YUKON RIVER SALMON SEASON REVIEW FOR 2002 AND TECHNICAL COMMITTEE REPORT

Prepared by

THE UNITED STATES AND CANADA
YUKON RIVER JOINT TECHNICAL COMMITTEE

Edited by

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1.0 INTRODUCTION

The fall meeting of the Yukon River Joint Technical Committee (JTC) was held in Whitehorse October 29-November 1, 2002. 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

Fisheries and Oceans Canada (DFO)
Mary Ellen Jarvis
Jacques Jobin
Sandy Johnston (JTC Co-Chair)
Pat Milligan
Eric Val
Al Von Finster

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

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

Independent Contractors
Brian Mercer
Clive Osborne

Indian and Northern Affairs Canada (DIAND)
Pat Roach

US Bureau of Land Management (BLM)
Bob Karlen

Yukon Salmon Committee – Canada (YSC)
Jake Duncan

US Geological Survey-Biological Research Division
Jim Finn

Bering Sea Fishermen's Association (BSFA)
Chris Stark

Tanana Chiefs Conference (TCC)
Kimberly Elkin

Association of Village Council Presidents (AVCP)
Ben Greene

Yukon River Drainage Fisheries Association (YRDFA)
Michael McDougall

2.0 COMMERCIAL FISHERY – ALASKA

The 2002 preseason outlook was for a below average to poor chinook salmon run and poor summer and fall chum salmon runs. Given the uncertainties associated with recent declines in productivity, managers anticipated the chinook salmon run would support an average subsistence harvest and possibly a small commercial harvest in the Alaska portion of the drainage. The preseason outlook anticipated a commercial harvest of zero to 20,000 chinook salmon. Similarly, recent declines in productivity of both summer and fall chum salmon, and below average parent-year escapements forebode neither chum salmon run would likely support a commercial harvest. The preseason commercial harvest outlook anticipated a commercial harvest of zero to 150,000 summer chum salmon, with likelihood the harvest would be incidental to a directed chinook salmon commercial fishery. The preseason outlook for commercial fall chum salmon harvest was anticipated to be zero to 150,000; with likelihood the harvest would be zero.

The commercial harvest of chinook and summer chum salmon was below the low end of the guideline harvest range for all districts and subdistricts. The commercial fishery was managed conservatively by reducing the length of fishing periods. The summer chum salmon harvest was taken incidental to fishing a directed chinook salmon fishery except for two directed chum salmon commercial fishing periods in District 6.

The total estimated commercial harvest, including the estimated harvest to produce salmon roe sold, was 24,430 chinook and 13,568 summer chum salmon for the Alaskan portion of the Yukon River drainage in 2002 (Appendix Table 1, Appendix Figure 1). The commercial harvest is expressed as the number of salmon sold in the round; pounds of salmon roe sold; and estimated harvest, which includes the estimated number of salmon harvested to produce the quantity of roe sold. Commercial sales in the round were 24,200 chinook and 13,548 summer chum salmon. Roe sales by species totaled 896 pounds for chinook and 16 pounds for summer chum salmon. The 2002 chinook salmon harvest was the third lowest commercial harvest since statehood. The summer chum salmon harvest was the third lowest since 1968. The 2002 chinook salmon harvest was 75% below the 1990-1999 average harvest of 152,220 chinook salmon (Appendix Table 2, Appendix Figure 2). The summer chum salmon harvest was 97% below the 1990-1999 average harvest of 502,849 fish (Appendix Table 3, Appendix Figure 3).

The age composition of chinook salmon samples collected from the combined commercial harvest was 4.0% age-4, 23.7% age-5, 59.6% age-6, and 12.8% age-7 fish. The sex composition of the samples was 54.7% females and 45.3% males. Age composition data from the commercial harvest indicated 4-year old fish accounted for approximately 53.7% of the summer chum salmon sampled. Age-5 summer chum salmon accounted for 42.5% of the commercial harvest samples.

Yukon River fishermen in Alaska received approximately $1.7 million for their chinook and summer chum salmon harvest in 2002, approximately 71% below the 1990-1999 average of $6.0 million (Appendix Table 4). The decrease in exvessel value was because the poor chinook and summer chum salmon run resulted in a low commercial harvest.

A total of 560 permit holders participated in the chinook and summer chum salmon fishery in 2002 (Appendix Table 5), which was 27% below the 1990-1999 average of 763 permit holders and 2002 was just two permits below the record low set in 2000. The Lower Yukon Area (Districts 1-3) and Upper Yukon Area (Districts 4-6) are separate Commercial Fisheries Entry Commission (CFEC) permit areas. A total of 540 permit holders fished in the Lower Yukon Area in 2002, which was 18% below the 1990-1999 average (Appendix Table 5). In the Upper Yukon Area, 20 permit holders fished, which was 81% below the 1990-1999 average.

Four buyer-processors operated in the Lower Yukon Area. Lower Yukon River fishers received an estimated average price per pound of $3.37 for chinook and $0.06 for summer chum salmon. The average price paid for chinook salmon in the Lower Yukon Area was well above the 1990-1999 average of $2.82 per pound. Prices paid for summer chum salmon in the round continued to be as low as observed since 1995. The exvessel value of the Lower Yukon Area chinook fishery of $1,691,105 is 69% below the 1990-1999 average of $5,208,089 million (Appendix Table 4). The average income for Lower Yukon Area fishers that participated in the 2002 fishery was $3,131.

Upper Yukon fishers received an estimated average price per pound of $0.75 for chinook and $0.32 for summer chum salmon. The average price paid for chinook salmon in the Upper Yukon Area was slightly below the 1990-1999 average of $0.90 per pound. The exvessel value of the Upper Yukon Area fishery of $20,744 is 77% below the 10-year-average (1990-1999) of $94,574 (Appendix Table 4). The average income for Upper Yukon Area fishers that participated in the 2002 fishery was $1,346.

The 2002 fall chum salmon run was expected to be poor once again with a preseason projection of 200,000 to 650,000 fish. The outlook was for no commercial salmon fishing and subsistence fishing restrictions were anticipated. However, optimism increased when the summer chum salmon run came in stronger than expected. Based on the historical performance relationship between the summer and fall chum salmon runs, the fall chum salmon run size outlook increased as the fall season approached, yet a commercial fishery remained unlikely. The fall chum salmon run began weak and built strength in the second half of the season. At the midpoint in the run, managers projected the 2002 total run size would be approximately 350,000. Since this number is the minimum run size specified for drainage-wide escapement requirements in the *Yukon River Drainage Fall Chum Salmon Management Plan* 5 AAC 01.249, all uses, including subsistence fishing, were closed throughout the entire Alaska portion of the Yukon River drainage (Table 1). Subsistence salmon fishing restrictions were only lifted after the last large pulse of fish had passed through each section of the mainstem river in an effort to conserve fall chum salmon.

In 2002, no directed commercial coho salmon fishing was allowed because of the weak fall chum salmon run even though the coho salmon run size was near average. The coho salmon run is managed following guidelines adopted by the Alaska Board of Fisheries in the *Yukon River Coho Salmon Management Plan* 5 AAC 05.369. The coho salmon management plan allows a directed coho salmon commercial fishery only under specific conditions. It is unlikely conditions outlined in the coho salmon management plan will occur. In most years, fall chum salmon is the primary species of management concern. Therefore, out of concern for fall chum salmon, there was no commercial coho salmon fishery and other uses were restricted including subsistence opportunities.

No fall chum or coho salmon commercial fishing was allowed in 1987, 1993, 1998, 2000, 2001, and 2002. In previous fall seasons (1992-2001), the average commercial salmon harvest was 52,092 fall chum salmon (Appendix Table 6, Appendix Figure 4) and 15,640 coho salmon (Appendix Table 7, Appendix Figure 5). The average (1990-1999) exvessel value for the fall season Yukon Area commercial fall chum and coho salmon harvests combined was approximately $0.2 million (Appendix Table 4). In the previous five fall seasons (1995-1999), an average of 253 permit holders fished the fall chum and coho salmon fishery (Appendix Table 5). No test fish are sold in years when the fall commercial periods remain closed the entire season, including the 2002 fall season.

2.1 Chinook and Summer Chum Salmon

The lower Yukon River was ice-free on May 24, nearly two weeks earlier than in 2001 and four days earlier than the historic average (1962-2001). The first subsistence catch of chinook salmon was reported on May 31 near Emmonak. The department's test fishing projects recorded the first chinook salmon catch on June 1. River conditions in the lower river throughout much of the summer season were characterized as having normal water levels. Chinook salmon take approximately 30 days to migrate to the U.S./Canada border. For management purposes, the Yukon River is divided into fishing districts, subdistricts and drainages (Figure 1).

In cooperation with federal subsistence managers, a preseason management strategy was developed and described in an information sheet that outlined the run and harvests outlooks, and the regulatory subsistence salmon fishing schedule. The summer chum salmon management plan overview is described in Table 2. The preseason management strategy was to implement the subsistence salmon fishing schedule as salmon began to arrive in a district or subdistrict. Before implementing the subsistence salmon fishing schedule, subsistence fishing throughout most of the Yukon River drainage would be allowed seven days a week to provide an opportunity for harvesting resident species, such as whitefish, sheefish, pike, and suckers. The management strategy information sheet was used to prepare fishers for the possibility of reductions to the subsistence salmon fishing schedule or to allow for a small commercial fishery depending upon how the chinook salmon run developed. The information sheet was mailed to Yukon River commercial permit holders and the 2,400 households contained within the subsistence survey database. State and federal staff also presented the management strategy to the YRDFA and the federal Regional Advisory Councils.

Emmonak test fish indices, subsistence harvest reports, and Pilot Station sonar passage estimates provide the information the department used to assess the salmon run inseason. As the run progressed upriver, other projects provide additional run assessment information. Poor runs since 1998, and an inseason run assessment indicating another weak run, prompted conservative management of the fishery. Based on set gillnet test fish catch per unit effort (CPUE) (Figure 2) and preliminary Pilot Station sonar estimates, the chinook salmon run appeared to be a week earlier than the 2001 run.

According to test fish CPUE data, approximately 50% (midpoint) of the chinook salmon run entered the lower river by June 20, the average date for the midpoint of the run, and five days earlier than

last year. The cumulative set gillnet test fish CPUE in 2002 was 20.22 compared to 15.23 in 2001. The Pilot Station sonar cumulative passage preliminary estimate of 185,711 chinook salmon (Table 3) was higher than last year's estimate of 137,453 fish. Based upon preliminary harvest and escapement information, this year's chinook salmon run abundance was poor and similar to last year, but contained a higher proportion of 4 year-old (jack) chinook salmon. Further analysis of the 2002 run assessment is ongoing.

The 2002 Yukon River summer chum salmon was managed according to the guidelines described in the *Yukon River Summer Chum Salmon Management Plan* (Table 2). The management plan provides for escapement needs and subsistence priority over commercial, sport, and personal use fishing activities. The management plan also stipulates that drainage-wide directed summer chum salmon commercial fisheries be allowed only when the run size projection is greater than one million summer chum salmon. Provisions in the plan allow for varying levels of subsistence salmon fishing opportunity depending on the run size projection. 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 escapement monitoring projects to assess the run size for the purpose of implementing this plan.

The department monitored the 2002 summer chum salmon run in the lower Yukon River by using the lower Yukon River drift gillnet test fishery, subsistence harvest reports, and Pilot Station and Anvik River sonar passage estimates. Results from these projects, in combination with the preseason projection, were the basis for initial management decisions in 2002.

The Pilot Station sonar project only provides an estimate of the number of salmon passing the site on the mainstem Yukon River during its operation. An estimate of the total Yukon River run size requires an estimate of the subsistence harvests and escapement below Pilot Station. The summer chum salmon subsistence harvest taken in 2000 (50,000) and the East and West Fork Andreafsky River escapement estimates taken in 2000 (45,000) were added to the 2002 inseason run projection. The corresponding total run size estimate was applied to the summer chum salmon management plan to determine appropriate management actions.

The summer chum salmon run was assessed as being below average, but double last year's run. Summer chum salmon production continues to be well below average. The Pilot Station sonar cumulative passage estimate through July 18 was approximately 1,022,942 summer chum salmon (Table 3). Run projections for summer chum salmon early in the season contain a wide range of estimates because of the variability of run timing between years. Because of the uncertainties early in the season estimating summer chum salmon run timing and abundances, and the lack of buyer interest in Districts 1, 2, 3, and 4, only a limited directed summer chum salmon commercial fishery occurred in District 6 of the Tanana River drainage.

Districts 1-3

The management strategy during years of average abundance is to open the chinook salmon directed commercial fishery in the Lower Yukon Area when increasing subsistence or test net catches of chinook salmon have occurred over a seven- to ten-day period. This management

strategy typically provides for passage of a portion of the early run through the lower river districts before commercial fishing starts. The 2002 commercial fishing season opened near the midpoint of the run on June 19 in District 2. This was after approximately 14 days of increasing subsistence and test fishery catches. Based on lower river test fishing, the chinook migration increased rapidly from June 12 through June 25, and remained fairly steady through June 29. After June 29, abundance of chinook salmon declined.

Three commercial fishing periods were allowed in Districts 1 and 2. Fishing periods in these districts were reduced to 6-hours duration rather than the more typical 12-hour periods. Eight-inch or greater mesh size gillnets were required during all fishing periods in the Lower Yukon Area to direct the harvest at chinook salmon. No small mesh size fishing periods were allowed because no summer chum salmon market existed, and an estimated run size remained just above the minimum threshold necessary to allow for a directed commercial chum salmon harvest.

The combined total harvest of 22,593 chinook salmon for Districts 1 and 2 was 62% below the low end of the guideline harvest range of 60,000 fish and 75% below the 1990-1999 average harvest of 89,939 fish. The average weight of chinook salmon in 2002 was 19.9 pounds. The estimated age composition of chinook salmon samples collected from the lower river commercial harvest was 3.6% age-4, 22.6% age-5, 60.6% age-6, and 13.2% age-7 fish. The sex composition of the samples was 56.2% females and 43.8% males.

The combined commercial summer chum salmon harvest in District 1 and 2 of 10,344 fish was 93% below the 1990-1999 average harvest of 155,022 fish. The average weight of summer chum salmon in 2002 was 7.2 pounds.

No commercial harvest of chinook salmon occurred in District 3 in 2002 because there were no buyers. The 1990-1999 average harvest is 966 fish.

District 4

Historically, the Subdistrict 4-A fishery targets summer chum salmon with the dominant gear type being fish wheels and the location of the fishery resulting in a very high chum to chinook salmon ratio. In 2002, efforts were made to provide some commercial fishing opportunity for Subdistrict 4-A. One buyer agreed to purchase chinook salmon provided fishermen avoided locally spawning chinook salmon. Subdistrict 4-A was opened for a single 12-hour period directed at chinook salmon. No commercial deliveries were made during this period because of a low harvest.

The Anvik River Management Area remained closed to commercial fishing for the fifth consecutive year in 2002, because of poor runs of summer chum salmon. The Anvik River did not meet the minimum escapement of 500,000 summer chum salmon required to allow an inriver commercial fishery. Commercial fishermen in Subdistrict 4-A, including the Anvik River, were greatly impacted because of the lack of commercial fishing. The 1989-1998 average harvest for Subdistrict 4-A and the Anvik River Management Area was 3,086 summer chum salmon in the round and 126,080 pounds of summer chum roe. Exvessel value from 1991 through 1998 averaged $398,000.

Prior to 1997 when summer chum salmon abundance dramatically decreased, an average of 60 permit holders fished annually (1991-1996) in this subdistrict.

Commercial fishing directed at chinook salmon was open for four 48-hour periods in Subdistricts 4-B and 4-C. No commercial sales of salmon were reported. Fish caught during the commercial fishing periods were retained for subsistence use.

Subdistricts 5-B, 5-C, and 5-D

Two commercial fishing periods were allowed in Subdistricts 5-B and 5-C for a total of 30 hours of fishing time. The harvest of 564 chinook salmon was 76% below the lower end of the guideline harvest range of 2,400 fish. Six summer chum salmon were sold. Typically, the harvest of summer chum salmon is low in these subdistricts because they are located above the vast majority of summer chum spawning areas.

Commercial fishing in Subdistrict 5-D was opened for one 24-hour fishing period in 2002. The Subdistrict 5-D harvest of 207 chinook salmon was 31% below the lower end of the guideline harvest range of 300 fish.

District 6

Commercial fishing in District 6 was opened for two 42-hour periods directed at the harvest of chinook salmon and two 42-hour periods directed at summer chum salmon in 2002. The total estimated commercial harvest was 1,066 chinook and 3,218 summer chum salmon in District 6. The chinook salmon harvest was above the upper end of the guideline harvest range of 600-800 fish. The 1990-1999 average summer chum salmon harvest is 19,142 fish. Management of the fishery was primarily based on Chena and Salcha River tower counts.

The estimated age composition of chinook salmon samples collected from the upper river commercial harvest was 10.3% age-4, 41.1% age-5, 42.3% age-6, and 6.1% age-7 fish. The sex composition of the samples was 30.5% females and 69.5% males.

2.2 Fall Chum and Coho Salmon

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 1). 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 Biological Escapement Goals (BEG) and minimum escapement requirements.

From 1987 to 1998 the Yukon River preseason fall chum salmon run size projection had been presented as a point estimate. The 1999 to 2002 (excluding 2001) Yukon River preseason projections were presented as ranges because of the uncertainty associated with the unexpected run failures observed in recent years. Consequently, the 2002 Yukon River preseason projection was presented as a range of 209,000 to 646,000 fall chum salmon. However, management actions are guided by the actual return as determined inseason and the management agencies rely heavily on inseason run assessment tools that include information from the summer chum salmon run earlier in the season. The 2002 fall chum salmon run size projection was adjusted after the summer season by using the historical relationship between annual summer and fall chum salmon abundance. Because the summer chum salmon run had been higher than expected, the fall chum salmon projection was revised to 500,000 to 650,000 fish, which would allow for normal subsistence harvest. The expectation preseason was that the return would be near the low end of the range, the revised return was near the high end of the range, and the final estimate appears closer to the mid-point of the preseason range. This was only a slight improvement in the observed return compared to the over optimistic revised range based on the summer to fall chum salmon estimate.

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. Consequently, assessing the run strength early in the season is difficult when pulse size and run timing vary so drastically each season.

The first recognized pulse of fall chum salmon entered the mouth of the Yukon River on July 17 and lasted approximately three days. A second pulse entered the river on July 25, and lasted approximately five days. A third pulse was tracked through the test drift gillnets in Emmonak from August 7 to 13. A fourth pulse coincided with strong storm activity at Emmonak, from August 15 to 18; this pulse was the largest of the fall season. The sizes of the pulses were approximately 32,000, 90,000, 73,000, and 116,000 fall chum salmon respectively. No additional pulses were detected after the fourth pulse of fish. The fall chum passage was near normal in duration with the second half of the run more abundant than the first half. Consequently, the run timing appeared to be five to seven days late in the lower river. The 2002 fall chum salmon run was judged to be poor overall, however the Tanana River stocks fared slightly better than the upper Yukon River stocks.

Each pulse of chum salmon was detected by the lower Yukon River and Mountain Village drift gillnet test fishing projects. The catch rates at the lower Yukon River project appeared to correlate well with other assessment projects in run timing and relative magnitude of each observed pulse. However, since the project only began in 2001, the Lower River indices should not be compared with previous years of the set gillnet project. Pilot Station sonar is used to estimate the number of fish in each pulse. Once an abundance estimate is generated, managers can effectively base decisions on where and when fall chum salmon are present, as they migrate upriver, using the regulatory management plan.

Management of the Yukon River fall chum and coho salmon fisheries began in the lower Yukon River on July 16. The first three weeks of the season were exceptionally slow with only three small pulses of fall chum salmon detected entering the mouth of the Yukon River. The weather was unusually warm across the interior and the western coast of Alaska, and calm winds prevailed. Although few salmon were entering the Yukon River, fishermen and fishery managers remained optimistic because the summer chum salmon run had come in better than expected. Managers anticipated a change to the cooler typical weather, and westerly winds would bring fall chum salmon into the river. The full regulatory subsistence fishing schedule remained in effect although most fishermen reported they were waiting to go fishing when fall chum salmon abundance increased.

Eventually the weather cooled, winds became more westerly, yet fall chum salmon were slow moving into the Yukon River. The average run timing midpoint is August 7. As of August 9, the Pilot Station cumulative sonar count was 147,000 fall chum salmon, 43% below the recent 7-year average for that date. The fall chum salmon run was re-evaluated at the historical midpoint and the projection dropped to less than 350,000 fish. A run of this size was not sufficient to meet escapement needs and provide subsistence harvest. Therefore, as guided by the *Yukon River Drainage Fall Chum Salmon Management Plan,* to conserve fall chum salmon, subsistence salmon fishing closures began throughout the entire Alaskan portion of the Yukon River drainage.

With widespread subsistence salmon fishing closures in effect, fishery managers attempted to allow subsistence harvest on the building coho salmon run and on non-salmon species. Subsistence fishing for non-salmon species remained open with gear restricted to gillnets with four inches or less mesh size and no longer than 60 feet. Freshwater tributaries of the Coastal District that do not flow into the Yukon River remained open seven days per week with unrestricted gear. Under state regulations, subsistence fishing with a line attached to a rod or pole was allowed in that portion of the Yukon River drainage downstream of the lower mouth of Paimiut Slough. Federally qualified users were allowed to fish using hook and line gear in Federal Conservation System Units in accordance with Federal regulations. However, under both state and federal regulations, all fall chum salmon caught with hook and line were required to be released immediately back into the water and a harvest limit for other salmon was set at a maximum of ten fish per day per person. In addition, dip nets were allowed for subsistence fishing in the mainstem waters of Districts 1, 2, and 3 also with the condition that all chum salmon be released. Fish wheel operations were closed to all fishing throughout the drainage.

In mid-August, two moderately sized fall chum salmon pulses entered the Yukon River mouth within days of each other. The cumulative passage estimate at Pilot Station sonar increased to approximately 350,000 fish. Although the fall chum salmon run was weak, average numbers of coho salmon were returning to the Yukon River. On August 26, dip net gear was allowed in District 4 including the Koyukuk River, to harvest coho salmon in an effort to allow some additional subsistence fishing opportunity while conserving fall chum salmon.

On August 29, approximately 360,000 fall chum salmon were estimated past the Pilot Station sonar and the end of season projection was for a total run of 361,000 to 385,000 fish. By August 24, the end of the last large pulse of fall chum salmon was estimated to be past the upper end of

District 3. In an effort to protect that pulse of fish, Yukon Area districts and subdistricts were reopened sequentially after this group of fish passed through each area on the way upriver. Fishing time was allowed to provide some opportunity to harvest the abundant coho salmon while continuing to conserve the weak fall chum salmon stocks. The Coastal District was opened to its full subsistence salmon fishing schedule of seven days per week because few salmon migrate close to the beach at that time of year. Districts 1, 2, and 3 were reopened on August 29, with a reduced fishing schedule of two 18-hour periods each week, which was half of their full regulatory salmon schedule. The Koyukuk River opened September 8 to one 72-hour period each week, at the same time the remainder of District 4 also opened to two 24-hour subsistence salmon fishing periods each week.

As the season progressed, distribution of fall chum salmon was monitored closely to determine the portion of the run bound for the various identified spawning areas. The Yukon Area fall chum salmon run consists of two main components, an upper Yukon River component and a Tanana River component. Each of these components is composed of smaller tributary spawning stocks. The Yukon River Rapids test fish wheel provides the first opportunity to judge the upper Yukon River component as salmon migrate above the confluence of the Tanana River. The test fish wheel agreed with earlier, lower river assessments that the first half of the run was weak and most of the strength was in the later portion of the run. For the same corresponding portion of the run, the Rampart Rapids tagging project, Chandalar River sonar, Sheenjek River sonar, Fishing Branch River weir, and DFO border passage estimates all indicated upper Yukon River stocks were weak. Because of the late entry of fall chum salmon into the river, all projects in the upper Yukon River showed a relative increase in the second half of the run. Two outliers were the extremely high catch rates (CPUEs) observed at the Yukon Rapids and DFO test fish wheels, which among other factors were assumed to be more efficient during high water events.

By the end of the first week in September, it appeared that the upper Yukon River fall chum salmon spawning component may not meet most of its tributary escapement goals. The migration rate decreased as fall chum salmon passed through the Yukon Rapids area, so the sequential relaxing of the subsistence salmon fishing restrictions were delayed in the upper Yukon Area to assure most fall chum salmon were allowed to pass.

In the lower river Districts 1, 2, and 3, most of the fall chum and coho salmon runs had passed. These three districts were returned to the full regulatory subsistence salmon fishing schedule of two 36 hour periods each week beginning September 15 to allow some harvest of late entering salmon and fishing gear to target non-salmon fish species was unrestricted. District 4 was returned to the full subsistence schedule of two 48-hour periods per week and the Koyukuk River was returned to subsistence salmon fishing seven days per week on the same date.

Subdistrict 5-A and District 6

Although a substantial number of coho salmon spawn in the Tanana River, the continued subsistence salmon fishing closure on the Tanana River was necessary based on the conservative management approach until the fall chum salmon run could be assessed in keeping with the conservative management approach. By the second week in September, fall chum and coho

salmon began to peak in the Tanana River at the same time. Salmon tagging projects on the Kantishna and upper Tanana Rivers indicated the fall chum salmon run was larger than the previous three years. On September 13, Subdistricts 5-A, 6-A, and 6-B opened for a single 24-hour coho salmon directed subsistence fishing period. Only fish wheels equipped with either a "livebox" or a "live chute" were allowed to operate and fishers were required to release all chum salmon.

Both the coho and fall chum salmon runs into the Tanana River continued to build along with confidence in the passage estimate from the tagging projects. The fall chum salmon run into the Tanana River was assessed to be large enough to meet escapement goals and support most subsistence needs. Therefore, on September 17, Subdistricts 5-A, 6-A, and 6-B opened to the full subsistence salmon fishing schedule of two 42-hour periods per week to harvest both fall chum and coho salmon.

Although most portions of the Tanana River were experiencing adequate escapements of fall chum salmon, attaining the Toklat River regulatory optimal escapement goal (OEG) was uncertain. According to the *Tanana River Salmon Management Plan*, a subsistence fishing schedule is limited to a maximum of two 42-hour periods each week except for the Kantishna River which could open to as many as seven days per week. Since the Toklat River is a tributary to the Kantishna River, two 42-hour periods per week subsistence fishing schedule continued to conserve fall chum salmon in that portion of the river. Use of all legal subsistence fishing gear to harvest of non-salmon species was authorized beginning October 1 in the Tanana River drainage.

Personal use salmon fishing in Subdistrict 6-C, was opened to directed coho salmon fishing using restricted gear which included fish wheels equipped with either a "livebox" or "live chute" or dip nets. Both types of gear required that all chum salmon had to be released. This requirement was in accordance with the *Yukon River Drainage Fall Chum Salmon Management Plan* that directed no personal use fall chum salmon fishing could be allowed when the drainagewide total run size was assessed to be below 550,000 fish even though the Tanana River had an available surplus.

Subdistrict 5-B, 5-C, and 5-D

In contrast, to the surplus of fall chum salmon returning to the Tanana River, the upper Yukon River monitoring projects on the Chandalar, Sheenjek and Fishing Branch Rivers, and the US/Canada border passage estimate indicted the upper Yukon River escapement goals may not be attained. By mid-September most of the fall chum salmon had passed through the area. Subdistricts 5-B and 5-C were opened on September 17 for a 12-hour subsistence salmon fishing period to allow fishermen opportunity to harvest other non-salmon species and to further assess salmon abundance in the area. Chum salmon catch rates and fishing effort were low during this opening, therefore Subdistricts 5-B and 5-C were returned to the full regulatory subsistence salmon fishing schedule of two 48-hour periods each week beginning September 20.

The Chandalar River was opened for subsistence fishing on the full regulatory fishing schedule of seven days per week on September 21, after managers determined the escapement goal would

be met. However, the Sheenjek River sonar estimate, Fishing Branch River weir count, and the mainstem US/Canada Border tag estimate were still projecting fall chum salmon escapement goals would not be met. Since Subdistrict 5-D is very large, the subdistrict was divided at 22-Mile Slough into a lower and upper section. The lower section opened on September 23 to a single 24-hour period to primarily allow subsistence fishing for non-salmon fish species after most of fall chum salmon had passed. On September 27, both the lower and upper sections opened to a single 24-hour period to also allow additional subsistence fishing opportunity for non-salmon species after most fall chum salmon had crossed the US/Canada Border.

On September 28, the Yukon River Coastal District, Districts 1, 2, 3, 4, and Subdistricts 5-A, 5-B, and 5-C were opened to subsistence fishing seven days per week to all types of legal subsistence fishing gear including fish wheels and gillnets with unrestricted mesh size. Subdistrict 5-D opened similarly three days later on October 1 after providing additional protection to the tail end of the weak fall chum salmon run.

All lower Yukon River monitoring projects are completed, but tributary escapement assessments are ongoing at this time. The Pilot Station sonar project ended August 31 with a fall chum salmon passage estimate of 360,000 salmon with an approximate 90% confidence interval range of 330,000 to 389,000 salmon. The Pilot Station sonar project 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 after operations end and an estimate of harvests below Pilot Station. The projected end of season total fall chum salmon run past the Pilot Station sonar site is estimated to range from 361,000 to 385,000 fish.

Compliance with the subsistence salmon fishing restrictions was relatively good considering the widespread closures. While imposing these restrictions, 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 was exchanged. 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 2002 were given away to local residents. These fish will be included in reported subsistence harvests.

As previously stated, Yukon River coho salmon typically 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 by the Alaska Board of Fisheries in the *Yukon River Coho Salmon Management Plan* 5 AAC 05.369. The coho salmon management plan allows a directed coho salmon commercial fishery only under specific conditions. In most years, fall chum salmon is the primary species of management concern during the fall season. Although the coho salmon run appeared to be near average, no directed commercial coho salmon fishing periods were allowed this year because of the weak fall chum salmon run.

Only one strong pulse of coho salmon was detected entering the Yukon River through the lower Yukon River drift gillnet test fishery. Pilot Station sonar estimated approximately 135,737 coho salmon passed the site by August 31. The coho salmon run was near normal in run timing and 9% above the historical average passage estimate at the Pilot Station sonar.

Subsistence fishing opportunities for coho salmon were reduced because of the weak fall chum salmon stocks. As the fall chum salmon passed upriver and the coho salmon run neared peak passage, limited subsistence fishing periods were allowed. These openings occurred in specific areas with gear requirements that provided opportunity to harvest coho salmon while continuing to protect fall chum salmon. Late in the season, when most fall chum salmon had passed through the fishery, the full subsistence salmon fishing schedule was reinstated with unrestricted gear.

3.0 COMMERCIAL FISHERY – CANADA

A preliminary total of 708 chinook salmon, 3,065 chum salmon and 17 coho salmon was harvested in the Canadian Yukon River commercial fishery in 2002 (Table 4). The combined species catch of 3,790 salmon was 81% below the previous ten-year average commercial harvest of approximately 20,200 salmon. Since 1997, poor catches have resulted from below average run sizes of upper Yukon River chinook and chum salmon.

A total of 21 commercial licenses was issued in 2002, three more than in 2001. Roughly two-thirds of the 2002 licensees opted not to fish in 2002 because of below average run sizes and limited opportunities to fish.

3.1 Chinook Salmon

The 2002 preseason expectation for Canadian-origin mainstem Yukon River chinook salmon was for a total run of approximately 49,000 fish. A run of this size would be well below average when compared to the previous cycle average of approximately 93,000 fish (1996-2001). The outlook was driven by uncertainty associated with marine survival of the fish that spawned between 1994 and 1999. The potential for reduced marine survivals has been made apparent by the poor run sizes of upper Yukon chinook salmon in the 1998 to 2001 period, which were significantly lower than expected despite healthy brood year escapements.

Key elements of the 2002 Canadian Integrated Fisheries Management Plan for Yukon chinook salmon developed by the Yukon Salmon Committee:

i) a target escapement goal of 28,000 chinook salmon. This goal was consistent with the Yukon Panel recommendation from the March 2002 Panel meeting. The YSC was willing to tolerate restricted First Nation fisheries so long as the spawning escapement

was greater than 18,000 chinook salmon and the First Nation catch was consistent with Yukon Salmon Agreement harvest sharing provisions;

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.

Similar to 2001, the plan described a series of management categories (Red, Yellow and Green Zones) which were bound 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. Projections falling in the Red Zone would result in all fisheries being closed except for the test fishery, which would operate for assessment purposes providing the projected run size 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 projection in the 19,000 to 37,000 range, only the First Nation fishery 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 size projections 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 49,000 fish (at the river mouth), it was expected that the proposed restrictions in Alaska would result in a border escapement of approximately 33,000 chinook salmon, or roughly the three quarter point of the Yellow Zone. This meant the likelihood of no commercial, domestic or recreational fisheries and a 25% 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, agreed to follow a conservative approach until inseason indicators became available.

Throughout June, before chinook salmon had entered the Canadian section of the upper Yukon River, Alaskan test fishing and sonar projects near the river mouth indicated run abundance was larger than 2001 and adequate to provide for escapement, subsistence fishing and a small commercial salmon harvest. However, in early July, run abundance was downgraded to a run size similar to, or larger than, 2001 and was cast as "below average" and lower than initially projected. Run timing was described as normal, based on the average run timing for 1989-2001.

Fish started to appear in DFO fish wheels on June 28, which is when chinook usually first appear. Throughout the run, the cumulative daily fish wheel catches remained well below average, initially suggesting the run was weak. 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 projections based on the tagging data are therefore a key component in management decisions.

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 similar to that of 2001 involving both First Nation and commercial fishers working 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. All fish caught in the test fishery were distributed under direction from the THFN. Without the tagging data, there would be little else 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. Unlike the previous two years, which were characterised by abnormally high water conditions, low water conditions prevailed in 2002 raising doubts regarding the comparability of catches this year with other years.

The chinook test fishery commenced July 6 and continued through the remainder of the month with two to four fishers fishing 48 hour periods/week to obtain mark-recapture data for run projections. The first inseason border escapement run projection was produced in statistical week 29, i.e. the week beginning July 14, indicating a run size of 39,000 chinook (range = 27,000 to 68,000). The wide range around the projection was attributed to uncertainty over run timing; the lower end of the range was based on the assumption that the run timing was one week earlier than normal, whereas, the upper end of the range was based on an assumption of normal run timing. At this point, it was unclear from the DFO fish wheel data which timing assumption to place the most confidence in, normal or early. ADF&G had characterised the run timing as "normal" in the lower river based on test fishing and sonar results. However, inseason reports from the 2002 Yukon chinook radio telemetry program consistently indicated that chinook migration rates for upriver stocks were much higher than expected. It was surmised that "normal" run timing at the mouth of the river could transform into earlier than normal run timing in the upper river. The run projection of 39,000 chinook salmon which was developed for management purposes in mid-July incorporated some of the uncertainty over run timing and was in the lower end of the Green Zone, i.e. greater than 37,000. As a result, First Nation fisheries were advised July 18 that a normal fishery could proceed. However, closures in all other fisheries were continued until it became apparent that the run projections would likely continue to fall in the Green Zone.

By 25 July, the run projection had increased to approximately 44,000 (range = 38,000 to 53,000), which was not only sufficient to allow for a normal First Nation fishery, but was also large enough to provide limited fishing opportunities in the recreational, commercial and domestic fisheries. Salmon retention in the recreational fishery commenced July 29 and a 48-hour fishing period was announced for the commercial and domestic fisheries starting at noon July 29. Six commercial fishers participated in this first opening, catching a total of 309 chinook salmon.

With a surge in DFO fish wheel catches in late July, it became apparent that early run timing assumptions were not valid. Run projections continued to hover around 45,000 chinook through August 06 prompting continuation of the salmon retention provisions in the recreational fishery and an additional opening in each of the commercial and domestic fisheries. The second commercial opening included a 72- hour period (August 2-5) in the section of the Yukon River downstream from the White River/Yukon River confluence with an additional 24 hours allowed in the area upstream of the White River. Participation in this opening increased by one fisher and the catch

totaled 378 chinook salmon. The second opening in the domestic fishery was for four days from August 2-6.

Catches in the DFO fish wheels rapidly declined during the first week of August and continued to taper off thereafter indicating little strength left in the run. Inseason run projections after August 6 declined to approximately 36,000 resulting in no further commercial or domestic fishery periods for chinook salmon.

The total catch of chinook salmon taken in the commercial fishery was 708 fish of which 687 were taken in the "Dawson area" fishery, downstream from the confluence of the Yukon and White Rivers, and 21 chinook salmon were caught in the "upper fishing area". The fishery was open for a total of five days and total fishing effort was 33 boat-days. For comparison, the previous ten-year average (1992-2001) commercial catch is approximately 6,500 chinook and the average effort is 170 boat-days [note: these averages include data from 1998 to 2001 when the fishery was severely restricted or closed].

3.2 Fall Chum and Coho Salmon

The preseason expectation for upper Yukon River chum salmon was for a poor run. Spawning escapements in 1997 and 1998, the primary brood years contributing to the 2002 run, were 85,400 and 46,300, respectively. The 1997 escapement had achieved the rebuilding target of >80,000 chum salmon, whereas the 1998 escapement was well below it. Although the runs in 1998 through 2001 were the product of excellent spawning escapements, the run sizes were well below average appearing to have been significantly impacted by poor marine survival. Managers surmised that poor survival could once again result in a depressed run in 2002. To capture this uncertainty, the total run outlook was expressed as a range from 37,000 (poor), to 144,000 (above average) upper Yukon River chum salmon. They felt that the lower end of this range was more likely, given the weak runs over the previous four years.

The Canadian chum salmon management plan for 2002 acknowledged the likelihood of a poor return and contained the following key elements:

i) A spawning escapement target of 60,000 upper Yukon River chum salmon which was consistent with Yukon Panel recommendation of March 2002;

ii) Given the expectation for a poor run, the commercial fishery would be closed until inseason run projections indicated the spawning escapement and First Nation requirements were likely to be achieved.

Funding was approved from the 2002 Restoration and Enhancement budget for a live-release test fishery to operate in the Dawson City area to obtain tagging data for run size estimates. This project, conducted jointly by the Yukon River Commercial Fishing Association and the Tr'ondek Hwech'in First Nation, marked a significant improvement over previous years. Prior to this year, run projections were generated either from DFO fish wheel catch data, which had proven to be of

marginal reliability in recent years, or from mark-recapture data collected from the commercial fishery. Commercial data *was* reliable but with the fishery initially planned to be closed in 2002, it would be lacking.

As per the chinook management plan, a decision matrix was included in the chum salmon plan with Red, Yellow and Green management zones described by specific reference points (run sizes into Canada) and expected management actions. The Red Zone included run projections of less than 40,000 fish when closures in all fisheries except for the test fishery could be expected. The Yellow Zone included run projections in the 40,000 to 63,000 range; in this zone, the commercial, domestic and recreational fisheries would be closed and the First Nation fishery would be reduced with restrictions increasingly more severe the closer the run projection was to the lower end of the Yellow Zone. The Green Zone included run size projections greater than 63,000 chum salmon 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 run abundance and international harvest sharing provisions.

Throughout August, chum catches in the DFO fish wheels remained low suggesting the run was below average. Although still very early in the upper Yukon chum salmon season, this was consistent with run status indicators in the Alaskan portion of the river where the run was also described as weak. The test fishery, which consisted of three fish wheels equipped with live boxes fishing two days per week, operated throughout September. Border escapement projections through mid-September were in the 28,000 to 42,000 range resulting in a continuing closure in the commercial fishery. A significant pulse of chum salmon crossed the border in late September causing the run projections to increase. By October 1, the projection had reached 68,000 chum salmon (Green Zone), which resulted in the scheduling of a 96-hour commercial fishing period from October 2-6. Because of the lateness in the fishing season, only four fishers participated in this first chum salmon opening, which netted 2,608 chum salmon and 12 coho salmon. Most of the catch was used for personal needs and was not sold. A second 96-hour commercial opening occurred October 9-13 after the run projection had been updated to approximately 72,000 fish. Participation in this last chum opening dropped to two fishers and the catch included 456 chum and five coho salmon. No further commercial openings were posted because of declining abundance and inclement fishing conditions.

The total commercial chum catch of 3,065 fish was 78% below the previous 10-year average. For comparison, the previous 10-year average commercial catch is 13,700 chum salmon (1992 to 2001); during this period the catch ranged from zero chum salmon in 1998 to 39,012 chum salmon in 1995. With only two fishing periods, total fishing effort was well below average in 2002: 21 boat-days of effort compared to the 1992-2001 average of 82 boat-days. The total commercial catch of 17 coho salmon was the highest ever recorded. Coho salmon are not usually encountered in the Dawson area fisheries; when they are, they generally appear in October just before freeze-up. It is possible that coho salmon migrate into the upper Yukon drainage after freeze-up and as a result have gone virtually undetected in the past.

4.0 SUBSISTENCE, PERSONAL USE, ABORIGINAL, DOMESTIC, AND SPORT FISHERIES in 2002

4.1 Alaska

4.1.1 Subsistence Salmon Fishery

Most of the chinook salmon harvested for subsistence use are dried, smoked or frozen for later human consumption. In addition to human consumptive uses, salmon are fed to dogs, which are used for recreation, transportation and as draft animals. Small chinook ("jacks"), summer chum, fall chum and coho salmon are primarily harvested to feed dogs in the Upper Yukon Area (Andersen 1992). Most subsistence salmon used for dog food are dried (summer chum salmon) or "cribbed" (frozen in the open air).

Postseason surveys are conducted annually to estimate the number of salmon taken in the subsistence and personal use salmon fisheries of the Alaskan portion of the Yukon Area. These surveys are typically conducted from September through October. Approximately 34 villages are visited and fishers from selected households are interviewed. These data are later expanded to estimate total subsistence harvest. In addition to postseason interview surveys, subsistence "catch calendars" are mailed to households in the non-permit portions of the Alaska Yukon River. These calendars are used to augment the surveys when a household may be unavailable for an interview. Subsistence and personal use fishers in portions of the upper Yukon and Tanana River drainages are required to obtain subsistence or personal use fishing permits. Data collected from these permits are added to the total estimate of the subsistence and personal use salmon harvest.

Results of the 2002 survey and permit summary will not be available until the spring of 2003. However, based on inseason anecdotal information, most of Yukon Area subsistence fishers probably met their subsistence needs for chinook and summer chum salmon. In contrast, the fall chum salmon run was very weak and subsistence-fishing closures were implemented throughout the drainage. The 2002 fall chum salmon subsistence harvest is anticipated to be small, and may not have met people's subsistence needs. The run size for coho salmon was average, however the runs were mixed with the fall chum salmon. Targeting coho salmon was difficult while protecting the weaker fall chum salmon stocks. The coho salmon harvest is anticipated to be minimal because much of the coho salmon migration occurred during the same time fall chum salmon subsistence fishing restrictions were in effect.

The estimated 2001 subsistence salmon harvest in the Alaska portion of the Yukon River drainage (not including catches from the Coastal District) totaled approximately 53,059 chinook (Appendix Table 2), 58,385 summer chum (Appendix Table 3), 35,154 fall chum (Appendix Table 6) and 21,654 coho salmon (Appendix Table 7). Included in the above mentioned subsistence harvest are approximately 122 chinook, 146 summer chum, 10 fall chum and 34 coho salmon were taken in the personal use salmon harvest.

4.1.2 Personal Use Fishery

Fishing 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 Nonsubsistence 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 this 1992 subsistence law 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 Nonsubsistence 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 Nonsubsistence Area. Since 1995, the Subdistrict 6-C salmon fishery has been managed under personal use regulations.

To conserve fall chum salmon in 2002, personal use salmon fishing within the Fairbanks Nonsubsistence Area was closed from August 16 until September 20 when the subdistrict reopened with restricted gear to target coho salmon and other non-salmon fish species. Personal use fishing was not restricted for chinook and summer chum salmon because those runs were judged adequate to provide for normal levels of harvest in Subdistrict 6-C.

Personal use salmon and whitefish/sucker permits are required for fishers who fish in the Fairbanks Nonsubsistence Area. Personal use salmon harvest in Subdistrict 6-C is limited to 750 chinook salmon, 5,000 summer chum salmon, and 5,200 fall chum and coho salmon combined. Data compilation for the 2002 fishing season will not be completed until the spring of 2003. Final results of the 2001 season are as follows: 54 personal use salmon permits were issued and 24 fishers reported harvesting 122 chinook salmon, 146 summer chum salmon, 10 fall chum salmon and 34 coho salmon in Subdistrict 6-C (Appendix Tables 2, 3, 6, and 7). Additionally, four personal use whitefish and suckers permits were issued and three fishers reported harvesting fish.

4.1.3 Sport Fishery

Sport fishing effort for anadromous salmon in the Yukon River drainage is directed primarily at chinook and coho salmon, and little effort is directed at chum salmon. Most of the effort occurs in

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Postseason surveys are conducted annually to estimate the number of salmon taken in the subsistence and personal use salmon fisheries of the Alaskan portion of the Yukon Area. These surveys are typically conducted from September through October. Approximately 34 villages are visited and fishers from selected households are interviewed. These data are later expanded to estimate total subsistence harvest. In addition to postseason interview surveys, subsistence "catch calendars" are mailed to households in the non-permit portions of the Alaska Yukon River. These calendars are used to augment the surveys when a household may be unavailable for an interview. Subsistence and personal use fishers in portions of the upper Yukon and Tanana River drainages are required to obtain subsistence or personal use fishing permits. Data collected from these permits are added to the total estimate of the subsistence and personal use salmon harvest.

Results of the 2002 survey and permit summary will not be available until the spring of 2003. However, based on inseason anecdotal information, most of Yukon Area subsistence fishers probably met their subsistence needs for chinook and summer chum salmon. In contrast, the fall chum salmon run was very weak and subsistence-fishing closures were implemented throughout the drainage. The 2002 fall chum salmon subsistence harvest is anticipated to be small, and may not have met people's subsistence needs. The run size for coho salmon was average, however the runs were mixed with the fall chum salmon. Targeting coho salmon was difficult while protecting the weaker fall chum salmon stocks. The coho salmon harvest is anticipated to be minimal because much of the coho salmon migration occurred during the same time fall chum salmon subsistence fishing restrictions were in effect.

The estimated 2001 subsistence salmon harvest in the Alaska portion of the Yukon River drainage (not including catches from the Coastal District) totaled approximately 53,059 chinook (Appendix Table 2), 58,385 summer chum (Appendix Table 3), 35,154 fall chum (Appendix Table 6) and 21,654 coho salmon (Appendix Table 7). Included in the above mentioned subsistence harvest are approximately 122 chinook, 146 summer chum, 10 fall chum and 34 coho salmon were taken in the personal use salmon harvest.

4.1.2 Personal Use Fishery

Fishing 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 Nonsubsistence 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 this 1992 subsistence law 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 Nonsubsistence 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 Nonsubsistence Area. Since 1995, the Subdistrict 6-C salmon fishery has been managed under personal use regulations.

To conserve fall chum salmon in 2002, personal use salmon fishing within the Fairbanks Nonsubsistence Area was closed from August 16 until September 20 when the subdistrict reopened with restricted gear to target coho salmon and other non-salmon fish species. Personal use fishing was not restricted for chinook and summer chum salmon because those runs were judged adequate to provide for normal levels of harvest in Subdistrict 6-C.

Personal use salmon and whitefish/sucker permits are required for fishers who fish in the Fairbanks Nonsubsistence Area. Personal use salmon harvest in Subdistrict 6-C is limited to 750 chinook salmon, 5,000 summer chum salmon, and 5,200 fall chum and coho salmon combined. Data compilation for the 2002 fishing season will not be completed until the spring of 2003. Final results of the 2001 season are as follows: 54 personal use salmon permits were issued and 24 fishers reported harvesting 122 chinook salmon, 146 summer chum salmon, 10 fall chum salmon and 34 coho salmon in Subdistrict 6-C (Appendix Tables 2, 3, 6, and 7). Additionally, four personal use whitefish and suckers permits were issued and three fishers reported harvesting fish.

4.1.3 Sport Fishery

Sport fishing effort for anadromous salmon in the Yukon River drainage is directed primarily at chinook and coho salmon, and little effort is directed at chum salmon. Most of the effort occurs in

the Tanana River drainage, along the road system. During 1996-2000, 88% of the total harvest were chinook salmon, 59% of the harvest chum salmon, and 81% of the harvest 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, but harvest estimates are typically not available until approximately one calendar year after the fishing season. 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 2002. Although some fall chum salmon may be taken by sport fishers, most of the harvest of that species is thought to come from the summer chum salmon run because 1) that run is much more abundant in tributaries where the most sport fishing occurs, and 2) the chum salmon harvest is typically incidental to effort directed at chinook salmon which overlap in timing with summer chum salmon. For these reasons, all of the sport fishing chum salmon harvest is reported here as summer chum. Yukon River drainage sport harvest estimates for recent years (1997-2001) have averaged about 888 chinook, 339 summer chum and 884 coho salmon (Appendix Tables 2, 3 and 7).

Sport harvest of salmon in the Alaskan portion of the Yukon River drainage in 2001 was estimated to total 571 chinook, 82 chum, and 1,248 coho salmon (Appendix Tables 2, 3 and 7). Harvest data are not yet available for 2002. In 2002, the sport fishery for chinook and chum salmon in the Yukon River drainage was restricted by emergency order by reducing the daily bag and possession limits for chinook and chum salmon in all waters of the Yukon River drainage effective June 19. The restriction prohibited anglers from taking more than one chinook or one chum salmon per day. The sport fishery for chum salmon was closed by emergency order on August 9 until the end of the season, because of poor returns of fall chum salmon.

4.2 Canada

4.2.1 Aboriginal Fishery

The seventh year of a multi-year comprehensive survey of the Aboriginal fishery was conducted in 2002 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 River drainage, excluding the Porcupine drainage. Catch estimates from the Porcupine River in the Old Crow area are determined independently from locally conducted, postseason interviews.

Preseason expectations for a below average chinook salmon run resulted in recommendations for a reduced harvest by Yukon First Nations. Plans were developed whereby fisheries would be restricted to approximately 75% of a normal harvest if required. By mid-July it was determined that the run was better than expected and First Nations were notified on July 18 that conservation concerns were diminished to the point where a normal level of harvest would be permitted. The preliminary estimate of the 2002 total upper Yukon chinook salmon catch in the Aboriginal

fishery is 7,143 fish (std = 389) (Table 4), 1% above the 1992-2001 10-year average of 7,028 chinook and 4% below the final estimate of 7,421 (std = 263) chinook in 2001. The total fishing effort during the chinook season, i.e. through the end of August (SW36) was 32,389 net-hours, 23% above the 1996-2001 average of 26,384 net-hours.

Fishing effort in upper Yukon First Nation fisheries was low during the early part of the chum salmon season. However, border escapement projections through mid September were in the 28,000 to 42,000 range resulting in consultations with First Nations about conservation concerns and restrictions in the principal First Nation fisheries. Following these discussions, the Dawson area Tr'ondek Hwech'in First Nation fishery was reduced to one day of fishing per week effective September 17 and the Selkirk First Nation fishery was restricted to 2 days/week effective September 22. A significant pulse of chum salmon crossed the border in late September causing the run projections to increase. On September 25, the projection had increased to the 59,000 to 61,000 range, i.e. the upper end of the Yellow Zone, prompting the removal of all restrictions in First Nation fisheries for the remainder of the season. The preliminary estimate of the 2002 harvest of upper Yukon chum salmon in the Aboriginal fishery is 3,093 fish (std = 451) through October 25. Although the fishery is virtually complete by late October, small numbers of chum salmon may be harvested during early November in the Selkirk First Nation fishery near Minto. This estimate is 27% above the 1992-2001 average of 2,434 chum salmon. The preliminary estimate of total fishing effort during the chum season (September on) was 2,468 net-hours, approximately 10% above the 1996-2001 average of 2,240 net-hours. The final chum salmon catch estimate for 2001 was estimated to be 3,027 fish (std 708) and the effort totaled 3,450 net-hours.

Because of the anticipated poor return of fall chum salmon to the Porcupine River drainage, the Vuntut Gwitch'in First Nation of Old Crow agreed in preseason consultations to reduce chum salmon harvests to approximately 25% of the normal allocation of 6,000 fish. Inseason, run status indicators in the Alaska portion of the drainage in combination with poor early season counts at the Fishing Branch River weir resulted in the implementation of a weekly conservation closure on the Porcupine River. As of September 4, fishing was restricted to two days per week to a maximum harvest allocation of 1500 chum salmon. Further opportunities for chum harvest on the Porcupine River were examined as the season progressed, however little improvement in run strength was demonstrated through the Old Crow fishery catches or by expanding Fishing Branch weir counts by historical timing. The closure remained in effect until October 11, at which time chum passage in the vicinity of Old Crow was considered complete and the restriction was lifted to allow for directed coho salmon harvests.

Detailed harvest data from the Vuntut Gwitch'in First Nation fishery near Old Crow on the Porcupine River are not yet available. Preliminary reports indicated the chinook catch was above average. The 1992-2001 average catch in this fishery includes 298 chinook salmon (Appendix Table 8, Appendix Figure 6), 4,282 chum (Appendix Table 9, Appendix Figure 7) and 296 coho salmon. Catches in 2001 included 370 chinook, 4,594 chum and 100 coho salmon. These catches are included in the Canadian total utilization numbers charted in Appendix Table 10 and graphed in Appendix Figure 8.

4.2.2 Domestic Fishery

The preliminary estimate of the total domestic fishery catch is 26 chinook salmon. Because of 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 allowing the fishery to open for two fishing periods: July 29–31 and August 02–06. Effort was low, only three fishers reported catches.

4.2.3 Sport Fishery

In 1999, a mandatory Yukon Salmon Conservation Catch Card was introduced by the Yukon Salmon Committee 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.

Because of preseason conservation concerns, the retention of chinook salmon in the recreational fishery was prohibited from June 24 through July 28. Retention was allowed with normal catch and possession limits (2 chinook/day, 2-day possession limit) from July 29 to August 20. Thereafter, salmon non-retention was re-introduced again because of conservation concerns.

Catch data for 2002 are not yet available. Estimated catches from YSCCC returns in 1999 through 2001 were as follows: 177 chinook and zero chum salmon in 1999; zero chinook and zero chum salmon in 2000; and, 146 chinook and zero chum salmon in 2001. These estimates have not yet been adjusted to account for unreturned cards. YCSSS return rates were 74.4% in 1999, 81.3% in 2000 and 72.1% in 2001.

5.0 STATUS OF SPAWNING STOCKS in 2002

Sixty-seven projects conducted by Alaska and Canadian researchers were developed to monitor escapement; and determine: genetic composition, relative abundances, run characteristics, and other information pertinent to the annual salmon migration (Tables 5 and 6). Employees of private companies, government managers and non-governmental agencies head the projects.

5.1 Chinook Salmon

5.1.1 Alaska

Escapement abundance for Yukon River chinook salmon was assessed as average or better for the second consecutive year in 2002. This assessment is based on escapement counts and estimates

from selected tributaries. Still, production from the 1996 and 1997 parent year appears to have been poor based on the overall low run abundance. Throughout escapements and fisheries, the increased number of 4-year-old fish was noticed. This increase may be a positive indication for runs in the next few years. Because of dry summer weather, successful aerial survey observations were made in six of the eight Yukon River index tributaries used for escapement assessment. Substantial rainfall in the Tanana River drainage deterred successful aerial surveys in the Chena and Salcha Rivers. Minimum aerial survey Sustainable Escapement Goals (SEGs) have been established in the East and West Fork Andreafsky, Anvik, North and South Fork Nulato, and Gisasa Rivers. For tributaries, in which surveys were conducted under acceptable conditions, all SEGs were met with the exception of the West Fork Andreafsky and Gisasa Rivers (Appendix Table 11).

The preliminary East Fork Andreafsky River weir count for chinook salmon was 3,979, compared to the 1997-2001 average of 2,981 fish. An aerial survey count on the East Fork Andreafsky was 1,447 chinook salmon. This count is very near the aerial survey SEG of 1,500 fish. Under good conditions, 917 chinook salmon were counted on the West Fork Andreafsky, roughly two-thirds the SEG. Age and sex composition information collected this season from fish passing through the weir is currently being processed.

An aerial survey of the Anvik River conducted under fair conditions resulted in a count of 1,713 chinook salmon. This count is above the aerial survey SEG of 1,300. Age and sex composition samples were collected in 2002 by carcass survey. Six-year-old chinook salmon samples, comprised 34.2% of the total with four and five year old fish (19.5% and 43.1%, respectively) comprising the remainder. Females represented 29% of the total fish that were aged.

The minimum aerial survey index SEG for the North Fork Nulato River is 800 chinook salmon and 500 for the South Fork. Aerial surveys were rated good for both tributaries. The aerial survey count of chinook salmon was 687 for the North Fork and 897 for the South Fork for a combined aerial survey count of 1,584. This count is above the combined escapement objective of 1,300 chinook salmon. The Nulato River escapement project was to become a weir in 2002 but because of high water early in the season, the weir was not installed. The preliminary tower count for 2002 was 2,696 chinook salmon. This count is well above the project's average of 1,978. Insufficient age, sex, and length information was collected in 2002 to describe the population.

The minimum aerial survey SEG for the Gisasa River of 600 chinook salmon was not met, with an aerial survey count in 2002 of 506 chinook salmon. The preliminary weir passage estimate of 1,931 chinook salmon was 27% below the 1996-2001 average of 2,640. Age and sex composition from scale samples was 31.9% age-4, 41.8% age-5, 23.4% age-6 and 2.9% age-7 fish. Females made up 21% of the total fish that were aged.

A weir was operated on Henshaw Creek between June 29 and August 2. This was the second successful year of operation of a multi-year monitoring effort using a weir to estimate escapement in this river. The escapement through the weir was estimated at 648 chinook salmon, roughly two-thirds of the 2001 count of 1,091 fish. An aerial survey counted 112 chinook salmon on July 28 under fair conditions. Age and sex composition from scale samples was 30.3% age-4, 36.0% age-5, 31.4% age-6 and 2.3% age-7 fish. Females made up 31% of the total fish that were aged.

Aerial surveys were flown on selected Koyukuk River tributaries. Unacceptable to poor conditions existed for surveys on the Jim and South Fork Koyukuk Rivers. Therefore, results are incomplete and are not detailed in this report.

The Tozitna River is a large northern tributary to the Yukon River, with a watershed area of 1640 square miles, 90% of which is managed by the BLM. The project site was located 50 river miles upstream from the mouth of the Tozitna River, approximately 1/4 mile upstream from the confluence of Dagislakhna Creek. BLM, with cooperation from the Tanana Tribal Council, operated a weir project on Tozitna River between June 18 and August 7. The project operated as a counting tower in 2001 and converted into a floating weir project this year. The preliminary escapement estimate past the weir was 1,438 chinook salmon. This escapement estimate is roughly half the estimate for the 2001 tower project's estimate of 2,854 chinook salmon. Age and sex composition from scale samples was 0.6% age-3, 43.3% age-4, 37.9% age-5, 17.6% age-6 fish and 0.6% age-7 fish with females accounting for 12.8% of the total sample.

Tower counting operations on the Chena River began on June 27 and ended on July 25. High water between July 4 and 14, and between July 22 and 23 interrupted counting. Because of the missed counts during the peak of the run, and the duration counts were missed, a mark-recapture study was conducted. Preliminary results of this study indicate the escapement for chinook salmon into the Chena River was approximately 6,967 fish. This escapement estimate is above the recommended upper end of the BEG range of 5,700 chinook salmon (Appendix Table 12, Appendix Figure 9). Because of poor survey conditions throughout the season, no acceptable aerial surveys were completed. The combined age composition estimated from all samples collected in the Chena River was 0.1% age-3, 29.0% age-4, 29.8% age-5, 38.5% age-6 and 2.7% age-7 fish. Females accounted for 31.7% of the samples.

Tower counting operations on the Salcha River began on July 29 and ended on August 10. Similar to the Chena River, counting was interrupted by high water between July 4 and 15, and between July 22 and July 27. The raw escapement count, without interpolations for days missed, was 4,814 chinook salmon. This minimum estimate falls near the middle of the BEG range of 3,300-6,500 chinook salmon (Appendix Table 12, Appendix Figure 9) but below the recent 10-year average (1992-2001) of 10,379. Expansions were calculated for the missed counting days in 2002, resulting in a passage estimate of 11,980 chinook salmon. An early aerial survey count on the Salcha River, under fair conditions was 2,416 chinook salmon. Age and sex composition information collected this season from this project is being processed.

Tower counting on the Chatanika River began on July 3 and was terminated on August 6. Counting operations were interrupted by high water from July 4-12, July 14 and July 26-31. Estimated escapement, not including expansions for missed days was 737 chinook salmon. This minimum estimate falls within the range of observed escapements, which have ranged from a low of 398 in 2000 to a high of 919 in 2001. During an aerial survey count conducted under good survey conditions 188 chinook salmon were counted. Age and sex composition samples were collected in 2002 from carcass surveys on the Chatanika River. These samples have not been processed or analyzed.

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. ADF&G Sport Fish Division has also conducted tower counting assessments since 1998 on the Chatanika River. High, turbid water hampered the operations on all three rivers in 2002.

5.1.2 Canada

The preliminary mark-recapture estimate of the total spawning escapement for the Canadian portion of the upper Yukon River drainage is 21,134 chinook salmon, 80.5% of the 1992-2001 average of 26,261 chinook salmon (Appendix Table 13). Results of the Fisheries and Oceans Canada tagging program are discussed in greater detail in Section 6.2.1.

Aerial surveys of the Little Salmon, Big Salmon, Wolf and Nisutlin river index areas were conducted by Fisheries and Oceans Canada; two surveys were flown for each area (Appendix Figure 10). 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 13.

The Little Salmon aerial survey was flown on August 15 and 24. Countability was rated as good to excellent for the first survey and good for the second survey, which had high water conditions. One surveyor participated in the first survey and two surveyors participated in the second survey; the total counts were 526 and 172 chinook salmon, respectively. The first count was 83.7% of the recent average (1992-2001) of 630 and both counts were much higher than the 2000 count of only 46 chinook salmon.

The Big Salmon, Nisutlin, and Wolf river index areas were flown on August 16 and August 23, with two surveyors participating on both surveys. Excellent survey conditions were encountered on the first survey date and poor to good survey conditions on the second survey. Counts of 1,149 and 231 chinook salmon were obtained in the Big Salmon River index area. The early survey was 12.8% higher than the recent 10-year average of 1,019 chinook salmon. The Nisutlin River index counts were 280 and 67 chinook salmon, respectively. The early count was 86.9% of the recent average of 322. In the Wolf River index area, counts of 84 and 34 chinook salmon were recorded; the early count was 36.4% of the recent average of 231, but it was much higher than the record low count 32 chinook salmon observed in 2000. The timing of the early aerial surveys of the Little Salmon, Big Salmon, Nisutlin and Wolf Rivers appeared to be very close to peak spawning. This survey was conducted approximately one week earlier than the peak survey date chosen in recent years. There is some anecdotal information that peak spawning occurred earlier in 2002, however the use of two aerial surveys should be continued to determine if what was observed this year was a one-year event or a trend.

Single aerial surveys do not count the entire escapement since runs are usually protracted with the early spawners disappearing before the late ones arrive. Weather and water conditions, the density of spawning fish, as well as observer experience and bias also affect survey accuracy.

The Blind Creek weir project was not conducted in 2001 or 2002. 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 for 1997 and 373 for 1998. 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 or 2002 because of local concerns that it was delaying and impeding chinook salmon migration. The enumeration project counted 277 chinook salmon in 2000, flooding caused early termination of the project. 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 attempted to install a resistance board weir on the Chandindu River in 2002. This is the fifth year that a weir has been in operation at this location. Problems were encountered[1] during the installation and operation of this weir in previous years and it was thought that a resistance board weir would be the more suitable structure for the site. However, there were operational problems associated with the resistance board; it was not totally installed and no fish were counted in 2002. A conventional conduit weir was operated from July 01 to September 8 2001, 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 2001. In 2000, the weir was installed much later than anticipated because of 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 605 fish, provided by the Yukon Fish and Game Association, was 44.1% of the recent average (1992-2001) of 1,371 fish. The sex composition observed at the fishway was 36.9% female. Hatchery produced fish accounted for 39.0% of the return and consisted of 198 males and 38 females.

5.2 Summer Chum Salmon

Preliminary postseason analysis of escapement data indicates the 2002 summer chum salmon escapement levels were below average, but well above escapements observed since 1998. Aerial surveys are conducted in conjunction with chinook salmon surveys. Because the chinook salmon peak spawning is dissimilar to summer chum salmon, aerial surveys in 2002 are not considered acceptable and are not reported. 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

[1] The problems involved high water conditions during installation, flood conditions, and difficulty associated with the uneven and large substrate of the river bottom.

salmon have been established for the Anvik and Andreafsky Rivers. Escapement monitoring projects are described in Appendix Tables 14-15 and Appendix Figure 11.

The estimated escapement for chum salmon pass the weir on the East Fork Andreafsky River in 2002 was 45,019. This is 31% below the low end of the ground-based BEG of 65,000-130,000 summer chum salmon. Weir-derived and aerial survey BEG ranges have been established for each fork of the Andreafsky River. The weir-derived BEG is 65,000-135,000 for each fork. The aerial survey BEG is 35,000-70,000 for each fork. Aerial surveys were conducted on the east and west forks for summer chum salmon. However, because of poor weather conditions, the surveys were not conducted at peak spawning activity for chum salmon. Therefore, these results are not useable. Age and sex composition information collected this season from fish passing through the weir is being processed.

The preliminary Anvik River sonar-based escapement count of 462,101 summer chum salmon was just above the low end of the BEG range of 400,000 to 800,000 and 30% below the recent 10-year average (1992-2001) of 664,191 chum salmon. The 2002 run were primarily from parent-year escapements of 609,118 in 1997 and 471,865 in 1998, which were within the current BEG range. Production from these brood years is well below average. Age and sex composition information collected this season from fish captured by beach seine gear is being processed.

The escapement estimate of summer chum salmon past the Gisasa River weir in 2002 was 32,943 fish. This escapement was 40% below the 1994-2001 average of 54,698 fish but more than twice the recent 4-year average of 15,048 fish. The age composition of samples collected was 0.6% age 3, 60.1% age-4, 36.9%ge-5 and 2.4% age-6 fish. Females made up 48% of the total fish that were aged.

The escapement estimate of summer chum salmon past the Henshaw weir in 2002 was 25,249 fish. This was the third year 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. This escapement was nearly identical to the 2000-2001 average of 26,312 fish. Age composition from scale samples was 0.1% age-3, 15.7% age-4, 80.1% age-5 and 4.0% age-6 fish. Females made up 61% of the total fish that were aged.

The Kaltag Creek tower project counted 13,583 summer chum salmon. This escapement is the highest escapement since 1997 but 61% below the 1994-2000 average of 34,851 fish. Limited counting occurred in 2001 because of high water. Age and sex composition information collected this season from fish passing the tower is being processed.

The Nulato River escapement project was to become a weir in 2002 but because of high water early in the season, the weir was not installed. The preliminary tower count for 2002 was 72,232 chum salmon. This count is well below the project's average of 110,978 but twice the 1998-2000 average of 34,508. The project did not operate in 2001 because of high water during the projects operation. Age composition from scale samples was 0.2% age-3, 61.6% age-4, 36.4% age-5 and 1.7% age-6 fish. Females made up 27% of the total fish that were aged.

The Tozitna River is a large northern tributary to the Yukon River drainage, with a watershed area of 1640 mi^2, 90% of which is managed by BLM. Cooperators in the project for 2002 included BLM, the Tanana Tribal Council, and ADF&G. The project site was located 50 river miles upstream from the mouth of the Tozitna River, approximately 1/4 mile upstream from the confluence of Dagislakhna Creek. This was the second year of the project and the first year a floating weir was used to enumerate escapement. Previously, escapement was estimated using counting tower methods. The preliminary summer chum salmon escapement estimate past the Tozitna River weir was 18,972 fish. This escapement estimate is roughly 50% more fish than was estimated for the 2001 tower project's estimate of 12,383 summer chum salmon. An aerial survey was conducted by BLM on 30 July from the mouth of the Tozitna River upstream to the weir. An estimated 1,194 live chum and 334 chum salmon carcasses were observed. The aerial survey results suggest approximately 10% of the chum salmon spawn below the weir. Age and sex composition from scale samples was 0.8% age-3, 19.3% age-4, 73.3% age-5, 6.3% age-6, and 0.3% age-7 fish with females accounting for 36.1% of the total sample.

Salmon escapement was estimated in Clear Creek by using a standard picket style weir and trap located approximately 1.0 kilometers above the confluence with the Hogatza River. The weir operated between June 19 and August 2. The estimated escapement of 13,150 chum salmon this year was well below the average of 63,340 (years of acceptable data) but more than three times the 2001 escapement of 3,674. No aerial surveys were flown because of poor weather conditions. Age composition was 1.1% age-3, 23.3% age-4, 72.6% age-5 and 3.0% age-6 fish. Females accounted for 51.6% of the sampled fish.

The Salcha River tower project was subcontracted by BSFA, with support from ADF&G. The Salcha River tower count of 20,837 summer chum salmon is considered minimal because high water hampered visibility and hampered tower-counting operations on the Chena and Salcha Rivers during the 2002 season. Aerial surveys were also limited because of poor conditions. The summer chum salmon count of 1,080 into the Chena River and 18,640 into the Salcha River is considered minimal and do not represent the actual escapement. The Chatanika Tower count was 965 chum salmon, and is also considered a minimum count. No interpolation was made for the periods of interrupted operations on any of the rivers. Comparing this year's partial tower estimates to years of similar run timing, the escapement into the Chena River was much smaller than previous years, although few days were counted, and escapements in the Salcha and Chatanika Rivers were likely below average levels, but higher than 2001 counts.

5.3 Fall Chum Salmon

5.3.1 Alaska

The 2002 preseason run projection for Yukon River fall chum salmon ranged from 209,000 to 646,000 fish. The high end of the range was derived from normal run size expectations for the parent-year escapements realized throughout the drainage in 1997 and 1998. The low end of the range was primarily based upon the expectation of extremely poor production observed in recent years of actual fall chum salmon returns.

Initial inseason assessments for 2002 were based on the performance of summer chum salmon that showed a small improvement over last season's extremely poor returns and provided optimism that the fall chum salmon would also improve. Using the relationship between summer to fall chum salmon, a return of 500,000 fall chum salmon was expected with a run size of approximately 1,050,000 summer chum salmon in 2002. However, the fall chum salmon migration began slow and never reached the level of return suggested by the relationship. Therefore, management of the fisheries continued with the use of inseason monitoring projects located throughout the drainage.

The fall chum salmon passage estimate, based on Pilot Station sonar for the period 19 July through 31 August, was approximately 360,000 fish (90% C.I. ± 29,500). One method to determine total run size is based on Pilot Station sonar abundance estimate with the addition of the estimated harvest downstream of sonar site, including the test fisheries (approximately 1,300 fish), and an estimated five percent for fall chum salmon that passed into the river after termination of the project. Therefore the preliminary total run size for the Yukon River drainage based on the main river sonar at Pilot Station is estimated to be 379,000 fall chum salmon.

Although final assessments of overall run size, spawner distribution and age composition are not available at this time. Preliminary indications are the 2002 Yukon River fall chum salmon run fell within the preseason range. The preliminary estimate of 379,000 fall chum salmon was 81% above the lower end (209,000) and 41% below the upper end of the range (646,000). In general, the fall chum salmon run could be characterized as having extremely weak components in the early portion of the run followed by one fair sized pulse towards the end of the run. This type of entry pattern resulted in run timing that appeared seven days later than average from the river mouth upstream to Rampart.

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 marginal in strength. The USFWS mark-recapture project near Rampart provided weekly passage estimates. The mark-recapture passage estimate through September 14 was approximately 196,000 (95% C.I. ± 24,600) fall chum salmon. The 2002 estimate represents the fourth weakest return since the project began and represents 61% of the historical (1996 to 1999 and 2001) average abundance of 322,063 fall chum salmon. Details are presented in Section 6.1.7. Additionally, escapements to the upper Yukon tributaries within Alaska appear to be weak based upon sonar counts attributed to fall chum salmon escaping to the Chandalar and Sheenjek River drainages.

In 2002, the Chandalar River sonar project ran from August 8 through September 26. The preliminary escapement estimate is approximately 89,847 upstream fish. This estimate is approximately 61% of the 1995-2002 average of 147,000 fish. Chandalar River sonar estimates of fall chum salmon range from a low of 65,894 fish in 2000 to 280,999 fish in 1995. The estimated escapement in the Chandalar River was 21% above the minimum passage based on the biological escapement goal range of 74,000 to 152,000 fall chum salmon spawners (Appendix Table 16, Appendix Figure 12).

By comparison, the preliminary escapement estimate of fall chum salmon in the Sheenjek River was approximately 32,000 fish. The Sheenjek River sonar operated from August 8 through September

24. The 2002 estimated escapement in the Sheenjek River was 36% below the lower end of the biological escapement goal range of 50,000 to 104,000 fall chum salmon spawners.

The fall chum salmon run into the Tanana River was slightly stronger than the upper Yukon River run in 2002 based upon fall chum salmon mark-recapture projects within the Tanana River drainage. 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 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 October 1 was 109,970 (95% C.I. ± 25,113) fall chum salmon. Fall chum salmon spawning ground surveys are currently being conducted in select locations throughout the Tanana River drainage. Further, it should be emphasized all escapement results are preliminary and may change somewhat on further analyses.

The Toklat River, a tributary of the Kantishna River, has been documented to historically provide most of the spawning habitat for chum salmon within the drainage. The minimum OEG for the Toklat River index area is 33,000 fall chum salmon. The preliminary estimate for the Kantishna River drainage as a whole through September 28, 2002 was 56,719 (95% C.I. ± 8,042), which is higher than all three previous seasons estimates of 27,199, 21,450, and 22,992 fall chum salmon for 1999 through 2001 respectively.

5.3.2 Canada

The preliminary fall chum salmon spawning escapement estimate based on mark-recapture data is 85,650 chum salmon. Details are presented in Section 6.2.1.

Aerial surveys conducted to date include the Kluane and mainstem Yukon Rivers which were flown on October 24 and October 25, respectively. The Kluane River count was 7,147 fall chum salmon. The average count for the 1992 to 2001 period is 7,172. A survey of the mainstem Yukon River counted 973 fall chum salmon. The average count for the 1992-2001 period, excluding 1999 when the area was not surveyed, is 3,448. Historical data are presented in Appendix Table 16, and Appendix Figures 13 and 14.

In the Porcupine River drainage, the Fishing Branch River weir count was 13,300 chum salmon. An undetermined number of fish migrated before the weir was installed.[2] This count was only 40.9% of the 1992-2001 average of 32,503, but it was well above the record low count of 5,053 recorded in 2000. Conservation measures implemented in the Vuntut Gwich'in First Nation aboriginal fishery at Old Crow improved escapement to the Fishing Branch River system. The

[2] To compensate for this loss, the average proportion (%) of fish that migrated through the weir prior to the installation date in the two dominant cycle years (4 and 5 year old fish) will be used to expand the observed weir count.

2002 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.

5.4 Coho Salmon

Assessment of coho salmon spawning escapement is limited in the Yukon River drainage because of funding limitations and marginal survey conditions that often prevail during periods of peak spawning. The coho salmon passage estimate, at Pilot Station represents less than the total return as it ends August 31. Tributary information is limited to the East Fork Andreafsky River and 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. The Delta Clearwater River count was 38,625 coho salmon and was conducted by boat survey on October 31, 2002. This escapement level is 92% above the average (1992-2001) of 20,139 coho salmon. Spawning ground surveys of selected areas were also conducted in other areas within the Tanana River drainage. Among the surveys being conducted are those in the Nenana River drainage utilizing funds provided by BSFA. The Pilot Station sonar estimated 135,737 coho salmon.

A preliminary minimal estimate of 3,534 coho salmon (Appendix Table 17) passed through the East Fork Andreafsky weir as of September 14, the last day of operation in 2002. Coho salmon passage into the Yukon River drainage was overall average in 2002. However, escapement into the East Fork Andreafsky was late and weak, approximately 44% of the average passage. The historical (1995 to 1997 and 1999 to 2001) average passage is 8,141 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. High water was also a factor in 2001, and though the passage of 9,252 was a minimal count, it represents an above average escapement.

6.0 PROJECT SUMMARIES

6.1 Alaska

6.1.1 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, ADF&G used sonar equipment, which operated at 420 kHz. In 1993, ADF&G 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, ADF&G 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 the system was converted to split-beam sonar equipment. This technology allows better testing of assumptions about direction of travel and vertical distribution, and to study sediment related attenuation. In 2002, as in 2001, electronic data was collected 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 employing paper chart recordings and should at the same time reduce operating expenses.

Fish 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 and drift gillnets are fished twice each day to apportion the sonar counts to species. In 2002, the sonar equipment was operated continuously for 24-hours on five occasions. Passage estimates during these expanded operations differed from 9-hour estimates by 2.5 % overall.

An assortment of gillnets, 25 fathoms long 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 a harvest of 8,512 fish during 2,070 drifts including 600 chinook salmon, 3,558 summer chum salmon, 1,160 fall chum salmon, 803 coho salmon, and 2,391 other species. Chinook salmon were sampled for age, sex and length and genetic samples were taken from both chinook and chum salmon. Any captured fish that could not be released successfully were distributed daily to nearby residents.

The sonar project was fully operational from June 7 through August 31 in 2002. In contrast to 2001, the past season was characterized by very low water levels throughout the summer. Although the substrate profile was not adversely affected on the left bank by ice scouring, as experienced in early 2001, the bank erosion occurring just upstream of the sonar site appears to be accelerating. The left bank substrate was unstable throughout most of the summer, with the cutbank approaching the region where the transducer is normally deployed. The transducer had to be relocated several times, both up- and downstream of the original deployment site, to more suitable profiles. The reverberation band observed on the south bank in previous years appeared infrequently, usually being associated with strong onshore winds and waves. The right bank deployment site remained stable throughout the summer.

Preliminary passage estimates for 2002 and final passage estimates for 1995 and 1997–2001 are listed in Table 2.

6.1.2 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 harvests. Three region-of-origin groupings of chinook salmon, or stock groups, have been identified within the Yukon River drainage. The lower and middle stock groups spawn in the Alaska portion of the drainage, and the upper stock group 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 group. 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 stock group 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 stock group based on geographical location of the harvest. Harvests occurring in District 6 are apportioned to the middle stock group, also based on geography.

The new analytical program, previously described, has substantially reduced the amount of time needed to construct and analyze data. The historical data from 1981 to 1996 have been re-processed using the new methodology. This information has been presented in a comprehensive regional information report (Lingnau 2000). This report is now the new reference for the historical database concerning stock identification of Yukon River chinook salmon using analysis of scale patterns

The contribution of each stock group, lower, middle and total upper, to the combined total, drainage-wide harvest is outlined in Table 7. The average does not include the current year rather the current year is being compared to the previous years' average. Proportions under the "United States Upper" and "Canada Upper" column headings refer to the portion of the contribution of the total upper harvest attributed to the Alaskan and Canadian harvest, respectively. All lower and middle run fish are harvested in the Alaskan fisheries. The portion of the Alaskan catch of Yukon River chinook salmon attributed to lower, middle, and upper river stock groups from 1981 through 2001 is shown in Table 8. Similarly, the portion of the total harvest of upper river stock group chinook salmon caught in Alaskan and Canadian fisheries from 1981 through 2001 is shown in Table 9.

During 2002, stock standards for the lower river stock group, 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, Henshaw and Salcha Rivers within the Tanana River drainage. DFO in Whitehorse collected scale samples from test fish wheels used in a mark recapture project and from the commercial fishery. Scales from these projects and commercial harvests are in the process of being aged. SPA will be preformed with the new optical reading system again 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.

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 provides a better understanding of the nature and variability of these stock characteristics.

Chum salmon entering the Yukon River were sampled from June 27 to August 8, 2002 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 gill nets, 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-Gene Conservation Laboratory in Anchorage.

During 2002, 1492 chum salmon were sampled. Weekly sampling goals for July 12-18, July19-25, and August 2-8, were not met (N=202, N=116 and N=86 respectively). Observations at the Pilot Station sonar site indicated lower than normal run strength for chum salmon entering the Yukon River for 2002. When incidental catch of chum salmon in the Pilot Station test fishery was below target levels, every fish caught was sampled for genetic stock identification. All individuals for these weeks will be used in the analysis.

Laboratory analyses are completed for sampling periods starting June 27–August 8, 2002. When possible, 200 chum salmon were randomly subsampled proportional to the daily passage rate by bank orientation. Estimates for 2002 are shown in Figure 3 along with estimates for 1999, 2000 and 2001 for comparison. Laboratory and statistical analysis completed on October 31, 2002.

6.1.4 Upper Yukon River Chum Salmon Genetic Stock Identification

The USFWS Conservation Genetics Laboratory (CGL) is supporting a Master of Science candidate at University of Alaska-Fairbanks, whose thesis project is comparing the utility of allozyme, AFLP, mitochondrial DNA, and microsatellite markers for genetic stock identification of fall run chum salmon in the Yukon River. The CGL is completing a DNA database for genetic stock identification for late summer and fall run chum salmon in the upper Yukon River. To date, the database is composed of eleven microsatellite loci for the following populations: Chulinak River (N=96), South Fork Koyukuk River (N=96), Jim Creek (N=160), Kantishna River (N=161), Toklat River (N=192), Chena River (N=172), Salcha River (N=185), Delta River (N=80), Chandalar River (N=200), Sheenjek River (N=79), Fishing Branch (N=96), Big Salt River (N=71), Black River (N=96), Kluane River (N=200), Big Creek (N=96), and Teslin River (N=96). A portion of the database was used to verify that chum salmon sampled at Ramparts Rapids were from the fall run for a pathology

study. Potential applications for the database include estimating the origin of chum salmon sampled through mark-recapture projects or from subsistence catches. Finally, chum salmon were sampled from the Jim River (Koyukuk River drainage).

6.1.5 Yukon River Salmon Ecology and Survival Studies

Introduction

The U.S. Geological Survey, Alaska Science Center Yukon River salmon research program was continued during 2002. Our program has expanded to include three main components: 1) Chum salmon freshwater ecology research, 2) Juvenile chinook salmon rearing habitat research, and 3) Juvenile Salmon Ecology in the Yukon Delta. Progress on the various components ranges from near completion (finishing analysis and writing) to newly initiated during 2002.

Because of the extreme size of the Yukon watershed and remoteness of most tributaries, our original proposal for chum salmon research 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, 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). Beginning in 2001 we have been able to initiate chum salmon research at a third study area (Clear Creek, Hogatza River drainage).

Juvenile chinook salmon rearing habitat studies aimed at determining the use of side-channel habitat for over-wintering were initiated in Hodgin's Slough (Chena River) during fall 2001. Field work was completed during spring 2002 with monitoring of emigrants.

We are initiating studies to examine the timing of migration and habitat use by juvenile salmon in the Yukon River delta and near-shore marine habitats. We are also conducting a pilot study examining duration of freshwater residence by chum salmon based on retrospective analysis of otolith microstructure and microchemistry.

Results and Progress

Chena and Tanana River Chum Salmon Studies

With the exception of continued recording of temperature measurements and limited piezometer measurements, no field work aimed at chum salmon research was conducted at the Chena and Tanana Rivers study sites during 2002. Analysis on the extensive data we collected on chum salmon spawner distributions and habitat is underway with the expectation for completion during 2003. Significant progress has been made in regards to our analysis of the affects of intragravel environmental conditions on egg/alevin survival and development (i.e., the upwelling component of the research). The upwelling component's analysis is near completion.

In general, the results from the Chena and Tanana Rivers study sites demonstrate that egg and alevin survival within the summer run spawning study site was primarily related to dissolved oxygen (DO), while development rates were influenced by temperature. In contrast, the fall run 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. Analyses or the substrate freeze-core samples are currently underway to further evaluate differences between the summer run and fall run sites.

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

Clear Creek Cooperative Chum Salmon Study

In cooperation with BLM personnel, an incline-plane trap was tested to monitor chum salmon smolt migrations out of Clear Creek during 2002. A single trap was operated at various locations about 0.5 km upstream from Clear Creek's confluence with the Hogatza River from May 11 through June 8. A total of 4,371 chum salmon smolt were captured. Other species included; age 1+ chinook salmon (15), juvenile Arctic grayling (145), char (2), round white fish (193), burbot (6), Alaska black fish (12), and slimy sculpin (145). We marked (Bismarck brown Y dye) and released 1,261 chum salmon smolt, of which 24 were recaptured. Although not rigorous estimates, due to the small number of marked and released chum smolt as well as numerous trap location changes, trap efficiencies ranged from < 1 to 5.25%. Based on these efficiencies the estimated total number of chum smolt is about 514,000. Using BLM's 2001 weir estimate of 1,601 female chums escaping into Clear Creek and an average (based on 97 Tanana River summer run chum salmon) fecundity of 2,300 eggs/female, our 2002 estimate of chum smolts suggests an egg to smolt survival rate of about 14%. As a first year project the estimate must be used with caution because of uncertainties of smolt trap efficiencies and that several more years of operations will be necessary to determine whether or not this is a realistic survival rate for Clear Creek chum salmon. In 2003, improvement of the study will include deployment of a second trap, maintaining consistent trap locations, and attempting to mark and release 10,000 or more smolts.

During 2002 we performed extensive habitat measurements both in designated study reaches and at individual spawning sites. Habitat quantification work was done from July 22 through August 10. A total of 18 study reaches at an interval of 1 km were established from the location of the BLM weir (about stream kilometer 0.5) upstream to about stream kilometer 20. At each study reach habitat measurements (e.g., gradient, channel width, profile, depth, velocity, intragravel temperature, substrate composition) were measured along three transects spaced at 50 m. Intragravel data-logger temperature recorders were installed at each of the 18 study reaches. In addition, measurements were taken at 104 individual spawning locations. The distribution of spawning fish was characterized by floating the creek during peak spawning (17 and 19 July) and counting visible redds while recording locations using a GPS system.

Chena River Juvenile Chinook Rearing Study

During fall 2001 (9/26-10/21) baited minnow traps were used to capture juvenile chinook in the study area. Fish were trapped to: 1) provide pre-winter size data, 2) PIT tagged for recapture during spring 2002, and 3) to attempt population estimates using removal methods. Overall, trap catches were low. A total of 300 juvenile chinook were captured for 720 minnow trap sets fished for more than 3200 hours. Our observations while snorkeling through the entire study area twice confirmed that juvenile chinook abundance was indeed low and that low trap catches were not due to trap

avoidance. From the 300 chinook captured, we were able to successfully PIT tag and release 261. Minnow trap catches did not allow for removal method population estimates. Removal method population estimates were attempted in three, approximately 100 to 200 m long reaches within the study areas. In each reach 50 baited minnow traps were fished for 8 to 10 hours. Every 2-3 hours the traps were emptied and the catches held in screened totes (for example, each 2-3 hour set was considered a removal pass). In two out of the three reaches, the last (fourth) removal resulted in a higher catch than the second and third passes. In both cases, the last removal pass ended as darkness was approaching. Furthermore, the high catches came from individual minnow traps that had low catches during earlier removal passes. Therefore, there appeared to be some sort of behavioral change in response to reduced light levels. In the remaining reach, the second pass catch exceeded the first pass catch. At the start of our fall sampling (9/26) water temperature was about 4 °C. By October 10, water temperatures were below 2 °C and very few fish were trapped.

During the spring 2002 we used baited minnow traps to capture juvenile chinook salmon within the study area and funnel nets to monitor fish migrating out of the study area. As during our fall sampling, minnow trap catches were low. A total of 482 minnow trap sets fished for more than 5,745 hours resulted in a total chinook catch of 240. Of these 240 fish, we PIT tagged and released 157 back into the study area. Funnel traps with 9 mm mesh wings were operated at the upstream and downstream ends of the study reach from 4, 2002 to 4/30. The wings extended across the entire wetted width of the channel forcing all age 1+ chinook salmon entering or exiting the study area into the funnel net holding boxes. A total of 2,845 age 1+ chinook salmon were counted in the downstream holding box (i.e., emigrating out of the study area). In contrast, only 103 chinook salmon were captured in the upstream holding box (i.e., entering the study area). We recaptured 47 out of the 261 tagged during fall 2001. As we were unable to monitor movements over the winter, it is not possible to say whether the reduction in the numbers of fall 2001 tagged fish was primarily because of over-winter mortality (82%) or migration out of the study area. Of the 157 fish tagged during the spring 2002, 125 (79%) were recaptured in the funnel trap as they migrated out of the study area. Based on these recaptures, we estimate the total number of chinook salmon over-wintering in the study area at about 3,400 fish.

Fish PIT tagged during fall 2001 differed little in terms of size or over-winter growth compared to untagged fish that were captured during spring 2002. Differences between mean lengths (76.4 mm for tagged versus 77.1 mm for untagged, $p > 0.4$) and weights (4.1 g for tagged versus 3.8 for untagged, $p > 0.055$).

Freshwater/ Marine Transition and Juvenile Salmon Ecology

During 2002, studies were initiated within the Yukon River delta. Methods of sampling and identification of significant habitat features were the primary focus. These activities will be used to guide design and methods for detailed analysis in 2003. Otolith samples were obtained from throughout the basin. Preparation and analysis of otoliths will continue through 2002.

6.1.6 Chinook Salmon Radio Telemetry

The Yukon River chinook salmon radio telemetry program was initiated in 2000 by the ADF&G and NMFS. Support for the project was also provided by the USFWS, DFO, BSFA and

organizations funded through the Yukon River Restoration and Enhancement Fund. The purpose of the three-year study was to provide information on the migration and distribution of chinook salmon in the basin. Chinook salmon returns have declined dramatically in recent years, and information is needed to facilitate conservation efforts and improve management. The primary objectives of the study were to provide detailed information on the movements, timing and spawning distribution of chinook salmon stocks, and to help evaluate run assessment programs in the basin. Work in 2000-2001 focused on the development of capture methods, tracking techniques, and infrastructure necessary for a study of this size and scope. A full scale, basinwide tagging and monitoring program was conducted in 2002.

Adult chinook salmon migrating upriver were captured with drift gill nets at two sites in the lower river near the villages of Marshall and Russian Mission. Local fishers were contracted to fish the sites from June 9 to July 13, 2002. Project personnel were responsible for tagging the fish and collecting data. Initially, two shifts (day and night) were fished at Marshall, and one shift (night) fished at Russian Mission. A second shift (day) was fished at Russian Mission from June 20 through July 13 to increase catches. The day crew from Marshall was relocated to Russian Mission from July 5-13 because of poor catch rates at the Marshall site. The gill nets typically used were 8.5" mesh size made with No. 21 seine twine, 46 m long, 7.6 m deep, and hung at a 2:1 ratio. This configuration was used effectively in 2001 to capture chinook salmon while minimizing summer chum salmon bycatch. Similar nets, with monofilament fiber instead of seine twine, were used on a limited basis.

The nets were monitored continually, and fish removed immediately after capture. The fish were placed in a tagging cradle submerged in a trough of fresh water. Anesthesia was not used during the tagging procedure. Fish were tagged with pulse-coded radio transmitters inserted through the mouth and into the stomach, and marked externally with yellow spaghetti tags attached below the dorsal fin. Selected fish were tagged with radio-archival tags, which recorded water depth and temperature every 3 minutes and transmitted a signal. Fish with radio-archival tags were marked externally with pink spaghetti tags. Information on sex, length (mid-eye to fork-of-tail), and condition of the fish was also recorded. A tissue sample was taken from the axillary process for genetic stock identification analysis, and scales collected to provide age data. The fish were released back into the main river immediately after the tagging procedure was completed. Handling, from removal from the net to release, took approximately five minutes.

Drift gillnets were effective in capturing chinook salmon in the lower river, however catch rates were substantially less than in previous years of the study. Cumulative CPUE for the two tagging sites in 2000-2001 ranged from 44.7 to 59.2 at Marshall, and 19.6 to 114.5 at Russian Mission, compared to 24.6 at Marshall and 31.4 at Russian Mission in 2002. A total of 1,310 fish were captured in 2002, including 538 fish at Marshall and 772 fish at Russian Mission. A total of 768 fish were radio tagged, including 279 fish at Marshall and 489 fish at Russian Mission. The average fish length was 819 mm ranging from 400 mm to 1,060 mm.

Radio-tagged fish migrating upriver were recorded by remote tracking stations located at 37 sites on important travel corridors and spawning tributaries. Sites on the Yukon River main stem included Paimiut Hills (30 km upriver from the Russian Mission tagging site), Anvik River confluence, Yuki River confluence (upriver from Galena), Ravens Ridge (upriver from Rampart Rapids), Circle, U.S.-Canada Border (upriver from the Fortymile River), White River

confluence, Selkirk (downriver from the Yukon-Pelly River confluence), Tatchun Creek confluence, Teslin River confluence, and Hootalinqua (upriver from the Yukon-Teslin River confluence). U.S. tributaries monitored by tracking stations included the Bonasila, Anvik, Innoko, Nulato, Koyukuk (Gisasa River, Hogatza River), Melozitna, Nowitna, Tozitna, Tanana (including sites near Manley, Nenana, Chena, and Salcha River, and upper section of the main stem), Chandalar, and Porcupine (including sites on the Sheenjek, and Black Rivers, downriver from the Porcupine-Coleen River confluence and U.S.-Canada border). Tracking stations were also operated on Canadian tributaries including the Stewart, Pelly, Big Salmon, and Kluane Rivers (Yukon River drainage), and Fishing Branch River (Porcupine River drainage).

Aerial tracking surveys were flown to determine the status of radio-tagged fish in non-terminal reaches of the basin, and obtain detailed movement and distribution information in spawning tributaries. Seventy-five surveys were flown during the season. Areas surveyed in the U.S. included the Yukon River main stem from Marshall to the border, and reaches of the Innoko, Nulato, Nowitna, Tanana, Chandalar, Sheenjek, Black, Kandik, Nation, and Charley Rivers. In Canada, surveys were flown along sections of the Yukon River main stem, and in numerous tributaries including Coal Creek; Chandindu, Fifteenmile, Klondike, White, Stewart, and Pelly Rivers; Tatchun Creek; Nordenskiold, Little Salmon, Big Salmon, and Teslin Rivers. Surveys were also flown in headwater reaches of the Porcupine River.

Chinook salmon responded well to the capture and tagging procedure, with 748 (97.3%) fish moving upriver. Movement rates averaged 54.4 km/day for fish traveling to the upper basin, including 48.4 km/day for Tanana River fish and 56.4 km/day for fish returning to the upper Yukon River. Middle basin fish traveled an average of 43.3 km/day, while fish in the lower basin were substantially slower (20.1 km/day). These rates were comparable to movement information obtained in previous years of the study.

A total of 269 (36.0%) fish that moved upriver were caught in fisheries including 235 (31.4%) fish in the U.S. and 34 (4.5%) fish in Canada. The U.S. harvest was comprised of 137 fish in the lower and middle basin, 14 fish in the Tanana River, and 84 fish in the Yukon River upstream from Tanana. Most (33) fish in Canada were caught near Dawson or Carmacks; one fish was caught on the Porcupine River near Old Crow. Twenty-three fish were recovered by run assessment projects in the basin, including weirs on the Gisasa, Kateel and Tozitna Rivers, carcass surveys in the Anvik, Chatanika, Chena, and Salcha Rivers, fish wheels operated upriver from the U.S.-Canada border, and at the Whitehorse fishway. Three tags, found by local residents, were also returned.

A total of 535 fish, including those caught in terminal fisheries, were tracked to areas throughout the basin. Eighty-eight (16.4%) fish traveled to tributaries in the lower and middle basin, including the Bonasila, Anvik, Nulato, Innoko, Koyukuk (including the Gisasa, and Kateel Rivers, and upper headwaters), Melozitna, Nowitna and Tozitna Rivers. These stocks were present throughout the run, although lower river fish were more prevalent during late June and July. Thirty-two (6.0%) fish were located in non-terminal reaches of the Yukon River main stem. Most (415, 77.6%) radio-tagged fish returned to reaches in the upper basin including the Tanana River (119, 22.3%) and upper Yukon River (296, 55.3%) drainages. Chena and Salcha River fish were predominant in the Tanana drainage, although fish were also located in other areas

including the Kantishna, and Chatanika Rivers and upper headwaters. Canadian stocks (223, 41.7%) were the primary component of the sample returning to the upper Yukon River, with substantial numbers of fish tracked to the Stewart, Pelly, Big Salmon and Teslin Rivers. Smaller numbers of fish were located in other tributaries including Coal Creek, Chandindu River, Klondike River, and Tatchun Creek. Fish in the upper Yukon River were also located in U.S. tributaries, including the Chandalar, Kandik, and Charley Rivers; and Beaver Creek. Fish returning to the Porcupine River were tracked to the Sheenjek, and Black Rivers and lower (U.S.) and upper (Canada) portions of the drainage. Limited aerial surveys in the upper drainage located several fish in the lower reaches of the Miner and Fishing Branch Rivers.These data only represent the distribution of fish radio tagged during the study. Stock composition estimates for the return will be developed based on the telemetry data weighted by run abundance information.

Twenty-three fish were tagged with radio-archival tags. Eighteen tags were recovered including seven tags in U.S. fisheries, five tags in Canadian fisheries and recovery projects, and six tags in spawning areas. Water depth appears to vary, with fish periodically swimming at depth of over 20 meters. Swimming depth and water temperature data are being analyzed, particularly in reference to movements through areas with fisheries and run assessment projects.

An automated database-GIS mapping program was used inseason to summarize telemetry data. Work on an Internet link to the database was completed and used during 2002. Although modifications are needed to make the system more user friendly, a version will be available for managers and the general public in 2003.

6.1.7 Middle Yukon River Fall Chum Salmon Tagging Study

The USFWS Rampart-Rapids tagging study was in operation for approximately seven weeks, July 29 to September 14, 2002. Similar to 2001, crews were stationed at both the Rapids tagging site and the Rampart, Alaska, recovery site. A preliminary abundance estimate for the seven weeks sampled was 196,154 (SE = 12,545) fall chum salmon, based on 5,518 tagged fish and 433 recaptured fish of 15,386 fish examined. The 95% confidence interval limits are 171,566 and 220,742. Weekly abundance estimates, standard errors, capture probabilities (P) and standard errors of P were as follows:

Date	Estimate	S.E.	*P*	S.E. of *P*
July 29 - Aug 4	10,082	3,523	0.0231	0.0081
Aug 5 - Aug 11	7,739	2,769	0.0326	0.0117
Aug 12 - Aug 18	41,673	12,641	0.0103	0.0031
Aug 19 - Aug 26	15,703	6,372	0.0593	0.0241
Aug 27 - Sep 1	27,809	3,988	0.0462	0.0066
Sep 2 - Sep 8	62,893	5,626	0.0243	0.0022
Sep 9 - Sep 14	30,254	3,350	0.0282	0.0031

The tagging project modified its fish processing protocol to complement a companion study on the fish handling effects of the project. Changes in protocol included holding fish for a variety of times from zero to approximately nine hours. The left pelvic fin clip used in the past as a secondary mark, was replaced with an adipose fin clip. The change in secondary mark was based on comments from other fishery professionals regarding the possible increase in visibility of the mark. A second companion project focused on the feasibility of using a variety of tag colors, and video image processing at the recapture site to examine fish for marks without handling them. Preliminary findings indicate that video can produce the data for the inseason estimates. A comparison of the traditional and video methods will be include in the 2002 project report.

6.1.8 Tanana River Fall Chum Salmon Tagging

A cooperative fall chum salmon stock assessment project by ADF&G and BSFA was initiated in 1995 on the Tanana River and operated annually through 2002. The primary objective was to estimate the abundance of fall chum salmon in the upper Tanana River (upstream of the Kantishna River) using mark-recapture techniques. Secondary objectives were to estimate the migration rates of fall chum salmon within the Tanana River and to determine the timing of selected stocks (e.g., the Delta River) as they passed the tagging site. As a result of the disastrous salmon runs to Western Alaska in 1997 and 1998, the Tanana River tagging study was expanded in 1999 with federal disaster-relief funding to include the Kantishna River fall chum salmon run component.

In 2002, a single fish wheel was operated in the Tanana River approximately 8 km above the mouth of the Kantishna River to capture chum salmon for tagging. A second tagging fish wheel was operated in the Kantishna River approximately 8 km upstream from its terminus on the Tanana River. Each tagging fish wheel was equipped with a live box, operated 24 hours a day and a three-person crew deployed tags during the daylight hours. Chum salmon were tagged with individually numbered spaghetti tags, and each tagged fish had its right pelvic fin clipped as a secondary mark. A total of 2,616 chum salmon were tagged and released from the Tanana River fish wheel between August 16 and September 27, 2002. A total of 3,159 chum salmon were tagged and released from the Kantishna tagging fish wheel during the same approximate period.

Four live-box equipped fish wheels were used to recapture the tagged fish. A single recovery fish wheel operated approximately 60-70 km upstream of the Tanana River tagging fish wheel to recapture tagged fish bound for the upper Tanana River. Two recovery fish wheels were operated on opposite sides of the Toklat River approximately 15 km upstream from its terminus on the Kantishna River to recapture tagged fish released from the Kantishna River tagging fish wheel. In addition, the NPS funded (from pass through funds from USFWS) a recovery fish wheel in the upper Kantishna River, which has been operated since 2000. All recovery fish wheels were operated 24-hours per day. A total of 70 tags were recovered from 3,141 chum salmon examined in the upper Tanana River recovery fish wheel during the period August 16 through October 1, 2002. In the Toklat recovery fish wheels, a total of 167 tags were recovered from 3,160 chum salmon examined. In the upper Kantishna recovery fish wheel, a total of 12 tags were recovered from 241 chum salmon examined. Tag recoveries from chum salmon will also be made from spawning ground surveys currently underway to provide stock-specific run-timing information where possible.

The preliminary abundance estimate, using the Bailey model, of the total number of fall chum salmon past the Tanana River tagging site through October 1, 2002, was approximately 109,970 (SE = 12,813). The preliminary estimate for the Kantishna River run component through September 28, 2002 was approximately 56,719 (SE = 4,103) fall chum salmon. Evaluations of returns to the Delta and Toklat Rivers, two areas with individual biological escapement goals, will be based on postseason aerial and foot surveys currently ongoing.

6.1.9 Restoration and Enhancement Fund Projects

After 16 years of negotiations, the United States and Canada signed the Yukon River Salmon Treaty on March 29, 2001. This agreement allowed full operation of the Yukon River Panel in 2002 to manage the $1.2 million Restoration and Enhancement Fund. 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 until a new agreement was signed.

In December 2001, the Yukon River Panel executive secretary 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. US researchers and managers contacted local area organizations and individuals about research needs. Thirteen proposals were received and technically reviewed by the U.S. Section of the JTC Restoration and Enhancement Subcommittee. The selected R&E projects met criteria to restore, conserve and enhance Canadian origin salmon stocks, and their habitats, of the Yukon River, including the Porcupine River system. Proposal evaluations were forwarded to the funding selection committee. This committee met in Whitehorse, Yukon Territory March 2002 and awarded funding to nine project applications. These projects help managers meet escapements of Canadian origin wild salmon stocks, negotiated levels agreed to by the panel in their meeting last spring. 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.

6.1.10 R &E Funded Projects Descriptions

URE 01-02 Radio Tag Recovery – Lower Yukon River – BSFA $8,000

The primary objective the of radio tag recovery project is to retrieve radio transmitters from chinook salmon caught in the lower section of the Yukon River. Transmitters would be sent back to Marshall or Russian Mission from whence they were attached to 770 chinook salmon to be redeployed. chinook salmon age, sex and length (ASL) data from subsistence fisheries in the lower section of the Yukon River will be collected.

Status:

Project completed – including the collection of the archival tags; final report submitted.

Financial:

Initial payment provided on signing contract; final payment paid upon receipt of final report.

URE 02-02 Mountain Village Fall Season Gillnet Test Fishery- Asacarsarmiut Traditional Council and BSFA $16,400

The Mountain Village drift gillnet salmon test fishery (MVTF) has operated in the lower Yukon River since 1995. The objectives of the Mountain Village drift gillnet project are: 1) to count fall chum and coho salmon by using test drift gillnet fishing techniques and procedures established by ADF&G for standardized time and data collection; and 2) scale samples, and sex and length data will be collected from all fall chum and coho salmon harvested. The test fishing CPUE in 2002 was much lower than the historical CPUE. The highest daily CPUE for fall chum salmon as of August 15 was 0.21 and the highest CPUE for coho salmon as of August 15 was 0.07.

Status:

Project completed, with second progress and final report due December 1, 2002.

Financial:

Initial payment and first progress report made, second progress payment and final payments held pending receipt of related reports.

URE 04-02 Salcha River Chinook and Chum Counting Tower – BSFA $52,200

The objectives of the Salcha River counting tower project are: 1) estimate the total escapement of chinook salmon in the Salcha River using tower counting techniques such that the estimates are within 15% of the actual value 95% of the time. The preliminary chinook salmon escapement is 8,850. 2) Estimate age, sex and length compositions of the escapement of chinook salmon in the Salcha River such that all estimated proportions are within 5 percentage points of the actual proportions 95% of the time. ASL data was collected from 323 chinook salmmon carcasses (34% female). 3) Estimate the total escapement of chum salmon through September 15 in the Salcha River using tower counting techniques or as long as weather conditions and funding permits. The tower was not operational in late August making it difficult to characterize the complete run period. 4) Map and describe located spawning reaches within the Salcha River index area. GPS locations of spawning reaches were collected and maps have been prepared.

Status:

Field aspects of project completed, with both progress reports received, and final report due January 10, 2003.

Financial:

Initial and both progress reports made, with final payout held pending receipt of final report.

URE 06-02 Kaltag Drift Gillnet Fall Chum and Coho Salmon Test Fishery – City of Kaltag $22,500

The objectives of the Kaltag drift gillnet project are: 1) to enumerate fall chum and coho salmon by using test drift gillnetfishing techniques and procedures established by ADF&G for standardized time and data collection; and 2) scale samples, and sex and length data will be collected from all fall chum and coho salmon harvested. Season project was successful, CPUE and data gleaned from scale samples is in the laboratory.

Status:

Field aspects of project complete, progress report due, and final report sent November 2002.

Financial:

Initial payment made on signing of contract, progress and final payments held pending receipt of those reports.

URE 08-02 Yukon River Sub-district 5-A Test Fish Wheel – Bill Fliris $35,000

The objective of the test fish wheel project is to provide Catch-Per-Unit-Effort data of all salmon stocks entering the Tanana River to managers of ADF&G, USFWS and to the public. The continued development of "video capture" technology and improved fish handling methods are important aspects of the project. A new basket design for the fish wheel was proposed for 2002 to reduce any possible harm to the fish captured. Overall, the season was a success. The new three basket fish wheel design functioned very well. It is strong and has a stable rotation rate. The "salmon friendly" features also worked for the most part, although it was padding in the basket chutes was never successfully attached. Bill Fliris found a new material and adhesive that may work well next season. This project had a close correlation of data to other projects within the Yukon River used to monitor and assess the salmon runs. This was the first season that the project was operated for assessment of summer salmon stocks and based on the first day catches of 276 chinook and 19 chum salmon on July 1, 2002 was a slightly late startup date based on passages observed. The start date was changed in the 2003 conceptual proposal to June 15 in order to be operational for the majority of the summer season chinook salmon run.

Status:

Fieldwork complete with provision of data and satisfactory progress reports – final report due November 15, 2002.

Financial:

Initial and two progress payments made, final payout pending receipt of final report.

URE 09-02 Rapids Fall Catch Per Unit Effort Video Monitoring, 2002 - Stan Zuray $13,900

Catch-Per-Unit-Effort data on fall chum salmon counted at this site provides valuable run timing and abundance data useful to fishery managers. Video systems are proved efficient and able to provide accurate counts. The fall chum salmon video project is designed to reduce the handling of fish while still providing run timing and other data crucial for assessment of the salmon returns for management purposes. The objective was to provide 24-hour video CPUE data collection on fall chum salmon and on migratory whitefish.

Status:

Fieldwork completed–final report due December 10, 2002.

Financial:

Initial payment made upon signing of contract, no progress report/payment involved, and final payment pending receipt of the final report.

URE 11-02 Inseason Salmon Management Teleconferences – YRDFA $7,000

The teleconferences assist in documenting distribution and abundance of salmon in the Yukon River drainage inseason. They are intended to maintain and expand communication and information sharing between the Yukon salmon fishery users and agency staff. A contractual system that pays public participants a stipend and requires set information to be researched and shared will foster increased participation and consistent reporting from fishers to managers. Canadian Yukon River Salmon Committee members and the Department of Fisheries and Ocean staff will be included in the teleconferences. This year the YRDFA teleconferences successfully supported communication between all people interested in Yukon River salmon fishing.

Status: Project complete, with final report due December 10, 2002.

Financial: Initial payment made upon signing of contract. There will be a budgetary surplus for this project which will be reconciled with final reporting.

URE 12-02 Enhance Mainstem Salmon Escapement – Andy Bassich, President of the Eagle Area Subsistence Fishermen's Association $15,800

The purpose of this project is to supply the fishermen of Eagle with a replacement source of subsistence fish in return for them reducing their harvest of stocks primarily bound for Canada. The community of Eagle typically harvests approximately 15,000 fall chum salmon annually. Truckloads of fish will be purchased from a hatchery and transported to Eagle.

Status:

This contingency project was not activated because of the nature of the very limited 'subsistence' opening in this area. Apparently the Association members proceeded with the project at their own expense (excepting the small preparatory payment/contribution by the Panel referred to below). A brief project report has been filed, and is being reviewed, in recognition of the 'project preparedness' contribution made by the Panel.

Financial:

A contract was put in place in the event this contingency project was to be activated, including an initial payment of $2,400US to buy bags to enable the Association to enable 'project preparedness'. Although this project was not activated, however consistent with precedent (note CRE-09-02, and previous years), the Panel Co-chairs-in consultation with Panel members-authorized the Association retaining the initial payment committed for preparatory project supplies. There will be no further financial commitment to this project this year. The project is considered "completed" with the submission of the above-mentioned report.

URE 13-02* Ichthyophonus – *Chinook Study – Dick Kocan $37,000

The objectives of this study are: 1) repeat multi-site survey (monitoring) of chinook salmon for *Ichthyophonus* prevalence and pathogenicity from Emmonak, Alaska to Whitehorse, Yukon Territory; 2) relate changes in annual disease severity to annual changes in river conditions using new and historical water temperature data; 3) examine spawn-outs at terminal spawning streams to determine if infected adults die before they successfully spawn; 4) attempt to find the source of *Ichthyophonus* infections in Yukon chinook salmon (fresh or salt water); 6) determine if non-salmonid species are also infected with *Ichthyophonus*. A dramatic decrease in the percent of infected and diseased chinook salmon in their spawning streams is consistent with what was observed in the Chena River in 2001 and for the past four years at Whitehorse. The Tanana River data revealed a different pattern of infection and disease than that seen in the Yukon River, with fewer females than males being infected or exhibiting clinical signs of disease. See Section 6.1.11 below.

Status: Fieldwork and data analysis complete with provision of draft final report – final due March 15, 2003.

Financial: Initial and progress payments made with final payout pending receipt of final report.

6.1.11 *Ichthyophonus*

The *Ichthyophonus* subcommittee was established at the February 20 to 22, 2002 JTC meeting in Anchorage. The subcommittee was formed for the purpose of developing research

recommendations, support individual researchers with project design and to prioritize goals for *Ichthyophonus* research in the Yukon River drainage. This meeting was called as an informal scoping meeting to assess available literature, discuss previous research, and determine available funding sources.

The committee developed questions that needed to be researched. In some instances, there is a sub-set of questions, which may be necessary to answer the primary question. Russ Holder (USFWS) provided background information on the initial identification of the protist in the Yukon River drainage in the late 1980's, how the research had developed from the early 1990's to last year, and the present theories being investigated by researchers Dick Kocan and Paul Hershberger of the University of Washington and Dr. Winton of the Washington USGS laboratory.

Currently, *Ichthyophonus* research is being funded by the Federal Office of Subsistence Management ($261K for FY00-02,) and the U.S./Canada Restoration and Education funding ($37K). This past year, ADF&G received a Sustainable Fisheries Grant from NOAA earmarking $500K for *Ichthyophonus* research over 5 years. Linda Brannian has identified herself as the Principal Investigator for administration of the grant funding.

Although Dr. Winton and Dr. Kocan have conducted previous research, and outlined research needs, the task of the subcommittee is to ensure future research is conducted to benefit or address the management questions related to chinook salmon.

Below is the abstract from the draft report *Yukon River Chinook Salmon - Ichthyophonus Study 2002* submitted by Richard Kocan and Paul Hershberger.

"A total of 638 male and 447 female chinook salmon were examined from eight sites along the Yukon and Tanana Rivers between mid June and mid August 2002. Chinook salmon entering the river in June exhibited the same pattern of infection and disease progression observed during the previous three years. Infection prevalence for males and females at Emmonak was 23.9% and 26.2% respectively, with clinical signs observed in 12.8% of males and 9.5% of females. When fish reached the Rampart Rapids the infection prevalence was 28.6% for females and 39.0% for females, with clinical signs appearing in 23.5% and 37.3% respectively. At Dawson, YT, 43.5% of males, and 51.9% of females were infected (clinical data not available at the time of writing). Since *Ichthyophonus* is transmitted by eating infected flesh, and salmon do not feed in fresh water, it appears that the prevalence levels detected at Emmonak represent a minimum prevalence of infection and the levels seen at the Rapids and Dawson are closer to the true infection levels. At Whitehorse, the infection prevalence dropped to 7.7% for males and 31.6% for females with 7.7% of males and 26.3% of females exhibiting clinical signs. This drop in prevalence levels at Whitehorse is similar to those seen in previous years except that males showed a more dramatic decline this year than females. Fish were also sampled from the mouth of the Tanana River, at Nenana, Fairbanks, and spawn-outs from the Chena and Salcha Rivers. At the mouth of the river 29.8% of males and 24.5% of females were infected with 21.3% and 18.4% exhibiting clinical signs of disease. Fish sampled from Nenana and Fairbanks had infection prevalence rates of 39.5% for males and 29.8% for females, with clinical signs appearing in 22.1% and 19.4% respectively. Chena and Salcha river spawn-outs were similar to each other with infections detected in 16.4% of males

and 9.9% of females. Clinical signs were present in 12.2% of males and 8.1% of females. This dramatic decrease in the percent of infected and diseased chinook salmonin their spawning streams is consistent with what was observed in the Chena River in 2001 and for the past four years at Whitehorse. The Tanana River data revealed a different pattern of infection and disease than that seen in the Yukon, with fewer females than males being infected or exhibiting clinical signs of disease. For the past 4 years every sample site on the Yukon (except Whitehorse) showed a pattern of more infected/diseased females than males. This could indicate a difference in time and place of exposure for Yukon and Tanana River fish, a genetic difference in susceptibility of the two populations or early mortality of females as they approach their spawning streams."

6.1.12 Contaminants

Hazardous chemicals including some pesticides (e.g., DDT, chlordane and toxaphene), industrial chemicals and by-products (including PCBs and dioxins), and toxic elements, such as mercury, are transported to Alaska from remote sources via atmospheric and ocean currents. Alaska also has hundreds of localized pollutant sources, including abandoned military installations, mining sites, landfills, wastewater discharges and frequent marine oil/fuel spills. Many environmental contaminants are known to alter reproductive system function in adult animals and to affect early life stages of fish, mammals and birds. These contaminates might also influence disease, parasites, genetic abnormalities, nutritional deficiencies and other factors.

Fisheries and subsistence managers need to determine if contaminants are a threat to the health and viability of salmon populations. Many Alaskans are also concerned about the quality of subsistence foods and whether those foods are safe to eat. No contaminants data (except for mercury) exist for Yukon River or Kuskokwim River salmon. The mercury study (Zhang et al., 2001) suggests that the level of mercury does not pose a risk for salmon food consumers. These same authors did however find that some northern pike, collected in both drainages, have levels of mercury, which are of concern.

To help answer some of the questions about contaminants and the health of salmon populations, the U.S. Fish and Wildlife Service (FWS), studied chinook and chum salmon from the Yukon and Kuskokwim Rivers in 2001. Each fish was analyzed for a range of contaminates, including metals, persistent organic pollutants (POPs) such as organochlorine pesticides (i.e. DDT) and polychlorinated biphenyls (PCBs). In 2002, USFWS assisted USGS-BRD on a similar project on freshwater fish in the Yukon drainage. The USGS-BRD targeted northern pike and longnose suckers. The sample analysis used on the two studies is very similar except where USFWS analyzed tissues, so while USFWS could comment on individual fish, USGS-BRD are compositiing fish by site and gender within sites. They need data comparable to their existing data. USGS intends these data to be part of their long-term, nation-wide database.

Many researchers have been and continue to investigate subsistence users diets. The list of projects and researchers, past and present, can be retrieved via the state DEC Wild Food Safety Coordinator.

State Contaminate Programs and contact person
Bob Gerlach with the Alaska Department of Environmental Conservation
-Wild Food Safety Coordinator (907-267-7635)
http://www.state.ak.us/dec/deh/contaminants.htm
http://www.state.ak.us/dec/deh/fishsafety.htm
http://www.gov.state.ak.us/oceans/contaminants.html
http://www.epi.hss.state.ak.us

Federal programs
Keith Mueller with the US Fish and Wildlife Service
http://alaska.fws.gov/es/dec.html
http://alaska.fws.gov/es/studies.html

6.1.13 Run Timing, Migratory Patterns, and Harvest Information of Chinook Salmon Stocks Within the Yukon River

Telemetry data collected in 2002 by USFWS, NMFS and ADF&G for a different study, indicated the existence of significant spawning populations in drainages previously thought to have few to no chinook salmon. Although attempts were made to collect samples from some of these systems, logistical problems made collections impossible. Sample collections will be made in 2003 on all the primary populations. Collections from the supplemental populations will be made as funding and logistics allow.

The Gene Conservation Laboratory (GCL) will analyze samples taken at Pilot Station and Russian Mission in 2002, using the existing allozyme database to provide estimates of run timing and migration patterns. Conservation Genetic Laboratory (CGL) and GCL will begin collecting microsatellite data from available collections during the fall of 2002. These two laboratories and DFO will analyze a portion of the samples with the final group of microsatellites to provide a direct comparision between the marker types. At DFO, surveys of microsatellite variation of 15 CanadianYukon River chinook salmon putative populations have been conducted, see section 6.2.11. This research indicated a general isolation by distance, more distant populations were more distinct genetically.

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)

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 two times daily, morning and evening[3]. Subsequent tag recoveries are made in a number of different fisheries located upstream and infrequently in those located downstream. Population estimates were developed in 2002 using spaghetti tag recoveries from the following areas:

1) the aboriginal fishery in the Dawson City area;
2) a chinook gillnet test fishery;
3) a fall chum live release fish wheel test fishery; and
4) the Canadian commercial fishery[4] located downstream of the Stewart River where the most intensive catch monitoring is conducted.

Commercial fishers are legally required to report catches, tag recovery and associated data within an eight hour period after the closure of each fishery. A number of potential reporting systems are available for the fishers including a toll free telephone catch line, hand delivery of the information to the tagging personnel or depositing the information in a drop box located in Dawson City. If the telephone option is chosen fishers are required to deposit or hand deliver their information within 6 days after the closure of the fishery.

Consistency in the fish wheel sites and fishing methods permits some interannual and inseason comparisons[5], although the primary purpose of the fish wheels is to live-capture salmon for the mark-recapture program. Fish wheel catch data in the absence of recapture information is not useful in assessing run abundance. This is particularly true for chinook salmon since fish wheel counts have limited correlation with border escapement estimates derived from mark-recapture. Similarly, chum salmon wheel counts are often directly related to water levels (high counts during high water conditions) rather than true abundance.

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[3] An additional afternoon wheel shift was added during the peak migration period of the chinook salmon run.

[4] In 2002 information was also used from the upper river commercial fishery, although the catch in the upper river commercial fishery was negligible.

[5] Recent changes in the fish wheel pontoons may have had an undetermined effect on catchability.

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 2002, the fish wheels ran 24 hours per day for an operational period from June 19 to October 07 for the White Rock wheel and from June 21 to October 05 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 June 28. The run as observed at the DFO fish wheels exhibited average timing. A peak daily fish wheel catch of 90 chinook salmon was recorded on July 30. Peak catches for the 1992 to 2001 period have ranged from July 05 to July 28.

The combined total fish wheel catch of chinook salmon in 2002 was 1,054 fish, 58.3% of the 1992-2001 average of recent cycle average of 1,808. The sex composition as observed in the fish wheel catches was 21.3% female.

The catch and tag recovery component of the chinook salmon mark-recapture study involved information from the following fisheries:

1. The First Nation fishery located near Dawson City;
2. The chinook gillnet test fishery; and
3. The commercial fishery openings which occurred late in the season.

The preliminary chinook salmon border escapement estimate for 2002 is 30,247 with a 95% confidence interval range of 24,791 to 36,891. After subtracting the harvest of 9,113 (1,036 test, 708 commercial, 7,143 aboriginal, 26 domestic and 200 recreational), 21,134 chinook salmon were estimated to have reached spawning areas. This estimate is 24.5% lower than the escapement goal of 28,000 adopted by the Yukon Panel for the 2002 season (Appendix Figure 15).

The Yukon Panel recognized the recent regime of low returns and the low preseason forecast for 2002 season. There were a number of options available with respect to setting the escapement goal. An escapement goal of 28,000 was also the target for the 1996 to 2001 period; this was the first step in a chinook rebuilding plan agreed to in 1995.

Comparative border and spawning escapement estimates from the tagging program for 1982 through 2002 are presented in Tables 10 and 11.

6.2.1.2 Fall Chum Salmon

The first chum salmon was captured at the White Rock fish wheel on July 26. On average over the previous ten years, the first chum salmon has been captured July 23. The mid-point of the run occurred on September 20. The average mid-point date over the previous ten years occurred on September 13, however the mid-point dates have been variable, ranging from September 5 to September 23. The peak catch of 358 chum salmon occurred on September 20. 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 daily peak catch for the 1992 to 2001 period range from September 05 to 27. The total fish wheel catch was 5,565 chum salmon, 48.2% higher than the 1992 to 2001 average of 3,755 chum salmon.

In 2002, 5,267 of 5,565 chum salmon captured in the DFO fish wheels were tagged. High daily fish wheel catches were recorded in the following two periods: from September 05-16 when the average daily catch was 197 with a range of 137 to 262; and from September 18-23 when the average daily catch was 253 ranging from 181 to 358.

Inseason run size information was obtained from the U.S. Pilot Station sonar project and other U.S. escapement projects. Based on this information there was an expectation that there would be below average and perhaps poor border escapement. There was, however late season run strength that was not anticipated. Late season run strength was not evident on the Porcupine River system based on the return to the Fishing Branch weir.

The catch and tag recovery component of the fall chum salmon mark-recapture study involved information from the following fisheries:

1. The First Nation fishery located near Dawson City;
2. The live-release fish wheel test fishery; and
3. The commercial fishery openings which occurred late in the season.

The initial postseason border escapement estimate is 91,808 with a 95% confidence interval range from 83,105 to 102,563. After subtracting the estimated catch (3,065 commercial and 3,093 aboriginal), the estimated spawning escapement is 85,650.

The fall chum salmon escapement goal adopted for 2002 season by the Yukon Panel of 60,000 fish was achieved. The preliminary escapement estimate also achieved the rebuilding goal of >80,000 fall chum salmon.

Comparative border and spawning escapement estimates from the tagging program for 1980 through 2002 are presented in Appendix Table 12.

6.2.2 Harvest Sampling

The Canadian chinook test fishery was sampled in 2002 for age, length, sex, and tag recovery data.

The unweighted chinook salmon sample was 34.8% female. This sample was collected from July 14 to August 04. The total sample size that involved age (scales) and sex information was limited to 276 chinook salmon, however another larger data set was collected from the test fishery; 733 of the 1,036 fish caught were sampled for length and sex information. With the exception of one fisher who used a 6 inch stretched measure gillnet (43% of his gear for one opening), the gear used in the test fishery was 8.25 inch stretched measure gillnets. Tag loss was not detected in the

test fishery; no fish were observed which had a secondary mark (adipose punch) and no spaghetti tag.

Adult chinook salmon harvested in the test fishery were sampled for the prevalence of the protist *Ichthyophonus*. Three test fishery sample groups were obtained in the following three sample periods: from July 21-August 04, July 20-22 and July 26-29, respectively. The prevalence of *Ichthyophonus* from laboratory analyses of these groups was as follows: Group 1, 25% (n=52); Group 2, 53% (n=129); and Group 3, 37% (n=79). Group 1 was also examined clinically (clinical examination of both the heart and liver). The result of this analysis was a 17% prevalence (n=60) of *Ichthyophonus*. The latter two sample groups involved heart samples only which were examined in the laboratory.

Other sample locations for *Icthyophonus* included the DFO fish wheels where live punch biopsy samples were collected from early (July 20-25) and late (August 04-20) migrating fish. The prevalence of Ichthyophonus from the early and late samples was 20% and 32%, respectively. Two sample sets were collected at the Whitehorse Hatchery. The results of the analyses of these samples for *Ichthyophonous* prevalence are not yet available. The results of the analyses of these samples are incomplete at this time.

One hundred four fry samples were also collected from the Whitehorse Rapids Hatchery for *Ichthyophonus* analyses. These samples were collected to determine if *Ichthyophonus* was present in fry and also to determine the potential for vertical transmission. The fry selected for the analyses did originate from eggs or females which tested positive for *Ichthyophonus,* although they were from a group of small and generally unfit fry. *Ichthyophonus* was not detected in this sample group.

6.2.3 Whitehorse Rapids Fishway Chinook Enumeration

A total of 605 chinook salmon ascended the Whitehorse Rapids Fishway between July 31 and September 02, 2002. This was 44.1% of the 1992-2001 average count of 1,371 fish. The sex ratio was 36.9% female (223 fish).

Hatchery produced fish accounted for 39.0% of the return and consisted of 198 males and 38 females. The contribution of hatchery fish was similar to the proportion (36%) observed in 2001 but lower than the 1992-2001 period average of 57.1%. The non-hatchery count consisted of 184 wild males and 185 wild females. The run mid-point occurred on August 13. The peak daily count occurred on August 05 when 65 fish were counted. Prior to August 05 only two fish had been counted. An attraction flow problem associated with a wooden structure recently constructed[6] below the Fishway was ameliorated when additional attraction flow was added to the Fishway on August 05.

[6] This structure was built to create a plunge pool at the entrance of the Fishway during low water conditions, however it appeared to cause water conditions that confused the fish.

Four fish were classified as mortalities in 2002. These fish (all females) had ceased migration and were in poor physical condition. These were used for broodstock. Record mortalities were observed in the 1997 to 1999 period including 114 in 1997, 150 in 1998 and 113 in 1999. The impact of these mortalities is significant when the number of females lost is considered. The number of female mortalities and percent of female run lost for the 1997 to 1999 period was 103 (9.7%), 38 (23.6%) and 37 (19.8%), respectively. The high mortality rates observed may 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.[7] This change appears to have improved the situation since there were no mortalities in 2000 and only three in 2001.

In 2002, no fish were specifically removed from the fishway for coded-wire tag sampling, however a number of samples were obtained from the broodstock collected. No weirs (i.e. Wolf or Michie creeks) operated in the upper drainage above the fishway this year (Tables 10 and 11).

6.2.4 Whitehorse Hatchery Operations

All of the 244,045 Brood Year (BY) 2001 chinook reared at the Whitehorse Rapids Fish Hatchery were released in late May and early June 2002. All fish released upstream of the dam 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.[8] The number of fry released and release location are summarized as follows:

Wolf Creek: 50,716
Michie Creek: 118,098
McClintock River (above the confluence of Michie Creek): 25,274
Byng Creek: 49,957.
All fry were released between May 28 and June 10, 2002.

The 2002 release was the seventh year (1995-2001 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) 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

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[7] 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.

[8] A total of 3,062 small unmarked fry were released below the Whitehorse Rapids dam at Rotary Peace Park. Due to the small size and general poor fitness of this release group, the adult return from this group is not thought to pose a significant concern with respect to the recent strategy of marking all hatchery fish.

hatchery releases has provided an opportunity to more accurately determine the contribution of hatchery fish to the Whitehorse Rapids Fishway returns.

An outbreak of a Myxobacteria infection was observed in some fry prior to release. The clinical signs of this infection included fin rot and deterioration of the lower mandible in some fish. A low number of mortalities were observed[9]. The tank with the highest prevalence of Myxobacteria was treated with a Chloramine (brand name) bath. A fish pathologist had no reservations with respect to releasing the fish because Myxobacteria is common in the environment and unlikely to cause a problem for wild fish.

In August 2002, brood stock collection began after 38 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 number of adipose clipped hatchery jacks returning. To allow for healthy escapement to the spawning grounds, a total of 51 males were retained for the brood stock-spawning program. Of these males, 15 were adipose clipped and 36 were wild. In total, 13.4% of the male population was retained for the brood stock program. In addition to these males, milt samples were taken from 12 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 32 fish comprising 14.4% of the female population. Of the females retained for brood stock, 3 were adipose clipped and 29 were wild. Four additional females (one clipped and three wild) which had ceased migration within the upper section of the fishway were salvaged and their eggs were also collected.

Egg takes began on August 14 and were completed on September 1, 2002. In total, 200,987 green eggs were collected from 36 females. Average fecundity was 5,600 eggs per female. The fertilization rate for the egg take was estimated to be 97%. Shocking and second inventory of these eggs began on October 6 and was completed on October 20. As of October 21, an estimated 188,369 eyed eggs are incubating in the hatchery. Survival from the green egg to the eyed stages was 93.72%.

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 16, Appendix Figure 15).

[9] Approximately 550 mortalities (1.1% of a specific group of fish) were observed in one of the fish tanks while mortalities and the clinical infection rate in other tanks was negligible.

In 2002, the weir was operational from August 29 to October 15. A total of 13,300 fall chum salmon were counted. Because the 2002 run appeared to have been a few days early, an undetermined number of fish migrated before weir installation. To compensate for this loss, the average proportion that migrated through the weir before August 29 in the two dominant cycle years (4 and 5 year old fish) will be used to expand the observed weir count. The peak count (604 chum salmon) occurred on September 14 and the run mid-point was observed on September 17. The 2002 count was 40.9% of the recent 10-year average of 32,503 and only 26.6% of the lower end of the interim escapement goal range of 50,000-120,000 chum salmon. Weir counts in the dominant cycle years were 26,959 chum salmon counted in 1997 and 13,564 counted in 1998. Conservation measures implemented in the Vuntut Gwich'in First Nation aboriginal fishery at Old Crow improved escapement to the Fishing Branch River system. The 2002 count is an 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 Ecology of Juvenile Chinook Salmon in the Upper Yukon River Basin. Update

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

From 1998-2001 we conducted research on the ecology of juvenile chinook in small streams and the Yukon River mainstem. Some of that work has been published (Bradford et al 2002, Bradford et al 2001, Moodie et al 2000, Mossop 2002, Perry 2002). The project officially ended in March 2002, however, we were able to continue some of the work in summer 2002.

From early June to August, 2002, a rotary auger trap was operated in the Yukon River mainstem near Dawson City to evaluate this technique as a means to monitor downstream migrations of young salmon from the upper basin. This project was a collaboration between local First Nations, community groups and DFO, as was supported by the R&E fund. The project was successful from a logistical perspective, and also yielded good information about the downstream migration timing and characteristics of chum salmon, chinook fry and chinook smolts. Our results indicate chum salmon are migrating directly from spawning areas, probably peaking in May. The peak of chinook salmon yearling migration was probably in June. Age 0+ chinook migration peaked in early July; the size and timing of chinook fry suggests growth occurred prior to, or during migration. Plans for 2003 include starting the program earlier in the season to more fully sample the migrations of chum salmon and chinook salmon yearlings. A report of the 2002 work is in preparation.

Also in 2002 abundances of juvenile chinook salmon were estimated for 10 streams in the Dawson, Minto and Whitehorse areas to continue a time series of abundance data begun in 1998. One objective of this work is to evaluate juvenile monitoring as a potential tool for stock assessment. Preliminary observations do suggest some potential, as average abundance was lowest in 2001, highest in 2002 and intermediate in 1999 and 2000.

We continued to monitor the effects of a 1999 wildfire on stream fish populations in two of our study streams near Dawson. About 35% of the catchment of one of the streams was burnt, and fish abundance in 2002 was lower than expected as suspended sediment levels remained elevated. The other stream was less affected (15% burned), sediment levels less elevated, and salmon populations appeared to be only somewhat depressed from pre-fire levels. We will attempt to continue to monitor these streams to estimate the loss of productive capacity, and its rate of recovery since the fire.

A master's project on the physical habitat of small non-natal streams should be finished this year. This study focussed on 'large woody debris' in small streams, as well as measures of physical habitat and its relation to fish abundance. The results should be useful for habitat restoration projects.

6.2.7 Status of 2002 Restoration and Enhancement Projects

Sixty R&E projects (fifty-one Canadian plus nine US) were approved at the March 2002 meeting of the Panel involving a financial commitment of $1,046,400US/1,653,300Cdn[10]. Fifty-eight total projects have been activated, while one has been deferred to 2003 (CRE-92-02), and another will not be activated (CRE-96-02).

CRE-01-02 Juv. Chin. Out-Mig. Timing&Char./Auger Trap YRCFA, DDRRC, YSC[11] $15,800/25,000 P/A

Purpose:

Determine the feasibility of describing and indexing the outmigration of juvenile salmonids from the Canadian portion of the Yukon River.

Objective/Method:

Run a rotary auger trap in the Yukon Mainstem near Dawson to determine if juvenile salmon can be captured, and if so, determine the timing and biological characteristics of those runs.

Status:

Project complete and final report submitted for review.

Financial:

Initial and progress payments made, with final payment pending review of final report (in hand).

CRE-02-02 Radio Tag Recovery, THFN Tradition Territory YRCFA/THFN$3,200/5,000P/A

Objective:

To acquire the post-spawning locations of NMFS-applied radio tags on streams within the Tr'ondek Hwech'in Traditional Territory and document any previously undocumented spawning areas found.

Status:

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[10] This was based on an exchange rate of approximately $1US = $1.58Cdn.

[11] YRCFA – Yukon River Commercial Fishers Association
YSC – Yukon Salmon Committee
THFN – Tr'ondek Hwech'in First Nation (Dawson City area – North Cdn. Yukon River Mainstem)
DDRRC – Dawson District Renewable Resources Council

Fieldwork complete, progress report filed and final report due.
Financial:
Initial and progress payments made, with final payment pending.

CRE-05-02 Klondike River Sampling & Redd Mapping YRCFA/THFN $9,000/14,200 P/A
Objective:
Determine overall run-size and techniques and methodologies for future broodstock collection, and, assess broodstock feasibility on the Klondike River. Sample juvenile Chinook salmon to determine optimum target grow-out sizes to mimic naturally occurring conditions for future incubation & outplanting. In the process, map spawning habitat and critical over-wintering habitat for future release strategies and conservation/protection efforts.
Status:
Fieldwork complete, progress report filed, and final report due.
Financial: Initial and progress payments made with final payment pending

CRE-06-02 Klondike Area Central Incub. & Outplanting Facility–Feasibility YRCFA/THFN $25,500/40,300 P
Purpose:
Assess the feasibility of building and operating an Incubation and out-planting facility in the Dawson Region in support of proposed salmon restoration programs for streams in the Tr'ondek Hwech'in Traditional Territory.
Objectives/Specific Deliverables: (Note: These 'deliverables' are currently under discussion, and represent completion of CRE-05-97.)

- central incubation facility - detailed biological program
- facility design
- facility/program management structure
- educational/interpretive-tourism potential
- environmental regulation and facility permitting
- program funding and potential partners

Status:
This project has not been launched, pending review and agreement on the recently proposed above noted 'deliverables'. The proposed revised schedule of a progress report for March 31, 2003 and final reporting date of October 31, 2003.
Financial:
The contract drafted in June for this project has been held in abeyance in consideration of the refined/updated list of deliverables, with no financial commitments/transactions made pending conclusion of this contract. It is expected this will be concluded by November 15, 2002.

CRE-07-02 First Fish 2002 Youth Camp YRCFA/THFN $2,500/4,000 A
Objective:
Teach conservation and stewardship ethics in respect to salmon and their habitats to local area youths.
Status:
Project completed and final report presently being reviewed.
Financial:
Initial payment made, and final payment pending current review of the project final report.

CRE-08-02 Coal Creek Stream Study–Spawn/Rearing YRCFA/THFN $2,400/3,800 A

Objective:

Assess the presence of spawning and/or rearing salmon in Coal Creek.

Status:

Project completed and final report received/approved.

Financial:

Initial payment made and final payment in progress.

CRE-09-02 Contingency Chum Test Fishery/Live Capture Fish wheels YRCFA/THFN $32,200/50,900 P

Objectives:

- 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; and,
- create stewardship incentives.

Status:

This contingency project was activated, with an option requested for a one-week extension–which was not exercised, with satisfactory progress being made/data provided; and, the final report is due.

Financial:

The initial payment was made in preparation for this project in advance of the decision to 'activate' this contingency project to ensure 'project preparedness'; the progress payment was made upon receipt of a satisfactory progress report; and, the final payment is being held pending receipt of a satisfactory final report.

CRE-10-02 Contingency Chinook Test Fishery – Dawson area YRCFA/THFN $25,700/40,600

Objectives:

- 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 chinook salmon; and,
- create stewardship incentives.

Status:

Fieldwork completed and data provided to DFO, satisfactory progress report filed, and final report due.

Financial:

Initial and progress payments made, with final payment being held pending receipt of satisfactory final report.

CRE-13-02 Chandindu River Salmon Enumeration Weir (2) YRCFA/THFN $31,400/50,300 P

Objectives:

- construct a 'Resistance-board' weir to be used on the Chandindu River;
- salvage older traditional steel conduit/tripod weir for use on other systems; and,
- address the environmental challenges that the project has faced with the resistance-board weir, and thus, enable the collection of information for a planned restoration program.

Status:

Fieldwork conducted, data provided, and satisfactory progress report, with final report due.
Financial:
Initial payment and progress payments made, with final payment pending receipt of final report.

CRE-15-02 Training & Chin/Coho Habitat Assessment NYRRC/VGFN[12] $47,500/75,000 A
Objectives:

- provide information to assist in the development of a watershed restoration and enhancement plan as well as creating the basis for further projects;
- provide training, employment and experience to 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;
- provide information regarding the presence or absence of juvenile chinook and coho in the Whitestone and Miner tributaries, and possibly the Porcupine mainstem;
- provide information regarding the extent of spawning and rearing habitat for chinook salmon in the Whitestone and Miner rivers;
- provide information regarding the extent of upstream utilization of chinook salmon in the Whitestone and Miner Rivers; and,
- inspire and build community capacity and stewardship for the conservation, restoration, and enhancement of salmon stocks in the Porcupine River sub-basin.

Status:
Project launched with satisfactory 1st and 2nd progress reports provided, and final report at draft stage.
Financial:
Initial payment and both progress payments made, with final payment being held pending receipt of satisfactory final report.

CRE-16-02 Traditional/Local Knowledge–VGFN/Porcupine System NYRRC/VGFN $5,100/8,000 A
Objectives:

- provide information to assist in the development of a watershed restoration and enhancement plan as well as creating the basis for further projects;
- provide information regarding the presence of chinook, coho and chum salmon in locations throughout the Porcupine River sub-basin;
- provide information regarding spawning habitat of chinook, coho and chum salmon in the Porcupine River sub-basin;
- document historic locations of fish-traps throughout the Porcupine River sub-basin; and,
- inspire and build community capacity and stewardship for the conservation, restoration, and enhancement of salmon stocks in the Porcupine River sub-basin.

Status:
Project launched, but behind schedule. Expect final report in December, 2002.
Financial:
Initial payment made, with final payment pending receipt of satisfactory final report.

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[12] NYRRC/VGFN – North Yukon Renewable Resources Council and Vuntut Gwitchin First Nation (Old Crow – Porcupine River system).

CRE-19-02 Monitor &Evaluate McQuesten River Logjam Diversion NND FN[13] $3,400/5,400A

Objective:

- develop an effective and efficient monitoring protocol; and,
- monitor and evaluate the partial diversion excavated in 2000/01.

Status:

Project launched, progress report overdue, and final report due January 15, 2003.

Financial: Initial payment made upon contract signing, progress and final payments held pending receipt of respective reports.

CRE-20-02 McQuesten River Watershed Assess/Rest Plan NND FN $28,200/44,500 A

Objectives:

- determine and rank restoration opportunities based on an integrated watershed approach;
- develop efficient and effective techniques for watershed assessment and restoration planning that can be repeated in other Stewart River sub-basins as part of a long-term management plan for the Stewart River;
- provide training, employment, build technical capacity and foster stewardship for NND people; and,
- provide baseline information (in an updateable format) for the NND Lands & Resources Department to monitor development and rehabilitation in the McQuesten River watershed.

Status:

Project launched, progress report overdue, and final report due December 31, 2002.

Financial:

Initial payment made, with progress and final payments held pending receipt of respective reports.

CRE-21-02 Salmon Habitat Signs at Fraser Falls NND FN $1,500 /2,300 A

Objectives:

- inform river travelers/users about the presence of migrating chinook salmon at Fraser Falls;
- provide NNDFN elders and citizens with an opportunity to inform other people about the importance of salmon as a critical food and cultural resource;
- provide an opportunity to use both English and Northern Tutchone on the signs, which is an educational tool in itself (i.e. providing river travelers information about NND culture); and,
- promote stewardship, among NNDFN citizens, of salmon and salmon habitat.

Status:

Project completed (signs designed and in place), with (brief) final report pending.

Financial: Initial payment made, with final pending receipt of final report.

CRE-23-02 McQuesten River Spawner Survey NND FN $9,200/14,500 P

Objectives:

- determine the specific spawning locations of Chinook salmon in the McQuesten River Watershed;

[13] NND FN – First Nation Of Na-cho Nyak Dun , Mayo Area – Stewart River System.

- determine numbers, age structure and health of the spawning population(s);
- provide training, employment, build technical capacity and foster stewardship for NND people; and,
- provide critical information that will help guide habitat restoration in the McQuesten River Watershed.

Status:
Project launched, progress report overdue, and final report due December 31, 2002.
Financial:
Initial payment provided with progress and final payments held pending receipt of related reports.

CRE-24-02 Lower Stewart River Habitat Classification & Mpg. Pilot NND FN $16,500/26,100 A
Objectives:

- using a portion of the lower Stewart River and smaller tributaries as a pilot project, develop fisheries habitat classification and mapping methods that would be applicable to most Yukon watercourses and water bodies;
- provide an initial assessment of fisheries habitat values for identified habitat units;
- provide training and employment opportunities for the Community of Mayo; and,
- foster stewardship and advance the awareness of fisheries values in the lower Stewart River near Mayo.

Status:
Project launched and progress achieved, but progress reports overdue, with final report due December 31, 2002.
Financial:
Initial payment made upon signing of contract, while progress payments held pending receipt of respective reports.

CRE-27-02 Pelly River Tributary Chinook Habitat & Use Survey Selkirk RRC $21,500/33,900 A
Objectives:

- initiate the collection of detailed ecological information from tributaries to the Pelly River on fish habitat types and fish utilization;
- initiate the mapping of spawning areas near the confluence of the Macmillan and Pelly Rivers;
- increase communication and strengthen the partnership between the Selkirk Renewable Resource Council (SRRC) and the Selkirk First Nation (SFN) Lands and Resources Dept.; and,
- provide training and employment for Selkirk First Nation community members and continue to foster a stewardship and conservation ethic towards salmon and salmon habitat in the SFN traditional territory.

Status:
Note: This project was approved as proposed by the Selkirk First Nation, however was contracted to the local/Selkirk Renewable Resources Council (with the assistance of the local Habitat Steward) as the SFN Lands & Resources Department was re-organized during the summer and fall and was not in a position to deliver this project this year.
The SRRC has launched this project with the progress report pending, and the final report due December 1, 2002.
Financial:

Initial payment made, with progress and final payments held pending receipt of the respective reports.

CRE-28-02 Mica Creek Salmon Habitat Restoration Selkirk First Nation $6,800/10,800 A

Objectives:

- trap spring and summer juvenile fry to determine presence/absence of Chinook salmon;
- maintain the trail beside the creek up to Towhata Lake;
- survey entire creek to monitor post spawning redds;
- breech obstructions in accordance to DFO guidelines and the traditional laws of the SFN; and,
- trap/remove beaver in accordance to DFO guidelines and SFN laws.

Status:

Fieldwork completed, progress report overdue, and final report due December 1, 2002.

Financial:

Initial payment made; progress and final payments held pending receipt of related reports.

CRE-29-02 Chum Spawning Ground Recoveries–Minto Selkirk First Nation $6,100/9,600 P

Objectives: (Note: these are revised/'added to' objectives that include the 3 original objectives approved by the Panel, with an additional 2 objectives noted below – for the originally approved project funding.)

- recover spaghetti tags applied by DFO at sheep rock and White Rock fish wheels for a twelve day period;
- determine tagged:untagged ratios in the Minto index area;
- involve SFN members in gathering this data to develop and foster stewardship and community–based fisheries management;
- collect 50 – 100 DNA samples; and,
- record sex of fish handled/observed to get sex ratio, with a desired sample size of 1000 noted.

Status:

Field work done by the contractor with involvement of Selkirk FN citizens, final report pending..

Financial:

Contract re-issued to SFN rather than contractor (the Lands & Resources Dept. now restructured and staffed, therefore able to administer this project), with initial payment made, and final being held for receipt of final report – expected later in November.

CRE-30-02 Groundwater ID & Investigations -Upper Yukon River Laberge Env. Services $12,500/20,000 A

Objectives:

- purchase and study satellite images, through computerized aide, existing satellite imagery (Lansat, radarsat, and/or SPOT) of the study sites;
- process, analyze and report on image analysis;
- 'truth' identified sites by boat during peak spawning times to document use by chum salmon; and,
- take stream survey measurements and identify any spawning habitat features.

Status:

Project launched, progress report accepted, and final report due March 31, 2003.

CRE-33-02 Carmacks Watershed Camp LSCFN14/YSC Hab.Stew.15 $3,200/5,000 A

Objectives:

The Cultural Education program at Little Salmon Carmacks First Nation allows for the high school (15-20 students) to participate in this three-day field trip to Alma Wrixon's Tatchun Creek fish camp in July 2002 during fishing season. The project is directed at developing stewardship of salmon habitat and resources with students. The shortage of qualified people in the community to deal with restoration and enhancement planning efforts will be addressed by raising awareness in students of the opportunities available in renewable resource management.

Status:

Project conducted and final report pending.

Financial:

Initial payment made and final payment pending receipt of satisfactory final report.

CRE-35-02 Klusha Creek & Tatchun Creek Beaver ManagementLSCFN $7,000/11,000 A

Objectives:

- conduct summer juvenile chinook fry trapping to determine presence or absence of chinook salmon;
- removal of additional beaver dams at both locations;
- observe, document, and provide visual counts (ground survey) of salmon;
- aerial survey of the creek for observation and visual counts of salmon and redds;
- trap beaver in late winter using traditional and conventional methods; and,
- encourage local trapline holders to trap beavers when the pelt is prime (Nov. through March) using traditional methods - otherwise, permission of the trapline holder will be obtained to trap beaver on their traplines.

Status:

Field program conducted and final report in progress – due November 15, 2002.

Financial:

Initial payment made; final payment pending receipt of final report.

CRE-39-02 Hess River16 Spawning Area Assessment Ross River Dene Council $12,500/20,000A

Objectives:

To document salmon utilization, inventory habitat characteristics and identify disruptions/disturbances, which may affect the habitat and salmon stock in the area described.

Status:

Fieldwork completed, progress report provided and final report pending.

Financial:

Initial and progress payments provided, with final report payment held pending Nov. 15, 2002 due date.

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[14] LSCFN – Little Salmon/Carmacks First Nation (in middle mainstem of the Cdn section of the Yukon River.

[15] (Canadian) Yukon Salmon Committee Habitat Steward.

[16] Stewart River Sub-basin – upper section (area of overlap with NND Traditional Territory)

CRE-40-02 Salmon Rearing Stream Signage Teslin Tlingit Council [17] ***$4,700/7,500 P***

Objective:

Put signs at strategic points throughout the Teslin River sub-basin to inform the public to salmon spawning streams and how sensitive the areas are to disturbance. This project will foster stewardship and conservation ethic towards salmon and salmon habitat in the Teslin area. These signs will identify the "partnership" of the TTC with the Yukon River Panel for the salmon restoration and enhancement and stewardship projects.

Status:

This project has been successfully implemented, and the signs are being used to develop a model for similar signage elsewhere in Yukon.

Financial:

The initial contractual payment has been made and the final payment is being held pending receipt of the project final report.

CRE-41-02 Chum Spawning Site-Upper Teslin River Teslin Tlingit Council $6,300/10,000 P

Objective:

To identify, photograph and map observed and potential chum spawning areas in the upper Teslin River drainage.

Status:

Project activated, progress report pending, and final report due March 31, 2003.

Financial:

Initial payment made, with progress and final payments pending receipt of those reports.

CRE-42-02 Prelim. Assess. Chin Incubation/Dist.-Swift River BC Teslin Tlingit Council $17,300/27,700 A

Objective:

The Teslin Tlingit Council is concerned about the possible disturbance of chinook salmon and their habitat by the use of outboard motors in the Swift River. The primary objective of this proposal is to initiate investigations of spawning habitat in the Swift River, which could determine if boating activity in this area is having a negative effect on egg and larvae survival.

Status:

Project activated and progress report provided, with final report due November 15, 2002.

Financial:

Initial payment and progress payments made, with final payment pending receipt of satisfactory final report.

CRE-44-02 Teslin River Watershed Salmon Information Gathering Teslin Tlingit Council $4,900/7,600 P

Objective: A great deal of knowledge exists in the combined experiences of consultants, locals, and renewable resources staff that work within the Teslin Tlingit Traditional Territory for both chinook and chum stocks. This proposal is to provide a venue for these resources to collaboratively share their local, traditional and scientific information and to document their experiences in relation to the salmon resource through a two-day workshop.

Status:

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[17] Teslin River Sub-basin

Project activated, completed, and project report pending.
Financial:
Initial payment made; progress and final reports/payments overdue.

CRE-50-02 McClintock River Watershed Salmon Mngmt. Plan Kwanlin Dun FN[18]
$25,000/39,900 P/A
Objectives:

- watershed barrier removal (Michie and Byng), dead pitch adult population and health enumeration, and juvenile chinook salmon relative index for population, timing, and health;
- document Traditional Knowledge resource values;
- document and map sensitive terrain potentially affecting salmon habitat if disturbed;
- gather information on present and future land use activities in the watershed; and,
- training of KDFN members.

Status:
Fieldwork completed, progress reports underway/overdue, and final report due December 20, 2002.

CRE-54-02 Upper Takhini River Restoration Plan Champagne & Aishihik FN 19
$12,500/20,000 A
Objectives:

- compile and review all data and activities performed in the study area and identify data gaps and areas of concern;
- develop management objectives to protect and enhance key habitat areas;
- perform a reconnaissance flight in the late spring/early summer to map beaver dam locations and other obstructions and obtain an overall sense of the study area;
- obtain initial stream survey data and JCS presence data in noted tributaries; and,
- perform a helicopter aerial spawning survey (with DFO if they include this area in their fall surveys) to record the abundance, distribution, and location of adult salmon [live & dead] including GPS references of any new obstructions, spawning sites, and habitat features, and monitor the year's activity.

Status:
Project activated and conducted, progress and final reports overdue.
Financial:
Initial payment made with signing of contract; progress and final payments pending receipt of respective reports.

CRE-55-02 Upper Nordenskiold River Restoration (4) Champagne&Aishihik FN
$9,500/15,000A
Objectives:
Toward ensuring the successful distribution of chinook in the upper Nordenskiold:

- reconnaissance flight of the project area and use as transport to Hutshi Lake;

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[18] Upper Yukon River mainstem.
[19] Haines Junction area, White River Sub-basin upper section, and some of Upper Lakes/South Mainstem and Middle Mainstem of the Canadian section of the Yukon River.

- continue to remove all obstructions to salmon migration at the critical migration time as per DFO Guidelines for the management of Beaver in Fish Bearing Streams in the Yukon & NBC Division;
- obtain temperature profiles in known historic spawning areas by collecting data loggers installed in 2001;
- take water sample at side tributaries just below Hutshi Lake and send out for analysis;
- helicopter aerial spawning survey in the fall to record the abundance, distribution, and location of adult salmon (live & dead) including GPS references of any new obstructions, spawning sites, and habitat features. Also obtain DNA samples from fresh carcasses and monitor the effects of the previous years activities; and,
- winter trapping of beaver in accordance with the DFO Guidelines for the Management of Beaver in Fish Bearing Streams in the Yukon & NBC Division.

Status:
Field work completed, progress report and final report overdue.
Financial:
Initial payment made upon contract signing; progress and final payments held pending receipt of respective repots.

CRE-56-02 Beaver Dams Upwelling Ground Water –ChumKluane First Nation[20] $33,300/51,000 A
Objectives:
To gain a better understanding of the relationship between upwelling ground water sites, beaver dams and the various life stages of chum salmon in the upper Kluane River in order to take appropriate action to conserve and restore chum salmon stocks and their habitats in this area.
Status:
Project activated and initial field component achieved with first progress report due November 15; winter field work to produce 2nd progress report January 31; and final report May 31, 2003.
Financial:
Initial payment made, with progress payments and final report payment pending receipt of same.

CRE-57-02 Investigation Spawning Chum - Kluane Lake Kluane First Nation $6,400/10,100 P
Objectives:
- provide preliminary information on an undocumented chum spawning area in Kluane Lake; and,
- provide information which may assist in locating other chum spawning areas in Kluane Lake and other lakes in the Yukon River drainage.

Status:
Project launched, with progress report due November 15, and final report due January 15, 2003.
Financial:
Initial payment advanced, with progress and final payments to be made upon receipt of respective reports.

CRE-58-02 Conserve/Restore Chinook Habitat-Tincup Cr.Kluane First Nation $4,400/7,000 P
Objectives:

[20] Kluane First Nation – Burwash Landing area – White River Sub-basin, upper section.

- inventory physical and biological data from the core spawning area in Tincup Creek (reach 1, below the outlet of Tincup Lake);
- enumerate adult chinook salmon in core spawning area; provide preliminary information on redd characteristics and fry emergence timing; and,
- provide ongoing training for members of Kluane First Nation.

Status:
Field work completed, progress report overdue/pending, and final report due December 15, 2002.

CRE-60-02 Chinook Utilization Upper White River Watershed White River FN21 $22,300/35,600 P

Objectives:

- determine existing and past extent of Chinook salmon utilization in the upper White River;
- determine locations of juvenile rearing, and spawning; and,
- provide training, employment, build technical capacity and foster stewardship for WRFN people.

Status:
Fieldwork completed, progress report filed and being reviewed, and final report due November 15, 2002.

Financial:
Initial payment made, progress payment pending review of progress report, and final payment held pending receipt of the final report.

CRE-63-02 Whitehorse Rapids Hatchery Coded Wire Tagging YF&GA/YEC/DFO22 $23,800/38,000P

Objectives:

- apply coded wire tags to all chinook salmon fry released at the Whitehorse Rapids Hatchery; and,
- recover a representative sample of heads (CWT recovery) from the Whitehorse Rapids Fishway.

Status:
Project underway as contracted, progress report overdue, but expected to achieve projected final report date of December 15, 2002.

Financial:
Initial payment on contract signing; and progress and final reports/payments are expected to occur as per final reporting date.

Note: A cheque in the amount of $8,684.29Cdn. has been received by the Panel from DFO as a project reimbursement, which has correspondingly been issued by the Panel to the YF&G Association for this project – as a net/zero balance transfer payment - for this CWT project retaining the overall project amount for the Panel being $38,000Cdn.

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[21] White River First Nation – Beaver Creek Area – White River Sub-basin

[22] YF&GA – Yukon Fish and Game Association
YEC – Yukon Energy Corporation

CRE-65-02 McIntyre Creek Salmon Incubation Project Yukon College–NRI $17,600/28,200A

Objectives:

- take eggs, incubate, rear, apply coded wire tags and release groups of chinook fry back into Takhini River, and Tatchun Creek;
- continue to modify and test various small scale salmon incubation techniques;
- monitor returning adults and fry that have been released to determine the effectiveness of the incubation, tagging and releasing strategies and to gather information on adult interception and survival;
- provide eyed eggs, and a facility for their incubation to schools around the Yukon, and to provide a site for Yukon students and the general public to visit to learn about salmon and their habitat through studying the adjacent McIntyre Creek;
- foster stewardship of the salmon by involving personnel of Yukon College in the care of the salmon, and by making them aware of the habitat requirements of salmon in hatcheries and in the wild through hands on experience, and through training them in the Streamkeepers techniques.
- provide training and employment to Yukon College staff and students in egg takes, incubation, rearing and sampling of juvenile chinook salmon sampling Streamkeepers techniques and habitat requirements of salmon in hatcheries and in the wild.

Status:

The project was approved by the Panel as an ongoing project of the Whitehorse Correctional Center – which was no longer in a position to deliver this project; hence, it was taken over by Yukon College.

Project well underway, progress report (Oct. 15) provided and accepted, with final report due March 31, 2003.

Financial:

Initial payment on signing of the contract, progress payment/report as scheduled, and final payment pending as projected.

Note: A surplus was carried forward for this project by the Whitehorse Correctional Institute (the previous project contractor), which was transferred directly to the new contractor (Yukon College/NRI) to be applied to costs for this project – which are greater than the approved amount, but will be covered by this transfer payment. (One of the changes is not having the "free labour" of the minimum security prison.)

CRE-67-02 Yukon Schools Fry Releases & Habitat Studies Streamkeepers North Soc. $2,500/4,000 A

Objectives:

- Give students, teachers and parent volunteers an appreciation of the natural aquatic habitat of the salmon by enabling them to participate in 'hands on' activities at Yukon salmon streams, and thus to foster stewardship of the salmon and their habitat.

Status:

Project completed and final report in draft.

Financial:

Initial payment made, and final pending review of final report.

CRE-68-02 First Nations Fisheries Tech & Stewardship Capacity Building Yukon College $14,400/23,000 S

Objective:

Provide technical and stewardship capacity within Yukon First Nations by supplying standardized and uniform training through the Fisheries Field Technician Training Certificate Program through Malaspina University-College but presented here in the Yukon. There are 12 modules.

Status:

Project launched, draft curriculum pending/payment, and final report due March 31, 2003.

Financial:

Initial payment provided, progress and final payments held pending respective reports.

CRE-69-02 Yukon Salmon Stewardship Program Yukon Salmon Committee $21,900/35,000 A

Objectives:

To assist in the Yukon Salmon Committee's stewardship program by providing funds to Yukon Habitat Stewards to use as 'seed money' to initiate valuable conservation and stewardship projects for:

- technical & professional quality control assistance to community based Panel R&E projects when required to assist Stewards in outlying communities with project design, the conduct of field techniques, data analysis and report writing in their work with community proponents and contractors;
- provide limited 'seed funding' to 'lever' funding, including 'in-kind' contributions for R&E/stewardship projects; and,
- provide funding for project field equipment purchases.

Status:

Individual sub-projects underway with an overall report to be provided at year-end.

Financial:

Initial payment made, with progress and final payments held pending receipt of respective reports.

CRE-70-02 Restore Fish Passage-YT Highway Culverts Laberge Env. Serv. $26,700/40,000A

Objectives:

To restore fish populations and habitat by creating access to historic migration areas, which have been prevented for up to 20 or so years due to culvert barriers. The utilization of each site by anadromous species will be assessed using standard fish habitat survey methodology. Standard stream habitat surveys will be conducted upstream and downstream of the given culvert. If it is found that populations of salmon utilize the downstream portions and that suitable habitat exists upstream of the barrier, considerations can then be given for future design work for culvert rehabilitation.

Specifically by:

- consultation with DFO, Community and Transportation Services, and the affected First Nations, develop a priority list of the culverts to assess and remediate;
- determine fish utilization through documented studies, small stream surveys and traditional knowledge; and,
- field studies to determine fish utilization, conduct habitat surveys upstream and downstream of the culverts and determine the area of suitable habitat upstream of the culverts, determine hydrological conditions at each location/local hire per area.

Status:
Field work completed and progress report filed and approved, final report due December 31, 2002.
Financial:
Initial and progress payment made based on related commitments/performance, with final report/payment pending.

CRE-71-02 Fisheries Habitat GIS Database–City Whitehorse City of Whitehorse $9,100/17,600A
Objective:
To improve the City of Whitehorse fisheries assessment capabilities and to promote stewardship and awareness of fisheries resources in the City. The Project includes two key deliverables that will support these objectives:

- creation of a digital, 1:20,000 scale Geographic Information System (GIS) database of fish and fish habitat inventory information for the City of Whitehorse; and,
- development of a long-term fisheries management and restoration plan for the City of Whitehorse.

Status:
Satisfactorily progress report received, and final report due.
Financial:
Initial payment made, and final payment pending receipt of final report.

CRE-72-02 Commercial Fish Plant Upgrades-Value Added C.Ball/S.Fleurant $12,700/20,000S
Objective:
Maintain the viability of the Yukon River Commercial Fishery by assisting a locally owned and operated commercial fish processing facility in their purchasing of necessary capital equipment.
Status:
Project completed, including acceptance of final report.
Financial:
Project paid out in full.

CRE-75-02 Commercial Salmon Fishery Feasibility Study YRCFA/THFN $12,700/20,000
Objective:
Complete a comprehensive business and development plan for the Commercial Fishery, based in Dawson City to maintain the long-term viability of Yukon's commercial fishery as a whole, while promoting stewardship and increasing the community's capacity to participate in the fisheries.
Status:
Draft report provided by consultant to contractor and presently under review.
Financial:
Initial payment provided, with final payment pending receipt of satisfactory final report.

CRE-78-02 Telemetry Cdn. Section Yukon River Basin Haldane Env. Serv. $113,900/180,100S
Objective:
Obtain accurate information on the numbers of radio-tagged fish entering primary tributaries of the upper Yukon River to determine spawning distribution and timing; with specific objective to establish 4 remote tracking stations located at or near the mouths of the Stewart, White, Pelly and Teslin Rivers, and a n additional station to be located on the upper Stewart River. These stations will detect and record the passage of radio tagged Chinook salmon.

Additional objective of recovery of archival tags added after project launched at the request of USF&WS, approved by the Panel Co-chairs (as with complimentary addition to URE-01-02).
Status:
Project activated and progress reports have been received and accepted (1st, 2nd , and 3rd under review), with final report due March 31, 2003.
Financial:
Project essentially 'on track'; and, the increased requirement of recovery of (USF&WS) archival tags can be achieved within original approved budget for this project.

CRE-79-02 MHC23 Variation & Stock ID of Yukon River Fisheries & Oceans $31,600/50,000S
Objectives: DNA level variation at microsatellite to Yukon River fall chum salmon, the objectives of the project include:

- survey MHC variation in Yukon River fall chum salmon populations on a drainage-wide basis;
- examine population structure and biodiversity of Yukon River fall chum populations at MHC loci;
- evaluate utility of using MHC variation to provide population-specific estimates of stock composition for Yukon River populations; and,
- eventually apply, in conjunction with microsatellite variation, MHC variation to estimate stock composition in mixed-stock fisheries.

Status:
Field specimens/data collected, administrative/contractual arrangements pending.
Financial:
As above.

CRE-86-02 Develop Protocol Restore Fish Hab–Placer Str. M. Miles&Assoc. $15,600/25,000A
Objective:
Long-term objective – expedite the recovery of effluvial processes which form fish habitat on streams impacted by historic placer mining activities and, where required to rehabilitate specific habit features which may be presently limiting fish production.
Status:
Project launched with initial field investigations and project planning for 2003.
Financial:
Initial and progress payments made, with final pending review of final project report.

CRE-92-02 Placer Miners to Monitor Sediment (2)/Method Tara Christie $12,400/14,300 A
Objective:
Two-year project to devise a field method for placer miners to monitor suspended sediment levels of effluent discharge. The specific objectives are:

- identify/devise inexpensive and accurate field method(s) for measurement of solids content of placer effluent and compare with legal samples taken by DIAND inspectors and submitted to a laboratory; and,
- consult with interested and affected parties for comment and support of project.

Status:

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[23] MHC – Major Histocompatibility Complex

Note: This project is deferred to 2003 at the request of the project contractor.
Financial:
Contract not activated, as per above.

CRE-95-02 Yukon Queen II Investigations Dawson District RRC $9,700/15,400 A/P
Objective:
Further investigations are needed to assess this community concern - in 2000/01 a limited study was completed however; the significance of this data is still unclear. This project proposal is to continue this study to clarify the significance of the harm to fry.
Status:Progress and final report provided – approval pending.
Financial:
Initial and progress payments made, with final payment held pending completion of the review of the final report.

CRE-96-02 Salmon restoration/Fox, Laurier & Joe Creeks Mundessa Dev. Corp. $19,00/30,000A
Objectives:

- record the historical use and harvest of salmon resources in the study area;
- develop long-term water quality/quantity monitoring program within the study areas;
- restore salmon access to rearing habitat through stream clearance and beaver management; and,
- train and employ Ta'an Kwach'an fisheries field technical staff.

Status:
This project was launched by the contractor but then stopped as agreement was not achieved between the contractor and the Technical Contact/Panel Secretariat on the project workplan.
It is hoped that this, or a similar project can be launched in 2003 with the staff of the Ta'an Kwach'an First Nation.
Financial:
This project has not been contracted, hence no financial commitment – for the reasons noted above.

6.2.8 Yukon Education Program 2002-2003

In 2001-2002, Fisheries and Oceans Canada 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 2001-2002, salmon eggs were incubated in 21 aquaria in seven Yukon communities as part of this program. "Eyed" chinook eggs from the Takhini River, Morley River and Tatchun Creek were put in 19 incubators. They were incubated to the eyed stage at the McIntrye Creek salmon incubation facility, which was run by the Whitehorse Correctional Centre. Two schools fertilized and incubated chum eggs that were taken from the Kluane River by the Kluane Lake School students. Most schools incubated about 50 chinook eggs. The Morley and Kluane schools each received around 300 eggs. Approximately 1,515 resultant fry (aggregate about 75% survival) were released back into the creeks in the spring of 2002. (Two projects lost all their fry due to difficulties with equipment and personnel.)

Yukon schools are incubating chinook eggs from Takhini River, Tatchun Creek, and, perhaps, chum from Kluane River and Porcupine River in 2002. Yukon College will be running the McIntyre salmon incubation project for the 2002-2003 season.

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 required to meet specific objectives within a set period of time. 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.

The HCSP will end on March 31, 2003. More information on the program may be found at http://www.hcsp.org/.

The HCSP is administered through the DFO Habitat and Enhancement Branch, and coorinated by the HEB Resource Restoration Biologist.

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 2001, 2002, the YSC had Habitat Stewards in Teslin, Dawson, Old Crow, Carmacks and Haines Junction. It also maintained a partnership with the Kwanlin Dun First Nation (Whitehorse) for a Steward. The overall administration of the YSC HCS program is through a part time coordinator.

Other Community Partners who have entered agreements with DFO HCSP include the City of Whitehorse, the Yukon Conservation Society, and the Yukon Fish and Wildlife Management Board.

The HCSP also funds an internal DFO Habitat Auxiliary located in the Habitat and Enhancement Branch in Whitehorse.

Habitat Stewards worked closely with their respective communities on a wide variety of projects and activities to meet the objectives of the Program. These included, but were not limited to, identification of funding sources for restoration and enhancement projects, education, information transfer between fisheries and other resource managers, scientists, communities and First Nations and the basic building of community capacity. Stewards were also active in a broad range of planning processes including but not limited to, Yukon River Salmon planning processes, Yukon Land Use Planning, Fish and Wildlife Management Planning and various planning processes. Habitat Stewards and HCSP contacts are listed in section 8.4.

6.2.11 Stock ID of Yukon River Chum Salmon using Microsatellite DNA Loci

One the major impediments to the inseason management, post season run reconstruction and evaluation of whether provisions of the Yukon River Salmon Agreement regarding upper Yukon fall chum are being achieved is the lack of acceptable stock ID capability. In addition, management for conservation of biodiversity within the drainage requires knowledge of genetic variation among populations as well as population-specific information from fisheries. In 2002/2003, through assistance from the Yukon Restoration and Enhancement Fund, a project is being conducted to investigate the utility of microsatellite DNA analysis in fall chum stock ID.

Microsatellite DNA loci are genetic markers found in nuclear DNA, with a microsatellite locus consisting of repeated sequences of 2, 3, or 4 basepairs arrayed in tandemly repeated units, flanked by regions of non-repetitive DNA. Microsatellite loci have been used extensively to survey variation in natural populations. Microsatellite loci are abundant, highly polymorphic, and considered selectively neutral. They are analyzed with a polymerase chain reaction (PCR) based approach to ensure cost effectiveness and speed in establishing databases used for evaluating genetic structure of natural populations. For Pacific salmon, microsatellites have been used extensively to examine population structure, and large-scale surveys of variation in sockeye, chinook, and coho salmon have been conducted by investigators at the Pacific Biological Station. Extensive applications to mixed-fishery analysis have also been conducted for each species.

Once population structure of a regional group of salmon is determined with microsatellites, it is then possible to evaluate whether it will be useful to use microsatellites to estimate stock composition in mixed-stock fisheries. Microsatellites are effective because there can be substantial differences among populations, they show little temporal or annual variation within populations compared with differences among populations, and they can be screened in a rapid, nonlethal, and cost-effective manner for both baseline and mixed-stock samples.

Tissue samples were collected from adult fish in chum salmon populations in the Yukon River drainage, and DNA extracted from the samples as described by Withler et al. (2000). For the survey of baseline populations, PCR products at 17 microsatellite loci: *Ots2*, *Ots3*, *Ots9* (primers outlined by Banks et al. 1999), *Ots103* (Small et al. 1998), *Oke3* (Buchholz et al. 1999), *Oki2* (Smith et al. 1998), *Oki100* (Miller et al. unpub), *One101*, *One102*, *One104*, *One106*, *One108*,

One109, One111, and *One114* (Olsen et al. 2000), Ssa419 (Cairney et al. 2000), and OtsG68 (Morris et al. 1996) were size fractionated on denaturing polyacrylamide gels and allele sizes determined with the ABI 377 automated DNA sequencer. Allele frequency differences among populations were then compared.

In order for a genetic based method of stock identification to be applied successfully, there must be significant genetic differences among the populations that fishery mangers wish to separate. Significant genetic differentiation at the microsatellite loci was observed among the 11 chum salmon populations surveyed to date from the Yukon River drainage. Based upon analysis of the genetic differences between specific populations, the following reporting groups or stocks may be possible for Canadian populations in estimation of stock composition in mixed-stock fishery samples:

Fishing Branch
Chandindu
Teslin
Kluane/Donjek
Mainstem Yukon River

At a minimum, both populations surveyed from Alaska (Sheenjek fall run, Andreafsky summer run) would likely be reporting groups in mixed stock analysis. In particular, significant differentiation was observed between the Sheenjek River population and the Fishing Branch River population, even though both are tributaries of the Porcupine River drainage.

No simulations have been conducted to date to evaluate accuracy and precision of stock compositions of Yukon River chum salmon. However, based on the genetic differentiation observed at the microsatellite loci (Fst=0.023 over all 17 loci), I expect that microsatellite variation can be successfully applied to estimate stock composition in reporting units that make sense for management applications. Once additional samples have been incorporated into the baseline, simulations will be conducted to evaluate accuracy and precision of stock compositions.

When additional population samples arrive at the Pacific Biological Station laboratory, they will be analyzed and incorporated into the baseline. Additional samples from the Canadian portion of the drainage are in transit to the Pacific Biological Station, and samples from the Alaskan portion of the drainage are expected in the near future.

For further information please contact: Dr. Terry Beacham, Pacific Biological Station, Fisheries and Oceans Canada, Nanaimo, B.C. V9T 6N7; ph: 250-756-7149; email: beachamt@dfo-mpo.gc.ca.

6.3 Yukon River JTC Strategic Research Plan

The JTC is challenged to develop research priorities and coordinate research projects to sustain healthy wild salmon populations and their habitats within the Yukon River drainage and its associated estuarine and marine environments.

Dr. Margaret Merritt introduced a systems approach for prioritizing research needs through the Analytical Hierarchy Process (AHP) during the February 21, 2002 JTC meeting in Anchorage. The JTC met for two planning sessions (April 15-17 in Fairbanks, Alaska and May 15-17 in Whitehorse, Yukon) to develop a comprehensive basinwide, Yukon River research plan using AHP. This dynamic plan can provide Canadian and Alaskan researchers and managers a framework of priorities for research for salmon stocks and their habitat throughout the river. The plan structure accommodates proposed "new" options as well as currently funded or "existing" projects. All projects were considered relevant to the planning process. The research plan projects 3 to 5 years into the future; covers the complete life cycle (including freshwater, estuarine and marine life stages) of three species of salmon: chinook, summer and fall chum, and coho; and encourages cooperation and communication with other institutions and organizations directing salmon research programs in the Yukon River or the Bering Sea.

During this planning effort, a reference document was developed for the JTC, "A Synopsis of the Yukon River Salmon Agreement, Plans, Policies and Protocols Relevant to Salmon Research in the Yukon River Drainage, 2002" (Merritt 2002), for use in addressing the problem of maintaining and restoring sustainable salmon fisheries through strategic planning. A glossary was started to define terms used in the plan.

During the fall JTC meeting a subcommittee formed to address problems with the plan. Future work may include reviewing or eliminating the weighting of all projects and needs, writing a discussion section, rewriting the plan for clarity and determining a regular schedule for plan modifications and updates.

7.0 STATUS OF BIOLOGICAL ESCAPEMENT GOALS

7.1 Fall Chum Salmon

7.1.1 Alaska

The Department of Fish and Game prepared and presented a report to the Alaska Board of Fisheries during the AYK meetings of 2001 concerning recommendations for the biological escapement goals (BEG) of Yukon River fall chum salmon (Eggers 2002). Additional peer reviews of the report were also conducted and presented at the BOF meeting. Since the report contained recommended BEGs for fall chum salmon stock components in the drainage, including Canadian-origin stocks,

additional approval was required through Canada/United States Yukon Salmon Agreement processes, for example the JTC and Yukon River Panel for the Canadian components. The Canadian Section of the JTC provided additional comments and the entire packet of information was sent to DFO's Pacific Scientific Advice Review Committee (PSARC) for technical review.

On May 13, 2002, PSARC reviewed the information provided on biological escapement goals for upper Yukon River fall chum salmon. The subcommittee acknowledged that a substantial amount of work was required to assemble this considerable body of data and that it represented a solid base to complete further analysis. The subcommittee did not, however, accept the paper, primarily because of concerns for data quality. The data series includes historical documentation of upper Yukon River fall chum salmon escapements from 1974 to 1999, but historical data on particular systems contained more than one enumeration method and their associated expansions. Escapement estimates are based on additional expansion factors that attempt to correct for incomplete time series. Various expansions have been used to estimate escapements of fall chum salmon over the years, particularly to the Sheenjek River (1974 to 1980), Chandalar River (1974 to 1994), and the Upper Yukon mainstem (1974 to 1979). The subcommittee has asked for future data analysis to contain additional descriptions of the stock composition of catch. The report based stock composition on fall chum salmon returns to the lower Yukon River since it is the most consistent dataset. Annual and consistent samples of escapement and harvest composition have been extremely difficult to collect. The subcommittee also recommended conducting evaluations on the effects of uncertainty in the data and the derived parameter estimates.

The data quality aspect of the escapements has increased greatly from the 1980's and another major step was made in the late 1990's. The current stock assessment program contains a near complete escapement enumeration of Yukon River fall chum salmon. A few more years of spawner-recruit observations should provide some clarification to the uncertainty concerning causes of productivity in recent brood years. Researchers recommended a re-evaluation of biological escapement goals to use estimated recruits from 1982 and later brood years to utilize the best available and comparable data.

ADF&G has adopted the BEGs for Alaskan stocks through this process of periodical goal review with the addition of presenting them in ranges. The goals for the Alaskan salmon stocks are based on the escapement goal policy also adopted by the department. The goals for US fall chum salmon stocks are based on the best available data at this time, and they will remain in place until additional analysis can be performed with more data. However, until additional reviews satisfy technical concerns, the fall chum escapement goals for rebuilt Canadian-origin stocks remain at: 50,000 to 120,000 for the Fishing Branch stock upstream from the weir; and greater than 80,000 for the upper Yukon River stock aggregate which spawns upstream from the Canada/U.S. border, i.e. mainstem Yukon River chum salmon.

7.1.2 JTC Discussion Of PSARC Review of Biological Escapement Goals for Yukon River Fall Chum Salmon

The principal question at this time is what will the JTC do to address the following PSARC comments and recommendations:

1) escapement estimates were based on expansion factors that attempted to correct for incomplete time series;
2) the techniques used to derive expansion factors were deficient;
3) stock compilations of catches were not adequately described;
4) the effects of uncertainty in the data and derived parameter estimates were not adequately evaluated;
5) the proposed biological escapement goals have an inadequate technical basis and should not be accepted; and
6) the author was encouraged to continue working to address the data quality and analytical problems.

The JTC discussed the PSARC concern regarding the effect of error and ignoring large-scale environmental effects on the estimate of the MSY escapement goal. Sensitivity analysis had been recommended by PSARC including: effects of error in various inputs such as expansion factors, catch, run timing, assumptions and the estimated age composition. JTC members discussed how it might be difficult to task someone with the recommended sensitivity analysis since the few technical experts available are fully subscribed with other duties. This analysis is likely more suited to a stand alone project for a graduate student directed by someone with experience in scientific analysis with extra funding being provided to support the project. The funding source may dictate the data set used. Several months of new work would likely be required. The graduate student approach is feasible but a unique person with computer programming experience as well as advanced statistical and analytic skills is required to make it successful. One significant comment was that the JTC should be cautious when dealing with a sensitivity analysis.

The JTC recognizes the need to improve the fall chum BEG data set and reduce the measurement error. The U.S. data set (i.e. brood year tables) will be updated. DFO will take the lead with respect to the Fishing Branch and the Upper Yukon mainstem data involving Canadian fall chum salmon. DFO will updat ebrood year tables for mainstem chum salmon and review the Fishing Branch expansion factors and determine the correlation between aerial survey counts and weir counts. DFO will also develop a new Fishing Branch data set (age structure, aerial expansion factors and brood year tables for escapement information). A remaining problem is how to reconstruct the entire Fishing Branch run when we do not know how many Fishing Branch chum salmon are caught in the lower river fisheries. The lack of stock composition data greatly limits our ability to reconstruct runs and measure survival. The use of DNA to identify discrete spawning stocks was briefly discussed. It was indicated that the degree of resolution through DNA analysis likely falls short of what is desired. However, DFO is conducting additional research in this regard. It was suggested that the JTC should receive an update on Yukon salmon DNA programs currently being conducted by the agencies during the spring 2003 JTC meeting.

The question of whether fall chum stocks are at risk if we don't update the escapement database was raised. It was agreed that existing fisheries would not damage the upriver stocks if the existing escapement goals were left in place.

7.2 Chinook Salmon

7.2.1 Alaska

Presented at the 2002 fall U.S./Canada JTC meeting were the combined 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 (Tables 12-14). 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 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. 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, projects and escapements in both countries.

After a previous review of the Upper River chinook salmon stock brood year table (Table 12), it was determined that a comprehensive BEG could not be developed using the available data per the CTC 1999 report. 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 (Figure 4). Until these criteria can be overcome, a comprehensive BEG may not be developed.

However, the escapement in 1985 (10,730) and 2001 (44,076) does provide a contrast of 4.1. This is just above the minimum range of 4.0 and up to 8.0 the CTC recommends prior to developing a BEG. Knowing the pitfalls of the current data, the JTC has decided not to approach Pacific Scientific Advice Review Committee (PSARC). Once results from the 2001 brood year are determined, the development of a BEG may be possible. Other discussions concerning the development of a Canadian chinook salmon stock escapement goal, was to use exploitation or a conservative return per spawner approach. This could be done as a committee assignment.

The JTC will continue to reconcile minor differences in harvest and escapement estimates, and investigate other methods to develop a less comprehensive BEG, or an SEG.

7.2.2 JTC Discussion Of Biological Escapement Goals for Upper Yukon River Chinook Salmon

The results of the JTC discussion of this topic were essentially the same as outlined in Section 7.2. A comprehensive BEG for Upper Yukon River chinook salmon (Canadian origin) cannot be developed using available data and the Chinook Technical Committee criteria. At this time the data is insufficient to warrant a PSARC review. The JTC will continue to reconcile minor

differences in harvest and escapement estimates and investigate other methods to develop a less comprehensive BEG, or an SEG.

8.0 PROPOSED CALL PROCESS FOR RESTORATION & ENHANCEMENT PROJECTS, YEAR 2002/2003

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 - 03:

*Step 1 – September 10	Advertise a call for Conceptual Proposals.
Step 2 – October 15	Deadline to receive the Conceptual Proposals.

Step 3 – November 18	Review of Conceptual Proposals
Step 4 – December 30	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 – January 20	Deadline to receive Project Proposals.
Step 6 – January 31	Project proposals forwarded to reviewers.
Step 7 – March	Panel review and decisions.

The October 15 deadline was adjusted from Sept 30 to give applicants more time.*Propose advertise 'Call' July 1 and Sept 1 reminder. Return to Sept 30 deadline for receipt of CPs.

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 October 15, 2002. 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
2003

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 HCSP Habitat Stewards and Contacts

Name and Location	Address	Telephone & Fax	E-mail
Alaska Highway North			
Brad Wilson	Box 2118	(867) 634-3843	bwilson@yknet.yk.ca
Alsek RRC Office	Haines Junction, YT	Fax 634-2527	
Haines Junction	Y0B 1L0	(867) 634-7011 (home)	
Teslin			
George Sidney	Box 133	(867) 390-2201 (TTC)	gsidney@yknet.ca
Lands & Resource Building	Teslin, YT	(867) 390-2058 (home/office)	
Teslin Tlingit Council	Y0A 1B0	Fax 390-2200	
Carmacks / Pelly			
Beverley Brown	c/o LSC FN	(867) 863-5520 (office)	
bevysc@yknet.yk.ca			
Little Salmon/Carmacks	Box 136	Fax 863-5710	
First Nation Office	Carmacks, YT	(867) 863-5177 (home)	
	Y0B 1C0		
Dawson			
Jake Duncan	Box 844	(867) 993-6210 (office)	jduncan@yknet.yk.ca
	Mme. Tremblay Building	*(867) 993-6974 (home)*	
	3rd & King	*Fax 993-6093*	
	Dawson City, YT Y0B 1G0		
Old Crow			
Isaac Anderton	Box 80	(867) 966-3034(office)	isaacysc@yknet.yk.ca
North Yukon RRC Office	Old Crow, YT	Fax 966-3620	
Old Crow	Y0B 1N0	(867) 966-3072 (home)	(867) 456-2353
(Whse)			
Kwanlin Dun			
First Nation, Whse.			
Dave Sembsmoen	35 McIntyre Road	(867) 633-7814(office)	DaveS@kdfn.yk.ca
Land Resource Technician	Whitehorse, YT	Fax 668-5057	
Kwanlin Dun First Nation (Office)	Y1A 5S2		
YSC - Habitat			
Stewardship Coordinator			
Stephanie Muckenheim	Box 20138	(867) 456-2227(office)	yscstephanie@yknet.ca
	Whitehorse, YT	Fax 456-2228	
	Y1A 7A2	(867) 393-3077 (home)	

City of Whitehorse
Whitehorse

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

Yukon Fish and Wildlife Management Board

Community Stewardship Co-ordinator

Jocylyn McDowell Whitehorse, Yukon (867)-393 – 6942 jmcdowell@yknet.ca
Fax 393 – 6947

Yukon Conservation Society
Stewardship Coordinator

Marlene Jennings Whitehorse, Yukon (867) 393-3564 mjennings@yknet.yk.ca

Fisheries and Oceans Canada Habitat and Enhancement Branch

Habitat Auxiliary

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

HCSP Area Coordinator

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

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 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, and Figure 6 shows the general ocean distribution of Asian and North American chum salmon.

While in the ocean, some of these salmon are caught by commercial fisheries that take place in marine waters. 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. Other commercial fisheries which operate in marine waters of the Bering Sea and Gulf of Alaska where Yukon River salmon live, but which 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 ADF&G 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 2002, the commercial catch of chinook and chum salmon for all of the Norton Sound subdistricts combined totaled 5 chinook and 600 chum salmon. The prior 5-year (1997-2001) average commercial catch was 4,695 chinook and 15,112 chum salmon.[24]

Salmon runs were weak again in 2002 across a broad region of western Alaska, including the Yukon River in Alaska and Canada. While the causes for the production failures are not known, attention has focused on the marine environment because of the broad scope of the production failures. Likely factors that have received the most attention to date have included 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 NMFS.

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[24] Source: Wes Jones, ADF&G

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 7 and 8). 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 exvessel value of the total Alaskan commercial fisheries from 1982 through 1999 is given in Table 15.

The U.S. groundfish fisheries use basically three types of fishing gear: trawls, hook-and-line (including longline and jig), and pots. Of these types of fisheries, trawlers have by far the greatest impact on salmon bycatch numbers.

A major issue affecting the BSAI and GOA groundfish fisheries was a NMFS biological opinion which concluded that continued fishing for groundfish, including pollock, Atka mackerel and Pacific cod, under the agency's existing rules is likely to jeopardize the western population of Steller sea lions and adversely affect its critical habitat. Many of the North Pacific Councils actions in 2001 were related to Steller sea lion protection measures establishing temporal and spatial dispersion of harvest and protection of Steller sea lion critical habitat. Figure 9 shows the areas where restrictions have been placed on the fisheries. There will now be two seasons and the amount taken within sea lion critical habitat will be limited. Also in 2001, NMFS worked on several Supplemental Environmental Impact Statements (SEIS) in accordance with the National Environmental Policy Act of 1969. A Draft Programmatic SEIS for the Alaska Groundfish Fisheries and a Draft SEIS for Steller Sea Lion Protection Measures in the Alaska Groundfish Fisheries were published and NMFS is preparing a SEIS for the essential fish habitat components of the several fishery management plans. The Western Alaska Community Development Quota (CDQ) Program, which has six groups representing the 65 western Alaska communities that are eligible, expanded from pollock only to all federally managed Aleutian Island and Bering Sea groundfish species. Currently, the CDQ program is allocated portions of the groundfish fishery that range from 10% for pollock to 7.5% for most other species. On January 1, 2000, the License Limitation Program (LLP) required that any person who wished to deploy a harvesting vessel in the king and Tanner crab fisheries in the BSAI and in the directed groundfish fisheries (except for IFQ sablefish, and for demersal shelf rockfish east of 140 degrees West longitude) in the

GOA or the BSAI must hold a valid groundfish or crab license (as appropriate) issued under the LLP.

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

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.

NMFS scientists then 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 14 presents a summary of the estimated numbers of chinook and other salmon caught by the U.S. groundfish fisheries from 1990 through September 2002. 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. For the most part, 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 2002 as of 15 September was 99,836 (29,751 chinook and 70,085 other salmon) and in the Gulf of Alaska the salmon catch was 13,128 (10,528 chinook and 2,600 other salmon). Certain areas in the BSAI have been declared salmon savings area for both chum and chinook salmon (Figures 7 and 8) based on high rates of catch in the past.[25] 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.

One of the big unanswered questions is what stocks of salmon are being caught by the U.S. 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, ten have been recovered in the Bering Sea groundfish fisheries (Table 17, Figure 10).

9.3 Law Enforcement

Representatives from Japan, Russia, Canada, and the United States met in Kodiak from May 7-9 for the annual Enforcement Evaluation and Coordination Meeting (EECM). The meeting included discussions by each party on enforcement efforts to date, enforcement plans for the remainder of 2002, and the effectiveness of the Joint Operations Information Coordination Group.

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[25] 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.

Japan intends to conduct enforcement activities from May through July in an area west of longitude 180° and south of latitude 50° N. Ten vessels will expend a total of 342 days on patrol. An additional 156 hours of patrol will be carried out by aircraft of the Japan Coast Guard.

Canada will base two CP 140 aircraft out of Eareckson Airfield on Shemya Island along with their associated aircrews, technicians, and ground support plus two DFO fishery officers and two NMFS officers. The area patrolled is shown in Figure 11.

The U.S. primary patrol resource is the HC-130 aircraft. USCG aircraft will fly patrols within the Convention Area approximately 4-4 days each month from May through September, and additional flights will be scheduled if required. Coast Guard high endurance cutters will provide a surface response capability. Additionally, NMFS agents will provide assistance with any seizures and may deploy with USGS aircraft and cutters. The following resources will be used in 2002 to enforce the NPAFC Convention Area:

Aircraft: Coast Guard HC-130 long range patrol aircraft based in Kodiak

Cutters: Four high endurance and three medium endurance cutter are scheduled to patrol in the Bering Sea from May - September and may respond to reports of illegal activity.

The USGS also coordinates closely with the Russian enforcement effort. Figure 12 shows the search patterns of the HC-130 through April of 2002.

9.4 Bering Sea Research

9.4.1 Background

Extensive research has began in the Bering Sea in the last few years focusing on physical and biological oceanography and climate change. Many different organizations from several countries have been involved, and several international organizations have been formed to try and coordinate this research. The discussion that follows will concentrate on those studies directed towards Pacific salmon.

9.4.2 Bering-Aleutian Salmon International Survey (BASIS)

The scientific concepts behind the North Pacific Anadromous Commission (NPAFC) BASIS plan calls for four synoptic 1-month seasonal surveys per year for 5 years. The survey area consists of 105 sampling stations spaced at regular intervals across the Bering Sea: from the Aleutians north to 64°N, and from the Alaskan to Russian coasts. Sampling will consist of surface trawls to capture salmon and other fishes, plankton tows, and sampling of ocean conditions (e.g., salinity, temperature, currents). Growth rates of salmon will be quantified by measurement and analysis of the scale patterns of specimens sampled for stomach contents. Scale pattern analysis and genetic

stock identification techniques will be used to estimate the proportions of regional assemblages of Asian and North American salmon in BASIS catches. Coordination of sampling by vessels of four nations will be through the NPAFC.

The 2002 year got underway with vessels from Russia, Japan, and the U.S. In September, vessels of the three countries met north of the Aleutian Islands and trawled side by side in order to calibrate their instruments and efforts. Protocols have been worked out to standardize data collection and recording, and also for data and sample sharing. All three vessels have finished the first leg of their efforts and are now in the second leg. Figures 13-15 show the location of the sampling efforts.

9.4.3 NMFS-ABL OCC Coastal Cruises

Before 2001, ABL's coastal cruises were confined to the waters of Southeast Alaska, Gulf of Alaska, and Bristol Bay. In 2001, a sampling cruise was made up to just off the mouth of the Kuskokwim River. In 2002 two cruises were scheduled for sampling the eastern Bering Sea as far north as the Nome area. Data analysis will follow the same protocol listed above for the BASIS cruises. Figure 16 shows the track of the 2002 OCC coastal cruises. Data are still being analyzed and reports will be forthcoming soon. Preliminary results can be accessed through the NMFS web-site:
http://www.afsc.noaa.gov/abl/OCC/occ.htm.

9.4.4 University of Washington, Fisheries Research Institute (FRI), High Seas Salmon Program

FRI studies include seasonal-specific migration patterns of salmon and their relationship to the Bering Sea ecosystem; key biological, climatic, and oceanographic factors affecting long-term changes in Bering Sea food production and salmon growth rates; similarities in production trends between salmon populations in the Bering Sea and common factors associated with their trends in survival; and overall limit or carrying capacity of the Bering Sea ecosystem to produce salmon. Information about these studies and results can be found at:
http://www.fish.washington.edu/research/highseas/research.html

9.4.5 NOAA – Pacific Marine Environmental Laboratory (PMEL)

PMEL has extensive studies in the North Pacific and Bering Sea including the North Pacific Marine Research Program (NPMR), Southeast Bering Sea Carrying Capacity (SEBCC), North Pacific Climate Change and Carrying Capacity (CCCC), Fisheries-Oceanography Coordinated Investigations (FOCI), NOAA Coastal Ocean Program (COP), and the Alaska Ecosystem Program. They also partner with the Cooperative Institute for Arctic Research (CIFAR) at UAA on a Fisheries Oceanography and Bering Sea Ecosystem Study; and with GLOBEC (Global Ocean Ecosystem Dynamics, A multidisciplinary study of the ocean ecosystem. Details can be found at:
http://www.pmel.noaa.gov/bering/pages/prog.html

9.4.6 Miscellaneous Sites

Alaska Fisheries Science Center: http://www.afsc.noaa.gov

BESIS: http://www.besis.uaf.edu/ak_climate.html

CIFAR: http://www.cifar.uaf.edu/

GLOBEC: http://globec.oce.orst.edu/groups/nep/index.html

NPMR: http://www.sfos.uaf.edu:800/npmr/projects/index.html

Center for Global Change: http://www.cgc.uaf.edu/

NPAFC: http://www.npafc.org/

NPRB: http://www.nprb.org/

9.5 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 ADF&G and the Alaska Board of Fisheries. For management and statistical purposes, ADF&G includes the False Pass area in Statistical Area M.

The Alaska Board of Fisheries 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.

Total catch in the False Pass June fishery in 2002 was 2,443 chinook; 591,106 sockeye and 177,606 chum salmon (Table 16), the highest catch since 1995; 76,251 pink, and four coho. The catch numbers in 2001 are low because of a fishers' strike in the False Pass June fishery. Participation this year was below average because of low prices offered by processors. The effort was about half of average because $0.47 for red salmon was too low to entice fishers to fish.

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Table 1. The Yukon River drainage fall chum salmon management plan, 2002.

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 2. The Yukon River drainage summer chum salmon management plan overview, 2002.

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 3. Pilot Station sonar project estimates.

Species	2002 Passage Estimate	2002 Lower 90% Confidence Intervals	2002 Upper 90% Confidence Intervals	2001 Passage Estimate	2000 Passage Estimate	1999 Passage Estimate	1998 Passage Estimate	1997[a] Passage Estimate	1995 Passage Estimate
Large Chinook[b]	133,994	108,254	159,734	118,935	61,055	159,176	109,101	119,128	199,078
Small Chinook	51,717	27,301	76,133	18,518	9,057	28,347	25,142	80,992	55,064
Total	185,711	150,233	221,189	137,453	70,112	187,523	134,243	200,120	254,142
Summer Chum	1,022,942	976,344	1,069,540	394,078	410,528	939,348	745,919	1,342,650	3,438,655
Fall Chum	359,565	330,033	389,097	396,012	267,181	438,755	374,597	521,531	1,070,968
Total	1,382,507			790,090	677,709	1,378,103	1,120,516	1,864,181	4,509,623
Coho[c]	135,737	122,974	148,500	147,341	192,108	73,413	132,363	120,564	120,366
Other Species[d]	580,045			332,832	364,996	385,322	381,127	500,484	926,504
Total	2,284,000			1,407,716	1,304,925	2,024,361	1,768,249	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.

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

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

[d] Includes pink and sockeye salmon, cisco, whitefish, sheefish, burbot, suckers, Dolly Varden, and Northern pike.

Table 4. Canadian weekly commercial catches of chinook, chum and coho salmon in the Yukon River in 2002.

Statistical Week	Week Ending	Start Date	Finish Date	Days Fished	Number Fishing	Boat Days	Chinook Salmon	Chum Salmon	Coho Salmon
27	06-Jul			closed	0				
28	13-Jul			closed	0				
29	20-Jul			closed	0				
30	27-Jul			closed	0				
31	03-Aug	29-Jul	31-Jul	2	6	12.0	309		
32	10-Aug	02-Aug	05-Aug	3	7	21.0	378	1	
33	17-Aug			closed	0				
34	24-Aug			closed	0				
35	31-Aug			closed	0				
36	07-Sep			closed	0				
37	14-Sep			closed	0				
38	21-Sep			closed	0				
39	28-Sep			closed	0				
40	05-Oct	02-Oct	06-Oct	4	4	14.0		2608	12
41	12-Oct	09-Oct	13-Oct	4	2	7.0		456	5
42	19-Oct			closed	0				
Dawson Area Subtotal					18	54.0	687	3,065	17
Upriver Commercial Subtotal							21		
Total Commercial Harvest							708	3,065	17
Chinook Test Fishery							1,036		
Domestic Harvest							26	0	0
Estimated Recreational Harvest							200	0	0
Aboriginal Fishery Catch							7,143	3,093	
TOTAL UPPER YUKON HARVEST							9,113	6,158	17
Old Crow AF							188	1,500	200

Table 5. Salmon fishery projects conducted in the Alaskan portion of the Yukon River drainage in 2002.

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.	postseason	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	USFWS ADF&G	lead agency
		develop a DNA database for Yukon River chinook salmon, evaluate stastical methods for genetic stock identification, and estimate origin of chinook salmn sampled from Pilot Station sonar	ongoing	USFWS	lead agency
Yukon River Salmon Escapement Surveys and Sampling	Alaskan portion of the Yukon 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.	ADF&G	all aspects
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 ADF&G	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 and summer chum 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 drift 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	index fall chum and coho salmon run timing and relative abundance using drift gillnets. sample captured salmon for age, sex, size composition information.	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 and summer and fall chum salmon passage in the mainstem Yukon River. Apportionment of species including coho salmon and other finfish.	June - Aug.	ADF&G AVCP	all aspects
Lower Yukon Chum Salmon Genetic Sampling	Pilot Station, RM 123	estimate the proportion of chum salmon passing from June 27-Aug 8 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

continued

Table 5. Continued (page 2 of 4).

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 Weir	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 - Aug.	USFWS	all aspects
Clear Creek Weir	mile 0 Clear Creek, Hogotza River drainage, Koyukuk River drainage, RM ~ 780	estimate daily escapement of summer chum salmon into Clear Creek; estimate age, sex, and size composition of the summer chum salmon escapement.	June - Aug	BLM	all aspects
Kateel River Weir	mile 27 Kateel River Koyukuk River drainage, RM 604	estimate daily escapement of chinook and summer chum salmon into Kateel River; estimate age, sex, and size composition of chinook and summer chum salmon escapements.	June - Aug.	USFWS	Federal Subsistence Funding all aspects
Henshaw Creek Weir	mile 1 Henshaw Creek, RM 976	estimate daily escapement of chinook and summer chum salmon into Henshaw Creek; estimate age, sex, and size composition of the chinook and summer chum salmon escapements.	June - Aug.	TCC BSFA USFWS-OSM	all aspects Federal Subsistence Funding funding
Chandalar River Sonar	mile 14 Chandalar River, RM 996	estimate fall chum salmon passage using split-beam sonar in the Chandalar River. investigate feasibility of using underwater video to document the presence of non-salmon fish species. Estimate sex and size composition of 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 Gillnet Test Fishing	Mainstem Yukon River Kaltag, RM 451	index fall chum and coho salmon run timing and relative abundance using drift gillnets. sample captured salmon for age, sex, size composition information.	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 USFWS-OSM	all aspects implementation with R & E funding
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.	ADF&G BSFA	all aspects funding
Tanana Village South bank Yukon River Fish Wheel, Test Fishing	Mainstem Yukon River Tanana, RM 695	index the timing of chinook, summer and fall chum, and coho salmon on the south bank of the Yukon River bound for the Tanana River drainage, using test fish wheel equiped with video monitoring systems.	Aug. - Sept.	ADF&G BSFA USFWS	all aspects R & E partial funding all aspects
Rapids Fish Wheel Test Fishing	Mainstem Yukon River RM 730	index run timing of chinook and fall chum salmon runs as well as non salmon species using video monitoring techniques.	June-Sept.	USFWS Zuray	Federal Subsistence Funding R&E and Federal Sub Funding

continued

Table 5. Continued (page 3 of 4).

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Rapids/Rampart Mark-recapture	Mainstem Yukon River RM 730	provides a mark-recapture abundance estimate for fall chum salmon within the Upper Yukon River drainage.	July - Sept.	USFWS Zuray	all aspects contracted operator
Rampart Fish Wheel Test Fishing	Mainstem Yukon River RM 763	index the timing of fall chum salmon using test fish wheel. recovers tags from the Rapids mark-recapture project to estiamte fall chum salmon abundance using video monitoring techniques as an alternate to live boxes to estimate catch-per-unit effort on fish wheels as well as testing feasibility of using color coded tags for the mark-recapture estimate.	July -Sept.	USFWS	all aspects
Handling Mortality Study	Mainstem Yukon River, RM, 730, 763, 932, 1070	Examine the effects of fall chum salmon capture by fish wheels. Rampart Rapids, Stevens Village, Beaver and Circle.	July - Sept.	USFWS	all aspects
Nenana Test 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. Tag recovery fish wheel for fall chum salmon for Tanana Tagging mark-recapture project.	June - Sept.	ADF&G BSFA	all aspects partial funding
Tanana Tagging Mark-recapture	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
Tozitna River Weir	Mile 50 Tozitna River Yukon River, RM 681	estimate daily escapement of chinook and summer chum salmon into the Tozitna River, estimate age, sex and size comp of the chinook and summer chum escapement	June-Aug.	BLM TTC	all aspects
Toklat River Ground Survey	Toklat River, between RM 848 and 853	estimate fall chum spawning escapement in Tolkat Springs and vicinity. recover tags from Kantishna mark-recapture program. Sample fall chum salmon carcasses for age, sex, and size composition information.	mid-Oct.	ADF&G	all aspects
Toklat River Tag Recovery	Toklat River Recovery RM 848	index run timing of fall chum and coho salmon using test fish wheels. recover tags from fall chum salmon for the Kantishna mark-recapture project.	Aug - Oct.	ADF&G	all aspects
Kantishna River Mark-recapture	Kantishna River RM 800	provides a mark-recapture abundance estimate for fall chum salmon within the Kantishna River drainage.	Aug - Oct.	ADF&G BSFA	all aspects funding for tagging fish wheel
Kantishna River Tag Recovery	Kantishna River RM 880	index run timing of fall chum and coho salmon using a test fish wheel. recover tags from fall chum salmon for the Kantishna mark-recapture project.	Aug. - Oct.	ADF&G NPS	all aspects funding for fish wheel contract
Delta River Ground Surveys	Tanana River drainage, RM 1,031	estimate fall chum spawning escapement in Delta River. recover tags from Upper Tanana mark-recapture program. Sample fall chum salmon carcasses for age, sex, and size composition information. Otolith collection for USGS.	Oct.-Dec.	ADF&G	all aspects
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	study spawning habitat and factors influencing freshwater survival field work finished at Bluff Cabin Slough, analysis is ongoing Clear Creek is ongoing	ongoing 2001	USGS-BRD	all aspects
Upper Yukon River Chum Salmon Genetic Stock Identification	Yukon River drainage	establish the feasibility of using DNA marks for genetic stock identification of chum salmon in the Yukon River.	June - Oct	USFWS	all aspects
Effects of *Ichthyophonus* on survival and Reproductive Success	Emmonak, RM 20, Eagle	Determine the effects of *Ichthyophonus* on survival and reproductive success in chinook salmon in the Yukon River	June-Dec.	U of W, USFWS-OSM	all aspects, funding

continued

Table 5. Continued (page 4 of 4)

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Lower Yukon River Chum Salmon Genetic Sampling	Pilot Station RM 123	using allozyme loci to discriminate between summer and fall run chum salmon. Testing the date, July 16, in the Lower Yukon River as a management date for fall season fisheries.	June- Aug	ADF&G	all aspects
Innoko River Site Survey	Innoko River NWR	Investigate potential weir sites in the Innoko River Drainage	June- July	USFWS, USFWS OSM	all aspects, funding
Sex-ratios of Juvenile and Adult Chinook Salmon	Tuluksak, Kwethluk and Gisasa Rivers and Big Creek	Investigate if sex-reversal is causing the skewed sex ratios reported at weirs on the Kuskokwim and Yukon Rivers through the comparison of genotypic and phenotypic gender of juvenile and adult chinook salmon.	June- July	USFWS, USFWS OSM, U of I	all aspects, funding
Contaminants Study	Yukon River drainage	Checking for 20 metals, organic chlorines, DDT, PCBs, sex hormones, vitelegonin (egg yolk protein), histlogy, *Ichthyophonous* in chinook, erod marker (induced when exposed to dioxin contaminants), H4IIE, vitamins, extra Y chromosome (on Columbia River having same researcher Nagler U of Idaho doing similar study in the Yukon River drainage)	ongoing	USFWS USGS-BRD	all aspects
Run Timing, Migratory Timing, and Harvest Information of Chinook Salmon Stocks	Yukon River drainage	Enlarge existing allozyme and develop a DNA database to characterize the genetic diversity of chinook salmon in the Yukon River within the U.S. and Canada.	June-Aug.	USFWS, ADFG, DFO, USFWS OSM	U.S. collections, microsatellites, allozyme, microsatellites Can. collections, microsatellites, funding

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	= Bureau 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.
TTC	= Tanana Tribal Council
U of I	= University of Idaho
U of W	= University of Washington
USFWS	= United States Fish and Wildlife Service
USFWS-OSM	= United States Fish and Wildlife Service, Office of Subsistence Management
USGS-ACS	= United States Geological Survey - Alaska Science Center
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 2002.

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. Continued (page 2 of 2)

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
LGL	= LGL Environmental Consultants Limited
NMFS	= National Marine Fisheries Service
NND FN	= Nacho Nyak Dun First Nation
QC	= Quixote Consulting
RR	= Government of Yukon- Renewable Resources
RRDC	= Ross River Dena Council
THFN	= Tr'ondek Hwech'in First Nation
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
YE	= Yukon Energy Corporation
YFGA	= Yukon Fish and Game Association
YRCFA	= Yukon River Commercial Fishers Association
YSC	= Yukon Salmon Committee

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

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	0.280	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	0.110	0.604
1995	0.179	0.224	0.492	0.105	0.597
1996	0.210	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	0.400	0.063	0.445	0.092	0.537
2000	0.339	0.123	0.441	0.097	0.538
2001	0.316	0.160	0.366	0.158	0.524
1981-2000[d] Average	0.210	0.232	0.458	0.100	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.

[d] Average does not include the current year but is being compared with current data

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

Year	Stock Grouping		
	Lower	Middle	Upper
1981	0.059	0.598	0.343
1982	0.154	0.275	0.571
1983	0.142	0.370	0.489
1984	0.280	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	0.570
1989	0.272	0.177	0.551
1990	0.228	0.284	0.488
1991	0.318	0.287	0.395
1992	0.180	0.242	0.578
1993	0.237	0.280	0.483
1994	0.204	0.241	0.555
1995	0.200	0.250	0.550
1996	0.240	0.118	0.642
1997	0.289	0.184	0.527
1998	0.347	0.185	0.468
1999	0.441	0.069	0.490
2000	0.375	0.136	0.489
2001	0.375	0.190	0.435
1981-2000 Average	0.246	0.244	0.510

Table 9. Proportion of the Upper River stock grouping 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	0.824	0.176
1996	0.819	0.181
1997	0.848	0.152
1998	0.888	0.112
1999	0.829	0.171
2000	0.819	0.181
2001	0.698	0.302
1981-2000 Average	0.819	0.181

Table 10 Summary of releases and recoveries of coded-wire tagged chinook salmon from Whitehorse Hatchery, 1985 - 2002

Release Location	Release Date*	Code	# Tagged & Clipped [c]	Adipose Clipped Only	%Tag-Loss [*]	Days [*]	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	4-Jun-96	182823	35,452	0	0.0000	5	35,452	2.43	0	35,452
Byng	4-Jun-96	181041	25,263	516	0.0020	5	25,779	2.37	0	25,779
Michie	5-Jun-96	183345	50,082	1,022	0.0020	5	51,104	2.51	0	51,104
Michie	5-Jun-96	183346	50,260	508	0.0010	5	50,768	2.43	0	50,768
Michie	5-Jun-96	183347	49,985	505	0.0010	5	50,490	2.32	0	50,490
Judas	4-Jun-96	183348	49,798	1,016	0.0020	5	50,814	2.43	0	50,814
McClintock	4-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 10 Summary of releases and recoveries of coded-wire tagged chinook salmon from Whitehorse Hatchery, 1985 - 2002 (page 2 of 2).

Release Location	Release Date*	Code	# Tagged & Clipped [c]	Adipose Clipped Only	%Tag-Loss *	Days [a]	Total Clipped	Weight (grams)	Total Unclipped	Total Released
Wolf	1-Jun-97	182325	14,850	150		2	15,000	2.30	0	15,000
Wolf	1-Jun-97	182326	20,334	0		4	20,334		0	20,334
Wolf	8-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	7-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	6-Jun-98	021958	10,104	421	0.0400	5	10,525	1.95	0	10,525
Wolf	4-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	6-Jun-99			80,393			80,393	3.13	0	80,393
Byng	6-Jun-99			64,430			64,430	2.92	0	64,430
McClintock	6-Jun-99			64,169			64,169	2.95	0	64,169
Wolf	6-Jun-99			31,048			31,048	3.07	0	31,048
SUM	1999			240,040			240,040		0	240,040
Michie	8-Jun-00	183128	25,114	254	0.0100	5	25,368	2.80	0	25,368
Michie	8-Jun-00	183129	25,037	253	0.0100	5	25,290	2.80	0	25,290
Michie	8-Jun-00	184303	10,907	110	0.0100	5	11,017	2.84	0	11,017
McClintock	8-Jun-00	181354	25,041	254	0.0100	5	25,295	2.70	0	25,295
McClintock	8-Jun-00	181355	25,016	253	0.0100	5	25,269	2.68	0	25,269
Wolf	4-Jun-00	182353	25,071	253	0.0100	5	25,324	2.67	0	25,324
Wolf	4-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	8-Jun-01	184416	25,318	256	0.0100	5	25,574	2.68	0	25,574
Michie	8-Jun-01	184417	27,293	276	0.0100	5	27,569	2.68	0	27,569
Michie	8-Jun-01	184418	27,337	276	0.0100	5	27,613	2.60	0	27,613
Michie	8-Jun-01	184419	11,629	117	0.0100	5	11,746	2.60	0	11,746
McClintock	8-Jun-01	184412	24,526	248	0.0100	5	24,774	3.13	0	24,774
McClintock	8-Jun-01	184413	25,033	253	0.0100	5	25,286	3.13	0	25,286
McClintock	8-Jun-01	183650	10,840	110	0.0100	5	10,950	3.13	0	10,950
Byng	8-Jun-01	184414	25788	260	0.0100	5	26,048	2.84	0	26,048
Byng	8-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
Wolf	23-May-02	18-51-01	25,334	126	0.5000	5	25,460	3.30		25,460
Wolf	02-Jun-02	18-51-02	25,079	177	0.7000	5	25,256	3.10	0	25,256
McClintock	10-Jun-02	18-51-03	24,769	505	0.2000	5	25,274	3.60	0	25,274
Byng	10-Jun-02	18-51-04	24,907	0	0.0000	5	24,907	3.00	0	24,907
Byng	10-Jun-02	18-51-05	24,925	125	0.5000	5	25,050	3.00	0	25,050
Michie	10-Jun-02	18-51-06	27,114	191	0.7000	5	27,305	3.20	0	27,305
Michie	10-Jun-02	18-51-07	26,854	0	0.0000	5	26,854	3.02	0	26,854
Michie	10-Jun-02	18-50-61	27,850	281	0.1000	5	28,131	3.20	0	28,131
Michie	10-Jun-02	18-50-62	27,241	0	0.0000	5	27,241	3.04	0	27,241
Michie	10-Jun-02	18-50-63	8,481	86	0.1000	5	8,567	3.20	0	8,567
SUM	2002		242,554	1,491			244,045	0	0	244,045
TOTAL			3,050,745	274,819			3,325,564		1,174,613	4,500,177

a: number of days needed to tag.

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 11. Summary of releases of chinook salmon from Yukon Territory instream 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)
ndike 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	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	1991	Tatchun R	180644	Spring Fry	Tatchun R	/ /	92/08/31	11585	0	320	11905	2.47
Klondike R, Nor	chinook	1991	Yukon R	NOCN9148	Spring Fry	Pothole Lk	92/06/	92/06/	0	0	1500	1500	0
Klondike R, Nor	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	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	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	1994	Tatchun R	0201010513	Spring Fry	Tatchun R	95/07/04	95/07/04	11649	238	413	12300	0.81
Klondike R, Nor	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	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	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	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	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	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	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	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	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	1995	Tatchun R	0201010211	Spring Fry	Tatchun R	96/06/27	96/06/27	13526	91	294	13911	0.81

continued

Table 11. Continued (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	Takhini R	0201010614	Spring Fry	Flat Cr	97/07/02	97/07/04	15622	158	382	16162	0
McIntyre Cr	chinook	1996	Takhini R	0201010406	Spring Fry	Flat Cr	97/07/02	97/07/04	14845	37	280	15162	0..
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 12. Yukon River Canadian chinook salmon total run by brood year (1982-95), and escapement by year, 1974-2002 and Return/Spawner. [a]

Brood Year	Escapement	Age Group by Brood Year 3	4	5	6	7	8	Total Run	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	19,790	0	5,083	13,907	32,119	20,417	333	71,860	3.6
1983	28,989	560	6,282	31,679	68,304	13,109	134	120,067	4.1
1984	27,616	69	12,586	28,842	61,587	10,590	114	113,788	4.1
1985	10,730	223	10,160	34,439	49,236	4,171	91	98,319	9.2
1986	16,415	347	20,207	40,128	99,601	14,798	138	175,220	10.7
1987	13,260	0	2,309	30,007	63,126	8,298	18	103,759	7.8
1988	23,118	0	6,491	32,390	60,038	7,393	68	106,380	4.6
1989	25,201	61	13,392	67,329	114,480	19,778	0	215,040	8.5
1990	37,699	45	6,185	22,833	48,488	8,585	9	86,145	2.3
1991	20,743	357	6,635	66,054	109,487	8,532	0	191,067	9.2
1992	25,382	6	2,459	22,318	33,018	1,285	0	59,087	2.3
1993	28,558	6	5,172	27,364	63,446	4,272	0	100,259	3.5
1994	25,890	0	596	17,381	21,597	5,455	75	45,105	1.7
1995	32,262	16	1,666	10,012	47,225	8,371	54	67,344	2.1
1996	28,409	6	162	21,329				21,497	
1997	37,683	7	3,535					3,543	
1998	16,750	0							
1999	11,153								
2000	12,166								
2001	44,076								
2002	21,134								
Average	23,975	(1982-1995)						110,960	4.6
							Contrast (1985 and 2001)		4.1

[a] Shaded areas are estimated projected returns using Age 6 fish to project Age 7 fish, and a 12 year average for Age 8 fish.

Table 13. Exvessel 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	783.80
1983	147.7	320.6	29.8	43	188	729.10
1984	103.4	343	20.4	19.6	239.4	725.80
1985	106.9	389.6	36.9	37.5	260.1	831.00
1986	183	404.1	38.4	70.1	268.6	964.20
1987	215.2	473	41.7	76.3	336.7	1,142.90
1988	235.6	744.9	56	66.1	444.6	1,547.10
1989	279.2	506.7	18.7	84.4	425.3	1,314.30
1990	355.1	546.7	24	86.9	474.9	1,487.60
1991	301.1	300.1	28.6	91.6	548.3	1,269.70
1992	335.1	544.5	27	48	656.9	1,611.50
1993	328.5	391.1	14.1	53.6	425.8	1,213.10
1994	321.2	424.4	21.6	84.7	465.2	1,317.10
1995	282.9	495.9	39.1	59.5	593.7	1,471.10
1996	175.2	346.5	44.8	74.2	541.9	1,182.60
1997	172.1	247.8	15.9	106.5	597.7	1,141.00
1998	218.7	242.7	10.8	94.1	415.5	981.80
1999	271.2	345.7	14.2	116.9	483.4	1,231.40
			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	22.0	1.4	9.5	51.8	100
1998						
1999						

Note: The value added by at-sea processing is not included in these estimates of exvessel 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.

Table 14. Estimated number of chinook and other salmon caught by the groundfish fisheries off the coast of Alaska, 1990 through October 2001 (Berger 2002). Data for 2002 through 9/28/02.

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	55,427	----------	----------	65,631	----------	121,058
1999	12,924	----------	----------	46,295	----------	59,219
2000	7,470	----------	----------	57,600	----------	65,070
2001	37,734	----------	----------	57,339	----------	95,073
2002	29,751	----------	----------	70,085	----------	99,836
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	26,705	----------	----------	10,995	----------	37,700
2001	15,104	----------	----------	6,063	----------	21,167
2002	10,528	----------	----------	2,600	----------	13,128

Table 15. 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	6-Dec-94	56 52	171 18
1992	181216	Jun-93	2-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
1997		Jun-98	28-Mar-01	56 18	170 33

Table 16. Commercial harvest of sockeye and chum salmon in the "False Pass" June Fishery, 1980-2002. Source of data: Mathew Ford, ADF&G.

Year	Sockeye	Summer 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	1,251,228	239,357
2001	150,632	48,350
2002	591,106	177,606

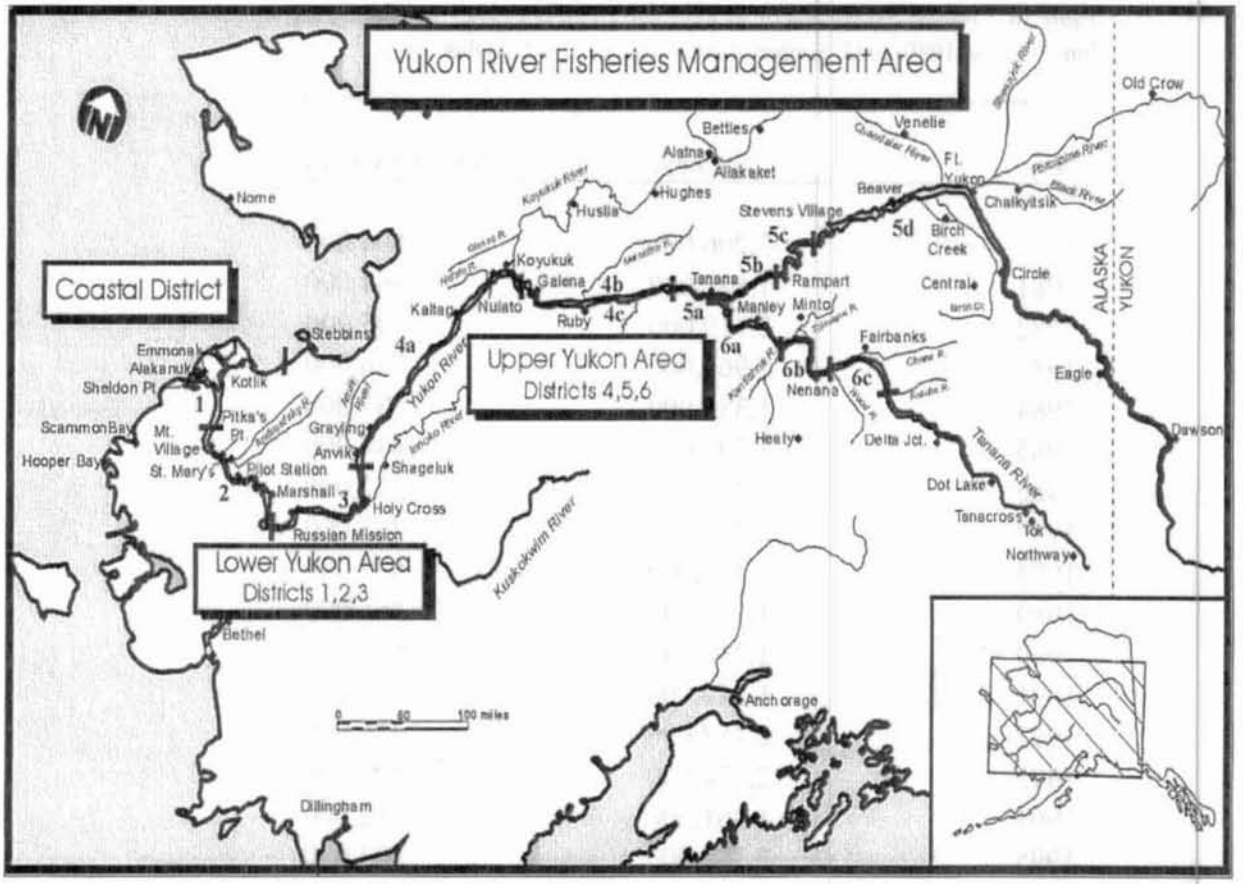
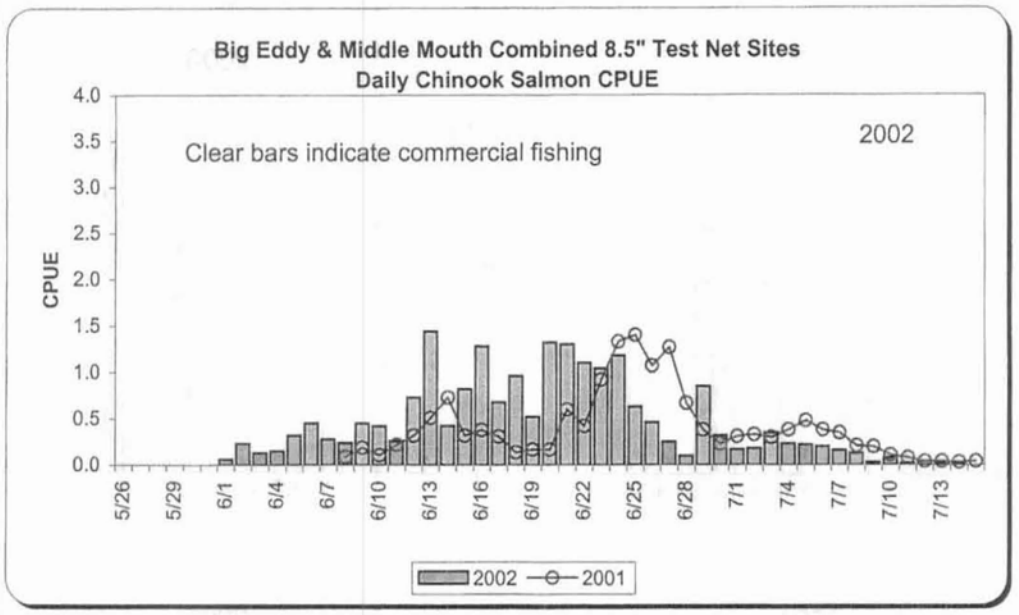


Figure 1. Alaska portion of the Yukon River drainage showing communities and fishing districts.



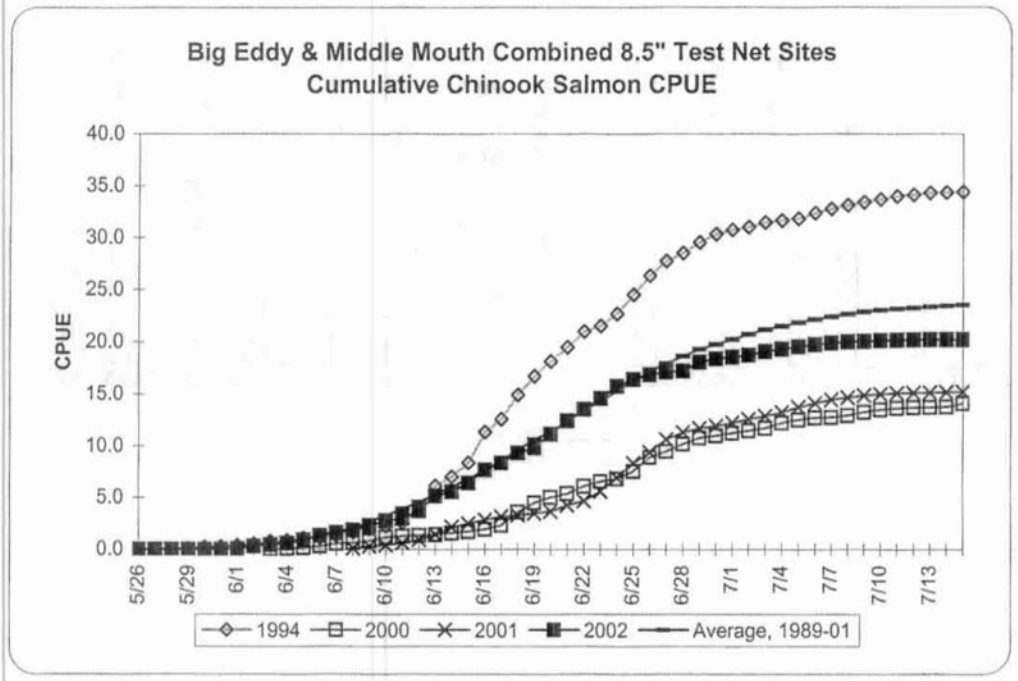


Figure 2. Daily test fish CPUE for chinook salmon test fish sites (above). Cumulative test fish in 2002 CPUE for chinook salmon test fish sites (below) compared to the 1989-2001 average CPUE.

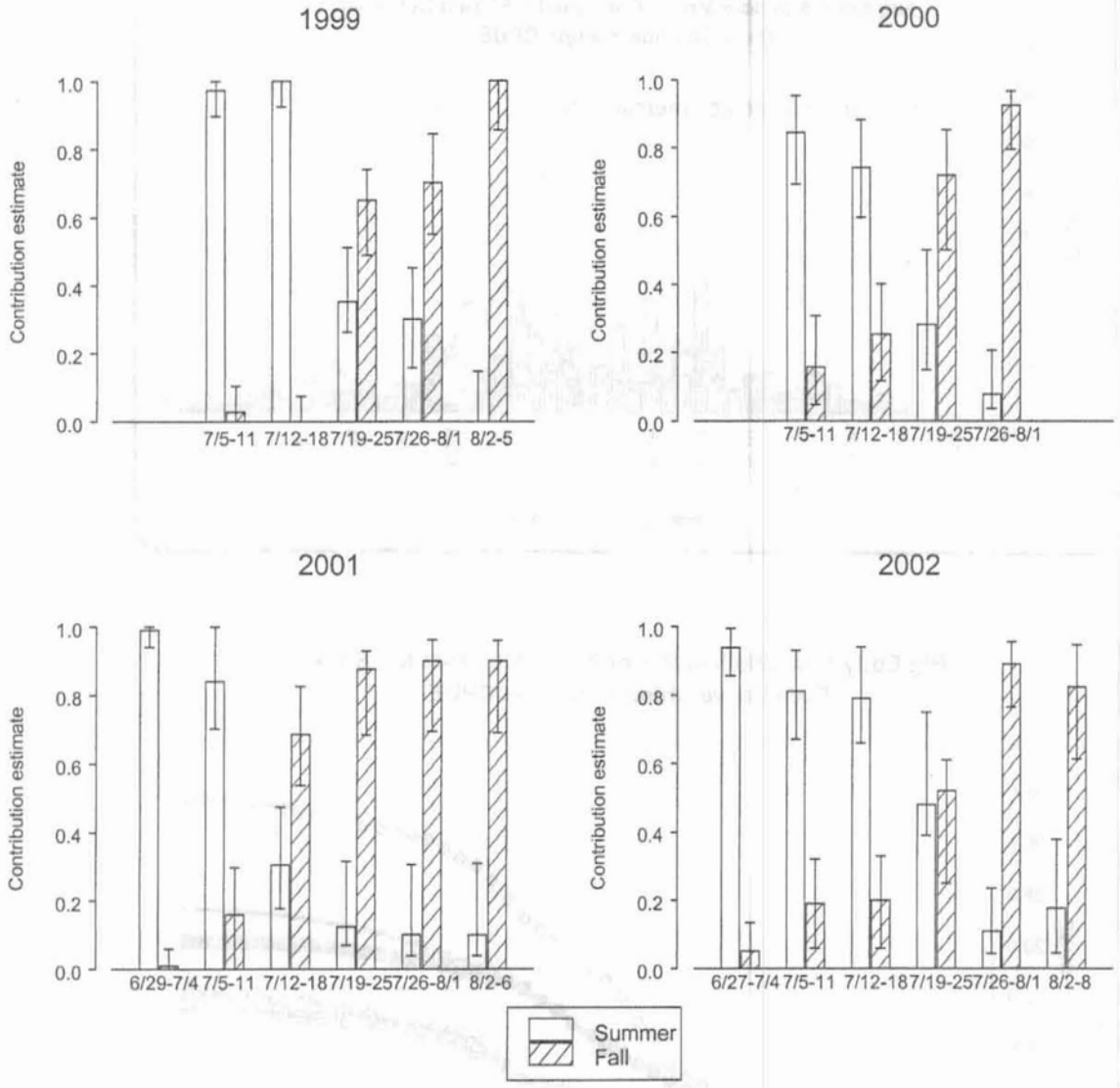


Figure 3. Draft contribution estimates with 90% bootstrap confidence intervals for summer and fall chum salmon sampled from species apportionment gillnetting at Pilot Station Sonar 1999-2002. Contributions were estimated using genetic stock identification.

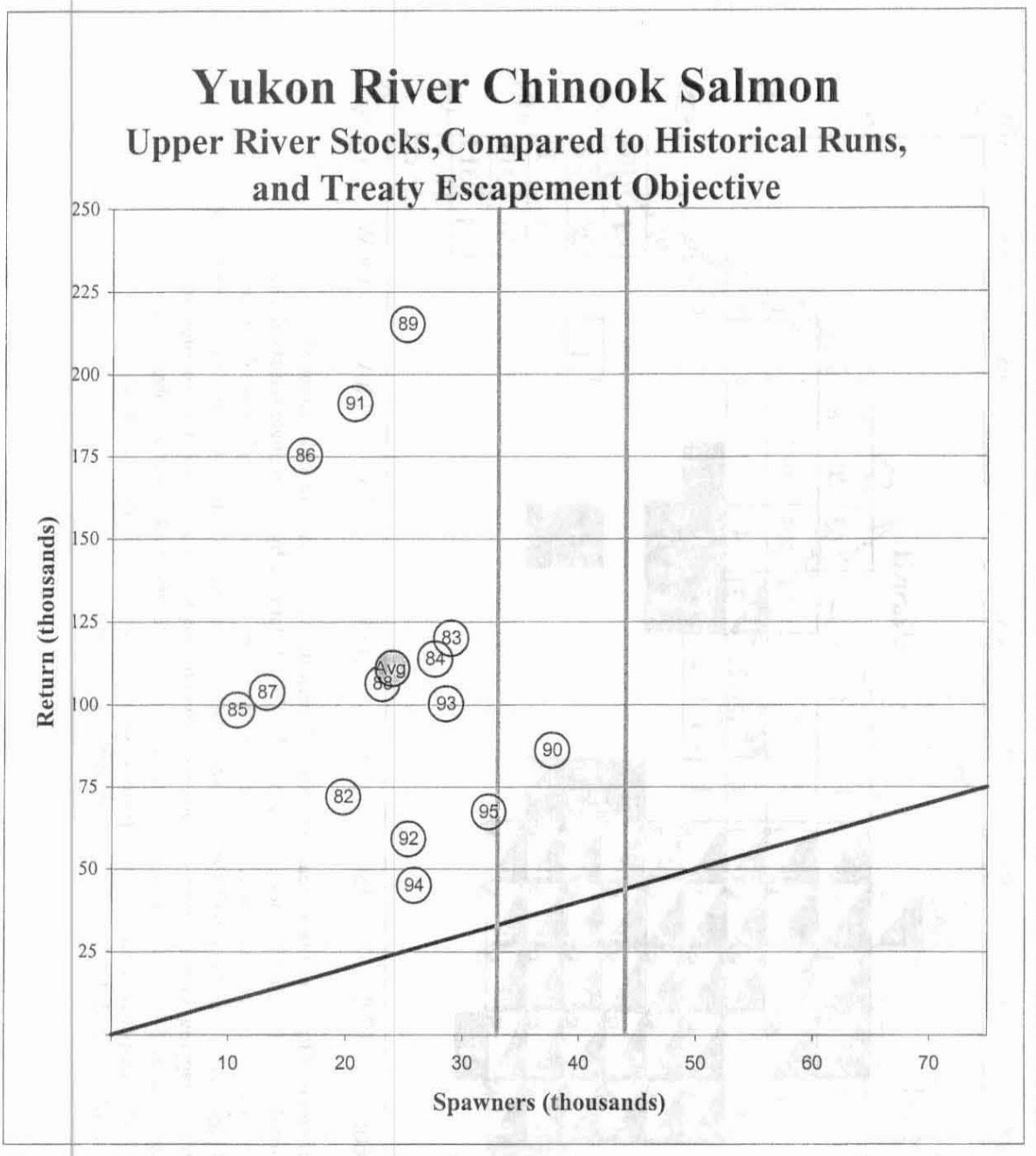


Figure 4. Yukon River mainstem Canadian chinook salmon spawners vs. estimated returns, the 1:1 replacement line, and the current treaty escapement goal range. The years in the figure represent the brood years.

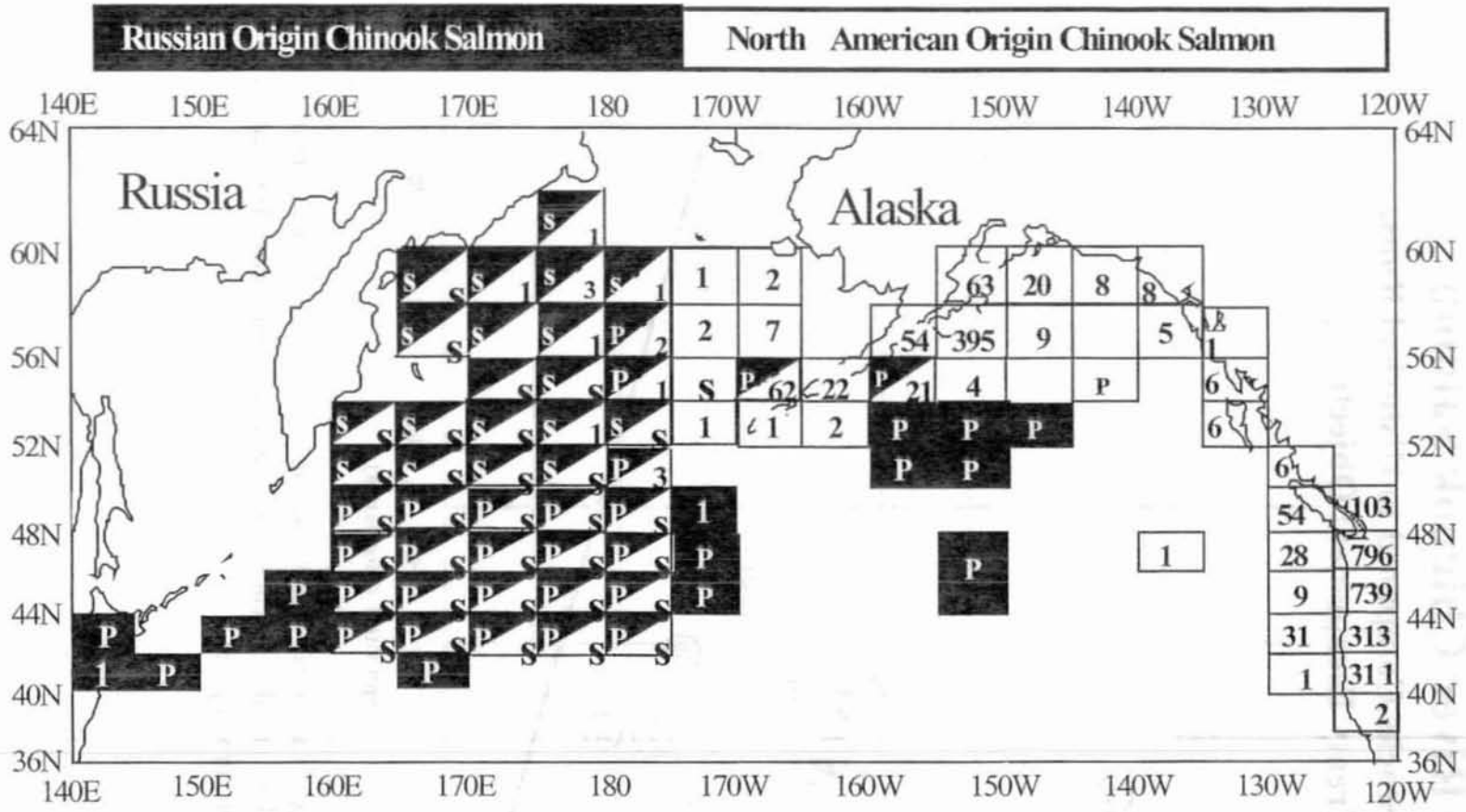


Figure 5. Ocean distribution of Russian (black areas) and North American (white areas) chinook salmon shown by International North Pacific Fisheries Commission (INPFC) 2°-latitude by 5° longitude statistical areas. If tagging experiments prove occurrence, the number of recoveries is shown. The high-seas salmon tag (1953-1997) and coded-wire tag (1983-1997) recovery databases are archived at the Uof W FRI. If there is not information from tagging, then a P means occurrence is hypothesized from detection of Myxobolus spp. parasite "tags", and an 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.

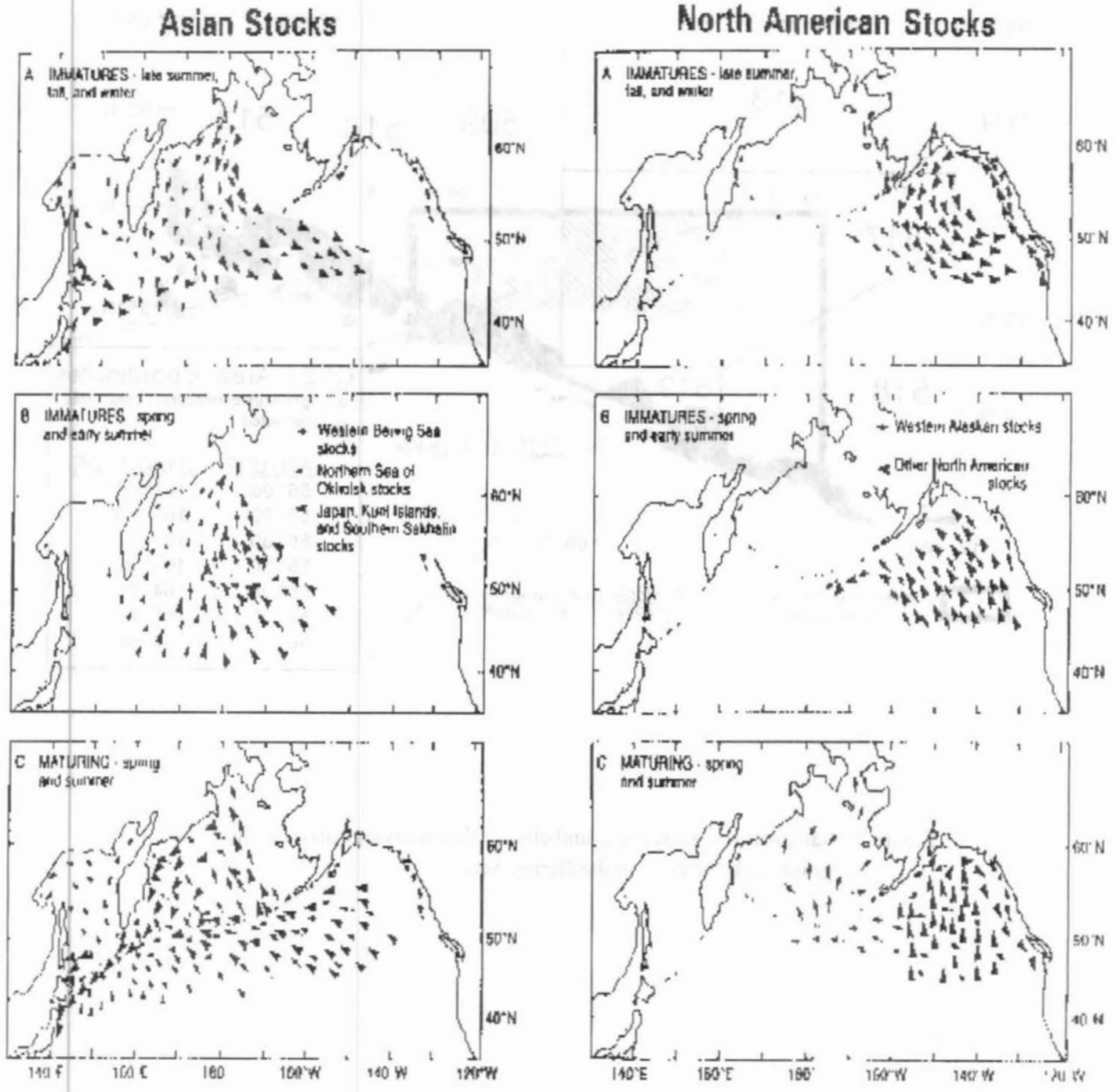


Figure 6. Migration routes of chum salmon in the North Pacific (Fredin et al. 1997).

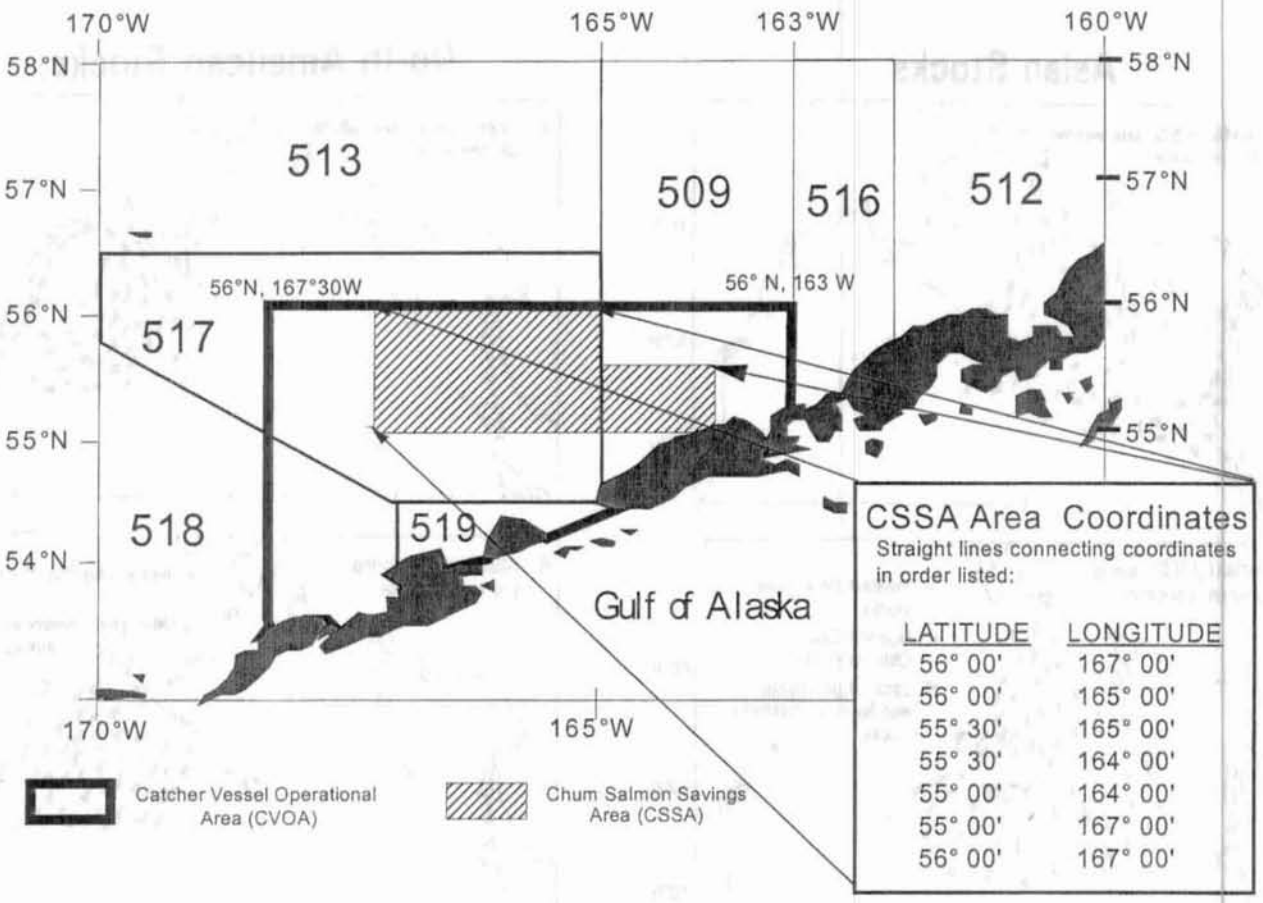


Figure 7. Statistical reporting areas and chum salmon savings area for the U. S. groundfish fisheries in the Bering Sea.

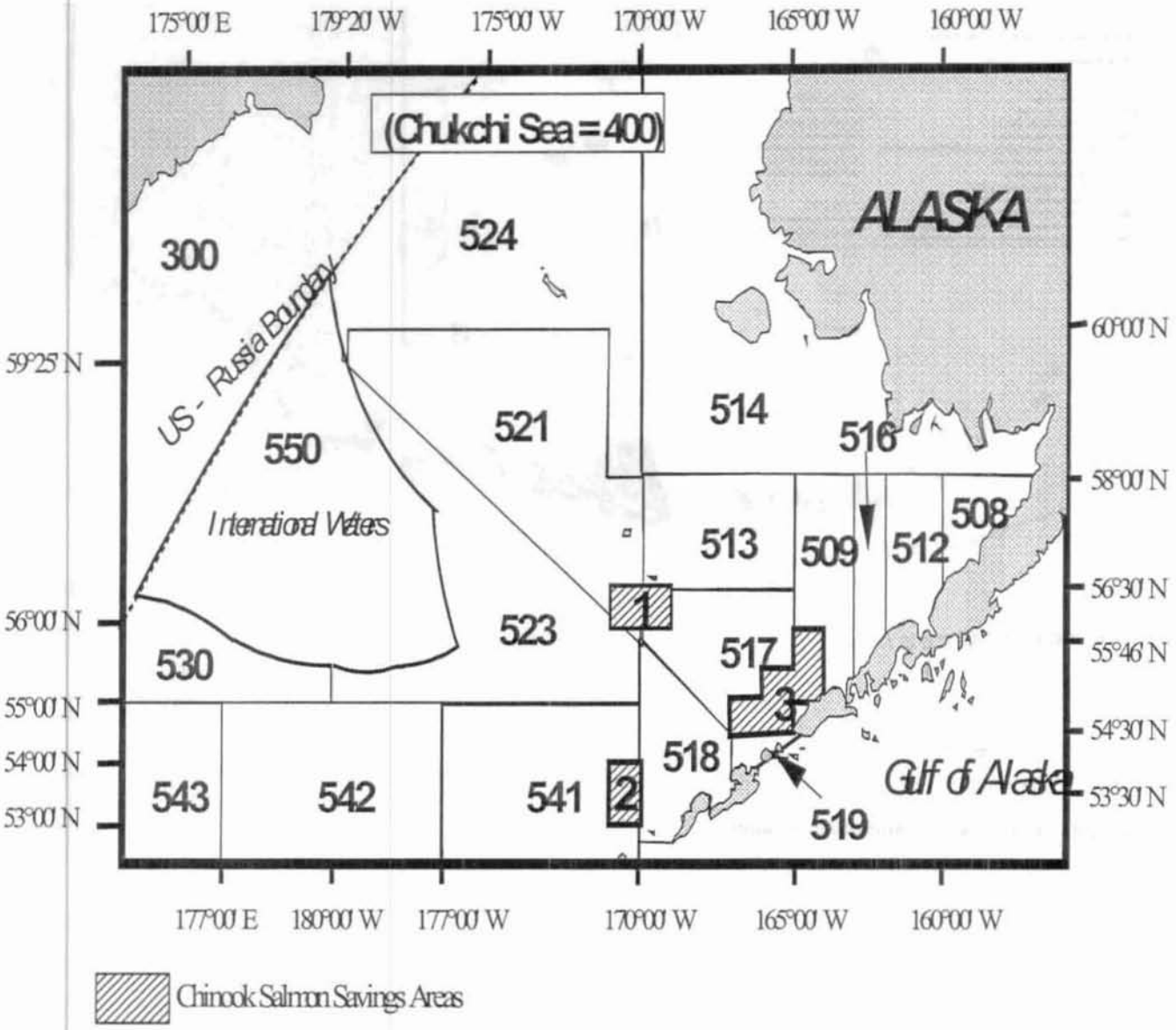


Figure 8. Statistical reporting areas and chinook salmon saving areas for the US groundfish fisheries in the Bering Sea.

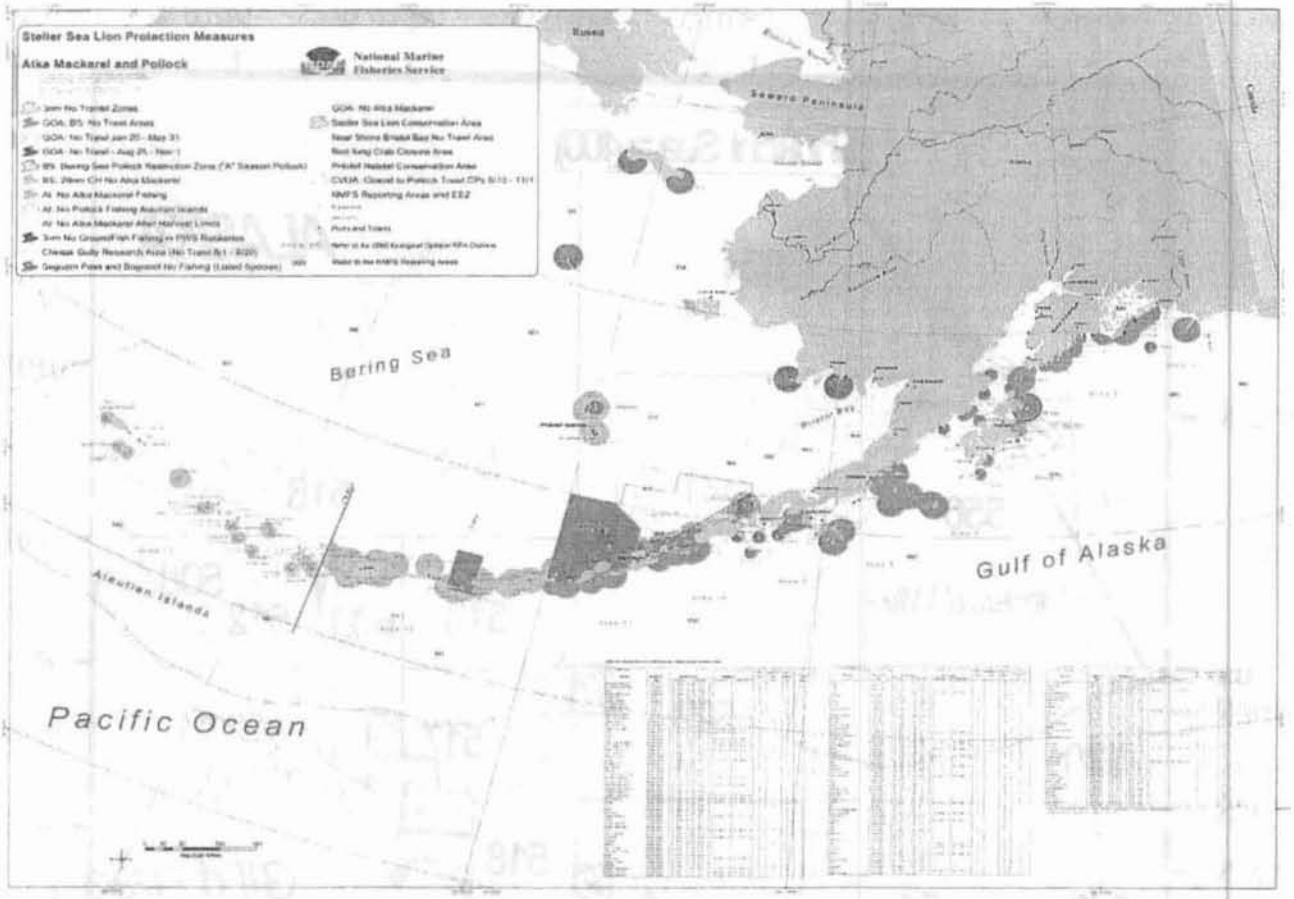


Figure 9. Steller sea lion protection measures.

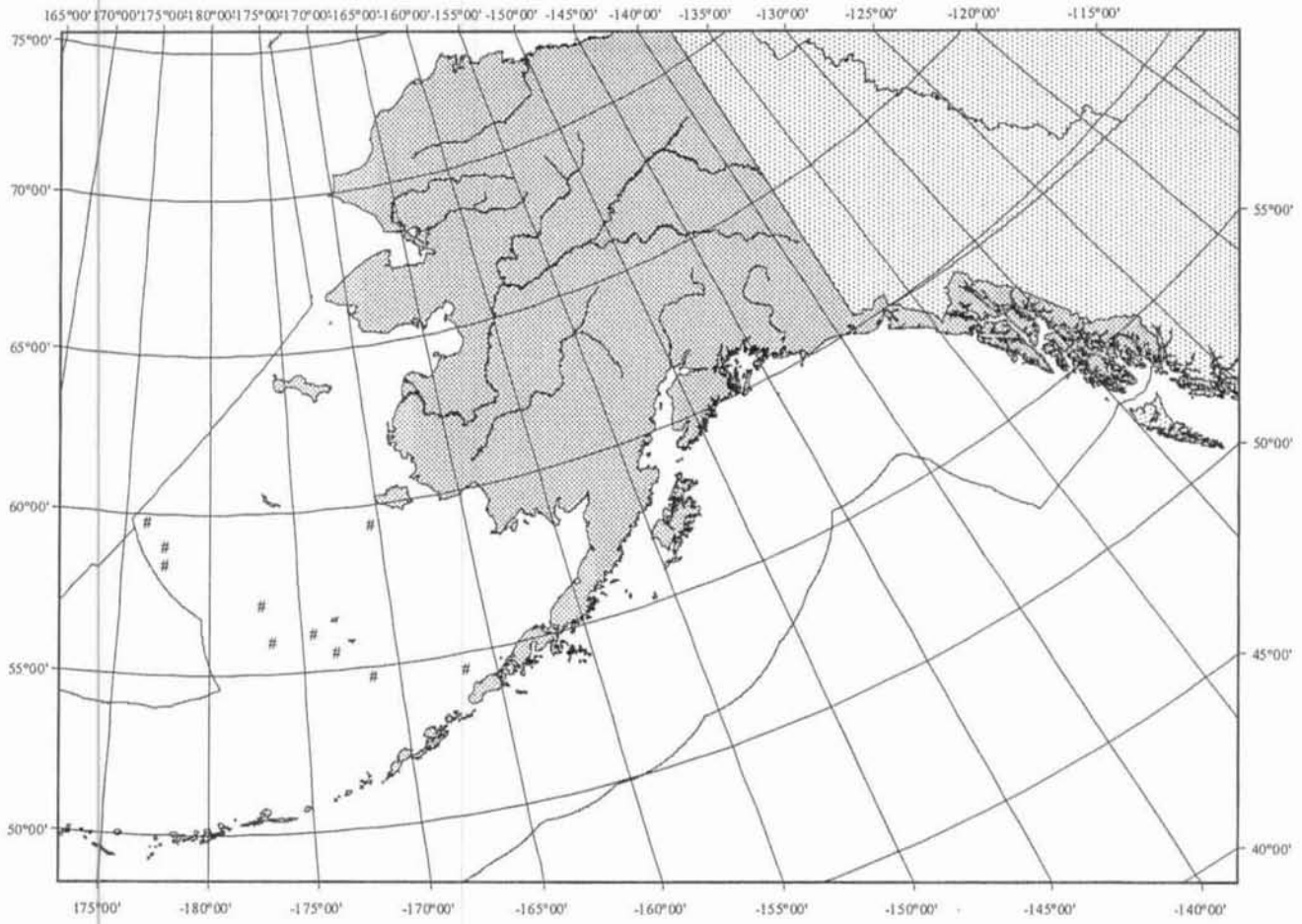


Figure 10. Location of the capture of Yukon River coded-wire tagged chinook salmon in the BSAI groundfish fishery.

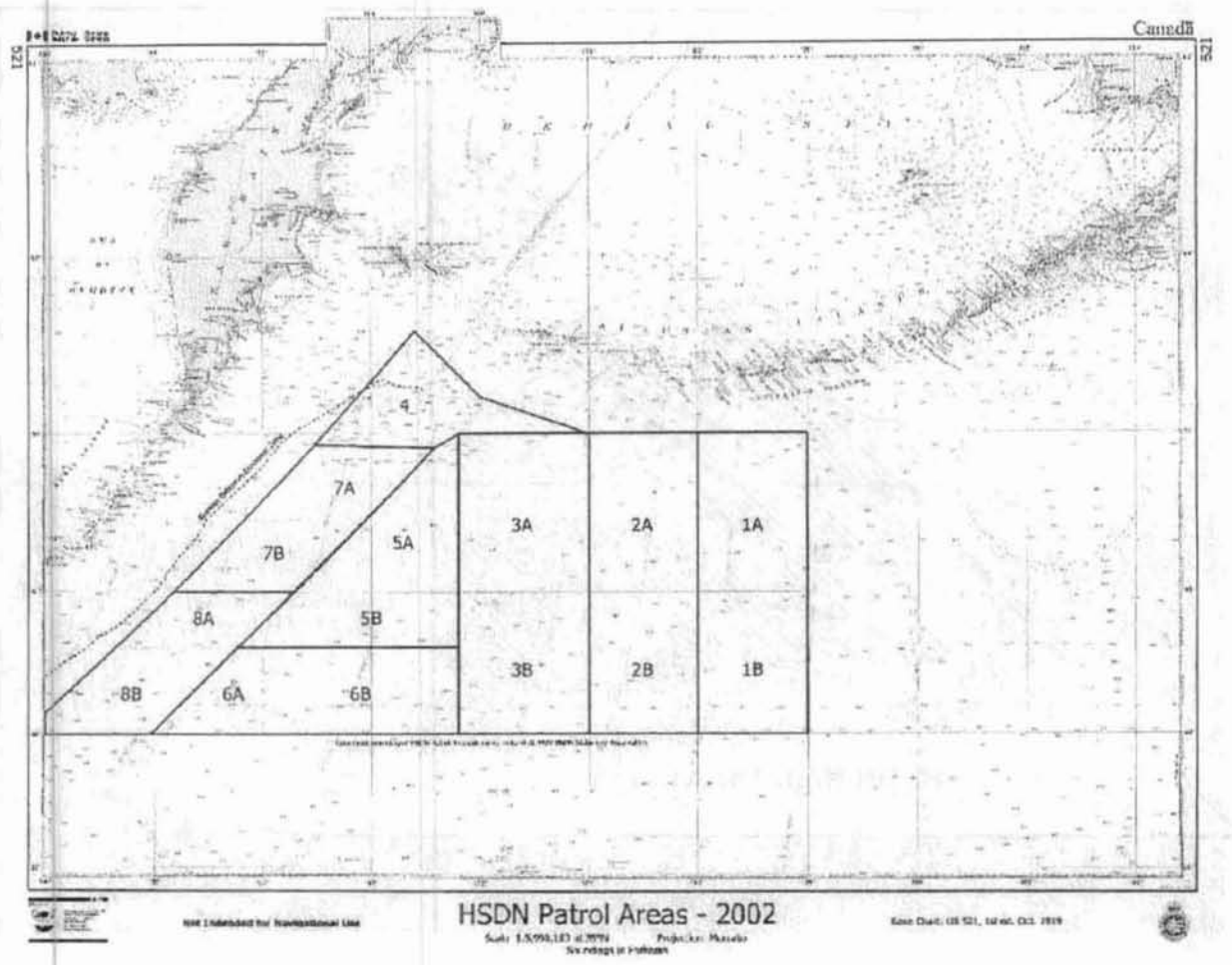


Figure 11. Canadian aircraft patrol tracks in the high seas driftnet area for 2002.

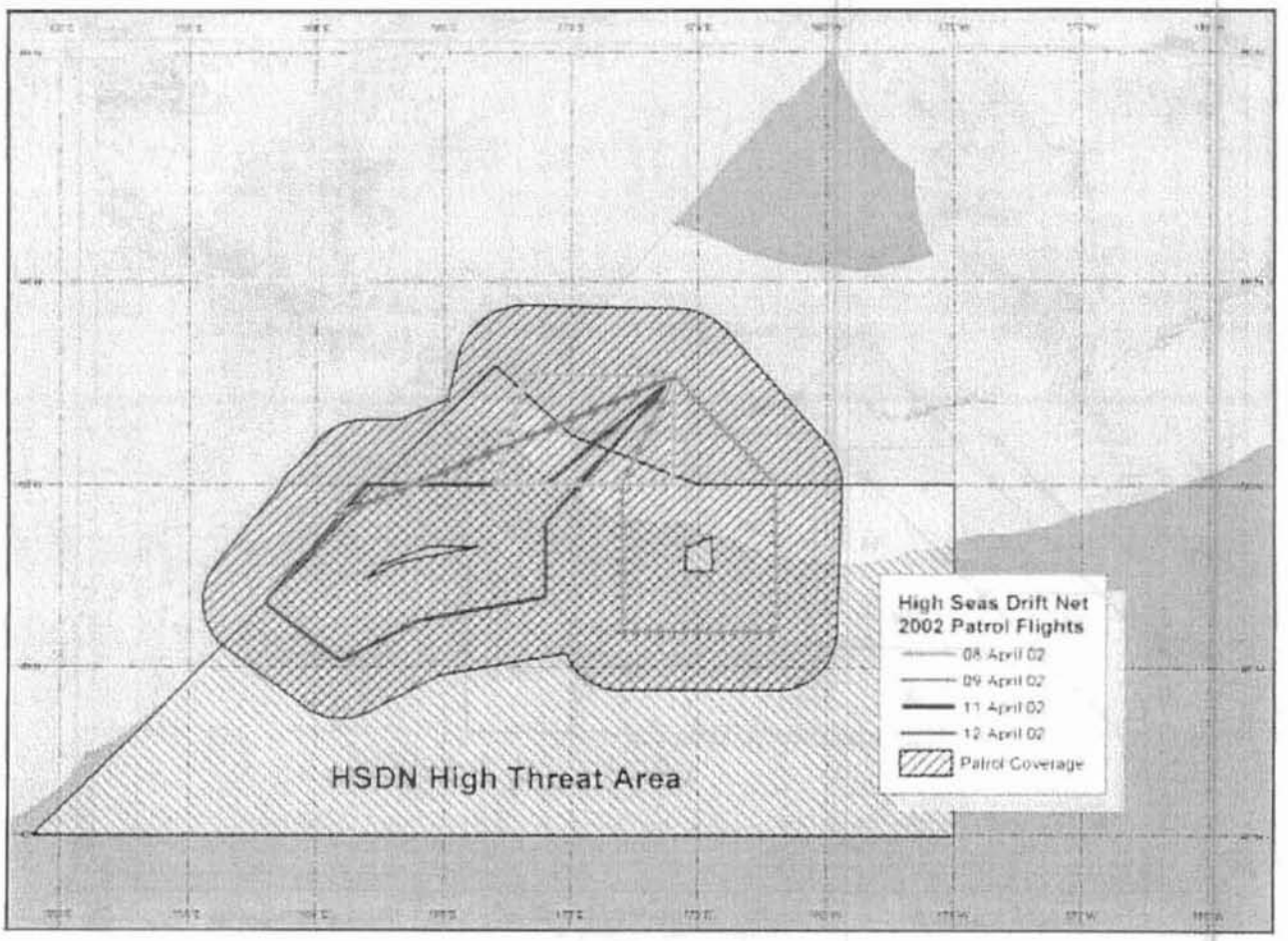


Figure 12. U.S. Coast Guard patrol route for 2002 in the high seas driftnet threat area.

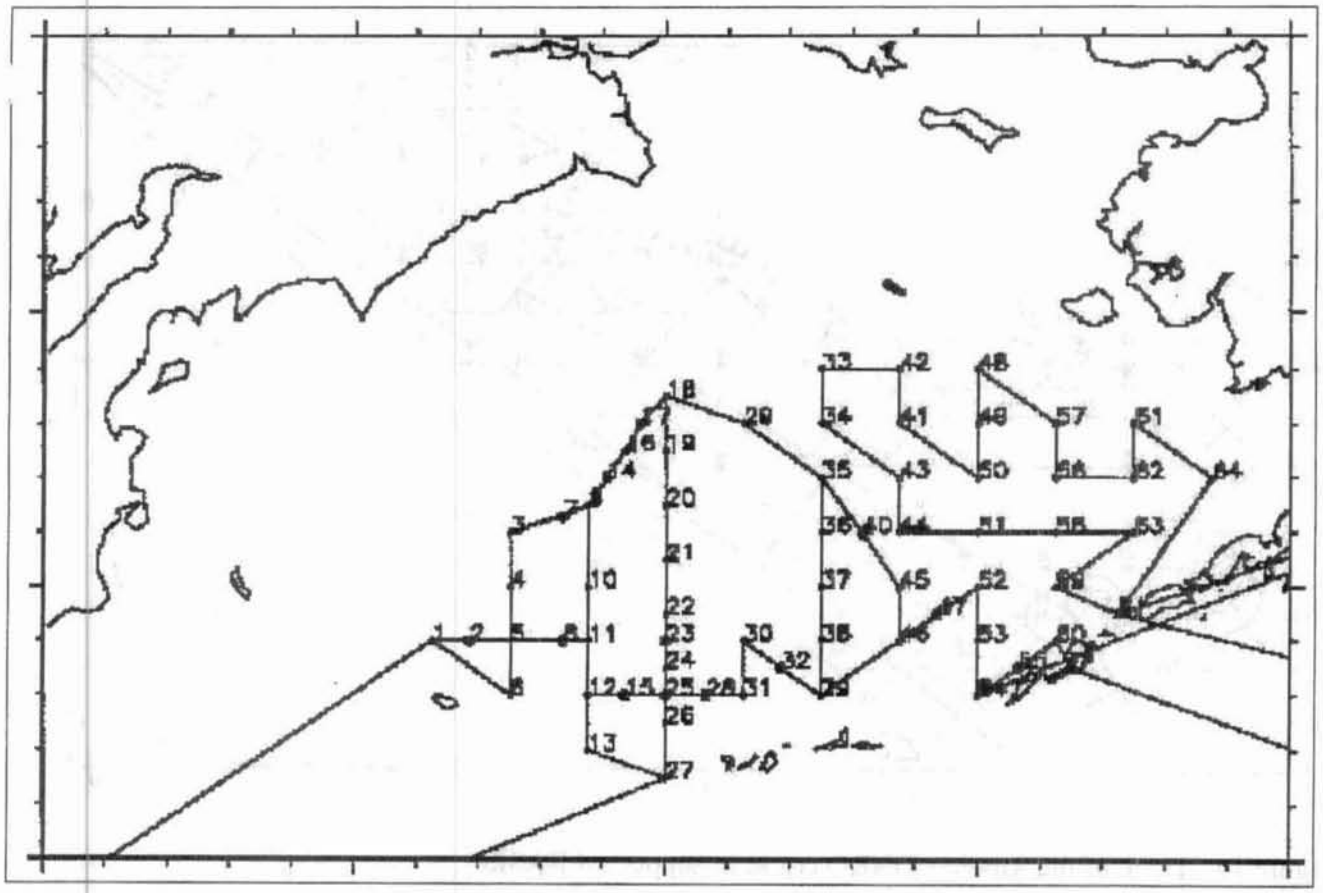


Figure 13. Japanese cruise track in support of BASIS in 2002.

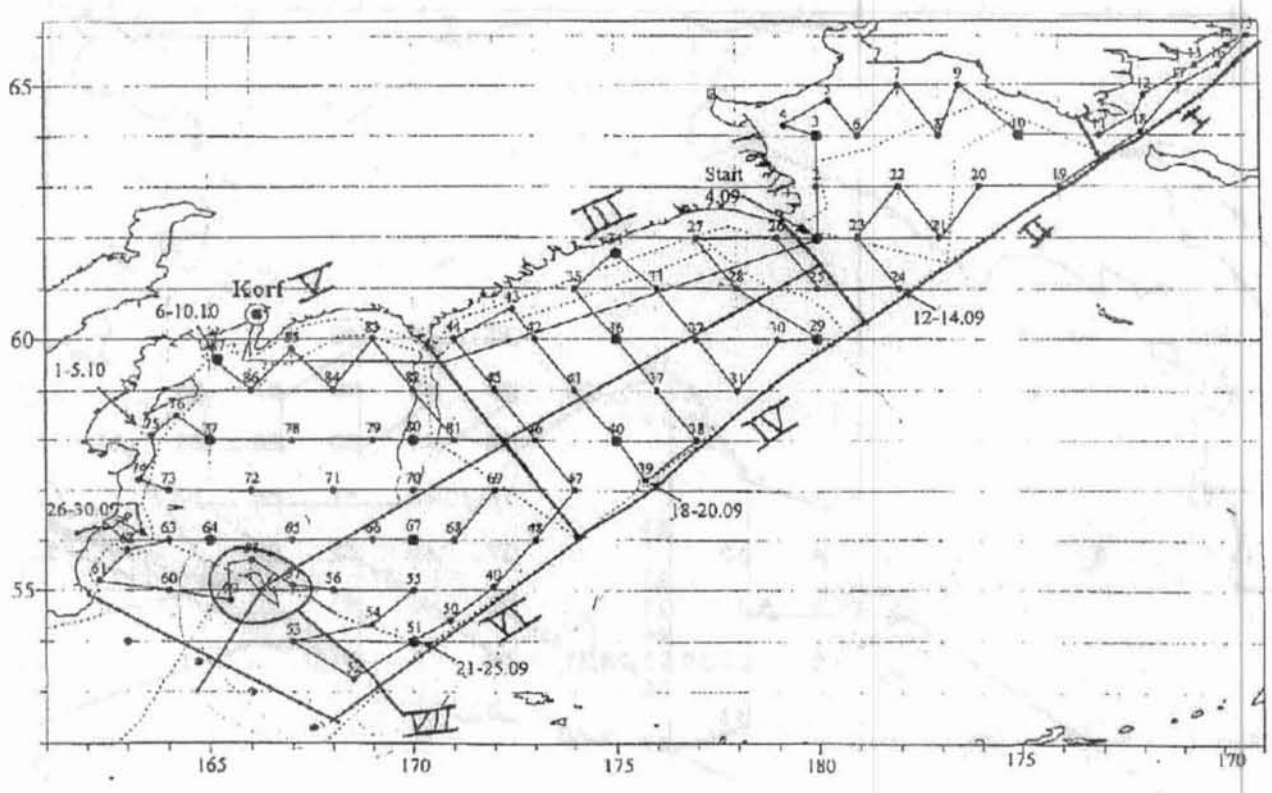


Figure 14. Track of the Russian TINRO cruise in support of BASIS.

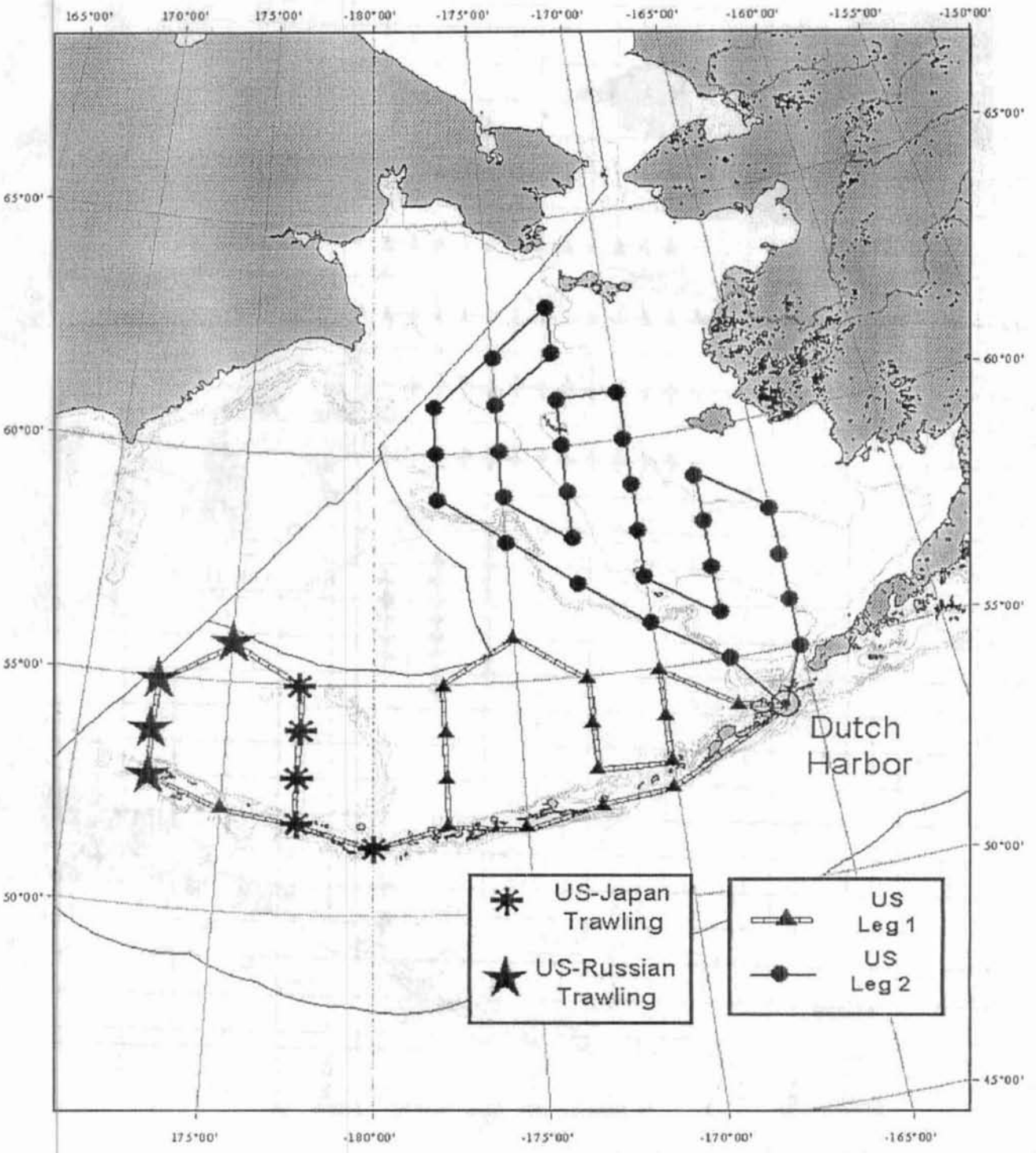


Figure 15. Cruise track of U.S BASIS fall survey.

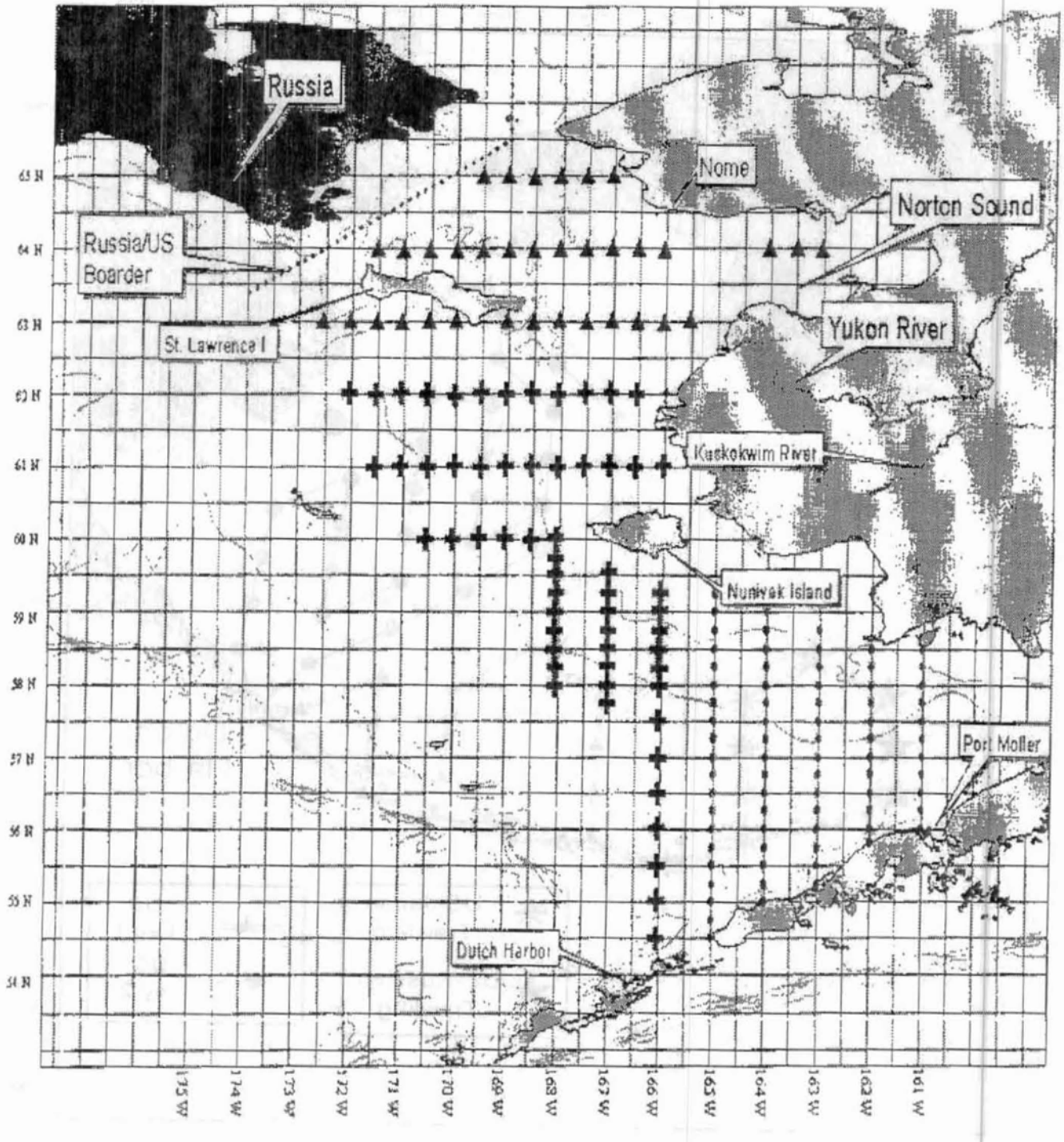


Figure 16. Tracks for the 2002 OCC Bering Sea cruises.

Appendix Table 1. Alaskan and Canadian total utilization of Yukon River chinook, chum and coho salmon, 1903-2002.

	Alaska [a,b]			Canada [c]			Total		
Year	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 [f]	8,115	14,052	105,306	207,850	313,156
1999	124,315	234,221	358,536	12,468	19,506	31,974	136,783	253,727	390,510
2000	45,308	106,936	152,244	4,879 [g]	9,273	14,152	50,187	116,209	166,396
2001	53,738	116,477	170,215	10,144	9,883	20,027	63,882	126,360	190,242
2002 [h, i]	24,430	13,568	37,998	9,301	17,638	26,939 [j]	33,731	31,206	64,937
Average									
1903-01	90,251	768,406	744,587	8,673	18,571	18,760	87,061	758,681	704,010
1992-01	131,716	554,427	686,144	14,619	20,696	35,315	146,335	575,123	721,458
1997-01	99,471	240,450	339,921	9,991	12,531	22,522	109,462	252,981	362,443
1990-99	152,220	770,932	923,152	17,100	25,776	42,876	169,320	796,708	966,028

[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] Catch includes 761 chinook salmon taken in the mark-recapture test fishery.

[g] Catch includes 737 chinook salmon taken in the test fishery.

[h] Data are preliminary.

[i] Subsistence, Personal Use and Sport Fish harvest data are unavailable at this time.

[j] Subsistence, Aboriginal and Sport Fish harvest data are unavailable at this time.

Appendix Table 2. Alaskan catch of Yukon River chinook salmon, 1961-2002

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	36,075	35,916	9,115	277	45,308
2001	53,059	53,059	0	571	53,738
2002	56,000 [g]	[h]	24,880	[h]	
Average					
1961-01	34,173	34,003	102,030	1,035	136,667
1992-01	51,523	51,023	79,231	1,452	131,716
1997-01	50,613	50,376	48,186	888	99,471
1990-99	52,600	51,921	98,801	1,499	152,220

[a] Includes salmon harvested for subsistence and personal use purposes, and an estimate of the number of salmon harvested for the commercial production of salmon roe and the carcasses 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. Alaska catch of Yukon River summer chum salmon, 1961-2002.

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	72,831	64,925	7,272	161 [h]	72,358
2001	58,385	58,385	0	82	58,467
2002	[h]	[h]	13,785	[h]	
Average					
1961-01	211,360	164,279	482,546	767	647,293
1992-01	158,316	96,456	276,285	694	373,436
1997-01	93,207	75,521	59,869	339	135,728
1990-99	192,946	107,723	394,306	821	502,849

[a] Includes salmon harvested for subsistence and personal use purposes, and an estimate of the number of salmon harvested for the commercial production of salmon roe and the carcasses 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, 1977-2002 in $US.

	Summer Season							Fall Season							
	Chinook			Summer Chum				Fall Chum			Coho				
	Lower	Upper		Lower	Upper		Total	Lower	Upper		Lower	Upper		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
2001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2002	1,691,105	20,744	1,711,849	4,342	6,176	10,518	1,722,367	0	0	0	0	0	0	0	1,722,367
5 and 10 Year Averages															
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
1990-1999	5,208,089	94,574	5,302,663	262,608	438,539	701,147	6,003,809	103,226	61,661	164,887	69,789	11,222	81,012	245,898	6,249,707

Appendix Table 5. Number of participating commercial salmon fishing gear permit holders by district and season, Yukon Area in Alaska, 1971-2002. [a]

Chinook and Summer Chum Salmon Season

Year	Lower Yukon Area				Upper Yukon Area				Yukon Area
	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	0	562	0	0	0	0	562
2001	0	0	0	0	0	0	0	0	0
2002 [c]	320	220		540		14	6	20	560
5-Year Average									
1995-1999	438	212	3	640	44	25	13	82	722
1990-1999	443	230	9	658	0 62	27	17	105	763

Fall Chum and Coho Salmon Season

Year	Lower Yukon Area				Upper Yukon Area				Yukon Area
	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	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0
2002	323	223	0	546	0	14	6	20	566
Average									
1995-1999	134	104	0	236	2	7	7	17	253
1990-1999	129	99	4	225	3	7	12	22	247

Continued

Appendix Table 5 (page 2 of 2)

Year	Combined Season								
	Lower Yukon Area				Upper Yukon Area				Yukon Area
	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	0	562	0	0	0	0	562
2001	0	0	0	0	0	0	0	0	0
2002	320	220	0	540	0	14	6	20	560
5-Year Average									
1995-1999	442	235	3	647	54	27	18	99	745
1990-1999	448	244	10	659	62	29	20	110	768

[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, 1961-2002.

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 [k]	110,369
2000	19,307	19,307	21,542	40,462
2001	35,154	35,154	0	35,154
2002 [m]			0	
Average				
1961-90	125,754	122,859	178,269	301,128
1992-01	92,949	87,109	52,092	139,162
1997-01	60,846	60,551	20,193	80,667

[a] Includes salmon harvested for subsistence and personal use purposes, and an estimate of the number of salmo harvested for the commercial production of salmon roe and the carcasses 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] Test fish harvest.

[m] Data are unavailable at this time.

Appendix Table 7. Alaskan catch of Yukon River coho salmon, 1961-2002.

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	24,579	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	14,717	14,717	0	335	15,271
2001	21,654	21,654	0	1,248	22,856
2002	[k]	[k]	0	[k]	
Average					
1961-01	24,699	24,284	25,658	1,053	50,588
1992-01	28,111	27,086	15,640	1,202	43,945
1997-01	19,940	19,883	7,484	884	28,286

[a] Includes salmon harvested for subsistence and personal use purposes, and an estimate of the number of salmon harvested for the commercial production of salmon roe and the carcasses 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. Canadian catch of Yukon River chinook salmon, 1961-2002.

Year	Mainstem Yukon River Harvest							Porcupine River Aboriginal Fishery Harvest	Total Canadian Harvest
	Commercial	Domestic	Aboriginal Fishery	Sport [a]	Test Fishery	Combined Non-Commercial	Total		
1961	3,446		9,300			9,300	12,746	500	13,246
1962	4,037		9,300			9,300	13,337	600	13,937
1963	2,283		7,750			7,750	10,033	44	10,077
1964	3,208		4,124			4,124	7,332	76	7,408
1965	2,265		3,021			3,021	5,286	94	5,380
1966	1,942		2,445			2,445	4,387	65	4,452
1967	2,187		2,920			2,920	5,107	43	5,150
1968	2,212		2,800			2,800	5,012	30	5,042
1969	1,640		957			957	2,597	27	2,624
1970	2,611		2,044			2,044	4,655	8	4,663
1971	3,178		3,260			3,260	6,438	9	6,447
1972	1,769		3,960			3,960	5,729		5,729
1973	2,199		2,319			2,319	4,518	4	4,522
1974	1,808	406	3,342			3,748	5,556	75	5,631
1975	3,000	400	2,500			2,900	5,900	100	6,000
1976	3,500	500	1,000			1,500	5,000	25	5,025
1977	4,720	531	2,247			2,778	7,498	29	7,527
1978	2,975	421	2,485			2,906	5,881		5,881
1979	6,175	1,200	3,000			4,200	10,375		10,375
1980	9,500	3,500	7,546	300		11,346	20,846	2000	22,846
1981	8,593	237	8,879	300		9,416	18,009	100	18,109
1982	8,640	435	7,433	300		8,168	16,808	400	17,208
1983	13,027	400	5,025	300		5,725	18,752	200	18,952
1984	9,885	260	5,850	300		6,410	16,295	500	16,795
1985	12,573	478	5,800	300		6,578	19,151	150	19,301
1986	10,797	342	8,625	300		9,267	20,064	300	20,364
1987	10,864	330	6,069	300		6,699	17,563	51	17,614
1988	13,217	282	7,178	650		8,110	21,327	100	21,427
1989	9,789	400	6,930	300		7,630	17,419	525	17,944
1990	11,324	247	7,109	300		7,656	18,980	247	19,227
1991	10,906	227	9,011	300		9,538	20,444	163	20,607
1992	10,877	277	6,349	300		6,926	17,803	100	17,903
1993	10,350	243	5,576	300		6,119	16,469	142	16,611
1994	12,028	373	8,089	300		8,762	20,790	428	21,218
1995	11,146	300	7,945	700		8,945	20,091	796	20,887
1996	10,164	141	8,451	790		9,382	19,546	66	19,612
1997	5,311	288	8,888	1,230		10,406	15,717	811	16,528
1998	390	24	4,687	0	737	5,448	5,838	99	5,937
1999	3,160	213	8,804	177		9,194	12,354	114	12,468
2000	0	0	4,068	0	761	4,829	4,829	50	4,879
2001	1,351	89	7,421	146	767	8,423	9,774	370	10,144
2002 [b]	708	26	7,143	200	1,036	8,405	9,113	188	9,301
Average									
1961-01	6,074	610	4,841	332		5,308	11,087	233	11,297
1992-01	6,478	195	7,028	394	755	7,843	14,321	298	14,619
1997-01	2,042	123	6,774	311	755	7,660	9,702	289	9,991

[a] Sport fish harvest unknown prior to 1980.

[b] Data are preliminary.

Appendix Table 9. Canadian catch of Yukon River fall chum salmon, 1961-2002.

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	9,513
2002	3,065	0	3,093	3,093	6,158	1,850	8,008
Average							
1961-90	9,978	1,088	2,590	3,120	13,098	5,397	18,315
1992-01	13,744	0	2,434	2,434	16,178	4,282	20,460
1997-01	4,397	1	2,340	2,340	6,738	5,609	12,347

Appendix Table 10. Alaskan and Canadian total utilization of Yukon River chinook and fall chum salmon, 1961-2002.

	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 [f]	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	12,468	124,315	136,783	19,506	110,369	129,875
2000	4,879	45,308	50,187	9,236	19,307	28,543
2001	10,144	53,738	63,882	9,513	35,154 [d]	44,667
2002 [g]	9,301	80,880	90,181	8,008	0	8,008
Average						
1961-01	12,334	137,718	149,015	18,315	301,128	319,443
1992-01	14,619	131,716	146,335	20,460	137,047	157,507
1997-01	9,991	99,471	109,462	12,347	76,436	88,783

[a] Catches in number of salmon. Includes commercial, Aboriginal, domestic, and sport catches

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

[g] Data are preliminary.

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

Appendix Table 11. Chinook salmon aerial survey indices for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1961-present. [a]

Year	Andreafsky River		Anvik River	Nulato River		Gisasa River	Chena River		Salcha River	
	East Fork	West Fork		North Fork	South Fork			Index Area [b]		Index Area [c]
1961	1,003		1,226	376 [d]	167	266 [d]			2,878	
1962	675 [d]	762 [d]					61 [d, e]		937	
1963							137 [d, e]			
1964	867	705							450	
1965		344 [d]	650 [d]						408	
1966	361	303	638						800	
1967		276 [d]	336 [d]							
1968	380	383	310 [d]						739	
1969	274 [d]	231 [d]	296 [d]						461 [d]	
1970	665	574 [d]	368				6 [d]		1,882	
1971	1,904	1,682					193 [d, e]		158 [d]	
1972	798	582 [d]	1,198				138 [d, e]		1,193	1,034
1973	825	788	613				21 [d]		391	352
1974		285	471 [d]	55 [d]	23 [d]	161	1,016 [e]	959 [e]	1,857	1,620
1975	993	301	730	123	81	385	316 [e]	262 [e]	1,055	950
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 [d]		4,789	4,310
1980	958 [d]	1,500	1,330	954 [d]	369 [d]	951	2,541		6,757	6,126
1981	2,146 [d]	231 [d]	807 [d]		791		600 [d]		1,237	1,121
1982	1,274	851				421	2,073		2,534	2,346
1983			653 [d]	526	480	572	2,553	2,336	1,961	1,803
1984	1,573 [d]	1,993	641 [d]				501	494	1,031	906
1985	1,617	2,248	1,051	1,600	1,180	735	2,553	2,262	2,035	1,860
1986	1,954	3,158	1,118	1,452	1,522	1,346	2,031	1,935	3,368	3,031
1987	1,608	3,281	1,174	1,145	493	731	1,312	1,209	1,898	1,671
1988	1,020	1,448	1,805	1,061	714	797	1,966	1,760	2,761	2,553
1989	1,399	1,089	442 [d]				1,280	1,185	2,333	2,136
1990	2,503	1,545	2,347	568 [d]	430 [d]	884 [d]	1,436	1,402	3,744	3,429
1991	1,938	2,544	875 [d]	767	1,253	1,690	1,277 [d]	1,277 [d]	2,212 [d]	1,925 [d]
1992	1,030 [d]	2,002 [d]	1,536	348	231	910	825 [d]	799 [d]	1,484 [d]	1,436 [d]
1993	5,855	2,765	1,720	1,844	1,181	1,573	2,943	2,660	3,636	3,562
1994	300 [d]	213 [d]		843	952	2,775	1,570	1,570	11,823	11,189
1995	1,635	1,108	1,996	968	681	410	3,575	3,039	3,978	3,734
1996		624	839		100		2,233	2,112	4,866	4,800
1997	1,140	1,510	3,979			144 [d]	3,495	3,303	3,457 [d]	3,457 [d]
1998	1,027	1,249 [d]	709 [d]	507	546	889 [d]	440 [d]	386 [d]	2,055 [d]	1,923 [d]
1999								2,412		3,608
2000	1,018	427	1,721				962 [d]	934 [d]	2,562 [d]	2,478 [d]
2001	1,065	570	1,420	1,116	768	1,298	1,651	1,487	3,107	2,990
2002	1,447	917	1,713	687	897	506	[d]		2,416 [d]	2,256
SEG [f]	1,500	1,400	1,300	800	500	600				

[a] Aerial survey counts are peak counts only. Survey rating was fair or good unless otherwise noted.

[b] Chena River index area for assessing the escapement objective is from Moose Creek Dam to Middle Fork River.

[c] Salcha River index area for assessing the escapement objective is from the TAPS crossing to Caribou Creek.

[d] Incomplete, poor timing and/or poor survey conditions resulting in minimal or inaccurate counts.

[e] Boat survey.

[f] Sustainable Escapement Goal

Appendix Table 12. Chinook salmon escapement counts for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1986-present.

Year	Andreafsky River		Nulato River Tower	Gisasa River Weir		Chena River		Salcha River	
	No. Fish	% Fem.	No. Fish	No. Fish	% Fem.	No. Fish	% Fem.	No. Fish	% Fem.
1986	1,530	23.3 [a]				9,065	25.4 [d]		35.8
1987	2,011	56.1 [a]				6,404	58.0 [d]	4,771	62.8 [d]
1988	1,339	38.7 [a]				3,346	60.9 [d]	4,562	39.6 [d]
1989		13.6				2,666	64.9 [d]	3,294	62.2 [d]
1990		41.6				5,603	46.2 [d]	10,728	48.9 [d]
1991		33.9				3,025	31.5 [d]	5,608	47.2 [d]
1992		21.2				5,230	37.7 [d]	7,862	34.4 [d]
1993		29.9				12,241	16.6 [a]	10,007	27.6 [a]
1994	7,801	35.5 [b, c]	1,795 [c]	2,888	[c]	11,877	45.1 [a]	18,399	44.5 [a]
1995	5,841	43.7 [b]	1,412	4,023	46.0	9,680	66.0	13,643	56.0 [a]
1996	2,955	41.9 [b]	756	1,952	19.5	6,833	44.0	7,958	50.8
1997	3,186	36.8 [b]	4,766	3,764	26.0	13,390	39.6 [a]	18,396	50.0 [a]
1998	4,011	29.0 [b]	1,536	2,356	16.2	4,745	41.2 [a]	5,027	30.0 [a]
1999	3,347	28.6 [b]	1,932	2,631	26.4	6,485	58.8 [a]	9,198	54.7 [a]
2000	1,344	54.3 [b]	908	2,089	34.4	4,694	34.9 [d]	3,108	43.9 [a]
2001		[c]	[c]	3,052	49.2 [c]	9,696	44.0 [a]	11,980	37.5 [a]
2002 [e]	4,896	21 [b]	2,696	1,931	20.7	6,967	31.7 [d]	8,850	34.8 [c]
BEG [f]						2,800-5,700		3,300-6,500	
Average									
1986-01	3,337		1,872	2,844		7,186		8,969	
1992-01	4,069		1,872	2,844		8,487		10,558	
1997-01	2,972		2,286	2,778		7,802		9,542	

[a] Tower counts.
[b] Weir counts.
[c] Incomplete count because of late installation, early removal of project or inoperable.
[d] Mark-recapture population estimate.
[e] Data are preliminary.
[f] Biological Escapement Goals (BEG) established by the Alaska Board of Fisheries, Jan. 2001.

Appendix Table 13. Chinook salmon escapement counts for selected spawning areas in the Canadian portion of the Yukon River drainage, 1961-2002.

Year	Tincup Creek [a]	Tatchun Creek [b]	Little Salmon River [a]	Big Salmon River [a, c]	Nisutlin River [a, d]	Ross River [a, e, f]	Wolf River [a, g]	Whitehorse Fishway		Canadian Mainstem		
								Count	Percent Hatchery Contribution	Border Passage Estimate	Harvest	Spawning Escapement Estimate [j]
1961								1,068	0			
1962								1,500	0			
1963								483	0			
1964								595	0			
1965								903	0			
1966		7 [k]						563	0			
1967								533	0			
1968			173 [k]	857 [k]	407 [k]	104 [k]		414	0			
1969			120	286	105			334	0			
1970		100		670	615		71 [k]	625	0			
1971		130	275	275	650		750	856	0			
1972		80	126	415	237		13	391	0			
1973		99	27 [k]	75 [k]	36 [k]			224	0			
1974		192		70 [k]	48 [k]			273	0			
1975		175		153 [k]	249		40 [k]	313	0			
1976		52		86 [k]	102			121	0			
1977		150	408	316 [k]	77			277	0			
1978		200	330	524	375			725	0			
1979		150	489 [k]	632	713		183 [k]	1,184	0			
1980		222	286 [k]	1,436	975		377	1,383	0			
1981		133	670	2,411	1,626	949	395	1,555	0			
1982		73	403	758	578	155	104	473	0	36,598	16,808	19,790
1983	100	264	101 [k]	540	701	43 [k, m]	95	905	0	47,741	18,752	28,989
1984	150	153	434	1,044	832	151 [k]	124	1,042	0	43,911	16,295	27,616
1985	210	190	255	801	409	23 [k]	110	508	0	29,881	19,151	10,730
1986	228	155	54 [k]	745	459 [k]	72 [p]	109	557	0	36,479	20,064	16,415
1987	100	159	468	891	183	180 [k]	35	327	0	30,823	17,563	13,260
1988	204	152	368	765	267	242	66	405	16	44,445	21,327	23,118
1989	88	100	862	1,662	695	433 [p]	146	549	19	42,620	17,419	25,201
1990	83	643	665	1,806	652	457 [k]	188	1,407	24	56,679	18,980	37,699 [q]
1991			326	1,040		250	201 [r]	1,266 [h]	51 [h]	41,187	20,444	20,743 [q]
1992	73	106	494	617	241	423	110 [r]	758 [h]	84 [h]	43,185	17,803	25,382 [q]
1993		183	184	572	339	400	168 [r]	668 [h]	73 [h]	45,027	16,469	28,558 [q]
1994	101 [k]	477	726	1,764	389	506	393 [r]	1,577 [h]	54 [h]	46,680	20,790	25,890 [q]
1995	121	397	781	1,314	274	253 [k]	229 [r]	2,103	57	52,353	20,091	32,262 [q]
1996	150	423	1,150	2,565	719	102 [k]	705 [r]	2,958	35	47,955	19,546	28,409 [q]
1997	193	1,198	1,025	1,345	277		322 [r]	2,084	24	53,400	15,717	37,683 [q]
1998	53	405	361	523	145		66	777	95	22,588	5,838	16,750 [q]
1999	2	252	495	353	330		131	1,118	74	23,608	12,354	11,254 [q]

Continued

Appendix Table 13. Continued (page 2 of 2)

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 Count	Whitehorse Fishway Percent Hatchery Contribution	Canadian Mainstem Border Passage Estimate	Canadian Mainstem Harvest	Canadian Mainstem Spawning Escapement Estimate [j]
2000	19 [t]	277 [u]	46	113	20		32	677	69	16,995	4,829	12,166 [q]
2001	39 [t]		1,035	1,020	481		154	988	36	54,029	9,774	44,255 [q]
2002 [s]			526	1,149	280		84	605	39	30,247	9,113	21,134
E.O.												28,000 [q]
Averages												
1961-01	113	235	441	846	426	279	193	859	18	40,306	16,149	24,332
1997-01	61	533	592	671	251		141	1,129	60	34,124	9,702	24,422
1992-01	83	413	630	1,019	322	337	231	1,371	60	40,582	14,321	26,261

[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 1989 and 1994, inclusive.

[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] Interim escapement objective. Stabilization escapement objective for years 1990-1995 was 18,000 salmon. Rebuilding step escapement objective for 2002 is 25,000 salmon for subsistence and 28,000 salmon for commercial.

[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 14. Summer chum salmon aerial survey indices for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1973-2002. [a]

Year	Andreafsky River		Rodo River	Nulato River		Gisasa River	Hogatza River (Clear & Caribou Cr.)	Tozitna River	Chena River	Salcha River
	East Fork	West Fork		South Fork	North Fork					
1973	10,149 [b]	51,835							79 [b]	290
1974	3,215 [b]	33,578	16,137	29,016	29,334	22,022		1,823	4,349	3,510
1975	223,485	235,954	25,335	51,215	87,280	56,904	22,355	3,512	1,670	7,573
1976	105,347	118,420	38,258	9,230	30,771 [b]	21,342	20,744	725 [b]	685	6,484
1977	112,722	63,120	16,118	11,385	58,275	2,204 [b]	10,734	761 [b]	610	677 [b]
1978	127,050	57,321	17,845	12,821	41,659	9,280 [b]	5,102	2,262	1,609	5,405
1979	66,471	43,391		1,506	35,598	10,962	14,221		1,025 [b]	3,060
1980	36,823 [b]	114,759		3,702	11,244 [b]	10,388	19,786	580	338	4,140
1981	81,555			14,348					3,500	8,500
1982	7,501 [b]	7,267 [b]				334 [b]	4,984 [b]	874	1,509	3,756
1983				1,263	19,749 [b]	2,356 [b]	28,141	1,604	1,097	716 [b]
1984	95,200 [b]	238,565					184 [b]		1,861	9,810
1985	66,146	52,750	24,576	10,494	19,344	13,232	22,566	1,030	1,005	3,178
1986	83,931	99,373		16,848	47,417	12,114		1,778	1,509	8,028
1987	6,687 [b]	35,535		4,094	7,163	2,123	5,669 [b]		333	3,657
1988	43,056	45,432	13,872	15,132	26,951	9,284	6,890	2,983	432	2,889 [b]
1989	21,460 [b]								714 [b]	1,574 [b]
1990	11,519 [b]	20,426 [b]	1,941 [b]	3,196	1,419 [b]	450 [b]	2,177 [b]	36	245 [b]	450 [b]
1991	31,886	46,657	3,977	13,150	12,491	7,003	9,947	93	115 [b]	154 [b]
1992	11,308 [b]	37,808 [b]	4,465	5,322	12,358	9,300	2,986	794	848 [b]	3,222
1993	10,935 [b]	9,111 [b]	7,867	5,486	7,698	1,581		970	168	212
1994						6,827	8,247 [c]		1,137	4,916
1995			12,849	10,875	29,949	6,458		4,985	185 [b]	934 [b]
1996			4,380	8,490	[b]		27,090 [c]	2,310	2,061	9,722
1997			2,775 [b]			686 [b]	1,821 [b]	428 [b]	594 [b]	3,968 [b]
1998							120 [b]	7 [b]	24 [b]	370 [b]
1999										
2000	2,094 [b]	18,989 [b]						480	107 [b]	228 [b]
2001		[b]							[b]	[b]
2002		[b]	[b]		[b]	[b]	[b]	[b]	1,080 [b]	18,640 [b]
BEG [d]	35-70	35-70								

[a] Aerial survey counts are peak counts only, survey rating is fair or good unless otherwise noted.

[b] Incomplete, poor timing and/or poor survey conditions resulting in minimal or inaccurate counts.

[c] BLM helicopter survey.

[d] Biological Escapement Goals (thousands of fish) established by the Alaska Board of Fisheries, Jan. 2001.

Appendix Table 15. Summer chum salmon gound based escapement counts for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1973-2002.[a]

Year	East Fork Andreafsky R.		Anvik R. Sonar		Kaltag Crk. Tower	Nulato R. Tower		Gisasa R. Weir		Clear Crk. Weir		Chena R. Tower	Salcha R. Tower
	No. Fish	% Fem.	No. Fish	% Fem.	No. Fish	No. Fish	% Fem.	No. Fish	% Fem.	No. Fish	% Fem.	No. Fish	No. Fish
1980			492,676	60.7									
1981	147,312	[a]	1,486,182	54.7									
1982	181,352	64.6 [a]	444,581	69.4									
1983	110,608	57.4 [a]	362,912	56.5									
1984	70,125	50.7 [a]	891,028	60.9									
1985		58.1 [d]	1,080,243	55.8									
1986	167,614	55.4 [b]	1,189,602	57.8									
1987	45,221	58.6 [b]	455,876	65.1			44.9						
1988	68,937	49.3 [b]	1,125,449	66.1			60.9						
1989			636,906	65.6									
1990			403,627	51.3									
1991			847,772	57.9									
1992			775,626	56.6									
1993		48.6	517,409	52.0								5,400	5,809
1994	200,981	65.2 [c,d]	1,124,689	59.1	47,295	148,762	47.7 [d]	51,116	[d]			9,984	39,450
1995	172,148	48.9 [c]	1,339,418	40.1	77,193	236,890	55.6	136,886	45.7	116,735	62.1	3,519 [d]	30,784
1996	108,450	51.4 [c]	933,240	47.3	51,269	129,694	51.9	157,589	49.3	100,912	59.0	12,810 [d]	74,827
1997	51,139	[c]	609,118	53.6	48,018	157,975	51.9	31,800		76,454		9,439 [d]	35,741
1998	67,591	57.3 [c]	471,865	55.9	8,113	49,140	64.2	18,228	50.8	212	[d]	5,901 [d]	17,289
1999	32,229	56.4 [c]	437,631	58.1	5,300	30,076	63.0	9,920	53.1	11,283	[d]	9,165 [d]	23,221
2000	22,918	48.2 [c]	196,349	61.6	6,727	24,308	62.6	14,410	49.9	19,376	43.6	3,515	20,516
2001		52.0 [d]	224,058	55.3	[d]		[d]	17,936	50.3 [d]	3,674	32.4	4,773 [d]	19,671
2002 [e]	45,019		462,101		13,583	72,232	27.0	32,943	47.7	13,150	51.6	[d]	20,837 [d]
BEG [f]	65-130		400-800										

[a] Sonar count.

[b] Tower count.

[c] Weir count.

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

[e] Data are preliminary.

[f] Biological Escapement Goals (in thousands of fish) established by the Alaska Board of Fisheries, Jan. 2001.

Appendix Table 16. Fall chum salmon passage estimates or escapement estimates for selected spawning areas in Alaskan and Canadian portions of the Yukon River Drainage, 1971-2002.[a]

	Alaska							
	Tanana River Drainage					Upper Yukon River Drainage		
Year	Toklat River [b]	Kantishna River Abundance Estimate [c]	Delta River [d]	Bluff Cabin Slough [e]	Upper Tanana River Abundance Estimate [f]	Rampart Rapids Abundance Estimate [g]	Chandalar River [h]	Sheenjek River [h]
1971								
1972			5,384					
1973			10,469					
1974	41,798		5,915					89,966 [w]
1975	92,265		3,734 [x]					173,371 [w]
1976	52,891		6,312 [x]					26,354 [w]
1977	34,887		16,876 [x]					45,544 [w]
1978	37,001		11,136					32,449 [w]
1979	158,336		8,355					91,372 [w]
1980	26,346 [ag]		5,137	3,190 [k]				28,933 [w]
1981	15,623		23,508	6,120 [k]				74,560
1982	3,624		4,235	1,156				31,421
1983	21,869		7,705	12,715				49,392
1984	16,758		12,411	4,017				27,130
1985	22,750		17,276 [x]	2,655 [k]				152,768
1986	17,976		6,703 [x]	3,458			59,313	84,207 [ac]
1987	22,117		21,180	9,395			52,416	153,267 [ac]
1988	13,436		18,024	4,481 [k]			33,619	45,206 [ac]
1989	30,421		21,342 [x]	5,386 [k]			69,161	99,116 [ac]
1990	34,739		8,992 [x]	1,632			78,631	77,750 [ac]
1991	13,347		32,905 [x]	7,198				86,496 [af]
1992	14,070		8,893 [x]	3,615 [k]				78,808
1993	27,838		19,857	5,550 [k]				42,922
1994	76,057		23,777 [x]	2,277 [k]				150,565
1995	54,513 [ag]		20,587	19,460	268,173		280,999	241,855
1996	18,264		19,758 [x]	3,920	134,563	654,296	208,170	246,889
1997	14,511		7,705 [x]	3,145	71,661	369,547	199,874	80,423 [aj]
1998	15,605		7,804 [x]	2,110	62,384	194,963	75,811	33,058
1999	4,551	27,199	16,534 [x]	5,078	97,843	189,741	88,662	14,229
2000	8,911	21,450	3,001 [x]	1,595	34,844	[am]	65,894	30,084 [an]
2001	6,007 [ao]	22,992	8,103 [x]	1,808 [k]	96,556 [ap]	201,766 [al]	110,971	53,932
2002	28,519 [al]	56,719 [al]	11,992 [al]		109,970 [al]	196,154 [al]	89,847 [al]	31,856 [al]
OEG [aq]	>33,000							
BEG [ar]	15,000-33,000		6,000-13,000		46,000-103,000		74,000-152,000	50,000-104,000
Average								
1971-01	32,018	23,880	12,787	4,998	109,432	322,063	110,293	83,645
1997-01	9,917	23,880	8,629	2,747	72,658	239,004	108,242	42,345
1992-01	24,033	23,880	13,602	4,856	109,432	322,063	147,197	97,277

continued

Appendix Table 16. (page 2 of 3)

	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 [ab]
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
1986	31,723 [v]	825	14	16,686	213	101,826	13,886	87,940
1987	48,956 [v]	6,115	50	12,000		125,121	44,345	80,776
1988	23,597 [v]	1,550	0	6,950	140	69,280	32,494	36,786
1989	43,834 [v]	5,320	40	3,050	210 [t]	55,861	20,111	35,750
1990	35,000 [ad]	3,651	1	4,683	739	82,947	31,212	51,735
1991	37,733 [v]	2,426	53	11,675	468	112,303	33,842	78,461
1992	22,517 [v]	4,438	4	3,339	450	67,962	18,880	49,082
1993	28,707 [v]	2,620	0	4,610	555	42,165	12,422	29,743
1994	65,247 [v]	1,429 [t]	20 [t]	10,734	209 [t]	133,712	35,354	98,358
1995	51,971 [v, ah]	4,701	0	16,456	633	198,203	40,111	158,092
1996	77,278 [v]	4,977		14,431	315	143,758	21,329	122,429
1997	26,959 [v]	2,189		3,350	207	94,725	9,286	85,439
1998	13,564 [v]	7,292		7,337	235	48,047	1,742	46,305
1999	12,094 [v]			5,136	19 [t]	75,541	13,506	62,035
2000	5,053 [v]	933 [t]		1,442	204	59,598	4,236	55,362
2001	21,635 [v]	2,453		4,884	5	38,908	4,919	33,989
2002	13,300 [al]	973		7,147	64	91,808 [al]	6,158	85,650 [al]
EO [aq]	50,000-120,000							60,000
Average								
1971-01	58,329	3,863	223	6,536	290	86,478	21,763	64,715
1997-01	15,861	3,217		4,430	134	63,364	6,738	56,626
1992-01	32,503	3,448	6	7,172	283	90,262	16,179	74,083

continued

[a] Latest table revision October 7, 2002.

[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.

[j] 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.

[aj] 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] Project ended early (September 12) because of low water.

[ao] Minimal estimate because Sushana River was breached by the main channel and uncountable.

[ap] Low numbers of tags deployed and recovered resulted in an estimate with an extremely large confidence interval (95% CI +/- 41,072).

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

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

[as] In the years 1998-2001 it was greater than 80,000.

Appendix Table 17. Coho salmon passage estimates or escapement estimates for selected spawning areas in the Alaskan portion of the Yukon River Drainage, 1972-2002. [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 [k]
			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 [c,p]	1,005	8,563 [r]		459 [k]	550
1982				81				1,436 [c,p]		8,365 [r]			
1983				42		766		1,042 [c]	103	8,019 [r]		253	88
1984				20 [k,m]		2,677		8,826 [c]		11,061		1,368	428
1985				42 [k,m]		1,584		4,470 [c]	2,081	6,842		750	
1986				5	496	794		1,664 [c]	218 [n]	10,857		1,800	146 [m]
1987				1,175		2,511		2,387 [c]	3,802	22,300		4,225 [n]	
1988	1,913 [s]		1,203	159	437	348		2,046 [c]		21,600		825 [n]	
1989				155	12 [k]			412 [c]	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 [c,t]	581	10,875		3,525 [n]	
1994				410	2,000 [c,u]	944	1,648	1,317 [c,v]	2,909	62,675	17,565	3,425 [n]	5,800
1995	10,901	120,366		142	192 [c,w]	4,169	2,218	500 [c]	2,972 [k]	20,100	6,283	3,625 [n]	
1996	8,037			233	0 [c]	2,040	2,171	201 [k,m]	3,666 [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	132,363		157		1,360 [m]	2,771 [m]	[y,z]	1,413 [y]	11,100	2,775	2,775 [n]	
1999	2,963	73,413		29		1,002 [m]	745 [m]	[z]	662 [m]	10,975	2,799		
2000	8,225	192,108		142		55 [k,m]	66 [k,m]	[z]	879 [k,m]	9,225	2,364	1,025 [n]	2,175
2001	9,252	147,341	262 [k]	578		242	855	699	3,741	46,875	12,013	4,425 [n]	1,531
2002 [aa]	3,534	135,737		744		0	328	935	1,910	38,625	10,442	5,900	
E.O. [ab]										>9,000 [ab]			

continued

[a] Latest table revision October 7, 2002.

[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.

[f] 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.

[j] Helicopter surveys counted tributaries of the Delta Clearwater River, outside of the normal mainstem index area, from 1994 to 1998, 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.

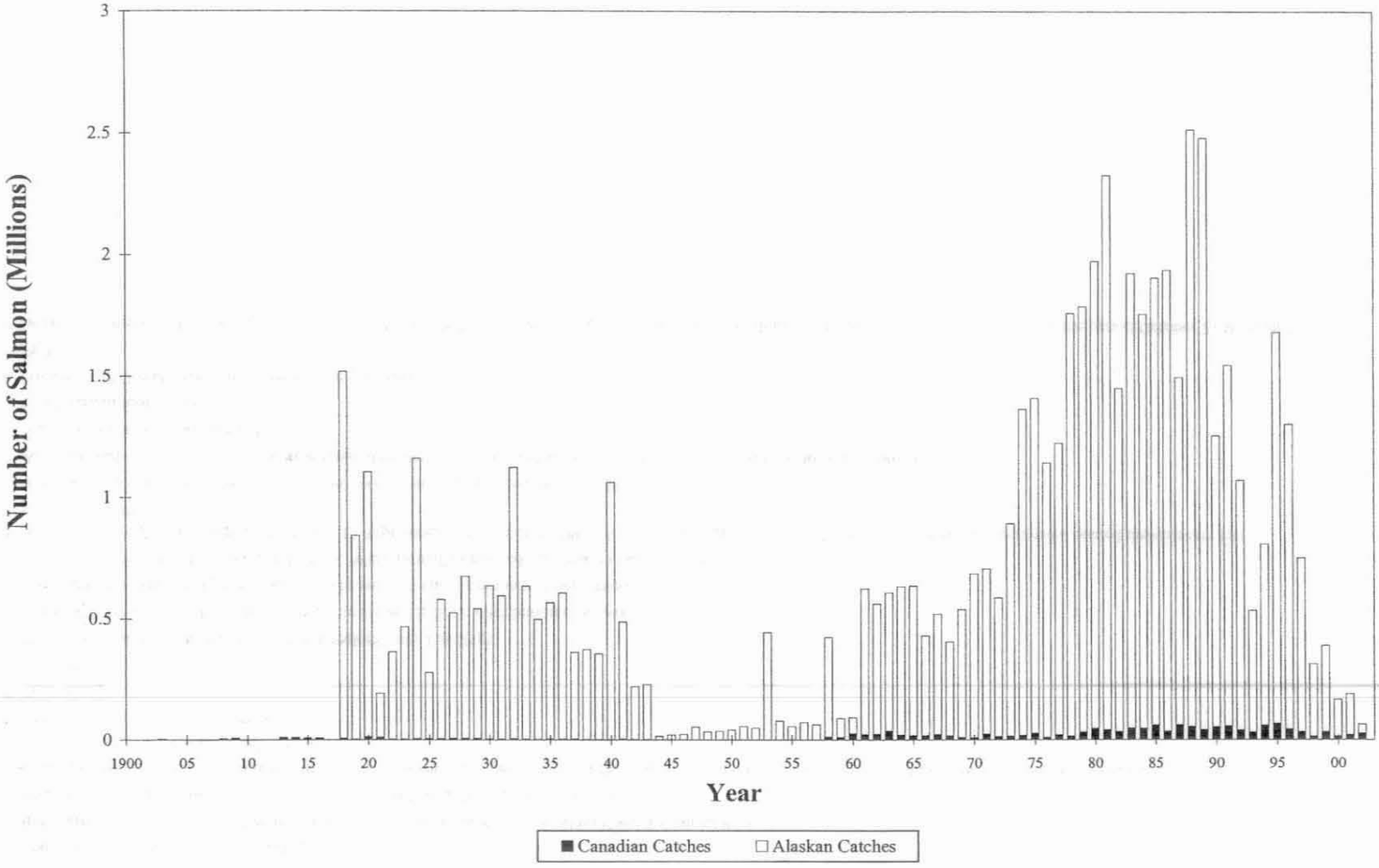
[x] Survey of western floodplain only.

[y] Combination foot and boat survey.

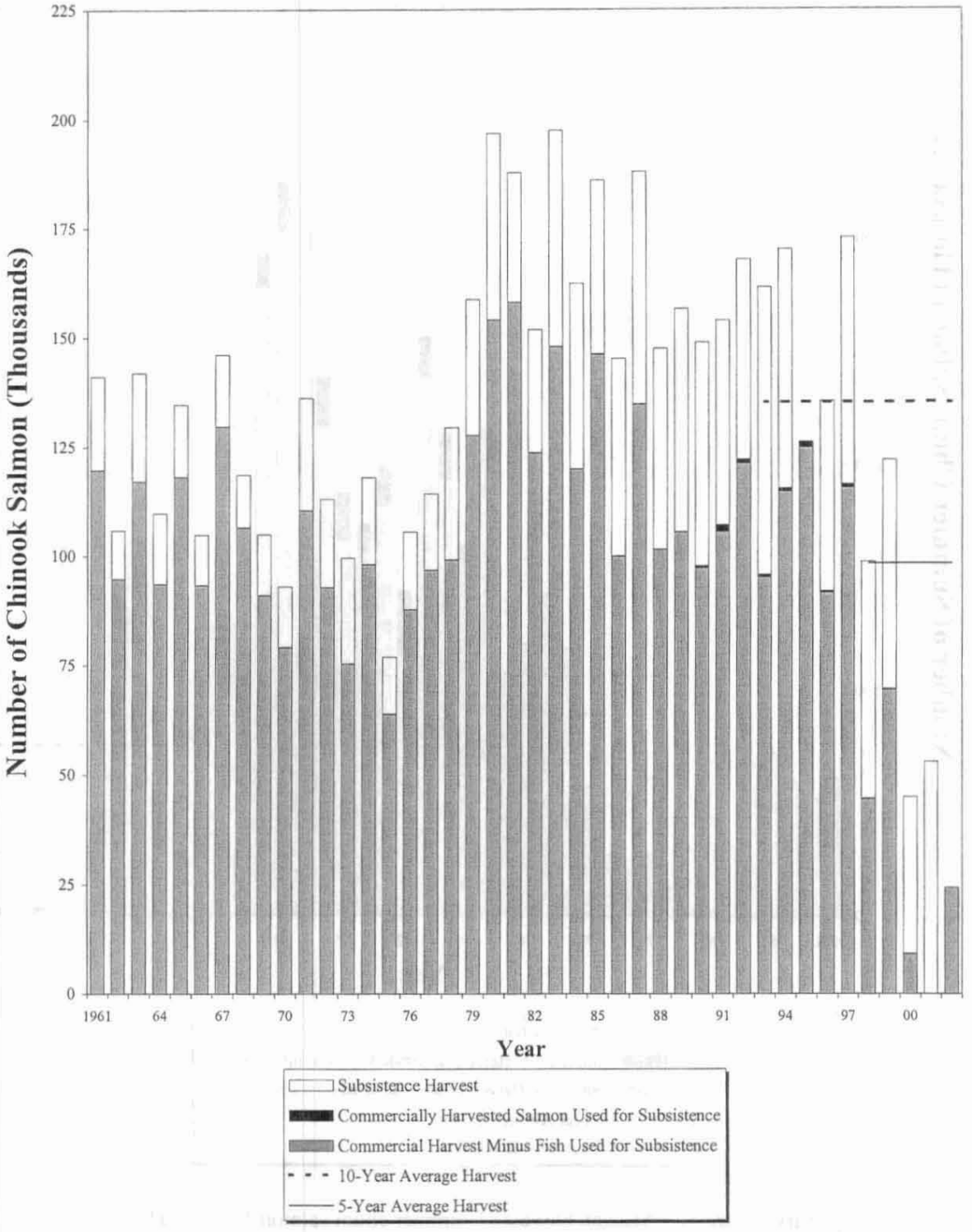
[z] No survey of Wood Creek due to obstructions in creek.

[aa] Preliminary.

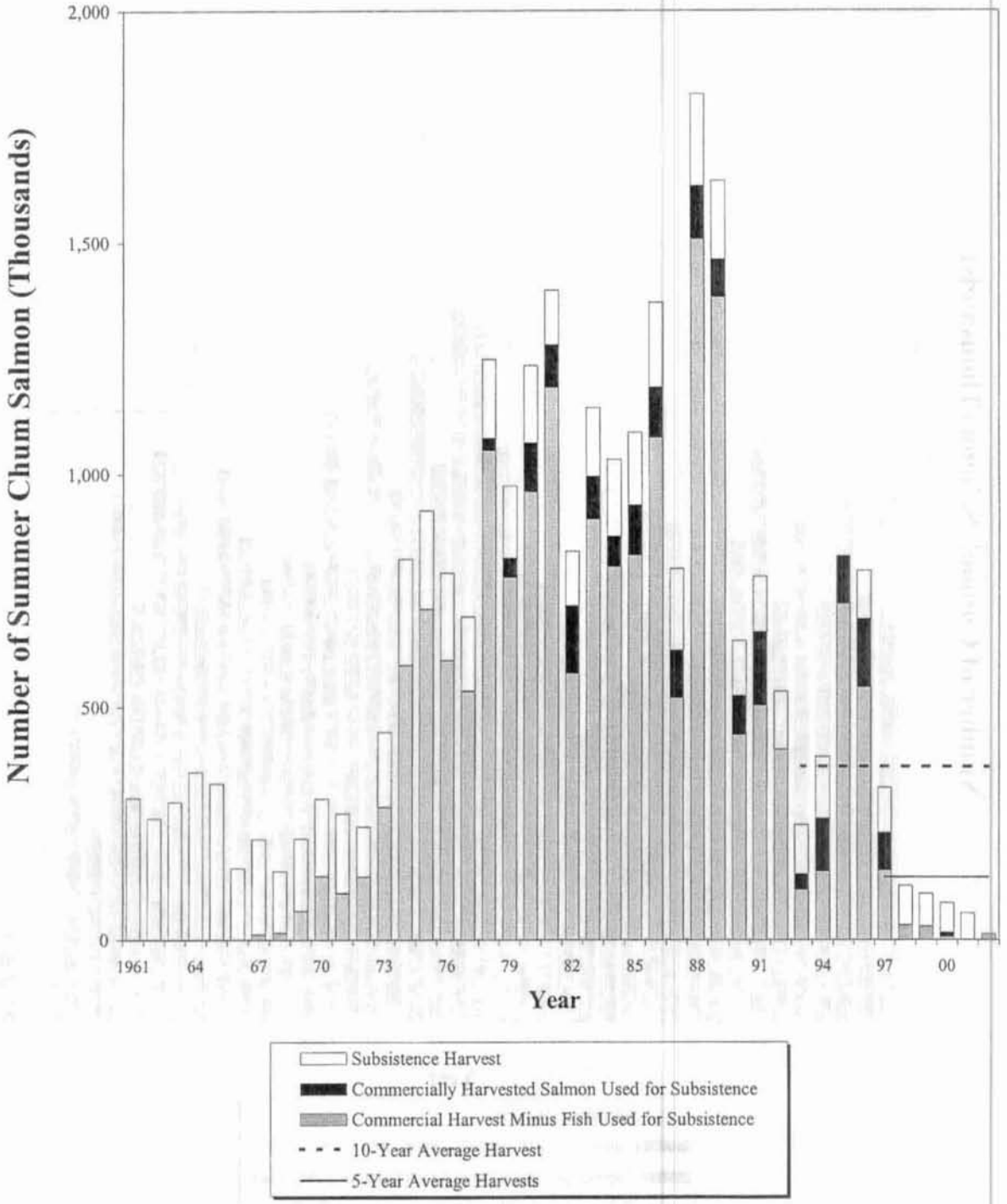
[ab] Interim escapement objective (E.O.) established March, 1993, based on boat survey counts of coho salmon in the lower 17.5 river miles during the period October 21 through 27.



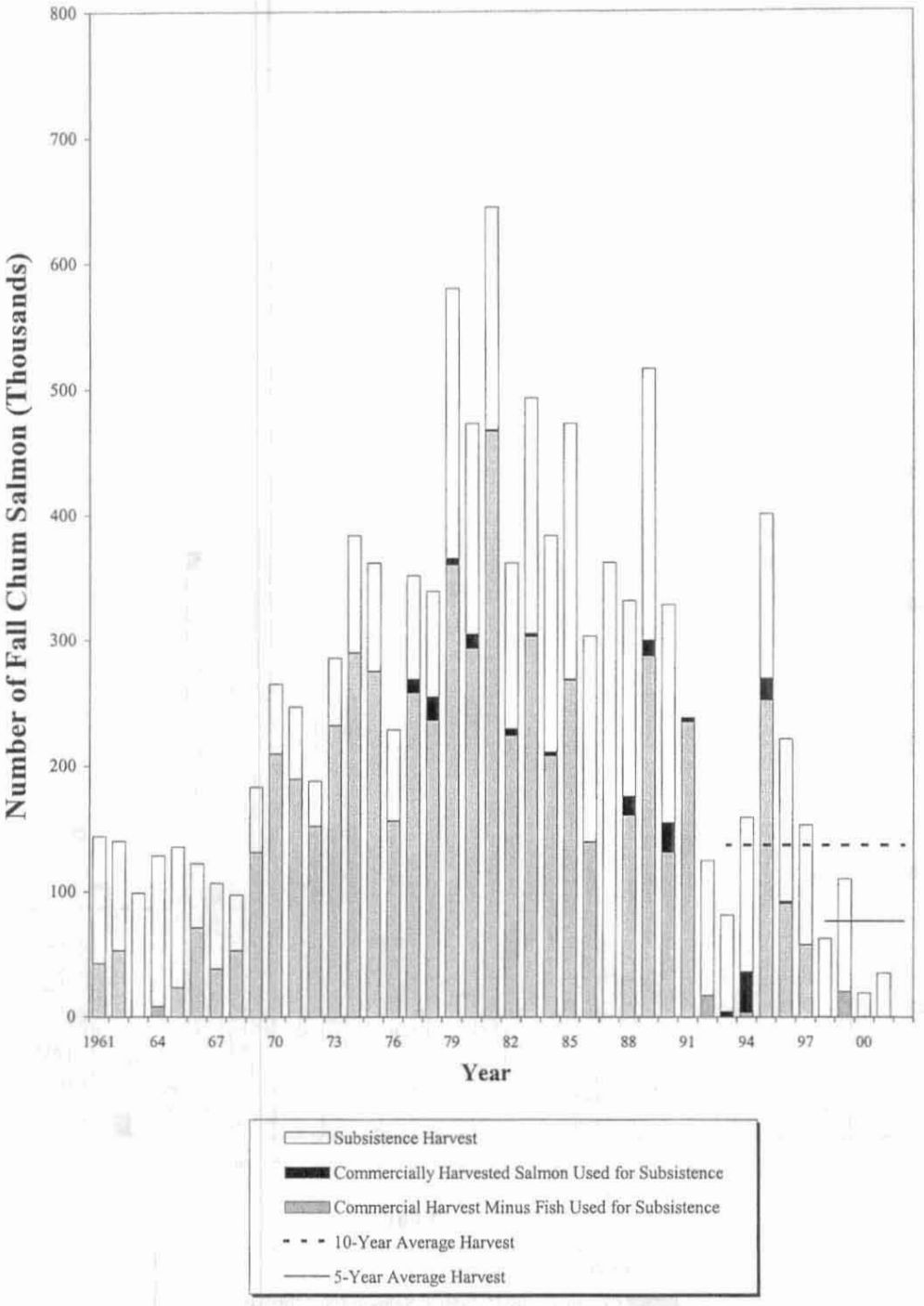
Appendix Figure 1. Total utilization of salmon, Yukon River, 1900-2002.
Alaskan harvest estimates other than commercial are unavailable at this time.



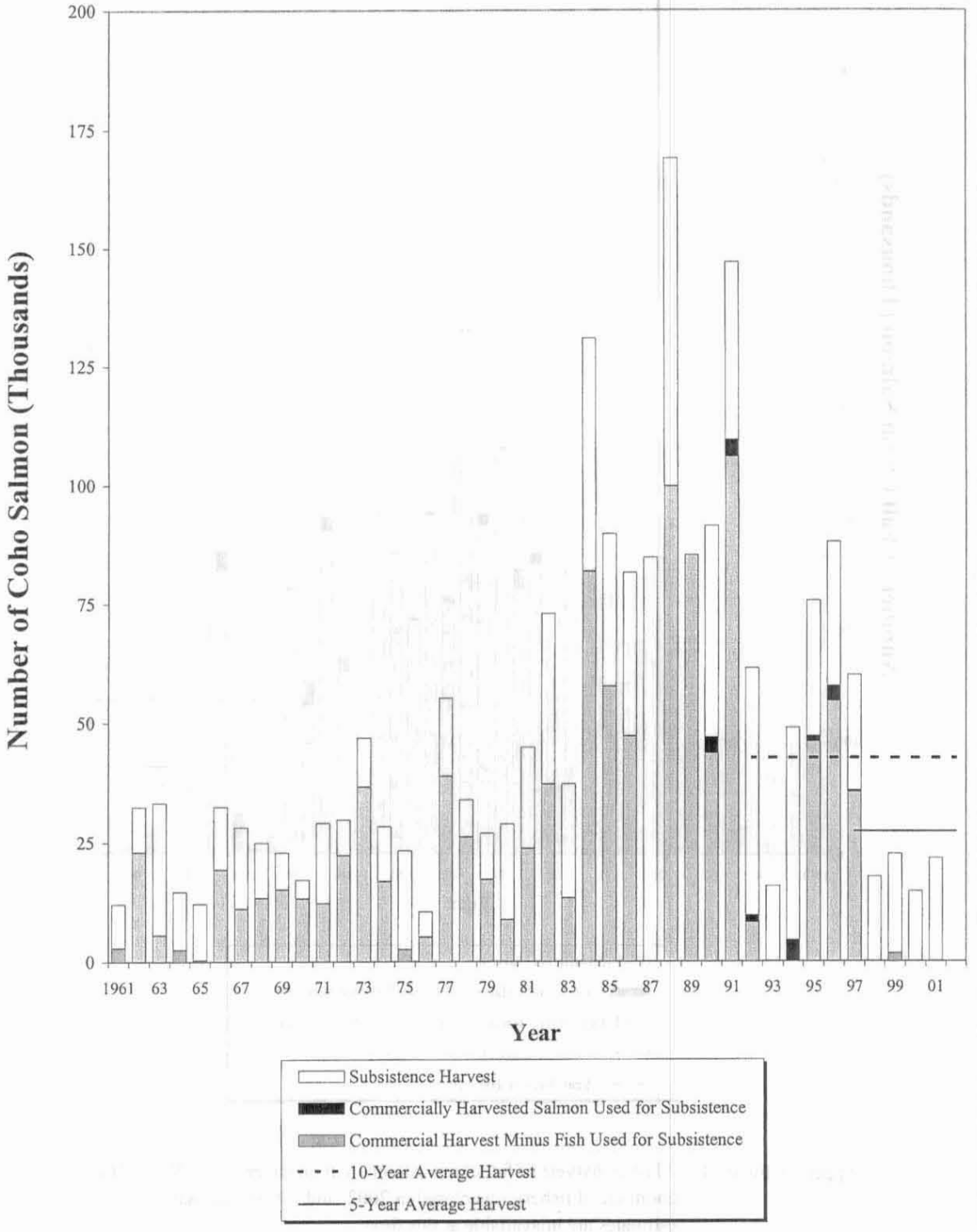
Appendix Figure 2. Alaskan harvest of chinook salmon, Yukon River, 1961-2002. The 2001 commercial fishery was closed. Alaskan harvest estimates other than commercial are unavailable at this time.



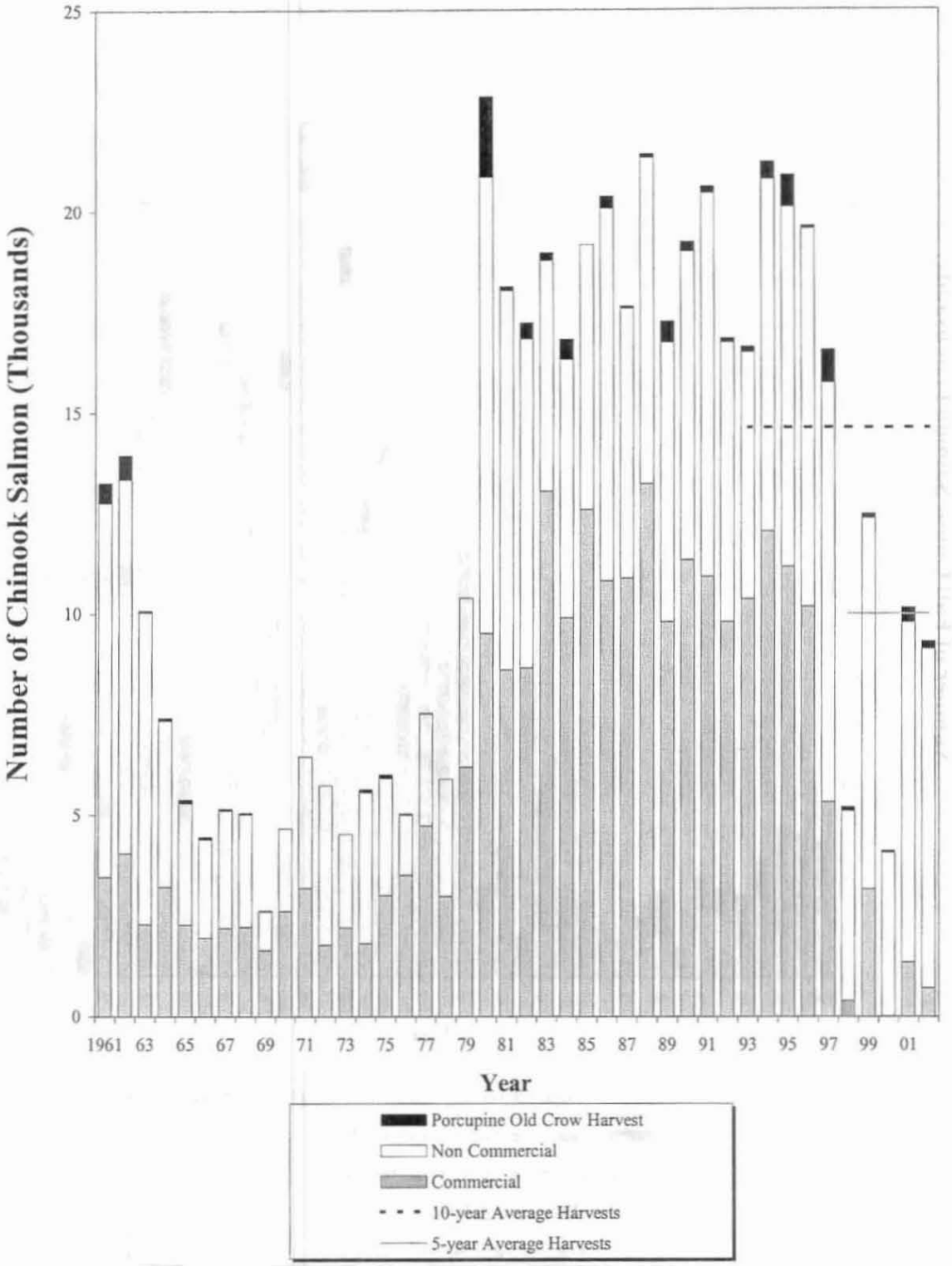
Appendix Figure 3. Alaskan harvest of summer chum salmon 1961-2002. The 2002 harvest estimates other than commercial are unavailable at this time.



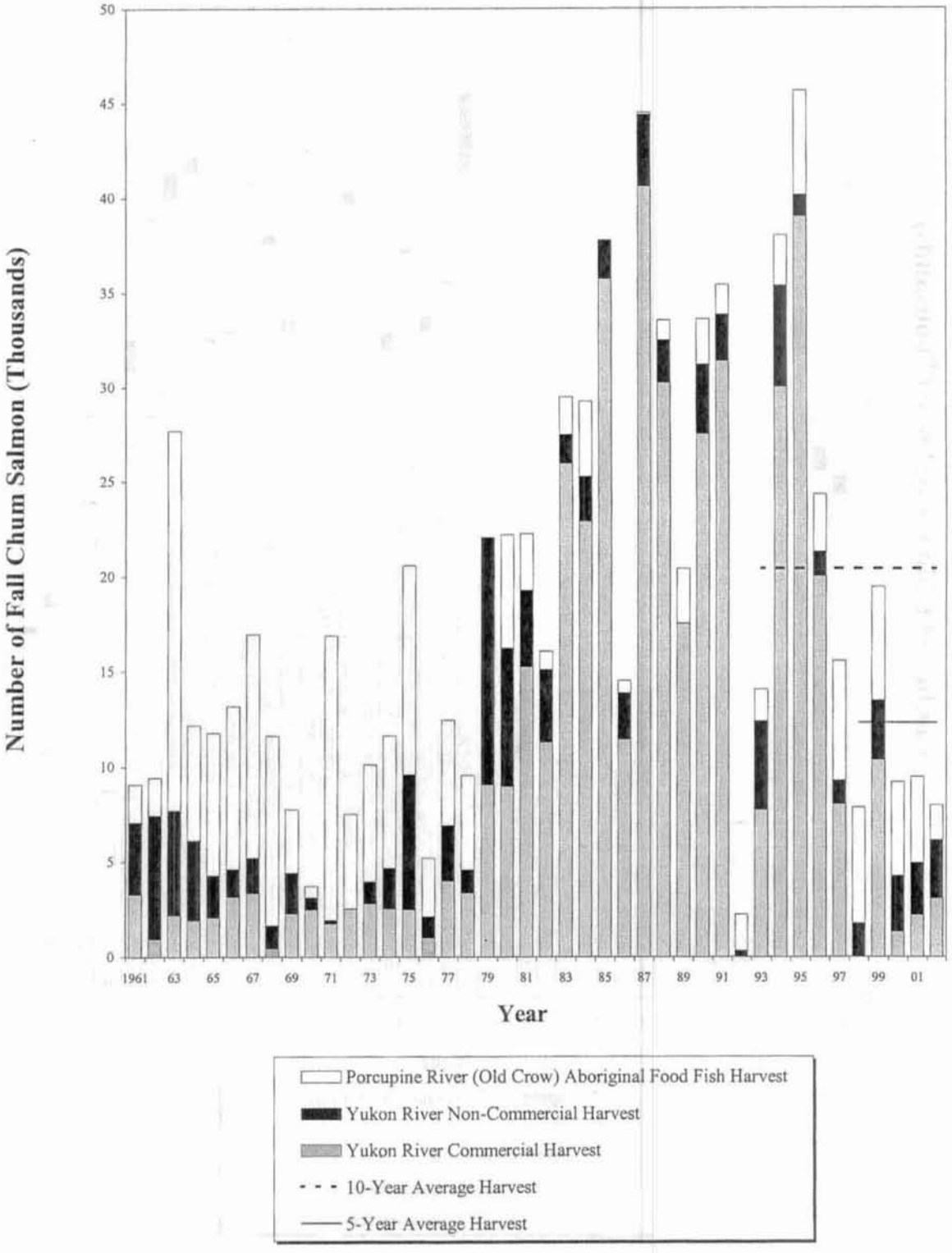
Appendix Figure 4. Alaskan harvest of fall chum salmon, Yukon River, 1961-2001. The commercial fishery was closed in 2002, and subsistence harvest estimates are unavailable at this time.



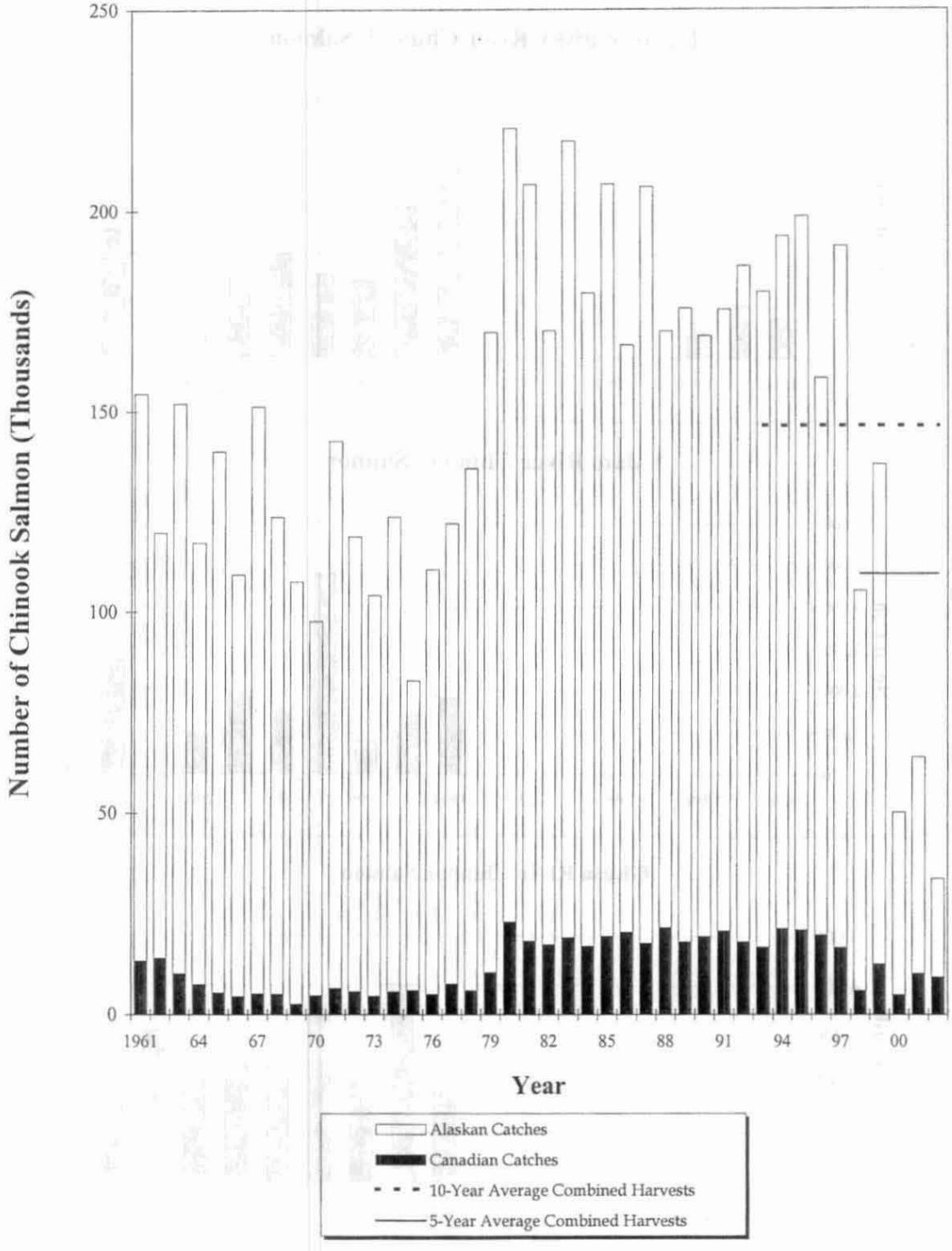
Appendix Figure 5. Alaskan harvest of coho salmon, Yukon River, 1961-2001. The commercial fishery was closed in 2002, and subsistence harvest estimates are unavailable at this time.



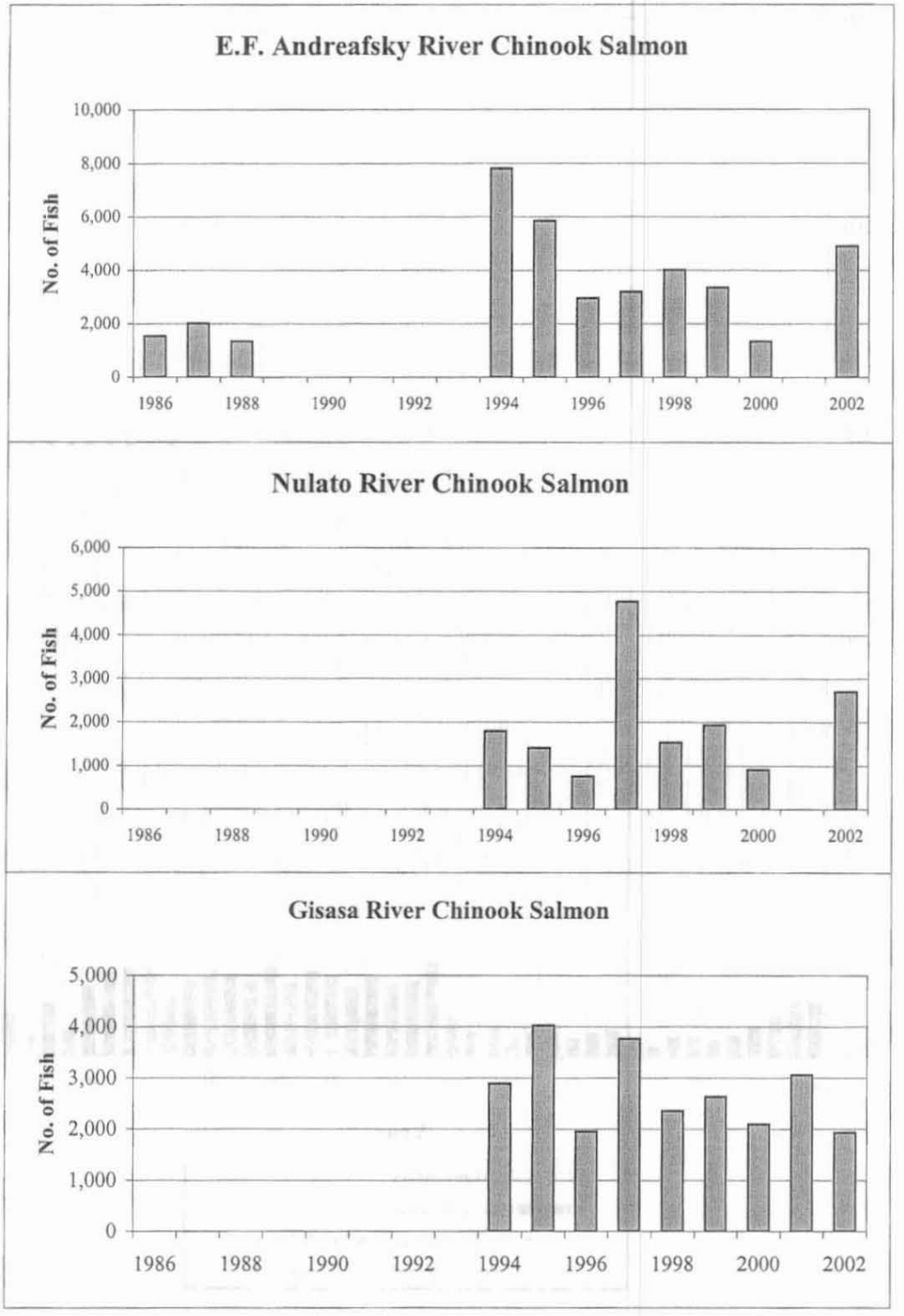
Appendix Figure 6. Canadian harvest of chinook salmon, Yukon River, 1961-2002. Catch data for 2002 are preliminary.



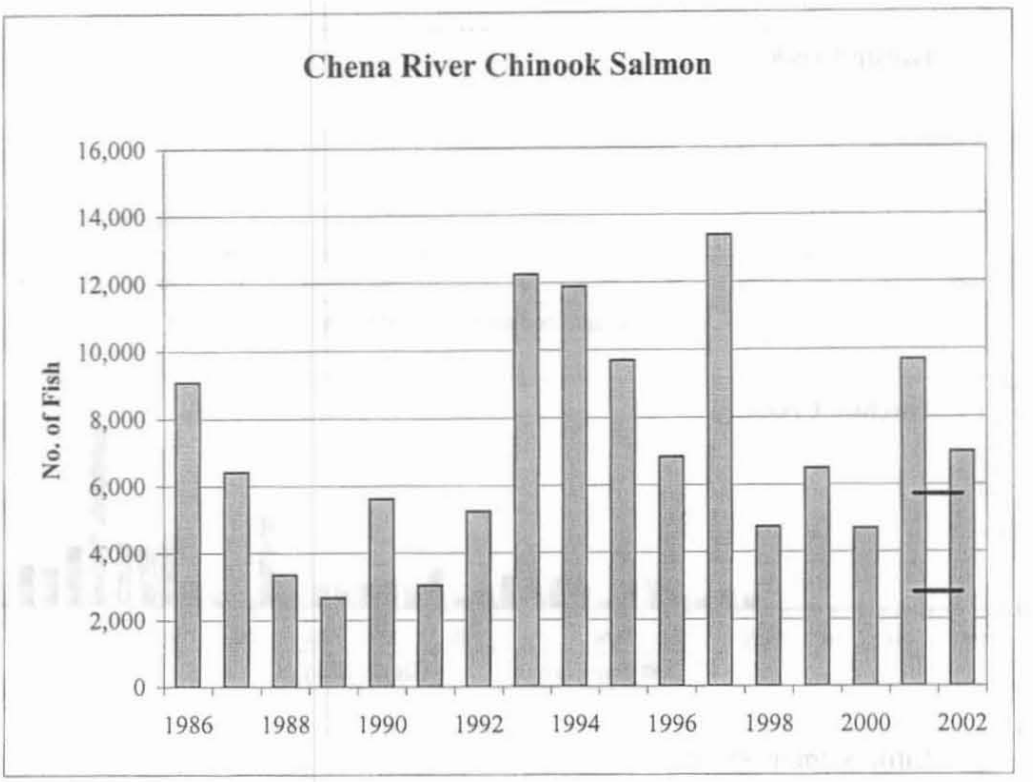
Appendix Figure 7. Canadian harvest of fall chum salmon, Yukon River, 1961-2002. Catch data for 2002 are preliminary.

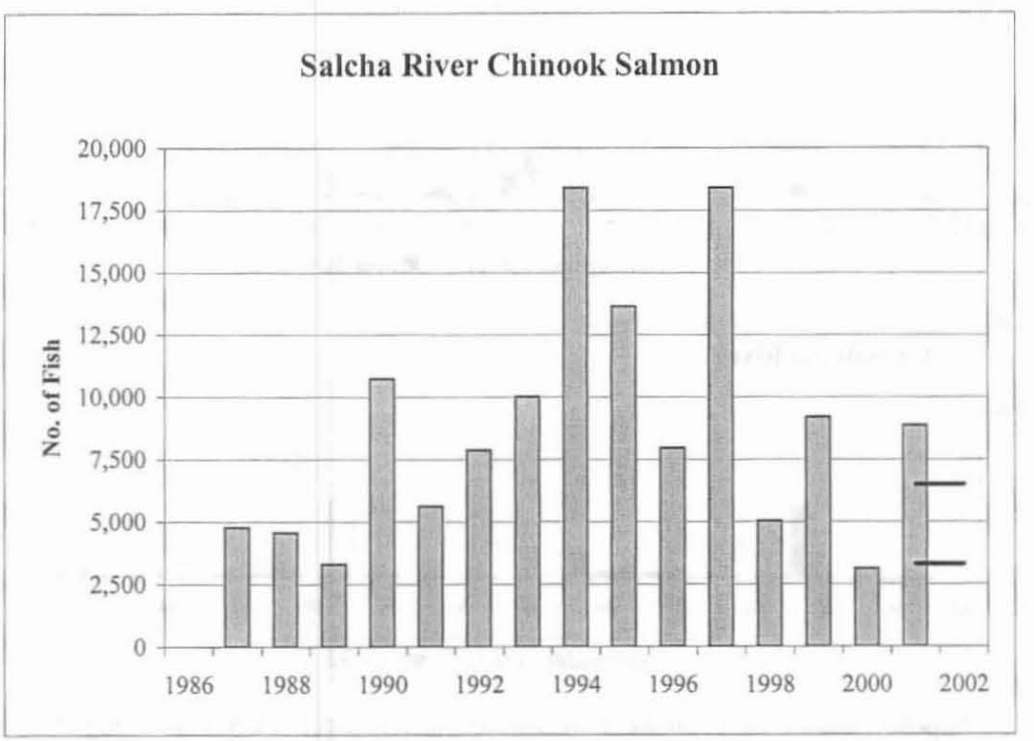


Appendix Figure 8. Total utilization of chinook salmon, Yukon River, 1961-2002. Catch data for 2002 are incomplete and preliminary.

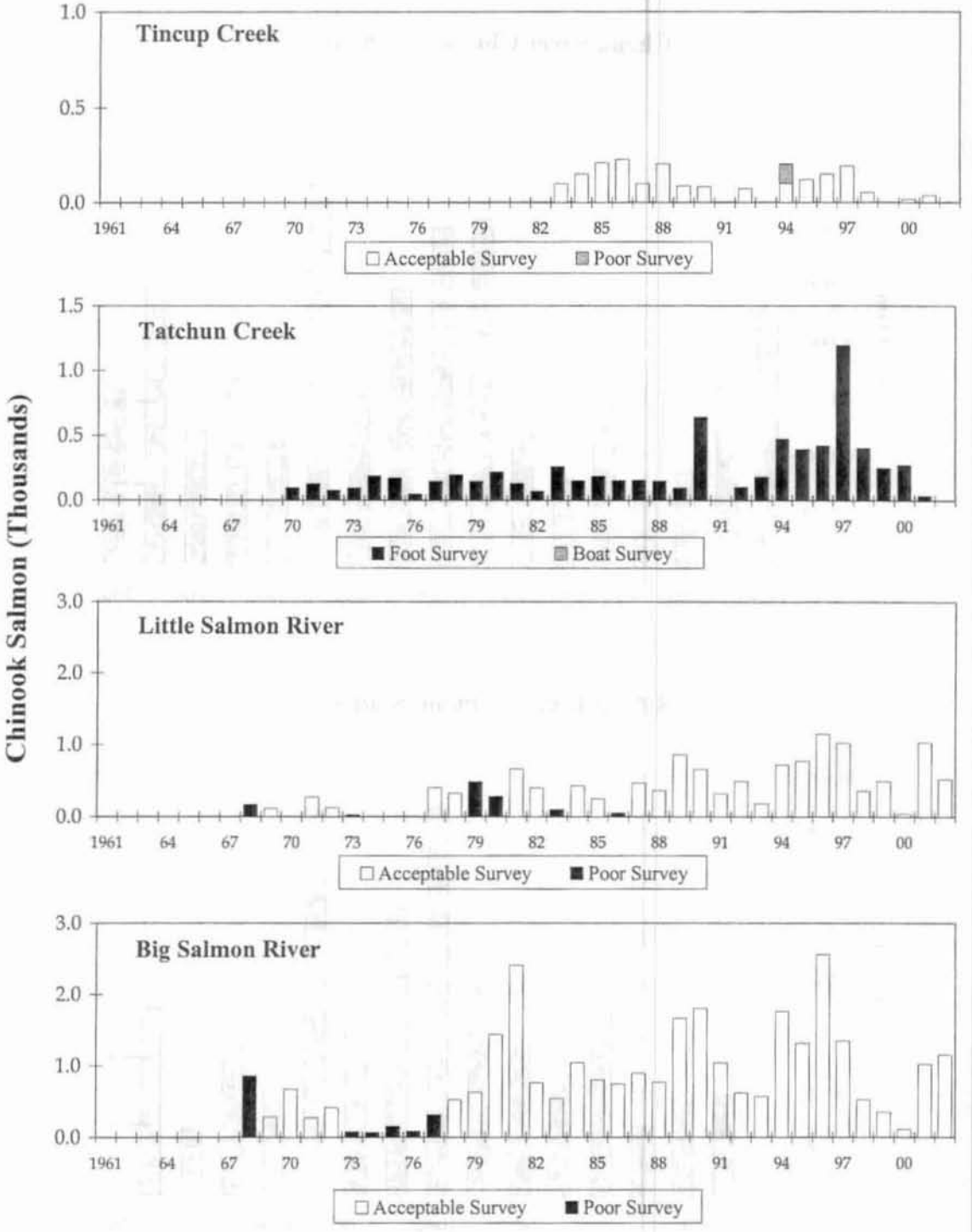


Appendix Figure 9. Chinook salmon ground based escapement estimates for selected tributaries in the Alaska portion of the Yukon River drainage, 1986-present. The BEG range is indicated by the horizontal lines for tributaries with BEGs. Note, vertical scale is variable.

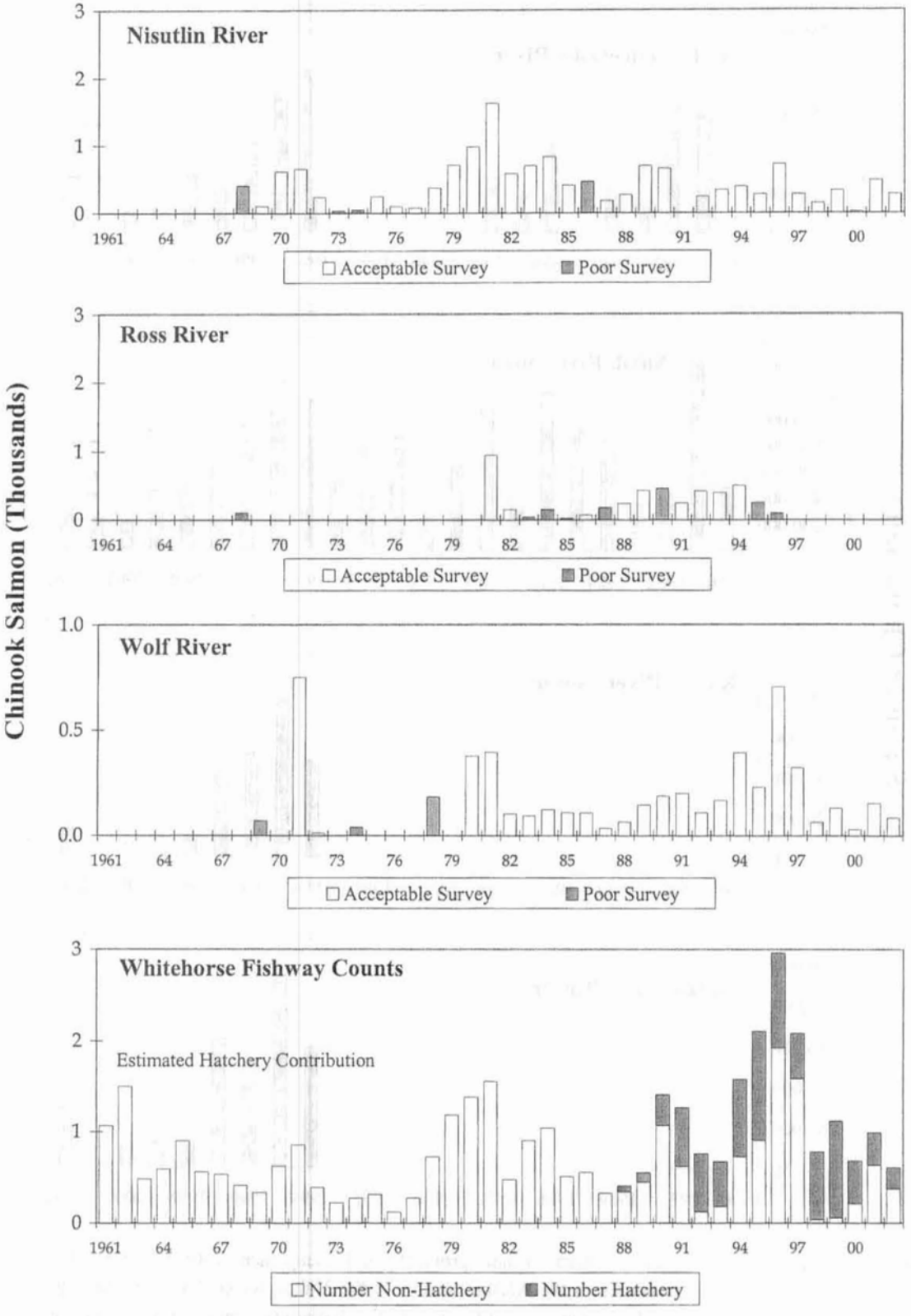




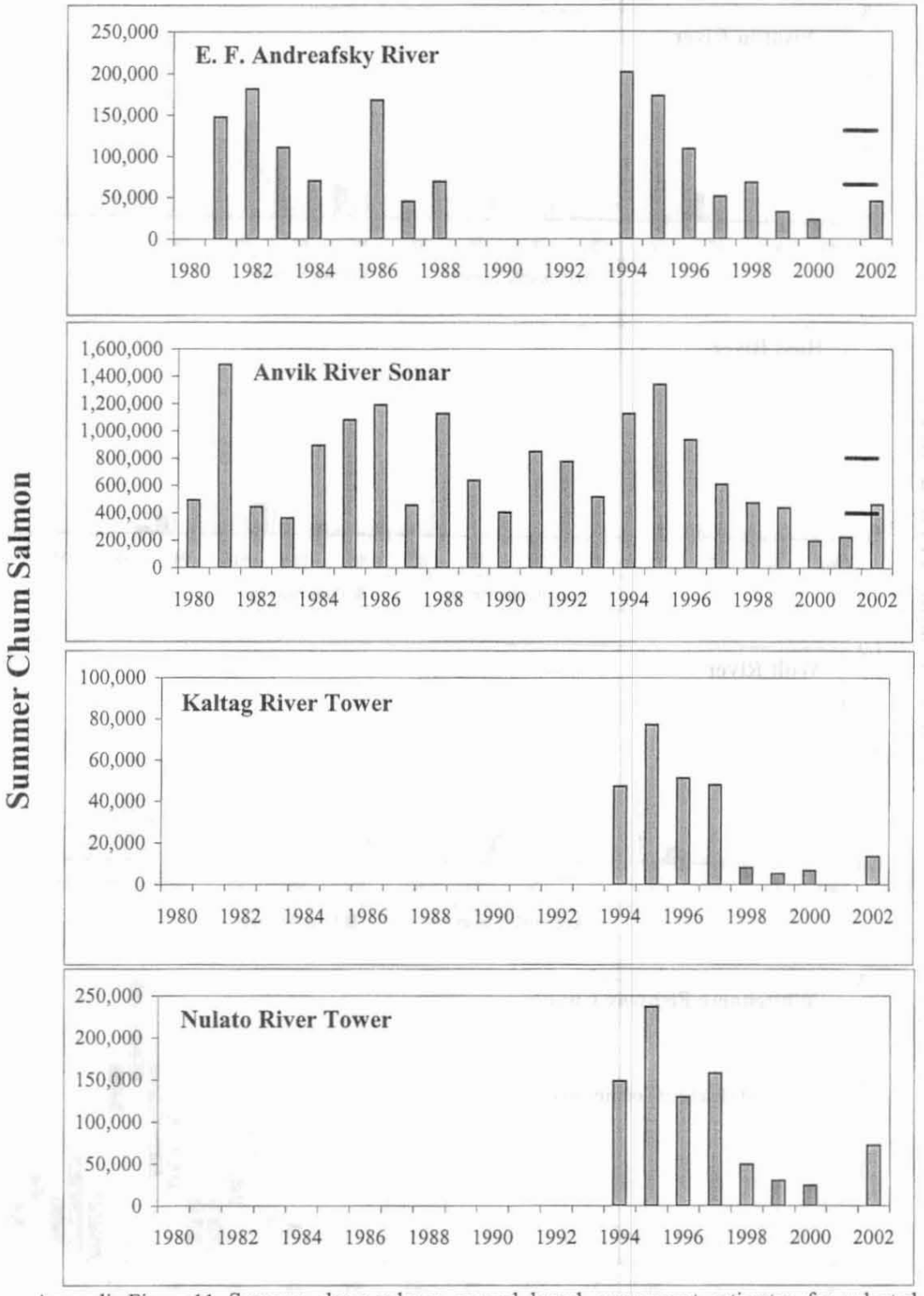
Appendix Figure 9 Continued. (page 2 of 2)



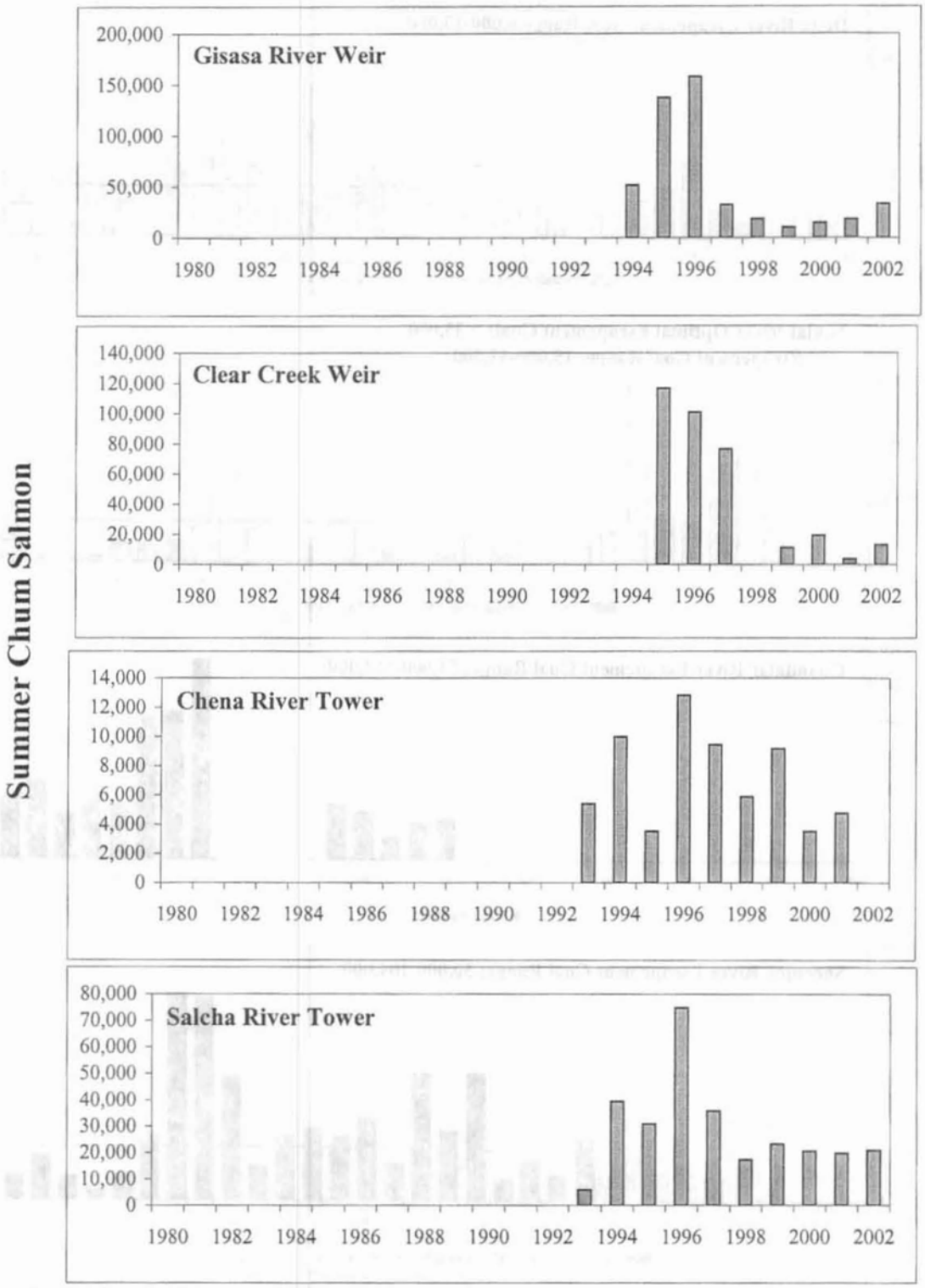
Appendix Figure 10. Chinook salmon escapement data for selected spawning areas in the Canadian portion of the Yukon River drainage, 1961-2002. Data are aerial survey observations unless noted otherwise.
Note, vertical scale is variable.



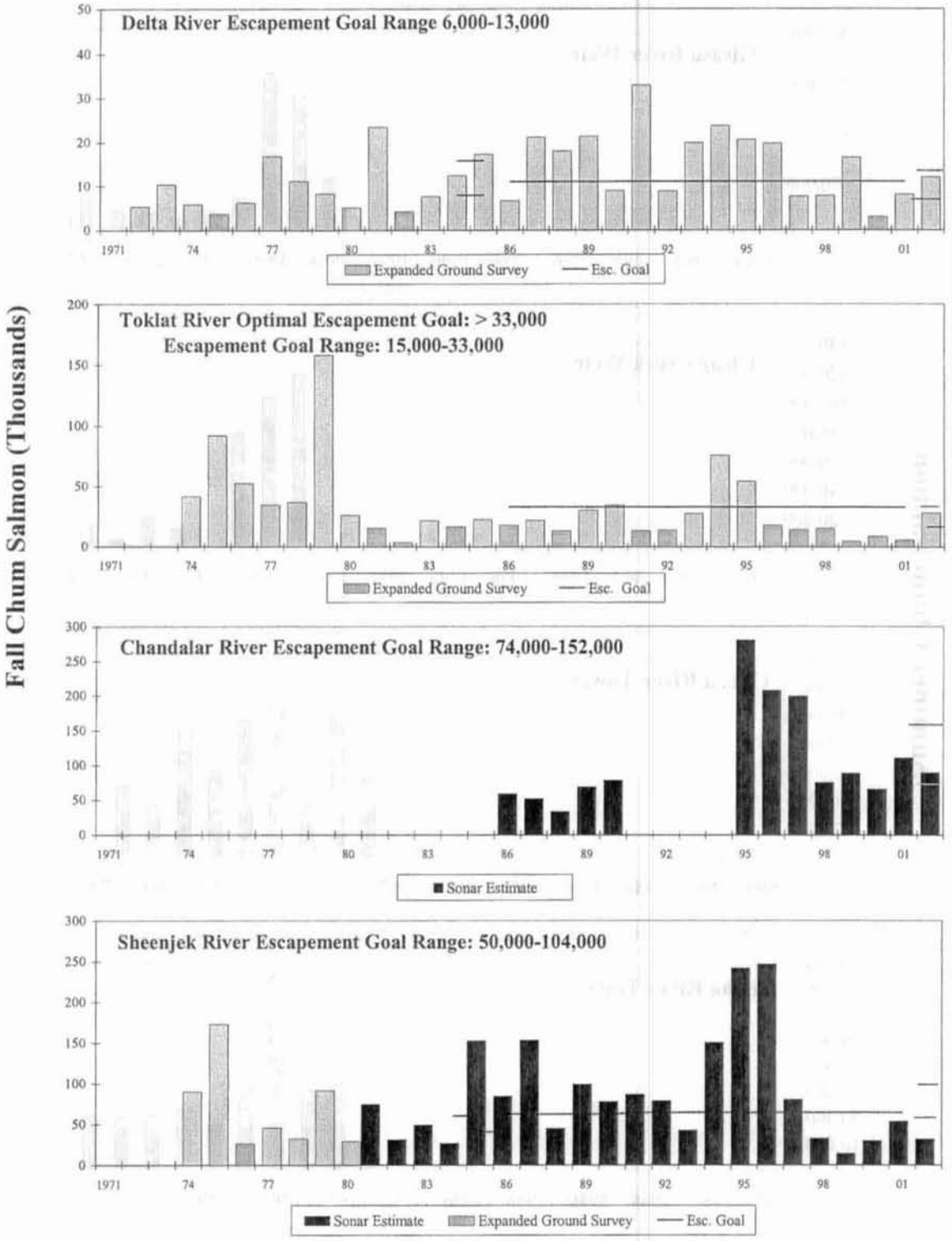
Appendix Figure 10 Continued. (page 2 of 2)



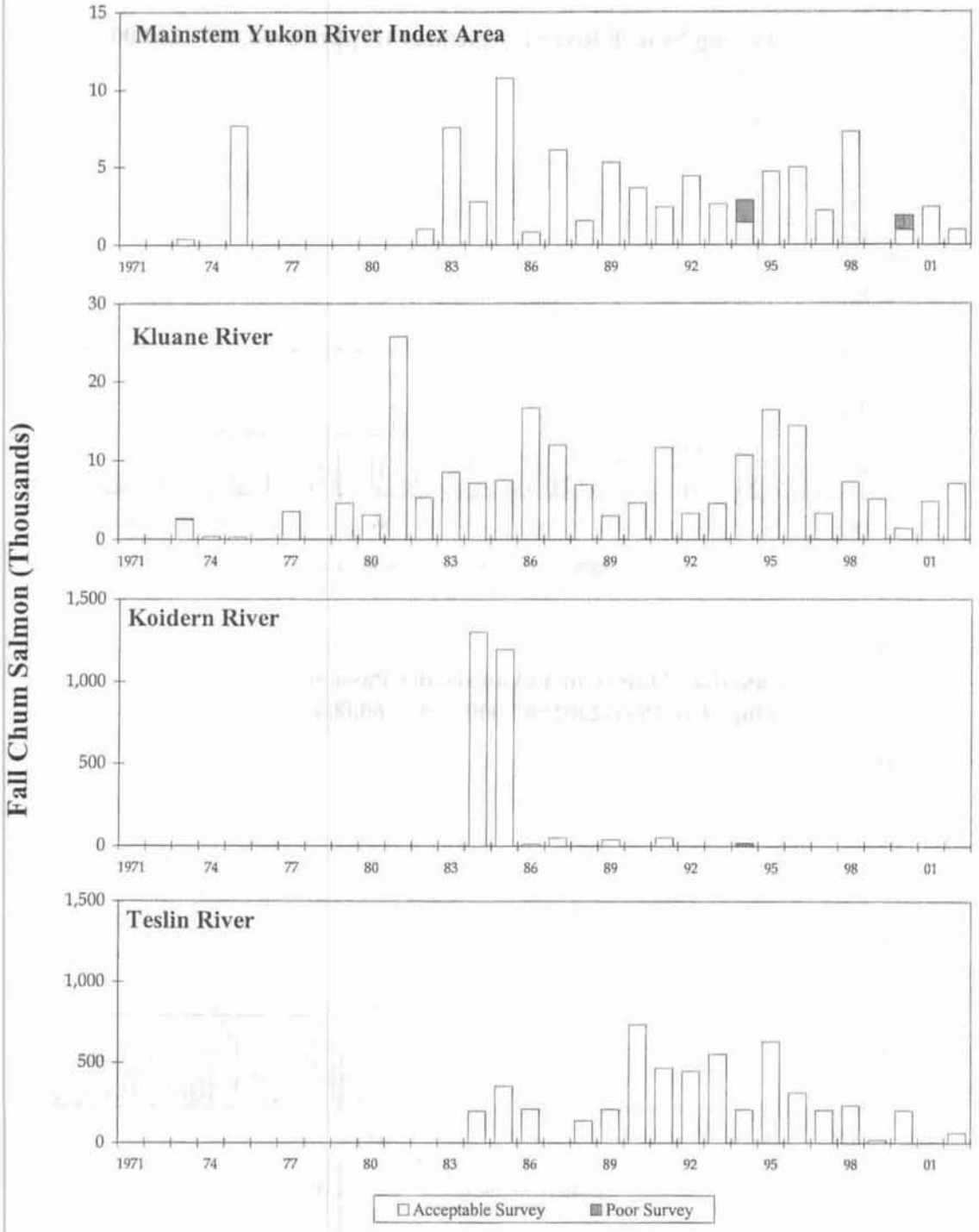
Appendix Figure 11. Summer chum salmon ground based escapement estimates for selected tributaries in the Alaska portion of the Yukon River drainage, 1980-2002. The BEG range is indicated by the horizontal lines for tributaries with BEGs. Note, vertical scale is variable.



Appendix Figure 11 Continued. (page 2 of 2)

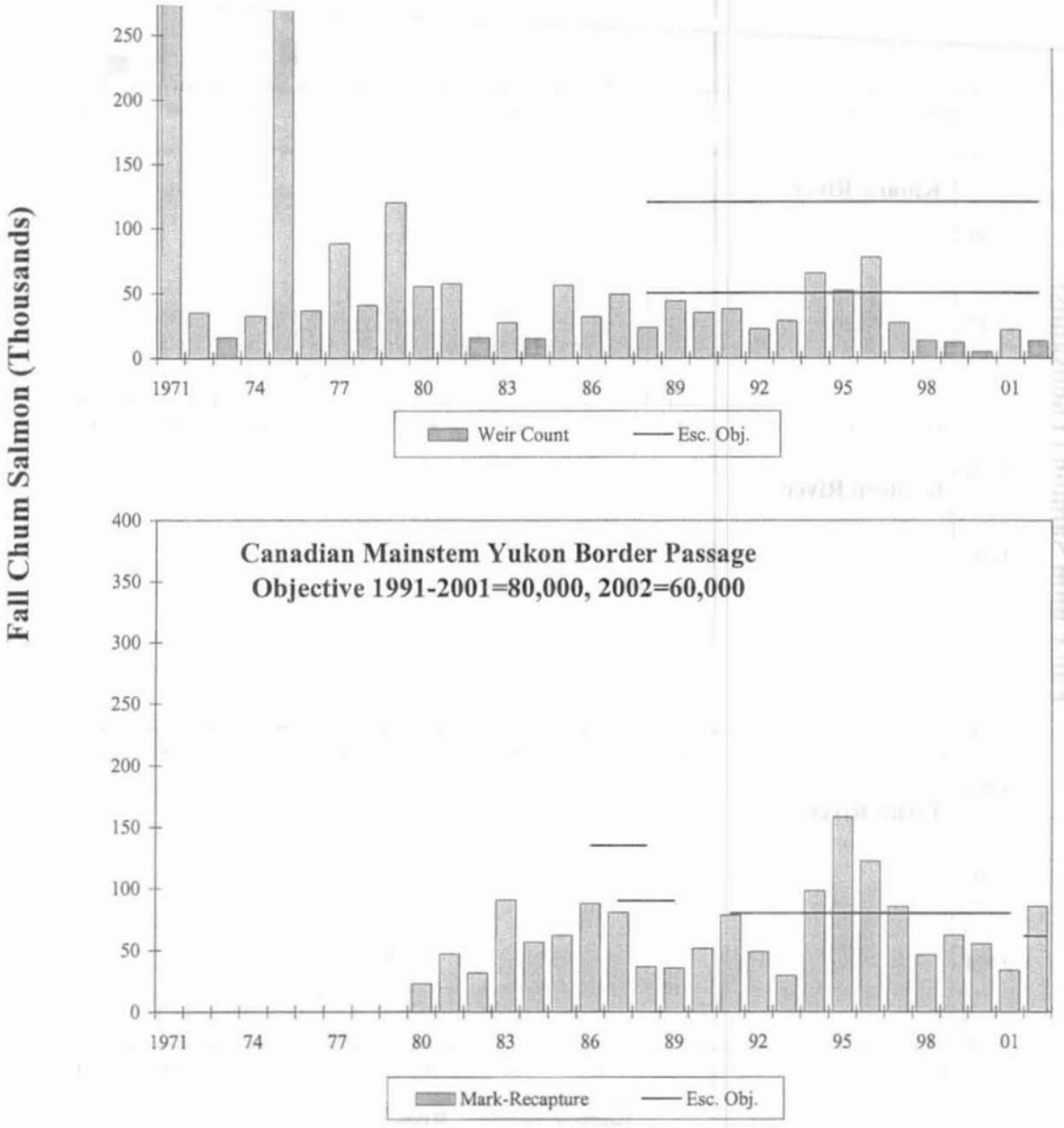


Appendix Figure 12. Fall chum salmon escapement estimates for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1971-2002. Horizontal lines represent biological escapement goals or ranges. Note, vertical scale is variable.

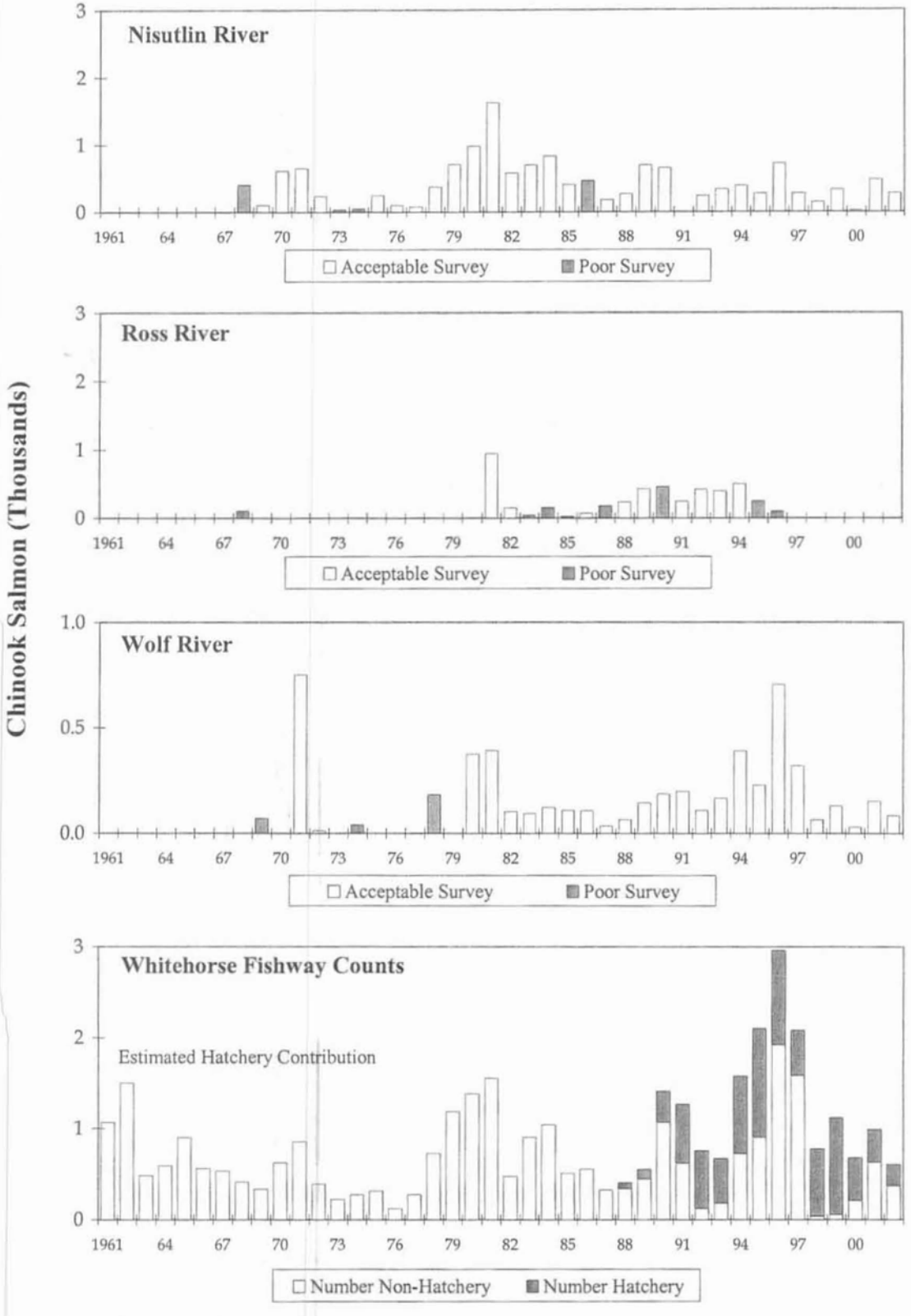


Appendix Figure 13. Fall chum aerial survey data for selected spawning areas in the Canadian portion of the Yukon River drainage, 1971-2002. Note, vertical scale is variable.

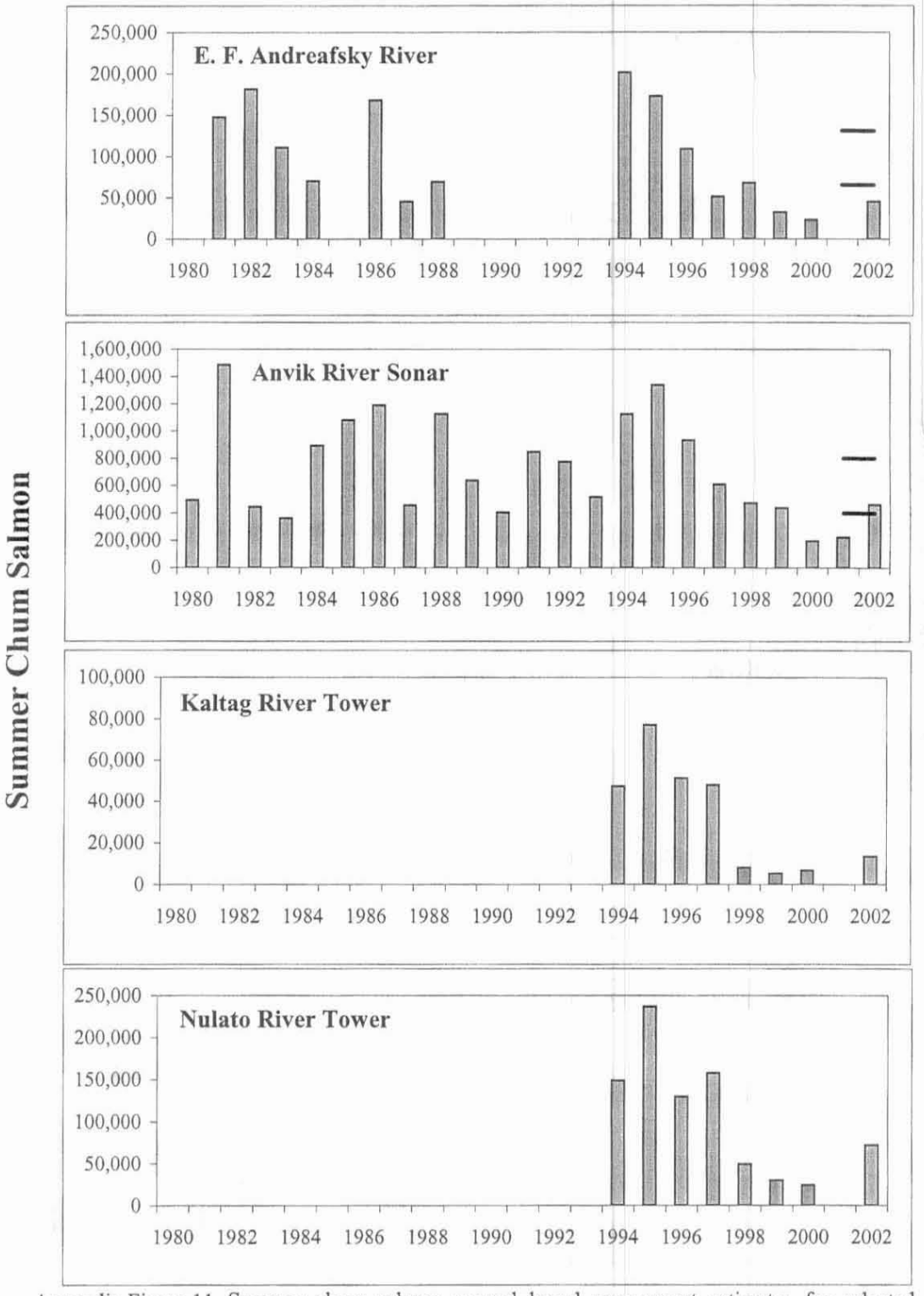
Figure 11. Summer chum salmon ground based escapement estimates for selected tributaries in the Alaska portion of the Yukon River drainage, 1980-2002. The BEG range is indicated by the horizontal lines for tributaries with BEGs. Note, vertical scale is variable.



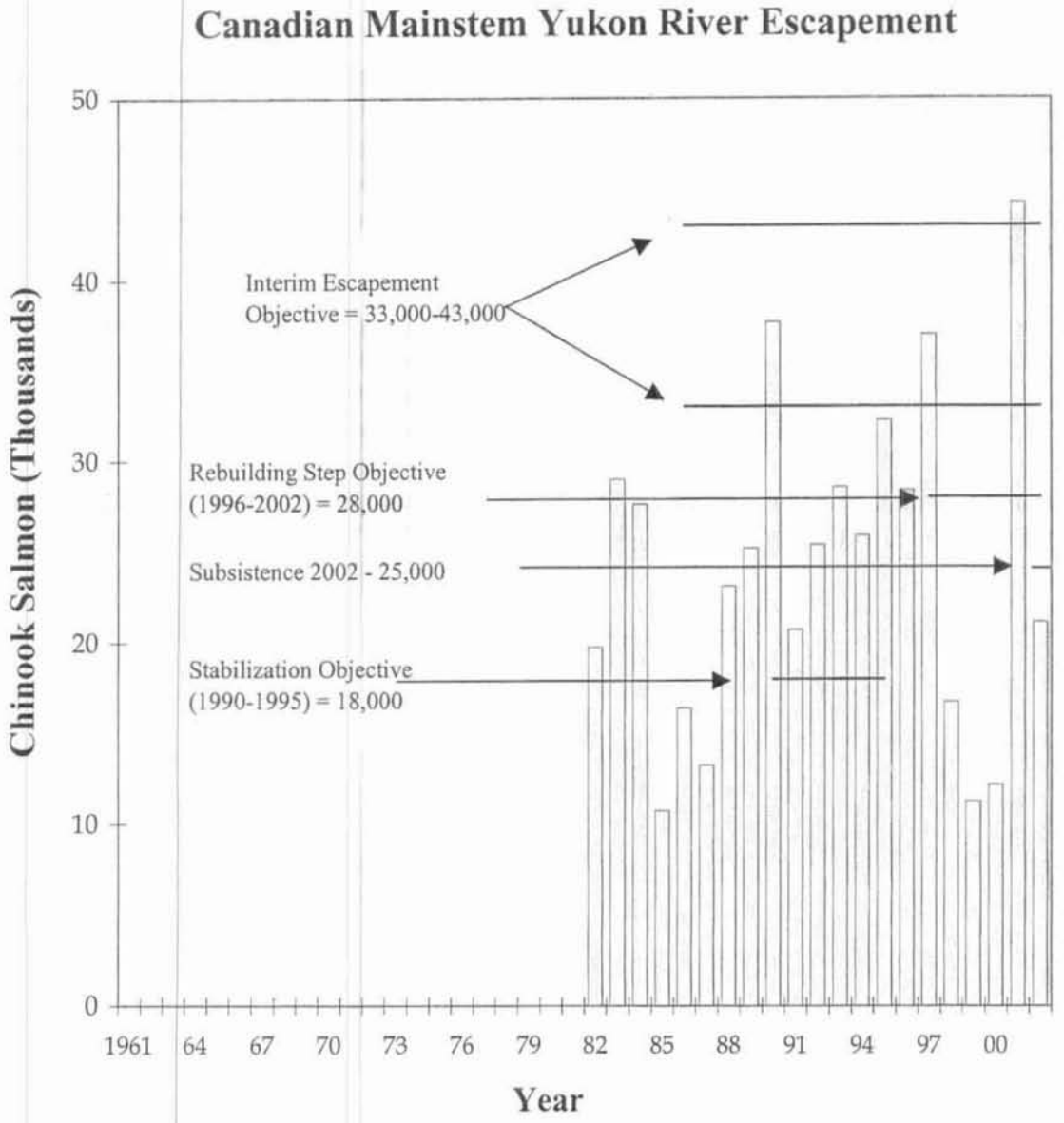
Appendix Figure 14. Fall chum salmon escapement estimates for spawning areas in the Canadian portion of the Yukon River drainage, 1971-2002. Horizontal lines represent interim escapement goal objectives or ranges.



Appendix Figure 10 Continued. (page 2 of 2)



Appendix Figure 11. Summer chum salmon ground based escapement estimates for selected tributaries in the Alaska portion of the Yukon River drainage, 1980-2002. The BEG range is indicated by the horizontal lines for tributaries with BEGs. Note, vertical scale is variable.



Appendix Figure 15. Estimated total chinook salmon spawning escapement in the Canadian portion of the mainstem Yukon River drainage, 1982-2002. 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. Subsistence objective for 2002 was set at 25,000.

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