YUKON RIVER SALMON SEASON REVIEW FOR 2001 AND TECHNICAL COMMITTEE REPORT

By

THE UNITED STATES AND 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 November 5-7, 2001. The agenda for the JTC meeting was to prepare the standard season summary report, including a review of the fisheries, stocks and projects. This agenda was cleared with the chief panelists, and the report is information intended for the panelists and project managers. Participants at the meeting included the following persons:

Executive Secretary, Yukon River Panel
Hugh J. Monaghan

Canadian Department of Fisheries and Oceans (DFO)
Sandy Johnston
Al Von Finster
Pat Milligan
Cain Vangel
Mary Ellen Jarvis
Brian Ferguson

Alaska Department of Fish and Game (ADF&G)
Bonnie Borba
Linda Brannian
Fred Bue
Hamachan Hamazaki
Tracy Lingnau
Susan McNeil
Ted Spencer
Charles Swanton
Tom Vania

National Marine Fisheries Service (NMFS)
John Eiler
Dick Wilmot

U.S. Fish and Wildlife Service (USFWS)
Jeff Adams
Jeff Bromaghin
Russ Holder

US Bureau of Land Management (BLM)
Bob Karlen

Bering Sea Fishermen's Association (BSFA)
Chris Stark

National Park Service (NPS)
Fred Andersen

Tanana Chiefs Conference (TCC)
Stanley Ned

Yukon River Drainage Fishermen's Association (YRDFA)
Michael McDougall

Association of Village Council Presidents (AVCP)
Jennifer Hooper

2.0 2001 COMMERCIAL FISHERY – ALASKA

The 2001 preseason outlook was far below average to poor chinook and chum salmon runs that, if similar to last year, would likely not meet subsistence needs or support a commercial harvest in the Alaska portion of the drainage (Figure 1). Although parent-year escapements were good, poor returns were expected primarily based on the recent trend of very poor survival, poor productivity and the weak runs that occurred in 2000. In addition, the return of 5 and 6-year-old chinook salmon was expected to be poor based on the number of 4 and 5-year-old fish that returned in 2000.

In response to the guidelines established in the Sustainable Salmon Fisheries Policy, the Board of Fisheries (BOF) classified the Yukon River chinook and fall chum salmon stocks as yield concerns during the September 28-29, 2000 work session. This determination was based on the inability, despite the use of specific management measures, to maintain expected yields, or harvestable surpluses, above the stocks' escapement needs since 1998 and the anticipated low harvest level in 2001. In addition, the board classified the Yukon River summer chum and Toklat River fall chum salmon stocks as management concerns. The determination of a management concern was based on the chronic inability to meet existing escapement goals for the chum salmon stocks since 1998.

Action plans were developed through the Board of Fisheries process to manage each stock of concern. The action plans contained goals, specified measurable and implementable objectives, and included provisions for fishery management actions as needed to achieve rebuilding goals and objectives, in proportion to each fishery's use of, and hazards posed to, a salmon stock.

The 2001 Yukon River salmon runs continued to show a trend of very low productivity, particularly in view of good parent-year escapements. For the first time since 1931 (Bergstrom et. al 2001), commercial salmon fishing in the Alaska portion of the Yukon River drainage was closed completely. Before the start of the fishing season, the Federal Subsistence Board restricted the taking of chinook and chum salmon on federal waters in the Yukon Area to only federally qualified subsistence users residing in the Yukon Area, including the village of Stebbins. The effect of that action closed the sport and commercial harvest of chinook and chum salmon on federal waters in the Yukon River drainage and closed subsistence harvest on those same waters by any residents living outside the Yukon River drainage or the community of Stebbins. Although the State manages the commercial fishery, most of the commercial harvest of chinook salmon occurs in waters administered by federal authorities within the Yukon River Delta National Wildlife Refuge.

The federal manager was authorized to remove this restriction inseason in the event that the salmon run strength demonstrated a harvestable surplus beyond subsistence and escapement needs. The preliminary Canadian border passage estimate of 47,600 chinook salmon and escapement above biological escapement goals (BEGs) in the Chena and Salcha Rivers may have provided an Alaskan commercial harvest of 15 to 20 thousand chinook salmon. Inseason run assessment tools in the lower river did not indicate this surplus was available at the same time salmon were present in the area. The precision of inseason management tools is such that relatively small harvestable surpluses beyond escapement and subsistence needs are difficult to detect. The declining trend in salmon production on the Yukon River prompted conservative management to be applied to the uncertainty inherent with inseason run assessments. Although too late to provide for a commercial chinook salmon fishery, the federal inseason manager did remove the restriction on the subsistence fishery July 27.

The first recorded Yukon River commercial chinook salmon harvest in Alaska was in 1918 (Appendix Table 1, Appendix Figure 1). The Lower Yukon Area (Districts 1, 2 and 3) commercial fishery was last closed during 1925-1930 because of the presence of a large Upper Yukon Area (Districts 4, 5 and 6) subsistence fishery and considerable opposition to the commercial fishery (Regnart et. al 1970). The recent ten-year-average commercial salmon harvest is 88,517 chinook salmon (83,096 Lower Yukon Area, 4,750 Upper Yukon Area) (Appendix Table 2, Appendix Figure 2) and 339,427 summer chum salmon (128,938 Lower Yukon Area, 233,877 Upper Yukon Area) (Appendix Table 3, Appendix Figure 3). The average exvessel value to the Yukon Area is $5.5 million ($5.0 million Lower Yukon Area, $0.5 million Upper Yukon Area) (Appendix Table 4). An average of 763 permit holders commercially fish the chinook and summer chum salmon fishery (658 Lower Yukon Area, 105 Upper Yukon Area) (Appendix Table 5). No test fish were sold during the summer season.

The 2001 fall chum salmon run was not anticipated to meet full subsistence needs or minimal escapement goals. Therefore, the 2001 fall season began on July 16 with a complete closure in Districts 1-3 in both state and Federal waters. District 4 was also closed as the fish progressed up river. As the fall chum salmon run was further assessed, the lower river districts were opened on a reduced schedule and the federal inseason manager implemented the federally qualified fishing restriction on August 6. Eventually all districts were opened to the full Board of Fisheries regulatory schedule and the restriction to subsistence fishing by only federally qualified users was lifted August 10. The fall chum salmon run appeared to be strong enough to meet minimal escapement goals as well as a reduced subsistence harvest. The 2001 coho salmon run was relatively strong. However, a directed commercial fishery was not implemented because a surplus of harvestable fall chum salmon, as outlined by the Yukon River coho salmon management plan, was inadequate.

No fall chum or coho salmon were commercially fished in 2000 and 2001. In the previous ten fall seasons (1991-2000), the average commercial salmon harvest was 75,000 fall chum salmon (47,800 Lower Yukon Area, 27,200 Upper Yukon Area) (Appendix Table 6, Appendix Figure 4) and 26,000 coho salmon (22,200 Lower Yukon Area, 3,800 Upper Yukon Area) (Appendix Table 7, Appendix Figure 5). The previous 10-year commercial fall chum and coho salmon seasons combined values for the Yukon Area averaged $187 thousand ($135 thousand Lower Yukon Area, $52 thousand Upper Yukon Area) (Appendix Table 4). In the previous 10 fall seasons, an average of 189 permit holders fished the fall chum and coho salmon fishery (171 Lower Yukon Area, 18 Upper Yukon Area) (Appendix Table 5). No test fish were sold during the 2001 fall season.

2.1 Chinook and Summer Chum Salmon Management Overview

In cooperation with U.S. Fish & Wildlife Service (USFWS) and National Park Service (NPS) staff, a preseason management strategy was developed and described in an information sheet (Table 1). That plan outlined the run and harvests outlooks, the new Alaska Board of Fisheries subsistence salmon fishing schedule and a reduced subsistence fishing schedule. The preseason management strategy was to begin the season following the Board of Fisheries subsistence salmon fishing schedule and if necessary, reduce the schedule at approximately the quarter point of the chinook salmon run. The information sheet was mailed to Yukon River commercial permit holders and the 2,400 subsistence fishing families who receive subsistence harvest calendars. State and federal staff also presented the management strategy to the Yukon River Drainage Fishermen's Association (YRDFA), Regional Advisory Councils, and at over 15 meetings in villages from the mouth of the river at Alakanuk to Eagle near the Canadian border.

Before the fishing season started, the Federal Subsistence Board restricted the taking of chinook and chum salmon on federal waters in the Yukon Area to only federally qualified subsistence users residing in the Yukon Area. This restriction closed all sport and commercial fishing for chinook and chum salmon in waters with federal jurisdiction. In addition, during the season, state managers closed personal use and sport fishing; and both State and Federal agencies restricted subsistence salmon fishing in all waters of the Yukon Area. Although formal inseason subsistence harvest information is not available at this time, subsistence fishers throughout the Yukon Area reported harvesting enough chinook salmon to meet their needs. Some subsistence fishers who are not federally qualified users, but traditionally fish on federally controlled waters, probably did not meet their chinook salmon needs.

Emmonak test fish indices, subsistence harvest reports and Pilot Station sonar passage estimates (Table 2) provide the information the department used to assess the inseason salmon run. As the run progressed upriver, other projects provide additional run assessment information. Poor runs since 1998 and an inseason, weak run assessment prompted conservative management of the fishery. Based on set net test fish catch per unit effort (CPUE) (Appendix Figure 6) and Pilot Station sonar preliminary estimates, the chinook salmon run started slowly and tracked similarly to last year's return. The run appeared unable to support a commercial harvest or a normal subsistence harvest and still meet spawning escapement requirements.

According to test fish CPUE data and the Pilot Station sonar passage estimate, approximately 50% of the chinook salmon run entered the lower river by June 25; five days later than average and the same as last year. The cumulative set gillnet test fish CPUE in 2001 was 15.23 compared to 14.12 in 2000. Based on sonar passage estimates and escapement project information, the test fish CPUE data underestimated the relative abundance of the run. Although the test fishery identified pulses of chinook salmon entering the river, catch numbers were lower than they should have been. High water levels and changes in conditions at Middle Mouth and South Mouth set net locations probably caused this low catch. The Pilot Station sonar cumulative passage preliminary estimate of 137,453 chinook salmon (Table 2) was higher than last year's estimate of 70,000. Sonar passage estimates were expanded to account for days of partial operations. Early in the season, high water conditions at Pilot Station probably caused sonar counts to underestimate chinook salmon passage. On June 30, after adequate data had been collected from full sonar operations, an estimated additional 25,000 chinook salmon and 38,000 summer chum salmon may have passed the site undetected. The sonar passage estimate looked similar to 2000 before this analysis. Overall, the chinook salmon run was higher than last year, but still well below average in abundance. Further analysis of the 2001 run assessment will continue this winter.

The 2001 Yukon River summer chum salmon run is managed according to guidelines established by the Alaska Board of Fisheries in January 2001. The *Yukon River Summer Chum Salmon Management Plan* (Table 1) provides for escapement needs and the subsistence use priority over commercial, sport and personal use fishing activities. The management plan stipulates drainage-wide directed summer chum salmon commercial fisheries be allowed only when the run size projection is greater than 1 million summer chum salmon. Provisions in the plan allow for varying levels of subsistence salmon fishing restrictions when the run size projection is between 600,000 and 700,000 summer chum salmon and closure of the fishery when the run size projection is less than 600,000 summer chum salmon. The department is tasked to use the best available data, including preseason run projections, test fishing indices, age and sex composition, subsistence and commercial harvest reports, and passage estimates from escapement monitoring projects to assess the run size for the purpose of implementing this plan.

The department monitored the 2001 summer chum salmon run in the lower Yukon River by using the lower Yukon River drift gillnet test fishery, subsistence harvest reports, Pilot Station sonar passage estimates and Anvik River sonar passage estimates. Results from these projects, in combination with the preseason projection, were the basis for initial management decisions in 2001.

Pilot Station provides an estimate of the number of salmon passing the site during its operational period. An estimate of the total Yukon River run size requires an estimate of the subsistence harvests and escapement below Pilot Station. The level of summer chum salmon subsistence harvest taken in 2000 (82,224) and the 2000 Andreafsky River escapement estimates (44,432) were added to the 2001 run size projection. The corresponding total run size estimate was applied to the summer chum salmon management plan to determine appropriate management actions.

Fishery managers assessed the summer chum salmon run as being very poor. The Pilot Station sonar cumulative passage estimate through July 18 was 394,078 summer chum salmon (Table 2). Difficulties with operating the sonar early in the chinook salmon run had little effect on the summer chum salmon projected run size because, based on test fish and inseason subsistence harvest information, few summer chum salmon were present during the time of partial sonar operations. An estimated 600,000 summer chum salmon are needed for spawning escapements. Passage estimates for summer chum salmon were 3.6 million in 1995, 1.4 million in 1997, 746,000 in 1998, 939,000 in 1999, and 11,000 in 2000.

Run projections for summer chum salmon early in the season ranged from 540,000 for normal run timing and 680,000 for late run timing. Early in the season, uncertainties of estimating run timing and Pilot Station sonar information forced a reduced subsistence fishing schedule implemented before the fishery closed. Beginning July 5, using late run timing, directed summer chum salmon subsistence fishing was closed for the remainder of the season because the projected run size fell below 600,000. Although formal subsistence harvest information is not available at this time, indications are that summer chum harvests will be below average for both state and federally qualified subsistence fishers.

Districts 1-3

Historically, subsistence salmon fishing time was allowed 7 days a week until the start of the commercial fishing season. The subsistence salmon fishing schedule adopted by the Board of Fisheries is a conservative measure designed to spread subsistence harvests over time until run assessment information is developed. Subsistence salmon fishing in the lower Yukon River districts initially followed the Board of Fisheries fishing schedule of two 36-hour periods per week. Chinook salmon run assessment information gathered through June 19, the estimated first 25% of the run, indicated the run was well below average. Therefore, beginning June 21 in District 1, June 24 in District 2, and June 27 in District 3, the subsistence salmon fishing schedule was reduced to two 24-hour periods per week.

Another conservative measure closed one of the scheduled 24-hour subsistence salmon fishing periods in each of the lower river districts. In District 1, subsistence fishing was not allowed during the scheduled period on Thursday, June 28. The next scheduled subsistence salmon fishing period of 24-hours in District 1 began on Monday, July 2. In District 2, subsistence fishing was not allowed during the scheduled period on Sunday, July 1. The next scheduled subsistence salmon fishing period of 24-hours in District 2 began on Wednesday, July 4. In District 3, subsistence fishing was not allowed during the scheduled period on Wednesday, July 4.

Beginning July 4, the summer chum salmon run projection (based on late run timing) fell below 600,000 fish, the minimum amount needed to allow for subsistence fishing. Directed summer chum salmon fishing was restricted by gillnet mesh size of 8 inch or larger. The subsistence salmon fishing schedule was reduced on July 6 to one 24-hour period each week to allow for the continued harvest of chinook salmon, which now appeared to be higher than initially assessed. The subsistence salmon fishing schedule was also changed to allow fishing on the weekend. After July 13, subsistence fishing in the lower river districts was closed for all salmon to conserve summer chum salmon and the early portion of an expected poor fall chum salmon run.

District 4

Subsistence salmon fishing in District 4 initially followed the Board of Fisheries fishing schedule of two 48-hour periods per week beginning June 13. Consistent with reductions to subsistence fishing time in the lower river districts, the subsistence salmon fishing schedule in District 4 was reduced to two 36-hour fishing periods each week. The reduced schedule began July 1 in Subdistrict 4-A and July 4 in Subdistricts 4-B & 4-C. Beginning July 8 in Subdistrict 4-A and July 11 in Subdistricts 4B & 4C subsistence salmon fishing gear was restricted to protect summer chum salmon. Gillnets were restricted to mesh sizes of either 8 inch or greater or 4 inches or less. Fish wheels were required to have either live boxes or live chutes with the condition that all chum salmon be released unharmed. After July 29, subsistence fishing in District 4 was closed for all salmon to conserve summer chum salmon and the early portion of an expected poor fall chum salmon run.

Subdistrict 5-B and 5-C

Subsistence salmon fishing in Subdistricts 5-B & 5-C initially followed the Board of Fisheries fishing schedule of two 48-hour periods per week beginning June 22. Consistent with reductions to subsistence fishing time in other districts, the subsistence salmon fishing schedule in Subdistricts 5-B & 5-C was reduced to two 36-hour fishing periods each week beginning July 10. The incidental catch of summer chum salmon in Subdistricts 5-B & 5-C is low; therefore, subsistence salmon fishing gear was not restricted in these subdistricts. After August 3, subsistence fishing in Subdistricts 5-B & 5-C was closed for all salmon to conserve the early portion of an expected poor fall chum salmon run.

Subsistence salmon fishing in Subdistrict 5-D initially followed the Board of Fisheries schedule of 7 days per week. Beginning July 17, the subsistence salmon fishing schedule in Subdistrict 5-D was reduced to two 48-hour fishing periods each week. Subsistence salmon fishing in Subdistrict 5-D returned to 7 days per week beginning July 31 because the Canadian tagging project projecting the chinook border passage was adequate for escapement and aboriginal harvest needs. Subdistrict 5-D remained on this schedule into the fall season.

Subdistrict 5-A and District 6

Subsistence salmon fishing in Subdistrict 5-A initially followed the Board of Fisheries fishing schedule of two 42-hour periods per week beginning June 22. Subdistrict 5-A typically targets salmon bound for the Tanana River, and is managed by the Tanana River Salmon Management Plan. The subsistence salmon fishing period on July 13 of 42 hours in Subdistrict 5-A was reduced to 36 hours based on total run indicators and restrictions for chinook salmon downriver. In addition, to conserve summer chum salmon, gillnets were restricted to 8 inch or greater mesh and fish wheels required either the use of live boxes or live chutes with the condition that all chum salmon be released unharmed. The schedule of

two 42-hour periods each week resumed the following fishing period on July 17 when Chena and Salcha River tower counts indicated the upper end of the escapement goal ranges would be met. Gear restrictions remained in place for the continued protection of summer chum salmon. After August 3, subsistence salmon fishing in Subdistrict 5-A was closed for all salmon to conserve summer chum salmon and the early portion of an expected poor fall chum salmon run.

Subsistence salmon fishing in District 6 opened by regulation at the beginning of the season and initially followed the Board of Fisheries fishing schedule of two 42-hour periods per week, except in the Old Minto Area where subsistence salmon fishing was allowed 5 days per week. The subsistence salmon fishing period on July 13 of 42 hours in District 6 was reduced to 36 hours and the Old Minto Area was reduced to four consecutive days per week based on total run indicators and restrictions to the subsistence fishery for chinook salmon downriver. In addition, to conserve summer chum salmon, gillnets were restricted to 8 inch or greater mesh and fish wheels were required to use live boxes or live chutes with the condition all chum salmon be released unharmed. The schedule of two 42-hour periods each week resumed the following fishing period on July 17 when Chena and Salcha River tower counts indicated the upper end of the escapement goal ranges would be met. Gear restrictions remained in place for the continued protection of summer chum salmon. After August 3, subsistence fishing in District 6 was closed for all salmon to conserve summer chum salmon and the early portion of an expected poor fall chum salmon run.

Coastal District

Subsistence salmon fishing in the Coastal District initially followed the Board of Fisheries fishing schedule of 7 days per week. The subsistence salmon fishing schedule in the Coastal District was reduced to four consecutive days each week beginning June 19, and remained on this schedule into the fall season.

Koyukuk River

Subsistence salmon fishing in the Koyukuk River initially followed the Board of Fisheries schedule of 7 days per week. Consistent with reductions to subsistence salmon fishing time in the Districts 1-4, the schedule was reduced to two 48-hour fishing periods each week. The reduced schedule began July 4 and remained in place until subsistence salmon fishing in the Koyukuk River was closed on July 29. Beginning July 8, gillnets were restricted to 8 inch or greater mesh and fish wheels required either the use of live boxes or live chutes with the condition that all chum salmon be released unharmed.

2.2 Fall Chum and Coho Salmon Management, 2001

The Yukon River fall chum salmon run is managed according to guidelines established by the Alaska Board of Fisheries in 5 AAC 01.249, *Yukon River Drainage Fall Chum Salmon Management Plan*; (Table 3) and A Title VIII in Federal waters. The management plan provides for escapement needs and the subsistence use priority over commercial, sport and personal use fishing activities. The management plan stipulates that commercial fisheries directed at fall chum salmon be allowed only when the run size projection is greater than 675,000 fall chum salmon. At run sizes of less than 600,000 fall chum salmon, the drainage-wide escapement goal drops in increments from 400,000 to a minimum of 350,000 fish. Provisions in the plan allow for varying levels of subsistence salmon

fishing restrictions before closure of the fishery, when necessary, to meet minimum escapement requirements.

From 1987 to 1998, the Yukon River preseason fall chum salmon projection was presented as a point estimate. The 1999 and 2000 Yukon River preseason projections were presented as ranges because of the uncertainty associated with the unexpected run failures observed in 1998 and 1999 (Appendix Table 6, Appendix Figure 4). A quantitative fall chum salmon projection was not available preseason in 2001 for the Yukon River drainage. As a result, the department relied more heavily on inseason run assessment tools including information from the summer chum and chinook salmon runs earlier in the summer. The 2001 run was monitored in the lower Yukon River by using the drift gillnet test fishery at Emmonak, Mountain Village drift gillnet test fishery (operated by Asacarsarmiut Traditional Council), Kaltag drift gillnet test fishery (operated by Kaltag village), by Pilot Station sonar passage estimates and subsistence catch reports. Results from these projects, including assessment of projections from Pilot Station data, were the basis for the initial management decisions concerning the 2001 fall chum salmon subsistence fishery.

Most fall chum salmon typically enter the Yukon River from mid-July through early September in erratic surges (pulses) that usually last two to three days. Generally, four or five such pulses occur each season. These pulses are often associated with onshore wind events or high tides. This characteristic entry pattern makes it difficult to accurately assess the run strength, particularly early in the season.

The 2001 fall chum salmon run showed strength at the beginning of the run by receiving a pulse of fish beginning the first day of fall season operations. The first large pulse of fall chum salmon entered the Yukon River mouth on July 17, and was estimated by Pilot Station sonar to be approximately 109,000 fish. It lasted two days before fish passage dropped off to near zero. A second pulse of fish began on July 23. It also lasted only two days and was approximately one-third the size of the first pulse. A third pulse began on July 31 and lasted for four days. It was estimated to be approximately the same size as the first pulse. A fourth pulse began on August 6. It lasted only two days and appeared to be approximately the same size as the second pulse. No significant passage was observed after August 11. The initial first pulse of fish was among the largest and earliest recorded by the Pilot Station Sonar, however, the 2001 fall chum salmon run ended almost six days earlier than average in the lower Yukon River. The overall run was judged poor based on the total sonar passage estimate of approximately 450,000 fall chum salmon. Although the run was poor, it showed increased numbers of fish over runs in 1998 and 2000.

Each pulse of chum salmon was detected by both the Lower Yukon River and Mountain Village test drift net fishery projects. The Lower Yukon River set gillnets test fishery overestimated fall chum salmon run strength in recent years. Therefore, the department changed operations to a drift gillnet program that appeared to correlate well with other assessment projects in run timing and relative magnitude of each observed pulse.

Management of the Yukon River fall chum and coho salmon fisheries began in the lower Yukon River on July 16. At that time, based on the recent poor returns of fall chum salmon and the 2001 summer season chum salmon performance, the run was expected to range between 200,000 and 400,000 fish. A return of this magnitude is not sufficient to meet both escapement needs and normal levels of subsistence harvest. No commercial, sport or personal use fisheries were anticipated and subsistence salmon fishing restrictions were deemed necessary.

On July 20 the Yukon River Districts 1, 2, and 3 were closed to subsistence salmon fishing while assessment projects evaluated the run. The upriver districts remained under subsistence restrictions based on the poor return of summer chum salmon and were as follows: Yukon River Districts 4 and 6 and Subdistrict 5-A were closed to chum salmon fishing by implementation of a gear restriction to 8 inch mesh or larger and fish wheels equipped with either "live chutes" or "live boxes". Subsistence fishing periods in Subdistricts 5-B, 5-C and 5-D were unrestricted by gear since chum salmon are uncommon during this time period and the subsistence openings were two 48-hour periods each week with 5-D returning to 7-days per week on August 2. Closures to the remaining districts or subdistricts were commensurate with the migration of the fall vs. summer salmon stocks as they moved upriver. District 4 closed on July 29, Subdistrict 5-A and District 6 were closed for chum salmon beginning July 31, and Subdistricts 5-B and 5-C closed on August 7.

On August 5, the fall chum salmon run size was reassessed based on inseason projections by the Pilot Station sonar project. Its range was set at between 400,000 to 500,000 salmon. Information at the Rampart/Rapids tagging project collaborated the run as approximately six days early. When applied to the Yukon River fall chum salmon management plan, this level of return should provide for escapement and at least a portion of subsistence needs. Therefore, the Yukon River Districts 1, 2, and 3 restrictions were relaxed on August 6 to a reduced schedule of two 24-hour periods. Increments of fishing time referenced the new Board of Fisheries regulatory subsistence fishing schedule. This schedule was developed to provide windows of opportunity in which salmon could freely pass through an area, and to assist in spreading out the harvests in time and among users. This reduced but standardized subsistence salmon fishing schedule is intended to be implemented in years when no commercial fishing is anticipated to occur.

Relaxation of subsistence salmon fishing restrictions was staggered from lower to upper river areas. District 4 reopened on August 8 to a reduced schedule of two 36-hour periods per week with the exception of the Koyukuk River drainage, which was reopened for one four-day period each week. Subsistence salmon fishing periods in Subdistricts 5-B and 5-C were extended from two 36-hour periods to two 48-hour periods per week on August 8. Subdistrict 5-D remained open seven days per week. Subdistricts 5-A and District 6 remained closed until the Tanana River fall chum salmon run could be assessed.

The run size projection range of fall chum salmon continued to climb at Pilot Station sonar on August 9. A low end projection of 530,000 fish was based on an early run timing, and an upper end of 650,000 was based on an average run timing. The fall chum salmon run abundance appeared higher than in 2000, subsistence fishing effort was low and fish passed upriver as indicated by the Rampart/Rapids tagging project. This information indicated a midpoint in the timing of a normal run. A commercial fishery could be allowed according to the fall chum salmon management plan if the chum salmon passage were to increase in the second half of the run, and if the salmon run size might exceed 675,000. However, Tanana River assessment projects were providing mixed information regarding the strength of the stocks because the season was still too early for normal run timing in that tributary. Therefore, the entire mainstem Yukon River was restored to the full Board of Fisheries schedule for subsistence salmon fishing. Commercial, sport and personal use fisheries remained closed, as did subsistence salmon fishing in Subdistricts 5-A and District 6 to conserve Tanana River chum salmon stocks.

By August 20, the first large pulses of chum salmon reached the upriver assessment projects on the Chandalar and Sheenjek Rivers at the expected estimated travel times. These confirmed estimates

gave managers confidence that lower river assessment projects indicated a strong early portion of the run. Meanwhile, the numbers of chum salmon entering the lower river had slowed. Apparently, the run was not as strong as anticipated, but had a shifted run timing that began early and was now expected to end early. Much of the first half of the run passed to upper river areas and a weak second half followed. Managers were concerned that the Tanana River stocks might return below escapement goals because they are typically comprised of the latest fish to enter the Yukon River.

As the chum salmon run began to taper off at the mouth of the Yukon River, the coho salmon run was building. The Pilot Station sonar indicated the coho salmon run was also earlier than normal with the cumulative sonar passage estimate almost three times the historical average and 55% above the previous record high estimate for that date. The entire Yukon River drainage including the Tanana River was opened to the full Board of Fisheries regulatory subsistence salmon fishing schedule by August 20 because the chum salmon run projection remained above 500,000, the coho salmon run was strong, and subsistence salmon fishing effort appeared to be low.

In early September, the Chandalar River sonar exceeded the minimum escapement goal of 75,000 fall chum salmon on September 9 and was projecting a total season passage of 126,000 fish. The Sheenjek River sonar exceeded its minimum escapement goal of 50,000 fall chum salmon on September 19 and projected a total season passage of 60,000 fall chum. The Fishing Branch weir was reporting good daily passage rates with some fish known to have been missed at the beginning of the project because early fish arrived before the project start up. All three projects were passing significantly more fall chum salmon than the previous three years. The Department of Fisheries and Oceans (DFO) mainstem Yukon River border passage projection for early to normal run timing of fall chum salmon ranged from 86,000 to 115,900 fish based on CPUE data through September 10. All upriver assessment projects were indicating the fall chum salmon run would attain minimum escapement goals.

By September 1, the Pilot Station sonar estimate had decreased to a projected passage estimate for fall chum salmon. Catch rates at the test fish wheel in Subdistrict 5-A, used to indicate fall chum salmon passage as they turn into the Tanana River, were also dropping off. It appeared as though the upper Tanana stock might attain its escapement goal while the Toklat River would end below its rebuilding escapement goal. Since a large portion of the Tanana River subsistence salmon fishery occurs where both stocks are mixed, directed fall chum salmon fishing was reduced to half the regulatory fishing time on September 19 in an attempt to reduce the fall chum salmon harvest. Furthermore, an additional subsistence fishing period was scheduled each week, which conditionally allowed fishers to target the abundant coho salmon with the use of fish wheels equipped with liveboxes or livechutes. All chum salmon were to be released immediately. Gillnet fishers were not allowed to target salmon during these periods to conserve fall chum salmon.

On September 18 the first fall chum salmon estimate and projection based on tagging information for the US/Canada border passage was distributed by Department of Fish and Oceans (DFO). Assuming an average run timing, the projection estimated the border passage would be approximately 57,600 fish. There was concern the run may be early with declining passage rates, which would lower the projection, and result in escapements below established goals. However, subsistence salmon fishing remained open on the Board of Fisheries regulatory schedule. Commercial, sport, and personal use fisheries had already been closed for the entire season, and subsistence fishing had been closed in Districts 1, 2, 3, and 4 earlier in the run. Further restrictions to subsistence salmon fishing in Alaska were not justified due to: restrictive actions which had

already been taken to significantly reduce harvest; residents of Eagle utilized R&E funds to obtain approximately 15,000 hatchery coho salmon carcasses as a substitute for fall chum salmon bound for Canadian waters; fishing effort was low; and the late timing in the run when over 95% of the run had already passed Subdistricts 5-B and 5-C which are some of the biggest users of fall chum salmon.

Beginning September 24, the Tanana River was returned to the full Board of Fisheries subsistence salmon fishing schedule with unrestricted gear except that fish wheels were not allowed during closed salmon periods to harvest non-salmon species. Approximately 95% of the fall chum salmon run and 80% of the coho salmon run had passed Nenana by that date. In keeping with the preseason management strategy, an opportunity to harvest coho salmon was provided when the impact to fall chum salmon could be minimized.

Since the majority of fall chum and coho salmon had moved through Districts 4, 5, and 6, fish wheel gear was allowed for non-salmon species on October 5. Likewise, on October 8, personal use fishing was reopened in the Fairbanks non-subsistence use area to provide opportunity to harvest whitefish, suckers, and any remaining salmon in the area.

All of the lower Yukon River assessment projects are completed at this time. Tributary escapement estimates are preliminary. The Pilot Station sonar project ended August 31 with a preliminary point estimate for fall chum salmon passage by Pilot Station of 360,356 salmon (the approximate 90% confidence interval range: 338,477 to 382,235 salmon). Pilot Station only provides an estimate of the number of salmon passing the site during its operational period. An estimate of the total Yukon River fall chum salmon run size requires an estimate of the passage by the sonar site including fish after operations end, plus the estimated subsistence harvests below Pilot Station. Because the 2001 season had numerous subsistence fishing restrictions in place throughout the season, the level of subsistence harvest was probably less than average. Therefore, it is likely that the total fall chum salmon run size was less than 500,000 fish. Based on management directives contained within the *Yukon River Drainage Fall Chum Salmon Management Plan*, the management actions taken during the 2001 fall chum salmon season were appropriate. No aerial or ground assessment surveys have been conducted yet.

Compliance with the subsistence salmon fishing restrictions was relatively good considering closures were imminent. While imposing these restrictions, the department and federal managers worked extensively with users throughout the drainage to provide subsistence fishing opportunity for other fish species. In addition to normal daily communications between the department, USFWS and individual fishers, teleconferences were held before implementation of additional restrictions and subsistence salmon fishing closures. During these teleconferences, information from throughout the drainage was exchanged among all parties. Fishing schedules were altered in particular areas based on information provided by fishers during these teleconferences.

Nearly all fall chum and coho salmon caught in test fisheries in 2001 were given away to local residents. These fish will be included in reported subsistence harvests.

As previously stated, Yukon River coho salmon have a slightly later, but overlapping, run timing with that of fall chum salmon. In managing the coho salmon run, the department follows guidelines adopted in November 1998 by the Board of Fisheries in 5 AAC 05.369, *Yukon River Coho Salmon Management Plan*. The coho salmon management plan allows a directed coho salmon commercial

fishery only under specific conditions. It is very unlikely that conditions outlined in the coho salmon management plan will occur. In most years, fall chum salmon is the primary species of management concern during the fall season. In 2001, no directed commercial coho salmon fishing periods were allowed because of the weak fall chum salmon run even though the coho salmon run was well above average.

Several strong pulses of coho salmon entered the Yukon River beginning July 31, as detected by the lower Yukon River drift gillnet test fishery. Pilot Station sonar estimated approximately 211,500 coho salmon passed the site by August 31, indicating that the 2001 coho salmon run was the highest observed by the project. The coho salmon run was approximately 5 days earlier than average and 110% above the average passage estimate at Pilot Station sonar. No aerial surveys have been conducted for coho salmon at this time.

3.0 2001 COMMERCIAL FISHERY – CANADA

A preliminary total of 1,351 chinook salmon, 2,198 chum salmon and 0 coho salmon was harvested in the Canadian Yukon River commercial fishery in 2001 (Table 4, Figure 2). The combined species catch of 3,549 salmon was 85% below the previous ten-year average commercial harvest of 24,075 salmon. Since 1997, poor catches have resulted from below average run sizes of upper Yukon River chinook and chum salmon.

A total of 18 commercial licenses were issued in 2001, two less than in 1999 and 2000.

3.1 Chinook Salmon

The 2001 preseason expectation for Canadian-origin mainstem Yukon River chinook salmon was for a total run of approximately 37,000 fish. A run size in this range would be extremely weak in magnitude when compared to the previous cycle average of approximately 106,000 fish 1995-2000 (Appendix Table 8, Appendix Figure 7). The outlook was driven by uncertainty associated with marine survival of the fish that spawned between 1993 and 1998. The potential for reduced marine survivals was made apparent by the poor run sizes of upper Yukon chinook salmon in 1998, 1999 and 2000, which were significantly lower than expected despite healthy brood year escapements.

Discussions in the Yukon River Panel in March 2001 over the poor run outlook lead to the following joint statement:

"The Panel, recognising the present regime of low returns and recognising the difficulties faced by people on both sides of the border, recommends to the two management entities that they plan to fish to a maximum of 50% of the normal subsistence catch on the Alaskan side of the border and 50% of the normal aboriginal catch on the Canadian side of the border. It is recommended that commercial fisheries remain closed on both sides of the border unless in-season estimates indicate that sufficient fish are returning to justify them. The expectation of this regime is that no fewer than 18K fish will reach the spawning grounds".

This statement provided the framework for the chinook salmon management plan for 2001, which was developed by the Yukon Salmon Committee (YSC). Key elements of the plan included:

i) a target escapement goal of greater than 28,000 chinook salmon (Appendix Figure 8). This goal was the same as that agreed to by the Yukon River Panel in the spring of 1996, which was to be in effect through 2001. However, consistent with the Panel resolution, the YSC was willing to tolerate restricted First Nation fisheries so long as the spawning escapement was greater than 18,000 chinook salmon;

ii) closures in the commercial, recreational and domestic fisheries would be in place from the beginning of the season until inseason run projections indicated the priorities for conservation, i.e. spawning escapement and First Nation harvest, would be achieved.

To provide clearer direction to fishers, the plan described a series of management categories (Red, Yellow and Green Zones), which were bounded by specific reference points (run sizes into Canada) and were associated with expected management actions. For example, the Red Zone included run projections of less than 19,000 fish. In the Red Zone, all fisheries would be closed except for a test fishery, which would operate for assessment purposes if the run was not less than 11,000 fish. No test fishery would be allowed if the run projection was less than 11,000. In the Yellow Zone, which was described as a run size from 19,000 to 37,000, only the First Nation fisheries and an assessment test fishery would operate. Restrictions in the First Nation fishery would depend on the run abundance, increasingly more severe the closer the run projection was to 19,000, i.e. the lower end of the Yellow Zone. The Green Zone included run sizes greater than 37,000 chinook and indicated that First Nation fisheries would be unrestricted and that harvest opportunities in the commercial, recreational and domestic fisheries would be considered depending on abundance and international harvest sharing provisions.

With a total run outlook of 37,000 fish (at the river mouth), it was expected that the proposed restrictions in Alaska would result in a border escapement somewhere in the middle of the Yellow Zone. This meant the likelihood of no commercial, domestic or recreational fisheries and a 50% reduction in the First Nation fishery. Hence the season commenced with closures in place for all fisheries except First Nation fisheries which, after a series of community meetings, developed plans to delay openings or fish only half as much as normal.

Throughout June and early July, before chinook salmon had entered the Canadian section of the upper Yukon River, Alaskan test fishing and sonar projects near the river mouth indicated a below average run size similar to, or slightly better than the run in 2000 (which was the lowest on record). Fish started to appear in DFO fish wheels on July 6, approximately 10 days later than normal, and by mid July the cumulative fish wheel catch was about average. The primary purpose of the DFO fish wheels is to live-capture salmon throughout the run for tagging purposes; fish are tagged and released. Recoveries of tagged fish primarily in the Dawson area commercial fishery allow assessment biologists to estimate the abundance of fish throughout the season. Inseason projections of the total run (into Canada) are made by expanding the abundance estimates by historical run timing.

The closure in the commercial fishery created the need to implement a test fishery to provide stock assessment data for inseason run forecasting. The test fishery operated similarly to that of 1998 and 2000 involving both First Nation and commercial fishers working together in teams under the direction of the Tr'ondek Hwech'in First Nation (THFN) and the Yukon River Commercial Fishing Association with funding provided from the Yukon Restoration and Enhancement Fund. The objective of the test fishery was to collect timely catch and tag recovery data that could be used in developing reliable inseason run forecasts. More information about the test fishery and results of this project appears in

Sections 6.2.1. All fish caught in the test fishery were distributed under direction from the THFN. Without the tagging data, little else existed upon which to rely for inseason run assessment. The option of just using the DFO fish wheel catch was not exercised because of the poor historical relationship between catch and run size. Similar to 2000, high water conditions raised doubts regarding the comparability of catches this year with other years.

Test fisheries were initiated July 14 and occurred over the following three weeks. Effort generally consisted of up to four teams fishing 48 hours per week. The first inseason forecast, which was produced in statistical week 30, the week beginning July 22, was based on the first test fishing period results in the previous week and indicated a run size in the 23,000 to 46,000 range. The wide range in the forecast was attributed to uncertainty over run timing; the lower estimate was based on the assumption that the run timing was normal, whereas, the upper end of the range was based on the assumption the run was one week late. Although the fish arrived at the fish wheels later than normal, fish wheel catches through the first three weeks of July appeared to be following more of a normal curve. Reports from downriver in Alaska also suggested run timing was normal.

A dramatic increase in the DFO fish wheel catches occurred starting 24 July and the catch on 25 July of 556 chinook salmon was by far the highest daily catch on record; the previous record daily catch was 227 chinook. The duration of this extremely strong pulse of fish lasted slightly more than a week. Not surprisingly, updated run forecasts increased and by 31 July the low end of the forecast range had increased to 43,000 fish, well above the reference point for opening the commercial fishery. As a result, the commercial fishery was opened 01 August for 48 hours and fishing continued for 48 hours per week over the next two weeks (Table 4). During the commercial openings, effort level was relatively low with ten fishers fishing the first week, five fishers in the second week and only one in the third week. Most fishers had made other commitments.

The total catch of chinook salmon taken in the commercial fishery was 1,351 fish of which 1,156 were taken in the Dawson Area fishery, downstream from the confluence of the Yukon and White rivers, and 195 were caught in the "upper fishing area" (Appendix Table 9, Appendix Figure 9). The fishery was open for a total of 6 days and total fishing effort was 32 boat-days. For comparison, the previous ten-year average (1991-2000) commercial catch is 7,400 chinook and the average effort is 186 boat-days [note these averages include data from 1998 to 2000 when the fishery was severely restricted and/or closed].

3.2 Fall Chum Salmon

Similar to the chinook run outlook, much uncertainty surrounded the 2001 preseason expectations for Canadian-origin upper Yukon chum salmon. Spawning escapements in 1996 and 1997, the primary brood years contributing to the 2001 run, were 122,400 and 85,400, respectively, well above the rebuilding target of >80,000 chum salmon. However, the run sizes in both 1999 and 2000, which were also the product of excellent spawning escapements, were well below average. Low returns in 1998 through 2000 appeared to have been significantly impacted by poor marine survival. It was surmised that this again could result in a depressed run in 2001. To capture this uncertainty, the total run outlook was expressed as a range from 67,400 (below average), to 245,000 (above average) upper Yukon chum salmon. It was felt that the lower end of this range was more likely given the poor runs over the previous three years.

The Canadian chum salmon management plan for 2001 was developed with the following components:

i) A spawning escapement goal of >80,000 upper Yukon chum salmon which was consistent with the rebuilding objective adopted by Canada and the U.S. in the course of Yukon River salmon negotiations;

ii) Given the expectation for a poor run, the commercial fishery would be closed until inseason run forecasts were >85,000 chum salmon.

By mid-August, fall chum run assessments in Alaska had become somewhat optimistic due to a relatively strong initial pulse of fish. However, the early run strength was not sustained and consequently, throughout the latter half of August, the outlook for fall chum became progressively bleaker. For example, the Alaska Department of Fish and Game (ADF&G) forecasts of the Pilot Station total estimate ranged from 500,000 to 600,000 on August 17 decreased to roughly 450,000 by the end of August. It was initially planned that if run projections were low in Alaska, a test fishery would operate in Canada to obtain run size estimates upon which to make inseason decisions for the chum fishery. Contingency funding had been built into the Restoration and Enhancement budget for 2001. When it appeared the run in Alaska was gaining some momentum during the first half of August, a decision was made to cancel the test fishery in anticipation that limited commercial openings in Canada would likely provide the necessary data.

With indications of decreasing inseason forecasts in Alaska, in late August, Canadian managers decided to continue the commercial fishery closure until sufficient run assessment data could be compiled in Canada to rationalize opening the fishery. However, by this time, the capability to obtain tag recovery data for use in inseason run forecasting had been reduced by the cancellation of the test fishery and the closure of the commercial fishery. This left the DFO fish wheel catches as the primary tool for assessing the run strength until tagging data became available. Unlike chinook salmon, there *has* been a statistically significant relationship between the DFO fish wheel catches of chum salmon and border escapement estimates. To estimate the run size, historical fish wheel timing data was used to project the total fish wheel catch for the season. It was assumed, based on information from assessments further downstream, that run timing was one week earlier than normal. A linear regression model was subsequently used to forecast the total run size based on the projected fish wheel catch.

Through the first week of September, the cumulative DFO fish wheel catches were average to slightly below average and run projections based on the early run timing scenario were below the trigger point for considering commercial openings, i.e. 85,000 fish. However, by September 09 the cumulative fish wheel catch was approximately 20% above average and the run forecast had increased to 87,000 chum salmon. Because of increasing run forecasts, a 48-hour opening in the commercial fishery was announced commencing 12 September. Mark-recapture data collected from this opening would be used to hopefully corroborate the fish wheel-derived run projections and to decide on future openings.

Five fishers participated in the opening catching a total of 2,189 chum salmon of which approximately 10% were tagged. The run forecast, derived from tag recapture data collected during this opening augmented with limited data from the Aboriginal fishery, was approximately 57,600 fish. This estimate was approximately 34% below the forecast based solely on fish wheel catch data.

Because of the decreased run forecast, no further openings in the commercial fishery were scheduled. Forecasts were updated with additional tag recovery data provided from the Aboriginal fishery, however they progressively decreased to the final inseason forecast, of 35,500 to 40,000 on Oct 01.

The total commercial chum catch of 2,198 fish was 87% below the previous 10-year average. For comparison, the previous 10-year average commercial catch is 16,665 chum salmon (1991 to 2000); during this period, the catch ranged from zero chum salmon in 1998 to 39,012 chum in 1995 (Appendix Table 10, Appendix Figure 10). Most of the chum salmon caught by commercial fishers in 2001 went towards meeting personal requirements and was not sold. With only two days of fishing, total effort was down significantly in 2001: 10 boat-days of effort compared to the 1991-2000 average of 91 boat-days.

4.0 2001 SUBSISTENCE, PERSONAL USE, ABORIGINAL, DOMESTIC, AND SPORT FISHERIES

4.1 Alaska

4.1.1 Subsistence Fishery

Subsistence "catch calendars" for use during the fishing season were mailed in May to rural community households in the non-permit portions of the Yukon River drainage in Alaska. Catch calendars are collected during the personal interviews conducted with fishers immediately following the season in September and October. Subsistence fishers in portions of District 5 (upper Yukon River drainage) and District 6 (Tanana River drainage) are required to obtain subsistence salmon fishing permits and record harvest data on the permit. Additionally, attempts are made to contact fishers by telephone or mail. Results of these surveys will not be available until mid-winter.

In January 2001, the Alaska Board of Fisheries (BOF) initiated a subsistence salmon fishing schedule for the Yukon River to increase the quality of escapement, spread the harvest throughout the run to reduce the impact on any particular component of the run and spread subsistence harvest among users. The schedule was based on current or past fishing schedules and was intended to provide reasonable opportunity for subsistence users to meet their needs during years of normal to below average runs. The goal of the schedule was to allow windows of time that salmon may migrate upriver unexploited. During the 2001 summer season and a portion of the fall season the BOF schedule was further reduced based on indicators of low run size and insufficient escapement. During subsistence salmon fishing closures, subsistence gillnet fishers fishing for whitefish, suckers, and other non-salmon species were restricted to gillnets of a maximum length of 60 feet and four inches or less in stretch mesh. Additionally, fishers were not allowed to use fish wheels to fish for non-salmon species. Restricting gillnet length and mesh size and not allowing the use of fish wheels during subsistence salmon fishing closures provided protection to chinook and summer chum salmon while allowing subsistence fishers the opportunity to fish for non-salmon species.

It is believed that the 2001 subsistence salmon schedule allowed most subsistence users to meet their chinook salmon needs, while still allowing sufficient escapement. Due to conservation concerns, most of the summer chum salmon fishery was closed by restricting allowable fishing gear

and fishing time. This resulted in a greatly reduced summer chum salmon harvest. Both the fall chum and coho salmon arrived early in 2001 and partially overlapped in run timing. Subsistence fishing restrictions were necessary to conserve fall chum salmon. Consequently, the subsistence harvest of fall chum and coho salmon was reduced.

The estimated 2000 subsistence salmon harvest in the Alaska portion of the Yukon River drainage totaled approximately 37,346 chinook (Appendix Table 2), 82,194 summer chum (Appendix Table 3), 18,920 fall chum (Appendix Table 6) and 14,333 coho salmon (Appendix Table 7). These estimates do not include personal use catches in the Fairbanks Non-subsistence Area. Preliminary analysis of 2001 subsistence harvest data will not be completed until the spring of 2002.

4.1.2 Personal Use Fishery

Regulations in effect from 1988 until July 1990 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 in 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 enabled 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 where subsistence was not a principal characteristic of the economy, culture, and way of life. The Fairbanks Non-subsistence Area was the only such area identified by the Joint Boards of Fisheries and Game in the Yukon River drainage. This area encompasses the Fairbanks North Star Borough and surrounding areas, which are primarily in the middle portion of the Tanana River drainage. 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 allowed all Alaskan residents to be eligible to fish for subsistence purposes during the 1994 fishing season.

In 1995, the Joint Board of Fisheries and Game reestablished the Fairbanks Non-subsistence Area. Subsistence fishing is not allowed within non-subsistence areas. This new regulation primarily affected salmon fishers within Subdistrict 6-C, which falls entirely within the Fairbanks Non-subsistence Area. Since 1995, the Subdistrict 6-C salmon fishery has been managed under personal use regulations. In 2001, to conserve summer chum salmon, personal use salmon fishing within the Fairbanks Non-subsistence Area was closed from July 6 through July 20, and from July 29 through the end of the season. The personal use fishery for chinook salmon reopened on July 20 when Chena and Salcha River tower counts indicated the upper end of the escapement goal ranges for chinook salmon would be met and the subsistence fishery in Subdistrict 5-A and District 6 was restored to the Alaska Board of Fisheries subsistence salmon fishing schedule. Preliminary data compilation for the 2001 fishing season will not be completed until the spring of 2002.

Personal use permits are required for fishers who fish in the Fairbanks Non-subsistence Area. 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. In 2000, 16 fishers were issued personal use salmon fishing permits and harvested approximately 75 chinook salmon, 30 summer chum salmon and no fall chum or coho salmon.

4.1.3 Sport Fishery

Sport fishing effort for anadromous salmon in the Yukon River drainage is directed primarily at chinook, chum, and coho salmon. The majority of the effort occurs in the Tanana River drainage, mostly along the road system. During 1995-1999, 93% of the total harvest of chinook salmon, 81% of the harvest of chum salmon, and 77% of the harvest of coho salmon was taken from the Tanana River system. Most chinook and chum salmon are harvested from the Chena, Salcha, and Chatanika rivers, while most coho salmon are harvested from the Delta Clearwater and Nenana River systems. Sport fishing effort and harvests are monitored annually through a statewide sport fishery postal survey. Some on-site fishery monitoring also takes place during some years at locations where more intense sport fishing occurs, although no on-site monitoring was conducted during 2001. Although some fall chum salmon may be taken by sport fishers, the majority of the harvest of that species is thought to come from the summer chum salmon run because 1) that run is much more abundant, and 2) the chum harvest is typically incidental to effort directed at chinook salmon which overlap in timing with summer chum. For these reasons, all of the sport fishing chum salmon harvest is reported here as summer chum salmon. Yukon River drainage sport harvest estimates for recent years (1995-99) have averaged about 1,719 chinook salmon, 927 chum salmon, and 954 coho salmon.

Sport harvest of salmon in the Alaskan portion of the Yukon River drainage in 1999 was estimated to total 1,023 chinook salmon, 555 chum salmon, and 609 coho salmon. At this time, harvest data are not yet available for 2000 or 2001. The sport fishery for chinook and chum salmon in the Yukon River drainage was restricted by emergency order to catch and release fishing only from July 7 to July 20 due to a generally weak run of chinook salmon in the Yukon River. Due to stronger than expected escapements in the Chena and Salcha rivers, the option to harvest chinook salmon in the sport fishery was restored on July 20 with a daily bag and possession limit of one chinook salmon. Sport fishing for chinook salmon in the remainder of the Yukon drainage and for chum salmon in all waters of the Alaska portion of the drainage remained restricted to catch and release only for the duration of the season.

4.2 Canada

4.2.1 Aboriginal Fishery

The sixth year of a multi-year comprehensive survey of the Aboriginal fishery was conducted in 2001 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. Catch estimates from the Porcupine River in the Old Crow area are determined independently from locally conducted, post season interviews.

The preliminary estimate of the 2001 total upper Yukon chinook salmon catch in the Aboriginal fishery is 7,421 fish (std = 263), 3% above the 1991-2000 10-year average of 7,187 chinook and 82% above the final estimate of 4,068 (std = 206) chinook salmon in 2000 (Appendix Table 9). The total fishing effort during the chinook season, i.e. through the end of August, was 22,112 net-hours, 19% below the 1996-2000 average of 27,464 net-hours. The reduction in effort is the result of voluntary cutbacks in fishing activity undertaken by many Yukon First Nations primarily early in the season because of the

preseason expectation for a very poor run. Before the season, numerous meetings were held throughout Yukon communities to prepare for the likelihood of a poor run. Plans were developed whereby fisheries would be delayed, restricted and or even closed if needed. Most fisheries were constrained early in the season following recommendations for a 50% reduction from the Yukon salmon Committee, which was consistent with the recommendation from the Yukon Panel. When it was determined inseason that the run size was much better than expected and conservation concerns had diminished, First Nations were notified on/about July 27 that "normal" fishing activity could occur.

The preliminary estimate of the 2001 harvest of upper Yukon chum salmon in the Aboriginal fishery is 2,717 fish (std = 707) through October 27. Usually the fishery is virtually completed by this date. This preliminary estimate is 12% above the 1991-2000 average of 2,406 chum salmon (Appendix Table 10, Appendix Figure 10). The preliminary estimate of total fishing effort during the chum season (September on) was 2,874 net-hours, approximately 33% above the 1996-2000 average. The final chum catch estimate for 2000 was estimated to be 2,917 fish (std = 352) and the effort totaled 1,786 net-hours.

Preliminary harvest data from the Vuntut Gwitchin First Nation fishery near Old Crow includes 370 chinook and 4,594 chum salmon. The 1991-2000 average catches in this fishery are 277 chinook, 3,980 chum and 232 coho salmon. Catches in 2000 included 50 chinook, 5,000 chum and 37 coho salmon.

4.2.2 Domestic Fishery

A total of 89 chinook and 3 chum salmon were taken in the domestic fishery in 2001. Due to the preseason expectation for a poor run, the domestic fishery did not open until it was determined that more the 28,000 chinook salmon would likely make it to the spawning grounds. This determination was made at the end of July and the fishery opened during the period August 5 to August 17.

4.2.3 Sport Fishery

In 1999, the Yukon Salmon Committee introduced a mandatory Yukon Salmon Conservation Catch Card in an attempt to improve harvest estimates and to serve as a statistical base to ascertain the importance of salmon to the Yukon sport fishery. Anglers are required to report their catch via mail by the late fall. Information requested includes: the number, sex, size, date and location of salmon caught and released.

Preliminary data from catch card returns in 2001 indicate 98 chinook salmon were retained and 27 were released in the Yukon River recreational fishery. Extensive restrictions were implemented through July in anticipation of a poor chinook run. For example, the daily catch limit was varied to zero chinook salmon drainage-wide and a total fishing closure was posted near the Tatchun – Yukon confluence, i.e. the area where most of the salmon fishing effort usually occurs. These restrictions were lifted August 1 as a result of inseason run assessments, which indicated escapement targets would likely be achieved.

In 2000, the estimated chinook salmon catch was zero based on the catch card returns. Primarily in response to conservation concerns, effective midnight July 17, the daily catch and possession limit for salmon in the upper Yukon River drainage was varied to zero. Since the timing of this closure

was before most sport fishing activity for salmon normally occurs, fishers had little opportunity to catch chinook salmon in 2000.

5.0 2001 STATUS OF SPAWNING STOCKS

Tables 5 and 6 outline the projects Alaska and Canadian researchers pursued in 2001. The researchers on most of the projects listed include employees of private companies, government managers and non-governmental agencies. The charts list the project name, location, primary research group and objectives.

5.1 Chinook Salmon

5.1.1 Alaska

Yukon River chinook salmon abundance in 2001 was assessed as well below average but improved when compared to the 2000 run. This assessment is based on escapement counts and estimates from selected tributaries (Appendix Table 11, Appendix Figure 11). Production from the 1995 and 1996 parent year appears to have been especially poor given the weak return of 5- and 6-year-old chinook salmon in 2001 and good parent year escapements particularly in 1995. Successful aerial survey observations were made in all eight Yukon River index tributaries used for escapement assessment. Minimum aerial survey SEGs have been established in the East and West Fork Andreafsky, Anvik, North and South Fork Nulato, and Gisasa Rivers. With the exception of the East and West Fork Andreafsky Rivers, all aerial survey goals were met. Upper ranges of the biological escapement goals for the Chena and Salcha Rivers were exceeded.

Because of high water, the USFWS East Fork Andreafsky River weir count of 1,148 chinook salmon is considered minimal. Counting did not begin until July 15, approximately 75% into the run when compared to the 1995-2000 average run timing. Given this information, escapement into the East Fork Andreafsky could have been approximately 4,000 chinook salmon. Age and sex composition samples were collected in 2001 from fish passing through the East Fork Andreafsky River weir. An aerial survey count on the East Fork Andreafsky was 1,065 chinook salmon. This is two-thirds the aerial survey SEG and roughly half the recent 10-year average of acceptable surveys. Under fair conditions, 570 chinook salmon were counted on the West Fork Andreafsky, roughly one-third the SEG. The preliminary estimated age composition was 14.5% age-4, 18.5% age-5, 64.5% age-6 and 2.5% age-7 chinook salmon. Females dominated the escapement samples, accounting for 64% of the total number sampled. Because these fish were sampled in the last 25% of the escapement migration, the results may not represent the actual age and sex composition.

An aerial survey of the Anvik River conducted under fair conditions resulted in a count of 1,420 chinook salmon. This count is nearly identical to last year's count and just above the aerial survey SEG of 1,300. Age and sex composition samples were collected in 2001 by carcass survey. Six-year-old chinook salmon dominated the samples, comprising 52.8% of the total with four and five year old fish (11.2% and 30.1%, respectively) comprising the remainder. Males were more numerous than females, accounting for 62.4% of the samples collected.

The minimum aerial survey index SEG for the North Fork Nulato River is 800 chinook salmon and 500 for the South Fork. Both of these SEGs were exceeded in 2001. Aerial surveys were rated good for both tributaries. The aerial survey count of chinook salmon was 1,116 for the North Fork and 768 for the South Fork. The Nulato River escapement project was to become a weir in 2001 but because of continued high water, was not installed. The high water also prevented tower counting for much of the season. A tower-based escapement estimate will not be possible. Age, sex and length information was not collected in 2001.

The minimum aerial survey SEG for the Gisasa River of 600 chinook salmon was exceeded by more than twice that amount in 2001 with a count of 1,298 chinook salmon. The USFWS weir passage estimate of 3,052 chinook salmon was 19% above the 1996-2000 average of 2,558. The weir was operated between June 28 and August 7. The first chinook salmon through the weir was on July 7. Sex composition from fish observed moving past the weir was 46% female. Age and sex composition from scale samples was 0.2% age-3, 20.2% age-4, 24.6% age-5, 51.9% age-6 and 3.2% age-7 fish. Of the aged fish, 39.3% were female.

A weir was operated on Henshaw Creek between June 25 and August 9. This was the second of a multi-year monitoring effort using a weir to estimate escapement in this river. A counting tower located near the mouth of Henshaw Creek was used in 1999 and aerial surveys have been conducted intermittently since 1960. The escapement through the weir was estimated at 1,091 chinook salmon, more than 10 times the 2000 count of 98 (considered a minimum count due to high water effecting operations in 2000). Sex composition from fish observed moving past the weir was 44% female. Age and sex composition from scale samples was 14.4% age-4, 38.8% age-5, 46.0% age-6 and 0.8% age-7 fish. Of the aged fish, 38.4% were female. An aerial survey counted 620 chinook salmon on August 1 under fair conditions.

Aerial surveys were flown on selected Koyukuk River tributaries. Aerial surveys flown under good conditions observed 494 chinook salmon in the South Fork Koyukuk River and 179 chinook salmon in the Jim River. Aerial surveys flown in 2001 on tributaries without escapement projects were rated incomplete or less than fair conditions.

The Bureau of Land Management (BLM) initiated a salmon enumeration project on the Tozitna River this past summer. BLM operated a tower project through a Cooperative Agreement with the Tanana Tribal Council (TTC). The project site was located at river km 80.4, 0.4 river kms upstream from the confluence of Dagislakhna Creek. A counting tower, partial weir, and contrast panels were installed during the period of 25 - 30 June. From 6 July - 10 August 2001, an estimated 2,830 chinook salmon migrated upstream. The peak for chinook salmon occurred on 20 July (n=268). Carcass sampling was conducted from 21 July - 12 August to determine age-sex-length. The sex ratio was 1.4:1, with 59% males and 41% females (n=63). The mean mid-eye to fork length of male and female salmon was 707 mm and 829 mm respectively (n=63). Age and sex composition from scale samples was 1.7% age 3, 13.6% age-4, 32.2% age-5, 50.8% age-6 and 1.7% age-7 fish with males accounting for 59.3% of the total sample. An aerial survey was conducted by the BLM on 31 July from the counting tower to the Tozitna River mouth to assess spawning activity. An estimated n=10 live and n=1 carcass for chinook salmon were observed, indicating most of the chinook spawning occurred upstream of the tower.

Since 1993, inseason assessment of chinook salmon escapement to the Tanana River drainage has been primarily based on counts of chinook salmon passing the Chena and Salcha River tower sites. ADF&G Sport Fish Division operated these projects. Since 1999, a private contractor monitored salmon

escapement to the Salcha River with funding from BSFA. High, turbid water hampered the operations on the Chena and Salcha River for short intervals during the 2001 season.

Tower counting on the Chena River began on June 30 and ended on August 9. Counting was interrupted by high water between July 7-9, and July 30-August 9. No interpolation was made for the periods of interrupted operations. The unadjusted escapement count of 9,244 chinook salmon is well above the recommended upper end of the BEG range of 5,700 chinook salmon and above the recent 10-year average (1991-2000) of 6,821. The aerial survey count on the Chena River, under good conditions was 1,651. The index count of 1,487 was an improvement over the 2000 index count of 934 chinook salmon but below previous counts conducted in 1995, 1996, 1997, and 1999. The combined age composition estimated from all samples collected in the Chena River was 20% age-4, 36% age-5, 36% age-6 and 8% age-7 fish. Females were more numerous than males, accounting for 35% of the samples.

Tower counting on the Salcha River began on July 1 and ended on August 10. Counting was interrupted by high water between July 7-9, July 24-26 and July 29-August 6. Unadjusted escapement counts were 8,981 chinook salmon, well above the recommended upper end of the BEG range of 6,500 chinook salmon and above the recent 10-year average (1991-2000) of 7,321. The aerial survey count on the Salcha River, under good conditions was 3,107. The index count of 2,990 was an improvement over the 2000 index count (rated as incomplete) of 2,478 chinook salmon but slightly below previous counts conducted in 1995, 1996, 1997, and 1999. The age composition estimated from all samples collected in the Salcha River was 20% age-4, 36% age-5, 36% age-6 and 8% age-7 fish. Females were more numerous than males, accounting for 35% of the samples.

Since 2000, a private contractor has monitored salmon escapement to the Salcha River with funding from BSFA. Tower counting assessments have also been conducted by ADF&G Sport Fish Division since 1998 on the Chatanika River. High, turbid water hampered the operations on the Salcha, Chena and Chatanika rivers for short intervals during the 2001 season. Counting was scheduled from July 1-29 on all three rivers, but high turbid water prevented counting on July 7-9 on the Chena and Salcha rivers and July 15 and part of July 16 on the Chena and Chatanika rivers. Counts continued uninterrupted from July 10 to July 23 on the Salcha River, then ended due to turbidity. Projected counts were developed for the missed days and estimates of total escapement were generated for all three rivers. Preliminary estimates of total escapement of chinook salmon were 10,000 for the Chena River, 13,200 for the Salcha River, and 861 for the Chatanika River.

Estimated escapement of chinook salmon in both the Chena and Salcha rivers exceeded the recent five-year averages (1996-2000) of 7,247 and 8,981 fish. Biological escapement goals for chinook salmon were recently established for both the Chena and Salcha rivers. These goals are 2,800-5,700 for the Chena River and 3,300-6,500 for the Salcha River. Estimated escapement in both rivers exceeded the goals. Estimated escapement in the Chatanika River was the second largest of the four estimates obtained since 1998. Age and sex composition samples were collected in 2001 from carcass surveys on the Salcha, Chena and Chatanika rivers. These samples have not yet been processed or analyzed.

5.1.2 Canada

The preliminary mark-recapture estimate of the total spawning escapement for the Canadian portion of the upper Yukon drainage is 44,222 chinook salmon, 85% higher of the 1991-2000 average of

23,900 chinook (Appendix Table 12). Results of the Fisheries and Oceans Canada tagging program are discussed in greater detail in Section 6.2.1. of this report.

Aerial surveys of the Little Salmon, Big Salmon, Wolf and Nisutlin river index areas were conducted by DFO, one survey of each index area (Appendix Figure 12). The Tincup Creek survey was not flown this year, however there is information available from a ground survey. Survey results relative to the previous cycle averages are presented below. Index surveys are rated according to fish countability. Potential ratings include excellent, good, fair and poor. Surveys with ratings other than poor are considered useful for inter-annual comparisons. Historical counts are documented in Appendix Table 11.

The Little Salmon aerial survey was flown on August 22. Countability was rated as excellent. Two surveyors participated and a total of 1,035 chinook salmon was counted. The 2001 count was 85.2% higher than the recent average (1991-2000) of 559 and it was much higher than the 2000 count of only 46 chinook salmon. A total of 39 chinook salmon were counted during the ground surveys of Tincup Creek. This count is 43.8% of the average aerial survey count of 83 for the 1991 to 2000 period. The Big Salmon, Nisutlin, and Wolf river index areas were flown on August 24. Good to excellent survey conditions were encountered. A count of 1,020 chinook salmon was observed in the Big Salmon River index area, almost identical to the recent 10-year average of 1,021. The Nisutlin River index count of 481 chinook salmon was 58.2% higher than the recent cycle average of 304. In the Wolf River index area, a count of 154 chinook salmon was observed; this count was 65.3% of the cycle average of 236, but it was much higher than the record low count (32) observed in 2000. Timing of the aerial surveys of the Little Salmon, Big Salmon, Nisutlin and Wolf rivers appeared to be very close to peak spawning.

Aerial surveys of both the Ibex and Takhini rivers were also conducted in 2001. No chinook salmon were observed in Ibex River, however, 249 were observed in the Takhini River. Previous surveys of the Takhini River were conducted from 1982 to 1989, excluding 1983. The average count for this period was 173 with a range from 38 to 300.

Additional aerial surveys for chinook salmon enumeration were conducted on streams which have not been subject to long term, consistent monitoring. These surveys were conducted by Yukon First Nations through the DFO Aboriginal Fisheries Strategy. Aerial surveys of the Morley and Swift rivers were conducted by Jane Wilson and Associates and the Teslin Tlingit Council. The Morley River count was 159. This index area was also surveyed during the 1997 to 2000 period; the average count for this period was 84 with a range from 4 (2000) to 230 (1997). The 2001 count for the Swift River, from the outlet at Teslin Lake to Swift Lake, was 16 chinook salmon. Counts in 1999 and 2000 were 10 and 3 chinook salmon, respectively.

Aerial surveys of the Pelly Lakes area (lower Pelly Lake to outlet at Pelly River) and Blind Creek (from outlet at Pelly River to unnamed lakes below Blind lake) were surveyed by Jane Wilson and Associates and the Ross River Dene Council. The Pelly Lakes count was 105 while the Blind Creek count was 226.

Single aerial surveys do not count 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 number of spawners observed in 2001 was a remarkable improvement over 2000 counts.

The Blind Creek weir project was not conducted in 2001, however as mentioned earlier the aerial count was 226. No fish were counted at the weir in 2000 (there were operational problems associated with the project). A total of 892 chinook salmon were counted between August 1 and August 22 in 1999. Counts for the two other years of weir operation were 957 and 373 for 1997 and 1998, respectively. A relationship between aerial surveys and weir counts has not been established for this project.

A weir was not operated on Tatchun Creek in 2001 due to local concerns that it was delaying and impeding chinook salmon migration. The enumeration project counted 241 chinook salmon in 2000, however the project was terminated early due to flooding. Previous weir counts were 250 in 1999, 405 in 1998 and 1,198 in 1997.

The Yukon Commercial Fishers Association and the Trondek Hwetchin First Nation installed a weir on the Chandindu River for the fourth year. The weir was operated from July 01 to September 8, however the weir was breached by high water conditions, which occurred from July 31 to August 7. A total of 129 chinook and 29 chum salmon were counted. In 2000, the weir was installed much later than anticipated due to high water conditions and 4 chinook and 21 chum salmon were counted. Previous counts were 239 chinook and 92 chum salmon in 1999 and 132 chinook and 23 chum salmon in 1998.

The Whitehorse Rapids Fishway chinook salmon count of 988 fish, provided by the Yukon Fish and Game Association, was 70.6% of the recent average (1991-2000) of 1,399. The sex composition observed at the fishway was 50% female. The quality of escapement in the current year is a substantive improvement over many recent years, which had a low number of female chinook and a high proportion of small males.

5.2 Summer Chum Salmon

Preliminary post-season analysis of escapement data indicates the 2001 summer chum salmon run was very weak and similar to 2000 (Appendix Table 13, Appendix Figure 13). Spawning escapements to selected tributaries were slightly better than the 2000 run, with the exception of Clear Creek where the escapement was the lowest since the project began in 1995. Generally, summer chum salmon escapements were well below most other years for each project. It is unlikely that any escapements in monitored tributaries met minimum goals or were considered adequate. Aerial surveys were hampered by poor weather conditions in most of the drainage.

Aerial surveys are conducted on summer chum salmon spawning tributaries that are primary index streams such as the East and West Fork Andreafsky River, North Fork Nulato River, Clear and Caribou creeks of the Hogatza-Koyukuk River drainage, and the Salcha River. These aerial survey index counts do not represent the total escapement to the spawning tributary. BEG ranges based on a spawner-recruit analysis for summer chum salmon have been established for the Anvik and Andreafsky Rivers.

Aerial surveys for chum salmon were not conducted throughout the drainage in 2001 due to poor conditions. Although some aerial surveys were conducted after conditions improved, chum salmon were past peak spawning and any recorded aerial survey counts are not accurate indices of the escapement.

The preliminary Anvik River sonar-based escapement count of 227,451 summer chum salmon was approximately 44% below the low end of the BEG range of 400,000 to 800,000 and 69% below the recent 10-year average (1991-2000) of 726,223 chum salmon. This year's escapement count was the second lowest on record coming in slightly higher than the 2000 estimate of 205,460. The 2001 run were primarily from parent-year escapements of 933,240 in 1996 and 609,118 in 1997. Age and sex composition samples were collected from beach seine catches in 2001. The weighted age composition of those samples was 0.4% age-3, 17.3% age-4, 80.8% age-5 and 1.5% age-6 fish. Females comprised 55.7% of the sample.

A weir was operated by USFWS on the East Fork Andreafsky River between July 15 and August 15. BEG ranges have been established for each fork of the Andreafsky River. The aerial survey BEG is 35,000-70,000 for each fork. The weir-derived BEG is 65,000-135,000 for each fork. Aerial surveys were conducted on the east and west forks for summer chum salmon in 2001. However, because of poor weather conditions, the surveys were not conducted at peak spawning activity for chum salmon. Therefore, these results are not useable. Counting did not begin until July 15 on the Andreafsky River because of high water. This was approximately 86% into the run when compared to the 1995-2000 average run timing. A count of 1,929 chum salmon past the East Fork Andreafsky River weir is considered minimal. The age composition of samples collected at the East Fork Andreafsky weir was 19.6% age-4, 78.4% age-5, and 2.0% age-6 fish. Females made up 52% of the total number sampled.

A weir was operated on the Gisasa River between June 25 and August 9. The estimated escapement by the weir site was 17,633 chum salmon. An aerial survey was conducted but because of poor weather conditions, the survey was not conducted at peak spawning activity for chum salmon. Therefore, the result is not useable. The 2001 summer chum salmon run into the Gisasa River was identical to the 1997-2000 average escapement of 17,841 fish and slightly higher than last year's estimate of 14,410, but 70% below the 1995-2000 average. A sample of 962 chum salmon moving past the weir indicated the percent of females was 53%. The age composition of samples collected was 16.7%, age-4, 78.7% age-5 and 4.5% age-6 fish. Of the aged fish, 50.6% were female.

A weir was operated on Henshaw Creek between June 25 and August 9. This was the second of a multi-year monitoring effort using a weir to estimate escapement in this river. Previously, a counting tower, located near the mouth, was used in 1999 and aerial surveys were conducted intermittently since 1960. An aerial survey was conducted but because of poor weather conditions, the survey was not conducted at peak spawning activity for chum salmon. Therefore, the result is not useable. The first summer chum salmon through the weir was on July 7. The escapement through the weir was estimated at 33,129 chum salmon, nearly twice the escapement of 17, 847 in 2000. Sex composition from the weir was 55% females. Age composition from scale samples was 0.2% age-3, 33.9% age-4, 63.6% age-5 and 2.4% age-6 fish. Of the aged fish, 62.9% were female.

The Kaltag Creek tower project was operated by the City of Kaltag and funded by the Alaska Cooperative 4-H Extension Service and BSFA. The Kaltag Creek tower project also had high water problems much of the season. It is unlikely any estimates will be derived from the limited tower counts collected in 2001. Age, sex and length information was not collected in 2001.

The Nulato Tribal Council and ADF&G jointly operated the Nulato River tower project, with partial funding provided by BSFA. The Nulato River escapement project was to become a weir in 2001 but because of continued high water, was not installed. The high water also prevented tower counting for

much of the season, so it is likely no estimates will be derived. Age, sex and length information was not collected in 2001.

This past summer was the initial year for the Tozitna River tower. BLM operated the project through a Cooperative Agreement with the Tanana Tribal Council (TTC). The project site was located at river km 80.4, 0.4 river kms upstream from the confluence of Dagislakhna Creek. A counting tower, partial weir, and contrast panels were installed during the period of 25 - 30 June. From 5 July - 11 August 2001, an estimated 12,503 summer chum salmon migrated upstream. The peak of the run occurred on 21 July (n=981). Carcass sampling was conducted from 21 July - 12 August to determine age-sex-length. The sex ratio for chum salmon was 1.3:1 with 56% males and 44% females (n=417). The mean mid-eye to fork length of male and female chum salmon was 595mm and 546mm respectively. Age and sex composition from scale samples was 8.5% age-4, 87.9% age-5 and 3.7% age-6 fish with females accounting for 57.4% of the total sample. An aerial survey was conducted by the BLM on 31 July from the counting tower to the Tozitna River mouth to assess spawning activity below the counting tower. An estimated 124 live and 1,270 carcasses of chum salmon were observed.

The Bureau of Land Management operated salmon enumeration project on Clear Creek (within the Hogatza River drainage). Salmon escapement was estimated by using a standard picket style weir and trap installed in Clear Creek, approximately 1.0 kilometers above the confluence with the Hogatza River. From 7 July to 2 August, an estimated 3,674 summer chum salmon migrated upstream. This year's adult chum return is 94% below the 5-year average of 63,498 and 81% below last years poor return of 18,698 chum (5-year average based on 1995-2001 excluding counts of 1998 and 1999 due to poor counting conditions). The peak of the run occurred on 12 July (n=542). The Clear Creek adult chum salmon return for 2001 accounted for approximately 0.8 % of the preliminary Pilot Station Sonar estimate for summer chum salmon. This compares to a 4-year average of 3.5 % (average based on Pilot Station sonar data available for the years 1995, 1997, 2000, 2001). The PVC-aluminum trap was used to collect fish for age-sex-length sampling. The mean mid-eye to fork of tail lengths of males and females for the run was 595 mm and 554 mm respectively. No aerial surveys were flown because of poor weather conditions. The sex ratio was 2:1 with 68% males and 32% females (n=383). Age composition was 30.3% age-4, 63.6% age-5 and 6.1% age-6 fish. Females accounted for 32.4% of the aged fish.

High turbid water periodically hampered visibility and hampered tower-counting operations on the Chena and Salcha rivers during the 2001 season. The Chena River tower count was 4,773 summer chum salmon. This count is considered minimal, as counting operations ceased prior to the end of the run. The Salcha River tower project was subcontracted by BSFA, with support from ADF&G. The Salcha River tower count of 6,922 summer chum salmon is considered minimal because of non-counting days due to high water. Nearly half the daily counts (12 of 29) were not possible. No interpolation was made for the periods of interrupted operations. Aerial surveys were conducted, but due to poor weather conditions, were conducted past the peak of spawning. Comparing this year's partial tower estimates to years of similar run timing, the escapements into Chena and Salcha Rivers were likely below average levels.

5.2.1 Alaska

A formal preseason run projection for Yukon River fall chum salmon was not completed for 2001. Run size projections in 1999 and 2000 ranged from 530,000 to 1,197,000 and in both years the run

materialized below the low end of the projection with 2000 being a significant decline from expectations even when factoring in recent poor production. The high ends of the ranges were derived from normal run size expectations for the good parent-year escapements realized throughout the drainage in the four and five-year old age classes. The low ends of the ranges were primarily based upon the expectation of extremely poor production observed from adequate parent-year escapements.

Inseason assessments for 2001 was based on the performance of the summer chum salmon that were also experiencing diminished returns beyond what would be expected given their parent-year escapements. The relationship between the two returns has been very strong with an increasing proportion of fall chum to summer chum salmon over the past six years since 1993 excluding 1994. Based on this model and the performance of the summer chum salmon inseason, prospects for the fall chum salmon run to meet escapement needs and allow normal subsistence fishing was anticipated to be poor.

Although final assessments of overall run size, spawner distribution and age composition are not yet available, preliminary indications are that the 2001 Yukon River fall chum salmon run is again on the increase compared to the summer chum salmon return. In general, the fall chum salmon run could be characterized as having relatively strong components in the early portion of the run followed by extreme weakness in the remainder of the run. This type of entry pattern resulted in run timing that appeared approximately six days earlier than average from the river mouth upstream to Rampart.

As discussed in the management review for 2001 (Section 2.2), the fall chum salmon passage estimate, based on Pilot Station sonar for the period 19 July through 31 August, was approximately 360,356 fish (approximate 90% confidence interval range: 338,477 - 382,235). Note, however, that this current run size estimate does not include the limited subsistence harvests taken downstream of the Pilot Station sonar site. Data from both the Mountain Village and Kaltag test fish projects also suggest that the 2001 run was weak, particularly during the later portion of the run.

A review of upper river test fish data and escapement information suggests that the upper Yukon River (non-Tanana) and Tanana River run components were also marginal in strength and the run appeared to have characteristics similar to those observed in 1999. The USFWS mark-recapture project near Rampart provided weekly passage estimates. The mark-recapture passage estimate through 10 September was approximately 197,000 fall chum salmon. Compared to the historical estimates provided by the project (1996 to 1999), the 2001 fall chum salmon passage rate for that date was slightly higher than both 1998 and 1999. The passage estimates are approximately 654,296, 369,547, 194,963, and 189,741 from 1996 through 1999 respectively making the 2001 estimate as low as 1998 and 1999. Escapements to the upstream Alaskan tributaries appear satisfactory based upon sonar counts attributed to fall chum salmon escaping to the Chandalar and Sheenjek River drainages.

In 2001, the Chandalar River sonar project ran from 8 August through 26 September. The preliminary 2001 escapement estimate is approximately 109,000 upstream fish (Appendix Table 14, Appendix Figure 14). This preliminary estimate is approximately 85% of the 1996-2000 average of 128,000 fish (range: 75,811 in 1998 to 208,170 in 1996). The 2001 estimated escapement in the Chandalar River was well within the recommended biological escapement range of 74,000 to 152,000 fall chum salmon spawners.

By comparison, the preliminary escapement estimate of fall chum salmon in the Sheenjek River was approximately 54,000 fish. The Sheenjek River sonar operated from 11 August through 23 September

and was terminated a few days early because of extremely low water levels. Passages at the time of termination were near 1,000 fish per day. The 2001 estimated escapement in the Sheenjek River was slightly above the low end of the recommended biological escapement range of 50,000 to 104,000 fall chum salmon spawners.

The fall chum salmon run into the Tanana River was also weak in 2001, based upon test fishery results from the south bank of the Yukon River near Tanana Village and from the projects within the Tanana River. Two population estimates from major components, the Kantishna River drainage and the upper Tanana River drainage (upstream of the Kantishna River), are evaluated to estimate the Tanana River drainage fall chum salmon contribution to the run.

The Toklat River has historically been documented to provide the majority of the spawning habitat for chum salmon within the Kantishna River drainage of which it is a tributary. The minimum management plan goal for the Toklat River index area is 33,000 fall chum salmon. The preliminary estimate for the Kantishna River drainage as a whole through 30 September 2001 was 37,425 ± 6,890 (95% C.I.) which is slightly higher than the previous two season estimates of 27,200 and 21,100 fall chum salmon for 1999 and 2000 respectively (Appendix Table 14).

The upper Tanana River recommended biological escapement goal range is from 46,000 to 103,000 fall chum salmon. For the upper Tanana River (upstream of the Kantishna River), the preliminary mark-recapture abundance estimate through 2 October was 96,793 ± 41,172 (95% C.I.) fall chum salmon. However due to the effects of water levels on both the upper Tanana River capture and recapture sites the tag deployment and recapture rates were not sufficient to provide inseason abundance estimates. Fall chum salmon spawning ground surveys are currently being conducted in selected locations throughout the Tanana River drainage. Further, it should be emphasized that all escapement results are preliminary and may change somewhat based upon further analyses.

5.2.2 Canada

The preliminary fall chum salmon spawning escapement estimate based on mark-recapture data is 34,119 chum salmon. Details are presented in Section 6.2.1.

Aerial surveys conducted to date include the Kluane and mainstem Yukon Rivers were flown on October 23 and October 26, respectively. The Kluane River count was 4,884 fall chum salmon. The average count for the 1991 to 2000 period is 7,851. A survey of the mainstem Yukon River counted 2,453 (no survey was conducted in 1999) fall chum salmon. The average count for the 1991-2000 period, excluding 1999 when the area was not surveyed, is 3,445. Historical data are presented in Appendix Table 14, and Appendix Figures 15 and 16.

In the Porcupine River drainage, the Fishing Branch River weir count is 20,326 chum salmon. The 2001 run appeared to have been approximately six days early and an undetermined number of fish migrated before weir installation. To compensate for this loss, the average proportion (6.05%) that migrated through the weir before September 03 in the two dominant cycle years (4 and 5 year old fish) was used to expand the observed weir count. This resulted in an expanded count of 21,635. This count was only 63.4% the 1991-2000 average of 34,112, but it was well above the record low count of 5,053 recorded in 2000. The 2001 count falls below the lower end of the interim

escapement goal range, which is 50,000 to 120,000 chum salmon. Details are presented in Section 6.2.5.

5.3 Coho Salmon

Assessment of coho salmon spawning escapement is very limited in the Yukon River drainage because of funding limitations and marginal survey conditions that often prevail during periods of peak spawning. Excluding the East Fork Andreafsky River in the lower Yukon River, most escapement information collected on coho salmon has historically been from the Tanana River drainage. Presently, only one escapement goal has been established for coho salmon in the Yukon River drainage. The Delta Clearwater River (DCR) in the Tanana River drainage has a minimum goal of 9,000 fish, based upon a boat survey during peak coho salmon spawning activity in late October or early November. 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 in the Nenana River drainage utilizing funds provided by BSFA.

Through a cooperative agreement between the USFWS and BSFA, 2001 marked the seventh consecutive year that East Fork Andreafsky weir operations were extended into September to collect coho salmon escapement data. A preliminary minimal passage of 9,054 coho salmon (Appendix Table 15) passed through the weir as of September 15, the last day of operation in 2001. The coho salmon passage into the Yukon River drainage was exceptional in 2001 and escapement into the East Fork Andreafsky was expected to be record. However, a high water event lasting eight days in the East Fork Andreafsky occurred during the peak of migration and resulted in a minimum passage estimate that still exceeded the average passage. The historical (1995 to1997 and 1999 to 2000) average passage is 8,199 coho salmon, ranging from 2,963 in 1999 to 10,901 in 1995. The 1998 passage of 5,417 is not included in the historical average since it was also affected by a high water event during peak passage.

6.0 2001 PROJECT SUMMARIES

6.1 Alaska

6.1.1 Yukon River Chinook Salmon Stock Identification

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. Age-1.3 and age-1.4 fish typically make up the major age groups; occasionally age-1.2 and age-1.5 fish constitute a major age group. The minor age groups in these harvests are apportioned to run of origin based on the presence of those age

classes in the run-specific escapement relative to the other run-specific escapements. Harvests occurring in District 5 and Canada are apportioned entirely to the upper run stock based on geographical location of the harvest. Harvests occurring in District 6 are apportioned to the middle run stock also based on geography.

The new analytical program, previously described in this section last year, has substantially reduced the amount of time constructing and analyzing data. The control file documents data input and the output file is easily imported into excel for summarizing. All the historical data back to 1981 have now been re-processed using the new methodology. This information has been presented in the comprehensive Regional Information Report No. 3A00-25 (Lingnau, T.L. 2000. *Origins of Chinook Salmon in the Yukon River Fisheries, Revised Edition, 1981-1996 Alaska Department of Fish and Game, Commercial Fisheries Division, AYK Region, Anchorage)*. This report is now the new reference for the historical database concerning stock identification of Yukon River chinook salmon using analysis of scale patterns. Table 7 outlines the contribution of each run, Lower, Middle and Total Upper, to the combined total, drainage-wide harvest. Proportions under the "United States Upper" and "Canada Upper" column headings refer to the portion of the contribution of the Total Upper Run harvest attributed to the Alaskan and Canadian harvest, respectively. All Lower and Middle Run fish are harvested in the Alaskan fisheries. Data from 1999 and 2000 are preliminary.

The portion of the total Alaskan catch of Yukon River chinook salmon attributed to lower, middle, and upper river stock groups from 1981 through 2000 is shown in Table 8. Data from 1999 and 2000 are preliminary. Similarly, the portion of the total harvest of upper river stock group origin chinook salmon caught in Alaskan and Canadian fisheries from 1981 through 2000 is shown in Table 9. Data from 1999 and 2000 are preliminary.

During 2001, stock standards for the lower river run of origin, escapement samples of chinook salmon were collected from the Andreafsky, Anvik and Gisasa Rivers. Middle river stock standards were obtained from chinook salmon escapements to the Chena, Goodpastor, Chatanika and Salcha Rivers within the Tanana River drainage. The Canada Department of Fisheries and Oceans in Whitehorse collected scale samples from test fish wheels used in an escapement-tagging project. Scales from these escapement projects and commercial harvests are in the process of being aged. SPA will be preformed with a new optical reading system beginning this year. A similar system is currently being used in the Juneau tag lab. The new system will reduce bias, increase the quality of the scale image, and allow images to be stored electronically. Scale pattern analysis for 2001 will begin once the chinook salmon scales have been aged and the new SPA equipment is operational.

6.1.2 Yukon River Sonar

The goal of the Yukon River sonar project at Pilot Station is to estimate the daily upstream passage of chinook and chum salmon. The project has been conducted since 1986. Sonar equipment is used to estimate total fish passage, and CPUE from the drift gillnet test fishing portion of the project is used to estimate species composition. Before 1992, we used sonar equipment, which operated at 420 kHz. In 1993, we changed the existing sonar equipment to operate at a frequency of 120 kHz to allow greater ensonification range and to minimize signal loss. The newly configured equipment's performance was verified using standard acoustic targets in the field in 1993. Use of lower frequency equipment increased our ability to detect fish at long range.

Prior to 1994, we attempted to classify detected targets as to direction of travel by aiming the acoustic beam at an upstream or downstream angle relative to fish travel. This technique was discontinued in 1995. Significant enhancements that year included further refinements to the species apportionment process and implementing an aiming strategy designed to consistently maximize fish detection. Because of these recent changes in methodology, data collected after 1994 are not directly comparable to previous years.

In 2001 we began the conversion to split-beam equipment. This technology allows us to better test our assumptions about direction of travel and vertical distribution, and to study sediment related attenuation. In addition, we collected electronic data this past summer to determine the likelihood of obtaining passage estimates using computer generated counts. Electronic data has the potential to minimize some of the subjectivity associated with the sonar counts and should at the same time reduce operating expenses.

Salmon passage estimates at Pilot Station are based upon a sampling design in which sonar equipment is operated in 3-hour intervals, three times each day. In 2001, the sonar equipment was operated 24-hours per day on four occasions. Passage estimates during these expanded operations differed from typical 9-hour passage estimates by 1.7% on average.

Gillnets with mesh sizes ranging from 7.0 cm to 21.6 cm (2.75 in to 8.5 in) were drifted through the sonar sampling areas twice daily, between sonar data collection periods. Drift gillnetting resulted in the harvest of 7,240 fish during 1,928 drifts including 673 chinook salmon, 2,281 summer chum salmon, 1,907 fall chum salmon, 1,192 coho salmon, and 1,187 other species. Captured fish were distributed to nearby residents daily.

The sonar project was operational from June 11 through August 31 in 2001. Although the range-dependent signal loss observed in previous years was not a serious problem in 2001, there were other difficulties encountered this past season. These problems were primarily associated with the abnormally high water levels and were, for the most part, limited to the south bank. Early in the season a reverberation band was located about 15 to 25 meters from the south bank. This band partially obscured fish passing within this zone. We believe this band is caused by sediment eroding from the bank just upstream of the sonar site – unfortunately, there is nothing we can do to correct this problem. Additionally, the late breakup left a very rough bottom on the south bank that we suspect may have compromised counts. Within one to two weeks the bottom smoothed out alleviating this concern. We believe our counts early in the season were conservative because of these problems. To better estimate the number of fish that passed during the first few weeks, we compared the north and south bank counts over days where counts were believed to have been accurate and used this relationship to estimate the south bank passage. We believe the passage estimates produced from this relationship more accurately reflect the true run and are the preliminary numbers reported here.

Preliminary passage estimates for 2001 and final passage estimates for 2000, 1999, 1998, 1997, and 1995 are listed in Table 2.

6.1.3 Lower Yukon River Chum Salmon Genetic Sampling

All chum salmon entering the Yukon River after July 15 are considered fall run for purposes of inseason management. During the summer of 1999, ADF&G genetics began a three-year study to

determine the variation in entry timing of summer run and fall run chum salmon. Genetic stock identification (GSI) methods developed by USFWS, BRD, and ADF&G using allozyme loci can accurately and precisely discriminate summer- and fall-run chum salmon. Use of genetic markers to estimate timing of entry and run-timing patterns will provide a better understanding of the variability of stock characteristics.

Chum salmon entering the Yukon River were sampled from June 29 to August 6 at the ADF&G sonar site at Pilot Station. Fish were sampled from species apportionment sampling conducted twice daily at the sonar site. Gillnets are drifted in the morning and in the evening using a variety of mesh sizes off both the right and left bank As chum salmon were picked from the gillnets, a numbered bar tag was applied, and information on bank orientation, gillnet mesh size, time, and date was recorded. After gillnet drifts were completed for a given sampling period (morning or evening), up to 30 chum salmon were randomly sampled from the total number of fish. Muscle, liver, and heart tissues were dissected from each fish, placed in numbered cryovials and frozen on liquid nitrogen; and the cryovial number was cross referenced with the bar tag number. Samples were periodically shipped to the ADF&G-Genetics Laboratory in Anchorage.

During 2001, 1672 chum salmon were sampled. Laboratory analyses are completed for the July 11-18, July 12-19, July 26-August 1, and August 2-August 6 time strata. For the July 12-18 time stratum, all chum salmon sampled were analyzed (N=100) and for the remaining time strata, 200 chum salmon were randomly subsampled proportional to the daily passage rate by bank orientation. Preliminary estimates for these time strata in 2001 are shown in Figure 3 along with estimates for 1999 and 2000 for comparison. Laboratory and statistical analysis on the remaining samples will be completed this winter.

6.1.4 Upper Yukon River Chum Salmon Genetic Stock Identification

The FWS Conservation Genetics Laboratory has been evaluating the feasibility of using DNA markers for genetic stock identification of chum salmon in the Yukon River. Preliminary computer simulations to measure baseline performance based on eight microsatellite markers yielded estimated U.S.-Canada allocations of greater than 85% for one baseline comprising seven fall-chum and two summer-chum populations. These allocations were similar to those from a baseline of 23 allozyme loci. A graduate student supported by the lab has been evaluating the utility of other classes of DNA markers for stock identification of Yukon River chum. Pilot studies have been completed to investigate the potential utility of mtDNA-RFLP and AFLP techniques. Preliminary results indicate the AFLP method has the best potential to discriminate among the stocks of interest. Therefore, a full-scale study using the selected AFLP markers has been initiated with the eight fall chum and two summer chum salmon populations. We are now in the process of scoring the DNA fragments and compiling the data in preparation for analyses comparing the multiple classes of genetic markers (i.e. allozymes, microsatellites, AFLPs, and SINEs). In addition, during the 2001 season, the FWS lab conducted sampling operations in the upper portion of the Yukon River drainage to increase sample sizes and expand the stock coverage of the baseline. The additional samples will be processed this winter. The Big Salt and Chandalar rivers were sampled and additional collections are planned this fall for the Salmon Fork and Kevinjik of the Black River, plus the Kluane, Teslin, and Donjek rivers in the Yukon Territory (ADF&G is also planning on sampling in the upper Kantishna River). Our results should identify the best marker types for genetic stock identification in Yukon River mixed stock fisheries (Table 10).

6.1.5 Chinook Salmon Radio Telemetry Program

The Yukon River chinook salmon radio telemetry program was initiated in 2000 by the Alaska Department of Fish and Game and the National Marine Fisheries Service (NMFS). This is a three-year project with the goal to provide migratory information and escapement distribution of Yukon River chinook salmon. This information includes but is not limited to run timing of various stocks, migration speed, and spawning distributions.

Chinook salmon returns into the Yukon River have declined dramatically in recent years. Specific run timing of the various stocks and spawning distribution information will provide a better understanding of the basic biology of these salmon. This project may also aid area managers by providing additional information on chinook salmon returns. Work in 2001 focused on completing feasibility and logistical components of the program in preparation for a full-scale study in 2002 when over 1,000 returning adults will be radio-tagged and tracked.

Adult chinook salmon migrating upriver were captured with various types of drift gillnets at two sites in the lower river near the villages of Marshall and Russian Mission. Local fishers were contracted to fish the various sites. Tagging crews consisting of department personnel were placed on each contracted fishing boat to conduct tagging and collect various information. Two fishing crews were located at Marshall and one crew in Russian Mission. Fishing began on June 6 and ended on July 20. Net configuration in 2001, because of its proven effectiveness at capturing chinook salmon while minimizing summer chum salmon bycatch, was 8.5" mesh size, 46 m long, 7.6 m deep gillnets hung at a 2:1 ratio. The effectiveness of deeper (9.7 m deep), shorter (37 m long), #21 seine twine, and "tangle" (4" mesh size) nets were also used to determine differences in fish injury and catch rates.

The nets were monitored continuously, and fish were removed immediately after capture. The fish were placed in a tagging cradle submerged in a trough of fresh water. Fish were then tagged with blue, yellow and white, color coded spaghetti tags. Anesthesia was not used during the tagging procedure. Colored tags depicted if the fish was radio tagged or not. Yellow spaghetti tags were used on chinook salmon which had radio transmitters inserted. Blue and white tags were used on salmon that were not fitted with radio telemetry transmitters. The spaghetti tags were inserted below the dorsal fin, the ends clamped with a metal sleeve roughly one inch behind the dorsal fin. Fish determined to be the healthiest were tagged with pulse-coded radio transmitters inserted through the mouth and placed in the stomach. All fish were given secondary marks consisting of an adipose fin hole punch. Scale samples were taken, and information on sex, body length, and general condition was recorded. An axillary fin was removed to provide tissue samples for genetic analysis.

Drift gillnets were effective in capturing chinook salmon at the tagging sites, 2,313 fish were captured: 1,294 fish at the Marshal test fishing site and 1,019 fish at Russian Mission test fishing site. A total of 1,894 fish were marked with blue/white spaghetti tags: 1,114 fish at Marshall and 780 fish at Russian Mission. Of the 302 untagged fish, 42 were recaptured, 38 were mortalities, and 222 were released from the net while still in the water, because too many fish were caught and could not be processed. The most common injury noted was tail splits caused by both the gillnets and the dip nets. Also observed were other fin cuts and scale loss. The average fish length was 816 mm with a range from 440 mm to 1040 mm.

A total of 217 tags were voluntarily returned. An additional 45 tags were collected during random sampling activities from 14,012 observed fish upstream of Russian Mission. This information will be evaluated to determine the feasibility of developing abundance estimates.

A total of 117 chinook salmon were radio tagged. These tags consisted of 108 standard transmitters, which were tracked upriver, and 9 experimental transmitters, which were tracked in the immediate vicinity of the tagging area (40 km upriver from the site). There were 115 fish (98%) tagged at Russian Mission during a 7-day period from June 18-24. Two fish were tagged at Marshal on July 5-6. Fish length averaged 806 mm with a range of 555 mm to 955 mm.

Radio-tagged fish migrating upriver were recorded by remote tracking stations. Ten of these remote tracking stations are located on important migration corridors and spawning tributaries. Five sites are located on the Yukon River main stem upriver from the Russian Mission tagging site (Paimiut Hills), the Yukon-Anvik River confluence, Galena, Rampart Rapids, and the U.S.-Canada border. Stations were activated near the mouth of the Anvik, Innoko, Koyukuk, and Tanana Rivers, and at the U.S.-Canada border on the Porcupine River. Stations were also installed or upgraded at 21 additional sites within the basin in preparation for the full-scale radio tag deployment program in 2002. Aerial tracking surveys were conducted in the lower river to collect information on the movements of the fish immediately after release.

Chinook salmon responded well to the capture and tagging procedure, 105 fish (97.2%) tagged with standard transmitters moved upriver. Twenty-nine fish (27.6%) that moved upriver were caught in fisheries; 23 (21.9%) fish in the U.S. and 6 (5.7%) fish in Canada. Seventeen of these fish, 73.9%, harvested in the U.S. were caught in District 3 and Subdistrict 4A.

Eighty-one radio-tagged chinook salmon were tracked to specific areas or spawning tributaries. In the lower basin, three fish (3.7%) were tracked to the Anvik River; five fish (6.2%) traveled past Paimiut Hills, but were not recorded further upriver, possibly representing fish in tributaries not monitored by tracking stations (e.g., Bonasila, Kaltag, and Nulato Rivers). No fish were recorded in the Innoko River. In the middle basin, three fish (3.7%) traveled to the Koyukuk River and nine fish (11.0%) were tracked upriver from Galena, possibly representing fish destined for the Melozitna, Nowitna or Tozitna Rivers. Twenty-three fish (28.4%) traveled to the Tanana River, including the three fish caught in the Tanana River fishery. Twenty-nine fish (35.8%) traveled past the Canadian border in the Yukon River mainstem, including the six fish caught in Canadian fisheries.

Nine fish (11.1%) were last recorded moving past tracking stations located at Rampart Rapids, and may represent fish spawning in upper reaches in the U.S. basin. However, recent information on the occurrence and possible effects of *Ichthyophonus* infections in Yukon River chinook suggests that some of these fish may have been destined for reaches further upriver, but succumbed to the disease while in-transit. Four other fish that moved past the tracking stations at Rampart Rapids were observed moving downriver 1.3 to 8.2 days later.

Movement rates for these radio-tagged chinook salmon averaged 51.3 kilometers per day (km/d). These results were comparable to movement rates observed for chinook salmon radio tagged at the Rampart Rapids in 1998. Travel time averaged 17 days for fish passing the lower Tanana River and 16 days for fish moving through the Rapids.

Seventeen fall chum salmon were also radio tagged from July 22 to August 15 to collect preliminary information on handling response and migration rates. Fish length averaged 588 mm, and ranged from 525 mm to 630 mm for the fall chum salmon.

An automated database-GIS mapping system was developed initially to summarize and present salmon telemetry data in the upper basin. Work to expand this database to encompass the lower and middle sections of the drainage has been completed. Plans are in place to have the system, including an inter-active Internet web site, on line for the 2001 field season.

6.1.6 Upper Yukon Fall Chum Salmon Tagging Study

The Rampart Rapids tagging study was operational for approximately seven weeks, July 31 to September 15, 2001. We changed the protocol to use a U. S. Fish and Wildlife Service crew at the Rampart recovery fish wheel to release fish. A total abundance estimate for the seven weeks sampled was 196,864 (SE=9,718) fall chum salmon, based on 8,480 tagged fish and 497 recaptured fish out of 11,424 fish examined (not including multiple recaptures). The 95% confidence intervals were 177,816 and 215,912. Note that the project was halted one week earlier then in previous years. Weekly abundance estimates, standard error of the estimates, capture probability (P) and standard error of P were as follows:

Date	Estimate	S.E.	P	SE of P
Jul 30 - Aug 4	14266.75	2453.39	0.0537	0.0092
Aug. 5- 11	46857.94	5019.53	0.0367	0.0039
Aug. 12-18	33033.43	3937.41	0.0443	0.0053
Aug. 19-25	38183.09	4651.00	0.0441	0.0054
Aug. 26- Sep. 1	32630.54	4944.48	0.0451	0.0068
Sep. 2-8	16377.82	3156.34	0.0546	0.0105
Sep. 9-15	15514.71	5744.74	0.0310	0.0115

Steps to reduce handling stress were continued from previous years and included construction of a new north wheel with plastic mesh, a crew at the Rampart recovery fish wheel to release fish, and minimizing the fishing time at the marking site. In addition, we began an associated study of handling mortality using recovery fish wheels at Beaver and Circle, Alaska. DFO Canada assisted in the new study by checking for primary and secondary marks at their study sites. A one-day workshop was held for our contracted fish wheel operators to discuss fish friendly fish wheel design and operation.

6.1.7 Restoration and Enhancement Fund Projects

The Yukon River Restoration and Enhancement Fund (Fund) was established in 1995 as part of the Interim Agreement between Canada and the United States for the purposes of seeking to ensure the effective conservation and management of Yukon River salmon. In the past, the USFWS transferred an annual Fund contribution to the Yukon River Panel for administration under the terms of the Interim Agreement. After the Interim Agreement expired in the spring of 1998, the USFWS became responsible for Fund administration. In desiring to continue using the Fund for Yukon River salmon restoration and enhancement activities, the USFWS distributed the Fund in Alaska during 2001 via a competitive proposal process similar to 2000 but abbreviated from previous years. Additionally, the U.S. negotiating section authorized the transfer of $200,000 for restoration and enhancement projects in the Yukon Territory, Canada.

In December 2000, the USFWS sent over 100 letters to tribal councils, village governments, Native corporations and private individuals and an advertisement was run in the Fairbanks Daily News-Miner requesting proposals to conduct Yukon River salmon research or assist in management activities. Twelve proposals were received and technically reviewed by the U.S. Section of the JTC Restoration and Enhancement Subcommittee. All 12 proposals were technically evaluated between February 1 and 16, 2001. Proposal evaluations were forwarded the following week to the funding selection committee. The funding selection committee met in Whitehorse, Yukon Territory during the last week of March 2001 and awarded funding to nine project applications. The table which follows lists the projects or activities funded for 2001. The field portions of projects are complete as of mid-October and final reports for all projects are due at various times over the next several months.

Yukon River Salmon Restoration and Enhancement Fund 2001 Projects

Proposal #	Title	Applicant	$ Amount
RE-01-01	Project to enhance mainstem salmon escapement	Eagle Area Subsistence Fisherman's Association	5,270
RE-02-01	Influence of *Ichthyophonus* infection on increased mortality in Yukon River chinook salmon	Kocan and Hershberger U. of Washington	36,791
RE-04-01	Rampart-Rapids fall catch-per-unit-effort video monitoring	Stan Zuray Tanana, AK	10,925
RE-05-01	Mountain Village fall season gillnet test fishery and Tanana Village south bank fall season fish wheel test fishery	BSFA Anchorage, AK	40,940
RE-06-01	Salcha River chinook and chum salmon tower, 2001 operations	BSFA Anchorage, AK	52,213
RE-08-01	Chena River chinook and chum salmon counting tower, 2001 operations	BSFA Anchorage, AK	18,000
RE-09-01	Nenana River coho and fall chum salmon estimates	BSFA Anchorage, AK	9,980
RE-10-01	Yukon River chinook and fall chum salmon management teleconferences	YRDFA, Anchorage, AK	12,500
Total			$196,619

6.1.8 R &E Funded Projects Descriptions

RE-06-01 Salcha River Counting Tower - BSFA

The primary objectives of the Salcha River counting tower are estimation of chinook and chum salmon escapements into the Salcha, collection of ASL data sufficient to describe these escapements; and location, description and mapping the spawning reaches of both species. Preliminary escapement estimates are 13,200 chinook and 22,000 chum salmon. The chum salmon escapement is the first total estimate. The chinook salmon estimates have been made using tower or mark/recapture methods since 1987. BSFA has conducted these counts since 1999. ASL data and mapping of spawning reaches are yet to be finalized.

In 2001, Salcha River tower counts began July 1 and ended September 19 when the chum run had slowed to a trickle. The tower counts were suspended, due to high muddy water July 7 through July 10, July 24 through July 27 and July 29 through August 6. The tower counting was operational during the peaks of both the chinook and chum salmon runs and sufficient data were collected to estimate escapement for both runs. The first chinook passed the tower July 5 and the last passed August 22. The first chum salmon passed the tower July 15 and the last passed September 19.

RE-09-01 Nenana River Coho and Chum Escapement - BSFA

The primary objective is to estimate coho and fall chum escapements into seven Nenana index tributaries. Surveys have been done since 1974. BSFA has conducted these surveys since 1996. Foot and helicopter surveys were done in late September through early October. ASL data was collected from coho salmon in Otter Creek, the Nenana tributary with the largest coho escapement. Escapement is estimated to be 7004 coho and 55 fall chum salmon.

RE-08-01 Chena River Chum Escapement - BSFA

The objective of the Chena River tower is to estimate chum escapement. This would be the first chum salmon total estimate. High, muddy water conditions prevented collection of sufficient data to make a reliable estimate in 2001.

RE-05-01 Mountain Village Drift Gillnet Salmon Test Fishery - BSFA

The Mountain Village drift gillnet salmon test fishery (MVTF) has operated since 1995. The objective of the project is to estimate the relative timing, abundance and age composition of fall chum and coho salmon in the Yukon River near Mountain Village (river mile 87). A limited analysis of the six seasons' results suggests the project does provide a useful measure of run timing and relative abundance between and within years. The MVTF results correlated reasonably well with the Pilot Station sonar and the Kaltag drift gillnet test fishery.

6.2 Canada

In addition to projects operated and funded by federal and territorial agencies, several fishery-related projects were conducted by local organizations within the Yukon River drainage. A list of all projects conducted within the Canadian portion of the Yukon River drainage, including project location, objectives, and responsible agencies or organizations, is provided in Table 6. Available 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. Only new projects, or projects of particular interest, are presented in detail here. These specific projects are: (1) Upper Yukon River Tagging Program (Yukon Territory), DFO; (2) Harvest Sampling, DFO and LGL; (3) Whitehorse Rapids Fishway Chinook Enumeration, YFGA; (4) Whitehorse Hatchery Operations, DFO; (5) Fishing Branch River Chum Salmon Weir, DFO; (6) The Importance of Small Streams as Salmon Habitat in the Upper Yukon River Basin; (7) Yukon Restoration and Enhancement Fund Projects and (8) Community Development and Education Program (CDEP), (9) Habitat Restoration And Salmon Enhancement Program (HRSEP) and (10) Habitat Conservation and Stewardship Program (HCSP).

6.2.1 Upper Yukon River Salmon Tagging Program (Yukon Territory)

Department of Fisheries and Oceans, Canada has conducted a tagging program on salmon stocks in the Canadian section of the upper Yukon River drainage since 1982 (excluding 1984). The objectives of this program are to provide inseason estimates of the border passage 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 fish wheels. Tagging events are twice daily, morning and evening[1]. Subsequent tag recoveries are made in the different fisheries located upstream and infrequently in those located downstream. Population estimates are usually developed using spaghetti tag recoveries from the Canadian commercial fishery located downstream from the Stewart River where the most intensive catch monitoring is conducted. In this area, commercial fishers are legally required to report catches and deposit tags and associated data in drop-off boxes at the Fortymile River or in Dawson City within eight hours of the closure of each fishery.

Consistency in the fish wheel sites and fishing methods permits some interannual and inseason comparisons[2], although the primary purpose of the fish wheels is to live-capture salmon for the mark-recapture program. Catch data are used cautiously when assessing abundance, particularly for chinook salmon, because mark-recapture estimates have limited correlation with border escapement.

The two fish wheels, White Rock and Sheep Rock, are situated approximately seven kilometers apart on the north bank of the river. With the exception of short periods for maintenance or repair in 2001, the fish wheels ran 24 hours per day for a cumulative operating period from June 21 to October 4 for the White Rock wheel and from June 29 to October 01 for the Sheep Rock fish wheel.

6.2.1.1 Chinook Salmon

The first chinook salmon was caught in the downstream fish wheel, White Rock on July 6. The run as observed at the DFO fish wheels exhibited average timing. A peak daily wheel catch of 545 chinook salmon was recorded on July 25. Peak catches for the 1991 to 2000 period have ranged from July 5 to August 6.

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[1] An additional afternoon wheel shift was added during the peak migration of chinook salmon and occasionally during the peak of the fall chum salmon run.

[2] Changes in the fish wheel pontoons may have had an undetermined effect on catchability.

The combined total fish wheel catch of chinook salmon in 2001 was 3,986 fish, 152% higher than the recent cycle average of 1,582. The sex composition as observed in the fish wheel catches was 31% female.

The preliminary chinook salmon border escapement estimate for 2001 is 53,850 with a 95% confidence interval range of 45,939 to 63,115. After subtracting the harvest of 9,628 (767 test, 1,351 commercial, 7,421 aboriginal and 89 domestic), 44,222 chinook salmon were estimated to have reached spawning areas. This estimate is 146% higher than the escapement goal of 18,000 adopted by the Yukon Panel for the 2001 season, and is 58% higher than the escapement goal (28,000) that has been used for several years.

The Yukon Panel recognized the recent regime of low returns and the low preseason forecast for 2001, and the resulting difficulties this presented to people on both sides of the border. The Panel recommended a fishery take place with a maximum of 50% of the normal subsistence catch on the Alaskan side of the border and 50% of the normal aboriginal catch on the Canadian side of the border. It also recommended commercial fisheries remain closed on both sides of the border unless inseason estimates indicated sufficient fish returning to justify an opening. The expectation of this regime was that no fewer than 18,000 fish would reach the spawning grounds

Comparative border and spawning escapement estimates from the tagging program for 1985 through 2001 are presented in Table 11.

6.2.1.2 Chum Salmon

The first chum salmon was captured at the White Rock fish wheel on August 2. On average over the previous ten years, the first chum salmon has been captured July 22. The mid-point of the run occurred on September 13. The average mid-point date over the previous ten years also occurred on September 13, however the mid-point dates have been variable, ranging from September 5 to September 23. The peak catch of 251 chum salmon occurred on September 8. On average, the daily catch peaks on September 16, although, as with run-mid point dates, peak count dates have been variable. The dates for the 1991 to 2000 period range from September 5 to 27. The total catch was 3,332 chum salmon, 92% of the 1991 to 2000 average of 3,620 chum salmon.

A number of green spaghetti tags applied at Rampart, Alaska were observed on chum salmon captured by fish wheels, and many of these tags were recovered in the two-day commercial opening and by aboriginal fishers. The U.S. tags captured in the DFO fish wheels will be incorporated in the final mark-recapture estimate when tag application and recovery information is finalized.

In 2001, 3,268 of 3,332 chum salmon captured in the DFO fish wheels were tagged. High daily fish wheel catches were recorded from September 01 –19 (average 134 and range 72-251); daily catches for the September 8-10 period exceeded 200 fish per day.

Run size information obtained from the U.S. Pilot Station Sonar project and test fisheries, indicated that the fall chum salmon run was early and stronger earlier in the season than normal. On August 6, the total season run size was predicted to be from 530,000 to 640,000, much higher than preseason predictions. Subsequent run size predictions based on sonar information were less optimistic; for example 515,000 to 605,000 on August 19, 500,000 on August 28 and 450,000 on September 12.

The optimism generated by the early sonar estimates resulted in the cancellation of a fall chum test fishery using fish wheels that was funded through the Restoration and Enhancement program and an initial plan to obtain tag recovery information from limited commercial fishery openings. The commercial fishery was, however, limited to a single two-day opening from September 12-14. At that time, it became apparent that the escapement goal for fall chum salmon (> 80,000) would not be achieved.

The catch and tag recovery component of the mark-recapture study for chum salmon was limited to the two day commercial opening but was augmented by the information from the aboriginal fishery in the Dawson City area.

The initial post-season border escapement estimate is 39,038 with a 95% confidence interval range from 34,862 to 43,712. After subtracting the estimated catch (2,198 commercial, 1 test, 2,717 aboriginal and 3 domestic), the estimated spawning escapement is 34,119.

The rebuilding goal for 2001 of > 80,000 chum salmon will not be achieved. The preliminary escapement estimate is 42.7% of the rebuilding goal and 43.4 % of the 10-year average of 78,531.

Comparative border and spawning escapement estimates from the tagging program for 1980 through 2000 are presented in Appendix Table 14.

6.2.2 Harvest Sampling

The Canadian chinook test and commercial fisheries were sampled in 2001 for age, length, and sex tag recovery and tag loss data. The unweighted chinook salmon sample was 30.7% female. This sample was collected from July 15 to August 10: the total sample size was limited to 354 chinook salmon. The sex composition for the subsample was similar to the sex composition reported by fishers in the commercial and test fisheries. The sex composition in the commercial fishery was 28.6% female (321 of 1,123) and 35.3% female in the test fishery (271 of 767). A much lower female ratio was observed in the Domestic Fishery (12.3%) where 11 of the 89 fish were reported to be female. Tag loss was not detected in the commercial/test fishery subsample; no fish were observed which had a secondary mark (opercular punch) and a spaghetti tag.

Chinook salmon harvested in the test and commercial fisheries were also sampled for *Ichthyophonus*. The commercial sample had an overall infection rate of 14.3% (sample size 49). Other sample locations for Icthyophonus included the DFO fish wheels (live punch biopsy sample), the Aboriginal Fishery on the Stewart and Pelly rivers, and the Whitehorse Hatchery. Two samples were taken from the fish wheels. The sample taken early in the run had infection rates of 10% (5 of 50 samples) while the sample taken later in the run had an infection rate of 30.6% (15 of 49 samples). Postseason analyses will involve examining the rate within the male and female components. The infection rate for male and female chinook sampled on the Stewart River was 22.2% (4 of 18) and 36.4% (4 of 11), respectively. The infection rate for male and female chinook on the Pelly River was 13.3% (4 of 30) and 3.4% (1 of 29), respectively. Some of the Pelly River samples were difficult to assess, thus the infection rates may have been higher. Two sample sets were collected at the Whitehorse Hatchery. Analysis of the first set is complete; the infection rate was 25.7% for males (9 of 35) and 12.5% for females (3 of 24).

6.2.3 Whitehorse Rapids Fishway Chinook Enumeration

A total of 988 chinook salmon ascended the Whitehorse Rapids Fishway between July 30 and September 03, 2001. This was 29% below the 1991-2000 average count of 1,399 fish. The sex ratio was 50% female (495 fish), which was above the recent 10-year average of 35%.

Hatchery produced fish accounted for 36.4% of the return and consisted of 187 males and 173 females. The contribution of hatchery fish was much higher for the 1998-2000 period when the return was 68%, 74% and 69% hatchery fish, respectively. The 1991-2000 average contribution of hatchery fish to the fishway return is 59%. The non-hatchery count consisted of 306 wild males and 322 wild females. The run mid-point and the peak daily count of 106 fish were both observed on August 19.

There were three mortalities observed within the fishway in 2001. Record mortalities were recorded in the 1997 to 1999 period including 114 (5.4%) in 1997, 150 (19.3%) in 1998 and 113 (10.1%) in 1999. The impact of these mortalities is significant when the number of females lost is considered. The number and percent of female mortalities for the 1997 to 1999 period was 103 (9.7%), 38 (23.6%) and 37 (19.8%), respectively. The high mortality rates observed might have been related to the water flow through the upper end of the fishway. Prior to the salmon run in 2000, an extra baffle was inserted which reduced the head flow and velocity of the water at the upper end of the fishway. The entrance of the fishway now has two baffles each involving a 0.305-meter vertical drop rather than a single baffle with a 0.61-meter vertical drop.[3] This change appears to have resolved the problem since there were no mortalities in 2000 and only three in 2001.

In 2001, no fish were specifically removed from the fishway for coded-wire tag sampling, however a number of samples were obtained from the broodstock. No weirs (i.e. Wolf or Michie creeks) operated in the upper drainage above the fishway this year.

6.2.4 Whitehorse Hatchery Operations

All of the 255,563 Brood Year (BY) 2000 chinook reared at the Whitehorse Rapids Fish Hatchery were released in late May and early June 2001. All fish released were marked with adipose fin clips and tagged with coded wire tags (Table 11). All fish were released into the Yukon River system upstream of the Whitehorse hydroelectric dam. The number of fry released and release location are summarized as follows:

Wolf Creek: 50,613
Michie Creek: 92,502
McClintock River (above the confluence of Michie Creek): 61,010
Byng Creek: 51,438.
All fry were released between May 28 and June 8, 2001.

The 2001 release was the 6th year (1995-2000 BY) in which all fish released from the Whitehorse Rapids Fish Hatchery were marked With the exception of the 1998 brood year (1999 release year)

[3] Increased storage of water in Schwatka Lake above the dam in recent years may have caused a hydraulic regime, which delayed salmon migration within the ladder, thus contributing to the mortalities.

when all fish were adipose clipped but not tagged, all releases within this period involved adipose fin removal and the application of coded wire tags. Approximately 94% of the 1994, brood year release was tagged with coded wire tags. The recent initiative to mark all hatchery releases has provided an opportunity to more accurately determine the contribution of hatchery fish to the fishway returns.

In August 2001, brood stock collection began after 111 adults had migrated through the Whitehorse Rapids Fishway. All attempts were made to collect two males for every female during brood stock collection to allow for matrix spawning in order to increase the potential of genetic diversity of the offspring. Unfortunately, this was difficult to perform because of the low numbers of males returning. To allow for healthy escapement to the spawning grounds, a total of 72 males were retained for the brood stock-spawning program. Of these males, seven were adipose clipped and 65 were wild. In total, 15% of the male population was retained for the brood stock program. In addition to these males, milt samples were taken from four males, which were released, back into the ladder to continue their migration to the spawning grounds. The number of females taken from the run was 51 fish comprising 10.3% of the female population. Of the females retained for brood stock, 10 were adipose clipped and 41 were wild. Two females in addition to the above, which had ceased migration through the upper section of the fishway, were recaptured in attempts to utilize their eggs before they perished.

Egg takes began on August 16 and were completed on September 4, 2001. In total, 294,189 green eggs were collected from 53 females. Average fecundity was 5,500 eggs per female. The fertilization rate for the egg take was estimated to be 95%. Shocking and second inventory of these eggs began on October 12 and was completed on October 22. As of October 19, an estimated 269,237 eyed eggs are incubating in the hatchery. Survival from the green egg to the eyed stages was 91.5%.

6.2.5 Fishing Branch River Chum Salmon Weir

A weir established to enumerate chum salmon escapement to the Fishing Branch River has operated annually since 1985, except for 1990. Prior to 1985, a weir was operated during the period between 1972-1975. Since 1991, the weir program has been conducted cooperatively by the Vuntut Gwitchin First Nation (VGFN)) of Old Crow, and Fisheries and Oceans Canada. Escapement estimates for the Fishing Branch River, including aerial count expansions, have ranged from approximately 5,000 chum salmon in 2000 to 353,000 chum salmon in 1975 (Appendix Table 14, Appendix Figure 16).

In 2001, the weir was operational from September 03 to October 13. A total of 20,326 fall chum salmon were counted. Because the 2001 run appeared to have been approximately six days early, an undetermined number of fish migrated before weir installation. To compensate for this loss, the average proportion (6.05%) that migrated through the weir before September 03 in the two dominant cycle years (4 and 5 year old fish) was used to expand the observed weir count. This resulted in an expanded count of 21,635. The peak count (1,138 chum salmon) occurred on 10 September and the run mid-point was observed on September 16. The 2001 count was 36.6% below the recent 10-year average of 34,112 and only 56.7% below the lower end of the interim escapement goal range of 50,000 - 120,000 chum salmon. Weir counts in the dominant cycle years were 77,278 chum salmon counted in 1996 and 26,959 counted in 1997. The 2001 count is a remarkable improvement over the 2000 count, which was only 5,038.

Generally, a low number of coho salmon are observed at the weir each year. However, the weir was not in place late enough to obtain quantitative information on coho escapement.

6.2.6 The Importance of Small Streams as Salmon Habitat in the Upper Yukon River Basin. Update

M.J. Bradford and J.A. Grout (Fisheries and Oceans Canada, Resource and Environmental Mgmt., Simon Fraser University, Burnaby, BC, Canada, V5A 1S6; mbradfor@sfu.ca)

Juvenile chinook salmon have long been observed to make use of very small streams as summer rearing habitat, however, the significance of these habitats is not clear. We selected a suite of small non-spawning streams that are tributary to the Yukon River near Whitehorse, Minto and Dawson City to contrast patterns of utilization in different parts of the Yukon River basin.

Our work in 2000 and 2001 focused on the following: (1) the distribution of streams with overwintering salmon; (2) food webs in small streams; and (3) the effects of fire on stream habitat.

In 1999, 2000 and 2001 we have surveyed small non-natal streams from the BC-Yukon border to the Dawson area for pre-smolts during the spring months to determine the distribution of streams used by overwintering chinook salmon. Our results suggest that juvenile salmon do overwinter in these small non-natal streams in the southerly, previously glaciated portion of the Yukon, but not in the Beringia area near Dawson. The dividing line appears to be near the Pelly River, and approximates the limit of recent continental glaciation. It seems likely that the slightly milder climate, the reduced incidence of permafrost and higher groundwater storage potential of underlying glacial deposits in the south contribute to winter flows in these types of streams that are suitable for salmon.

In 2000, we used stable isotopes of carbon and nitrogen to estimate the role of terrestrial leaf litter and instream algal production as energy sources for young salmon in small streams near Dawson. We found that in streams with clear summer flows, the algal pathway can contribute significantly to fish growth, through the stream invertebrates that salmon feed on. Two of our study streams were affected by wildfire in 1999 and were very turbid during our study. In these streams, there was little energy transfer from algae to fish, probably because of light limitation for benthic algae imposed by high sediment loads.

In 2001, we continued to monitor the effects of the 1999 wildfire on stream fish populations. About 35% of the catchment of one of our study streams was burnt, and in this stream no salmon colonized the stream in the summer, because of the high sediment load. The other stream was less affected (15% burned), and salmon populations appeared to be reduced from pre-fire levels. We will attempt to continue to monitor these streams to estimate the loss of productive capacity that has occurred because of the fire.

6.2.7 Restoration and Enhancement Fund Projects

6.2.7.1 "In-Yukon"[4] Restoration & Enhancement Projects, 2001

Approved Projects

Project #	Project Title	Contractor	Amount TC[5]
RE-02-01	Feasibility Study – Measurement Suspended Solids	Tara Christie[6]	$ 5,000 L
RE-03-01	2001 Chinook Contingency Test Fishery	YRCFA & THFN[7]	35,000 P
RE-04-01	2001 Chum Contingency Test Fishery	YRCFA & THFN	30,000[8] P
RE-07-01	Chum Spawning Ground Recoveries/Educ & Stewardship	Kluane First Nation	3,100 P
RE-08-01	Chum Spawning Ground Recoveries – Minto Area	Selkirk First Nation	8,100 P
RE-09-01	Mica & Willow Creeks Monitoring & Low Flow Survey	Selkirk First Nation	8,000 P
RE-10-00	Pelly Salmon Information Workshop	Selkirk First Nation	4,000 LP
RE-12-01	Carmacks Salmon Information Workshop	Carmacks River Vision Soc	5,000 LP
RE-13-01	Klusha creek Habitat Monitoring Program	Little Salmon/Carmacks FN	17,000 L
RE-16-01	Restoration Fish Passage/Highway Culverts	Laberge Env Services	5,000 L
RE-17-01	Upper Nordenskiold River Salmon Restoration – Stage 3	Champagne & Aishihik FN	27,300 L
RE-19-01	McClintock River Valley JCS Investigation	Kwanlin Dun First Nation	35,000 PL
RE-24-01	Salmon Research Training & Coho/Chinook Hab. Asses.	North Yukon RRC[9]	43,000 L
RE-25-01	Snag Creek Inventory & Assessment – Training Project	White River First Nation	10,000 L
RE-26-01	Wolf creek Riparian Re-vegetation & Mine Reclamation	Yukon Conservation Soc.	10,000 L
RE-27-01	Klondike River Sampling & Redd Mapping	YRCFA & THFN	20,300 PL
RE-28-01	Yukon Queen II Investigations	Dawson District RRC	2,500 L
RE-30-01	McQueston River Logjam Diversion Completion	FN Na-Cho N'yak Dun	9,500 L
RE-32-01	Chinook Salmon Habitat Assessment–Pelly Lakes Region	Ross River Dene Council	25,900 PL
RE-33-01	Inventory Chinook Habitat – Tincup Creek Drainage	Kluane First Nation	20,000 PL
RE-34-01	Beaver Management – Deadman Creek	Teslin Tinglit Council	2,700 L
RE-35-01	Beaver Mitigation – Swift River	Teslin Tinglit Council	20,300 PL
RE-36-01	Whitehorse Rapids Chinook CWT	Yukon Fish &Game Assoc	43,500 P
	TOTAL 2001 R&E COMMITMENTS		$409,900[10]

Funds Received
- Approx. $300kUS($200US for R&E and $100US for admin)/$460kCdn[11], the bulk of which was assigned to R&E projects.
- Surplus/difference will be used for "B" priority projects; R&E project admin, Panel admin, and financial audit.

6.2.7.2 Status Of 2001 Restoration & Enhancement Projects

The Canadian section of the Yukon River Panel approved 23 R&E projects for year 2001 involving a financial commitment of $409,900Cdn/approx. $273,267US [13], with a further conditional commitment

[4] Refers to the Canadian section of the Yukon River.
[5] Technical Contact for the contractor – L(Lana Miller/Al von Finster) or P(Pat Milligan) of the Department of Fisheries & Oceans, Whitehorse.
[6] Independent placer miner.
[7] Yukon Commercial Fishers Association and Tr'ondek Hwech'in First Nation.
[8] This project was approved in the event was required, incurred an initial expenditure of $3,600. to prepare equipment but the test fishery was not implemented due to the limited opening of the commercial fishery.
[9] North Yukon Renewable Resources Council
[10] A further $7,000 has been committed to RE-24-01 if required, which is not likely; the change to actual expenditure RE-04-01 is noted in footnote 6 above; and, "B" commitments, should funds be available to $5k to Dawson Regional Training Capacity (YRCFA&THFN), and Yukon River Stewardship Program for $10k.
[11] Actual figures are - $299,983.79US/$459,395.18Cdn on May 29, 2001.

to two additional projects for an additional $15kCdn/approx10kUS dependant on a reassessment of the budget mid-term. These commitments were based on receipt of $300kUS for R&E projects and administrative costs in Yukon for 2001. Following are brief descriptions and the status of each project - all figures are in $Cdn/approx.US.

RE-02-01 "Feasibility Study – Measurement of Suspended Solids" $5.0kCdn/3.3kUS
Tara Christie, Independent Placer Miner

Purpose:

- To devise a field method for placer miners to monitor suspended sediment levels of effluent discharge.

Objectives:

1. Identify/devise inexpensive and accurate field method(s) for measurement of solids content of placer effluent and compare with legal samples taken by inspectors of the Department of Indian and Northern Affairs and submitted to a laboratory.
2. Consult with interested and affected parties for comment and support of the project.
3. Preliminary field-test the potential methods.
4. Plan a second phase of mine site field tests using apparatus that is shown to be appropriate by the preliminary study.

Status:

- Project launched, initial payment made, progress report submitted; on schedule and final report due January 31, 2002.

RE-03-01 "2001 Chinook Contingency Test Fishery" $35kCdn/23.3kUS
Yukon River Commercial Fishers Association & Tr'ondek Hwech'in F.N.

Purpose:

- Conduct a chinook test fishery to provide DFO with mark-recapture data for run abundance/escapement estimates in the event that a commercial fishery cannot take place due to low numbers of returning Canadian origin, chinook salmon.
- Remunerate commercial fishers as fairly as possible to address their input and to maintain their vested interest in the Yukon River salmon, thus maintaining the value of Canadian-origin salmon to Yukoners, and building a greater incentive for stewardship of the salmon resource.

Objectives:

- As above, and ongoing as required on an annual basis.

Status:

- Project completed, data provided to DFO, and final report submitted and accepted.
- Total project cost was $22,037.50, with a project saving of approximately $13,000.

RE-04-01 "2001 Chum Contingency Fishery" $30kCdn/20kUS
Yukon River Commercial Fishers Association & Tr'ondek Hwech'in F.N.

Purpose:

- Provide DFO with mark-recapture data for their run abundance/escapement estimates in the event that a commercial fishery cannot take place due to low numbers of returning Canadian origin chum salmon.

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[13] This is based on receiving 2001 Funds of which $200kUs was identified for R&E projects and $100kUS for Administration. The Canadian Section of the Panel determined all of the R&E funds and a considerable portion of the Administration funds should be committed to R&E projects (while keeping the Administration costs at a minimum).

- Create stewardship incentive.

Status:

- Project was approved and the preparatory field logistics undertaken to prepare fish wheels but then terminated as the run was determined to be insufficient to authorize a limited commercial fall chum fishery thereby negating the purpose of this project.
- The initial project payment was returned excepting $3,600 approved costs incurred before termination of the project; hence an R&E budgetary saving of $26,400.
- Final report (a "one pager") due and requested.

RE-07-01"Chum Spawning Ground Recoveries/Education & Stewardship"
Kluane First Nation **$3.1kCdn/2.1kUS**

Purpose:

- To gather mark/recapture information on fall chum stocks originating from the Kluane sub-basin as a back-up to other data being collected, and to provide a training opportunity for Kluane First Nation citizens and to achieve related stewardship benefits.

Objectives:

1. Recover spaghetti tags applied by DFO at the Sheep Rock and White Rock fish wheels.
2. Determine tagged to untagged ratios in the Kluane Index Area.
3. Involve local people - and in particular First Nation citizens – including school groups in gathering this data to develop and foster a stewardship ethic in the community/Kluane River sub-basin.

Note: Complimentary funding provided by HRSEP and other sources.

Status:

- Project currently underway, final report due November 2001.

RE-08-01 "Chum Spawning Ground Recoveries – Minto Area" $8.1kCdn/5.4kUS
Selkirk First Nation

Purpose:

- Gather mark/recapture information on fall chum stocks from the mid-Yukon River area, a back up to other data being collected.
- Provide a training opportunity for Selkirk First Nation citizens in the Minto area and to achieve related stewardship benefits.

Objectives:

1. Recover spaghetti tags applied by DFO at the Sheep Rock and White Rock fish wheels.
2. Determine tagged to untagged ratios in the Minto Index Area.
3. Involve local fishers and Selkirk First Nations citizens in gathering this data to encourage a stewardship ethic for salmon resources.

Status:

- Currently underway and final report due November 15, 2001.

RE-09-01 "Mica & Willow Creeks Monitoring & Low Flow Survey"
Selkirk First Nation **$8.0kCdn/5.5kUS**

Purpose:

- Ultimately to return stocks in areas of the creeks where stocks have previously existed but now do not occur due to obstructions.

Objectives:

1. Create and maintain unobstructed access for salmon in Mica and Willow creeks.

2. Determine habitat utilization and distribution through trapping of fry.
3. Conduct an overwintering habitat (low flow) on Mica and Willow creeks to further establish habitat suitable to sustain fish.

Status:

- Currently in progress and final report due March 31, 2002.

Note: Complimentary funding of $12,000Cdn provided by the HRSEP program.

RE-10-00 "Pelly Salmon Information Workshop" $4.0kCdn/2.7kUS
Selkirk First Nation

Purpose:

- Provide training and encourage stewardship of salmon resources with Selkirk First Nation citizens and residents of Pelly Crossing.

Objectives:

1. Exchange information, education and awareness with the community of Pelly Crossing on the current status of chinook and chum salmon stocks.
2. Introduce the Habitat Conservation and Stewardship Program to the public, review community-based initiatives that promote sustainable salmon populations and encourage further community involvement.
3. Foster watershed stewardship values in the community and trust between governments.

Status:

- A community workshop was held including Elders, government staff and the community at large, facilitated by a member of the Yukon Salmon Committee. Project successfully completed, and final report submitted and accepted.

Note: The Yukon Salmon Committee provided a member to facilitate the workshop and related expenses.

RE-12-01 "Carmacks Salmon Information Workshop" $5.0kCdn/3.3kUS
Carmacks River Vision Society

Purpose:

- Provide training and encourage stewardship of salmon resources with Little Salmon-Carmacks First Nation citizens in cooperation with the Little Salmon Carmacks First Nation Lands and Resources Department and the Yukon Salmon Committee's Habitat Steward.

Objectives:

1. Exchange information, education and awareness with the community of Carmacks on the current status of chinook and chum salmon stocks.
2. Introduce the Habitat Conservation and Stewardship Program to the public, review community-based initiatives that promote sustainable salmon populations and encourage further community involvement.
3. Foster watershed stewardship values within the community.

Status:

- Project successfully completed, and final report submitted and accepted.

RE-13-01 "Klusha and Tatchun creeks Habitat Monitoring Program" $17.0kCdn/11.3kUS
Little Salmon/Carmacks First Nation

Purpose:

- Continuation (third year) of habitat restoration program for Klusha Creek and Tatchun Creek involving removal of obstructions to salmon passage and a small fry trapping project to determine habitat utilization.
- Provide counts of spawning chinook salmon in Tatchun Creek as a part of the ongoing monitoring program for that run.

Objectives:

1. Three-person crew to walk survey Tatchun Creek on August 5, 13 and 18 to record the number of spawning chinook salmon.
2. Conduct a flight survey of the Klusha Creek and the Nordenskiold River to determine, and identify the location by GPS coordinates, any obstructions to water flow and salmon habitat access.
3. Obstructions to be breached.
4. Three gee-type minnow traps to be set for one 24-hours period in each creek.
5. Thermo data loggers previously placed in Klusha Creek to be recovered and used to explore future enhancement options.
6. Fall flight survey to record spawning ground activity.

Status:

- Fieldwork completed; final report overdue and being pursued.

Note: Complimentary funding received by HRSEP.

RE-16-01 "Restoration Fish Passage/Highway Culverts" $5.0kCdn/3.3kUS
Laberge Environmental Services

Purpose:

- Restore fish populations and access to habitat by creating access to historic migration areas that has been prevented for several decades by culvert barriers on the South Canol Road.

Objectives:

1. Determine which streams support salmon populations where their habitat is limited to the downstream side of the culvert barriers (identified in 2000, including Murphy, Cottonwood and Pony Creeks).
2. Design and implement remediation measures on a priority basis.

Status:

- Project underway, on schedule, with final report due April 30, 2002.

RE-17-01 "Upper Nordenskiold River Salmon Restoration – Stage 3" $27.3Cdn/19kUS
Champagne & Aishihik First Nations

Purpose:

- Remove obstructions to salmon passage in the upper Nordenskiold River as a part of the ongoing habitat and stock restoration plan for this system.

Objectives:

1. Conduct reconnaissance flights by fixed wing aircraft of the study area at the beginning of the field season.
2. Continue to remove all obstructions to salmon migration at the critical migration time as called for by relevant DFO guidelines.
3. Obtain temperature profiles in known historic spawning areas by installing data loggers.
4. Document distribution, and location of adult salmon (live and dead) including GPS locations for any new obstructions, spawning sites and habitat features.

5. Obtain DNA samples from fresh carcasses.
6. Monitor the effects of the habitat restoration activities conducted in previous years.
7. Conduct winter beaver trapping program in accordance with DFO guidelines.

Status:

- Project underway, satisfactory progress report (August), and final report due November 15, 2001.

Note: complimentary in-kind support provide by C&AFN.

RE-19-01 "McClintock River Valley JCS Investigation and Beaver Management"
Kwanlin Dun First Nation $35Cdn/23.3kUS

Purpose:

- Begin a multi-year investigation to determine the trends, effects and comparative health of natal stream chinook fry with enhanced fry placed from the Whitehorse Rapids Fish Hatchery.
- Conduct beaver management so as to maintain access to salmon and appropriate habitat protective measures.

Objectives:

1. Compile and review data and restoration activities performed in the McClintock drainage with respect to juvenile chinook.
2. Conduct research characteristic survey for all data monitoring stations. These will include hydrological, geo-physical and benthic surveys.
3. Index populations and health of natal and hatchery reared fry at different sections over time in the drainage.
4. Analyze stomach contents of natal and hatchery reared fry at different sections and times in the drainage.
5. Conduct winter monitoring program at the previously identified stations.
6. Conduct beaver management activities as appropriate to achieve habitat management objectives.

Note: These objectives, and the related field techniques and activities were modified in consultation with DFO's technical contact to lower the profile of some of the JCS studies, and to adjust those studies to allow a multi year approach; while the beaver management activities were added to be conducted on an opportunistic basis.

Status:

- Project underway, progress report overdue/being sought, and final report due December 20, 2001.

RE-24-01 "Salmon Research Training & Coho/Chinook Habitat Assessment"
North Yukon Renewable Resources Council $43kCdn/28.7US

Purpose:

- Provide the starting point for the development of a Porcupine River watershed restoration and enhancement plan, including the development of technical skills and stewardship interests toward salmon by the Vuntut Gwitchin of Old Crow.

Objectives:

1. Obtain information regarding the presence or absence of juvenile coho and chinook salmon in the Whitestone and Miner tributaries, and the main-stem of the Porcupine River.
2. Provide information regarding the presence/absence of adult chinook salmon in the Whitestone and Miner rivers.

3. Provide training, employment and experience for a number of interested community members who will become a pool of trained and experienced community habitat researchers, as well as habitat conservation and stewardship advocates for the Porcupine River sub-basin.

Status:
Project completed and final report pending.

RE-25-01 **"Snag Creek Inventory & Assessment – Training Project"**
White River First Nation **$10kCdn/6.7kUS**

Purpose:
- Gather biological information on the lower reaches of Enger Creek.
- Involve White River First Nation citizens so as to encourage their interest and effective participation in the long-term conservation of salmon and habitat resources of their traditional territory.

Objectives:
1. Conduct an inventory of the lower reaches of Enger Creek, which will map habitat features, obstructions, assess chinook salmon utilization (adult and juvenile) and conduct some baseline water quality sampling.
2. Provide white River First Nation and fisheries managers with information that will be valuable in future management, development and restoration/enhancement strategies in the Enger Creek watershed.
3. Provide Streamkeepers training to 2-3 local community members in Beaver Creek and provide employment and further training to these members through the Enger Creek inventory project.
4. Help build community capacity for fisheries-related projects in Beaver Creek, and to increase awareness and foster watershed stewardship in the White River sub-basin.

Status:
- Project completed and final report due November 15, 2001.

Note: White River First Nation provided complimentary project funding.

RE-26-01 **"Wolf Creek Riparian Re-vegetation & Mine Reclamation"**
Yukon Conservation Society **$10kCdn/6.7kUS**

Purpose:
- To restore salmon habitat along a section of Wolf Creek.

Objectives:
1. Protect chinook spawning and rearing habitat by re-vegetating the riparian zone of a 300 meter reach of Wolf Creek that was impacted by the deposit of copper mine waste rock.
2. Provide a training opportunity for Whitehorse area youth, to build partnerships in the community of Whitehorse; and to create awareness about the importance of riparian vegetation, conservation and watershed stewardship.
3. To conduct riparian re-vegetation and mining reclamation work that may be used as an example or pilot for other impacted areas in Yukon.
4. Increase community capacity to mitigate the environmental impacts of abandoned mines and foster a strong base of practical and technical skills for the re-vegetation, and increase community awareness of mine site impacts on fish and fish habitat.
5. Test different planting methods, a variety of plant species and different watering methods.
6. Conduct some toxicity tests of surrounding soil, water and vegetation to determine contamination levels (if any) and to help select hardy/tolerant plant species that are most appropriate for the chemical environment in the reach of Wolf Creek.

Status:

- Project completed and final report pending.

Note: Complimentary funding received from HRSEP.

RE-27-01 "Klondike River Sampling & Redd Mapping" $20.3kCdn/13.5kUS
Yukon River Commercial Fishers Association & Tr'ondek Hwech'in F.N.

Purpose:

- Identify spawning or rearing populations of salmon in the Klondike River as a basis for planning future population enhancement measures for this river.

Objectives

1. Determine overall run-size for the Klondike River.
2. Develop techniques and methodologies for future broodstock collection and assess broodstock feasibility on the Klondike River.
3. Sample juvenile chinook salmon to determine optimum target grow-out sizes to mimic naturally occurring conditions for future incubation/outplanting.
4. Assess spawning habitat and critical overwintering habitat for future release strategies and conservation/protection measures. (Note comment on reporting below, and funding footnote page 1.)

Status:

- Project underway, satisfactory progress report submitted August 2001, and final report due November 30, 2001.

(Note: The objectives relating to "critical overwintering identification" and "emergence timing" studies were committed to be conducted with volunteer labour during the winter, not be included in the final report for this project. Funding may now be available for this aspect of this project.)

RE-28-01 Yukon Queen II Investigations $2.5kCdn/1.7kUS
Dawson District Renewable Resources Council

Purpose:

- Assess the concern that migrating salmon fry may be significantly harmed by stranding as a result of the wake from a large tour boat regularly operating in the 100-mile section of the Yukon River.

Objectives

- Conduct weekly trips for 8 weeks to identify and document the effects of the wake of this vessel on salmon fry.

Status:

- Field investigations conducted, final report pending.

RE-30-01 "McQuesten River Logjam Diversion Completion"
$9.5kCdn/6.3kUS
First Nation of Na-Cho N'yak Dun

Purpose:

- Second phase of this project to clean up of remainder of the diversionary channel.

Objectives:

1. Hand clear and excavate a partial diversion of the McQuesten River which will bypass a logjam in an 'oxbow' of the river and provide access upstream for migrating chinook salmon.
2. Remove several barrels from the logjam to ensure that rearing habitat that will remain available is not affected by contaminants.
3. Foster stewardship for salmon and salmon habitat resources in the Mayo area.

Status:

- Project completed satisfactorily in consultation with DFO staff and final report pending.

RE-32-01 "Chinook Salmon Habitat Assessment–Pelly Lakes Region"
Ross River Dene Council $25.9kCdn/17.3kUS

Purpose:

- To gather and analyze the basic information necessary to develop a management plan for chinook salmon stocks and habitat of the Pelly Lakes area.

Objectives:

1. Inventory and map characteristics of chinook salmon habitat in the Pelly Lakes area.
2. Assess the current level of chinook salmon use in the above area.
3. Develop expertise within the Ross River Dena Council on techniques and methods used to describe and assess salmon habitats.
4. Foster a stewardship and conservation ethic among user groups of the Pelly Lakes area toward salmon and salmon habitat through an educational program.
5. Produce a report in a format that will be useful to increase awareness of chinook salmon habitat by user groups of the Pelly Lakes area.

Status:

- Fieldwork completed, satisfactory progress report provided at the end of August, with the final report due January 15, 2002.

RE-33-01 "Inventory Chinook Habitat – Tincup Creek Drainage"
Kluane First Nation $20kCdn/13.3kUS

Purpose:

- Obtain the baseline data necessary to monitor changes in Tincup Creek and to contribute to an overall plan to conserve and restore chinook stocks of the White River sub-basin.

Objectives:

1. Inventory physical and biological data from the core spawning area (reach 1) in Tincup Creek to contribute to the baseline data for this area.
2. Assess current level of use of Tincup Creek by chinook salmon.
3. Characterize and sketch habitat in reaches 4 and 5 to contribute to inventory of critical fish habitat throughout Tincup Creek.
4. Determine if chinook salmon utilize Nuntaea Creek, a tributary of Tincup Lake.
5. Continue training program and provide employment for members of Kluane First Nation through participation in field investigations.
6. Prepare a report that will document the study results and including appropriate maps.

Status:

- Fieldwork essentially complete, satisfactory progress report submitted in September, and final report due November 30, 2001.

RE-34-01 "Beaver Management – Deadman Creek" $2.7kCdn/1.8kUS
Teslin Tinglit Council

Purpose:

- Restore access to the habitat of Deadman Creek for chinook salmon by managing beaver and beaver dams.

Objectives:

1. Restore access to rearing habitat for juvenile chinook salmon.

2. Provide training and employment to members of the community of Teslin in beaver management and juvenile chinook salmon sampling techniques.
3. Foster a stewardship and conservation ethic toward salmon and salmon habitat in the Teslin area.

Status:

- Fieldwork completed and final report due November 1, 2001.

RE-35-01 **"Beaver Mitigation – Swift River"** **$20.3kCdn/13.5kUS**
Teslin Tinglit Council

Purpose:

- Management of beaver and beaver dams so as to maintain access to chinook salmon to the Swift River.

Objectives:

1. Enhance access to traditional spawning areas for chinook salmon adults in the Swift River, a known natal river, by removing or altering beaver dams.
2. Document the level of utilization of the Swift River by both juvenile and adult chinook salmon.
3. Employ local people in all aspects of this project thereby encouraging the development of related technical skills and knowledge as well as a stewardship ethic.

Status:

- Fieldwork completed and final report due November 1, 2001.

RE-36-01 **"Whitehorse Rapids Chinook Coded Wire Tags"** **43.5kCdn/29kUS**
Yukon Fish &Game Association

Purpose:

Application of the coded wire tags and the collection of related information from returning chinook salmon are essential to assessing the success of the fry release program at the Whitehorse Rapids Fish Hatchery.

Objectives:

1. Apply coded wire tags to all chinook salmon fry released from the Whitehorse Rapids Hatchery in year 2001.
2. Contract out the clipping and coded wire tagging of the chinook salmon fry.
3. Recover a representative sample of chinook heads (CWT recovery) from the Whitehorse Rapids Fishway during broodstock collection to potentially estimate return rates from specific release sizes and locations.
4. Consolidate the Whitehorse Rapids Hatchery CWT database. Specifically, to provide data to DFO which will conduct an analysis of historical chinook salmon return information to the Whitehorse Rapids Hatchery and potentially determine return rates from specific release sizes and locations;
5. Send the year 2001 head samples to the Vancouver laboratory for CWT recovery.
6. Determine the relevance of the broodstock protocols used in the Whitehorse Rapids hatchery in consultation with DFO and hatchery staff. To review the broodstock collection protocol used in year 2000.

Status:

- CWTs applied and clipping achieved, heads recovered and data presently being analyzed. Progress reports overdue (and hence progress payments withheld) – being pursued, and final report due December 15, 2001.

6.2.8 Community Development and Education Program (CEDP)

In 2000-2001, Fisheries and Oceans again supported the educational program "Salmon in the Classroom". Curriculum material to support the program is available in all 26 Yukon schools, at the Learning Resource Centre and through DFO. Incubation equipment and salmon eggs are also offered to all Yukon schools. In 2000-2001, teachers in 21 classrooms in nine Yukon communities chose to run classroom incubators as part of the program. All schools received "eyed" chinook eggs that were incubated to this stage at the McIntrye Creek salmon incubation facility, which is run by the Whitehorse Correctional Centre. Schools along the Alaska Highway north of Whitehorse attempted a chum egg take but were unsuccessful because low numbers of salmon were inaccessible on the spawning grounds. Morley River eggs were also unavailable due to lack of spawners in 2000. Klondike River eggs were taken to one school. Each school incubated about 50 eggs. About 860 resultant fry (aggregate about 85% survival) were released back into the Tatchun Creek and the Takhini River. No fry were released into the Klondike. Yukon schools will be incubating eggs from Takhini River, Tatchun Creek, Morley River, Kluane River and, perhaps, the Porcupine River in 2001.

6.2.9 Habitat Restoration and Salmon Enhancement Program (HRSEP)

The Habitat Restoration and Salmon Enhancement Program (HRSEP) was established by DFO Pacific Region in January 1997. The Program is "B-based": that is, resources for the program were granted by the Treasury Board for a specific purpose and for a limited period of time. As presently configured, HRSEP will end on March 31, 2002. The current round of funded projects will be the last unless the Program is extended. The Program focus is: "Increasing the quantity and quality of salmon habitat and conserving salmon stocks in British Columbia and the Yukon"

Eligible applications fitted within one of three categories: Resource and Watershed Stewardship; Habitat Restoration; or Stock Rebuilding. Reviews of the applications were conducted by a team comprised of Regional and Divisional DFO staff, and representatives of other governments and entities. Criteria used in the review included the priority of the watershed or salmon stock, the degree to which partnerships had been sought and achieved, the technical feasibility of the project and the budget.

2001/2002 HRSEP Projects
Funding was approved for the following projects in the Yukon River basin:

Project #	Project Title and Contractor	$Cdn
01-YT-RSW-001	Wolf Creek Restoration and Enhancement Project Yukon Fish and Game Association	**4,050**
01-YT-ST-001	Chandindu River Salmon Enumeration Weir Yukon River Commercial Fishing Association And Tr'ondek Hwech'in First Nation	**63,795**
01-YT-HR-003	Mica and Willow Creek Monitoring Selkirk First Nation	**12,000**

01-YT-ST-005	McIntyre Creek Salmon Incubation Project Whitehorse Correctional Centre – McIntyre Creek Hatchery	**23,960**
01-YT-ST-006	McQuesten River Salmon Stock Rebuilding Nacho Nyak Dun	**18,113**
01-YT-ST-007	Ibex River Enhancement Wood Street Centre Experiential Programs	**4,670**
01-YT-RWS-010	Salmon in the Classroom Field Trips StreamKeepers North Society	**4,400**

6.2.10 Habitat Conservation and Stewardship Program (HCSP)

The Habitat Conservation and Stewardship Program (HCSP) is part of DFO Pacific Region's Resource Rebuilding Program. The HCSP is a "B-based" program: that is, the program was designed and required to, meet specific objectives. The HCSP objectives are to:

- nurture the adoption of a stewardship "land ethic" by government and non-government stakeholders;
- incorporate fish habitat protection requirements into all levels of land and water use planning;
- increase public and stakeholder awareness of fish habitat requirements;
- improve habitat mapping, inventory data, etc. to improve decision-making with respect to land management and resource planning;
- increase local stream surveillance and monitoring;
- improve compliance monitoring of development projects;
- provide technical information, advice, and support to partners and communities;
- increase community participation in existing land and water use planning and/or the development of watershed management plans;
- ensure the enhancement and restoration of habitats is completed in the context of an overall watershed strategy or management plan(s); and
- increase community responsibility for watershed management and protection.

B-based programs have "sunset" provisions: that is, they have a fixed end point. As presently configured, the HCSP will end on March 31, 2003.

The HCSP is based primarily on forming partnerships with organizations, governments and entities outside of DFO to fund positions for Stewards. These organizations are termed "Community Partners". There are also a limited number of positions within DFO.

In the Yukon, the Yukon Salmon Committee (YSC) is the main Community Partner. During 2000/1, the YSC formed partnerships with the Kwanlin Dun First Nation (Whitehorse) and the Na-Cho N'yak Dun (Mayo) for Stewards. The overall administration of the YSC HCS program is through a part time co-ordinator. Names, addresses, affiliations and geographical areas of responsibility of the YSC Stewards are listed in Section 8.4.

The City of Whitehorse has also entered a partnership with DFO, and has on staff one Habitat Steward also listed in Section 8.4.

A Habitat Auxiliary hired under the HCSP is located in the Habitat and Enhancement Branch in Whitehorse. This position performs habitat management services to DFO and provides information support to the external Stewards, to the Dept. and to other agencies, also listed in Section 8.4.

All external Stewards are working closely with their respective communities on a wide variety of projects and activities to meet the objectives of the Program. These include, but are not limited to, finding funding sources for restoration and enhancement projects and assisting communities to access funds, education, information transfer both from and to fisheries managers, and the basic building of community capacity. They are also active in a broad range of planning processes including, among others, Yukon River Sub-basin Restoration and Enhancement Planning, Yukon Land Use Planning, and various municipal planning processes.

As currently configured, the HCSP will end on March 31, 2003. Please visit the HCSP web site for additional information on the Program http://www.hcsp.org/.

7.0 STATUS OF BIOLOGICAL ESCAPEMENT GOALS

7.1 Fall Chum Salmon

Before the JTC meeting, ADF&G distributed the following reports to JTC members for review:
Eggers, D.M. 2001. *Biological escapement goals for Yukon River fall chum salmon.* ADF&G Regional Information Report No. 3A-01-10.

Anonymous. 2001. *A Preliminary Review of Western Alaskan Biological Escapement Goal Reports for the Alaska Board of Fisheries.* Draft Independent Scientific Review Committee Report. Alaska Department of Fish and Game.

Andersen, F., J. Bromaghin, L. Buklis, D. Cannon, S. Fried, K. Harper, E. Knudsen, T. Kron, C. Lean, D. McBride, D. Nelson and P. Probasco. 2001. *Summary Review Comments on Alaska Department of Fish and Game Draft Reports on Biological Escapement Goal Recommendations.* United States Fish & Wildlife Service, National Parks Service and U.S. Geological Survey.

The initial report had been prepared by ADF&G for presentation to the Alaska Board of Fish meetings in the spring of 2001. Although the report contains recommended BEGs for all fall chum salmon stock components in the drainage, it was pointed out that those ranges proposed for Canadian-origin stocks would require separate approval through Canada/United States Yukon Salmon Agreement processes, i.e. the JTC and Yukon River Panel. Proposed BEGs for Alaskan stocks have been adopted by ADF&G.

The methodology used in the analysis, involved reconstruction of annual runs back to 1974. In years where escapement data were lacking (numerous), various techniques were employed to obtain estimates such as expanded aerial survey counts and historical extrapolations of mark-recapture

estimates. Catches were apportioned to the various stock groupings based on historical escapement ratios.

A number of comments and concerns about the recommended goals for Canadian stocks were discussed by the JTC. In Canada, the process for modifying spawning escapement goals involves technical review through DFO's Pacific Scientific Advice Review Committee (PSARC). It was mentioned that revised escapement goals would likely need to be consistent with Canada's emerging Wild Salmon Policy, which is expected to be finalised this year. The JTC agreed to draft an explanatory note which will include corrections, additional technical information and describe revisions in the final draft that were made to address previous technical reviews. This note will be submitted along with the report and other review documents to PSARC for review in 2002.

7.2 Chinook Salmon

The JTC agreed that its members would prepare a stock status paper including the data included in the brood table for upper Yukon chinook salmon, and submit it to PSARC and/or other agency review processes for advice.

7.2.1 Canadian Chinook Salmon Spawner/Recruitment Data Review

Presented at the 2001 Fall U.S./Canada Joint Technical Committee (JTC) meeting were the upper Yukon River chinook salmon catch by age from commercial, subsistence and aboriginal harvests, the estimated catch by age for the Canadian chinook salmon escapements and a brood year table. The Upper River Stock is considered to be a composite of Canadian origin chinook salmon stocks. The goal of this review was to determine if there is enough quality data available to develop a comprehensive Biological Escapement Goal (BEG) for the Upper River chinook salmon stocks.

The data presented in this section is a summation of results from several projects conducted in both in the United States and in Canada (Tables 12-14). Proportions of Upper River Stock (Canadian origin chinook salmon) harvested in mixed stock fisheries throughout the drainage are determined using scale pattern analysis (see section 6.1.1). Both countries have projects which monitor and collect harvest information to determine the number of chinook salmon harvested in various fisheries. Border passage of chinook salmon is estimated using a mark/recapture tagging project in Canada, near the Canada/U.S. border. Age composition is determined from sampled harvests and escapements in both countries.

After review of the Upper River chinook salmon stock brood year table (Table 15), it was determined that a comprehensive BEG could not be developed using the available data. Shortcomings in the data include poor contrast in escapement, short time series data set, and no escapements below the 1:1 return per spawner replacement line. The contrast (range of escapement divided by the smallest escapement) for the data set presented in Table 15 is 2.5. A range of this magnitude is likely to produce a poor estimate of S_{MSY} (CTC 1999). There should be a minimum of 15 years of complete age classes represented in the brood year table for parameter estimates to be unbiased (CTC 1999). Currently, there are 11 complete age classes in the presented data set. The 8 year old age group could be interpolated and included to extend the number of complete age classes to 12 years for the brood year table (Table 15). This interpolation was completed in the data series

presented in this section. In the current data set (Figure 4), there are no data points below the 1:1 replacement line, "...lack of these low ratios is circumstantial evidence that spawning abundance has not been high enough to expose the underlying density-dependent relationship" (CTC 1999).

The JTC is continuing to reconcile minor differences in harvest and escapement estimates and investigating other methods to develop a less comprehensive biological escapement goal (BEG), or a Sustainable Escapement Goal (SEG). These investigations will continue over the winter and the results of these methods will be available for the spring 2002 Yukon River Panel meeting.

8.0 PROPOSED CALL PROCESS FOR RESTORATION & ENHANCEMENT PROJECTS, YEAR 2001/2002

8.1 Rationale, Status and Schedule for 2002

Rationale:

- This is a call for proposals for funding for salmon restoration and enhancement projects funded by the Yukon River Panel's Restoration and Enhancement (R&E) Program for 2002.
- R&E funds are committed to research and management projects that are directed to the restoration and enhancement of salmon stocks of Canadian origin in the Yukon River watershed, including the Porcupine River system; including developing stewardship of these resources.

Status of the Panel and R&E Process:

- The Yukon River Panel is in the process of being formally re-established as enabled by the U.S./Canada Yukon River Salmon Agreement of March 29, 2001.
- An important part of the Agreement involves reactivating the Panel's Restoration and Enhancement Program – the first step of which is this call for proposals to be considered by the Panel for 2002.
- The Co-chairs of the Panel have approved this call for proposals as an essential first step to achieve the Panel's goal of having a fully operational R&E Program in 2002 in anticipation that formal ratification of the Agreement occur in the near future.
- Project proponents will be kept informed on the status of the Panel's R&E Fund and administrative processes.

What's Different in 2002 from Previous Yukon River Panel R&E "Calls"?

- This call is subject to funding being confirmed.
- This R&E call and review process is being changed - aided by the first step involving submission of brief, one page "Conceptual Proposals". (This step was used experimentally in the Yukon Territory in 2001 – with the result that the R&E process was more user-friendly and efficient.)
- The purpose of the R&E Fund now includes "programs and projects that are directed at developing stewardship of salmon habitat and resources and maintaining viable salmon fisheries in the Yukon River in Canada".

R&E Call Review Process and Schedule for 2002:

Step 1 – October 24	Advertise a call for Conceptual Proposals.
Step 2 – November 22	Deadline to receive the Conceptual Proposals.
Step 3 – December 15	Review of Conceptual Proposals
Step 4 – December 20	Correspondence to each applicant – i.e. either: "not of interest/priority to the Panel at this time"; or, "please submit a detailed Project Proposal based on the reviewers comments provided on your Conceptual Proposal".
Step 5 – February 15	Deadline to receive Project Proposals.
Step 6 – February 20	Project proposals forwarded to reviewers.
Step 7 – March	Panel review and decisions.

Those interested in participating in the Panel's R&E program are encouraged to contact those listed below. We'll work with you to produce the best possible product for the Panel.

For administrative information and support, and to receive applications:

Hugh J. Monaghan
Executive Secretary
Yukon River Panel
Box 20973
Whitehorse, Yukon, Y1A 6P4

Phone: (867) 393-1900
Fax: (867) 393-6738
E-mail: monaghan@internorth.com

For technical advice:

In Yukon,

Al von Finster & Pat Milligan
Fisheries and Oceans Canada
Phone: (867) 393-6735
Fax: (867) 393-6738
E-mail: vonfinstera@pac.dfo-mpo.gc.ca
milliganp@pac.dfo-mpo.gc.ca

In Alaska,

Susan McNeil
Alaska Department of Fish & Game
Phone: (907) 267-2166
Fax: (907) 267-2442
E-mail: susan_mcneil@fishgame.state.ak.us

And in the Yukon, the community based Habitat Stewards (see Section 8.4).

8.2 Criteria for Yukon River Panel's Salmon Restoration and Enhancement Projects

Purposes of the R&E Fund

- Programs, projects and associated research, and management activities on either side of the Alaska-Yukon border directed at the restoration, conservation and enhancement of Canadian origin salmon stocks of the Yukon River, including the Porcupine River system.
- Programs and projects that are directed at developing stewardship of salmon habitat and resources, and maintaining viable salmon fisheries in the Yukon River in Canada.

Principles

- Restoration, conservation and enhancement programs and projects shall be consistent with the protection of existing wild salmon stocks and the habitats upon which they depend.

- Given the wild nature of the Yukon River and its salmon stocks, and the substantial risks associated with the large-scale enhancement through artificial propagation, such enhancement activities are inappropriate at this time.
- Artificial propagation shall not be used as a substitute for effective fishery regulation, stock and habitat management or protection.

Guidelines

- The priorities for implementing projects with the Fund shall be in this order:
    1. restoring habitat and wild stocks;
    2. conserving habitat and wild stocks;
    3. enhancing habitat; and
    4. enhancing wild stocks.
- Programs and projects will be limited to:
    a. encouraging habitat stewardship, conservation and reclamation in activities and industries that impact salmon and their habitats; and,
    b. maintaining viable salmon fisheries in the Yukon River in Canada, and any funding for commercial salmon fisheries and processing will be limited to the development of infrastructure, capital equipment expenditures, and in years when no commercial processing occurs, the maintenance of processing infrastructure.
- Careful planning is necessary before undertaking any restoration or enhancement projects that might affect any wild stock. Projects shall be evaluated based on basin wide stock rebuilding and restoration plans, where these plans are in hand. A careful assessment and inventory of wild stocks and their health, habitat, and life history must be an integral part of restoration and enhancement planning.
- The most stringent of the fish genetics and fish disease policies will be applied.
- Socio-economic effects of projects will be considered.

8.3 Format and an Example for the R&E One Page Conceptual Proposal

The following format is requested for R&E One Page Conceptual Proposals due November 22, 2001. Items to include for the project proposal are:

- **PROJECT TITLE**;

- **PROJECT PROPONENT** (who will be conducting the project);
- **PROJECT PARTNERS/ADDITIONAL PARTICIPANTS**;

- **PROJECT LOCATION** (sub-basin, closest community, etc.);

- **PROJECT OBJECTIVES**
    - how the project objectives meet R&E Fund criteria and guidelines – also attached with this package;

- **BRIEF PROJECT SUMMARY**; and,
- **ESTIMATED BUDGET**

Note: Please limit conceptual proposals to one page and provide an electronic copy to the Panel's Executive Secretary.

The following is an example of the one page conceptual proposal:

YUKON RIVER RESTORATION AND ENHANCEMENT FUND
2002

CONCEPTUAL PROPOSAL

PROJECT TITLE: Beaver Management on Deadman Creek

PROJECT PROPONENT: Teslin Tlingit Council

PROJECT PARTNERS/ADDITIONAL PARTICIPANTS: possibly a consultant

PROJECT LOCATION: Deadman Creek, Tributary to Teslin Lake, Teslin River sub-basin. Nearest community – Teslin.

PROJECT OBJECTIVES:
Numbers of salmon are declining in the Teslin River sub-basin. Steps must be taken to conserve, restore and enhance stocks in this sub-basin. Deadman Creek is an important creek for rearing jcs. Restoring access to the habitat in this creek is part of a larger overall plan to restore stocks in the Teslin sub-basin to traditional levels. The objectives of this project include:

- restoring access to rearing habitat for juvenile chinook salmon;
- providing training and employment to local members of the community of Teslin in beaver management and juvenile chinook salmon sampling techniques;

Fostering a stewardship and conservation ethic towards salmon and salmon habitat in the Teslin area.

PROJECT SUMMARY:

This project will involve the following steps:

- Winter minnow trapping, water quality sampling and ground water investigations to determine presence/absence of overwintering juvenile chinook salmon (jcs);
- Reconnaissance flight in the late spring/early summer to map beaver dam locations;
- Initial minnow trapping in early summer to determine if beaver dams are restricting jcs movement in the creek;
- If jcs movement appears to be restricted, conduct a density study (mark-recapture) below the dams (high densities could be limiting to jcs survival in this creek);
- breach beaver dams in accordance with the *DFO Guidelines for the Management of Beaver in Fish Bearing Streams in the Yukon & NBC Division*; and,
- Trap beaver in accordance with the *DFO Guidelines for the Management of Beaver in Fish Bearing Streams in the Yukon & NBC Division.*

ESTIMATED BUDGET: $30, 000.00

8.4 Yukon Salmon Committee Habitat Stewards

For Canadian proposals the following Yukon Salmon Committee Habitat Stewards are available to provide technical advice:

YUKON SALMON COMMITTEE HABITAT STEWARDS

ALASKA HIGHWAY NORTH

Brad Wilson
Box 2118
120 Rainbow St. Haines Junction
Haines Junction, YT
Y0B 1L0
(867) 634-3843
(867) 634-7011(home)
Fax 634-3842
bwilson@yknet.yk.ca

TESLIN

George Sidney
Box 133
Lands & Resource Building
Teslin, YT
Y0A 1B0
(867) 390-2201 (TTC)
(867) 390-2058 (home/office)
Teslin Tlingit Council
Fax 390-2200
gsidney@yknet.ca or georgesidney@hotmail.com

CARMACKS / PELLY

Beverley Brown
Box 24
Beside Old Trading Post
Carmacks, YT
North Klondike Hwy Y0B 1C0
(867) 863-5520(home/office)
Fax 863-5521
bevysc@yknet.yk.ca

DAWSON

Jake Duncan
Box 844
3rd & King
Dawson City, YT
Mme. Tremblay Building
Y0B 1G0
(867) 993-6210(office)
(867) 993-6974(home)
Fax 993-6093
jduncan@yknet.yk.ca

OLD CROW

Isaac Anderton
Box 80
North Yukon RRC Office
Old Crow, YT
Y0B 1N0
(867) 966-3034(office)
(867) 966-3072(home)
Fax 966-3620
vgrrc@yknet.yk.ca

NACHO NYAK DUN
First Nation, Mayo
NND Lands Office – Mayo (Presently vacant)

KWANLIN DUN
First Nation, Whitehorse

Joshua Smith	35 McIntyre Road KDFN Office - Whitehorse Whitehorse, YT	(867) 633-7808(office) Fax 668-5057
j.smith@kdfn.yk.ca	Y1A 5S2	

YSC - HABITAT STEWARDSHIP COORDINATOR

Stephanie Muckenheim	Box 20138 Vista Road - Whitehorse Whitehorse, YT	(867) 456-2227(office) (867) 393-3077(home) Fax 456-2228
yscstephanie@yknet.ca	Y1A 7A2	

CITY OF WHITEHORSE
HABITAT COORDINATOR/HABITAT STEWARD

Whitehorse

Ross Burnett	2121 2nd Avenue Municipal Services Building Whitehorse, YT 4210-4th Avenue, Whitehorse	(867) 668-8347(office) Fax 668-8395
	Y1A 1C2	ross.burnett@city.whitehorse.yk.ca

FISHERIES AND OCEANS CANADA
HABITAT CONSERVATION AND STEWARDSHIP PROGRAM

Habitat Auxiliary

Kate Maddigan	100-419 Range Road DFO - Whitehorse Office Whitehorse, YT	(867) 393-6703(office) Fax 393-6737
	Y1A 3V1	maddiganK@pac.dfo-mpo.gc.ca

HCSP Area Coordinator

Al von Finster	100-419 Range Road DFO - Whitehorse Office Whitehorse, YT	(867) 393-6721(office), (867) 667-4317(home) Fax 393-6737
	Y1A 3V1	vonFinstera@pac.dfo-mpo.gc.ca

9.0 MARINE FISHERIES INFORMATION

9.1 Introduction

Yukon River salmon migrate as juveniles out of the river and into the Bering Sea. Where they go once they enter the ocean is only partly understood, but evidence from tagging studies and the analysis of scale patterns indicate that these salmon spread throughout the Bering Sea Some move considerably south of the Aleutian Island chain into the Gulf of Alaska and North Pacific Ocean, and some move

north into the Chukchi Sea. While in the ocean, they mix with salmon stocks from Asia and elsewhere in North America. Figure 5 shows the general ocean distribution of Asian and North American chinook salmon.

While in the ocean, some of these salmon are caught by commercial fisheries in marine waters. In 2000, marine commercial fisheries with a bycatch that likely included some Yukon River salmon included: (1) the U.S. groundfish trawl fisheries in the Bering Sea-Aleutian Islands area and in the Gulf of Alaska, and (2) the purse seine and gill net salmon fishery in the South Alaska Peninsula (False Pass) area. Some of the commercial fisheries which operate in marine waters of the Bering Sea and Gulf of Alaska and catch few, if any, salmon include: (1) the U.S. longline fisheries for Pacific halibut, Pacific cod, and other groundfish, (2) the U.S. pot fisheries for Pacific cod and other groundfish, and Dungeness, king, and Tanner crab, and (3) the U.S. purse seine and gillnet fisheries for Pacific herring.

Until 1992, five large commercial fisheries in the ocean caught large numbers of salmon, some of which were likely Yukon River salmon. However, under international agreements, those fisheries no longer operate. They were (in order of decreasing salmon catches): (1) the Japanese high-seas mothership and land-based salmon gill net fisheries; (2) the high-seas squid gillnet fisheries in the North Pacific Ocean of Japan, the Republic of Korea, and the Republic of China (Taiwan); (3) the foreign groundfish fisheries of the Bering Sea and Gulf of Alaska, (4) the joint venture groundfish fisheries of the Bering Sea and the Gulf of Alaska, and (5) the groundfish trawl fishery by many nations in the international waters area of the Bering Sea (the Doughnut Hole).

As has been noted in the past, a small commercial salmon gill net fishery operates in subdistricts at various river mouths in Norton Sound, and is managed by the Alaska Department of Fish and Game and the Alaska Board of Fisheries. A small portion of the chinook and chum salmon caught in the southern subdistricts may be bound for the Yukon River. In 1999, the commercial catch of chinook and chum salmon for all of the Norton Sound subdistricts combined totaled 2,500 chinook and 7,900 chum salmon. The prior 5-year (1994-1998) average commercial catch was 7,800 chinook and 24,400 chum salmon.

Salmon run failures were evident again in 2000 across a broad region of western Alaska, including the Yukon River in Alaska and Canada. While the causes are not known, attention has focused on the marine environment because of the broad scope of the production failures. Researchers speculate several possible factors: the effects of El Nino, ocean and climate regime shifts, and competition relative to ocean carrying capacity.

9.2 Bering Sea and Gulf Of Alaska Groundfish Fishery

9.2.1 History and Management of the Groundfish Fishery

The U.S. groundfish fisheries in the Bering Sea-Aleutian Islands area and in the Gulf of Alaska are managed under the Magnuson-Stevens Fisheries Conservation and Management Act by the North Pacific Fishery Management Council (NPFMC), and are regulated by the National Marine Fisheries Service.

In general, the groundfish fisheries of the Gulf of Alaska are managed and regulated separately from those in the Bering Sea-Aleutian Islands area. Both major areas contain a number of smaller regulatory

areas, which are numbered. The groundfish fisheries east of 170° west longitude and north of the Alaska Peninsula are considered to be in the Bering Sea-Aleutian Islands Area (Figure 6 and 7). The groundfish fisheries operating in waters south of the Alaska Peninsula and east of 170° west longitude are considered to be in the Gulf of Alaska Area (Figure 8).

The U.S. groundfish fishery off the coast of Alaska expanded rapidly during the last 15 years. In 1977, the year after the Magnuson Act went into effect, the U.S. groundfish harvest off Alaska amounted to only 2,300 metric tons (mt, 1 mt = 2,204.6 pounds), or only 0.2% of the total groundfish harvest off Alaska by all nations. Most of that U.S. catch was Pacific halibut caught with hook-and-line gear.

The Magnuson Act, which claimed exclusive fishery jurisdiction by the United States of waters to a distance 200 nautical miles seaward from the coast, allowed the U.S. to gradually replace the foreign groundfish fisheries by "joint-venture" fisheries, in which U.S. fishermen caught the fish and delivered them at sea to foreign fish processing vessels. The joint-venture fishery, in turn, was replaced by an entirely U.S. fishery. The estimated ex-vessel value of the total Alaskan commercial fisheries from 1982 through 1999 is given in Appendix Table 16.

The U.S. groundfish fisheries use basically three types of fishing gear: trawls, hook-and-line (including longline and jig), and pots. In 1999, 1,358 vessels landed groundfish caught off Alaska. Of these, 972 used hook-and-line gear, 242 used trawls, 271 used pots. Appendix Table 17 summarizes the number of vessels that landed groundfish by gear type in the two areas from 1992 to 1999. Appendix Table 18 summarizes the number of vessels by length within each type of fishing gear from 1992 to 1996.

9.2.2 The Observer Program

Under U.S. law and regulations, salmon may not be retained by the U.S. groundfish fishery and must be returned to the sea. The groundfish observer program began in 1977 on foreign groundfish vessels operating within the U.S. Exclusive Economic Zone (200 nautical miles from the U.S. shore). It continued with the joint-venture fishery until its end. Until 1990, however, there was little information on the accidental or incidental catch of salmon by the U.S. groundfish fishery.

In 1990, the United States began a scientific observer program for the U.S. groundfish fishery off the coast of Alaska. In general, a groundfish harvesting or processing vessel must carry a NMFS certified observer on board whenever fishing or fish processing operations are conducted if the operator is required by the NMFS Regional Administrator to do so, and a shoreside groundfish processing plant must have a NMFS certified observer present whenever groundfish is received or processed if the plant is required to do so by the NMFS Regional Administrator.

The amount of observer coverage is usually related to the length of the vessel or the amount of fish processed by a shoreside plant or mothership processing vessel. Groundfish harvesting vessels having a length of 125 feet or more are required to carry observers at all times when they are participating in the fishery. Vessels with lengths between 60 through 124 feet are required to carry observers during 30 percent of their fishing days during trips when they fish more than 3 days. Vessels shorter than 60 feet do not have to carry observers unless required to do so by the Administrator of the NMFS Alaska Region. Mothership or shoreside processing plants processing 1,000 metric tons (mt) or more per month are required to have 100 percent observer coverage, those processing between 500 and 1,000 mt

per month are required to have 30 percent coverage, and those processing less than 500 mt per month need no observer coverage unless it was required specifically by the NMFS Regional Administrator.

Observers must be trained and certified. An applicant must have a bachelor's degree in fisheries, wildlife biology, or a related field of biology or natural resource management to be certified as an observer by the National Marine Fisheries Service. Observers must be capable of performing strenuous physical labor and working independently without direct supervision under stressful conditions. Applicants must apply directly to a certified contractor, because observers are not employees of the Federal Government, but are hired by certified contractors. If hired, the contractor will arrange for them to attend a 3-week observer training course in Seattle or Anchorage. They will be certified as a groundfish observer upon successful completion of the course.

In addition to the observer coverage, all groundfish harvesters over 60 feet and processors must maintain and submit logbooks on their groundfish harvests and their catch of the prohibited species, including crabs, halibut, herring, and salmon.

9.2.3 Estimated Catch of Salmon in the Groundfish Fisheries

NMFS estimates the number of salmon caught in the groundfish fisheries from the observer reports and the weight of groundfish caught. Observers are instructed to collect random samples of each net haul before it has been sorted, and to gather information from each salmon in a haul. Observers record the species caught and the number of each species, determine the sex of dead or dying salmon, record the weight and length of each salmon, collect scales, and check for missing adipose fins. If a salmon is missing its adipose fin, the observer removes and preserves the snout, which may contain a coded-wire tag.

Subsequently, NMFS scientists use the number of salmon of each species caught in each haul sampled, the weight of groundfish caught in each haul sampled, and the total weight of groundfish harvested during the sampling period to estimate the total number of salmon of each species caught by the entire groundfish fleet. Table 4 presents a summary of the estimated numbers of chinook and other salmon caught by the U.S. groundfish fisheries from 1990 through September 2001. Table 4 indicates that the number of salmon caught by the groundfish fisheries varies considerably by species of salmon, by year, and between the Bering Sea-Aleutian Islands Area and the Gulf of Alaska. Usually, chinook and chum salmon make up most of the catch, with coho a distant third, and sockeye and pink salmon minor components.

The catch of salmon in the Bering Sea-Aleutian Islands (BSAI) area in 2001 as of 15 September was 64,828 (25,571 chinook and 39,257 other salmon) and in the Gulf of Alaska the salmon catch was 17,056 (12,930 chinook and 4,126 other salmon). Certain areas in the BSAI have been declared salmon savings area for both chum and chinook salmon (Figures 6 and 7) based on high rates of catch in the past.[12] After the 1998 season, because of the concerns regarding chinook salmon conservation in western Alaska and in response to a proposal submitted by BSFA, the NPFMC lowered the allowable bycatch of chinook salmon in the BSAI trawl fishery.

Of particular concern is identifying what stocks of salmon are being caught by the U.S.

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[12] Information on past and present bycatch of salmon in the BSAI and GOA groundfish fisheries can be obtained from the NMFS Alaska Region web page at www.fakr.noaa.gov.

groundfish fisheries and how many of each stock. Some information comes from coded-wire tagged salmon recovered by observers. But that information only shows that certain coded-wire tagged stocks are caught, it says nothing specific about the many stocks without coded-wire tags. Canada has coded-wire tagged upper Yukon River chinook salmon for a number of years. To date, nine have been recovered in the Bering Sea groundfish fisheries (Table 17, Figure 9).

Currently, NMFS and ADF&G are looking at genetic stock identification (GSI) techniques to shed more light on the question. More of the stocks in the U.S. and Canada are being defined, particularly chinook and chum salmon, and more GSI information is becoming available on the stocks in Japan and Russia, as well. NMFS observers have collected GSI samples from chum salmon caught by the trawls in the BSAI, ADF&G has sampled the chum catch in the June False Pass fishery, and the Japanese in cooperation with NMFS collected chum salmon samples from the Okhosk Sea and various areas in the North Pacific and Bering Sea. Regional origins as determined by GSI from these three studies are shown in Table 6.

9.3 South Alaska Peninsula (False Pass) June Fishery

A purse seine and gill net fishery targeting Bristol Bay sockeye salmon, with an incidental catch of chum salmon bound for Bristol Bay, the Arctic-Yukon-Kuskokwim region, and Asia, operates during the month of June in the South Alaska Peninsula area near Unimak Island and the Shumagin Islands. This fishery, known as the "False Pass" fishery, has operated since 1911, and is managed by the Alaska Department of Fish and Game and the Alaska Board of Fisheries. For management and statistical purposes, the Alaska Department of Fish and Game includes the False Pass area in Statistical Area M.

The Alaska Board of Fisheries (BOF) has made changes to the fishery management plan for the False Pass June fishery on a periodic basis. During their January 2001 meeting, they made the following regulation changes to the South Unimak and Shumagin Islands June fishery:

1. Eliminated the sockeye salmon guideline harvest levels.

2. Eliminated the chum salmon *O. keta* guideline harvest levels.

3. Limited fishing time to no more than 16 hours per day by any gear group.

4. Limited total fishing time by seine and drift gillnet gear to no more than 48 hours in a floating seven day period with no more than two 16-hour periods on consecutive days in any seven day period.

5. From June 10 through June 24, set gillnet gear may fish on consecutive days for 16-hour fishing periods as long as the set gillnet sockeye to chum salmon ratios in each fishery is equal to or greater than the recent 10-year average in each fishery. If the set gillnet sockeye to chum salmon ratio falls below the recent 10-year average in one of the fisheries, that fishery will be closed for one period. From June 10 through June 24, daily fishing periods for set gillnet gear will be from 6:00 AM until 10:00 PM.

6. Purse seine and drift gillnet fishing periods through June 24 will occur at the same time in the South Unimak and Shumagin Islands fisheries.

7. After June 24, in either the South Unimak or Shumagin Islands fishery if the ratio of sockeye to chum salmon by all gear combined is two to one or less on any day, the next fishing period shall be of six hours duration for all gear in that fishery. If the sockeye to chum salmon ratio is two to one or greater, a six-hour fishing period can be extended to a maximum of 16 hours. The South Unimak or Shumagin Islands fishery shall close for all gear groups if the ratio of sockeye to chum salmon is two to one or less for two consecutive fishing periods.

During the most recent 10 years, the South Unimak sockeye salmon *Oncorhyncus nerka* harvest has averaged 1,280,552 fish (Appendix Table 19) while the Shumagin Islands harvest averaged 431,410 (Appendix Table 17). The combined South Unimak and Shumagin Islands average sockeye salmon harvest during 1990-1999 was 1,711,962 fish (Appendix Table 18).

Total catch in the False Pass June fishery in 2001 was 148,588 sockeye and 48,913 chum salmon. These catch numbers are low because of a fishers' strike in the False Pass June fishery. Participation was below average because of low prices offered by processors. The following Table summarizes the 2001 catch for all salmon fished with all gear types. Appendix Table 20 summarizes historical sockeye and chum salmon catches in this fishery since 1980.

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Table 1. The Yukon River drainage summer chum salmon management plan overview, 2001.

Projected Run Size [a]	Required Management Actions Summer Chum Salmon Directed Fisheries			
	Commercial	Personal Use	Sport	Subsistence
600,000 or Less	Closure	Closure	Closure	Closure [b]
600,000 to 700,000	Closure	Closure	Closure	Possible Restrictions [c]
700,001 to 1,000,000	Restrictions [d]	Restrictions [e]	Restrictions [e]	Normal Fishing Schedules
Greater Than 1,000,000	Open [f]	Open	Open	Normal Fishing Schedules

a The department will use the best available data including preseason projections, mainstem river sonar passage estimates, test fisheries indices, subsistence and commercial fishing reports, and passage estimates from escapement monitoring projects to assess the run size.

b The department may, by emergency order, open subsistence chum salmon directed fisheries where indicators show that the escapement goal(s) in that area will be achieved.

c The department shall manage the fishery to achieve drainage wide escapement of no less than 600,000 summer chum salmon, except that the department may, by emergency order, open a less restrictive directed subsistence summer chum fishery in areas that indicator(s) show that the escapement goal(s) in that area will be achieved.

d The department may, by emergency order, open commercial fishing in areas that show the escapement goal(s) in that area will be achieved.

e The department may, by emergency order, open personal use and sport fishing in areas that indicator(s) show the escapement goal(s) in that area will be achieved.

f The department may open a drainage-wide commercial fishery with the harvestable surplus distributed by district or subdistrict in proportion to the guideline harvest levels established in 5 AAC 05.362. (f) and (g).

Table 2. Pilot Station sonar project estimates.

Species	2001 Estimate Passage	2001 Lower 90% Confidence Intervals	2001 Upper 90% Confidence Intervals	2000 Estimate Passage	1999 Estimate Passage	1998 Estimate Passage	1997[a] Estimate Passage	1995 Estimate Passage
Large Chinook Salmon[b]	118,935	108,003	129,867	61,055	159,176	109,101	119,128	199,078
Small Chinook Salmon	18,518	14,528	22,508	9,057	28,347	25,142	80,992	55,064
Total Chinook Salmon	137,453	125,815	149,091	70,112	187,523	134,243	200,120	254,142
Summer Chum Salmon	394,078	377,292	410,864	410,528	939,348	745,919	1,342,650	3,438,655
Fall Chum Salmon	360,356	338,477	382,235	253,512	405,230	353,371	521,531	1,070,968
Total Chum Salmon	754,434			664,040	1,344,578	1,099,290	1,864,181	4,509,623
Coho Salmon[c]	143,213	128,330	158,096	183,192	76,481	134,408	120,564	120,366
Other Species[d]	372,606			387,339	415,789	400,309	500,484	926,504
TOTAL	1,407,706			1,304,683	2,024,371	1,768,250	2,685,349	5,810,635

[a] The Yukon River sonar project did not operate at full capacity in 1996 and therefore there are no passage estimates for that year.

[b] Chinook Salmon >655 mm for 1999- 2001, >700mm for 1995-1998.

[c] This estimate may not include the entire run.

[d] Includes Pink Salmon, Cisco, Whitefish, Sheefish, Burbot, Suckers, Dolly Varden, Sockeye Salmon, and Northern Pike.

Table 3. The Yukon River drainage fall chum salmon management plan, 2001.

Run Size Estimate [b] (Point Estimate)	Recommended Management Action [a] Fall Chum Salmon Directed Fisheries				Targeted Drainagewide Escapement
	Commercial	Personal Use	Sport	Subsistence	
350,000 or Less	Closure	Closure	Closure	Closure [c]	350,000
350,001 to 450,000	Closure	Closure	Closure	Restrictions [d]	350,000
450,001 to 550,000	Closure	Closure	Closure	Restrictions [d]	375,000
550,001 to 600,000	Closure	Closure [e]	Closure e	Restrictions [d]	400,000
600,001 to 675,000	Closure	Normal Fishing Schedules	Retention Allowed	Normal Fishing Schedules	400,000 or More
Greater Than 675,000	Commercial Fishing Considered [f]	Normal Fishing Schedules	Retention Allowed	Normal Fishing Schedules	400,000 or More

a Considerations for the Toklat River and Canadian Mainstem rebuilding plans may require more restrictive management actions.

b The department will use the best available data including preseason projections, mainstem river sonar passage estimates, test fisheries indices, subsistence and commercial fishing reports, and passage estimates from escapement monitoring projects to assess the run size.

c The department may, by emergency order, allow subsistence chum salmon directed fisheries where indicator(s) suggest that the escapement goal(s) in that area will be achieved.

d The department may, by emergency order, allow a less restrictive or a normal subsistence fishing schedule in areas that indicator(s) suggest that the escapement goal(s) in that area will be achieved.

e The department may, by emergency order, allow personal use and sport fishing in areas that have normal subsistence fishing schedules and indicator(s) that suggest the escapement goal(s) in that area will be achieved.

f When the projected run size is more than 675,000 chum salmon, the department may allow for a drainage-wide commercial fishery with the targeted harvest of the surplus above 625,000 chum salmon distributed by district or subdistrict proportional to the guideline established in harvest range 5 AAC 05.365. The department shall distribute the harvest at levels below the low end of the guideline harvest range by district or subdistrict proportional to the mid-point of the guideline harvest range.

> 5 AAC 05.365. (4) manage the commercial fishery during the fall chum salmon season for a guideline harvest range of 72,750 to 320,500 chum salmon, distributed as follows:
>
> (A) Districts 1, 2 and 3: 60,000 to 220,000 chum salmon;
> (B) Subdistricts 4-B and 4-C: 5,000 to 40,000 chum salmon;
> (C) Subdistrict 5-A: 0 to 4,000 pounds chum salmon roe;
> (D) Subdistricts 5-B and 5-C: 4,000 to 36,000 chum salmon;
> (E) Subdistrict 5-D: 1,000 to 4,000 chum salmon;
> (F) District 6: 2,750 to 20,500 chum salmon.

Table 4. Canadian weekly commercial catches of chinook and chum salmon in the Yukon River in 2001.

Statistical Week	Week Ending	Start Date	Finish Date	Days Fished	Number Fishing	Boat Days	Chinook Salmon	Chum Salmon	Coho Salmon
27	07-Jul			closed	0.0				
28	14-Jul			closed	0.0				
29	21-Jul			closed	0.0				
30	28-Jul			closed	0.0				
31	04-Aug	01-Aug	03-Aug	2	10.0	20.0	789		
32	11-Aug	08-Aug	10-Aug	2	5.0	10.0	334	8	
33	18-Aug	15-Aug	17-Aug	2	1.0	2.0	26	1	
34	25-Aug			closed	0.0				
35	01-Sep			closed	0.0				
36	08-Sep			closed	0.0				
37	15-Sep	12-Sep	14-Sep	2	5.0	10.0	7	2189	
38	22-Sep			closed	0.0				
39	29-Sep			closed	0.0				
40	06-Oct			closed	0.0				
41	13-Oct			closed	0.0				
42	20-Oct			closed	0.0				
Dawson area subtotal						42.0	1156	2198	0
Upriver commercial subtotal							195		
Total Commercial Harvest							1351	2198	
Chinook Test Fishery							767	1	
Domestic Harvest							89	3	
Estimated Recreational Harvest									
Aboriginal fishery catch							7421	2717	
TOTAL UPPER YUKON HARVEST							9628	4919	0
Old Crow AF							370	4594	

Table 5. Salmon fishery projects conducted in the Alaskan portion of the Yukon River drainage in 2001.

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 and Personal Use 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, and of the personal use fishery personal use fishery 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 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 provide scale samples
		investigate the utility of nuclear genes, microsatellites, and SINE's in identifying U.S./Canada fall chum salmon stocks.	ongoing	USGS-BRD USFWS & ADF&G	lead agency
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
Hooper Bay Subsistence Fishing Monitor	90 miles south Yukon River's South Mouth	monitor summer chum and chinook salmon run timing and abundance using subsistence catch data.	June-July	Hooper Bay Trad. Council USFWS	all aspects provide funding
Lower Yukon River 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
Lower Yukon River Drift 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.	July - Sept.	Asa'carsarmiut Trad. Council	all aspects implementation with R & E
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.
		determine feasibility of using video and time-lapse photography to improve escapement monitoring	July - Sept.	USFWS	partial funding from R & E
Yukon River Sonar	Pilot Station, RM 123	estimate chinook, summer and fall chum salmon passage in the mainstem Yukon River.	June - Sept.	ADF&G AVCP	all aspects
Lower Yukon Chum Salmon Genetic Sampling	Pilot Station, RM 123	estimate the proportion of chum salmon passing from June 29-Aug 6 as summer or fall chum	June-Aug	ADF&G	all aspects
Yukon River Chinook Salmon Tagging and Telemetry Study	mainstem Yukon River, RM 161 and	provide information on run characteristics – including stock composition, run timing and migration patterns	June-July	ADF&G	all aspects
Marshall Drift Gillnet Test Fishing	mainstem Yukon River, RM 161 and 213	determine feasibility of using drift gillnets to index timing and relative abundance of chinook salmon run.	June - July	AVCP Marshall Traditional Council	all aspects implementation with R & E

continued

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Anvik River Sonar	mile 40 Anvik River, RM 358	estimate daily escapement of summer chum salmon to 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 ACES BSFA	all aspects provided funding 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 ADF&G BSFA	all aspects provided funding 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	TCC BSFA	all aspects
Henshaw Creek Weir	mile 0 Henshaw Creek, RM 970	estimate daily escapement of chinook and summer chum salmon into Henshaw Creek; estimate age, sex, and size composition of the salmon escapement.	June - July	TCC BSFA	all aspects implementation with R & E
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
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
Kaltag Village Drift Gill Net Test Fishing	Mainstem Yukon River Kaltag, RM 451	determine feasibility of using drift gillnets to index timing and relative abundance of fall chum and coho salmon runs.	July - Sept.	City of Kaltag	all aspects implementation with R & E
Middle Yukon River Chinook Sampling Project	Mainstem Yukon River Kaltag, RM 451	estimate age, sex, and size composition of chinook salmon harvested in middle Yukon River subsistence fisheries	June - July	City of Kaltag	all aspects implementation with R & E
Nenana River Escapement Surveys	Nenana River drainage, above RM 860	aerial and ground surveys for numbers and distribution of coho and chum salmon in ten tributaries of the Nenana below Healy Creek.	Sept. - Oct.	BSFA	all aspects funding
Tanana Village South bank Yukon River Fish Wheel, Test Fishing	Mainstem Yukon River Tanana, RM 695	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 recovery.	Aug. - Sept.	ADF&G BSFA	all aspects partial funding R & E partial funding
		determine feasibility of using stored video images as an alternative to live boxes to estimate catch per unit effort on fishwheels	July - Sept.	USFWS	implementation with R & E

continued

Table 5. (page 3 of 3).

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Tanana River Fish Wheel Test Fishing	mainstem Tanana River Nenana, RM 860	index the timing of chinook, summer chum, fall chum, and coho salmon runs using test fish wheels.	June - Sept.	ADF&G BSFA	all aspects partial funding
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 Ground Survey	Toklat River, between RM 848 and 853	estimate fall chum spawning escapement in Tolkat Springs and vicinity.	mid-Oct.	ADF&G	all aspects
Toklat River Fall Chum Salmon Restoration Feasibility Study	5-A Test Fish Wheel RM 690 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.	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.	July - Aug.	BSFA	all aspects implementation with R & E
Yukon River Chum Salmon Ecology Study	Chena River and Bluff Cabin Slough	study spawning habitat and factors influencing freshwater survival	ongoing	USGS-BRD	all aspects
Ichthyophonus hoferi Feasibility Study	Emmonak, RM 20, Tanana Village, RM 695	determine feasibility of collecting samples to estimate infection rate of *Icthyophonus hoferi* fungus, and its effects on Yukon River chinook salmon.	June - July.	BSFA	all aspects
Upper Yukon River Chum Salmon Genetic Stock Identification	Upper Yukon River	establish the feasibility of using DNA marks for genetic stock identification of chum salmon in the Yukon River	Aug - Oct	USFWS	all aspects

Agency Acronyms:

ACES	= Alaska Cooperative Extension Service
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 6. List of harvest/escapement monitoring and incubation/rearing projects involving salmon in the Canadian portion of the Yukon River drainage in 2001.

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Yukon Mark-Recapture and Chinook Test Fishery	downstream of the Stewart River	- to obtain population, escapement and harvest rate estimates of chinook and chum salmon in the Canadian section of the mainstem Yukon River; - to collect stock ID, age, size, sex composition data; - to contribute to inseason run forecasting.	June - Oct	DFO YSC, YRCFA, THFN	all aspects chinook test fishery
Commercial Catch Monitoring	near Dawson City	- to determine weekly catches and effort in the Canadian commercial fishery; recovery of tags.	July - Oct	DFO	all aspects
Aboriginal Catch Monitoring	Yukon communities	- to determine weekly catches and effort in the aboriginal fishery; recovery of tags; - to implement components of the UFA.	July - Oct	LGL, Yukon First Nations DFO	joint project
Harvest Sampling	downstream of the Stewart River;	- to obtain age, size, sex composition of commercial, aboriginal, and test fish catches; - to sample for coded wire tags - to sample for Icthypphonus in Dawson area	July - Oct	DFO, LGL U of W	joint project
DFO Escapement Index Surveys	chinook and chum index streams	- to obtain escapement counts in index spawning areas.	Aug - Nov	DFO	all aspects
Escapement Surveys	throughout upper Yukon R. drainage	- to conduct mobile surveys (on foot or by helicopter) - to enumerate chinook returns to Tincup Creek, Pelly Lks. area, Swift and Morley rivers and other tributaries	July - Aug	various R&E Fund recipients including Yukon First Nations, consultants, and individuals	all aspects
Fishing Branch Weir	Fishing Branch R.	- to enumerate chum and chinook salmon returning to the Fishing Branch River and obtain age, size, tag and sex composition data.	July - Oct	VGFN DFO	chinook season chum season
Whitehorse Rapids Fishway	Whitehorse	- to enumerate wild and hatchery reared chinook returns to the Whitehorse area and obtain age, size, sex and tag composition data.	July - Aug	YFGA	all aspects
Chandindu River Weir	near Dawson City	- enumerate chinook returns to Chandindu River and obtain age, size, sex and tag composition data.	July - Aug	YRCFA	all aspects

continued

Table 6. (Page 2 of 2)
List of harvest/escapement monitoring and incubation/rearing projects involving salmon in the Canadian portion of the Yukon River drainage in 2001.

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Escapement Sampling	various tributaries	- to obtain age and size composition - to sample for Icthyophonus in Whitehorse, at DFO fish wheels, Stewart and Pelly rivers and other sites	Aug -Oct	DFO LGL/U. of Wash.	all aspects
Upper Yukon R. and Porcupine R. Chinook Radio Tag Tracking	- upper Yukon River: mstm Yukon R. near Minto and Kluane R. - Porcupine R. drainage	- to track chinook salmon tagged with transmitters at Ramparts AK. using fixed tracking stations - to collect radio tags from fisheries and weirs	June-Oct	DFO, NMFS, USFWS	joint project
Whitehorse Rapids Fish Hatchery and Coded-wire Tag Project	Whitehorse	- to incubate ~250K chinook eggs obtained at the Whitehorse Fishway; - to rear fry until spring, then mark, tag, and release upstream of Whitehorse hydroelectric facility.	ongoing	YFGA, RR, YE DFO	all aspects coded-wire tagging
MacIntyre Incubation Box and Coded-wire Tag Project	Whitehorse	- to incubate up to 120K chinook fry obtained from the Takhini River and/or Tatchun Creek; - to rear fry to taggable size, then mark, tag, and release at natal site.	ongoing	DFO WCC	technical support field work, project monitoring
Mayo Area Pilot Incubation Projects	3 ground water springs in the Mayo area	to identify a site for small scale egg incubation near Mayo	ongoing	DFO NND FN	technical support field work, project monitoring

Acronyms:

DFO	= Department of Fisheries and Oceans Canada
NMFS	= National Marine Fisheries Service
QC	= Quixote Consulting
RRDC	= Ross River Dena Council
THFN	= Tr'ondek Hwech'in First Nation
LGL	= LGL Environmental Consultants Limited
U OF W	= University of Washington
UFA	= Umbrella Final Agreement
USFWS	= U.S. Fish and Wildlife Service
VGFN	= Vuntut Gwitchin First Nation
WCC	= Whitehorse Correctional Centre
YFGA	= Yukon Fish and Game Association
RR	= Government of Yukon- Renewable Resources
YE	= Yukon Energy Corporation
YRCFA	= Yukon River Commercial Fishers Association
YSC	= Yukon Salmon Committee
NND FN	= Nacho Nyak Dun First Nation

Table 7. Proportions of the total Yukon River chinook salmon stock harvest by stock of origin.

Year	Lower [a]	Middle [b]	United States Upper [c]	Canada Upper [c]	Total Upper [c]
1981	0.054	0.545	0.313	0.088	0.401
1982	0.139	0.247	0.513	0.101	0.614
1983	0.129	0.337	0.446	0.087	0.533
1984	0.253	0.402	0.251	0.094	0.345
1985	0.276	0.223	0.409	0.092	0.501
1986	0.195	0.096	0.587	0.122	0.709
1987	0.159	0.196	0.559	0.086	0.645
1988	0.218	0.158	0.498	0.126	0.625
1989	0.244	0.159	0.494	0.102	0.597
1990	0.202	0.252	0.433	0.114	0.547
1991	0.28	0.253	0.349	0.118	0.467
1992	0.163	0.218	0.523	0.096	0.619
1993	0.215	0.254	0.439	0.092	0.531
1994	0.182	0.214	0.494	0.11	0.604
1995	0.16	0.236	0.499	0.105	0.604
1996	0.21	0.104	0.562	0.124	0.686
1997	0.264	0.168	0.482	0.086	0.568
1998	0.327	0.174	0.442	0.056	0.498
1999	0.405	0.068	0.435	0.092	0.527
2000	0.321	0.126	0.461	0.092	0.553
1981-2000 Average	0.21	0.232	0.458	0.1	0.558

[a] The Lower River stock group includes Koyukuk River stocks downstream from and including the Gisasa River, and those stocks spawning downstream from the Koyukuk River.

[b] The Middle River stock group includes all Tanana River stocks, all Koyukuk River stocks upstream from the Gisasa River, and those stocks spawning between the Koyukuk and Tanana Rivers.

[c] The Upper River stock group includes all Yukon River stocks spawning upstream from the Tanana River confluence.

Table 8. Stock identification of Yukon River chinook salmon caught in Alaska.

Total Alaska catch.

Year	Lower	Middle	Upper
1981	0.059	0.598	0.343
1982	0.154	0.275	0.571
1983	0.142	0.37	0.489
1984	0.28	0.443	0.277
1985	0.304	0.246	0.451
1986	0.223	0.109	0.668
1987	0.174	0.214	0.612
1988	0.249	0.181	0.57
1989	0.272	0.177	0.551
1990	0.228	0.284	0.488
1991	0.318	0.287	0.395
1992	0.18	0.242	0.578
1993	0.237	0.28	0.483
1994	0.204	0.241	0.555
1995	0.179	0.264	0.557
1996	0.24	0.118	0.642
1997	0.289	0.184	0.527
1998	0.347	0.185	0.468
1999	0.446	0.075	0.479
2000	0.353	0.139	0.508
1981-2000 Average	0.233	0.258	0.509

Table 9. Proportion of the Upper River stock of Yukon River chinook salmon caught in Alaska and Canada.

Year	Alaska	Canada
1981	0.781	0.219
1982	0.835	0.165
1983	0.837	0.163
1984	0.727	0.273
1985	0.816	0.184
1986	0.827	0.173
1987	0.867	0.133
1988	0.798	0.202
1989	0.829	0.171
1990	0.792	0.208
1991	0.748	0.252
1992	0.845	0.155
1993	0.826	0.174
1994	0.818	0.182
1995	0.826	0.174
1996	0.819	0.181
1997	0.848	0.152
1998	0.888	0.112
1999	0.825	0.175
2000	0.834	0.166
1981-2000 Average	0.821	0.179

Table 10. Results of 100% simulations with a genetic baseline comprising data from 8 microsatellite loci for 9 populations of Yukon River chum salmon showing proportions of allocations and misallocations by individual population and country-of-origin. Each row in the table represents the results of a 100% simulation for a population. The mean stock composition estimates are in regular font and the standard errors for each point estimate are italicized below each estimate. Estimates for the tested populations are in bold.

100% of this population..	allocated to these populations....										
⇨	U.S.			⇩		Canada					
	Chulinak	**SF Koyukuk**	**Delta**	**Chan-dalar**	**Sheen-jek**	**Fishing Br**	**Big Cr**	**Kluane**	**Teslin**	**U.S. Sum**	**Canada Sum**
Chulinak	**0.8865**	0.0714	0.0071	0.0066	0.005	0.0031	0.0084	0.0012	0.0108	0.9766	0.0235
	0.0549	*0.052*	*0.0113*	*0.0116*	*0.0089*	*0.0073*	*0.0128*	*0.0036*	*0.0139*		
SF Koyukuk	0.0767	**0.8201**	0.0174	0.0245	0.019	0.0059	0.0199	0.0014	0.0151	0.9577	0.0423
	0.041	*0.0611*	*0.0228*	*0.0282*	*0.0222*	*0.0125*	*0.0245*	*0.0031*	*0.0166*		
Delta	0.0093	0.0363	**0.8475**	0.0129	0.0321	0.0095	0.0323	0.0086	0.0115	0.9381	0.0619
	0.0126	*0.0346*	*0.0614*	*0.021*	*0.0347*	*0.0179*	*0.0351*	*0.0124*	*0.0193*		
Chandalar	0.005	0.0211	0.0099	**0.6862**	0.1306	0.0273	0.0661	0.0035	0.0501	0.8528	0.147
	0.0097	*0.0251*	*0.0138*	*0.0771*	*0.0647*	*0.034*	*0.0522*	*0.0079*	*0.0334*		
Sheenjek	0.0026	0.006	0.0215	0.1198	**0.7544**	0.0621	0.0251	0.0025	0.006	0.9043	0.0957
	0.0061	*0.0151*	*0.0244*	*0.0711*	*0.0851*	*0.056*	*0.0352*	*0.0057*	*0.0099*		
Fishing Br	0.0027	0.015	0.0087	0.007	0.0543	**0.7949**	0.0716	0.0443	0.0014	0.0877	0.9122
	0.0056	*0.0157*	*0.0138*	*0.0168*	*0.0537*	*0.0846*	*0.0545*	*0.0369*	*0.0051*		
Big Cr	0.005	0.0159	0.0172	0.0432	0.0603	0.0698	**0.743**	0.0099	0.0358	0.1416	0.8585
	0.0081	*0.019*	*0.0263*	*0.0484*	*0.0441*	*0.0548*	*0.0798*	*0.0135*	*0.0321*		
Kluane	0.0003	0.0013	0.0066	0.0097	0.0076	0.0675	0.0097	**0.8959**	0.0012	0.0255	0.9743
	0.0011	*0.0037*	*0.0144*	*0.0186*	*0.0136*	*0.051*	*0.0153*	*0.0553*	*0.0038*		
Teslin	0.0006	0.0058	0.0122	0.0337	0.0034	0.0025	0.0414	0.0004	**0.9001**	0.0557	0.9444
	0.0023	*0.0114*	*0.0162*	*0.036*	*0.008*	*0.007*	*0.044*	*0.0025*	*0.055*		

Table 11. Summary of releases and recoveries of Coded-wire Tagged Chinook Salmon from Whitehorse Hatchery, 1985 - 2001

Release Location	Release Date[a]	Code	# Tagged & Clipped[c]	Adipose Clipped Only	%Tag-Loss[a]	Days[a]	Total Clipped	Weight (grams)	Total Unclipped	Total Released
Michie	25-May-85	023248	26,670	518			27,188		0	
Michie	25-May-85	023226	28,269	518			28,787		0	
Michie	25-May-85	023247	43,325	518			43,843		0	
Wolf	1985	no-clip	0	0			0		10,520	10,520
SUM	1985		98,264	1,555			99,819		10,520	110,339
Michie	1986	023731	77,170				77,170		1,000	78,170
Wolf	1986						0		5,720	5,720
SUM	1986		77,170				77,170		6,720	83,890
Michie	05-Jun-87	024812	47,644	1,361	0.0280 [b]		49,005	2.50	9,598	58,603
Michie	05-Jun-87	024813	49,344	808	0.0160 [b]		50,152	2.50	9,141	59,293
Michie	05-Jun-87	024814	51,888	559	0.0110 [b]		52,447	2.50	9,422	61,869
Michie	05-Jun-87	024815	43,367	2,066	0.0450 [b]		45,433	2.50	7,868	53,301
Michie	05-Jun-87	024258	25,945	245	0.0090 [b]		26,190	2.50	4,171	30,361
Wolf	30-May-87	024259	26,752	123	0.0050 [b]		26,875	2.50	422	27,297
SUM	1987		244,940	5,162			250,102		40,622	290,724
Michie	10-Jun-88	025549	77,670	1,991		15	79,661	2.80	84,903	164,564
Michie	10-Jun-88	025550	78,013	1,592		11	79,605	2.70	85,288	164,893
Wolf	05-Jun-88	no-clip	0	0			0		25,986	25,986
SUM	1988		155,683	3,583			159,266		196,177	355,443
Wolf	1989	no-clip	0	0			0		22,388	22,388
Michie	06-Jun-89	026004	26,161	326	0.0150		26,487	2.30	0	26,487
Michie	06-Jun-89	026005	24,951	128	0.0040		25,079	2.30	0	25,079
Michie	06-Jun-89	026006	25,098	291	0.0180		25,389	2.40	0	25,389
Michie	06-Jun-89	026007	25,233	156	0.0008		25,389	2.20	95,724	121,113
Fishway	06-Jun-89	026008	25,194	357	0.0130		25,551	2.70	0	25,551
Fishway	06-Jun-89	026009	25,190	351	0.0125		25,541	2.70	0	25,541
SUM	1989		151,827	1,609			153,436		118,112	271,548
Wolf	06-Jun-90	no-clip	0	0			0		11,969	11,969
Michie	02-Jun-90	020238	24,555	501	0.0200		25,056	2.30	0	25,056
Michie	02-Jun-90	020239	24,345	753	0.0300		25,098	2.30	0	25,098
Fishway	02-Jun-90	020260	24,508	501	0.0200		25,009	2.20	0	25,009
Fishway	02-Jun-90	020263	25,113	254	0.0100		25,367	2.20	0	25,367
SUM	1990		98,521	2,009			100,530		11,969	112,499
Wolf	08-Jun-91	180322	49,477	793	0.0150		50,270	2.30	0	50,270
Fishway	06-Jun-91	180323	52,948	193	0.0025		53,141	2.30	0	53,141
Michie	06-Jun-91	180324	50,020	176	0.0025		50,196	2.30	87,348	137,544
SUM	1991		152,445	1,162			153,607		87,348	240,955
Wolf	04-Jun-92	180829	48,239	0	0.0000		48,239	2.40	0	48,239
Fishway	04-Jun-92	180828	49,356	99	0.0020		49,455	2.30	0	49,455
Michie	04-Jun-92	180830	52,946	643	0.0120		53,589	2.20	249,166	302,755
SUM	1992		150,541	742			151,283		249,166	400,449
Wolf	06-Jun-93	181215	50,248	0	0.0000		50,248	2.30	0	50,248
Fishway	06-Jun-93	181216	49,957	434	0.0090		50,391	2.30	0	50,391
Michie	06-Jun-93	181217	50,169	0	0.0000		50,169	2.30	290,647	340,816
SUM	1993		150,374	434			150,808		290,647	441,455
Wolf	02-Jun-94	181427	50,155	270	0.0053		50,425	2.30	0	50,425
Michie	02-Jun-94	181428	50,210	127	0.0002		50,337	2.30	158,780	209,117
Fishway	02-Jun-94	181429	50,415	125	0.0002		50,540	2.30	0	50,540
SUM	1994		150,780	522			151,302		158,780	310,082
Wolf	06-Jun-95	181246	10,067	164	0.0163	3	10,231	1.67	0	10,231
Wolf	06-Jun-95	181247	9,122	0	0.0000	3	9,122	1.53	0	9,122
Michie	06-Jun-95	181826	25,231	337	0.0134	3	25,568	2.47	4,552	30,120
Michie	06-Jun-95	181827	25,187	141	0.0056	3	25,328	2.33	0	25,328
SUM	1995		69,607	642			70,249		4,552	74,801
Wolf	26-May-96	18748	10,131	102	0.0010	5	10,233	2.30	0	10,233
Fox	04-Jun-96	182823	35,452	0	0.0000	5	35,452	2.43	0	35,452
Byng	04-Jun-96	181041	25,263	516	0.0020	5	25,779	2.37	0	25,779
Michie	05-Jun-96	183345	50,082	1,022	0.0020	5	51,104	2.51	0	51,104
Michie	05-Jun-96	183346	50,260	508	0.0010	5	50,768	2.43	0	50,768
Michie	05-Jun-96	183347	49,985	505	0.0010	5	50,490	2.32	0	50,490
Judas	04-Jun-96	183348	49,798	1,016	0.0020	5	50,814	2.43	0	50,814
McClintock	04-Jun-96	183349	49,991	302	0.0010	5	50,293	2.27	0	50,293
SUM	1996		320,962	3,971			324,933		0	324,933

continued

Table 11. Page 2 of 2.

Release Location	Release Date[a]	Code	# Tagged & Clipped[c]	Adipose Clipped Only	"a Tag-Loss"	Days[a]	Total Clipped	Weight (grams)	Total Unclipped	Total Released
Wolf	01-Jun-97	182325	14,850	150		2	15,000	2.30	0	15,000
Wolf	01-Jun-97	182326	20,334	0		4	20,334		0	20,334
Wolf	08-Jun-97	182906	10,158	0		8	10,158		0	10,158
Fox	11-Jun-97	182554	25,242	0		3	25,242	2.43	0	25,242
Fox	11-Jun-97	182555	24,995	253		3	25,248		0	25,248
Byng	11-Jun-97	182907	10,029	0		1	10,029	2.37	0	10,029
Byng	11-Jun-97	182905	10,155	0		1	10,155		0	10,155
Michie	11-Jun-97	182859	49,657	502		3	50,159	2.51	0	50,159
Michie	11-Jun-97	182860	50,130	0		3	50,130	2.43	0	50,130
Judas	07-Jun-97	182327	19,951	202		3/7	20,153	2.43	0	20,153
Judas	11-Jun-97	182553	25,146	0		11	25,146	2.43	0	25,146
McClintock	11-Jun-97	182551	25,399	0		3	25,399	2.27	0	25,399
McClintock	11-Jun-97	182552	24,792	251		3	25,043		0	25,043
SUM	1997		310,838	1,358			312,196		0	312,196
Michie	12-Jun-98	184122	49,243	1,004	0.0200	5	50,247	2.84	0	50,247
Michie	12-Jun-98	184121	49,197	1,004	0.0200	5	50,201	2.81	0	50,201
Byng	12-Jun-98	183160	24,518	1,022	0.0400	5	25,540	3.00	0	25,540
McClintock	12-Jun-98	184043	49,810	503	0.0100	5	50,313	2.76	0	50,313
Judas	13-Jun-98	025417	19,018	1,432	0.0700	5	20,450	2.55	0	20,450
Judas	12-Jun-98	183159	25,331	256	0.0100	5	25,587	2.60	0	25,587
Wolf	06-Jun-98	021958	10,104	421	0.0400	5	10,525	1.95	0	10,525
Wolf	04-Jun-98	024606	34,813	710	0.0200	5	35,523	2.63	0	35,523
SUM	1998		262,034	6,352			268,386		0	268,386
Michie	06-Jun-99			80,393			80,393	3.13	0	80,393
Byng	06-Jun-99			64,430			64,430	2.92	0	64,430
McClintock	06-Jun-99			64,169			64,169	2.95	0	64,169
Wolf	06-Jun-99			31,048			31,048	3.07	0	31,048
SUM	1999			240,040			240,040		0	240,040
Michie	08-Jun-00	183128	25,114	254	0.0100	5	25,368	2.80	0	25,368
Michie	08-Jun-00	183129	25,037	253	0.0100	5	25,290	2.80	0	25,290
Michie	08-Jun-00	184303	10,907	110	0.0100	5	11,017	2.84	0	11,017
McClintock	08-Jun-00	181354	25,041	254	0.0100	5	25,295	2.70	0	25,295
McClintock	08-Jun-00	181355	25,016	253	0.0100	5	25,269	2.68	0	25,269
Wolf	04-Jun-00	182353	25,071	253	0.0100	5	25,324	2.67	0	25,324
Wolf	04-Jun-00	182354	25,012	254	0.0100	5	25,266	2.40	0	25,266
SUM	2000		161,198	1,631			162,829		0	162,829
Michie	08-Jun-01	184416	25,318	256	0.0100	5	25,574	2.68	0	25,574
Michie	08-Jun-01	184417	27,293	276	0.0100	5	27,569	2.68	0	27,569
Michie	08-Jun-01	184418	27,337	276	0.0100	5	27,613	2.60	0	27,613
Michie	08-Jun-01	184419	11,629	117	0.0100	5	11,746	2.60	0	11,746
McClintock	08-Jun-01	184412	24,526	248	0.0100	5	24,774	3.13	0	24,774
McClintock	08-Jun-01	184413	25,033	253	0.0100	5	25,286	3.13	0	25,286
McClintock	08-Jun-01	183650	10,840	110	0.0100	5	10,950	3.13	0	10,950
Byng	08-Jun-01	184414	25788	260	0.0100	5	26,048	2.84	0	26,048
Byng	08-Jun-01	184415	25,136	254	0.0100	5	25,390	2.84	0	25,390
Wolf	28-May-01	184410	26,205	265	0.0100	5	26,470	3.34	0	26,470
Wolf	28-May-01	184411	23,902	241	0.0100	5	24,143	3.34	0	24,143
SUM	2001		253,007	2,556			255,563		0	255,563
TOTAL			2,808,191	273,328			3,081,519		1,174,613	4,256,132

b: unknown period.
c: usually corresponds to "tagged" category on MRP release forms
Non-CWT groups not recorded. 1985-1986.
CWT Data recorded from CWT release sheets 1989-94.
CWT Data prior to 1987 not verified against SEP records.
* release year = brood year + 1

Table 12. United States harvests of Yukon River Upper Run chinook salmon stocks, 1982-2000.

	Age Group						
Year	3	4	5	6	7	8	Total
1982	1,534	2,201	9,216	55,781	17,945	564	87,241
1983	15	950	9,406	72,897	13,588	138	96,994
1984	0	1,055	5,241	28,973	9,448	18	44,735
1985	0	986	7,321	61,008	16,074	384	85,773
1986	560	5,045	23,612	42,046	25,537	793	97,593
1987	69	4,821	10,150	79,003	20,660	555	115,258
1988	223	10,176	22,992	15,936	33,849	1,473	84,649
1989	347	9,574	23,080	41,594	11,381	822	86,798
1990	0	15,253	20,161	31,277	6,134	171	72,996
1991	0	1,168	24,236	29,347	6,351	108	61,210
1992	36	3,537	17,406	73,181	3,032	69	97,261
1993	5	7,878	20,167	40,646	10,055	64	78,815
1994	140	3,358	45,651	41,608	4,771	138	95,666
1995	6	3,453	13,478	77,829	4,228	18	99,012
1996	1	997	46,729	26,656	14,447	68	88,898
1997	0	3,252	15,657	70,653	2,600	0	92,162
1998	0	283	16,759	23,381	6,515	9	46,947
1999	0	1,619	13,308	44,241	1,008	0	60,176
2000	0	65	5,322	10,656	2,613	0	18,656

Table 13. Canadian harvests of Yukon River chinook salmon catch by age, 1982-2000. [a]

	Age Group						
Year	3	4	5	6	7	8	Total
1982	0	726	2,840	8,888	4,353	0	16,808
1983	0	209	2,026	13,358	3,159	0	18,752
1984	0	1,587	4,074	8,306	2,328	0	16,295
1985	0	38	1,973	12,621	4,386	134	19,151
1986	0	0	3,087	9,262	7,606	109	20,064
1987	0	859	2,215	10,418	3,930	143	17,563
1988	0	1,319	3,894	8,147	7,190	777	21,327
1989	0	171	1,785	11,529	3,762	173	17,419
1990	0	4,602	6,362	6,729	1,196	90	18,980
1991	0	1,085	10,420	7,711	1,228	0	20,444
1992	0	2,678	6,087	8,978	61	0	17,803
1993	0	5,048	5,043	5,492	860	27	16,469
1994	95	2,693	11,938	5,419	645	0	20,790
1995	0	2,814	5,323	11,496	459	0	20,091
1996	0	1,369	9,196	7,423	1,558	0	19,546
1997	0	1,590	2,778	10,572	778	0	15,717
1998	0	195	2,889	2,141	614	0	5,838
1999	0	0	2,428	9,869	158	0	12,455
2000	0	25	1,156	2,881	587	0	4,649

[a] Excludes Aboriginal harvests of Old Crow.

Table 14. Yukon River Canadian chinook salmon escapement historical age composition, 1982-2000.

	Age Group						
Year	3	4	5	6	7	8	Total
1982	0	689	3,379	10,789	4,902	32	19,790
1983	0	429	3,906	20,271	4,359	24	28,989
1984	0	2,188	6,686	14,334	4,395	12	27,616
1985	0	26	1,119	7,131	2,379	75	10,730
1986	0	38	2,585	7,571	5,987	234	16,415
1987	0	603	1,542	7,948	3,014	153	13,260
1988	0	1,091	4,793	8,036	8,039	1,159	23,118
1989	0	415	3,976	15,181	5,274	354	25,201
1990	0	352	7,916	23,580	5,778	73	37,699
1991	0	56	5,472	12,178	3,011	26	20,743
1992	25	276	6,514	17,443	1,078	45	25,382
1993	40	465	7,180	16,989	3,884	0	28,558
1994	122	134	9,740	13,011	2,883	0	25,890
1995	0	369	4,032	25,155	2,706	0	32,262
1996	5	93	10,130	14,409	3,773	0	28,409
1997	0	330	3,883	28,263	5,207	0	37,683
1998	16	119	7,716	7,496	1,404	0	16,750
1999	6	47	1,645	9,336	119	0	11,153
2000	7	71	3,490	7,948	1,050	0	12,566

Table 15. Yukon River Canadian chinook salmon total run by brood year, and escapement by year, 1982-2000 and R/S.

Brood	Age Group by Brood Year								
Year	3	4	5	6	7	8	Total	Escapement	R/S
1974						596			
1975					27,200	162			
1976				75,458	21,106	30			
1977			15,435	106,526	16,170	593			
1978		3,616	15,339	51,614	22,839	1,137			
1979	1,534	1,588	16,001	80,761	39,130	851	139,865		
1980	15	4,830	10,412	58,878	27,604	3,409	105,149		
1981	0	1,050	29,283	97,369	49,078	1,348	178,128		
1982	0	5,083	13,907	32,119	20,417	333	71,860	19,790	
1983	560	6,282	31,679	68,304	13,109	134	120,067	28,989	
1984	69	12,586	28,842	61,587	10,590	114	113,788	27,616	
1985	223	10,160	34,439	49,236	4,171	91	98,319	10,730	
1986	347	20,207	40,128	99,601	14,798	138	175,220	16,415	
1987	0	2,309	30,007	63,126	8,298	18	103,759	13,260	
1988	0	6,491	32,390	60,038	7,393	68	106,380	23,118	
1989	61	13,392	67,329	114,480	19,778	0	215,040	25,201	
1990	45	6,185	22,833	48,488	8,585	9	86,145	37,699	
1991	357	6,635	66,054	109,487	8,532	0	191,067	20,743	
1992	6	2,459	22,318	33,018	1,285	0	59,087	25,382	
1993	6	5,172	27,364	63,446	4,250	0	100,237	28,558	
1994	0	596	17,381	21,485			39,463	25,890	
1995	16	1,666	9,968				11,649	32,262	
1996	6	161					167	28,409	
1997	7						7	37,683	
1998								16,750	
1999								11,153	
2000								12,566	
Average							120,081	23,125	5.2

Contrast	2.5

Table 16. Summary of Releases of Chinook Salmon from Yukon Territory In-stream Incubation/Rearing Sites 1991-2001

PROJECT	SPECIES	BROOD YEAR	STOCK	MARK	STAGE	RELEASE SITE	START DATE	END DATE	# TAGGED	# AD ONLY	# UN-MARKED	TOTAL REL.	WT. (GM)
Klondike R. Nor	chinook	1990	Tatchun R	0201010212	Spring Fry	Tatchun R	91/06/28	91/06/28	13593	21	650	14264	0.74
Klondike R. Nor	chinook chinook	1990	Tatchun R	0201010209	Spring Fry	Tatchun R	91/06/28	91/06/28	15247	173	750	16170	0.74
Klondike R. Nor	chinook	1991	Tatchun R	180645	Spring Fry	Tatchun R	/ /	92/08/31	11734	0	817	12551	2.47
Klondike R. Nor	chinook	1991	Tatchun R	023356	Spring Fry	Tatchun R	/ /	92/08/31	6453	0	852	7305	2.47
Klondike R. Nor	chinook chinook	1991	Tatchun R	180644	Spring Fry	Tatchun R	/ /	92/08/31	11585	0	320	11905	2.47
Klondike R. Nor	chinook chinook	1991	Yukon R	NOCN9148	Spring Fry	Pothole Lk	92/06/	92/06/	0	0	1500	1500	0
Klondike R. Nor	chinook chinook	1993	Klondike R Nor	0201010503	Spring Fry	Klondike R Nor	94/06/30	94/06/30	6174	10	54	6238	0.88
Klondike R. Nor	chinook	1993	Tatchun R	0201010407	Spring Fry	Tatchun R	94/06/30	94/06/30	12077	246	71	12394	0.99
Klondike R. Nor	chinook chinook	1993	Tatchun R	0201010505	Spring Fry	Tatchun R	94/06/30	94/06/30	9982	0	61	10043	0.99
Klondike R. Nor	chinook	1994	Klondike R Nor	0201010603	Spring Fry	Klondike R Nor	95/07/04	95/07/04	2159	11	190	2360	0.75
Klondike R. Nor	chinook chinook	1994	Klondike R Nor	0201010602	Spring Fry	Klondike R Nor	95/07/04	95/07/04	1809	16	56	1881	0.75
Klondike R. Nor	chinook	1994	Tatchun R	0201010511	Spring Fry	Tatchun R	95/07/04	95/07/04	12431	100	686	13217	0.81
Klondike R. Nor	chinook	1994	Tatchun R	0201010515	Spring Fry	Tatchun R	95/07/04	95/07/04	2490	33	177	2700	0.81
Klondike R. Nor	chinook	1994	Tatchun R	0201010601	Spring Fry	Tatchun R	95/07/04	95/07/04	1476	19	155	1650	0.81
Klondike R. Nor	chinook chinook	1994	Tatchun R	0201010513	Spring Fry	Tatchun R	95/07/04	95/07/04	11649	238	413	12300	0.81
Klondike R. Nor	chinook chinook	1995	Klondike R Nor	0201010408	Spring Fry	Klondike R Nor	96/06/22	96/06/22	11423	1707	0	13130	0.76
Mayo River	chinook	1991	Mayo R	NOCN9147	Spring Fry	Mayo R	92/06/	92/06/	0	0	13000	13000	0
Mayo River	chinook chinook	1992	Mayo R	NOCN9292	Spring Fry	Mayo R	93/07/	93/07/	0	0	500	500	0
McIntyre Cr	chinook	1990	Takhini R	023355	Fall Fry 5-8 gm	Takhini R	91/09/13	91/09/13	7967	80	39	8086	3.2
McIntyre Cr	chinook chinook	1990	Takhini R	023354	Fall Fry 5-8 gm	Takhini R	91/09/13	91/09/13	10789	109	101	10999	3.2
McIntyre Cr	chinook	1991	Takhini R	0201010308	Spring Fry	Flat Cr	/ /	92/07/04	12141	143	3425	15709	0.98
McIntyre Cr	chinook	1991	Takhini R	0201010309	Spring Fry	Flat Cr	/ /	92/07/04	13102	466	1398	14966	0.98
McIntyre Cr	chinook chinook	1991	Takhini R	0201010310	Spring Fry	Flat Cr	/ /	92/07/04	4955	261	601	5817	0.98
McIntyre Cr	chinook	1992	Klondike R Nor	0201010404	Spring Fry	Klondike R Nor	93/07/01	93/07/01	12832	240	144	13216	1.14
McIntyre Cr	chinook chinook	1992	Klondike R Nor	0201010405	Spring Fry	Klondike R Nor	93/07/01	93/07/01	7546	256	167	7969	1.14
McIntyre Cr	chinook	1992	Takhini R	023424	Spring Fry	Flat Cr	93/08/17	93/08/17	9532	823	95	10450	2.71
McIntyre Cr	chinook	1992	Takhini R	023423	Spring Fry	Flat Cr	93/08/17	93/08/17	9822	850	218	10890	2.71
McIntyre Cr	chinook	1992	Takhini R	181454	Spring Fry	Flat Cr	93/08/17	93/08/17	10925	567	227	11719	2.71
McIntyre Cr	chinook	1992	Takhini R	181453	Spring Fry	Flat Cr	93/08/17	93/08/17	10658	865	226	11749	2.71
McIntyre Cr	chinook	1992	Takhini R	020217	Spring Fry	Flat Cr	93/08/17	93/08/17	2291	114	37	2442	2.71
McIntyre Cr	chinook	1992	Takhini R	023422	Spring Fry	Flat Cr	93/08/17	93/08/17	10355	314	40	10709	2.71
McIntyre Cr	chinook chinook	1992	Tatchun R	0201010402	Spring Fry	Tatchun R	93/06/17	93/06/17	4654	633	335	5622	0.76
McIntyre Cr	chinook	1993	Takhini R	181751	Spring Fry	Flat Cr	94/08/26	94/08/31	7410	46	222	7678	2.6
McIntyre Cr	chinook	1993	Takhini R	181750	Spring Fry	Flat Cr	94/08/26	94/08/31	11227	40	87	11354	2.6
McIntyre Cr	chinook	1993	Takhini R	181749	Spring Fry	Flat Cr	94/08/26	94/08/31	11071	159	142	11372	2.6
McIntyre Cr	chinook	1993	Takhini R	181748	Spring Fry	Flat Cr	94/08/26	94/08/31	11375	0	104	11479	2.6
McIntyre Cr	chinook	1993	Takhini R	181752	Spring Fry	Flat Cr	94/08/26	94/08/31	10668	21	198	10887	2.6
McIntyre Cr	chinook	1993	Takhini R	020216	Spring Fry	Takhini R	94/08/30	94/08/30	9343	271	36	9650	2.8
McIntyre Cr	chinook chinook	1993	Takhini R	020163	Spring Fry	Takhini R	94/08/30	94/08/30	10899	222	62	11183	2.8
McIntyre Cr	chinook	1994	Takhini R	0201010415	Spring Fry	Takhini R	95/08/14	95/08/14	9887	0	410	10297	2.2
McIntyre Cr	chinook	1994	Takhini R	0201010413	Spring Fry	Takhini R	95/08/14	95/08/14	14452	0	365	14817	2.2
McIntyre Cr	chinook	1994	Takhini R	0201010412	Spring Fry	Flat Cr	95/08/14	95/08/14	14193	59	281	14533	2.2
McIntyre Cr	chinook chinook	1994	Takhini R	0201010414	Spring Fry	Flat Cr	95/08/14	95/08/14	13586	130	295	14011	2.2
McIntyre Cr	chinook	1995	Takhini R	0201010508	Spring Fry	Takhini R	96/08/12	96/08/12	15731	251	496	16478	2.1
McIntyre Cr	chinook	1995	Takhini R	0201010509	Spring Fry	Takhini R	96/08/12	96/08/12	8085	41	293	8419	2.1
McIntyre Cr	chinook chinook	1995	Takhini R	0201010510	Spring Fry	Flat Cr	96/08/07	96/08/07	10727	65	170	10962	2.01
McIntyre Cr	chinook	1995	Tatchun R	0201010210	Spring Fry	Tatchun R	96/06/27	96/06/27	14530	49	62	14641	0.81
McIntyre Cr	chinook chinook	1995	Tatchun R	0201010211	Spring Fry	Tatchun R	96/06/27	96/06/27	13526	91	294	13911	0.81
McIntyre Cr	chinook	1996	Takhini R	0201010614	Spring Fry	Flat Cr	97/07/02	97/07/04	15622	158	382	16162	0.8
McIntyre Cr	chinook	1996	Takhini R	0201010406	Spring Fry	Flat Cr	97/07/02	97/07/04	14845	37	280	15162	0.8

continued

Table 16. Page 2 of 2.

PROJECT	SPECIES	BROOD YEAR	STOCK	MARK	STAGE	RELEASE SITE	START DATE	END DATE	# TAGGED	# AD ONLY	# UN-MARKED	TOTAL REL.	WT. (GM)
McIntyre Cr	chinook	1996	Tatchun R	0201010703	Spring Fry	Tatchun R	97/06/27	97/06/27	1521	15	148	1684	1
McIntyre Cr	chinook	1997	Tatchun R	0201010608	Spring Fry	Tatchun R	98/06/19	98/06/19	9284	150	74	9508	1.1
McIntyre Cr	chinook	1997	Tatchun R	0201010609	Spring Fry	Tatchun R	98/06/19	98/06/19	10318	211	188	10717	1.1
McIntyre Cr	chinook	1997	Tatchun R	0201010702	Spring Fry	Tatchun R	98/06/19	98/06/19	2536	52	0	2588	1.1
McIntyre Cr	chinook	1997	Takhini R	0201010709	Spring Fry	Flat Cr	98/06/22	98/06/22	11374	115	115	11604	1.1
McIntyre Cr	chinook	1997	Takhini R	0201010611	Spring Fry	Takhini R	98/06/23	98/06/23	12933	334	118	13385	1.1
McIntyre Cr	chinook	1997	Takhini R	0201010610	Spring Fry	Takhini R	98/06/23	98/06/23	12186	37	115	12338	1.1
McIntyre Cr	chinook	1997	Takhini R	0201010708	Spring Fry	Takhini R	98/06/23	98/06/23	12341	253	148	12742	1.1
McIntyre Cr	chinook	1998	Tatchun Cr.	0201010612	Spring Fry	Tatchun		99/07/08	10363	0	67	10430	
McIntyre Cr	chinook	1998	Tatchun Cr.	0201010613	Spring Fry	Tatchun		99/07/08	4733	0	82	4815	
McIntyre Cr	chinook	1998	Takhini R.	201010710	Spring Fry	Takhini R.		99/07/14	13753	28	148	13929	
McIntyre Cr	chinook	1998	Takhini R.	201010711	Spring Fry	Flat Cr.		99/07/15	11273	23	206	11502	
McIntyre Cr	chinook	1999	Takhini River	201010707	Spring Fry	Flat Cr.		06/23/00	11332.53	114.47	219	11666	0.8
McIntyre Cr	chinook	1999	Takhini River	201010712	Spring Fry	Flat Cr.		06/23/00	12246	0	214	12460	0.8
McIntyre Cr	chinook	1999	Takhini River	201010604	Spring Fry	Takhini River		06/24/00	11105	0	147	11252	0.9
McIntyre Cr	chinook	1999	Takhini River	201010605	Spring Fry	Takhini River		06/24/00	12044	0	88	12132	0.9
McIntyre Cr	chinook	1999	Takhini River	201010606	Spring Fry	Takhini River		06/24/00	4561	0	0	4561	0.9
McIntyre Cr	chinook	1999	Tatchun Cr.	201010705	Spring Fry	Tatchun		06/19/00	12239.34	187.66	409	12836	1
McIntyre Cr	chinook	1999	Tatchun Cr.	0201010706	Spring Fry	Tatchun		06/19/00	987.03	9.97	0	997	1
McIntyre Cr	chinook	2000	Takhini River	201010801	Spring Fry	Takhini River		07/25/01	11724	163	123	12010	1.1
McIntyre Cr	chinook	2000	Takhini River	201010802	Spring Fry	Flat Creek		07/26/01	9995	101	60	10156	1.1
McIntyre Cr	chinook	2000	Tatchun Cr.	201010705	Spring Fry	Tatchun		07/09/01	11654	360.42	10	12024.42	1.1
McIntyre Cr	chinook	2000	Tatchun Cr.	0201010706	Spring Fry	Tatchun		07/09/01	6321	329	14	6664	1.1

Table 17. Coded-wire tagged Yukon River chinook salmon recoveries in the U.S. groundfish fisheries.

Brood Year	Tag Number	Date Tagged	Date Recovered	Location	
				Lat.	Long.
1988	26006	Jun-89	25-Mar-92	56 44	173 15
1990	180322	Jun-91	14-Mar-94	60 06	178 58
1991	180830	Jun-92	24-Feb-95	55 19	164 43
1992	181215	Jun-93	06-Dec-94	56 52	171 18
1992	181216	Jun-93	02-Jun-97	59 29	167 49
1993	181428	Jun-94	10-Mar-98	59 26	178 05
1995	183348	Jun-96	30-Mar-99	57 43	173 34
1995	182554	Jun-97	16-Mar-00	55 56	168 52
1995	182823	Jun-96	29-Mar-98	58 56	178 06

Table 18. Regional stock composition estimates (%) of chum salmon from four studies using genetic stock identification.

	Region of Origin			
Area Sampled	Asia	Western Alaska Summer Run	Fall Yukon	Alaska Peninsula	PWS/SE Alaska/ BC/Washington
Okhotsk Sea[1]					
1993	90.6	7.9	0	1	0.5
Western North Pacific[1]					
1993	86.7	8.2	0	5.1	0.1
1996	93.7	2.3	0	2.5	1.5
1997	77.9	11.1	0	11.1	0
1998	82.1	7.6	0	5.4	4.9
(Sample seized from F/V *Ying Fa* 1999)[5]	87.8	2	0	8.1	2.1
(Sample seized from F/V *Arctic Wind* 2000)[6]	77	11	0	6	5
Central North Pacific[1]					
1996	78.9	12.9	0	6.6	1.6
Eastern North Pacific[1,4] (Gulf of Alaska)					
1996	15.7	14.8	0	13.1	56.6
(Central Gulf of Alaska					
1998 (49-52°N, 145°W)	10.9	15.1	0.4	28.8	44.9
1998 (53-56°N, 145°W)	15.1	13.2	0.7	21.6	49.4
1998 (49-56°N, 145°W)	11.2	14.5	0.4	24.7	49.6
(Western Gulf of Alaska)					
1998 (45-50°N, 165°W	77.8	13	0.3	3.9	5
Off Vancouver Island[1]					
1995	18.9	0.7	0	21.4	59.1
Central Bering Sea[1]					
1996	79.6	4.3	0	15.5	0.7
Bering Sea [2] (Trawl Bycatch)					
1994	46.9	22.3	3.6	3	24.2
1995	36.7	31.4	6.3	1.7	23.9
Area M (False Pass) Shumagin[3]					
1994	34	44	3	8	9
1995	25	52	1	8	12
1996	34	36	2	19	10
South Unimak[3]					
1993	22	59	1	7	11
1994	27	57	2	9	6
1995	26	65	1	3	7
1996	23	40	5	17	14

Sources: [1] Urawa et al. 1998. [2] Wilmot et al. 1997. [3] Seeb et al. 1997. [4] Urawa et al. 1999. [5] Wilmot et al. 1999. [6] Wilmot et al., 2000.

Table 19. 2001 Total Combined S. Unimak and Shumagin Island (False Pass), June 6-30.

AREAS INCLUDE: 282-00 THRU 282-99 AND 284-39 THRU 285-40

TOTALS ALL GEAR TYPE:

Catch			Chinook		Sockeye		Coho		Pinks		Chums	
	Permits	Landings	NO.	lbs	NO.	lbs	NO.	lbs	NO.	lbs	NO.	lbs
13-Jun	4	4	133	3,459	8,422	48,819	0	0	260	663	2,491	18,299
15-Jun	4	4	60	1,370	5,706	32,286	0	0	1,044	2,228	3,384	22,709
20-Jun	93	93	38	873	32,849	195,077	0	0	7,135	17,453	11,609	77,731
23-Jun	46	48	36	707	35,023	200,592	0	0	1,898	5,468	9,412	62,634
24-Jun	28	34	48	755	14,820	82,568	2	16	1,636	5,156	5,009	33,983
25-Jun	1	1	2	28	312	2,033	0	0	197	591	214	1,505
27-Jun	37	43	20	328	28,596	172,832	0	0	10,582	32,316	9,774	69,378
30-Jun	44	47	11	230	22,860	139,408	0	0	15,596	51,262	7,020	49,775
TOTAL	**131**	**274**	**348**	**7,750**	**148,588**	**873,615**	**2**	**16**	**38,348**	**115,137**	**48,913**	**336,014**

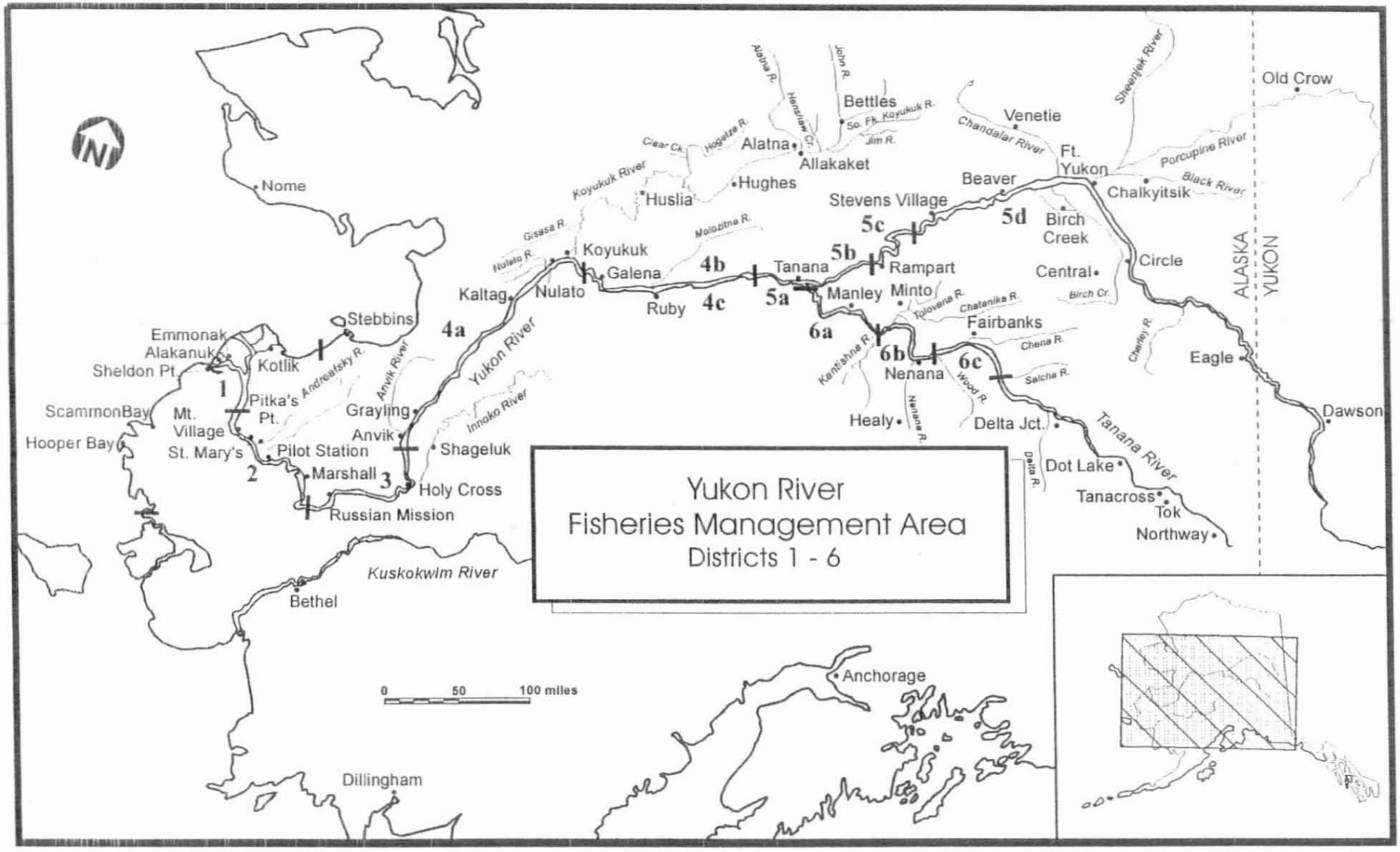


Figure 1. Map of the Alaska portion of the Yukon River Drainage.

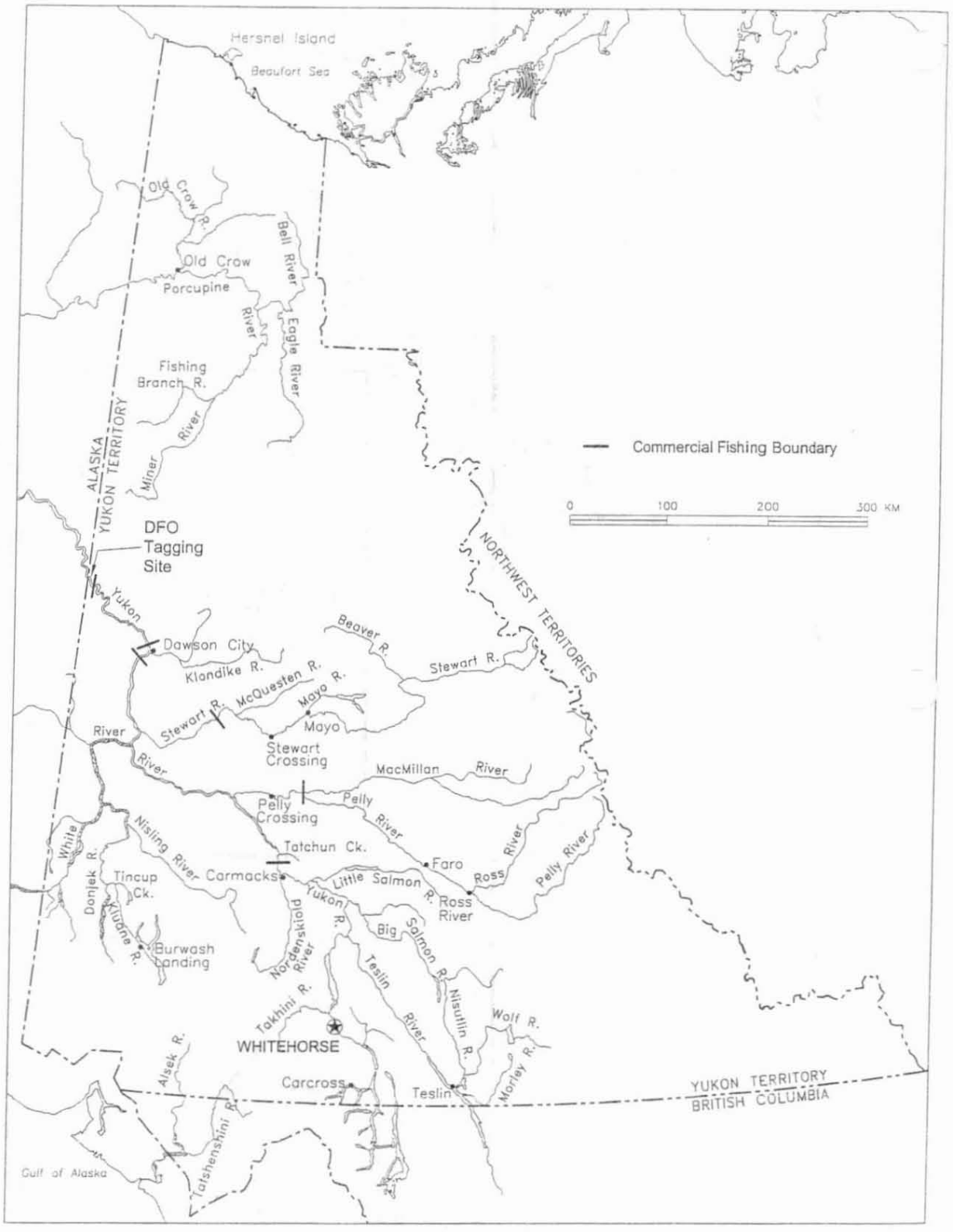


Figure 2. Map of the Canadian portion of the Yukon River showing commercial fishing boundaries

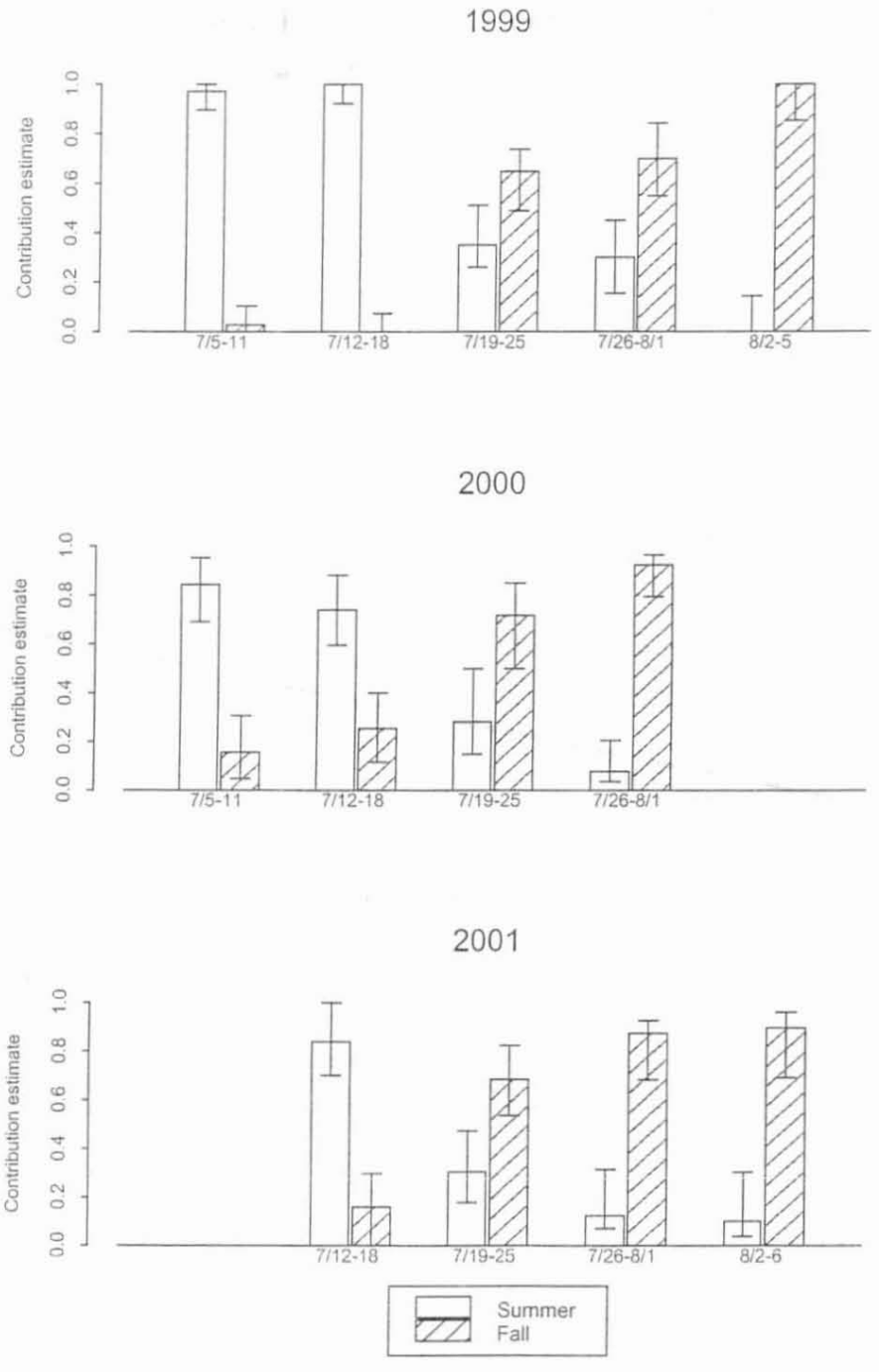


Figure 3. Draft contribution estimates for summer and fall run chum salmon sampled from species apportionment gillnetting at Pilot Station Sonar 1999-2001. Contributions were estimated using genetic stock identification.

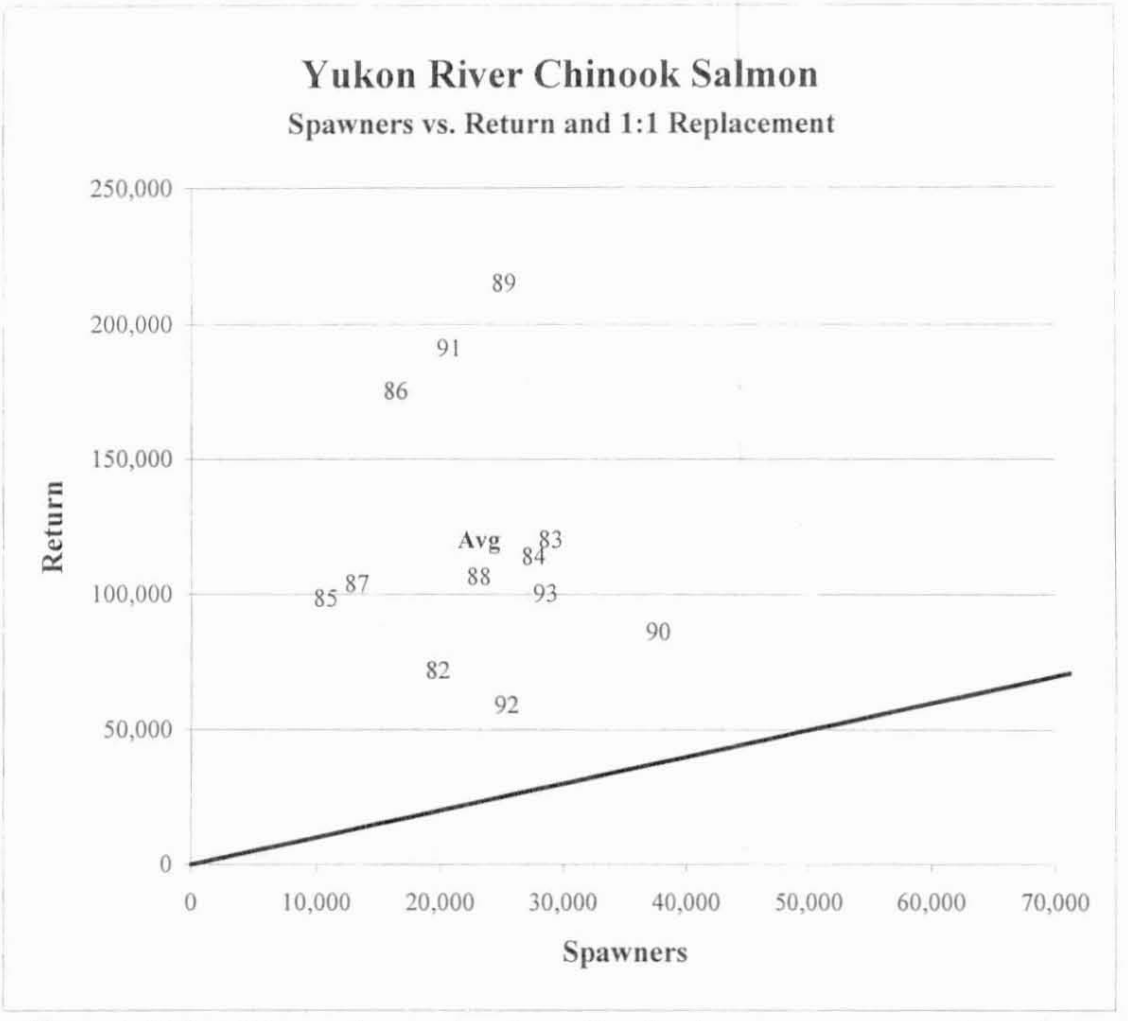


Figure 4. Yukon River mainstem Canadian chinook salmon spawners vs. estimated returns, and the 1:1 replacement line.

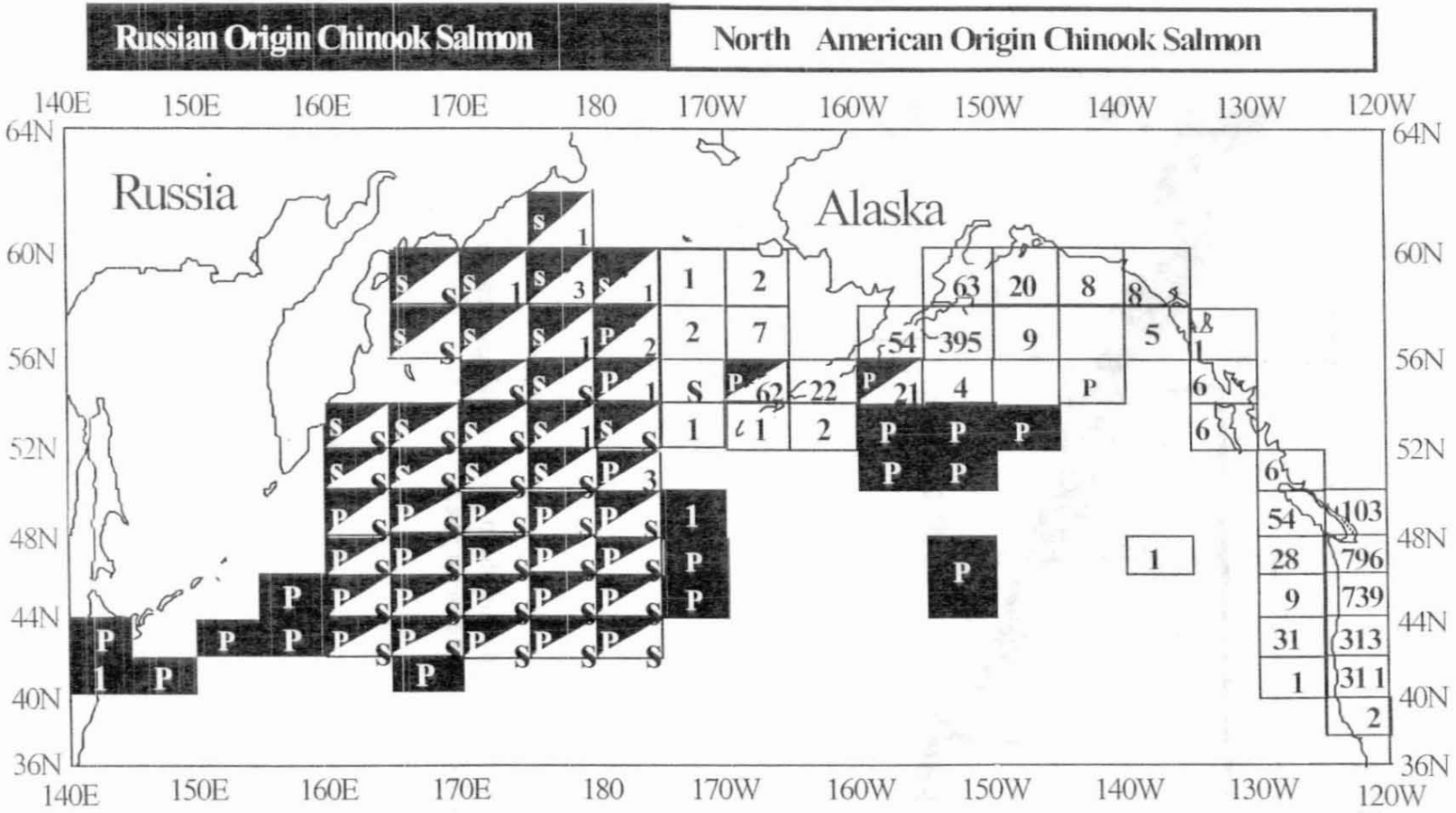


Figure 5. Ocean distribution of Russian (black areas) and North American (white areas) chinook salmon shown by International North Pacific Fisheries Commission (INPFC) 2°-latitude by 5° longitude statistical areas. If tagging experiments prove occurrence, the number of recoveries is shown. The high-seas salmon tag (1953-1997) and coded-wire tag (1983-1997) recovery databases are archived at the FRI. If there is not information from tagging, then a P means occurrence is hypothesized from detection of Myxobolus spp. parasite "tags", andan S means a statistically significant estimate for the stock group was obtained in NMFS and FRI scale-pattern analyses. Scale pattern estimates stratified by INPFC statistical subareas are applied to all 2°-latitude by 5°-longitude strata within that subarea.

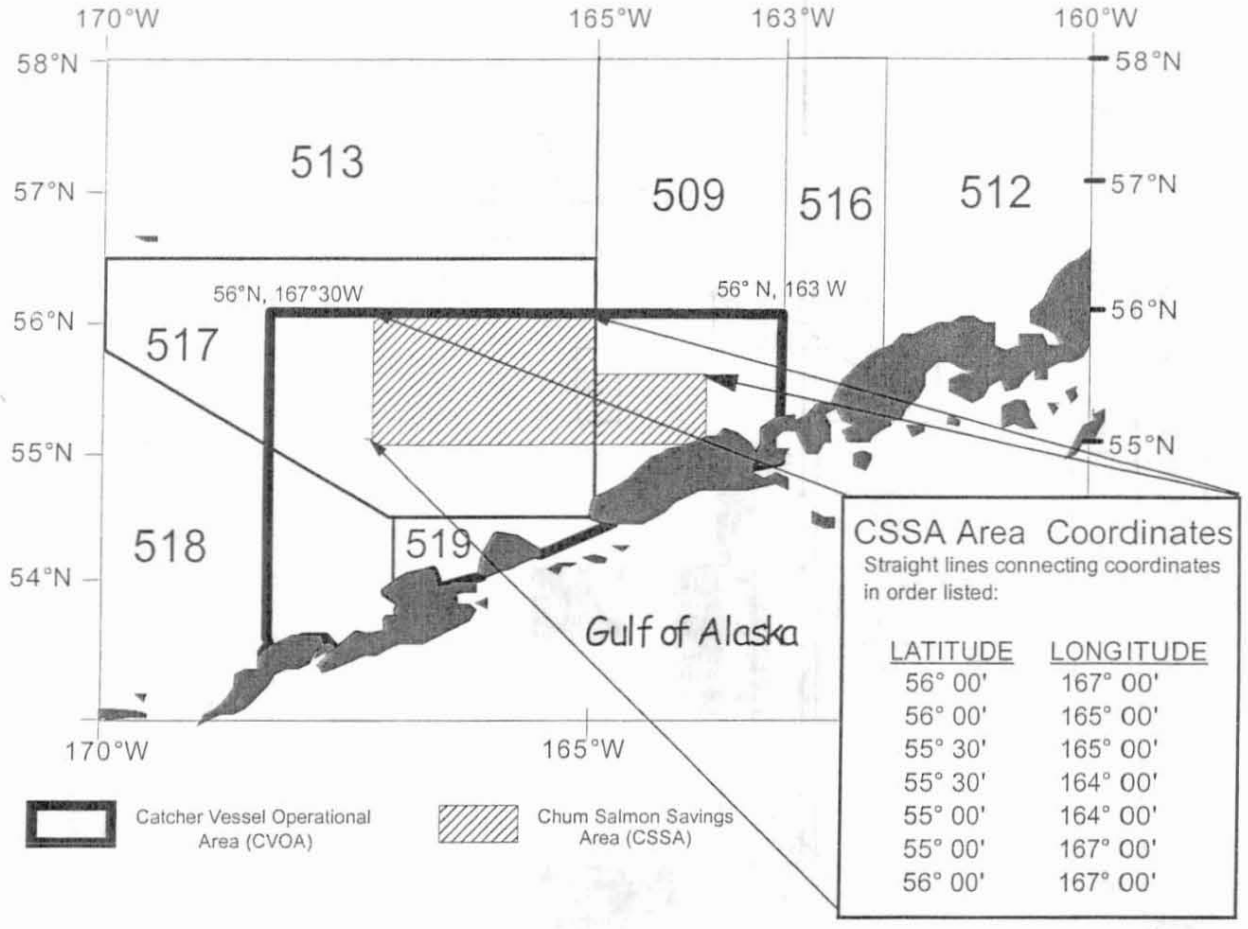


Figure 6. Statistical reporting areas and chum salmon savings area for the U. S. groundfish fisheries in the Bering Sea.

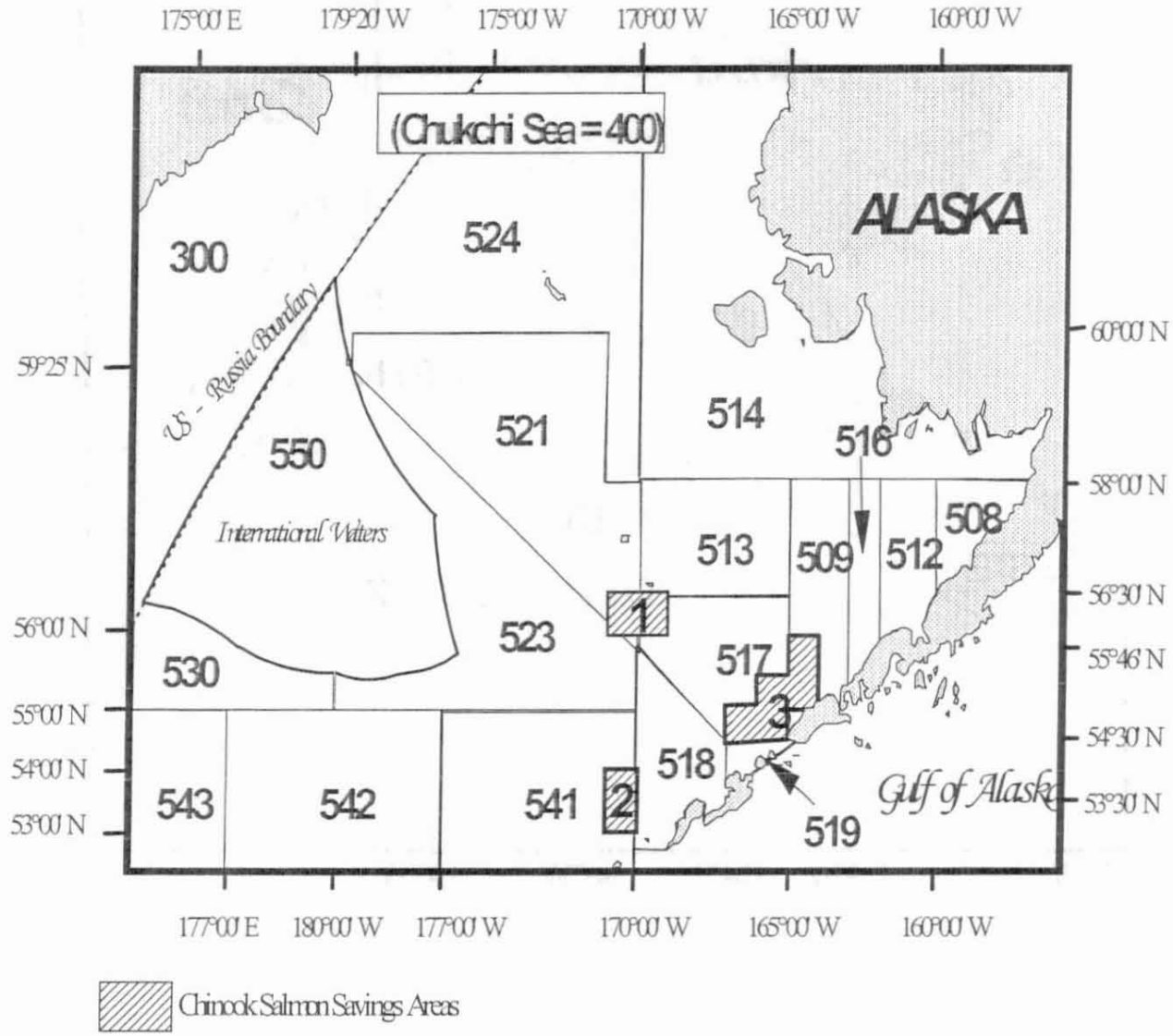


Figure 7. Statistical reporting areas and chinook salmon saving areas for the U. S. groundfish fisheries in the Bering Sea.

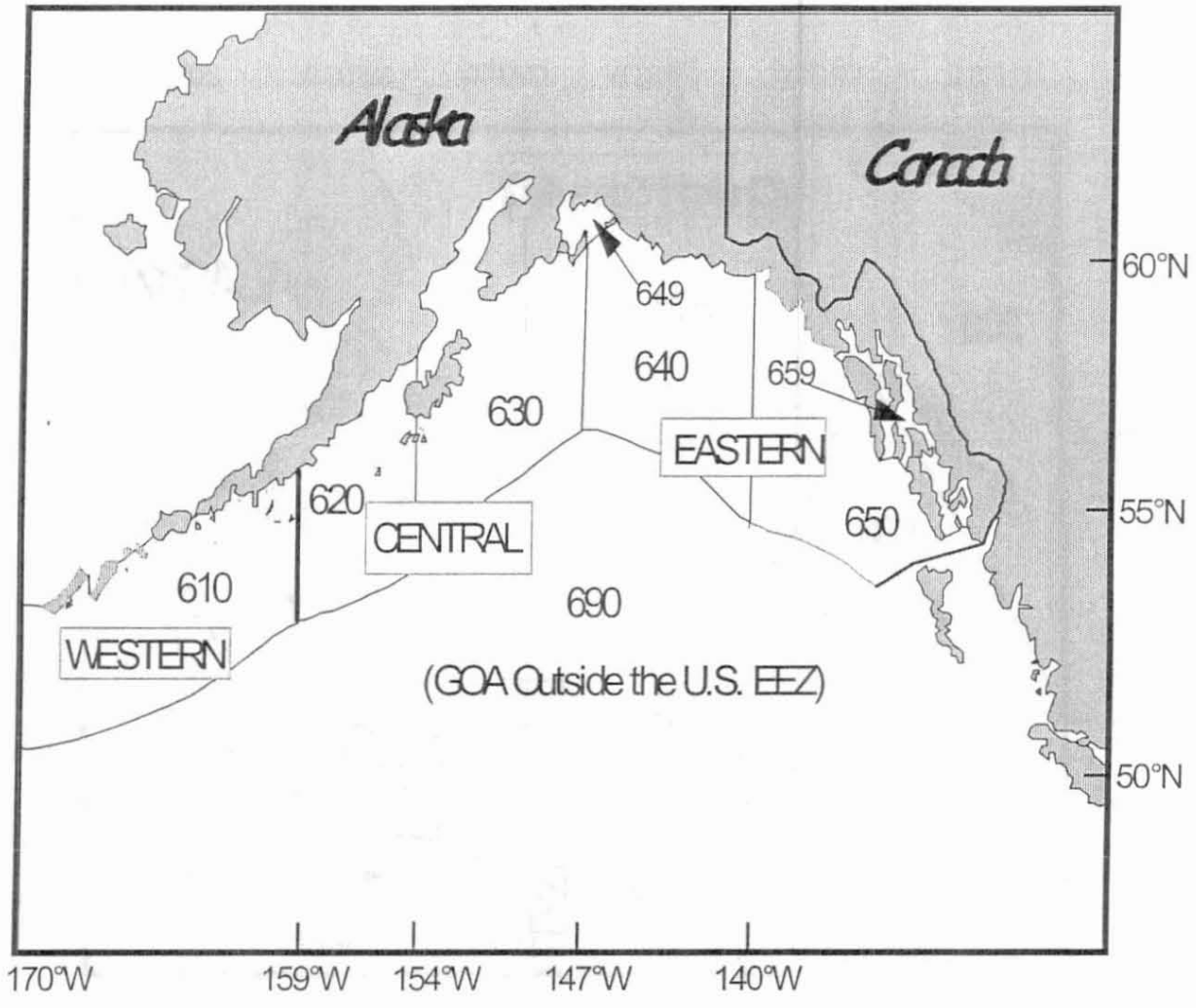


Figure 8. Statistical reporting areas for the U.S. groundfish fisheries in the Gulf of Alaska (GOA).

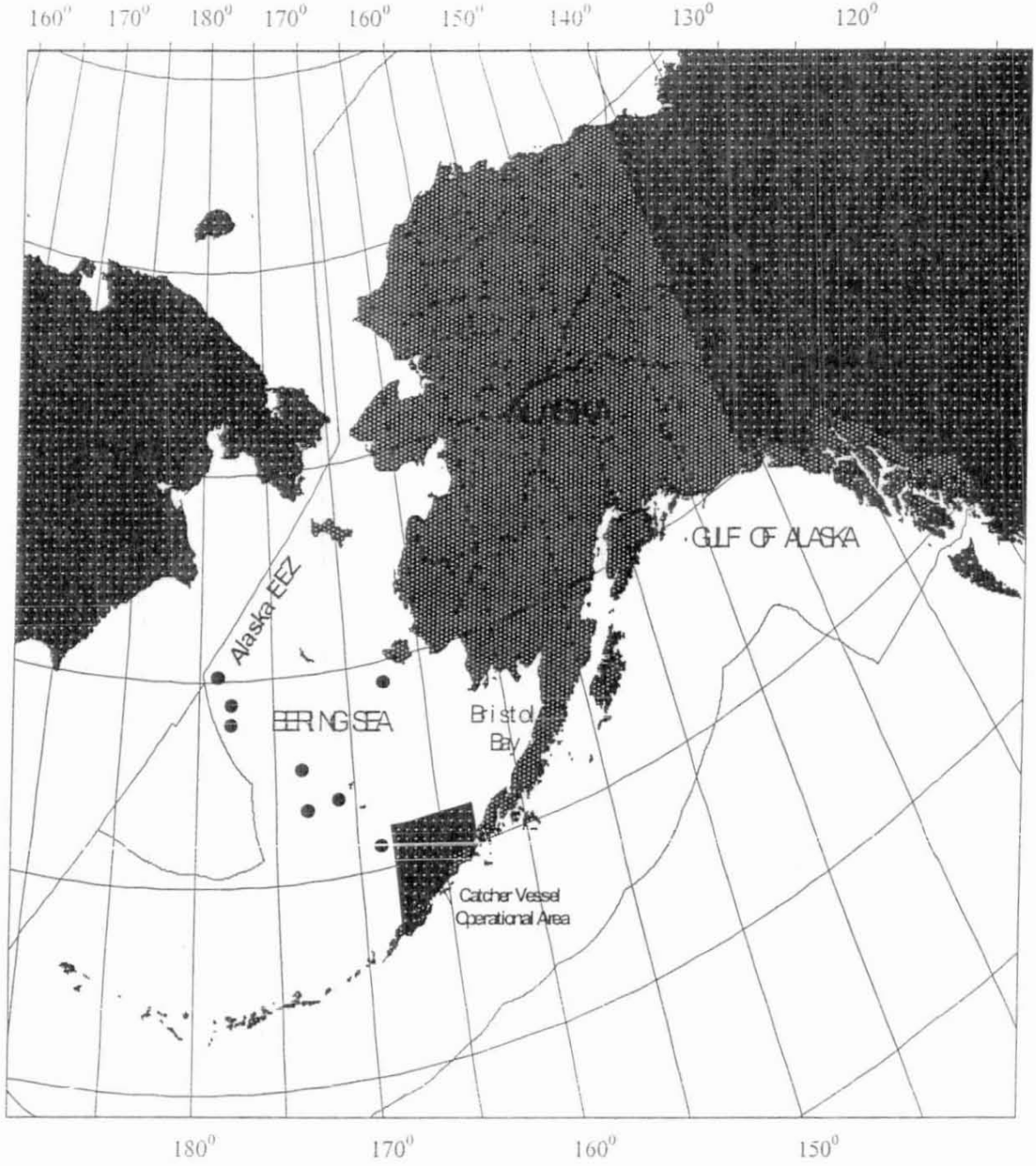


Figure 9. Locations of the recoveries of coded-wire tagged Yukon River chinook salmon in the Bering Sea trawl fishery.

Appendix Table 1. Alaskan and Canadian total utilization of Yukon River chinook, chum and coho salmon, 1903-2001.

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

continued

Appendix Table 1. (page 2 of 2).

Year	Alaska [a, b]			Canada [c]			Total		
	Chinook	Other Salmon	Total	Chinook	Other Salmon	Total	Chinook	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	2,311,214	2,459,635	21,427	33,915 [d]	55,342	169,848	2,345,129	2,514,977
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	19,227	34,302 [d]	53,529	168,660	1,087,653	1,256,313
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	342,197	505,275	16,611	14,150 [d]	30,761	179,689	356,347	536,036
1994	172,315	577,233	749,548	21,218	38,340	59,558	193,533	615,573	809,106
1995	177,663	1,437,837	1,615,500	20,887	46,109	66,996	198,550	1,483,946	1,682,496
1996	138,562	1,121,181	1,259,743	19,612	24,395	44,007	158,174	1,145,576	1,303,750
1997	174,625	544,879	719,504	16,528	15,878	32,406	191,153	560,757	751,910
1998	99,369	199,735	299,104	5,937 [h]	8,115	14,052	105,306	207,850	313,156
1999	124,315	234,221	358,536	12,569	19,506	32,075	136,884	253,727	390,611
2000	46,536	122,749	169,285	4,879 [i]	9,273	14,152	51,415	132,022	183,437
2001 [f]	0 [g]	0 [g]	0	10,096	9,512	19,608	10,096	9,512	19,608
Average									
1903-90	83,308	794,194	742,385	7,653	17,410	15,860	78,549	778,101	691,304
1991-00	141,931	677,872	819,802	15,675	23,273	38,948	157,606	701,145	858,750
1996-00	116,681	444,553	561,234	11,905	15,433	27,338	128,586	459,986	588,573

[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] Data are preliminary.
[g] Subsistence, Personal use, Aboriginal and Sport Fish harvest data are unavailable at this time.
[h] Catch includes 737 chinook salmon taken in the test fishery.
[i] Catch includes 761 chinook salmon taken in the mark-recapture test fishery.

Appendix Table 2. Alaskan catch of Yukon River chinook salmon, 1961-2001

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	43,827	43,521	91,890	3,151	138,562
1997	57,060	56,291	116,421	1,913	174,625
1998	54,171	54,090	44,625	654	99,369
1999	52,699	52,525	70,767	1,023	124,315
2000	37,346	37,421	9,115	[g]	46,536
2001 [g]	[h]	[h]	0	[h]	0
Average					
1961-90	27,919	27,905	109,461	755	137,718
1991-00	51,175	50,545	89,941	1,605	141,931
1996-00	49,021	48,770	66,564	1,685	116,681

[a] Includes salmon harvested for subsistence purposes, and 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 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 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] Data are preliminary.

[h] Data are unavailable at this time.

Appendix Table 3. Alaskan catch of Yukon River summer chum salmon, 1961-2001.

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	311,742	198,824	1,620,269	1,037	1,820,130
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]	106,054	141,985	564	248,603
1994	245,973 [g]	132,494	261,953	350	394,797
1995	221,308 [g]	119,503	824,487	1,174	945,164
1996	248,856 [g]	103,408	689,542	1,854	794,804
1997	177,506	97,500	230,842	475	328,817
1998	86,275	86,088	31,817	421	118,326
1999	71,040	70,705	29,412	555	100,672
2000	82,194	82,224	7,272	[h]	89,496
2001	[h]	[h]	0	[h]	0
Average					
1961-90	226,898	188,411	545,317	800	734,101
1992-01	180,981	104,201	342,489	860	369,303
1997-01	133,174	87,985	197,777	826	127,462

[a] Includes salmon harvested for subsistence purposes, and 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 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 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 estimated because catches of species other than chinook salmon were not differentiated.

[g] Subsistence harvest, summer chum salmon commercially harvested for the production of salmon roe in District 5 and 6, and the estimated subsistence use of commercially-harvested summer chum salmon in District 4.

[h] Data are unavailable at this time.

Appendix Table 4. Value of commercial salmon fishery to Yukon Area fishermen, 1977-2000.

	Summer Season							Fall Season							
	Chinook			Summer Chum				Fall Chum			Coho				
	Lower Yukon	Upper Yukon		Lower Yukon	Upper Yukon		Total	Lower Yukon	Upper Yukon		Lower Yukon	Upper Yukon		Total	Total
Year	Value	Value	Subtotal	Value	Value	Subtotal	Season	Value	Value	Subtotal	Value	Value	Subtotal	Season	Value
1977	1,841,033	148,766	1,989,799	1,007,280	306,481	1,313,761	3,303,560	718,571	102,170	820,741	140,914	2,251	143,165	963,906	4,267,466
1978	2,048,674	66,472	2,115,146	2,071,434	655,738	2,727,172	4,842,318	691,854	103,091	794,945	96,823	6,105	102,928	897,873	5,740,191
1979	2,763,433	124,230	2,887,663	2,242,564	444,924	2,687,488	5,575,151	1,158,485	347,814	1,506,299	83,466	6,599	90,065	1,596,364	7,171,515
1980	3,409,105	113,662	3,522,767	1,027,738	627,249	1,654,987	5,177,754	394,162	198,088	592,250	17,374	2,374	19,748	611,998	5,789,752
1981	4,420,669	206,380	4,627,049	2,741,178	699,876	3,441,054	8,068,103	1,503,744	356,805	1,860,549	87,385	4,568	91,953	1,952,502	10,020,605
1982	3,768,107	162,699	3,930,806	1,237,735	452,837	1,690,572	5,621,378	846,492	53,258	899,750	135,828	18,786	154,614	1,054,364	6,675,742
1983	4,093,562	105,584	4,199,146	1,734,270	281,883	2,016,153	6,215,299	591,011	128,950	719,961	17,497	11,472	28,969	748,930	6,964,229
1984	3,510,923	102,354	3,613,277	926,922	382,776	1,309,698	4,922,975	374,359	103,417	477,776	256,050	12,823	268,873	746,649	5,669,624
1985	4,294,432	82,644	4,377,076	1,032,700	593,801	1,626,501	6,003,577	634,616	178,125	812,741	176,254	26,797	203,051	1,015,792	7,019,369
1986	3,165,078	73,363	3,238,441	1,746,455	634,091	2,380,546	5,618,987	399,321	30,309	429,630	211,942	556	212,498	642,128	6,261,115
1987	5,428,933	136,196	5,565,129	1,313,618	323,611	1,637,229	7,202,358	0	0	0	0	0	0	0	7,202,358
1988	5,463,800	142,284	5,606,084	5,001,100	1,213,991	6,215,091	11,821,175	638,700	151,300	790,000	734,400	34,116	768,516	1,558,516	13,379,691
1989	5,181,700	108,178	5,289,878	2,217,700	1,377,117	3,594,817	8,884,695	713,400	223,996	937,396	323,300	33,959	357,259	1,294,655	10,179,350
1990	4,820,859	105,295	4,926,154	497,571	506,611	1,004,182	5,930,336	238,165	174,965	413,130	137,302	37,026	174,328	587,458	6,517,794
1991	7,128,300	97,140	7,225,440	782,300	627,177	1,409,477	8,634,917	438,310	157,831	596,141	300,182	21,556	321,738	917,879	9,552,796
1992	9,957,002	168,999	10,126,001	606,976	525,204	1,132,180	11,258,181	0	54,161	54,161	0	19,529	19,529	73,690	11,331,871
1993	4,884,044	113,217	4,997,261	226,772	203,762	430,534	5,427,795	0	0	0	0	0	0	0	5,427,795
1994	4,169,270	124,270	4,293,540	79,206	396,685	475,891	4,769,431	0	8,517	8,517	0	8,739	8,739	17,256	4,786,687
1995	5,317,508	87,059	5,404,567	241,598	1,060,322	1,301,920	6,706,487	185,036	167,571	352,607	80,019	11,292	91,311	443,918	7,150,405
1996	3,491,582	47,282	3,538,864	89,020	966,277	1,055,297	4,594,161	48,579	45,438	94,017	96,795	13,020	109,815	203,832	4,797,993
1997	5,450,433	110,713	5,561,146	56,535	96,806	153,341	5,714,487	86,526	7,252	93,778	79,973	1,062	81,035	174,813	5,889,300
1998	1,911,370	17,285	1,928,655	26,415	821	27,236	1,955,891	0	0	0	0	0	0	0	1,955,891
1999	4,950,522	74,475	5,024,997	19,687	1,720	21,407	5,046,404	35,639	876	36,515	3,620	0	3,620	40,135	5,086,539
2000	725,606		725,606	8,633		8,633	734,239	0	0	0	0	0	0	0	734,239
5 Year Average															
1995-1999	4,224,283	67,363	4,291,646	86,651	425,189	511,840	4,803,486	71,156	44,227	115,383	52,081	5,075	57,156	172,540	4,976,026

Appendix Table 5. Number of commercial salmon fishing gear permit holders by district and season, Yukon Area, 1971-2000. [a]

Chinook and Summer Chum Salmon Season

	Lower Yukon Area				Upper Yukon Area				Yukon Area
Year	District 1	District 2	District 3	Subtotal [b]	District 4	District 5	District 6	Subtotal	Total
1971	405	154	33	592	-	-	-	-	592
1972	426	153	35	614	-	-	-	-	614
1973	438	167	38	643	-	-	-	-	643
1974	396	154	42	592	27	31	20	78	670
1975	441	149	37	627	93	52	36	181	808
1976	453	189	42	684	80	46	29	155	839
1977	392	188	46	626	87	41	18	146	772
1978	429	204	22	655	80	45	35	160	815
1979	425	210	22	657	87	34	30	151	808
1980	407	229	21	657	79	35	33	147	804
1981	448	225	23	696	80	43	26	149	845
1982	450	225	21	696	74	44	20	138	834
1983	455	225	20	700	77	34	25	136	836
1984	444	217	20	613	54	31	27	112	725
1985	425	223	18	666	74	32	27	133	799
1986	441	239	7	672	75	21	27	123	795
1987	440	239	13	659	87	30	24	141	800
1988	456	250	22	678	95	28	33	156	834
1989	445	243	16	687	98	32	29	159	846
1990	453	242	15	679	92	27	23	142	821
1991	489	253	27	678	85	32	22	139	817
1992	438	263	19	679	90	28	19	137	816
1993	448	238	6	682	75	30	18	123	805
1994	414	250	7	659	55	28	20	103	762
1995	439	233	0	661	87	28	21	136	797
1996	448	189	9	627	87	23	15	125	752
1997	457	188	0	639	39	29	15	83	722
1998	434	231	0	643	0	18	10	28	671
1999	412	217	5	631	5	26	6	37	668
2000	350	214	-	562	-	-	-	-	562
5-Year Average 1995-1999	438	212	3	640	44	25	13	82	722

Fall Chum and Coho Salmon Season

	Lower Yukon Area				Upper Yukon Area				Yukon Area
Year	District 1	District 2	District 3	Subtotal [b]	District 4	District 5	District 6	Subtotal	Total
1971	352	-	-	352	-	-	-	-	352
1972	353	75	3	431	-	-	-	-	431
1973	445	183		628	-	-	-	-	628
1974	322	121	6	449	17	23	22	62	511
1975	428	185	12	625	44	33	33	110	735
1976	422	194	28	644	18	36	44	98	742
1977	337	172	37	546	28	34	32	94	640
1978	429	204	28	661	24	43	30	97	758
1979	458	220	32	710	31	44	37	112	822
1980	395	232	23	650	33	43	26	102	752
1981	462	240	21	723	30	50	30	110	833
1982	445	218	15	678	15	24	25	64	742
1983	312	224	18	554	13	29	23	65	619
1984	327	216	12	536	18	39	26	83	619
1985	345	222	13	559	22	39	25	86	645
1986	282	231	14	510	1	21	16	38	548
1987	0	0	0	0	0	0	0	0	0
1988	328	233	13	563	20	20	32	72	635
1989	332	229	22	550	20	24	28	72	622
1990	301	227	19	529	11	11	27	49	578
1991	319	238	19	540	8	21	25	54	594
1992	0	0	0	0	0	0	22	22	22
1993	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	1	11	12	12
1995	189	172	0	357	4	12	20	36	393
1996	158	109	0	263	1	17	17	35	298
1997	176	130	0	304	3	8	0	11	315
1998	0	0	0	0	0	0	0	0	0
1999	146	110	0	254	4	0	0	4	258
2000	-	-	-	-	-	-	-	-	-
5-Year Average 1995-1999	105	82	0	185	2	8	10	19	204

continued

Appendix Table 5 (page 2 of 2).

	Combined Season								
	Lower Yukon Area				Upper Yukon Area				Yukon Area
Year	District 1	District 2	District 3	Subtotal [b]	District 4	District 5	District 6	Subtotal	Total
1971	473	154	33	660	-	-	-	27	687
1972	476	153	35	664	-	-	-	-	664
1973	529	205	38	772	-	-	-	47	819
1974	485	190	42	717	28	43	27	98	815
1975	491	197	39	727	95	57	46	198	925
1976	482	220	44	746	96	62	56	214	960
1977	402	208	54	609	96	53	39	188	797
1978	472	221	29	650	82	53	38	173	823
1979	461	230	33	661	90	49	40	179	840
1980	432	247	27	654	88	51	38	177	831
1981	507	257	26	666	94	56	31	181	847
1982	455	244	22	664	76	53	27	156	820
1983	458	235	26	655	79	47	31	157	812
1984	453	236	26	676	58	45	33	136	812
1985	434	247	24	666	76	48	33	157	823
1986	444	259	18	672	75	30	27	132	804
1987	440	239	13	659	87	30	24	141	800
1988	460	260	24	683	97	35	38	170	853
1989	452	257	23	687	99	38	32	169	856
1990	459	258	22	679	92	31	30	153	832
1991	497	272	29	680	85	33	28	146	826
1992	438	263	19	679	90	28	25	143	822
1993	448	238	6	682	75	30	18	123	805
1994	414	250	7	659	55	28	20	103	762
1995	446	254	0	664	87	31	24	142	806
1996	455	217	9	628	87	29	19	135	763
1997	463	221	0	640	39	31	15	85	725
1998	434	231	0	643	0	18	10	28	671
1999	422	238	5	632	6	26	6	38	670
2000	350	214	-	562	-	-	-	-	562
5-Year Average 1995-1999	442	235	3	647	54	27	18	99	745

[a] Number of permit holders which made at least one delivery.

[b] Since 1984 the subtotal for the Lower Yukon Area was the unique number of permits fished. Before 1984, the subtotals are additive for Districts 1, 2, and 3. Some individual fishermen in the Lower Yukon Area may have operated in more than one district during the year.

Appendix Table 6. Alaskan catch of Yukon River fall chum salmon, 1961-2001.

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 [j]	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	146,154	129,222	107,347	236,569
1997	96,899	95,425	59,054	154,479
1998	62,869	62,869	0	62,869
1999	89,999	89,998	20,371	110,369
2000	18,920	18,920	0	18,920
2001	[k]	[k]	0	0
Average				
1961-90	125,754	122,859	178,269	301,128
1991-00	106,284	98,107	75,753	173,860
1996-00	82,968	79,287	37,354	116,641

[a] Includes salmon harvested for subsistence purposes, and 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 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 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 estimated because catches of species other than chinook salmon were not differentiated.

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

[k] Data are unavailable at this time.

Appendix Table 7. Alaskan catch of Yukon River coho salmon, 1961-2001.

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	0 [h]	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 [j]	1,666	63,195
1993	15,772	15,772	0	897	16,669
1994	48,926	44,594	4,451	2,174	51,219
1995	29,716	28,642	47,206	1,278	77,126
1996	33,651	30,510	57,710	1,588	89,808
1997	24,295	24,295	35,818	1,470	61,583
1998	17,781	17,781	1	758	18,540
1999	20,970	20,970	1,601	609	23,180
2000	14,333	14,333	0	[k]	14,333
2001 [k]			0		
Average					
1961-90	23,021	22,913	26,197	823	49,494
1991-00	29,968	28,621	26,605	1,468	56,547
1996-00	22,206	21,578	19,026	1,106	41,489

[a] Includes salmon harvested for subsistence purposes, and 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 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 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] Catches estimated because catches of species other than chinook were not differentiated.
[g] Minimum estimates because surveys were conducted before 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] Commercial fishery operated only in District 6, the Tanana River.
[k] Data are unavailable at this time.

Appendix Table 8. Alaskan and Canadian total utilization of Yukon River chinook and fall chum salmon, 1961-2001.

	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	19,227	149,433	168,660	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	20,887	177,663	198,550	45,600	415,547	461,147
1996	19,612	138,562	158,174	24,354	236,569	260,923
1997	16,528	174,625	191,153	15,580	154,479	170,059
1998	5,937	99,369	105,306	7,901	62,869	70,770
1999	12,569	124,315	136,884	19,506	110,369	129,875
2000	4,879	46,536	51,415	9,236	18,920	28,156
2001 [f]	10,096	0	10,096 [f]	9,512 [h]	0 [h]	9,512
Average						
1961-90	11,297	137,718	149,015	18,315	301,128	319,443
1992-01	15,675	141,931	141,089	23,051	173,860	196,911
1997-01	11,905	116,681	98,971	15,315	116,641	131,957

[a] Catches 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] Data are 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.

Appendix Table 9. Canadian catch of Yukon River chinook salmon, 1961-2001.

Year	Mainstem Yukon River Harvest					Total	Porcupine River Aboriginal Fishery Harvest	Total Canadian Harvest
	Commercial	Aboriginal Fishery	Sport [a]	Test Fishery	Combined Non-Commercial			
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	3,342			3,748	5,556	75	5,631
1975	3,000	2,500			2,900	5,900	100	6,000
1976	3,500	1,000			1,500	5,000	25	5,025
1977	4,720	2,247			2,778	7,498	29	7,527
1978	2,975	2,485			2,906	5,881		5,881
1979	6,175	3,000			4,200	10,375		10,375
1980	9,500	7,546	300		11,346	20,846	2000	22,846
1981	8,593	8,879	300		9,416	18,009	100	18,109
1982	8,640	7,433	300		8,168	16,808	400	17,208
1983	13,027	5,025	300		5,725	18,752	200	18,952
1984	9,885	5,850	300		6,410	16,295	500	16,795
1985	12,573	5,800	300		6,578	19,151	150	19,301
1986	10,797	8,625	300		9,267	20,064	300	20,364
1987	10,864	6,069	300		6,699	17,563	51	17,614
1988	13,217	7,178	650		8,110	21,327	100	21,427
1989	9,789	6,930	300		7,630	17,419	525	17,944
1990	11,324	7,109	300		7,656	18,980	247	19,227
1991	10,906	9,011	300		9,538	20,444	163	20,607
1992	10,877	6,349	300		6,926	17,803	100	17,903
1993	10,350	5,576	300		6,119	16,469	142	16,611
1994	12,028	8,089	300		8,762	20,790	428	21,218
1995	11,146	7,945	700		8,945	20,091	796	20,887
1996	10,164	8,451	790		9,382	19,546	66	19,612
1997	5,311	8,888	1,230		10,406	15,717	811	16,528
1998	390	4,687	0	737	5,448	5,838	99	5,937
1999	3,160	8,804	278		9,295	12,455	114	12,569
2000	0	4,068	0	761	4,829	4,829	50	4,879
2001 [b]	1,351	7,421	98	767	8,375	9,726	370	10,096
Average								
1961-90	5,779	4,841	332		5,308	11,087	233	11,297
1991-00	7,433	7,187	420		7,965	15,398	277	15,675
1996-00	3,805	6,980	460		7,872	11,677	228	11,905

[a] Sport fish harvest unknown prior to 1980.

[b] Data are preliminary.

Appendix Table 10. Canadian catch of Yukon River fall chum salmon, 1961-2001.

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	1,260	1,260	21,329	3,025	24,354
1997	8,068	0	1,218	1,218	9,286	6,294	15,580
1998	0	0	1,742	1,742	1,742	6,159	7,901
1999	10,402	0	3,104	3,104	13,506	6,000	19,506
2000	1,319	0	2,917	2,917	4,236	5,000	9,236
2001	2,198	3	2,717	2,720	4,918	4,594	9,512
Average							
1961-90	9,978	1,088	2,590	3,120	13,098	5,397	18,315
1991-00	16,665	0	2,406	2,406	19,071	3,980	23,051
1996-00	7,972	0	2,048	2,048	10,020	5,296	15,315

Appendix Table 11. Chinook salmon escapement counts for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1961-2001.[a]

Year	Andreafsky River			Anvik River		Nulato River			Gisasa River		Chena River			Salcha River		
	East Fork		West Fork	River	Index Area	North Fork	South Fork	Mainstem	River		River		Index Area	River		Index Area
	Aerial	Tower or Weir	Aerial	Aerial [b]	Aerial [b]	Aerial [c]	Aerial	Tower	Aerial	Weir	Population Estimate [m]	Aerial	Aerial [c]	Population Estimate [m]	Aerial	Aerial [c]
1961	1,003			1,226		376 [g]	167		266 [g]						2,878	
1962	675 [g]		762 [g]									61 [g, h]			937	
1963												137 [g, h]				
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					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	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	1,312	1,209	4,771	1,898	1,671
1988	1,020	1,339 [k]	1,448	1,805	1,449	1,061	714		797		3,346	1,966	1,760	4,562	2,761	2,553
1989	1,399		1,089	442 [g]	212 [g]						2,666	1,280	1,185	3,294	2,333	2,136
1990	2,503		1,545	2,347	1,595	568 [d]	430 [g, n]		884 [g]		5,603	1,436	1,402	10,728	3,744	3,429
1991	1,938		2,544	875 [g]	625 [g]	767	1,253		1,690		3,025	1,277 [g]	1,277 [g]	5,608	2,212 [g]	1,925 [g]
1992	1,030 [g]		2,002 [g]	1,536	931	348	231		910		5,230	825 [g]	799 [g]	7,862	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 [r]	2,775	2,888 [r]	11,877 [k]	1,570	1,570	18,399 [k]	11,823	11,189
1995	1,635	5,841 [p]	1,108	1,996	1,147	968	681	1,412	410	4,023	9,680	3,575	3,039	13,643 [k]	3,978	3,734
1996		2,955 [p]	624	839	709		100 [n]	756		1,952	6,833	2,233	2,112	7,958	4,866	4,800
1997	1,140	3,186 [p]	1,510	3,979	2,690			4,766	144 [g]	3,764	13,390 [k]	3,495	3,303	18,396 [k]	3,457 [g]	3,457 [g]
1998	1,027	4,011 [p]	1,249 [g]	709 [g]	648 [g]	507	546	1,536	889 [g]	2,356 [s]	4,745 [k]	440 [g]	386 [g]	5,027 [k]	2,055 [g]	1,923 [g]
1999		3,347 [p]			950 [g]			1,932		2,631 [s]	6,485 [k]		2,412	9,198 [k]		3,608
2000 [t]	1,018	1,358 [p]	427	1,721	1,394			908		2,089	4,707	962 [g]	934 [g]	3,108 [k]	2,562 [g]	2,478 [g]
2001	1,065	[r]	570	1,420	1,172	1,116	768	[r]	1,298	3,052	9,244 [k]	1,651	1,487	8,981 [k]	3,107	2,990
E.O. [u]	>1,500		>1,400	>1,300 [v]	>500 [v]	>800	>500		>600		2,800-5,700 [w]		>1,700	3,300-6,500 [w]		>2,500

continued

[a] Aerial survey counts are peak counts only. Survey rating was fair or good unless otherwise noted.
[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] Mark-recapture population estimate.
[e] Chena River index area for assessing the escapement objective is from Moose Creek Dam to Middle Fork River.
[f] Salcha River index area for assessing the escapement objective is from the TAPS crossing to Caribou Creek.
[g] Incomplete and/or poor survey conditions resulting in minimal or inaccurate counts.
[h] Boat survey.
[j] Data unavailable for index area. Calculated from historic (1972-91) average ratio of index area counts to total river counts (0.90:1.0).
[k] Tower counts.
[m] Mark-recapture population estimate from 1986 (Chena) or 1987 (Salcha) through 1992.
[n] Mainstem counts below the confluence of the North and South Forks Nulato River included in the South Fork counts.
[p] Weir counts.
[r] Incomplete count because of late installation and/or early removal of project.
[s] Data are preliminary.
[t] Interim sustained escapement goals. Established January, 1999.
[u] 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.
[v] Estimate is expanded for missing data caused by high water. Actual count in published agency reports may vary.
[w] Biological Escapement Goals (BEG) established by the Board of Fish, Jan. 2001.

Appendix Table 12. Chinook salmon escapement counts for selected spawning areas in the Canadian portion of the Yukon River drainage, 1961-2001.

Year	Tincup Creek [a]	Tatchun Creek [b]	Little Salmon River [a]	Big Salmon River [a, c]	Nisutlin River [a, d]	Ross River [a, f]	Wolf River [a, g]	Whitehorse Fishway		Canadian Mainstem		
								Count	Percent Hatchery Contribution	Border Passage Estimate	Harvest	Spawning Escapement Estimate [j]
1961												
1962								1,068	0			
1963								1,500	0			
1964								483	0			
1965								595	0			
1966		7 [k]						903	0			
1967								563	0			
1968			173 [k]	857 [k]	407 [k]	104 [k]		533	0			
1969			120	286	105			414	0			
1970		100		670	615		71 [k]	334	0			
1971		130	275	275	650		750	625	0			
1972		80	126	415	237		13	856	0			
1973		99	27 [k]	75 [k]	36 [k]			391	0			
1974		192		70 [k]	48 [k]			224	0			
1975		175		153 [k]	249		40 [k]	273	0			
1976		52		86 [k]	102			313	0			
1977		150	408	316 [k]	77			121	0			
1978		200	330	524	375			277	0			
1979		150	489 [k]	632	713		183 [k]	725	0			
1980		222	286 [k]	1,436	975		377	1,184	0			
1981		133	670	2,411	1,626	949	395	1,383	0			
1982		73	403	758	578	155	104	1,555	0			
1983	100	264	101 [k]	540	701	43 [k, n]	95	473	0	36,598	16,808	19,790
1984	150	153	434	1,044	832	151 [k]	124	905	0	47,741	18,752	28,989
1985	210	190	255	801	409	23 [k]	110	1,042	0	43,911	16,295	27,616
1986	228	155	54 [k]	745	459 [k]	72 [p]	109	508	0	29,881	19,151	10,730
1987	100	159	468	891	183	180 [k]	35	557	0	36,479	20,064	16,415
1988	204	152	368	765	267	242	66	327	0	30,823	17,563	13,260
1989	88	100	862	1,662	695	433 [p]	146	405	16	44,445	21,327	23,118
1990	83	643	665	1,806	652	457 [k]	188	549	19	42,620	17,419	25,201
1991			326	1,040		250	201 [r]	1,407	24	56,679	18,980	37,699 [q]
1992	73	106	494	617	241	423	110 [r]	1,266 [h]	51 [h]	41,187	20,444	20,743 [q]
1993		183	184	572	339	400	168 [r]	758 [h]	84 [h]	43,185	17,803	25,382 [q]
1994	101 [k]	477	726	1,764	389	506	393 [r]	668 [h]	73 [h]	45,027	16,469	28,558 [q]
1995	121	397	781	1,314	274	253 [k]	229 [r]	1,577 [h]	54 [h]	46,680	20,790	25,890 [q]
1996	150	423	1,150	2,565	719	102 [k]	705 [r]	2,103	57	52,353	20,091	32,262 [q]
1997	193	1,198	1,025	1,345	277		322 [r]	2,958	35	47,955	19,546	28,409 [q]
1998	53	405	361	523	145		66	2,084	24	53,400	15,717	37,683 [q]
1999	2	250	495	353	330		131	777	95	22,588	5,838	16,750 [q]
2000	19 [t]	241 [u]	46	113	20		32	1,118	74	23,608	12,455	11,153 [q]
2001 [s]	39		1,035	1,020	481		154	677	69	16,995	4,829	12,166 [q]
E.O.								988	36	53,850	9,726	44,124 [q]
												28,000 [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.

[b] All foot surveys prior to 1997 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] Counts and estimated percentages may be slightly exaggerated. In some or all of these years a number of adipose-clipped fish ascended the fishway, and were counted more than once. These fish would have been released into the fishway as fry between

[j] Estimated total spawning escapement excluding Porcupine River (estimated border escapement minus the Canandian catch).

[k] Incomplete and/or poor survey conditions resulting in minimal or inaccurate counts.

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.

[q]

28,000 salmon.

[r] Counts are for Wolf Lake to Fish Lake outlet.

[s] Data are preliminary.

[t] Foot survey.

[u] High water delayed project installation, therefore, counts are incomplete.

Appendix Table 13. Summer chum salmon escapement counts for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1973-2001. [a]

Year	Andreafsky River			Anvik River		Rodo River	Kaltag Creek	Nulato River			Gisasa River		Hogatza River		Tozitna River	Chena River		Salcha River	
	East Fork		West Fork					South Fork	North Fork [c]	Mainstem			Clear & Caribou Cr.	Clear Creek					
	Aerial	Sonar, Tower, or Weir Counts	Aerial	Tower & Aerial [b]	Sonar	Aerial	Tower	Aerial	Aerial	Tower	Aerial	Weir	Aerial	Tower	Weir & Aerial	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 [d]	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	5,400	212	5,809
1994		200,981 [i, k]			1,124,689		47,295			148,762 [k]	6,827	51,116 [k]	8,247 [m]			1,137	9,984	4,916	39,450
1995		172,148 [j]			1,339,418	12,849	77,193	10,875	29,949	236,890 [g]	6,458	136,886		116,735	4,985	185 [d]	3,519 [k]	934 [d]	30,784
1996		108,450 [j]			933,240	4,380	51,269	8,490 [d, h]		129,694 [g]		157,589	27,090 [m]	100,912	2,310	2,061	12,810 [k]	9,722	74,827 [k]
1997		51,139 [j]			609,118	2,775 [d]	48,018			157,975 [g]	686 [d]	31,800	1,821 [d]	76,454	428 [d]	594 [d]	9,439 [k]	3,968 [d]	35,741 [k]
1998		67,591 [j]			471,865		8,113			49,140 [g]		18,228 [g]	120 [d, r]	212 [k]	7 [d]	24 [d]	5,901 [k]	370 [d]	17,289 [k]
1999		32,229 [j]			437,631		5,300			30,076 [g]		9,920 [g]		11,300			9,165 [k]		23,221 [g]
2000	2,094 [d]	23,349 [j]	18,989 [d]		205,460		6,727			24,308 [g]		14,410 [g]		18,698	480	107 [d]	3,515	228 [d]	20,516 [g]
2001 [q]		[k]	[d]		227,451 [t]		[k]			[k]		17,633 [k]		3,674 [k]	12,503 [g]	[d]	4,773 [k]	[d]	6,922 [k]
E.O. [n]									>53,000 [o]				>17,000 [p]					>3,500	
BEG [q]	35-70 [s]	65-135 [s]	35-70 [s]		400-800 [s]														

continued

	Canada							
						Canadian Mainstem		
Year	Fishing Branch River [j, k]	Mainstem Yukon River Index [k, m]	Koidern River [k]	Kluane River [k, n]	Teslin River [k, p]	Border Passage Estimate	Harvest	Spawning Escapement Estimate [r]
1971	312,800							
1972	35,125 [s]			198 [t, e]				
1973	15,989 [v]	383		2,500				
1974	32,525 [v]			400				
1975	353,282 [v]	7,671		362 [e]				
1976	36,584			20				
1977	88,400			3,555				
1978	40,800			0 [e]				
1979	119,898			4,640 [e]				
1980	55,268			3,150		39,130	16,218	22,912
1981	57,386 [y]			25,806		66,347	19,281	47,066
1982	15,901	1,020 [z]		5,378		47,049	15,091	31,958
1983	27,200	7,560		8,578 [e]		118,365	27,490	90,875
1984	15,150	2,800 [aa]	1,300	7,200	200	81,900	25,267	56,633 [ab]
1985	56,016 [v]	10,760	1,195	7,538	356	99,775	37,765	62,010 [ab]
1986	31,723 [v]	825	14	16,686	213	101,826	13,886	87,940 [ab]
1987	48,956 [v]	6,115	50	12,000		125,121	44,345	80,776 [ab]
1988	23,597 [v]	1,550	0	6,950	140	69,280	32,494	36,786 [ab]
1989	43,834 [v]	5,320	40	3,050	210 [t]	55,861	20,111	35,750 [ab]
1990	35,000 [ad]	3,651	1	4,683	739	82,947	31,212	51,735 [ab]
1991	37,733 [v]	2,426	53	11,675	468	112,303	33,842	78,461 [ab]
1992	22,517 [v]	4,438	4	3,339	450	67,962	18,880	49,082 [ab]
1993	28,707 [v]	2,620	0	4,610	555	42,165	12,422	29,743 [ab]
1994	65,247 [v]	1,429 [t]	20 [t]	10,734	209 [t]	133,712	35,354	98,358 [ab]
1995	51,971 [v, ah]	4,701	0	16,456	633	198,203	40,111	158,092 [ab]
1996	77,278 [v]	4,977		14,431	315	143,758	21,329	122,429 [ab]
1997	26,959 [v]	2,189		3,350	207	94,725	9,286	85,439 [ab]
1998	13,564 [v]	7,292		7,337	235	48,047	1,742	46,305 [ab]
1999	12,094 [v]			5,136	19 [t]	75,541	13,506	62,035 [ab]
2000	5,053 [al]	933 [t]		1,442	204	59,598	4,236	55,362 [ab]
2001	21,556 [al]	2,453		4,884	5	38,908 [al]	4,919	33,989 [al]
E.O. [ap]	50,000-120,000							>80,000

continued

[a] Latest table revision November 30, 2001.

[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.

[c] Fall chum salmon abundance estimate for the Kantishna and Toklat River drainages is based on a mark-recapture program. Tag deployment occurs at a fish wheel located near the mouth of the Kantishna River and recaptures are collected at three fish wheels; two located eight miles upstream of the mouth of the Toklat River (1999-2001) and one fish wheel on the Kantishna River (2000-2001).

[d] Estimates are a total spawner abundance, generally from using spawner curves and stream life data.

[e] Foot survey, unless otherwise indicated.

[f] Fall chum salmon abundance estimate for the upper Tanana River drainage is based on a mark-recapture program. Tag deployment occurs from a fish wheel (two fish wheels in 1995) located just upstream of the Kantishna River and recaptures are collected from one fish wheel (two fish wheels in 1995) located downstream from the village of Nenana.

[g] Fall chum salmon abundance estimate for the upper Yukon River drainage is based on a mark-recapture program. Tag deployment occurs at two fish wheels located at the "Rapids" and recaptures are collected from a fish wheel located downstream from the village of Rampart.

[h] Side-scan sonar estimate for Sheenjek beginning in 1981 and for Chandalar from 1986-1990. Split beam sonar estimate for Chandalar beginning 1995.

[i] 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.

[k] Aerial survey count, unless otherwise indicated.

[m] Tatchun Creek to Fort Selkirk.

[n] Duke River to end of spawning sloughs below Swede Johnston Creek.

[p] Boswell Creek area (5 km below to 5 km above confluence).

[r] Excludes Fishing Branch River escapement (estimated border passage minus Canadian removal).

[s] Weir installed Sept 22. Estimate consists of weir count of 17,190 after Sept 22, and tagging passage estimate of 17,935 before weir installation.

[t] Incomplete and/or poor survey conditions resulting in minimal or inaccurate counts.

[v] Weir count.

[w] Total escapement estimate using sonar to aerial survey expansion factor of 2.22.

[x] Population estimate generated from replicate foot surveys, stream life data (area under the curve method).

[y] Initial aerial survey count doubled before applying the weir/aerial expansion factor of 2.72 since only half of the spawning area was surveyed.

[z] Boat survey.

[aa] Total index area not surveyed. Survey included the mainstem Yukon River between Yukon Crossing to 30 km below Fort Selkirk.

[ab] Escapement estimate based on mark-recapture program unavailable. Estimate based on assumed average exploitation rate.

[ac] Expanded estimates for period approximating second week August through middle fourth week Sept, using Chandalar River run timing data.

[ad] Weir 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.

[af] Total abundance estimates are for the period approximating second week August through middle fourth week of September. Comparative escapement estimates before 1986 are considered more conservative; approximating the period end of August through mid week of September.

[ag] Minimal estimate because of late timing of ground surveys with respect to peak of spawning.

[ah] Incomplete count due to late installation and/or early removal of project or high water events.

[ai] The passage estimate includes an additional 15,134 salmon that were estimated to have passed during 127 hours that the sonar was inoperable due to high water from 29 August until 3 September 1997.

[ak] Aerial survey count from 23 October. Unexpanded foot survey counts conducted from 10/11-10/16/00 was 2,496 fish.

[al] Data are preliminary.

[am] Project ended early, population estimate through 19 August 2000 was 45,021 on average this represents 0.24 percent of the run.

[an] Peak foot survey count conducted on 31 October resulted in 1,743 chum salmon.

[ao] Low numbers of tags deployed and recovered resulted in an estimate with an extremely large confidence interval (95% CI +/- 41,172).

[ap] Interim escapement objective (E.O.)

[aq] Based on escapement estimates for years 1974-1990.

[ar] Biological Escapement Goal (BEG) recommended to the Board of Fisheries 2001.

Appendix Table 15. Coho salmon passage estimates or escapement estimates for selected spawning areas in the Alaskan portion of the Yukon River Drainage, 1972-2001.[a,b]

Year	East Fork Andreafsky River [c]	Yukon River Mainstem Sonar Estimate [d]	Kantishna River Drainage			Nenana River Drainage				Delta Clearwater River [h]	Delta Clearwater River Tributaries [j]	Clearwater Lake and Outlet	Richardson Clearwater River [l]
			Anvik River	Geiger Creek [f]	Barton Creek	Lost Slough	Nenana Mainstem [g]	Wood Creek	Seventeen Slough				
1972										632		417	454 [m]
1973										3,322		551	375
1974						1,388			27	3,954 [m]		560	652
1975						943			956	5,100		1,575 [n]	4 [m]
1976			467 [k]	25 [k,m]		118			281	1,920		1,500 [n]	80 [m]
1977			81 [k]	60		524 [k]		310 [f]	1,167	4,793		730 [n]	327
1978						350		300 [f]	466	4,798		570 [n]	
1979						227			1,987	8,970		1,015 [n]	372
1980				3 [k,m]		499 [k]		1,603 [f]	592	3,946		1,545 [n]	611
1981	1,657 [k]					274		849 [e,p]	1,005	8,563 [r]		459 [k]	550
1982				81				1,436 [e,p]		8,365 [r]			
1983				42		766		1,042 [e]	103	8,019 [r]		253	88
1984				20 [k,m]		2,677		8,826 [e]		11,061		1,368	428
1985				42 [k,m]		1,584		4,470 [e]	2,081	6,842		750	
1986				5	496	794		1,664 [e]	218 [n]	10,857		1,800	146 [m]
1987				1,175		2,511		2,387 [e]	3,802	22,300		4,225 [n]	
1988	1,913 [k]		1,203	159	437	348		2,046 [e]		21,600		825 [n]	
1989				155	12 [k]			412 [e]	824 [k]	12,600		1,600 [n]	483
1990				211		688	1,308		15 [k]	8,325		2,375 [n]	
1991				427	467 [k]	564	447		52	23,900		3,150 [n]	
1992				77	55 [k]	372			490	3,963		229 [n]	500
1993				138	141	484	419	666 [e,t]	581	10,875		3,525 [n]	
1994				410	2,000 [e,u]	944	1,648	1,317 [e,v]	2,909	62,675	17,565	3,425 [n]	5,800
1995	10,901	120,366		142	192 [e,w]	4,169	2,218	500 [e]	2,972 [k]	20,100	6,283	3,625 [n]	
1996	8,037			233	0 [e]	2,040	2,171	201 [k,m]	3,668 [n]	14,075	3,300	1,125 [m]	
1997	9,472	120,564		274		1,524 [x]	1,446	[z]	1,996	11,525	2,375	2,775 [n]	
1998	5,417	134,408		157		1,360 [m]	2,771 [m]	370 [y,z]	1,413 [y]	11,100	2,775	2,775 [n]	
1999	2,963	76,481		29		1,002 [m]	745 [m]	[z]	662 [m]	10,975	2,799		
2000	8,199	183,192		142		55 [k,m]	66 [k,m]	[z]	879 [k,m]	9,225	2,364	1,025 [n]	2,175
2001 [ab]	9,054	143,213	262 [k]	578		242	855	699	3,741	46,875	12,013	4,425 [n]	1,531
E.O. [ab]										>9,000 [ab]			

continued

[a] Latest table revision November 30, 2001.
[b] Only peak counts presented. Survey rating is fair to good, unless otherwise noted.
[c] Weir count, unless otherwise indicated.
[d] Passage estimates for coho salmon are incomplete. The sonar project is terminated prior to the end of the coho salmon run.
[e] Foot survey, usless otherwise indicated.
[g] Index area includes mainstem Nenana River between confluence's of Lost Slough and Teklanika River.
[h] Boat survey counts of index area (lower 17.5 river miles), unless otherwise indicated.
[i] Helicopter surveys counted tributaries of the Delta Clearwater River, outside of the normal mainstem index area, from 1994 to 1999, after which an expansion factor was used to estimate the escapement to the areas.
[k] Aerial survey, fixed wing or helicopter.
[m] Poor survey.
[n] Boat Survey.
[p] Weir was operated at the mouth of Clear Creek (Shores Landing).
[r] Expanded estimate based on partial survey counts and historic distribution of spawners from 1977 to 1980.
[s] The West Fork Andreafsky was also surveyed and 830 chum salmon were observed.
[t] Weir project terminated on October 4, 1993. Weir normally operated until mid to late October.
[u] A total of 298 coho salmon passed between 11 September and 4 October 1994. However, an additional 1,500-2,000 coho salmon were estimated pooled downstream just prior to weir removal.
[v] Weir project terminated September 27, 1994. Weir normally operated until mid-October.
[w] An additional 1,000 coho salmon were estimated pooled downstream of weir on October 2, 1995, just prior to weir removal.
[x] Survey of western floodplain only.
[y] Combination foot and boat survey.
[z] No survey of Wood Creek due to obstructions in creek.
[aa] Preliminary.
[ab] Interim escapement objective (E.O.) established March, 1993, based on boat survey counts of coho salmon in the lower 17.5 river miles during the period October 21 through 27.

Appendix Table 16. Ex-vessel value of the catch in the commercial fisheries off Alaska by species group, 1982-97, (value in $ millions and percentage of total).

Year	Shellfish	Salmon	Herring	Halibut	Groundfish	Total
1982	216.5	310.7	19.9	25.7	211	783.8
1983	147.7	320.6	29.8	43	188	729.1
1984	103.4	343	20.4	19.6	239.4	725.8
1985	106.9	389.6	36.9	37.5	260.1	831
1986	183	404.1	38.4	70.1	268.6	964.2
1987	215.2	473	41.7	76.3	336.7	1142.9
1988	235.6	744.9	56	66.1	444.6	1547.1
1989	279.2	506.7	18.7	84.4	425.3	1314.3
1990	355.1	546.7	24	86.9	474.9	1487.6
1991	301.1	300.1	28.6	91.6	548.3	1269.7
1992	335.1	544.5	27	48	656.9	1611.5
1993	328.5	391.1	14.1	53.6	425.8	1213.1
1994	321.2	424.4	21.6	84.7	465.2	1317.1
1995	282.9	495.9	39.1	59.5	593.7	1471.1
1996	175.2	346.5	44.8	74.2	541.9	1182.6
1997	172.1	247.8	15.9	106.5	597.7	1141
1998	218.7	242.7	10.8	94.1	415.5	981.8
1999	271.2	345.7	14.2	116.9	483.4	1231.4
			Percentage of Total			
1982	27.6	39.6	2.5	3.3	26.9	100
1983	20.3	44	4.1	5.9	25.8	100
1984	14.2	47.3	2.8	2.7	33	100
1985	12.9	46.9	4.4	4.5	31.3	100
1986	19	41.9	4	7.3	27.9	100
1987	18.8	41.4	3.6	6.7	29.5	100
1988	15.2	48.2	3.6	4.3	28.7	100
1989	21.2	38.6	1.4	6.4	32.4	100
1990	23.9	36.8	1.6	5.8	31.9	100
1991	23.7	23.6	2.3	7.2	43.2	100
1992	20.8	33.8	1.7	3	40.7	100
1993	27.1	32.2	1.2	4.4	35.1	100
1994	24.4	32.2	1.7	6.4	35.3	100
1995	19.2	33.7	2.7	4	40.4	100
1996	14.8	29.4	3.8	6.3	45.7	100
1997	15.3	22	1.4	9.5	51.8	100
1998						
1999						

Note: The value added by at-sea processing is not included in these estimates of ex-vessel value. Includes Joint venture and foreign groundfish catch.

Source: National Marine Fisheries Service, Alaska Region; National Marine Fisheries Service Office of the Pacific Marine Fisheries Commission, Pacific Fisheries Information Network, 7600 Sand Point Way N.E., BIN C15700, Seattle, WA 98115-0070.

Appendix Table 17. Number and total registered net tons of vessels that caught groundfish off Alaska by area and gear, 1992-1999.

	Gulf of Alaska		Bering Sea and Aleutians		All Alaska	
Gear/Year	Number of vessels	Registered net tons	Number of vessels	Registered net tons	Number of vessels	Registered net tons
Hook and line						
1992	1,811	54,698	163	22,076	1,848	64,050
1993	1,515	48,571	115	19,086	1,537	53,068
1994	1,386	51,264	138	17,822	1,410	54,422
1995	1,107	39,203	175	18,395	1,159	45,317
1996	1,017	39,658	158	16,902	1,066	45,762
1997	975	32,455	137	15,616	1,004	38,116
1998	887	31,551	115	16,032	926	38,698
1999	934	32,765	116	15,464	972	37,733
Pot						
1992	226	11,822	73	13,584	277	22,598
1993	103	4,867	21	2,956	118	7,282
1994	110	5,767	40	5,253	136	9,787
1995	188	13,939	126	16,457	263	24,419
1996	146	9,121	103	14,579	217	20,151
1997	147	8,917	84	13,369	202	19,056
1998	181	11,054	79	12,033	233	19,585
1999	212	16,449	105	16,797	271	25,211
Trawl						
1992	233	48,547	201	87,268	300	93,405
1993	193	37,107	182	80,259	282	87,786
1994	187	34,247	164	77,830	256	84,565
1995	220	49,909	184	80,551	264	86,024
1996	199	40,124	192	77,789	277	83,374
1997	206	37,452	168	72,324	262	78,725
1998	197	32,077	166	68,074	261	74,448
1999	172	25,785	166	55,281	242	60,200
All gear						
1992	2,118	104,833	408	115,193	2,243	162,352
1993	1,718	84,334	309	98,995	1,837	139,097
1994	1,571	84,051	335	98,381	1,683	139,075
1995	1,396	95,026	464	112,253	1,545	144,446
1996	1,269	82,935	439	107,061	1,448	140,338
1997	1,245	73,808	381	98,655	1,374	127,919
1998	1,153	68,041	337	92,419	1,284	122,306
1999	1,208	67,576	373	83,925	1,358	112,686

Note: Includes only vessels fishing Federal TACs. Registered net tons totals exclude mainly smaller vessels for which data were unavailable. The percent of Vessels missing are: 1992 - 8%, 1993 - 5%, 1994 - 3%, 1995 - 4%, 1996 - 6%, 1997 - 4%, 1998 - 3%, 1999 - 5%.

Source: Blend estimates, fish tickets, Norpac data, federal permit file, CFEC vessel data, National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Appendix Table 18. Numbers of vessels that caught groundfish off Alaska by area, vessel length class (feet), catcher type, and gear, 1992-96.

	Gulf of Alaska				Bering Sea and Aleutian				All Alaska			
	Vessel length class				Vessel length class				Vessel length class			
Number of vessels	<60	60-124	125-230	>230	<60	60-124	125-230	>230	<60	60-124	125-230	>230
Catcher vessels (excluding catcher processors)												
Fixed												
1992	1649	209	7	0	68	75	11	0	1660	239	15	0
1993	1367	148	0	0	36	36	3	0	1375	163	3	0
1994	1455	190	2	0	66	48	5	0	1470	212	6	0
1995	1216	199	9	0	91	136	19	0	1251	255	23	0
1996	1116	179	7	0	64	125	17	0	1143	222	18	0
Trawl												
1992	63	109	15	0	6	97	29	1	66	131	29	1
1993	64	86	9	0	10	87	22	0	71	126	22	0
1994	62	82	18	0	3	77	26	0	62	110	26	0
1995	58	108	20	0	3	95	22	1	59	122	24	1
1996	63	82	17	0	6	91	31	0	66	115	32	0
All Gear												
1992	1684	297	22	0	74	167	40	1	1695	344	44	1
1993	1409	218	9	0	45	123	25	0	1423	273	25	0
1994	1483	247	20	0	69	125	31	0	1498	297	32	0
1995	1241	286	29	0	94	225	40	1	1275	349	46	1
1996	1147	245	24	0	69	216	47	0	1176	320	49	0
Catcher-processors												
Fixed												
1992	3	24	23	0	0	28	46	0	3	30	48	0
1993	4	27	23	0	1	31	31	0	4	32	31	0
1994	3	30	21	0	2	33	26	0	3	35	26	0
1995	5	18	16	0	2	28	27	0	5	29	27	0
1996	4	13	11	0	1	21	32	0	4	21	32	0
Trawl												
1992	0	8	28	6	0	12	40	19	0	13	40	19
1993	0	8	22	5	0	9	37	21	0	9	38	21
1994	0	5	17	4	0	5	34	21	0	6	34	21
1995	0	8	20	8	0	10	35	22	0	10	36	22
1996	0	7	28	2	0	7	34	21	0	8	34	21
All Gear												
1992	3	31	49	6	0	33	79	19	3	36	80	19
1993	4	34	43	5	1	39	62	21	4	40	62	21
1994	3	35	38	4	2	38	58	21	3	41	58	21
1995	5	26	36	8	2	36	60	22	5	37	61	22
1996	4	19	39	2	1	27	65	21	4	27	65	21
All Catchers, All Gear												
1992	1684	323	70	6	74	198	110	20	1695	373	114	20
1993	1410	247	52	5	45	157	85	21	1424	302	85	21
1994	1484	271	58	4	71	156	86	21	1499	321	87	21
1995	1243	307	63	8	95	248	96	22	1277	371	101	22
1996	1149	258	63	2	70	232	108	21	1178	334	110	21

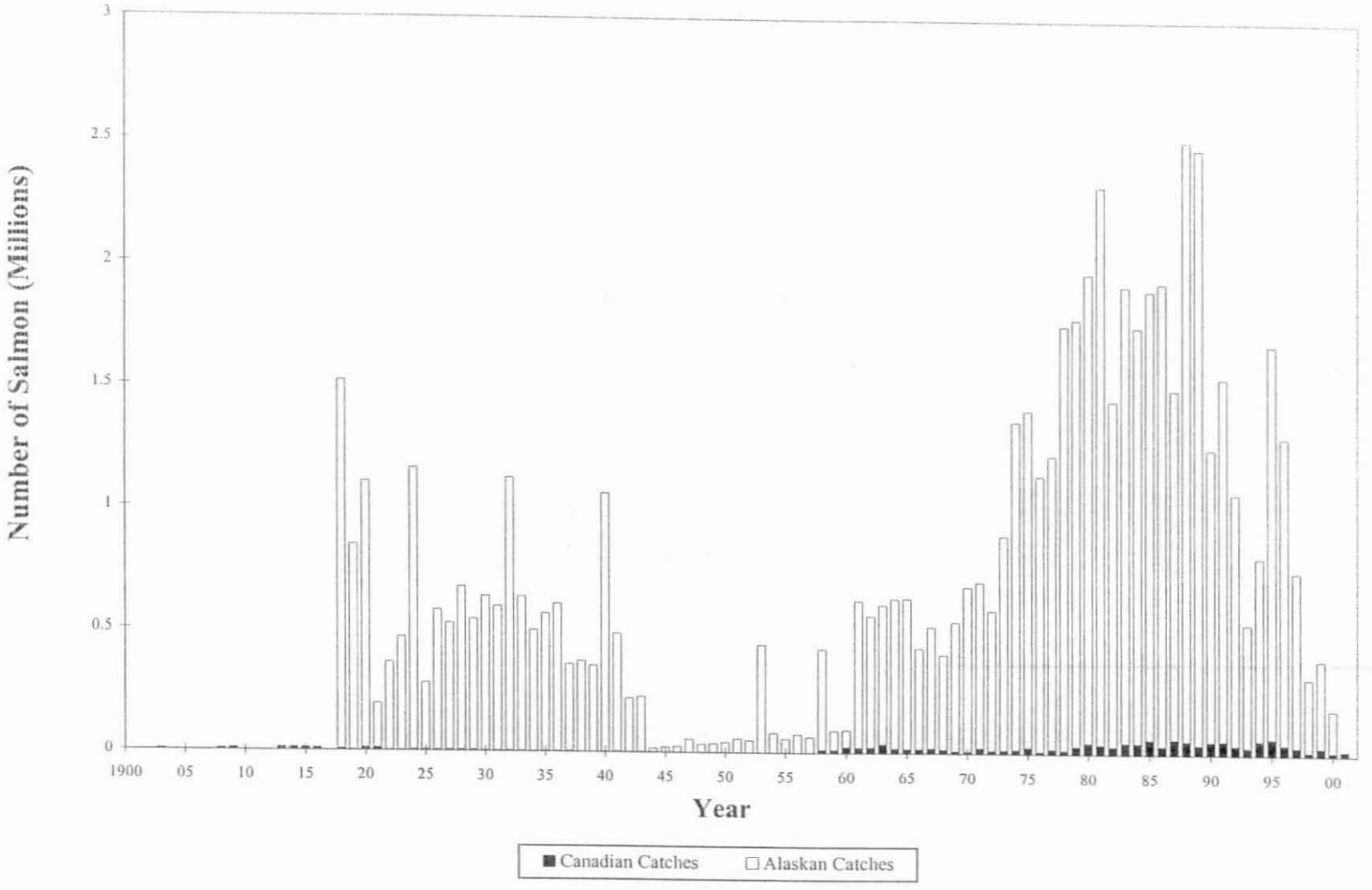
Appendix Table 19. Estimated number of chinook and other salmon caught by the groundfish fisheries off the coast of Alaska, 1990 through October 2000 (Berger 2000). Data for 2001 through 10/27/01.

Year	Chinook	Chum	Coho	Sockeye	Pink	Total
BSAI						
1990	14,085	16,202	153	30	31	30,501
1991	48,873	29,706	396	79	79	79,133
1992	41,955	40,090	1,266	14	80	83,405
1993	45,964	242,895	321	22	8	289,210
1994	44,380	95,978	231	20	202	140,811
1995	23,079	20,901	858	0	21	44,859
1996	63,205	77,771	218	5	1	141,200
1997	50,218	67,349	114	3	69	117,753
1998	55,431	----------65,697----------				121,128
1999	12,937	----------46,325----------				59,262
2000	7,474	----------57,621----------				62,095
2001	36,254	----------58,282----------				62,918
GOA						
1990	16,913	2,541	1,482	85	64	21,085
1991	38,894	13,713	1,129	51	57	53,844
1992	20,462	17,727	86	33	0	38,308
1993	24,465	55,268	306	15	799	80,853
1994	13,973	40,033	46	103	331	54,486
1995	14,647	64,067	668	41	16	79,439
1996	15,761	3,969	194	2	11	19,937
1997	15,119	3,349	41	7	23	18,539
1998	16,984	----------13,544----------				30,528
1999	30,600	---------- 7,530----------				38,130
2000	26,729	---------- 10,995----------				37,721
2001	14,782	---------- 5,882----------				20,664

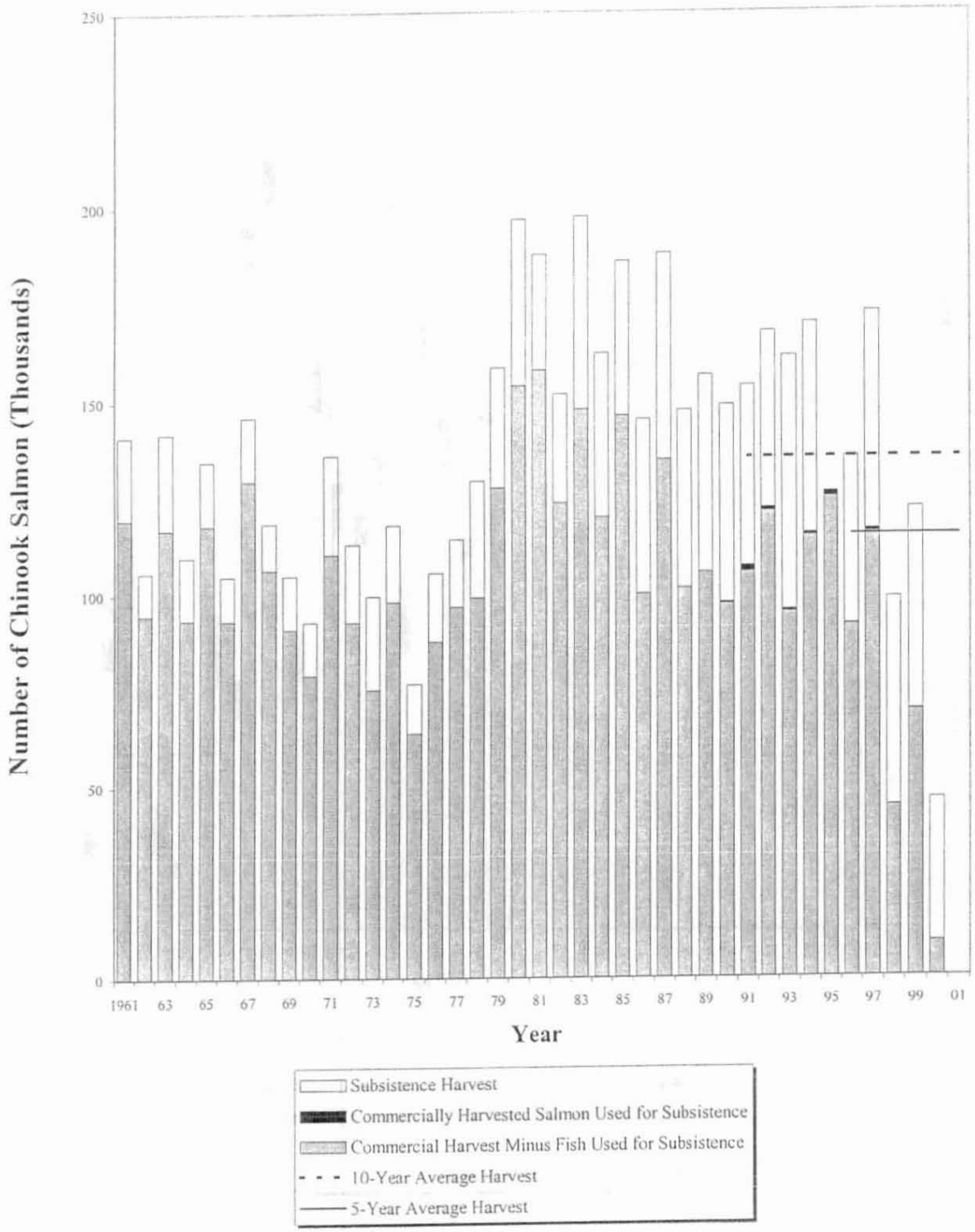
Appendix Table 20. Commercial harvest of sockeye and chum salmon in the "False Pass" June Fishery, 1980 – 1999.

Source of data: ADF&G.

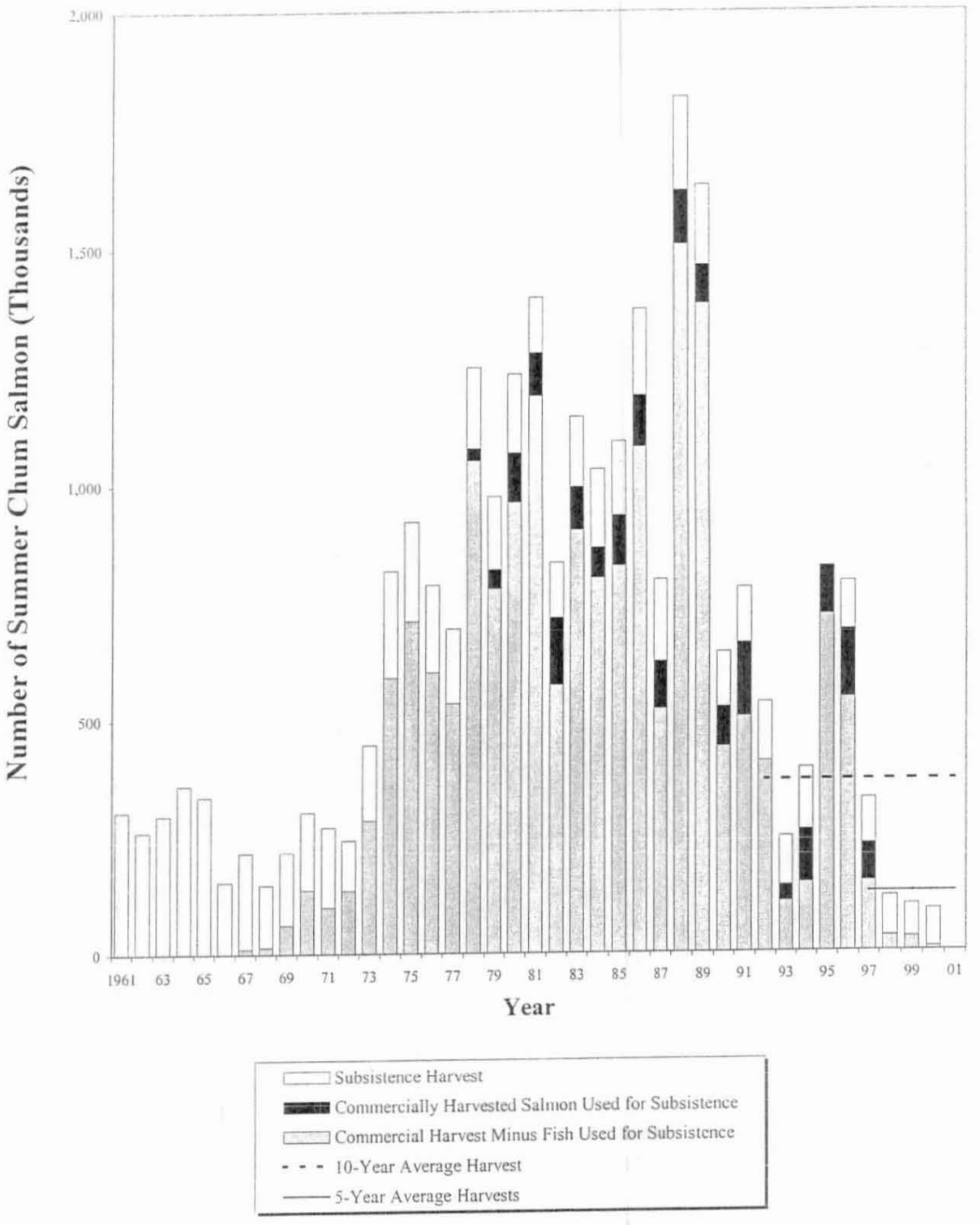
Year	Sockeye	Chum
1980	3,206,000	509,000
1981	1,821,000	564,000
1982	2,119,000	1,095,000
1983	1,964,000	786,000
1984	1,388,000	337,000
1985	1,791,000	434,000
1986	471,000	352,000
1987	794,000	443,000
1988	757,000	527,000
1989	1,745,000	455,000
1990	1,346,000	519,000
1991	1,549,000	773,000
1992	2,458,000	426,000
1993	2,974,000	532,000
1994	1,461,000	582,000
1995	2,105,000	537,000
1996	1,029,000	360,000
1997	1,628,000	322,000
1998	1,288,000	246,000
1999	1,375,000	245,000
2000	1,272,000	248,000
2001	148,588	49,913



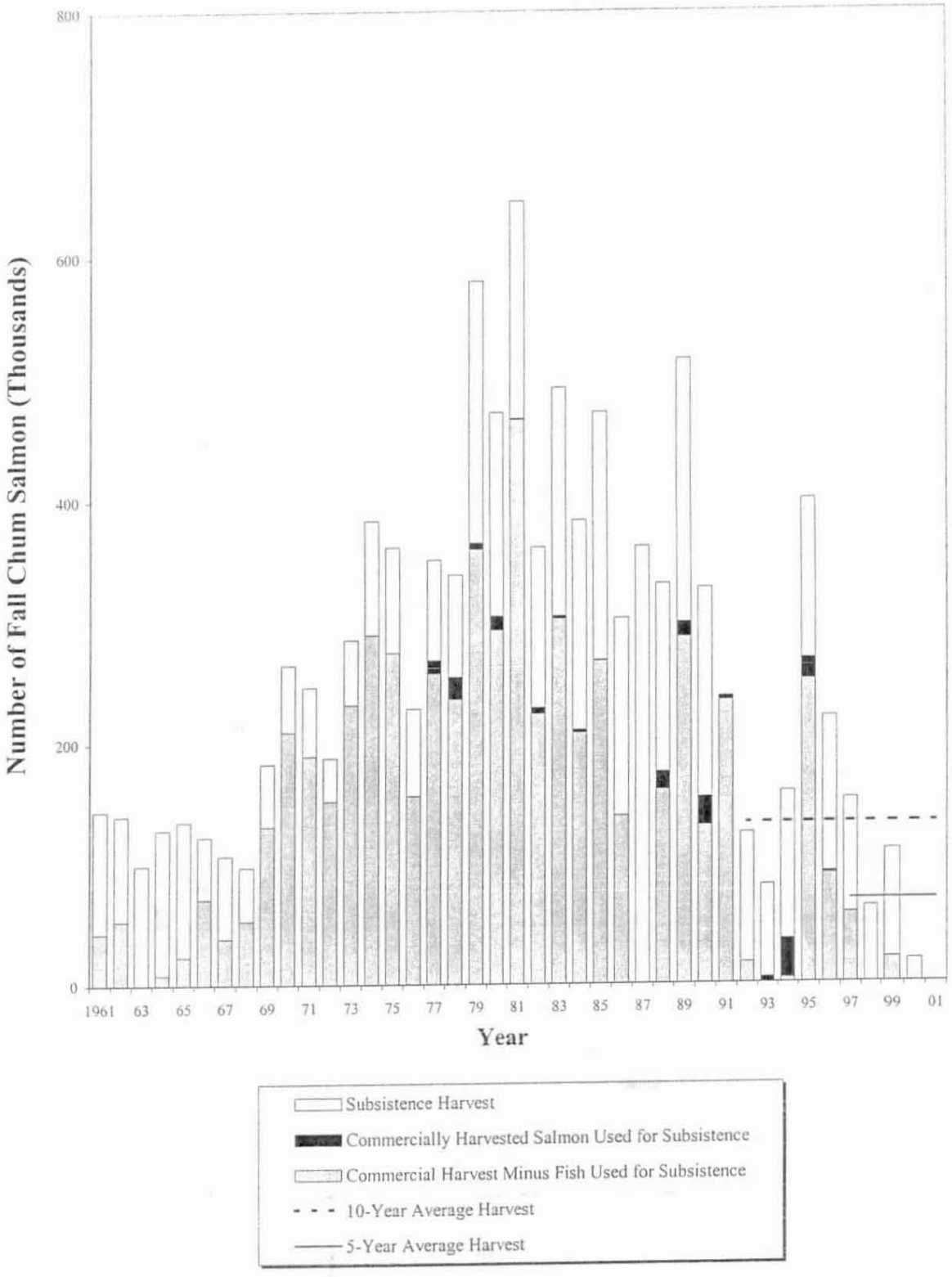
Appendix Figure 1. Total utilization of salmon, Yukon River, 19-2001. The 2001 Alaskan commercial fishery was closed. Other Alaskan harvest estimates are unavailable at this time.



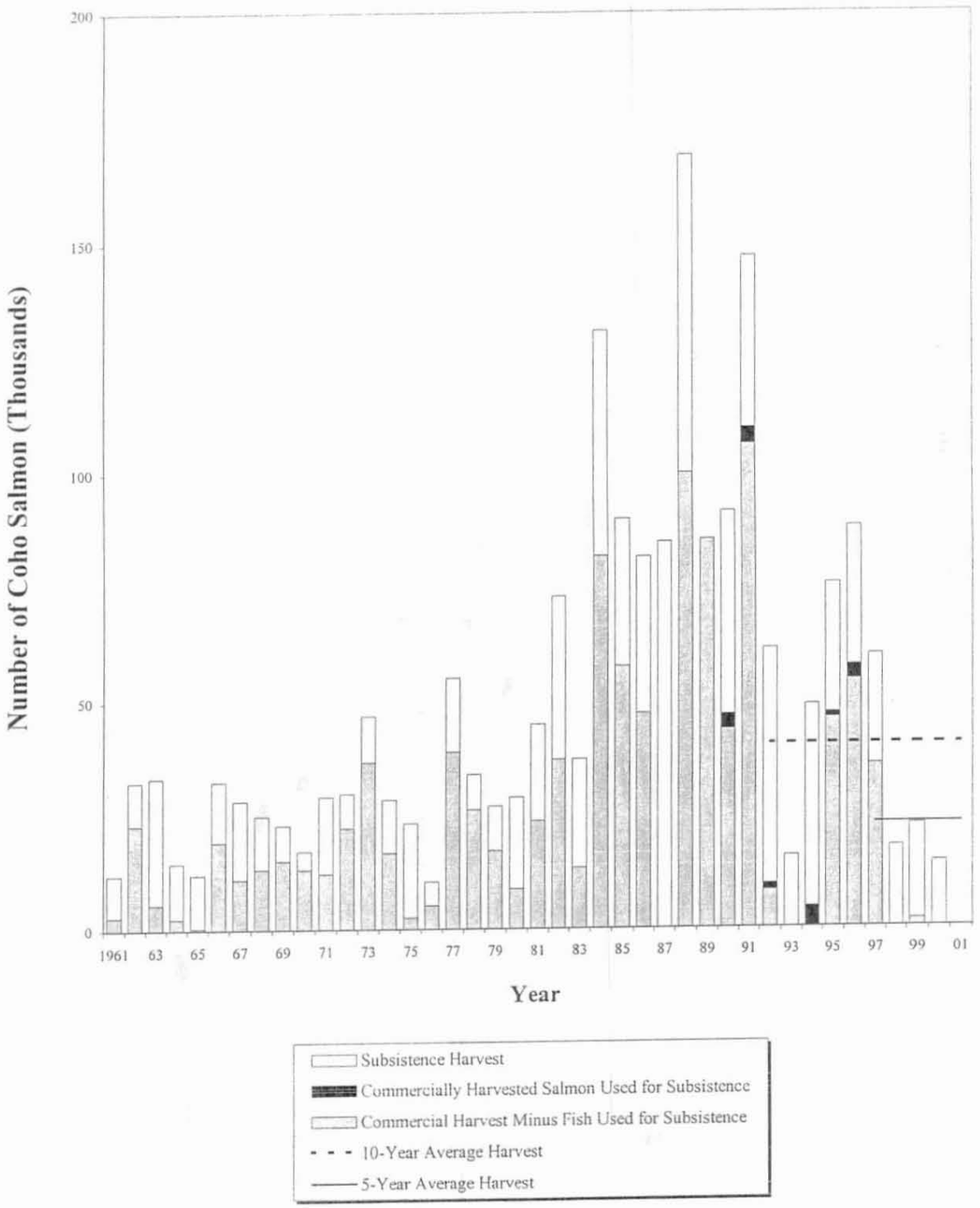
Appendix Figure 2. Alaskan harvest of chinook salmon, Yukon River, 1961-2001. The 2001 commercial fishery was closed. Other Alaskan harvest estimates are unavailable at this time.



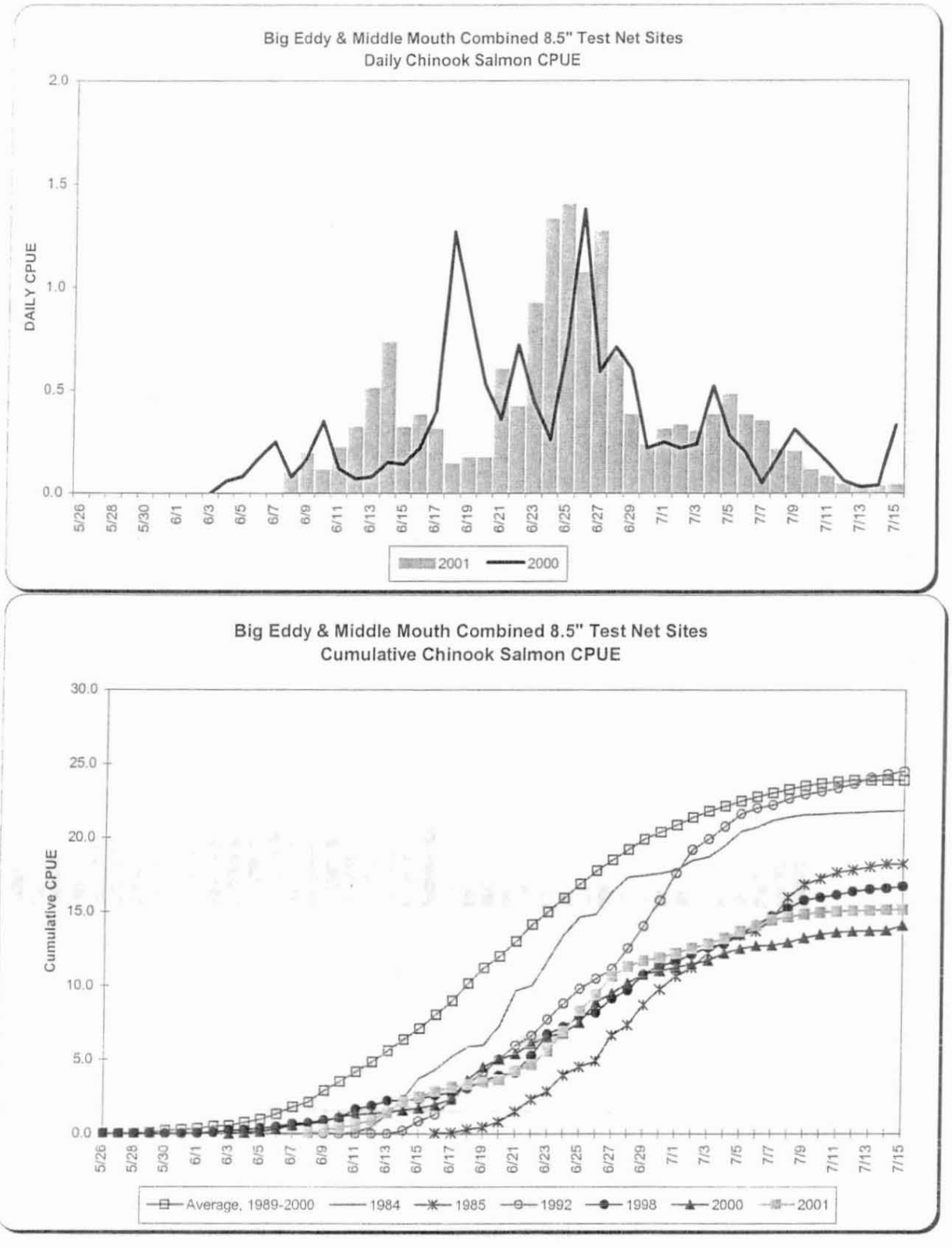
Appendix Figure 3. Alaskan harvest of summer chum salmon, Yukon River, 1961-2001. The 2001 harvest estimates are unavailable at this time.



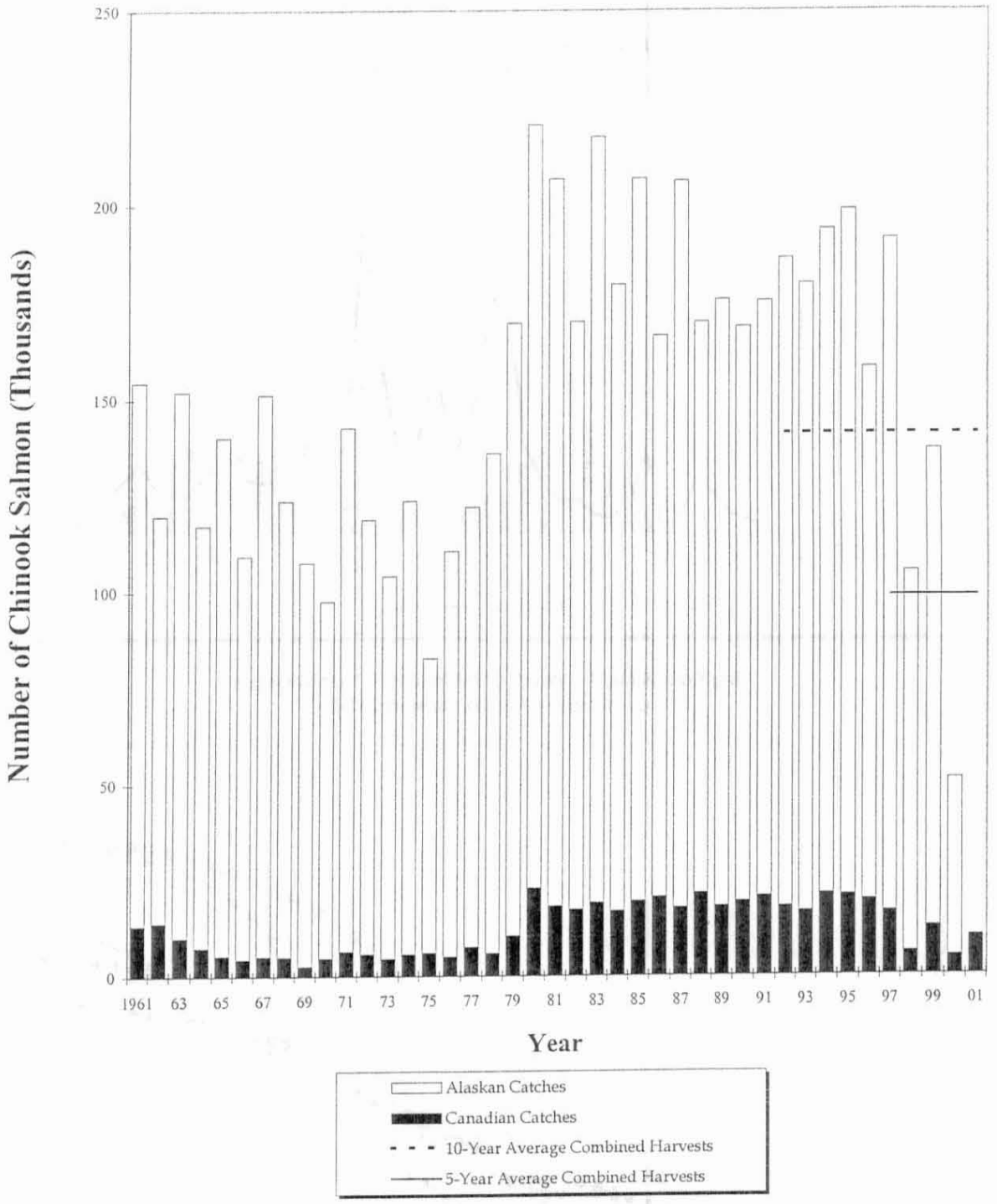
Appendix Figure 4. Alaskan harvest of fall chum salmon, Yukon River, 1961-2001. The 2001 harvest estimates are unavailable at this time.



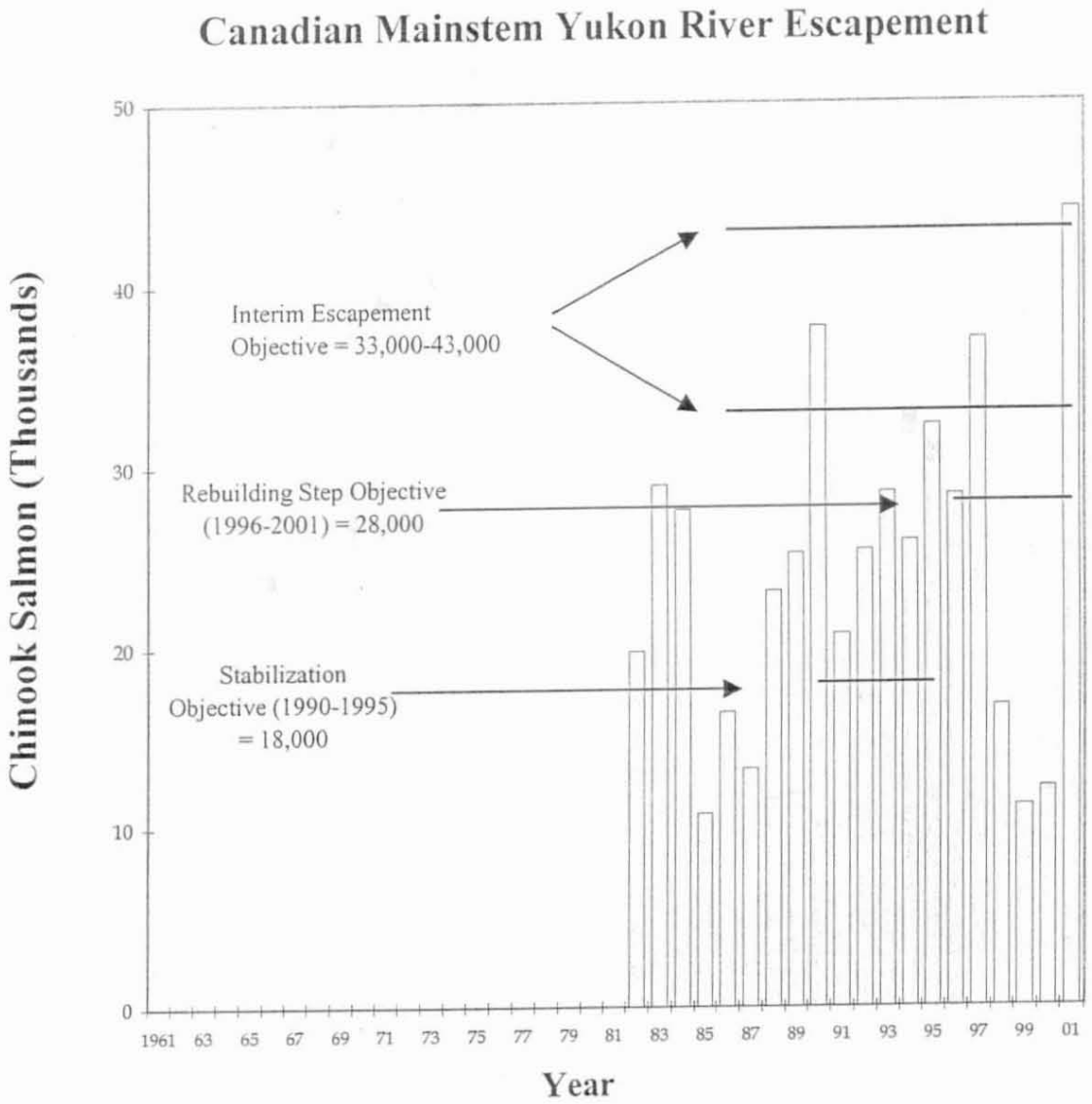
Appendix Figure 5. Alaskan harvest of coho salmon, Yukon River, 1961-2001. The 2001 Alaskan harvest estimates are unavailable at this time.



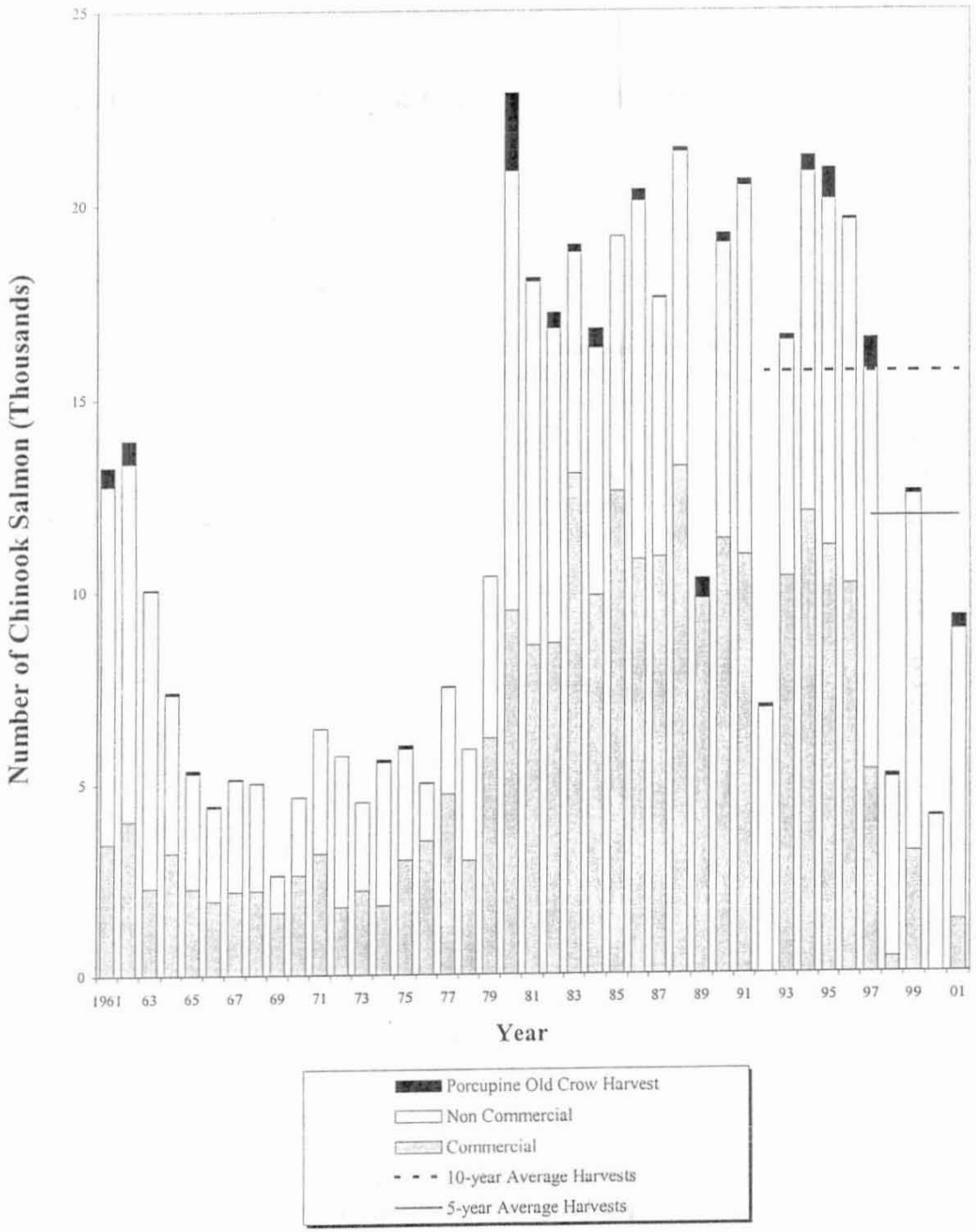
Appendix Figure 6. Daily 2001 test fish CPUE for chinook salmon test fish sites (above). Cumulative 2001 test fish CPUE for chinook salmon test fish sites (below) compared to the 1989-2000 average CPUE.



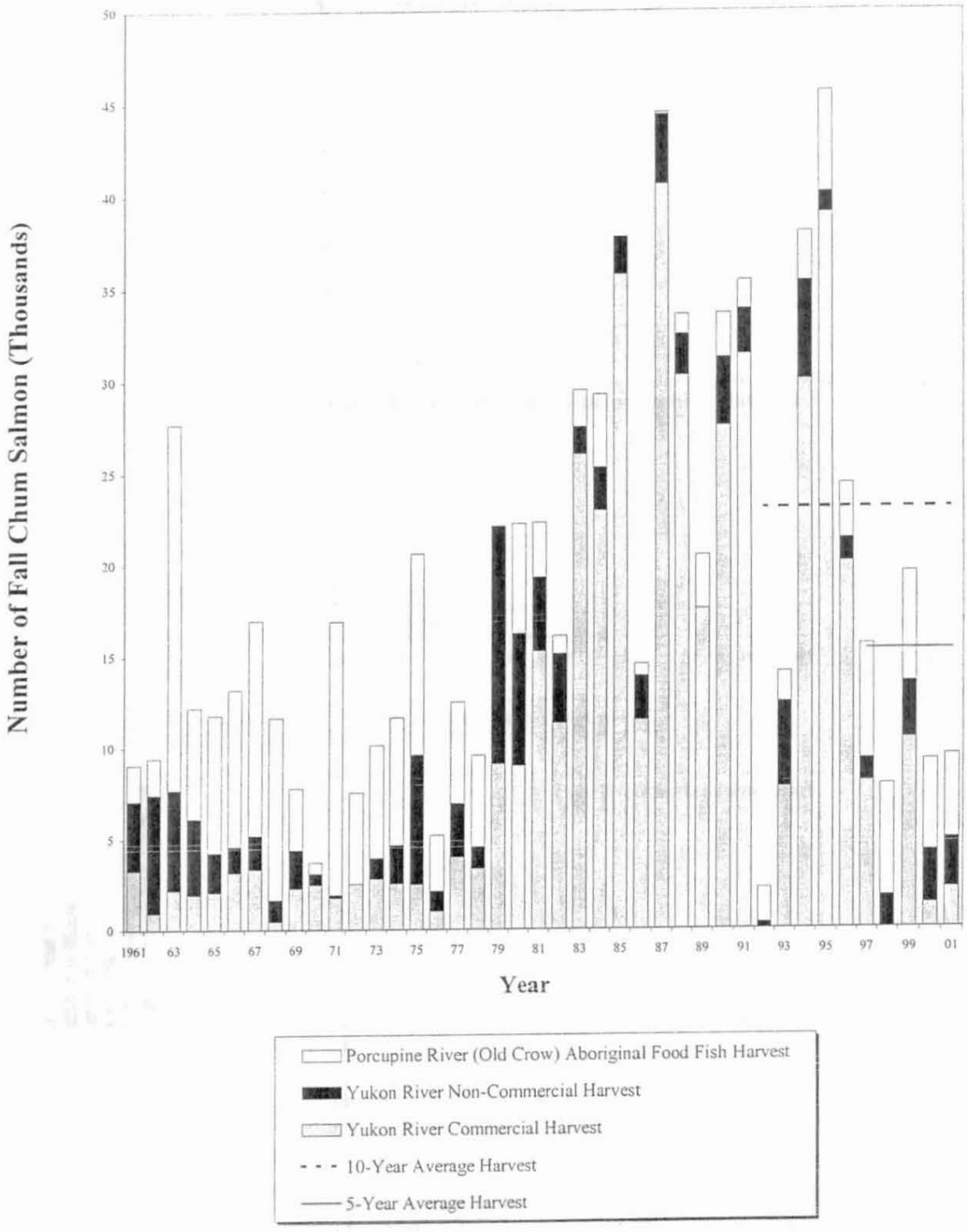
Appendix Figure 7. Total utilization of chinook salmon, Yukon River, 1961-2001. The 2001 Alaskan harvest estimates are unavailable at this time.



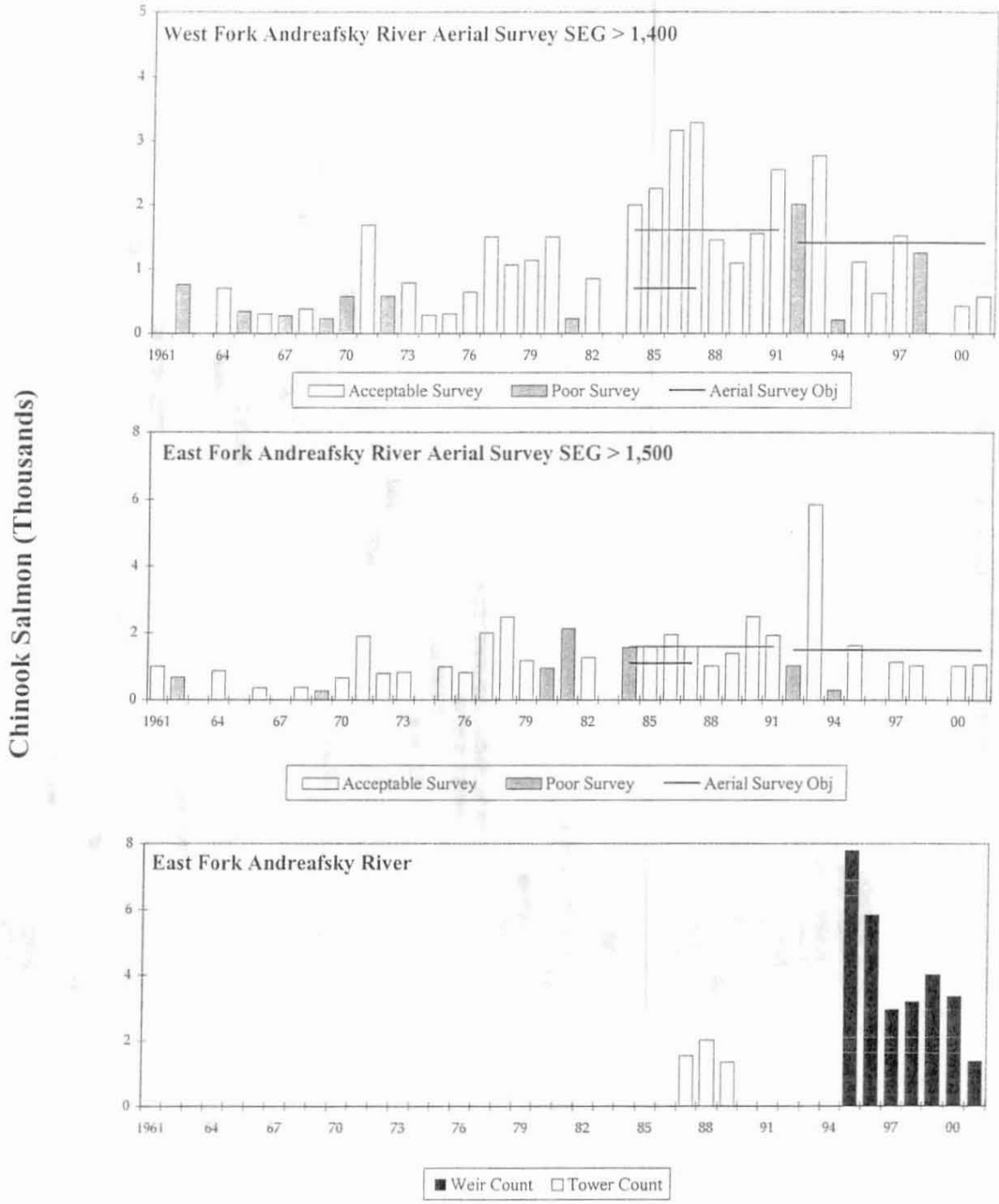
Appendix Figure 8. Estimated total chinook salmon spawning escapement in the Canadian portion of the mainstem Yukon River drainage, 1982-2001. Horizontal lines represent the interim escapement objective range of 33,000-43,000 salmon, the rebuilding step objective of 28,000 salmon and the stabilization objective of 18,000 salmon.



Appendix Figure 9. Canadian harvest of chinook salmon, Yukon River, 1961-2001. Reported harvests for 2001 should be considered minimum as some harvest estimates are unavailable at this time.

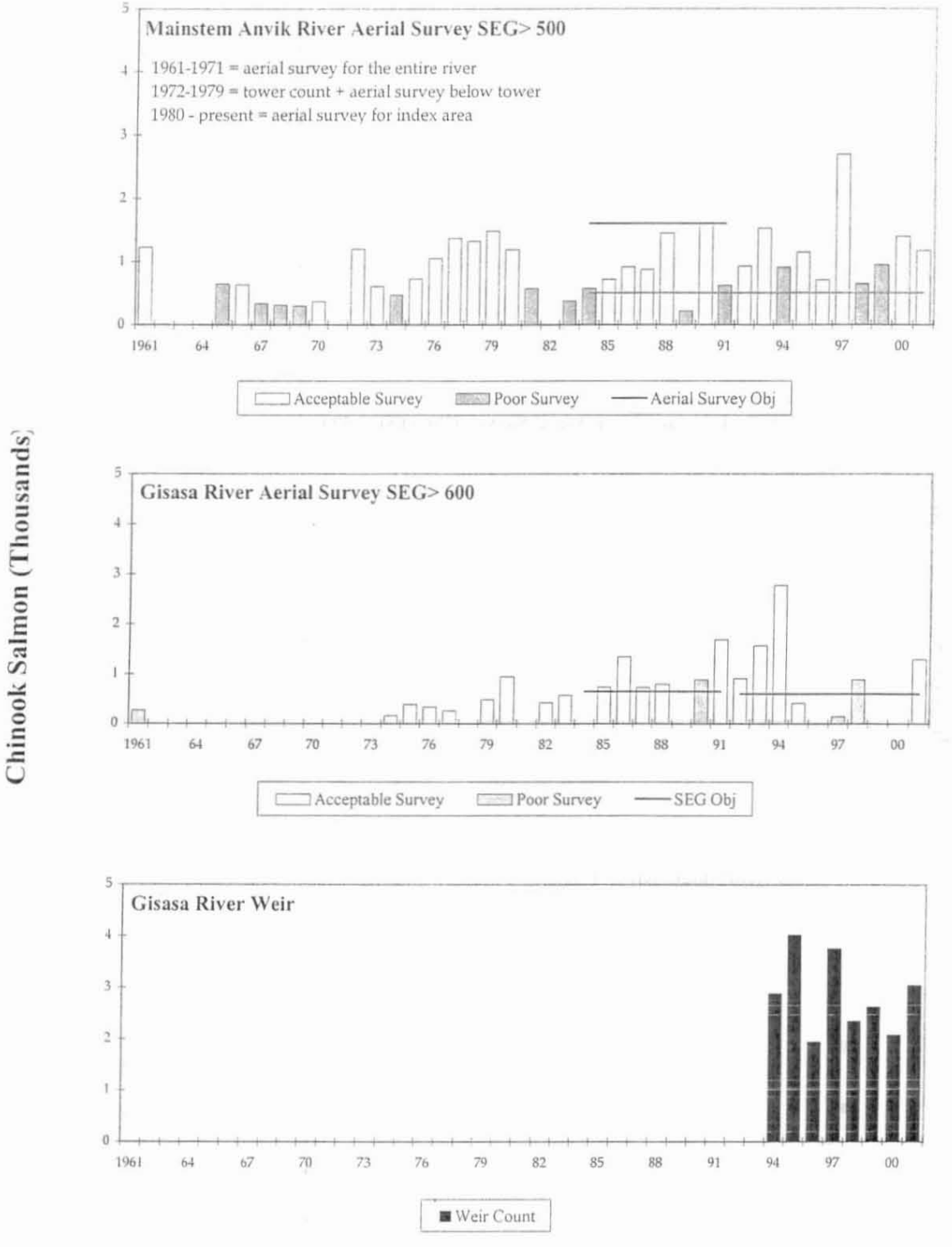


Appendix Figure 10. Canadian harvest of fall chum salmon, Yukon River, 1961-2001.

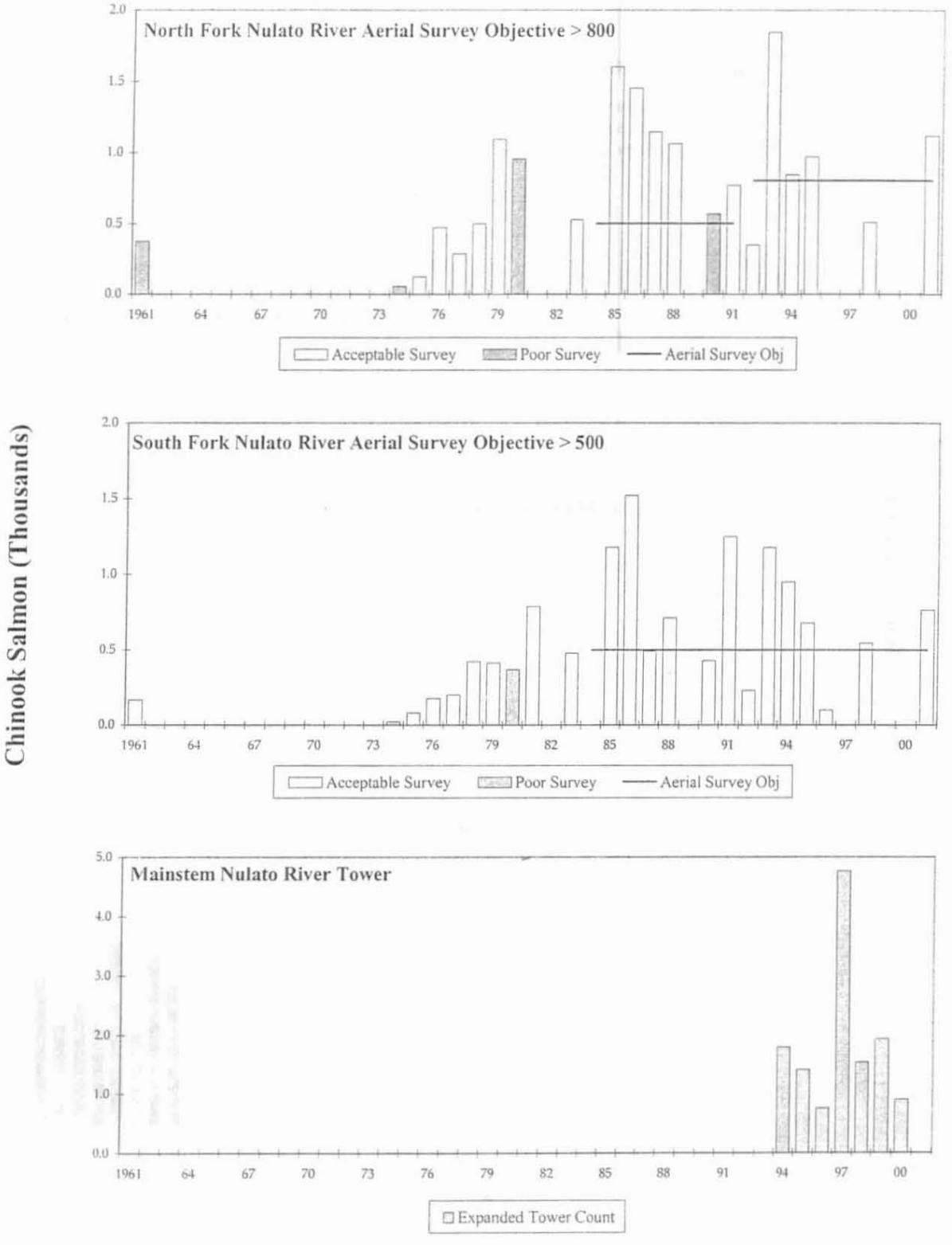


Appendix Figure 11.

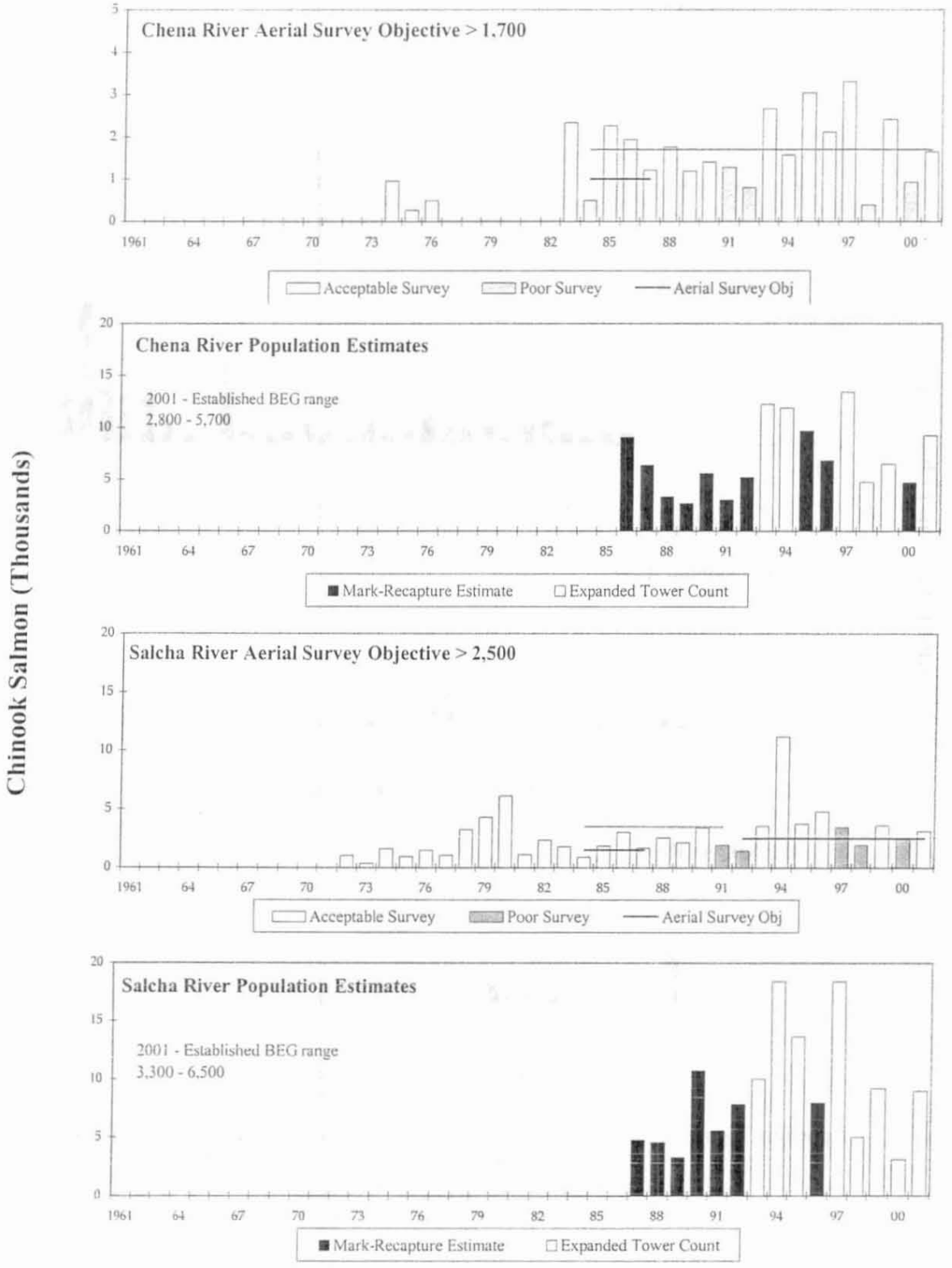
Chinook salmon escapement data for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1961-2001. Data are aerial survey observations unless noted otherwise. Horizontal lines represent interim escapement goal objectives or ranges. Note that the scale of the vertical axis differs between projects.



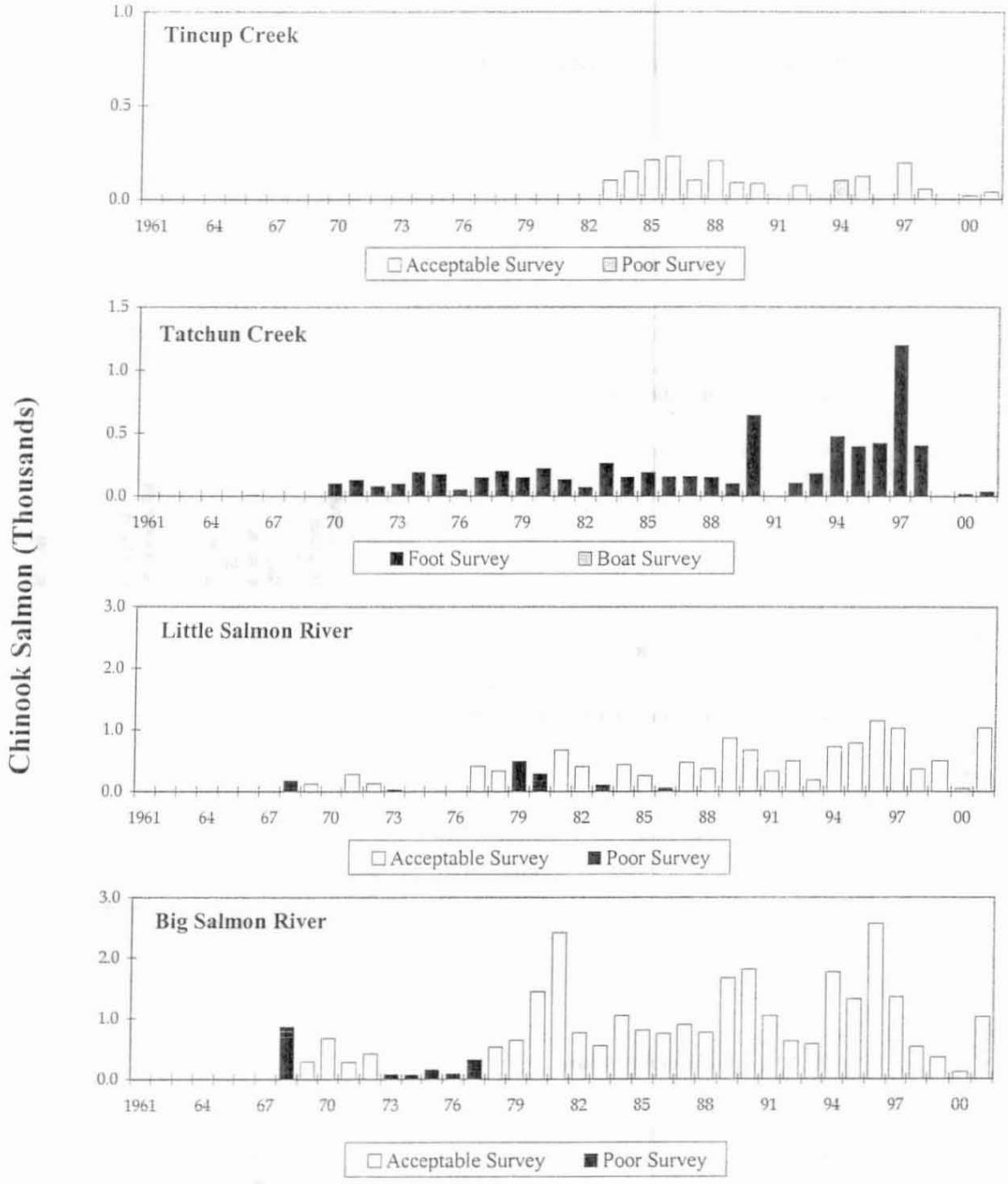
Appendix Figure 11. (page 2 of 4).



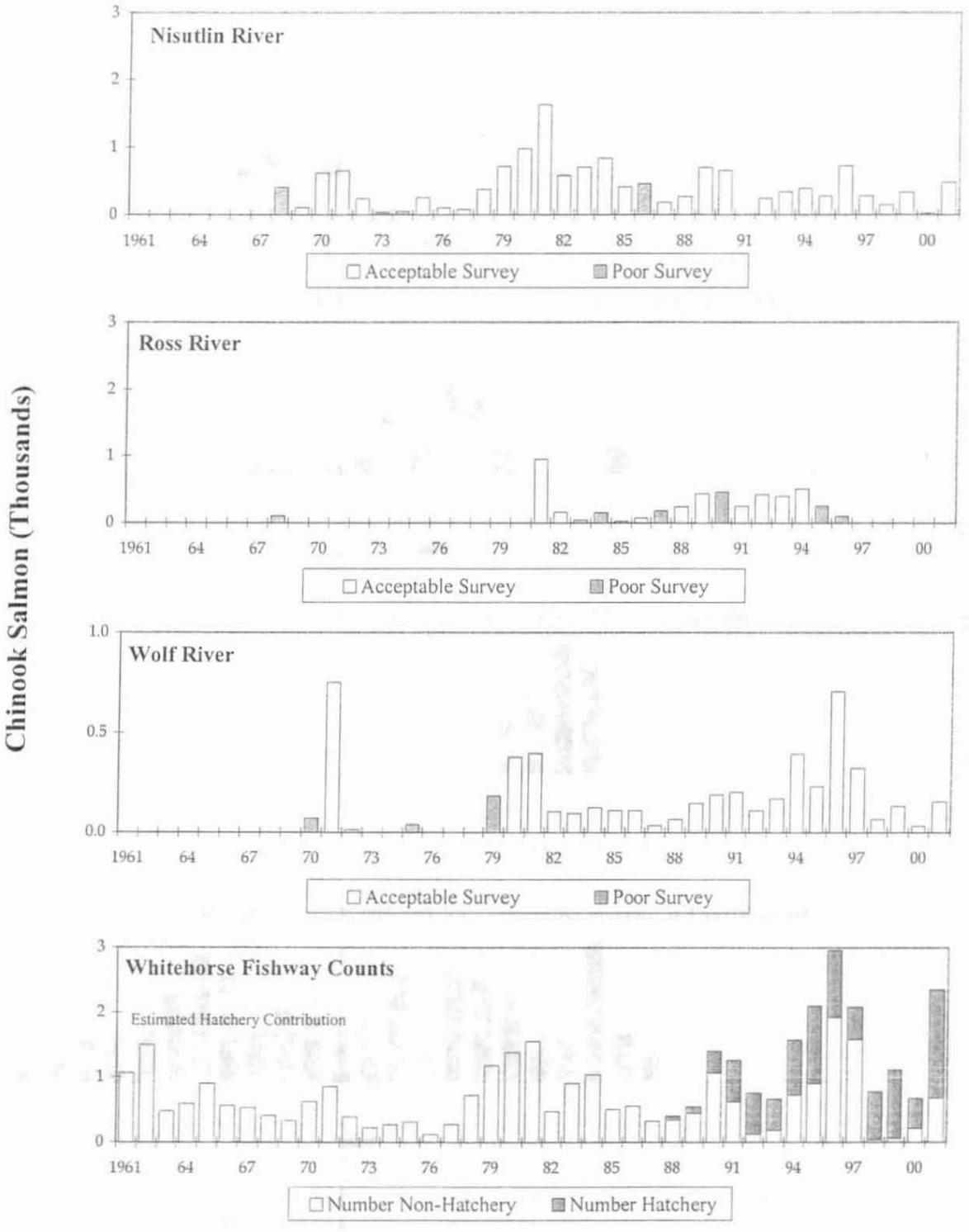
Appendix Figure 11. (page 3 of 4).



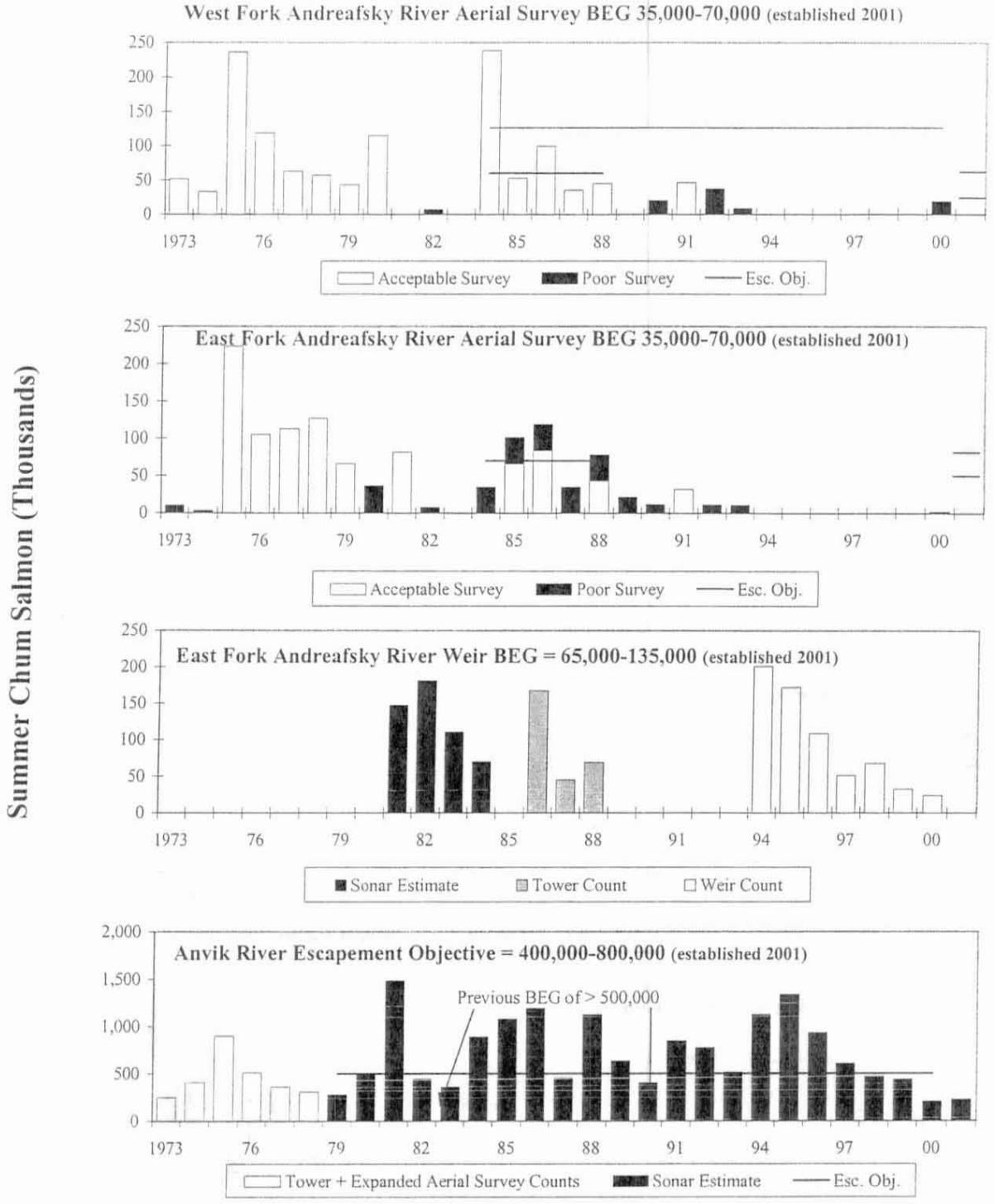
Appendix Figure 11. (page 4 of 4).



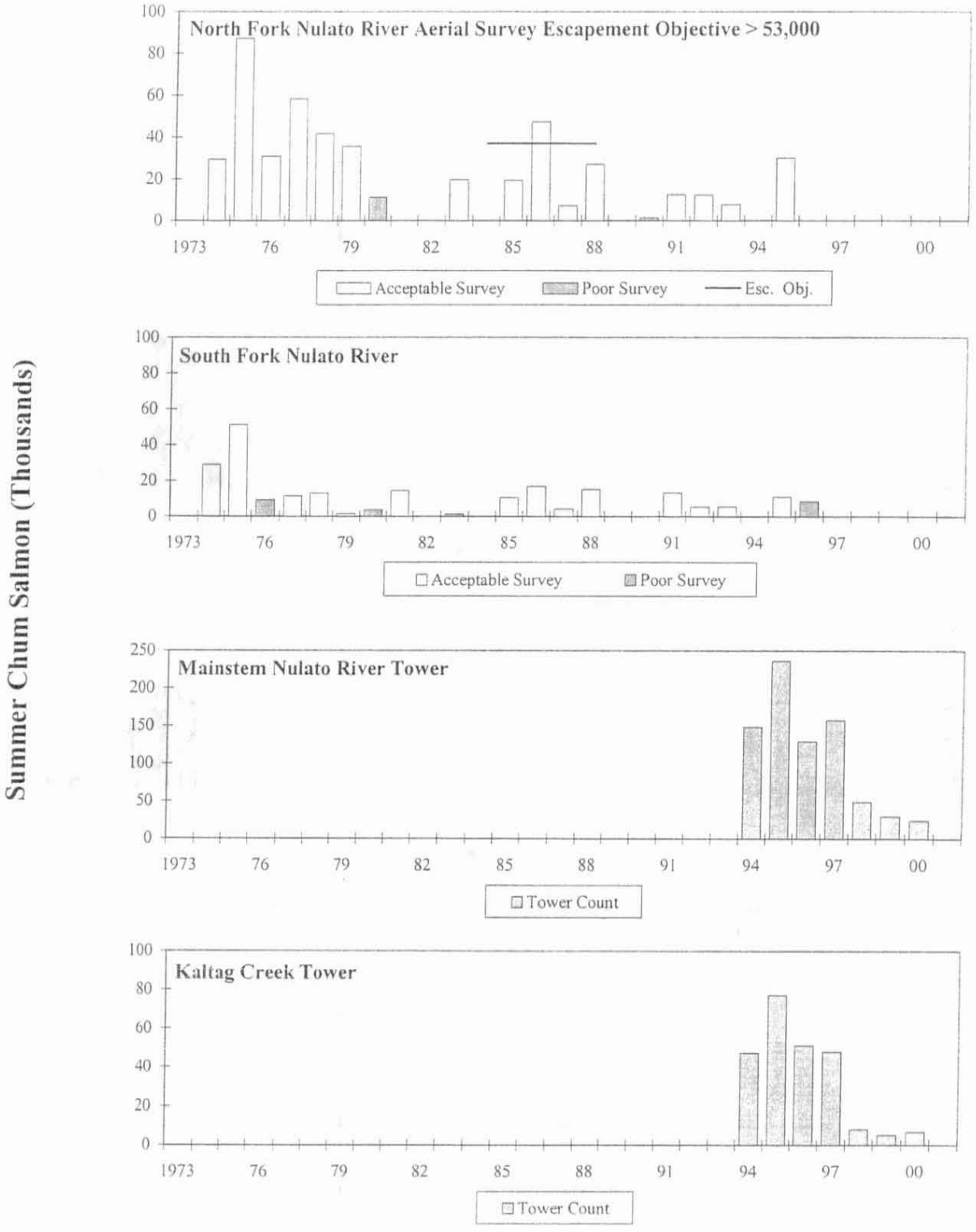
Appendix Figure 12. Chinook salmon escapement data for selected spawning areas in the Canadian portion of the Yukon River drainage, 1961-1999. Data are aerial survey observations unless noted otherwise.
Note the scale of the vertical axis is variable.



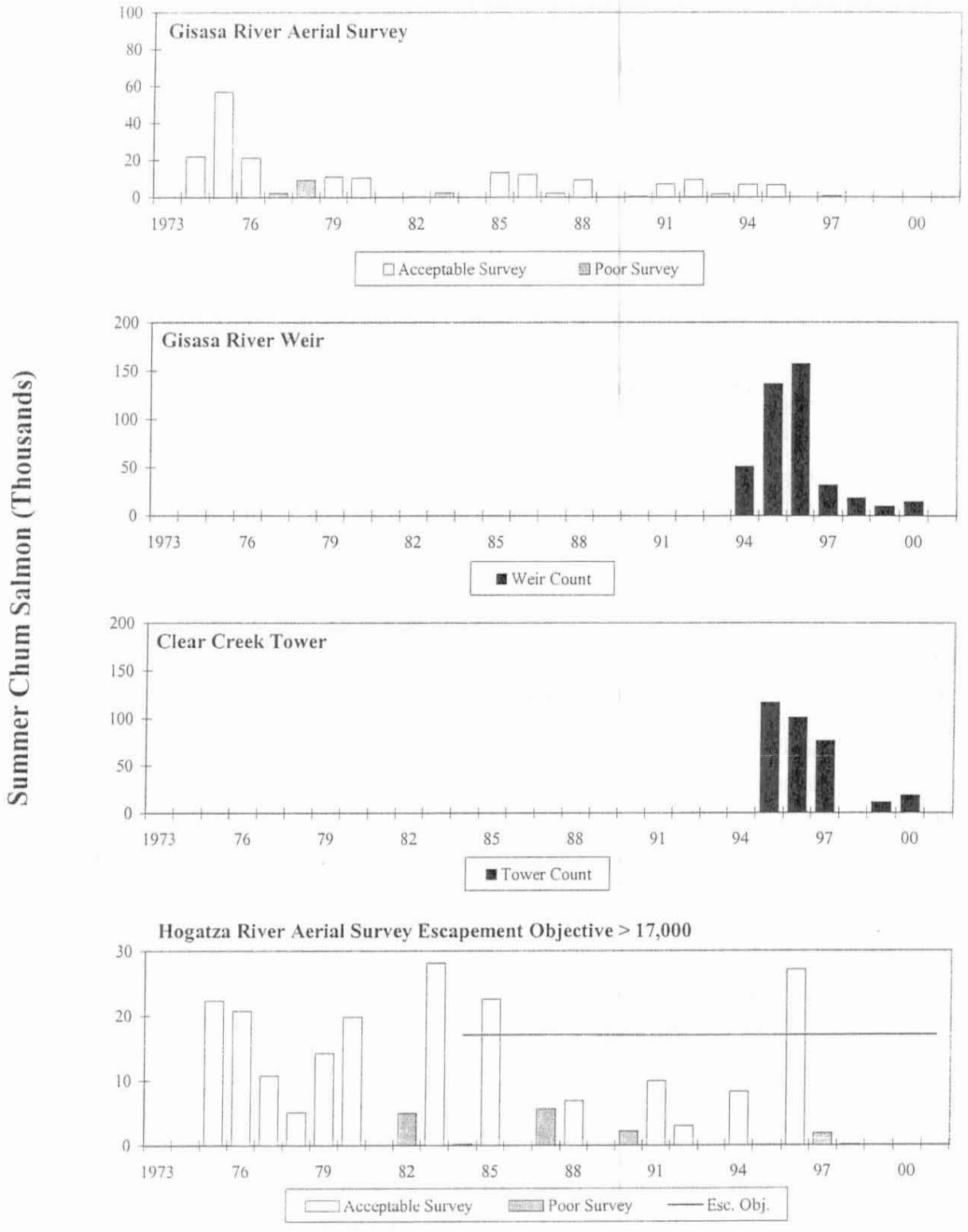
Appendix Figure 12. (page 2 of 2).



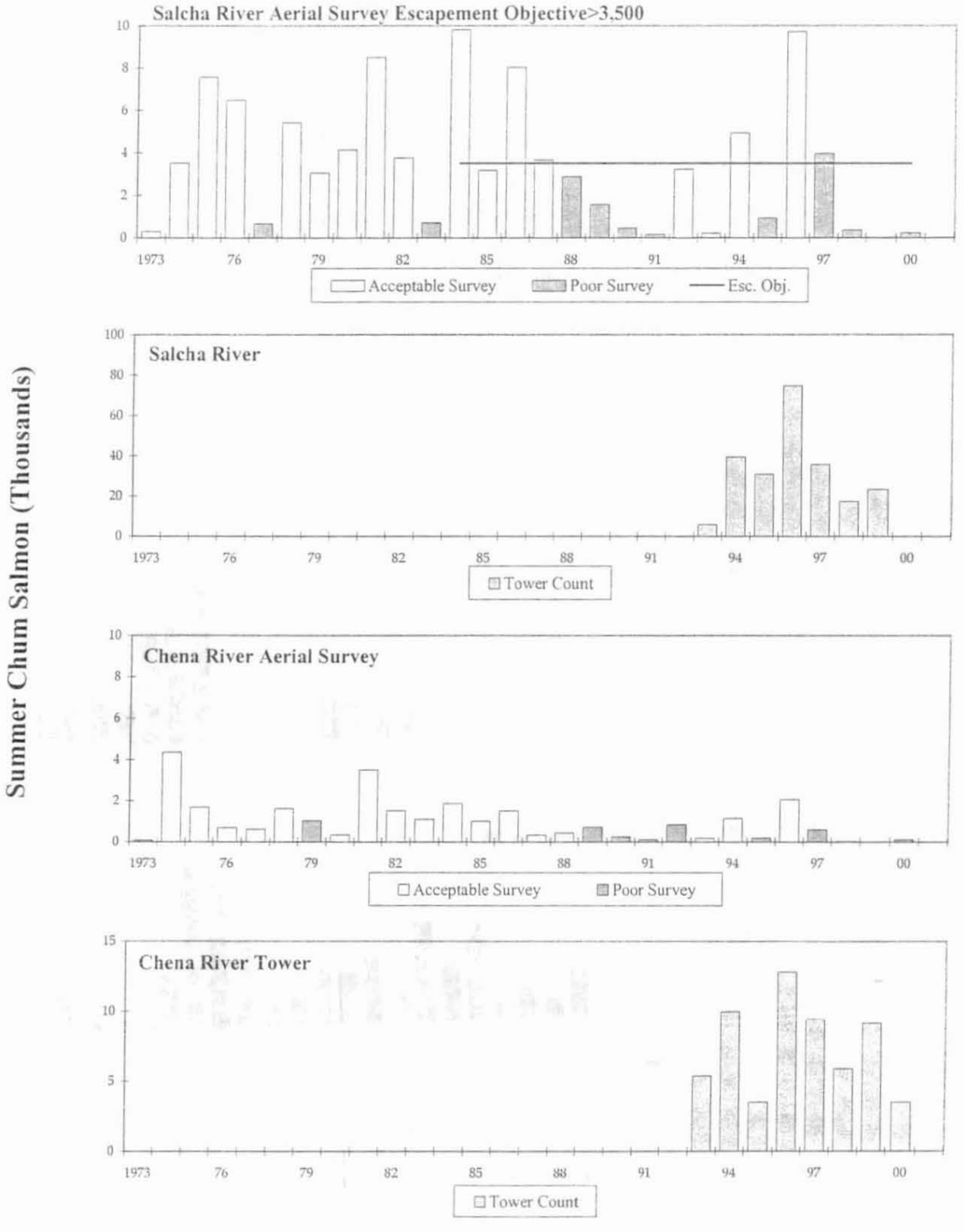
Appendix Figure 13. Summer chum salmon escapement data for selected spawning areas in the Yukon River drainage, 1973-2001. Horizontal lines represent escapement goal objectives or ranges. Data are aerial survey observations unless noted otherwise. Note that the scale of the vertical axis is variable.



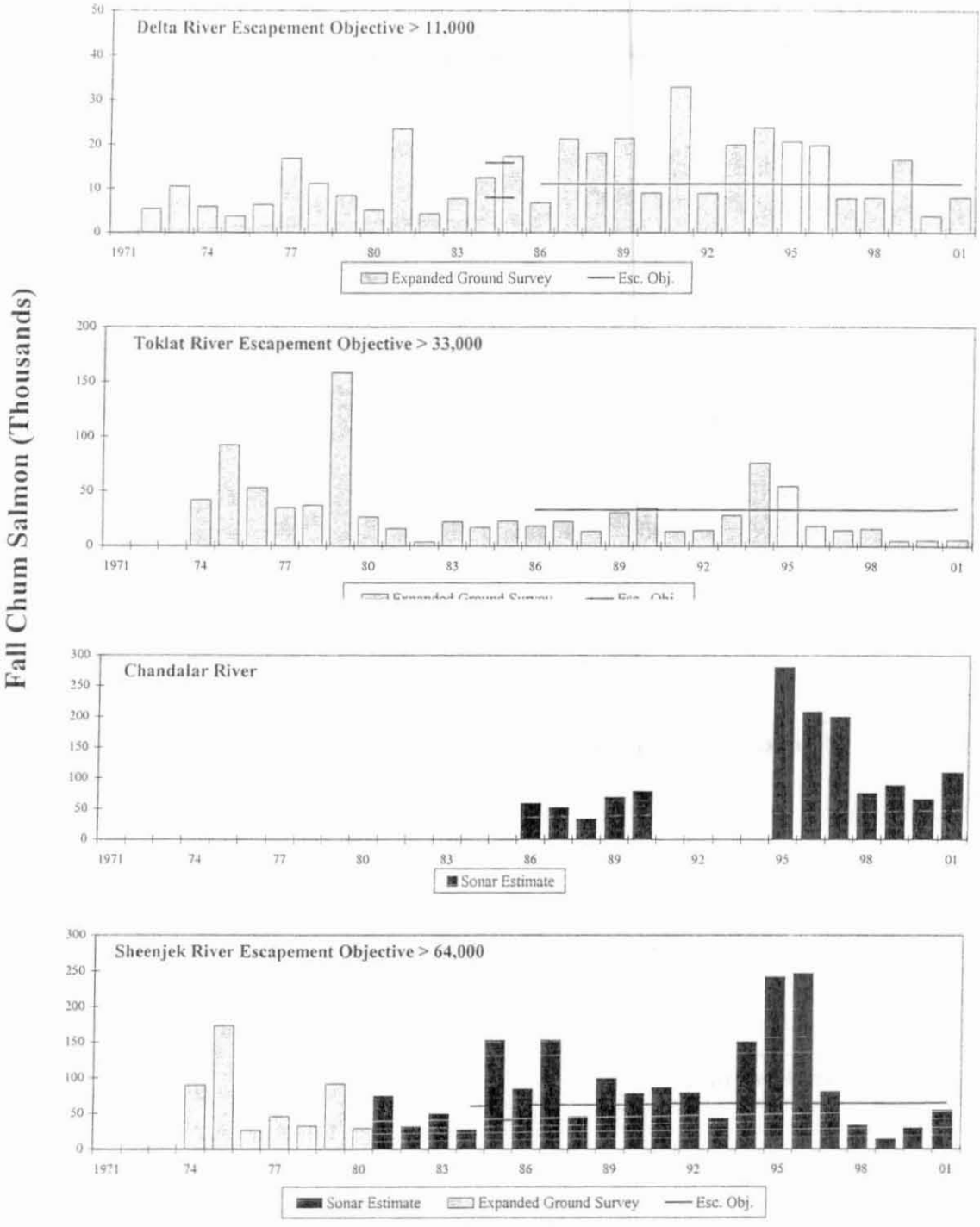
Appendix Figure 13 (page 2 of 4).



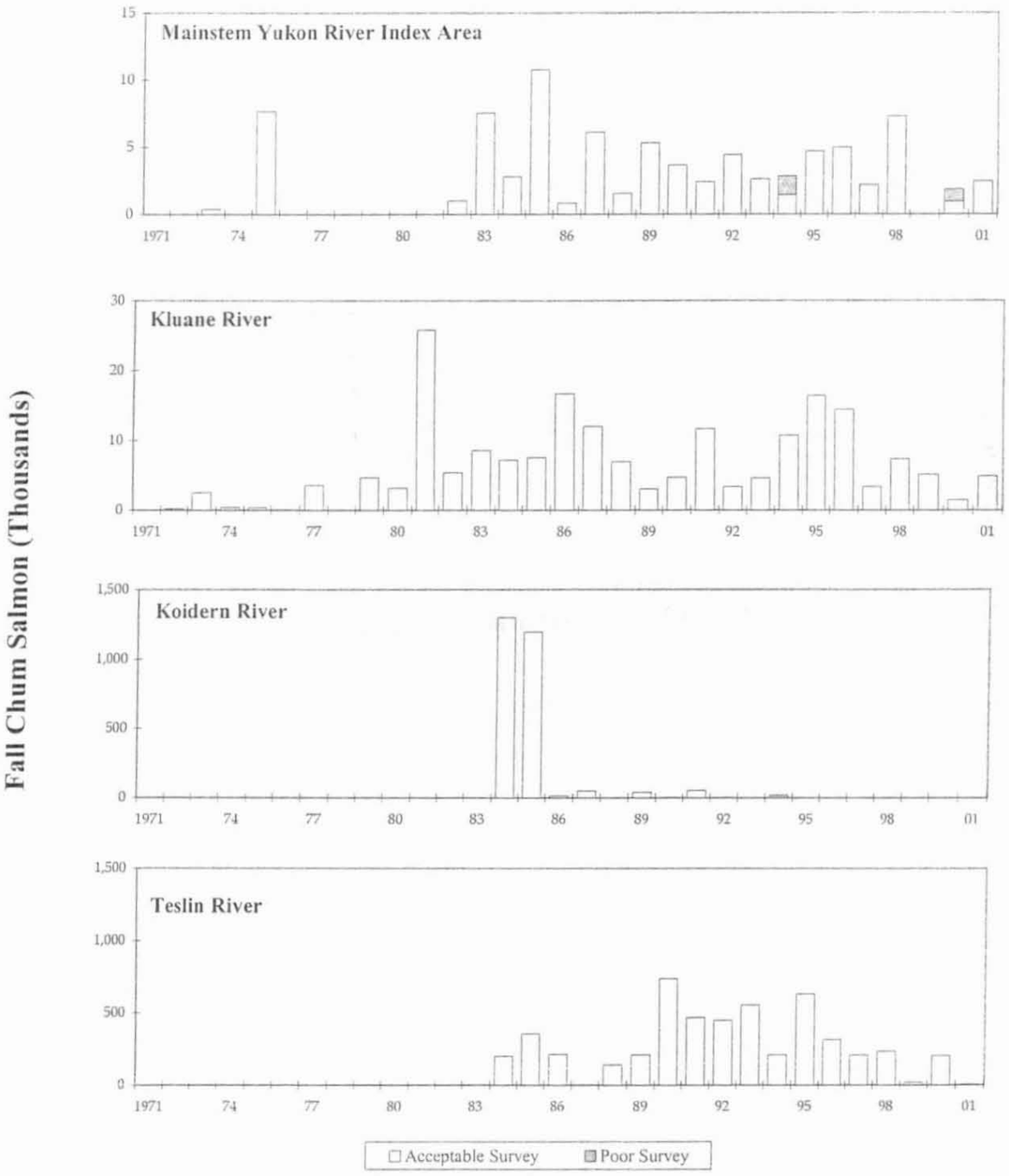
Appendix Figure 13 (page 3 of 4).



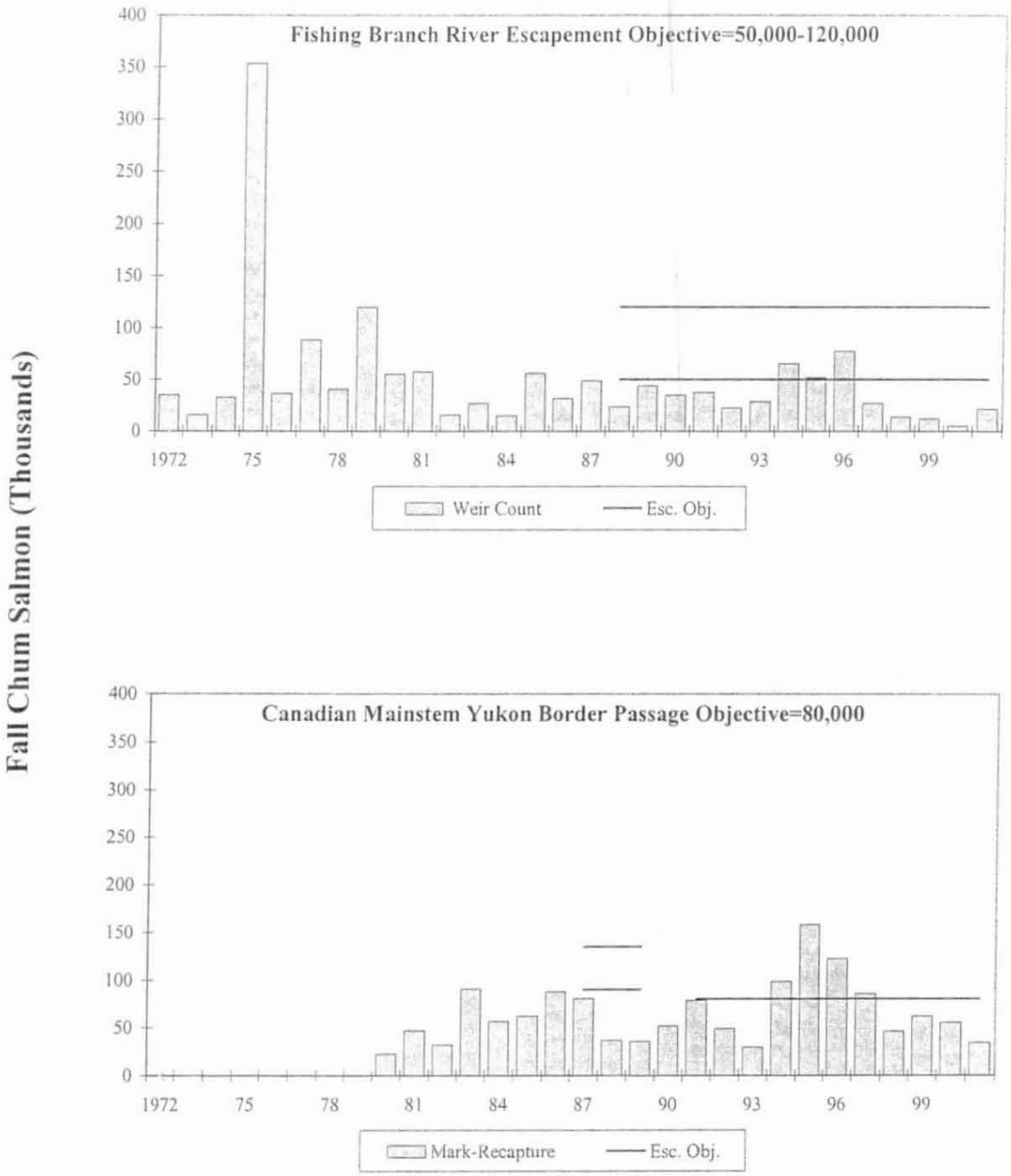
Appendix Figure 13 (page 4 of 4).



Appendix Figure 14. Fall chum salmon escapement estimates for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1971-2001. Horizontal lines represent interim escapement goal objectives or ranges. Note that the scale of the vertical axis is variable.



Appendix Figure 15. Fall chum aerial survey data for selected spawning areas in the Canadian portion of the Yukon River drainage, 1971-2001. Note that the scale of the vertical axis is variable.



Appendix Figure 16. Fall chum salmon escapement estimates for spawning areas in the Canadian portion of the Yukon River drainage, 1971-2001. Horizontal lines represent interim escapement goal objectives or ranges.

ADDENDUM **SUBMITTED 12/18/01**

USGS-Alaska Biological Science Center Salmon Freshwater Ecology and Survival Studies

The U.S. Geological Survey, Alaska Biological Science Center chum salmon research aimed at identifying factors affecting or controlling the abundance of Yukon River chum salmon was continued during 2001. That study has focused on the freshwater portion of the chum salmon's lifecycle. The purpose of the study is to estimate production in terms of numbers of smolts per spawner. Nested within this estimate are estimates of egg deposition per spawner, survival from egg deposition to alevin (pre-emergent sac-bearing fry), from alevins to emergence, and from emergence to smolt emigration. Survival estimates at shorter life stages during this period (e.g., egg deposition to alevin), from alevins to emergence, and from emergence to smolt emigration) should reveal production bottlenecks. An important facet of our research is to determine the effects of environmental conditions (e.g., water/intra-gravel temperatures and flow) on the survival of chum salmon at critical life stages.
Our overall study objectives include:

1) Estimating spawner abundance,
2) Estimating the duration and distribution of spawners in the spawning area,
3) Quantifying spawning habitat,
4) Estimating over-winter survival rates of eggs and fry in the gravel,
5) Determining what factors influence freshwater survival.

Because of the extreme size of the Yukon watershed and remoteness of most tributaries, our original proposal (Knudsen 1996) included four representative chum salmon stocks, two summer-run (Chena and Salcha rivers) and two fall-run (Toklat and Tanana rivers). After the initial year (1996 and early 1997) of exploratory surveys, however, funding and logistical constraints had required us to limit work to two study sites (Hodgin's Slough, Chena River and Bluff Cabin Slough, Tanana River).

During 2000 an interagency agreement with the BLM was established to fund chum salmon research on Clear Creek in the Hogatza River drainage.
Under this agreement, the overall study objectives include:

6) Estimate annual adult escapements into Clear Creek (Work to be preformed by BLM personnel),
7) Quantify and map spawning and incubation habitat within established study reaches,
8) Estimate over-winter survival rates of eggs and alevins in the gravel within established study reaches,
9) Determine the feasibility of estimating the number of emigrating smolts from Clear Creek.

Methods developed at the Chena River and Tannana River sites will be used at Clear Creek.

During 2001, we initiated research in the Chena River drainage to examine freshwater habitat use by juvenile chinook salmon. The overall study is designed to test a marking method, assess our ability to mark and recapture fish over the winter, determine the

stability of the population within the study site (i.e., do juvenile chinook demonstrate fidelity to the site or do they freely move in and out of the site), collect genetic material to test the geographical importance of Hodgin's Slough, and develop more rigorous study designs (i.e., use these results to determine the feasibility of estimating the over-wintering chinook populations in Interior Alaska drainages).

Chena River and Tannana River Chum Salmon Studies

Habitat mapping using surveying equipment has allowed us to develop detailed computer based maps of the study sites and spawner distributions. Adult fish have been enumerated at weirs, intra-gravel survival and densities estimated were attempted using a hydraulic pump, and smolt emigrations using funnel traps and mark-recapture. Using a fecundity/length relationship, we have been able to estimate potential egg deposition (PED). However, our attempts to estimate actual egg deposition within the study sites using redd pump sampling have not been tenable. Therefore, n alternative method for estimating intra-gravel survival rates was begun during 1999.

This study has used mini-piezometers (stand pipes) and egg incubation baskets to assess both the intra-gravel environment and chum salmon egg survival. During 1999, mini-piezometers were systematically deployed along transects in both summer-run and fall-run chum salmon spawning areas. Piezometers allow us to measure the hydraulic pressure differential between subsurface and surface waters (VHG), substrate permeability, and subsurface water velocity. In addition, we are measuring and monitoring dissolved oxygen (DO), conductivity, pH and temperature within each piezometer. Piezometers are installed in a geo-referenced (Universal Transverse Mercator (UTM) coordinates) grid pattern along 11 transects, for a total of 44 piezometers at the Chena R. and 48 piezometers at the Tanana R. study sites. To date, hydraulic and water quality measurements have been collected eight times at the Chena River site and five times at the Tannana River site.

Measurements in Hodgin's Slough showed large variation in hydraulic variables, temperature, and DO. Relatively distinct patterns were evident for temperature, DO and VHG. In contrast, measurements taken in the Bluff Cabin Slough study site indicated a more homogenous environment with the exception of VHG, which appeared patchy. During 2001 we have added piezometers to determine direction of intra-gravel flow and magnitude. Preliminary results indicate a subsurface flow from the main-stem Chena R. into Hodgin's Slough. In comparison, Bluff Cabin Slough is strongly influenced by regional groundwater discharge. Intra-gravel water velocity estimates have been calculated and are being analyzed.

During 1999 and 2000, temperature and DO appeared to match observed spawning distributions best at the Hodgin's Slough study site. In areas of high spawner densities, late July intra-gravel temperatures where higher (7 to 9.5° C) and D.O was slightly higher (4 to 5.5 mg/l) than in areas of little and no observed spawning where temperatures were 3 to 6° C and DO was <2 to 4 mg/l. During winter the temperatures in the spawning areas were lower (0.5 to 2° C) than in non-spawning areas (1 to >2° C). However, DO was distinctly higher (>6 to 7.5 mg/l) in spawning areas than in non-spawning areas (>1

to 6 mg/l). In August 2001, average DO concentrations in spawning areas were less than half (1.2 mg/L) of averages observed in the previous two years (4.2 mg/L and 4.8 mg/L) during nearly the same time. However, Measurements were collected along transect 3 on 5 October showed that DO concentrations were relatively high (5 – 6.5 mg/L) in the spawning area, but remained low outside of the spawning area (1.4 – 3.4 mg/L). USGS personnel, in cooperation with YRDFA and BSFA personnel, collected intra-gravel measurements on the Salcha R. within 6 spawning areas during August 2001. In general, average DO concentration (4.5 mg/L) was consistent with Hodgin's Slough 1999 and 2000 averages.

In the Bluff Cabin Slough study site, temperatures varied little between September (3.1 – 4.4° C) and January (3.1 – 4.4° C). DO also showed little variation between fall and winter sampling, 10.3 – 12.0 mg/l as compared to 9.5 – 11.0 mg/l.

At the Hodgin's Slough study site, survival rates in spawning areas were 63 – 94% at the eyed-egg stage and 26 – 91% at the pre-emergent stage. All but four of the 11 baskets in spawning areas were damaged during spring flooding, in those three baskets survival until emergence was 40 – 98%. In non-spawning areas, baskets were buried in silt, and survival to emergence was 0%. In the Bluff Cabin Slough study site survival until the eyed-egg stage ranged from 40 to 100%. Ignoring the two lowest basket survivals (40 and 63%), survival in the remaining 12 baskets was very high (87 – 100%). Pre-emergent survival was extremely low in the Bluff Cabin study site baskets (0 – 33%). Indeed, live alevins were only found in two baskets (2% and 33% survival). It appeared that the baskets in Bluff Cabin Slough had become heavily silted.

We have compared results of chum salmon survival within egg baskets to differential intra-gravel environments for each study site. Survival at Hodgin's Slough was primarily regulated by DO concentrations, which show a positive correlation of survival with increasing DO concentrations greater than approximately 2 mg/L. Egg and alevin survival within the Hodgin's Slough study site was not related to upwelling velocity or temperature, but development rates were influenced by temperature. In contrast, egg and alevin survival at the Bluff Cabin Slough site was not directly limited by temperature or DO concentrations. The infiltration of silt may have reduced velocities therefore decreasing delivery rates of DO and metabolite removal from eggs and alevins. An alternative explanation is that siltation caused mechanical injuries to the alevins. We are currently analyzing substrate freeze-core samples to further evaluate differences between the summer-run and fall-run sites.

Our results to date, coupled with data on spawner distribution within the sites, indicate that freshwater survival of chum salmon in their northern range is dependent on an intra-gravel environment which allows them to survive extreme winter conditions while supporting developmental rates that result in proper emergence and downstream migration timing.

During 2001 monitoring of adult spawning chum was limited to Hodgin's Slough. No weir was operated, rather stream surveys where used to observe spawning fish and

identify redds. Due to intermittent high and turbid flows, only 66 redds where successfully mapped and measured from 8 - 26 August. The general spawning pattern was similar to 1997-2000, with the exception of increased use of habitat in the upper study section.

Clear Creek Cooperative Chum Salmon Study

In cooperation with BLM personnel we did a reconnaissance survey of lower Clear Creek, a tributary of the Hogatza River during September 2000. We installed one surface and five intra-gravel temperature recorders in the lower portion of Clear Creek. During August 2001, additional temperature recorders were installed to increase the coverage in the main-stem of Clear Creek and its major tributary (Aloha Creek). Fall 2000 through August 2001 temperatures demonstrate that the thermal regime in Clear Creek is different than what we have recorded at our Chena River and Tannana River sites. Clear Creek cooled to just above 0 °C by the end of September 2000 and did not begin to increase until June 2001. Once we recover the recorders during spring 2002 we will have the first cycle that completely covers the thermal regime from fertilization through emergence.
Attempts at collecting emigrating cum smolts during the spring of 2001 were limited. We were able to operate a small funnel net, covering 30% to 75% of the water flow from 17 April through 27 May. During this time, only 360 chum smolts were captured. After 27 May, high water precluded running the trap.
During June – August 2001 USGS personnel assisted with operation of the BLM weir. In addition, we surveyed the main-stem Clear Creek over the entire range of previously observed chum salmon spawning. Stream channel and spawning locations were mapped using a GPS. The lower and upper reaches of Aloha Creek were also surveyed.
Plans for FY2002 included:

1) Construction and testing of inclined plane smolt traps.
2) Establishment of detailed study reaches where spawning distributions and habitat will be quantified.

Chena River Juvenile Chinook Rearing Study

During May 2000 we collected emigrating chinook at Hodgin's Slough to test PIT tag methods. The fish (n=120) where randomly divided into four treatment groups. The groups (n=30) were 1) weighed, measured, PIT tagged, and fin-clipped; 2) weighed, measured, and fin-clipped; 3) fin-clipped and 4) control. The fish were transported to the Fairbanks US Fish and Wildlife Service laboratory and reared in a divided 284 liter aquarium. Fish were weighed, measured, and scanned for PIT tags monthly. Initial results show that there was no significant growth or survival differences among treatment groups and tag retention was > 95%.
During October 2001 we were able to capture, tag and release 261 juvenile chinook in Hodgin's Slough. We plan to continue minnow trapping beginning in February 2002 and monitor emigration during the spring.
During August 2001, the ADF&G Fairbanks Sports Fish Division office in Fairbanks helped us to collect fin clips from 290 adult carcasses for genetic analysis. Tissue samples will be processed at the USGS, Molecular Genetics Lab in Anchorage over the 2001/2002 winter.

For further information or to receive copies of the progress report or study plans contact

Jim Finn
Fishery Biologist
USGS, Alaska Biological Science Center
1011 East Tudor Rd.
Anchorage, AK 99503

PHONE: (907) 786-3450
FAX: (907) 786-3636
E-MAIL: jim_finn@usgs.gov