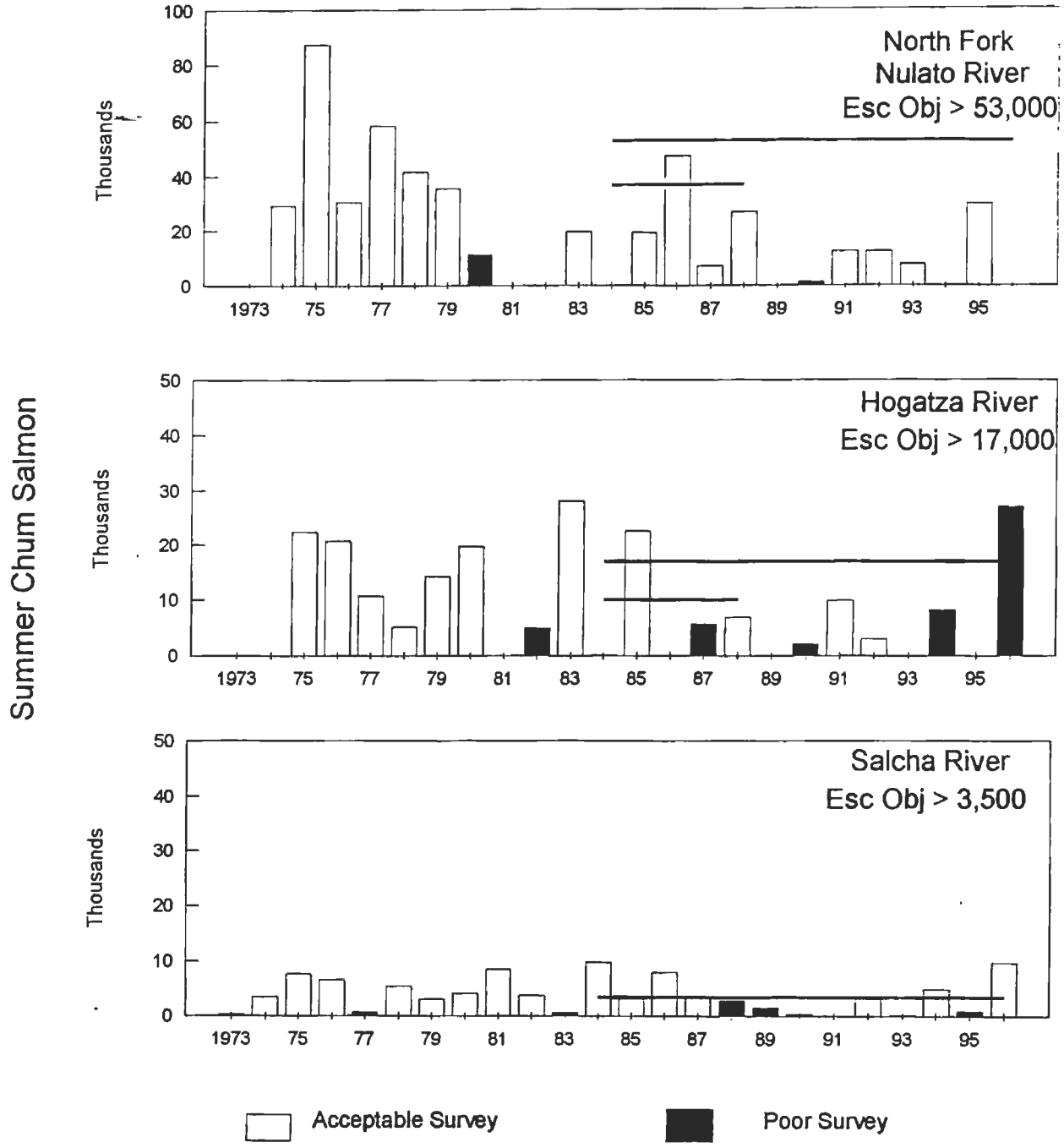
Attachment Figure 11. **(page 3 of 3).**



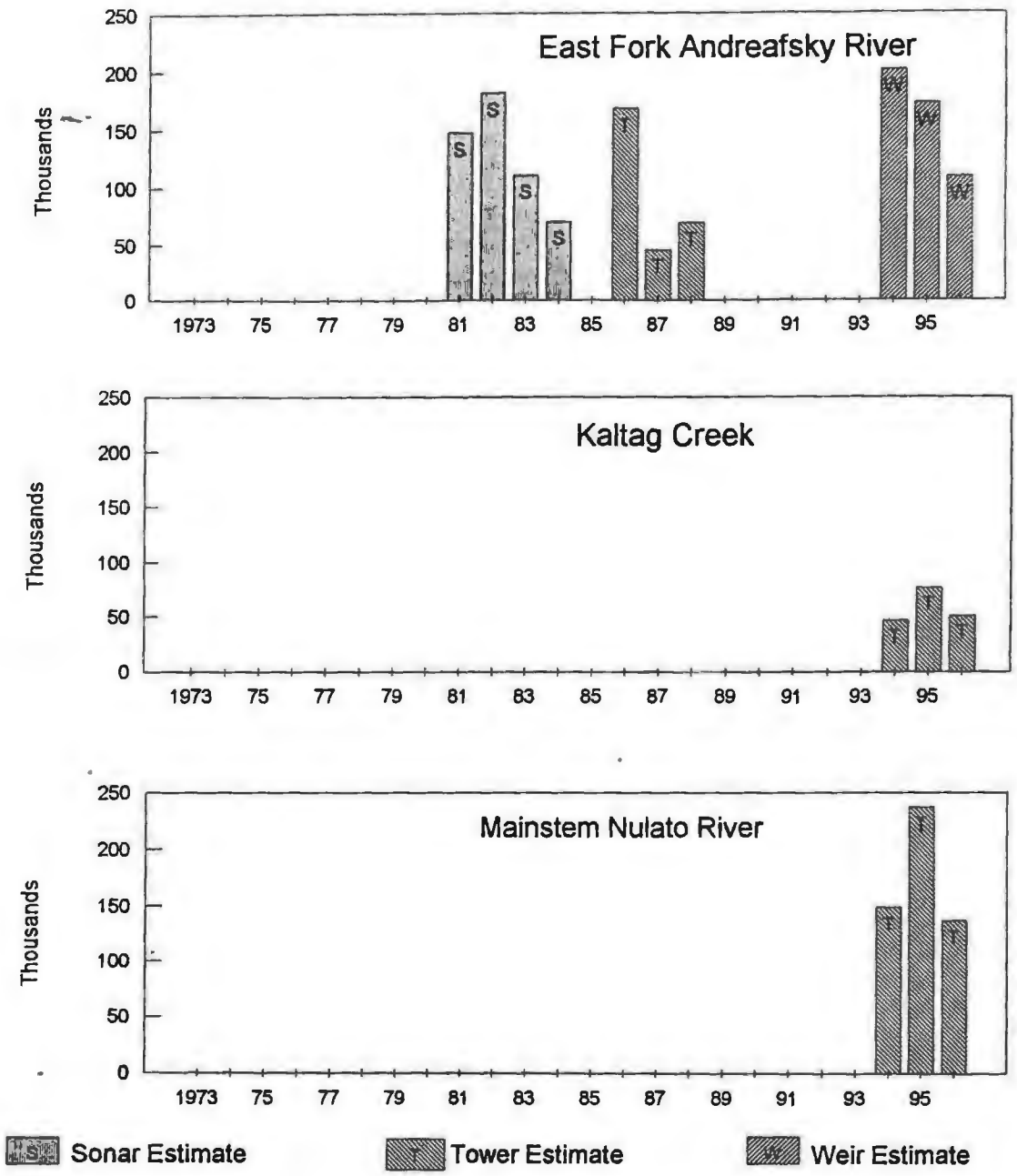
Attachment Figure 12. **Estimated total chinook salmon escapement to the Canadian portion of the mainstem Yukon River, 1982-1995. Horizontal lines represent the interim escapement goal range, 33,000-43,000 salmon, the stabilization objective, 18,000 salmon, and the rebuilding step objective, 28,000 salmon.**



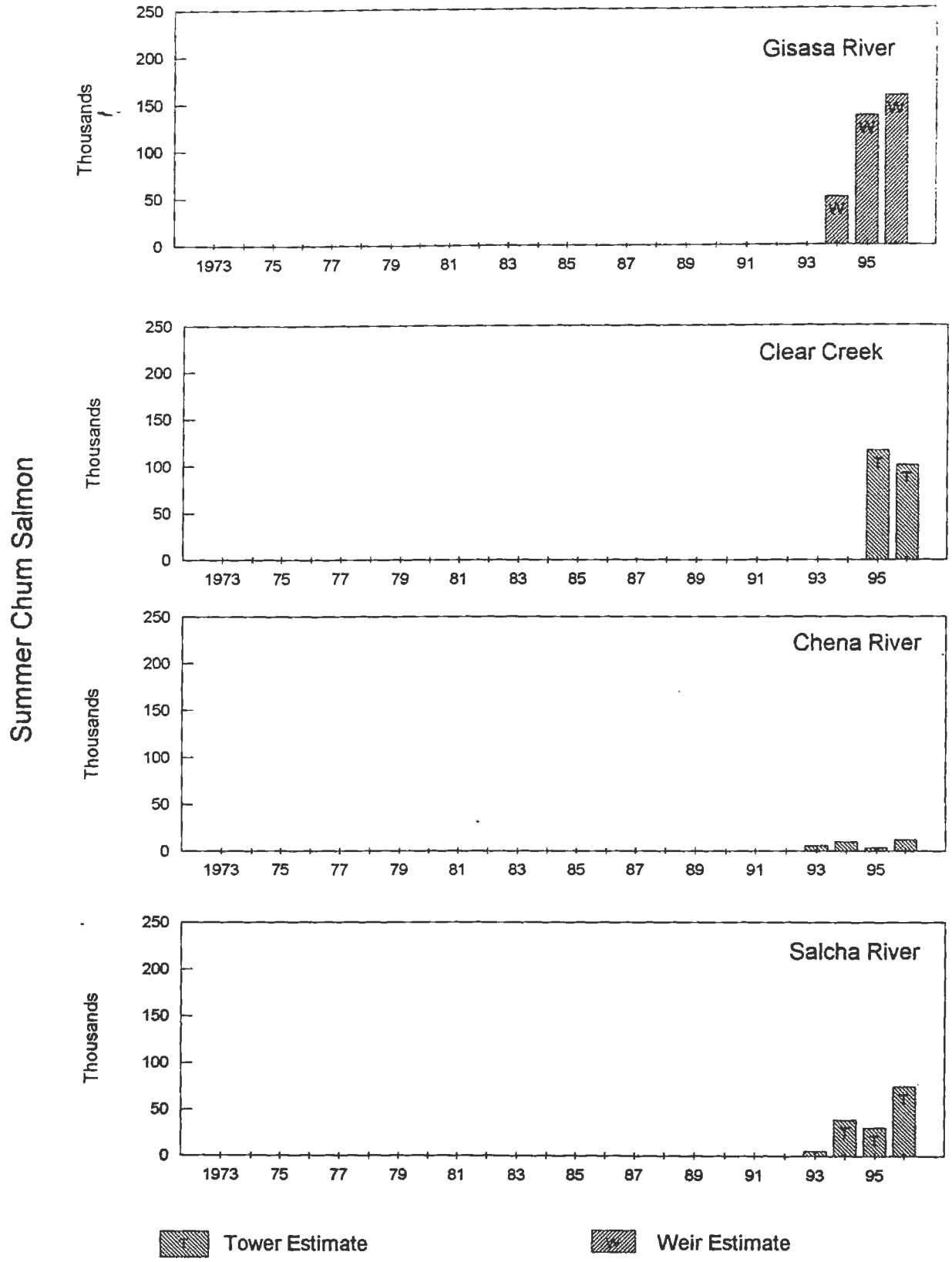
Attachment Figure 13. **Summer chum salmon escapement counts for selected spawning areas in the Yukon River drainage, 1973-1996. Horizontal lines represent interim escapement objectives. Counts are aerial survey counts of summer chum salmon, unless otherwise noted.**



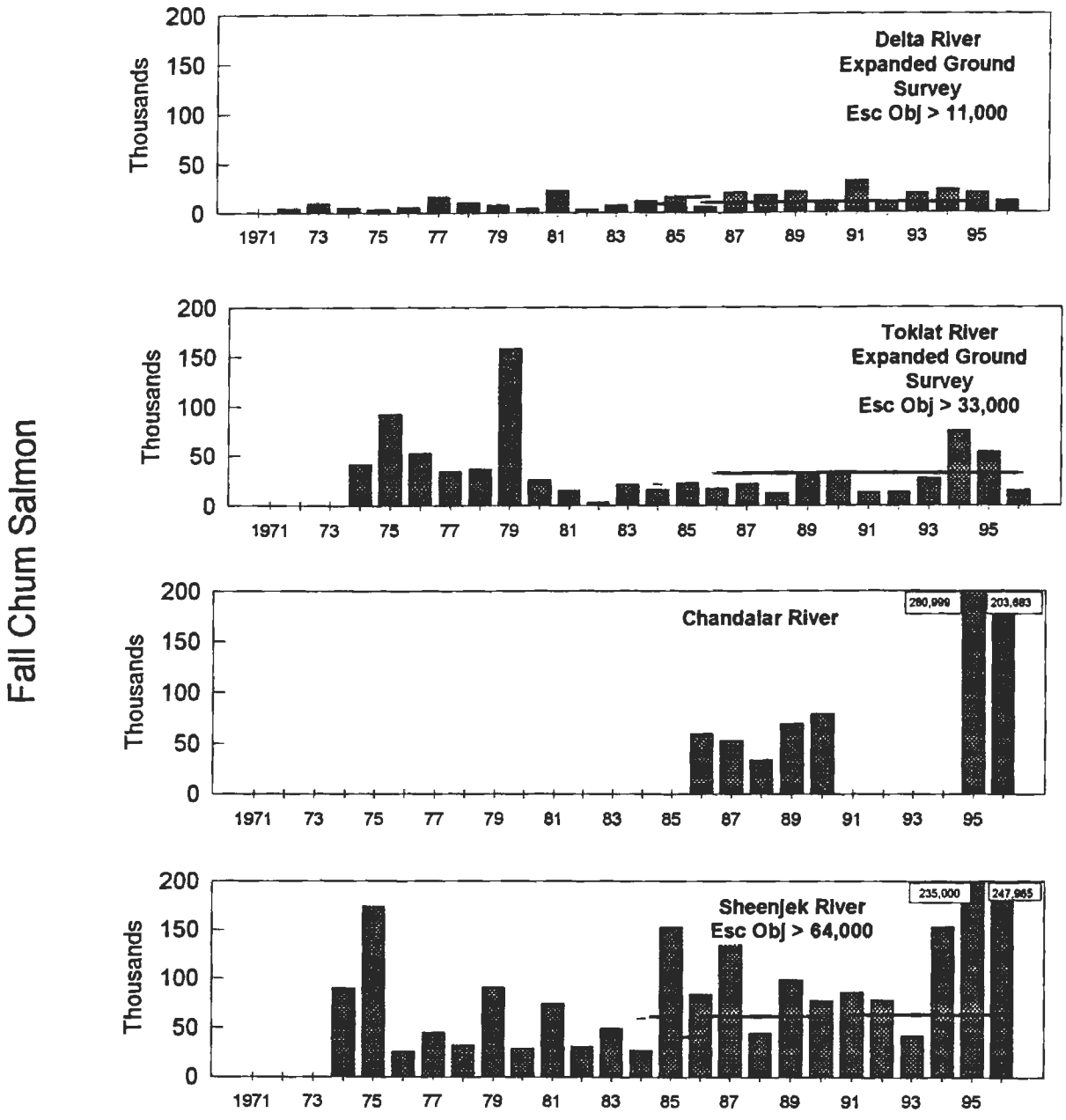
Attachment Figure 13. (page 2 of 2).



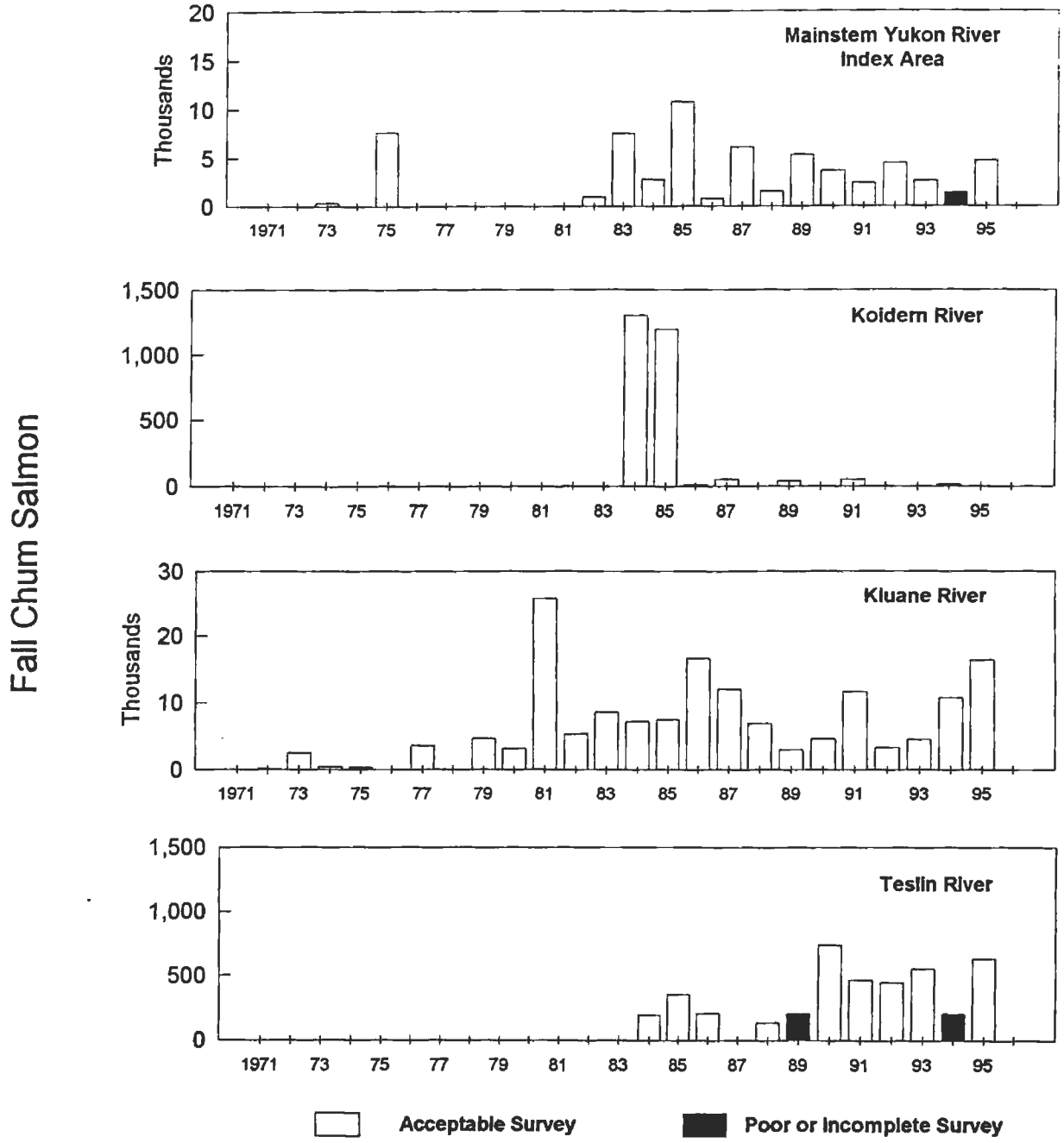
Attachment Figure 14. **Sonar, tower, and weir-based escapement estimates for selected summer chum salmon spawning tributaries within the Alaskan portion of the Yukon River drainage.**



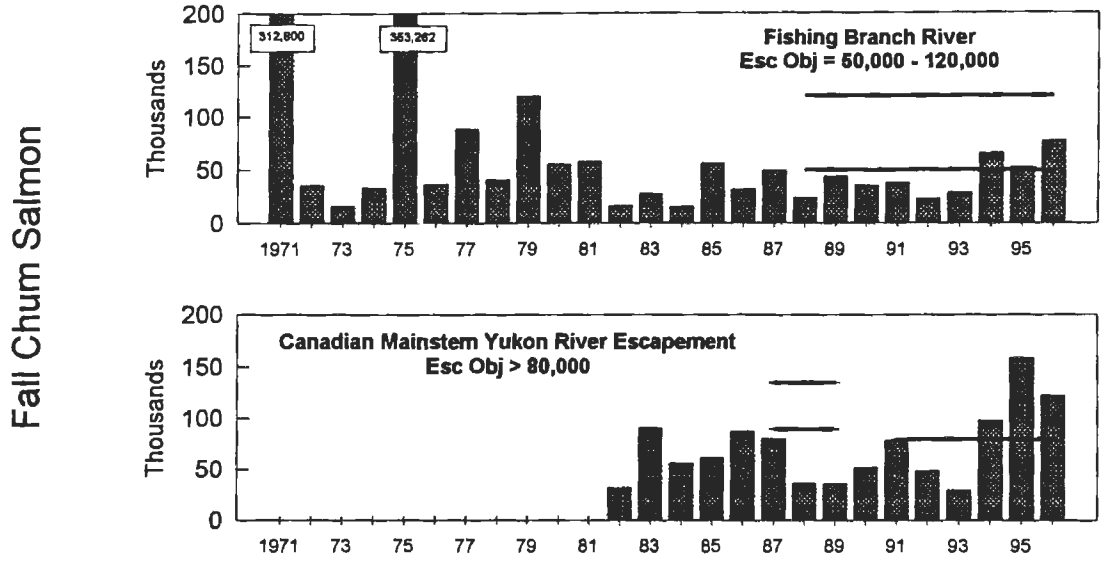
Attachment Figure 14. (p 2 of 2).



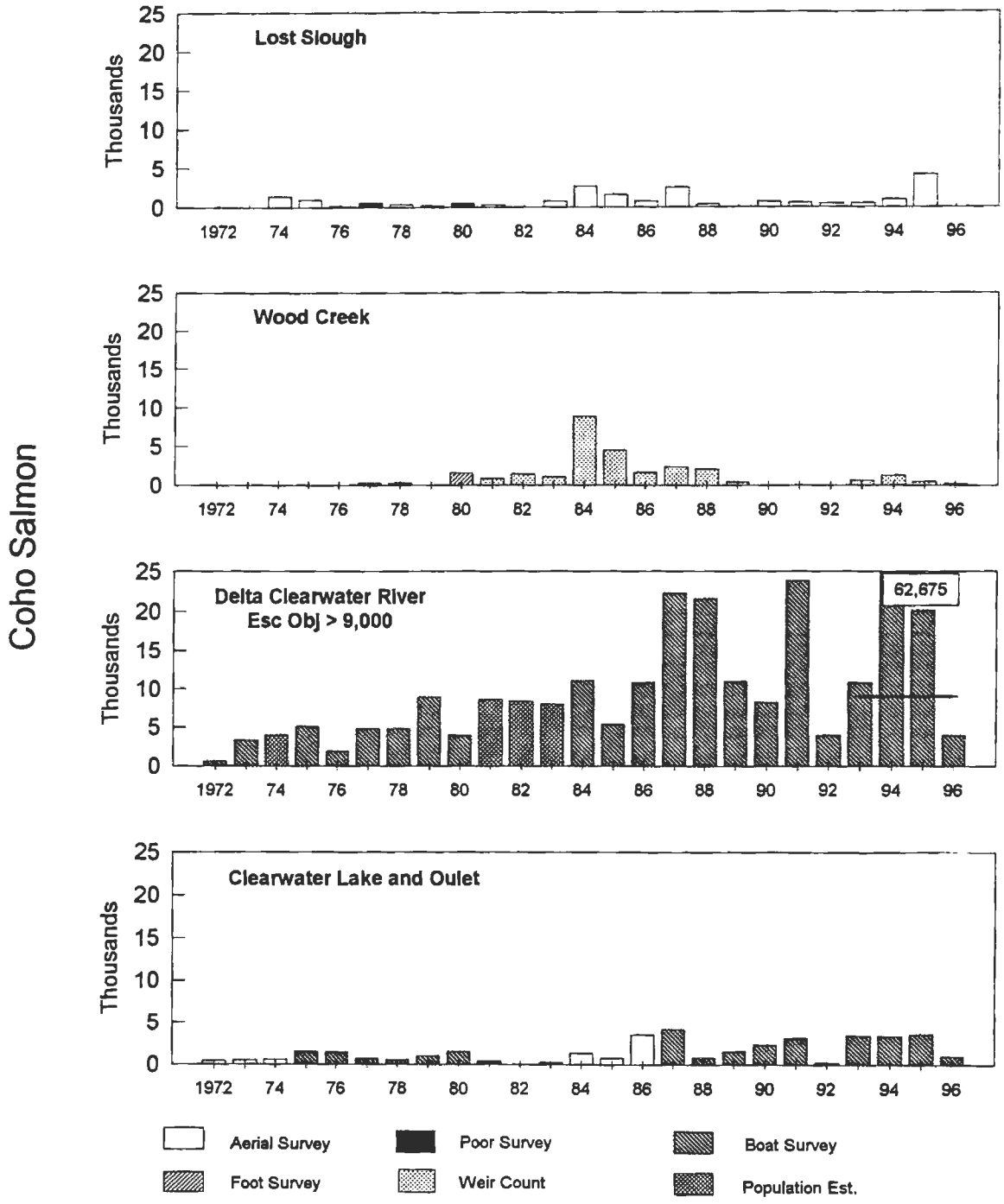
Attachment Figure 15. **Fall chum salmon escapement estimates for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1971-1996. Horizontal lines represent interim escapement goals.**



Attachment Figure 16. **Fall chum salmon aerial survey escapement counts for selected spawning areas in the Canadian portion of the Yukon River drainage, 1971-1996. Note that the y-axis scale is variable.**



Attachment Figure 17. **Fall chum salmon escapement estimates for spawning areas in the Canadian portion of the Yukon River drainage, 1971-1996. Horizontal lines represent interim escapement goals.**



Attachment Figure 18.

Coho salmon escapement counts for selected spawning areas in the Yukon River drainage, 1972-1996. Horizontal line indicates the interim escapement goal.