YUKON RIVER SALMON 2003 SEASON REVIEW AND 2004 OUTLOOK

Prepared by

THE UNITED STATES AND CANADA
YUKON RIVER JOINT TECHNICAL COMMITTEE

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1.0 INTRODUCTION

The fall meeting of the Yukon River Joint Technical Committee (JTC) was held in Whitehorse from November 30 to December 3, 2003. The agenda for this meeting was to present the standard season summaries, including a review of the 2003 fisheries, stocks and projects. The spring meeting was held in Anchorage on February 18-19, 2004. This meeting agenda included discussions on escapement goals, managers presented outlooks for 2004 and discussion about net selectivity ensued. These agendas were cleared with the chief panelists, and this report is information intended for the panelists and project managers. Participants at the meetings included the following persons:

Executive Secretary, Yukon River Panel
- Hugh J. Monaghan

Fisheries and Oceans Canada (DFO)
- Sandy Johnston (JTC Co-Chair)
- Rick Ferguson
- Al Von Finster
- Mary Ellen Jarvis
- Patrick Milligan
- Raquel Roizman*

Alaska Department of Fish and Game (ADF&G)
- John Hilsinger (JTC Co-Chair)
- Bonnie Borba
- Fred Bue
- Drew Crawford
- Hamachan Hamazaki
- Tracy Lingnau
- Susan McNeil
- Ted Spencer
- Paul Salomone#

U.S. Fish and Wildlife Service (USFWS)
- Jeff Adams
- Jeff Bromaghin
- Russ Holder
- Steve Lewis
- David Wiswar

Tanana Chiefs Conference (TCC)
- Mike Smith

Independent Canadian Contractors
- Clive Osborne*
- Brian Mercer*

US Bureau of Land Management (BLM)
- Bob Karlen

NOAA-NMFS
- John Eiler
- Dick Wilmot*

US Geological Survey-Biological Research Division
- Jim Finn

Association of Village Council Presidents (AVCP)
- Jennifer Hooper
- Norman Cohen#

Bering Sea Fishermen's Association (BSFA)
- Chris Stark

Panel Members
- Sidney Carl#
- Jerry Couture#

Yukon River Drainage Fisheries Association (YRDFA)
- Joe Sullivan

* Fall only.
\# Spring only.

2.0 COMMERCIAL FISHERY – ALASKA in 2003

2.1 CHINOOK SALMON MANAGEMENT OVERVIEW

The lower Yukon River was ice-free on May 17, the second earliest date since the Alaska Department of Fish and Game (ADF&G) began maintaining records (1961) and ten days earlier than the historic average of May 27 (1962-2002). The first subsistence catch of chinook salmon was reported on May 22 near Alakanuk. ADF&G's test fishing project recorded its first chinook salmon catch immediately after setting the test fishing nets on May 27. Elders noted conditions in the Lower Yukon Area during the early portion of the season were characterized by low and unusually clear water, the lowest and clearest water the Yukon River has been in many years during this early portion of the season. Near normal levels were prevalent from mid-June to the end of the summer season. 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 and subdistricts and drainages (Table 1 and 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 harvest outlooks. This sheet included the regulatory subsistence salmon fishing schedule. 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 would be allowed 7 days a week to provide opportunity to harvest resident species, such as whitefish, sheefish, pike, and suckers. The information sheet was used to prepare fishers for the possibility of reductions to the subsistence salmon fishing schedule or to allow a small commercial fishery depending upon how the runs developed. The information sheet was mailed to Yukon River commercial permit holders and approximately 2,400 subsistence-fishing families who receive subsistence harvest calendars. State and federal staff presented the management strategy to the Yukon River Drainage Fishermen's Association (YRDFA), State of Alaska Advisory Committees, and Federal Regional Advisory Councils.

A major and conservative component of the preseason management plan was to wait until near the midpoint of the chinook salmon run before determining if the run was strong enough to support a commercial fishery. The strategy was to pass fish upstream for escapement, cross-border commitments to Canada, and subsistence uses, and give the department time to assess the run before commercial fishing. This interim strategy was designed to offer some limited opportunity during the recent weak runs. However, a drawback to this approach is that any commercial fishing would occur on the end of the run, on singular stocks, and does not spread out harvest. Also, if the run is strong, to delay commercial fishing could result in foregone commercial harvests. Because the 2003 chinook salmon run was unexpectedly strong, this management strategy was detrimental to the commercial fishery. The first half of the run was strong enough to have sustained commercial harvest of chinook salmon. The preferred strategy for a commercial fishery is to fish during the middle 50% of the run, a strategy in place before the decline of the runs beginning in 1998. Because of two years of improved runs, and an additional surplus of fish above escapement and subsistence

needs, a return to commercial fishing during the mid-portion of the run will be considered for the 2004 season. Conservative management in 2003 may have contributed to a foregone commercial harvest of up to 40,000 chinook salmon, a loss to commercial fishers of up to 2 million dollars.

Emmonak test fishing indices, subsistence harvest reports, and Pilot Station sonar passage estimates provide information ADF&G used to assess the salmon run in season. As the run progressed upriver, other projects provided additional run assessment information. Poor runs since 1998 lead to a conservative preseason management strategy in 2003 with a potential harvest, if the run was similar to 2002, ranging from 0-20,000 chinook salmon. As the run developed it became clear the 2003 chinook salmon run was better than expected and management of the fishery became more liberal as a result. The preliminary season commercial harvest totals for chinook salmon were approximately 41,000 fish, twice the preseason outlook. Based on set gillnet test fishing catch per unit effort (CPUE) data and preliminary Pilot Station sonar estimates, the chinook salmon run appeared to be a week earlier than the 2002 run (Figure 2).

According to test fishing CPUE data, approximately 50% (mid-point) of the chinook salmon run had entered the lower river by June 15, six days earlier than the average date for the midpoint. The cumulative set gillnet test fishery CPUE in 2003 was 26.98 compared to 1998-2002 average of 17.59 and above the 1989-1997 (prior to the run decline) average of 26.17. The Pilot Station sonar cumulative passage preliminary estimate of approximately 254,000 chinook salmon (Table 2) was nearly twice the estimate of 112,000, and the highest ever recorded at the project. This estimate in contrast with information from test nets, indicated a run of near average run strength. Commercial catches during openings in Districts 1 and 2 were near record harvests for the period of time fished, indicating a good run. Good catch rates were reported in subsistence harvests throughout the Alaska portion of the Yukon River drainage, corroborating ADF&G assessment of the strong chinook salmon run.

ADF&G uses the best available data, including preseason run outlooks, test fishing indices, age and sex composition, subsistence and commercial harvest reports, and escapement monitoring projects to assess the run. Preliminary harvest and escapement information from projects throughout the drainage indicated chinook salmon escapement goals were either met or exceeded, the 2003 chinook salmon run abundance was assessed at near average and the best run since 1997. Escapement information from tributaries in the Tanana River drainage indicated escapements of near record levels. Aerial surveys in the U.S. portion of the drainage were limited because of poor weather and high water levels. Preliminary escapement information from Canada also indicated high numbers of chinook salmon in spawning tributaries. Several escapement indices having a long history, were breaking records. However, the border passage estimate indicated a run approximately 15% below the record set in 2001.

2.2 SUMMER CHUM SALMON MANAGEMENT OVERVIEW

The 2003 Yukon River summer chum salmon run was managed according to the guidelines described in the Yukon River Summer Chum Salmon Management Plan (Table 3). Similar to chinook salmon, this management plan provides escapement and subsistence needs as first priority

over other consumptive uses such as commercial, sport, and personal use fishing. The plan allows for varying levels of harvest opportunity depending on the run size projection.

ADF&G monitored the 2003 summer chum salmon run in the lower Yukon River by using the lower Yukon River drift gillnet test fishery, subsistence harvest reports, Pilot Station sonar passage estimates, and Anvik River sonar passage estimates. Results from these projects, in combination with the preseason projection, were the basis for initial management decisions in 2003.

The Pilot Station sonar project only provides an estimate of the number of salmon passing the sonar site. 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 2002 (87,000) and the most current East Fork Andreafsky River (multiplied by two, to account for the West Fork Andreafsky River) escapement estimate, and commercial harvests were added to the 2003 inseason Pilot Station passage projection. The corresponding total run size estimate was applied to the summer chum salmon management plan to determine appropriate management actions.

Unlike chinook salmon, the run timing of summer chum salmon was normal. Before the 2003 season, ADF&G informed buyers and commercial fishers of the potential for a directed summer chum salmon commercial fishery in 2003. By the end of June, the estimated summer chum salmon projection, based on Pilot Station sonar counts, had reached a passage estimate to allow a directed summer chum salmon fishery. No buyers were interested in a directed summer chum salmon fishery except in District 6. Poor market conditions and infrastructure problems, limited opportunity for commercial fishing for summer chum salmon.

Summer chum salmon estimates at Pilot Station indicated a run size similar to 2002. However, by the first week in July, escapement projects throughout the drainage were not reflecting the run strength Pilot Station had shown. ADF&G discussed this during the July 22 Yukon River Drainage Fishermen's Association (YRDFA) teleconference. The example used was the Anvik River. The Anvik River typically observes about half of the Pilot Station summer chum salmon passage. With the Pilot Station cumulative passage of 1.2 million summer chum salmon, roughly 500,000 summer chum salmon would have expected to escape into the Anvik River. However, the escapement estimate was approximately 250,000 fish at that time. This apparent discrepancy was not limited to the Anvik River. All summer chum salmon escapement projects indicated escapements were less than 2002.

Although new, the lower river summer chum salmon drift gillnet project indicated, similar to the escapement projects, a summer chum salmon run of less magnitude than 2002. This year's cumulative CPUE was 1,704 compared to last years 2,490. The 2003 cumulative CPUE was roughly 70% of last year and may have better reflected the actual summer chum salmon abundance. However, the number of fish passing the Pilot Station sonar project, along with the CPUE associated with the species apportionment portion of the project, verified the sonar counts.

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 and 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 segment through the lower river districts before commercial fishing begins. Because of concerns for the 2003 chinook salmon run strength, the commercial fishing season did not open until after the mid-point of the run on June 16 in District 1. This opening was after approximately 17 days of increasing subsistence and test fishery catches. Based on lower river test fishing, the chinook migration exhibited steady passage rates from May 31 through July 6, declining thereafter. A strong pulse was detected in the test fishery from June 11 to June 15 and at Pilot Station from June 13 to June 17. This pulse was tracked all the way to the Canadian border and provided a reference point in the run as it migrated upriver.

Fishing periods in Districts 1 and 2 were reduced to 6-hours duration rather than the more typical 12-hour periods. All District 1 and 2 openings were restricted mesh openings; 8-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 of the lack of a summer chum salmon market and an estimated run size just above the minimum threshold necessary to allow for a directed commercial summer chum salmon harvest.

Five commercial fishing periods were allowed in District 1 and four periods in District 2. No commercial fishing occurred in District 3 because there was no buyer (Table 1). One fishing period (period 4 in District 1 and period 3 in District 2) was a concurrent fishing period. District 1 was open but only a portion of District 2. For District 2, buyers at that time would only purchase fish from the lower end of District 2, i.e., a higher quality product, therefore ADF&G developed a plan to provide opportunity for District 2 commercial fishers. Otherwise, District 2 commercial fishers were allowed to commercially fish only in a specific area of District 2. The area open to District 2 commercial fishers was downriver of Department of Fish and Game regulatory marker located in Mountain Village at the old cannery on the north side and a regulatory marker on the opposite south bank side. This catch area was outlined because of processor concerns over the quality of fish caught in the upper reaches of District 2. This type of split district opening represented a creative attempt to offer opportunity to fishers in District 2 who lacked a market for fish had this opportunity not occurred. The result of commercial fishing in two districts at the same time proved unsatisfactory and the remaining fishing periods were opened on a single district basis and not opened concurrently.

The combined total harvest of 36,928 chinook salmon for Districts 1 and 2 was 33% below the low end of the guideline harvest range of 60,000 fish and 53% below the 1993-2002 average harvest of 78,723 fish. The average weight of chinook salmon in the 2003 commercial harvest was 21.4 pounds. The estimated age composition of chinook salmon samples collected from the lower river commercial harvest was 0.6% age-4, 27.9% age-5, 63.4% age-6, and 7.8% age-7 fish. The sex composition of the samples was 53.2% females and 46.8% males.

The combined commercial summer chum salmon harvest in District 1 and 2 of 6,162 fish was 92% below the 1993-2002 average harvest of 85,505 fish. The average weight of summer chum salmon in the 2003 commercial harvest was 7.3 pounds.

District 4

Historically, the Subdistrict 4-A fishery targets summer chum salmon, dominant gear type is fish wheels and the location of the fishery results in a very high chum to chinook salmon ratio. In 2003, preseason efforts were made by ADF&G to develop markets in anticipation of a potential surplus of summer chum salmon. In spite of a proactive approach by ADF&G, no market was found and the result was no commercial openers were held in Subdistrict 4-A.

The Anvik River Management Area remained closed to commercial fishing in 2003 for the sixth consecutive year in 2003, because of a poor run of summer chum salmon into that tributary. 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, and along the Anvik River were greatly impacted because of no commercial fishing.

Commercial fishing directed at chinook salmon was open for one 24-hour and two 48-hour periods in Subdistricts 4-B and 4-C. A total of 562 chinook salmon harvested is 75% below the lower end of the guideline harvest range for all of District 4. A total of 62 summer chum salmon were harvested incidentally to the directed chinook salmon fishery.

Additional commercial periods were considered directed at summer chum salmon in Subdistrict 4-C to see if the summer chum salmon run was stronger along the south bank of the Yukon River. Information about summer chum salmon abundance above the Koyukuk River was sparse in 2003 because high water disrupted operations at most of the escapement projects. A commercial fishing period in Subdistrict 4-C may have provided managers with information on abundance through qualitative analysis of catch rates. Other factors that effect catchability are water levels and amount of effort, but run strength information can be obtained from a commercial fishing period. Although ADF&G favored the opening, the federal inseason manager was against the idea and the commercial opening was not pursued.

District 5

Four commercial fishing periods were allowed in Subdistricts 5-B and 5-C for a total of 60 hours of fishing time. The harvest of 908 chinook salmon was 62% below the lower end of the guideline harvest range of 2,400 fish. The low harvest was not caused by a weak run. The inability to catch fish was because of the predominant gear type in that portion of the river. Also, buying power limited harvests in Subdistricts 5-B and 5-C after the second opening. Typically, the harvest of summer chum salmon is low in these subdistricts because they are located above most summer chum spawning areas.

Commercial fishing in Subdistrict 5-D was opened for two 24-hour fishing periods in 2003. The Subdistrict 5-D harvest of 226 chinook salmon was below the lower end of the guideline harvest range of 300-500 chinook salmon.

District 6

Commercial fishing in District 6 was opened for three 42-hour chinook salmon directed periods and two 42-hour summer chum salmon directed periods in 2003. Test fish wheel and commercial catches indicated summer chum salmon in the Tanana was near average and warranted commercial fishing. The total estimated commercial harvest was 1,813 chinook and 4,461 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 1993-2002 average summer chum salmon harvest is 18,585 fish. Management of the fishery for chinook salmon was primarily based on Chena and Salcha River tower counts.

The age, sex, and length data of chinook salmon collected from the upper river commercial harvest was 0.9% age-3, 11.3% age-4, 41.3% age-5, 40.2% age-6, and 6.2% age-7 fish. The sex composition of the samples was 35.8% females and 64.2% males. Fish wheels, the predominant gear type in the upper Yukon River area, are biased in their harvests, catching mostly smaller chinook salmon, and mostly males.

2.3 FALL CHUM AND COHO SALMON

2.3.1 Fall Chum and Coho Salmon Fisheries Summary

The Yukon Area commercial fisheries for fall chum and coho salmon has become sporadic with commercial fishing occurring in only five out of the past ten years and significantly reduced harvests in each of those five years. The 2003 fall commercial fishery developed late because of the initial conservative run assessment and the cautious management approach. As the fall chum salmon run progressed upriver, managers reassessed the run strength based on Pilot Station sonar estimates by comparing indicators from upriver abundance projects and subsistence catch reports. The fall chum salmon run was then considered sufficient enough to achieve the drainagewide escapement goal of 400,000 fish and individual escapement goals in most areas, provide for subsistence needs and meet Canadian obligations; and provide for sport, personal use and commercial fishing opportunities.

The 2003 season marks the first commercial fishing for fall chum and coho salmon since 1999. On August 25, when the first commercial period was announced in District 1, approximately 90% of the fall chum and 80% of the coho salmon run had already entered the Yukon River. The estimated Yukon Area commercial harvest for fall chum salmon was 10,996 (5,586 Lower Yukon Area, 5,410 Upper Yukon Area) or approximately 77% below the previous 10-year average (1993-2002) of 47,500 fall chum salmon (30,500 Lower Yukon Area, 17,000 Upper Yukon Area). The estimated Yukon Area commercial harvest for coho salmon was 25,243 (9,757 Lower Yukon Area, 15,486 Upper Yukon Area) or 74% above the previous ten-year average of 14,500 coho salmon (12,500 Lower Yukon Area, 2,000 Upper Yukon Area). The combined overall 2003 estimated harvest for fall chum and coho salmon was 36,239 fish or 42% below the recent 1993-2002 average of 62,000 salmon.

The low commercial harvest of fall chum salmon and above average harvest of coho salmon was the result of the combination of late season fishing dates, the large return of coho salmon, buyer

preference for coho salmon, and limited commercial markets, all affected by conservative management. In 2003, 82 commercial permit holders participated in the fall season fisheries (75 Lower Yukon Area, 7 Upper Yukon Area) compared to the 1993 to 2002 average number of 128 fishermen (118 Lower Yukon Area and 10 Upper Yukon Area).

In 2003, Yukon River fishermen received an average price for fall chum salmon of $0.15 per pound in the Lower Yukon Area and $0.10 per pound in the Upper Yukon Area. For coho salmon, fishermen received an average price of $0.25 per pound in the Lower Yukon Area and $0.05 per pound in the Upper Yukon Area The preliminary 2003 combined commercial exvessel value for fall chum and coho salmon was estimated to be approximately $32,654 ($24,161 Lower Yukon Area, $8,493 Upper Yukon Area) or 37% below the previous 10-year average of $88,000 ($61,600 Lower Yukon Area, $26,400 Upper Yukon Area). No ADF&G test fish sales were made for either fall chum or coho salmon.

2.3.2 Fall Chum Salmon Management Overview

The 2003 Yukon River fall chum salmon run was 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 4). The management plan provides for escapement needs and the subsistence use priority over commercial, sport and personal use fishing activities. The management plan stipulated 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 less than 600,000 fall chum salmon, the drainagewide escapement goal drops in increments from 400,000 to a minimum of 350,000 fish. Provisions in the plan allowed for varying levels of subsistence salmon fishing restrictions before closure of the fishery, when necessary, to meet escapement goals.

From 1987 to 1998, the Yukon River preseason fall chum salmon run size projection had been presented as a point estimate. However, the 1999 to 2003 (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 2003 Yukon River preseason projection was presented as a range of 260,000 to 650,000 fall chum salmon. Management actions are dictated by the actual return and managers relied heavily on inseason run assessment tools that included information from the summer chum salmon run earlier in the season.

The trend of low fall chum salmon productivity was anticipated to continue in the 2003 season. The fall chum salmon run was monitored in the lower Yukon River by the drift gillnet test fisheries at Emmonak and Mountain Village (operated by Asacarsarmiut Traditional Council) and in the middle Yukon River at Kaltag (operated by the City of Kaltag), Pilot Station sonar passage estimates and subsistence catch reports. Mixed results from these projects and the close relationship between annual summer and fall chum salmon run sizes in recent years were utilized for initial management decisions to reduce fall chum salmon subsistence fishing time at the start of the season.

In recent years when summer chum salmon estimates were below average, the fall chum salmon run was also below average to poor. In 2003, the Pilot Station sonar was suspected of over-estimating summer chum salmon passage by 50% when compared to several upriver escapement projects. However, the poor summer chum salmon assessment was driven by the relationship

between the Pilot Station and Anvik River sonar indices. Consequently, conservative management of the fall chum salmon run was based on the inseason assessment of summer chum salmon in the escapements in comparison to the Pilot Station sonar passage estimate.

The Pilot Station Sonar discrepancy with escapement assessments was discussed during the weekly inseason YRDFA teleconferences, a forum to get fishermen input on management options and strategies. Based on the recent trend of poor fall chum salmon runs and the questionable early assessment, there was support for a reduced subsistence fishing schedule of approximately 1/3 the fishing time of the Board of Fisheries 2001 windowed schedule until the sonar assessment could be corroborated using upriver projects. The reduction was to be initiated in the lower river and implemented in other areas as the run progressed upstream, thereby spreading harvest throughout the run rather than potentially exploiting only certain portions of the run. It was hoped that subsistence fishing opportunity would also be more evenly spread throughout the drainage. Furthermore, fishing times and dates were adjusted to provide some opportunity during daylight hours and on weekends as recommended during teleconferences.

As the fall season progressed, it became apparent the run was either very early or very strong. On August 8, the Pilot Station cumulative sonar count was approximately 470,000 fall chum salmon. This was 52% above the recent nine-year average of 246,000 fish by that date. In a year with average run timing, August 8 represents the midpoint of the fall chum salmon run at the Pilot Station sonar suggesting the run size may be near one million.

By August 17, the average three-quarter point of the fall chum salmon run in the lower Yukon River, upriver assessment projects agreed with the Pilot Station sonar estimates. On August 20, the department returned subsistence salmon fishing in the lower Yukon River Districts 1, 2, 3, and the Coastal District to the BOF windowed subsistence fishing schedule, confidence increased the run size would exceed 600,000 fish. Fishing was also returned to the BOF windowed schedule in those upriver districts and subdistricts where fishing time had been reduced. However, gillnet gear restrictions of mesh size no larger than 4 inches and gillnet length no longer than 60 feet remained in effect between scheduled periods. Even though the department viewed the overall drainagewide fall chum salmon run assessment as strong, concerns still existed for the Porcupine River stocks bound for the Sheenjek and Fishing Branch Rivers. Subsistence fishing reductions in harvest were anticipated to have already significantly bolstered upriver escapements. However, if the recent trend of poor fall chum salmon run strength to the Porcupine River drainage continued throughout the 2003 return, the department was prepared to reestablish conservation measures to restrict or close fishing altogether at a later date.

On September 9, the fall chum salmon run appeared large enough to provide for drainagewide escapement needs, subsistence needs, Canadian Border passage commitments and support commercial, personal use, and sport fish harvest as stipulated in the *Yukon River Drainage Fall Chum Salmon Management Plan*. All subsistence salmon fishing had been returned to the full BOF schedule by August 21 and the fall commercial salmon fishing season was opened in Yukon Districts 1 through 6. Actually, commercial fishing periods were only allowed in District 1 and Subdistricts 4-B, 4-C, 6-B, and 6-C because of limited commercial markets.

In 2003, a small pulse of chum salmon entering the river just before the start of fall season on July 16 could have contained a proportion of fall chum salmon. For management considerations, the first two recognizable pulses of fall chum salmon entered the river on July 21 and July 27, and lasted approximately four and three days, respectively and had relatively low abundance. A large third pulse was tracked through the test nets in Emmonak from August 3 –5. A sustained fourth pulse was observed August 10 – 17. This pulse was the largest of the fall season. And a late fifth pulse was tracked through the test nets from August 22 – 24. The Pilot Station Sonar Project ended operation on August 31. Test fishing continued at Mountain Village through September 10, no additional significant pulses of either fall chum or coho salmon detected late in the season.

The final Pilot Station sonar passage estimate was approximately 930,000 fall chum salmon. In comparison, the average return of fall chum salmon has been approximately 400,000 for the last five years (1998-2002). The Rampart-Rapids mark-recapture abundance estimate through September 18 was approximately 488,000 fall chum salmon. This provided a run size projection to the upper Yukon River of approximately 500,000 fish. In addition, the upper Tanana River mark-recapture abundance estimate through October 1 was approximately 200,000 fall chum salmon and the Kantishna River mark-recapture abundance estimate was approximately 80,000 fall chum salmon. In combination, the Tanana River estimates account for roughly 300,000 fall chum salmon. Together, the upper Yukon River and Tanana River estimates totaled approximately 800,000 fall chum salmon. Fall chum salmon continue to pass after these projects end each season and the mark-recapture estimates in the upper Yukon Area do not include estimates of unmonitored areas such as the Koyukuk River drainage. Therefore, these estimates are considered conservative and do not account for the entire run, but do assess most of the run and can be used in annual comparisons.

The 2003 run timing for fall chum salmon in the Yukon River was near normal and the run was judged to be average to above average overall, except the Porcupine River stocks were considered below average. The Tanana, Chandalar, Fishing Branch and mainstem Yukon River stocks all exceeded escapement objectives. Fishery management was conservative and harvest was restricted even though the fall chum salmon run was relatively strong. A commercial harvest of approximately 200,000 to 300,000 fall chum salmon was foregone and the subsistence harvest is anticipated to likely be estimated at roughly one half the historical average.

2.3.3 Coho Salmon Management Overview

Yukon River coho salmon have a slightly later, but overlapping, run timing with fall chum salmon. In managing the coho salmon run, the department follows guidelines adopted by the Alaska Board of Fisheries in 5 AAC 05.369 *Yukon River Coho Salmon Management Plan*. The coho salmon management plan allows a directed coho salmon commercial fishery only under specific conditions. Based on the poor preseason outlook for fall chum salmon, conditions outlined in the coho salmon management plan were very unlikely to occur in 2003. In most years, fall chum salmon are the primary species for management and coho salmon are typically taken incidentally during the fall season fisheries.

The 2003 coho salmon run began about one week early and stronger than the last few years, considered large runs with near normal run timing. The coho salmon run estimate through August

31 at Pilot Station sonar was 277,000 fish. This estimate was over twice the recent 5-year historical average passage estimate of 128,000 fish and well above the peak sonar passage estimate of 192,000 coho salmon in 2000. In addition, the Andreafsky River weir passage of coho salmon ended the season slightly above average as did most of the upriver test fish indices with some areas showing extremely good escapements.

Subsistence fishing opportunity for coho salmon was initially reduced in the lower districts because of management actions implemented to protect the anticipated weak fall chum salmon stocks. As the fall chum salmon run was reassessed to be average to above average, subsistence fishing periods were returned to the BOF schedule.

Confidence in the run assessment increased with the late season reevaluation of fall chum salmon monitoring projects coupled with the strong coho salmon run. Limited commercial fisheries for fall chum and coho salmon were conducted in District 1 and Subdistricts 4-B, 4-C, 6-B, and 6-C late in the season where commercial interest was expressed. In areas with no market interest, subsistence salmon fishing schedules were further relaxed and gear restrictions lifted.

3.0 COMMERCIAL FISHERY – CANADA

A preliminary total of 2,672 chinook salmon and 9,030 chum salmon was harvested in the Canadian Yukon River commercial fishery in 2003 (Table 5). The combined species catch of 11,702 salmon was 34% below the previous ten-year average commercial harvest of 17,656 salmon. Since 1997, below average run sizes of upper Yukon River chinook and chum salmon have contributed to a reduction in commercial catches.

A total of 21 commercial licenses was issued in 2003, the same number as in 2002. Most licensees opted to fish in 2003 because of a larger than anticipated above border run sizes for both chinook and chum salmon and increased fishing opportunities.

3.1 Chinook Salmon

The 2003 preseason expectation for Canadian-origin Yukon River chinook salmon was a below average return of approximately 62,000 fish[1]. A run of this size would be well below the average long term run size of approximately 120,000 fish (1980-2002). The 2003 outlook was driven by uncertainty associated with marine survival of the fish that spawned between 1995 and 2000. The potential for reduced marine survival was made apparent by the poor total run sizes of upper Yukon chinook salmon in the 1998 to 2002 period, were significantly lower than expected despite healthy brood year escapements.

The key elements of the 2003 Canadian Integrated Fisheries Management Plan (IFMP) for Yukon chinook salmon as developed by the Yukon Salmon Committee (YSC) follow:

[1] The initial 2003 outlook was reduced from 90,300 to 62,000 based on the proportion of the observed run vs. the expected run in 2002.

1) A target escapement goal of 28,000[2] chinook salmon. This goal was consistent with the Yukon River Panel recommendation from the March 2003 panel meeting. YSC was willing to accept restricted First Nation fisheries as long as the spawning escapement was greater than 18,000 chinook salmon and the First Nation catch was consistent with the Yukon River Salmon Agreement harvest sharing provisions; and

2) Closures in the commercial, recreational and domestic fisheries would be in place from the beginning of the season until inseason run projections indicated priorities established for conservation, spawning escapement, and First Nation's harvests, were expected to be achieved.

Similar to 2002, the management plan established a series of colour-coded categories (Red, Yellow and Green Zones) bound by specific reference points (run sizes into Canada) and were associated with anticipated management actions. For example, the Red Zone included run projections of less than 19,000 chinook salmon. Projections falling in the Red Zone would result in all fisheries being closed except the test fishery 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, 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 upon the run abundance, and be increasingly more severe the closer the run projection was to 19,000, the lower end of the Yellow Zone. The Green Zone included run size projections greater than 37,000 chinook and indicated First Nation fisheries would be unrestricted and harvest opportunities in the commercial, recreational and domestic fisheries would be considered to depend on abundance and international harvest sharing provisions.

With a total run outlook of 62,000 upper Yukon River chinook salmon (at the river mouth), proposed management actions in Alaska were expected to result in a border escapement of approximately 36,000 chinook salmon, or roughly the upper end of the Yellow Zone. This zone meant the likelihood of no commercial, domestic or recreational fisheries and a potential need for restrictions in the First Nation fishery. Hence, the season commenced with closures in place for all fisheries except First Nation fisheries. After a series of community meetings, First Nations communities agreed to follow a conservative management approach until inseason indicators became available.

Throughout most of June, before chinook salmon entered the Canadian section of the upper Yukon River, Alaskan test fisheries and a sonar project located near the river mouth indicated the run abundance was larger than the 2002 return and adequate to provide for U.S. and Canadian escapement targets, subsistence fishing and a small commercial salmon harvest in the U.S. Run timing was described as being a few days early but very close to normal, compared to the average run timing for 1989 to 2002 period.

The first chinook salmon were caught in DFO fish wheels on June 26, two days earlier than usual. The cumulative fish wheel catch of chinook salmon was initially above average, but after early July

[2] The 2003 escapement was set at 25,000 by the Yukon Panel with a provision that it would be increased to 28,000 in the event that a U.S. commercial fishery was initiated

the catch was consistently below average. A total of 1,276 chinook salmon was caught in the fish wheels, 74% of the 1993-2002 average catch of 1,726. Based on tag return ratios from the test and commercial fisheries and subjective observations of water levels, the 2003 chinook salmon return appeared above average in run strength, but fish wheels were not catching fish in proportion to their abundance.

The primary purpose of DFO fish wheels is to live-capture salmon throughout the run for tagging purposes; fish are tagged and subsequently released. Recoveries of tagged fish, primarily in the test fishery and Dawson area commercial fishery, are used to estimate abundance of fish throughout the season. Inseason projections of the total run into Canada, also referred to as *border escapement*, are made by expanding the point estimates of run size by historical run timing information. Projections calculated from tagging data are therefore a key component in Canadian management decisions.

The early season closure of 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 2002 and involved both commercial and First Nation fishers working under the direction of Yukon River Commercial Fishing Association (YRCFA) and Tr'ondek Hwech'in First Nation (THFN) Commercial Fishing Association, funding provided was from Yukon River Restoration and Enhancement Fund. The objective of the test fishery was to collect timely catch and tag recovery data used to develop inseason run forecasts. All fish caught in the test fishery were distributed under the direction of THFN. Without the tagging data, little else would be available for inseason run assessment. The option of just using the DFO fish wheel catch was not exercised because of a poor historical relationship between fish wheel catch information and run size estimates. Similar to 2002, low water conditions prevailed throughout much of the chinook salmon migration. Both 2000 and 2001 were characterized by abnormally high water conditions

The chinook salmon test fishery commenced July 4 and continued for a two week period ending July 13. Four fishers participated in the fishery; each fishing two days per week, although specific times they fished were not the same. A total of 263 chinook salmon was caught in the test fishery. The first two inseason border escapement run projections were produced in statistical weeks 27 and 28 (the weeks ending July 5 and July 12). A potential total season run size of 36,700 chinook salmons estimate was based on the statistical week 27 information, and a potential total season run size ranging from 49,900 to 78,200 was based on the statistical week 28 information. The initial week 28, border escapement estimate was 11,100 with a 95% confidence interval of 9,300 to 16,300. This estimate based on timing information was extrapolated to a projected border escapement of 49,900. An estimate made later in the week with additional tag application information produced 78,200 as the total season projection.

Early in the season, the run projections are volatile because timing information represents only a small proportion of the entire run. For example, based on normal timing, 4.4% of the run occurs by July 5 and 14.2% by July 12. Inseason projections of total border escapement are developed using various run timing scenarios: normal (average) timing, early run timing and other timing scenarios consistent with inseason information collected elsewhere in the drainage. The intent is to ensure projections developed from timing information cover an appropriate range of potential differences in run timing. Each timing scenario results in a different run size projection and can greatly influence the total season run projection. Information from DFO mark-recapture information

consistently suggested the total season border escapement would be higher than the preseason outlook; this information was supported by information from the U.S. test fishery at Emmonak, information from the Pilot Station sonar project, and U.S. subsistence catch information that tracked a substantive pulse of fish from the lower river to the upper Yukon River in Alaska.

The border escapement projections made in statistical week 28 were >49,000 chinook salmon. Because the projections exceeded the lower end of the Green Zone, greater than 37,000, Yukon First Nations were advised early in the season to proceed with a normal, unrestricted fishery. Similarly, recreational fishers were advised on July 10 the recreational fishery was open to salmon retention. Canadian commercial and domestic fisheries were subsequently opened for two days starting July 13.

By 23 July, the border escapement projection was approximately 68,300. The run projections declined thereafter and the initial postseason estimate is 58,100. This estimate is considered preliminary and will be finalized at a later date. Based on information from an independent radio telemetry program, the mark-recapture program may have underestimated the 2003 chinook salmon return.

The total catch of 2,672 chinook salmon was taken in the commercial fishery, 2,603 in the "Dawson area" fishery, downstream from the confluence of the Yukon and White Rivers, and 69 chinook salmon were caught in the "upper fishing area". The fishery was open for a total of 15 days and total fishing effort was 93 boat-days. For comparison, the previous ten-year average (1993-2002) commercial catch is 5,461 chinook salmon, however this average includes data from 1998 to 2002 when the commercial 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 below average return. Spawning escapements in 1998 and 1999, the primary brood years contributing to the 2003 run, were 46,300 and 62,000 chum salmon, respectively. Although excellent spawning escapement was assessed for the 1994 to 1997 period (average, 116,800; range, 85,400 to 158,100), the cycle year returns from these escapements were well below average and appeared to have been significantly impacted by poor marine survival. Managers surmised poor survival could once again result in a depressed run in 2003. To capture this uncertainty, the total run outlook was expressed as a range from 97,500 (below average) to 145,000 (average) upper Yukon River fall chum salmon. Managers thought the lower end of this range was more likely given the weak runs observed in 1998 to 2001.

The Canadian chum salmon management plan for 2003 acknowledged the likelihood of a poor return and contained the following key elements:

1) A spawning escapement target of 65,000 upper Yukon River chum salmon, consistent with Yukon Panel recommendation of March 2003; and

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

Funding was approved from the 2003 Yukon River Restoration and Enhancement Fund for a live-release test fishery in the Dawson City area to obtain tagging data for population estimates. This was the second year a live-release test fishery operated fish wheels. Yukon River Commercial Fishing Association and the Tr'ondek Hwech'in First Nation jointly conducted this project. Before 2002, projections of chum salmon border escapement were generated either from DFO fish wheel catch data, or from mark-recapture data collected from First Nation and commercial fisheries located in the Dawson area.

As per the chinook salmon 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 live release test fishery, could be expected. The Yellow Zone included run projections in the 40,000 to 68,000 range. Commercial, domestic and recreational fisheries would be closed and the First Nation fishery would have restrictions increasingly more severe the closer the run projection was to the lower end of this Yellow Zone. The Green Zone included run size projections greater than 68,000 chum salmon and indicated First Nation fisheries would be unrestricted and harvest opportunities in the commercial, recreational and domestic fisheries would be dependent on run abundance and international harvest sharing provisions.

Throughout August, chum salmon catches in the DFO fish wheels remained above average suggesting the run strength was above average or the timing of the run was early. Although still early in the upper Yukon chum salmon season, this above average run strength was consistent with run status indicators in the Alaskan portion of the river. A live release test fishery consisted of two fish wheels equipped with live boxes, and operated four days per week from August 24 to August 28 and from August 31 to September 4. A total of 990 chum salmon was caught and released. Based on average run timing, border escapement projections for the weeks ending September 6 and 13 were 110,000 and 140,000 fish, respectively. The September 6 run projection exceeded the trigger point of 68,000 for the Green Management Zone identified in the IFMP. This point resulted in a conservative commercial fishery opening of 48 hours from September 7 to September 9. Subsequent inseason border escapement projections consistently exceeded 120,000 chum salmon. Since these projections were in the Green Zone, the commercial fishery was opened for five days each week for the next six weeks. The final commercial opening took place from October 19 to October 24.

The total commercial chum salmon catch of 9,030 fish was 26% below the 1993 to 2002 average of 12,193 chum salmon. During this period, the catch ranged from zero chum salmon in 1998 to 39,012 chum salmon in 1995. Because of a stronger than anticipated border escapement and limited fishing effort, most of the weekly commercial fishing periods were posted at 5 days per week. The number of fishers who participated in the openings ranged from one to four. No coho salmon were recorded in the commercial catch in 2003. Seventeen coho salmon, the largest annual commercial catch, were recorded in 2002.

4.0 SUBSISTENCE, PERSONAL USE, ABORIGINAL, DOMESTIC, AND SPORT FISHERIES IN 2003

4.1 ALASKA

4.1.1 Subsistence Salmon Fishery

Most chinook salmon harvested for subsistence use are dried, smoked or frozen for later human consumption. Small chinook ("jacks"), summer chum, fall chum and coho salmon are primarily harvested to feed dogs in the Upper Yukon Area used for recreation, transportation and drafting activities (Andersen 1992). Most subsistence salmon used for dog food are dried (summer chum salmon) or "cribbed" frozen in the open air (fall chum salmon).

In 2003, subsistence fishing opportunity was not restricted for chinook and summer chum salmon because those runs were judged adequate to provide for normal levels of harvest throughout the Yukon Area. However, management concerns for fall chum salmon initially reduced subsistence salmon fishing times one-third of the BOF window schedule beginning July 16. This reduction in fishing time was implemented sequentially as the fall chum salmon migrated upriver from the lower Districts 1 to 5. By the time the fall chum salmon run entered District 6 (Tanana River), the run was assessed to be large enough to meet escapement needs and to provide for a normal subsistence and personal use harvest. District 6 fishing schedule remained unchanged, and Districts 1 to 5 were returned to the BOF window fishing schedule.

Inseason fishers' reports suggested most Yukon Area subsistence fishers probably met their subsistence needs for chinook salmon in 2003, but likely fell short of meeting their subsistence needs for summer chum, fall chum, and coho salmon. Chinook salmon abundance was high and subsistence fishing opportunity was not reduced or restricted. Summer chum salmon abundance was low and fishing conditions were poor, to result in a low harvest even though fishing opportunity was normal. Conversely, abundance of both fall chum and coho salmon was high, but significant fishing restrictions during the early portion of the run is anticipated to have likely resulted in below average harvests in 2003.

Postseason subsistence surveys are conducted annually to estimate the number of salmon taken in the subsistence 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 randomly 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 drainage. 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 not surveyed 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. Subsistence harvest numbers also include the number of test fish given away in communities that operate monitoring projects. Results of the 2003 survey and permit summary will be available in late spring of 2004.

The estimated 2002 subsistence salmon harvest in the Alaska portion of the Yukon River drainage (not including catches from the Coastal District) totaled approximately 42,746 chinook, 72,435 summer chum, 19,393 fall chum and 15,261 coho salmon. The estimated subsistence harvest includes small amounts taken in the personal use salmon fishery.

4.1.2 Personal Use Fishery

The Fairbanks Nonsubsistence Area, located in the middle portion of the Tanana River, contains the only personal use fishery within the Yukon River drainage. Personal use fishing regulations were in effect from 1988 until July 1990 and from 1992 until April 1994. In 1995, the Joint Board of Fisheries and Game reestablished the Fairbanks Nonsubsistence Area. Since 1995, the Fairbanks Nonsubsistence Area has maintained its designation consistently and managed under personal use regulations however historical harvest data must take changes in status into account. Subsistence or personal use permits have been required in this portion of the drainage since 1973. Subsistence fishing is not allowed within non-subsistence areas.

Personal use salmon and whitefish/sucker permits and a valid resident sportfish license are required for fishers who fish in the Fairbanks Nonsubsistence Area. Within the Fairbanks Nonsubsistence Area, personal use fishing for salmon is allowed only in Subdistrict 6-C. Subdistrict 6-C personal use salmon fishery harvest limit is 750 chinook salmon, 5,000 summer chum salmon, and 5,200 fall chum and coho salmon combined. The individual personal use household permit harvest limit is 10 chinook, 75 summer chum, and 75 fall chum and coho salmon combined.

In 2003, fishing time for salmon was not reduced in District 6, including Subdistrict 6-C personal use fishing area, because the runs were judged adequate to provide for normal levels of harvest. Data compilation for the 2003 fishing season will not be completed until late spring of 2004. However, final results of the 2002 season are as follows: 57 personal use salmon permits were issued and 29 fishers reported harvesting 126 chinook, 175 summer chum, 3 fall chum and 20 coho salmon in Subdistrict 6-C. Additionally, five personal use whitefish and suckers permits were issued and one fisherman 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, with little effort directed at chum salmon. Most of the effort occurs in the Tanana River drainage, along the road system. From 1998-2002 the Tanana River on average made up 89% of the total Yukon River drainage chinook salmon harvest, 61% of the summer chum salmon harvest, and 71% of the coho salmon harvest. Most chinook and chum salmon are harvested from the Chena, Salcha, and Chatanika Rivers, and 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. Occasionally, inseason on-site fishery monitoring takes place at locations where

more intense sport fishing occurs. No inseason on-site salmon fishery monitoring was conducted during 2003.

All of the chum salmon harvested in the sport fishery are categorized in this report as summer chum salmon. Although a portion of the genetically distinct fall chum salmon stock may be taken by sport fishers, most of the sport chum salmon harvest is thought to be made up of summer chum salmon because: 1) that run is much more abundant in tributaries where the most sport fishing occurs, and 2) the chum salmon harvest, typically incidental to effort directed at chinook salmon, overlap in run timing with summer chum salmon. The total sport harvest of salmon in the Alaskan portion of the Yukon River drainage in 2002 was estimated at 486 chinook, 384 summer chum, and 1,092 coho salmon (Appendix Tables 2, 3 and 7). Harvest data are not yet available for 2003. The recent five year (1998-2002) average Yukon River drainage sport salmon harvest was estimated at 624 chinook, 321 summer chum and 843 coho salmon.

In 2003, 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 May 30. The restriction prohibited anglers from taking more than one chinook or one chum salmon per day. This emergency order was rescinded on July 11 availability of a harvestable surplus of both chinook and chum salmon increased. On July 12 the daily bag and possession limit of chinook salmon in the lower Tanana River was liberalized to three king salmon greater than 20 inches. This action was warranted because a large surplus of chinook salmon returned to the Chena and Salcha Rivers. The sport fishery for chum salmon was closed by emergency order on August 17, because of projected poor returns of fall chum salmon; this action was rescinded on August 26, because the availability of a harvestable surplus of fall chum salmon increased.

4.2 CANADA

4.2.1 Aboriginal Fishery

In 2003, as part of the implementation of the Yukon Comprehensive Land Claim Umbrella Final Agreement, the collection of inseason harvest information was conducted by the First Nations in their respective Traditional Territories. Although not as intensive, the general approach was similar to that developed under the *Yukon River Drainage Salmon Harvest Study* conducted by LGL Limited from 1996 to 2002. Before the start of the fishing season, locally hired surveyors distributed calendars to known fishers and asked them to voluntarily record their catch and effort information daily. Interviews to obtain more detailed catch, effort, gear, location, and tag recovery information were conducted in season at fish camps or in the community one to three times weekly. Weekly summaries were completed by the surveyors and sent to the DFO office in Whitehorse by fax. This general approach was used during the chinook salmon season in the Dawson, Mayo, Pelly, Teslin and Carmacks areas where over 90% of the harvest typically occurred (LGL data 1996-2002).

Postseason interviews were conducted in Ross River, Burwash Landing, and Whitehorse areas. Inseason harvest data collection continued for the aboriginal fishery for chum salmon in the

Dawson and Pelly Crossing areas, but no information was reported from the Carmacks area. Catch estimates from the Porcupine River in the Old Crow area are independently determined from locally conducted, postseason interviews.

Preseason expectations for a below average chinook salmon run resulted in recommendations for a voluntary reduction in aboriginal harvest by Yukon First Nations. Plans were developed whereby fisheries would be reduced to approximately 75% of a normal harvest if required. However, early season run indications were better than expected and First Nations were notified of this trend on June 26, 2003. Further run strength assessment through the mark-recapture program in early July confirmed restrictions were not likely to be required and First Nations were notified on July 9 a normal level of harvest would be permitted. The preliminary estimate of the 2003 upper Yukon chinook salmon catch in the Aboriginal fishery is 6,121 fish, 13.9% below the 1993-2002 average of 7,107 chinook salmon and 14.3% below the final estimate of 7,143 chinook salmon harvested in 2002. Survey effort in the Carmacks area in 2003 was noted to be low; the reported chinook salmon harvest for this area was 1,342, 40% below the 1993-2002 average of 2,251. The total fishing effort during the chinook salmon season, i.e. through the end of August (statistical week 36) was approximately 24,557 net-hours, 17% below the 1996-2002 average of 29,526 net-hours.

Preliminary estimate of the 2003 upper Yukon fall chum salmon harvest in the Aboriginal fishery is 1,433 fish. This estimate is 48% below the 1993-2002 average of 2,764 fall chum salmon. No fall chum salmon catch information was received from the Carmacks area. The preliminary estimate of total fishing effort during the chum salmon season (Statistical week 30 and later) was 1,867 net-hours, approximately 18% below the 1996-2002 average of 2,282 net-hours.

A full closure was in place from August 10 to October 15 within the Canadian section of the Porcupine River to conserve the depressed Fishing Branch River fall chum salmon run. In anticipation of a poor return in 2003, the Vuntut Gwitchin First Nation submitted a proposal to the Yukon River Restoration and Enhancement Fund for a substitution fishery. The proposal involved the purchase of a meat[3] product to reduce the impact of potential restrictions on the Old Crow Aboriginal fishery. This project (CRE-106N-03) was accepted by the Yukon River Panel and the project proceeded as described in the proposal. Community members received a small number of chum salmon for human consumption and sled dog food (total was 319) were available through the test fishery component of a chum tagging program (CRE-27N-03), also funded through the Yukon River Panel. An additional 63 chum salmon were caught incidentally during a late fall coho salmon fishery, which harvested 523 coho salmon. A total of 173 chinook salmon was also taken in the Aboriginal fishery.

4.2.2 Domestic Fishery

The preliminary estimate of the total domestic fishery catch is 115 chinook salmon. Because of the preseason expectation for a poor run, the domestic fishery did not open until it was determined more than 28,000 chinook salmon would likely reach the spawning grounds. This determination was made in early July allowing the fishery to open for two days starting July 13.

[3] Chicken was initially proposed and Arctic Charr was used

The domestic fishery opened for 19 days spread over five fishing periods in concert with commercial fishery openings. Except the July 13 to 15 opening, the domestic fishery opened on the same day as the commercial fishery and one additional day was granted for each fishing period. Effort was low, only four fishers reported catches, although seven domestic licenses were sold.

4.2.3 Sport Fishery

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

The preliminary 2003 recreational harvest was 275 chinook and seven coho salmon. An additional 356 chinook salmon were caught and released. This is the second year coho salmon were caught in the recreational fishery. Reported harvest dates (for example, early to late fall), indicate they are unlikely chinook salmon misidentified as coho salmon.

Because of preseason conservation concerns, the retention of chinook salmon in the recreational fishery was prohibited before July 10. Run strength indicators suggested the 2003 return was better than expected and retention was allowed with normal catch and possession limits (2 chinook salmon/day, 2-day possession limit) starting July 10, 2003.

Estimated catches from YSCCC returns in 1999 through 2002 were: 177 chinook salmon in 1999; zero chinook salmon in 2000- fishery was closed; 146 chinook salmon in 2001; and 128 chinook and nine coho salmon in 2002. 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 2003

Various government agencies, non-government organizations and private contractors operate projects throughout the drainage (Table 6 and 7). 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.

5.1 CHINOOK SALMON

5.1.1 Alaska

Yukon River chinook salmon escapement in 2003 was assessed as average or better for the third consecutive year. This assessment is based on escapement counts and estimates from selected

tributaries. Production from 1997 and 1998 parent years appears to have improved determined from overall run abundance.

The upper part of the Yukon River drainage, was plagued poor weather conditions and high rainfall in the late part of July and early August, particularly the Tanana River basin. As a result, no aerial surveys were flown in the Upper Yukon Basin, Minimum aerial survey SEGs have been established in the East and West Fork Andreafsky, Anvik, North and South Fork Nulato, and Gisasa Rivers. Only the Anvik and Andreafsky rivers were surveyed in 2003. Of these three surveys, only the West Fork Andreafsky was considered an acceptable survey.

Biological escapement goals have been established for the Chena and Salcha Rivers located on the Tanana River. These two spawning tributaries are most likely the largest producers of chinook salmon in the Yukon River drainage. Each of these rivers surpassed their escapement goals before the projects were pulled because of high water. The point in the run these projects were pulled, is unclear, therefore escapement estimates for these tributaries are preliminary and will change. Without interpolation for the missed counting periods, preliminary results indicate chinook salmon escapement into the Chena River was approximately 8,770 fish and 10,228 chinook salmon into Salcha River. A summary of escapements can be found in Appendix Tables 11 and 12, and Appendix Figure 9.

Age and sex composition data for chinook salmon collected this season from escapement projects are tabulated and described in Table 13.

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 48,636 chinook salmon, 79.2% above the 1993-2002 average of 27,148 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 with two surveyors participating in both surveys (Appendix Table 13). Survey results relative to the previous cycle averages are presented below. Index surveys are rated according to fish count ability. 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 21. Count-ability was rated as good to excellent for the first survey and fair for the second survey. The total counts were 1,658 and 1,301 chinook salmon, respectively. The first count was 161.9% higher than the recent average (1993-2002) of 633. The first count was the highest ever observed and both counts were much higher than the lowest recorded count of 46 chinook salmon observed in 2000.

The Big Salmon, Nisutlin, and Wolf river index areas were flown on August 17 and August 23. Excellent survey conditions were encountered on the first survey date and fair to good survey

conditions on the second survey. Counts of 3,075 and 929 chinook salmon were obtained in the Big Salmon River index area. The early survey was 186.8% higher than the recent 10-year average of 1,072 chinook salmon and is the highest count ever observed. The Nisutlin River index counts were 687 and 311 chinook salmon, respectively. The early count was 111.4 % higher than the recent average of 325 fish. In the Wolf River index area, counts of 292 and 192 chinook salmon were recorded; the early count was 28% higher than the recent average of 228 fish. The timing of the 2003 early aerial surveys of the Little Salmon, Big Salmon, Nisutlin and Wolf Rivers appeared close to what was believed to be peak spawning. The early survey was conducted approximately one week earlier than the date chosen for peak aerial surveys in recent years. Based on information from surveys conducted in both 2002 and 2003 peak spawning appears to be more closely matched to the early aerial survey date. It is not known if there has been a subtle change (an advance) in the timing of peak spawning. Single aerial surveys do not count the entire escapement since runs are usually protracted, early spawning fish disappear before the late ones arrive. Weather and water conditions, the density of spawning fish, and observer experience and bias all affect survey accuracy.

The Blind Creek weir project was conducted in 2003 with a total of 1,155 chinook salmon counted between July 31 and August 18. This project was not conducted in 2001 or 2002. A total of 892 chinook salmon was counted between August 1 and August 22 in 1999. Counts of chinook salmon for the two other years of weir operation were 957 in 1997 and 373 in 1998. A relationship between aerial surveys and weir counts has not been established for this project.

The Yukon Commercial Fishers Association and the Tr'ondek Hwech'in First Nation attempted to install a resistance board weir on the Chandindu River in 2003. This is the sixth year a weir has been in operation at this location. Problems were encountered[4] during the installation and operation of this weir in previous years and a resistance board weir (RBW) was thought more suitable for the site. An RBW information exchange was conducted with USFWS; project staff visited and participated in installation of a RBW in Alaska and USFWS personnel visited the Chandindu River during RBW installation. Despite the training, onsite assistance and much hard work, operational problems were associated with installing the RBW on the Chandindu River in 2003. Installation was initially unsuccessful because water velocity was high despite relatively low water conditions during installation. A combination of a RBW and tripod weir was successfully installed, however flood conditions eventually washed part of the weir out. The weir staff counted 85 chinook salmon between July 10 and July 30. No chum salmon were seen.

Because of challenges associated with installing the Chandindu River weir in some of the previous years (1998-2001), a RBW was built and tested for three weeks in 2002. A conventional tripod/conduit weir was operated from July 01 to September 8, 2001, however the weir was breached by high water, these conditions occurred from July 31 to August 7. A total of 129 chinook and 29 chum salmon was 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.

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

Unfortunately, high water conditions have continuously presented a formidable challenge to the operation of the Chandindu River weir. This cornerstone program to build community capacity attempts to restore chinook salmon to many streams within the Klondike region. Experience with a RBW and Tripod Weir indicates the solution to the successful operation of a weir on the Chandindu River may be this tripod/conduit structure.

The Whitehorse Rapids Fishway chinook salmon count of 1,443 fish, provided by the Yukon Fish and Game Association, was 6.4% above the recent average (1993-2002) of 1,356 fish. The sex composition observed at the fishway was 16.8% female. Hatchery produced fish accounted for 72.5% of the return and consisted of 968 males and 78 females.

5.2 SUMMER CHUM SALMON

Analysis of escapement data indicates the 2003 summer chum salmon escapement levels continue to be below average. Generally, the lower river escapement projects indicated escapement levels were approximately of 60% of the 2002 estimates. Similar levels of summer chum salmon escapements were observed in the Koyukuk River tributary projects. Projects in the Tanana River were washed out by high water before most of the summer chum salmon had arrived into the system. Summer chum salmon are generally not readily observed during aerial surveys; in 2003 most of the areas that are normally surveyed from the air were not surveyed because of unfavorable weather or high water. Escapement goals have been established for the Andreafsky and Anvik Rivers. A drainagewide escapement objective for the Yukon River, based on the Pilot Station sonar project (800,000-1,600,000), was achieved.

The Pilot Station passage estimate was 1,235,483 summer chum salmon. This estimate was near the 2002 estimate 1,158,475 and the 1994-2002 average of 1,391,543 fish. Although Pilot Station indicated a passage similar to 2002, no other monitored escapement indicated a run of this size. The exception may be the Tanana River drainage where projects were pulled early because of flooding conditions. Anecdotal data indicate the chum salmon run into Tanana River tributaries may have been quite strong. Henshaw Creek weir, not listed in the escapement tables, counted 21,400 fish in 2003. The 2003 escapement was slightly below the 2000-2002 average of 28,144 fish.

A new project in 2003 using a resistance board weir collected escapement, run timing, and age-sex-length (ASL) composition from the Tozitna River, a tributary of the middle Yukon River. High stream discharge from the periods of July 2 to 6 and July 26 to August 12 prevented counting and biological sampling and no interpolation was made for these periods. The escapement for Tozitna River was 8,487 summer chum salmon.

Escapement monitoring projects are described in Appendix Table 14 and Appendix Figure 11. Age and sex composition data for summer chum salmon collected this season from escapement projects are tabulated and described in Table 15.

5.3 FALL CHUM SALMON

5.3.1 Alaska

The 2003 preseason run projection for Yukon River fall chum salmon ranged from 260,000 to 650,000 fish. The high end of the range was derived from normal run size expectations for the parent-year escapements realized throughout the drainage in 1998 and 1999. The low end of the range was primarily based upon the average proportion of the expected runs from 1998 to 2003, because of concerns for extremely poor production.

Initial inseason assessments of fall chum salmon for 2003 were influenced by the performance of summer chum salmon, that ranged from slightly below average, based on the main river sonar abundance estimate to extremely poor, based on observed escapements. The discrepancy between the two summer assessments resulted in conservative management of fall chum salmon particularly during the early portion of the run. Management of the fisheries continued with use of inseason monitoring projects located throughout the drainage. Assessment of the run occurs at each location and managers look for alignment from the various indicators.

Each pulse of chum salmon typically takes approximately 20 days to reach the confluence of the Tanana River, and another ten days to migrate to the Canadian Border. In 2003, the largest pulse did not entered the river until August15. Once the upriver assessment projects confirmed the main river sonar was more realistic relative to run strength, management actions were adjusted accordingly. In particular, mark-recapture projects provide abundance estimates to the upper Yukon and Tanana Rivers and were used extensively.

Although final assessments of overall run size, spawner distribution and age composition are not available at this time, preliminary assessments of run size can be made using several methods. Initially, a considerable amount of weight is placed on the inseason Pilot Station sonar abundance estimate until the up river monitoring projects can provide data. The fall chum salmon passage estimate, based on Pilot Station sonar for the period July 19 through August 31, was approximately 930,000 fish (90% C.I. ± 59,000). One method to determine total run size is based on Pilot Station sonar abundance estimate with the addition of estimated commercial and subsistence harvests downstream of the sonar site, including the test fisheries (approximately 10,600 fish), and an estimated five percent for fall chum salmon that passed into the river after termination of the project (31 August). Therefore the preliminary total run size for the Yukon River drainage based on the main river sonar at Pilot Station is estimated to be 988,000 fall chum salmon, however this appears slightly high when looking at the estimates provided by upriver escapements. Coho salmon have overlapping run timing with fall chum salmon, possibly caused by test fishing apportionment.

A second method to calculate run size is based on the upper Yukon and Tanana River individual monitored systems, plus an average escapement for tributaries downstream of the confluence of the Tanana (for example 25,000 escapement to the Koyukuk River), plus the estimated harvest from both U.S. and Canada to result in a preliminary estimate of 763,000 fall chum salmon. The mid-point between the two estimates is approximately 875,000 fish, 34% above the upper end of the expected production based on average return per spawner of 650,000 fish. The 2003 fall chum salmon run could be characterized as near average run size consisting of two major pulses, the one

in early August fell off to below average followed by a second pulse in mid-August to result in improved overall run strength and average run timing throughout the Lower Yukon Area.

A review of upper river test fish data and escapement information suggest run strength of both the upper Yukon River (non-Tanana) and Tanana River run components were larger compared to recent years. The USFWS mark-recapture project near Rampart provided weekly passage estimates used for inseason management. The preliminary mark-recapture passage estimate through September 18 was approximately 489,000 (95% C.I. ± 51,500) fall chum salmon. The 2003 estimate represents the third largest return since the project began and is a 62% increase above the historical (1996 to 1999 and 2001 to 2002) average abundance of 301,000 fall chum salmon. Details are presented in Section 6.1.7.

The Chandalar River sonar project ran from August 8 through September 25, 2003. The preliminary escapement estimate is approximately 196,985 upstream fish. This estimate is approximately 41% above the 1995-2002 average of 140,000 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 23% above the upper end of 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 44,000 fish based on the run timing observed at the USWFS Rampart tag recovery fish wheel. The Sheenjek River sonar operated from August 9 through September 26 had an estimated passage of 38,000 fall chum salmon. However, the last week of counts were the highest daily passages for the season indicating a late component to the return and therefore the estimate was expanded to account for this late component. The adjusted 2003 preliminary estimated escapement in the Sheenjek River was 12% below the lower end of the biological escapement goal range of 50,000 to 104,000 fall chum salmon.

The 2003, inseason monitoring of the Tanana River drainage consisted of estimating fall chum salmon run abundance based on mark-recapture techniques (Section 6.1.8). Two population estimates were generated, one in the Kantishna River drainage and the other in the Tanana River drainage (upstream of the Kantishna River).

The Tanana River established biological escapement goal range of 61,000 to 136,000 and it includes the Toklat River range. To represent the Upper Tanana River the Toklat River range is subtracted out leaving a range of 46,000 to 103,000 fall chum salmon to compare with the mark-recapture estimate. The 2003 preliminary mark-recapture abundance estimate through October 1 was 208,534 (95% C.I. ± 21,247) fall chum salmon based on the Bailey method. Postseason data analyses are ongoing at this time. In 2003, because of the large number of fish captured and longer man hours required to tag, fish captured during nighttime hours were released untagged.

The Toklat River, a tributary of the Kantishna River, is an important fall chum salmon spawning area within the Kantishna River drainage. The minimum OEG for the Toklat River index area is 33,000 fall chum salmon and the BEG range is 15,000 to 33,000. The preliminary estimate for the Kantishna River drainage as a whole through October 1 was 80,961 (95% C.I. ± 14,089), the highest estimate since the project began in 1999. During postseason analysis, the data will be

stratified using the Darroch method, because large numbers of fish captured at the site cause methods to change in season as fish were released without tags or enumeration during nighttime operation hours.

5.3.2 Canada

The preliminary fall chum salmon spawning escapement estimate based on mark-recapture data is 132,128 chum salmon. Details are presented in Section 6.2.1.

Aerial surveys of the mainstem Yukon, Kluane and Teslin Rivers were flown on October 16, 20 and 27, respectively. All survey dates were approximately one week earlier than the dates these surveys were flown in recent years. Timing of recent surveys appeared to be after the peak spawning period, initial survey dates were advanced to hopefully better correspond with peak spawning. Two surveys were planned for each index site in 2003, a week early and the usual timed survey. The early surveys seemed to capture the peak spawning period and the second survey was not conducted. The Kluane and mainstem Yukon River survey areas both involve a large number of discrete spawning areas (sloughs and side channels) with a range of small to high densities of fish, and the Teslin River index area is a single spawning area.

The Kluane River count was 39,347 fall chum salmon; the highest count recorded in a database back to 1972. The average count for the 1993 to 2002 period is 7,553 fish. A survey of the mainstem Yukon River counted 7,982 fall chum salmon. The average count for the 1993-2002 period, excluding 1999 when the area was not surveyed, is 3,063 fish. The Teslin River count was 390; the 1993 to 2002 average count for this river is 245 fish. 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 29,519 chum salmon[5]. This count was 93.1% of the 1993-2002 average of 31,692 fish. The 2003 forecast for Fishing Branch River chum salmon return was initially based on an estimate of 28,900 fish, but was adjusted downward to 11,300 according to the observed run versus run forecast in 2002. The pattern of observed returns being lower than forecast returns was evident for the 1998 to 2002 period. This trend has been attributed to poor marine survival. The 2003 Fishing Branch River weir return was well above the record low count of 5,053 recorded in 2000, but was below the lower end of the interim escapement goal range, 50,000 to 120,000 chum salmon. A stabilization escapement target of >15,000 chum salmon agreed upon for 2003 was based on realistic expectations given the low productivity of the stock. Conservation measures implemented in the U.S. fisheries and Vuntut Gwitchin First Nation (VGFN) aboriginal fishery at Old Crow significantly improved escapement to the Fishing Branch River in 2003. The VGFN endorsed a closure throughout the fall chum fishing season. Lost harvest opportunities were somewhat offset by a fishery substitution program. This program involved the purchase, transport and distribution

[5] The FBR weir count was not adjusted for fish that moved through before weir installation because < 1% of the fish were counted before August 30 in the 1991-2002 period and 0% were counted prior to this date in the two principal brood years (1998 and 1999).

of fish to community members; and was funded through a Yukon River Restoration and Enhancement program. 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 sonar passage estimate at Pilot Station represents less than the total return because the project terminates on August 31 before the end of the run. However an estimated passage of 276,961 coho salmon at Pilot Station is the highest abundance level documented to date.

Tributary escapement estimate 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 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 102,800 coho salmon and was conducted by boat survey on October 21, 2003. This escapement level is the highest on record and is 436% above the ten-year average (1993-2002) of 23,605 coho salmon. Spawning ground surveys of selected areas were conducted in other areas within the Tanana River drainage primarily the Nenana River (BSFA) and upper Tanana River (ADF&G) areas. Most of these areas substantially surpassed previous year's escapement levels.

In the lower Yukon River drainage only the East Fork Andreafsky River escapement is monitored. In 2003 as of September 15, the preliminary weir passage estimate was 7,970 coho salmon (Appendix Table 17). The historical (1995 to 1997 and 1999 to 2002) average passage is 7,451 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 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, this number represents an above average escapement. The 2003 escapement had a four-day high water event early in the season with minimal impact on estimates that ended up slightly above the historical average.

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, 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.

Before 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 2003, as in 2001 and 2002, electronic data was collected to determine the likelihood of obtaining passage estimates using computer generated counts. Electronic data have 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 to operate in 3-hour intervals, three times each day and drift gillnets are fished twice each day to apportion the sonar counts to species. In 2003, the sonar equipment was operated continuously for 24-hours on five occasions. Passage estimates during these expanded operations differed from 9-hour estimates by 18 % 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 9,413 fish during 2,091 drifts including 897 chinook, 3,521 summer chum, 2,426 fall chum, 1,436 coho salmon, and 1,133 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 not released successfully were distributed daily to nearby residents.

The sonar project was fully operational from June 6 through August 31 in 2003. Very low water levels characterized this past season during the first 2 weeks of June, and historically typical water levels throughout the remainder of the summer. Although the substrate profile was not adversely affected on the left (south) bank by ice scouring, as experienced in early 2001, bank erosion occurring just upstream of the sonar site appears to continue. The left bank substrate was unstable throughout most of the summer, the cutbank approach the region where the transducer is normally deployed. The transducer was relocated downstream of the 2002 deployment site, to more suitable profile. The reverberation band observed on the left bank in previous years appeared infrequently, usually associated with strong onshore winds and waves. The right bank deployment site remained stable throughout the summer.

Preliminary passage estimates for 2003 and final passage estimates for 1995 and 1997–2002 (Table 2) were generated using the most current apportionment model. This model, first employed during the fall 2002 season, was used for the entire 2003 season. Historical estimates were revised to allow direct comparison between 1995 and 1997-2003.

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 chinook salmon harvest in the District 1, 2, 3, and 4 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.

A new analytical program has substantially reduced the amount of time needed to construct and analyze data. 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, drainagewide harvest is shown in Table 8. The current year is being compared to 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 2002 is shown in Table 9. Similarly, the portion of the total harvest of upper river stock group chinook salmon caught in Alaskan and Canadian fisheries from 1981 through 2002 is shown in Table 10.

During 2003, 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 Henshaw Creek, and the Chena, and Salcha Rivers within the Tanana River drainage. Upper river stock standards were collected by DFO from test fish wheels used in a mark recapture project. 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

Chum Salmon

ADF&G monitored migration and run timing of summer- and fall-run chum salmon at Pilot Station sonar site over a four-year period (1999-2002) using genetic markers. Muscle, liver, and heart tissues were collected from individual chum salmon encountered in the species apportionment gillnet test fishery. Sampling began each year on June 27 and continued into early August. Over the four-year study, the relative contributions of summer to fall-run chum salmon showed a steady decline from June to August with fall-run chum salmon becoming dominant during the week of July 12-18. Fall-run stocks were significantly more abundant in the early weeks before July 15 in 2000 and 2002, suggesting a possible relationship with the even/odd year abundance cycles. In these even years, between 9 and 12 percent of the salmon migration were allocated to fall chum salmon but in relative proportion to summer chum salmon both years only represented 5 percent.

During the 2003 field season, 1700 Pilot Station, 300 Middle Mouth, and 300 Big Eddy chum salmon samples were collected. Pilot Station samples were collected from June 27 to August 5 from the species apportionment gillnetting at the Pilot Station sonar site. Middle Mouth and Big Eddy samples were collected from July 16 to August 23 from the Emmonak test fisheries. These fin clips stored in ethanol will be archived for genetic stock identification. DNA markers are being developed for genetic stock identification, and these archived samples will provide important information to monitor chum salmon stocks in the Yukon River.

Chinook Salmon

During the 2003 field season, 486 chinook salmon genetic samples were collected at Emmonak. The Middle Mouth and Big Eddy samples were collected from June 4 to 26. Fin clips stored in ethanol are archived for future genetic stock identification.

The USFWS, CDFO, and ADF&G genetics labs are collaborating on an OSM-funded project to apply microsatellite DNA markers for chinook salmon from the Yukon River. Preliminary data from this project were presented at the February 2004 JTC meetings in Anchorage, Alaska. The ADF&G Gene Conservation Lab developed ten single nucleotide polymorphism (SNP) genotyping assays for chinook salmon and applied these markers to lineages from throughout this species range. These SNP markers are similar to other classes of genetic markers, they identify lineages of chinook salmon on a broad scale and help distinguish among stocks within drainages. The SNPs are very different from other classes of genetic markers. Standardizing markers allows data to be transferred among and combined across laboratories and management agencies. Three SNP genotyping assays have been developed in chum salmon as a pilot study.

6.1.4 Upper Yukon River Chum Salmon Mixed-Stock Analysis

Comparisons of allozyme, AFLP, mitochondrial DNA, and microsatellite markers for mixed-stock analysis (MSA) of Yukon River fall run chum salmon revealed a concordant picture of population structure and similar mixed stock estimates, although microsatellites tended to give greater precision. The CGL is completing a DNA database for MSA of 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=196), 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=150), Fishing Branch (N=150), Big Salt River (N=71), Black River (N=112), Kluane River (N=200), Big Creek (N=150), and Teslin River (N=96). The baseline will be applied this fall to estimate stock compositions for fall chum salmon sampled from Pilot Station test fisheries.

6.1.5 Chinook Salmon Radio Telemetry Program

The Yukon River chinook salmon radio telemetry program was initiated in 2000 by the Alaska Department of Fish and Game and the National Marine Fisheries Service in response to dramatic declines in chinook salmon returns to the basin. The purpose of the study was to improve management and facilitate conservation efforts by providing information on migratory patterns, distribution and run abundance. Work in 2000-2001 focused on 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 and 2003. In addition to the efforts by the two lead agencies, support for the project was provided by the U.S. Fish and Wildlife Service, Department of Fisheries and Oceans Canada, Bering Sea Fishermen's Association, Yukon River Drainage Fisheries Association, National Park Service and organizations funded through the Yukon River Panel Restoration and Enhancement Fund.

During 2003, adult chinook salmon migrating up river were captured with drift gillnets near the village of Russian Mission. Local fishers were contracted to fish the area from June 3 to July 14. Project personnel were responsible for tagging the fish and collecting data. The gillnets 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 effective in capturing chinook salmon and 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. A maximum of two fish were tagged per drift to minimize handling time and sampling bias. 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. Radio-archival tags inserted in selected fish recorded water depth and temperature every three 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. Data on gender were not used in the analysis because of

difficulties in distinguishing the sexes in the lower river because of the lack of distinct external characteristics; information from upriver fisheries indicated a portion of the sample (e.g., 48% during the 2002 study) was misidentified. 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 initial processing to release, took approximately six to eight minutes depending on the number of fish tagged.

Drift gillnets were effective in capturing chinook salmon in the lower river. A total of 2,312 fish were captured in 2003, with weekly catches of 144 fish in Week 23 (June 3-7), 378 fish in Week 24 (June 8-14), 949 fish in Week 25 (June 15-21), 423 fish in Week 26 (June 22-28), 274 fish in Week 27 (June 29-July 5), 135 fish in Week 28 (July 6-12), and 9 fish in Week 29 (July 13-14). Catch per unit effort ranged from 3.5 (Week 29) to 43.5 (Week 25). Weekly fish capture numbers correlated closely with Russian Mission CPUE. This was especially noticeable in Week 25 during the peak of the run, when CPUE numbers spiked dramatically.

A total of 1097 fish were radio tagged during the study, including 78 fish in Week 23, 168 fish in Week 24, 390 fish in Week 25, 236 fish in Week 26, 148 fish in Week 27, 72 fish in Week 28, and 5 fish in Week 29. The average fish length was 849 mm and ranged from 205 mm to 1075 mm. Most captured fish were age 6, 69.2% (n=1004) in 2003. The contributions of other age groups were: age 5 (22.2%), age 7 (8.1%), age 4 (0.4%) and age 8 (0.1%). Based on visual identification, sex ratio was about equal: male 43.2%, female 45.4%, and unknown 11.4% (n=1099). However, visual identification method is not accurate. A total of 1,160 fish were released without being tagged (two fish were inadvertently marked and released with only spaghetti tags), 22 fish were recaptures, and 33 fish were handling mortalities (given away to local residents).

Radio-tagged fish migrating upriver were recorded by remote tracking stations located at 39 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), below the White River confluence, above the White River confluence, Selkirk (downriver from the Pelly River confluence), Tatchun Creek confluence, Teslin River confluence, and Hootalinqua (upriver from the Teslin River confluence). U.S. tributaries monitored by tracking stations included the Innoko, Bonasila, Anvik, Nulato, Koyukuk (including sites near the mouth, Gisasa River, Hogatza River and upper section of the main stem), Melozitna, Nowitna, Tozitna, Tanana (including sites near Manley, Nenana, Chena River, Salcha River, and upper section of the main stem), Chandalar, and Porcupine (including sites on the Sheenjek River, Black River, downriver from the Porcupine-Coleen River confluence and U.S.-Canada border) Rivers. Tracking stations were also operated on Canadian tributaries including the Stewart (near the Yukon-Stewart confluence and above Fraser Falls), 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 movement and distribution information in spawning tributaries.

Eighty-two 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, Koyukuk, 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 River, Fifteenmile River, Klondike River, White River, Stewart River, Pelly River, Tatchun Creek, Nordenskiold River, Little Salmon River, Big Salmon River, and Teslin Rivers. Surveys were also flown in Canadian reaches of the Porcupine River.

Chinook salmon responded well to the capture and tagging procedure, 1081 (98.5%) fish moved upriver. Movement rates averaged 53 km/day for fish traveling to the upper basin, including 48 km/day for Tanana River fish and 55 km/day for fish returning to the upper Yukon River. Fish returning to reaches in the lower and middle basin traveled substantially slower (24-40 km/day). These rates were comparable to movement information obtained in previous years of the study.

A total of 271 (25.1%) chinook salmon that moved upriver was caught in fisheries: 226 (20.9%) fish in the U.S. and 45 (4.2%) fish in Canada. The U.S. harvest was comprised of 88 fish in the lower and middle basin, 24 fish in the Tanana River, and 114 fish in the upper Yukon River. Twenty-three fish were caught in Canadian reaches of the Yukon River main stem near Dawson and Carmacks; 19 fish were caught in Canadian tributaries including the Stewart, Pelly and Teslin Rivers. Three fish were caught in the Porcupine River near the village of Old Crow. Forty-eight fish were recovered or reported by run assessment projects in the basin, including weirs on the Gisasa, Henshaw, Tozitna, Chandindu and Pelly Rivers, sampling and carcass surveys on the Anvik, Nenana, Chena, Salcha, Goodpaster, Chandalar, Big Salmon, Nordenskiold and Teslin Rivers, fish wheels operated on the Tanana River, Rampart Rapids, and Bio Island (upriver from the U.S.-Canada border), and at the Whitehorse fishway.

A total of 884 chinook salmon was tracked to specific reaches within the basin. Numerous fish traveled into Canada, including 413 (46.7%) upper Yukon River fish and 30 (3.4%) Porcupine River fish. Most (315, 35.6%) Canadian fish were tracked to tributaries of the Yukon River main stem, primarily the Stewart (27, 3.1%), Pelly (71, 8.0%), Big Salmon (59, 6.7%) and Teslin (63, 7.1%) Rivers. Fish were also located in the Chandindu (3, 0.3%), Klondike (19, 2.2%), White (12 1.4%), Nordenskiold (8, 0.9%), Little Salmon (17, 1.9%), and Takhini (6, 0.7%) Rivers, and several other small tributaries. Seventy-seven (8.7%) fish remained in reaches of the Yukon River main stem or traveled to associated tributaries not monitored by tracking stations or surveyed by aircraft. Fish in the Canadian portion of the Porcupine River fish traveled to reaches of the Miner (13, 1.2%), Old Crow (2, 0.2%), Whitestone (1, 0.1%), and Fishing Branch (1, 0.1%) Rivers.

Chinook salmon were also located in U.S. reaches of the upper basin. Substantial numbers of fish returned to the Tanana River (190, 21.5%). The Chena (40, 4.5%), Salcha (58, 6.6%) and Goodpaster (36, 4.1%) Rivers fish comprised the primary stocks. Tanana River fish also traveled to the Kantishna (15, 1.7%), Tolovana (5, 0.6%), and Nenana Rivers (3, 0.3%), and several other small tributaries. Twelve (1.4%) fish remained in reaches of the Tanana River main stem or traveled to associated tributaries not monitored by tracking stations or surveyed by aircraft. Upper Yukon River fish were located in U.S. tributaries, including the Chandalar River (36,

4.1%), Charley River (3, 0.3%), Beaver Creek (3, 3%), Kandik River (1, 0.1%), and Nation River (1, 0.1%). Thirty-one (3.5%) fish remained in reaches of the Yukon River main stem or traveled to associated tributaries not monitored by tracking stations or surveyed by aircraft. Fish returning to the U.S. portion of the Porcupine River were tracked to the Sheenjek (20, 2.3%) and Black (2, 0.2%) Rivers.

Ninety-six (10.9%) fish traveled to tributaries in the lower and middle basin, including the Innoko (2, 0.2%), Bonasila (6, 0.7%), Anvik (31, 3.5%), Nulato (15, 1.7%), Melozitna (1, 0.1%), Nowitna (2, 0.2%), Tozitna (10, 1.1%), and Koyukuk (25, 2.8%) Rivers. Koyukuk River fish travel to the Gisasa River, Hogatza River, Henshaw Creek, South Fork River, Middle Fork River, and other reaches in the upper headwaters. Although present throughout the run, these lower and middle basin stocks were more prevalent during late June and July. Fifty-seven (6.5%) fish remained in reaches of the Yukon River main stem or traveled to associated tributaries not monitored by tracking stations or surveyed by aircraft.

Mark-recapture estimates require equal tag ratios among recovery sites; however from preliminary 2003 information, the ratio differed among river systems. The tag ratio ranged from 0.25 % in Tanana River, 0.42 % in Koyukuk River, 0.55 % in the Canadian Yukon River, and a total tag ratio of 0.36% and 0.55% conservatively excluding Tanana River. The low tag ratio in the Tanana River, partially caused by high water events in the Chena and Salcha Rivers, lead to a liberal abundance estimate of 299,806 (95%CI: 266,827-332,785) and a conservative estimate of 207,252 (95%CI: 175,545-238,959). For individual river systems, the mark-recapture abundance estimates were 6,567 (95%CI: 3,808-9,325) for Koyukuk River, 74,566 (95%CI: 64,952-84,180) for Tanana River, and 74,728 (95%CI: 63,856-85,599) for Canadian Yukon River.

Thirty-seven fish were tagged with radio-archival tags. Twenty-three tags were recovered and returned, including three tags in the lower and middle basin, seven tags in the Tanana River, five tags in U.S. reaches of the upper Yukon River, and eight tags in Canadian reaches of the basin. Water depth appears to vary, fish periodically swam at depth 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 is used in season to compile and summarize telemetry data. Work on an Internet link to the database was completed in 2001 and used during 2002 and 2003, making it easier to access and distribute the information. Although modifications are still needed to make the system more user friendly, the website was made available to resource managers during the 2003 field season.

The telemetry study has provided new information on run characteristics of Yukon River chinook salmon, and helped evaluate data provided by other assessment projects within the basin. The Alaska Department of Fish and Game and National Marine Fisheries Service are proposing a third year of the basinwide program in 2004. Operational plans would be similar to 2002 and 2003, and has a goal of tagging over 1,000 fish at the Russian Mission capture site. Remote tracking stations would be the primary method of tracking the upriver movements of tagged fish, with aerial surveys in selected areas to provide information on the status of fish that remained in non-terminal areas and for identifying the location of important spawning areas.

6.1.7 Middle Yukon River Fall Chum Salmon Tagging Study

The Rampart-Rapids chum salmon tagging study was in operation for approximately eight weeks, from July 28 to September 21, 2003. Similar to previous years of this study, the field crew was stationed at both the Rapids marking site and at the Rampart recovery site. Chum salmon were captured using two fish wheels for marking and one fish wheel for recovery. A distance of 52 km separates the mark and recovery sites. Color-coded and individually numbered spaghetti tags were applied to 5,532 fish at the marking sites. Throughout the season, 35,048 fish were examined for marks by video at the recovery site and 421 of these fish were recaptured with color-coded tags. The resulting fall chum salmon preliminary population estimate for the entire season included 485,102 (SE 25,737) fish. Weekly estimates of abundance and the probability of recapture, with associated measures of precision (SE = standard error, CV = coefficients of variation), for the 2003 run of Yukon River fall chum salmon were as follows:

		Abundance			Capture probability		
Stratum	Date of stratum	Estimate	SE	CV	Estimate	SE	CV
1	Jul 30-Aug 5	17,891	4,751	0.27	0.013	0.003	0.23
2	Aug 6-12	19,254	4,596	0.24	0.022	0.005	0.23
3	Aug 13-19	47,719	9,702	0.20	0.008	0.002	0.25
4	Aug 20-26	73,463	11,145	0.15	0.010	0.002	0.20
5	Aug 27-Sep 2	74,824	13,070	0.17	0.009	0.002	0.22
6	Sep 3- 9	159,118	16,633	0.10	0.010	0.001	0.10
7	Sep 10-16	73,510	6,313	0.09	0.018	0.002	0.11
8	Sep 17-21	19,321	4,226	0.22	0.011	0.002	0.18

While processing individual fish at the marking site additional information collected on length and sex, clipped the adipose fin as a secondary mark, and applied an individually numbered and color-coded spaghetti tag. Length measurements (cm) were taken from mid-eye to tail fork. Sex was determined based on external morphological characteristics. The entire adipose fin was clipped with a pair of scissors, and spaghetti tags were applied through the muscle at the posterior base of the dorsal fin with a hollow applicator needle. All marked fish were released directly into the river.

Processing fish at the recovery site was done solely by video without the need to net or hold fish. Recaptures relied on tag color and not individual tag numbers for mark identification.

During the past few years, work has been conducted to improve marking and recapture protocols to reduce the impact on captured fish by 1) switching to a video recovery effort, 2) upgrading the quality of fish wheel materials (padding on and around chute and netting on the baskets), and 3) reducing the amount of time fish are held in nets and in the live-box before and after they are marked. This was the first field season holding time was eliminated at both the marking and recovery sites throughout the season.

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 2003. The primary objective is to estimate the abundance of fall chum salmon in the upper Tanana River (upstream of the Kantishna River) using mark-recapture techniques. Secondary objectives are 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 2003, 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 at both sites. Chum salmon were tagged with individually numbered spaghetti tags, and each tagged fish had its adipose fin clipped as a secondary mark. A total of 5,563 chum salmon were tagged and released from the Tanana River fish wheel between August 16 and September 28, 2003. A total of 3,969 chum salmon was tagged and released from the Kantishna tagging fish wheel through September 25, 2003.

Five 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) two recovery fish wheels in the upper Kantishna River, one on each side of the river. NPS has funded the operation of the left bank upper Kantishna River recovery fish wheel since 2000 and added the second recovery fish wheel in 2003. All recovery fish wheels were operated 24-hours per day. A total of 365 tags were recovered or viewed using video techniques from 14,137 chum salmon examined in upper Tanana River recovery fish wheel during the period August 16 through October 1, 2003. Toklat recovery fish wheels recovered a total of 89 tags from 1,897 chum salmon examined. Upper Kantishna recovery fish wheels recovered a total of 38 tags from 811 chum salmon examined.

Using the Bailey model, the preliminary abundance estimate for the Upper Tanana River, September 28 was 199,949 (95% C.I. ± 20,185) fall chum salmon. The preliminary estimate for the Kantishna River run component through September 25, 2003 was approximately 76,087 (95% C.I. ± 12,703), the highest estimate since the project began. However, both estimates will be adjusted using stratification during the postseason analysis since the methods had to be modified in season to release fish untagged during night time hours because large numbers of fish were captured and many man hours were required to tag them.

Evaluations of returns to the Delta and Toklat Rivers, two areas with individual biological escapement goals, were made from postseason foot surveys. The Delta River in the upper Tanana

River drainage has a BEG of 6,000 to 13,000 fall chum salmon. The area under the curve estimate using live fish observed during nine replicate surveys, conducted between October 3 and December 4, provided an estimate of 22,582 fall chum salmon. Approximately 92 live fish with tags were observed over the course of conducting the surveys however only 31 tags on dead fish were recovered. The Toklat River in the Kantishna River drainage has a BEG of 15,000 to 33,000 and an OEG of 33,000 fall chum salmon. The Toklat River abundance is estimated from a single ground survey of the index area conducted on October 23-24, 2003. The abundance of fall chum salmon was estimated to be 21,492 fall chum salmon derived from the expansion of the actual stream count using the migratory time-density curve. Eighty-nine tags were recovered during the survey and another 54 tags were found on live fish.

6.1.9 *Ichthyophonus*

The *Ichthyophonus* subcommittee was established at the February 20 to 22, 2002 JTC meeting in Anchorage. The subcommittee was formed to develop research recommendations to support individual researchers with project design and to prioritize goals for *Ichthyophonus* research in the Yukon River drainage for the years ahead.

Ichthyophonus is a common pathogen of many species of wild marine fishes. The infection is prevalent in some species, and the organism has caused severe disease and mortality in some fishes such as Pacific salmon and herring. Although initially considered a fungus, it is actually related to *Dermocystidium* and the rosette agent, choanoflagellate parasites. The infection is systemic in salmon, infecting the muscle, heart, kidney, spleen, and other organs.

Ichthyophonus was first detected in Yukon River chinook salmon in 1988 (T. Burton, ADF&G, Fish Pathology Lab, Anchorage, personal communication). A pilot study conducted in 1999 indicated approximately 30% of the chinook salmon sampled in Lower Yukon River in late June were infected with *Ichthyophonus* and subsequent samples of chinook salmon at Tanana showed significant increases in disease severity as they moved upstream (Kocan and Hershberger 1999). Research on the effects on *Ichthyophonus* on Yukon River chinook salmon has been conducted annually since 1999 (Kocan et al. 2003).

Current, ADF&G *Ichthyophonus* research is funded by a Sustainable Fisheries Grant ($500K) from the National Oceanic and Atmospheric Administration. John Hilsinger, ADF&G Yukon River Regional Research Supervisor, is the Principal Investigator for the administration of the grant funding.

In 2003, ADF&G determined a need exists to develop a sensitive, specific and non-lethal test for *Ichthyophonus*. ADF&G entered into a cooperative agreement with Oregon State Universtiy (OSU) to develop this test. OSU researcher Dr. Michael Kent proposed a Polymerase Chain Reaction (PCR) method as the best test. PCR tests are sensitive, specific, and less costly and labour-intensive than the traditional culture testing method. Therefore, OSU was contracted by ADF&G to develop a non-lethal blood test for *Ichthyophonus* to screen large numbers of adult chinook salmon.

OSU researchers had extensive prior experience conducting important preliminary studies in this area. They obtained a ribosomal DNA (rDNA) sequence of *Ichthyophonus* from infected chinook salmon collected from the Yukon River, found to be identical to that from Pacific herring, but different from rockfish species. With this sequence in hand, they were confident they could develop a suitable test. Ribosomal DNA is useful for diagnostic tests because multiple copies of the gene exist in each cell, and the test can be designed to be species specific.

During the 2003 field season, samples were collected at two locations on the Yukon River, and at Ship Creek in Anchorage. Thirty-seven chinook salmon blood samples were taken near the mouth of the Yukon River at Emmonak. However, these samples were of limited use, because tissue samples were not collected for PCR comparative testing. Blood and tissue samples (e.g., heart, spleen, kidney, and muscle) were taken from 129 chinook salmon at Tanana (river mile 695) for PCR testing. All tissue samples were stored in ethanol in separate vials for comparative PCR testing. Control samples taken from twelve chinook salmon at Elmendorf Hatchery on Ship Creek in Anchorage included: blood and tissue samples (heart, spleen, kidney, and muscle) stored in ethanol for comparative PCR testing and tissue samples stored in formalin (heart, spleen, kidney, and muscle) for histology controls. The Ship Creek samples were taken as potential uninfected controls. Scientists cannot be certain these fish are not infected, however there is no known history of *Ichthyophonus* in the Ship Creek drainage. The ADF&G Pathology lab in Anchorage has histology samples from these fish for controls.

OSU requested histology tests be used as a gold standard to evaluate the new diagnostic tests. ADF&G pathology lab in Anchorage preformed all of the histology tests for OSU. ADF&G has completed the histology analysis for some chinook salmon tissue samples (n=108) collected at Tanana in 2003.

At the Yukon River Panel Meeting in Anchorage on December 11, 2003, Dr. Michael Kent and OSU graduate student Chris Whipps reported the PCR tests results from 36 Yukon River chinook salmon samples from Tanana. The following were analyzed separately from each fish: visceral samples (e.g., heart and kidney), muscle tissue, and blood (e.g., 1/10 dilutions and 1/100 dilutions). Thirteen of 36 fish (36%) tested positive for *Ichthyophonus* using PCR visceral tests (this test is lethal). Eleven of 36 (31%) fish tested positive for *Ichthyophonus* using PCR muscle tests (this test is presumed to be non-lethal). Zero of 36 fish (0%) tested positive for *Ichthyophonus* using PCR blood tests. The PCR tests for whole blood at 1/10 and 1/100 dilutions were all negative. This result, or lack thereof, was a surprise to the researchers and their cooperative agreement partner. Past work with PCR blood tests for other pathogens suggested a high likelihood of success.

A comparison of ADF&G histology test results versus OSU test results for PCR for the same 36 fish yielded:

1) Heart test results were in total agreement for 89% of the samples. Two heart samples were PCR positive and histology negative (5.6%). Two heart samples were PCR negative and histology positive (5.6%).

2) Kidney test results were in total agreement for 83% of the samples. Five kidney samples were PCR positive and histology negative (14%). One kidney sample was PCR negative and histology positive (3%).
3) Muscle test results were in total agreement for 72% of the samples. Nine muscle samples were PCR positive and histology negative (25%). One muscle sample was PCR negative and histology positive (3%).
4) The actual number of fish that tested positive for *Ichthyophonus* by either PCR or histology was 14 of 36 fish. For one fish all PCR tests were negative and it's histology test was positive. Then there were two fish that tested positive on at least one PCR test and tested negative by histology.
5) Using the muscle PCR test, 11 of 36 fish tested positive for *Ichthyophonus*. The actual detection rate of truly positive fish (positive by any method) using the muscle PCR test was 11 of 14 fish (78%).

ADF&G fish pathologist, Tammy Burton, reported not all fish that tested positive by histology were heavily infected and showed signs of infection in all tissues. Some fish had negative muscle tissue tests but showed some level of infection in other tissues. This discrepancy may explain why two fish in OSU tests had a positive PCR visceral test and a negative PCR muscle test for *Ichthyophonus*.

PCR test results to date are based upon a small sample size. OSU will complete the testing of the remaining 64 Tanana samples by PCR by late February 2004. Still unknown is whether the PCR muscle test can detect sub clinical levels of *Ichthyophonus* in fish captured in the Lower Yukon River. This test may be suitable for detecting *Ichthyophonus* in chinook salmon in Middle and Upper Yukon River, and their respective tributaries where clinical symptoms of the disease are more advanced. Lower river fish typically exhibit little or no signs of infection when they enter the river. Also, since *Ichthyophonus* spores are not distributed uniformly in muscle tissues (often found in separate and distinct pockets) a greater chance exists of getting false negatives in PCR muscle tests in fish with sub clinical infections. Also, a concern is the unknown effects of the muscle punch sampling technique upon the survivability of migrating chinook salmon in the Yukon River drainage.

Given the concerns about a PCR muscle test and the muscle punch technique, the JTC *Ichthyophonus* Subcommittee agreed if a successful PCR blood test could be developed for *Ichthyophonus*, this method may still be a better tool for detecting sub clinical levels of *Ichthyophonus* in Lower River fish and further work on developing a PCR blood test was worth pursuing. Taking a blood sample from a fish may be less intrusive than taking a piece of their muscle. However, additional work (on developing a non-lethal PCR blood test) above and beyond the current cooperative agreement with OSU may require additional funding, and would not be completed in time for the 2004 field season.

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 the major projects conducted within the Canadian portion of the Yukon River drainage, including project location, objectives, and responsible agencies or organizations, is provided in Table 7. 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 as follows: (1) Upper Yukon River Tagging Program; (2) Chinook and Chum Salmon Test Fisheries; (3) Commercial Catch Monitoring; (4) Aboriginal Catch Monitoring; (5) Sport Catch Monitoring; (6) Harvest Sampling; (7) DFO Escapement Index Surveys; (8) Escapement Surveys; (9) Fishing Branch River Chum Salmon Weir; (10) Whitehorse Rapids Fishway; (11) Chandindu Weir; (12) Blind Creek Weir; (13) Escapement Sampling; (14) Upper Yukon and Porcupine River Chinook Salmon Radio Telemetry Program; (15) Whitehorse Rapids Hatchery and Coded-Wire Tagging Project; (16) MacIntyre Incubation Box and Coded-Wire Tagging Project. In addition to the projects listed, many fishery related programs funded under the Yukon River Restoration and Enhancement Program provide valuable fishery related information.

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 escapement of chinook and chum salmon for management purposes and to provide postseason estimates of the total spawning escapements, harvest rates, migration rates and run timing. Spaghetti tags are applied to salmon live-captured in fish wheels. Tagging events for many years involved two daily tagging events, morning and evening. In recent years, additional checks have been implemented for both the chinook and chum salmon migration periods. In 2003, chinook salmon were tagged every 6 hours and the fall chum salmon were tagged three times per day (morning, afternoon and evening) for most of the run. Subsequent tag recoveries are made in a number of different fisheries located upstream and infrequently in some downstream fisheries. Population estimates were developed in 2003 using spaghetti tag recoveries from the following areas:

1) a chinook salmon gillnet test fishery;
2) a fall chum salmon live release fish wheel test fishery; and
3) the Canadian commercial fishery 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 eight hours 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 to deposit the information in a drop box located in Dawson City. If the telephone option is chosen, fishers are required to deposit their information in the catch box, hand deliver, or mail 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[6], 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 generally not useful in assessing run abundance. Absence of recapture information is particularly true for chinook salmon since fish wheel counts have limited correlation with border escapement estimates derived from mark-recapture. Chinook salmon catches are highest during high water conditions when the fish are most vulnerable to the shore based gear and lower during low water conditions. Similarly, chum salmon wheel counts are often directly related to water levels rather than true abundance.

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 2003, both of the fish wheels ran 24 hours per day for an operational period that started June 24 and went to October 7 for the Sheep Rock fish wheel and October 10 for the White Rock fish wheel.

Chinook Salmon

The first chinook salmon was caught in the upper fish wheel, Sheep Rock on June 26. The run as observed at the DFO fish wheels exhibited average timing with what could be characterized as early run strength. A peak daily fish wheel catch of 63 chinook salmon was recorded on July 15. Peak catches for the 1993 to 2002 period have ranged from July 05 to July 30. The combined total fish wheel catch of chinook salmon in 2003 was 1,276 fish, 74.0% of the 1993-2002 average of recent cycle average of 1,726. The sex composition as observed in the fish wheel catches was 28% female.

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

1. chinook salmon gillnet test fishery; and
2. Yukon River commercial fishery downstream of the Stewart River.

The preliminary chinook salmon border escapement estimate for 2003 is 58,092[7] with a 95% confidence interval range of 46,071 to 75,518. After subtracting the harvest of 9,446 (263 test, 2,672 commercial, 6,121 aboriginal, 115 domestic and 275 recreational), 48,636 chinook salmon were estimated to have reached spawning areas. This estimate is 73.7% higher than the escapement goal of 28,000[8] adopted by the Yukon Panel for the 2003 season (Appendix Table 12, Appendix Figure 15).

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

[7] This estimate is preliminary. A postseason estimate may involve a tag loss correction factor and stratified analyses. Determined from an independent mark recapture estimate using radio telemetry data, the mark-recapture estimate derived from the spaghetti tagging program and fish wheels as the capture gear, apparently underestimated the 2003 return.

[8] For 2003, the Canadian escapement target was set at 28,000 chinook salmon.

In light of the unexpectedly low run sizes since 1998 and the below average run outlook for 2003, the Yukon River Panel recommended a target escapement of 25,000 to 28,000 Canadian-origin upper Yukon chinook salmon for 2003. If the U.S. determined the run was of sufficient strength to allow commercial fishing opportunities, the target would be 28,000 fish. If, on the other hand, the inseason run strength was judged to be inadequate to allow commercial fishing opportunities in Alaska, the U.S. subsistence fishery would be managed for an escapement of at least 25,000 upper Yukon chinook salmon. An escapement goal of 28,000 was also the target for the 1996 to 2002 period; this step was the first in a chinook salmon rebuilding plan agreed to in 1995.

Comparative border and spawning escapement estimates from the tagging program for 1982 through 2002 are presented in Appendix Table 13.

Fall Chum Salmon

The total fish wheel catch was 5,582 chum salmon, 37.9% higher than the 1993 to 2002 average of 4,049 chum salmon. The first chum salmon was captured at the White Rock fish wheel on July 11. On average over the previous ten years, the first chum salmon has been captured July 23 (range July 6 to Aug 9). The mid-point of the run occurred on September 10. 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 chum salmon in 2003 (316 fish) occurred on September 2. On average, the recent 10-year average daily catch peaks on September 17, although, as with run mid-point dates, peak count dates have been variable. The dates for the daily peak catch for the 1993 to 2002 period range from September 5 to 27.

In 2003, 5,393 of 5,582 chum salmon captured in the DFO fish wheels were tagged with spaghetti tags. High daily fish wheel catches were recorded in the following two periods: from September 1 to September 3 when the average daily catch was 234 with a range of 188 to 316 and from September 8 to September 13 when the average daily catch was 236 with a range from 196 to 266.

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 the 2003 upper Yukon fall chum salmon return was stronger than preseason forecasts. Generally it appeared that the upper Yukon fall chum salmon run was stronger than the fall chum salmon return to the Porcupine River system.

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

1. A live-release fish wheel test fishery; and
2. The fall season commercial fishery

The initial postseason border escapement estimate is 142,591[9] chum salmon with a 95% confidence interval range from 128,958 to 158,509 fish. After subtracting the estimated catch (10,463 commercial and 1,433 aboriginal), the estimated spawning escapement is 132,128 chum salmon. This estimate is more than two times the escapement target of 65,000 chum salmon adopted by the Yukon Panel for 2003. 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 2003 are presented in Appendix Table 16.

Harvest Sampling

The Canadian chinook salmon test fishery was sampled in 2003 for length, sex, and tag recovery data. Some sampling also occurred in the commercial fishery. The chum salmon test fishery was sampled for sex ratios and tag recovery data.

Length and sex information collected from the chinook salmon test fishery had a limited sample size of only 263 chinook salmon; this total was augmented by sampling within the commercial fishery. Some commercial fishers volunteered to sample their catch and to collect DNA samples. The sex ratio and length information collected has not been analyzed, although some inseason comparisons of the length frequencies by sex from the fish wheel and commercial/test fisheries samples were made. Both the commercial and test fisheries typically use an 8 to 8.5 inch mesh size (stretched measure).

The 2003 Canadian *Ichthyophonus* sampling program was reduced relative to the sampling program conducted in 2001 and 2002. Punch biopsy samples (flesh samples from live fish) were not collected at the fish wheels and samples (flesh, heart or liver) were not collected from fish harvested in the test or commercial fisheries.

A limited opportunistic *Ichthyophonus* sampling program was conducted in spawning areas and at the Whitehorse Rapids Hatchery. Samples from spawning fish were collected during a brood stock program conducted at Tatchun Creek and the Takhini River. At Whitehorse, the fish used for *Ichthyophonus* sampling were initially collected from the Whitehorse Rapids Fishway and held in circular tanks at the Whitehorse Rapids Hatchery until they were ready to be spawned. Heart samples (the apex of the heart) were taken during brood stock collection. All samples were placed into tissue culture medium supplemented with 5% bovine serum and 2X antibiotics. Cultures were incubated and microscopically evaluated for the presence of *Ichthyophonus*. The presence or absence of growth was recorded on two separate occasions.

Thirty-six percent of the fish sampled in spawning areas tested positive for *Ichthyophonus* during laboratory analyses, although the total sample size was small (n=11). A total of 37 samples comprising 12 females and 25 males was collected at the Whitehorse Rapids Hatchery. Seventeen percent of females and 28% of the males tested positive for *Ichthyophonus*.

[9] This estimate is preliminary. A post-season estimate may involve a tag loss correction factor and stratified analyses.

6.2.2 Whitehorse Rapids Fishway Chinook Salmon Enumeration

A total of 1,443 chinook salmon ascended the Whitehorse Rapids Fishway between July 24 and September 01, 2003. This was 6.4% above of the 1993-2002 average count of 1,356 fish. The sex ratio was 16.8% female (242 fish).

Hatchery produced fish accounted for 72.5% of the return and consisted of 968 males and 78 females. The non-hatchery count consisted of 233 wild males and 164 wild females. The run mid-point occurred on August 13. The peak daily count occurred on August 12 when 118 fish were counted.

Three fish were classified as mortalities in 2003. These fish (all females) had ceased migration and were in fair physical condition. These fish were used for brood stock. Record fishway mortalities were observed in the 1997 to 1999 period and included 114 in 1997, 150 in 1998 and 113 in 1999. The impact of these mortalities was significant considering the number of females lost. 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. Before the salmon run in 2000, an extra baffle was to reduce 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.[10] This change appears to have improved the situation since there were no mortalities observed in 2000 and only three recorded in 2001. The front of the fishway where the baffles are located was dredged out in 2003 and the sand and silt was removed. This effort may have helped to reduce incidence of fish ceasing their migration or damaging themselves within the fishway.

In 2003, no fish were specifically removed from the fishway for coded-wire tag sampling, however a number of samples were obtained from the brood stock collected. No weirs (i.e. Wolf or Michie creeks) operated in the upper drainage above the fishway this year (Tables 11 and 12).

6.2.3 Whitehorse Hatchery Operations

A total of 176,648 chinook salmon fry[11] originating from the 2002 brood year (BY) were released from the Whitehorse Rapids Fish Hatchery between May 14 and June 2, 2003. All fish were tagged with coded wire tags and marked with an adipose fin clip (Table 11). A summary of the number of fry released into each outplant location, all located upstream of the Whitehorse Rapids hydroelectric dam, follows:

Wolf Creek: 54,437

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[10] Increased water storage in Schwatka Lake above the dam before 2000 may have caused a hydraulic regime, which delayed salmon migration within the ladder, thus contributing to the mortalities.

[11] The fish released are referred to as fry, however virtually all of them emigrate to the ocean shortly after release thus they may more accurately be referred to as pre-smolts.

Michie Creek:	71,545
Byng Creek	50,666

Approximately 2,500 small and unfit fry, thought untaggable, were released into Judas Lake on June 6, 2003 for recreational fishing opportunities. These fish will not emigrate to the ocean, because Judas Lake has no outlet.

The 2003 release was the eighth year (1995-2002 BY) all chinook salmon released from the Whitehorse Rapids Fish Hatchery were marked. With the exception of the 1998 BY (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 BY release was tagged with coded wire tags. The recent initiative to mark all hatchery releases has provided an opportunity to more accurately determine the contribution of hatchery fish to the Whitehorse Rapids Fishway return and has provided the ability to make conscientious decisions about the number of hatchery-origin fish used in the egg-take program.

A very small outbreak of a Myxobacteria infection was observed in some fry prior to release in 2003. The clinical signs of this infection included fin rot and the deterioration of the lower mandible of some fish. A low number of mortalities was observed.[12]

In August 2003, brood stock collection began after 121 adult chinook salmon had migrated through the Whitehorse Rapids Fishway. Brood stock was collected from August 5 to August 29, 2003. An attempt was made to collect two males for each female during brood stock collection to allow for matrix spawning. Matrix spawning has been used in recent years in an attempt to maintain genetic diversity of the hatchery offspring.

A total of 62 males was retained and used for the brood stock-spawning program. Of these males, 18 were adipose clipped and 44 were wild. An additional five adipose clipped males collected from the fishway were used for the brood stock program; these fish were subsequently released back into the fishway. In total, 5.6% of the male population was retained for the brood stock program.

A total of 33 females was retained for brood stock. The females retained included 12 adipose clipped fish and 24 wild fish. An additional three female chinook salmon (one clipped and two wild) that had ceased migration in the upper section of the fishway were used for brood stock. These fish were captured in an attempt to utilize their eggs before they died. Previous experience has shown fish that cease migration within the fishway die unspawned. The total number of females used for brood stock (36) represents 14.9% of the total return of female chinook salmon (242) to the fishway.

Egg takes began on August 19 and were completed on September 05, 2003. In total, 165,100 green eggs were collected from 31 of the 36 females. Average fecundity was 5,300 eggs per

[12] Approximately 30 mortalities (0.1% of a specific group of fish) were observed in one of the fish tanks; mortalities and observations of clinical infection in other tanks were negligible. The outbreak of this disease agent was much reduced over what was observed in 2002.

female. The fertilization rate for the egg take was estimated to be 95.2%. Shocking and second inventory of these eggs began on October 10 and was completed by October 25, 2003. Hatching of the eggs began on November 10 and was complete by November 30, 2003 at an average Acquired Thermal Unit (ATU) value of 527. An estimate of the number of alevins as of January 12, 2004 is 144,800. Approximately 144,000 fry will be ponded in early February 2004.

6.2.4 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 1972 to 1975 period. Since 1991, the weir program has been conducted cooperatively by Fisheries and Oceans Canada and the Vuntut Gwitchin First Nation (VGFN)) of Old Crow. 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 15, Appendix Figure 14).

In 2003, the weir was operational from August 30 to October 19. A total of 29,519 fall chum salmon was counted. The count was not adjusted for fish that may have moved through the weir prior to installation because typically only 1% of the fish are counted prior to August 30 (based on the 1992-2002 period) and 0% were counted prior to this date in the two principal brood years (1998 and 1999).

The peak count (1,179 chum salmon) occurred on September 20 and the run mid-point was observed on September 22. The 2003 count was 93% of the recent 10-year average of 31,692 and only 59% of the lower end of the interim escapement goal range of 50,000-120,000 chum salmon. However the Yukon Panel agreed upon stabilization target of >15,000 chum salmon escapement was exceeded by 97%. The stabilization goal was based on the weir counts in the dominant cycle years were 13,564 chum salmon counted in 1998 and 12,904 counted in 1999. The 2003 count is an improvement over the 2000 count of only 5,053 fish. Apparently U.S. subsistence fishery restrictions and the Vuntut Gwitchin First Nation chum salmon fishery closure to address conservation concerns, described in Section 4.2.1, increased Fishing Branch River escapement in 2003.

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

6.2.5 Yukon Education Program 2002-2003

In 2002 – 2003, Fisheries and Oceans Canada again supported the educational program "Salmon in the Classroom". Lesson Aids to support the program are available to all 26 Yukon schools, through the Learning Resource Centre, and through DFO. DFO offers incubation equipment and salmon eggs are offered to all Yukon schools. In 2002-2003, salmon eggs were incubated in 12 aquaria in five Yukon communities as part of this program. Chinook salmon eggs from the Takhini River and Tatchun Creek were incubated to the eyed stage at the McIntrye Creek salmon incubation facility, administer by the Northern Research Institute (NRI) since summer 2002. Morley River eggs were

unavailable because of a low spawning stock. Approximately 50 eggs were distributed to each of 11 schools in November, 2002. Kluane Lake School students fertilized and incubated eggs that they helped to collect from chum salmon on the Kluane River. Kluane Lake School took about 400 eggs. Students released approximately 800 resultant fry (aggregate survival ~ 73% eyed egg to fry) into the creeks in spring 2003. The Kluane Lake School lost many fry they were rearing because a filter malfunctioned.

Seventeen Yukon schools are incubating chinook salmon eggs from the Takhini River, Tatchun Creek, Morley River and Kluane River, collected from the 2003 run. The Northern Research Institute is operating the McIntyre salmon incubation project for the 2003-2004 season. A small group of Yukon College Renewable Resources students is taking a series of workshops concerning the incubation project, and NRI employs these students to carry out site monitoring and maintenance.

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

Population structure and the application to genetic stock identification for chum salmon (Oncorhynchus keta) in the Yukon River was examined using microsatellite markers. Variation at 13 microsatellite loci (Ots3, Oke3, Oki2, Oki100, One101, One102, One103, One104, One106, One111, One114, Ssa419, and OtsG68) was surveyed for approximately 1500 chum salmon from nine Yukon Territory populations and approximately 1900 chum salmon from 13 populations in Alaska. Genetic differentiation among eight populations analyzed sampled in two or more years was, on average, over three times greater than annual variation within these populations, indicative of relative stability of allele frequencies. Regional population structure was observed for the 23 populations surveyed.

In the analysis of simulated single-population mixtures, where the expected result is 100% allocation to the target population, mean estimated stock composition for the 13 Alaskan populations evaluated was 83% while the mean estimated stock composition for the nine Yukon Territory populations evaluated was 87%. For populations contained in four local geographic areas in Alaska and two local areas in the Yukon Territory, mean estimated stock composition was 91% correctly assigned to the local geographic area. In multi-population simulated mixtures, mean estimated stock compositions were generally within 3-4% of the specific population contribution, within 2% for the local geographic region (six regions, four in Alaska, two in the Yukon Territory), and within 1% for Alaska and Yukon Territory contributions. The results of the simulations suggest that microsatellite variation has the potential to provide reliable estimates of stock composition of Yukon River chum salmon.

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

Initially, Dr. Margaret Merritt was contracted to facilitate the planning process and write the JTC plan. The first planning meeting was the week of May 14, 2002 in Whitehorse, Yukon. With Dr. Merritt's direction, the JTC used the Analytical Hierarchy Process and related Expert Choice software to develop the research plan. Goals, Objectives and Issues were ranked according to importance. The committee broke into groups based on interest (escapement, harvest, stewardship, habitat and ecosystem) to prioritize current issues and possible future projects. A glossary was written to define terms used within the plan. Dr. Merritt wrote a draft plan, not for general distribution, describing the planning process and the results of the initial planning exercise for the JTC in September 2002.

The JTC discussed the draft plan at our meeting in Whitehorse during the week of October 28, 2002. Work session discussions identified numerous research themes and needs, and were educational for JTC members with different backgrounds and interests, but the JTC thought the draft plan would benefit from additional work before proceeding to the next step. The JTC formed a subcommittee tasked with trying to improve the organization of the plan, while maintaining its original content. The subcommittee combined two of the original goals, leaving four goals: fisheries management, public support and participation, habitat, and salmon biology. Within each goal, objectives and issues were generalized and referenced from the original plan. The subcommittee completed its work and a new draft plan structure was distributed to all JTC members for review February 2003.

Sub-committee members prioritized the goals, objectives and issues of the newly reworked plan in May 2003 and subsequently listed the projects under relevant issues. Each project's objectives were used to guide project placement within the plan. By agreement, any project could not appear more than three times within the plan. The gap analysis will meet in February 2004 to work on the plan gap analysis. A draft will be prepared in April.

6.4 RESTORATION AND ENHANCEMENT FUND

6.4.1 Status of 2003 Restoration and Enhancement Projects

Fifty (50) R&E projects, two (2) agency support projects, one (1) R&E Fund planning and evaluation project for a total of fifty three (53) projects approved during the March 2003 meeting of the Panel involving a financial commitment of $1,212,000US/1,802,100Cdn[13]. All projects were activated.[14]

[13] This was based on an exchange rate at the time of approximately $1US = $1.58Cdn.

[14] An additional three projects were contracted in consultation with the Panel's Communications Committee that directly or indirectly support the Panel's R&E program.

Project No.	Project Title	Contractor	Funding$US/Cdn TC[15]

URE-01-03Radio Tag Recovery – Lower Yukon River *BSFA*[16] *$7,000/10,400 S*

Objective:

To retrieve radio transmitters from salmon caught in the lower section of the Yukon River. Transmitters would then be sent back to Marshall or Russian Mission to be re-deployed; and to collect age, sex and length (ASL) data from subsistence fisheries in the lower section of the Yukon River.

Note: Archival tags to be returned in a timely fashion, DNA samples to be collected, and list of contacts to be consulted with to be updated/have currency.

Status: Final report overdue and in preparation.

Financial: Initial payment provided on signing contract; final payment ($2,500) held pending approval of final receipt of final report.

URE-02-03 Mountain Village Fall Season Gillnet Test Fishery BSFA $15,000/24,300 S

Objective:

Provide the Alaska Department of Fish and Game (ADF&G) with fall chum and coho salmon migration timing, run composition and relative abundance at sites on the lower Yukon River. ASL to be documented for all fish handled, all radio tags to be collected and reported to ADF&G, and if requested Ichthyophonus and DNA samples to be collected.

Status: Project launched, satisfactory progress & final reports received – project completed.

Financial: Contract paid out.

URE-03-03 Chinook Salmon Capture for Radio Telemetry BSFA $60,000/88,800 S

Objectives:

- to capture up to 1100 chinook salmon in suitable condition for tagging;
- to increase local involvement in salmon stewardship and research projects; and,
- to provide training and employment opportunities to local residents.

ASL to be documented for all fish handled, all radio tags to be collected and reported to ADF&G, and if requested Ichthyophonus and DNA samples to be collected.

Status: Initial, progress and final reports received and approved.

Financial: Contract paid out.

URE-06-03 Kaltag Fall Chum/Coho Gillnet Test Fishery City of Kaltag $22,500/33,000 S

Objective:

Enumerate fall chum and coho salmon by using test drift fishing techniques and procedures established by the Alaska Department of Fish and Game for standardized time and data collection. ASL to be documented for all fish handled, all radio tags to be collected and reported to ADF&G, and if requested Ichthyophonus and DNA samples to be collected.

Status: Progress and final reports filed and accepted – project completed.

Financial: Initial, progress and final payments made – contract paid out.

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[15] TC – Technical Contact – S/Susan McNeil (ADF&G); A/Al von Finster, P/Pat Milligan, S/Sandy Johnston (DFO).

[16] BSFA - Bering Sea Fishermen's Association

URE-11-03 Inseason Management Teleconferences YRDFA[17] $7,000/10,400 S

Objectives:

Arrange and conduct weekly teleconferences to include fishers and management agencies involved throughout the Yukon River drainage during the fisheries season to:

- document distribution and abundance of salmon in the Yukon River Drainage;
- maintain and expand communication and information sharing between the Yukon salmon fishery users and agency staff through inseason teleconferences;
- foster increased participation and consistent reporting from fishers to managers; and,
- work with Canadian Yukon River Salmon Committee members and Department of Fisheries and Ocean staff to ensure the sharing of timely inseason management information among fishers and managers.

Status: Final report submitted/approved – project completed.

Financial: Initial and final payments made -- contract paid out.

URE-12-03 Enhance Mainstem Fall Chum Escapement EASFA[18] $15,800/25,600 S

Objective:

- Increase escapement of fall chum to the Canadian border by reducing the subsistence harvest of fall chum salmon passing Eagle by replacing subsistence harvest with terminal hatchery coho salmon from Valdez.

Status: This contingency project was fully activated due to the nature of opening of the subsistence fall chum fishery in the Eagle area. The Association members managed the project with full community participation and compliance (i.e. non-fishing) except one family that was too distant thereby making their participation inefficient. Project completed.

Financial: Contract paid out (with $696US deficit absorbed by the contractor).

URE-13-03 Ichthyophonus – Chinook StudyUniv. Wash/R.Kocan $38,8000/57,400 S

Objectives:

- Repeat multi-year survey (monitoring) of chinook salmon for *Ichthyophonus* prevalence and pathogenicity with previous years samples and 2003 upriver samples.
- Determine if Canadian-bound Chinook have different infection and disease prevalence than Alaskan fish.
- Examine spawn-outs to expand on previous year's findings that *Ichthyophonus*-infected post-spawn adults are under represented on the spawning streams.
- Continue monitoring Yukon River temperature and its relationship with disease severity.

Status: Fieldwork and data analysis complete with draft final report currently under review.

Financial: Initial payment ($35,000US) and progress ($11,500) made, with final payment ($3,500) held pending receipt of an approved final project report.

URE-15N-03 Kaltag Subsistence Chinook Drift Fishery Scale Sampling City of Kaltag $1,400/2,100Cdn S

Objectives:

1. Estimate the age, length and sex composition of chinook salmon caught in Yukon River Subsistence fisheries using data from samples collected.

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[17] YRDFA – Yukon River Drainage Fisheries Association

[18] EASFA – Eagle Area Subsistence Fisherman's Association

2. Document the age and sex composition of the chinook salmon subsistence harvest by location and gar type in the Yukon River.
3. Record location where chinook are caught, fisherman, gear type-fish wheel, set or drift gillnet, length, depth and mesh size of net used.

Project location – along the east bank of the Yukon River, directly across from the village of Kaltag, downstream to a point approximately 3 miles.

Status: Project completed, with final report overdue (Nov. 15 03).

Financial: Initial payment made ($1,000), with final payment ($400) held pending receipt of a satisfactory final report.

CRE-01-03 Juv. Chin. Out-Mig. Timing&Char./Auger Trap YRCFA, DDRRC, YSC[19] $30,000/47,000 P/A

Purpose: Document the out-migration timing and characteristics of juvenile salmonids from the Canadian portion of the Yukon River utilizing information and experience gained in the pilot study in 2002 (CRE-01-03).

Objectives/Method: Run a rotary auger trap in the Yukon Mainstem near Dawson to determine when juvenile salmon out-migrate, and determine other biological characteristics of those runs, such as water columns and relative densities in local area creeks.

Objectives and workplan refined in consultation with Technical Contact. Status:

Project complete, satisfactory progress report approved, and draft final report being reviewed.

Financial: Initial ($28,000) and progress ($14,000) payments made, with draft final report currently being reviewed; with, final payment ($5,000) held pending review of final report (in hand).

CRE-02-03 Radio Tag Recovery, THFN Traditional Territory YRCFA/THFN $5,100/7,500 P/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: Fieldwork complete, acceptable progress report filed, and final report in-preparation.

Financial: Initial ($750) and progress ($6,000) made with final payment held pending receipt of a satisfactory final report.

Note:

Project $2,086.55 over budget due to excess aircraft charter, radio receiver rental fees, etc. Working through resolution of financial settlement with the contractor in conjunction with final report.

Small project equipment purchases being recorded as Panel assets, with use by the contractor's use for various Panel R&E projects.

CRE-05-03 2003 Klondike River Sampling YRCFA/THFN $9,600/14,200 P/A

Objectives:

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[19] 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

1. Estimate the overall run-size and determine the techniques and methodologies for future broodstock collection, and assess the feasibility of collecting brood stock on the Klondike River.
2. Sample juvenile Chinook salmon to determine optimum target grow-out sizes to mimic naturally occurring conditions for future incubation/outplanting.
3. Provide DFO with inseason tag:untagged ratios on a terminal stream to aid with inseason stock assessment and the mark-recapture program.
4. Assess the inter-annuals spawning distribution of chinook salmon in the study area.
5. Contribute to an overall area-wide restoration program.

Status: Fieldwork complete, satisfactory progress report filed, and final report pending.
Financial: Initial ($8,000) and progress ($4,000) payments made with final payment ($2,200) held pending receipt of approved final report.

CRE-07-03 2003 'First Fish' Youth Camp YRCFA/THFN $700/1,000 A

Objective: Teach conservation and stewardship ethics in respect to salmon and their habitats to local area youths.
Status: Project completed; and, final report approved.
Financial: Initial payment ($900); final payment ($100) held pending receipt of the hard copies of the final report.

CRE-11N-03 Inseason Management Fund (Test Fisheries) YRCFA/THFN $50,700/75,000 P

Objectives:

1. Provide DFO with mark-recapture data for their run abundance/escapement estimates in the event that commercial fisheries cannot take place due to low numbers of returning Canadian origin chinook salmon.
2. Remunerate commercial fishers as fairly as possible to address their input and to maintain their vested interest in Yukon River salmon, thus maintaining the value of Canadian-origin salmon to Yukoners, and building a greater incentive for stewardship for the salmon resource.
3. Manage this 'Inseason Management Fund' via a steering committee on a multi-year basis to increase both the efficiency and effectiveness of this project, given the likelihood of its necessity in future years (given current run regimes).
4. Enable the YRP R&E Fund to operate in a more strategically-planned manner as the Fund could better allocate funds given the adoption of the In Season Management Fund.

Status: Field project complete, acceptable progress and related financial accounting provided.
Financial: The Panel's financial commitment of $75,000Cdn is a maximum project amount, with final payout to be based on documented/approved project expenditures.
Initial ($20,000) and progress ($20,000) payments made; total actual project expenditures of $46,700, final report currently under review. Free balance (i.e. $75,000 – 46,700) of $28,300 to be committed for 04 continuance of this project.

CRE-13-03 Chandindu River Salmon Enumeration Weir YRCFA/THFN $33,800/50,000 S/P

Objectives:

1. Learn more about the operations of the resistance-board weir by gaining hands-on experience with setting-up and operating them (in conjunction with USF&WS and ADF&G projects) by way of a skills exchange
2. Apply the knowledge gained in Alaska (with the helpful of USF&WS and ADF&G) and enumerate chinook salmon with a resistance-board weir on the Chandindu River.

SAL to be documented and reported on, all radio tags to be collected and submitted, and if requested *Ichthyphonus* and DNA samples to be collected if requested.
Status: Fieldwork conducted, data provided, and satisfactory progress report, with final report in progress.
Financial: Initial ($35,000) and progress ($11,500) payments made, with final payment ($3,500) held pending receipt of satisfactory final report.

CRE-15-03 Training & Chin/Coho Habitat Assessment NYRRC/VGFN[20] $32,200/47,600 A
Objectives:

- Inspire and build community capacity and stewardship for the conservation, restoration , and enhancement of salmon stocks in the Porcupine Rive sub-basin.
- Provide information regarding the presence or absence of juvenile chinook and coho salmon in the Bell and Fishing Branch tributaries, and possibly the porcupine main-stem.
- Provide training, employment and experience to a number of interested community members who will become a pool of trained and experienced community habitat researchers and stewardship advocates.

'Bridge' training to be provided carried forward from CRE-15-02 surplus to be included in the 03 final report; and, to collect DNA samples as requested by Technical Contact.
Status: Project launched, satisfactory progress and final reports received and accepted – project complete.
Financial: Contract paid out.
Note: Project surplus of $6,800 retained by the Panel as the Fishing Branch part of the project was set aside due to logistical and technical reasons.

CRE-16-03 Traditional/Local Knowledge Salmon Survey NYRRC/VGFN $5,700/9,900 A (VGFN/Porcupine System)
Objectives:

- Conserve and restore Porcupine and Fishing Branch River chum salmon stocks.
- Identify all areas within the Porcupine watershed where salmon have been found in the past.
- Identify areas of interest for future habitat assessment research.
- Build community capacity for the management of salmon stocks in the Porcupine River sub-basin.

Status: Project launched, satisfactory progress report provided, with final report currently being reviewed.
Financial: Initial ($4,000) and progress ($3,900) payments made, with final payment $2,000) held pending approval of final report.

CRE-17N-03 Chinook Radio Tracking /Telemetry Pilot Project NYRRC/VGFN $15,000/22,700 P
Objectives:

- Build community capacity and stewardship for the conservation and restoration of salmon stocks and their habitat in the Porcupine River sub-basin.

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

- Provide information regarding spawning destinations of Porcupine River chinook salmon stocks.
- Provide information for use by the community in fisheries and related resource planning and management that will ensure the long-term conservation of the salmon resource and its' habitat in the Porcupine River sub-basin.

Status: Project launched, satisfactory field progress report received, with final report approved – project complete.
Financial: Project was approved at $16,400Cdn, with Co-Chair approval granted for an increase $6,300Cdn based on aircraft no longer being locally available, to now be ferried from Inuvik; hence, total project approved cost became $22,700.
Revised project budget paid out.

CRE-19N-03 Lower Mayo River Chinook & Channel Assessment NND FN[21] $24,100/35,700A
Objectives:

- To determine changes that occurred on the Mayo River (downstream of the dam) since completion of the dam.
- To determine opportunities (future projects) to improve habitat for adult and juvenile chinook salmon within close proximity of the community of Mayo.
- To provide training, employment and capacity building to local members of the community of Mayo.

Status: Project launched, satisfactory progress report, draft final report reviewed and review comments presently being incorporated into final report.
Financial: Initial progress ($17,000) payment made, with final payment ($18,700) held pending receipt of final report.

CRE-23N-03 South McQuesten River Water Quality Monitoring NND FN $9,000/13,300 A
Objectives:

1. To review and analyze all exiting water quality data.
2. Design a water quality study to monitor water quality throughout the South McQuesten Watershed.
3. To develop an understanding of background 'natural' metal levels in the watershed.
4. To provide training, capacity building, and employment to local members of the NND.

Status: Project launched, satisfactory progress report received, with final report due March 15, 2004.
Financial: Initial and progress payment ($6,000) made, with final payment ($7,300) held pending a satisfactory final report.

CRE-26N-03 Weir Feasibility Study Stewart River Watershed NND FN $10,400/14,900 A
Objectives:

1. Identify potential chinook salmon index streams in the Stewart River sub-basin.
2. Evaluate steams for suitability as weir sites based on physical characteristics, logistics, historical and present use and status as spawning streams.
3. Provide training, employment and build technical capacity of community members and foster stewardship in the NND Traditional Territory.

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

Status: Project launched, satisfactory progress and approved final reports received – project completed.
Financial: Contract paid out.

CRE-27N-03 Chum Tagging/Test Fishery NYRRC/VGFN $33,200/49,100 P
Objectives:

- Build community capacity and stewardship for the conservation and restoration of salmon stocks and their habitat in the Porcupine River sub-basin.
- Restore chum salmon stocks by directly increasing spawning escapement.
- Provide managers with inseason information regarding the abundance and timing of chum runs in the Porcupine River.
- Provide information on the proportion of Porcupine River chum stocks that spawn in the Fishing Branch River.
- Provide information for use by the community in fisheries and related resource planning and management tat will ensure the long-term conservation of the salmon resource and its' habitat in the Porcupine River sub-basin.

Status: Project launched, with approved progress and final reports.
Financial: Project contract paid out.

CRE-29-03 2003 Chum Spawning Ground Recoveries – Minto Area Selkirk First Nation $9,000/13,300 P
Objectives:

- To recover spaghetti tags applied by DFO at Sheep Rock and White Rock fish wheels.
- To determine tagged:untagged ratios in the Minto index area.
- To involve and train local fisher people in this stock assessment management tool.

Status: Project launched and satisfactory field report filed.
Financial: There will be a single payment upon receipt of a satisfactory final report.

CRE-33N-03 Big Creek Investigation $4,300/6,300 A
Objectives:

1. To allow project partners (LSCFN and Carmacks Renewable Resources Council) an opportunity to assess the various mining project developments that occur within the Big Creek sub-basin.
2. To coordinate training for conducting juvenile fry trapping & water quality program within the Big Creek sub-basin.
3. To assess the feasibility of salmon habitat restoration projects within this area.
4. To encourage stewardship and communication between partners.

Status: Project launched and satisfactory progress and final reports received.
Financial: Initial ($3,000), progress ($2,000) and final ($1,300) paid – contract completed.

CRE-34N-03 Little Salmon/Carmacks Habitat SurveysLittle Salmon/Carmacks FN $9,100/13,500 A
Objectives:

1. To continue in the development of a salmon restoration plan within the Yukon River mid-mainstem sub-basin.
2. to continue the collection of detailed biophysical information on selected tributaries of the Yukon River on fish habitat types and fish utilization.

3. To build capacity and provide training for LSCFN crews and continue to foster a stewardship ethic towards salmon and salmon habitat in the LSCFN Traditional Territory.

Status: Project launched, satisfactory progress and final reports filed.

Financial: Initial ((\$6,500), progress (\$4,500) and final (\$2,500) payments made – contract paid out.

CRE-35-02 Klusha & Tatchun Creeks Ongoing Beaver Management LSCFN[22] \$9,200/13,600 A

Objectives – to continue to restore and monitor habitat and salmon stocks in Klusha Creek and Tatchun Creek:

1. to coordinate a meeting between LSCFN, DFO and YTG regional biologist to review the Klusha and Tatchun salmon Restoration and Enhancement Plan;
2. to continue to restore and monitor habitat and salmon stocks in Klusha Creek and Tatchun Creek; and,
3. to improve the implementation of Tatchun Creek as an index area for LSCFN fisheries management.

Status: Project launched, and satisfactory progress and final reports filed – project completed.

Financial: Initial (\$6,500), progress (\$5,000) and final (\$2,100) project payments made – contract paid out.

CRE-37N-03 Blind Creek Chinook Salmon Enumeration Weir Jane Wilson\$12,500/20,000 P

Objectives:

1. Install and operate an numeration weir in Blind Creek to obtain an accurate count of chinook salmon spawners utilizing this creek and an escapement index for the Pelly River drainage.
2. Provide biological information used to conserve and restore chinook salmon stocks in the Pelly River sub-basin and retrieve radio tags and 'spaghetti' tags applied for management purposes.
3. Provide training and employment for members of the Ross River Dena Council.

Status: Project launched, fieldwork completed and satisfactory progress report filed, with final report pending.

Financial: Initial (\$20,000) and progress (\$10,000) payments made with final report payment (\$6,600) held pending receipt of satisfactory final report.

CRE-43N-03 Compilation & Mapping of Fisheries Data Teslin Tlingit Council \$10,800/16,000 P/A

Objectives:

1. To collect and map all existing fisheries (with an emphasis on salmon) information within the Teslin Tlingit Traditional Territory.
2. To identify gaps in salmon knowledge, so that future research can be designed to fill these gaps.
3. To identify salmon related issues/concerns in each watershed, which should be addressed (i.e. habitat restoration).
4. To provide training, employment, build technical capacity and foster stewardship for TTC people.

Status: Project activated, progress report provided, with final report being reviewed.

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

Financial: Initial ($6,000) and progress ($7,000) payments made, with final ($3,000) payment pending receipt of satisfactory final report.

CRE-47-03 Teslin River Sub-basin Community Stewardship Teslin Tlingit Council $27,000/40,000 A

Objectives:

- To conduct an integrated management program through to address conservation concerns throughout the Teslin Rive drainage in season needed.
- Provide training and employment for Teslin Tlingit members to build technical capacity within the community.

Programs will include but not be limited to the following:

- Identification and removal of beaver dams that pose a barrier to migrating salmon.
- Identification, characterization and mapping of undocumented spawning areas and rearing streams indicated from traditional ecological and local knowledge.
- Collection of tissue samples for DNA analysis for stock identification.

Status: Project launched and satisfactory progress report received with final report pending.

Financial: Initial ($15,000) and progress ($7,500) payments made, with final payment ($17,500) held pending receipt of a satisfactory final report.

CRE-50-03 McClintock River Watershed Salmon Mngmt. PlanKwanlin Dun FN[23] $37,800/56,000 A/P

Objectives – In keeping with its vision of resource stewardship and to further develop KDFN capacity:

- to continue filed research and perform watershed monitoring through data collection and analysis of the length, weight, and health of both wild and enhanced of JTCS and adult carcasses in Michie Creek and M'Clintock River;
- to examine, document, and maintain salmon habitat in these watercourses; and,
- to initiate watershed management planning activities for the conservation of salmon and salmon habitat in the Michie/M'Clintock watershed.

These objectives further build KDFN capacity in field techniques, project management, and community –based planning, to contribute to KDFN taking on an increasing role in the stewardship and management of land and resources within its Traditional Territory.

Status: Project launched, field work completed, satisfactory progress reports accepted, with draft final report accepted with few minor editorial changes – hard and electronic copies expected during the next week.

Financial: Initial ($25,000), first progress ($11,000), and second progress ($10,000) payments made, with final

($10,000) payment held pending receipt of final report (as per above).

CRE-53N-03 Salmon Planning Within White River FN TTWhite River FN $21,800/32,300 A

Objectives:

1. Determine salmon priorities within the White River First Nation Traditional Territory.
2. Build capacity, provide training, stewardship and employment opportunities in the WRFN.
3. Generate salmon interest within the Whiter River community.

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[23] Upper Yukon River mainstem.

4. Develop ideas for future projects and direction.

Status: Project launched, satisfactory progress report received, and the WRFN community (March) workshop scheduled leading to the final report at the end of March 04.

Financial: Progress payment made ($15,000) made with final payment ($17,300) held pending receipt of a satisfactory final report.

CRE-54-03 Takhini River Chinook Investigation and Champagne & Aishihik FN [24] $10,100/15,000 A

Objectives – project objectives are collectively directed to restoring habitat and wild stocks and protecting and enhancing habitat:

Phase 1: Perform filed investigations and obtain juvenile chinook salmon occurrence data, geo-physical stream survey data, and hydrological data.

Phase 2: Identify salmon management objectives for the entire Takhini Basin. Add to the growing Traditional Knowledge database for the area; develop management objectives to protect and enhance key habitat areas; and, identify and match potential CAFN goals with R&E objectives.

Status: Project activated, satisfactory progress report provided, and final report approved with copies of final report pending.

Financial: Progress payment made ($10,000) with final payment ($5,000) held pending receipt of satisfactory final report.

CRE-55-03 Upper Nordenskiold River Restoration 2003 Champagne & Aishihik FN $10,100/15,000 A

Objectives – collectively focused on restoring habitat and wild stocks and protecting and enhancing habitat:

- perform reconnaissance flight of the project area and use as transport to Hutshi Lake;
- continue to remove all obstructions to salmon migration at the critical migration time;
- obtain temperature profiles in known historic spawning areas by collecting data loggers installed in 2001 & 02;
- take water sample at side tributaries just below Hutshi Lake and send out for analysis;
- perform a 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,
- conduct winter beaver trapping program.

Status: Field work completed, satisfactory progress report filed, draft final report reviewed, with final report being prepared with review comments being incorporated.

Financial: Progress payment made ($10,000) and final payment ($5,000) pending s held pending receipt of respective repots.

CRE-58N-03Traditional & Local Knowledge SurveyKluane First Nation $10,100/15,000 P

Objectives:

Status: Field work completed, progress report provided, with final report pending.

Financial: Progress payment made, final held pending receipt of final report.

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[24] 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.

CRE-62N-03 Juvenile Salmon Identification Field Book Jake Duncan $3,300/4,900 P
Objectives:
Status: Project launched, progress report (unpaid), and proceeding satisfactorily – final report due March 5/04.
Financial: Initial payment made ($2,000), with final payment ($2,900) held pending approval of the final report.

CRE-63-03 Whitehorse Rapids Hatchery Coded Wire Tagging YF&GA/YEC/DFO[25] $27,700/41,000 P
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: Projected conducted, satisfactory progress report received and final report pending.
Financial: Initial and first progress payments made with second progress and final payment ($9,000) total held pending receipt of final report.

CRE-64N-03 Wolf Creek Monitoring Yukon Fish & Game Association $3,400/5,000 P/A
Objectives:

1. To provide base line information to D.F.O. for stock assessment analysis of the success of the Wolf Creek Restoration and Enhancement Project.
2. Stream surveys to identify, count and flag redds from the spawning populaton of the returning adult salmon to Wolf Creek.
3. Carcass recovery of coded-wire tagged chinook salmon adults, in Wolf Creek. Sample all salmon carcasses under DFO protocols.
4. To provide students with experience in the filed of fisheries science and management.
5. To monitor obstructions which may impede salmon migration in Wolf Creek, to include beaver dams and the new fishway at the Alaska Highway.
6. To provide the community with knowledge of the resource and local stewardship of the Yukon River chinook salmon and Wolf Creek tributary.

Status: Project complete and report in preparation.
Financial: Nil payment made pending receipt of a satisfactory final report.

CRE-65-03 McIntyre Creek Salmon Incubation Project YukonCollege–NRI$29,000/42,900 A
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;

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

- 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: Project launched and satisfactory progress received, with final report due March 15/04.
Financial: Initial payment on signing of the contract, progress payment pending, and final payment pending completion of the project.

CRE-67-03 Yukon Schools Fry Releases & Habitat Studies Streamkeepers North Soc. $2,700/4,000 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 launched and progressing satisfactorily – final report due March 5/04.
Financial: Initial payment made, and final pending review of final report.

CRE-71N-03 Salmon Habitat Management Plan City of Whitehorse $6,800/10,000 A
Objective:
Develop a detailed, operational-level Salmon Habitat Management Plan for the City of Whitehorse based on the previous project (CRE-71-02).

- Develop detailed recommendations for enhancement of salmon habitat within areas identified in the previous project report.
- Provide detailed recommendations for restoration and risk reduction of salmon habitat within areas identified in the previous project report.
- Identify areas of salmon habitat requiring increased level of protection as a result of the findings of the previous project.
- Update the GIS database created by the previous project, where necessary, e.g., where data have become available since completion of the earlier project.

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

CRE-72-03 Commercial Fish Plant Upgrades-Value Added C.Ball/S.Fleurant$13,500/20,000 S
Objective: Maintain the viability of the Yukon River Commercial Fishery by assisting a locally owned and operated commercial fish processing facility by providing 50:50 funding toward the upgrading of this local processing plan, and the purchase and installation of new capital equipment – year 2 of a 3 year project.
Status: Project satisfactorily completed, including acceptance of final report.
Financial: Project paid out in full.

CRE-75-03 Comm Fishery Value-Added Study–Phase 3 (Business Plan) YRCFA/THFN $26,800/39,600 S

Objective: Complete a comprehensive business and development plan for the Commercial Fishery, based in Dawson City – building on previous related projects.

1. Complete a comprehensive business and development plan for the entire Canadian Commercial Salmon Fishery, based in Dawson City and on the Yukon River salmon.
2. Maintain the long-term viability of the Yukon's commercial fishery as a whole.
3. Promote stewardship, through the community's vested interest in the resource. Increase the community's capacity.

Status: Final report received/approved.

Financial: Contract paid out.

CRE-78-03 Telemetry Cdn. Section Yukon River Basin Haldane Env. Serv. $119,800/164,000S

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 (complimentary addition to URE-01-02).

Status: Project activated and 1-4 satisfactory progress reports, with final report due March 31, 2004.

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. Initial and progress payments made with final payment held pending receipt of final report – significant surplus expected to accrue favourably to the Panel.

CRE-79-03 MHC[26] Variation & Stock ID of Yukon River Fisheries&Oceans$33,800/50,000 S

Objectives: DNA level variation at microsatellite to Yukon River chinook, the objectives of the project include:

- survey MHC variation in Yukon River chinook salmon populations on a drainagewide basis;
- examine population structure and biodiversity of Yukon River chinook 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: Project initiated, with satisfactory progress and approved final report – project completed.

Financial: Financial agreement paid out.

CRE-87N-03 Germaine Creek Demonstration Restoration Project M. Miles&Assoc. $28,000/41,500 A

Objective: Germaine Creek has been identified as a potentially suitable site for demonstrating riparian, stream and fish habitat restoration techniques. The project objectives are to determine if the

[26] MHC – Major Histocompatibility Complex

site is suitable and, if this is the case, to develop restoration prescriptions, cost estimates and plans for undertaking the proposed work.
Status: Project conducted and reported on – satisfactorily completed.
Financial: Project paid out.

CRE-95-03 Yukon Queen II Investigations Dawson District RRC $12,200/18,000 A/P
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 harm to fry.
Status: Project launched, satisfactory progress report, and final report accepted – project complete.
Financial: Contract paid out.

CRE-98N-03 Yukon Stewardship Program Yukon Fish & Wildlife Management Board $68,400/108,000
Objectives: The overall goal of the YFWMB's Stewardship Program is to achieve conservation of fish and wildlife through community participation in locally driven projects. To help reach this goal, individual Stewards will endeavor to achieve these objectives:

- Increase understanding of the importance of stewardship and conservation of salmon, freshwater fish and wildlife resources and habitats.
- Assist communities to identify local stewardship priorities and help develop relevant plans, programs and projects.
- Ensure the collection and integration of scientific, local, and First Nation traditional knowledge as part of the design and implementation of stewardship initiatives.
- Provide opportunities for individual and community capacity building through stewardship project implementation.
- Support and facilitate communication between various community and government stakeholders and assist in the cost effective implementation of stewardship programs at the local level.
- Identify and pursue various funding sources to support local stewardship initiatives.
- Ensure tangible and measurable results of stewardship initiatives are achieved and are apparent to communities and partners.

Status: Project contracted and launched during the summer and fall of 2003 with the Coordinator establishing and hiring Stewards in Mayo (Northern Tutchone) and Dawson, with assessment of future community and program needs to enable a complete Stewardship program in 2004. Satisfactory progress reports provided.
Financial: This project was approved $91,200/135,000, however contracted in the amount of $108,000Cdn in consideration of the mid-year start-up date. Initial project payment of $45,000 made with progress ($30,000 & $25,000) and final ($8,000) payments pending.

CRE-104N-03 Yukon Fisheries Field Assistant Program $37,900/56,100 S/H Yukon College/Dawson Campus
Objectives:

- The intent is to increase the quality of salmon community based restoration projects, build community capacity, and encourage stewardship.

- Provide an opportunity for Yukoners to complete a Yukon Fisheries Field Assistant Program in Yukon. Students to be equipped with skills and knowledge of salmonid biology, fish identification, and fish and fish habitat inventories, assessments, and restoration techniques. Students also to be shown how to acquire skills in planning procedures, permit applications, project administration, and proposals for fisheries field work.
- Local expertise to be used for course instruction with locally relevant material in combination with an instructor for a Northern B.C. college.

Status: Project completed and a satisfactory final report accepted.
Financial: Contract paid out.

CRE-106N-03 Chum salmon Fishery Substitution (Porcupine River) NYRRC/VGFN $9,900/14,600 P

Objectives:

- Build community capacity and stewardship for the conservation and restoration of salmon stocks and their habitat in the Porcupine River sub-basin.
- Restore chum salmon stocks by directly increasing spawning escapement.
- Set the stage to ensure the long-term conservation f the salmon resource and its' habitat in the Porcupine River sub-basin.

Vuntut Gwitchin First Nation and DFO to collaboratively monitor the offset of no subsistence of the fall chum salmon run in the Old Crow Area.
Status: Project launched and satisfactory progress report, with final report pending.
Financial: Initial ($2,600) and progress ($10,000) payments made with final ($2,000) payment held pending receipt of approved final report.

6.4.2 Proposed Call Process for Restoration & Enhancement Projects, Year 2004/2005, Conceptual Proposals Due October 11, 2004

- Response to this call for conceptual proposals is the first essential step for applicants to the Yukon River Panel's salmon restoration and enhancement (R&E) fund in 2005.
- Panel R&E funds are committed to research and management projects directed to the restoration and enhancement of salmon stocks of Canadian origin in the Yukon River watershed in Yukon and Alaska; and, to develop community-based stewardship for salmon and their habitats and maintaining viable salmon fisheries in Yukon.

Yukon River Panel's R&E Program

- The Yukon River Panel is mandated by the U.S.A./Canada agreement on Yukon River Salmon (March 29, 2001) enabled by the Pacific Salmon Treaty (1985).
- An important part of this agreement is the use of the Panel's R&E fund to achieve its salmon stock and habitat restoration objectives.
- Applicants are strongly urged to review their conceptual proposal with an agency technical contact before submitting their conceptual proposal to the Panel.
- Project applicants will be kept informed on the status of the Panel's decisions and administrative processes.

Call and Review Schedule for 2005 R&E Project Proposals

Step 1 – May – August E-mail alerts to previous R&E project contractors concerning the Panel's 2005 R&E schedule; notice in the spring 2004 YRDFA newsletter; ongoing encouragement of potential applicants by Panel members and agency staff as opportunities arise; and, public notice via the ADF&G and Panel web sites.

Step 2 – September 1 Advertise the call for conceptual proposals (CPs) in the Anchorage, Fairbanks, and Whitehorse newspapers.

Step 3 – October 11 Deadline for 2005 CPs to be filed with the Panel's Executive Secretary – preferably by e-mail.

Step 4 – December 15 Panel decisions will be made on the 2005 conceptual proposals.

Step 5 – December 18 E-mail response to each CP applicant indicting either:

- "Approved" – the applicant is encouraged to submit a detailed project proposal based on the CP as submitted;
- "Modified" – the applicant is encouraged to submit a detailed project proposal to incorporate the revisions requested by the Panel review comments on the CP;
- "Other" – as determined by Panel comment; or,
- "Not Approved" – being of relatively low priority, or not meeting the criteria of the Panel's R&E program.

Step 5 – January 20 Deadline for receipt of detailed project proposals.

Step 6 – March 15 (approx.) Panel review of detailed project proposals, with decisions to be communicated to applicants the following week

Assistance to Project Proponents

Those wishing to participate in the Panel's R&E program are encouraged to contact agency technical staff and the Panel's Executive Secretary – we will work with you to help produce your best application for the Panel's consideration.

For administrative information and to submit applications:

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

Phone: (867) 393-1900
Fax: (867) 633-8677
E-mail: monaghan@internorth.com

For technical advice:

In Yukon,

Al von Finster & Pat Milligan
Fisheries and Oceans Canada, Whitehorse

Phone: (867) 393-6722
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, Anchorage

Phone: (907) 267-2166
Fax: (907) 267-2442
E-mail susan_mcneil@fishgame.state.ak.us

We will be pleased to provide:

- Criteria for R&E projects and the Panel's R&E budget priorities
- An outline for conceptual proposals
- An example of a conceptual proposal

And, any other information that we can muster that may be helpful to you.

6.4.3 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.

7.0 YUKON RIVER SALMON RUN OUTLOOKS 2004

7.1 ALASKA

7.1.1. Chinook Salmon

Yukon River chinook salmon return primarily as age-5 and age-6 fish, although age-4 and age-7 fish also contribute to the run (Table 13). Spawning ground escapements in 1998, the brood year producing 6-year-old fish returning in 2004, were near the upper end of the escapement goals in the Chena and Salcha Rivers but below the escapement objective in Canada. However, the 5-year-old component in 2003 was average, indicating improved production. With the exception of 2003, the return of salmon since 1998 has been well below average in strength indicating abnormally poor production from parent year escapements. Assuming a normal return of 6-year-old fish, and a weaker return of 5-year-old fish, the 2004 season is expected to be average to below average (Table 14).

Overall, the 2004 chinook salmon run is anticipated to be average to below average in strength but improved over recent poor years of 1998-2002. Given the uncertainties associated with recent declines in productivity, it is anticipated the run will provide for escapements, support a normal subsistence harvest, and a below average commercial harvest. The fishery management will be based upon inseason assessments of the run. If inseason indicators of run strength suggest sufficient abundance exists to have a commercial fishery, the commercial harvest in Alaska could range from 20,000 to 40,000 chinook salmon. This range of commercial catch is below the 10-year (1994-2003) average of approximately 62,800 chinook salmon.

In January 2001, the Alaska Board of Fisheries (BOF) modified the Yukon River King Salmon Management plan by adding a fishing schedule for the subsistence salmon fisheries. This schedule was in response to the poor 2000 chinook salmon run, and expected poor run in 2001. The objectives of the schedule are to 1) reduce harvest early in the run when there is a much higher level of uncertainty, 2) spread the harvest throughout the run to reduce harvest impacts on any particular component of the run and 3) spread subsistence fishing opportunity among users during years of low salmon runs. The BOF addressed numerous proposals in January 2004 to change the current subsistence fishing schedule. Proposals ranged from reducing subsistence fishing opportunity in Districts 1-3 in half to lifting the schedule entirely. No changes were adopted to the current subsistence fishing schedule.

7.1.2. Summer Chum Salmon

Summer chum salmon runs in 2004 will be dependent on the escapements, and the production of the escapements from 2000 (age-4 fish) and 1999 (age-5-fish). Spawning escapements in 1999 were slightly above the low end of the recently established Biological Escapement Goal (BEG) range in the Anvik River and below the BEG in the East Fork Andreafsky River. The 2000 run of summer chum salmon was the poorest on record and none of the escapement goals were met. It appears that recent declines in the productivity of Yukon River summer chum salmon are continuing. This trend is similar to the declines seen in many chinook and chum salmon stocks in the Bering Sea region.

Specifically, production of Anvik River chum salmon, the largest spawning stock of Yukon River summer chum salmon, has fallen well below one return per spawner for the most recent returning brood years. There is uncertainty as to how long this trend will continue, and whether productivity could be reduced even further. Exact reasons for the run failures are unknown, but is widely speculated to poor marine survival related to localized weather and ocean conditions in the Bering Sea are the primary contributing factors. Weakness in Yukon River salmon runs has been attributed to reduced productivity, and not the result of low levels of parent year escapements. Information from the Bering Sea (BASIS and trawl fisheries) indicates ocean conditions and summer chum salmon production may be improving.

If ocean conditions are more conducive to survival, it is anticipated the run will provide for escapements, support a normal subsistence harvest and possibly a small commercial harvest. If production remains low, subsistence harvest opportunity may require reductions to provide for escapements. If inseason qualitative indicators of run strength suggest sufficient abundance exists to have a commercial fishery, the commercial harvest in Alaska could range from zero to 50,000 summer chum salmon.

7.1.3 Fall Chum Salmon

Drainagewide, Yukon River fall chum salmon escapements for the period 1974 through 1999 have been estimated to have ranged from approximately 180,000 (1982) to 1,500,000 (1975), based upon expansion of escapement assessments for selected stocks to approximate overall abundance (Eggers 2001). Escapements in these years resulted in subsequent returns that ranged in size from approximately 312,000 (1996 production) to 1,400,000 (1975 production) fish, using the same approach to approximating overall escapement. Corresponding return-per-spawner rates range from 0.3 to 3.2, averaging 1.8 for all years combined (1974-1997).

Dramatic declines in salmon returns to western Alaska have been realized from 1997 through 2002 with a record low in 2000. Weakness in the recent salmon runs have been attributed to reduced productivity in the marine environment and not to low levels of parental escapement. To adjust for the run failures, beginning in 1999, the projections have been presented as a range that includes the normal point projection as the high end. The low end was determined by reducing the normal point projection by the average ratio of observed to predicted returns from 1998 through the current year. The proportions of the expected runs are shown in the following table:

Year	Expected Run Size (preseason)	Estimated Run Size (post season)	Proportion of Expected Run
1998	880,000	329,000	0.37
1999	1,197,000	424,000	0.35
2000	1,137,000	241,000	0.21
2001	962,000	383,000	0.40
2002	646,000	414,000	0.65
2003	647,000	750,000	1.16
Average			0.52

Yukon River fall chum salmon return primarily as age-4 or age-5 fish, although age-3 and age-6 fish also contribute to the run (Table 15). The 2004 run will be comprised of the parent years 1998 to 2001. Estimates of return per spawner based on brood year return were used to estimate production for 1998 and 1999 and an auto-regressive Ricker spawner-recruit model was used to predict the returns from 2000 and 2001. The point estimate utilizes the 1984 to 1997 odd/even maturity schedules and the lower end of the range is based on the average proportion of 0.52, resulting in a 2004 run size projection in the range of 350,000 to 672,000 fall chum salmon, with the following approximate brood year composition:

Brood Year	Escapement	Est'd prod'n (R/S)	Est'd Prod'n	Contribution based on age	2004 Return
1998	257,588	1.45	373,502	0.9%	6,024
1999	292,185	3.23	943,758	40.8%	274,207
2000	212,376	3.04	646,660	56.7%	380,984
2001	337,559	2.53	854,252	1.6%	10,779
Total expected run (unadjusted)					**671,994**
Total, expressed as a range using the 1998 to 2003 forecast return vs. observed return (52%):					**350,000 to 672,000**

The escapements for each of the four parent years that will contribute to the 2004 run were extremely poor and below the minimum drainagewide optimal escapement goal of 350,000 fall chum salmon. The major contributor to the 2004 fall chum salmon run is anticipated to be age-4 fish returning from the parent year 2000 the worst return on record. The return of age-4 fish from even-numbered brood years during the time period 1984 to 1997 typically averages 376,000 chum salmon, and ranges from a low of 166,000 for brood year 1996 to a high of 650,000 for brood year 1992. To meet the projected level of return just for age-4 fish would require exceptional survival conditions. In this case, the projected level of age-4 fish would surpass the average total run size for even-numbered years of 620,000 fall chum salmon.

The projection for 2004, based on the combination of extremely weak escapements and the likelihood of a weaker return in an even numbered year, advocates the use of a conservative run size estimate for 2004. However improvements in production were evident in the 2003 return that included an unanticipated strong component of age-4 fish from the brood year 1999. If this affect of improved survival was maintained, a strong carryover of age-5 fish could materialize to bolster the run size enough to realize or surpass the upper end of the range.

The projected run size using the point estimate for the 2004 return should support normal subsistence fishing activities. Commercial fishing can occur on run sizes greater than 600,000 fall chum salmon. The run will be monitored inseason to determine the strength in relation to the estimated range and what amount of harvest can be provided based on the levels stipulated in the Alaska *Yukon River Drainage Fall Chum Salmon Management Plan*.

7.1.4 Coho Salmon

Although comprehensive escapement information on Yukon River drainage coho salmon is lacking, it is known that coho salmon primarily return as age-4 fish and overlap in run timing with fall chum salmon. Based on Pilot Station sonar operations from 1995, and 1997 to 2003, the 2000 return was the second largest on record and will be the dominant age class in the 2004 return. However, in contrast to the high abundance estimated at Pilot Station sonar, escapements in the upper portions of the drainage were weak to poor in 2000. These low survey counts were possibly caused by warm fall weather maintaining high water levels. These high water levels resulted in poor survey conditions and may have caused fish to hold off moving to spawning areas. In at least one area it was noted, coho salmon moved in extremely late. Assuming average survival, the 2004 coho salmon run is anticipated to be average to above average based on the performance of Pilot Station sonar in 2000 and the fact that coho salmon abundance has been on the increase in recent years.

The Alaska *Yukon River Coho Salmon Management Plan* allows a directed commercial coho salmon fishery, but only under very unique conditions. Directed coho salmon fishing is dependent on the assessed levels of return for both coho and fall chum salmon since they commonly return mixed together.

7.2 CANADA

7.2.1 Canadian-Origin Upper Yukon Chinook Salmon

The total run size of Canadian-origin upper Yukon[27] River chinook salmon return in 2004 is expected to fall within a range of 69,700 to 107,200. The upper end of this forecast is based on a stock-recruitment (S/R) projection while the lower end is the average proportion that the 1998 to 2003 returns have fallen short of the expected run size. With the exception of the 2003 return, the observed returns were all substantially below the expected run size.

The performance of run outlooks based on unadjusted S/R models over the previous six years:

Year	Expected Run Size (Preseason)	Observed Run Size (Post season)	Proportion of Expected Run
1998	143,000	69,600	.49
1999	136,000	84,700	.63
2000	128,000	39,500	.31
2001	124,000	78,100	.63
2002	95,000	65,600	.69
2003	90,300	103,000	1.14
Average			**0.65**

[27] The upper Yukon River, for the purpose of Sections 2.2 and 3.0 of this report, is defined as the Canadian portion of the Yukon River drainage excluding the Porcupine River drainage.

Incorporation of the past performance of outlooks into the 2004 outlook is an attempt to take into account the recent decline in the upper Yukon River chinook salmon return per spawner values. Despite good brood year escapements, observed run sizes for the 1998-2002 period were relatively low. Available information suggests thislow size is primarily the result of poor marine survival. The upper Yukon chinook salmon run size averaged approximately 74,000 fish during the recent six-year cycle from 1998 to 2003[28]. The longer term average run size for the 1980 to 2003 period is 119,200 fish.

Escapement goal range for rebuilt upper Yukon River chinook salmon (excluding the Porcupine drainage) is 33,000 to 43,000. In recognition of depressed chinook salmon escapements, the Yukon River Panel developed an interim rebuilding goal of >28,000[29] for the 1996 through 2002 period both Parties endeavor to manage towards. Only one of the three principal brood years for the 2004 run exceeded the interim rebuilding goal of 28,000 chinook salmon. This return involved an estimated escapement of 37,683 chinook salmon in 1997. This return also exceeded the lower end of interim escapement goal range of 33,000 to 43,000 for rebuilt stocks.

The 2004 run outlook is based on escapement data for 1994 through 1999 and calculated returns per spawner for the individual brood year escapements based on a spawner-recruitment relationship developed for the 1982 to 1994 brood years. Production estimates incorporated age composition data from escapements, and from estimated harvests of Canadian-origin chinook salmon in the U.S. and Canada. Annual returns were reconstructed using ADF&G scale pattern data and Fisheries and Oceans Canada tagging results. Total escapements for 1980-81 and 1984 were estimated by expanding a cumulative five-area escapement index (Tatchun Cr., Big Salmon R., Nisutlin R., Wolf R., and the non-hatchery returns to the Whitehorse Fishway) by the average proportion the index represented of the total escapement estimates. Mark-recapture results were used to estimate the escapement in 1982, 1983 and from 1985 onwards.

The relationship between the natural logarithm of the return per spawner (R/S) and number of spawners (S) for the 1982 to 1994 brood years is described as follows:

Equation [1]: Ln (R/S) =2.895-0.000058(S);

Where: S = # spawners (in thousands), R = returns.

The coefficient of determination (r^2) of this regression is 0.47 and the relationship is significant ($p<0.05$).

The 2004 run outlook was estimated by first, calculating the total expected returns from each brood year escapement based on equation [1] and then, apportioning them by the average age composition

[28] The preliminary estimate of the 2003 run size is 103,00 fish.

[29] The 2001 outlook was for a poor run; there was a desire to provide harvest opportunities for the subsistence fishery in Alaska and the aboriginal fishery in Canada. Based on this information the Yukon River Panel expected that limited fishing opportunities would provide a maintenance harvest and a Canadian spawning population exceeding 18,000 chinook salmon.
In 2003, the escapement target for Canadian-origin upper Yukon chinook salmon was 25,000. This target was increased to 28,000 in the event that a U.S. commercial fishery was initiated.

of brood year returns. For example, the escapement of 37,683 chinook salmon in 1997 is expected, under normal survival conditions, to produce 76,153 chinook salmon, all ages combined. However, only age-7 chinook salmon will be returning in 2004 from the 1997 brood year. To calculate the number of age-7 chinook salmon expected from the 1997 brood year, the expected total production of 76,153 was apportioned by the average age composition of brood year returns. Over the 1982-1994 period, the average age composition of brood year returns is as follows: <0.1% age-3, 4.6% age-4, 24.0% age-5, 56.8% age-6, 14.1% age-7, and 0.4% age-8. Therefore, 14.1% of the production from 1997 is expected will return as age-7 chinook in 2004; this equals 10,760 fish. The calculations for this, and other, brood years are summarized below:

Brood Year	Escapement	Calc'd R/S	Est'd prod'n	Contribution based on age	2004 Return
1996	28,409	3.60	102,196	.4%	378
1997	37,683	2.02	76,153	14.1%	10,760
1998	16,888	6.78	113,624	56.8%	65,105
1999	11,254	9.59	107,901	24.0%	25,864
2000	12,166	9.05	110,109	4.6%	5,021
2001	44,081	1.43	63,028	0.1%	82
Total expected run size (unadjusted)					**107,210**
Total expressed as a range based on the forecasted vs. observed returns for the 1998 to 2003 period					**69,700-107,200**

The point estimate of 107,210 chinook salmon does not incorporate the 95% confidence interval range for the Yukon chinook stock-recruitment relationship or the recent trend towards decreased marine survival. It is therefore considered to be optimistic. In addition, the estimated escapements for the 1998, 1999 and 2000 brood years were all very low (<17,000 fish). The stock recruitment-relationship shows very high return per spawner values for these low escapement years. This calculation should be viewed in light of the following two points:

1) The spawner-recruitment relationship requires additional information before a comprehensive Biological Escapement Goal can be developed using the Chinook Technical Committee criteria; and

2) The quality[30] of the escapement for 1998, 1999 and 2002 is not well understood.

Another consideration is stock-recruitment relationships are usually developed from density dependent relationships developed for a single stock rather than the aggreg'te of a number of stocks as is used for Yukon River outlooks.

[30] The inference here is a question, or a precautionary concern exists regarding the fitness of the fish observed and the number of females.

The 2004 run outlook is forecast to be below average with a forecast range of 69,700 to 107,200 chinook salmon. The forecast is presented as a range to demonstrate the uncertainty regarding the stock-recruitment relationship, the status of marine survival conditions and the quality of the escapement in three of the brood years.

7.2.2 Canadian-Origin Upper Yukon Chum Salmon

On average, 65% of upper Yukon adult fall chum salmon return as age-4 and 33% return as age-5. This suggests that the major portion of the 2004 fall chum salmon run should originate from escapements of 61,905 in 1999 and 55,362 in 2000.

The historic average escapement for the 1984-2003 period was 68,800 fish. More recently, for the 1994 to 2003 period, it was 79,700 fish. Escapement for the two principle brood years (1999 and 2000) which contribute to the 2004 run, fall below both the historic and recent averages. The escapement goal for rebuilt upper Yukon chum salmon is >80,000 fish.

The joint Canada/U.S. upper Yukon chum salmon rebuilding model has used a return rate of 2.5 adults per spawner (R/S) for a number of past years by Fisheries and Oceans Canada to develop preseason run expectations. This return rate is close to the estimated 1982 -1995 average drainagewide fall chum salmon R/S rate of 2.6. The average R/S rate for the 1990-1995 brood years is estimated to have been 2.6, however the estimated R/S for two recent brood years (1994 and 1995) was only 0.8, a value below which is required for replacement; a preliminary R/S for brood year 1996 is <0.8.

The relationship between the natural logarithm of the return per spawner (R/S) and number of spawners (S) for the 1982 to 1995 brood years is described as follows:

Equation [1]: Ln (R/S) =1.544-0.000011(S);

Where: S = # spawners (in thousands), R = returns.

The coefficient of determination (r^2) of this regression is 0.48 and the relationship is significant ($p<0.05$).

Canadian-origin upper Yukon River fall chum salmon runs have consistently failed to meet outlooks based on S/R models over the recent cycle. The estimated forecast error is:

Year	Expected Run Size (Preseason)	Estimated Run Size (Postseason)	Proportion of Expected Run
1998	198,000	61,500	0.31
1999	336,000	102,400	0.30
2000	334,000	70,100	0.21
2001	245,000	45,200	0.18
2002	144,000	97,000	0.67
2003	145,000	165,000[31]	1.14
Average			**0.47**

[31] This number is based on a preliminary 2003 border escapement estimate of 142,600 and an estimated U.S. harvest of 22,400.

The estimated 2003 return was actually stronger than the expected (or forecast) run. This discrepancy is a welcome change given that the 1998 to 2002 returns were only 18% to 67% of the preseason forecast made through a stock-recruitment model. As a precautionary approach, it is reasonable to assume that the 2004 run also suffer somewhat from below average marine survival. The 2004 run size expectation therefore has been expressed as a range using the average proportion (0.47) of the estimated run size to the expected run size for the 1998 to 2003 period. The calculated range is from 68,900 to 146,500.

Brood Year	Escapement	Est'd prod'n (R/S)	Contribution based on age	2004 Return
1998	46,305	2.88	1.3%	1,736
1999	61,905	2.44	32.8%	49,477
2000	55,362	2.62	64.8%	94,108
2001	33,679	3.27	1.1%	1.213
Total expected run (unadjusted)				**146,534**
Total, expressed as a range using the 1998 to 2003 forecast return vs. observed return (47%)				**68,900 to 146,500**

Insufficient stock identification data are available for accurately estimating annual run sizes of upper Yukon chum salmon. However, rough estimates can be made with the following assumptions:

1) 25-30% of the total U.S. catch of fall chum salmon is composed of Canadian-origin fish;
2) U.S. catches of Canadian-origin upper Yukon and Porcupine River fall chum salmon are proportional to the ratio of their respective border escapements; and,
3) Porcupine River border escapement consists of the Old Crow aboriginal fishery catch plus the Fishing Branch River escapement, although the database will be updated when additional tag recovery data[32] is available.

The recent four-year cycle (2000-2003) run size of upper Yukon Canadian-origin chum salmon is 100,600 fish. The 1994 to 2004 average estimated run size is 150,100 fish and the 1984 to 2003 average estimated run size is 173,800 fish. In the 5-year period prior to 2003, the estimated post season, chum salmon run sizes averaged only 33% of the preseason projections. However, in 2003 there was some improvement insofar as the estimated run was 14% higher than the preseason run outlook possibly indicating improved survival, although still below average.

The 2004 run outlook expressed as a range of 68,900 to 146,500 fish, demonstrates uncertainty regarding the stock-recruitment relationship and the status of marine survival conditions. An assumption that the run strength will be closer to the upper end of the range suggests the forecast is for an average return.

[32] In 2003, 88% of the tags applied near Old Crow were observed at the Fishing Branch River Weir.

7.2.3 Canadian-Origin Porcupine River Chum Salmon

The fall chum salmon run to Canadian portions of the Porcupine River drainage in 2004 should originate primarily from the 1999 and 2000 escapements. For these years, the Fishing Branch River weir counts were 12,904 and 5,053 chum salmon, respectively. These counts were 22% and 69% lower than the 1999-2003 cycle average of 16,542 fish. However it is emphasized that these are the lowest counts recorded for the 1971 to 2003 and the recent cycle average is severely depressed. The interim escapement goal is 50,000 to 120,000 chum salmon.

As with upper Yukon chum salmon, run sizes have consistently failed to meet expected levels over the recent cycle as indicated below:

Year	Expected Run Size (Preseason)	Estimated Run Size (Post season)	Proportion of Expected Run
1998	112,000	25,200	0.23
1999	124,000	23,500	0.19
2000	150,000	11,800	0.08
2001	101,000	30,500	0.30
2002	41,000	16,100	0.39
2003	29,000	39,900[33]	1.38
Average			0.43

The productivity of the Fishing Branch River chum salmon stocks appears to be lower than that of both the drainagewide stock aggregate and the upper Yukon stock aggregate, particularly when averaged over the 1988 to 1991 brood years. Return information from the 1992 to 1997 brood years has not been finalized. A stock-recruitment brood table prepared using the assumptions listed above suggests that the average R/S for brood years 1982 through 1991 was 2.2. The 2004 run size expectation based on average (1998 to 2003) proportion (0.43) of the estimated run size to the expected run size provides the lower end of a range of production. The calculated range is from 7,500 to 17,600 fall chum salmon. This estimated production level was used to develop a forecast for 2003 that was reduced by the shortfall estimated in 2002.

Brood Year	Escapement	Est'd Prod'n @ 2.2 (R/S)	Contribution based on age	2004 Return
1999	12,904	28,389	36.0%	10,220
2000	5,053	11,117	60.0%	6,670
Sub-total				16,890
Total expected run (expanded for other age classes and rounded)				**17,600**
Total, expressed as range using 1998-2003 forecast returns vs observed return (43%)				**7,600-17,600**

[33] The 2003 Fishing Branch River weir return was 29,519; 63 chum salmon were caught in the Old Crow coho fishery and 319 were taken in the test fishery. The total Canadian Porcupine run size was calculated as follows: weir count (29,519)/0.88+63+319=33,926 Porcupine border escapement; @ 15% US harvest rate, the total Porcupine run size of 39,900 chum salmon.

Assuming an R/S value of 2.2, and using the average age at maturity for Fishing Branch chum salmon of 60.0% age-4 and 36.0% age-5, a return of 17,600 fish is expected in 2004. There was some improvement in the Fishing Branch River escapement in 2003 when 29,519 chum salmon were counted at the weir. The record low weir count of 5,053 in 2000 was followed by 21,669 in 2001, and 13,563 in 2002.

The 2004 run outlook represents a poor forecast of only 7,600 to 17.600 fall chum salmon. This outlook is expressed with serious conservation concerns for the Fishing Branch River stock. The 2004 run outlook is 35% of the lower end of the 50,000 to 120,000 escapement goal range.

7.2.4 2004 Spawning Escapement Target Options: Canadian-Origin Chinook and Chum Salmon

The JTC examined a number of options for spawning escapement targets for Canadian origin chinook and fall chum salmon stocks for 2004. Options were developed based on the following:

- Determine the weighted average (weighted by average age composition) of the principle brood year escapements contributing to the 2004 chinook salmon (1997, 1998 and 1999) and fall chum (1999, 2000) salmon runs. This is referred to as the base level escapement;
- Calculate the appropriate targets that would step the base level spawning escapement to the respective rebuilding goals for chinook and fall chum salmon (as specified in the Treaty) over one, two or three cycles (also specified in the Treaty).

The JTC then examined the range of escapement target options relative to the run outlooks for 2004 and discussed what actions might be required to achieve them.

Upper Yukon Chinook Salmon

The base level chinook salmon escapements (weighted average of the 1997-1999 escapements) for 2004 is 18,500 fish. The targets to rebuild this base level escapement to the midpoint of the chinook escapement goal range of 33,000 to 43,000 over one, two and three cycles are as follows:

Base level escapement = 18,500	
Rebuilding Option	**2004 Escapement Target**
1 cycle	38,000
2 cycle	28,000
3 cycle	25,000

A fourth target escapement option, 33,000 chinook salmon, was also investigated. To assess the impact of the various options presented above, the JTC examined what the basic consequences of each option might be to fisheries given the 2004 run outlook for a total run size of Canadian-origin chinook salmon in the 70,000 to 107,000 range. It was felt the best way to examine this was to estimate the allowable harvests and/or harvest rates under each scenario and compare them to the recent 5-year average harvests and/or harvest rates. The following table summarizes the expected total allowable catch (TAC), harvest shares, border escapement targets and maximum allowable U.S. harvest rates at different run sizes and escapement targets.

Run size	Escap't target	TAC	Cdn share (23%)	U.S. share (Cdn stock)	Est'd total U.S. harvest	Border Passage Target	Allowable U.S. harvest rate
107,000	38,000	69,000	15,900	53,100	106,300	53,900	49.7%
107,000	33,000	74,000	17,000	57,000	114,000	50,000	53.3%
107,000	28,000	79,000	18,200	60,800	121,700	46,200	56.9%
107,000	25,000	82,000	18,900	63,100	126,300	43,900	59.0%
70,000	38,000	32,000	7,400	24,600	49,300	45,400	35.2%
70,000	33,000	37,000	8,500	28,500	57,000	41,500	40.7%
70,000	28,000	42,000	9,700	32,300	64,700	37,700	46.2%
70,000	25,000	45,000	10,400	34,600	69,300	35,400	49.5%

The recent five year average (1998-2002) U.S. harvest rate on upper Yukon chinook salmon is approximately 57%, ranging from 30% in 2001 when the commercial fishery was closed, to 72% in 1999. During this period, the estimated U.S. catch of Canadian-origin chinook salmon averaged about 47,000 chinook salmon, whereas, the Canadian catch averaged approximately 9,000 chinook salmon.

As outlined in section 7.2.1, the 2004 run is expected to be towards the upper end of the outlook range, i.e. 107,000 Canadian-origin chinook salmon. If this prediction is correct, an escapement of 28,000 should be achievable without impacting the U.S. fishery. The allowable U.S. harvest rate, approximately 57%, would be similar to both the recent 5-year average and what it appeared to be in 2000. The impact on the U.S. fishery if the escapement target is raised to 33,000 also appears to be low. The harvest rate reduced from a normal rate of 57%, to 53%, would constitute a 7% reduction. However, the expected harvest level (approximately 114,000 total chinook salmon) should be sufficient to meet U.S. subsistence needs and allow a commercial harvest at/above the upper end of the harvest range specified in the proposed 2004 U.S. management plan. For the Canadian fishery, the expected harvest level at each escapement target option exceeds the catch in recent years if the run size is at the upper end of the expected range.

If the run size is at the low end of the outlook range, for example, a run size of 70,000 Canadian-origin chinook salmon, reductions in the U.S. fishery would be required regardless the rebuilding spawning target selected. Under this low run scenario, subsistence needs are likely to be met but major restrictions in commercial fisheries would likely be required. All allowable harvest rates are less than the "normal", for example, average, harvest rate, and the degree of restrictions required in the U.S. fisheries over a "normal" fishery would vary depending upon the escapement target selected. For example, if the escapement target is 33,000, the allowable U.S. harvest rate would be 41%. Relative to the "normal" U.S. harvest rate of 57%, a 29% reduction in harvest rate would be required to meet a spawning target of 33,000. In other words, the fishery would need to be reduced by slightly more than one quarter. The required reduction in harvest rate to meet the target escapements for the 2- and 3- cycle rebuilding options would be 19% and 13%, respectively. Restrictions would also be required in the Canadian fishery if the run size is low. Although a normal First Nation fishery is likely, significant restrictions would likely need to be imposed in all other fisheries, particularly the commercial fishery.

Canadian Origin Upper Yukon Fall Chum Salmon

The base level upper Yukon fall chum salmon brood escapement (weighted average of the 1999 and 2000 escapements) for 2004 is 58,000 fish. The targets to rebuild this base level escapement to >80,000 chum salmon, the current escapement objective, over one, two and three cycles follows:

Base level escapement = 58,000	
Rebuilding Option	**2004 Escapement Target**
1 cycle	>80,000
2 cycle	>69,000
3 cycle	>65,000

As outlined in section 7.2.2, the 2004 outlook for Canadian-origin, upper Yukon chum salmon is for a run towards the upper end of the expected a range of 69,000 to 147,000 chum salmon. No consensus formed as to where within that range the run is expected to be, although runs of Canadian fall chum salmon appear to be improving compared to recent years. To assess the potential impact of different escapement target options, a similar approach to what was done for chinook salmon was followed, for example, the allowable harvests or harvest rates under each scenario were calculated. The results are summarized in the following table:

Run size	Escap't target	TAC	Cdn share (32%)	U.S. share (Cdn stock)	Est'd total U.S. harvest	Border Passage Target	Allowable U.S. harvest rate
147,000	>80,000	<67,000	21,400	45,600	182,000	101,400	31.0%
147,000	>69,000	<78,000	25,000	53,000	212,000	94,000	36.1%
147,000	>65,000	<82,000	26,200	55,800	223,000	91,200	37.9%
69,000	>80,000	0	0	0	0	80,000	0.0%
69,000	>69,000	0	0	0	0	69,000	0.0%
69,000	>65,000	<4,000	1,300	2,700	11,000	66,300	3.9%

Unfortunately, unlike chinook salmon, we currently do not have stock ID data to estimate the contribution of Canadian origin, upper Yukon fall chum salmon to the U.S. total fall chum salmon catch. The total U.S. harvest estimates in the table above are based on an assumed contribution rate of 25%. Given the expected below average return of fall chum salmon throughout the drainage in 2004, it is likely that conservation concerns for other stocks, particularly Porcupine stocks, will be the limiting factor this year. In addition, market conditions are not expected to be very good and hence, the commercial exploitation is expected to be comparatively light. As with chinook salmon, this could also make higher escapement targets achievable in 2004.

If the upper Yukon River stocks return at levels near the upper end of the outlook range, an escapement target of >80,000 seems achievable given current average harvest levels and expected market conditions. Catches in both countries could be above average, however, mixed stock conservation concerns in U.S. fisheries downstream of the Porcupine River may necessitate

extra precaution. Catches in the Canadian section of the upper Yukon would likely meet First Nation and commercial needs.

Conversely, a run size at the lower end of the outlook range, would require severe fishing restrictions throughout the drainage with a concerted effort to pass as many fish through to the spawning grounds as possible. Although the low run scenario may be unlikely, the difference in choosing an escapement target of 65,000 over 80,000 may have significant impact on Canadian First Nation fisheries and US subsistence fisheries if the run is near the low end of the expected range. At the low end of the expected range, an escapement target of either 65,000 or 80,000 will result in severe fishery impacts and allowable harvest will be virtually nil, but the lower number would allow limited harvest.

Porcupine River Fall Chum Salmon – Fishing Branch and Sheenjek Stocks

Very poor runs into the Porcupine tributaries are expected in 2004 due to record, and/or near record, low spawning escapements in both the Fishing Branch and Sheenjek Rivers in 2000. For the Fishing Branch River chum salmon stock, the base level brood escapement is approximately 7,000 fish; far below the lower end of the agreed escapement range of 50,000 to 120,000 chum salmon. Given the outlook for a total run size of only 17,600 Fishing Branch chum salmon in 2004, even a total closure throughout the drainage, the three cycle rebuilding target of 22,000 in 2004 is likely not achievable. However, there was no consensus to ignore it.

A second option for consideration is to establish a "stabilization" goal of 13,000 chum salmon for 2004. This number would at least signify some increase in spawning escapement over the brood years. To achieve this target, the overall harvest rate on the Fishing Branch stock could not exceed 26% if the run is at the expected level. Considerable discussion ensued over how these stocks might be avoided in the fall chum salmon fisheries, both in the Porcupine River and in mixed stock fisheries in the Yukon River.

The weighted average brood year escapement into the Sheenjek River is approximately 23,000 chum salmon; this is well below the lower end of the U.S. biological escapement goal range of 50,000 to 104,000 chum salmon for this river. Addressing fall chum salmon escapement needs in the Sheenjek River greatly benefit Fishing Branch River chum salmon stocks, also returning from poor escapements.

8.0 STATUS OF BIOLOGICAL ESCAPEMENT GOALS

Beginning in December of 2002, the Alaska Department of Fish and Game undertook a review of its escapement goals for the Arctic-Yukon-Kuskokwim Region (ADFG 2004), as called for in the state's Policy for the Management of Sustainable Salmon Fisheries (5AAC 39.222. This review was also governed by the state's Policy for Statewide Salmon Escapement Goals (5AAC 39.223). Under these policies the department sets either a biological escapement goal (BEG) or a sustainable escapement goal (BEG). Biological escapement goal means a level of escapement that provides the highest potential to produce maximum sustainable yield. Sustainable escapement goal means a level of escapement known to provide for sustainable yield over a five

to ten year period. An escapement goal review team consisting of staff from Sport Fish and Commercial Fisheries Divisions met five times over a fourteen-month period. Federal agency biologists and representatives of Tribal and fishermen's groups were invited to attend and participate in the meetings. The team's recommendations were presented to the Alaska Board of Fisheries in January 2004.

Escapement goal analyses were updated with the latest information and many goals were brought into compliance with the policies for goals to be ranges, rather than point goals.

8.1 CHINOOK SALMON

Five chinook salmon aerial survey goals were converted to ranges using the method devised by Bue and Hasbrouck (2001). In the case of Nulato River, the goals for the two forks were combined into a single goal.

Chinook Salmon Stock	Previous Goal (Type) Year Established	Recommended Goal 2004 (Type)
E. Fork Andreafsky River	>1,500 (EO[1]) 1992	960-1,700 (SEG)
W. Fork Andreafsky River	>1,400 (EO[1]) 1992	640-1,600 (SEG)
Anvik River	>1,300 (EO[1]) 1992	1,100 – 1,700 (SEG)
Gisasa River	>600 (EO[1]) 1992	420 – 1,100 (SEG)
Nulato N. and S. combined	None	940 – 1,900 (SEG)
Chena River	2,800 – 5,700 (BEG) 2001	No Change
Salcha River	3,300 – 6,500 (BEG) 2001	No Change

[1] Goals were called escapement objectives (EO) because they were inconsistent with definitions BEG and SEG in policy

8.1.1 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 are 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.

8.2 SUMMER CHUM SALMON

For summer chum salmon, aerial survey goals were discontinued for the East and West Forks of the Andreafsky in favor of using the East Fork Andreafsky River weir as an index of escapement into the system. No change was recommended for the East Fork Andreafsky River weir goal. A revision was recommended to the biological escapement goal for the Anvik River, changing it from 400,000 to 800,000 fish range to a range of 350,000 to 700,000 summer chum salmon as measured by the Anvik sonar project.

Summer Chum Salmon Stock	Previous Goal (Type) Year Established	Recommended Goal 2004 (Type)
E. Fork Andreafsky River	65,000 – 130,000 (BEG) 2001	No Change
E. Fork Andreafsky River	35,000 – 70,000 (BEG) 2001	Discontinue[1]
W. Fork Andreafsky River	65,000 – 130,000 (BEG) 2001	Discontinue[1]
W. Fork Andreafsky River	35,000 – 70,000 (BEG) 2001	Discontinue[1]
Anvik River	400,000 – 800,000 (BEG) 2001	350,000 – 700,000 (BEG)

[1] Discontinued because of difficulty aerial surveying chum salmon

8.3 FALL CHUM SALMON

Analyses for all biological escapement goals for Alaskan fall chum salmon stocks were updated using the most recent data and no change was indicated for any goal.

Fall Chum Salmon Stock	Previous Goal (Type) Year Established	Recommended Goal 2004 (Type)
Yukon Drainage	300,000 – 600,000 (BEG) 2001	No Change
Tanana River	61,000 – 136,000 (BEG) 2001	No Change
Delta River	6,000 – 13,000 (BEG) 2001	No Change
Toklat River	15,000 – 33,000 (BEG) 2001	No Change
Upper Yukon tributaries	152,000 – 312,000 (BEG) 2001	No Change
Chandalar River	74,000 – 152,000 (BEG) 2001	No Change
Sheenjek River	50,000 – 104,000 (BEG) 2001	No Change

8.4 COHO SALMON

For coho salmon, the Delta Clearwater River boat survey goal was revised from >9,000 to range of 5,200 – 17,000 using the Bue and Hasbrouck (2001) method.

Coho Salmon Stock	Previous Goal	Recommended Goal 2004 (Type)
Delta Clearwater	>9,000 (SEG) 1992	5,200 – 17,000 (SEG)

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 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.

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 gillnet salmon fishery in the South Alaska Peninsula ("False Pass") area. Other commercial fisheries operate in marine waters of the Bering Sea and Gulf of Alaska where Yukon River salmon occur, but catch few, if any, salmon: (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 were likely Yukon River salmon. However, under international agreements, those fisheries no longer operate. They were (in order of decreasing salmon catches): (1 Japanese high-seas mothership and land-based salmon gillnet fisheries; (2) high-seas squid gillnet fisheries in the North Pacific Ocean of Japan, the Republic of Korea, and the Republic of China (Taiwan); (3) foreign groundfish fisheries of the Bering Sea and Gulf of Alaska, (4) joint venture groundfish fisheries of the Bering Sea and the Gulf of Alaska, and (5) groundfish trawl fishery by many nations in international waters area of the Bering Sea ("Doughnut Hole").

The South Alaska Peninsula June fishery is thought to harvest large numbers of western Alaska chum salmon. The catch figures for this fishery from 1980 to 2003 are shown in Table 16 and Figure 4. Substantial changes were made to this fishery in 2001 that has reduced catch. The 20 year average prior to 2003 was 1,566,000 sockeye salmon and 489,000 chum salmon. The three year average since 2001 has been 422,000 sockeye salmon and 194,000 chum salmon. A small commercial salmon gillnet fishery operates in subdistricts at various river mouths in Norton Sound, and is managed by the Alaska Department of Fish and Game and the Alaska Board of Fisheries. A small portion of the chinook and chum salmon caught in the southern subdistricts may be bound for the Yukon River. In 2003, the commercial catch of chinook and chum salmon for all of the Norton Sound subdistricts combined totaled <1,000 chinook and 4000 chum salmon. The prior 5-year (1997-2001) average commercial catch was 4,695 chinook and 15,112 chum salmon.[34]

Salmon runs were substantially better in 2003 than in previous years across a broad region of western Alaska, including the Yukon River in Alaska and Canada. However, they were still below average. The causes for the production failures are not known, but 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 the National Marine Fisheries Service (NMFS).

In general, the groundfish fisheries inGulf 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 5 and 6). 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.

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 claimed exclusive fishery jurisdiction by the United States of waters to a distance 200 nautical miles seaward from the coast to allow the U.S. to gradually replace the foreign

[34] Source: Wes Jones, ADF&G

groundfish fisheries by "joint-venture" fisheries, U.S. fishermen caught the fish and delivered them at sea to foreign fish processing vessels. The joint-venture fishery, in turn, was replaced by an entirely U.S. fishery. The estimated ex-vessel value of the total Alaskan commercial fisheries from 1982 through 1999 ranged from 725.8-1,231.4 million dollars (Table 17).

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 NMFS biological opinion affecting the BSAI and GOA groundfish fisheries concluded 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 7 shows the areas where restrictions were placed on the fisheries. Two seasons and the amount taken within sea lion critical habitat will now 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, six groups representing the 65 eligible western Alaska communities, expanded from pollock only to all federally managed Aleutian Island and Bering Sea groundfish species. Currently, the CDQ program allocated portions of the groundfish fishery range from 10% for pollock to 7.5% for most other species. On January 1, 2000, the License Limitation Program (LLP) required 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 to 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). The observer program continued with the joint-venture fishery until its end. Until 1990 however, little information was documented 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 125 feet or longer are required to carry observers at all times when participating in the fishery. Vessels 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 required specifically by the NMFS Regional Administrator.

Observers must be trained and certified. To be certified as an observer by the National Marine Fisheries Service, 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 18 and Figure 5 present a summary of the estimated numbers of chinook and other salmon caught by the U.S. groundfish fisheries from 1990 through September 2002. Table 18 indicates that the number of salmon caught by the groundfish fisheries varies considerably by species of salmon, by year, and between the Bering Sea-Aleutian Islands Area and the Gulf of Alaska. 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 2003 as of 15 September was 241,949 (52,593 chinook and 189,356 other salmon) and in the Gulf of Alaska the salmon catch was 26,105 (15,643 chinook and 10,462 other salmon). Certain areas in the BSAI have been

declared salmon savings area for both chum and chinook salmon (Figures 6 and 8) based on high rates of catch in the past.[35] 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, 12 have been recovered in the Bering Sea groundfish fisheries and three were picked up by the U.S BASIS cruise in 2003 (Table 19, Figure 9).

9.3 LAW ENFORCEMENT

Cooperation and coordination amongst the North Pacific Anadromous Fish Commission (NPAFC) parties, as well as by a bilateral MOU with the People's Republic of China (PRC), result in a highly successful enforcement year in 2003. Twenty-seven suspected high seas driftnet (HSDN) vessels were sighted: four were boarded and turned over to the PRC for prosecution; two Korean vessels were boarded and evidence of large-scale HSDN fishing was turned over to Korea for further action. One Russian vessel, *F/V Aront*, was sighted with HSDN fishing gear on board and reported to Russian authorities. No salmon species were found aboard any of the vessels. A total of 195 aircraft patrol hours were conducted in the Convention Area, two USCG cutters were deployed for 60 days, and one helicopter was flown 90 hours to support the HSDN patrol. In addition, NOAA Enforcement Officers were deployed for 257 hours on board Canadian and USCG patrol aircraft.

For 2004, the USCG will emphasize surveillance with its C-130 aircraft at levels consistent with 2003 or adequate to meet the high seas driftnet fishing. USCG high endurance cutters will continue to be scheduled to patrol in areas to give them capability to respond to any potential violators in the Convention Area. NOAA Enforcement will continue to place enforcement officers on Canadian high seas driftnet flights during 2004, and USCG will continue to issue Notice for Mariners requesting commercial vessels report any observed illegal activity. Table 20 shows the enforcement efforts by the NPAFC member parties in 2003.

9.4 BERING SEA RESEARCH

9.4.1 Background

Extensive research has begun in the Bering Sea in the last few years focusing on physical and biological oceanography and climate change. Many different organizations from several countries

[35] 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.

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 *F/V Sea Storm* has conducted OCC/BASIS surveys on juvenile salmon (*Oncorhynchus spp.*) during 2002 and 2003. Results of OCC/BASIS research cruises indicate that juvenile salmon are widely distributed across the eastern Bering Sea shelf (Figures 10 and 11); species specific distributional patterns of juvenile salmon can exist; oceanographic characteristics can influence distribution and migration pathways; the size (length and weight) and relative abundance of juvenile sockeye (*O. nerka*) and chum salmon (*O. keta*) were large during 2002; and that age 1.0 juvenile sockeye salmon comprised the largest component of catch. These biological characteristics of juvenile salmon along the eastern Bering Sea shelf during fall are intended to provide a measure of juvenile salmon health prior to entering their first winter at sea.

The *F/V Northwest Explorer* survey in 2002 consisted of two cruise legs between September 5 and October 8 (Figure 12). The first leg included 23 rope trawl stations along the Aleutian chain in the Bering Sea basin and resulted in the capture of 27,548 (biomass of 2,868 kg) of fish and squid including at least 17 species. The second leg included 21 rope trawl stations on or adjacent to the Eastern Bering Sea shelf, resulting in a catch of 269,127 fish and squid (biomass of 1,590 kg), and included at least 22 species. Immature chum salmon were present at the highest biomass levels in the catch during leg 1, followed by juvenile Atka mackerel (*Pleurogrammus monopterygius*). Catch of juvenile Atka mackerel was significantly higher along the western Aleutian chain (west of 180 degrees longitude) than the eastern Aleutian chain, whereas catches of immature sockeye salmon were higher along the eastern Aleutian chain. The 1999 brood year of chum salmon (age 0.2) was the predominate brood year of immature chum salmon captured during the survey and made up 65% (n=1000) of the immature chum salmon. Juvenile walleye pollock (*Theragra chalcogramma*) occurred at the highest biomass levels in the catch during leg 2 and were captured primarily in the middle shelf habitat of the Eastern Bering Sea shelf along with adult walleye pollock. Immature chum salmon had the second highest biomass levels and were caught primarily in the outer shelf and oceanic habitats. Juvenile chum and chinook salmon (*O. tshawytscha*) were captured primarily in the inner shelf habitat along with herring (*Clupea pallasi*) and capelin (*Mallotus villosus*). Juvenile Pacific ocean perch (*Sebastes alutus*) and juvenile sablefish (*Anoplopoma fimbria*) were caught in the outer shelf habitat. Eastern Bering

Sea juvenile salmon were larger than juvenile salmon captured in Southeast Alaska during October, 1997. During 1997, Southeast Alaska juvenile salmon had the highest rate of growth observed between 1997 and 2002. This limited information provides evidence to indicate the size of Eastern Bering Sea juvenile salmon as they enter their first marine winter was not an important limiting factor in 2002.

Trawl comparisons and fishing power corrections for the *F/V Northwest Explorer*, *R/V TINRO*, and *R/V Kaiyo maru* were completed during the 2002 BASIS (Bering-Aleutian Salmon International Survey) survey (Figures 12-14). Immature chum salmon, sockeye salmon, chinook salmon, and juvenile Atka mackerel were the primary species and life-history stages caught during the trawl comparisons. Generalized linear models were used to fit fishing power models to catch and catch rates with a robust maximum likelihood approach. The *Kaiyo maru* had the largest fishing power for both catch and catch rates, followed by the *TINRO* and the *Northwest Explorer*. The largest difference in fishing power consistently occurred between the *Kaiyo maru* and the *Northwest Explorer*. The *TINRO* and the *Northwest Explorer* were most similar in their fishing power for salmon, whereas the *Kaiyo maru* and *TINRO* were most similar in their fishing power for Atka mackerel. Although large differences exist in the sampling characteristics of pelagic trawls used by BASIS vessels (particularly with respect to sampling depth, or vertical trawl opening), fishing power models provide reasonable corrections for differences in fishing power.

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 and 2003 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 13 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.

9.4.3 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

9.4.4 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

9.4.5 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/

10.0 FUNDING SOURCES

10.1 AYK-SSI

Funding Source: Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative (AYK-SSI)

Program Goal: The purpose of the AYKSSI is to foster expanded fishery research in order to help understand the causes of the decline of these stocks and to support sustainable salmon management in the region. This initiative will accomplish this through:
1. Address the pressing research and information needs throughout the salmon lifecycle and by funding proposals related to the freshwater, near shore and marine phases of AYK salmon stocks, as well as research proposals spanning multiple life-history phases.

2. Facilitating coordination and cooperation among research and management institutions by developing a dynamic, comprehensive, long range Research and Restoration Plan for the region.

Funds Available: In federal fiscal year 2002, Congress appropriated $5 million to support this interagency, multi-disciplinary research effort to determine the cause of the decline of salmon in the region.

Matching Funds? None required.

Who Can Apply? Not defined.

Funding Mechanisms: Grant

Proposal Submission: One step process for submission of investigation plans.

Project Selection:

2004-05 Interim Research and Restoration Priorities

1. Projects supporting comprehensive research planning. This category includes projects designed to compile and/or analyze existing information, projects to assist with research and restoration planning within drainages or projects that will contribute to research and restoration planning efforts of the AYK SSI including:
    - Community outreach, information and education projects to facilitate community input to the SSI or identification of needs for research and restoration.
    - Projects to develop information management systems, refine or develop databases, or to develop information sharing protocols for future AYK SSI funded projects.
    - Retrospective data analyses and/or related modeling projects that directly contribute to the assessment of the current state of knowledge of western Alaska salmon stocks and other aspects of research planning.
2. Feasibility and small-scale pilot studies to evaluate the implementation of innovative large-scale research projects within the AYK region. This category refers to projects intended to plan, evaluate, and organize large-scale research initiatives. Small-scale pilot projects evaluate the feasibility of subsequent large-scale field studies. Statistical analyses of existing data are used to design future large-scale studies or sampling programs.
3. High priority research and monitoring projects that are time sensitive and/or require critical support. This category refers to projects currently identified elsewhere as high-priority projects (such as regional research plans). Investigators will need to clearly explain why the proposed project is a high priority. This category includes projects that provide time-sensitive critical information for use in fishery decision-making such as: assessing the state of the stocks or escapement goal analysis projects.
4. Proposals that address the needs and opportunities for restoration within the AYK region. This category refers to projects designed to address restoration needs in a critical and strategic framework. Examples of projects in this category are high priority pilot restoration projects that critically evaluate strategies and actions that could be used to improve salmon stocks and identification of data gaps needed to formulate restoration plans.
5. Research investigating the linkages between the marine and freshwater life stages of AYK salmon. This category refers to projects that explore the connections between the freshwater and

marine life stages of salmon including ecology and nutrient dynamics. Examples of projects in this category aresStudies identifying and measuring the connections between marine, freshwater, and terrestrial environments, including the use of proxies or indicators of these linkages such as stable isotopes and nutrients.

Proposal Review Process

1. Initial Screening of Applications. Upon receipt, the AYK staff will screen applications for conformance with requirements set forth in this notice. Applications that do not conform to the requirements may not be considered for further evaluation.

2. Technical Evaluation. The AYK SSI Scientific Technical Committee will conduct detailed technical review of proposals supplemented by external peer reviews, as appropriate. Reviewers will evaluate applications using the following evaluation criteria:

- Project responsiveness to AYK SSI interim research priorities. Applications will be evaluated to determine if they clearly respond to the interim research priorities established by the AYK SSI.
- Soundness of project design and methods. Applications will be evaluated on the applicant□s comprehension of the problem(s); the overall concept proposed for resolution; whether the applicant provided sufficient information to evaluate the project technically; and, if so, the strengths and/or weaknesses of the technical design relative to achieving productive results.
- Project management and experience and qualifications of personnel. The organization and management of the project, and the project□s principal investigator and other personnel in terms of related experience and qualifications will be evaluated.
- Project costs. The justification and allocation of the budget in terms of the work to be performed will be evaluated. Unreasonably high or low project costs will be taken into account.
- Coordination and capacity building. Applicants must demonstrate they are aware of other past and ongoing research on their topic, and how they will coordinate and collaborate with other projects. Applicants must seek to avoid duplication of other research efforts. Applicants must demonstrate they have made appropriate consultations with local communities and planned for capacity development.

Selection Procedures

Following its detailed technical review of proposals, the AYK Scientific Technical Committee will forward funding recommendations and any recommended modifications to the proposal to the AYK Steering Committee. The Steering Committee will make final funding decisions at it March 2004 meeting. Successful applicants will be notified following Secretarial approval. The tentative schedule is as follows, (except for the proposal deadline, dates are subject to change):

Project Examples:

The National Academies, Division on Earth and Life Studies, Board on Environmental Studies and Toxicology Polar Research BoardReview of Arctic-Yukon-Kuskokwim (Alaska) Research and Restoration Plan for Salmon.

A multidisciplinary committee will be established to assist the Arctic-Yukon-Kuskokwim (AYK) Sustainable Salmon Initiative (SSI) in developing a high-quality, long-range restoration and

research (science) plan for the AYK region. The committee will assess the current state of knowledge, describe ongoing research in the region, and identify research questions of greatest concern to the region's stakeholders. The committee will outline essential components of a successful, long-term science plan, identify research themes that the science plan should be based on, and identify critical research questions within the research themes. The committee will later provide an analysis and technical review of the research and restoration plan drafted by the Scientific and Technical Committee of the AYK SSI. The first report is expected in July, 2004 and the second report is expected in February, 2005.
Sponsor: Alaska State Department of Fish and Game Start Date: 03/19/03

Program Does Not Fund: None identified

Timelines:
Release of RFP 15 October 2003
Deadline for Proposals 31 December 2003
AYK Scientific Technical Committee reviews, January □ March 2004
AYK Steering Committee Project Approval, early March 2004
Notification of PIs Mid-March 2004

Agency Contact: Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative, c/o Bering Sea Fishermen's Association, 725 Christensen Dr. #3, Anchorage, AK 99501, Toll Free: 1 (888) 927-2732 or (907) 279-6519. Joseph J. Spaeder, PhD, AYK Coordinator jjspaeder@earthlink.net Karen Gillis, Program Director, karen@cdqdb.org. Website: http://www.aykssi.org.

10.2 MOORE FOUNDATION

Funding Source: Gordon and Betty Moore Foundation

Program Goal: The Gordon and Betty Moore Foundation seeks to support high-risk, high-reward projects that lack other funding. To pursue this, the Foundation has four program areas: the environment, higher education, scientific research, and a Bay Area program. The majority of its grantmaking is organized around large-scale initiatives related to its program areas.

Wild Salmon Ecosystems Initiative The objective of the Foundation's Wild Salmon Ecosystems Initiative is to preserve the diversity and function of wild salmon ecosystems throughout the North Pacific. These robust and productive ecosystems include the watersheds and wildlife communities that nurture juvenile wild salmon, and, in turn, are nurtured by returning adult wild salmon.

The geographic focus of this initiative stretches around the North Pacific Rim, from the Kamchatka Peninsula in the west to the northern tip of Vancouver Island in the east.

Funds Available: Grants in the amount of $50,000 to $350,000 annually. The time frames for individual grants are generally from one to three years.

Matching Funds? None required.

Who Can Apply? Foundation staff members consult with experts in various fields to formulate their initiatives and then send out request for proposals to address their topics of concern. There is not a general call for proposals. The Foundation solicits proposals from those they consider qualified to address the topic. Open to non-profit and academia. Not open to government agencies.

Funding Mechanisms: The Foundation has chosen to concentrate its grantmaking in areas where it can make a measurable difference. Outcomes, outputs, and milestones are quantitatively collected, quarterly and annually, so the Board can assess the progress of individual grants and the overall initiative. That means that there is a bias for projects with a linear timeline, headed towards a discrete set of deliverables.

Proposal Submission: The Foundation's policy is to solicit grants to address topics within initiatives and to not accept unsolicited proposals. Investigation plans are reviewed and if accepted become a proposed grant. There is a comment and review period. The Board of the Foundation must approve the investigation plan before it goes out as a grant.

Project Selection: The Foundation is interested in addressing key threats to the abundance and diversity of wild salmon stocks and supports efforts to:

- Mitigate threats from open net-cage salmon aquaculture and hatchery propagation
- Promote sustainable fisheries management
- Invest in science to better understand the function of pristine freshwater salmon systems, the survival of salmon in the marine environment, and the linkages between these two systems
- Launch the "State of the Salmon" program to ensure that information on the conservation of wild salmon ecosystems is synthesized at a single point and widely disseminated to key audiences.

Project Examples:
A three-year grant supports The Alaska Conservation Foundation□s efforts to protect wild salmon habitat by securing permanent conservation status for key watersheds in Alaska.

In February 2003, the Alaska Conservation Foundation received a one-year, $350,000 grant to protect Alaska's salmon-bearing public lands from immediate threats and, ultimately, to provide permanent safeguards for the intact ecosystems of the Tongass and Chugach National Forests.

Ecotrust received three grants from the Foundation. The first, awarded in April 2001, is a $25,000 grant to complete a large-scale conservation strategy for the Copper River watershed. A second Copper River grant was awarded in June 2003. This $660,000 grant supports a preservation program for the Copper's eastern delta. The third grant, awarded in February 2003 for $2.03 million, is helping Ecotrust establish the State of the Salmon program, a collaborative project with the Wild Salmon Center. Through an alliance that extends beyond political boundaries, party affiliations, and urban-rural divides, Ecotrust aims to create a place where

people and wild salmon thrive. Ecotrust's goal is to enhance the health of whole watersheds and the economies of the people that live in them.

Program Does Not Fund: The Foundation does not to pursue the following initiatives: Biomedical Science, Climate/Global Warming, Environmental Education, Mathematics, Population, and Stewardship.

Timeline: Varies.

Agency Contact: Genny Biggs at genny.biggs@moore.org or 415.561.7722. Pic Walker 415.561.7743 Mailing Address: Gordon and Betty Moore Foundation, The Presidio of San Francisco, P.O. Box 29910, San Francisco, California 94129-0910415-561-7700. Website: http://www.moore.org

10.3 NORTH PACIFIC RESEARCH BOARD

Funding Source: North Pacific Research Board

Program Goal: The North Pacific Research Board (NPRB) was created by Congress in 1997 to conduct research activities on or relating to the fisheries or marine ecosystems in the north Pacific Ocean, Bering Sea, and Arctic Ocean (including any lesser related bodies of water) with priority on cooperative research efforts designed to address pressing fishery management or marine ecosystem information needs. The Board research funds are based on the interest earned by the Environmental Improvement and Restoration Fund, also created by Congress and derived from the Dinkum Sands case. The Board mission is to develop a comprehensive science program to enhance understanding of the North Pacific, Bering Sea, and Arctic Ocean ecosystems and fisheries. It conducts its work through science planning, prioritization of pressing fishery management and ecosystem information needs, coordination and cooperation among research programs, competitive selection of research projects, increased information availability, and public involvement.

Funds Available: Approximately $3 million may be made available in 2004

Matching Funds? None required.

Who Can Apply? All Federal, State, private or foreign organizations or individuals are eligible.

Funding Mechanisms: Competitive grant program, award periods may range up to two years.

Proposal Submission: NPRB has separated the RFP into two major components. The first component is an invitation for individuals or teams of researchers to respond to specific project needs identified by the Board. Approximately $1.2 million has been set aside for this first component. The second component is an invitation for proposals that respond to a more general list of research priorities, similar to, but more focused than, priorities in previous RFP□s.

Approximately $1.8 million in EIRF funds has been set aside for this second component, and may be supplemented by additional congressional appropriations.

Project Selection: All proposals undergo independent, anonymous, technical peer review, conducted by regional and national experts. Reviewers provide comments and qualitative assessments of the following technical aspects for each proposal, and an overall summation (percentages indicate the weight that the subsequent review by the NPRB Science Panel will give to the criteria):

- Project responsiveness to NPRB research priorities (5%)
- Soundness of project design/conceptual approach (60%)
- Project management (25%)
- Project costs (10%

Project Examples: Taxa of interest to NPRB include squid, capelin, eulachon, sandlance, herring, bathylagids, and mychtophids, however projects on salmon have been funded:

- Early marine ecology of juvenile chum salmon in Kuskokwim Bay, Alaska, North Pacific Anadromous Fish Commission (NPAFC) cooperative research: Use of genetic stock identification to determine the distribution, migration, early marine survival, and relative stock abundance of sockeye, chinook, and chum salmon in the Bering Sea
- Establishing a statewide data warehouse of salmon size, age and growth records
- NPAFC Cooperative research: genetic stock identification of chum salmon in the Bering Sea and adjacent waters
- NPAFC Cooperative Research: salmon community structure and response to environmental change in the Bering Sea

Program Does Not Fund: N/A

Timelines: The schedule for the 2003 RFP is as follows:

October 7, 2003
December 5, 2003
December 2003 February 2004
March 2-4, 2004
Mid to late March 2004

Preliminary Notification of PIs	March 31, 2004
Submission to NMFS	March 31, 2004
Final Notification of PIs	April 2004
Grant Arrangements to PIs	April 2004
Possible Commence Research	May 1, 2004

Agency Contact: Dr. Clarence Pautzke, Executive Director Email: cpautzke@nprb.org or Misty Ott, Administrative Assistant, Email: mistyott@nprb.org. North Pacific Research Board, 1007 West 3rd Avenue, Suite 100, Anchorage, AK 99501, Phone: (907) 278-6772. Fax: (907) 278-6773. Website: http://www.nprb.org/

10.4 OFFICE OF SUBSISTENCE MANAGEMENT

Funding Source: Office of Subsistence Management (OSM)

Program Goal: To fund proposals which gather, analyze and report information for effective subsistence fisheries management on federal public lands in Alaska. The program also develops fisheries management expertise within Alaska Native and rural organizations and promotes collaboration among federal, state, Alaska Native, and local organizations.

Funds Available: Total annual funding for new projects fluctuates between $1.2 - $2.5 million dollars statewide with approximately 20 to 30% typically allocated to the Yukon River geographic region.

Matching Funds? None required.

Who Can Apply? State, local, and tribal governments, non-profit and educational organizations, and private individuals.

Funding Mechanisms: One, two, or three year cooperative agreements and contracts with continuation funding contingent upon attainment of study objectives.

Proposal Submission: A two-step application process is utilized. The first submission is a study proposal of an abstract style. Should the Technical Review Committee (TRC) select the proposal to move forward, then a full investigative plan is requested.

Project Selection: Project proposals are evaluated on their responsiveness to 1) strategic priorities, 2) their technical and scientific merit, 3) the proposers past performance and administrative expertise, and 4) the level of partnerships and capacity building elements contained in the proposal. The full investigative plan is reviewed and evaluated by the TRC, the Federal Subsistence Board Staff Committee, and the Regional Advisory Councils. Final project selection is the responsibility of the six member Federal Subsistence Board.

Project Examples: Enumeration projects using towers, weirs, or sonar. Test fish projects using set gillnets, drift gillnets, and fishwheels. Fish disease studies, radio telemetry, and genetic investigations. Traditional ecological knowledge projects documenting past and present practices including customary trade.

Program Does Not Fund: Habitat protection, restoration or enhancement. Hatchery propagation, restoration, or supplementation. Contaminant assessment, evaluation or monitoring.

Timelines: The Request for Proposals (RFP) is typically announced in early November.
The Deadline for submission of study proposals is the end of January the year before implementation, for example, project proposals for the Federal Fiscal Year (FFY) 2005 cycle are due January 26, 2004. If the proposal is accepted by the TRC then a complete Investigation Plan

is requested the middle of March and due the middle of May, i.e. investigation plan for the FFY 2005 cycle are requested March 15, 2004 with a submission deadline of May 17, 2004.

Agency Contact: Kathy Orzechowski, Fisheries Information Services Division, Office of Subsistence Management, U.S. Fish and Wildlife Service, 3601 C Street, Suite 1030, Anchorage, Alaska 99503, Telehone 907-786-3645, and fax 907-786-3612 Website: http://www.r7.fws.gov/asm/home.html

10.5 SEA GRANT ALASKA

Funding Source: Alaska Sea Grant

Program Goal: Alaska Sea Grant's mission is to develop and support research, education, and outreach programs that enhance the wise use and conservation of coastal and marine resources.

Funds Available: Depending on Congressional appropriations, NOAA and the U.S. Fish and Wildlife Service expect to make available up to about $2 million in FY 2004.

Matching Funds? None required.

Who Can Apply? Academic scientists

Funding Mechanisms: 2 year grant funding cycle.

Proposal Submission: Proposals are directed towards specific topics identified by Sea Grant. Competition begins with a call for brief preliminary proposals and full proposals are due about a week later. Preliminary proposals are not subjected to a selection process, but are used to help Sea Grant prepare for the full proposal competition. Only investigators who submit a preliminary proposal will be eligible to submit a full proposal.

Project Selection: Competitive bids.

Project Examples:
Impacts on Salmon Industry

- Long-term variability in Alaska sockeye salmon: effects of past warm climate on salmon abundance
- Conserving salmon biodiversity: outbreeding depression in pink salmon
- Setting escapement goals to account for climatic fluctuations and uncertainty managing salmon fisheries for quality
- Maintaining salmon quality aboard fishing vessels and on shore

Wiser Utilization of Fisheries

- Precision of prohibited species bycatch estimates for pooled and individual bycatch quotas

Marine Environmental Issues

- Has local depletion of walleye pollock occurred in Steller sea lion critical habitat?

Education and Training

- Sea Grant Traineeships

Outreach

- Public Information Services
- Marine Advisory Program

Program Does Not Fund: None identified.

Timelines: The request for proposals is published in the Federal Register. Dates of proposal submission vary. Proposals are sent out for peer review. About two months later a scientific panel meets to advise on the final selection of projects. An omnibus implementation plan is sent to the National Sea Grant Office. Funding for selected proposals begins about a month later. Timeline from proposal submission to project acceptance and funding is 5-6 months.

Agency Contact:
The Alaska Sea Grant administration and public information offices are located at 205 O'Neill Building on West Ridge at the University of Alaska Fairbanks campus. Alaska Sea Grant College Program, School of Fisheries and Ocean Sciences, University of Alaska Fairbanks, PO Box 755040, Fairbanks, AK 99775-040, Telephone: (907) 474-7086Fax: (907) 474-6285E-mail: fygrant@uaf.edu. Website:http://www.uaf.edu/seagrant/index.html

10.6 BERING SEA FISHERMEN'S ASSOCIATION

Funding Source: Bering Sea Fishermen's Association (BSFA)

Program Goal: Provide funding for salmon research and restoration projects in the AYK region that will lead to salmon as a sustainable resource

Funds Available: Variable amounts

Matching Funds: Matching funds are not necessary.

Who Can Apply: Any non-governmental organization or individual with a federal or state cooperator can apply.

Funding Mechanisms: Grantees are given contracts that confirm their proposed work product. Contracts include timelines for reporting project progress to BSFA's Program Director. Payment of funds is divided throughout the season and is contingent upon reporting requirements being met.

Proposal Submission: Proposals are submitted for review following a public Request for Proposal. Proposals are then either awarded, denied or the author(s) are invited to submit additional information for clarification purposes.

Project Selection:

- Projects must be directed at Arctic, Yukon or Kuskokwim region salmon stocks.
- Projects must meet state or federal management needs for the chosen region. Open communication with the appropriate state or federal management must be established.
- Projects must improve management of existing regional fisheries by increasing monitoring of salmon escapements, and maintaining and preserving the health and integrity of salmon spawning grounds, rearing areas, and migration corridors.
- Projects should involve public education and/or outreach activities, i.e. provide public information in local papers regarding project details/outcome; publish an agency newsletter or brochure that outlines the local involvement; speak or present project information at local, regional or statewide meetings; or other education/outreach activity.

Project Examples: BSFA supports projects by providing funding for materials and services and technician's salaries.

Program Does Not Fund: Funds do not go directly to state or federal agencies, nor do funds go to projects without the ability to help maintain the sustainability of AYK salmon stocks.

Timelines: In late winter or early spring after funding is secured, there is a call for proposals with a submission deadline of four to six weeks later. The review process may take up to a month and applicants receive notice as to project acceptance, rejection, or a request to submit additional information. Applicants in the latter category are then given a window of approximately two weeks to submit additional information. Final decisions on projects occur about two weeks later.

Contact: Karen Gillis [karen@cdqdb.org], Bering Sea Fishermens Association, Anchorage, Alaska 99501. Phone: 907 279 6519. Toll-free: 888 927 2732. No Website.

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Table 1. Yukon River drainage commercial salmon sales and estimated harvest by district and country, 2003[a].

District/ Subdistrict	Number of Fishermen[b]	Chinook			Summer Chum			Fall Chum			Coho		
		Sold in Round	Pounds of Roe	Estimated Harvest[c]	Sold in Round	Pounds of Roe	Estimated Harvest[c]	Sold in Round	Pounds of Roe	Estimated Harvest[c]	Sold in Round	Pounds of Roe	Estimated Harvest[c]
1	358	22,709	0	22,709	3,579	0	3,579	5,586	0	5,586	9,757	0	9,757
2	217	14,220	0	14,220	2,583	0	2,583	0	0	0	0	0	0
Subtotal	575	36,929	0	36,929	6,162	0	6,162	5,586	0	5,586	9,757	0	9,757
3		No commercial fishing in 2003											
Total Lower Yukon	562	36,929	0	36,929	6,162	0	6,162	5,586	0	5,586	9,757	0	9,757
Anvik River	0	0	0	0	0	0	0	0	0	0	0	0	0
4-A	0	0	0	0	0	0	0	0	0	0	0	0	0
4-BC	3	562	0	562	62	0	62	1,315	0	1,315	367	0	367
Subtotal District 4[d]	3	562	0	562	62	0	62	1,315	0	1,315	367	0	367
5-ABC	15	908	0	908	0	0	0	0	0	0	0	0	0
5-D	1	226	0	226	0	0	0	0	0	0	0	0	0
Subtotal District 5	16	1,134	0	1,134	0	0	0	0	0	0	0	0	0
6	8	1,813	0	1,813	4,461	0	4,461	4,095	0	4,095	15,119	0	15,119
Total Upper Yukon	27	2,947	0	2,947	4,523	0	4,523	5,410	0	5,410	15,486	0	15,486
Total Alaska	584	39,876	0	39,876	10,685	0	10,685	10,996	0	10,996	25,243	0	25,243

a Does not include ADF&G test fishery sales.

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

c Unless otherwise noted, estimated harvest is the number of fish sold in the round plus the estimated number of females harvested to produce roe sold (pounds of roe sold divided by weighted average roe weight per female).

d Estimated harvest includes both males and females harvested to produce roe sold (pounds of roe sold divided by weighted average roe weight per female divided by average percent females in the harvest). Summer chum salmon sold in the round in District 4 are assumed to be males and are included in the estimated harvest calculation.

Note: See Appendix Tables 1-7 and 10. See Appendix Figures 1-5 and 8

Table 2. Pilot Station sonar project estimates, Yukon River drainage, 1995, 1997-2003[a].

Species	2003 Passage Estimate	2003 Lower 90% Confidence Intervals	2003 Upper 90% Confidence Intervals	2002 Passage Estimate	2001 Passage Estimate	2000 Passage Estimate	1999 Passage Estimate	1998 Passage Estimate	1997b Passage Estimate	1995 Passage Estimate
Large Chinook[c]	235,161	211,131	259,191	83,612	75,413	36,554	105,273	60,448	87,004	105,414
Small Chinook	22,475	16,965	27,985	28,938	12,156	4,723	15,554	11,724	61,408	24,582
Total	257,636			112,550	87,569	41,277	120,827	72,172	148,412	129,996
Summer Chum	1,235,023	1,175,582	1,294,464	1,158,475	468,183	457,687	1,024,519	859,211	1,442,787	3,708,659
Fall Chum[d]	930,452	871,362	989,542	359,565	396,012	267,181	438,755	374,597	550,177	1,171,451
Total	2,165,475			1,518,040	864,195	724,868	1,463,274	1,233,808	1,992,964	4,880,110
Coho[d]	277,504	243,620	311,388	135,737	147,341	192,108	73,413	132,363	107,859	113,942
Other Species[e]	404,153	374,577	433,729	517,820	308,611	346,672	366,847	329,906	436,120	750,688
Total	3,104,768			2,284,147	1,407,716	1,304,925	2,024,361	1,768,249	2,685,355	5,874,736

[a] Estimates for all years were generated with the most current apportionment model and may differ from earlier estimates.

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

[c] Chinook salmon >655 mm for 1999- 2003, >700mm for 1995-1998.

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

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

Table 3. The Yukon River drainage summer chum salmon management plan overview, 2003.

	Required Management Actions Summer Chum Salmon Directed Fisheries			
Projected Run Size [a]	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

rojections, 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 4. 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 5. Canadian weekly commercial catches of chinook, chum and coho salmon in the Yukon River in 2003.

Statistical Week	Week Ending	Start Date	Finish Date	Days Fished	Number Fishing	Boat Days	Chinook Salmon	Chum Salmon	Coho Salmon
27	05-Jul			closed					
28	12-Jul			closed					
29	19-Jul	13-Jul	15-Jul	2	10.5	21	845	0	0
30	26-Jul	20-Jul	23-Jul	3	10.3	31	909	0	0
31	02-Aug	27-Jul	31-Jul	4	7.5	30	666	5	0
32	09-Aug	03-Aug	06-Aug	3	2.3	7	150	0	0
33	16-Aug	10-Aug	13-Aug	3	1.3	4	33	5	0
34	23-Aug			closed					
35	30-Aug			closed					
36	06-Sep			closed					
37	13-Sep	07-Sep	09-Sep	2	3.0	6	0	894	0
38	20-Sep	14-Sep	19-Sep	5	3.6	18	0	3424	0
39	27-Sep	21-Sep	26-Sep	5	1.6	8	0	1830	0
40	04-Oct	28-Sep	03-Oct	5	1.8	9	0	1850	0
41	11-Oct	05-Oct	10-Oct	5	1.0	5	0	184	0
42	18-Oct	12-Oct	17-Oct	5	1.8	9	0	671	0
43	25-Oct	19-Oct	24-Oct	5	1.0	5	0	167	0
				47	45.7	152.7	2603	9030	0

·ea Subtotal	2,603	9,030	0
.al Subtotal	69		
:ial Harvest	2,672	9,030	0
:elease Test	263	990	
Domestic Harvest	115	0	0
Estimated Recreational Harvest	275	0	7
Aboriginal Fishery Catch	6,121	1,433	0
TOTAL UPPER YUKON HARVEST	9,446	10,463	7
₰ Aboriginal Fishery	173	63	523
Old Crow Test Fishery		319	

Note: See Appendix Tables 8-9 and 15. See Appendix Figures 6-8 and 10.

Table 6. Salmon fishery projects conducted in the Alaskan portion of the Yukon River drainage in 2003.

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.	0	ADF&G	all aspects
Sport Catch, Harvest and Effort Assessment	Alaskan portion of the Yukon River drainage	document and estimate the catch, harvest, and associated effort of the Alaskan Yukon River sport fishery via post-season mail-out questionnaires.	post season	ADF&G	all aspects
Yukon River Salmon Stock Identification	Yukon River drainage	estimate chinook salmon stock composition of the various Yukon River drainage harvests through analyses of scale patterns, age compositions, and geographical distribution of catches and escapements;	ongoing	ADF&G DFO & USFWS	all aspects provide scale samples
		investigate the utility of nuclear genes, microsatellites, and SINE's in identifying U.S./Canada fall chum salmon stocks.	ongoing	USFWS ADF&G	lead agency
		develop a DNA database for Yukon River chinook salmon, evaluate statical methods for genetic stock identification, and estimate origin of chinook salmon 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 Yupik 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; RM 20	Fin clips were taken from chum salmon at Pilot Station through August 1 were the duties were transferred to Emmonak test fish through the end of August.	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 6. Continued (page 2 of 4).

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Anvik River Sonar	mile 40 Anvik River, RM 258	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 ACRE BSFA	all aspects provided funding provided funding
Nulato River Weir	mile 3 Nulato River, RM 488	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
Glanta River Weir	mile 3 Glanta River, Koyukuk River drainage, RM 567	estimate daily escapement of chinook and summer chum salmon into the Glanta 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, Hogatza 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 692	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 equipped 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 Survey	Federal Subsistence Funding R&E and Federal Sub Funding

continued

Table 6. Continued (page 3 of 4).

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Rapids/Rampart Mark-recapture	Mainstem Yukon River RM 930	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 estimate 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, 930, 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
Tolklat River Ground Survey	Tolklat River, between RM 848 and 853	estimate fall chum spawning escapement in Tolklat 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 840	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 30, Eagle	Determine the effects of *Ichthyophonus* on survival and reproductive success in chinook salmon in the Yukon River	June-Dec.	U of W, USFWS-CSM	all aspects, funding

continued

Table 6. 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	Tolukuk, 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, vitelogenin (egg yolk protein), biology, *Ichthyophonous* in chinook, and marker (induced when exposed to dioxin contaminants), MHE, 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

Note: See Appendix Tables 11 and 12, 14 and 15, and Appendix Figure 11.

T. .. List of harvest/escapement monitoring and incubation/rearing projects involving salmon in the Canadian portion of the Yukon River drainage in 2003.

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Upper Yukon Tagging Program	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	all aspects
Chinook and Chum Test Fisheries	near Dawson City	- to provide catch and tag recovery information for the recapture program - to provide AWL samples - the chinook test fishey uses nets while the chum test uses fish wheels and a live release technique	July-Oct	YRCFA, THFN	all aspects
Commercial Catch Monitoring	near Dawson City	- to determine weekly catches and effort in the Canadian commercial fishery; recovery of tags - to provide AWL samples	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	YFN's DFO	joint project
Sport Catch Monitoring	Yukon tributaries	- to detrmine the recretation harvest, landed and retained, of salmon caught in the Yukon Territory thyough a catch card program	June-Oct	YSC/DFO	all aspects
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	joint project
DFO Escapement Index Surveys	chinook and chum aerial index streams	- to obtain counts in index areas including: Big Salmon, L. Salmon Wolf, Nisutlin, Mainstem Yukon, Kluane & Teslin rivers	Aug - Nov	DFO	all aspects
Escapement Surveys	throughout upper Yukon R. drainage	- to conduct mobile surveys (on foot, boat or aerial) - to enumerate chinook returns to tributaries of Pelly and Teslin rivers and other locations - to enumerate fall chum salmon	July - Aug	various R&E Fund recipients including YFN's, consultants and individuals	all aspects
Fishing Branch Chum Salmon Weir	Fishing Branch R.	- to enumerate fall chum salmon returning to the Fishing Branch River and obtain age size, tag and sex composition data	Aug - Oct	DFO VGFN	joint project
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 and early chum salmon returns to Chandindu R. River and obtain age, size, sex and tag composition data	July - Aug	YRCFA	all aspects

continued

Table 7. Continued (page 2 of 2)

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Blind Creek Weir	Pelly River	- enumerate chinook return and recover tags	July-Aug	RRDC	all aspects
Escapement Sampling	various tributaries	- to obtain age and size composition - to sample for Ichyophonus in Whitehorse, at DFO fish wheels, Stewart and Pelly rivers and other sites	Aug -Oct	DFO U. of Wash.	all aspects Ich. Sampling
Upper Yukon and Porcupine River Chinook Radio Telemetry Program	- Mainstem, White Stewart, Pelly, and Teslin rivers - Porcupine R.	- to track chinook salmon tagged with transmitters at Ramparts AK. using fixed tracking stations and aerial racking - to collect radioand archival tags from fisheries and weirs	June-Oct	DFO, NMFS, M&A HEC VGFN YRCFN & THFN	joint project
Whitehorse Rapids Fish Hatchery and Coded-Wire Tagging Project	Whitehorse	- to incubate ~150K 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, YEC DFO	all aspects coded-wire tagging
MacIntyre Incubation Box and Coded-Wire Tagging 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 NRI	technical support field work, project monitoring

Acronyms:

DFO = Department of Fisheries and Oceans Canada
HEC = Haldane Environmental Consultants
M&A = Mercer and Associates Ltd.
NMFS = National Marine Fisheries Service
NRI = Northern Research Institute
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
VGFN = Vunnut Gwitchin First Nation
WCC = Whitehorse Correctional Centre
YEC = Yukon Energy Corporation
YFN's = Yukon First Nation's
YFGA = Yukon Fish and Game Association
YRCFA = Yukon River Commercial Fishers Association
YSC = Yukon Salmon Committee

Note: See Appendix Tables 13 and 15; and Appendix Figures 10 and 13.

Table 8. Proportions of total Yukon River chinook salmon harvest by stock group, 1981-2002..

Year	109.000	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
2002	0.194	0.292	0.392	0.122	0.514
1981-2001[d] Average	0.212	0.230	0.457	0.101	0.557

[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 9. 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
2002	0.221	0.333	0.446
1981-2000 Average	0.236	0.256	0.508

Table 10. 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
2002	0.763	0.237
1981-2001 Average	0.819	0.181

Table 11. Summary of releases and recoveries of Coded-wire Tagged Chinook Salmon from Whitehorse Hatchery, 1985 - 2003.

Location	Release Date*	Code	# Tagged & Clipped[c]	Adipose Clipped Only	%Tag-Loss	Days [a]	Sample Size	Total Clipped	Weight (grams)	Total Unclipped	Total Released
Michie	25-May-85	02-32-48	26,670	518	0.0191 [b]			27,188		0	
Michie	25-May-85	02-32-26	28,269	518	0.0180 [b]			28,787		0	
Michie	25-May-85	02-32-47	43,325	518	0.0118 [b]			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	02-37-31	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	02-48-12	47,644	1,361	0.0278 [b]		?	49,005	2.50	9,598	58,603
Michie	05-Jun-87	02-48-13	49,344	808	0.0161 [b]		?	50,152	2.50	9,141	59,293
Michie	05-Jun-87	02-48-14	51,888	559	0.0107 [b]		?	52,447	2.50	9,422	61,869
Michie	05-Jun-87	02-48-15	43,367	2,066	0.0455 [b]		?	45,433	2.50	7,868	53,301
Michie	05-Jun-87	02-42-58	25,945	245	0.0094 [b]		?	26,190	2.50	4,171	30,361
Wolf	30-May-87	02-42-59	26,752	123	0.0046 [b]		?	26,875	2.50	422	27,297
SUM	1987		244,940	5,162				250,102		40,622	290,724
Michie	10-Jun-88	02-55-49	77,670	1,991	0.0250	15	?	79,661	2.80	84,903	164,564
Michie	10-Jun-88	02-555-0	78,013	1,592	0.0200	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	02-60-04	26,161	326	0.0123 [b]		500	26,487	2.30	0	26,487
Michie	06-Jun-89	02-60-05	24,951	128	0.0051 [b]		500	25,079	2.30	0	25,079
Michie	06-Jun-89	02-60-06	25,098	291	0.0115 [b]		500	25,389	2.40	0	25,389
Michie	06-Jun-89	02-60-07	25,233	156	0.0061 [b]		500	25,389	2.20	95,724	121,113
Fishway	06-Jun-89	02-60-08	25,194	357	0.0140 [b]		500	25,551	2.70	0	25,551
Fishway	06-Jun-89	02-60-09	25,190	351	0.0137 [b]		500	25,541	2.70	0	25,541
SUM	1989		151,827	1,609				153,436		118,112	271,548

Location	Release Date*	Code	# Tagged & Clipped[c]	Adipose Clipped Only	%Tag-Loss	Days [a]	Sample Size	Total Clipped	Weight (grams)	Total Unclipped	Total Released
Wolf	06-Jun-90	no-clip	0	0				0		11,969	11,969
Michle	02-Jun-90	02-02-38	24,555	501	0.0200 [b]		500	25,056	2.30	0	25,056
Michie	02-Jun-90	02-02-39	24,345	753	0.0300 [b]		500	25,098	2.30	0	25,098
Fishway	02-Jun-90	02-02-60	24,508	501	0.0200 [b]		500	25,009	2.20	0	25,009
Fishway	02-Jun-90	02-02-63	25,113	254	0.0100 [b]		500	25,367	2.20	0	25,367
SUM	1990		98,521	2,009				100,530		11,969	112,499
Wolf	08-Jun-91	18-03-22	49,477	793	0.0158 [b]		500	50,270	2.30	0	50,270
Fishway	06-Jun-91	18-03-23	52,948	193	0.0036 [b]		500	53,141	2.30	0	53,141
Michie	06-Jun-91	18-03-24	50,020	176	0.0035 [b]		500	50,196	2.30	87,348	137,544
SUM	1991		152,445	1,162				153,607		87,348	240,955
Wolf	04-Jun-92	18-08-29	48,239	0	0.0000 [b]		500	48,239	2.40	0	48,239
Fishway	04-Jun-92	18-08-28	49,356	99	0.0020 [b]		500	49,455	2.30	0	49,455
Michie	04-Jun-92	18-08-30	52,946	643	0.0120 [b]		500	53,589	2.20	249,166	302,755
SUM	1992		150,541	742				151,283		249,166	400,449
Wolf	06-Jun-93	18-12-15	50,248	0	0.0000 [b]		500	50,248	2.30	0	50,248
Fishway	06-Jun-93	18-12-16	49,957	434	0.0086 [b]		500	50,391	2.30	0	50,391
Michie	06-Jun-93	18-12-17	50,169	0	0.0000 [b]		500	50,169	2.30	290,647	340,816
SUM	1993		150,374	434				150,808		290,647	441,455
Wolf	02-Jun-94	18-14-27	50,155	270	0.0054 [b]		500	50,425	2.30	0	50,425
Michie	02-Jun-94	18-14-28	50,210	127	0.0025 [b]		500	50,337	2.30	158,780	209,117
Fishway	02-Jun-94	18-14-29	50,415	125	0.0025 [b]		500	50,540	2.30	0	50,540
SUM	1994		150,780	522				151,302		158,780	310,082
Wolf	06-Jun-95	18-12-46	10,067	164	0.0160	3	100	10,231	1.67	0	10,231
Wolf	06-Jun-95	18-12-47	9,122	0	0.0000	3	100	9,122	1.53	0	9,122
Michie	06-Jun-95	18-18-26	25,231	337	0.0132	3	100	25,568	2.47	4,552	30,120
Michie	06-Jun-95	18-18-27	25,187	141	0.0056	3	100	25,328	2.33	0	25,328
SUM	1995		69,607	642				70,249		4,552	74,801

Location	Release Date[a]	Code	# Tagged & Clipped[c]	Adipose Clipped Only	%Tag-Loss	Days[a]	Sample Size	Total Clipped	Weight (grams)	Total Unclipped	Total Released
Wolf	26-May-96	18-07-48	10,131	102	0.0100	5		10,233	2.30	0	10,233
Fox	4-Jun-96	18-28-23	35,452	0	0.0000	5		35,452	2.43	0	35,452
Byng	4-Jun-96	18-10-41	25,263	516	0.0200	5		25,779	2.37	0	25,779
Michie	5-Jun-96	18-33-45	50,082	1,022	0.0200	5		51,104	2.51	0	51,104
Michie	5-Jun-96	18-33-46	50,260	508	0.0100	5		50,768	2.43	0	50,768
Michie	5-Jun-96	18-33-47	49,985	505	0.0100	5		50,490	2.32	0	50,490
Judas	4-Jun-96	18-33-48	49,798	1,016	0.0200	5		50,814	2.43	0	50,814
McClintock	4-Jun-96	18-33-49	49,991	302	0.0060	5		50,293	2.27	0	50,293
SUM	1996		320,962	3,971				324,933		0	324,933
Wolf	1-Jun-97	18-23-25	14,850	150	0.0100	2		15,000	2.30	0	15,000
Wolf	1-Jun-97	18-23-26	20,334	0	0.0000	4		20,334		0	20,334
Wolf	8-Jun-97	18-29-06	10,158	0	0.0000	8		10,158		0	10,158
Fox	11-Jun-97	18-25-54	25,242	0	0.0000	3		25,242	2.43	0	25,242
Fox	11-Jun-97	18-25-55	24,995	253	0.0100	3		25,248		0	25,248
Byng	11-Jun-97	18-29-07	10,029	0	0.0000	1		10,029	2.37	0	10,029
Byng	11-Jun-97	18-29-05	10,155	0	0.0000	1		10,155		0	10,155
Michie	11-Jun-97	18-28-59	49,657	502	0.0100	3		50,159	2.51	0	50,159
Michie	11-Jun-97	18-28-60	50,130	0	0.0000	3		50,130	2.43	0	50,130
Judas	7-Jun-97	18-23-27	19,951	202	0.0100	3 to 7		20,153	2.43	0	20,153
Judas	11-Jun-97	18-25-53	25,146	0	0.0000	11		25,146	2.43	0	25,146
McClintock	11-Jun-97	18-25-51	25,399	0	0.0000	3		25,399	2.27	0	25,399
McClintock	11-Jun-97	18-25-52	24,792	251	0.0100	3		25,043		0	25,043
SUM	1997		310,838	1,358				312,196		0	312,196
Michie	12-Jun-98	18-41-22	49,243	1,004	0.0200	5		50,247	2.84	0	50,247
Michie	12-Jun-98	18-41-21	49,197	1,004	0.0200	5		50,201	2.81	0	50,201
Byng	12-Jun-98	18-31-60	24,518	1,022	0.0400	5		25,540	3.00	0	25,540
McClintock	12-Jun-98	18-40-43	49,810	503	0.0100	5		50,313	2.76	0	50,313
Judas	13-Jun-98	02-54-17	19,018	1,432	0.0700	5		20,450	2.55	0	20,450
Judas	12-Jun-98	18-31-59	25,331	256	0.0100	5		25,587	2.60	0	25,587
Wolf	6-Jun-98	02-19-58	10,104	421	0.0400	5		10,525	1.95	0	10,525
Wolf	4-Jun-98	02-46-06	34,813	710	0.0200	5		35,523	2.63	0	35,523
SUM	1998		262,034	6,352				268,386		0	268,386

Location	Release Date[a]	Code	# Tagged & Clipped[c]	Adipose Clipped Only	%Tag-Loss	Days[a]	Sample Size	Total Clipped	Weight (grams)	Total Unclipped	Total Released
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	18-31-28	25,114	254	0.0100	5		25,368	2.80	0	25,368
Michie	8-Jun-00	18-31-29	25,037	253	0.0100	5		25,290	2.80	0	25,290
Michie	8-Jun-00	18-43-03	10,907	110	0.0100	5		11,017	2.84	0	11,017
McClintock	8-Jun-00	18-13-54	25,041	254	0.0100	5		25,295	2.70	0	25,295
McClintock	8-Jun-00	18-13-55	25,016	253	0.0100	5		25,269	2.68	0	25,269
Wolf	4-Jun-00	18-23-53	25,071	253	0.0100	5		25,324	2.67	0	25,324
Wolf	4-Jun-00	18-23-54	25,012	254	0.0101	5		25,266	2.40	0	25,266
SUM	2000		161,198	1,631				162,829		0	162,829
Michie	8-Jun-01	18-44-16	25,318	256	0.0100	5		25,574	2.68	0	25,574
Michie	8-Jun-01	18-44-17	27,293	276	0.0100	5		27,569	2.68	0	27,569
Michie	8-Jun-01	18-44-18	27,337	276	0.0100	5		27,613	2.60	0	27,613
Michie	8-Jun-01	18-44-19	11,629	117	0.0100	5		11,746	2.60	0	11,746
McClintock	8-Jun-01	18-44-12	24,526	248	0.0100	5		24,774	3.13	0	24,774
McClintock	8-Jun-01	18-44-13	25,033	253	0.0100	5		25,286	3.13	0	25,286
McClintock	8-Jun-01	18-36-50	10,840	110	0.0100	5		10,950	3.13	0	10,950
Byng	8-Jun-01	18-44-14	25788	260	0.0100	5		26,048	2.84	0	26,048
Byng	8-Jun-01	18-44-15	25,136	254	0.0100	5		25,390	2.84	0	25,390
Wolf	28-May-01	18-44-10	26,205	265	0.0100	5		26,470	3.34	0	26,470
Wolf	28-May-01	18-44-11	23,902	241	0.0100	5		24,143	3.34	0	24,143
SUM	2001		253,007	2,556				255,563		0	255,563

Location	Release Date*	Code	# Tagged & Clipped[c]	Adipose Clipped Only	%Tag-Loss	Days [a]	Sample Size	Total Clipped	Weight (grams)	Total Unclipped	Total Released
Wolf	23-May-02	18-51-01	25,334	126	0.0049	5		25460	3.30	0	25460
Wolf	02-Jun-02	18-51-02	25,079	177	0.0070	5		25256	3.10	0	25256
McClintock	10-Jun-02	18-51-03	24,769	505	0.0200	5		25274	3.60	0	25274
Byng	10-Jun-02	18-51-04	24,907	0	0.0000	5		24907	3.00	0	24907
Byng	10-Jun-02	18-51-05	24,925	125	0.0050	5		25050	3.00	0	25050
Michie	10-Jun-02	18-51-06	27,114	191	0.0070	5		27305	3.20	0	27305
Michie	10-Jun-02	18-51-07	26,854	0	0.0000	5		26854	3.02	0	26854
Michie	10-Jun-02	18-50-61	27,850	281	0.0100	5		28131	3.20	0	28131
Michie	10-Jun-02	18-50-62	27,241	0	0.0000	5		27241	3.04	0	27241
Michie	10-Jun-02	18-50-63	8,481	86	0.0100	5		8567	3.20	0	8567
SUM	2002		242,554	1,491				244,045		0	244,045
Wolf	25-May-03	18-47-48	27,489	83	0.0030	5		27,572	2.72	0	27,572
Wolf	25-May-03	18-47-49	26,704	161	0.0060	5		26,865	2.69	0	26,865
Byng	02-Jun-03	18-47-47	23,483	71	0.0030	5		23,554	3.01	0	23,554
Byng	02-Jun-03	18-47-46	27,058	54	0.0020	5		27,112	2.98	0	27,112
Michie	02-Jun-03	18-49-58	28,485	0	0.0000	5		28,485	3.05	0	28,485
Michie	02-Jun-03	18-49-59	27,519	0	0.0000	5		27,519	2.98	0	27,519
Michie	02-Jun-03	18-49-60	15,541	0	0.0000	5		15,541	3.07		15,541
SUM	2003		176,279	369				176,648		0	176,648
TOTAL			3,227,024	275,188				3,502,212		1,174,613	4,676,825

a:The number of days refers to the period of the the fish were held to determine tag loss.

b: Unknown period.

c: usually corresponds to "tagged" category on MRP release forms.

CWT Data recorded from CWT release sheets 1989-94.

CWT Data prior to 1987 not verified against SEP records.

* release date = brood year + 1

Table 12. Summary of releases of chinook salmon from Yukon Territory instream incubation/rearing sites 1991-2003

PROJECT	SPECIES	BROOD YEAR	STOCK	MARK	STAGE	RELEASE SITE	START DATE	END DATE	# TAGGED	# AD ONLY	# UN-MARKED	TOTAL REL.	WT. (GM)
Klondike R, Nor	chinook	1990	Tatchun R	02-01-01-02-12	Spring Fry	Tatchun R	91/06/28	91/06/28	13593	21	650	14264	0.74
Klondike R, Nor	chinook	1990	Tatchun R	02-01-01-02-09	Spring Fry	Tatchun R	91/06/28	91/06/28	15247	173	750	16170	0.74
Klondike R, Nor	chinook	1991	Tatchun R	18-06-45	Spring Fry	Tatchun R	/ /	92/08/31	11734	0	817	12551	2.47
Klondike R, Nor	chinook	1991	Tatchun R	02-33-56	Spring Fry	Tatchun R	/ /	92/08/31	6453	0	852	7305	2.47
Klondike R, Nor	chinook	1991	Tatchun R	-68	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	02-01-01-05-03	Spring Fry	Klondike R Nor	94/06/30	94/06/30	6174	10	54	6238	0.88
Klondike R, Nor	chinook	1993	Tatchun R	02-01-01-04-07	Spring Fry	Tatchun R	94/06/30	94/06/30	12077	246	71	12394	0.99
Klondike R, Nor	chinook	1993	Tatchun R	02-01-01-05-01	Spring Fry	Tatchun R	94/06/30	94/06/30	9982	0	61	10043	0.99
Klondike R, Nor	chinook	1994	Klondike R Nor	02-01-01-06-03	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	02-01-01-06-02	Spring Fry	Klondike R Nor	95/07/04	95/07/04	1809	16	56	1881	0.75
Klondike R, Nor	chinook	1994	Tatchun R	02-01-01-05-11	Spring Fry	Tatchun R	95/07/04	95/07/04	12431	100	686	13217	0.81
Klondike R, Nor	chinook	1994	Tatchun R	02-01-01-05-15	Spring Fry	Tatchun R	95/07/04	95/07/04	2490	33	177	2700	0.81
Klondike R, Nor	chinook	1994	Tatchun R	02-01-01-06-01	Spring Fry	Tatchun R	95/07/04	95/07/04	1476	19	155	1650	0.81
Klondike R, Nor	chinook	1994	Tatchun R	02-01-01-05-13	Spring Fry	Tatchun R	95/07/04	95/07/04	11649	238	413	12300	0.81
Klondike R, Nor	chinook	1995	Klondike R Nor	02-01-01-04-08	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	02-33-55	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	02-33-54	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	02-01-01-03-08	Spring Fry	Flat Cr	/ /	92/07/04	12141	143	3425	15709	0.98
McIntyre Cr	chinook	1991	Takhini R	02-01-01-03-09	Spring Fry	Flat Cr	/ /	92/07/04	13102	466	1398	14966	0.98
McIntyre Cr	chinook	1991	Takhini R	02-01-01-03-10	Spring Fry	Flat Cr	/ /	92/07/04	4955	261	601	5817	0.98
McIntyre Cr	chinook	1992	Klondike R Nor	02-01-01-04-04	Spring Fry	Klondike R Nor	93/07/01	93/07/01	12832	240	144	13216	1.14
McIntyre Cr	chinook	1992	Klondike R Nor	02-01-01-04-05	Spring Fry	Klondike R Nor	93/07/01	93/07/01	7546	256	167	7969	1.14
McIntyre Cr	chinook	1992	Takhini R	02-34-24	Spring Fry	Flat Cr	93/08/17	93/08/17	9532	823	95	10450	2.71
McIntyre Cr	chinook	1992	Takhini R	02-34-23	Spring Fry	Flat Cr	93/08/17	93/08/17	9822	850	218	10890	2.71
McIntyre Cr	chinook	1992	Takhini R	18-14-54	Spring Fry	Flat Cr	93/08/17	93/08/17	10925	567	227	11719	2.71
McIntyre Cr	chinook	1992	Takhini R	18-14-53	Spring Fry	Flat Cr	93/08/17	93/08/17	10658	865	226	11749	2.71
McIntyre Cr	chinook	1992	Takhini R	02-02-17	Spring Fry	Flat Cr	93/08/17	93/08/17	2291	114	37	2442	2.71
McIntyre Cr	chinook	1992	Takhini R	02-34-22	Spring Fry	Flat Cr	93/08/17	93/08/17	10355	314	40	10709	2.71
McIntyre Cr	chinook	1992	Tatchun R	02-01-01-04-02	Spring Fry	Tatchun R	93/06/17	93/06/17	4654	633	335	5622	0.76
McIntyre Cr	chinook	1993	Takhini R	18-17-51	Spring Fry	Flat Cr	94/08/26	94/08/31	7410	46	222	7678	2.6
McIntyre Cr	chinook	1993	Takhini R	18-17-50	Spring Fry	Flat Cr	94/08/26	94/08/31	11227	40	87	11354	2.6
McIntyre Cr	chinook	1993	Takhini R	18-17-49	Spring Fry	Flat Cr	94/08/26	94/08/31	11071	159	142	11372	2.6
McIntyre Cr	chinook	1993	Takhini R	18-17-48	Spring Fry	Flat Cr	94/08/26	94/08/31	11375	0	104	11479	2.6
McIntyre Cr	chinook	1993	Takhini R	18-17-52	Spring Fry	Flat Cr	94/08/26	94/08/31	10668	21	198	10887	2.6
McIntyre Cr	chinook	1993	Takhini R	02-02-16	Spring Fry	Takhini R	94/08/30	94/08/30	9343	271	36	9650	2.8
McIntyre Cr	chinook	1993	Takhini R	02-01-63	Spring Fry	Takhini R	94/08/30	94/08/30	10899	222	62	11183	2.8
McIntyre Cr	chinook	1994	Takhini R	02-01-01-04-15	Spring Fry	Takhini R	95/08/14	95/08/14	9887	0	410	10297	2.2
McIntyre Cr	chinook	1994	Takhini R	02-01-01-04-13	Spring Fry	Takhini R	95/08/14	95/08/14	14452	0	365	14817	2.2
McIntyre Cr	chinook	1994	Takhini R	02-01-01-04-12	Spring Fry	Flat Cr	95/08/14	95/08/14	14193	59	281	14533	2.2
McIntyre Cr	chinook	1994	Takhini R	02-01-01-04-14	Spring Fry	Flat Cr	95/08/14	95/08/14	13586	130	295	14011	2.2
McIntyre Cr	chinook	1995	Takhini R	02-01-01-05-08	Spring Fry	Takhini R	96/08/12	96/08/12	15731	251	496	16478	2.1
McIntyre Cr	chinook	1995	Takhini R	02-01-01-05-09	Spring Fry	Takhini R	96/08/12	96/08/12	8085	41	293	8419	2.1
McIntyre Cr	chinook	1995	Takhini R	02-01-01-05-10	Spring Fry	Flat Cr	96/08/07	96/08/07	10727	65	170	10962	2.01
McIntyre Cr	chinook	1995	Tatchun R	02-01-01-02-10	Spring Fry	Tatchun R	96/06/27	96/06/27	14530	49	62	14641	0.81
McIntyre Cr	chinook	1995	Tatchun R	02-01-01-02-11	Spring Fry	Tatchun R	96/06/27	96/06/27	13526	91	294	13911	0.81

continued

Table 12. 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.	02-01-01-06-14	Spring Fry	Flat Cr	97/07/02	97/07/04	15622	158	382	16162	0.8
McIntyre Cr	chinook	1996	Takhini R.	02-01-01-04-06	Spring Fry	Flat Cr	97/07/02	97/07/04	14845	37	280	15162	0.8
McIntyre Cr	chinook	1996	Tatchun R.	02-01-01-07-03	Spring Fry	Tatchun R.	97/06/27	97/06/27	1521	15	148	1684	1
McIntyre Cr	chinook	1997	Tatchun R.	02-01-01-06-08	Spring Fry	Tatchun R.	98/06/19	98/06/19	9284	150	74	9508	1.1
McIntyre Cr	chinook	1997	Tatchun R.	02-01-01-06-09	Spring Fry	Tatchun R.	98/06/19	98/06/19	10318	211	188	10717	1.1
McIntyre Cr	chinook	1997	Tatchun R.	02-01-01-07-02	Spring Fry	Tatchun R.	98/06/19	98/06/19	2536	52	0	2588	1.1
McIntyre Cr	chinook	1997	Takhini R.	02-01-01-07-09	Spring Fry	Flat Cr	98/06/22	98/06/22	11374	115	115	11604	1.1
McIntyre Cr	chinook	1997	Takhini R.	02-01-01-06-11	Spring Fry	Takhini R.	98/06/23	98/06/23	12933	334	118	13385	1.1
McIntyre Cr	chinook	1997	Takhini R.	02-01-01-06-10	Spring Fry	Takhini R.	98/06/23	98/06/23	12186	37	115	12338	1.1
McIntyre Cr	chinook	1997	Takhini R.	02-01-01-07-08	Spring Fry	Takhini R.	98/06/23	98/06/23	12341	253	148	12742	1.1
McIntyre Cr	chinook	1998	Tatchun Cr.	02-01-01-06-12	Spring Fry	Tatchun		99/07/08	10363	0	67	10430	
McIntyre Cr	chinook	1998	Tatchun Cr.	02-01-01-06-13	Spring Fry	Tatchun		99/07/08	4733	0	82	4815	
McIntyre Cr	chinook	1998	Takhini R.	02-01-01-07-10	Spring Fry	Takhini R.		99/07/14	13753	28	148	13929	
McIntyre Cr	chinook	1998	Takhini R.	02-01-01-07-11	Spring Fry	Flat Cr.		99/07/15	11273	23	206	11502	
McIntyre Cr	chinook	1999	Takhini River	02-01-0-07-07	Spring Fry	Flat Cr.		06/23/00	11333	114	219	11666	0.8
McIntyre Cr	chinook	1999	Takhini River	02-01-01-07-12	Spring Fry	Flat Cr.		06/23/00	12246	0	214	12460	0.8
McIntyre Cr	chinook	1999	Takhini River	02-01-01-06-04	Spring Fry	Takhini River		06/24/00	11105	0	147	11252	0.9
McIntyre Cr	chinook	1999	Takhini River	02-01-01-06-05	Spring Fry	Takhini River		06/24/00	12044	0	88	12132	0.9
McIntyre Cr	chinook	1999	Takhini River	02-01-01-06-06	Spring Fry	Takhini River		06/24/00	4361	0	0	4361	0.9
McIntyre Cr	chinook	1999	Tatchun Cr.	02-01-01-07-05	Spring Fry	Tatchun		06/19/00	12239	188	409	12836	1
McIntyre Cr	chinook	1999	Tatchun Cr.	02-01-01-07-06	Spring Fry	Tatchun		06/19/00	987	10	0	997	1
McIntyre Cr	chinook	2000	Takhini River	02-01-01-08-01	Spring Fry	Takhini River		07/25/01	11724	163	123	12010	1.1
McIntyre Cr	chinook	2000	Takhini River	02-01-01-08-02	Spring Fry	Flat Creek		07/26/01	9995	101	60	10156	1.1
McIntyre Cr	chinook	2000	Tatchun Cr.	02-01-01-07-05	Spring Fry	Tatchun		07/09/01	11654	360	10	12024	1.1
McIntyre Cr	chinook	2000	Tatchun Cr.	02-01-01-07-06	Spring Fry	Tatchun		07/09/01	6321	329	14	6664	1.1
McIntyre Cr	chinook	2001	Takhini River	02-01-01-08-04	Spring Fry	Takhini River		06/29/02	10109	314	301	10724	1
McIntyre Cr	chinook	2001	Takhini River	02-01-01-08-05	Spring Fry	Takhini River		06/29/02	9814	100	405	10319	1
McIntyre Cr	chinook	2001	Takhini River	02-01-01-08-07	Spring Fry	Flat Creek		06/28/02	4161	42	0	4203	1
McIntyre Cr	chinook	2001	Tatchun Cr.	02-01-01-08-03	Spring Fry	Tatchun		06/27/02	6432	415	279	7126	1
McIntyre Cr	chinook	2002	Takhini River	02-11-22-31-41	Spring Fry	Takhini River		07/21/03	8431	0	55	8486	1.7
McIntyre Cr	chinook	2002	Takhini River	02-11-22-31-42	Spring Fry	Takhini River		07/21/03	14017	0	76	14093	1.7
McIntyre Cr	chinook	2002	Takhini River	02-01-01-07-01	Spring Fry	Takhini River		07/21/03	11589	13	104	11706	1.7
McIntyre Cr	chinook	2002	Takhini River	02-11-21-38-46	Spring Fry	Flat Creek		07/22/03	6426	65	0	6491	1.7
McIntyre Cr	chinook	2002	Tatchun Cr.	02-01-01-07-14	Spring Fry	Tatchun		07/04/03	10746	50	79	10875	1.4
McIntyre Cr	chinook	2002	Tatchun Cr.	02-01-01-07-15	Spring Fry	Tatchun		07/04/03	13261	0	166	13427	1.4

Table 13. Chinook salmon age and sex percentages from selected Yukon River escapement projects, 2003.

Location	Sample Size		Age 3	4	5	6	7	8	Total
Anvik River [a]	428	Males	0.2	8.7	41.4	11.7	0.4	0.0	62.4
		Females	0.0	0.2	13.3	21.5	2.6	0.0	37.6
		Total	0.2	8.9	54.7	33.2	3.0	0.0	100.0
Chena River [a]	370	Males	0.0	4.8	34.3	13.2	2.7	0.0	55.1
		Females	0.0	0.3	12.2	28.4	4.1	0.0	44.9
		Total	0.0	5.1	46.5	41.6	6.8	0.0	100.0
East Fork Andreafsky River [b]	510	Males	0.4	13.0	35.5	5.7	0.0	0.0	54.7
		Females	0.0	3.2	18.1	23.0	1.0	0.0	45.3
		Total	0.4	16.2	53.6	28.7	1.0	0.0	100.0
Gisasa River [b]	472	Males	0.2	5.5	51.3	4.9	0.0	0.0	61.9
		Females	0.0	0.0	18.2	18.8	1.1	0.0	38.1
		Total	0.2	5.5	69.5	23.7	1.1	0.0	100.0
Henshaw Creek [b]	304	Males	1.6	19.4	35.5	4.3	0.0	0.0	60.9
		Females	0.0	0.0	8.6	28.9	1.6	0.0	39.1
		Total	1.6	19.4	44.1	33.2	1.6	0.0	100.0
Salcha River [a]	151	Males	0.7	7.3	34.4	13.9	1.3	0.0	57.6
		Females	0.0	0.0	8.0	28.5	6.0	0.0	42.4
		Total	0.7	7.3	42.4	42.4	7.3	0.0	100.0
Toxitna River [b]	501	Males	0.4	26.9	46.2	7.6	0.2	0.0	81.4
		Females	0.0	0.0	5.7	12.8	0.2	0.0	18.6
		Total	0.4	26.9	51.9	20.4	0.4	0.0	100.0

[a] Samples were collected from carcasses.

[b] Samples were collected from a weir trap.

Table 14. Yukon River Canadian chinook salmon total run by brood year, and escapement by year, 1982-1995 and R/S. (8-year-olds for Brood Year 1995 are projected)

Brood	Age Group by Brood Year							
Year	3	4	5	6	7	8	Total	Escapement
1974						596		
1975					27,200	162		
1976				75,458	21,106	30		
1977			15,435	106,526	16,170	593		
1978		3,616	15,339	51,614	22,839	1,137		
1979	1,534	1,588	16,001	80,761	39,130	851	139,865	
1980	15	4,830	10,412	58,878	27,604	3,409	105,149	
1981	0	1,050	29,283	97,369	49,078	1,348	178,128	
1982	0	5,083	13,907	32,119	20,417	333	71,860	19,790
1983	560	6,282	31,679	68,304	13,109	134	120,067	28,989
1984	69	12,586	28,842	61,587	10,590	114	113,788	27,616
1985	223	10,160	34,439	49,236	4,171	91	98,319	10,730
1986	347	20,207	40,128	99,601	14,798	138	175,220	16,415
1987	0	2,309	30,007	63,126	8,298	18	103,759	13,260
1988	0	6,491	32,390	60,038	7,393	68	106,380	23,118
1989	61	13,392	67,329	114,480	19,778	0	215,040	25,201
1990	45	6,185	22,833	48,488	8,585	9	86,145	37,699
1991	357	6,635	66,054	109,487	8,532	0	191,067	20,743
1992	6	2,459	22,318	33,018	1,285	0	59,087	25,382
1993	6	5,172	27,364	63,446	4,272	0	100,259	28,558
1994	0	596	17,381	21,597	5,455	11	45,041	25,890
1995	16	1,666	10,012	47,225	11,379	86	70,385	32,262
1996	6	162	21,329	62,346				28,409
1997	7	3,535	33,945					37,683
1998	0	7,544						16,750
1999	123							11,153
2000								12,566
2001								44,124
2002								38,671
2003								48,636
Average (1982-1995)							111,173	23,975

Contrast	4.5

Table 15. Chum salmon age and sex percentages from selected Yukon River escapement projects, 2003.

Location	Sample Size		Age 3	4	5	6	7	Total
Anvik River [a]	584	Males	0.3	30.9	12.9	0.7	0.0	44.7
		Females	1.1	42.0	11.6	0.6	0.0	55.3
		Total	1.4	72.9	24.5	1.3	0.0	100.0
Clear Creek [b]	679	Males	0.0	51.5	6.0	2.0	0.0	59.5
		Females	0.3	37.2	2.9	0.2	0.0	40.5
		Total	0.3	88.7	8.9	2.2	0.0	100.0
East Fork Andreafsky River [b]	1,085	Males	0.2	35.4	14.4	0.5	0.0	50.5
		Females	0.4	40.3	8.5	0.3	0.0	49.5
		Total	0.6	75.7	22.9	0.8	0.0	100.0
Gisasa River [b]	703	Males	0.3	37.5	16.5	0.6	0.0	54.9
		Females	0.3	32.6	11.4	0.8	0.0	45.1
		Total	0.6	70.1	27.9	1.4	0.0	100.0
Henshaw Creek [b]	696	Males	0.3	40.4	5.0	2.5	0.0	48.1
		Females	0.8	45.5	3.5	2.0	0.0	51.9
		Total	1.1	85.9	8.5	4.5	0.0	100.0
Nulato River [b]	377	Males	0.0	45.1	11.9	0.8	0.0	57.8
		Females	1.6	34.7	5.6	0.3	0.0	42.2
		Total	1.6	79.8	17.5	1.1	0.0	100.0
Tozitna River [b]	555	Males	0.6	57.2	8.2	1.1	0.0	67.1
		Females	0.5	29.8	2.3	0.2	0.0	32.9
		Total	1.1	87.0	10.5	1.3	0.0	100.0

[a] Samples were collected by beach seine.

[b] Samples were collected from a weir trap.

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	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
2003	524,709	357,043

Table 17. Exvessel value of the catch in the commercial fisheries off Alaska by species group, 1982-02, (value in $ millions and percentage of total).

109 [a]	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						

[a] Data for years 2000-2003 are unavailable at this time.

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 18. 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.

109

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	12,759	----------	----------	3,192	----------	15,951
2003	15,643	----------	----------	10,462	----------	26,105

Table 19. Coded-wire tagged Yukon River chinook salmon recoveries in the U.S. groundfish fisheries.

Brood Year	109 Location	Release Date	Recovery Date	Latitude	Longitude	Gear Type
1995	Mitchie Cr.	6/11/1997	3/16/2000	55° 56'	168° 52'	Domestic
1997	Judas Cr.	6/12/1998	3/28/2001	56° 18'	170° 33'	Domestic
2000	McClintock	6/8/2001	2/15/2002	56° 10'	166° 00'	Domestic
2001	Mitchie Cr.	6/10/2002	10/3/2002	64° 06'	164° 31'	Research
2001	Wolf Cr.	6/2/2002	10/3/2002	64° 06	164° 31'	Research
2001	Mitchie Cr.	6/10/2002	10/4/2002	63° 00'	165° 58'	Research
2001	Mitchie Cr.	6/10/2002	2/8/2003	56° 44'	167° 00'	Domestic
1988	Mitchie Cr.	6/6/1989	3/25/1992	56° 44'	173° 15'	Domestic
1990	Wolf Cr.	8/8/1991	3/14/1994	60° 06'	178° 58'	Domestic
1992	Wolf Cr.	6/6/1993	12/6/1994	56° 52'	171° 18'	Domestic
1991	Mitchie Cr.	6/4/1992	2/24/1995	55° 19'	164° 43'	Domestic Trawl
1992	Yukon R.	6/15/1993	6/2/1997	59° 29'	167° 49'	Domestic Trawl
1993	Mitchie Cr.	6/1/1994	3/10/1998	59° 26'	178° 05'	Domestic Trawl
1995	Fox Cr.	6/4/1996	3/29/1998	58° 56'	178° 06'	Domestic Trawl
1995	Judas Cr.	6/4/1996	3/30/1999	57° 43'	173° 34'	Domestic Trawl

Table 20. Surveillance for illegal driftnet fishing in

	Boat Days	Flights	Flight Hours
United States	60	12	194
Russia	215	13	--
Japan	461	--	190
Canada	--	5	149

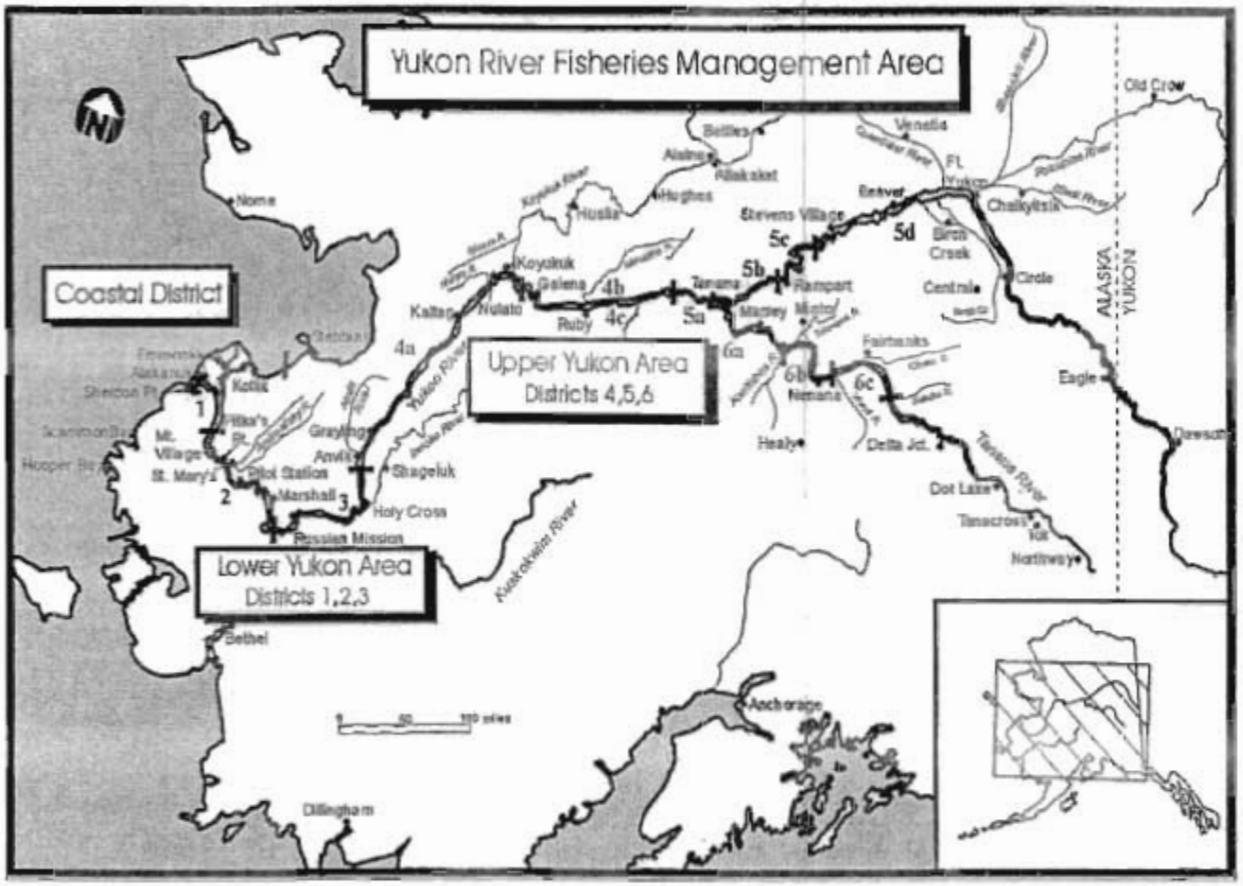
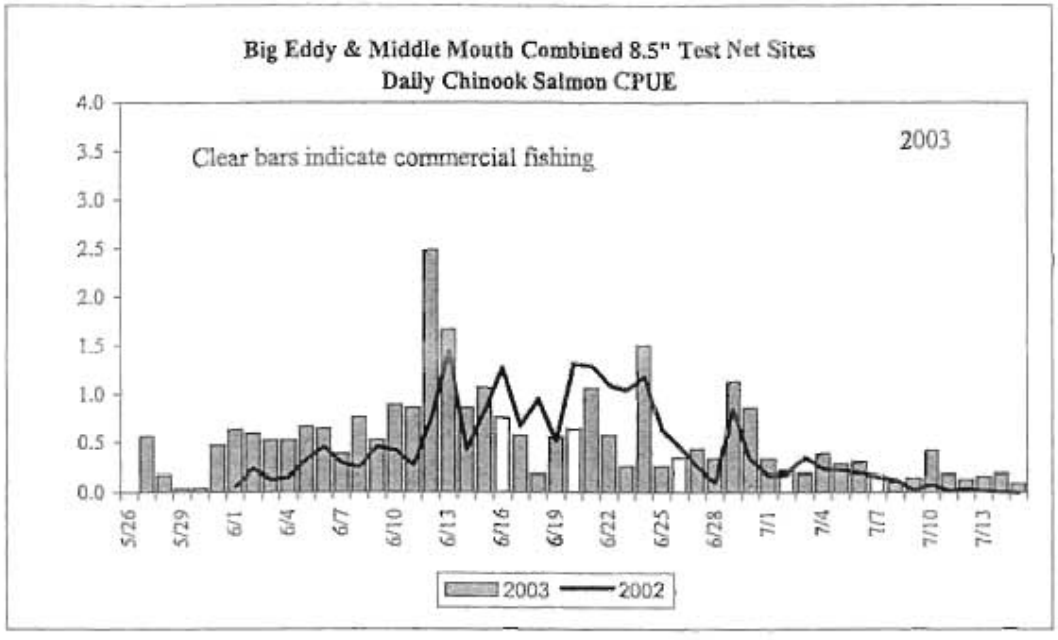


Figure 1. Alaska portion of the Yukon River drainage showing communities and fishing districts.

Note: See Appendix Figures 1-5.



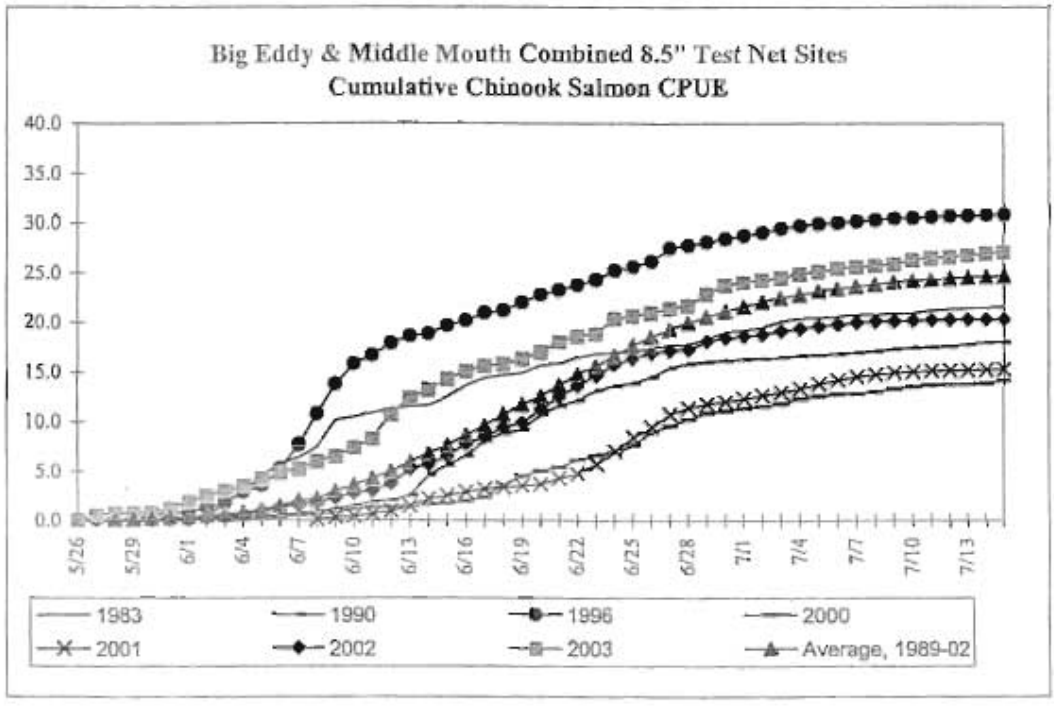


Figure 2. Daily test fish CPUE for chinook salmon test fish sites (above). 2003 Cumulative test fish CPUE for chinook salmon test fish sites (below) compared to the 1989-2002 average CPUE. Average is without 1998 and 2000.

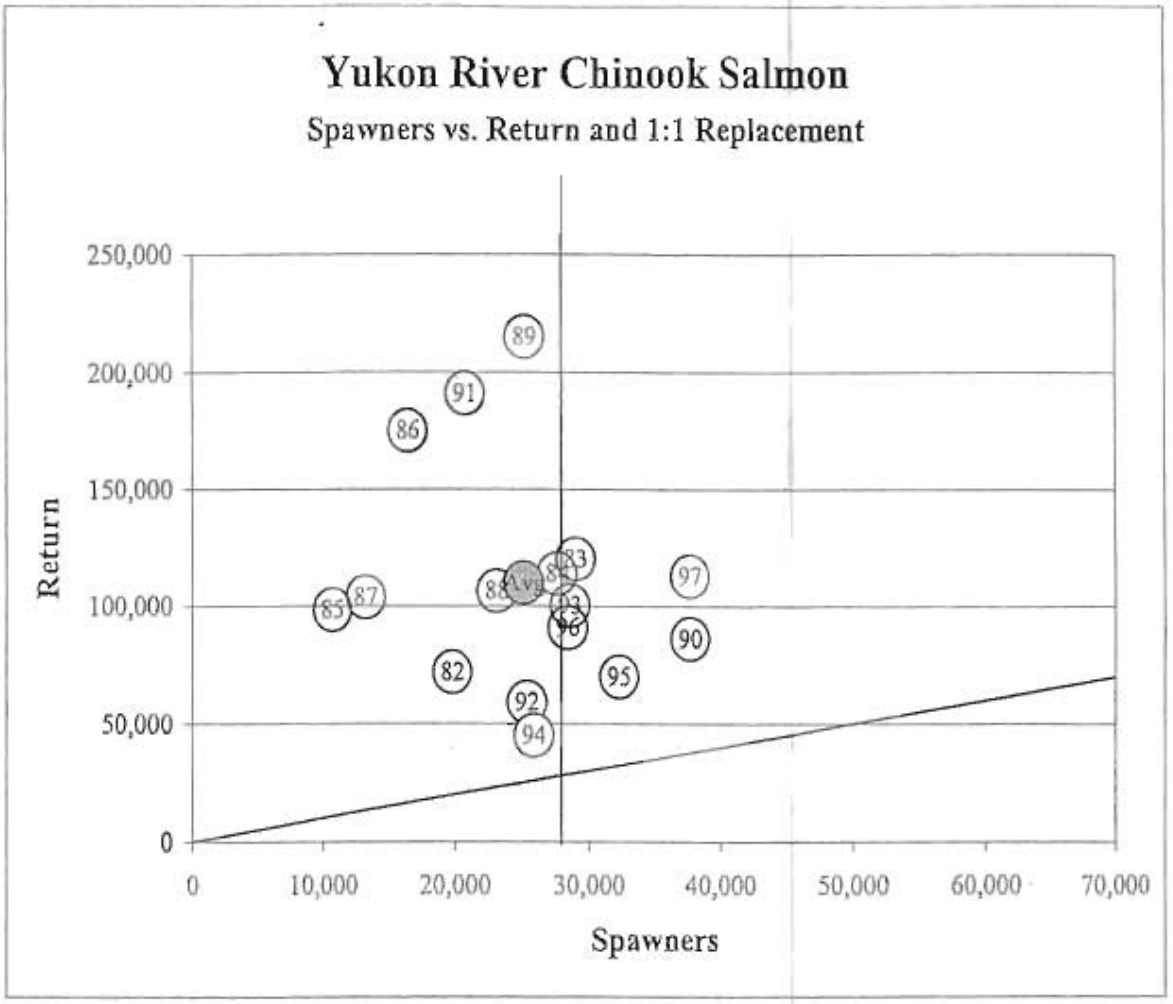


Figure 3. Yukon River mainstem Canadian chinook salmon spawners vs. estimated returns, the 1:1 replacement line and the most recent escapement goal objective. The years in the figure represent the brood years.

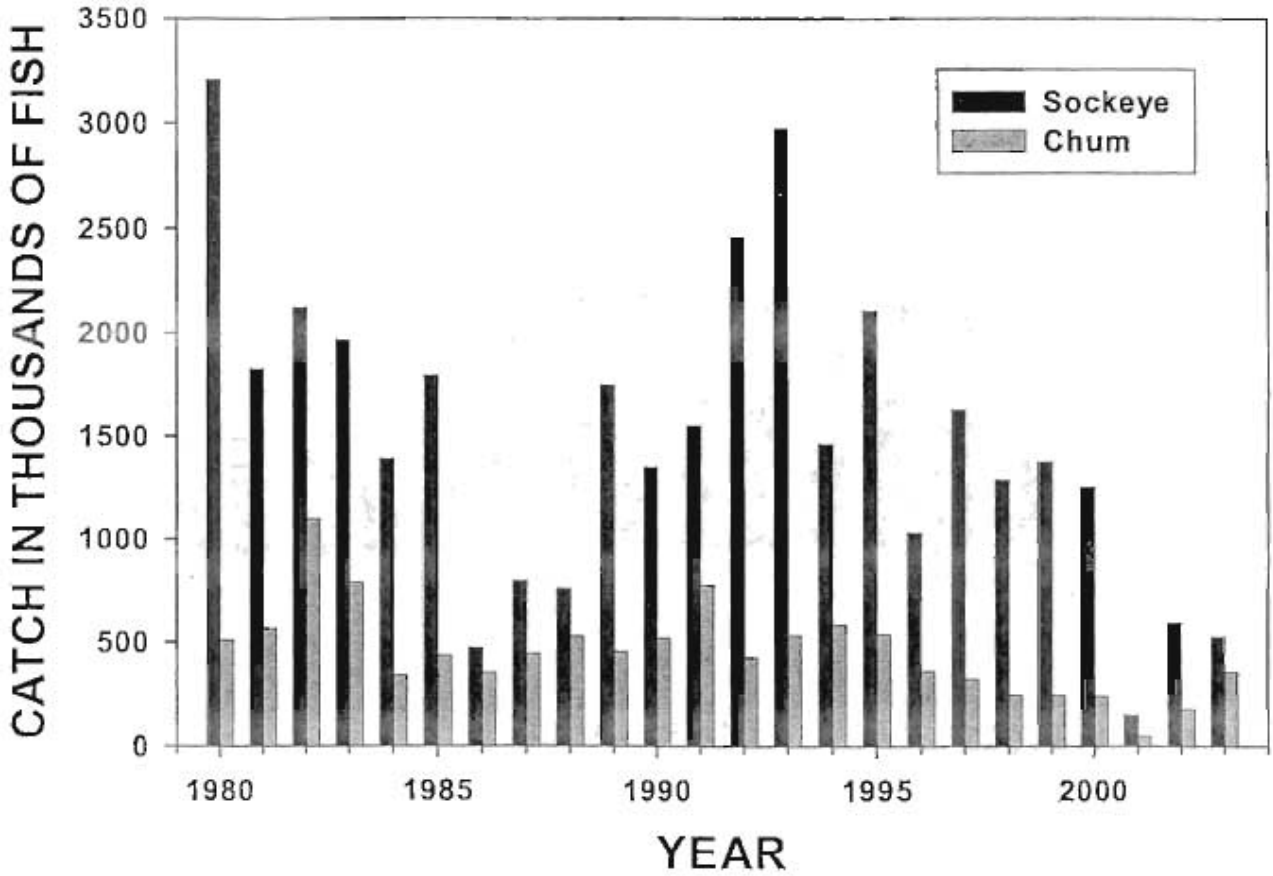


Figure 4. Sockeye and chum salmon harvest in the South Peninsula June fishery, 1980-2003

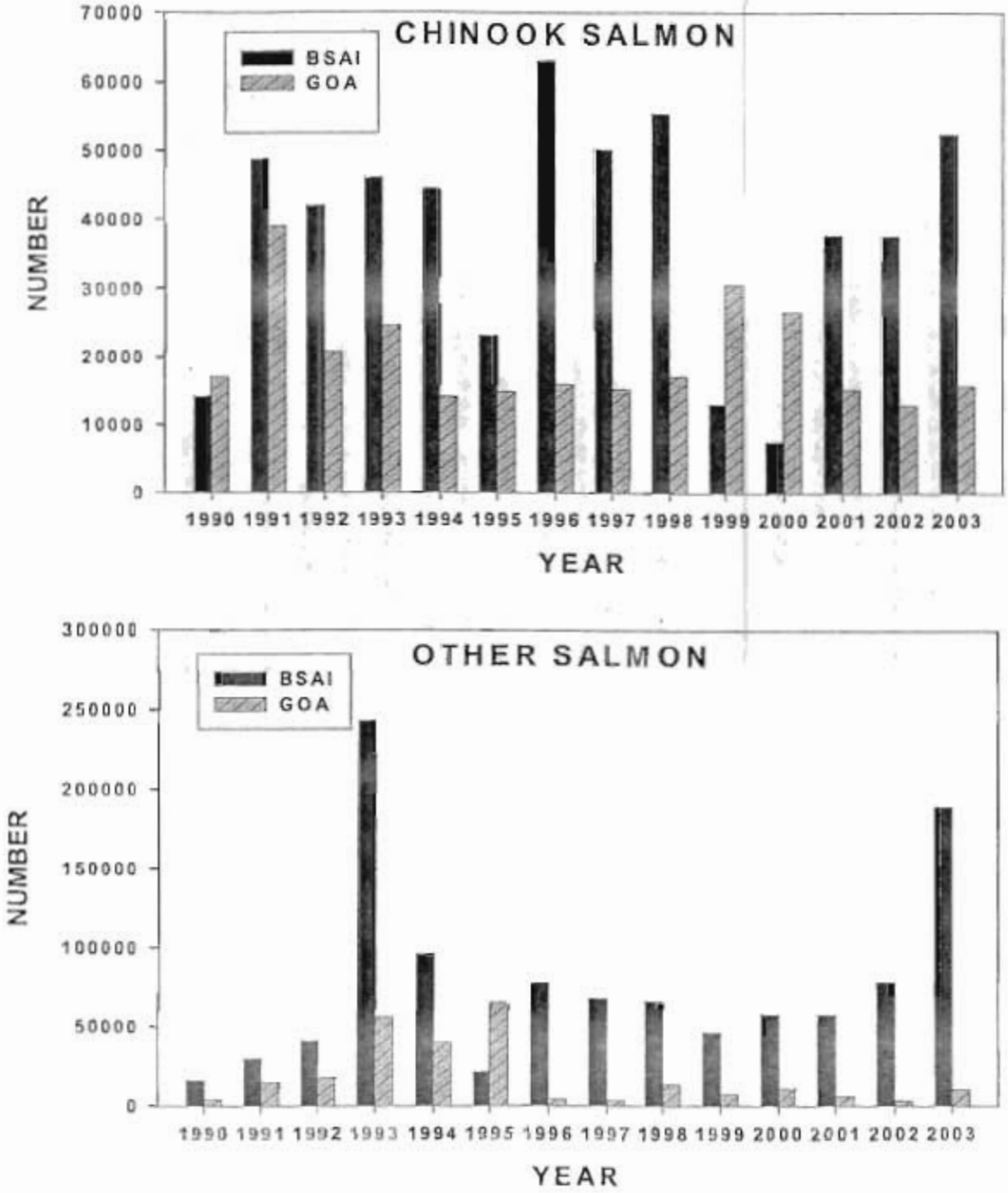


Figure 5. Chinook and other salmon bycatch in the BSAI and GOA groundfish fisheries, 1990-2003.

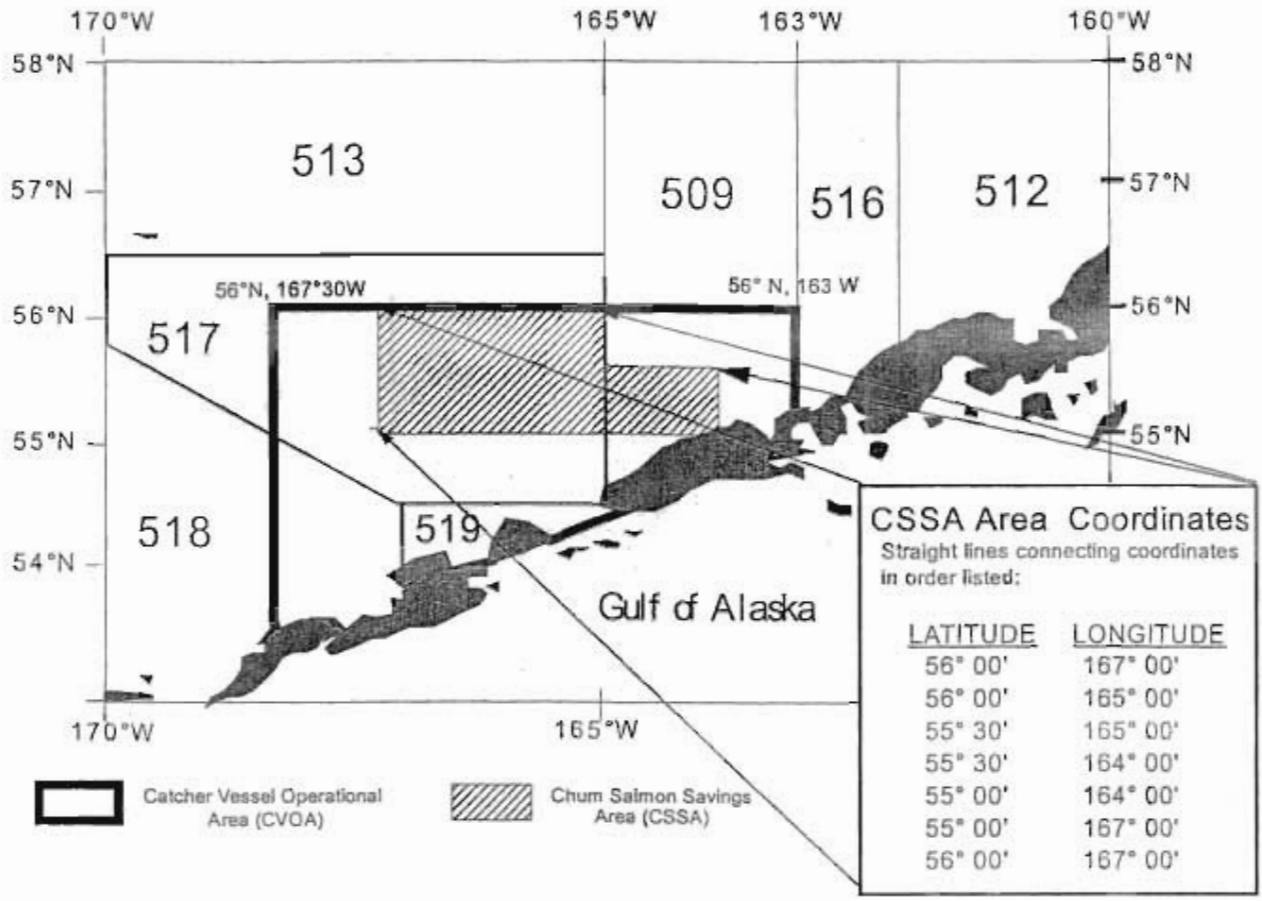


Figure 6. Statistical reporting areas and chum salmon savings area for the U. S. groundfish fisheries in the Bering Sea.

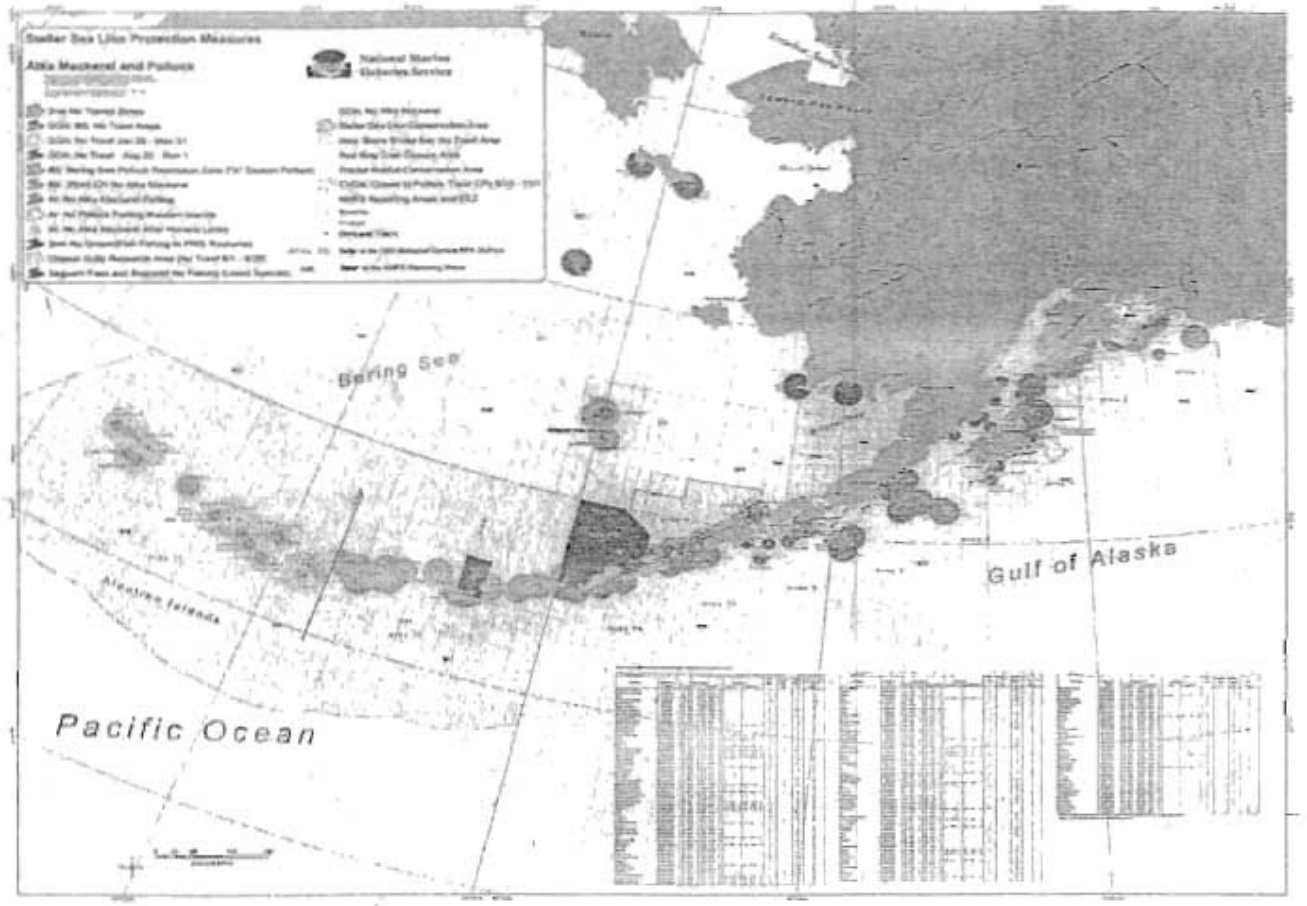


Figure 7. Steller sea lion protection measures.

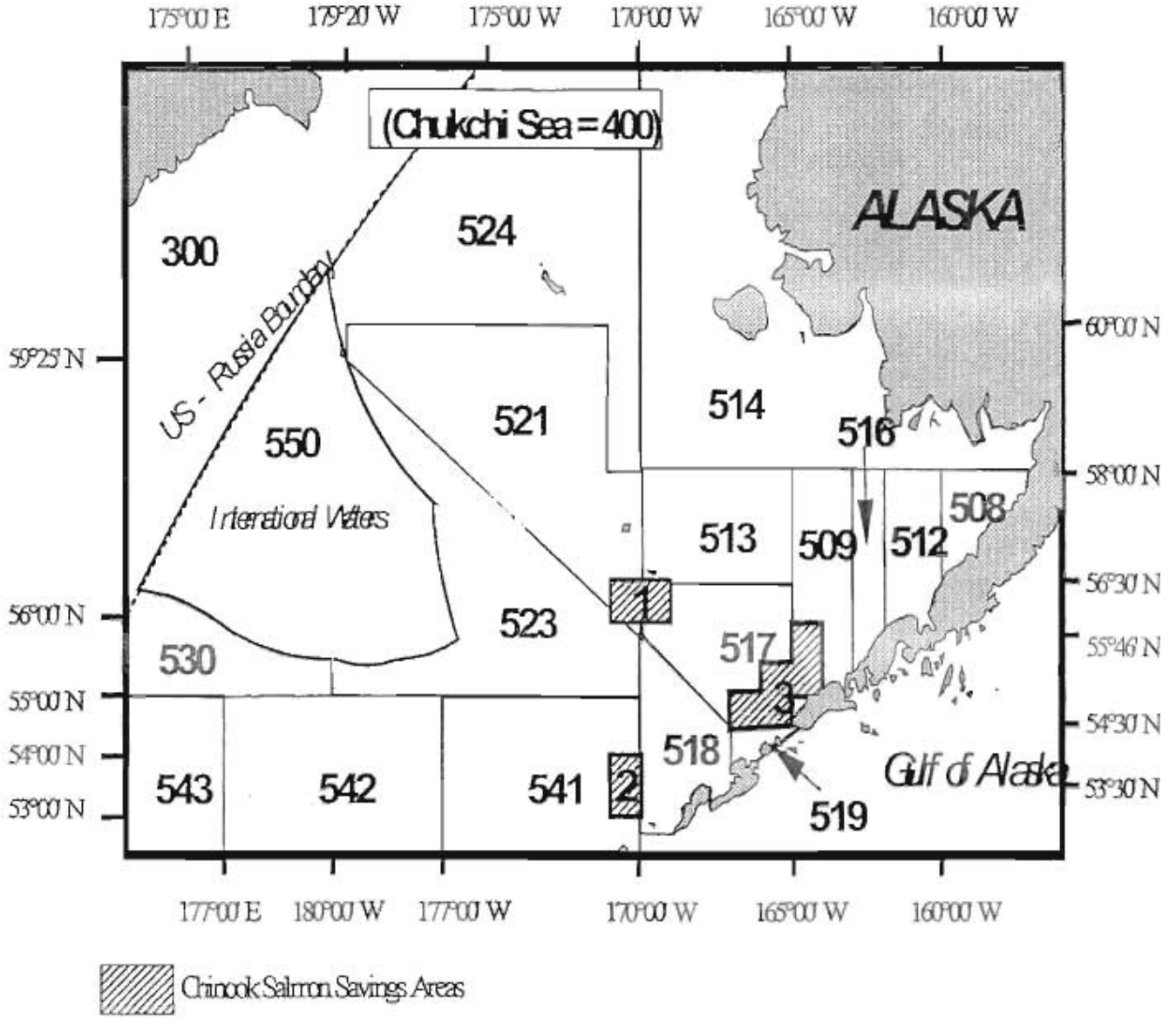


Figure 8. Statistical reporting areas and chinook salmon saving areas for the US groundfish fisheries in the Bering Sea.

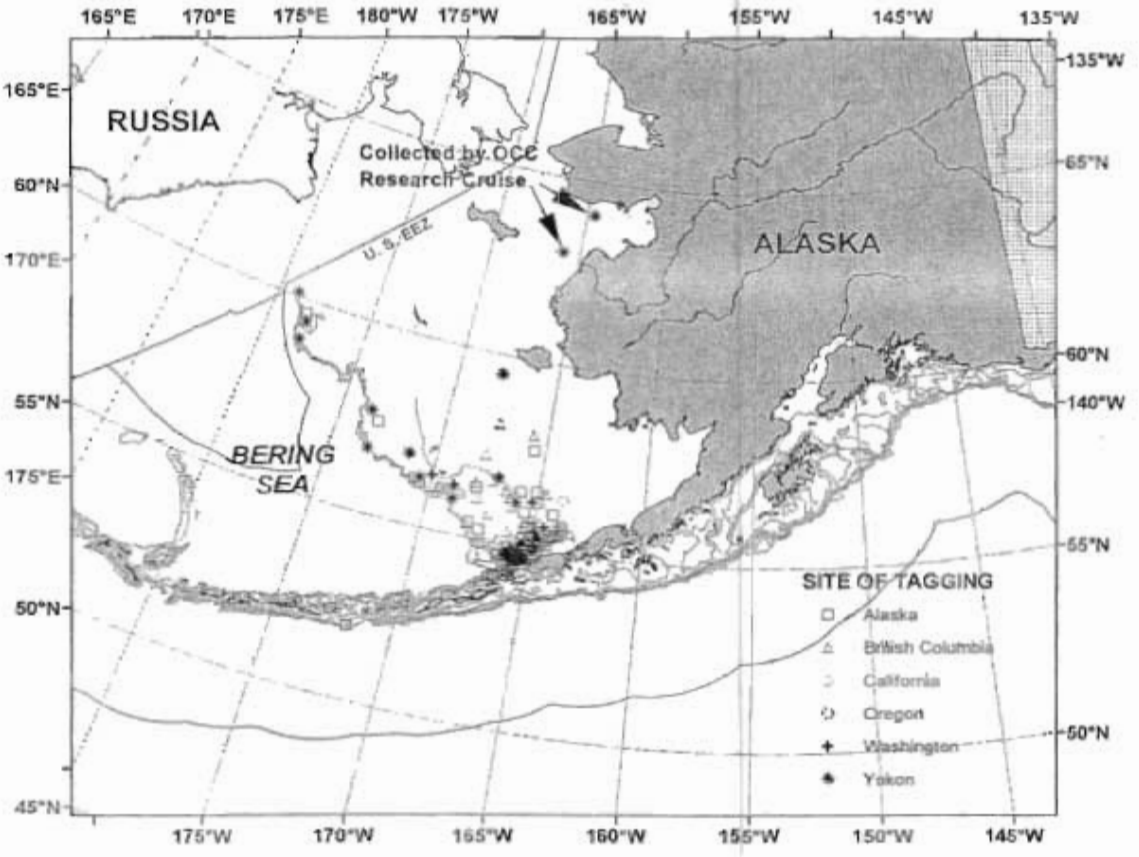


Figure 9. Location of the capture of coded-wire tagged chinook salmon in the BSAI groundfish fishery.

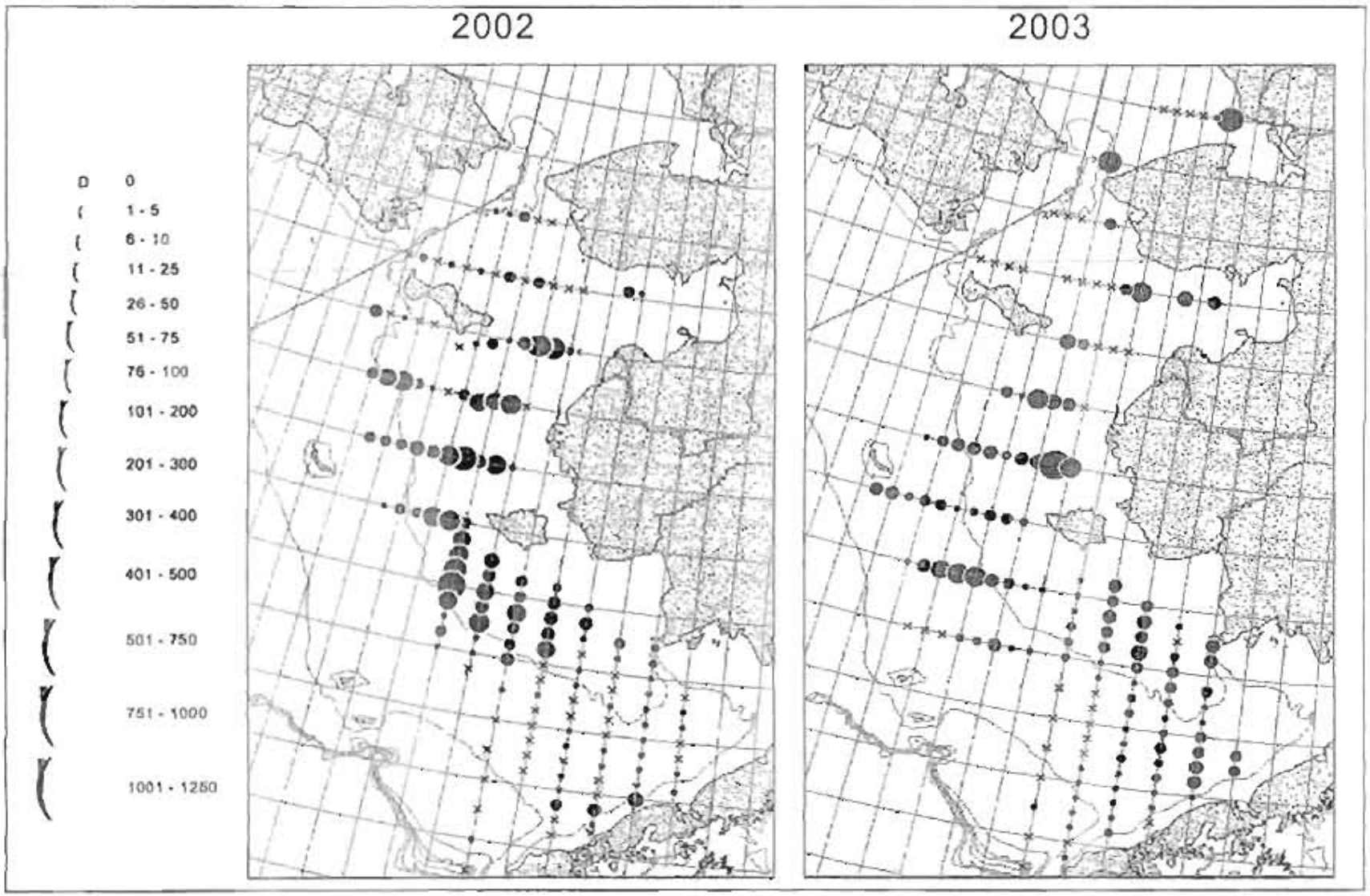


Figure 10. Distribution of chum salmon catches in the 2002 and 2003 Bering Sea BASIS cruises.

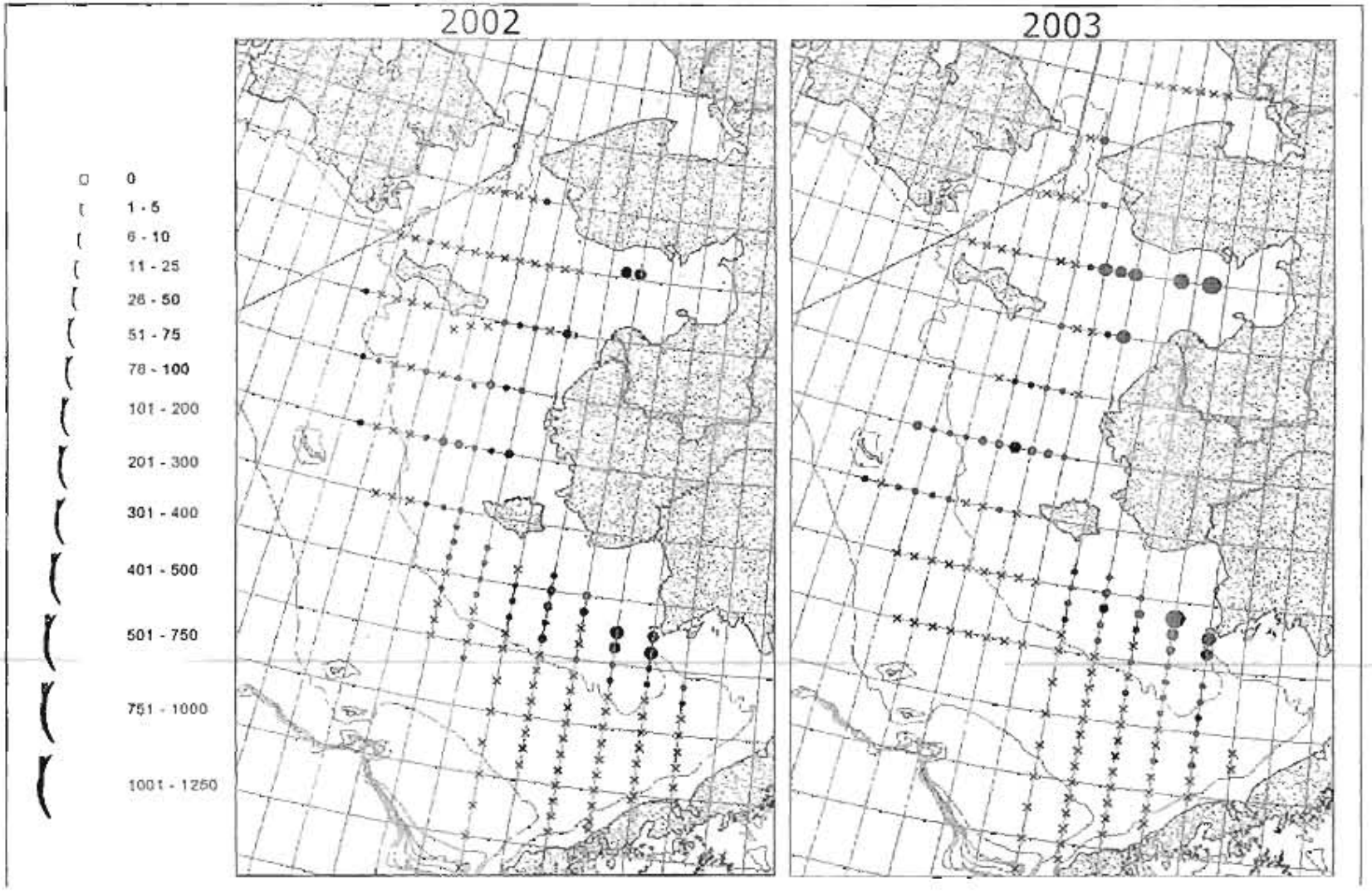


Figure 11. Distribution of chinook salmon catches in the 2002 and 2003 Bering Sea BASIS cruises.

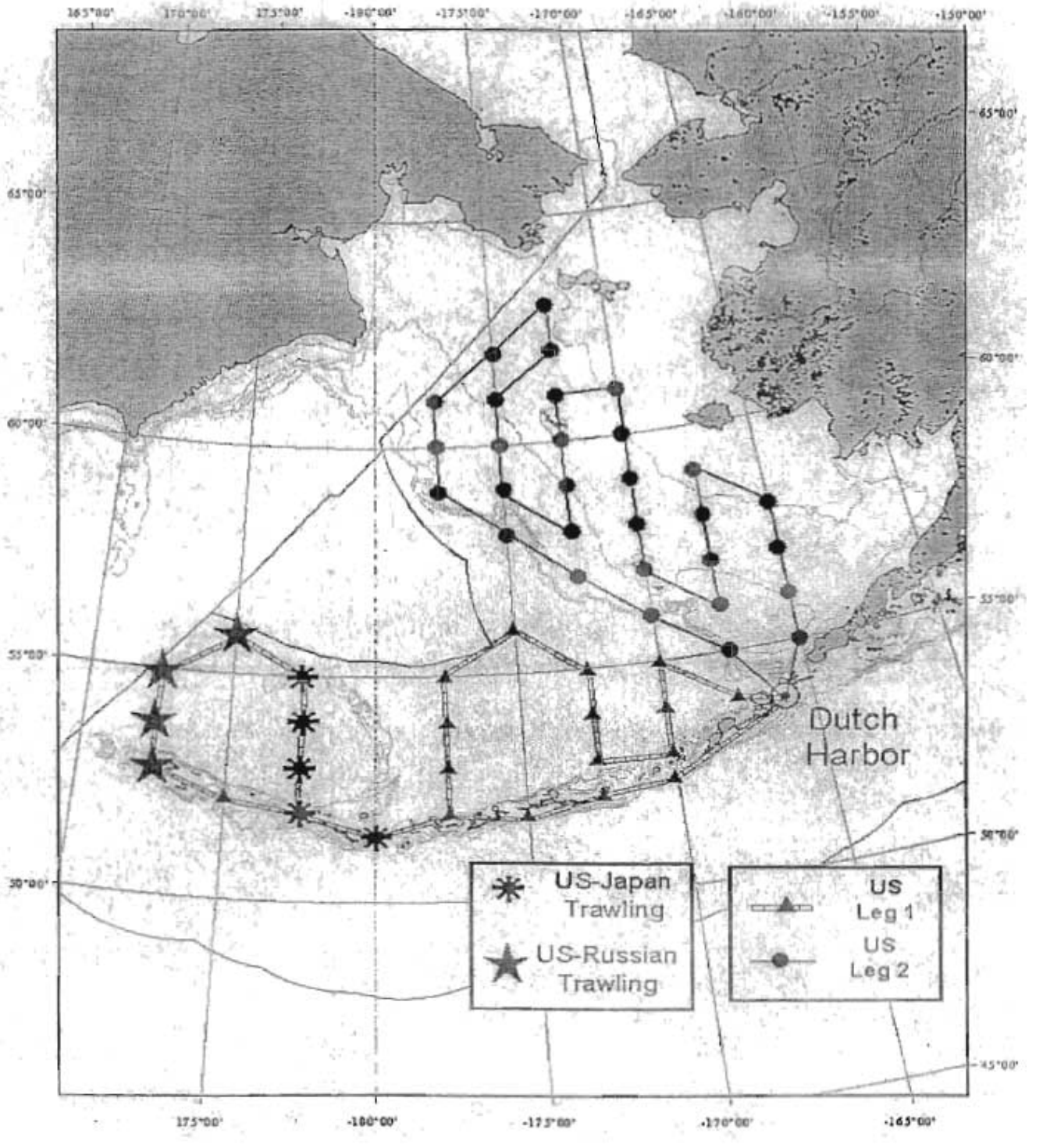


Figure 12. Cruise track of U.S BASIS fall survey.

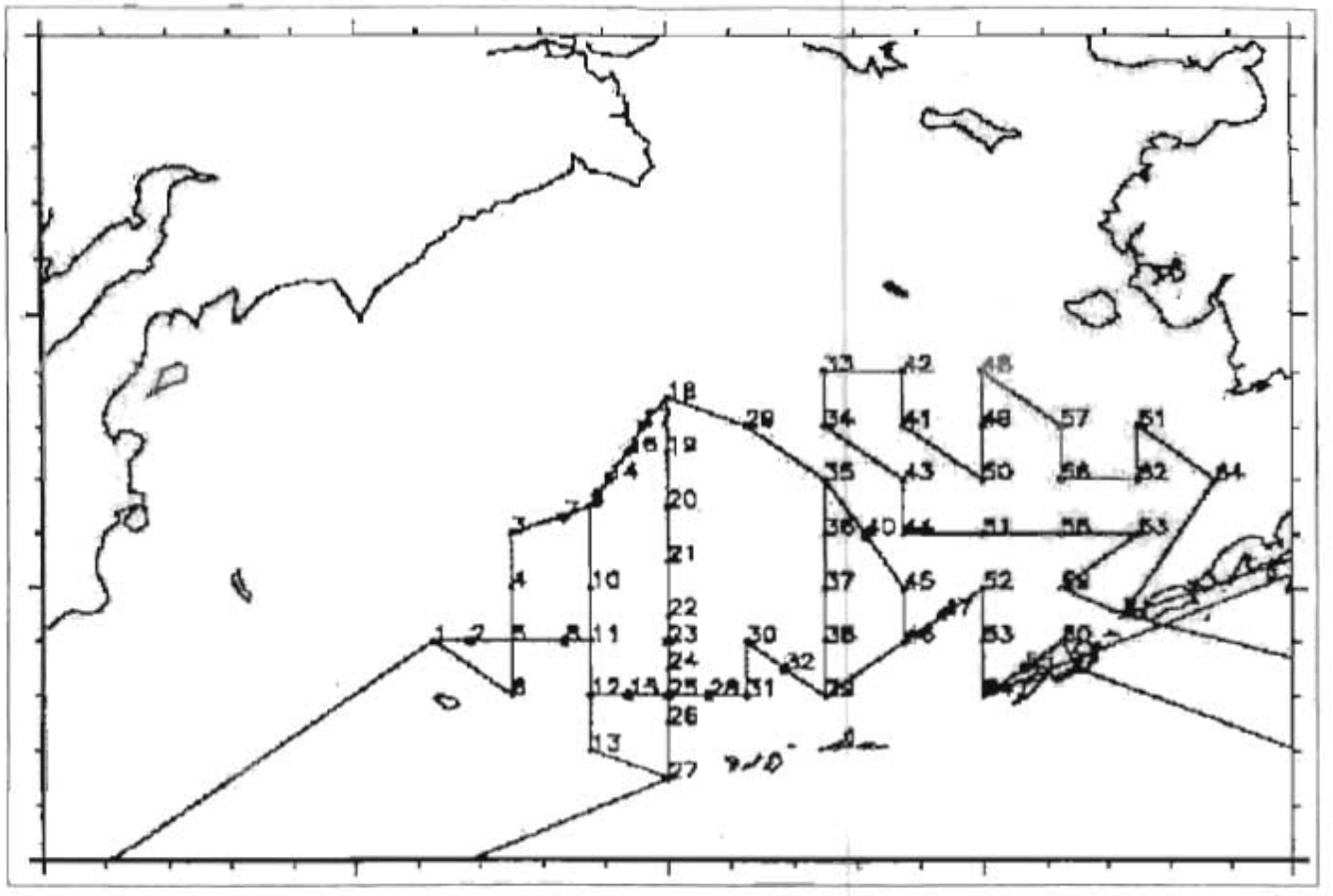


Figure 13. Japanese cruise track in support of BASIS in 2002.

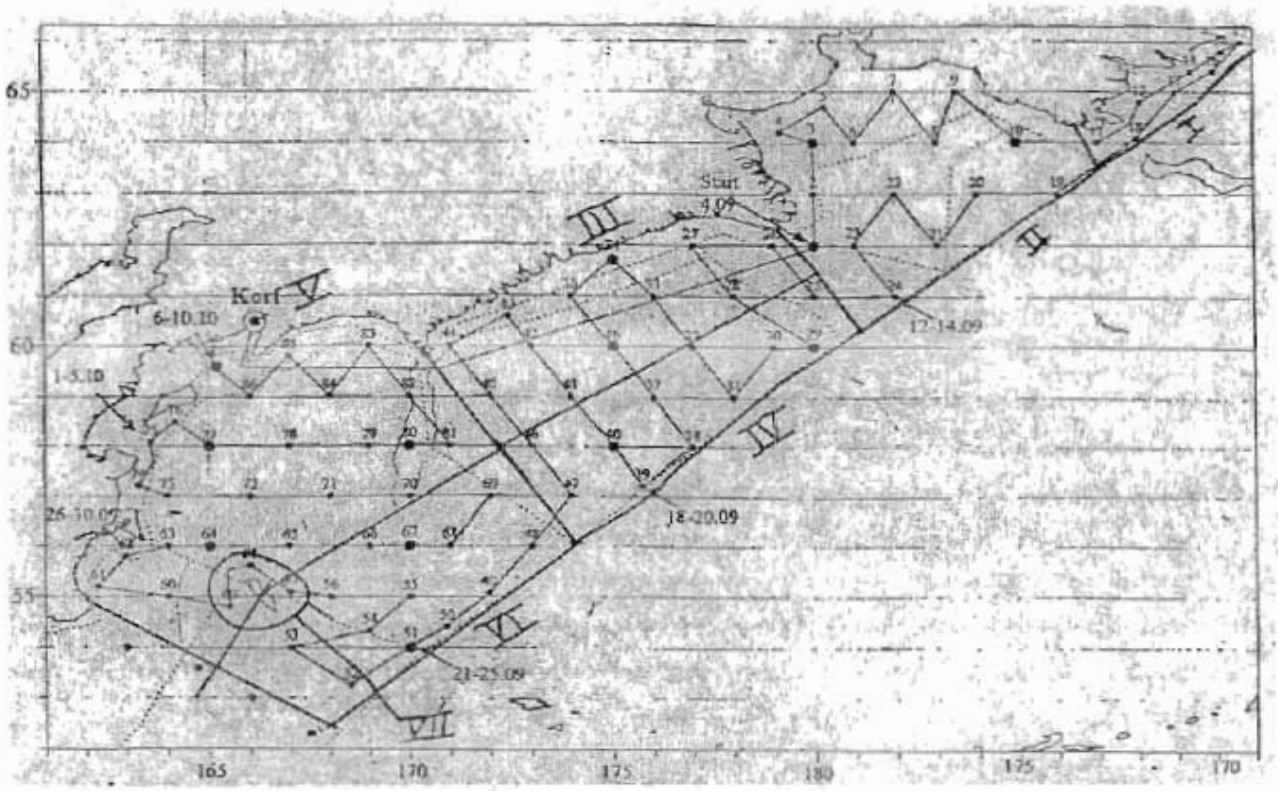


Figure 14. Track of the Russian TINRO cruise in support of BASIS.

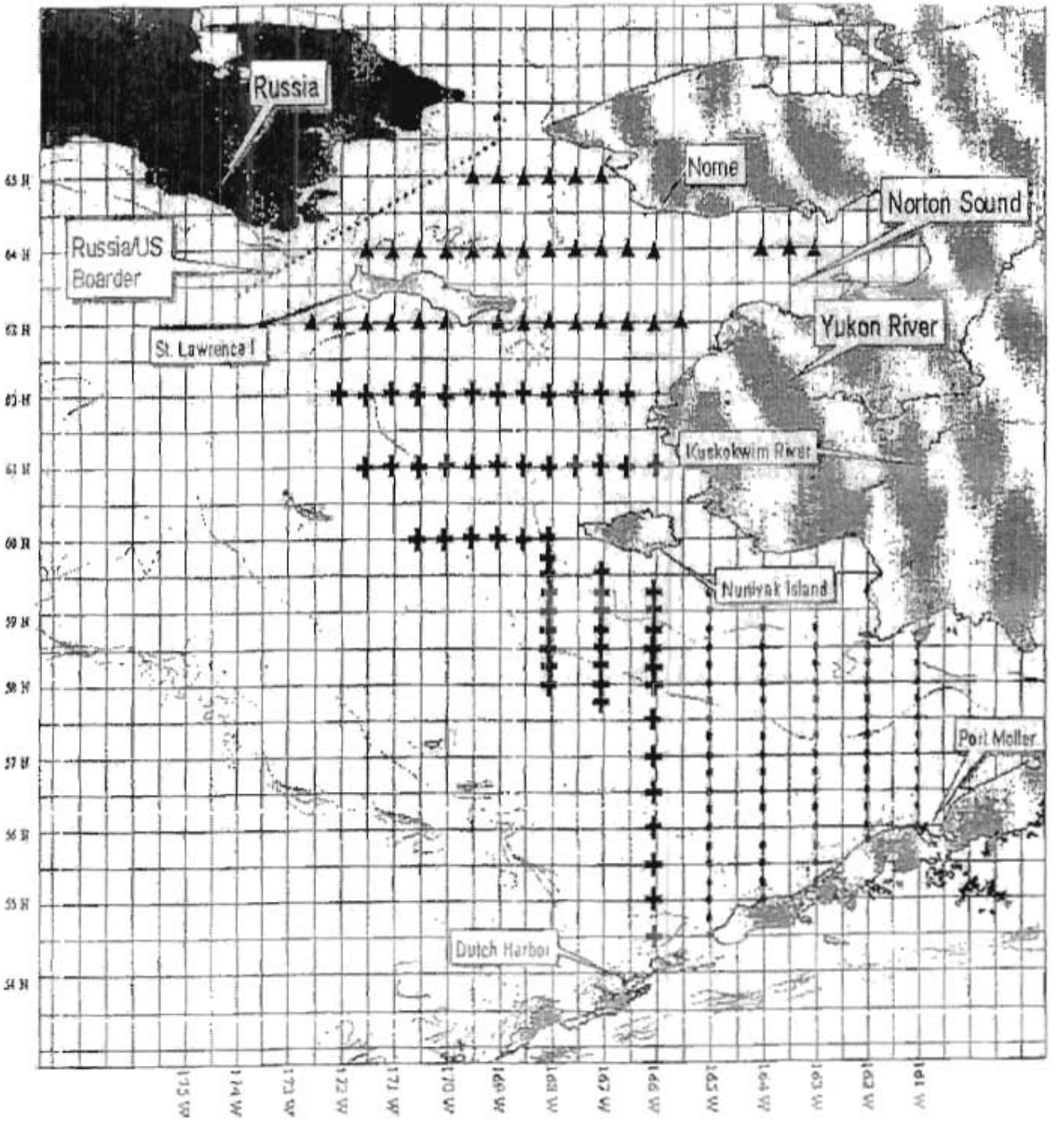


Figure 15. Tracks for the 2002 OCC Bering Sea cruises.

Appendix Table 1. Alaskan and Canadian total utilization of Yukon River chinook, chum and coho salmon, 1903-2003.

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

continued

Appendix Table 1. (page 2 of 2)

Year	Alaska [a, b]			Canada [c]			Total		
	Chinook	Other Salmon	Total	Chinook	Other Salmon	Total	Chinook	Other Salmon	Total
1961	141,152	461,597	602,749	13,246	9,076	22,322	154,398	470,673	625,071
1962	105,844	434,663	540,507	13,937	9,436	23,373	119,781	444,099	563,880
1963	141,910	429,396	571,306	10,077	27,696	37,773	151,987	457,092	609,079
1964	109,818	504,420	614,238	7,408	12,187	19,595	117,226	516,607	633,833
1965	134,706	484,587	619,293	5,380	11,789	17,169	140,086	496,376	636,462
1966	104,887	309,502	414,389	4,452	13,192	17,644	109,339	322,694	432,033
1967	146,104	352,397	498,501	5,150	16,961	22,111	151,254	369,358	520,612
1968	118,632	270,818	389,450	5,042	11,633	16,675	123,674	282,451	406,125
1969	105,027	424,399	529,426	2,624	7,776	10,400	107,651	432,175	539,826
1970	93,019	585,760	678,779	4,663	3,711	8,374	97,682	589,471	687,153
1971	136,191	547,448	683,639	6,447	16,911	23,358	142,638	564,359	706,997
1972	113,098	461,617	574,715	5,729	7,532	13,261	118,827	469,149	587,976
1973	99,670	779,158	878,828	4,522	10,135	14,657	104,192	789,293	893,485
1974	118,053	1,229,678	1,347,731	5,631	11,646	17,277	123,684	1,241,324	1,365,008
1975	76,883	1,307,037	1,383,920	6,000	20,600	26,600	82,883	1,327,637	1,410,520
1976	105,582	1,026,908	1,132,490	5,025	5,200	10,225	110,607	1,032,108	1,142,715
1977	114,494	1,090,758	1,205,252	7,527	12,479	20,006	122,021	1,103,237	1,225,258
1978	129,988	1,615,312	1,745,300	5,881	9,566	15,447	135,869	1,624,878	1,760,747
1979	159,232	1,596,133	1,755,365	10,375	22,084	32,459	169,607	1,618,217	1,787,824
1980	197,665	1,730,960	1,928,625	22,846	23,718 [d]	46,564	220,511	1,754,678	1,975,189
1981	188,477	2,097,871	2,286,348	18,109	22,781 [d]	40,890	206,586	2,120,652	2,327,238
1982	152,808	1,265,457	1,418,265	17,208	16,091 [d]	33,299	170,016	1,281,548	1,451,564
1983	198,436	1,678,597	1,877,033	18,952	29,490 [d]	48,442	217,388	1,708,087	1,925,475
1984	162,683	1,548,101	1,710,784	16,795	29,767 [d]	46,562	179,478	1,577,868	1,757,346
1985	187,327	1,657,984	1,845,311	19,301	41,515 [d]	60,816	206,628	1,699,499	1,906,127
1986	146,004	1,758,825	1,904,829	20,364	14,843 [d]	35,207	166,368	1,773,668	1,940,036
1987	188,386	1,246,176	1,434,562	17,614	44,786 [d]	62,400	206,000	1,290,962	1,496,962
1988	148,421	2,311,214	2,459,635	21,427	33,915 [d]	55,342	169,848	2,345,129	2,514,977
1989	157,606	2,281,566	2,439,172	17,944	23,490 [d]	41,434	175,550	2,305,056	2,480,606
1990	149,433	1,053,351	1,202,784	19,227	34,302 [d]	53,529	168,660	1,087,653	1,256,313
1991	154,651	1,335,111	1,489,762	20,607	35,653 [d]	56,260	175,258	1,370,764	1,546,022
1992	168,191	863,575	1,031,766	17,903	21,310 [d]	39,213	186,094	884,885	1,070,979
1993	163,078	342,197	505,275	16,611	14,150 [d]	30,761	179,689	356,347	536,036
1994	172,315	577,233	749,548	21,218	38,340	59,558	193,533	615,573	809,106
1995	177,663	1,437,837	1,615,500	20,887	46,109	66,996	198,550	1,483,946	1,682,496
1996	138,562	1,121,181	1,259,743	19,612	24,395	44,007	158,174	1,145,576	1,303,750
1997	174,625	544,879	719,504	16,528	15,878	32,406	191,153	560,757	751,910
1998	99,369	199,735	299,104	5,799 [f]	8,165	13,964	105,168	207,900	313,068
1999	124,315	234,221	358,536	12,468	19,636	32,104	136,783	253,857	390,640
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	10,139	10,193	20,332	63,877	126,670	190,547
2002	67,626	120,874	188,500	9,257	11,265	17,766	76,883	132,139	206,266
2003 [h, i]	40,664	46,924	87,588	9,619	12,365	20,994	50,283	59,289	108,582
Average									
1903-02	89,971	759,536	738,045	8,678	18,420	18,753	86,949	750,333	698,603
1993-02	128,287	583,355	711,641	14,659	21,197	35,627	142,946	604,552	747,268
1998-02	78,071	155,649	233,720	8,508	11,706	19,664	86,580	167,355	253,383

[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.

Appendix Table 2. Alaskan catch of Yukon River chinook salmon, 1961-2003

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	276	45,308
2001	53,059	53,059	0	679	53,738
2002	42,746	42,746	24,880	486	67,626
2003	[g]	[g]	40,437 [h]	[g]	40,437
Averages					
1961-02	34,377	34,003	102,030	1,018	136,667
1993-02	51,142	50,735	69,506	1,468	121,660
1998-02	47,750	47,667	29,877	624	78,071

[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 unavailable at this time.

[h] Data are preliminary.

Appendix Table 3. Alaska catch of Yukon River summer chum salmon, 1961-2003.

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	72,358
2001	58,385	58,385	0	82	58,467
2002	72,435	72,435	13,785	384	86,220
2003	[h]	[h]	10,685 [i]	[h]	10,685
Average					
1961-02	208,053	162,092	471,386	753	633,934
1993-02	139,415	91,150	223,110	602	314,823
1998-02	72,193	70,508	16,457	321	87,209

[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.

[i] Data are preliminary.

Appendix Table 4. Value of commercial salmon fishery to Yukon Area fishermen, 1977-2003 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	5,599	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	1,639,229	7,202,358	0	0	0	0	0	0	0	7,202,358
1988	5,463,800	142,284	5,606,084	5,001,500	1,313,991	6,315,091	11,921,175	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	157,302	17,026	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	165,036	167,571	332,607	80,019	11,292	91,311	445,918	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	56,553	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
2003	1,871,202	40,957	1,912,159	1,585	6,879	8,464	1,920,623	5,993	3,398	9,391	18,168	5,095	23,263	32,654	1,953,277
Averages															
1977-02	3,995,656	101,572	4,093,321	1,036,144	495,437	1,512,526	5,605,847	372,960	99,767	472,727	114,582	10,486	125,067	597,795	6,451,787
1993-02	3,259,144	66,116	3,318,649	75,224	303,619	348,478	3,667,126	35,578	22,965	58,543	26,041	3,411	29,452	87,995	4,172,257
1998-02	1,855,721	28,126	1,878,221	11,815	2,179	13,559	1,891,780	7,128	175	7,303	724	0	724	8,027	2,374,759

Appendix Table 5. Number of participating commercial salmon fishing gear permit holders by district and season, Yukon Area in Alaska, 1971-2003. [a]

Chinook and Summer Chum Salmon Season

Year	Lower Yukon Area				Upper Yukon Area				Yukon Area Total
	District 1	District 2	District 3	Subtotal [b]	District 4	District 5	District 6	Subtotal	
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	89	43	26	149	845
1982	450	225	21	696	74	44	20	138	834
1983	435	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	0	540		14	6	20	560
2003	351	217	0	568	3	16	7	26	594
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 Total
	District 1	District 2	District 3	Subtotal [b]	District 4	District 5	District 6	Subtotal	
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	393	232	23	650	33	43	26	102	752
1981	462	240	21	723	30	50	20	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	29	20	22	72	635
1989	332	229	22	559	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
2003	56	0	0	56	2	0	4	60	116
Average									
1971-02	262	149	11	411	13	20	19	52	458
1993-02	99	74		172	1	5	5	12	184
1998-02	94	67		160	1	3	1	5	165

Continued

Combined 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	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
2003	358	217	0	575	3	16	8	27	602
Averages									
1971-02	436	223	21	643	67	36	26	127	769
1993-02	375	208	3	565	35	21	12	80	659
1998-02	305	181	1	475	1	12	4	30	526

[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, 1961-2003.

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 [i]	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	21,542	110,369
2000	19,307	19,307	0	40,462
2001	35,154	35,154	0	35,154
2002	19,393	19,393	0	19,393
2003	[k]	[k]	10,996 [l]	10,996
Average				
1961-02	116,438	112,423	145,399	258,298
1993-02	83,798	78,288	48,012	128,298
1998-02	45,344	45,344	4,308	53,649

[a] Includes salmon harvested for subsistence and personal use purposes, and an estimate of 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 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, most 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.

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

[k] Data are unavailable at this time.

[l] Data are preliminary.

Appendix Table 7. Alaskan catch of Yukon River coho salmon, 1961-2003.

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	554	15,271
2001	21,654	21,654	0	1,202	22,856
2002	15,261	15,261	0	1,092	15,261
2003	[k]	[k]	25,243 [l]	[k]	
Average					
1961-02	24,474	24,069	25,047	1,061	49,746
1993-02	24,303	23,420	14,679	1,162	39,151
1998-02	18,077	18,077	320	843	19,022

[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.
[l] Data are preliminary.

Appendix Table 8. Canadian catch of Yukon River chinook salmon, 1961-2003.

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	8,579	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	4,549	0	737	5,310	5,700	99	5,799
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	7,416	146	767	8,418	9,769	370	10,139
2002	708	59	7,138	128	1,036	8,361	9,069	188	9,257
2003 [b]	2,672	115	6,121	275	263	6,774	9,446	173	9,619
Average									
1961-02	5,947	435	5,512	349	825	6,082	12,028	247	12,257
1993-02	5,461	173	7,092	377	825	7,973	13,433	306	13,740
1998-02	1,122	77	6,395	90	825	7,222	8,344	164	8,508

[a] Sport fish harvest unknown before 1980.

[b] Data are preliminary.

Appendix Table 9. Canadian catch of Yukon River fall chum salmon, 1961-2003.

Year	Mainstem Yukon River Harvest						Porcupine River Aboriginal Fishery Harvest	Total Canadian Harvest
	Commercial	Domestic	Test	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	13,464	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		1,792	1,792	1,792	6,159	7,951
1999	10,402	0		3,234	3,234	13,636	6,000	19,636
2000	1,319	0		2,917	2,917	4,236	5,000	9,236
2001	2,198	3		3,027	3,030	5,228	4,594	9,823
2002	3,065	0	2,756	3,109	3,109	8,930	1,860	10,790
2003	9,030	0	990	1,433	1,433	11,453	382	11,835
Average								
1961-02	11,220	638		2,573	2,952	14,238	4,945	19,066
1993-02	12,193	0		2,764	2,764	15,232	4,274	19,507
1998-02	3,397	1		2,816	2,816	6,764	4,723	11,487

Appendix Table 10. Alaskan and Canadian total utilization of Yukon River chinook and fall chum salmon, 1961-2003.

	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 [g]	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	5,799	99,369	105,168	7,951	62,869	70,820
1999	12,468	124,315	136,783	19,636	110,369	130,005
2000	4,879	45,308	50,187	9,236	19,307	28,543
2001	10,139	53,738	63,877	9,823	35,154 [d]	44,977
2002	9,257	67,626	76,883	8,034	0	8,034
2003 [a, h]	9,619	40,664	50,283	10,845	1	10,846
Average						
1961-02	12,257	135,023	147,281	19,000	257,333	276,333
1993-02	13,740	121,660	135,400	19,231	124,244	143,475
1998-02	8,508	78,071	86,580	10,936	45,540	56,476

[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
	East Fork	West Fork		North Fork	South Fork	
1961	1,003		1,226	376 [b]	167	266 [b]
1962	675 [b]	762				
1963						
1964	867	705				
1965		344	650			
1966	361	303	638			
1967		276	336			
1968	380	383	310			
1969	274	231	296			
1970	665	574	368			
1971	1,904	1,682				
1972	798	582	1,198			
1973	825	788	613			
1974		285	471	55	23	161
1975	993	301	730	123	81	385
1976	818	643	1,053	471	177	332
1977	2,008	1,499	1,371	286	201	255
1978	2,487	1,062	1,324	498	422	
1979	1,180	1,134	1,484	1,093	414	484
1980	958	1,500	1,330	954	369	951
1981	2,146	231	807		791	
1982	1,274	851				421
1983			653	526	480	572
1984	1,573	1,993	641			
1985	1,617	2,248	1,051	1,600	1,180	735
1986	1,954	3,158	1,118	1,452	1,522	1,346
1987	1,608	3,281	1,174	1,145	493	731
1988	1,020	1,448	1,805	1,061	714	797
1989	1,399	1,089	442			
1990	2,503	1,545	2,347	568	430	884
1991	1,938	2,544	875	767	1,253	1,690
1992	1,030	2,002	1,536	348	231	910
1993	5,855	2,765	1,720	1,844	1,181	1,573
1994	300	213		843	952	2,775
1995	1,635	1,108	1,996	968	681	410
1996		624	839		100	
1997	1,140	1,510	3,979			144
1998	1,027	1,249	709	507	546	889
1999						
2000	1,018	427	1,721			
2001	1,065	570	1,420	1,116	768	1,298
2002	1,447	917	1,713	687	897	506
2003		1,578				
SEG [c]	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] Incomplete, poor timing and/or poor survey conditions resulting in minimal or inaccurate counts.

[c] Sustainable Escapement Goal

Appendix Table 12. Chinook salmon escapement counts for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1986-2003.

Year	Andreafsky River		Nulato River Tower	Gisasa River Weir		Chena River w/corrected percent females		Salcha River w/corrected percent females	
	No. Fish	% Fem.	No. Fish	No. Fish	% Fem.	No. Fish	% Fem.	No. Fish	% Fem.
1986	1,530	23.3 [a]				9,065	20.0 [d]		35.8
1987	2,011	56.1 [a]				6,404	43.8 [d]	4,771	47.0 [d]
1988	1,339	38.7 [a]				3,346	46.0 [d]	4,562	36.6 [d]
1989		13.6				2,666	38.0 [d]	3,294	46.8 [d]
1990		41.6				5,603	35.0 [d]	10,728	35.4 [d]
1991		33.9				3,025	31.5 [d]	5,608	34.0 [d]
1992		21.2				5,230	27.8 [d]	7,862	27.3 [d]
1993		29.9				12,241	11.9 [a]	10,007	24.2 [a]
1994	7,801	35.5 [b, c]	1,795 [c]	2,888	[c]	11,877	34.9 [a]	18,399	35.2 [a]
1995	5,841	43.7 [b]	1,412	4,023	46.0	9,680	50.3	13,643	42.2 [a]
1996	2,955	41.9 [b]	756	1,952	19.5	6,833	27.0	7,958	26.3
1997	3,186	36.8 [b]	4,766	3,764	26.0	13,390	17.0 [a]	18,396	36.3 [a]
1998	4,011	29.0 [b]	1,536	2,356	16.2	4,745	30.5 [a]	5,027	22.4 [a]
1999	3,347	28.6 [b]	1,932	2,631	26.4	6,485	47.0 [a]	9,198	38.8 [a]
2000	1,344	54.3 [b]	908	2,089	34.4	4,694	20.0 [d]	4,595	29.9 [a]
2001		[c]	[c]	3,052	49.2 [c]	9,596	32.4 [a]	13,328	27.9 [a]
2002	4,896	21.1 [b]	2,696	1,931	20.7	6,967	27.0 [d]	8,850	34.8 [c]
2003	4,383	45.3 [b]	1,716 [c]	1,873	38.1	12,500	34.0 [e]	14,600	31.8 [e]
BEG [f]						2,800-5,700		3,300-6,500	

[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, 1961-2003.

Year	Tincup Creek [a]	Tatchun Creek [b]	Little Salmon River [c]	Big Salmon River [d, e]	Nisutlin River [d]	Ross River [d, f]	Wolf River [d, g]	Whitehorse Fishway		Canadian Mainstem		
								Count	Percent Hatchery Contribution	Border Passage Estimate	Harvest	Spawning Escapement Estimate [i]
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, n]	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	5,700	16,888 [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		Canadian Mainstem		
								Count	Percent Hatchery Contribution	Border Passage Estimate	Harvest	Spawning Escapement Estimate [j]
2000	19 [i]	277 [m]	46	113	20		32	677	69	16,995	4,829	12,166 [q]
2001	39 [i]		1,035	1,020	481		154	988	36	54,029	9,769	44,260 [q]
2002 [p]			526	1,149	280		84	605	39	43,359	9,301	34,058
2003			1,658	3,075	687		292	1,443	70	58,082	9,446	48,636
Escapement Objective												28,000 [q]
Averages												
1961-02	113	235	441	846	426	279	193	859	18	40,931	16,151	24,780
1993-02	85	452	633	1,072	325	315	228	1,356	56	40,599	13,457	27,143
1998-02	28	311	493	502	251		93	833	63	32,116	8,391	23,725

[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 South 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

[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.

[m] 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 gound based escapement counts for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1973-2003.[a]

Year	East Fork Andreafsky R. No. Fish	% Fem.		Anvik R. Sonar No. Fish	% Fem.	Kaltag Crk. Tower No. Fish	Nulato R. Tower No. Fish	% Fem.		Gisasa R. Weir No. Fish	% Fem.		Clear Crk. Weir No. Fish	% Fem.		Chena R. Tower No. Fish		Salcha R. Tower No. Fish	
1980				492,676	60.7														
1981	147,312		[e]	1,486,182	54.7														
1982	181,352	64.6	[e]	444,581	69.4														
1983	110,608	57.4	[e]	362,912	56.5														
1984	70,125	50.7	[a]	891,028	60.9														
1985		58.1	[c]	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]
2003	22,603			251,358		3,056	[d] 17,814		[d]	24,379			5,230				[d]		[d]
BEG	[f] 65-130			400-800															

[a] Sonar count.

[b] Tower count.

[c] Weir count.

[d] Incomplete count caused by 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 15. Fall chum salmon passage estimates or escapement estimates for selected spawning areas in Alaskan and Canadian portions of the Yukon River Drainage, 1971-2003.[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[w][i]		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[w]
1987	22,117		21,180	9,395			52,416	153,267[w]
1988	13,436		18,024	4,481[x]			33,619	45,206[w]
1989	30,421		21,342[x]	5,386[x]			69,161	99,116[w]
1990	34,739		8,992[x]	1,632			78,631	77,750[w]
1991	13,347		32,905[x]	7,198				86,496[w]
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[w][i]		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[w]
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[am]
2001	6,007[am]	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]	3,116	109,970[al]	196,154[al]	89,847[al]	31,856[al]
2003	21,492	80,961[al]	22,582[x]	10,600	208,534[al]	488,552[al]	196,985[al]	44,047[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								
1971-02	31,898	32,090	12,762	4,916	109,499	301,078	108,721	81,859
1993-02	25,478	32,090	13,912	4,806	109,499	301,078	140,029	92,581
1998-02	12,719	32,090	9,487	2,741	80,319	195,656	86,237	32,632

continued

Appendix Table 15. (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, u]				
1973	15,989 [v]	383		2,500				
1974	32,525 [v]			400				
1975	353,282 [v]	7,671		362 [w]				
1976	36,584			20				
1977	88,400			3,555				
1978	40,800			0 [x]				
1979	119,898			4,640 [z]				
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 [a]		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 [y]	10,760	1,195	7,538	356	99,775	37,765	62,010
1986	31,723 [y]	825	14	16,686	213	101,826	13,886	87,940
1987	48,956 [y]	6,115	50	12,000		125,121	44,345	80,776
1988	23,597 [y]	1,550	0	6,950	140	69,280	32,494	36,786
1989	43,834 [y]	5,320	40	3,050	210 [y]	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 [y]	2,426	53	11,675	468	112,303	33,842	78,461
1992	22,517 [y]	4,438	4	3,339	450	67,962	18,880	49,082
1993	28,707 [y]	2,620	0	4,610	555	42,165	12,422	29,743
1994	65,247 [y]	1,429 [y]	20 [y]	10,734	209 [y]	133,712	35,354	98,358
1995	51,971 [y, ah]	4,701	0	16,456	633	198,203	40,111	158,092
1996	77,278 [y]	4,977		14,431	315	143,758	21,329	122,429
1997	26,959 [y]	2,189		3,350	207	94,725	9,286	85,439
1998	13,564 [y]	7,292		7,337	235	48,047	1,742	46,305
1999	12,904 [y]			5,136	19 [y]	75,541	13,506	62,035
2000	5,053 [y]	933 [y]		1,442	204	59,598	4,236	55,362
2001	21,669 [y]	2,453		4,884	5	38,908	4,919	33,989
2002	13,563 [al]	973		7,147	64	91,808 [al]	6,158	85,650 [al]
2003	29,519	7,982		39,347	390	142,591	10,463	132,128
EO [am]	50,000-120,000							60,000
Average								
1971-02	56,956	3,731	223	6,556	290	86,710	21,085	65,625
1993-02	31,692	3,063	7	7,553	245	92,647	14,906	77,740
1998-02	13,351	2,913		5,189	105	62,780	6,112	56,668

continued

[b] Latest table revision October 7, 2002.

[c] 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.

[d] 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).

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

[f] Foot survey, unless otherwise indicated.

[g] 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.

[h] 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.

[i] 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).

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

[aa] Boat survey.

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

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

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

[ad] Weir not operated. Although only 7,541 chum salmon were counted on a single survey flown October 26, a population estimate of approximately 27,000 fish was made through date of survey, based upon historic average aerial-to-weir expansion of 28%. Actual population of spawners was reported by DFO as between 30,000-40,000 fish considering aerial survey timing.

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

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

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

[ai] due to high water from 29 August until 3 September 1997.

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

[ak] 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.

[ay] 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 16. Coho salmon passage estimates or escapement estimates for selected spawning areas in the Alaskan portion of the Yukon River Drainage, 1972-2003.[a,b]

Year	East Fork Andreafsky River[c]	Yukon River Mainstem Sonar Estimate[d]	Kantishna River Drainage: Geiger Creek[f]	Nenana River Drainage: Lost Slough	Nenana Mainstem[g]	Wood Creek	Seventeen Mile Slough	Delta Clearwater River[h]	Delta Clearwater River Tributaries[i]	Clearwater Lake and Outlet	Richardson Clearwater River[k]
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			25[l,m]	118			281	1,920		1,500[n]	80[m]
1977			60[l]	524[l]		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[l,m]	499[n]		1,603[f]	592	3,946		1,545[n]	611
1981	1,657[k]			274		849[f,o]	1,005	8,563[f]		459[k]	550
1982			81			1,436[f,o]		8,365[f]			
1983			42	766		1,042[o]	103	8,019[f]		253	88
1984			20[k,m]	2,677		8,826[o]		11,061		1,368	428
1985			42[k,m]	1,584		4,470[o]	2,081	6,842		750	
1986			5	794		1,664[f]	218[k]	10,857		1,800	146[m]
1987			1,175	2,511		2,387[f]	3,802	22,300		4,225[n]	
1988	1,913[n]		159	348		2,046[f]		21,600		825[n]	
1989			155[k]			412[f]	824[k]	12,600		1,600[n]	483
1990			211	688	1,308		15[k]	8,325		2,375[n]	
1991			427[k]	564	447		52	23,900		3,150[n]	
1992			77[k]	372			490	3,963		229[n]	500
1993			138	484	419	666[f,o]	581	10,875		3,525[n]	
1994			410[f,m]	944	1,648	1,317[f,o]	2,909	62,675	17,565	3,425[n]	5,800
1995	10,901	120,366	142[f,m]	4,169	2,218	500[f]	2,972[k]	20,100	6,283	3,625[n]	
1996	8,037		233[n]	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[k]	1,446	[p]	1,996	11,525	2,375	2,775[n]	
1998	5,417	132,363	157	1,360[m]	2,771[m]	[p]	1,413[k]	11,100	2,775	2,775[n]	
1999	2,963	73,413	29	1,002[m]	745[m]	[p]	662[m]	10,975	2,799		
2000	8,225	192,108	142	55[k,m]	68[k,m]	[p]	879[k,m]	9,225	2,364	1,025[k]	2,175
2001	9,252	147,341[k]	578	242	859	699	3,753	46,875	12,013	4,425[n]	1,531
2002[m]	3,534	135,737	744	0	328	935	1,910	38,625	10,442	5,900	874
2003	7,970	276,961	973	85	658	3,055	4,535	102,800	27,791	8,800	6,232
E.O.[m]								>9,000[m]			
Average 1972-2002	6,426	131,026	199	1,017	1,282	1,690	1,316	12,709	6,184	1,721	857

Continued

[a] Latest table revision February 11, 2004.

[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.

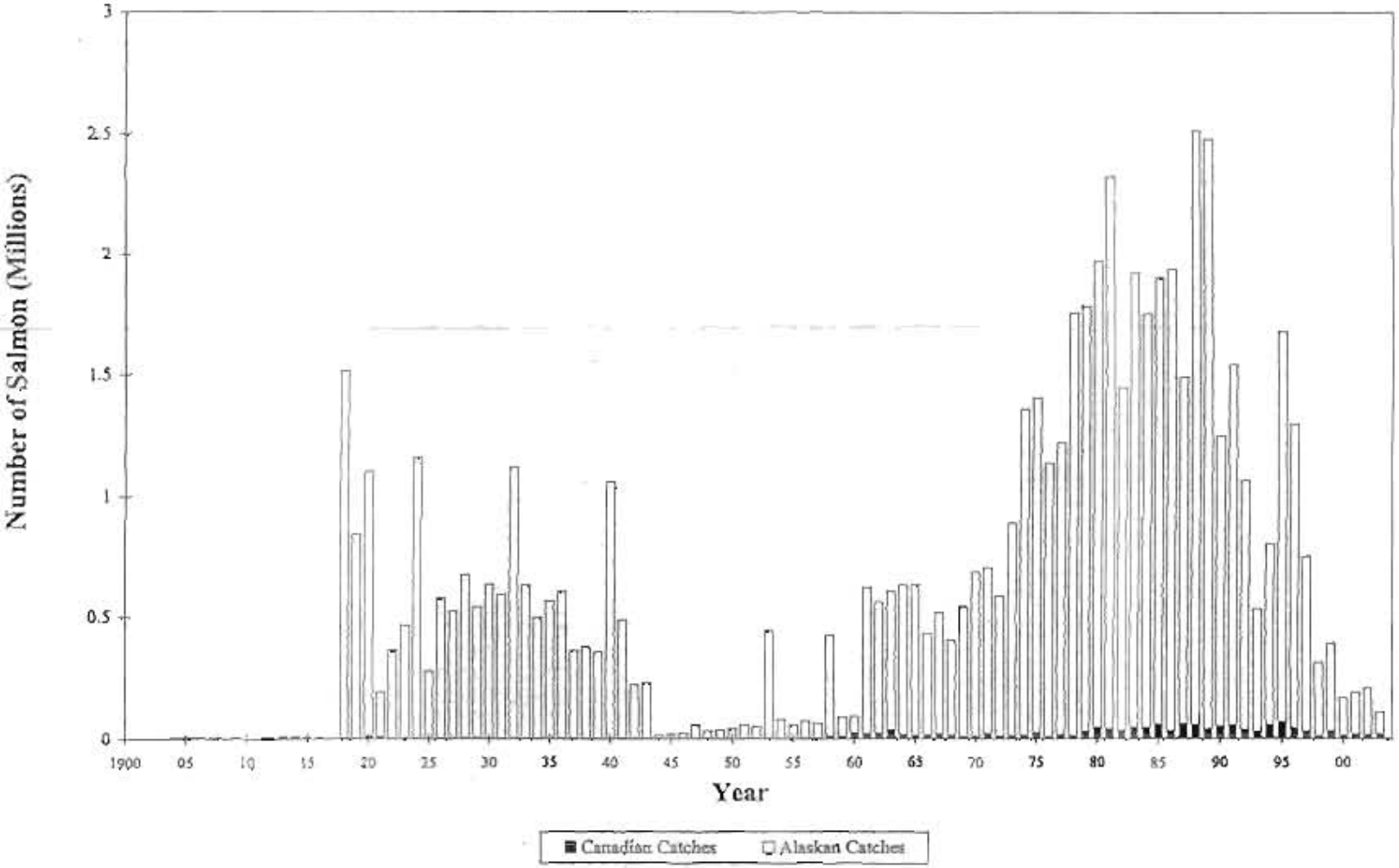
[x] Survey of western floodplain only.

[y] Combination foot and boat survey.

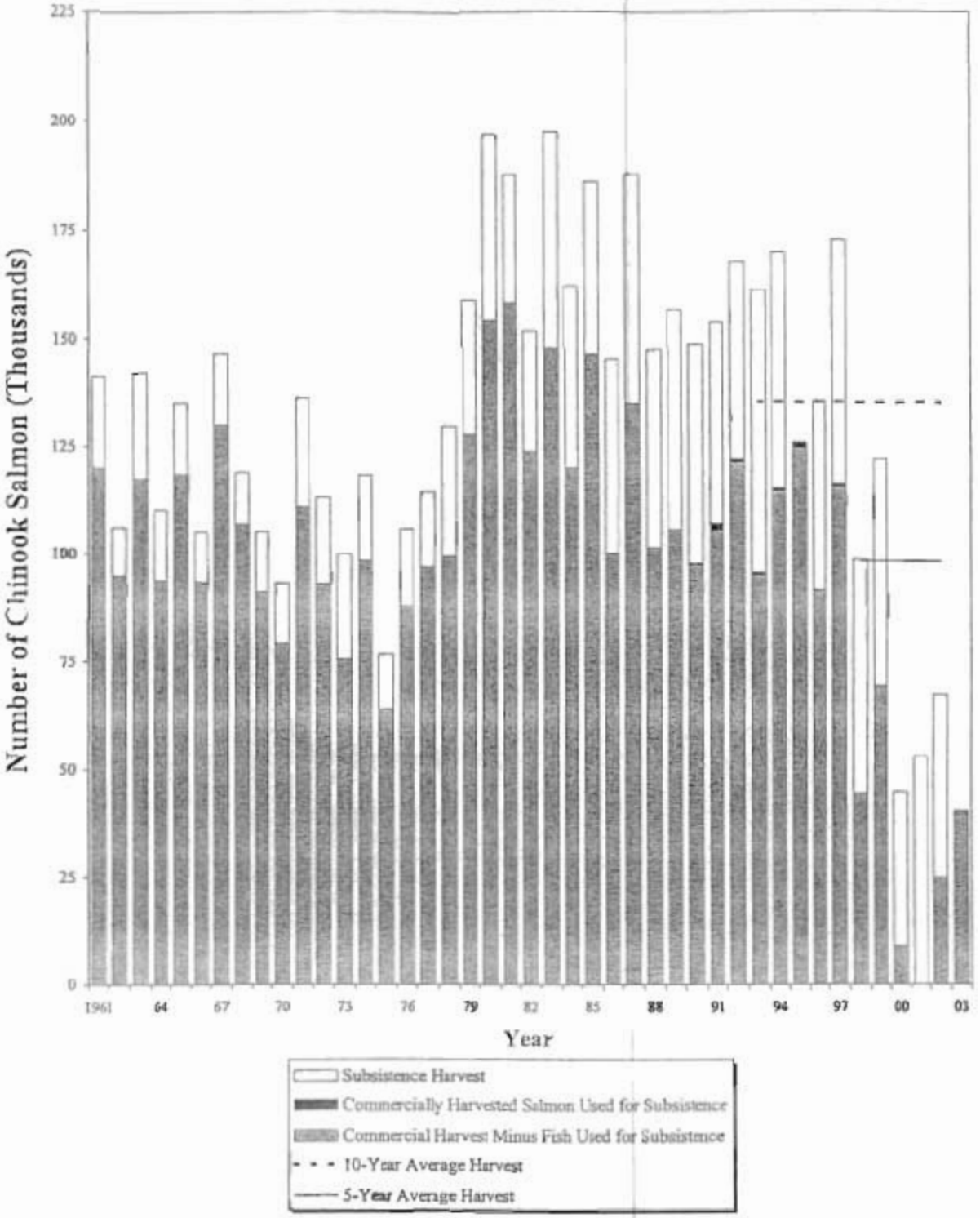
[z] No survey of Wood Creek due to obstructions in creek.

[aa] Preliminary.

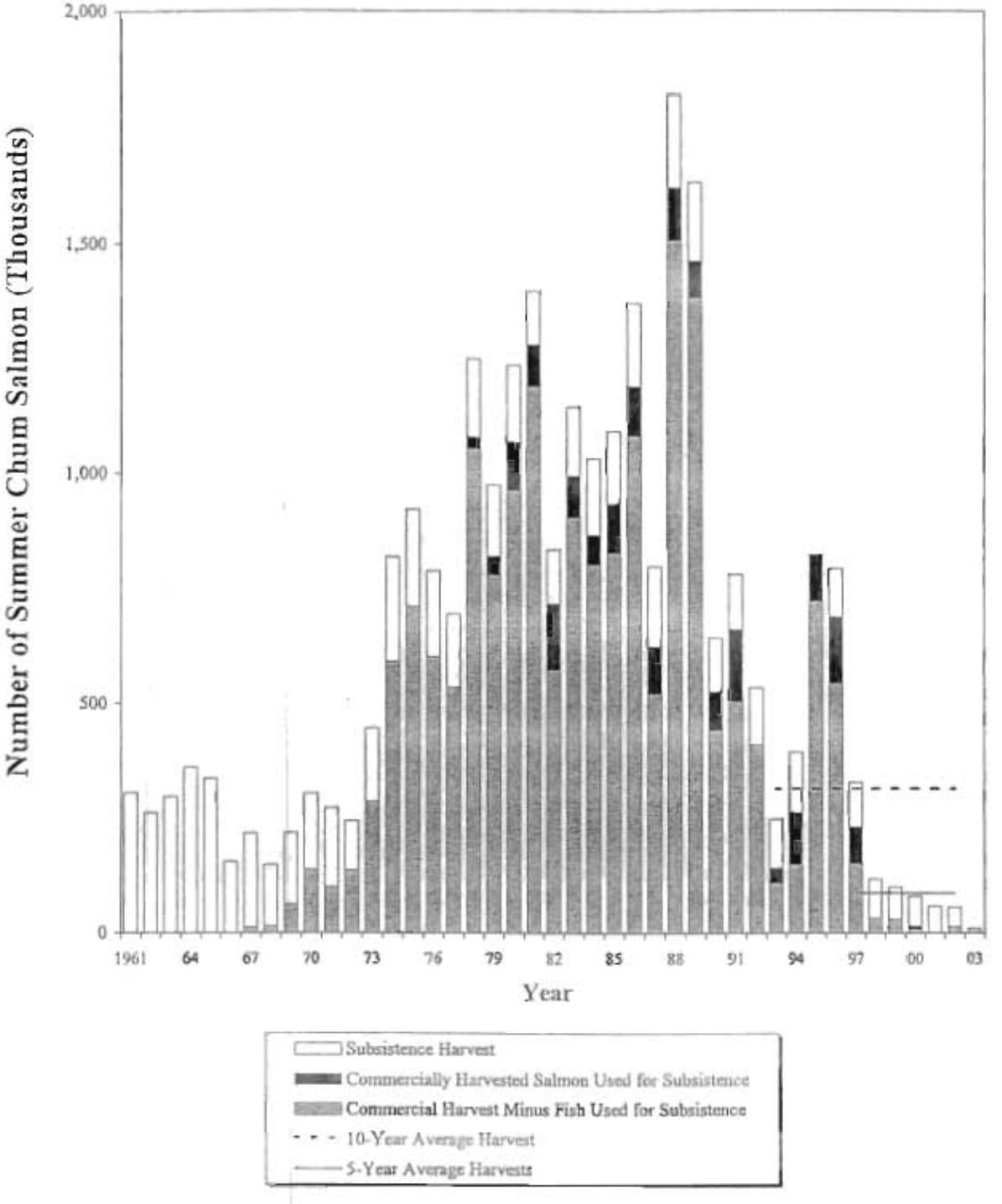
[ab] Interim escapement objective (E.O.) established March, 1993, based on boat survey counts of coho salmon in the lower 17.5 river miles during the period October 21 through



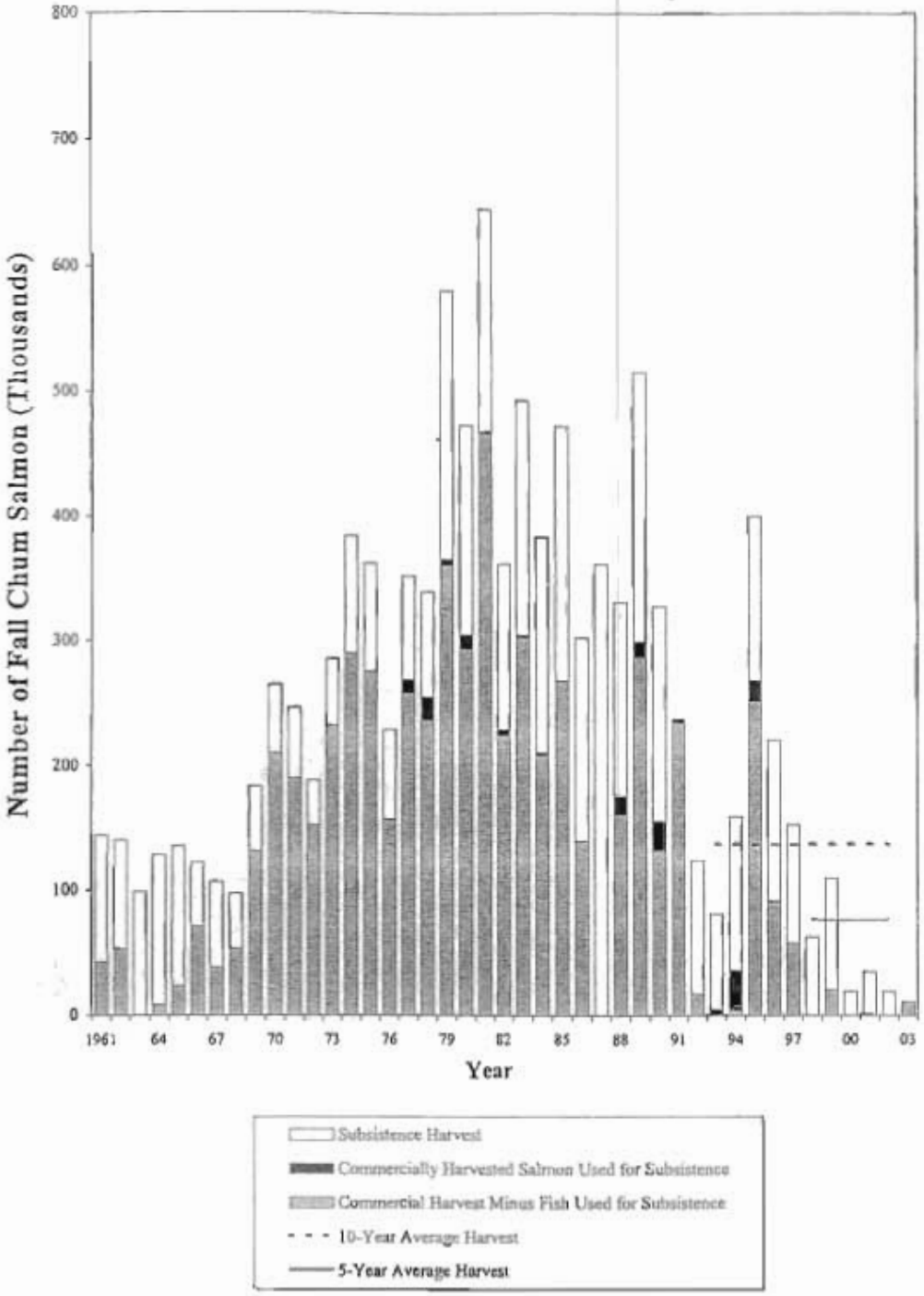
Appendix Figure 1. Total utilization of salmon, Yukon River, 1900-2003. Alaskan harvest estimates other than commercial are unavailable at this time.



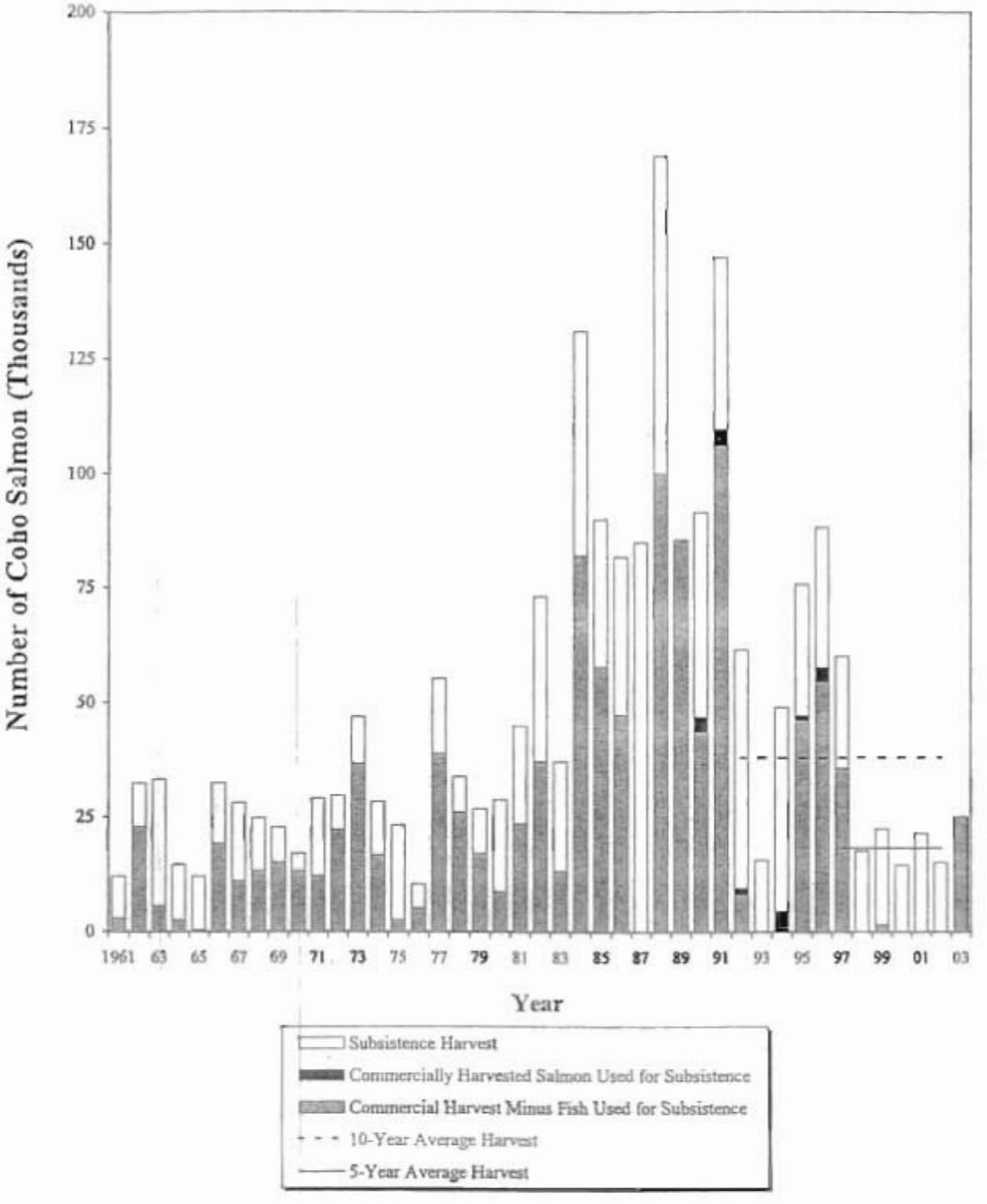
Appendix Figure 2. Alaskan harvest of chinook salmon, Yukon River, 1961-2003. The 2001 commercial fishery was closed. Alaskan harvest estimates other than commercial are unavailable at this time.



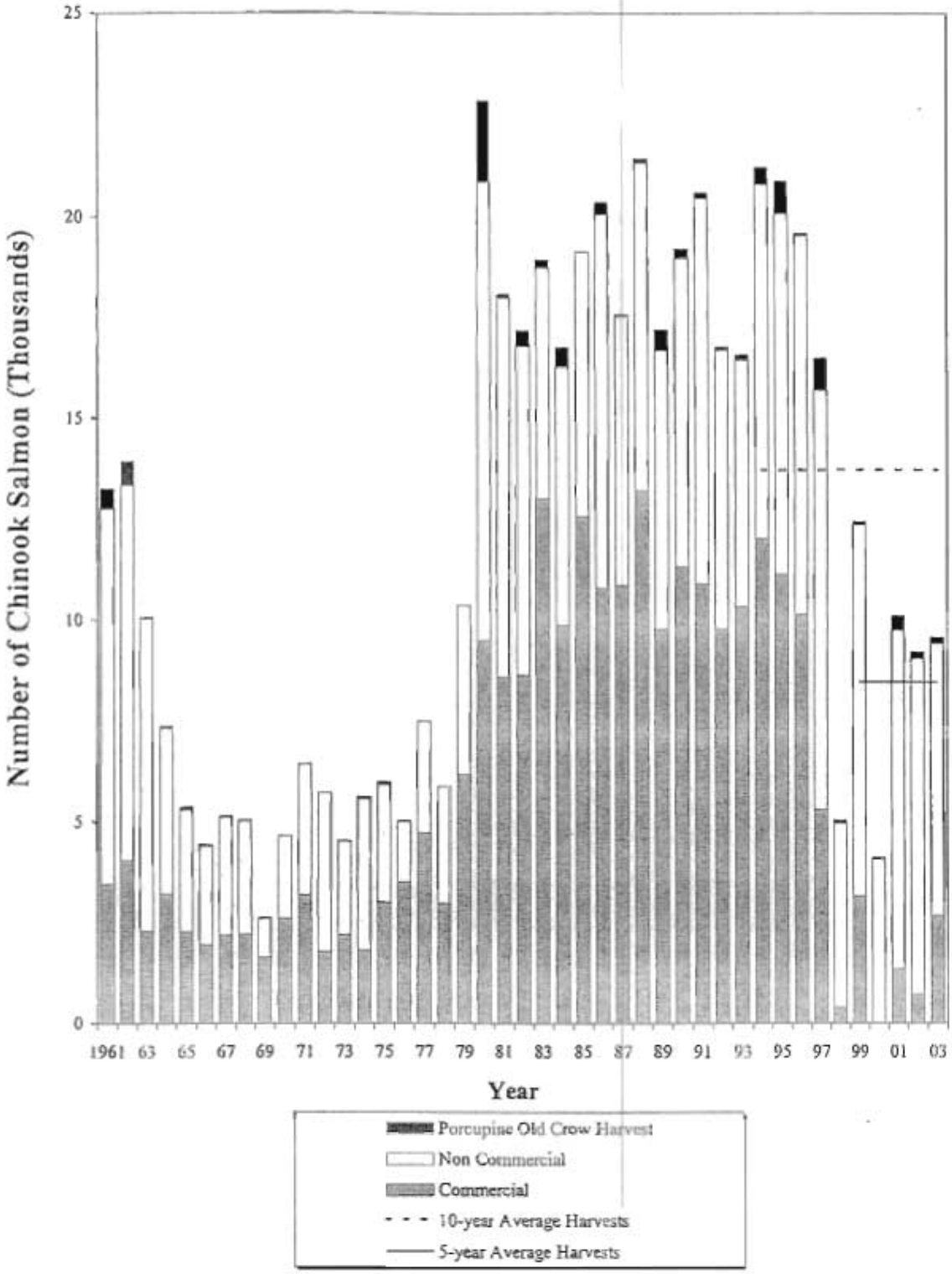
Appendix Figure 3. Alaskan harvest of summer chum salmon 1961-2003. The 2003 harvest estimates other than commercial are unavailable at this time.



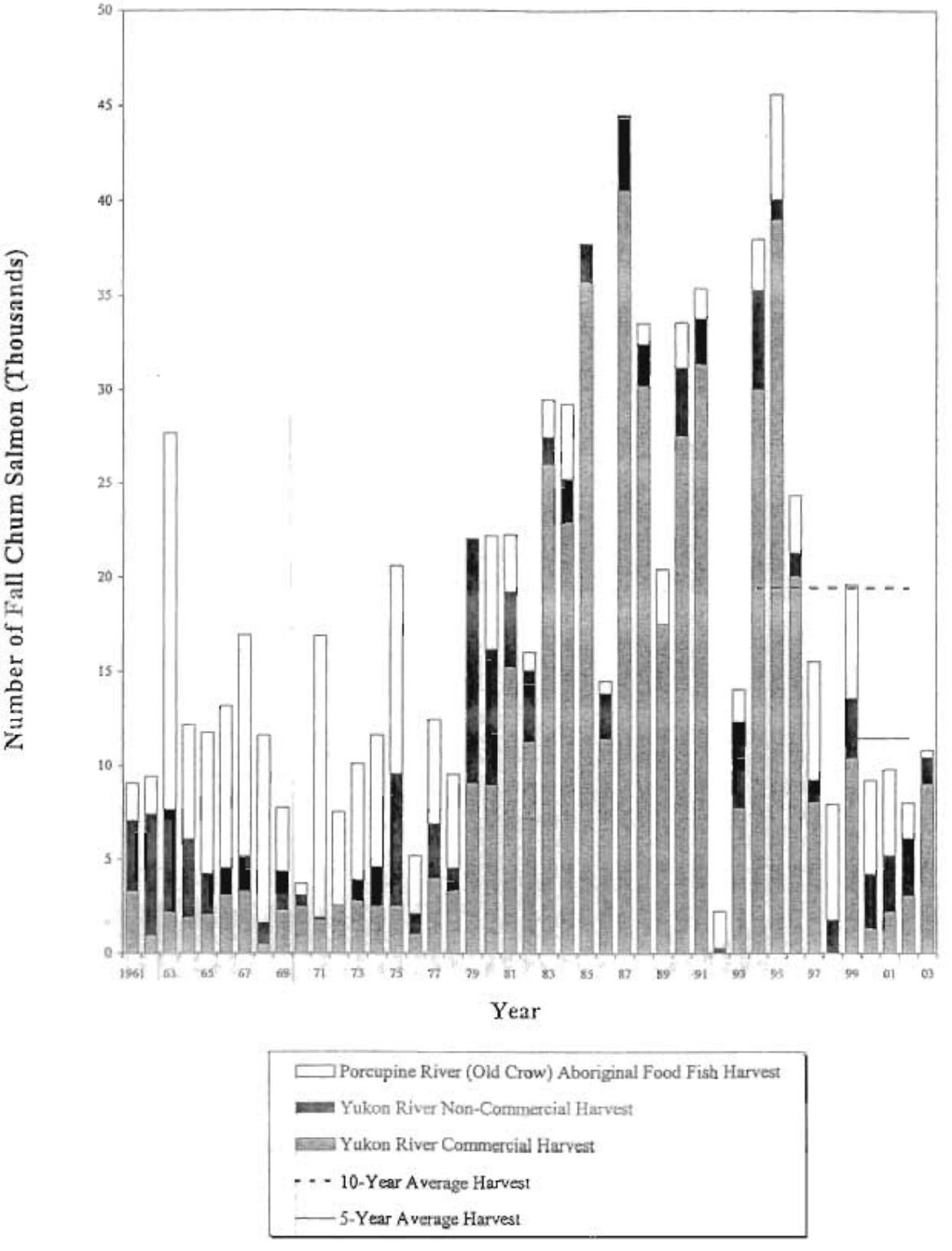
Appendix Figure 4. Alaskan harvest of fall chum salmon, Yukon River, 1961-2003. The commercial fishery was closed 2000-2002. The 2003 subsistence harvest estimates are unavailable at this time.



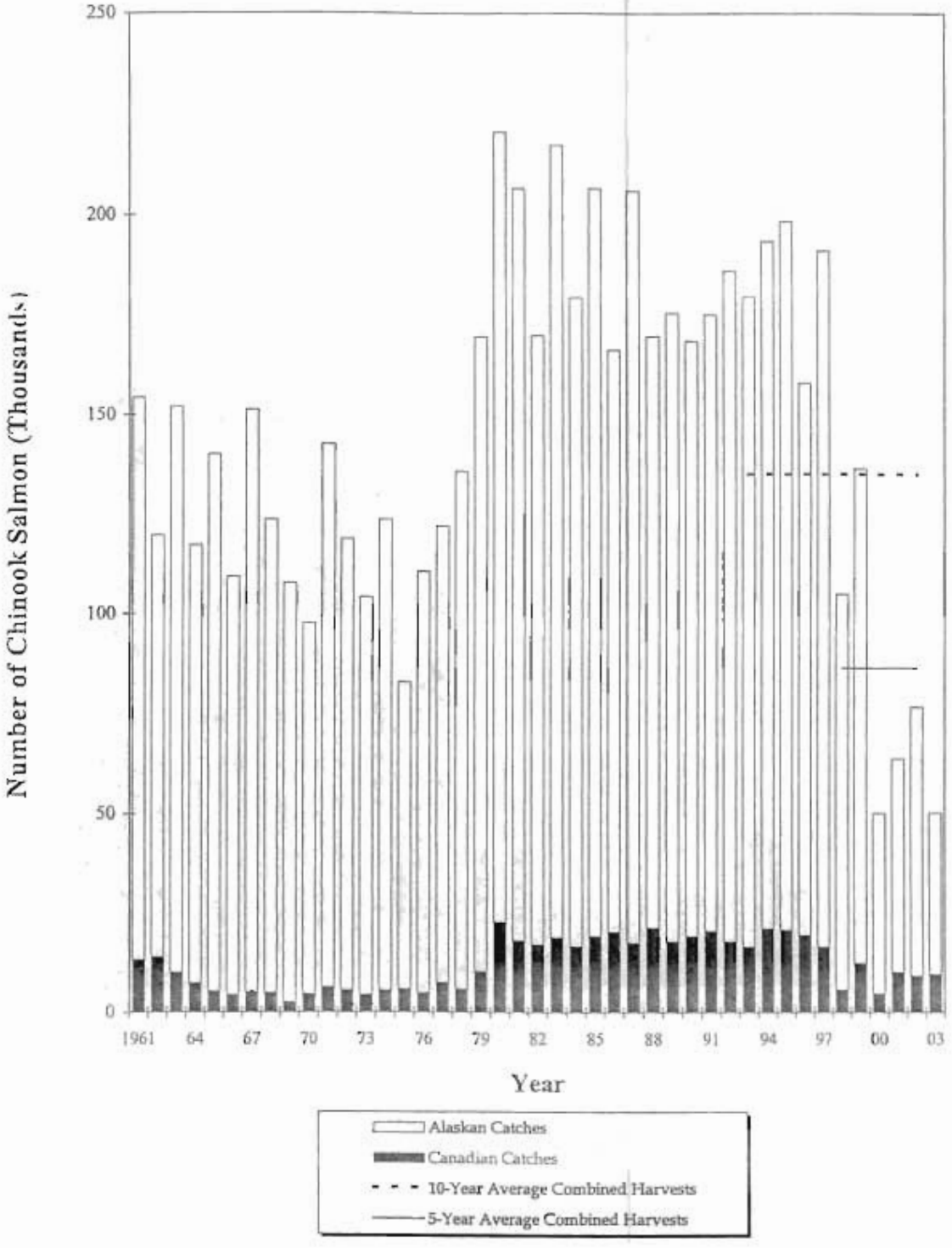
Appendix Figure 5. Alaskan harvest of coho salmon, Yukon River, 1961-2003. The commercial fishery was closed 2000-2002. The 2003 subsistence harvest estimates are unavailable for 2003 at this time. Commercial harvest is not adjusted for subsistence use of commercially caught fish.



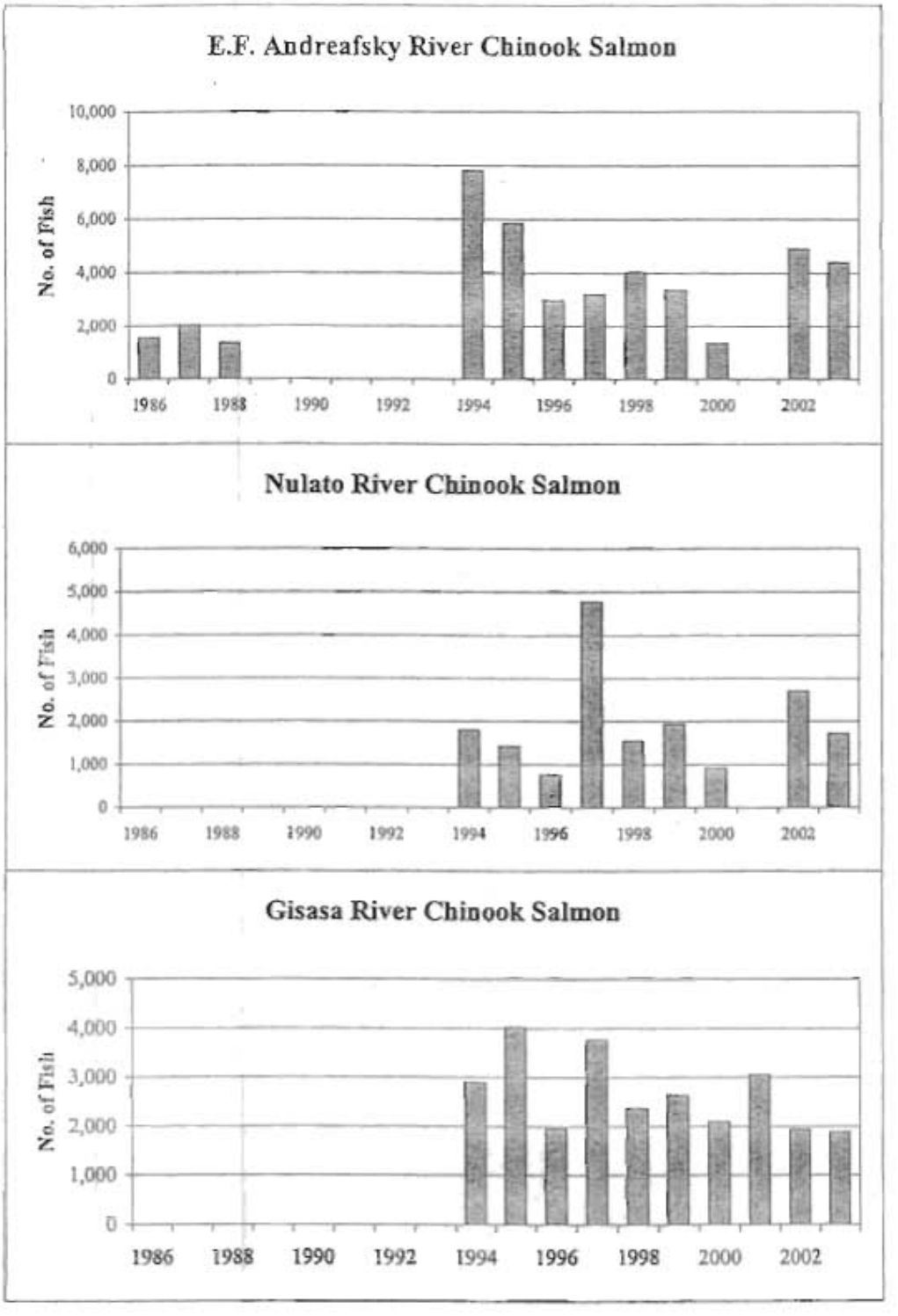
Appendix Figure 6. Canadian harvest of chinook salmon, Yukon River, 1961-2003. Catch data for 2003 are preliminary.



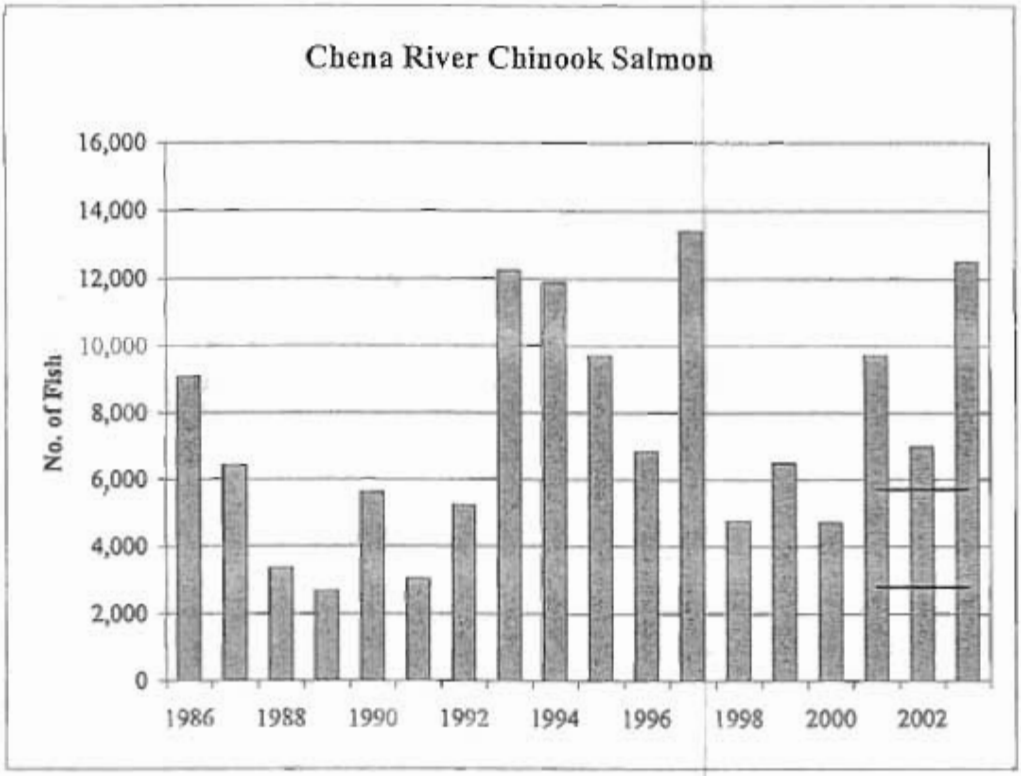
Appendix Figure 7. Canadian harvest of fall chum salmon, Yukon River, 1961-2003. Catch data for 2003 are preliminary.

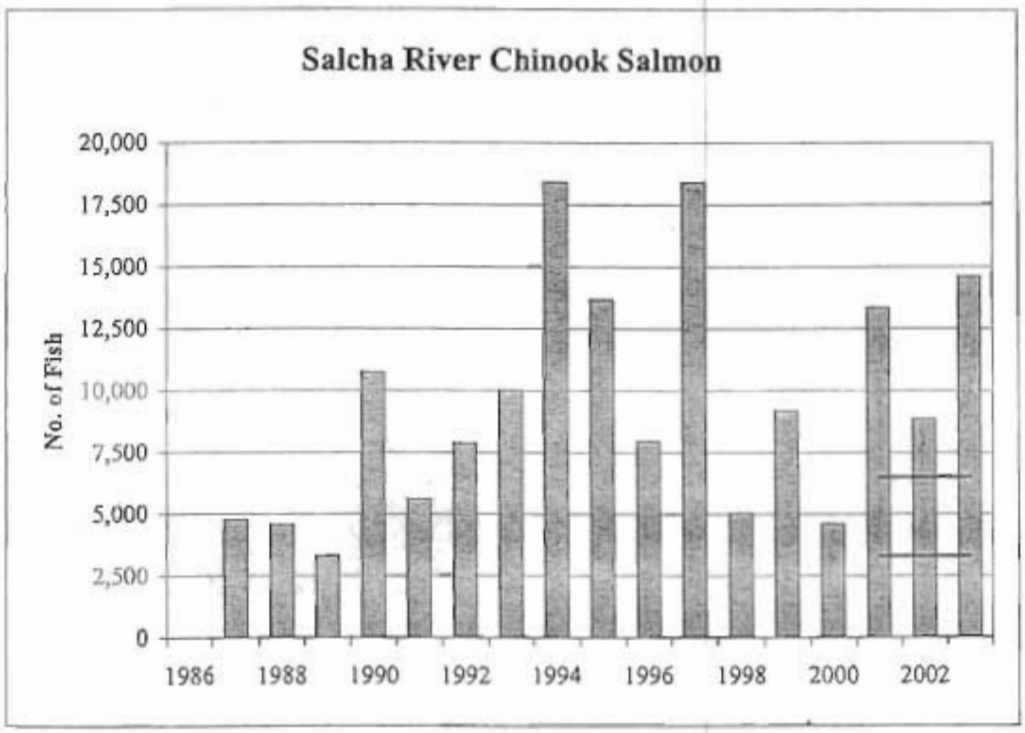


Appendix Figure 8. Total utilization of chinook salmon, Yukon River, 1961-2003. Catch data for 2003 are incomplete and preliminary.

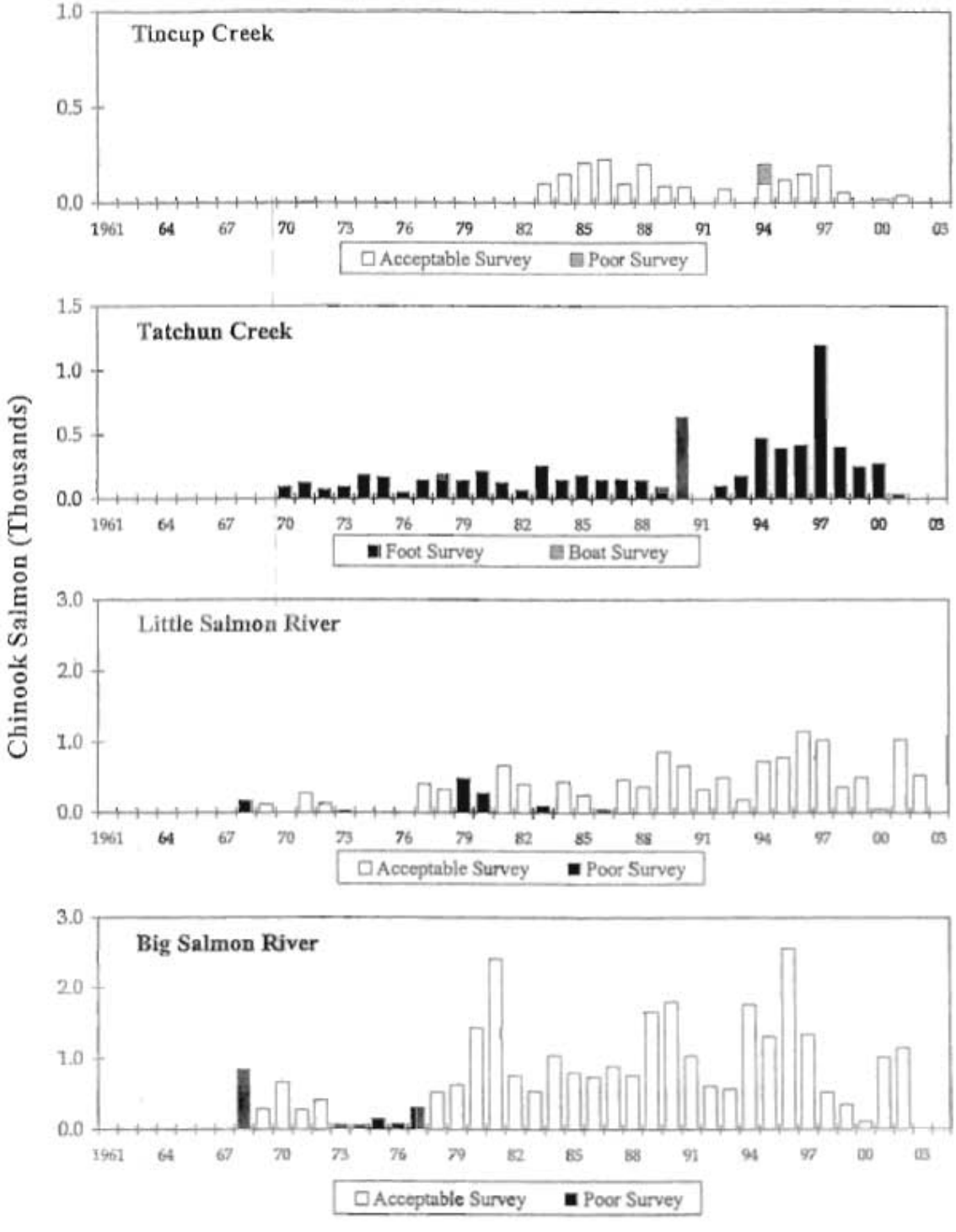


Appendix Figure 9. Chinook salmon ground based escapement estimates for selected tributaries in the Alaska portion of the Yukon River drainage, 1986-present. The BEG range is indicated by the horizontal lines for tributaries with BEGs. Note, vertical scale is variable.

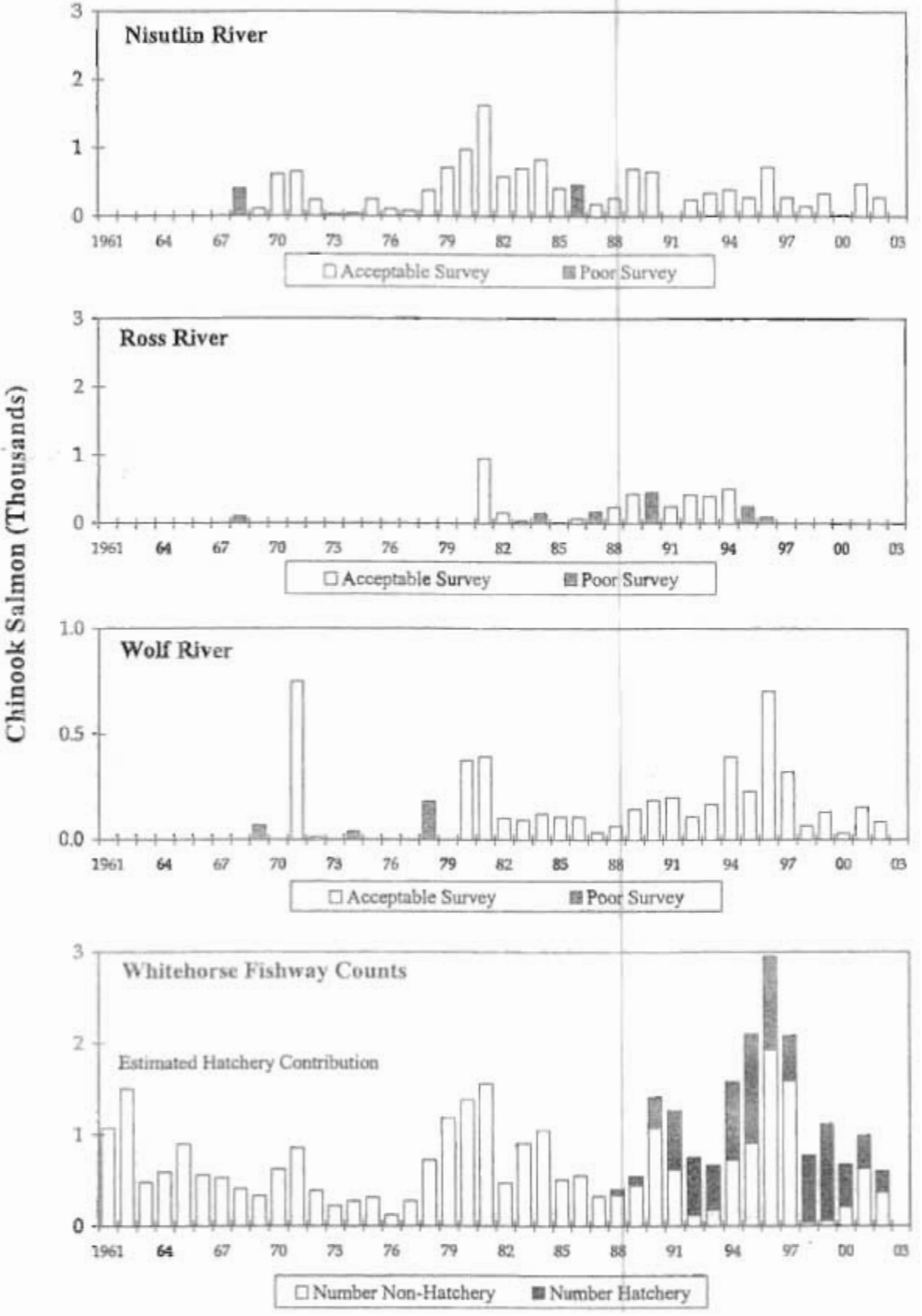




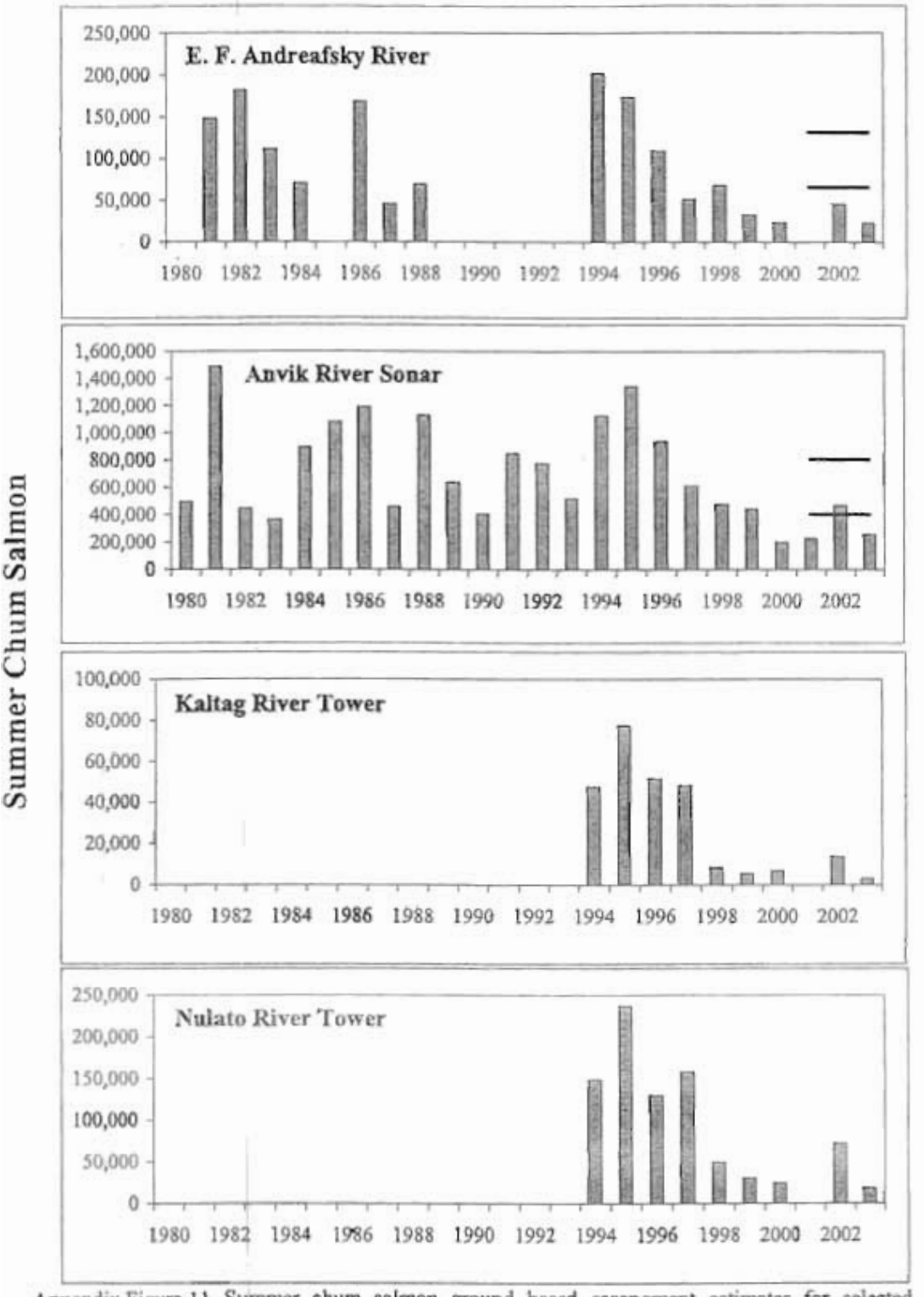
Appendix Figure 9 Continued. (page 2 of 2)



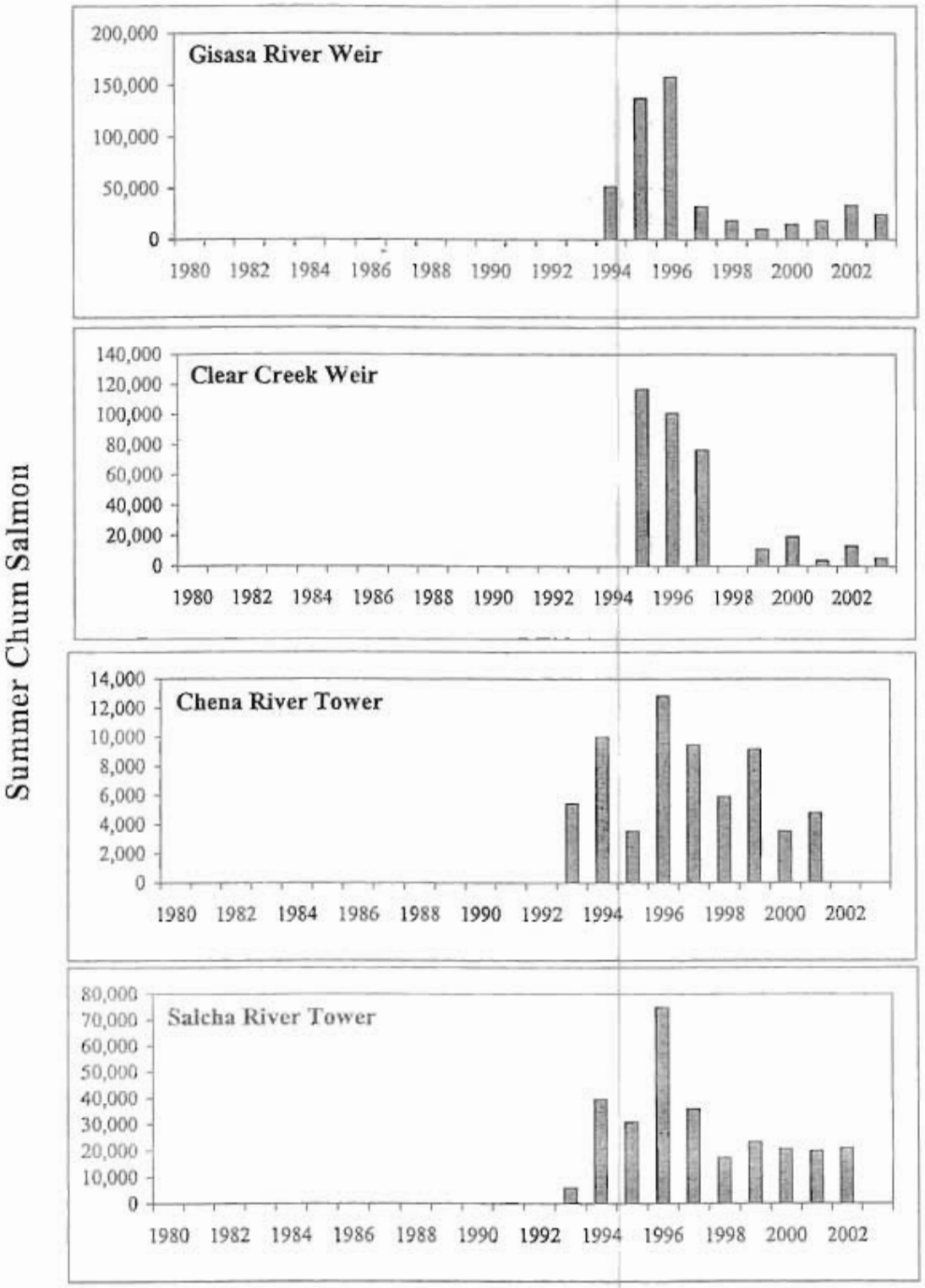
Appendix Figure 10. Chinook salmon escapement data for selected spawning areas in the Canadian portion of the Yukon River drainage, 1961-2003. Data are aerial survey observations unless noted otherwise.
Note, vertical scale is variable.



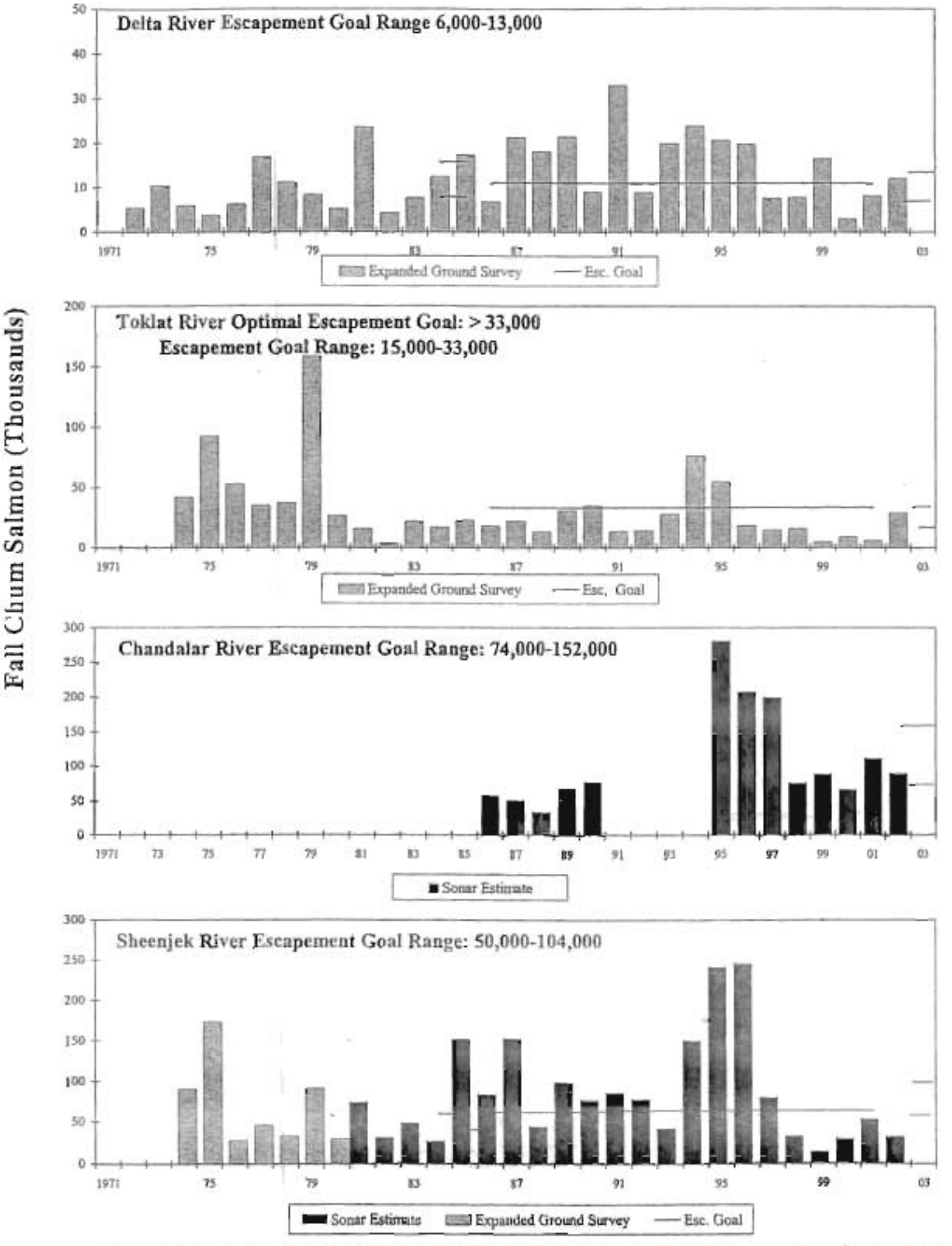
Appendix Figure 10 Continued. (page 2 of 2)



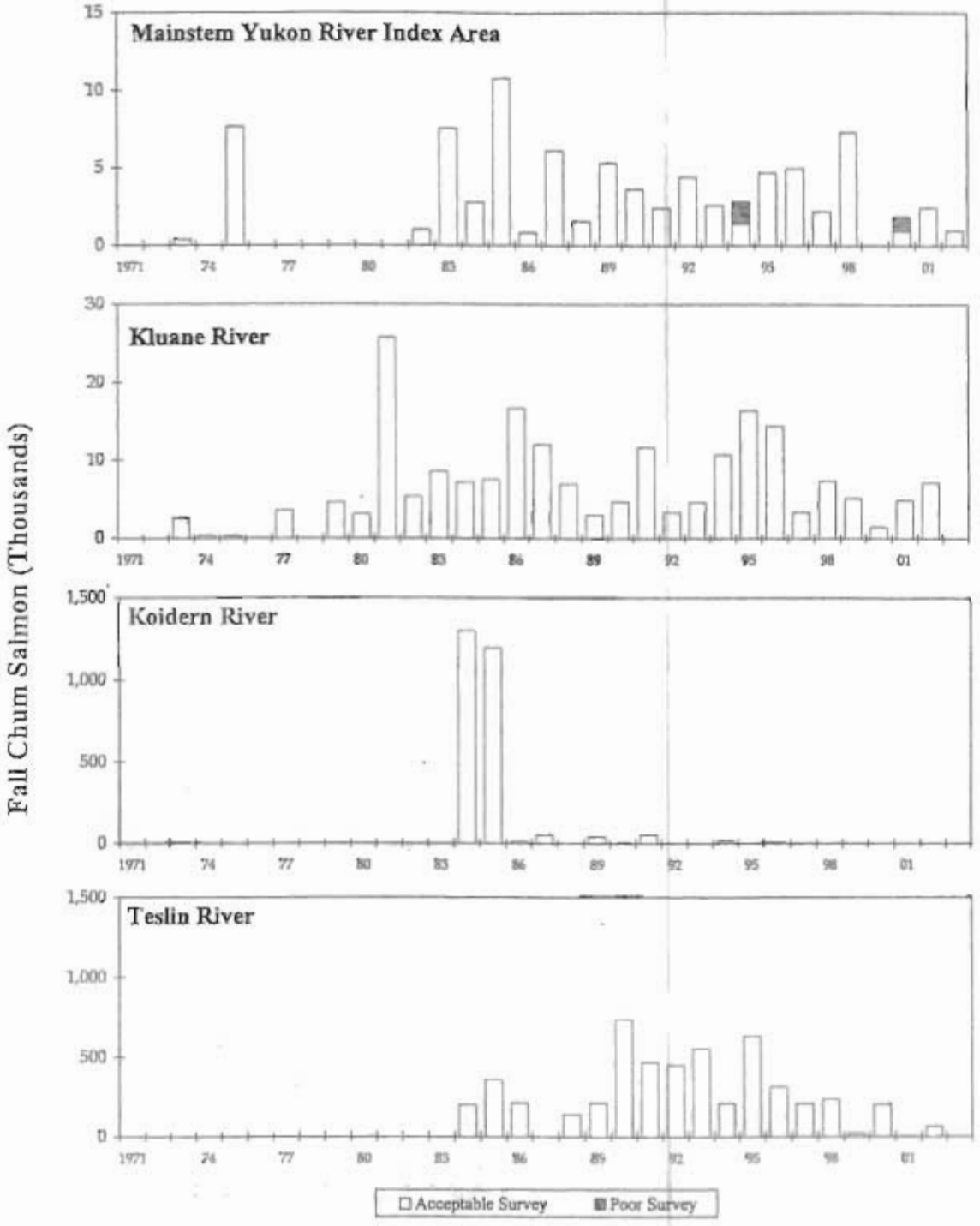
Appendix Figure 11. Summer chum salmon ground based escapement estimates for selected tributaries in the Alaska portion of the Yukon River drainage, 1980-2003. The BEG range is indicated by the horizontal lines for tributaries with BEGs. Note, vertical scale is variable.



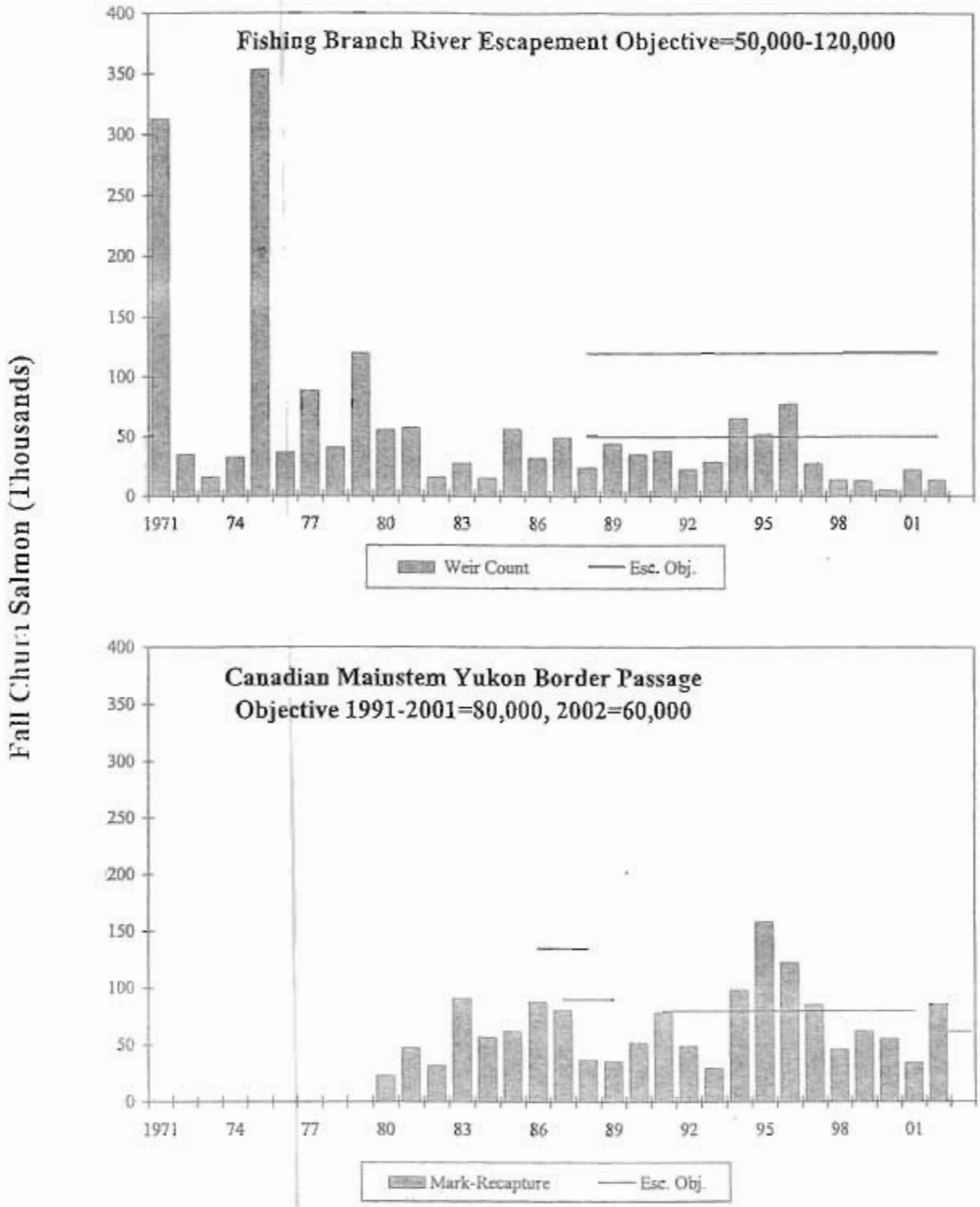
Appendix Figure 11 Continued. (page 2 of 2)



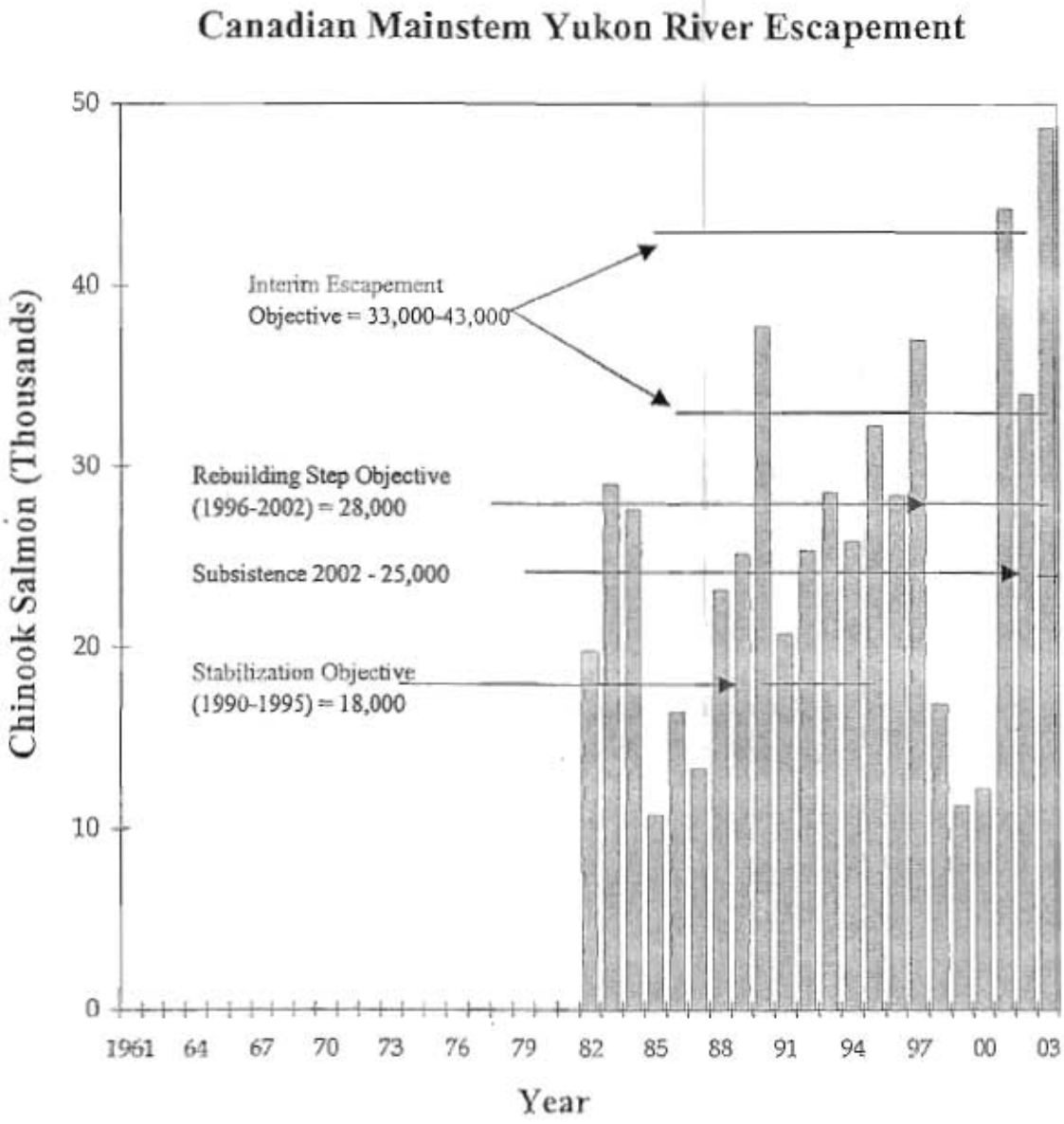
Appendix Figure 12. Fall chum salmon escapement estimates for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1971-2003. Horizontal lines represent biological escapement goals or ranges. Note, vertical scale is variable.



Appendix Figure 13. Fall chum aerial survey data for selected spawning areas in the Canadian portion of the Yukon River drainage, 1971-2003. 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, 1971-2003. Horizontal lines represent interim escapement goal objectives or ranges.



Appendix Figure 15. Estimated total chinook salmon spawning escapement in the Canadian portion of the mainstem Yukon River drainage, 1982-2003. 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 2003 was set at 25,000.