YUKON RIVER SALMON 2011 SEASON SUMMARY AND 2012 SEASON OUTLOOK

Prepared by

THE UNITED STATES AND CANADA
YUKON RIVER JOINT TECHNICAL COMMITTEE

March 2012
Regional Information Report 3A12-01
Alaska Department of Fish and Game
333 Raspberry Road
Anchorage, AK 99518, USA

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, Special Publications and the Division of Commercial Fisheries Regional Reports. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

REGIONAL INFORMATION REPORT NO. 3A12-01

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The United States and Canada
Yukon River Joint Technical Committee

Alaska Department of Fish and Game
Division of Commercial Fisheries
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The Regional Information Report Series was established in 1987 and was redefined in 2006 to meet the Division of Commercial Fisheries regional need for publishing and archiving information such as project operational plans, area management plans, budgetary information, staff comments and opinions to Board of Fisheries proposals, interim or preliminary data and grant agency reports, special meeting or minor workshop results and other regional information not generally reported elsewhere. Reports in this series may contain raw data and preliminary results. Reports in this series receive varying degrees of regional, biometric and editorial review; information in this series may be subsequently finalized and published in a different department reporting series or in the formal literature. Please contact the author or the Division of Commercial Fisheries if in doubt of the level of review or preliminary nature of the data reported. Regional Information Reports are available through the Alaska State Library and on the Internet at http://www.adfg.alaska.gov/sf/publications/.

This document should be cited as:

JTC (Joint Technical Committee of the Yukon River US/Canada Panel). 2012. Yukon River salmon 2011 season summary and 2012 season outlook. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A12-01, Anchorage.

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1.0 ABSTRACT

The Joint Technical Committee (JTC) of the United States and Canada serves as a scientific advisory body to the Yukon River Panel. The JTC discusses harvest and escapement goals, management trends, postseason reviews and preseason outlooks, and results of cooperative research projects. This report summarizes the status of Chinook, coho, and summer and fall chum salmon stocks in 2011, presents an outlook for the 2012 season, and provides data on utilization of salmon species by commercial, subsistence, aboriginal, personal use, domestic, and sport/recreational fisheries. Summaries of Yukon River projects (e.g., mark–recapture, sonar, stock identification) and a review of salmon bycatch in the groundfish and pollock fisheries of the Bering Sea and the Gulf of Alaska are provided. Recommended Yukon River escapement goals for Chinook, chum and coho salmon remained unchanged from 2011. Preliminary Chinook salmon escapement in Canada was 46,307 fish, which was within the 42,500–55,000 escapement goal range and provided for the Canadian harvest share. By preliminary estimate, about 40,211 Chinook salmon were harvested for subsistence in Alaska, and in Yukon Territory, 4,550 Chinook salmon were harvested in aboriginal fisheries. For fall chum salmon, the preliminary 2011 Yukon River drainagewide total run size estimate was 1,000,000 fish, based on the postseason expanded escapement and estimated harvest. The border passage estimate was 212,000 fall chum salmon, and after subtracting harvests in Canada, the spawning escapement was approximately 205,930 fish, exceeding the upper end of the IMEG range of 70,000 to 104,000 fall chum salmon. The total commercial harvest of fall chum salmon in Alaska was 238,979 fish; the largest harvest since 1995, and by preliminary estimate, the Alaskan subsistence harvest of fall chum salmon was 79,887 fish. The Canadian commercial harvest was 5,312 fall chum salmon.

Keywords: Yukon watershed, Yukon River Salmon Agreement, Chinook salmon, chum salmon, coho salmon, escapement, season outlook.

2.0 INTRODUCTION

The United States and Canada Yukon River Joint Technical Committee (JTC) was established in 1985 and serves as a scientific advisory body to the Yukon River Panel. The JTC meets semi-annually to discuss harvest and escapement goals, management trends, preseason outlooks and postseason reviews, and results of cooperative research projects.

The fall JTC meeting was held November 1–4, 2011 in Whitehorse, Yukon Territory. The meeting included the following presentations and discussion topics:

1. A review of the Yukon River salmon treaty and role of the JTC;

2. Two presentations of Chinook salmon run reconstruction modeling projects in progress (Brian Bue, Steve Fleischman), and a presentation on escapement goal risk analysis (Matt Catalano);

3. Marine fisheries and research review including salmon bycatch in the Bering Sea and Gulf of Alaska trawl fisheries and results from the 2011 Bering Sea and Aleutian Islands survey (BASIS) and coded wire tag (CWT) collection (Jim Murphy), and

4. A postseason review of 2011 fisheries including information on management, harvests, and escapements in the U.S. (Steve Hayes, Katie Howard, Bonnie Borba, and Jeff Estensen) and Canada (Mary Ellen Jarvis, Trix Tanner); Yukon River environmental conditions (Sean Collins); and U.S. federal agency and ADF&G Subsistence and Sport Fish Division activities (Aaron Martin, Randy Brown, Tom Taube, Bob Karlen).

Conceptual proposals for the Restoration and Enhancement Fund (R&E) were reviewed prior to the meeting by the R&E subcommittee, and the results were presented to and reviewed by the full JTC. Three subcommittees were reinstated and given assignments. The *Ichthyophonus* subcommittee, led by Aaron Martin, was directed to review available literature and determine at what rate of infection in salmon research on *Ichthyophonus* would become a priority for future proposals. The border ASL subcommittee, led by Marc Labelle and Hamachan Hamazaki, was

charged with analyzing the relationship between salmon age-sex-length estimates from data collected at a fish wheel and data collected in the Eagle sonar test fishery. The Canadian Index Area Priority Planning Subcommittee (CIAPPS), also led by Marc Labelle, was formed to determine a priority list from within Canadian conservation units for genetic and ASL sampling and juvenile salmon research.

Fall meeting attendance:

Steve Smith (JTC Co-Chair), Fisheries and Oceans Canada (DFO)
Mary Ellen Jarvis, DFO
Trix Tanner, DFO
Bonnie Huebschwerlen, DFO
Sean Collins, DFO
Elizabeth MacDonald, DFO
Carl Pfisterer (JTC Co-Chair), Alaska Department of Fish and Game (ADF&G)
Dan Bergstrom, ADF&G
Bonnie Borba, ADF&G
Jan Conitz, ADF&G
Jeff Estensen, ADF&G
Hamachan Hamazaki, ADF&G
Steve Hayes, ADF&G
Katie Howard, ADF&G
Heather Leba, ADF&G
Caroline Brown, ADF&G Subsistence Division
Tom Taube, ADF&G Sport Fish Division
Aaron Martin, U.S. Fish and Wildlife Service (USFWS)
Randy Brown, USFWS
Bob Karlen, US Bureau of Land Management
Jim Murphy, National Ocean and Atmospheric Administration (NOAA)
Casie Stockdale, Association of Village Council Presidents (AVCP)
Lisa Kangas, Tanana Chiefs Conference (TCC)
Chris Stark, Bering Sea Fishermen's Association (BSFA)
Shelly Woods, Yukon River Drainage Fisheries Association (YRDFA)

The spring JTC meeting was held February 21–23, 2012 in Anchorage, Alaska. A presentation on a newly formed Chinook Expert Panel was given by Joe Spaeder of the Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative (AYKSSI); the group is investigating hypotheses for apparent declines in Chinook salmon productivity across a wide region including the Yukon River drainage. Jim Murphy gave an update on salmon bycatch in marine trawl fisheries and marine fisheries research. The 2012 preseason outlooks for system-wide and Canadian-origin stocks were summarized for Chinook salmon (Stephanie Schmidt and Elizabeth MacDonald) and fall chum salmon (Bonnie Borba and Elizabeth MacDonald). The JTC discussed escapement goal recommendations for the upcoming season and reached consensus that without new data or analysis methods, a change in the escapement goals could not be supported. For Chinook salmon, the JTC recommended maintaining the current escapement goal range of 42,500 to 55,000 fish. For fall chum salmon, the JTC recommended maintaining the current range of 70,000 to 104,000 fish to the upper Yukon mainstem, and kept the range of 22,000 to 49,000 fish

to the Fishing Branch River that was previously set through 2013. Steve Hayes outlined the current plan for Alaskan preseason meetings. Information about the Alaska Board of Fisheries process and review of Alaskan salmon escapement goals in preparation for the January 2013 Board meeting was provided by Steve Hayes and Jan Conitz.

In addition, the R&E subcommittee met to finalize their review of Detailed Proposals for the R&E Fund and presented their results to the full JTC. The JTC discussed the review overall, the Pacific Salmon Commission involvement in the review, and comments on individual proposals.

There were no other subcommittee reports at the Spring 2012 meeting. The *Ichthyophonus* subcommittee met prior to the December 2011 Yukon River Panel meeting and presented their information to the Panel at that meeting. Neither the border ASL subcommittee nor CIAPPS met or conducted any work during the interim, but some analysis by Marc Labelle should be ready for the border ASL subcommittee soon. Additionally, the genetics subcommittee needs to reconvene and update the genetic baseline priority list as soon as possible. The need for formal JTC by-laws was recognized, and a by-laws subcommittee was formed, to be led by Aaron Martin; other members are Steve Smith, Jan Conitz, Caroline Brown, Chris Stark.

Spring meeting attendance:

Mary Ellen Jarvis, (acting JTC Co-Chair), Fisheries and Oceans Canada (DFO)
Trix Tanner, DFO
Bonnie Huebschwerlen, DFO
Elizabeth MacDonald, DFO
Jan Conitz, (new JTC Co-Chair), Alaska Department of Fish and Game (ADF&G)
Carl Pfisterer (outgoing JTC Co-Chair), ADF&G
Bonnie Borba, ADF&G
Steve Hayes, ADF&G
Stephanie Schmidt, ADF&G
Heather Leba, ADF&G
Katie Howard, ADF&G
Caroline Brown, ADF&G Subsistence Division
Aaron Martin, U.S. Fish and Wildlife Service (USFWS)
Randy Brown, USFWS
Jim Murphy, National Ocean and Atmospheric Administration (NOAA)
Casie Stockdale, Association of Village Council Presidents (AVCP)
Alyssa Frothingham, Tanana Chiefs Conference (TCC)
Chris Stark, Bering Sea Fishermen's Association (BSFA)

3.0 COMMERCIAL FISHERY–ALASKA

3.1 CHINOOK AND SUMMER CHUM SALMON

The Yukon River drainage is divided into fishery districts and sub-districts for management purposes (Figure 1). ADF&G uses an adaptive management strategy that evaluates run strength inseason to determine a harvestable surplus above escapement requirements and subsistence uses. Preseason, a management strategy is developed in cooperation with federal subsistence managers, fishermen, tribal council representatives, and other stakeholders that outlines run and harvest outlooks along with the regulatory subsistence salmon fishing schedule. Before implementing this schedule, subsistence fishing is allowed 7 days a week to provide opportunity to harvest non-salmon species, such as whitefish, sheefish, pike, and suckers. Additionally, an informational sheet is used to prepare fishermen for possible reductions to the subsistence salmon fishing schedule, or to allow for a small commercial fishery contingent on run abundance. The information sheets are mailed to Yukon River commercial permit holders and approximately 2,900 families identified from ADF&G's survey and permit databases. State and federal staff presents the management strategy to the Yukon River Drainage Fisheries Association (YRDFA), State of Alaska Advisory Committees, Federal Regional Advisory Councils, and other interested and affected parties.

3.1.1 2011 Chinook Salmon Outlook

The total Yukon River Chinook salmon run outlook was estimated by applying historical average proportions of Canadian-origin fish in the total run to the outlook estimated for the Canadian component of the run. The average proportion of Canadian origin fish in the total run has been approximately 50% over the past several decades. Applying this proportion to expand the unadjusted model estimate, the expected total Yukon River run size in 2011 was projected to be 216,200[1] fish. However, there is a lot of uncertainty associated with this methodology and, due to reductions in productivity in recent years, environmental factors and other phenomena not incorporated into the models; a run this large was considered unlikely. The drainage-wide run outlook was adjusted to 130,000–178,000 Chinook salmon, by reducing the Canadian origin model estimate in proportion to the actual returns against the outlooks in previous years, in attempt to account for low productivity since 2007. Thus, the 2011 Yukon River Chinook salmon run was forecasted to be poor to below average.

3.1.2 Preseason Management Strategy Planning

Before the 2011 season, ADF&G developed a preseason management strategy with input from United States Fish and Wildlife Service (USFWS), fishermen, tribal council representatives, and other stakeholders to prepare for the poor run outlook. ADF&G and USFWS staff distributed inseason management approaches identified on the 2011 Yukon River Salmon Fisheries informational flyer. The resulting preseason strategy was to enter the 2011 season with the prospect that conservation measures would be necessary to share the available subsistence harvest and meet escapement goals. Conservation measures included several management actions.

[1] Based on the averaged value for both sibling and Ricker models. Values for each model separately are 205,500 and 224,000 for Ricker and sibling models respectively.

The subsistence salmon fishing schedule was to begin June 6 in District 1 and be implemented chronologically with the upriver migration until the salmon run size was projected to be of sufficient strength to warrant relaxing, or it became apparent additional conservation measures were necessary. Until the regulatory subsistence salmon fishing schedule was implemented, Districts 1-4 and Subdistricts 5-ABC were open to subsistence salmon fishing 7 days per week. The Coastal District, Koyukuk and Innoko Rivers, and Subdistrict 5-D were open 7 days per week. District 6 was on two 42-hour subsistence salmon fishing periods per week all season. Table 1 shows the 2011 subsistence fishing schedule based in regulations 5 AAC 01.210 and 5 AAC 05.360.

Table 1.–Yukon Area regulatory subsistence salmon fishing schedule, 2011.

Note: this schedule is subject to change depending on run strength.

Area	Reduced Regulatory Subsistence Fishing Periods	Approximate Schedule to Begin	Days of the Week
Coastal District	7 days/week	All Season	M/T/W/TH/F/SA/SU – 24 hours
District Y-1	Two 36-hour periods/week	June 6	Mon. 8 pm to Wed. 8 am /Thu. 8 pm to Sat. 8 am
District Y-2	Two 36-hour periods/week	June 8	Wed. 8 pm to Fri. 8 am / Sun. 8 pm to Tue. 8 am
District Y-3	Two 36-hour periods/week	June 12	Wed. 8 pm to Fri. 8 am / Sun. 8 pm to Tue. 8 am
Subdistrict Y-4-A	Two 48-hour periods/week	June 15	Sun. 6 pm to Tue. 6 pm / Wed. 6 pm to Fri. 6 pm
Subdistricts Y-4-B, C	Two 48-hour periods/week	June 22	Sun. 6 pm to Tue. 6 pm / Wed. 6 pm to Fri. 6 pm
Koyukuk and Innoko Rivers	7 days/week	All Season	M/T/W/TH/F/SA/SU – 24 hours
Subdistricts Y-5-A, B, C	Two 48-hour periods/week	June 28	Tue. 6 pm to Thu. 6 pm /Fri. 6 pm to Sun. 6 pm
Subdistrict Y-5-D	7 days/week	All Season	M/T/W/TH/F/SA/SU – 24 hours
District Y-6	Two 42-hour periods/week	All Season	Mon. 6 pm to Wed. Noon /Fri. 6 pm to Sun. Noon
Old Minto Area	5 days/week	All Season	Friday 6 pm to Wednesday 6 pm

To conserve the greatest number of Chinook salmon and to share the available surplus, there was reduced fishing on the first pulse of Chinook salmon in portions of the Coastal District. In the southern portion of the Coastal District, from the Naskonat Peninsula north to 62 degrees latitude, mesh size was restricted to 6 inch or smaller from June 6 through June 12. This action was intended to conserve Chinook salmon while allowing subsistence fishermen the opportunity to target summer chum salmon. The timeframe corresponds with expectations of when the first pulse of Chinook salmon typically migrates through the area which includes the communities of Chevak, Hooper Bay, and Scammon Bay. The remaining northern portion of the Coastal District, from 62 degrees North latitude to Point Romanoff, was to have a one period closure with dates and times that coincided with the first period closure in District 1. Similar period closures were to be followed in the mainstem Yukon River districts, based on migratory timing, to provide pulse protection.

Subsistence fishing in the Koyukuk and Innoko Rivers was not to be reduced initially from their standard 7 days per week subsistence fishing schedule because they do not harvest substantial amounts of Chinook salmon. The Tanana River District 6 was to be managed inseason based on tributary assessment data.

According to the preseason plan, if inseason assessment indicated Chinook salmon run strength continued to be poor after closing the first period, additional conservation measures would be taken, and announced by short notice news releases on VHF, radio stations, and YRDFA teleconferences.

Because of the large size of Subdistrict 5-D and the travel time that is associated with fish migrating through the area, that subdistrict was divided into 3 separate management portions. Further subdividing Subdistrict 5-D into 3 smaller portions allowed for more management precision and flexibility when the reduced subsistence fishing schedule was implemented. These management areas were defined at a meeting in late May in Fort Yukon and maps were sent to villages in Subdistrict 5-D prior to the fishing season.

A directed Chinook salmon commercial fishery in 2011 on the mainstem Yukon River was not expected. However, because the Tanana River is managed independently as a terminal fishery, there was potential opportunity to commercially harvest less than 1,000 Chinook salmon.

If a surplus of summer chum salmon was identified above escapement and subsistence needs, the plan called for directed chum commercial fishing with gillnets restricted to 6-inch maximum mesh size in Districts 1 and 2. A buyer was not available in District 3. However, because Chinook salmon are incidentally caught in summer chum salmon directed fisheries, and the 2011 Chinook run was poor to below average, limitations on the summer chum commercial fishery were necessary. ADF&G has emergency order authority to prohibit the sale of Chinook salmon during chum directed commercial fishing periods during times of Chinook salmon conservation. No sale of incidental Chinook salmon harvested during summer chum commercial fishing periods was allowed in the 2011 summer season.

It was expected that if fishermen used their incidental Chinook salmon harvest for subsistence rather than commercial use, then there would be a reduction in the overall harvest of Chinook salmon. As a result, summer chum directed fishing opportunity was initiated earlier in the summer chum salmon run. Incidental harvest of Canadian-origin Chinook salmon was minimized after the third quarter point of the run, because after July 4, fewer Canadian bound Chinook salmon are typically present.

3.1.3 Chinook Salmon Inseason Management

YRDFA facilitated weekly teleconferences to provide managers, fishermen, tribal council representatives, and other stakeholders the opportunity to share information, provide input, and discuss inseason management options. During YRDFA inseason weekly teleconferences, ADF&G and USFWS staff provided run assessment and management strategies. Subsistence fishermen provided reports on fishing efforts, water conditions, and were encouraged to provide input on management strategies.

Inseason run strength assessment of Chinook and summer chum salmon was based on the lower river test fisheries (LYTF) at Emmonak (Big Eddy) and Middle Mouth, Mountain Village test fishery (MVTF), Pilot Station sonar, and subsistence fishermen catch reports. In addition, genetic samples collected in the lower river test fisheries and at Pilot Station sonar were analyzed

inseason to determine stock contribution and to project abundance of the Canadian Chinook salmon stocks.

The LYTF, a set net project designed to assess Chinook salmon run timing and relative abundance, was operational at the Big Eddy site on May 30 and at the Middle Mouth site on June 2. The first Chinook salmon subsistence catch was reported in the lower river on May 31, and the first Chinook salmon caught in the LYTF occurred on June 3. An early group of Chinook and chum salmon entered the river from June 5 through June 9 as indicated by an increase in catch rates recorded by the LYTF and reports from subsistence fishermen. Due to difficulties experienced at Big Eddy caused by high water and excessive debris, additional drift test fishing was conducted throughout the season in the South Mouth with 8.25-inch mesh gillnets for Chinook salmon to confirm set gillnet test fishing catches. The first pulse of Chinook salmon was observed in the LYTF project on June 14–18, a second pulse on June 20-23, and a third on June 27–31 (Figure 2). The LYTF concluded summer operations on July 14 with a cumulative CPUE of 15.34, which was below the average of 22.49 at this date. The first quarter point, midpoint, and third quarter point were June 16 (1 day late), June 21 (1 day early), and June 28 (average).

The Pilot Station sonar project preliminary cumulative passage estimate was 107,027 Chinook salmon, compared to the 1995–2011 average of about 159,000 fish (Appendix A2). The first quarter point, midpoint, and third quarter point were June 19, June 23, and July 1. The sonar assessment estimated the first pulse of Chinook salmon as consisting of approximately 20,800 fish. The estimate for the second pulse was about 37,000 fish and the third pulse came in lower than anticipated at 17,300 Chinook salmon.

Consistent with preseason management strategies, a conservative management plan was initiated in District 1 and the northern portion of the Coastal District on June 13. Based upon historical run timing and the current inseason information, a subsistence salmon fishing period was cancelled to protect the first pulse of Chinook salmon in each fishing district and subdistrict based on migratory timing. As the run developed it became evident that the Chinook salmon run size would likely be at or below the lower end of preseason projections. Consequently, it was necessary to protect the second pulse of Chinook salmon. An additional 2 subsistence periods were reduced by half in District 1 and an additional subsistence period in Districts 2–5 was cancelled to ensure that escapement goals were met. A third subsistence closure was implemented in the middle and upper portions of Subdistrict 5D to further protect Canadian Chinook salmon stocks.

Furthermore, beginning June 27 in District 1 and June 29 in District 2, the mesh size during subsistence fishing periods was restricted to 6 inch or smaller for the remainder of the summer season to provide further protection for the third pulse of Chinook salmon as it passed through the districts. This management action was taken with the intent that Chinook salmon incidentally harvested during summer chum salmon directed commercial fishing periods in these districts would be used for subsistence purposes, which would help offset a reduction in subsistence fishing opportunity.

Some subsistence fishermen were able to take advantage of the early Chinook salmon throughout the drainage, but many delayed harvest effort, preferring better processing weather and higher abundance later in the run. Preliminary reports from fishermen indicate that management actions

taken later in the run to reduce the subsistence harvest of Chinook salmon resulted in many fishermen throughout the drainage not meeting their subsistence needs.

Due to the uncertainty concerning Chinook salmon run strength and the need to fulfill the Canadian border passage obligation, meet Alaska escapement needs, and provide for subsistence uses, management of the Chinook salmon commercial fishery continued to follow the conservative preseason management strategy. No commercial periods targeting Chinook salmon were allowed in 2011 in the Yukon River mainstem or in the Tanana River (Appendix B2).

The actual 2011 Chinook salmon run fell within the preseason projection of 65,000 to 89,000 fish. Preliminary passage at Eagle sonar was 51,271 Chinook salmon, yielding a border passage of approximately 50,901 fish (Appendix B16). This was within the 42,500–55,000 Chinook salmon escapement goal and provided for the Canadian harvest share.

3.1.4 Summer Chum Salmon Outlook

The strength of the summer chum salmon run in 2011 was dependent on production from the 2007 (age-4 fish) and 2006 (age-5 fish) escapements, as these age classes dominate the run. The total run during 2006 and 2007 were both above average at approximately 4.0 and 2.0 million summer chum salmon respectively, though tributary escapements were highly variable.

Yukon River summer chum salmon generally exhibit strong run size correlations among adjacent years, and the total run in the Yukon River was similar to the 2010 run of approximately 1.6 million fish. Based on a good showing of age-3 fish from the 2007 brood year, it was projected that an increase in run size would occur if the age-4 return was above average. The high seas Bering Arctic Subarctic Integrated Surveys (BASIS) study indicated a decline in chum salmon in 2004 and 2005, but 2006 and 2007 results showed an increase. No BASIS survey was conducted in 2008. A collaborative effort between ADF&G and NOAA is in progress to test the applicability of BASIS juvenile salmon indices for run size forecasting.

3.1.5 Summer Chum Salmon Inseason Management

The Yukon River summer chum salmon run was managed according to the guidelines described in the *Yukon River Summer Chum Salmon Management Plan* (Appendix A1). The management plan provides for escapement needs and subsistence use priority before 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 uses the best available data to assess the run including: preseason run outlooks, Pilot Station sonar passage estimate, test fishing indices, age and sex composition, subsistence and commercial harvest reports, and information from escapement monitoring projects.

The summer chum salmon run passage at the Pilot Station sonar project was approximately 1.8 million fish (Appendix A2). The first quarter point, midpoint, and third quarter point were on June 22, June 26, and July 4, respectively.

The Lower Yukon summer chum salmon drift test fishery indicated pulses entering the mouth on approximately June 5, June 14, June 20, and June 28. The largest of these pulses passed Pilot Station sonar on June 21 and contained approximately 580,300 summer chum salmon.

In an effort to reduce incidental harvest of Chinook salmon during a poor run, management actions regarding the summer chum commercial salmon fishery were delayed until near the midpoint in the Chinook salmon run at LYTF. At that time, a harvestable surplus of summer

chum had been identified based on projections from Pilot Station sonar. The first summer chum directed commercial periods took place June 24 in District 1 and June 26 in District 2. Gillnet gear was restricted to 6-inch or smaller mesh size. Concurrent subsistence and commercial fishing periods in Districts 1 and 2 were instituted intermittently throughout the season, primarily early in the summer chum salmon commercial season when the subsistence schedule was still in effect. The intent of these concurrent openings was to decrease the amount of time that Chinook salmon were susceptible to harvest.

When it appeared the third pulse of Chinook salmon was not developing as expected, further measures were taken to provide commercial summer chum salmon harvest opportunities while still protecting Chinook salmon. The area open in the third, fourth, fifth, and sixth periods in District 1 was restricted to the south mouth only, where Chinook salmon abundance was low. Chinook salmon were entering the river primarily through the North and Middle Mouths throughout the season. The third commercial fishing period in District 2 was delayed until July 6 because of the high abundance of Chinook salmon in the district. Once it was expected that most of the third pulse of Chinook salmon was in the upstream portion of District 2, ADF&G scheduled 2 periods in which the fishing area was limited to downstream of the Andreafsky River (period 3), and downstream of the slough at Pilot Station (period 4). A total of 11 commercial fishing periods were scheduled in District 1 and 9 in District 2. The preliminary cumulative summer chum salmon harvest for Districts 1 and 2 combined was 266,510 fish. The summer chum salmon harvest was 214% above the 2001–2010 average harvest of 84,764 (Appendix A3).

The sale of incidentally caught Chinook salmon was not allowed during the summer season because subsistence fishing had been restricted during the season in Districts 1-5, and this action helped ensure escapement goals would be met. Fishermen could release any incidentally caught live Chinook salmon or use them for subsistence purposes. It was required to report on fish tickets any Chinook salmon caught but not sold. A total of 4,090 Chinook salmon were incidentally caught but not sold in Districts 1 and 2 during the summer season.

District 6 was managed using inseason assessment information provided by multiple projects operated in the Tanana River drainage. Run assessment was difficult this season due to high water and drift that hampered the operation of projects on the Chena, Salcha and Goodpaster Rivers. However, a harvestable surplus of summer chum salmon was identified based upon subsistence harvest information and the Nenana test fish wheel, as well as indications from lower river genetics and assessment data. Based upon this surplus and market interest, the department scheduled the first commercial fishing period to target chum salmon in District 6 on July 18. As in Districts 1 and 2, the sale of incidentally caught Chinook salmon was not allowed. The department scheduled 11 commercial fishing periods in District 6 and the preliminary cumulative harvest was 8,651 summer chum salmon (Appendix A3).

The total commercial harvest for Districts 1, 2, and 6 combined was 275,161 summer chum salmon, which is 163% above the 2001–2010 average harvest of 104,064 fish (Appendix B3).

3.1.6 Harvest and Value

A total of 408 permit holders participated in the summer chum salmon commercial fishery, which was approximately 15% below the 2001–2010 average of 520 permit holders (Appendix A4). The Lower Yukon Area (Districts 1–3) and Upper Yukon Area (Districts 4–6) are separate Commercial Fisheries Entry Commission (CFEC) permit areas. A total of 403 permit holders

fished in the Lower Yukon Area in 2011, which was approximately 21% below the 2001–2010 average of 513. In the Upper Yukon Area, 5 permit holders fished, which was approximately 71% below the 2001–2010 average of 19.

3.1.7 Commercial Harvest Characteristics

Summer chum salmon age composition from the District 1 commercial harvest (n=1,728) was 0.1% age-3, 50.2% age-4, 49.1% age-5, and 0.6% age-6 fish. Females comprised 38.8% of the sample.

Summer chum salmon age composition from the District 2 commercial harvest (n=157) was 0% age-3, 42.7% age-4, 56.1% age-5, and 1.3% age-6 fish and females comprised 38.9% of the sample. Because samples from the District 2 commercial harvest were only obtained from period 1, these percentages are based upon fish sampled from District 2 period 1; age class percentages from District 1 period samples were applied to the harvest numbers from District 2.

In the District 6 summer chum salmon commercial harvest, 366 fish were aged. The summer chum salmon age composition was 0.8% age-3, 47.1% age-4, and 52.1% age-5, and 0.0% age-6 and females comprised 36.7% of the sample.

3.2 Fall Chum and Coho Salmon

Management of the Yukon Area fall season commercial salmon fisheries is in accordance with the *Policy for the Management of Sustainable Salmon Fisheries* 5 ACC 39.222, The *Yukon River Drainage Fall Chum Salmon Management Plan* 5 ACC 1.249, The *Yukon River Coho Salmon Management Plan* 5 ACC 05.369, and the *Tanana River Salmon Management Plan* 5 AAC 05.367. The threshold number of fall chum salmon needed to prosecute a commercial fishery is 500,000 fish (Appendix A5) and commercial fishing is generally allowed only on the surplus above that level. The fall chum salmon plan incorporates U.S./Canada treaty obligations for border passage of fall chum salmon and provides guidelines necessary for escapement and prioritized uses. The intent of the plan is to align management objectives with the established escapement goals, provide flexibility in managing subsistence harvests when stocks are low, and bolster salmon escapement as run abundance increases. The SEG range for the Yukon River drainage is 300,000 to 600,000 fall chum salmon. There are provisions in the plan to allow incremental levels of subsistence salmon fishing balanced with requirements to attain escapement objectives during low runs.

The coho salmon plan allows a coho salmon directed commercial fishery in the absence of achieving the threshold number of fall chum salmon if a harvestable surplus of coho salmon exists and a commercial fishery will not have a significant impact on fall chum salmon escapement and allocation.

Finally, under the Tanana River plan, commercial fishing in Subdistrict 5-A and District 6 is based on the assessment and timing of salmon stocks bound for the Tanana River drainage.

3.2.1 Fall Chum Salmon Management Overview

The fall chum salmon forecast for 2011 was a point estimate of 737,000 fish with a range of 605,000 fish to 870,000 fish. The forecast range was based on the upper and lower values of the 80% confidence bounds for the point estimate. Confidence bounds were calculated using deviation of point estimates and observed returns from 1987 through 2010. This forecasted run size was below average for odd-numbered year returns.

The range around the point estimate stemmed from uncertainty regarding parent year production. Annually, Yukon River fall chum salmon return primarily as age-4 and age-5 fish with small percentages of age-3 and age-6 fish present. Hence, the 2011 run was comprised of fish returning from the 2005 to 2008 parent years. Fall chum salmon escapements in those years exceeded the upper end of the drainagewide escapement goal range (300,000 to 600,000 fish) except for 2008 when escapement was within the range. Based on spawner-recruit analysis, the 2005 through 2007 parent years were predicted to contribute less than one return per spawner (the estimated return per spawner of 0.25 from the 2005 brood year was the lowest on record).

The preseason projection, calculated in early July and determined from a historical relationship between summer and fall chum salmon runs, was 790,000 fish. Management decisions made early in the fall season were based primarily on the preseason projection. Based on the projection, it was anticipated that the 2011 fall chum salmon run size would be sufficient for escapement and subsistence uses, and support a commercial harvest. The fall season began with subsistence fishing in Districts 1–3, and Subdistrict 5-D open 7 days a week, 24 hours a day, while District 4 and Subdistricts 5-A, 5-B, and 5-C were on a 5 days a week schedule (pre 2001 schedule). A limited commercial harvest was allowed in Districts 1 and 2 during the transition time between the summer and fall seasons. The strategy was to allow a conservative commercial harvest early in the run. If the fall chum salmon run assessment indicated the run was meeting the expectations of the preseason projection, more commercial opportunity would have been provided. There were 3 commercial openings in District 1 between July 16 and August 1. A total of 19,561 fall chum salmon were harvested during those openings. However, by the last week of July, run assessment indicated that the 2011 run strength was below average and no further commercial fishing occurred during that time.

As the fall chum salmon run approached the first quarter point (late July-early August), management decisions started incorporating abundance and run timing information from Pilot Station sonar and the drift gillnet test fisheries located at Emmonak and Mountain Village. Cumulative fall chum salmon passage estimates from Pilot Station sonar were used to determine inseason run size projections. In turn, the projections triggered management actions in accordance with the fall chum salmon management plan. Run timing and run strength information from the drift gillnet test fisheries were compared inseason for consistency with the Pilot Station sonar estimates as a method to check that the projects were operating correctly. In 2011, fall chum salmon run timing past Pilot Station sonar correlated well with the drift gillnet projects in the Lower Yukon Area (Figure 3).

The first and largest pulse of fall chum salmon entered Yukon River on July 30 (Figure 4). After that, fall chum salmon continued to enter Yukon River over 4 additional pulses through September 7. Inseason run size projections estimated a run size ranging from 800,000 to 1 million fall chum salmon. Commercial fishing continued in Districts 1 and 2 through the majority of the season. Attempts were made to align commercial openings with pulses as they entered the river. In between pulses, commercial openings occurred on a set schedule. Limited commercial fishing also occurred in Subdistricts 5-B and 5-C in early August, and in District 6 into early October. The subsistence schedule in District 4 was liberalized to 7 day per week on August 30. The subsistence schedule in Subdistricts 5A, B, and C went to 7 days a week on September 13. The subsistence schedule in District 6, excluding the Personal Use area, was relaxed to 7 days a week on October 30, 2011.

3.2.2 Coho Salmon Management Overview

The 2011 coho salmon run was anticipated to be average based on escapements observed in 2007 and the assumption of average survival to spawning. The coho salmon run was assessed to be above average early in the run, but began falling below average by mid-August until the largest pulse of coho salmon entered the river around August 24. Because of the number of coho salmon in this pulse, the run strengthened, but remained below average for the rest of the 2011 run.

In the mainstem Yukon River districts, coho salmon were harvested incidentally in the fall chum salmon directed commercial fisheries. Three coho salmon directed commercial openings were prosecuted in District 1 in early September. In District 6, coho and fall chum salmon were both targeted in the commercial fishery.

3.2.3 Harvest and Value

There were a total of 31 commercial periods in 2011 with majority of commercial fishing occurring in the lower river districts. The 2011 total commercial harvest for the Yukon River fall season in the Alaskan portion of the drainage was 238,979 fall chum and 76,315 coho salmon (Appendix A3). Both harvests were above their respective most recent 5-year (2006–2010) and 10-year (2001–2010) averages (Appendices B4 and B5). The fall chum salmon harvest was the largest since 1995 and the coho salmon harvest was the largest since 1991. All salmon were sold in the round and no salmon roe was sold separately.

A total of 402 individual permit holders participated in the 2011 fall chum and coho salmon fishery; 395 in Districts 1 and 2 combined and 7 in Districts 4, 5, and 6 combined. Participation in all districts was above historical averages (Appendix A4).

4.0 COMMERCIAL FISHERY–CANADA

4.1 CHINOOK SALMON

The total run of Upper Yukon River Chinook salmon in 2011 was expected to be below average, with a preseason outlook range of 65,000 to 89,000 Chinook salmon. This outlook included an adjustment to reflect a recent trend where actual runs were lower than the preseason outlooks.

The inseason Chinook salmon run status indicated that there would not be a sufficient run to support a commercial fishery. As a result, the fishery remained closed throughout the 2011 Chinook salmon season. A total of 4 Chinook salmon was harvested incidentally during the early fall chum salmon opening in late August. The boundaries of the commercial fishing areas within the Yukon Territory are presented in Figure 6.

Canadian Upper Yukon River commercial harvests for the 1961 to 2011 period are presented in Appendix B7. The average commercial Chinook salmon catch for the 2001–2010 period, excluding years when the fishery was closed for conservation purposes, was 2,183 fish. Since 1997, there has been a marked decrease in commercial catch of Upper Yukon River[2] Chinook salmon, resulting from closures and/or very limited fishing opportunities. The recent 5-year average (2006–2010) commercial catch in the fishery was 1,348 Chinook salmon.

[2] The Upper Yukon River is defined as the Canadian portion of the Yukon River drainage excluding the Porcupine River drainage.

4.1.1 Upper Yukon Chinook Salmon Escapement Goal

Upper Yukon Chinook salmon are managed under the umbrella of the Yukon River Salmon Agreement (YRSA). In 2010, the Yukon River Panel (YRP) approved an Interim Management Escapement Goal (IMEG) range of 42,500–55,000 Upper Yukon Chinook salmon; this goal was adopted again in 2011 by the YRP and DFO and included in the 2011 Integrated Fisheries Management Plan (IFMP) for Yukon River Chinook salmon in Canada. The success of achieving this escapement goal, was to be assessed using the Eagle sonar estimate minus catches from fisheries occurring upstream of the sonar, namely U.S. subsistence catch near the community of Eagle, Alaska and the catch data from Canadian fisheries.

4.1.2 Upper Yukon Chinook Salmon Inseason Decision Matrix

Canadian fishing opportunities in 2011 were dependent upon inseason assessments of run strength. As in previous years, a Chinook salmon decision matrix was developed preseason and was included as part of the IFMP. The decision matrix provided detailed guidance for the management of fisheries linked to specific inseason run abundance levels. The 2011 decision matrix summarized the management reference points, general allocation plans, and anticipated management responses under different run size scenarios (Table 2).

It is important to note that the incorporation of an escapement goal range of 42,500–55,000 in 2011 resulted in the following decision thresholds:

i. The commercial and domestic fisheries would not open unless it was expected that the border escapement would be greater than 51,000 Chinook salmon based on the Eagle sonar program. The recreational fishery default regulation is that it is open until closed, therefore, the recreational fishery would be closed at a run size of 51,000 or fewer. A border escapement larger than 51,000 fish was sufficient to allow for an unrestricted First Nation fishery;
ii. Consideration would be given to restricting First Nation fisheries if the run size to the border was in the 30,000 to 51,000 range. All other fisheries would not be permitted to target Chinook salmon; and
iii. Closures in First Nation fisheries would be expected if the run projection was 30,000 or fewer fish.

Management discretion was to be used when the inseason projections were close to the trigger points.

Table 2.–2011 Inseason fishery management decision matrix for Upper Yukon Chinook salmon.

	Border Escapement Projections	Fishery	Guideline Harvest	Anticipated Management Action
RED ZONE	0–30,000	TF	0	Not required. Assessment using Eagle Sonar.
		FN	0	Closures considered.
		CF	0	Closed.
		RF	0	Closed, i.e. Chinook salmon quota varied to zero.
		DF	0	Closed.
YELLOW ZONE	30,000–51,000	TF	0	
		FN	0 to 8,000	Catch target to vary with abundance within zone: 0 at run size of 30,000; 8,000 catch at run of 51,000. Catch is subject to International harvest sharing provisions.
		CF	0	Closed.
		RF	0	Closed, i.e. Chinook salmon quota varied to zero.
		DF	0	Closed.
GREEN ZONE	>51,000	TF	0	Not required. Assessment data collected through Eagle Sonar.
		FN	8,000+	Unrestricted.
		CF	Variable	Catch target to vary with abundance and be consistent with International agreement on harvest shares.
		RF	100–700	Expected harvest range based on recent harvests. Opportunities subject to abundance and International agreement on harvest shares.
		DF	100–300	

Legend: TF = test fishery; FN = First Nation fishery; CF = commercial fishery; RF = recreational fishery; DF = domestic fishery.

4.1.3 Upper Yukon Chinook Salmon Decisions and Management

Early in the 2011 season, information from the U.S. test fishery at Emmonak and the Pilot Station sonar program on the lower Yukon River suggested that the Upper Yukon Chinook salmon run would be at the low end of the preseason outlook range of 65,000 to 89,000 Chinook salmon. In response to U.S. conservation measures and uncertainty surrounding projections, DFO began a series of regular teleconferences with First Nation managers to update them on run projections scenarios and to advise that a precautionary approach be adopted early in the season. The commercial fishery remained closed and the catch and possession limits in the recreational fishery were reduced to zero on July 9, 2011.

Further upriver, as the run was migrating into Canada, border escapement run projections were usually produced twice weekly, based on data from the Eagle sonar estimate, considering timing

information from the fish wheel project at Rampart Rapids, and assuming a reduced subsistence Alaskan harvest. Border escapement run projections are expanded based on what is considered to be the most likely timing scenario (i.e., early, average or late timing) given the information at hand. The intent of applying different expansions is to ensure that the projections cover an appropriate range of the potential run timing.

Border escapement projections were not sufficient to allow for a commercial harvest; consequently the Chinook salmon commercial fishery remained closed throughout the 2011 season.

4.2 FALL CHUM AND COHO SALMON

A stronger than expected return of fall chum salmon resulted in opportunities for commercial fishery openings throughout the fall season. A total of 5,312 fall chum salmon were harvested during 4 commercial fishery openings (Appendix A6). Since 1997, there has been a marked decrease in commercial catches of Upper Yukon River fall chum salmon that have resulted from a limited market as well as reduced fishing opportunities in some years due to below average run sizes.

Upper Yukon River commercial fall salmon harvests for the 1961 to 2011 period are presented in Appendix B8. Commercial harvest of coho salmon within the upper Yukon River drainage is usually negligible; this is thought to be related to a combination of low abundance and limited availability of this species to fisheries due to late migration timing. The preseason outlook for the Upper Yukon fall chum salmon run in 2011 was a run of 151,000 to 217,000 fish.

4.2.1 Upper Yukon Fall Chum Salmon

4.2.1.1 Escapement Goal

Similar to Chinook salmon, Upper Yukon fall chum salmon are also managed according to provisions of the YRSA. The Yukon River Panel meets annually to recommend the Upper Yukon fall chum salmon escapement goal. Since the brood year escapements achieved the level defined in the YRSA for a rebuilt Upper Yukon fall chum salmon stock, the Yukon River Panel maintained the longstanding escapement goal of greater than 80,000 fall chum salmon for 2006 to 2009. For 2010 and again in 2011, the Yukon River Panel adopted an escapement goal range of 70,000 to 104,000 fall chum salmon. (Appendix A19). The range was established to offer more flexibility with respect to uncertainties associated with management. Spawning escapement was to be measured using Eagle sonar estimates minus catch data from U.S. and Canadian fisheries occurring upstream of the sonar location.

4.2.1.2 Inseason Decision Matrix

The decision matrix adopted by DFO for the management of Upper Yukon chum salmon and included in the 2011 IFMP, provides detailed guidance for specific inseason decisions. The 2011 matrix (Table 3) takes into account the changeover from the mark–recapture program to the use of the Eagle Sonar and the escapement goal range, therefore differs slightly from the matrix used from 2006 to 2009. The Red Zone includes run projections of less than 40,000 fall chum salmon when closures in all fisheries could be expected. The Yellow Zone includes run projections within the 40,000 to 73,000 range; within this zone, commercial, domestic and recreational fisheries would be closed and the First Nation fishery would likely be reduced with restrictions increasingly more severe the closer the run projection was to the lower end of the Yellow Zone. The Green Zone includes run size projections greater than 73,000 fall chum salmon and

indicated that First Nation fisheries would be unrestricted and harvest opportunities within the commercial, domestic, and recreational fisheries would be considered depending on run abundance and international harvest sharing provisions. The difference between the lower end of the escapement goal range (70,000) and the trigger point for the Green Zone is 3,000 fall chum salmon, which is the number of chum salmon needed to allow an unrestricted Canadian aboriginal fishery. Management discretion is used when the inseason projections are close to the trigger points.

Table 3.–Inseason fishery management decision matrix for Upper Yukon fall chum salmon, 2011.

	Border Escapement Projections	Fishery	Guideline Harvest	Anticipated Management Action
RED ZONE	<40,000	FN	0	Closures considered.
		CF	0	Closed.
		CF	0	Closed, i.e. chum salmon quota varied to zero.
		RF	0	Closed.
		TF	0	Open- note-this is a live release fishery.
YELLOW ZONE	40,000-73,000	FN	0 to 3,000	Catch target to vary with abundance within zone.
		CF	0	Closed.
		RF	0	Closed, i.e. chum salmon quota varied to zero.
		DF	0	Closed.
		TF	0	Open-note- this is a live release fishery.
GREEN ZONE	>73,000	FN	3,000+	Unrestricted.
		CF	Variable	Catch target to vary with abundance and be consistent with international agreement on harvest shares.
		RF	0	Fishing opportunity provided, no catch anticipated.
		DF	0	Fishing opportunity provided, no catch anticipated.

Note: Legend: FN = First Nation fishery; CF = commercial fishery; RF = recreational fishery; DF = domestic fishery; TF = test fishery.

4.2.1.3 Determination of Inseason Run Status

Genetic stock identification data were used in conjunction with the Pilot Station sonar counts to develop a preliminary index of the Canadian-origin fish run size estimates. These data have been useful in recent years since they provide an early indication of potential Upper Yukon run strength as the fish move through the lower section of the Yukon River in Alaska. Other data such as the Rampart Rapids video test fish wheel project results were used to assess run timing for use in projection models. In 2011, projections from the Eagle sonar program were used for the third year for inseason management. Prior to 2008, the Canadian inseason management regime was based primarily on the DFO tagging program.

4.2.1.4 Decisions and Management

Inseason decisions on fishery openings/closures for Upper Yukon fall chum salmon were made in a similar way to those for Chinook salmon. Pilot Station estimates and historic run timing early in the 2011 fall chum salmon season indicated that the run was better than expected. Although there is often much uncertainty associated with the chum salmon early inseason

forecasts due to the unpredictable size, timing and destination of the pulses, there was sufficient Lower Yukon assessment information available to project that border escapements would be of a magnitude strong enough to support a normal aboriginal harvest and to provide opportunities in the commercial fishery. Inseason forecasts of the Canadian fall chum salmon run are based on Eagle sonar estimates, and informed by run timing information from downstream indicators (Pilot Station and Rampart Rapids) as well as genetic estimates of run composition from the Pilot Station test fishery.

As per the decision matrix, a "border escapement" projection of greater than 73,000 was required before fishing opportunities were provided in the commercial fishery. Since it was anticipated, based on harvest in recent years, that the Alaskan subsistence fishery upstream of the Eagle sonar program would take about 15,000 chum salmon, a projection of greater than 88,000 at the Eagle sonar site was required to meet the border escapement objective.

The objective of management actions in 2011 was to ensure that the conservation objective (70,000–104,000 escapement goal range) was achieved. By mid-August, it was evident that the fall chum salmon run was at or above the upper end of the preseason forecast based on projections from the LYTF and Pilot Station Sonar and indications from the Rampart Rapids fish wheel. The commercial fishery was opened on a conservative schedule commencing on August 26 to provide opportunities for the catch and sale of early run chum salmon, considered to be marketable as food for human consumption. Two 4-day openings followed on September 2 and September 9. As further confidence in Eagle sonar-guided projections was realized, the commercial fishery was opened for 7 days per week commencing September 16 and remained open until October 9 with a further extension to October 16.

The total 2011 commercial fall chum salmon catch of 5,312 fish was close to the 2001–2010 average of 5,134 and 15% higher than the 2006–2010 average of 3,549 (Appendix B8). Within the 2001–2010 period, the commercial fall chum salmon catch ranged from 293 in 2009, when the run was late and the fishery was closed most of season due to conservation concerns, to 11,931 fall chum salmon in 2005. The fall chum salmon commercial fishery is somewhat of a misnomer as virtually all of the catch is used for what could be termed personal needs; few fish are sold. This situation could change with the recent development of local value-added products such as smoked fall chum salmon and salmon caviar.

4.2.2 Coho Salmon

No coho salmon were recorded in the 2011 commercial fishery. The harvest of coho salmon is negligible within the Upper Yukon River commercial, domestic, recreational and aboriginal fisheries. This is thought to be related to a combination of low abundance and limited availability of this species based on migration timing.

5.0 SUBSISTENCE, PERSONAL USE, ABORIGINAL, DOMESTIC, AND SPORT FISHERIES

5.1 ALASKA

5.1.1 Subsistence Salmon Fishery

Subsistence salmon fishing activities in the Yukon Area typically begin in late May and continue through early October; fishing opportunity in the Lower River Area in May and in the Upper

River Area in October is highly dependent upon river ice conditions. Fishing activities are usually based from a fish camp or a home community. Extended family groups, representing 2 or more households, often work together to harvest, cut, and preserve salmon for subsistence use. Some households from tributary communities travel to the mainstem Yukon River to harvest fish.

Throughout the drainage, most Chinook salmon harvested for subsistence use are dried, smoked, or frozen for later human consumption. Summer chum, fall chum and coho salmon harvested in the Lower River Area are primarily utilized for human consumption and are also dried, smoked, or frozen for later use. In the Upper River Area, small Chinook (jack), summer chum, fall chum, and coho salmon are all an important human food source, but a larger portion of the harvest is fed to dogs used for recreation, transportation, and drafting activities (Andersen 1992). Most subsistence salmon used for dog food are dried (summer chum salmon) or frozen in the open air "cribbed" (fall chum and coho salmon) late in the fall.

In Alaska, subsistence fishing for Chinook and summer chum salmon was open 7 days a week prior to commencement of the *Yukon River King Salmon Management Plan* regulatory schedule on June 6 (Table 1). Breakup timing was near average in the lower river. The 2011 preseason outlook was for a poor Chinook salmon run, with enough salmon for escapement, but likely not strong enough for normal subsistence harvests. On June 13, conservative management strategies were enacted in District 1 and the northern portion of the Coastal District to protect the first pulse of Chinook salmon (Hayes et. al 2011). Restrictions continued up the mainstem river in Districts 2, 3, 4 and 5 based on migration timing of Chinook salmon. The schedules for the Coastal District and the Koyukuk, and Innoko rivers remained open on their regulatory schedules (7 days a week), as these areas have less efficient fishing conditions and/or do not harvest Canadian-bound salmon. This was the first year the restriction of gear to mesh sizes 7.5 inches or less took effect in all Districts, including the Coastal District.

In 2011, subsistence fishing periods were closed to protect the first 2 pulses of Chinook salmon as they traveled up river. Subdistrict 5-D, in the upper most Alaska portion of the Yukon River drainage, is nearly 400 miles in length; during the 2011 summer season, managers divided the area into 4 smaller portions (Figure 7). Within Subdistrict 5-D, these smaller areas were closed consecutively as the Chinook salmon pulses migrated through, allowing subsistence fishing opportunity in other portions. In District 1 and District 2, mesh size during subsistence fishing periods was reduced to 6 inches or smaller to further protect Chinook salmon harvested incidentally with summer chum salmon. Summer chum salmon escapement to most tributaries was above average; however subsistence fishing opportunities for summer chum salmon were restricted to protect Chinook salmon (Hayes et. al. 2011).

The preseason run size projection and the inseason relationship between summer and fall chum salmon suggested that the fall chum salmon run would be sufficient to meet subsistence and escapement goals and support a commercial harvest. The coho salmon run in 2011 was anticipated to be average with enough fish to support a commercial harvest between 10,000 to 70,000 fish (Estensen and Borba 2011). Fishing during the fall season began by regulation on July 16. Subsistence fishing was open for 7 days a week in Districts 1, 2, 3, and 5-D, and open for 5-days a week in District 4 and Subdistricts 5-A, 5-B, and 5-C. Subsistence fishing periods were liberalized to 7 days a week for District 4 on August 8, Subdistricts 5-A, 5-B, and 5-C on September 12, and District 6 on October 1.

Aside from closures to protect the first and second pulses of the Chinook salmon run, subsistence fishing closures occurred in Districts 1 and 2 before, during and after commercial fishing openings in the summer and fall season. However, some commercial openings in Districts 1 and 2 in the summer season were held concurrently with subsistence fishing openings in order to decrease the amount of time Chinook salmon were susceptible to harvest (Hayes et. al. 2011). Commercial fishing openings also occurred in District 6, and Subdistricts 5-B and 5-C in the fall season (Estensen and Borba 2011). In 2011, fishermen were not allowed to sell Chinook salmon caught during summer chum salmon commercial openings. Commercial fishing households can retain salmon caught during commercial openings for subsistence purposes. Income from commercial fishing is often used by households to help pay for the costs associated with subsistence harvesting activities, including fuel and fishing equipment.

Apart from the poor Chinook salmon run, summer chum, fall chum and coho salmon runs were strong enough to support escapement, subsistence, and commercial fishing. Throughout the summer and fall fishing seasons, additional subsistence fishing opportunities for non-salmon fish species were available during subsistence salmon period closures. Stipulations for harvesting non-salmon species during closed salmon periods required the use of gillnets with 4 inch or less stretch mesh and prohibition of fish wheel operation. For more information and detail about the Alaskan fishery see Section 3 of this report.

Poor Chinook salmon runs resulted in management actions that reduced subsistence salmon fishing opportunities during the summer season. Of the households that answered survey questions in 2011 about whether their subsistence needs were met, the majority of households reported meeting over 50% of their needs for summer chum (63% of households) and coho salmon (51% of households). Approximately 45% of households that responded reported meeting over 50% of their needs for either Chinook or fall chum salmon. The preliminary percentage of households meeting over 50% of their needs for each species in 2011 was greater than the recent 5 year average (2006–2010) for each species.

Commonly cited reasons for not meeting needs: the fishing schedule conflicted with work opportunities, fishing periods were too short and families could not afford to travel back and forth to fish camps, and fishing took place during poor weather conditions for fish preservation. Several fishermen reported they were unable to fish because they did not have gear meeting the new 7.5 inch maximum mesh size regulation that took effect in 2011. Remarks on poor weather conditions included wet, cold and rainy weather, especially in the Lower Yukon Area. Surveyed households mentioned other factors that contributed to the inability to meet subsistence salmon needs including expenses such as fuel, low salmon abundance, and health or other personal reasons.

Documentation of the subsistence salmon harvest is necessary to determine if sufficient salmon are returning to the Yukon Area for subsistence requirements and if enough fishing opportunities are provided to meet subsistence needs. In years with fishery restrictions, estimates of harvest can be used to assess the effect of the management actions taken to meet escapement goals for future salmon production. Most subsistence users in the Alaskan portion of the Yukon River drainage are not required to report their salmon harvest. The primary method of estimating this harvest is voluntary participation in the annual subsistence salmon harvest survey conducted by ADF&G (Jallen and Hamazaki 2011). Surveys are conducted in 33 communities in September, October and November (lower to upper river) after most households have completed fishing for salmon. Community household lists are maintained and updated annually during the surveys to

provide the most current information. All households in each community are assigned to 1 of 5 harvest use groups based on their recent historical harvest pattern. Households are preselected for survey and heads of households are targeted for interviews but another knowledgeable household member may be interviewed. Survey data are expanded to estimate total subsistence harvest in surveyed communities.

In portions of the upper Yukon and Tanana River drainages that are road accessible, fishermen are required to obtain a household subsistence fishing permit. Harvest reported from subsistence permits are added to the survey estimates to obtain the total number of salmon harvested in the drainage. Subsistence totals also include salmon that are harvested from test fishery projects and distributed to residents of communities near the projects. Subsistence surveys and fishing permits also include other information such as non-salmon harvest and demographic information. In addition to postseason surveys and permits, subsistence "catch calendars" are mailed to approximately 1,600 households annually in the non-permit portions of the Yukon River drainage. Calendar data supplements the survey information, provides households a place to record their catch which assists households in remembering their harvest numbers during the survey, and also provide harvest timing information by fish species.

Data compilation of the 2011 survey and subsistence permit information was not completely finished at the time of this publication. A summary of preliminary results as of February 15, 2012 is presented below. In 2011, just over 1,430 households were selected to be surveyed. By a preliminary estimate, 1,145 households from 31 communities fished for salmon (does not include the Coastal District communities of Hooper Bay and Scammon Bay). In portions of the Yukon Area drainage requiring a permit, 418 subsistence permits were issued. As of February 15, 2012, approximately 97% of the subsistence permits had been returned, and 229 households reported fishing for salmon and other non-salmon fish species. The preliminary 2011 estimated subsistence salmon harvest in the Alaska portion of the Yukon River drainage totaled approximately 40,211 Chinook, 77,715 summer chum, 79,887 fall chum, and 12,289 coho salmon (Deena Jallen, Yukon Area Commercial Fisheries Biologist, ADF&G, Fairbanks; personal communication). Included in the estimated total subsistence harvest are 2,777 Chinook, 7,615 summer chum, 2,777 fall chum, and 824 coho salmon distributed for subsistence use from the various test fish projects distributed to Yukon River communities. The recent 5 year average (2006–2010) subsistence salmon harvest estimates are 44,308 Chinook, 73,959 summer chum, 81,639 fall chum, and 16,861 coho salmon (Appendices B2–B5) from communities in the Alaskan portion of the Yukon River drainage.

5.1.2 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. Subsistence or personal use permits have been required in this portion of the drainage since 1973. 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, and it has been managed consistently under personal use regulations since then. Historical harvest data must account for these changes in status. Subsistence fishing is not allowed within non subsistence areas.

Subdistrict 6-C is completely within the Fairbanks Nonsubsistence Area and therefore falls under personal use fishing regulations. Personal use salmon and/or whitefish/sucker permits and a valid

resident sport fishing license are required to fish within the Fairbanks Nonsubsistence Area. The harvest limit for a personal use salmon household permit is 10 Chinook, 75 summer chum, and 75 fall chum and coho salmon combined. The personal use salmon fishery in Subdistrict 6-C has a harvest limit of 750 Chinook, 5,000 summer chum, and 5,200 fall chum and coho salmon combined.

Data compilation of the 2011 personal use permit information was not completely finished at the time of this publication. Preliminary results as of February 15, 2012 are as follows. In 2011, the personal use salmon fishery followed the regulatory fishing time of two 42-hour periods per week. Personal use fishing was closed in the Tanana River within a 1/2 mile radius of the mouth of the Chena River from 6:00 p.m. Friday, July 22 until 6:00 p.m. Friday, August 12 to conserve Chinook salmon. A total of 67 personal use salmon and 7 personal use whitefish and sucker household permits were issued. The 2011 preliminary harvest results based on 96% of the personal use household permits returned in Subdistrict 6-C included 89 Chinook, 439 summer chum, 347 fall chum, and 232 coho salmon. The recent 5 year (2006–2010) average personal use harvest was 128 Chinook, 242 summer chum, 795 fall chum, and 319 coho salmon (Appendices B2–B5) in the Yukon River drainage.

5.1.3 Sport Fishery

Most of the drainage's sport fishing effort occurs in the Tanana River drainage along the road system. From 2006 to 2010 the Tanana River made up 75% of the total Yukon River drainage Chinook salmon harvest, 22% of the summer chum salmon harvest, and 42% of the coho salmon harvest, on average. In the Tanana River, most Chinook and chum salmon are harvested from the Chena, Salcha, and Chatanika rivers, while most coho salmon are harvested from the Delta Clearwater and Nenana river systems. In the Yukon River drainage, excluding the Tanana River, most sport fishing effort for salmon takes place in the Anvik and Andreafsky rivers.

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. In this report, all of the chum salmon harvested in the sport fishery are categorized as summer chum salmon. Although a portion of the genetically distinct fall chum salmon stock may be taken by sport anglers, most of the sport chum salmon harvest is thought to be made up of summer chum salmon, because: 1) the run is much more abundant in tributaries where most sport fishing occurs, and 2) the chum salmon harvest is typically incidental to efforts directed at Chinook salmon, which overlap in run timing with summer chum salmon.

In 2011, an emergency order was issued on June 1 that reduced the sport fishing bag limit to one Chinook salmon in all Yukon River tributaries (excluding the Tanana River drainage) and closed all waters of the mainstem Yukon River to sport fishing for Chinook salmon effective June 2. On July 20 an emergency order prohibited the retention of king salmon and prohibited the use of bait in all tributaries of the Tanana River drainage effective July 23.

Alaskan sport fishing effort and harvests are monitored annually through a statewide sport fishery postal survey. Harvest estimates are typically not available until approximately one calendar year after the fishing season; therefore, the 2011 harvest estimates will not be available in this report. The total 2010 sport harvest of salmon in the Alaskan portion of the Yukon River drainage (including the Tanana River) was estimated at 474 Chinook, 1,183 summer chum, and 944 coho salmon (Appendices B2, B3, and B5). The recent 5 year (2006–2010) average Yukon

River drainage sport salmon harvest was estimated at 689 Chinook, 511 summer chum and 769 coho salmon (Appendices B2, B3, and B5).

Since 2005, all freshwater sport fishing guides and guide businesses operating in Alaska have been required to be licensed. In addition, sport fishing guides and businesses are required to report sport fish harvest and fish released by species in logbooks. From 2006 to 2010, guided sport harvests in the Yukon River drainage (excluding the Tanana River drainage) averaged 80 Chinook and 219 coho salmon (Sigurdsson and Powers 2011).

5.2 CANADA

5.2.1 Aboriginal Fishery

5.2.1.1 Upper Yukon

In 2011, as part of the implementation of the Yukon River Final Agreements (comprehensive land claim agreements), the collection of inseason harvest information for the Upper Yukon River was conducted by First Nations within their respective Traditional Territories. Before the start of the fishing season, locally hired surveyors distributed catch calendars to known fishers and asked them to voluntarily record catch and effort information on a daily basis. Interviews were then conducted inseason to obtain more detailed catch, effort, gear, and location information at fish camps or in the community, 1–3 times weekly. In most cases, weekly summaries were completed by the surveyors and e-mailed to the DFO office in Whitehorse. Late or incomplete information was obtained post season and reviewed by First Nation staff in conjunction with DFO.

Based on a preseason outlook for a below average run of 65,000 to 89,000 Upper Chinook salmon, it was prudent to consider that conservation measures would likely be required in Canadian fisheries (i.e. commercial, domestic and recreational fisheries). DFO hosted frequent teleconferences with the First Nations throughout the Chinook salmon run to provide updated information on run timing and abundance, as well as to announce potential changes to fishing plans in other fisheries. Using the decision matrix described in Section 4.1.2 (Table 2), DFO recommended that Yukon First Nations develop individual community harvest plans to address conservation concerns for Chinook salmon. Approaches to reductions in harvest varied, but generally the First Nations accepted the need for conservation and implemented harvest monitoring measures in order to stay below what would be considered a normal harvest.

Given the preseason outlook and the inseason information, it was apparent prior to fishing season that it would be challenging to meet the 2011 border escapement and that conservation measures might be required in the aboriginal fishery. It was suggested to the First Nation governments that they take a precautionary approach early in the season and on July 25 it was recommended that they reduce their harvest to 75% of normal. The voluntary recommended reduction was relaxed on August 3 as confidence grew in the border escapement. In response to early information, the majority of fishers decided not to open their fish camps and the Chinook salmon needs of Yukon aboriginal communities were not met in 2011.

In 2011, the Upper Yukon River aboriginal Chinook salmon catch was estimated to be 4,550 fish; including 2,879 reported harvest, and an adjustment of 1,674 to account for underreporting. The adjustment was derived through recent harvest data that was expanded based on average percentage of harvest to reflect harvest numbers by each First Nation. This adjusted estimate is 43% below the 8,000 Chinook salmon considered to be the harvest of a full unrestricted fishery.

While intensive surveys regarding salmon harvest of First Nation communities carried out between 1996 and 2001 provided accurate harvest data, recent data has been less robust, indicating the need to incorporate the adjusted harvest numbers. The total reported harvest (2,879) and adjusted harvest (4,550) in the First Nation Fishery was 45% and 13% respectively, below the recent 10-year average (2001–2010) of 5,260 salmon and is one of the lowest on record since the 1970's (Appendix B7).

The 2011 harvest recorded by Tr'ondëk Hwëch'in in the Dawson area was 1,193 Chinook salmon, approximately 116% of the recent 10-year average. Ross River Dena Council, fishing on the upper Pelly River, did not report a harvest for 2011, but their 2001–2010 average was 271. The Selkirk First Nation in the Pelly area and Little Salmon Carmacks First Nation (LSCFN) in the Carmacks area, are normally the 2 largest aboriginal fisheries in the mid-area of the upper Yukon River drainage. The harvest reported by Selkirk First Nation was 633 fish, 48% of their 2001–2010 average of 1,308. Little Salmon Carmacks First Nation did not report a harvest for 2011, but 542 Chinook salmon were reported directly to the Conservation and Protection Branch of DFO during a visit to the area midseason. The 2001–2010 average for LSCFN was 1,203 fish. A harvest of 407 Chinook salmon was reported by the First Nation of Na-Cho Nyäk Dun on the Stewart River; 53% of the 2001–2010 average of 764 fish. The Teslin Tlingit Council (TTC) voluntarily reduced their fishing to weekends for the 2011 season. They experienced almost complete compliance by community members and reported a total of 56 Chinook salmon harvested, 90% below the 2001–2010 average of 554 fish. The Ta'an Kwach'an Council (TKC), fishing in the vicinity of Lake Laberge near Whitehorse, reported a catch of 48 Chinook salmon, 92% of their recent 10-year average of 52 salmon. TKC has seen a renewed interest in salmon fishing in the last few years that is largely due to the creation of a culture camp.

The preseason outlook for Upper Yukon River fall chum salmon in 2011 indicated a below average to average run of 151,000 to 217,000 fish. The border passage estimate at this run projection would place Canadian Management in the green zone and therefore no restrictions were expected in the First Nation fishery. As inseason information became available, it became apparent that the run was strong, and would support an unrestricted First Nation fishery. This fishery is managed in a similar fashion to the Chinook salmon fishery using an abundance-based approach as described in Section 4.2.2 and presented in Table 3.

The 2011 Upper Yukon River fall chum salmon harvest reported in the aboriginal fishery totaled 771. This reported harvest was increased to 1,000 to account for underreporting (Appendix B8). The chum salmon adjusted value was based on recent average harvests during conservation years.

The Tr'ondëk Hwëch'in First Nation fishery in the Dawson area reported 502 fall chum salmon, 70% lower than the previous 10-year average of 1,696 fall chum salmon. Little Salmon Carmacks First Nation did not report a harvest in 2011, but their 2001–2010 average was 142 Chinook salmon. The Selkirk First Nation at Pelly Crossing reported a harvest of 269; their recent 10-year average was 257 Chinook salmon. Averages of fall chum salmon derived from a 7-year harvest study conducted by LGL Limited from 1996 to 2002 in the Pelly and Carmacks areas were 433 and 460 chum salmon, respectively. There is an ongoing effort to finalize the 2011 fall chum salmon catch data.

5.2.1.2 Porcupine River

Catch estimates of salmon on the Porcupine River near Old Crow are determined from locally conducted interviews using the catch calendar and a voluntary recording system described above. The Vuntut Gwitch'in Government (VGG) also conducted an intensive door to door survey, post season.

For the 2011 season, 290 Chinook salmon were reported harvested (Appendix B7). This data was finalized from the results of the survey. The 10-year average is 306 Chinook salmon.

Preseason run size forecasts indicated that conservation measures might be required for Porcupine River chum salmon during the 2011 season. There was great uncertainty associated with the preseason forecast and with early inseason forecasts.

Only 1,851 fall chum salmon were harvested in the Old Crow aboriginal fishery, which is 30% below the 2001–2010 average harvest of 2,615 chum salmon. According to community members, the last fall chum salmon pulse came in during freeze up which prevented fishing. Data was finalized after the post season survey results. Preliminary data suggests that VGG citizens were able to fulfill their needs in 2011.

There were 63 coho salmon harvested on the Porcupine River in 2011, compared to the 2001–2010 average of 177 fish.

5.2.1.3 Fishing Branch River Fall Chum Salmon Escapement Goal

The Fishing Branch River is the principal fall chum salmon spawning population within the Porcupine River drainage. DFO has maintained an assessment program on this river since the early 1970's, which has involved aerial surveys and/or a counting weir.

Porcupine fall chum salmon are managed under the umbrella of the YRSA of the Pacific Salmon Treaty. In April 2008, the Yukon River Panel accepted the Canada/U.S. Joint Technical Committee recommendation to adopt an Interim Management Escapement Goal (IMEG) range of 22,000 to 49,000 Fishing Branch River fall chum salmon for the 2008 to 2010 period. This IMEG range was extended in 2010 for another 3 years, ending in 2013. Following consultation with the YSSC, the IMEG was subsequently adopted by DFO and included in the IFMP.

The analyses used to determine the IMEG was based on a technique that assumes when fishery exploitation has been low to moderate and the production regime has been somewhat stable, a sustainable escapement goal range (not necessarily the number of spawners at maximum sustained yield (S*msy*)) tends to overlap with the historical spawning escapement range. This analysis uses escapement contrast (i.e. maximum/minimum escapement) and harvest rate information to determine what percentile range of the actual escapement is appropriate for the escapement goal range determination. In this analysis, escapements from 1985 to 2007 (excluding 1990) were incorporated along with the high contrast ratio of 24:1. The IMEG reflects the approximated 25 and 75 percentiles of 22 years of Fishing Branch River weir counts. The 2011 Fishing Branch weir count and run size estimate did not provide any indication that the 2008 IMEG required revision.

5.2.1.4 Porcupine Chinook Salmon Decisions and Management

DFO and the VGG held regular teleconference calls to provide updated information on run timing, abundance and to address conservation concerns for Chinook salmon within the Porcupine River drainage. No specific management actions were required inseason, but as with

Upper Yukon First Nations, a precautionary approach was taken in the early season when Lower Yukon estimates indicated a poor return of Chinook salmon. VGG developed their own management strategies accordingly, and there were no official restrictions required in 2011

5.2.1.5 Porcupine Fall Chum Salmon Inseason Decision Matrix

The Porcupine River Working Group (PRWG) of the YSSC last met in Old Crow on December 1, 2009. At the Yukon Panel meeting which took place in March 2011, the decision matrix remained the same, as did the IMEG range adopted by the Yukon Panel for 2008 through 2010 and extended for 2011.

The following decision rules for the First Nation fishery in the Porcupine River were developed (Table 4) after the escapement goal range had been adopted by DFO:

i. The run would be considered to be in the GREEN ZONE if the inseason Fishing Branch River escapement projections exceeded 22,000 fall chum salmon. No restrictions in the Vuntut Gwitchin FN fishery would be required for projections in the GREEN ZONE;

ii. Escapement projections within the 10,000 to 22,000 range would constitute the YELLOW ZONE and restrictions may be required, the severity of which would depend upon how close the projections were to the lower end of the range;

iii. Escapement projections of less than 10,000 chum salmon would constitute the RED ZONE and there would be consideration for a full fishery closure.

If inseason information suggested that restrictions were required within the Vuntut Gwitchin FN fishery (projections in the yellow or red zones), DFO and the Vuntut Gwitchin Government would discuss potential conservation options before implementing restrictions.

Table 4.–Inseason fishery management decision matrix for Fishing Branch fall chum salmon.

	Border Escapement Projections	Fishery	Guideline Harvest	Anticipated Management Action
RED ZONE	<10,000	FN	0	Closures considered.
		RF	0	Closed, i.e. fall chum salmon quota varied to zero.
YELLOW ZONE	10,000–22,000	FN	0 to 3,000	Catch target to vary with abundance within zone. Catch is subject to International harvest sharing provisions.
		RF	0	Closed, i.e. fall chum salmon quota varied to zero.
GREEN ZONE	>22,000	FN	3,000+	Unrestricted.
		RF	0	Fishing opportunity provided, no catch anticipated.

Note: Legend: FN = First Nation fishery; RF = recreational fishery.

5.2.1.6 Determination of Porcupine Inseason Run Status

Canadian fishery management considered inseason information on the status of the fall chum salmon run from Alaskan portions of the river including fishery information, sonar estimates from Pilot Station, and the Ramparts Rapids video test fish wheel data. U.S. genetic stock identification data were used in conjunction with the Pilot Station sonar estimates to develop a preliminary index of the potential run size destined for the Canadian section of the Porcupine River drainage. However, early season forecasts are highly uncertain.

Inseason genetic sampling indicated that the second and fifth pulses of the fall chum salmon run had strong Canadian Porcupine components; along with the strong run in the basin, this indicated that run strength would likely be sufficient to meet escapement. There is uncertainty associated with the genetic sample stock size indication because Fishing Branch River component comprises such a small part of the Yukon River run they are typically underrepresented in the mix stock samples. Once fall chum salmon approached Old Crow, additional information was provided by the sonar assessment program operated by the VGG and Environmental Dynamics Incorporated (EDI), an environmental consulting firm. This was the first year of sonar enumeration of Porcupine River chum salmon, so the accuracy of the passage estimate had not been assessed. Sonar estimates of the run passage early in the season were lower than anticipated, with an estimated cumulative passage of 7,200 fish to the end of the period that corresponded with the Pilot Station sonar estimate 39 days earlier: the end of the second pulse. The sonar project ceased operations prior to the expected arrival of the fifth pulse.

The Fishing Branch River enumeration weir, approximately 2,560 km upstream of the mouth of the river, was operational from September 1 through September 7, and provided early run information. However, heavy rain resulted in flood conditions that put the weir out of operation from September 8 to September 18. Counts resumed at noon on September 19. Prior to flooding, weir counts were slightly higher than the Old Crow sonar passage estimates for the corresponding period, 12 days earlier. This was contrary to what was expected, given known spawning between the sonar site and the weir, and suggested that the sonar might have been underestimating fish passage. An aerial survey upstream of the weir was conducted on September 20 to help estimate chum salmon passage during the flood. Cumulative weir count at the time of the survey was 2,424. The average survey count from 2 surveys was 1,740 chum salmon (1,560 and 1,920). While historic data indicates that counts underestimate the weir passage, the numbers were interpreted as indicating that the passage during the period of flooding was unlikely to have been much greater than 2,000 fish. The parabolic expansion factor used annually for the post season weir passage estimate was applied to expand the flood passage estimates forward 6 days after the last complete day before the flood, and backward 6 days from the first complete day after operations resumed. A total flood passage estimate of 1,541 was added to the weir passage estimate. The weir was kept operational until the morning of October 16, in an attempt to capture the later pulse of chum salmon that had been anticipated based on the Pilot Station genetics; however, a strong pulse did not show up. The total chum salmon passage estimated through the weir for the season was 13,085 fish, including 11,168 fish enumerated at the weir, 1,541 fish estimated missed during the flood, and 377 fish estimated in the post season expansion.

5.2.1.7 Porcupine Fall Chum Salmon Decisions and Management

The estimated escapement to the Fishing Branch was 13,085 salmon and therefore, the Fishing Branch River escapement goal range of 22,000 to 49,000 fall chum salmon was not achieved in 2011. Preseason projection and the genetic sampling indicated that the escapement goal would be achieved. Due to the interruption of Fishing Branch weir operations during flooding, the lack of late run information from the sonar project, and the lack of certainty regarding the reliability of the sonar estimate, the upstream information was not sufficient to determine that the escapement goal would not be achieved until the Old Crow fishing season was over. The final weir passage estimate of 13,085 fall chum salmon was in the yellow zone.

5.2.1.8 Coho Salmon

Coho salmon were not recorded in the upper Yukon fisheries (aboriginal, commercial, domestic and recreational) but 63 coho salmon were reportedly harvested in the Porcupine aboriginal fishery (Section 5.2.1.2). The harvest of coho salmon is usually negligible within the upper Yukon River fisheries. This is thought to be related to a combination of low abundance and limited availability of this species based on late migration timing. Within the Porcupine River drainage there is often some aboriginal fishing for coho salmon that occurs with nets set under the ice.

5.2.2 Domestic Fishery

The domestic fishery was closed during the Chinook salmon season and opened concurrently with the commercial fishery for 5 openings during the fall chum salmon season. In recent years domestic fishers have targeted Chinook salmon, although historically fall chum salmon were targeted in some years. There was no reported domestic fishing for fall chum salmon in 2011. The average domestic fishery catch of Chinook and fall chum salmon for the 1974 to 2010 period was 393 and 514, respectively; domestic fishery catches were not recorded prior to 1974 (Appendices B7 and B8).

5.2.3 Recreational Fishery

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

In 2011, in response to early season projections for a poor return of Chinook salmon, the daily catch and possession limits in the recreational fishery were reduced to zero effective 1200 hours July 9. On July 25, continued low border escapement projections and subsequent reductions in the Aboriginal fishery triggered the closure of the Tatchun River to all angling to allow unimpeded passage of Chinook salmon through this popular fishing site. However, by the end of the first week of August, the inseason Chinook salmon run projections climbed slightly into the Green Zone allowing for normal catch and possession limits (2 and 4, respectively) in the recreational fishery to be reinstated and for the Tatchun River area to be re-opened for angling.

From catch card information received as of this publication, 40 Chinook salmon were retained in the 2011 recreational fishery and 27 reported as released.

The average retained Chinook salmon catch within the 2001–2010 period was 238 fish.

For the 2011 season, the daily catch and possession limits of fall chum salmon in the recreational fishery remained at 2 and 4, respectively. There are no reports of fall chum salmon caught.

5.2.4 Commercial Fishery

The lower Canadian commercial fishery area is located downstream of the Stewart River. The most intensive fishing activity and catch monitoring is conducted in this area, and if a commercial fishery takes place, the data are used for population estimates. Commercial fishers are legally required to report catches, tag recovery and associated data no later than 8 hours after the closure of each fishery and there is also a requirement that catch forms be either received by the Whitehorse office or post-marked within 10 business days after the closure of each commercial opening. A toll-free telephone catch line is also available for catch reporting.

6.0 STATUS OF SPAWNING STOCKS IN 2011

Alaskan and Canadian researchers have developed projects to monitor escapement and to determine genetic composition, relative abundance, run characteristics, and other information pertinent to the annual salmon migration. Main river sonar, tributary sonar, weir, and counting tower projects and aerial surveys are used to monitor escapement. Other information collected at ground-based projects may include, but is not limited to, salmon gender and length composition, scales for age determination, samples for genetic stock identification, data on resident species, and information from the recovery of tagged fish from various projects. Various government agencies, non-government organizations, and private contractors operate projects throughout the drainage (Appendices A7 and A8).

6.1 CHINOOK SALMON

6.1.1 Alaska

In Alaska, a suite of projects are used to assess the Chinook salmon run. The Lower Yukon Test Fishery (LYTF) assessment project, which uses 8.5-inch mesh set gillnets, indicated that the run was likely dominated by age-6 fish. Chinook salmon age composition estimated from a sample of 998 fish collected in the LYTF was 1% age-4, 32% age-5, 63% age-6, and 4% age-7 fish. The proportions of age-5 and age-6 fish were nearly reversed from those in 2010, and were close to the long-term averages (Table 5). Females comprised about 52% of the samples. Chinook salmon age composition estimated from samples collected in escapement projects on the Andreafsky, Anvik, Gisasa, Chena, and Salcha rivers, and Henshaw Creek ranged, among these sampling sites, from 15-46% age-4, 36-57% age-5, 12-48% age-6, and 0-2% age-7 fish. Female percentages in these escapement projects ranged from 18 to 42% (Appendix A10).

Table 5.–Yukon River Chinook salmon age and female percentages from the combined Big Eddy and Middle Mouth 8.5-inch mesh set gillnet test fishery catches, 1985–2011.

Year	Sample Size	Number of Days Sampled	Percent (%) by Age Class						Percent Female
			3	**4**	**5**	**6**	**7**	**8**	
1985	309	18	0.0	3.9	8.4	79.3	8.1	0.3	53.7
1986	533	25	0.3	0.9	22.7	52.9	23.1	0.2	46.3
1987	465	20	0.3	0.9	3.0	78.5	17.0	0.4	62.8
1988	262	30	0.0	2.3	15.3	43.9	37.8	0.8	56.1
1989	381	29	0.0	0.8	17.8	67.2	13.9	0.5	53.0
1990	227	23	0.0	3.5	11.0	76.7	8.8	0.0	56.4
1991	356	27	0.0	1.4	42.1	48.9	7.0	0.6	49.2
1992	359	19	0.0	1.1	10.6	82.7	5.0	0.6	56.5
1993	472	25	0.0	0.8	25.8	63.8	9.3	0.2	50.8
1994	653	41	0.2	1.4	41.3	51.8	5.5	0.0	47.3
1995	445	19	0.0	0.9	11.2	81.6	6.3	0.0	50.8
1996	355	13	0.0	1.1	61.4	21.4	16.3	0.0	53.0
1997	302	12	0.0	1.7	9.6	86.4	2.6	0.0	51.3
1998	928	39	0.0	1.3	43.4	45.3	9.9	0.1	50.2
1999	942	35	0.0	0.7	9.1	87.0	3.1	0.0	61.4
2000	950	42	0.2	0.7	19.2	71.1	9.1	0.0	53.4
2001	1,020	37	0.0	0.5	11.0	80.6	8.0	0.0	56.9
2002	1,050	43	0.0	2.5	20.5	64.9	12.1	0.0	52.2
2003	1,400	50	0.0	0.6	24.1	68.0	7.3	0.1	52.5
2004	865	48	0.1	4.3	18.5	74.5	2.7	0.0	58.2
2005	994	43	0.0	1.5	40.9	55.0	2.5	0.0	48.9
2006	987	38	0.0	2.2	50.6	45.0	2.2	0.0	48.5
2007	1,030	42	0.0	4.7	14.4	80.2	0.8	0.0	52.5
2008	1,271	43	0.0	1.2	44.4	51.0	3.5	0.0	46.3
2009	1,035	42	0.0	3.4	9.1	85.5	2.0	0.0	60.3
2010	1,328	37	0.2	4.1	59.6	33.6	2.6	0.0	47.8
2011	998	42	0.0	1.4	31.7	62.7	4.1	0.1	52.4
Average [a]			0.0	2.0	29.2	63.7	5.0	0.0	52.6

Note: The Big Eddy and Middle Mouth 8.5" set gillnet test fisheries were conducted from the end of May through July 15. Before 1998, these test fisheries were often discontinuous or were not conducted throughout the season. The "Number of Days" refers only to those days that scale samples were collected from Chinook salmon and aged.

[a] Average includes years 1994 and 1998–2011 when samples were collected throughout the season and years with a 35 day season minimum. Average was not weighted by number of fish sampled each year.

The actual 2011 Chinook salmon run fell within the preseason projection. Chinook salmon escapement goals for the East Fork and West Fork Andreafsky rivers were achieved. However, the Anvik River escapement goal was not met. Season cumulative counts on the Gisasa and Henshaw Rivers were above average, but these are relatively small contributors. High water conditions on the Chena, Salcha, and Goodpaster rivers precluded counting at towers or on aerial

surveys for much of the season, but aerial surveys on the Salcha River were adequate to obtain total counts meeting the escapement goal (Table 6; Appendices B9, B10, and C9).

Table 6.–Summary of 2011 Chinook salmon escapement counts, in comparison with existing escapement goals.

Location	Assessment Method	Escapement Goal	2011 Chinook Salmon Escapement
E. Fork Andreafsky	Weir	2,100-4,900 (SEG)	5,213
W. Fork Andreafsky	Aerial survey	640-1,600 (SEG)	1,173
Anvik	Aerial survey	1,100–1,700 (SEG)	642
Gisasa	Weir	none	2,692
Henshaw	Weir	none	1,796
Chena	Tower	2,800–5,700 (BEG)	na[1]
Salcha	Tower	3,300–6,500 (BEG)	3,537[2]
Goodpaster	Tower	none	1,325[3]

[1] Tower count was not available due to high water, and aerial survey counts were inadequate.

[2] Based on aerial counts (July 21 and 25); tower count was not available due to high water.

[3] This is a conservative estimate; the tower count was affected by flooding and high water from July 20 to 23 and July 27 to August 1.

The preliminary Chinook salmon estimate based on Pilot Station sonar counts was 107,027 fish (Appendix A2). Preliminary Chinook salmon passage at Eagle sonar in 2011 was 51,271 fish, and after subtracting estimated U.S. subsistence harvest above Eagle sonar, the estimated border passage was approximately 50,901 fish (Appendix B11).

6.1.2 Canada

The Yukon River Panel adopted an Interim Management Escapement Goal (IMEG) of between 42,500 and 55,000 Chinook salmon for 2010 and 2011, assessed using information from the Eagle sonar passage estimate. The estimated spawning escapement based on the Eagle sonar count and minus upstream harvest data is 46,307[3], which is within the IMEG (details are presented in Section 7.1.5).

Aerial surveys of the Little Salmon, Big Salmon, and Wolf river index areas were conducted by DFO (Appendix B12; Appendix C10). The Nisutlin River aerial survey was not completed this year due to extreme high water and turbidity. The Little Salmon aerial survey was flown on August 19. Survey conditions were rated as being poor, due to high water levels and turbidity; surveyors counted 38 Chinook salmon, 4.4% of the 2001–2010 (10-year) average count of 869 Chinook salmon. The Big Salmon and Wolf river index areas were surveyed on August 22 under fair survey conditions due to high water, wind and turbidity. The Big Salmon count of 405 was 35% of the 10-year average 1,148 Chinook salmon. The Wolf River count of 81 was 57% of the 10-year average count of 143 salmon. Single (or multiple) aerial surveys do not count the entire escapement within an aerial index area as runs are usually protracted with the early spawning

[3] This is based on a sonar estimate of 51,271 Chinook salmon, Eagle subsistence catch of 370 and Canadian Upper Yukon catch of 4,594 which included: 4,550 aboriginal, 4 commercial, 0 domestic, and 40 recreational.

fish disappearing before the late ones arrive. Weather and water conditions, the density of spawning fish, as well as observer experience and bias also affect survey accuracy. Index surveys are rated according to survey conditions. Potential ratings include excellent, good, fair and poor. Survey ratings that rank higher than poor are considered useful for inter-annual comparisons.

In 2011, a DIDSON sonar program was operated for the third time on the Klondike River. A total of 1,181 targets identified as Chinook salmon were counted at the sonar station between July 5 and August 14, 2011. This represents 2.5% of the Upper Yukon spawning estimate of 46,294 as compared with the 2010 and 2009 estimates of 803 (2.4%) and 4,725 (7.2%) respectively.

DIDSON sonar was operated for the seventh year on the Big Salmon River. A total of 5,156 targets identified as Chinook salmon were counted between July 17 and August 23, 2011. This estimate represents 11% of the Upper Yukon spawning escapement estimate of 46,294. The Big Salmon average sonar estimates from 2005 to 2010 is 5,292 (Appendix B12).

The 2011 Whitehorse Rapids Fishway Chinook salmon count of 1,534 was 131% of the 2001–2010 average count of 1,170 fish (Appendix B12), and 3.3% of the Yukon spawning escapement estimate of 46,294 fish. The overall sex ratio was 37% female (573 fish). Hatchery-produced fish accounted for 48.3% of the return, and consisted of 536 males and 205 females. The non-hatchery count consisted of 793 fish, 425 wild males and 368 wild females. Historical fishway counts are presented in Appendix B12.

In 2011, 360 Chinook salmon, with 55% of the sampled Chinook salmon being female, were counted at the Blind Creek weir. The 10-year average (2001–2010) count is 589 Chinook salmon.

6.2 SUMMER CHUM SALMON ALASKA

Summer chum salmon escapement was above average in most tributaries in 2011. Summer chum goals for East Fork Andreafsky and Anvik rivers were achieved. Counts at the Gisasa and Henshaw Creek were above average (Table 7; Appendices B13 and C11). Salcha River escapement as assessed by tower counts was near average; however, because this project experienced problems due to high water conditions, it is likely that these counts were very conservative. Escapement on the Chena River was impossible to assess because of environmental conditions (Appendix B13). The estimated cumulative passage of 1,778,870 summer chum salmon at the Pilot Station sonar project (Appendix A2), through July 18, exceeded the Optimal Escapement Goal (OEG) of 600,000 summer chum salmon.

Table 7.–Summary of 2011 summer chum salmon escapement counts, in comparison with existing escapement goals.

Location	Assessment Method	Escapement Goal	2011 Summer Chum Escapement
E. Fork Andreafsky	Weir	>40,000 (BEG)	100,473
Anvik	Sonar	350,00 –700,000 (BEG)	642,527
Gisasa	Weir	none	95,796
Henshaw	Weir	none	248,247

6.3 FALL CHUM SALMON

6.3.1 Alaska

The preliminary 2011 Yukon River drainagewide total run size estimate of 1,200,000 fall chum salmon is based on the postseason expanded escapement and estimated harvest. This run size was above the upper end of the preseason forecast range of 737,000 to 870,000 salmon and above the preseason projection (summer to fall chum salmon relationship) of 793,000 fish. Although final assessments of overall run size, spawner distribution, and age composition are not available at this time, preliminary assessments of run size are made using 2 methods. Fishery management initially places a considerable amount of weight on the Pilot Station sonar abundance estimate until upriver monitoring projects can provide data. The preliminary fall chum salmon passage estimate, based on Pilot Station sonar for the period July 19 through September 7, was 698,762 fish with a 90% confidence interval of 652,695 to 744,829 fish (Figure 4; Appendix A2). In 2011, references to inseason run size included estimates of harvest below Pilot Station sonar and an adjustment factor of 10% for Pilot Station being conservative. This reconstruction of the run was used to provide projections for inseason management and produced an estimated total run size of 956,458 fall chum salmon. Because of the location of the project (river mile 123), the abundance estimate includes Koyukuk River drainage stocks.

A second method to calculate run size uses information from individually monitored spawning escapements projects in the upper Yukon and Tanana River, including estimated U.S. and Canadian harvests where appropriate. In 2011, sonar projects were operated on Chandalar and Sheenjek rivers and provided escapement estimates of 295,000 and 98,000 fish respectively. A weir operated on Fishing Branch River in Canada's upper Porcupine River drainage provided an escapement estimate of 13,000 fall chum salmon. The passage of chum salmon into Canada on the mainstem Yukon River is estimated using sonar just downstream of Eagle and provided an estimate of 224,000 fish. This estimate was adjusted for the passage between October 6 and October 18. To estimate border passage, 12,400 fall chum salmon were subtracted from the sonar estimate to account for subsistence harvest between the sonar site and the Canadian border. The Tanana River component was determined based on a regression between historical Delta River population estimates and Tanana River population estimates generated from mark–recapture studies conducted between 1995 and 2007 (minus harvests in District 6). In 2011, this produced a preliminary estimated escapement of 271,000 fall chum salmon in the Tanana River.

Historically, Pilot Station sonar estimates agree reasonably well with the reconstructed run size for most years. In the recent escapement goal analysis (Fleischman and Borba 2009) there was on average 10% disagreement between the Pilot Station sonar estimates (1995, 1997–2005) and the collective escapement and harvest assessment projects. In 2011, the estimate based on collective projects is higher by about 27% based on the preliminary estimate of Pilot Station sonar and harvest below.

In 2011, the proportion by age class for fall chum salmon were all near average and include age-0.2 (0.8%), age-0.3 (70.4%), age-0.4 (28.3%) and age-0.5 (0.4%) fish when compared to the Lower Yukon Test Fishery weighted averages for the years 1977 to 2010. This level of age-0.3 and age-0.4 fish was very near the expected contribution based on the preseason forecast of 72.2% and 25.5% respectively. Age and sex composition data were collected from escapement projects at the Chandalar, Sheenjek, and Delta rivers, but analyses were not completed by this report publication date.

Fall chum salmon entered the Yukon River in 6 pulses, the first one containing high proportions of summer chum salmon (Figure 3). The summer and fall chum salmon runs are split by a calendar date (July 15, at the mouth of the Yukon River), where overlap occurs. As in 2008–2010, the sonar at Pilot Station was operated an additional week into September. Mt. Village test fishery was also operated later into the season, through September 30. A pulse was detected September 10-11 for both fall chum and coho salmon and no significant pulses after that time period. Based on genetics through September 7 and the lack of Tanana River fall chum salmon through that point in the run, the last pulse was expected to be bound for that system. In 2011, persistent high water throughout the season altered the migration between monitoring projects; the run timing was 1-4 days early in the Lower Yukon Area and subsequently 2–5 days late in the Upper Yukon Area.

Preliminary estimates of drainagewide escapement are based on a total run size estimate 1,200,000 fish minus U.S. and Canada commercial (242,000) as well as subsistence and Aboriginal (83,000) harvests of fall chum salmon. Hence, drainagewide escapement of fall chum salmon is estimated to be 881,000 fish. The Fishing Branch River interim management escapement goal was not met, however the goals were achieved in the Chandalar, Sheenjek, Mainstem Yukon, Tanana and Delta rivers (Table 8).

Table 8.–Summary of 2011 fall chum salmon escapement counts, in comparison with existing escapement goals.

Location	Assessment Method	Escapement Goal	2011 Fall Chum Salmon Escapement
Drainagewide	Run Reconstruction	300,000 – 600,000 (SEG)	881,309
Chandalar River	Sonar	74,000 – 152,000 (BEG)	295,335
Sheenjek River	Sonar	50,000 – 104,000 (BEG)	97,976 [a]
Upper Tributary [b]	Sonar/Weir	212,000 – 441,000 (BEG)	406,396
Tanana River	M/R regressions	61,000 –136,000 (BEG)	270,846
Delta River	Ground Survey	6,000 –13,000 (BEG)	23,639

[a] Total estimate from both banks includes 61,883 right bank and 36,094 left bank. Goal is measured by right bank passage only.

[b] Upper tributary goal is Chandalar, Sheenjek and Fishing Branch rivers combined.

The Chandalar River sonar project operated from August 9 through September 26, 2011. The cumulative count was 273,297 fish. However, because the project was still passing more than 5,000 fish a day when the project ceased operation, an expansion of passage through October 9 was made. The total passage estimate of 295,000 chum salmon was above the upper end of the BEG range of 74,000 to 152,000 fish (Appendices B13 and C12).

The Sheenjek River escapement was monitored by a Dual-Frequency Identification Sonar (DIDSON) one on each bank. Both bank operations have occurred in 2005-2009 and 2011. Most of the historical Sheenjek River escapement estimates were derived from right bank operations, originally using Bendix systems and then slit beam sonar (Appendix B14). The right bank passage estimate of 62,000 fish surpassed the lower end of the BEG range of 50,000 to 104,000

fall chum salmon (BEG is based on the historical right bank data; Appendix C12). Expansions of passage on both the left and right banks from September 25 through October 9 resulted in an estimate of 98,000 fall chum salmon.

An interim management escapement goal (IMEG) of 22,000 to 49,000 fish was established for the Fishing Branch River to apply from 2008 through 2013. This goal uses percentiles based on weir data only, excluding all years with extrapolations based on other methods of measurement. In 2011 the Fishing Branch River weir experienced a high water event early in the season that prevented counting therefore extrapolation was used to estimate passage during that portion of the run. The project operated from September 1 to October 16, and an expansion was used to estimate fall chum salmon passage through October 25. The 2011 estimated passage of approximately 13,085 fish is below the lower end of the IMEG (Appendices B15 and C14).

The Yukon River mainstem sonar at Eagle counted fall chum salmon from August 13 through October 6, and then counts were extrapolated through October 18, 2011. The estimated passage was 224,354 fall chum salmon. Subtracting an estimated harvest of 12,400 fall chum salmon from the community of Eagle (those who fished between the sonar site and the U.S./Canada border) resulted in a border passage estimate of 212,000 fish. Harvests in Canada resulted in an escapement estimate of approximately 205,930 fall chum salmon. In 2011, the upper end of the IMEG range of 70,000 to 104,000 fall chum salmon was exceeded (Appendices B15 and C14).

The Delta River, a tributary of the Tanana River, has a BEG range of 6,000 to 13,000 fall chum salmon. Evaluation of the run to the Delta River in 2011 was based on 7 replicate foot surveys conducted between October 4 and November 29. The Delta River escapement was estimated to be approximately 24,000 fall chum salmon using the area under the curve method and exceeded the upper end of the BEG range (Appendices B13 and C12).

In 2011, inseason assessment of the fall chum salmon run into the Tanana River drainage consisted of monitoring run timing and catch at 2 test fishery wheels located near the village of Tanana and Nenana, and monitoring subsistence and commercial harvest in the fisheries. Initially mixed stock analysis (MSA) is used to assess the fall chum salmon run into the Tanana River drainage, but this can be greatly affected by stock run timing. Based on the historical mark–recapture abundance estimates of fall chum salmon (1995–2007) within the Tanana River, the drainage contributes approximately 30% to the overall Yukon River drainage fall chum salmon run.

In 2011, there were concerns when the MSA was providing low estimates of Tanana River fall chum salmon when compared to run size estimates for other areas of the Yukon River drainage (e.g. U.S. Border and Mainstem Canadian border). Estimation of the Tanana River component using the relationship between the Tanana River (Upper Tanana and Kantishna rivers mark–recapture) and the Delta River produced a run size estimate of 293,000, minus an estimated Tanana River harvest of 22,000, results in an escapement of 271,000 fall chum salmon. The estimated escapement was above the Tanana River BEG range of 61,000 to 136,000 fall chum salmon (Appendix B13).

6.3.2 Canada

The preliminary fall chum salmon spawning escapement estimate based on the Eagle sonar program is 205,642[4] (details are presented in Section 7.1.5). The sonar program near Eagle has operated since 2006 for chum salmon; generally there was good agreement between the sonar estimates and estimates derived from the mark–recapture program for 2006–2008.

Mark–recapture estimates for the 1980 to 2008 period are presented in Appendix B14. The highest estimated fall chum salmon spawning escapement of 437,733 occurred in 2005.

Aerial surveys of the mainstem Yukon, Kluane and Teslin River index areas were not conducted between 2007 and 2011. Estimates of the relative abundance of fall chum salmon in these areas were developed from GSI collected in conjunction with the DFO tagging program (2007–2008) and the Eagle sonar program (2009). Historical aerial survey data are presented in Appendices B15, C13 and C14.

In the Porcupine River drainage, the Fishing Branch River weir was operated from September 1 to October 15. The count was 11,157 fall chum salmon and included 6,285 females and 4,872 males. During September 8–18, no weir counts were obtained due to a high water event. An aerial survey was flown on September 20 to assess the chum salmon passage during this high water event and it was confirmed that minimal chum salmon had migrated through the weir when counts were not obtained. An adjustment of 1,928 chum salmon was made to account for fish that had migrated past the weir site during the high water event and after the weir was removed. These estimates were developed by extrapolating the first and last full days' counts based on run timing data. Thus the total estimated 2011 Fishing Branch River escapement is 13,085 fall chum salmon (Appendices B14 and C14), which is below the lower end of the escapement target of 22,000 to 49,000 fall chum salmon. Details of the 2011 weir operation are presented in Section 7.2.8.1.

In addition to the Fishing Branch River weir, a sonar program was operated from August 21 to September 22, on the Porcupine River immediately downstream of Old Crow. A total of 11,431 targets were enumerated with a preliminary passage of 12,438 chum salmon after extrapolating for periods the sonars were down due to generator failures. The preliminary spawning escapement developed by the sonar program is 10,938 for the Porcupine River in Canada. More detail is provided in Section 7.2.8.2.

[4] This is based on a sonar estimate of 224,355 (expanded for fish passage after the cessation of the program), Eagle subsistence catch of 12,425 and Canadian Upper Yukon catch of 4,044 which included: 1,000 aboriginal, 5,092 commercial, 0 domestic, and 0 recreational.

Table 9.–Summary of 2011 chum salmon escapement counts to Canada, in comparison with existing interim management escapement goals (IMEG).

Location	Assessment Method	Interim Management Escapement Goal	2011 Fall Chum Salmon Escapement
Fishing Branch River	Weir	22,000 – 49,000 (IMEG)	13,085
Yukon River Mainstem	Sonar-Harvest	70,000 – 104,000 (IMEG)	205,838

7.0 PROJECT SUMMARIES

7.1 ALASKA

7.1.1 Pilot Station Sonar

The goal of the Yukon River sonar project at Pilot Station is to estimate the daily upstream passage of Chinook, chum, and coho salmon. The project has been in operation 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.

Prior to 1993, ADF&G used dual-beam sonar equipment that operated at 420 kHz. In 1993, ADF&G changed the 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 fish detection at long range.

Up until 1995, ADF&G attempted to identify direction of travel of detected targets 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 refinements to the species apportionment process and implementation of an aiming strategy designed to consistently maximize fish detection. Because of these changes in methodology, data collected from 1995 to 2011 are not directly comparable to previous years. In 2001, the equipment was changed from dual-beam to the current split-beam sonar system. This technology allows better testing of assumptions about direction of travel and vertical distribution.

Early in the 2005 season, the Yukon River experienced high water levels and erosion in the river bottom profile, which, along with a combination of changes in fish movement and distribution, affected detection of fish with the split-beam sonar within 20 m of shore on the left (south) bank. On June 19, a Dual Frequency Identification Sonar (DIDSON) was deployed in this area to supplement estimates generated with the split-beam sonar. With its wider beam angle, the DIDSON system was able to detect fish passage within 20 m despite high water levels and problematic erosion nearshore, and was operated for the remainder of the season.

Starting in 2006, the DIDSON was integrated into the sampling routine on the left bank for the whole season, operating side-by-side with the split-beam sonar. The DIDSON samples the first 20 m offshore; the remainder of the 300 m range is sampled by the split-beam sonar (Figure 8). The use of the DIDSON has not been necessary on the right bank because it is stable and not prone to erosion.

Fish passage estimates at Pilot Station are based on a sampling design in which sonar equipment is operated daily in three 3-hour intervals, and drift gillnets are fished twice each day between sonar periods to apportion the sonar counts to species. The test fishing program, used 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), drifted through the sonar sampling areas twice daily between sonar data collection periods.

During the 2011 season, split-beam sonar was deployed on the right bank on June 1 and both banks were fully operational from June 4 through September 7. Test fishing began on June 1, with the first Chinook salmon caught on June 1, first summer chum salmon caught on June 6, and the first coho salmon caught on July 21.

Drift gillnetting resulted in a catch of 9,808 fish including 571 Chinook, 3,951 summer chum, 2,615 fall chum, and 850 coho salmon; 1,651 fish of other species were also caught. Chinook salmon were sampled for age, sex, and length, and genetic samples were taken from both Chinook and chum salmon. Any captured fish that were not successfully released alive were distributed daily to nearby residents in Pilot Station.

The right bank bottom profiles remained similar to prior years with little or no change throughout the season. On the left bank, profiles remained linear throughout the field season, but heavy silt bands between June 1 and June 21 made detection difficult within the first 20m. Water levels observed near Pilot Station were above average during a majority of both the summer and fall seasons compared to USGS 2001–2010 data.

Cumulative passage estimates for each targeted species through September 7 were 87,090 large Chinook, 19,937 small Chinook, 1,778,870 summer chum, 698,762 fall chum, and 118,453 coho salmon. Additionally, passage estimates for non-target fish species include 5,934 pink salmon and 637,062 other fish species. Detailed historical passage estimates for 1995 and 1997–2011 are listed in Appendix A for comparison. The DIDSON sonar accounted for an additional 4.8% of Chinook salmon, 3.9% of summer chum salmon, 3.7% of fall chum salmon, and 3.0% of coho salmon passage over the split beam estimates. Overall, the DIDSON estimate contributed an additional 4.0% of the total passage.

In 2011 all project goals were met, with passage estimates given to fisheries managers daily during the season. Information generated at the Pilot Station Sonar project was also disseminated weekly through multi-agency international teleconferences and data-sharing with stakeholders in areas from the lower Yukon River all the way to the spawning grounds in Canada.

7.1.2 Yukon River Chinook Salmon Harvest Stock Identification

Scale pattern analysis, age composition estimates, and geographic distribution has been used by ADF&G on an annual basis from 1981 through 2003 to estimate stock composition of Chinook salmon in Yukon River harvests. Three region-of-origin groupings of Chinook salmon, or stock groups, had been identified within the Yukon River drainage. The Lower and Middle stock groups spawn in Alaska and the Upper stock group spawns in Canada.

In 2004, genetic analysis replaced scale pattern analysis as the primary method for stock identification. Tissue samples were collected from fish in mixed-stock harvests in Districts 1 through 5 and these were typically paired with age data. Genetic analysis has been performed by major age class, age-1.3 and -1.4, but in recent years all ages have been combined. Results from

these analyses were combined with harvest age composition to provide stock composition by harvest.

ADF&G Gene Conservation Laboratory provided genetic stock estimates for Chinook salmon sampled in commercial and subsistence harvests, and test fisheries in 2010. These estimates, harvest age composition, and geographic location were used to apportion the annual harvest within the drainage to Lower, Middle, and Upper stock groups. Drainagewide (U.S. and Canada) harvest estimates for 2010 were 17.6% from the Lower stock group, 32.9% from the Middle stock group, and 49.6% from the Upper stock group (Appendix A12). U.S.-only harvest estimates from the Lower, Middle, and Upper stock groups were 18.4%, 34.5%, and 47.1%; respectively (Appendix A13). The Upper stock group harvest estimates were 90.5% in U.S. and 9.5% in Canada (Appendix A14). Comparing the 2010 total Chinook salmon harvest (U.S. and Canada) percentage with the 1981 through 2009 average, the Lower stock group was slightly below average, the Middle stock group was above average, and the Upper stock group was below average (Appendix A14). Comparing the 2010 Upper stock group harvest (U.S. and Canada) percentage with the average, the U.S. harvest was above average (Appendix A15). The 2011 estimates by stock group will not be available until the following year.

7.1.3 Alaska Drainage Yukon River Chinook and Chum Salmon Genetic Sampling

7.1.3.1 Chinook salmon

ADF&G field crews, along with other collaborators, collected 7,076 samples (axillary process tissue preserved in ethanol) from Chinook salmon harvested by test, tagging, subsistence, and the incidental commercial harvest in 2011. These samples were from mixed-stock fisheries in the coastal area and mainstem Yukon River in Districts 1 through 5. Samples from test fisheries totaled 2,314 fish: 2 from Dall Point, 1,267 from Big Eddy and Middle Mouth combined, 430 from Mountain Village, 568 from Pilot Station Sonar, and 500 from Eagle Sonar. The Pilot Station acoustic tagging project collected 47 samples. Samples from the incidental commercial catch in Districts 1 and 2 combined totaled 521 fish. Samples from subsistence fisheries totaled 3,741 fish: 64 from Alakanuk, 56 from Emmonak, 209 from Saint Mary's, 498 from Anvik, 250 from Kaltag, 70 from Nulato, 569 from Galena, 93 from Ruby, 251 from Tanana, 1,194 from Rampart Rapids, 222 in the vicinity of Hess Creek near the Yukon River bridge, and 53 from Fort Yukon. Subsistence harvest samples were collected by several organizations: Association of Village Council Presidents, Tanana Chiefs Conference, City of Kaltag, and Rapids Research Center. These organizations typically contract with individual fishermen in several locations to sample their harvest.

Baseline Chinook salmon samples were collected from 3 locations: 4 from the Jim River, 13 from the Middle Fork Koyukuk River, and 25 from the Coleen River. Chinook salmon genetic samples reside in the Gene Conservation Laboratory, ADF&G, Anchorage.

7.1.3.2 Chum salmon

ADF&G, in cooperation with USFWS, collected genetic tissue samples from the Pilot Station test fishery from 3,952 summer and 2,615 fall run chum salmon. Baseline samples from 63 fish were collected from Chandalar River fall chum salmon. Chum salmon genetic samples reside in the Conservation Genetics Laboratory, USFWS, Anchorage.

7.1.4 Yukon River Chum Salmon Mixed-Stock Analysis

From 2004 to 2007, the stock compositions of fall chum salmon were estimated from samples collected from Pilot Station sonar test fisheries for the period spanning July 1 through August 31. Since 2008, sampling has started at the beginning of June through the first week of September to estimate the stock compositions for the majority of the summer and fall chum salmon runs. A baseline of standardized data collected at 21 microsatellite loci was constructed from the following stocks (sample sizes in parentheses): Andreafsky River (261), Chulinak River (100), Anvik River (100), Nulato River (100), Gisasa River (200), Henshaw River (200), South Fork Koyukuk River (200), Jim Creek (160), Melozitna River (146), Tozitna River (200), Chena River (172), Salcha River (185), Big Salt River (71), Kantishna River (161), Toklat River (192), Delta River (80), Chandalar River (338), Sheenjek River (263), Black River (112), Fishing Branch River (481), Big Creek (200), Minto River (166), Pelly River (84), Tatchun River (175), Kluane River (462), Donjek River (72), and Teslin River (143). Results from this analysis were reported for each pulse or time stratum and distributed by email to fishery managers within 24-48 hours of receiving the samples. For summer chum salmon, the lower river stock group comprised 84% of the run while the middle river stock group comprised 16%. Within the middle river stock group, the Tanana summer component comprised 4% and peaked in passage past Pilot Station sonar during the sampling period of July 12 to 18. For fall chum salmon, 60% of the run was of U.S.-origin and 40% of Canadian-origin. The composition of the U.S. contribution was 16% Tanana and 44% U.S. border (Chandalar and Sheenjek rivers). The composition of the Canadian contribution was 14% mainstem, 8% Porcupine, 16% White, and 2% Teslin rivers. Stock abundance estimates were derived by combining the Pilot Station sonar passage estimates with the stock composition estimates. To evaluate the concordance of various data sources, an analysis was conducted to compare these stock specific abundance estimates against escapement and harvest estimates. This analysis revealed that the stock proportions were concordant for 2004–2009. However, the level of agreement of estimated abundance between the monitoring methods appeared to be related to the run timing of the summer and fall runs of chum salmon. There was better agreement in 2004 and 2005 when fall chum salmon comprised the majority of the run after the transition date. Less agreement was found in 2006–2009 when the fall run was late, which suggested that the sonar missed the late returning fish after it ended operations and that escapement projects counted summer chum salmon as fall (Flannery et al 2011). An analysis is ongoing for the 2010 and 2011 data, and preparations are underway to continue the project for the 2012 season.

7.1.5 Eagle Sonar

In 2003, ADF&G began investigating the feasibility of using sonar to estimate Chinook and fall chum salmon passage in the Yukon River near the United States/Canada border. This effort was initiated in response to concerns about assessment methodologies and the importance of accurate border passage information. A suitable section of river was identified near Eagle, Alaska for a potential sonar project. In 2004, ADF&G carried out a 2-week study to evaluate the performance of sonar at 2 preferred sites, Calico Bluff and Six-Mile Bend (Carroll et al. 2007a). It was found that Six-Mile Bend was the superior site, that Dual Frequency Identification Sonar (DIDSON) should be deployed on the shorter, steeper right bank, and split-beam sonar should be deployed on the longer, more linear left bank.

A full-scale project was initiated at Six-Mile Bend in 2005 to estimate Chinook salmon passage using sonar (Carroll et al. 2007b). Since 2006 both Chinook and fall chum salmon passage has

been estimated at the same location (Crane and Dunbar 2011). DIDSON was the ideal system for the right bank, where the profile is steep and less linear than the left bank. The split-beam system worked well on the left bank and appeared to have a satisfactory detection rate nearshore, while still adequately detecting targets out to 150 m.

In 2011, the Chinook salmon passage estimate at the Eagle sonar site was 51,271 for the dates July 5 through August 12 (Table 8). When the preliminary Eagle area Chinook salmon subsistence harvest of 370 (Deena Jallen, Fisheries Biologist, ADF&G, Fairbanks, Alaska; personal communication) is subtracted from the sonar estimate, the resulting border passage estimate is 50,901. After removal of Canadian harvest the resulting escapement falls within the IMEG of 42,500-55,000 Chinook salmon. The fall chum salmon passage estimate at the Eagle sonar site was 212,162 for the dates August 13 through October 6 (Table 10). Because of the high passage of chum salmon when the project was terminated the sonar estimate was subsequently adjusted to 224,355 fish. The expansion was calculated using a 2nd order polynomial calculated to the date October 18 (Bonnie Borba, Fisheries Biologist, ADF&G, Fairbanks, Alaska; personal communication). When the preliminary Eagle area chum salmon subsistence harvest of 12,425 (Deena Jallen, Fisheries Biologist, ADF&G, Fairbanks, Alaska; personal communication) is removed from the sonar estimate, the resulting border passage estimate is 211,930. After removal of Canadian harvest the resulting escapement was well above the high end of the IMEG of 70,000-104,000.

In 2011 there was only one high water event that included large amounts of silt and woody debris. Sonar counts were subsequently adjusted to account for fish that may have been missed during periods of high water.

Table 10.–Eagle sonar project passage estimates, and border passage estimates, 2005–2011.

	Sonar Estimate		Eagle Area Subsistence Harvest[a]		U.S. Sonar Mainstem Border Passage Estimate	
Date	Chinook	chum	Chinook	chum	Chinook	chum
2005	81,528	NA	2,566	NA	78,962	NA
2006	73,691	236,386	2,303	17,775	71,388	218,611
2007	41,697	282,670[b]	1,999	18,691	39,698	263,979
2008	38,097	193,397[b]	815	11,755	37,282	181,642
2009	69,957	101,734[b]	382	6,995	69,575	94,739
2010	35,074	132,930[b]	609	11,350	34,465	121,580
2011	51,271	224,355[b]	370	12,425	50,901	211,930

Note: Estimates for subsistence caught salmon between the sonar site and border (Eagle area) prior to 2008 include an unknown portion caught below the sonar site. This number is most likely in the hundreds for Chinook salmon, and a few thousand for chum salmon. Starting in 2008, the estimates for subsistence caught salmon only include salmon harvested between the sonar site and the U.S./Canada border.

[a] Except for 2005, 2008, and 2009 subsistence estimates are preliminary.

[b] Expanded sonar estimate, includes expansion for fish that may have passed after operations ceased.

In addition to operating the sonar, a drift gillnet program was conducted at or near Six-Mile Bend to monitor species composition, and to collect age, sex, and length (ASL) data, and genetic samples of the fish passing the sonar site. Four gillnets, 25 fathoms in length with mesh sizes including 5.25, 6.5, 7.5, and 8.5 inches, were fished daily to collect the samples. Although there

is some minor overlap, Chinook and chum salmon runs appear to be largely discrete in time based on test fishery results, local knowledge of catches, and data collected in Canada.

7.1.6 Sheenjek River Sonar

The Sheenjek River sonar project has estimated fall chum salmon escapement since 1981 and has undergone a number of changes throughout the years. The project originally operated Bendix single-beam sonar equipment and, although the Bendix sonar functioned well, the manufacturer ceased production in the mid-1990s and no longer supports the system. In 2000, ADF&G purchased a Hydroacoustic Technology Inc. model 241 split-beam digital echosounder system for use on the Sheenjek River. In 2000 and 2002, the new system was deployed alongside the existing single-beam sonar and it produced results comparable to the Bendix equipment (Dunbar 2004). In 2003 and 2004, the split-beam sonar system was used exclusively to enumerate fall chum salmon in the Sheenjek River.

The current biological escapement goal (BEG) is based only on right bank passage. Historically, due to unfavorable conditions for transducer placement on the left bank, only the right bank of the Sheenjek River has been used to estimate fish passage. Drift gillnet studies in the early 1980's suggested that distribution of the upstream migrant fall chum salmon was primarily concentrated on the right bank of the river at the sonar site, with only a small but unknown proportion passing on the left bank (Barton 1985).

In 2003, a dual frequency identification sonar (DIDSON) was deployed on the left bank to better understand the distribution of migrating chum salmon. Results showed that approximately 33% of the fish were migrating up the left bank (Dunbar 2006). Due to large numbers of fish observed on the left bank, ADF&G began operating DIDSON on both banks in 2005. The 2005 season marked a successful transition from a single split-beam system on the right bank to DIDSON systems deployed on both banks (Dunbar and Pfisterer 2009). The new equipment was both easier to use and produced more accurate estimates.

In 2009, 39% of the fish migrated on the formerly unmonitored left bank, compared to 16 % in 2008, 40% in 2007 and 39% in 2005 and 2006 (Dunbar 2010). The left bank sonar did not operate in 2010 because of flooding. In 2011, 40% of migrating salmon passed on the left bank and 60% passed on the right bank. It will take several more years of data collection to determine how best to treat the historical estimates, but in order to provide the best escapement number possible the left bank must continue to be monitored. Until then, only the right bank estimate will be used to evaluate whether the BEG is obtained. The transition from split-beam to DIDSON has gone smoothly and this equipment should continue to provide accurate escapement estimates in future years.

In 2011, the fall chum salmon passage estimate at the Sheenjek River sonar site was 81,980 for the dates August 8 through September 24. Because of high passage when the project was terminated the sonar estimate was subsequently adjusted to 97,976 fall chum salmon. The expansion was calculated using a 2^{nd} order polynomial calculated to the date October 9 (Bonnie Borba, Fisheries Biologist, ADF&G, Fairbanks, Alaska; personal communication). For comparison with past years, only the expanded right bank estimate of 61,882 was used to evaluate whether the biological escapement goal (BEG) was obtained. The right bank estimate was 19% above the low end of the Sheenjek River biological escapement goal of 50,000 to 104,000 chum salmon.

7.1.7 Juvenile Chinook salmon study near U.S./Canada border

Previous life history and distribution studies have shown that some age-0 Chinook salmon leave their natal streams and colonize downriver, nonnatal habitats for rearing and overwintering. A pilot study in 2006–2007 documented rearing of Canadian-origin Chinook salmon in downstream U.S. waters. A comprehensive 3-year distribution study was funded by the Alaska Sustainable Salmon Fund in 2008 to describe the extent of Chinook salmon rearing in nonnatal U.S. tributary streams of the Yukon River between the U.S.–Canada border and Tanana, Alaska, a distance of over 850 km. Juvenile Chinook salmon were captured in 44 of the 56 streams sampled. Genetic material was collected from all 616 fish captured and the stock composition results from the samples are summarized here (genetics work funded by R&E Fund, Project URE-23N-10). Using genetic mixed-stock and individual assignment analyses, sample mixtures and individuals were assigned to regional stock groups and country of origin. Canadian-origin Chinook salmon contributed between 88% and 100% of the yearly mixtures (2008-2010) and between 91% and 100% of the yearly assigned samples, with Canadian percentages decreasing with increased distance from the U.S.–Canada border. The Carmacks regional group, 470 to 590 km upstream of the border, made up the majority of mixtures and individual assignments throughout the study area. Other Canadian groups were under-represented, including the large-river stocks from the Stewart, Pelly, and Teslin rivers. The furthest travel distance was estimated to be over 1,300 km. The Upper USA stock group was identified in some downstream creeks below the Dalton Highway Bridge, but always in low numbers. The mechanism that causes this disproportionate number of Carmacks area juveniles to leave their natal streams for downstream rearing areas and the cost, if any, of this dispersal strategy are unknown. The R&E funded report is available on request (david_daum@fws.gov) or from the Yukon Panel website:

http://yukonriverpanel.com/salmon/restoration-enhancement/re-fund-reports/re-reports-2010/.

7.2 CANADA

7.2.1 Upper Yukon River Salmon Assessment Programs (Yukon Territory)

7.2.1.1 Chinook Salmon

The Eagle sonar program was used to determine the Canadian Upper Yukon border passage estimate in 2011. The preliminary border passage estimate for 2011 is 50,901 Chinook salmon on based on the Eagle sonar estimate of 51,271 minus an estimated Alaskan subsistence harvest upstream of the sonar site of 370 fish[5]. After subtracting the Canadian Upper Yukon River Chinook salmon harvest of 4,550 aboriginal, 4 commercial, 0 domestic and 40 recreational, a total of 46,307 Chinook salmon is estimated to have reached Canadian spawning areas. The spawning escapement is within the Interim Management Escapement Goal (IMEG) range of 42,500 to 55,000 adopted by the Yukon River Panel in 2010.

A preliminary reconstruction suggests that the total Canadian-origin Chinook salmon run size was approximately 72,371 fish. A run size of this magnitude is above the lower end of the precautionary preseason outlook range of 65,000 to 89,000 (JTC 2011)[6].

[5] Eagle subsistence harvest of Chinook and fall chum salmon upstream of sonar site was provided by ADF&G.

[6] This low end is the forecast developed using the adjustment indicated by the models' performance in 2010, while the high end is the forecast developed using the adjustment indicated by the models performance in 2009. These were the extremes of model performance in the last 5 years.

7.2.1.2 Fall Chum Salmon

The Eagle sonar program was also used to determine the Upper Yukon chum salmon border passage estimate in 2011.

The estimate at the Eagle sonar program is 224,355[7] fall chum salmon. A preliminary border passage estimate of 211,930 has been calculated by subtracting the estimated Alaskan subsistence harvest (12,425 fish5) upstream of the sonar site.

A total of 205,617 fall chum salmon is estimated to have reached Canadian spawning areas in the upper Yukon drainage. This estimate is derived by subtracting the Canadian harvest of 6,312 Upper Yukon River fall chum salmon, which includes 1,000 harvested in the aboriginal fishery and 5,312 harvested in the commercial fishery, from the border passage estimate of 211,929. The spawning escapement estimate is approximately double the upper end of the spawning escapement goal range of 70,000 to 104,000 adopted by the Yukon River Panel in 2010 and maintained for 2011.

A preliminary reconstruction of the 2011 fall chum salmon run suggests the total Canadian-origin fall chum salmon run size was approximately 326,000 fish[8]. This reconstruction is above the preseason outlook range of 151,000 to 217,000 Upper Yukon fall chum salmon. The 2011 preseason outlook range was based on the ADF&G drainage wide outlook range of 605,000 to 870,000 fall chum salmon and an assumption that upper Yukon Canadian-origin fall chum salmon would constitute at least 25% of the drainage wide return.

7.2.2 Klondike Sonar

A feasibility study for a Klondike River Chinook salmon sonar program was conducted in 2008. A suitable sonar site was found approximately 3.5 km upstream of the mouth of the Klondike River; this site was used for a fully operational program in 2009 to 2011 (Appendix B12). The project was conducted by B. Mercer and Associates and funding for the 2008 to 2011 programs was provided by the Restoration and Enhancement Fund (project numbers CRE-16-11).

The sonar site has a total wetted river width of approximately 53 m with a maximum depth of approximately 2 m. The profile of the cross-section at this location is conducive to providing complete ensonification of the water column with no acoustic shadows or blind spots. Two weir structures were constructed on each side of the river to reduce the effective migration width to 38 m. A DIDSON-LR was available for the first 15 days and then a standard DIDSON was utilized for the remainder of the season at the maximum ensonification range of 40 m and was fitted with an 8^{o} concentrator lens.

The sonar program was operational from July 5 through August 14, 2011. The sonar was operational 24 hours per day with the exception of one 11 hour period (July 6-7) and 4 hours on both July 19 and August 5. All files from each 24 hour period were examined and all salmon targets counted. A total of 1,282 targets were counted at the sonar station and an additional 29 targets were added to account for sonar outages and passage after the removal of the DIDSON, for a total of 1,311 salmon.

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[7] Eagle sonar estimate was provided by ADF&G and includes the expanded count for chum that may have passed after the program ceased.

[8] Reconstructed run estimate of 326,000 Canadian Upper Yukon fall chum salmon comprised of 224,354 chum salmon from Eagle Sonar, plus 25,366 estimated US subsistence harvest (32% of 79,269) of Canadian upper Yukon fall chum salmon, plus 76,473 estimated commercial harvest (32% of 238,979 fall chum salmon from the mainstem Yukon US commercial harvest).

After August 2, counts started to rise, likely due to chum salmon entering the system. A chum salmon subtraction factor using exponential regression was used to obtain a Klondike River Chinook escapement of 1,181. This represents 2.5% of the upper Yukon spawning estimate of 46,294 Chinook salmon. The dates when 10%, 50% and 90% of the fish had passed were July 14, July 23 and August 3, respectively. The Klondike River Chinook salmon run has one of the earliest migration timing patterns of upper Yukon River Chinook salmon stocks.

A carcass pitch survey of the upper Klondike River was conducted on August 4, 8, 11 and 14. Chinook salmon carcasses were sampled for age, sex, length and genetics. A total of 48 Chinook salmon were sampled, of which 15 (31%) were female and 33 (69%) were male. The mean mideye fork length (MEFL) of females and males sampled was 883 mm and 803 mm, respectively. DNA samples were obtained from 36 of the Chinook salmon. The DFO scale lab determined ages of 42 of the Chinook salmon sampled. Of these, age-5 and age-4 fish were the predominant age classes, comprising 52.4% and 40.5% of the sample, respectively. Age 3 and 6 represented 2.4% and 4.8, respectively.

7.2.3 Blind Creek Weir

A weir was operated in Blind Creek by J. Wilson and Associates with funding from the Restoration and Enhancement Fund (Project number CRE-37-11) to enumerate the 2011 Chinook salmon escapement and obtain information on stock characteristics. The weir site was located at the same site as in previous years, approximately 1 km upstream of the confluence with the Pelly River. Operation of the weir began on July 15 and continued until August 18. The first Chinook salmon passed through the weir on July 24. In total, 360 Chinook salmon were counted. This is approximately 57% of the average total count of 627 (Appendix B11). The count of 360 Chinook represents 0.78% of the Upper Yukon spawning escapement of 46,294. Fifty percent of the run had passed through the weir by August 10 and 90% by August 13.

Age-sex-length samples were randomly collected from migrating Chinook salmon throughout the period of weir operation. A total of 203 Chinook salmon (69% of the run) was sampled, of which 55% were female and 45% were male. Jacks (males with a snout to fork length ≤630 mm) compromised 25% of the males sampled. The mean fork length of females and males sampled was 882 mm and 770 mm respectively. The DFO scale lab determined ages of 165 of the Chinook salmon sampled. Of these, age 5 and age 4 fish were the predominant age classes, comprising 55.7% and 26.1% of the sample, respectively. Age 3 and 6 represented 9.7% and 8.4%, respectively. Scale age determined that 7.2% of the Chinook sampled spent 2 years in freshwater.

7.2.4 Big Salmon Sonar

A long range dual frequency identification sonar (DIDSON-LR) was used to enumerate Chinook salmon returning to the Big Salmon River in 2011. This was the seventh year a sonar program has been conducted at this site by J. Wilson and Associates in partnership with B. Mercer and Associates with funding from the Restoration and Enhancement Fund (Project number CRE-41-11). The sonar site is located on the Big Salmon River approximately 1.5 km upstream of the Yukon River confluence, the same location used for the 2005 to 2010 programs. Partial weirs placed on both sides of the river were used to constrict fish movement through a 36 m opening. The sonar unit was configured to provide a 29^{o} wide by 8^{o} deep ensonified field.

The sonar program was operational from July 17 through August 23, 2011. The sonar was operational 24 hours per day with less than 5 hours of downtime. A total of 5,156 targets were identified as Chinook salmon. This estimate represents about 11% of the 46,338 upper Yukon spawning escapement estimate. The first Chinook salmon was observed on July 17. The peak daily passage of 426 fish was observed on August 4; 10%, 50% and 90% of the run had passed the station by July 28, August 4 and August 12, respectively. The 2011 estimate is close to the average from 2005 to 2010 of 5,292 (Appendix B11).

A carcass pitch was conducted over approximately 120 km of the Big Salmon River, yielding 271 Chinook salmon carcasses. Each carcass was sampled for age, sex and length (ASL data). Of the 271 fish sampled, 64% were female and 36% were male. Age data were determined from 219 fish sampled. Age 5 was the dominant age class comprising 77.6%, followed by age 4 (15.1%) fish. Age 3 and age 6 fish represented 2.7% and 4.6% of the sample, respectively.

7.2.5 Teslin River Sonar

In 2011 a feasibility project was conducted by B. Mercer & Associates with Restoration and Enhancement Funds (Project number CRE-01N-11) on the lower mainstem Teslin River. The goal of the project was to identify and evaluate a DIDSON sonar site suitable for enumerating the Chinook salmon escapement entering the Teslin River watershed. Only one site was identified as being suitable for the effective use of DIDSON sonar in the area. The site chosen had the following characteristics: river width of 90m, laminar flow, appropriate cross section profile and a maximum thalweg depth of less than 5.5m.

Two DIDSON units were deployed at the site, one on each bank aimed to the center of the river. The sonars were operated continuously from August 3- August 16 over the assumed peak of the Chinook run. Sonar targets were identified as Chinook and differentiated from resident fish species based on size and swimming characteristics. Species apportionment was not validated by test fishing. A total of 3,401 assumed Chinook salmon were counted. The majority (97%) of the Chinook salmon targets were enumerated by the North Bank sonar, and only 3% counted by the sonar on the south bank. The sonar units were inter-changed during the project with no change in the detection ratio. The orientation of migrating Chinook salmon to the north side of the river could be due to the stronger current and turbulence observed on the south side. The feasibility study concluded an accurate estimate of the Teslin watershed Chinook salmon escapement could be obtained using DIDSON sonar at the identified site.

In addition to the sonar feasibility study, a carcass pitch was conducted from September 3 to 5. Carcasses and moribund fish were recovered from the mainstem Teslin River and sampled for DNA (if alive or red gilled), scales, sex and length. A total of 176 Chinook salmon were sampled for ASL including a sub-set of 55 DNA samples. The sample set was comprised of 58 (33%) female and 118 (67%) male. The mean mideye to fork length was 869 mm for females and 757 mm for males. Age data were determined from 146 fish sampled. Age-4 was the dominant age class comprising about 47%, followed closely by age-5 (45%) fish. Age-3 and age-6 fish each represented 4.1% of the sample.

7.2.6 Whitehorse Rapids Fishway Chinook Salmon Enumeration

A total of 1,534 Chinook salmon ascended the Whitehorse Rapids Fishway between August 5 and September 6, 2011. This total was 131% of the 2001–2010 average count of 1,170 fish (Appendix B11). The overall sex ratio was 37% female (572 fish). Hatchery-produced fish

accounted for about 48% of the return, and consisted of 536 males and 205 females. The non-hatchery count consisted of 793 fish, 426 wild males and 367 wild females. The run midpoint occurred on August 17 and the peak daily count of 192 fish occurred on August 12. The midpoint of the 2011 run coincided with the 10-year average (2001–2010).

In 2011, Chinook salmon were not specifically removed from the fishway for coded wire tag sampling; however, several samples were obtained from the brood stock collected. No weirs, i.e. the Wolf or Michie creek weirs, were operated in the drainage upstream of the Whitehorse Rapids Fishway in 2011.

The Whitehorse Rapids Fishway program is a joint Yukon Fish and Game Association, Yukon Energy Corporation and DFO initiative; it has a number of components that are linked to the operation of Whitehorse Rapids Hatchery and the coded wire tagging program. Students count all fish moving upstream through the Fishway, record the sex and relative size of each fish, identify hatchery-origin fish based on the absence of the adipose fin which is removed from all hatchery released fry, and assist with brood stock collection.

7.2.7 Whitehorse Hatchery Operations

Eight Capilano troughs were installed at the Whitehorse Rapids Hatchery when the facility was constructed in 1983. The recommended maximum loading capacity was 456,000 Chinook salmon fry (57,000 2 gm fry/trough) although the actual operational load was approximately 360,000 fry (45,000 2 gm fry/trough). As the hatchery program progressed, the longstanding release target became 300,000 fry at an average release weight of 2 grams, although the average release weight was higher than 2 grams. For example, the average release weight was 2.45 gm for the 1985–2001 period, and in many years it was approximately 3 grams. The average release for brood years 1984–2001 was approximately 250,200 fry. The highest fry releases were 400,449 released in 1992 and 441,455 released in 1993.

The Whitehorse Rapids Hatchery transitioned from rearing Chinook salmon fry in Capilano troughs to rearing them in circular tanks in brood year 2000, when the hatchery was modified to accommodate other species. As hatchery staff gained experience culturing Chinook salmon in the round tanks, it became apparent that the prevailing loading densities were too high. As a result, effective brood year 2002, the Chinook salmon release target was reduced from 300,000 to 150,000 fry at a 2 gram release weight. The reduced release target was based on a DFO analysis and was applicable to the circular tanks, the existing water delivery system, and a risk assessment. The average release for brood years 2002–2010 was approximately 141,649 fry with a range from 85,300 to 176,600.

Chinook salmon fry reared at the Whitehorse Rapids Hatchery were adipose fin-clipped and injected with “Agency-only” coded wire tags in the early summer of 2011. This was the fifth year the facility used an “Agency-only” coded wire tag. Tricaine methane sulphonate (MS222) was used to anaesthetize the fry prior to clipping and tagging.

All 134,922 Chinook salmon fry from the 2010 brood year reared at the Whitehorse Rapids Fish Hatchery were released between June 6 and June 10, 2011. All fish were marked with an adipose

fin clip. The fry[9] were released into various locations upstream of the Whitehorse Rapids hydroelectric dam.

Included in the Wolf Creek release total were 1,550 fry that were considered to be too small or unfit for tagging. These fish had their adipose fins removed, and they were released untagged on June 10, 2011. A summary of Chinook salmon releases into the upper Yukon River from instream incubation and rearing sites is presented in Appendix A16. Average fry weight at time of release was 2.81 grams.

The 2011 release was the sixteenth year in which all fit fish released from the Whitehorse Rapids Fish Hatchery into the Yukon River were marked, i.e., the 1995–2010 brood years. With the exception of all fish released from the 1998 BY, which were adipose-clipped but not tagged, all of the 1995–2010 brood year releases involved adipose fin removal and application of coded wire tags to all fit fish. The initiative to mark all of the fish released from the hatchery provides an opportunity to accurately determine the hatchery contribution as adult fish migrate upstream through the Whitehorse Rapids Fishway and it is also helpful during brood stock collection.

Tag retention for the fish tagged for the 2011 release (2010 brood year) was calculated to be 99.25%. This calculation is derived from information that suggests that 1,000 of the 133,372 tagged fish did not retain their tag. The total 2011 release includes 132,372 adipose-clipped fish with intact coded wire tags, 1,000 fish estimated to have lost their tags, and 1,550 small (or unfit) fish that were clipped but not tagged for a total release of 134,922 fish.

Brood stock collection began on August 13, after 353 Chinook salmon had migrated through the Whitehorse Rapids Fishway, and ended on September 3, 2011. An attempt was made to collect 2 males for each female during brood stock collection to allow matrix spawning. Matrix spawning has been used for 23 years in an effort to maintain genetic diversity.

A total of 88 males were used for the brood stock program; 38 of these fish were adipose-clipped (hatchery) and 50 had intact adipose fins (wild). This total represents 9.2% of the total male return of 961 Chinook salmon.

In total, 47 females were successfully spawned for the Whitehorse Rapids Hatchery program, producing a preliminary estimated total of 190,500 green eggs, which was revised to 260,194 at shocking stage. There were no mortalities during holding. Average fecundity was estimated at 6,051 eggs per female with a range from 4,945 to 8,087. The fertilization rate was estimated to be 100%. Shocking and second inventory of the eggs began on October 5 and was completed by October 23, 2011. An estimated total of 252,176 eyed eggs were on hand in October 2011. The overall survival from green egg to eyed egg was estimated to be 97.6%.

On November 2, 2011 an estimated 102,100 eyed eggs were transferred from the Whitehorse Rapids Hatchery to the McIntyre Creek Salmon Incubation Facility. These eggs will be used for the Fox Creek restoration program funded by the Yukon River Panel Restoration and Enhancement fund (CRE-54-11). The remaining eggs had an estimated survival from eyed stage to the hatch stage of 99%.

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

7.2.8 Porcupine River Investigations

7.2.8.1 Fishing Branch River Fall Chum Salmon Weir

Fall chum salmon returns to the Fishing Branch River have been assessed annually since 1971 when 115,000 chum salmon were counted on an October 12 survey. The 1971 count was later estimated to represent a return of approximately 312,800, based on the observed relationship between weir counts and aerial survey counts. A weir established to enumerate fall chum salmon escapement to the Fishing Branch River operated during the following periods; 1972-1975; 1985-1989; and has operated annually since 1991 in a cooperative effort between DFO and the Vuntut Gwitchin Government. Spawning escapement estimates for the Fishing Branch River, including aerial expansions for years lacking complete weir counts, have ranged from approximately 5,100[10] in 2000, to 353,300[11] chum salmon in 1975 (Appendix B14).

The Fishing Branch River weir provides the primary assessment of the fall chum salmon return to the Porcupine River drainage. In 2011, the Fishing Branch River weir was operated from September 1 to October 15. The count was 11,157 fall chum salmon and included 6,285 females and 4,872 males. A high water event prevented daily weir counts for the September 8-18 period. To assess chum salmon passage during the high water event, an aerial survey was flown on September 20 and it was confirmed that minimal chum salmon had migrated through the weir during the high water event. Expanded counts were developed using a parabolic expansion function[12] provided by ADF&G (Bonnie Borba, Commercial Fisheries Biologist, ADF&G, Fairbanks, Alaska; personal communication) and 1,928 chum salmon were added to the total to account for periods when the weir was inoperable (the high water event and after the weir was removed). After extending the daily counts from September 1 to October 20, the total estimated 2011 Fishing Branch escapement is 13,085 fall chum salmon. The 2011 escapement is 35% of the 2001–2010 average of 32,832 fall chum salmon (Appendix B15).

The estimated midpoint of the run occurred on September 25, 6 days later than the recent 10-year average midpoint in the run of September 19. The Fishing Branch River weir is usually removed before the run is completely over. Historical weir counts, expanded using the parabolic expansion function described, are presented in Appendix B14. Weir installation dates have ranged from as early as August 18, in 1996, to as late as September 23 in 1972. However, weir installation has been completed by September 6 in all but 3 years, and run data for projects that operated throughout September indicated that an average of only 3% of chum salmon have passed through the weir by this date. No consistent expansion method has been applied to estimate fish missed at the beginning of the project, but adjustments have been made when installation timing or first day's counts indicated that a significant portion of the run had been missed. The 2011 Fishing Branch River escapement was 41% below the lower end of the Fishing Branch River Interim Management Goal (IMEG) range of 22,000 to 49,000, which was established for the 2008-2011 period, then extended to 2013.

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[10] Weir operations were interrupted due to flooding for an 8 day period following September 22 in 2005. Weir count prior to the flooding was 4993. Only 60 chum salmon were counted through the weir after operations resumed on October 1, 2005.

[11] Estimate expanded from a count of 301,296 at the weir, which was out of operation due to high water for a three day period at the peak of the run.

[12] The equation used is essentially a shifted and scale parabola is $Y=L/d^2 * (x-d)^2$ where: L=last Count; d=number of days expanding for; and x=day count 1 through last count.

7.2.8.2 Porcupine River Sonar

Two sonars (SIMRAD ES-60) were used to enumerate Chinook salmon returning to the Porcupine River in 2011. This was the first year a full sonar program has been conducted at this site by Vuntut Gwitchin Government in partnership with Environmental Dynamics Inc. (EDI) with funding from the Restoration and Enhancement Fund (Project number CRE-114-11). The sonar site is located on the Porcupine River approximately 2 km downstream of the Old Crow settlement, the same location used for the 2010 pilot study. Partial weirs were placed on both sides of the river to direct fish through the sonar beam for enumeration.

The sonar device was installed on a submerged adjustable mounting platform. Recording began on August 21 (left bank) and August 22 (right bank) and continued until September 22, 2011. A total of 11,431 targets were enumerated with a preliminary passage of 12,438 chum salmon after extrapolating for periods the sonars were down due to generator failures. The first chum salmon was observed on August 22. The peak daily passage of 1,239 fish was observed on September 11; 10%, 50% and 90% of the run had passed the station by September 5, September 8 and September 20, respectively.

Test netting was conducted for species apportionment at the site on: August 25 to August 27, September 3 to September 5; and September 8 to September 22. A total of 71 fall chum salmon, 1 Broad Whitefish and 1 Longnose Sucker were captured. Length and sex was obtained for the chum salmon. A total of 20 females (mean fork length 67 cm), 46 males (mean fork length 71 cm) and an additional 5 chum salmon were unsexed (dropouts) were captured.

A preliminary spawning escapement estimate can be calculated by subtracting the harvest above the sonar from the sonar enumeration estimate. An estimated 1,500 chum were harvested above the sonar (Lance Nagwan, Director of Natural Resources, Vuntut Gwitchin Government, Old Crow, Yukon; personal communication) which would result in a preliminary spawning escapement estimate for fall chum of 10,938.

7.2.9 Stock Identification of Yukon River Chinook and Fall Chum Salmon using Microsatellite DNA Loci

7.2.9.1 Chinook Salmon

Genetic stock identification of the 2011 Chinook salmon migration bound for Canada was developed using genetic samples collected from the Eagle sonar test drift gillnet program. Variation of 16 microsatellite loci was surveyed from 494 Chinook salmon sampled.

The populations and regional reporting groups for Chinook salmon are presented in Table 11. The estimated stock composition and the associated standard errors for the period from July 3 to August 13, 2011 are presented in Table 12. The estimated relative abundance by period is presented in Table 13 and Figure 9.

Table 11.–Baseline comprised of 24 stocks used to estimate stock compositions of Chinook salmon collected at the Eagle sonar test drift gillnet program, 2011.

Stock Aggregate Name	Populations in Baseline
North Yukon Tributaries	Chandindu and Klondike rivers
White River	Tincup Creek, Nisling River
Stewart River	Mayo and Stewart rivers
Pelly River	Little Kalzas, Earn, Glenlyon, Hoole and Pelly rivers, Blind Creek
Mid-mainstem Tributaries	Mainstem Yukon and Nordenskiold rivers
Carmacks Area Tributaries	Little Salmon and Big Salmon rivers, Tatchun Creek
Teslin River	Teslin Lake, Nisutlin, Morley, Jennings and Teslin rivers
Upper Yukon Tributaries	Whitehorse Hatchery and Takhini River

For Chinook salmon, based on the composition estimates for the 8 regional reporting groups (stock aggregates) for specific time periods as summarized in Table 12 and the final corresponding sonar estimates, the estimated contributions of the stock aggregates to the total 2011 Eagle sonar estimate were as follows: Carmacks Area Tributaries (9.9%); Teslin River (24.6%); Pelly River (18.3%); Mid-mainstem Tributaries (23.0%); Stewart River (5.4%); North Yukon Tributaries (8.2%); White River (5.9%); and Upper Yukon River tributaries (4.8%).

The estimated abundance for the 6 sample periods (i.e. to July 3-9, July 10–16, July 17-23, July 24-30, July 31- Aug 6 and Aug 7–13) presented in Table 13 and Figure 9 were derived from the analysis of individual genetic samples, pooled into these sample periods and multiplied by the final abundance estimates from the Eagle sonar program corresponding to these periods. The standard deviation (SD) of the estimates is also provided.

Table 12.–Estimated percentage stock composition of Chinook salmon migrating past the Eagle sonar site in 2011 by time period.

	July 3-9		July 10-16		July 17-23		July 24-30		July 31 - Aug 6		Aug 7-13		Season Aggregate	
Region	n=9	SD	n=112	SD	n=178	SD	n=142	SD	n=46	SD	n=7	SD	n=494	SD
Upper Yukon Tributaries	0.0	2.4	3.5	2.1	2.9	1.8	4.9	2.1	6.2	4.0	0.1	3.6	4.8	1.1
Teslin River	12.6	13.1	30.9	5.9	24.0	4.9	28.4	6.4	23.6	10.8	36.2	29.7	24.6	3.4
Carmacks Tributaries	10.5	15.0	7.7	4.2	11.3	4.4	19.1	5.6	9.7	7.3	12.2	18.2	9.9	2.4
Mid-Mainstem	12.1	15.6	10.7	4.6	14.8	4.9	32.6	6.7	50.4	12.6	29.7	28.4	23.0	3.5
Pelly River	14.5	16.3	17.0	5.7	20.3	4.3	10.0	3.6	7.1	5.3	19.2	18.8	18.3	2.9
Steart River	3.2	8.3	5.8	4.1	9.1	3.7	0.3	0.9	0.9	2.8	0.7	4.7	5.4	2.0
North Yukon Tributaries	33.2	14.2	11.4	3.2	10.4	2.4	3.5	1.8	1.9	2.2	0.0	3.1	8.2	1.3
White River	14.0	12.1	13.1	4.4	7.1	2.5	1.3	1.2	0.2	1.1	1.7	6.3	5.9	1.5

Table 13.–Estimated relative abundance of Chinook salmon migrating past the Eagle sonar site in 2011.

Region	July 3-9 n=9	July 10-16 n=112	July 17-23 n=178	July 24-30 n=142	July 31 - Aug 6 n=46	Aug 7-13 n=7	Season Passage n=494 (∑of periods)
Upper Yukon Tributaries	0	232	437	854	475	4	2,469
Teslin River	194	2,060	3,564	4,945	1,818	1,114	12,598
Carmacks Tributaries	162	511	1,683	3,325	746	376	5,057
Mid-Mainstem	186	710	2,200	5,689	3,873	914	11,815
Pelly River	223	1,130	3,017	1,738	545	592	9,372
Steart River	49	389	1,360	44	72	22	2,747
North Yukon Tributaries	510	761	1,552	609	145	1	4,192
White River	215	873	1,056	229	16	53	3,022
Total	1,538	6,665	14,869	17,432	7,691	3,076	51,271

7.2.9.2 Fall Chum Salmon

Genetic stock identification of the 2011 fall chum salmon migration bound for Canada was developed using genetic samples collected from the Eagle sonar test drift gillnet program. Variation of 14 microsatellite loci was surveyed for 882 fall chum salmon from the Eagle test drift gillnet program.

The populations and regional reporting groups for fall chum salmon are presented in Table 14. The estimated percentage stock compositions for the various sampling periods from July 31 to October 1 are presented in Table 15. The estimated abundance by period is presented in Table 16 and Figure 10.

An estimated 51.2% of the return that passed the sonar site to October 1 originated from the Mainstem Yukon River reporting group, which includes a number of mainstem Yukon River spawning populations, and 47.9% were from the White River aggregate (Table 15). The 2 remaining reporting groups contributing to the run were the Teslin River (0.7%) and the Yukon Summer group, which is represented by the Chandindu River population (1.0%). The estimated abundance for the 5 sample periods (i.e. July 31-August 6, September 4–10, September 11–17, September 18-24 and September 25–October 1) presented in Table 16 and Figure 10 were derived from the analysis of genetic samples for each of these sample periods multiplied by the final abundance estimates from the Eagle sonar program corresponding to these periods.

Table 14.–Baseline comprised of 9 stocks used to estimate stock compositions of fall chum salmon collected at the Eagle sonar test netting program, 2011.

Stock Aggregate Name	Populations in Baseline
Yukon Early	Chandindu River
White River	Kluane River, Kluane Lake, Donjek River
Mainstem Yukon River	Mainstem Yukon River at Pelly River, Tatchun Creek, Big Creek, and Minto
Teslin River	Teslin River

Table 15.–Estimated percentage composition of fall chum salmon migrating past the Eagle sonar site in 2011.

Period	Aug 3 - Sept 7		Sept 8 - 12		Sept 13 - 18		Sept 19 - 26		Sept 27 - Oct 2		Season	
Sample Size	n=170		n=197		n=200		n=195		n=115		n=877	
Region	Est	SD	Est	SD	Est	SD	Est	SD	Est	SD	Est	SD
Mainstem	31.9	(4.0)	44.5	(4.1)	49.2	(4.1)	56.4	(4.0)	65.1	(4.8)	51.2	(2.4)
White	62.3	(4.0)	55.3	(4.1)	49.1	(4.1)	42.8	(3.9)	34.2	(4.6)	47.9	(2.3)
Teslin	0.5	(0.7)	0.1	(0.3)	1.7	(1.1)	0.7	(0.8)	0.6	(1.1)	0.7	(0.4)
Yukon Summers	5.3	(2.0)	0.1	(0.3)	0.0	(0.2)	0.0	(0.2)	0.1	(0.5)	0.1	(0.2)

Table 16.–Estimated relative abundance of fall chum salmon migrating past the Eagle sonar site in 2010 to October 4.

Period	Aug 3 - Sept 7	Sept 8 - 12	Sept 13 - 18	Sept 19 - 26	Sept 27 - Oct 2	Season
Sample Size	n=170	n=197	n=200	n=195	n=115	n=877
Region	Estimate	Estimate	Estimate	Estimate	Estimate	Estimate
Mainstem	8774	15781	18462	32751	24636	100559
White	17136	19416	18425	24854	12942	94078
Teslin	138	35	638	406	227	1375
Yukon Summers	1458	35	0	0	38	196

7.2.10 Yukon Education Program 2009–2010

Due to changes in focus and workload capacities at DFO Whitehorse the education program previously provided for approximately 20 years could not be delivered to Yukon Territory public schools. Options are being pursued to continue the education initiative that provides Salmon in the Classrooms to community schools, exposing young students to wild processes and specifically the challenges and life stages of salmon.

In late October, DFO staff collected chum salmon eggs from the Kluane River to incubate over the winter and provide a release and habitat educational day for Kluane area schools. On May 31, 2011 three schools from the Kluane area participated in the chum salmon fry release including Destruction Bay, Burwash Landing and Beaver Creek. Approximately 125 fry were released near Glacier Creek slough on the Kluane River. Ten students of ages 7 to 12 were given an educational and interactive talk that described the salmon life cycle, habitat requirements of salmon, freshwater fish in the Yukon, general habitat concerns and participated in sampling benthic invertebrates from the river to observe and learn about other fish habitat features.

7.2.12 Yukon River Canadian Sub-basin Environmental Conditions

The Yukon River Canadian sub-basin includes that area upstream of the Alaska/Yukon Territory border including the Yukon River and the Porcupine River. The sub-basin encompasses a very large expanse of salmon habitat including over 100 documented spawning streams and a further yet identified number of rearing streams. The intent of this summary of environmental conditions

is to record annual unusual events, conditions or lack thereof for record to determine opportunities to improve management strategies or focus habitat considerations in the future.

Because information on specific salmon habitats year to year is not extensively collected, information provided is a high level synopsis of what was experienced in the sub-basin for a given year and the report results should be handled as such. In order to provide an environmental condition report, various weather and water level measurements from other agencies are used and applied as a means to determine if conditions were within normal ranges on record or there were unusual instances. Conditions are also collected through observations made by the public, fishers, consultants, DFO staff and relevant projects or studies. Through experience and professional judgment this information is applied to fish habitat to determine general conditions experienced for the year.

Winter snowpack was above normal (1971-2000) in the majority of the Yukon drainage as of May 2011. Winter 2010/11 was a near normal temperature from October to February (1948-present). Spring 2011 was cool and remained cooler than normal until May delaying the spring freshet composed of substantial snow. June was also cooler than normal but warmed in the third week of the month and a strong freshet occurred. Along with this, rain became common by late June and persisted throughout the summer; prolonging high water levels in streams during freshet and maintaining levels throughout the summer in many locations, some exceeding spring freshet flows. The summer was recorded as the wettest on record for the Northern BC and Yukon Territory region since 1948 by Environment Canada, exhibiting 38% more precipitation than normal. At Eagle Alaska, a US Geological Survey water survey site records discharge that reflects the total Canadian Sub-basin of the Yukon River excluding the Porcupine River drainage portion. The spring peak in late May surpassed the normal range and persisted for the entire summer almost entirely above the 61 year record. Despite the wet conditions, summer temperatures were slightly higher than normal (0.2°C) according to the 1948 to present record maintained by Environment Canada. An R&E project (URE-25-11) recorded temperatures in various locations throughout the territory for a portion of the summer following consistent methods for the first time in 2011. When those temperatures are compared to other studies conducted in summer 2010 (recorded 0.9°C above normal and 11% more precipitation than normal) these temperatures were lower and likely attributable to increased precipitation in 2011.

Subsurface sediment discharge was noted on 2 streams surveyed during the summer. In the Michie Creek drainage, a small tributary carried substantial sediment to downstream spawning grounds in Michie Creek below the lake. It was investigated and appears to be a subsurface discharge from an adjacent aquifer carrying fine sediment. This north facing aspect may be permafrost degradation and may be attributable to the season's precipitation, but will require additional investigation to determine the cause or expected duration of this impact to the spawning grounds. A subsurface discharge of a similar nature was observed in the Duke River drainage, a tributary of the Kluane River. Permafrost failures have occurred and will continue to occur throughout much of the Yukon drainages fish habitat and are noted here as reference for future conditions.

The young of year juvenile Chinook salmon (jcs, 0+) from brood year 2010 would have likely been dispersed widely by the strong spring freshet conditions and prolonged elevated water levels described previously. This also likely assisted emigration of the 2009 brood year smolts. The 0+ Chinook salmon juveniles may have experienced a slower growth rate in 2011 due to lower temperatures and, in some cases, delayed migration to upstream rearing habitats until

flows subsided. Where flows did not subside substantially growth to a size that allowed them to surpass the streamflow and access beneficial rearing habitat may have caused a delay in rearing season growth. Catches of juveniles were low in some sampling projects conducted this year. This may be due to migration issues, or it could also reflect poor escapement in 2010. Fish passage may improve as high water conditions can cause beaver dams, log jams and other obstructions to fail opening up new habitat.

Migration of adult Chinook salmon in 2011 was not observed to have been delayed by flows. A spike in flows occurred during expected migration of Chinook salmon in the White River but was short lived and should not have seriously impacted the run within the White River system. The majority of spawning locations observed exhibited high flows, however not destructive conditions. Of note though was the Nordenskiold River which was quite high during the spawning period and both the Little Salmon River and the Nisutlin River were running with enough color, due to rain and streamflow, that DFO staff could not adequately assess the run from aerial surveys. Salmon observed by ladder staff at the fishway in Whitehorse commented that the fish were generally healthy looking with little or no obvious stress (injuries, infection etc).

Fall 2011 temperature conditions were relatively mild. This combined with substantial precipitation throughout the summer and into the fall will have charged groundwater aquifers well and should provide good conditions for egg incubation throughout the winter. Snowfall occurred throughout the southern Territory as viewed from an opportunistic flight prior to substantially cold temperatures developing. This may allow for better infiltration of spring melt runoff and should partially insulate streams from winter temperatures.

7.3 RESTORATION AND ENHANCEMENT FUND

7.3.1 Status of R&E Projects 2011

Project Number	Project Title	Affiliation	Country	R&E grant amount	Project status
CRE-01N-11	Teslin River Sonar Project	B. Mercer and Associates	Canada	62,259	
CRE-06-11	Yukon River North Mainstem Stewardship	Dawson District Renewable Resource Council	Canada	29,290	Completed
CRE-07-11	Tr'ondëck Hwëch'in First Fish Culture Camp	Tr'ondëck Hwëch'in First Nation Government	Canada	10,000	Completed
CRE-09-11	Tr'ondëck Hwëch'in Student Steward	Tr'ondëck Hwëch'in First Nation Government	Canada	5,290	Completed
CRE-12N-11	Yukon River Salmon Stewards Summit	Council of Yukon First Nations	Canada	20,960	Completed
CRE-16-11	Klondike River Sonar Project	B. Mercer and Associates	Canada	70,236	Completed
CRE-37-11	Blind Creek Chinook Salmon Enumeration Weir	J. Wilson & Associates	Canada	48,000	
CRE-41-11	Sonar Enumeration of Chinook Salmon on the Big Salmon River	J. Wilson and Associates	Canada	79,915	Completed
CRE-51-11	2011 KDFN Michie Creek	Kwanlin Dun	Canada	29,482	

	Monitoring Project	First Nation Government			
CRE-54-11	Ta'an Kwäch'än Council Community Stewardship Program	Ta'an Kwäch'än Council	Canada	45,000	
CRE-63-11	Whitehorse Rapids Hatchery Coded Wire Tagging and Recovery	Yukon Fish and Game Association	Canada	47,415	
CRE-65-11	McIntyre Creek Salmon Incubation	Northern Research Institute, Yukon College	Canada	44,965	
CRE-67-11	Yukon Schools Fry Releases & Habitat Studies	Streamkeepers North Society	Canada	5,000	
CRE-78-11 (CAN)	Collection and Analysis of Yukon River DNA Baseline Samples in Canada	DFO	Canada	45,000	Completed
CRE-79-11	Stock Identification of Yukon River Chum and Chinook Salmon	DFO	Canada	30,000	Completed
CRE-114N-11	Porcupine River Sonar Program – Chum Salmon Component	Vuntut Gwitchin Government	Canada	87,983	Completed
CRE-128-11	Ta'an Kwäch'än Council Family Fish Camp	Ta'an Kwäch'än Council	Canada	9,306	Completed
CRE-130-11	First Nation of Na Cho Nyak Dun Youth Steward	Na Cho Nyak Dun First Nation Government	Canada	5,290	Cancelled
CRE-132-11	Yukon Fisheries Field Assistance Program	Yukon College	Canada	69,085	Completed
CRE-137N-11	Collection and Comparison of Chinook Salmon Age, Length, Sex and Genetic Data Using a Fish Wheel	Gaetan Beaudet (Contractor)	Canada	35,175	Completed
				779,651	**Total CAN**
URE-08-11	Technical Assistance, Development, and Support to the Yukon River Fish Wheel Salmon Monitoring Project at Rampart Rapids Using Remote Video Technology	United States Fish and Wildlife Service	US	5,500	Completed
URE-09-11	Rampart Rapids Full Season Video Monitoring, 2011	Stan Zuray (Contractor)	US	46,100	Completed
URE-16-11	Yukon River Border Sonar Operations	ADFG	US	136,116	Cancelled
URE-22-11	Mountain Village Cooperative Chinook Salmon Drift Test Fishery 2011	Yukon Delta Fisheries Development Association	US	17,944	
URE-25-11	Temperature Monitoring of Alaskan and Canadian Yukon Tributaries	ADFG	US	10,096	
CRE-78-11 (US)	Collection and Analysis of Yukon River DNA Baseline Samples in Alaska	ADFG	US	15,000	
CRE-143-11	Little Salmon Chinook Spawning Grounds Survey	G. Sandone Consulting, LLC	US	19,920	
CC-01-11	Yukon River In-season	Yukon River	US	11,000	Completed

	Management Teleconferences	Drainage Fisheries Association			
CC-02-11	Yukon River Educational Exchange	Yukon River Drainage Fisheries Association	US	31,900	Completed
CC-03-11	Yukon River Summer Season Preparedness Process	Yukon River Drainage Fisheries Association	US	60,000	Completed
CC-04N-11	Science and Salmon Education Outreach Series	ADFG	US	7,638	
				361,214	**Total US**
	R&E Fund Administration	PSC	Canada	**90,939**	
			Total	1,231,804	Total funds

8.0 YUKON RIVER SALMON RUN OUTLOOKS 2012

8.1 CHINOOK SALMON

8.1.1 Canadian-Origin Upper Yukon Chinook Salmon

The Canadian-origin upper Yukon River Chinook salmon spawning escapements in 2006 and 2007, the brood years producing the age-6 and age-5 fish returning in 2012, were 62,630 and 34,904, respectively. The spawning escapement in 2006 was above average but below average in 2007. The 2012 run of Canadian-origin upper Yukon River Chinook salmon is expected to be poor to below average; the average run size for 2002–2011 was 96,170.

Stock-recruitment (S/R) and sibling models predict the 2012 run size of Canadian-origin Chinook salmon to be as high as 106,090 and 87,160, respectively. However, these models do not include uncertainty associated with lower productivity observed in recent years. Over the past 5 years, observed returns were approximately 31% lower than preseason outlooks developed with the stock-recruitment (S/R) model, 37% lower than preseason outlooks developed with the sibling model, and 33% lower than preseason outlooks developed by averaging the 2 models. It is important to note that neither model incorporates environmental variables such as oceanic or freshwater conditions.

To account for some of the uncertainty in the preseason outlook due to lower productivity in recent years, the projection from each of the 2 models (106,090 and 87,160 for S/R and sibling models, respectively) was adjusted by the recent 5-year model performance. Based on this adjustment, the resulting preseason outlook range is 54,000 to 73,000[13]. In the past 5 years it has been observed that even-year returns (2008 and 2010) have been considerably lower than the preseason outlook due to a poor 6 year old return (Figure 11) and it is anticipated that this trend will continue with the 2012 return. These outlooks suggest that the 2012 Canadian-origin upper Yukon River Chinook salmon run may be a poor to below average run.

[13] The preason range was rounded to the nearest thousand.

8.1.1.1 Development of Revised Canadian-origin Chinook Salmon Database

Information from a number of sources suggest that the border and spawning escapement estimates derived from the DFO Chinook salmon mark–recapture program were biased low. In 2008, various stock-recruitment datasets were examined, including those developed from spawning escapements estimated from mark–recapture data and combinations of estimates derived from sonar, radiotelemetry and aerial survey data. Border passage estimates were developed from a combination of Eagle Sonar estimates (2005–2007) and radiotelemetry data (2002–2004). Total spawning escapements for 2002 to 2007 were then calculated by subtracting the Canadian catch from these estimates. Linear regression of the estimated total spawning escapements for these years versus a 3-area aerial survey index of Big Salmon, Little Salmon, and Nisutlin rivers was used to develop historical Canadian spawning escapement estimates back to 1982 (Appendix B11). Age-specific returns were then calculated based on age, harvest and escapement data in the return years. The resulting database forms the basis for the current stock-recruitment model.

JTC members are pursuing further statistical analysis of mark–recapture project data to improve historic run size estimates.

8.1.1.2 Performance of Stock-Recruitment Models for the Years 2001–2011

The performance of run outlooks developed using S/R and sibling models for the 2000–2011 period is presented in Table 15. Revised historical Canadian run size estimates were used to reconstruct the 2000 and 2001 runs; border passage estimates for 2002–2004 were based on radiotelemetry estimates while border escapement estimates for 2005–2011 were based on Eagle sonar. A review of preseason outlook performance provides an opportunity to document the recent decline in the upper Yukon River Chinook salmon return per spawner values. In Table 17, the average of the preseason outlook is derived using stock-recruitment (S/R) and sibling model projections compared to postseason estimates of run size. The averaged model projection for 2012 is 97,000. This preseason estimate is derived from each model's estimate, multiplied by the 5-year average performance to create a range. Despite good brood year escapements, the observed run sizes were relatively low from 2000 to 2002 and from 2007 to 2010. The causes of low returns are unknown but likely involve a number of factors in the marine and/or freshwater environments. For example, the 2008 outlook of 117,000 overestimated the run size by a factor of 1.77; the preseason outlook was size 77% above the actual run. It will be important to determine if the low run sizes observed in the 2007 to 2011 period develop into a long-term trend.

Table 17.–Preseason upper Yukon River Chinook salmon outlooks for 2001 to 2012 and the observed run sizes for the 2000 to 2011 period.

Year	Expected Run Size S/R (Preseason)	Expected Run Size Sibling (Preseason)	Expected Run Size Avg. (S/R & Sib.) (Preseason)	Expected Run Size Avg. Performance S/R (Preseason)	Expected Run Size Avg. Performance Sib. (Preseason)	Estimated Run Size (Postseason)	Performance of Preseason Outlooks
2000	127,784	85,889	107,000			53,000	2.01
2001	126,641	51,082	89,000			86,000	1.03
2002	113,759	107,496	111,000			82,000	1.35
2003	116,948	109,577	113,000			150,000	0.75
2004	123,469	124,326	124,000			117,000	1.06
2005	121,764	117,860	120,000			124,000	0.97
2006	115,995	123,132	120,000			119,000	1.01
2007	118,557	139,934	129,000			88,000	1.47
2008	111,551	122,435	117,000			66,000	1.77
2009	98,172	103541	101,000			87,000	1.16
2010	109,797	116346	113,000			60,000	1.88
2011	102,831	113,323	108,000			72,000	1.50
2012	106,090	87,160	97,000	54,000	73,000		
Avg. (2000–2011)	115,606	109,578	113,000			92,000	1.33

Note: Run size estimates incorporate: radiotelemetry data (2002–2004); Eagle Sonar estimates (2005–2011); and the relationship between telemetry/sonar to aerial surveys for 2000 and 2001. The average of the preseason S/R and sibling run sizes, and the postseason run sizes are rounded to nearest thousand.

8.1.2 Drainagewide Chinook Salmon

The total Yukon River Chinook salmon run can be estimated by applying historical average proportions of Canadian-origin fish in the total run to the outlook estimated for the Canadian component of the run. The average proportion of Canadian-origin fish in the total run is approximately 50%. The drainage-wide run outlook based on the adjusted Canadian-origin model estimate, which attempts to account for low productivity since 2007, is 109,000–146,000 Chinook salmon. Thus, the 2012 Yukon River Chinook salmon run will likely be below average to poor.

Currently, the Yukon River Drainage Fisheries Association (YRDFA) is facilitating an in person meeting in April to provide managers, fishermen, tribal council representatives, and other stakeholders the opportunity to share information, provide input, and discuss management options. The purpose of this meeting is to work cooperatively to identify options and practical management strategies for 2011 that will assist in getting adequate numbers of fish to the spawning grounds should the Chinook salmon run be similar to the below average runs of 2007–2010.

8.2 SUMMER CHUM SALMON

The strength of the summer chum salmon run in 2012 will be dependent on production from the 2008 (age-4 fish) and 2007 (age-5 fish) escapements, as these age classes generally dominate the

run. The total runs during 2007 and 2008 were both approximately 1.9 million summer chum salmon, though tributary escapements were highly variable. However, it is worth noting that poor runs have resulted from large escapements.

Yukon River summer chum salmon generally exhibit strong run size correlations among adjacent years, and it is expected that the total run in the Yukon River will be similar to the 2011 run of approximately 2.0 million fish. The high seas Bering Arctic Subarctic Integrated Surveys (BASIS) study indicated a decline in chum salmon in 2004 and 2005, but 2006 and 2007 results showed an increase (Figure 15). No BASIS survey was conducted in 2008. A collaborative effort between ADF&G and NOAA is in progress to test the applicability of BASIS juvenile salmon indices for run size forecasting.

The 2012 run is anticipated to provide for escapements, a normal subsistence harvest, and a surplus for commercial harvest. Summer chum salmon runs have provided for a harvestable surplus in each of the last 9 years (2003–2011). If inseason indicators of run strength suggest sufficient abundance exists to allow for a commercial fishery, the commercially harvestable surplus in Alaska could range from 500,000 to 1,000,000 summer chum salmon. Similar to 2011, the actual commercial harvest of summer chum salmon in 2012 will likely be affected by a potentially poor Chinook salmon run, as Chinook salmon are incidentally harvested in chum salmon-directed fisheries.

8.3 FALL CHUM SALMON

8.3.1 Drainagewide Fall Chum Salmon

Preseason outlooks are determined using estimates of escapement and resulting production. Yukon River drainagewide estimated escapements of fall chum salmon for the period 1974 through 2005 have ranged from approximately 180,000 (1982) to 2,000,000 (2005), based on 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 311,000 (1996 production) to 3,000,000 (2001 production) fish, using the same approach of approximating overall escapement. Corresponding return per spawner rates ranged from 0.3 to 9.0, averaging 2.0 for all years combined (1974–2005).

A considerable amount of uncertainty has been associated with these run forecasts, particularly in recent years, because of unexpected run failures (1998 to 2002) followed by strong runs from 2003 through 2008. Weakness in salmon runs prior to 2003 has generally been attributed to reduced productivity in the marine environment and not low levels of parental escapement. Similarly, recent improvements in productivity may be attributed to the marine environment. Forecasts have been presented as ranges since 1999 to allow for adjustments based on more recent trends in production. Historical ranges included the normal point projection as the upper end and the lower end was determined by reducing the projection by the average ratio of observed to predicted returns from 1998 to each consecutive current year through 2004. In 2005, the average ratio of 2001 to 2004 was used in attempt to capture some of the observed improvement in the run. The point estimate for 2006 and 2007 used 1974 to 1983 odd/even maturity schedules to represent years of higher production, while 2008–2011 used 1984 to current year odd/even maturity schedules to represent years of lower production.

Table 18.–Preseason drainagewide fall chum salmon outlooks and observed run sizes for the Yukon River, 1998–2011.

Year	Expected Run Size (Preseason)	Estimated Run Size (Postseason)	Proportion of Expected Run
1998	880,000	334,000	0.38
1999	1,197,000	420,000	0.35
2000	1,137,000	239,000	0.21
2001	962,000	383,000	0.40
2002	646,000	425,000	0.66
2003	647,000	775,000	1.20
2004	672,000	614,000	0.92
2005	776,000	2,325,000	3.00
2006	1,211,000	1,144,000	0.94
2007	1,106,000	1,098,000	0.99
2008	1,057,000	905,000	0.86
2009	791,000	576,000	0.73
2010	690,000	606,000	0.88
2011	737,000	1,206,000	1.64
Avg. (1998-2011)	894,000	790,000	0.94

Yukon River fall chum salmon return primarily as age-0.3 and age-0.4 fish, although age-0.2 and age-0.5 fish also contribute to the run (Appendix A17). The 2012 run will be composed of brood years 2006 to 2009 (Table 19). Estimates of returns per spawner (R/S) were used to estimate production for 2006 and 2007. An auto-regressive Ricker spawner-recruit model was used to predict returns from 2008 and 2009. The point projection estimates for 2012 used the 1984 to the current complete brood year returns applied to the odd/even maturity schedule, because current production is reduced from the pre-1984 level. The result is an estimate of 1,114,000 fall chum salmon. The forecast range is based on the upper and lower values of the 80% confidence bounds for the point projection. Confidence bounds were calculated using deviation of point estimates and observed returns from 1987 through 2011. Therefore, the 2012 forecasted run size is expressed as a range from 986,000 to 1,200,000 fall chum salmon. This forecasted run size is above average, particularly for an even-numbered year run (1974–2010).

Table 19.–Forecasted 2012 total run size of fall chum salmon based on parent year escapement for each brood year and predicted return per spawner (R/S) rates, Yukon River, 2005–2009.

Brood Year	Escapement	Estimated Production (R/S)	Estimated Production	Contribution based on age	Current Return
2006	880,503	0.89	783,648	1.0%	11,333
2007	910,883	1.44	1,311,672	32.3%	360,160
2008	687,153	1.66	1,141,261	65.2%	725,909
2009	482,411	1.98	957,148	1.5%	16,357
Total expected run (unadjusted)					1,114,000
Total 2012 run size expressed as a range based on the forecasted vs. observed returns from 1987 to 2011 (80% CI):					986,000 to 1,200,000

The contributing parent year escapements from 2006 through 2008 all exceeded the upper end of the drainagewide escapement goal range while 2009 was within the drainagewide escapement goal range of 300,000 to 600,000 fall chum salmon. The age-0.5 parent year approached 1.0 return per spawner and the remainder of the parent years now appear to be exceeding 1.0 return per spawner. The major contributor to the 2012 fall chum salmon run is anticipated to be age-0.3 fish returning from 2008 parent year (Appendix A17; Figure 15)). If returns remain high, these large escapements could improve production, potentially producing above average runs in the future.

Typically the sibling relationship between the age-0.2 to age-0.3 fish (R^2=0.49) is slightly better than the age-0.3 to age-0.4 fish (R^2=0.39). Brood year returns of age-0.2 fish range from zero to 150,000 chum salmon. Returns of age-0.3 fish from even-numbered brood years during the time period 1974 to 2005 typically averaged 387,000 chum salmon, and ranged from a low of 165,000 for brood year 1996 to a high of 646,000 for brood year 1992. Return of age-0.4 fish from even-numbered brood years during the time period 1974 to 2005 typically averaged 176,000 chum salmon, and ranged from a low of 58,000 for brood year 1998 to a high of 405,000 for brood year 1990. For fall chum salmon, the sibling relationship is best between the age-0.4 to age-0.5 component (R^2=0.61).

Additionally, there is uncertainty as to how well returns from large escapements (>700,000) produce since 6 out of 8 failed to yield replacement values. The most recent high production levels of 2.1 return/spawner (average R/S 1998 to 2003, excluding 2001) are well above the poor returns observed in 1994–1997 (average 0.50 R/S). Production in 2005 was at a record low of 0.25 R/S indicating poor survival; however 2006 and 2007 have increased each year respectably.

During the 2012 fall fishing season, estimated strength of the projected run will be adjusted using summer chum salmon run abundance, and inseason monitoring projects data (Appendix A5). With a projected run size range from 986,000 to 1,242,000 fall chum salmon, it is anticipated that escapement goals would be met while supporting normal subsistence fishing activities, and potential commercial harvest levels of 500,000 to 700,000 fall chum salmon. Commercial harvestable surpluses will be determined inseason and opportunity provided where commercial ventures exist.

8.3.2 Canadian-Origin Upper Yukon River Fall Chum Salmon

The drainage wide outlook range of 986,000 to 1,200,000 fall chum salmon was used to develop the upper Yukon fall chum salmon outlook. The analyses undertaken to develop the drainagewide outlook range is outlined in Section 8.3.1. There is a longstanding assumption that the Canadian contribution to the drainagewide return of fall chum salmon is approximately 30%. Recent genetic stock identification analyses have indicated that this assumption is reasonably close. For the purpose of developing a 2012 outlook, it was assumed that the Upper Yukon Canadian-origin component is likely to be at least 25% of the drainagewide return while the Fishing Branch River component will be approximately 5% of the drainagewide return. Based upon the drainagewide outlook range of 986,000 to 1,200,000 and an assumed 25% contribution, the upper Yukon outlook range is 246,500 to 300,000 fall chum salmon. The average upper Yukon River fall chum salmon run size for 1998–2010 is approximately 195,000 fish (Table 21).

There is a considerable amount of uncertainty associated with the upper Yukon fall chum salmon run projections due to unexpected run failures within the 1998–2002 period, followed by improved productivity and higher runs observed within the 2003–2007 period. For example: the 1998 outlook

of 198,000 overestimated the run size by a factor of 2.83; the preseason outlook was 183% above the actual run size. Weakness in fall chum salmon runs prior to 2003 has generally been attributed to reduced productivity in the marine environment and not the result of low levels of parental escapement. A notable development that added to the uncertainty and complexity of both the 2009 and 2010 preseason outlooks was high parent spawning escapements which were well above levels previously observed. For example, the 2005 escapement of approximately 437,500 is the highest observed within the 1982 to 2010 period, while the 2006 and 2007 escapements are the fourth and third highest observed, respectively (Table 20). Returns from these recent high escapements have helped to redefine a number of S/R parameters including the number of spawners at maximum sustained yield and the number of spawners at equilibrium, i.e. replacement, the point where the return equals escapement. The following table shows the brood year escapements which will contribute to the 2012 run. The even year average proportional contribution of each age class to the total returns from a brood year is estimated at 57.2% age-4 and 39.7% age-5 fish.

Table 20.–Summary of upper Yukon fall chum salmon brood year spawning escapements for the 2006–2009 period and the average even-year contribution for age-3 to age-6 fish returning in 2012.

Brood Year	Escapement	Age	Estimated age proportion contributing to 2012 run	Estimated Production
2006	211,994	6	1.0%	2,120
2007	254,649	5	39.7%	101,096
2008	174,267	4	57.2%	99,681
2009	93,626	3	2.3%	2,153

Given the uncertainty associated with the 2012 Upper Yukon fall chum salmon return, it is prudent to enter the 2012 season with the expectation that inseason assessment programs will determine run strength and appropriate management actions will be undertaken to ensure conservation and harvest sharing objectives are achieved. Since 2002, Upper Yukon fall chum salmon preseason outlooks have usually been based on S/R models, which incorporate escapement and the subsequent associated adult return by age data. Annual runs have been reconstructed using mark–recapture and recent sonar data, and assumed contributions to U.S. catches. Recent genetic stock identification data (i.e., mixed stock analyses) has been used to estimate the annual U.S. catch of upper Yukon River fall chum salmon; it has corroborated some longstanding assumptions and should allow a more accurate estimation of the proportion of Canadian fall chum salmon run harvested in U.S. fisheries. A summary of preseason outlooks, postseason run size estimates and the proportion of the expected run size observed for the 1998 to 2011 period are presented in Table 19.

Table 21.–Preseason upper Yukon River fall chum salmon outlooks for 1998 to 2012 and observed run sizes for the 1998–2011 period.

Year	Expected Run Size (Preseason)	Estimated Run Size (Postseason)	Performance of Preseason Outlook
1998	198,000	70,000	2.83
1999	336,000	116,000	2.90
2000	334,000	66,000	5.06
2001	245,000	49,000	5.00
2002	144,000	113,000	1.27
2003	145,000	182,000	0.80
2004	147,000	193,000	0.76
2005	126,000	558,000	0.23
2006	126,000	330,000	0.38
2007	147,000	347,000	0.42
2008	229,000	269,000	0.85
2009	195,000	128,000	1.52
2010	172,000	143,000	1.20
2011	184,000	326,000	0.56
2012	273,000		
Avg. (1998-2010)	195,000	206,000	2.0

Note: Run sizes are rounded to nearest one thousand. The 2009 through 2011 outlooks are the average of an outlook range.

8.3.3 Canadian-Origin Porcupine River Fall Chum Salmon

In the Canadian section of the Porcupine River, most of the production of fall chum salmon originates from the Fishing Branch River. Conservation concerns for the Fishing Branch River fall chum salmon run arose in the late 1990s and were heightened in 2000 when the count through the Fishing Branch River weir was only 5,057[14] fish, the lowest recorded escapement for the system. However, run sizes improved somewhat within the 2001–2009 period when weir counts ranged from a low of 13,600 in 2002 to a high of 119,058 in 2005. Recent Fishing Branch River fall chum salmon runs appear to be occurring later in the season and it is not unusual for the counting program to end while significant numbers of fish are still migrating. A consistent approach was used to estimate the number of fish that may have migrated after the weir program ended.

Table 22 shows the brood year escapements which will contribute to the 2012 run and the age of fish returning in 2012 from each contributing brood year. The average age composition of offspring produced is 60% age-4 fish and 36% age-5 fish.

[14] The counting fence was inoperable due to high water levels for a full week in late September, 2000.

Table 22.–Summary of Fishing Branch River fall chum salmon brood year spawning escapements contributing to 2012 returns for the 2006–2009 period and the average (all years) age composition of offspring produced.

Brood Year	Escapement	Age	Avg. age proportion
2006	30,954	6	2.0%
2007	32,150	5	36%
2008	19,086	4	60%
2009	25,828	3	1.0%

The weighted average (by age) base level escapement for the 2012 Fishing Branch River fall chum salmon run is approximately 24,000 fish. For many years the preseason outlook for the Fishing Branch River fall chum salmon was based on an assumed return/spawner rate of 2.5. Based upon the low returns observed in the 2011 run which indicates poor production from the 2007 brood year escapement of 32,150 chum salmon, a return/spawner value of 2.5 is unlikely.

The 2011 Fishing Branch River preseason outlook range was 30,250 to 43,500 chum salmon while the preliminary estimated reconstructed run was approximately 21,198 fish. The spawning escapement goal of 22,000–49,000 to the Fishing Branch River weir was not achieved; the post season estimate of the spawning escapement was 13,085 fish.

The 2012 Fishing Branch River outlook range is from 49,300 to 60,000. This is based on the drainagewide outlook range of 986,000 to 1,200,000 and an assumption that approximately 5% of the drainagewide outlook will be Fishing Branch River fall chum salmon. Fishing Branch weir escapement alone, which does not include the component of the Fishing Branch run harvested during migration, has accounted for an average of 4% of the total Yukon fall chum salmon run since 1995. This percentage does not include Porcupine chum salmon spawning in other Canadian tributaries. While analysis of genetic sampling taken in the Pilot Station sonar test fishery after July 19 between 2004 and 2010 produced an underestimation of the contribution of Porcupine stock to the total Yukon River fall chum salmon run, estimates may have been more accurate in 2010. In 2011 the preliminary genetic sampling seems to have overestimated the Porcupine stock to the total Yukon River fall chum salmon run. Sampling indicated that approximately 52,000 fall chum salmon were bound for the Canadian Porcupine River. A Fishing Branch weir spawning escapement estimate from the preliminary genetics was calculated to be 25,000[15] fall chum salmon. The spawning escapement calculated from the genetics is almost double the actual escapement of 13,085 fall chum salmon.

The 2012 outlook range is the estimated number of chum salmon entering the mouth of the Yukon River bound for the Fishing Branch River; hence, the number of fish reaching the Fishing Branch River weir will be reduced by any catches in U.S. and Canadian fisheries prior to the fish reaching the weir. It has been difficult to accurately estimate the U.S. harvest rate (and catch) of Porcupine stocks, although genetic mixed stock analyses may improve this situation in the future. However, the 2012 Fishing Branch River outlook range will only provide for minimal harvest relative to an escapement goal of 22,000 to 49,000 fish. Given the outlook, it is prudent to enter the 2012 season with the expectation that inseason assessment programs will determine

[15] 52,112 Porcupine fish is estimated to have passed Pilot an assumed 75% were Fishing Branch fall chum. By subtracting the harvest (32% was assumed in the U.S. fisheries and 75% of the Old Crow harvest of 1851) the spawning escapement from genetics can be calculated.

the run strength and appropriate management actions will be taken to ensure conservation and harvest sharing objectives are achieved.

As was observed with the Upper Yukon River fall chum salmon stocks, the postseason estimates of the Porcupine[16] River fall chum salmon run sizes were consistently below preseason outlooks throughout the 1998–2002 period (Table 21). For example, the 1998 outlook of 112,000 overestimated the run size by a factor of 4.48; the preseason outlook was 348% above the actual run size. Canadian postseason estimates of the Porcupine drainage fall chum salmon return consistently exceeded preseason outlooks from 2003 to 2005 while the 2006–2011 postseason estimates were lower than the preseason estimates.

Table 23.–Preseason Porcupine River fall chum salmon outlooks for 1998 to 2012 and observed run sizes for the 1998–2011 period.

Year	Expected Run Size (Preseason)	Estimated Run Size (Postseason)	Performance of Preseason Outlook
1998	112,000	25,000	4.48
1999	124,000	24,000	5.17
2000	150,000	13,000	11.54
2001	101,000	33,000	3.06
2002	41,000	19,000	2.16
2003	29,000	46,000	0.63
2004	22,000	32,000	0.69
2005	48,000	186,000	0.26
2006	54,000	48,000	1.13
2007	80,000	50,000	1.60
2008	78,000	30,000	2.60
2009	49,000	40,000	1.23
2010	43,000	20,000	2.15
2011	37,000	28,000	1.32
2012	54,650		
Avg. (1998-2011)	69,000	42,000	2.72

Note: Run sizes are rounded to nearest one thousand. The 2009 through 2012 outlooks are the average of an outlook range.

8.4 COHO SALMON

Although there is little comprehensive escapement information for Yukon River drainage coho salmon, it is known that coho salmon primarily return as age-2.1 fish and overlap in run timing with fall chum salmon. The major contributor to the 2012 coho salmon run will be 4 year old fish returning from the 2008 parent year. Based on run reconstruction using Pilot Station sonar estimates, the 2008 passage estimate of 135,000 coho salmon was below average (146,000). The commercial harvest in 2008 was the sixth highest since 1991.

[16] The Fishing Branch River weir monitors the escapement to what is believed to be the dominant spawning stock within the Porcupine drainage.

Escapements are mostly monitored in the Tanana River drainage. The Delta Clearwater River (DCR) is a major producer of coho salmon in the upper Tanana River drainage with comparative escapement monitoring data since 1972. The parent year escapement of 7,500 fish in 2008 was within the Sustainable Escapement Goal (SEG) range of 5,200 to 17,000 coho salmon. DCR escapement has increased since 1972, with substantial increases between 2001 and 2005, a time when fishing effort was low. During the most recent years 2006-2010, DCR escapement estimates have fluctuated within the goal; however some of the years were conducted before peak spawning because of weather conditions in October. Coho salmon escapements in the Nenana River complex were average to above average. Assuming average survival, the 2012 coho salmon run, is anticipated to be average based on escapements observed in 2008.

8.5 Spawning Escapement Target Options in 2012: Canadian Origin Chinook and Fall Chum Salmon

8.5.1 Upper Yukon River Chinook Salmon

Cooperative Canada/U.S. management of Canadian-origin Yukon River Chinook salmon was based on an agreed escapement goal range for rebuilt stocks of 33,000 to 43,000 fish for many years (Appendix A20). This goal was developed from, and was subsequently monitored by a mark–recapture program located just upstream of the international border on the Yukon River. Since 2005, the Parties have developed an improved technique, the Eagle sonar program, to assess the abundance of salmon migrating into Canada. Estimates derived from the mark–recapture program were consistently lower than those produced from the sonar program. Based on the disparity between the mark–recapture and sonar estimates of Canadian border passage, it was inappropriate to continue to apply the longstanding escapement goal based on mark–recapture to escapement estimates derived from the sonar program.

The JTC discussed recommendations provided by the Chinook Salmon Escapement Goal working group for a minimum Interim Management Escapement Goal (IMEG) in 2008. The JTC recommended that the Yukon River Panel adopt an IMEG of greater than 45,000 Canadian-origin Yukon River Chinook salmon for 2008, to be assessed using information from the Eagle sonar program. This recommendation was established for one year, recognizing that further analysis of a biologically based escapement goal was required and additional factors such as habitat capacity had yet to be incorporated. In 2009, the JTC recommended that the minimum IMEG (>45,000) established for 2008 be used for the second year.

In 2010, the JTC recommended that the IMEG be established as a range to allow for the uncertainty of information from assessment projects. The JTC reached consensus for an upper bound of 55,000, and agreed to adopt a lower bound of 42,500 after discussion with the Yukon River Panel. The JTC recommended retaining this IMEG range for 2012.

8.5.2 Upper Yukon River Fall Chum Salmon

The upper Yukon River escapement goal specified within the Yukon River Salmon Agreement is >80,000 fall chum salmon (Appendix A20). This goal was achieved 17 times within the 30 year period from 1982–2011. The DFO fall chum salmon mark–recapture program was conducted from 1982 to 2008[17] while the joint U.S./Canada Eagle sonar program was conducted from 2006

[17] Mark–recapture estimates were used to determine border passage and spawning escapement estimates from 1982 to 2007.

to 2011. The mark–recapture estimates generally agreed with Eagle sonar estimates when the 2 programs were conducted concurrently. The JTC recommended using the Eagle sonar project as the primary assessment tool for the Canadian border passage estimate starting in 2008.

The upper Yukon River escapement goal was reviewed in 2001 and after considerable analysis of the available data a recommendation was made for a biological escapement goal (BEG) of 60,000 to 129,000 fall chum salmon (Eggers 2001). However, due to concerns over the quality of the data and analytical issues, the BEG recommendation was not accepted during a Pacific Scientific Advice Review Committee (PSARC) review.

For 2012, the JTC recommends that the upper Yukon interim management escapement goal (IMEG) remain as established in 2010 as a range from 70,000 to 104,000 fall chum salmon (Appendix A19). This range was developed as 0.8 to 1.2 times the estimated spawners at maximum sustained yield (86,600) which was derived prior to the returns from the exceptional 2005 spawning escapement of 477,498 fall chum salmon. An update of the spawner-recruit model will be conducted to reevaluate the returns off of the 2005 run once returns are completed. The JTC Escapement Goal Working Group will continue to examine other data that may be used in recommending a revised escapement goal for future years.

8.5.3 Fishing Branch River Fall Chum Salmon

The escapement goal specified within the Yukon River Salmon Agreement is a range of 50,000 to 120,000 fall chum salmon to the Fishing Branch River. This goal has been achieved only 10 times since 1974 and only 5 times since 1985 when the weir program went back into operation. The Fishing Branch escapement goal was reviewed in 2001 and after considerable analysis of the available data a recommendation was made for a biological escapement goal (BEG) of 27,000 to 56,000 fall chum salmon (Eggers 2001). However, due to concerns over the quality of the data and analytical issues, the BEG recommendation was not accepted during a Pacific Scientific Advice Review Committee (PSARC) review.

The inability to reach the 50,000–120,000 goal, particularly when considering the goal was achieved once over the 2 fall chum salmon 4-year-cycles preceding 2008 when escapements to the upper Yukon River in Canada were rebuilding, led the JTC to question whether the lack of success was related to an unrealistically high goal. As a result, a JTC Escapement Goal Working Group revisited the goal and attempted to address some of the issues raised during the PSARC review. Although there are some approaches that can improve data quality and analysis of a BEG, the working group recommended postponing this analysis until the returns from the recent high escapement of 119,058 fall chum salmon in 2005 were documented.

For 2008–2010, the JTC recommended an Interim Management Escapement Goal (IMEG) range of 22,000 to 49,000 Fishing Branch River fall chum salmon. In 2011 the JTC recommended maintaining the IMEG for an additional 3 years (2011–2013) before the next review (Appendix A19). The IMEG is based on the Bue and Hasbrouck (*Unpublished*) method of determining a Sustainable Escapement Goal (SEG) and has been used in Alaska. The Fishing Branch River SEG analyses incorporates weir counts from 1985 to 2007 (22 years; excluding 1990) and the contrast in these escapements, i.e., the ratio of the highest to lowest count (24:1). The escapement goal range reflects the approximated 25 and 75 percentiles of the 22 years of weir counts.

The SEG range encompasses the escapement levels that preliminary analysis of the stock recruitment information indicates will produce maximum returns and maximum sustainable yield, 22,188 and 39,400 respectively. However, while weir counts provide good estimates of spawning escapement, the stock specific harvest data necessary for robust stock recruitment estimates is lacking, lending a high degree of uncertainty to the current estimates.

9.0 STATUS OF ESCAPEMENT GOALS

ADF&G undertakes a review of salmon escapement goals in preparation for its triennial Board of Fisheries (BOF) meeting. Chinook, summer chum, and fall chum salmon are currently being reviewed for the 2013 BOF cycle. This review is governed by the state's Policy for the Management of Sustainable Salmon Fisheries (5AAC 39.222) and Policy for Statewide Salmon Escapement Goals (5AAC 39.223) adopted in 2001. Under these policies ADF&G recommends either a biological escapement goal (BEG) or a sustainable escapement goal (SEG) (ADF&G 2004; Brannian et al. 2006). A BEG refers to a level of escapement that provides the highest potential to produce maximum sustainable yield. An SEG identifies a level of escapement known to provide for sustainable yield over a 5 to 10 year period.

Most Arctic-Yukon-Kuskokwim (AYK) Region escapement goals were originally set in the late 1970s or early 1980s. These goals were first documented by Buklis (1993) as required under ADF&G's original escapement goal policy signed in 1992. Changes to these goals were adopted in 2001 when BEGs were set for Yukon River fall chum salmon (Eggers 2001), Anvik River summer chum salmon (Clark and Sandone 2001), and Andreafsky River summer chum salmon (Clark 2001). These 2001 goals were adopted prior to passage of the policies, but were consistent with the policies.

Beginning in December of 2002, ADF&G undertook the first full review of its escapement goals following the adoption of the policies. Recommendations were presented to BOF in January 2004 and formally adopted by ADF&G in 2005. Because the 2001 and 2004 escapement goals received thorough review, no changes to escapement goals were recommended for the February 2007 BOF meeting. ADF&G completed another review of escapement goals in preparation for the January 2010 BOF meeting. That escapement goal review, which included formal meetings open to agencies and the public, was completed in December 2009 (Volk et al. 2009).

In May 2011, ADF&G began another escapement goal review cycle to prepare for the January 2013 Board of Fisheries meeting. Data series were reviewed and updated before and after the 2011 season, and this information was presented at a meeting open to agencies and the public was in November 2011. Draft analyses were reviewed in a second public meeting on 2 March 2012. During the spring and summer of 2012, formal recommendations and an updated escapement goal report will be prepared. Escapement goal changes are being considered for 2 Chinook salmon stocks; although further reviews are being conducted on several other stocks, other changes in escapement goals are unlikely to be recommended during this cycle.

9.1 CHINOOK SALMON

Current escapement goals for Chinook salmon in the U.S. portion of the Yukon River drainage include aerial survey goals on the West Fork Andreafsky, Anvik, and Nulato (North and South Forks combined) Rivers; a weir count goal on the East Fork Andreafsky River; and tower count goals on the Chena and Salcha Rivers. At the January 2010 Board of Fisheries meeting, the escapement goal for East Fork Andreafsky River Chinook salmon was revised to a weir based

goal, and the escapement goal for Gisasa River Chinook salmon was discontinued (Volk et al. 2009). All other Yukon Chinook salmon goals were retained at the 2010 Board of Fisheries meeting, and the goals as established or left in place at the 2010 meeting continued to be used in 2011 and will be used in 2012 (Table 24). All of these goals are under discussion in preparation for the 2013 Board of Fisheries meeting.

Table 24.–List of current and former escapement goals for Yukon River Chinook salmon.

Chinook Salmon Stock	2007-2010 Goal (Type) and Year Established	2011 Goal (Type) and Year Established
E. Fork Andreafsky River	960-1700 (SEG) 2005	2,100-4,900 (SEG) 2010
W. Fork Andreafsky River	640-1,600 (SEG) 2005	No change
Anvik River	1,100–1,700 (SEG) 2005	No change
Gisasa River	420–1,100 (SEG) 2005	Discontinued 2010
Nulato N. and S. combined	940–1,900 (SEG) 2005	No change
North Fork Nulato River	Discontinued 2005	No change
South Fork Nulato River	Discontinued 2005	No change
Chena River	2,800–5,700 (BEG) 2001	No change
Salcha River	3,300–6,500 (BEG) 2001	No change

9.1.1 JTC Discussion of BEG for Upper Yukon River Chinook Salmon

A comprehensive Biological Escapement Goal for Canadian-origin Upper Yukon River Chinook salmon cannot be developed using available data and the Chinook Salmon Technical Committee criteria. At this time, the data are insufficient to warrant a Pacific Scientific Advice Review Committee (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 a Spawning Escapement Goal (not to be mistaken for Sustainable Escapement Goal (SEG)). Estimates of return per spawner for Yukon River Chinook salmon are presented in Appendix A10 and Figure 11. However, estimates of historic spawning escapement and historic total run size, and therefore return per spawner estimates, lack robustness.

9.1.1.1 Objective

Cooperative Canada/U.S. management of Canadian origin Yukon River Chinook salmon used an agreed upon escapement goal range for rebuilt stocks, which was monitored through the use of a mark–recapture program. Prior to 2008, the longstanding escapement goal range for rebuilt stocks was set at 33,000 to 43,000. Since 2005, the Parties have relied upon the Eagle sonar program to assess the abundance of Chinook salmon migrating into Canada. Comparisons between estimates derived from the earlier mark–recapture and current sonar programs suggest that the mark–recapture program underestimated Chinook salmon abundance. In order to fully develop the sonar based assessment, a new spawning escapement goal is needed that is applicable to sonar-based estimates, and is biologically defensible, incorporating known information on escapement, returns, and factors limiting production such as habitat capacity. At the present time, some technical concerns with the standard methodology used to assess escapement goals for Canadian-origin Yukon River Chinook salmon may be addressed with additional habitat capacity evaluations.

9.1.1.2 Habitat Based Approach

Independent methods for assessing habitat capacity for Chinook salmon have been developed by Parken et al. (2006) based on relationships between various stock recruitment parameters (e.g., capacity) and watershed area for stream and ocean type Chinook salmon stocks along the Pacific Coast. There is potential to apply this methodology to Canadian-origin Yukon River Chinook salmon. The JTC recommended that this work be a high priority in refining a biologically-based escapement goal (JTC 2011). A Canadian Index Area Priority Planning Subcommittee (CIAPPS) was appointed at the fall 2011 JTC meeting to address this need.

9.2 SUMMER CHUM SALMON

Current summer chum salmon escapement goals are in place only for East Fork Andreafsky and Anvik Rivers (Table 25). The East Fork Andreafsky River goal was changed to a weir based goal in the 2010 Board of Fisheries meeting, with a lower bound SEG replacing the BEG range primarily because it would be difficult or undesirable to hold escapements below the upper bound of a range through inseason management actions. Both the East and West Fork Andreafsky River aerial survey based goals were eliminated (Volk et al. 2009). The existing summer chum escapement goals are expected to be retained during the next Board of Fisheries cycle, and a small number of others are being reviewed, in particular, a Yukon River drainagewide goal.

Table 25.–List of current and former escapement goals for Yukon River summer chum salmon.

Chinook Salmon Stock	2007-2010 Goal (Type) and Year Established	2011 Goal (Type) and Year Established
E. Fork Andreafsky River	65,000–130,000 (BEG) 2001	> 40,000 (SEG) 2010
E. Fork Andreafsky River	Discontinued (aerial) 2005	No change
W. Fork Andreafsky River	Discontinued (aerial) 2005	No change
Anvik River	350,00–700,000 (BEG) 2005	No change

9.3 FALL CHUM SALMON

There has been little change to the Biological Escapement Goals (BEGs) established in 2001 for Alaskan fall chum salmon stocks (Table 26). The Toklat River escapement goal was discontinued in 2010 because the foot survey assessment project was terminated. The drainagewide BEG for fall chum salmon in the Yukon River was changed to an SEG in 2010 (Fleischman and Borba 2009) because the fishery subsistence fishery priority prevents management for maximum sustained yield. There are no fall chum salmon BEGs for Canadian-origin stocks within the Upper Yukon River (mainstem) and Porcupine River drainages. The BEGs recommended in 2001 for the Upper Yukon (60,000–129,000) and Fishing Branch rivers (27,000–56,000) were not accepted by the Pacific Scientific Advice Review Committee (PSARC) review undertaken in 2002, because of concerns with the quality of the data. However, as is outlined in Sections 8.5.2 and 8.5.3, the JTC has recommended a Canadian Upper Yukon River escapement goal range of 70,000 to 104,000 for 2012. The Fishing Branch River IMEG range of 22,000 to 49,000, initiated in 2008, is extended through 2013. The development of the IMEG for Fishing Branch River is based on the Bue and Hasbrouck (*Unpublished*) method applied to those years the weir was fully operational.

Table 26.–Yukon River escapement goals from 2001 and recommendations for 2012.

Fall Chum Salmon Stock	Current Goal Established in 2001	Goal Type	Goal Recommended in 2011
Yukon Drainage	300,000–600,000	SEG	No Change
Tanana River	61,000–136,000	BEG	No Change
Delta River	6,000–13,000	BEG	No Change
Toklat River	15,000–33,000	BEG	Discontinued
Upper Yukon R. Tributaries	152,000–312,000	BEG	No Change
Chandalar River	74,000–152,000	BEG	No Change
Sheenjek River	50,000–104,000	BEG	No Change
Canadian Upper Yukon River	>80,000	Yukon Salmon Agreement	70,000–104,000
Fishing Branch River	50,000–120,000	Yukon Salmon Agreement	22,000–49,000

9.4 COHO SALMON

A SEG range of 5,200 to 17,000 fish for the Delta Clearwater River is the only goal currently established for coho salmon in the Yukon River drainage.

10.0 MARINE FISHERIES INFORMATION

10.1 INTRODUCTION

Yukon River salmon migrate into the Bering Sea during the spring and summer after typically spending either zero, one, or 2 winters rearing in fresh water, depending on the species. Information on stock origin from tagging, scale pattern, parasites, and genetic analysis indicate that Yukon River salmon are present throughout the Bering Sea, in regions of the North Pacific Ocean south of the Aleutian chain, and the Gulf of Alaska during their ocean migration (Healey, 1991; Salo 1991). Yukon River salmon have the potential to be captured by fisheries that harvest mixed stocks of salmon, other species of fish (bycatch), and by illegal fishing activities throughout their oceanic distribution. Recovery of coded-wire tags in these fisheries provides one of the key descriptors of the oceanic distribution of Yukon River Chinook salmon (Whitehorse Rapids chinook salmon; Appendix A20).

Several U.S. fisheries are currently managed to limit the interception and bycatch of salmon stocks that include Yukon River salmon. These fisheries include salmon fisheries in the South Alaska Peninsula area and U.S. groundfish trawl fisheries in both the Gulf of Alaska (GOA) and Bering Sea-Aleutian Islands (BSAI) management areas. Information on the South Alaska Peninsula fisheries and salmon bycatch in the Bering Sea and Gulf of Alaska groundfish fisheries are included here along with information on High Seas Driftnet enforcement activities by the United States Coast Guard and National Marine Fisheries Service. Relative abundance estimates of juvenile chum and Chinook salmon in the northern Bering Sea from pelagic trawl surveys by the Alaska Fisheries Science Center, Auke Bay Laboratories are also included as a leading ecosystem indicator of stock status for Yukon River chum and Chinook salmon.

10.2 SOUTH ALASKA PENINSULA SALMON FISHERIES

The first documented commercial harvests from the South Unimak and Shumagin Islands June fisheries occurred in 1911. During the early to mid-1960s, the South Unimak and Shumagin Islands fisheries were open to commercial salmon fishing 5 days per week. From 1967-1970, fishing occurred 7 days per week regardless of the Bristol Bay sockeye salmon run strength. Special regulatory meetings were held annually and resulted in different regulations every year from 1971-1974.

In 1975, the Alaska Board of Fisheries (BOF) implemented an allocation plan in which the South Unimak and Shumagin Islands June fisheries were granted an annual guideline harvest level (GHL) based on the projected Bristol Bay inshore sockeye salmon harvest. Based on historical catch data, 6.8% of the forecasted inshore Bristol Bay harvest was allocated to the South Unimak June fishery and 1.5% was allocated to the Shumagin Islands June fishery. Portions of the GHL were assigned to discrete time periods so the harvest would be spread throughout June. Concerns over large harvests of chum salmon in the early 1980s, and a weak fall Yukon River chum salmon run resulted in a chum salmon cap that, if reached, would result in closure of the fishery for the remainder of June. Between 1986 and 2000, the chum salmon cap was as high as 700,000 fish (1992-1997) and as low as 350,000 fish (1998-2000).

In January 2001, the BOF modified the South Unimak and Shumagin Islands June salmon fishery management plan. These modifications were in effect through the 2003 season and included the elimination of the sockeye salmon GHL and the chum salmon cap. Fishing time for any gear group was reduced to a maximum of 16 hours per day. Fishing time by seine and drift gillnet gear was limited to a maximum of 48 hours in a floating 7 day period with no more than two 16-hour periods on consecutive days in any 7 day period. Purse seine and drift gillnet fishing periods through June 24 occurred at the same time in the South Unimak and Shumagin Islands fisheries.

From June 10 through June 24, in 2001 through 2003, set gillnet gear could be operated on consecutive days for 16-hour fishing periods as long as the set gillnet sockeye to chum salmon ratio was above the recent 10-year average in each fishery. If the set gillnet sockeye to chum salmon ratio fell below the recent 10-year average in either of the fisheries (South Unimak or Shumagin Islands), that fishery was closed for one period.

After June 24, in either the South Unimak or Shumagin Islands fisheries, if the ratio of sockeye to chum salmon, for all gear combined, was 2:1 or less on any day, the next fishing period was 6 hours in duration for all gear groups in that fishery. If the ratio of sockeye to chum salmon was 2:1 or less for 2 consecutive fishing periods in either fishery, the season was closed for the remainder of June for all gear groups. If the sockeye to chum salmon ratio was greater than 2:1, a 6-hour fishing period could be extended to a maximum of 16 hours.

Prior to the 2004 fishing season, many of the restrictions in place from 2001 to 2003 were replaced by a set fishing schedule, which is currently still in effect. Sockeye salmon harvests from 2004 through 2009 averaged 642,981 in the South Unimak and 649,701 in the Shumagin Islands June fisheries for an average total harvest of 1,292,682. This average total harvest was lower than the 1975–2000 average, but above the 2001–2003 average. Chum salmon harvests from 2004 through 2009 for the South Unimak and Shumagin Islands June fisheries average 168,168 and 267,701 respectively. The average chum salmon harvest was below the 1975–2000 average total harvest, and above the 2001–2003 average (Appendix A20).

10.3 SALMON BYCATCH IN THE BERING SEA AND GULF OF ALASKA GROUNDFISH FISHERIES

U.S. groundfish fisheries in the Bering Sea-Aleutian Islands (BSAI) and Gulf of Alaska (GOA) regions 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) Alaska Regional Office. Annual summaries and inseason information on Pacific salmon bycatch in the Bering Sea and Gulf of Alaska groundfish fisheries are provided by the Alaska Regional Office as part of NMFS catch accounting system (NMFS, 2011). Bycatch of Chinook and non-Chinook salmon (principally chum salmon) in the BSAI and GOA remained at low levels in 2011 (Appendix A22). Estimated bycatch of Chinook salmon during 2011 was 26,672 in BSAI groundfish fisheries and 20,773 in GOA groundfish fisheries. Much of the 2011 BSAI bycatch of Chinook occurred during the B-season (19,021). Bycatch levels on non-Chinook salmon species increased significantly in the BSAI groundfish fisheries. Estimated bycatch of non-Chinook salmon species during 2011 was 192,497 in BSAI groundfish fisheries. Bycatch of non-Chinook salmon species were not available for GOA groundfish fisheries in 2011, but bycatch levels should be under 10,000 if consistent with bycatch in recent years.

Pollock directed fisheries in the Bering Sea have been the primary groundfish fishery of concern for salmon bycatch as they account for over 80% of the total Chinook salmon bycatch and over 90% of the non-Chinook salmon bycatch in the BSAI groundfish fisheries (Appendix A23). Harvests are managed in the BSAI pollock fishery by setting an annual total allowable catch (TAC) for pollock and allocating the catch to various sectors of the fishery as specified by the American Fisheries Act in 1998. These allocations are divided into 2 seasons – 40% to the winter roe season (January 20 to June 10; A-season) and 60% to summer/fall season (June 10 to November 1; B-season). Chinook salmon bycatch occurs in both the winter season (63%) and the summer/fall season; non-Chinook salmon are caught almost entirely during the summer/fall season (99%) (Appendix A23).

A variety of regulatory measures have been used to limit salmon bycatch in the GOA and BSAI groundfish fisheries. These measures include: classifying salmon as a prohibited species, salmon savings areas, and a voluntary rolling hotspot system (VRHS). Prohibited species within US groundfish fisheries must be either discarded or donated through the Pacific Salmon Donation Program, which allows for distribution of salmon taken as bycatch to economically disadvantaged individuals by tax exempt organizations. Chinook and Chum Salmon Savings Areas were created in the mid-1990s as part of the BSAI groundfish fisheries. These savings areas enabled cap-and-closure measures to limit salmon bycatch in the Bering Sea pollock fishery. Savings areas are based on locations with historically high spatial and temporal levels of salmon bycatch and were closed to fishing once salmon bycatch levels reached a specified cap. In 2006, fishing vessels participating in the VRHS were exempted from the salmon savings areas. The VRHS is intended to increase the ability of the pollock fishery to minimize salmon bycatch by adaptively defining area closures with inseason bycatch information.

Escalating numbers of Chinook salmon captured as bycatch in the BSAI pollock fishery in 2006 and 2007 prompted a review of alternative management measures used to limit the bycatch of Chinook salmon and an environmental impact assessment of Chinook salmon bycatch in the Bering Sea pollock fishery (NMFS 2009a, NMFS 2009b). Following these reviews, the NPFMC

recommended amendment 91 (http://www.fakr.noaa.gov/frules/75fr53026.pdf, http://www.fakr.noaa.gov/frules/75fr58337.pdf) be added to the BSAI Groundfish Fisheries Management Plan for the Bering Sea pollock fishery. Amendment 91 was implemented by NMFS during the 2011 fishing season and established a bycatch hard-cap of 60,000 Chinook salmon and a performance cap of 47,591 Chinook salmon for vessels participating in an incentive plan agreement (IPA). Chinook salmon bycatch quotas are allocated to each season and sector of the fishery based on bycatch caps, historical Chinook salmon bycatch, and pollock harvest allocations; however provisions are made in the amendment to transfer unused quotas under the approval of the National Marine Fisheries Service (NMFS) Alaska Regional Office. Performance caps establish benchmark performance criteria of incentive plan agreements, the primary tool used to minimize salmon bycatch. Sectors that exceed their proportion of the performance cap more than 2 times in any 7-year period while participating in an IPA will have their hard cap reduced to their proportion of the performance cap. Salmon still retain their classification of a prohibited species; however, amendment 91 establishes benchmark performance criteria for incentive plan agreements such as the voluntary rolling hotspot system that have been used or may be used in the future to avoid salmon bycatch in the Bering Sea pollock fishery.

10.4 Northern Bering Sea Pelagic Trawl Survey

Pelagic trawl surveys in the northern Bering Sea shelf were initiated in 2002 as part of the Bering-Aleutian Salmon International Survey (BASIS: 2002-2007). BASIS was developed by member nations of the North Pacific Anadromous Fish Commission (NPAFC) (United States, Russia, Japan, Canada, and Korea) to improve our understanding of marine ecology of salmon in the Bering Sea. The United States (Alaska Fisheries Science Center, Auke Bay Laboratories) continued pelagic trawl surveys in the northern Bering Sea in support of the Bering Sea Integrated Ecosystem Research Project (BSIERP) in 2009 and 2010. Salmon catches during these multi-disciplinary trawl surveys have provided a unique opportunity to evaluate the status of salmon stocks during their juvenile life-history stage. Funding support for the northern Bering Sea trawl studies in 2011 was provided by the Alaska Sustainable Salmon Fund and the Arctic Yukon Sustainable Salmon Initiative to specifically address Yukon River juvenile Chinook salmon. Figures 14 and 15 summarize the relative abundance (abundance is relative to trawl catchability) of juvenile Chinook and chum salmon within the northern Bering Shelf (60N–65N). Estimates from 2002 were added to this year's data after correcting for vertical opening of the trawl used in 2002 (Cantrawl model 300) and subsequent years (Cantrawl model 400). Based on genetic stock composition of the juvenile population, the northern Bering Shelf has been identified as the primary index area for Yukon River salmon (Murphy et al., 2009; Chris Kondzela personal communication). Juvenile salmon present in the northern Bering Sea in 2008 (no survey data) and 2009 will be the primary contributors to the 2012 return (Chinook and chum salmon primarily return after 3 to 4 years in the ocean). Similar abundance levels of juvenile chum salmon in 2009 and 2007 indicate similar strengths of the 2006 and 2008 brood years. Juvenile chum and Chinook abundance were both relatively high in 2011; however, those estimates from 2011 are considered preliminary and subject to change.

10.5 ENFORCEMENT OF HIGH SEAS DRIFTNET FISHING MORATORIUM

Provided by the U.S. Coast Guard and NOAA Law Enforcement.

Illegal high seas fishing activity continues to threaten the world's ocean resources and the United States Government is committed to assisting with the protection of these resources from Illegal, Unregulated, and Unreported (IUU) fishing. Operation North Pacific Guard is the United States Coast Guard (USCG) and the National Oceanic & Atmospheric Administration/National Marine Fisheries Service (NOAA/NMFS) high seas fisheries enforcement plan and provides monitoring compliance with the North Pacific Anadromous Fisheries Commission (NPAFC) Convention and United Nations moratorium on Large Scale-High Seas Driftnet (HSDN) fishing (General Assembly Resolution 46/215).

Operation North Pacific Guard 2011 commenced in May with a HC-130 deployment out of Shemya Island, Alaska. USCG Cutter MUNRO commenced their deployment in late July. The Canadian Air Force and Department of Fisheries and Oceans also made an extended CP-140 deployment from Shemya Island, Alaska. During this deployment the CP-140 provided air support to the USCG Cutter MUNRO with real time sighting reports of fishing fleet activity. In addition, Japan Coast Guard aircraft patrolled the NPAFC Convention Area (www.npafc.org) and coordinated surveillance efforts with the USCG Cutter MUNRO. USCG aircraft flew a total of 150 dedicated mission hours in 2011, with 103 hours directly surveying the convention area for IUU fishing activity. The USCG cutter MUNRO conducted a 100-day patrol (42 patrol days in the Convention Area) in direct support of Operation North Pacific Guard (Appendix A24).

Two HSDN vessel were sighted by the USCG in 2011, the F/V Bangun Perkasa and the F/V Shun Li No. 6. The F/V Bangun Perkasa (Figure 16) was boarded and seized by United States enforcement officials. The USCG cutter MUNRO boarded the F/V Bangun Perkasa on September 8, 2011 and discovered over 9 nautical miles of drift gillnet fishing gear on board, along with 30 tons of squid and 30 shark carcasses. The F/V Bangun Perkasa's claim of Indonesian registry was officially denied by the Indonesian Ministry of Marine Affairs and Fisheries, and the U.S. declared the vessel to be stateless and seized the vessel for violation of U.S. law prohibiting large scale driftnet fishing. Similar levels of enforcement effort are planned for the United States in 2012 to reduce IUU fishing activities in the NPAFC Convention Area.

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FIGURES

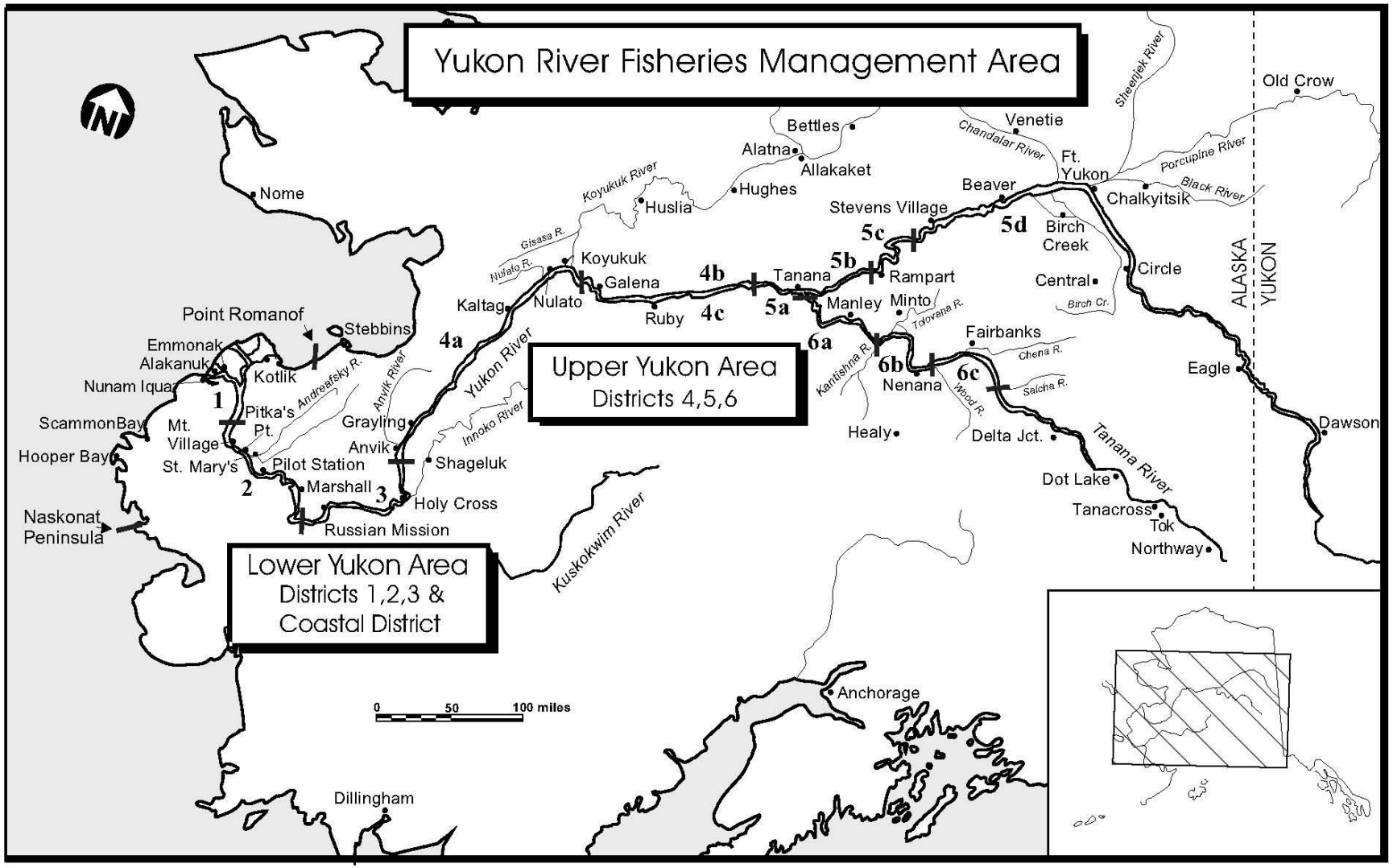
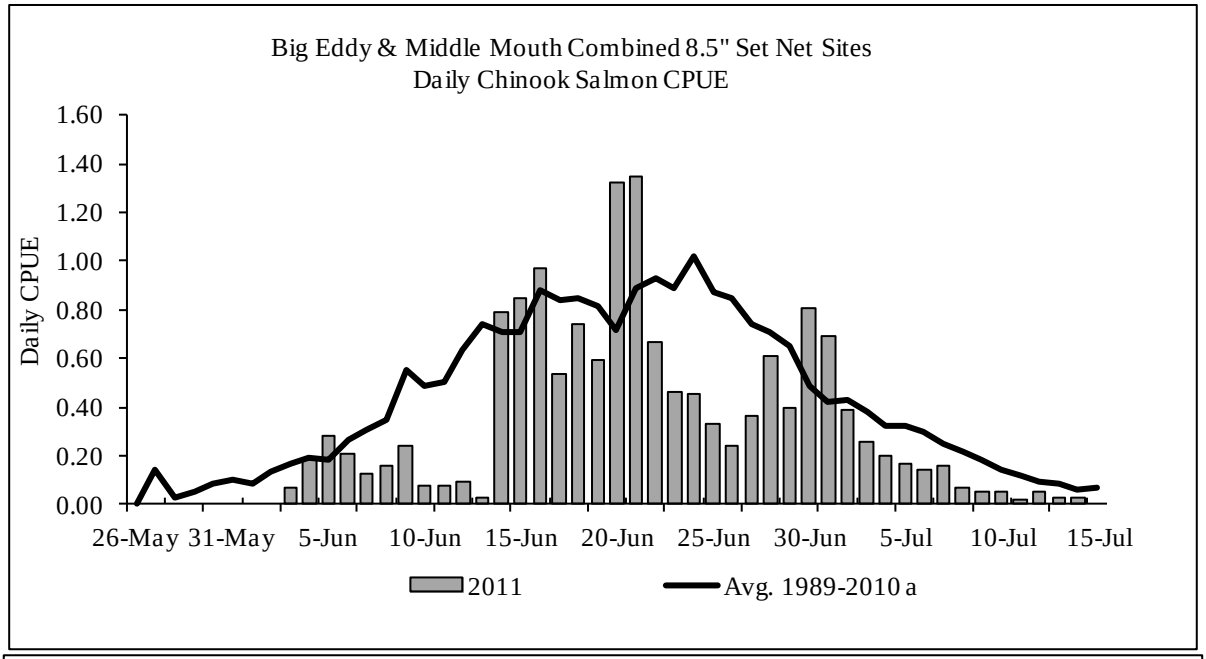
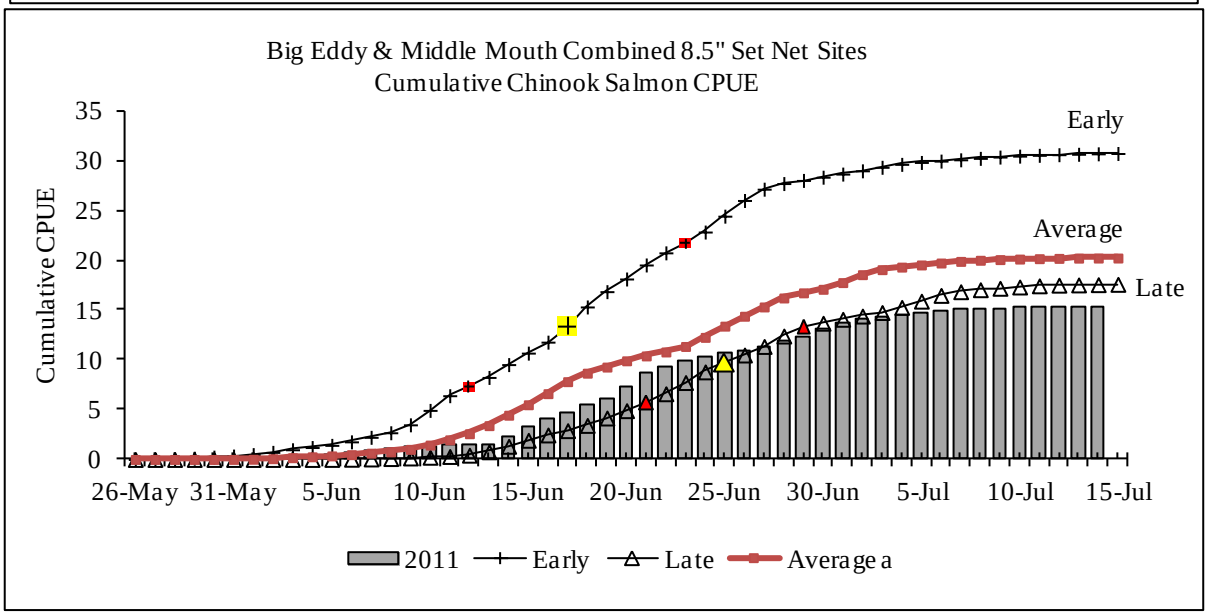


Figure 1.–Map of the Alaskan portion of the Yukon River drainage showing communities and fishing districts.





Note: The 2011 cumulative CPUE compared to the 1989 to 2010 average early, and late run timing (bottom). The symbols located along the cumulative index lines represent the first to the third quartile of the cumulative index. The median date of the cumulative index is represented by the center symbol.

[a] 2009 not included in average because high water and debris caused considerable difficulty for the project.

Figure 2.–Daily test fishery CPUE for Chinook salmon in 2011 compared to the 1989 to 2010 average (top).

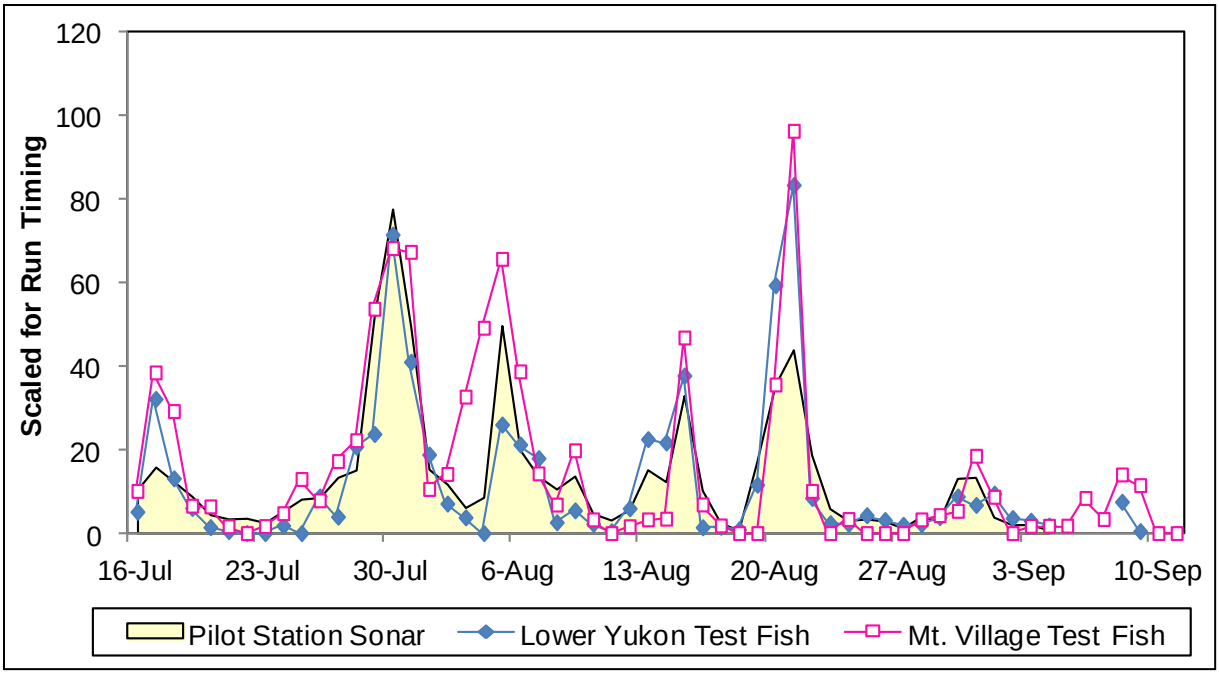
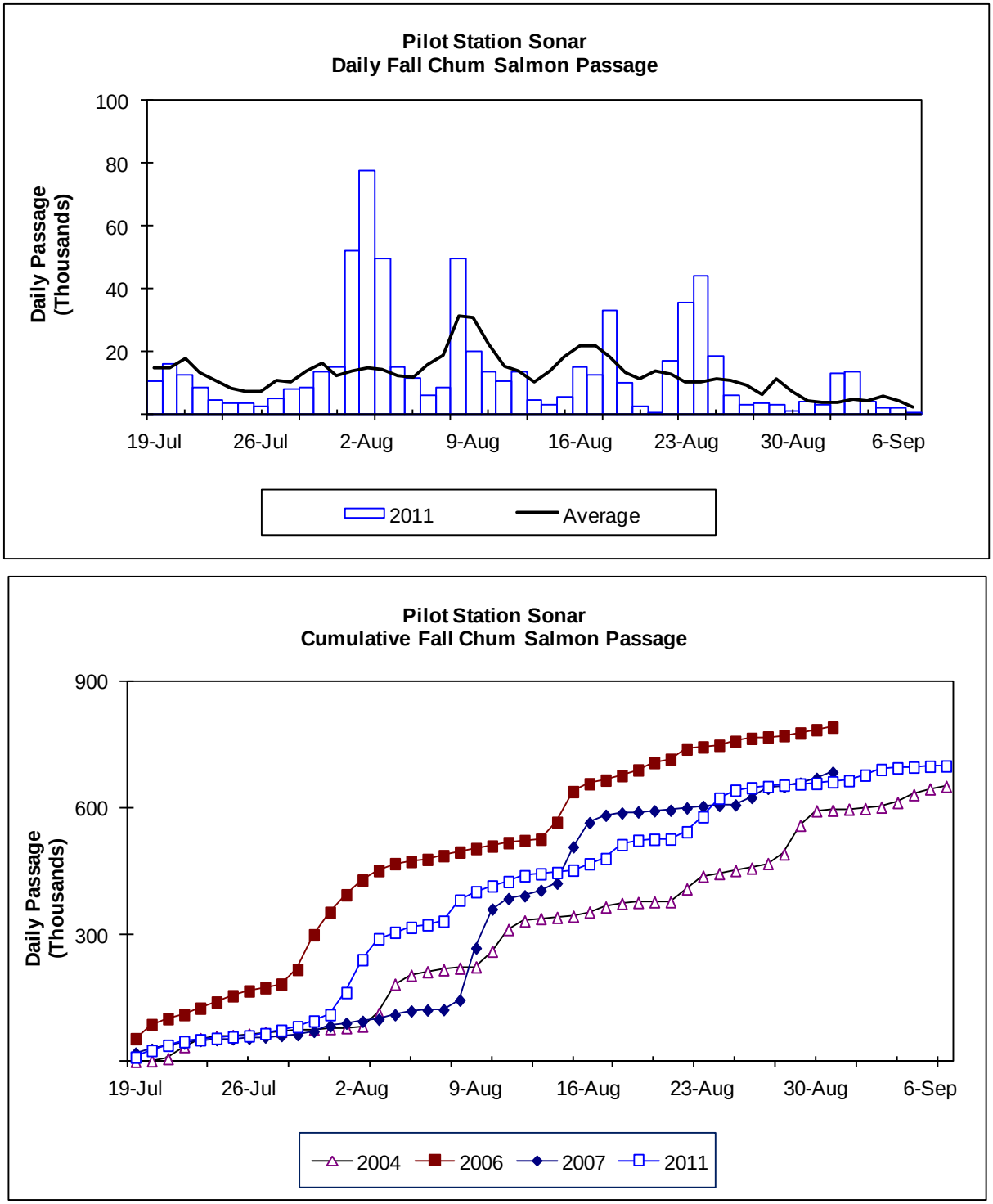


Figure 3.–Comparisons of assessment projects, Lower Yukon Test fish, Mt. Village Test Fish, and Pilot Station sonar, each lagged for run timing and scaled, 2011.



Note: Cumulative Pilot Station sonar passage counts attributed to fall chum salmon in 2011 (bottom), compared to 1998, 2004, 2006, and 2007 (other runs of similar size).

Figure 4.–Daily Pilot Station sonar passage estimates attributed to fall chum salmon in 2011 (top), compared to 1995,1997–2010 average.

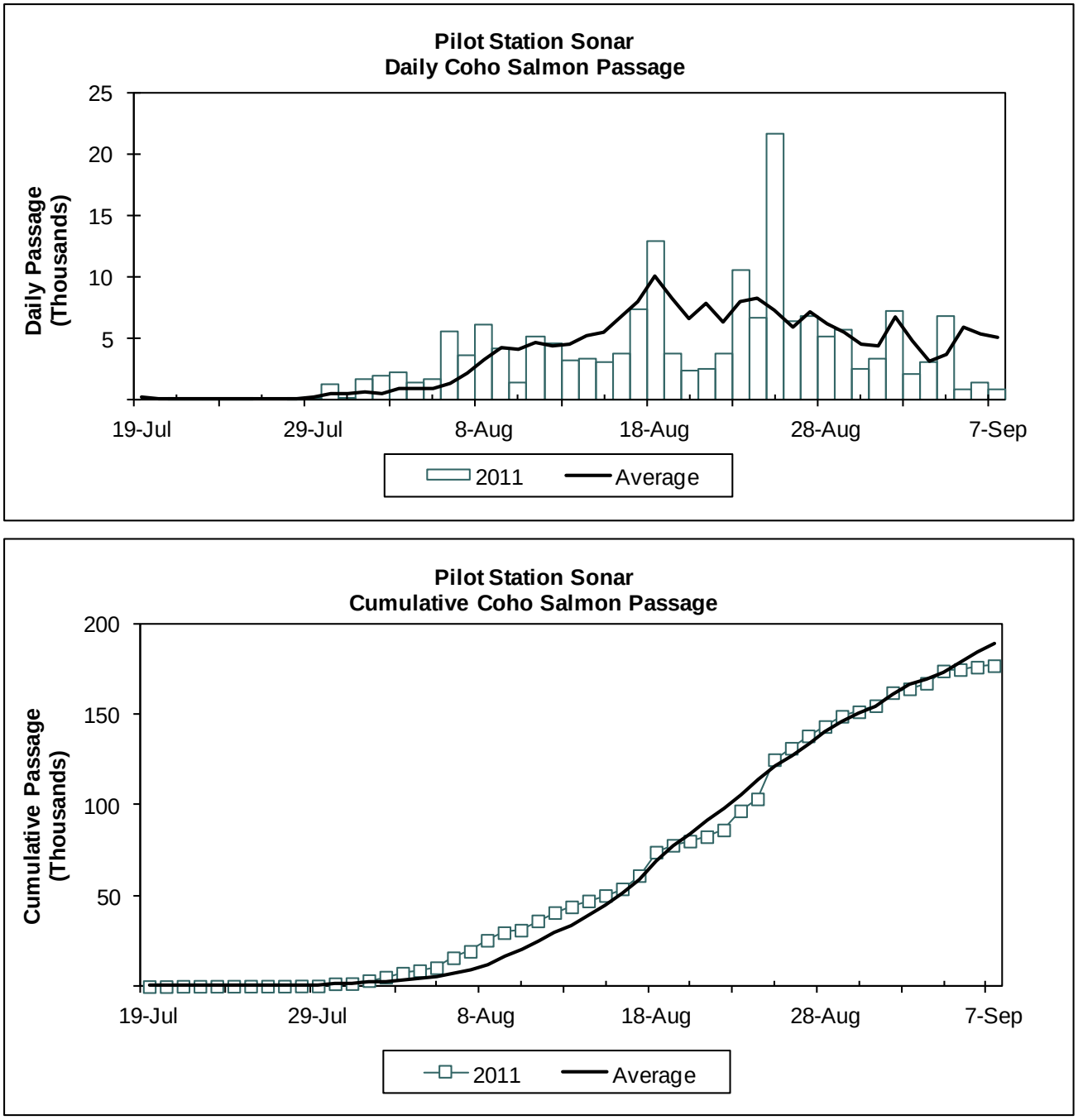


Figure 5.–Daily Pilot Station sonar passage estimates attributed to coho salmon in 2011 (top), and cumulative passage (bottom) compared to 1995, 1997–2008, and 2010 average.

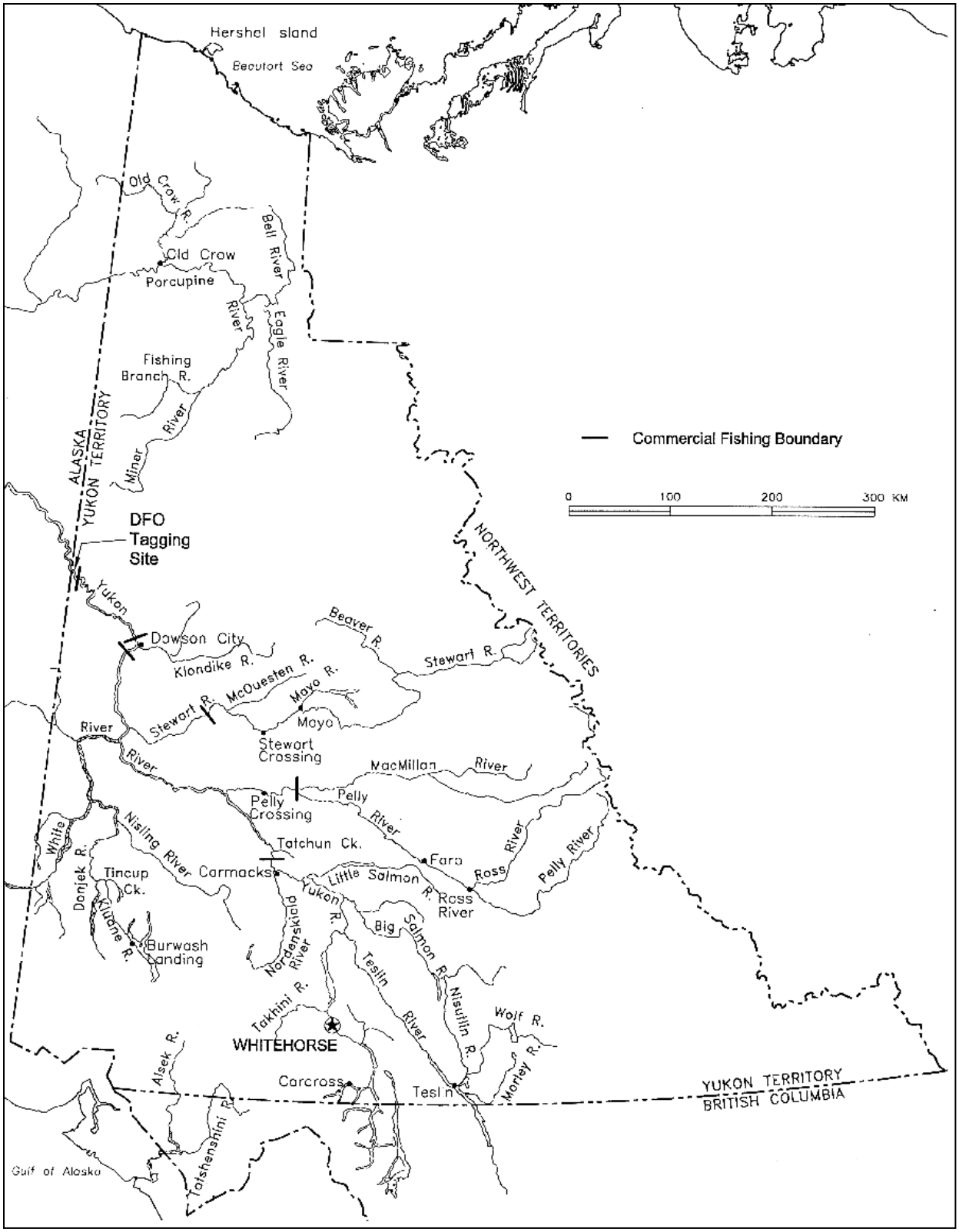


Figure 6.–Commercial fishing boundaries, tributaries, and major towns within the Yukon Territory, Canada.

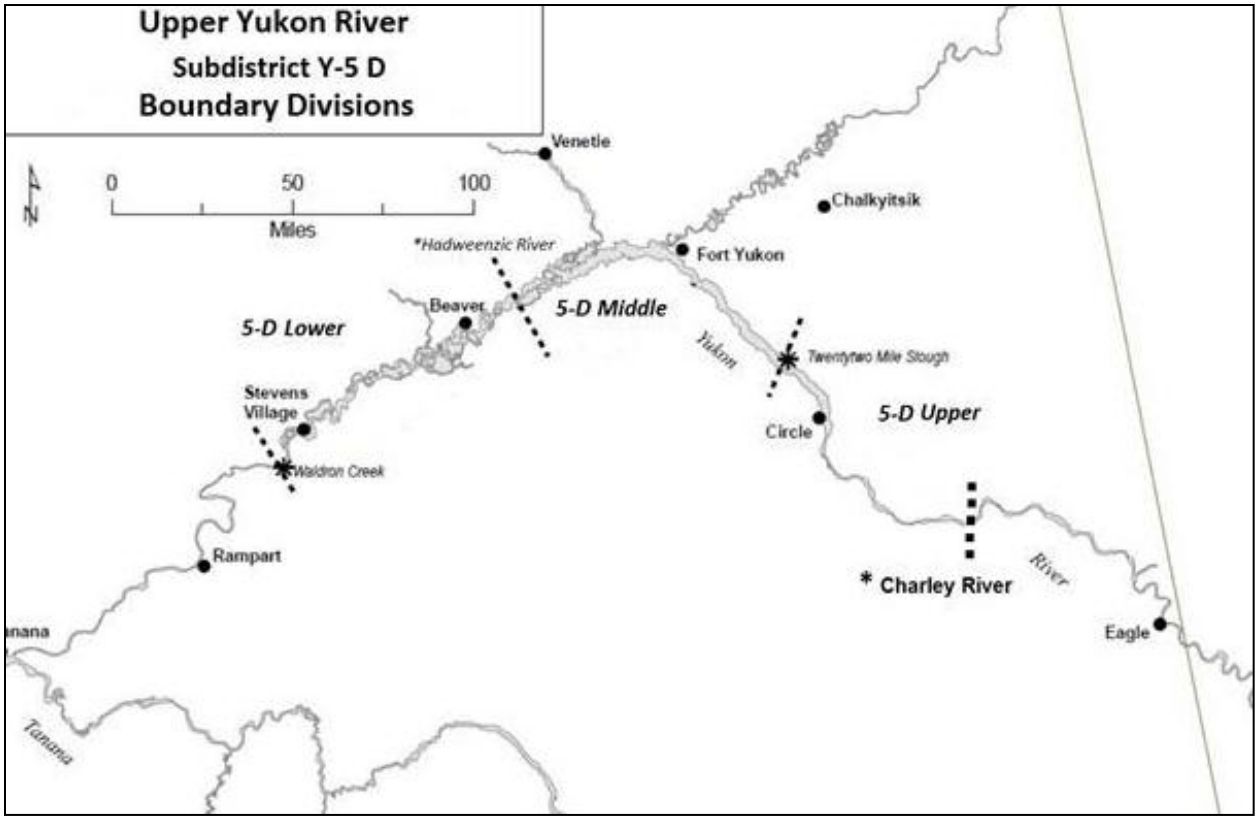


Figure 7.–Subdistrict Y-5D was divided into 4 smaller areas during the 2011 season in order to protect Chinook salmon pulses.

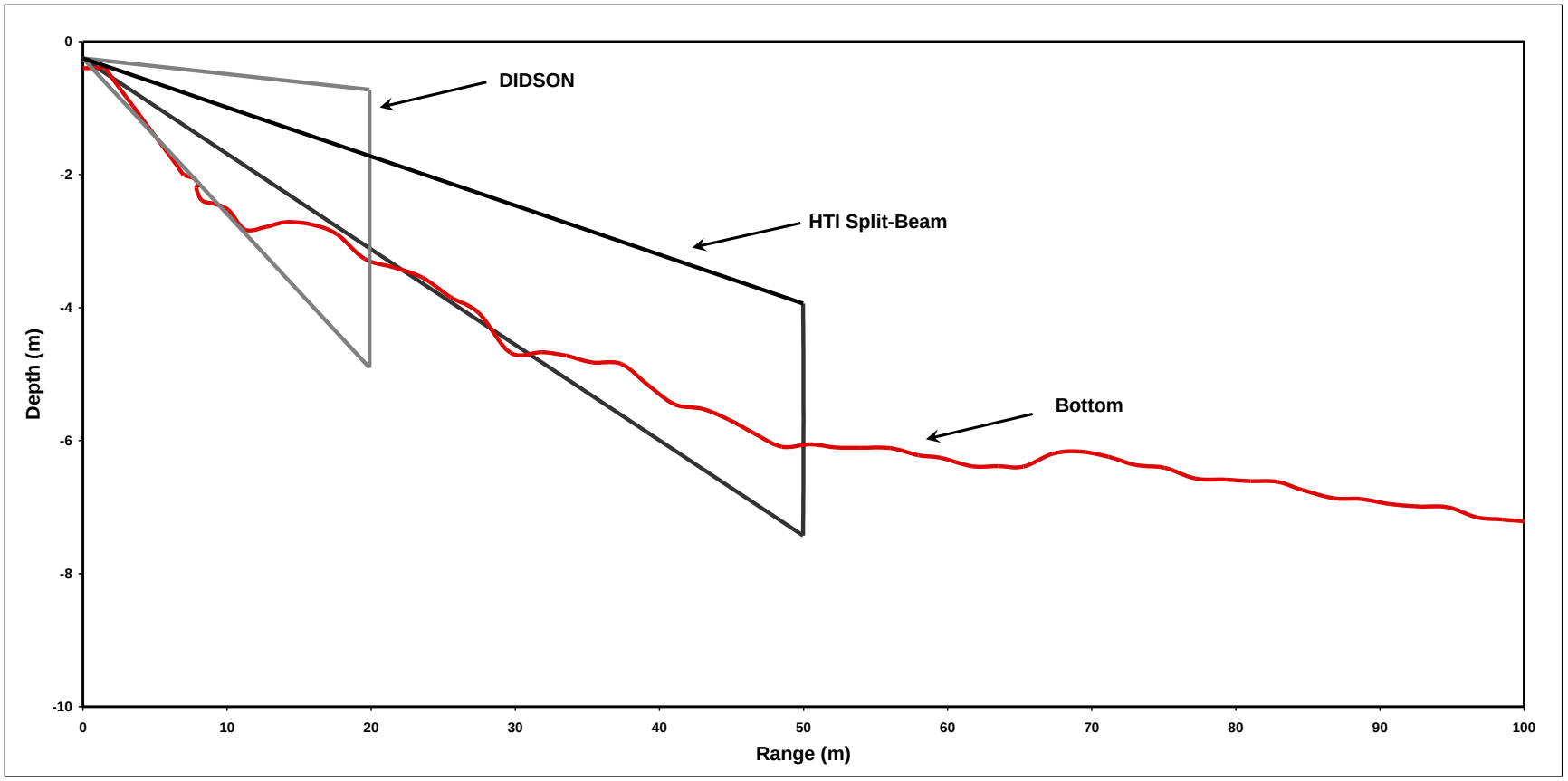
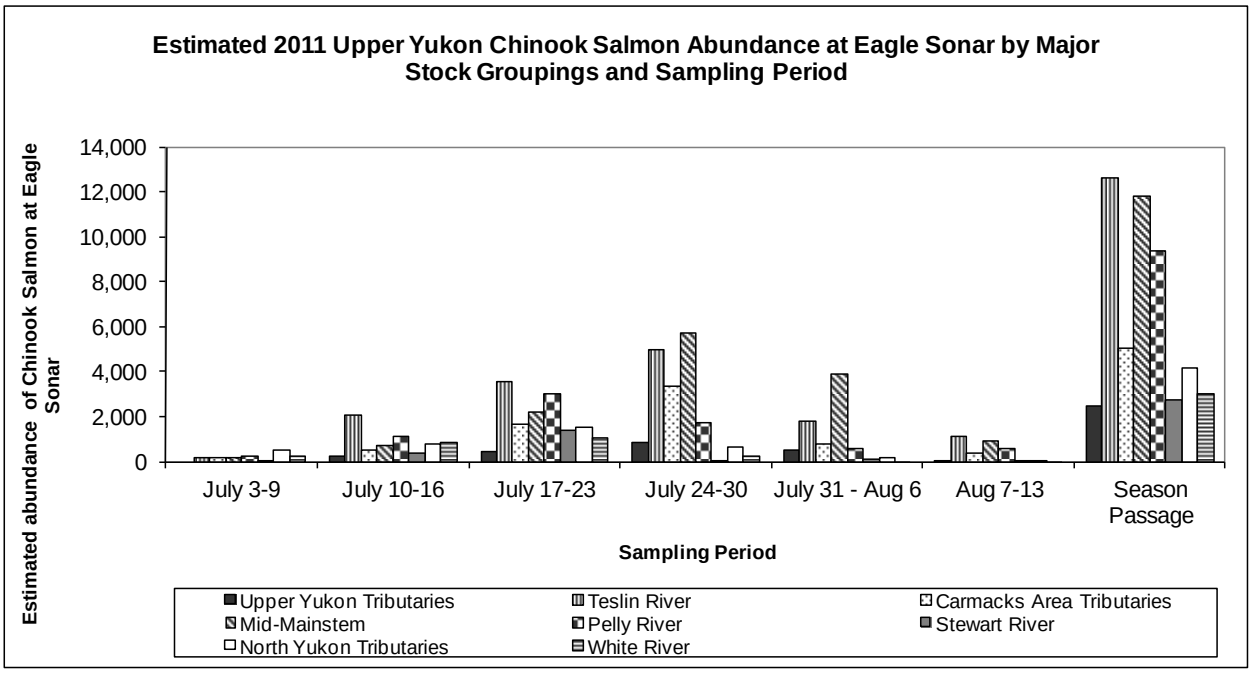
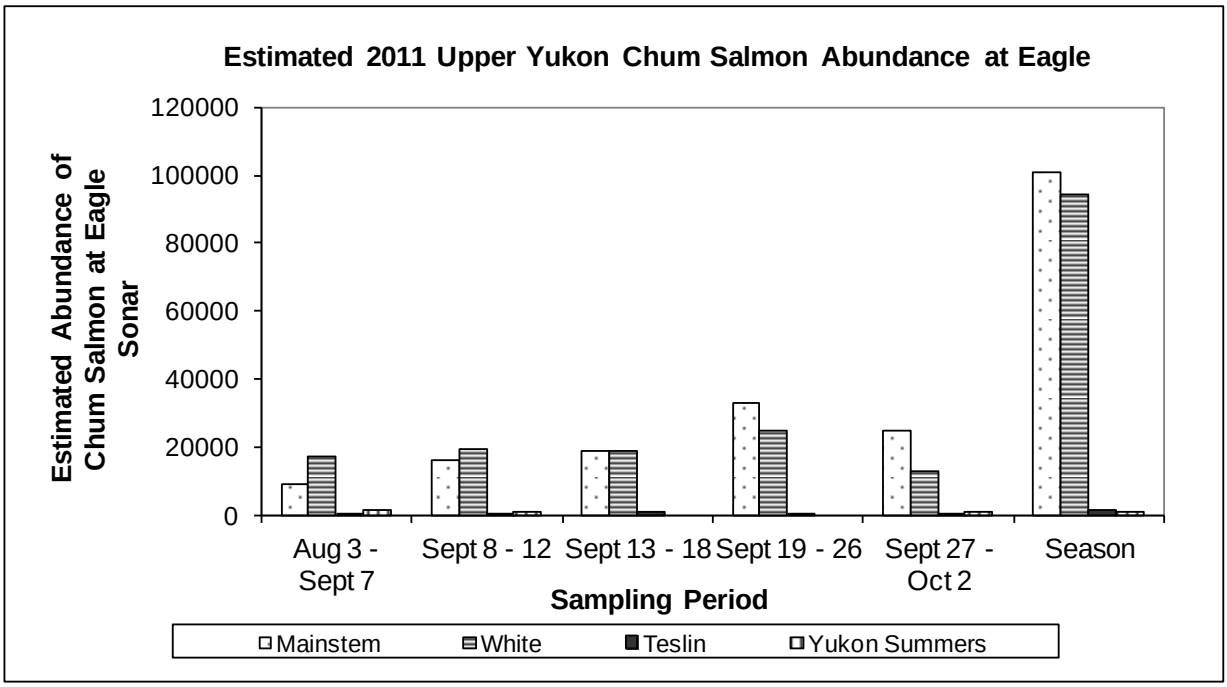


Figure 8.–Schematic representation of the approximate river profile in 2005 and associated nominal beam-width of the DIDSON and split-beam sonar of the first sampling stratum on the left bank at Pilot Station sonar used from 2005 through 2011.



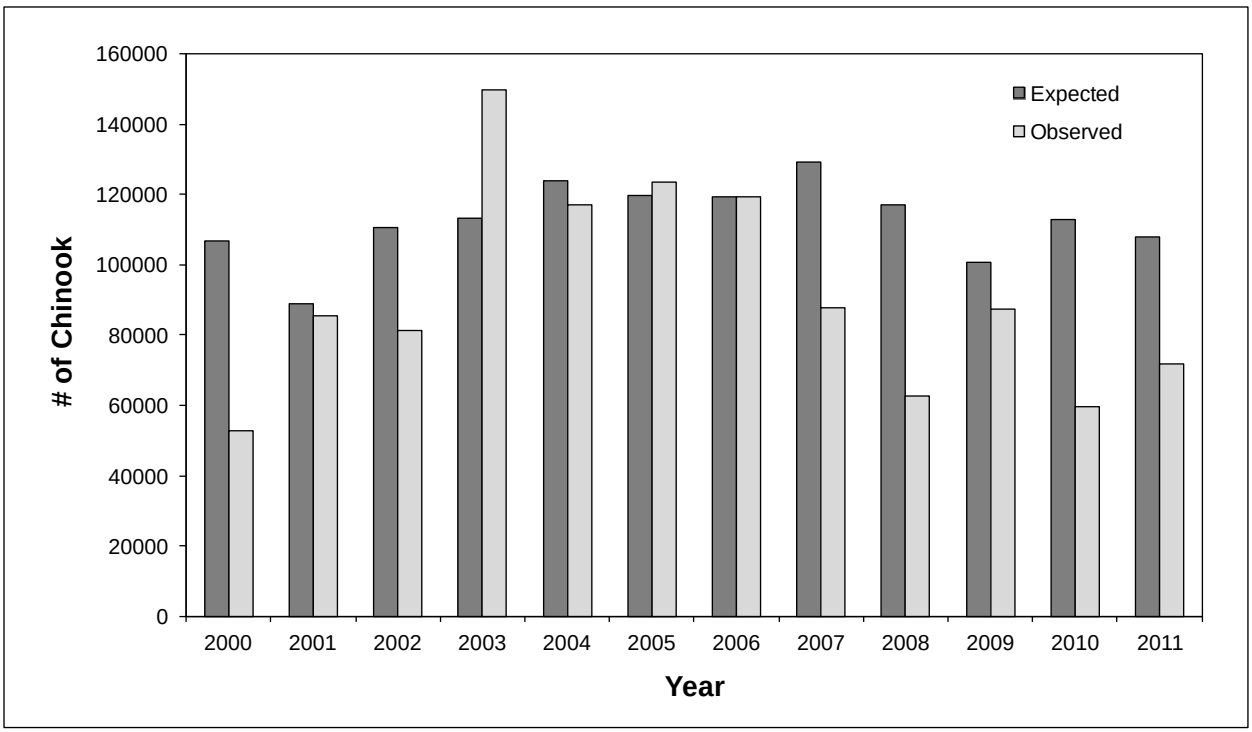
Note: This figure shows the abundance for each sample period as well as total seasonal abundance for 8 regional stock aggregates.

Figure 9.–Abundance of Upper Yukon Chinook salmon stocks at Eagle sonar site in 2010 determined by Genetic Stock Identification analyses.



Note: This figure shows the abundance for each sample period as well as the total to October 4 for 4 regional stock aggregates.

Figure 10.–Relative abundance of Upper Yukon fall chum salmon stocks at Eagle sonar site in 2010 to October 4 determined by Genetic Stock Identification analyses.



Note: Expected values are based on the average of the stock-recruitment and the sibling models.

Figure 11.–Expected versus observed number of Canadian-origin Chinook salmon returning to spawn each year.

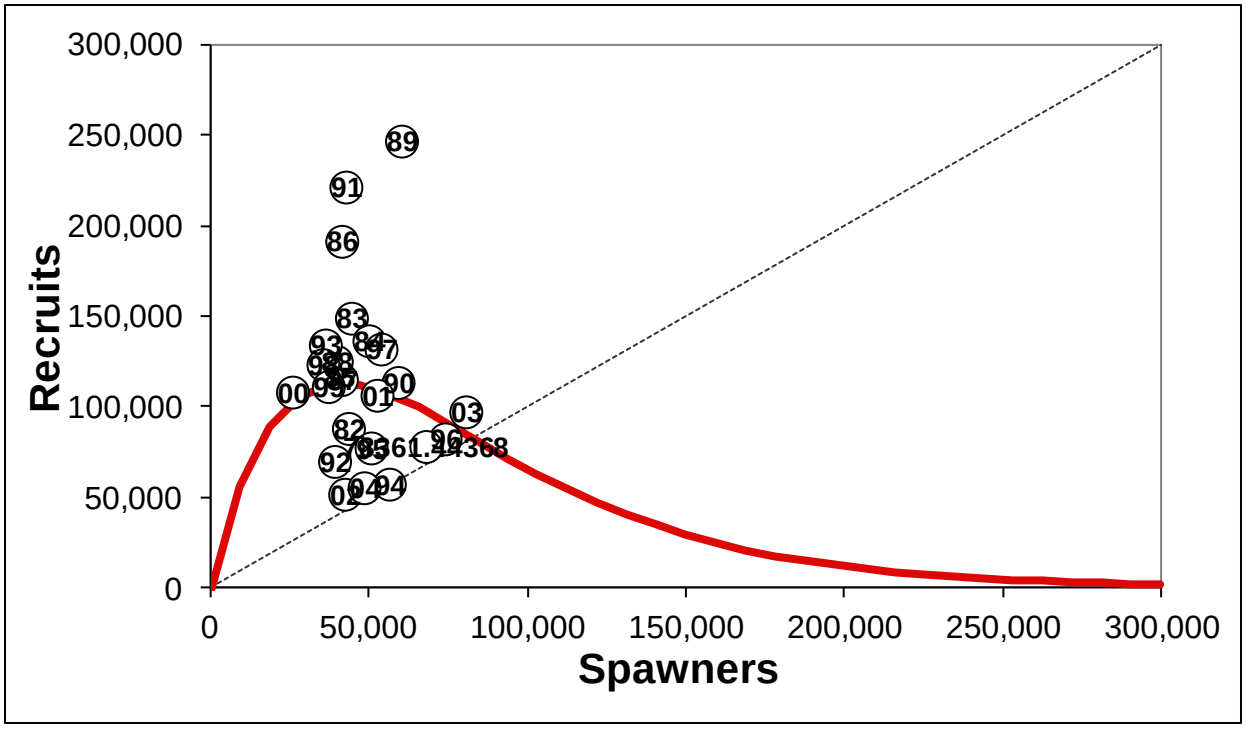


Figure 12.–Yukon River Canadian-origin Chinook salmon recruits versus spawners, Ricker curve, and 1:1 replacement line.

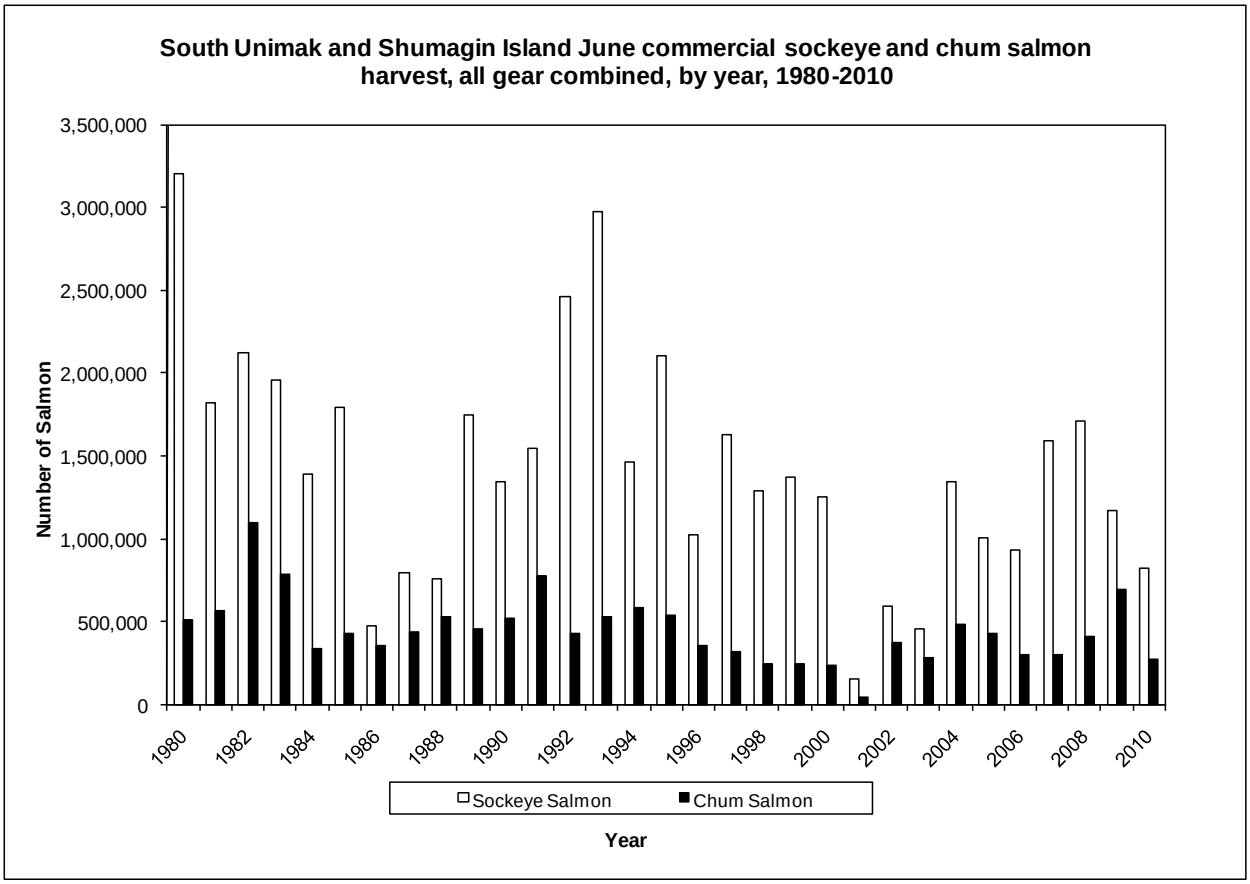
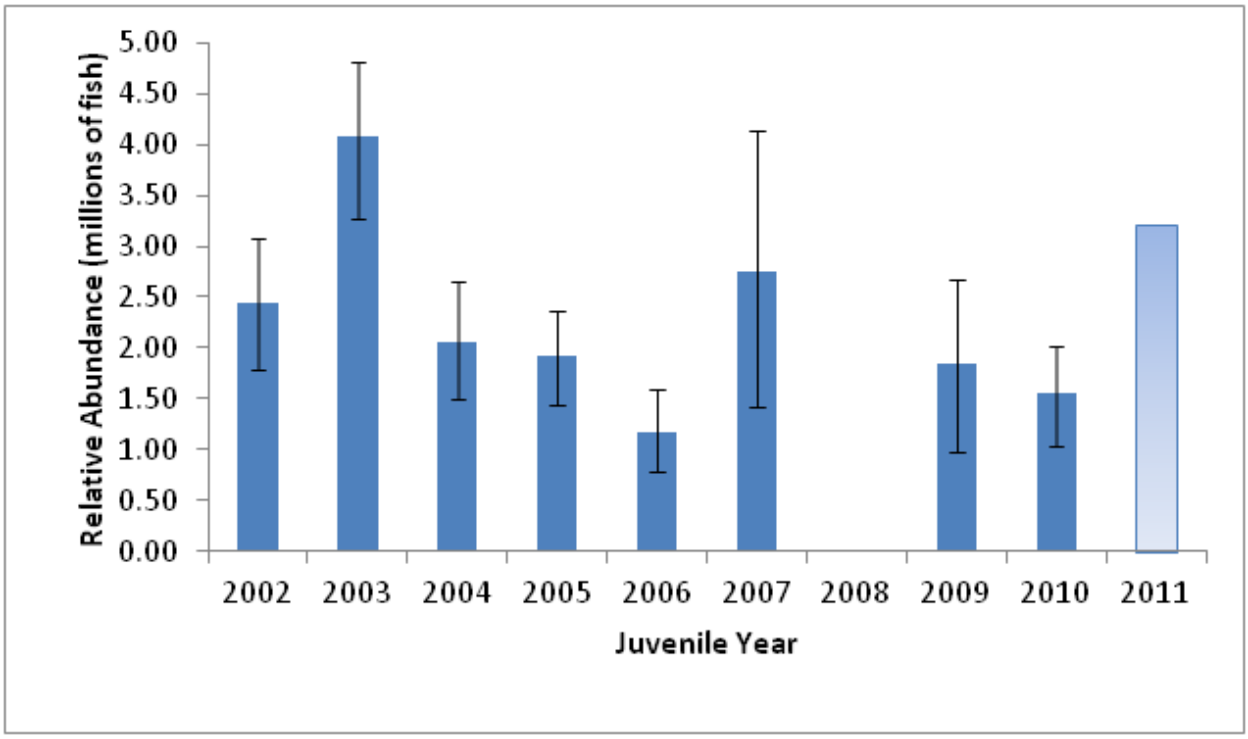
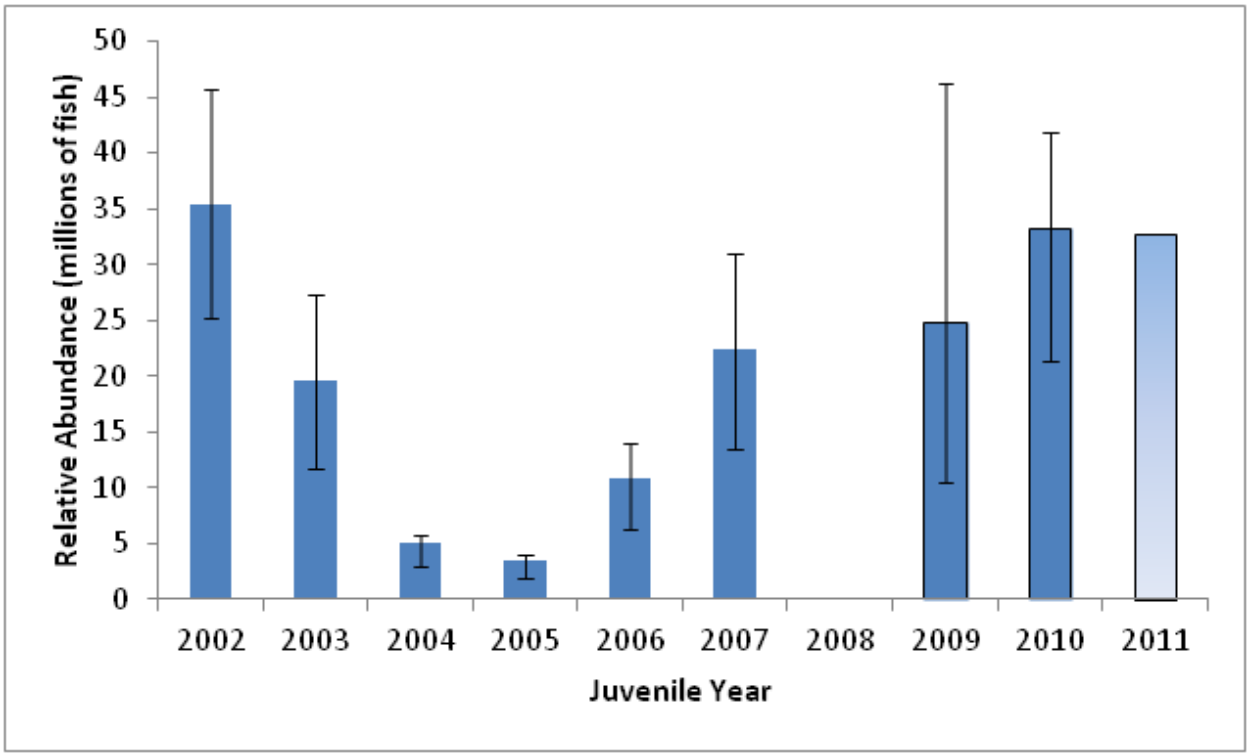


Figure 13.–South Unimak and Shumagin Islands, June commercial sockeye and chum salmon harvest, all gear combined, by year, 1980–2011.



Note: Error bars identify the 80% confidence interval of the abundance estimates. Data for 2011 are preliminary.

Figure 14.–Relative abundance of juvenile Chinook salmon estimated from catch rates in pelagic trawl research surveys in the northern Bering Sea (60N-65N).



Note: Error bars identify the 80% confidence interval of the abundance estimates. Data for 2011 are preliminary.

Figure 15.–Relative abundance of juvenile chum salmon estimated from catch rates in pelagic trawl research surveys in the northern Bering Sea (60N-65N).

Figure 16.–Photograph of the *F/V Bangun Perkasa*, seized by United States enforcement officials for engaging in illegal high seas driftnet fishing within the North Pacific Anadromous Fish Commission Convention Area (provided by the United States Coast Guard).

APPENDIX A: TABLES

Appendix A1.–Yukon River drainage summer chum salmon management plan overview.

	Recommended Management Actions			
Projected Run Size [a]	Commercial	Personal Use	Sport	Subsistence
600,000 or Less	Closure	Closure	Closure	Closure [b]
600,001 to 700,000	Closure	Closure	Closure	Possible Restrictions [b]
700,001 to 1,000,000	Restrictions [b]	Restrictions [b]	Restrictions [b]	Normal Fishing Schedules
900,001 to 1,000,000	0-50,000	Open	Open	Normal Fishing Schedules
Greater than 1,000,000 [d]	Open [c]	Open	Open	Normal Fishing Schedules

[a] ADF&G will use best available data including preseason projections, mainstem river sonar passage estimates, plus the estimated harvest below the sonar site and the Andreafsky River escapement.

[b] The fishery may be opened or less restrictive in areas where indicator(s) suggest the escapement goal(s) in that area will be achieved.

[c] ADF&G may open a drainagewide 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) and 5 AAC 05.365 if buying capacity allows.

[d] Inriver run goal: This is a specific management objective for salmon stocks that are subject to harvest upstream of the point where escapement is estimate.

Appendix A2.–Pilot Station sonar project passage estimates, Yukon River drainage, 1995 and 1997–2011.

	Chinook			Chum						
Year [a]	Large [a]	Small	Total	Summer	Fall [b]	Total	Coho [b]	Pink	Other [c]	Total
2011	87,090	19,937	107,027	1,778,870	698,762	2,477,632	118,453	5,934	637,062	3,346,108
2010	95,913	17,497	113,410	1,327,581	350,981	1,678,562	142,149	651,128	761,800	3,347,049
2009 [d]	92,648	30,342	122,990	1,285,437	240,449	1,525,866	205,278	16,380	677,860	2,548,394
2008	106,708	23,935	130,643	1,665,667	615,127	2,280,794	135,570	558,050	585,303	3,690,360
2007	90,184	35,369	125,553	1,726,885	684,011	2,410,896	173,289	71,699	1,085,316	3,866,753
2006	145,553	23,850	169,403	3,767,044	790,563	4,557,607	131,919	115,624	875,899	5,850,452
2005 [e]	142,007	17,434	159,441	2,439,616	1,813,589	4,253,205	184,718	37,932	593,248	5,228,544
2004	110,236	46,370	156,606	1,357,826	594,060	1,951,886	188,350	243,375	637,257	3,177,474
2003	245,037	23,500	268,537	1,168,518	889,778	2,058,296	269,081	4,656	502,878	3,103,448
2002	92,584	30,629	123,213	1,088,463	326,858	1,415,321	122,566	64,891	557,779	2,283,770
2001 [f]	85,511	13,892	99,403	441,450	376,182	817,632	137,769	665	353,431	1,408,900
2000	39,233	5,195	44,428	456,271	247,935	704,206	175,421	35,501	361,222	1,320,778
1999	127,809	16,914	144,723	973,708	379,493	1,353,201	62,521	1,801	465,515	2,027,761
1998	71,177	16,675	87,852	826,385	372,927	1,199,312	136,906	66,751	277,566	1,768,387
1997 [g]	118,121	77,526	195,647	1,415,641	506,621	1,922,262	104,343	2,379	621,857	2,846,488
1995	130,271	32,674	169,945	3,556,445	1,053,245	4,609,690	101,806	24,604	1,011,855	5,917,900

Note: Estimates for all years were generated with the most current apportionment model (ca 2006) and may differ from earlier estimates.

[a] Chinook salmon >655 mm.

[b] This estimate may not include the entire run. However, in 2008 through 2010, operations were extended to Sept. 7 instead of the usual end date of Aug. 31.

[c] Includes sockeye salmon, cisco, whitefish, sheefish, burbot, suckers, Dolly Varden, and northern pike.

[d] High water levels were experienced at Pilot Station in 2009 during the summer season and extreme low water occurred during the fall season, and therefore passage estimates are considered conservative.

[e] Estimates include extrapolations for the dates June 10 to June 18, 2005 to account for the time before the DIDSON was deployed.

[f] High water levels were experienced at Pilot Station in 2001, and therefore passage estimates are considered conservative.

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

Appendix A3.–Alaskan commercial salmon sales and estimated harvest by district 2011.

District/Subdistrict	Number of Fishermen [a]	Chinook [b]	Summer Chum	Fall Chum	Coho
1	260	36	163,439	127,735	45,336
2	201	46	103,071	100,731	24,195
Subtotal		82	266,510	228,466	69,531
3	-	-	-	-	-
Total Lower Yukon	437	82	266,510	228,466	69,531
Anvik River	-	-	-	-	-
4-A	-	-	-	-	-
4-BC	-	-	-	-	-
Subtotal District 4	-	-	-	-	-
5-ABC	2	-	-	1,246	0
5-D	-	-	-	-	-
Subtotal District 5	2	-	-	1,246	0
6	7	-	8,651	9,267	6,784
Total Upper Yukon	9	-	8,651	10,513	6,784
Total Alaska	446	82	275,161	238,979	76,315

Note: Unless otherwise noted, blank cells indicate years in which no information was collected or harvest numbers were insufficient to generate summary information. Endash indicates no commercial fishing activity occurred. Does not include ADF&G test fishery sales.

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

[b] No Chinook salmon were sold in the summer season. A total of 82 Chinook salmon were sold in District 1 and 2 in the fall season.

Appendix A4.–Number of commercial salmon fishing gear permit holders making at least one delivery by district and season, Yukon Area, 1971–2011.

Chinook and Summer Chum Salmon Season									
	Lower Yukon Area				Upper Yukon Area				Yukon Area
Year	District 1	District 2	District 3	Subtotal	District 4	District 5	District 6	Subtotal	Total
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 [c]	-	-	-	-	-	-	-	-	-
2002	322	223	0	540	0	18	6	24	564
2003	351	217	0	556	3	16	7	26	582
2004	396	212	0	549	0	14	6	20	569
2005	370	228	0	578	0	12	5	17	595
2006	379	214	6	569	0	15	10	25	594
2007	359	220	3	564	5	12	10	27	591
2008	266	181	0	444	8	0	5	13	457
2009	213	166	0	376	6	0	5	11	387
2010	264	181	0	440	5	0	5	10	450
2011	228	182	0	403	0	0	5	5	408
2001-2010 Average	324	205	1	513	3	10	7	19	520

-continued-

Fall Chum and Coho Salmon Season									
	Lower Yukon Area				Upper Yukon Area				Yukon Area
Year	District 1	District 2	District 3	Subtotal	District 4	District 5	District 6	Subtotal	Total
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 [c]	-	-	-	-	-	-	-	-	-
2002	0	0	0	0	0	0	0	0	0
2003	75	0	0	75	2	0	5	7	82
2004	26	0	0	26	0	0	6	6	32
2005	177	0	0	177	0	0	7	7	184
2006	219	71	0	286	0	4	11	15	301
2007	181	122	0	300	0	2	8	10	310
2008	251	177	0	428	0	3	8	11	439
2009	165	130	0	292	0	0	2	2	294
2010	72	18	0	90	0	0	4	4	94
2011	234	169	0	395	0	2	5	7	402
2001-2010 Average	122	56	0	176	0	1	5	6	182

-continued-

COMBINED SEASON [a]									
	Lower Yukon Area				Upper Yukon Area				Yukon Area
Year	District 1	District 2	District 3	Subtotal	District 4	District 5	District 6	Subtotal	Total
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	349	214	0	561	0	0	0	0	561
2001	-	-	-	-	-	-	-	-	-
2002	322	223	0	540	0	18	6	24	564
2003	358	217	0	557	3	16	8	27	584
2004	399	212	0	551	0	14	9	23	574
2005	392	228	0	581	0	12	9	21	602
2006	396	224	6	574	0	20	16	36	610
2007	366	236	3	566	5	13	12	30	596
2008	297	208	0	474	8	3	11	22	496
2009	226	172	0	391	6	0	6	12	403
2010	274	183	0	444	5	0	6	11	455
2011	260	201	0	437	0	2	7	9	446
2001-2010 Average	337	211	1	520	3	11	9	23	543

[a] Combine season numbers will differ as the data represent the total number of unique permits fished during the entire season.

Appendix A5.–Yukon River drainage fall chum salmon management plan, 5AAC 01.249, 2011.

Run Size Estimate [b] (Point Estimate)	Recommended Management Action [a] Fall Chum Salmon Directed Fisheries				Targeted Drainagewide Escapement
	Commercial	Personal Use	Sport	Subsistence	
300,000 or Less	Closure	Closure	Closure	Closure [c]	300,000
300,001 to 500,000	Closure	Closure [c]	Closure [c]	Possible Restrictions [c, d]	to
Greater Than 500,001	Open [e]	Open	Open	Pre-2001 Fishing Schedules	600,000

[a] Considerations for the Canadian mainstem rebuilding plans may require more restrictive management actions.

[b] ADF&G 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.

[c] The fisheries may be opened or less restrictive in areas where indicator (s) suggest the escapement goal(s) in that area will be achieved.

[d] Subsistence fishing will be managed to achieve a minimum drainagewide escapement goal of 300,000 fall chum salmon.

[e] Drainagewide commercial fisheries may be open and the harvestable surplus above 500,000 fall chum salmon will be distributed by district or subdistrict (in proportion to the guidelines harvest levels established in 5 AAC 05.365 and 5 AAC 05.367).

Appendix A6.–Canadian weekly commercial catches of Chinook, fall chum and coho salmon in the Yukon River in 2011.

Statistical Week	Week Ending	Start Date	Finish Date	Days Fished	Number of Fishers	Boat Days	Chinook Salmon	Chum Salmon	Coho Salmon
29	16-Jul			closed					
30	23-Jul			closed					
31	30-Jul			closed					
32	6-Aug			closed					
33	13-Aug			closed					
34	20-Aug			closed					
35	27-Aug	Aug 26	Aug 27	1.5	1	1.5	1	2	
36	3-Sep	Aug 28	Sep 3	3	2	2.5	3	16	
37	10-Sep	Sept 4	Sept 10	4	7	12		660	
38	17-Sep	Sept 11	Sept 17	4	4	12		1,015	
39	24-Sep	Sept 18	Sept 24	7	3	17		2,257	
40	1-Oct	Sept 25	Oct 1	7	2	11		891	
41	8-Oct	Oct 2	Oct 8	7	2	8		251	
42	15-Oct	Oct 9	Oct 15	7	1	7		220	
43	22-Oct	Oct 16	Oct 16	0.5	1	0.5		0	
44	29-Oct			closed				0	
Dawson Area Commercial				41		71.5	4	5,312	0
Upriver Commercial							0	0	0
Total Commercial Harvest							4	5,312	0
Domestic							0	0	0
Recreational							40	0	0
Aboriginal Fishery							4,550 [a]	1,000 [a]	0
Total Upper Yukon Harvest							4,594	6,312	0
Old Crow Aboriginal Fishery							290	1,851	63

[a] Numbers were expanded to account for underreporting.

Appendix A7.–Salmon fishery projects conducted in the Alaskan portion of the Yukon River drainage in 2011.

Project Name	Location, River Mile (RM)	Primary Objective(s)	Duration	Agency	Responsibility
Commercial Catch and Effort Assessment	Alaskan portion of the Yukon River drainage	1)Document and estimate the catch and associated effort of the Alaskan Yukon River fisheries and 2) Commercial salmon fishery via receipts (fish tickets) of commercial sales of salmon.	June - Oct.	ADF&G	All aspects
Commercial Catch Sampling and Monitoring	Alaskan portion of the Yukon River drainage	1)Determine age, sex, and size of Chinook, chum and coho salmon harvested in Alaskan Yukon River commercial fisheries and 2) Monitor Alaskan commercial fishery openings and closures.	June - Oct.	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 based on fishery permits.	Ongoing	ADF&G YRDFA	All aspects Assistants in communities
Sport Catch, Harvest and Effort Assessment	Alaskan portion of the Yukon River drainage	Document and estimate the catch, harvest, and associated effort of the Alaskan Yukon River sport fishery via post-season mail-out questionnaires.	Postseason	ADF&G	All aspects
Yukon River Chinook Microsatellite Baseline	Yukon River drainage	Survey standardized microsatellites and Yukon River Chinook salmon populations.	Ongoing	ADF&G USFWS DFO	R&E Funding R&M Funding
Biological Sampling of Yukon River Salmon	Lower Yukon, RM 17-107	Collect genetics samples and age, sex and length information from subsistence caught Chinook salmon.	June-July	AVCP	All aspects
Yukon River Salmon Stock Identification	Yukon River drainage	Estimate Chinook salmon stock composition of the various Yukon River drainage harvests through genetic stock identification, age compositions, and geographical distribution of catches and escapements.	Ongoing	ADF&G	All aspects R&M Funding
Yukon River Chum Salmon Mixed-Stock Analysis	Pilot Station, RM 123	Estimate the stock compositions of chum salmon using samples collected from Pilot Station sonar test fisheries	May - Aug.	USFWS OSM	All aspects R&M Funding-summer, OSM Funding - fall
YRDFA Weekly Teleconference	Yukon River drainage	Acts as a forum for fishermen along the Yukon River to interact with state and federal managers for the collection and dissemination of fisheries information.	May - Sept.	YRDFA	All aspects R&M funding
Lower Yukon River Set Gillnet Test Fishing	South, Middle, and North mouths of the Yukon River Delta, RM 20	1) Index Chinook salmon run timing and abundance using set gillnets and 2) Sample captured salmon for age, sex, size composition information.	June - Aug.	ADF&G	All aspects

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Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Hooper Bay Dall Point Offshore Test Fishing	Coastal Bering Sea south of Yukon River outlets	Assess run abundance, species composition, and run timing information of salmon bound for the Yukon River in offshore waters to assist with timely management decisions.	June - July	ADF&G	All aspects
Lower Yukon River Drift Test Fishing	South, Middle, and North mouths of the Yukon River delta, RM 20	1)Index Chinook, summer and fall chum, and coho salmon run timing and abundance using drift gillnets and 2)Sample captured salmon for age, sex, size composition information.	June - Aug.	ADF&G	All aspects
Mountain Village Drift Gillnet Test Fishing (1)	Mainstem Yukon River, RM 87	1)Index fall chum and coho salmon run timing and relative abundance using drift gillnets and 2)Sample captured salmon for age, sex, and size composition information.	July - Sept.	Asa'carsar miut Trad. Council BSFA	All aspects R&M funding
East Fork Weir, Andreafsky River	Mile 20 East Fork RM 124	1) Estimate daily escapement of summer chum salmon to the East Fork Andreafsky River and; 2) Estimate age, sex, and size composition of the summer chum salmon escapement.	June - Aug.	USFWS	All aspects OSM funding
Acoustic Radio Tagging	St. Mary's, Yukon River Mile 107-123	1) Document 3-deminsional trajectory of Chinook and chum salmon migrating upstream in the Yukon mainstem past the Pilot Station sonar and; 2) Determine trajectory of fish relative to the detection range of the transducers and the drift fishing locations.	June – July	ADF&G	All aspects AKSSF funding
Yukon River Sonar	Pilot Station, RM 123	1) Estimate Chinook and summer and fall chum salmon passage in the mainstem Yukon River. Apportionment of species including coho salmon and other finfish and; 2) Biological sampling includes genetics and age, sex, length of Chinook, chum and coho salmon.	June – Sept.	ADF&G	All aspects YDFDA and R&M funded- extended operations
Anvik River Sonar	Mile 40 Anvik River, RM 358	1)Estimate daily escapement of summer chum salmon to the Anvik River and 2)Estimate age, sex, and size composition of the summer chum salmon escapement.	June - July	ADF&G	All aspects
Gisasa River Weir	Mile 3 Gisasa River, Koyukuk River drainage, RM 567	1)Estimate daily escapement of Chinook and summer chum salmon into the Gisasa River and 2)Estimate age, sex, and size composition of the Chinook and summer chum salmon escapements.	June - Aug.	USFWS	All aspects OSM funding

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Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Henshaw Creek Weir	Mile 1 Henshaw Creek, RM 976	1) Estimate daily escapement of Chinook and summer chum salmon into Henshaw Creek and 2) Estimate age, sex, and size composition of the Chinook and summer chum salmon escapements.	June - Aug.	TCC USFWS-OSM	All aspects oversight & funding report write-up
Y5A Test Fish Wheel	Mainstem Yukon River RM 695	Index the timing of 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 system.	Aug. - Oct.	ADF&G USFWS	R&M funded contract R&E funded tech support
Chandalar River Sonar	RM 14 Chandalar River, RM 43 Chandalar River RM 996 Yukon River	1) Estimate fall chum salmon passage using DIDSON sonar in the Chandalar River and; 2) Collect vertebrae for ageing, sex and size composition of the fall chum salmon escapement.	Aug. - Sept.	USFWS	All aspects TI Funding R&M funding-ASL
Sheenjek River Sonar	Mile 6 Sheenjek River Porcupine River drainage, RM 1,060	1)Estimate daily escapement of fall chum salmon into the Sheenjek River using DIDSON sonar and counted both left and right banks and 2)Estimate age, sex, and size composition of the fall chum salmon escapement.	Aug. - Sept.	ADF&G	All aspects
Yukon River Sonar	Eagle, RM 1,213	1) Estimate daily passage of Chinook and chum salmon in the mainstem Yukon River using both split-beam and DIDSON sonars and; 2) Estimate age, sex, and size composition of salmon captured in the test nets, includes genetic sampling.	July - Oct.	ADF&G DFO	All aspects, technical support, TI Funding, R&E Funding
Middle Yukon River Chinook Sampling Project	Mainstem Yukon River Kaltag, RM 451	Estimate age, sex, and size composition of Chinook salmon harvested in middle Yukon River subsistence fisheries.	June – July	City of Kaltag	All aspects
Nenana River Escapement Surveys	Nenana River drainage, above RM 860	Aerial surveys for numbers and distribution of coho and chum salmon in 10 tributaries of the Nenana River below Healy Creek..	Sept. - Oct.	ADF&G	All aspects
Rapids Test Fish Wheel	Mainstem Yukon River RM 730	1) Index run timing of Chinook and fall chum salmon runs as well as non-salmon species using video monitoring techniques and 2) Characterize the sex, weight, length, and girth composition of Chinook salmon.	June - Sept.	Zuray USFWS	All aspects R&E funding
Nenana Test Fish Wheel	mainstem Tanana River Nenana, RM 860	Index the timing of Chinook, summer chum, fall chum, and coho salmon runs using a test fish wheel equipped with video monitoring system.	June - Sept.	ADF&G USFWS	All aspects R&E funded tech support
Biological Sampling of Yukon River Salmon	Middle Yukon (RM279-581) and Fort Yukon	Collect genetics samples and age, sex, and length information from subsistence caught Chinook salmon.	July - Aug.	TCC	All aspects R&E funded
Delta River Ground Surveys	Tanana River drainage, RM 1,031	1) Estimate fall chum salmon spawning escapement in Delta River and 2) Sample fall chum salmon carcasses for age, sex, and size composition information.	Oct. - Dec.	ADF&G	All aspects

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Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Chena River Tower	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 AKSSF funding
Salcha River Tower	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 R&M funding
Goodpaster River Tower	RM 45 Goodpaster River, Tanana River drainage, RM 1,049	Estimate daily escapement of Chinook and summer chum salmon into the Goodpaster River.	July	TCC	All aspects Pogo Mine funding
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
Yukon River Inseason Salmon Harvest Interviews	Emmonak, Holy Cross, Nulato, Huslia, Galena, and Beaver	Collect qualitative inseason subsistence salmon harvest information through weekly interviews.	June - Sept	USFWS YRDFA	All aspects OSM funding
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. U.S. collections include microsatellites and allozyme. Canadian collections include microsatellites.	June - Aug.	USFWS ADF&G DFO OSM	All aspects

Acronyms:

ADF&G = Alaska Department of Fish and Game
ADPS = Alaska Department of Public Safety
AVCP = Association of Village Council Presidents, Inc.
AYKSSF = Arctic-Yukon-Kuskokwim Sustainable Salmon Fund

BSFA = Bering Sea Fishermen's Association
DFO = Department of Fisheries and Oceans (Canada)
DNA = Deoxyribonucleic acid

NPS = National Park Service
OSM = Office of Subsistence Management

R&E =Yukon River Panel Restoration and Enhancement Program
R&M =Research and Management Fund
TCC = Tanana Chiefs Conference, Inc.
UAF = University of Alaska Fairbanks
USFWS = United States Fish and Wildlife Service
USFWS-OSM = United States Fish and Wildlife Service, Office of Subsistence Management
YDFDA =Yukon Delta Fisheries Development Association
YRDFA = Yukon River Drainage Fisheries Association

Appendix A8.–List of harvest/escapement monitoring and incubation/rearing projects involving salmon in the Canadian portion of the Yukon River drainage in 2011.

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Commercial Catch Monitoring	Yukon River near Dawson City	1) To determine weekly catches and effort in the Canadian commercial fishery (Chinook, chum and coho salmon), and 2) To collect other information as required.	July - Oct.	DFO	All aspects
Aboriginal Catch Monitoring	Yukon communities	1)To determine weekly catches and effort in the aboriginal fishery, and 2) To implement components of the UFA and AFS.	July - Oct.	YFN's DFO	Joint project
Recreational Catch Monitoring	Yukon R mainstem and tributaries	1) To determine the recreational harvest by species including the date, sex, whether released or retained, and fishing location, and 2) Salmon caught are reported through the Yukon Salmon Conservation Catch Card program.	July - Oct.	DFO	All aspects
DFO Escapement Index Surveys	Chinook aerial index streams	To obtain counts in index areas including: Big Salmon, L. Salmon Wolf, and Nisutlin rivers.	Aug.	DFO	All aspects
Escapement Surveys and DNA Collection	Throughout upper Yukon R. drainage	1) To conduct surveys of spawning fish by foot, boat, air etc.; 2) To collect DNA samples from spawning population; and 3) To enumerate and recover tags in terminal areas.	July - Oct.	R&E Projects DFO YFN's AFS	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 VGG	Joint project
Whitehorse Rapids Fishway	Whitehorse	To enumerate wild and hatchery reared Chinook salmon returns to the Whitehorse fishway area and obtain age, size, sex and tag data.	July - Aug.	YF&GA	All aspects
Blind Creek Weir	Pelly River	To enumerate Chinook salmon escapement, recover tags and collect ASL data and DNA samples.	July - Aug.	JW&A	All aspects
Big Salmon Sonar	Big Salmon River	1) Installation and operation of a DIDSON sonar program for Chinook salmon, and 2) Carcass survey, ASL, and genetic samples.	July - Aug.	JW&A	All aspects
Klondike River Sonar	Klondike River	Installation and operation of a DIDSON sonar program for Chinook salmon- this was a new program in 2009.	July - Oct.	BM&A	All aspects
Escapement Sampling	Various tributaries	Collect ASL data and DNA samples.	Aug. - Oct.	DFO	All aspects

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Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Porcupine River Sonar-chum	Old Crow	1) Installation and operation of a SIMRAD sonar program for chum salmon; 2) Conduct test netting for species apportionment, sex and length; and 3) To provide inseason projections of run strength from relationship between sonar and Fishing Branch River weir counts	Aug. - Oct.	EDI & VGG	All aspects
Whitehorse Rapids Fish and Coded-Wire Tagging	Whitehorse	1)To rear and release ~150K Chinook salmon fry produced from Whitehorse Rapids Fishway broodstock; and 2)To mark fry with a CWT, adipose clip, and release upstream of the Whitehorse hydroelectric facility.	Ongoing	GY, YEC YF&GA	All aspects Coded-wire
MacIntyre Incubation Box and Coded-Wire Tagging Project	Whitehorse	1)To rear up to 120K Chinook salmon fry from brood stock collected from the Takhini River and/or Tatchun Creek; 2) To mark fry with a CWT, adipose clip, and release at natal sites.	Ongoing	DFO YC NRI	Technical support field work, project monitoring
Fox Creek Restoration Program	Whitehorse Area	Incubate CK eggs , mark fry with a CWT, and release into Fox CK.	Ongoing	TKC	All aspects

Acronyms:

ASL = Age Sex Length- term that refers to the collection of biological information
AFS = Aboriginal Fisheries Strategy
BM&A = B. Mercer and Associates
CWT = Coded Wire Tag
DFO = Department of Fisheries and Oceans Canada
DNA = Deoxyribonucleic acid
EDI = Environmental Dynamics Incorporated
GY = Government of Yukon-Environment Yukon
JW&A = Jane Wilson & Associates
NRI = Northern Research Institute
R&E = Yukon Panel Restoration and Enhancement Program
TKC = Ta'an Kwa'chin Council
VGG = Vuntut Gwitchin Government
YC = Yukon College
YEC = Yukon Energy Corporation
YFN's = Yukon First Nation's
YF&GA = Yukon Fish and Game Association

Appendix A9.–Yukon River Canadian Chinook salmon total run by brood year, and spawners by year, based on 3-Area Index (1983–2004), radiotelemetry (local) (2002–2004), and Eagle Sonar (2005–present).

Brood	Age								
Year	3	4	5	6	7	8	Return	Spawners	R/S
1974						634			
1975					33,080	175			
1976				88,405	22,026	40			
1977			19,491	111,771	19,734	801	151,797		
1978		4,443	22,845	63,235	29,424	1,493	121,439		
1979	1,534	3,388	21,422	100,503	48,253	1,175	176,274		
1980	15	6,604	13,510	70,415	33,978	4,240	128,763		
1981	0	1,122	33,220	114,180	54,845	1,841	205,208		
1982	0	5,141	17,169	37,883	27,763	376	88,330	43,538	2.03
1983	560	7,558	35,117	89,449	16,408	162	149,253	44,475	3.36
1984	69	13,368	34,379	75,041	13,782	138	136,778	50,005	2.74
1985	223	10,738	38,956	62,142	4,756	91	116,906	40,435	2.89
1986	347	20,408	45,928	109,067	15,843	138	191,731	41,425	4.63
1987	0	2,368	33,542	67,697	11,700	18	115,325	41,307	2.79
1988	0	6,641	34,323	75,396	8,937	68	125,366	39,699	3.16
1989	75	13,517	78,826	128,851	25,841	0	247,109	60,299	4.1
1990	56	6,343	24,873	71,641	10,816	9	113,737	59,212	1.92
1991	501	7,108	82,332	121,590	10,182	0	221,712	42,728	5.19
1992	6	2,608	23,981	41,677	1,831	0	70,103	39,155	1.79
1993	14	5,313	36,383	86,880	5,880	0	134,450	36,244	3.71
1994	0	755	19,932	30,638	6,175	0	57,545	56,449	1.02
1995	34	1,784	15,989	52,720	7,026	10	77,562	50,673	1.54
1996	20	276	23,201	44,462	14,610	2	82,571	74,060	1.11
1997	14	3,567	26,386	94,406	7,026	14	132,216	53,821	2.46
1998	0	3,478	39,260	76,502	4,380	0	123,598	35,497	3.48
1999	134	1,692	30,110	76,649	2,870	0	111,455	37,184	3.00
2000	0	2,798	40,704	63,414	1,509	0	108,424	25,870	4.19
2001	8	1,813	50,877	51,785	2,205	0	106,688	52,564	2.03
2002	75	2,262	28,704	20,715	227	2	51,985	42,359	1.23
2003	63	58,98	37,220	52,106	2,232	2	97,520	80,594	1.21
2004	3	2,462	26,660	22,121	4314	0	55,561	48,469	1.15
2005	9	8,213	29,318	40,819	0	0	78,359	67,985	1.15
2006	15	6,050	24,623					62,630	
2007	66	2,603						34,904	
2008	11							33,883	
Brood	Age								
Year	3	4	5	6	7	8	Return	Spawners	R/S
2009								65,278	
2010								31,818	
2011								46,307	
Average	(1982-2004)						118,084	47,655	2.48
							Contrast	**3.12**	

Note: Data highlighted in grey are preliminary.

Appendix A10.–Chinook salmon age and sex percentages from selected Yukon River escapement projects, 2011.

Location	Sample Size		Age 2	3	4	5	6	7	8	Total
Anvik River [a]	236	Males	0	0	16.9	51.3	5.9	0	0	74.2
		Females	0	0	0	5.5	19.9	0.4	0	25.8
		Total	0	0	16.9	56.8	25.8	0.4	0	100
Chena River [a]	425	Males	0	0.2	22.6	38.1	7.1	0.2	0	68.2
		Females	0	0	0	8.7	21.6	1.4	0	31.8
		Total	0	0.2	22.6	46.8	28.7	1.6	0	100
East Fork Andreafsky River [b]	542	Males	0	0	44.8	32	3.4	0	0	80.1
		Females	0	0	0.8	7.6	11.2	0.2	0	19.9
		Total	0	0	45.6	39.6	14.6	0.2	0	100
Gisasa River [b]	597	Males	0	0	29.9	50	1.8	0	0.3	82
		Females	0	0	0.6	6.7	10.5	0.3	0	18
		Total	0	0	30.4	56.7	12.3	0.3	0.3	100
Henshaw Creek [b]	428	Males	0	0.2	20.2	39.6	5	0	0	65
		Females	0	0	0.5	7.9	26.1	0.4	0	35
		Total	0	0.2	20.7	47.4	31.2	0.4	0	100
Salcha River [a]	527	Males	0	0.2	14.6	33.2	9.7	0.2	0	57.9
		Females	0	0	0	2.3	38.5	1.3	0	42.1
		Total	0	0.2	14.6	35.5	48.2	1.5	0	100

[a] Samples were handpicked from carcasses.

[b] Samples were collected from a weir trap.

Appendix A11.–Summer chum salmon age and sex percentages from selected Yukon River escapement projects, 2011.

Location	Sample Size		Age 3	4	5	6	7	Total
Anvik River [a]	509	Males	0	21.1	25.7	0.7	0	47.5
		Females	0.4	28.1	24	0	0	52.5
		Total	0.4	49.2	49.7	0.7	0	100
East Fork Andreafsky River [b]	944	Males	0.4	20	37.3	0.2	0	57.9
		Females	0	16	26.1	0	0	42.1
		Total	0.4	36	63.4	0.2	0	100
Gisasa River [b]	846	Males	0.6	23.3	20.7	0.1	0	44.7
		Females	0.8	31.5	23	0	0	55.3
		Total	1.4	54.8	43.7	0.1	0	100
Henshaw Creek [b]	580	Males	1	17.6	20.2	0	0	38.8
		Females	1.4	26.7	33.2	0	0	61.2
		Total	2.4	44.2	53.4	0	0	100

[a] Samples were collected by beach seine.

[b] Samples were collected from a weir trap.

Appendix A12.–Total (U.S. and Canada) Yukon River Chinook salmon harvest percent by stock group, 1981–2011.

	Stock Group		
Year [a]	Lower	Middle	Upper
1981	5.4	54.5	40.1
1982	13.9	24.7	61.4
1983	12.9	33.7	53.3
1984	25.3	40.2	34.5
1985	27.6	22.3	50.1
1986	19.5	9.6	70.9
1987	15.9	19.6	64.5
1988	21.8	15.8	62.5
1989	24.4	15.9	59.7
1990	20.2	25.2	54.7
1991	28.0	25.3	46.7
1992	16.3	21.8	61.9
1993	21.5	25.4	53.1
1994	18.2	21.4	60.4
1995	17.9	22.4	59.7
1996	21.0	10.4	68.6
1997	26.4	16.8	56.9
1998	32.7	17.4	49.8
1999	40.1	6.3	53.6
2000	33.9	12.3	53.8
2001	31.6	16.0	52.4
2002	19.4	29.2	51.4
2003	6.8	28.9	64.3
2004	15.3	28.8	55.9
2005	20.7	21.4	57.9
2006	17.6	27.6	54.9
2007	13.0	30.6	56.4
2008	17.0	28.0	55.0
2009	11.1	31.4	57.5
2010[b]	17.6	32.9	49.6
2011[c]			
Average (1981-2010)	20.2	23.9	55.9

[a] Stock identification methods from 1981 through 2003 were based on scale pattern analysis. Beginning in 2004, genetic analysis was used.

[b] 2010 estimates are preliminary.

[c] 2011 estimates are not available until the following year.

Appendix A13.–Yukon River Chinook salmon harvest percent by stock group in Alaska, 1981–2011.

	Stock Group		
Year [a]	Lower	Middle	Upper
1981	5.9	59.8	34.3
1982	15.4	27.5	57.1
1983	14.2	37.0	48.9
1984	28.0	44.3	27.7
1985	30.4	24.6	45.1
1986	22.3	10.9	66.8
1987	17.4	21.4	61.2
1988	24.9	18.1	57.0
1989	27.2	17.7	55.1
1990	22.8	28.4	48.8
1991	31.8	28.7	39.6
1992	18.0	24.1	57.8
1993	23.7	28.0	48.3
1994	20.4	24.1	55.5
1995	20.0	25.0	55.0
1996	24.0	11.8	64.2
1997	28.9	18.3	52.8
1998	34.7	18.5	46.8
1999	44.1	6.9	49.0
2000	37.5	13.6	48.9
2001	37.5	19.0	43.5
2002	22.1	33.3	44.6
2003	7.5	31.7	60.8
2004	16.9	31.6	51.5
2005	23.4	24.2	52.4
2006	19.2	30.2	50.5
2007	13.7	32.3	54.0
2008	18.2	30.0	51.8
2009	12.7	35.7	51.6
2010[b]	18.4	34.5	47.1
2011[c]			
Average (1981-2010)	22.4	26.5	51.1

[a] Stock identification methods from 1981 through 2003 were based on scale pattern analysis. Beginning in 2004, genetic analysis was used.

[b] 2010 estimates are preliminary.

[c] 2011 estimates are not available until the following year.

Appendix A14.–Upper stock group percent, by country, from the Yukon River Chinook salmon harvest, 1981–2011.

	Upper Stock Group	
Year [a]	Alaska	Canada
1981	78.1	21.9
1982	83.5	16.5
1983	83.7	16.3
1984	72.7	27.3
1985	81.6	18.4
1986	82.7	17.3
1987	86.7	13.3
1988	79.8	20.2
1989	82.9	17.1
1990	79.2	20.8
1991	74.8	25.2
1992	84.5	15.5
1993	82.6	17.4
1994	81.8	18.2
1995	82.4	17.6
1996	81.9	18.1
1997	84.8	15.2
1998	88.8	11.2
1999	83.0	17.0
2000	81.9	18.1
2001	69.8	30.3
2002	76.3	23.5
2003	86.2	13.8
2004	83.7	16.3
2005	80.1	19.9
2006	84.1	15.9
2007	90.5	9.5
2008	88.1	11.9
2009	78.8	21.2
2010 [b]	90.5	9.5
2011 [c]		
Average (1981-2010)	82.3	17.7

[a] Stock identification methods from 1981 through 2003 were based on scale pattern analysis. Beginning in 2004, genetic analysis was used.

[b] 2010 estimates are preliminary.

[c] 2011 estimates are not available until the following year.

Appendix A15.–Summary of releases for coded wire tagged Chinook salmon from Whitehorse Hatchery, 1985–2011.

Release Location	Release Date*	Code	# Tagged & Clipped [c]	Adipose Clipped Only	%Tag-Loss		Days [a]	Total Clipped	Weight (grams)	Total Unclipped	Total Released
Michie	25-May-85	02-32-48	26,670	518	0.019	[b]		27,188		0	
Michie	25-May-85	02-32-26	28,269	518	0.018	[b]		28,787		0	
Michie	25-May-85	02-32-47	43,325	518	0.012	[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	0.028	[b]		49,005	2.50	9,598	58,603
Michie	05-Jun-87	02-48-13	49,344	808	0.016	[b]		50,152	2.50	9,141	59,293
Michie	05-Jun-87	02-48-14	51,888	559	0.011	[b]		52,447	2.50	9,422	61,869
Michie	05-Jun-87	02-48-15	43,367	2,066	0.045	[b]		45,433	2.50	7,868	53,301
Michie	05-Jun-87	02-42-58	25,945	245	0.009	[b]		26,190	2.50	4,171	30,361
Wolf	30-May-87	02-42-59	26,752	123	0.005	[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	0.025		15	79,661	2.80	84,903	164,564
Michie	10-Jun-88	02-555-0	78,013	1,592	0.020		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	0.012	[b]		26,487	2.30	0	26,487
Michie	06-Jun-89	02-60-05	24,951	128	0.005	[b]		25,079	2.30	0	25,079
Michie	06-Jun-89	02-60-06	25,098	291	0.011	[b]		25,389	2.40	0	25,389
Michie	06-Jun-89	02-60-07	25,233	156	0.006	[b]		25,389	2.20	95,724	121,113
Fishway	06-Jun-89	02-60-08	25,194	357	0.014	[b]		25,551	2.70	0	25,551
Fishway	06-Jun-89	02-60-09	25,190	351	0.014	[b]		25,541	2.70	0	25,541
SUM	1989		151,827	1,609				153,436		118,112	271,548
Wolf	06-Jun-90	no-clip	0	0				0		11,969	11,969
Michie	02-Jun-90	02-02-38	24,555	501	0.020	[b]		25,056	2.30	0	25,056
Michie	02-Jun-90	02-02-39	24,345	753	0.030	[b]		25,098	2.30	0	25,098

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Release Location	Release Date*	Code	# Tagged & Clipped [c]	Adipose Clipped Only	%Tag-Loss	Day[s] [a]	Total Clipped	Weight (grams)	Total Unclipped	Total Released
Fishway	02-Jun-90	02-02-60	24,508	501	0.020	[b]	25,009	2.20	0	25,009
Fishway	02-Jun-90	02-02-63	25,113	254	0.010	[b]	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	0.016	[b]	50,270	2.30	0	50,270
Fishway	06-Jun-91	18-03-23	52,948	193	0.004	[b]	53,141	2.30	0	53,141
Michie	06-Jun-91	18-03-24	50,020	176	0.004	[b]	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	0.000	[b]	48,239	2.40	0	48,239
Fishway	04-Jun-92	18-08-28	49,356	99	0.002	[b]	49,455	2.30	0	49,455
Michie	04-Jun-92	18-08-30	52,946	643	0.012	[b]	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	0.000	[b]	50,248	2.30	0	50,248
Fishway	06-Jun-93	18-12-16	49,957	434	0.009	[b]	50,391	2.30	0	50,391
Michie	06-Jun-93	18-12-17	50,169	0	0.000	[b]	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	0.005	[b]	50,425	2.30	0	50,425
Michie	02-Jun-94	18-14-28	50,210	127	0.003	[b]	50,337	2.30	158,780	209,117
Fishway	02-Jun-94	18-14-29	50,415	125	0.002	[b]	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	0.016	3	10,231	1.67	0	10,231
Wolf	06-Jun-95	18-12-47	9,122	0	0.000	3	9,122	1.53	0	9,122
Michie	06-Jun-95	18-18-26	25,231	337	0.013	3	25,568	2.47	4,552	30,120
Michie	06-Jun-95	18-18-27	25,187	141	0.006	3	25,328	2.33	0	25,328
SUM	1995		69,607	642			70,249		4,552	74,801
Wolf	26-May-96	18-07-48	10,131	102	0.010	5	10,233	2.30	0	10,233
Fox	4-Jun-96	18-28-23	35,452	0	0.000	5	35,452	2.43	0	35,452
Byng	4-Jun-96	18-10-41	25,263	516	0.020	5	25,779	2.37	0	25,779
Michie	5-Jun-96	18-33-45	50,082	1,022	0.020	5	51,104	2.51	0	51,104
Michie	5-Jun-96	18-33-46	50,260	508	0.010	5	50,768	2.43	0	50,768
Michie	5-Jun-96	18-33-47	49,985	505	0.010	5	50,490	2.32	0	50,490

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Release Location	Release Date*	Code	# Tagged & Clipped [c]	Adipose Clipped Only	%Tag-Loss	Day[s] [a]	Total Clipped	Weight (grams)	Total Unclipped	Total Released
Judas	4-Jun-96	18-33-48	49,798	1,016	0.020	5	50,814	2.43	0	50,814
McClintock	4-Jun-96	18-33-49	49,991	302	0.006	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	0.010	2	15,000	2.30	0	15,000
Wolf	1-Jun-97	18-23-26	20,334	0	0.000	4	20,334		0	20,334
Wolf	8-Jun-97	18-29-06	10,158	0	0.000	8	10,158		0	10,158
Fox	11-Jun-97	18-25-54	25,242	0	0.000	3	25,242	2.43	0	25,242
Fox	11-Jun-97	18-25-55	24,995	253	0.010	3	25,248		0	25,248
Byng	11-Jun-97	18-29-07	10,029	0	0.000	1	10,029	2.37	0	10,029
Byng	11-Jun-97	18-29-05	10,155	0	0.000	1	10,155		0	10,155
Michie	11-Jun-97	18-28-59	49,657	502	0.010	3	50,159	2.51	0	50,159
Michie	11-Jun-97	18-28-60	50,130	0	0.000	3	50,130	2.43	0	50,130
Judas	7-Jun-97	18-23-27	19,951	202	0.010	3 to 7	20,153	2.43	0	20,153
Judas	11-Jun-97	18-25-53	25,146	0	0.000	11	25,146	2.43	0	25,146
McClintock	11-Jun-97	18-25-51	25,399	0	0.000	3	25,399	2.27	0	25,399
McClintock	11-Jun-97	18-25-52	24,792	251	0.010	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	0.020	5	50,247	2.84	0	50,247
Michie	12-Jun-98	18-41-21	49,197	1,004	0.020	5	50,201	2.81	0	50,201
Byng	12-Jun-98	18-31-60	24,518	1,022	0.040	5	25,540	3.00	0	25,540
McClintock	12-Jun-98	18-40-43	49,810	503	0.010	5	50,313	2.76	0	50,313
Judas	13-Jun-98	02-54-17	19,018	1,432	0.070	5	20,450	2.55	0	20,450
Judas	12-Jun-98	18-31-59	25,331	256	0.010	5	25,587	2.60	0	25,587
Wolf	6-Jun-98	02-19-58	10,104	421	0.040	5	10,525	1.95	0	10,525
Wolf	4-Jun-98	02-46-06	34,813	710	0.020	5	35,523	2.63	0	35,523
SUM	1998		262,034	6,352			268,386		0	268,386
Michie	6-Jun-99			80,393			80,393	3.13	0	80,393
Byng	6-Jun-99			64,430			64,430	2.92	0	64,430
McClintock	6-Jun-99			64,169			64,169	2.95	0	64,169
Wolf	6-Jun-99			31,048			31,048	3.07	0	31,048

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Release Location	Release Date*	Code	# Tagged & Clipped [c]	Adipose Clipped Only	%Tag-Loss	Day[s] [a]	Total Clipped	Weight (grams)	Total Unclipped	Total Released
SUM	1999			240,040			240,040		0	240,040
Michie	8-Jun-00	18-31-28	25,114	254	0.010	5	25,368	2.80	0	25,368
Michie	8-Jun-00	18-31-29	25,037	253	0.010	5	25,290	2.80	0	25,290
Michie	8-Jun-00	18-43-03	10,907	110	0.010	5	11,017	2.84	0	11,017
McClintock	8-Jun-00	18-13-54	25,041	254	0.010	5	25,295	2.70	0	25,295
McClintock	8-Jun-00	18-13-55	25,016	253	0.010	5	25,269	2.68	0	25,269
Wolf	4-Jun-00	18-23-53	25,071	253	0.010	5	25,324	2.67	0	25,324
Wolf	4-Jun-00	18-23-54	25,012	254	0.010	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	0.010	5	25,574	2.68	0	25,574
Michie	8-Jun-01	18-44-17	27,293	276	0.010	5	27,569	2.68	0	27,569
Michie	8-Jun-01	18-44-18	27,337	276	0.010	5	27,613	2.60	0	27,613
Michie	8-Jun-01	18-44-19	11,629	117	0.010	5	11,746	2.60	0	11,746
McClintock	8-Jun-01	18-44-12	24,526	248	0.010	5	24,774	3.13	0	24,774
McClintock	8-Jun-01	18-44-13	25,033	253	0.010	5	25,286	3.13	0	25,286
McClintock	8-Jun-01	18-36-50	10,840	110	0.010	5	10,950	3.13	0	10,950
Byng	8-Jun-01	18-44-14	25788	260	0.010	5	26,048	2.84	0	26,048
Byng	8-Jun-01	18-44-15	25,136	254	0.010	5	25,390	2.84	0	25,390
Wolf	28-May-01	18-44-10	26,205	265	0.010	5	26,470	3.34	0	26,470
Wolf	28-May-01	18-44-11	23,902	241	0.010	5	24,143	3.34	0	24,143
SUM	2001		253,007	2,556			255,563		0	255,563
Wolf	23-May-02	18-51-01	25,334	126	0.005	5	25460	3.30	0	25460
Wolf	02-Jun-02	18-51-02	25,079	177	0.007	5	25256	3.10	0	25256
McClintock	10-Jun-02	18-51-03	24,769	505	0.020	5	25274	3.60	0	25274
Byng	10-Jun-02	18-51-04	24,907	0	0.000	5	24907	3.00	0	24907
Byng	10-Jun-02	18-51-05	24,925	125	0.005	5	25050	3.00	0	25050
Michie	10-Jun-02	18-51-06	27,114	191	0.007	5	27305	3.20	0	27305
Michie	10-Jun-02	18-51-07	26,854	0	0.000	5	26854	3.02	0	26854
Michie	10-Jun-02	18-50-61	27,850	281	0.010	5	28131	3.20	0	28131
Michie	10-Jun-02	18-50-62	27,241	0	0.000	5	27241	3.04	0	27241

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Release Location	Release Date*	Code	# Tagged & Clipped [c]	Adipose Clipped Only	%Tag-Loss	Day[s] [a]	Total Clipped	Weight (grams)	Total Unclipped	Total Released
Michie	10-Jun-02	18-50-63	8,481	86	0.010	5	8567	3.20	0	8567
Yukon River									3,062	3062
SUM	2002		242,554	1,491			244,045		3,062	247,107
Wolf	25-May-03	18-47-48	27,489	83	0.003	5	27,572	2.72	0	27,572
Wolf	25-May-03	18-47-49	26,704	161	0.006	5	26,865	2.69	0	26,865
Byng	2-Jun-03	18-47-47	23,483	71	0.003	5	23,554	3.01	0	23,554
Byng	2-Jun-03	18-47-46	27,058	54	0.002	5	27,112	2.98	0	27,112
Michie	2-Jun-03	18-49-58	28,485	0	0.000	5	28,485	3.05	0	28,485
Michie	2-Jun-03	18-49-59	27,519	0	0.000	5	27,519	2.98	0	27,519
Michie	2-Jun-03	18-49-60	15,541	0	0.000	5	15,541	3.07		15,541
Judas Lake	6-Jun-03								2,500	
SUM	2003		176,279	369			176,648		0	176,648
Wolf	5/28-30/2004	01-01-70	28,946	292		5	29,238	2.90	0	29,238
Wolf	22-Jun-04								2,514	2,514
Mainstem	5/28-29/2004	02-01-69	24,920	431		5	25,351	3.10	0	25,351
Byng	8-Jun-04	02-01-68	24,401	626		5	25,027	3.36	0	25,027
McClintock	8-Jun-04	02-01-67	24,246	879		5	25,125	3.20	0	25,125
Michie	8-Jun-04	02-01-66	24,609	554		5	25,163	3.12	0	25,163
Michie	8-Jun-04	02-01-65	13,594	306		5	13,900	3.12	0	13,900
SUM	2004		140,716	3,088			143,804		2,514	146,318
Wolf	5/31-6/05	18-19-36	10,751	109	1.000	5	10,860	2.50	0	10,860
Wolf	5/31-6/05	18-56-17	5,835	59	1.000	5	5,894	2.50	0	5,894
Wolf	7-Jul-05			614			614			614
Byng	13-Jun-05	18-56-18	5,853	119	2.000	5	5,972	2.50	0	5,972
Byng	13-Jun-05	18-56-19	4,369	89	2.000	5	4,458	2.50	0	4,458
McClintock	13-Jun-05	18-44-19	10,632	0	0.000	5	10,632	2.50	0	10,632
Michie	13-Jun-05	02-01-64	4,870	0	0.000	5	4,870	2.50	0	4,870
Michie	13-Jun-05	02-01-65	5,983	0	0.000	5	5,983	2.50	0	5,983
Michie	13-Jun-05	08-01-65	28,082	284	1.000	5	28,366	2.50	0	28,366
Michie	13-Jun-05	18-56-20	5,906	0	0.000	5	5,906	2.50	0	5,906

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Release Location	Release Date*	Code	# Tagged & Clipped [c]	Adipose Clipped Only	%Tag-Loss	Days [a]	Total Clipped	Weight (grams)	Total Unclipped	Total Released
Mainstem	6/02,6/14,07/7	08-01-68	28,991	293	1.000	5	29,284	2.50	0	29,284
SUM	2005		111,272	1,567			112,839			112,839
Wolf	6/4 - 6/11	08-01-66	26,412	0	0.000	2	26,412	2.66	0	26,412
Wolf	6/4 - 6/11	08-01-71	8,718	88	1.000	2	8,806	2.66	0	8,806
Mainstem	8-Jun-06	08-01-72	6,761	427	1.500	2	7,188	2.63	0	7,188
Mainstem	8-Jun-06	08-01-67	28,045	103	1.500	2	28,148	2.63	0	28,148
Michie	14-Jun-06	08-01-69	39,164	596	1.500	2	39,760		0	39,760
Michie	14-Jun-06	08-01-74	3,692	56	1.500	2	3,748	2.41	0	3,748
McClintock	14-Jun-06	08-01-70	29,282	296	1.000	5	29,578	2.58	0	29,578
McClintock	14-Jun-06	08-01-73	5,426	55	1.000	5	5,481	2.89	0	5,481
Wolf	11-Jun-06		0	7,658	0.000		7,658	3.02	0	7,658
SUM	2006		147,500	9,279			156,779			156,779
Wolf	5/24-6/3	Agency Tags 18	37,781	771	2.000	2	38,552		0	38,552
Wolf	3-Jun-07			2,632	0.000		2,632	2.33	0	2,632
Mainstem	29-May-07	Agency Tags 18	35,253	356	1.000	2	35,609	2.87	0	35,609
Michie	8-Jun-07	Agency Tags 18	50,084	506	1.000	2	50,590	3.22	0	50,590
McClintock	8-Jun-07	Agency Tags 18	38,383	388	1.000	2	38,771	3.22	0	38,771
SUM	2007		161,501	4,653			166,154			166,154
Wolf	6/01-6/26	Agency Tags 08	10,939	0	0.000		10,939	2.97	0	10,939
Wolf	26-Jun-08			2,618			2,618		0	2,618
Mainstem	5-Jun-08	Agency Tags 08	20,498	418	2.000		20,916	2.84	0	20,916
Michie	5-Jun-08	Agency Tags 08	24,615	502	2.000		25,117	2.71	0	25,117
McClintock	5-Jun-08	Agency Tags 08	24,687	1,029	4.000		25,716	2.89	0	25,716
SUM	2008		80,739	4,567			85,306		0	85,306
Wolf	31-May-09	Agency Tags 08	19,652	199	1.000		19,851	2.76	0	19,851
Wolf	11-Jun-09			2,672			2,672		0	2,672
Mainstem	6-Jun-09	Agency Tags 08	42,648	258	0.600		42,906	3.00	0	42,906
Michie	6-Jun-09	Agency Tags 08	77,048	778	0.100		77,826	2.87	0	77,826
McClintock	6-Jun-09	Agency Tags 08	26,338	53	0.020		26,391	2.52	0	26,391
SUM	2009		165,686	3,960			169,646			169,646

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Release 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	30-May-10	Agency Tag 18	12,000	0	0.00			12,000	2.89	0	12,000
Michie	1-Jun-10	Agency Tag 18	66,848	2,067	3.00			66,848	3.00	0	68,915
McClintock	1-Jun-10	Agency Tag 18	19,714	0	0.00			19,714	3.00	0	19,714
McClintock	1-Jun-10			1,369				1,369		0	1,369
Mainstem	1-Jun-10	Agency Tag 18	23,985	242	1.00			23,985	2.98	0	24,227
SUM	2010		122,547	3,678			0	123,916		0	126,225
TOTAL			4,034,438	302,302				4,336,740		1,180,189	5,516,929
Wolf	29-May-11	Agency Tag 18	10,000		0			10,000	2.95	0	10,000
Wolf	10-Jun-11			1,550				1,550	2.76	0	1,550
Michie	6-Jun-11	Agency Tag 18	66,640	1,000	1.5			67,640	2.94	0	67,640
McClintock	6-Jun-11	Agency Tag 18	32,811	0	0			32,811	2.65	0	32,811
Mainstem	6-Jun-11	Agency Tag 18	23,921	0	0			23,921	2.67	0	23,921
SUM	2011		133,372	2,550				135,922		0	135,922
TOTAL			4,412,904	302,302				4,720,494		1,180,189	5,905,301

[a] The number of days refers to the period of 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 1989-1994.

CWT Data prior to 1987 not verified against SEP records.

Appendix A16.–Summary of releases of Chinook salmon from Yukon Territory in stream incubation/rearing sites 1991–2011.

Project	Brood Year	Stock	Mark	Stage	Release Site	Start Date	End Date	# Tagged	# Ad Only	# Un-Marked	Total Rel.	WT. (gm)
Klondike R, Nor	1990	Tatchun Ck.	02-01-01-02-12	Spring Fry	Tatchun Ck.	91/06/28	91/06/28	13593	21	650	14264	0.74
Klondike R, Nor	1990	Tatchun Ck.	02-01-01-02-09	Spring Fry	Tatchun Ck.	91/06/28	91/06/28	15247	173	750	16170	0.74
Klondike R, Nor	1991	Tatchun Ck.	18-06-45	Spring Fry	Tatchun Ck.	NA	92/08/31	11734	0	817	12551	2.47
Klondike R, Nor	1991	Tatchun Ck.	02-33-56	Spring Fry	Tatchun Ck.	NA	92/08/31	6453	0	852	7305	2.47
Klondike R, Nor	1991	Tatchun Ck.	18-06-44	Spring Fry	Tatchun Ck.	NA	92/08/31	11585	0	320	11905	2.47
Klondike R, Nor	1991	Yukon R	NOCN9148	Spring Fry	Pothole Lk	92/06/	92/06/	0	0	1500	1500	0
Klondike R, Nor	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	1993	Tatchun Ck.	02-01-01-04-07	Spring Fry	Tatchun Ck.	94/06/30	94/06/30	12077	246	71	12394	0.99
Klondike R, Nor	1993	Tatchun Ck.	02-01-01-05-05	Spring Fry	Tatchun Ck.	94/06/30	94/06/30	9982	0	61	10043	0.99
Klondike R, Nor	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	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	1994	Tatchun Ck.	02-01-01-05-11	Spring Fry	Tatchun Ck.	95/07/04	95/07/04	12431	100	686	13217	0.81
Klondike R, Nor	1994	Tatchun Ck.	02-01-01-05-15	Spring Fry	Tatchun Ck.	95/07/04	95/07/04	2490	33	177	2700	0.81
Klondike R, Nor	1994	Tatchun Ck.	02-01-01-06-01	Spring Fry	Tatchun Ck.	95/07/04	95/07/04	1476	19	155	1650	0.81
Klondike R, Nor	1994	Tatchun Ck.	02-01-01-05-13	Spring Fry	Tatchun Ck.	95/07/04	95/07/04	11649	238	413	12300	0.81
Klondike R, Nor	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

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Project	Brood Year	Stock	Mark	Stage	Release Site	Start Date	End Date	# Tagged	# Ad Only	# Un-Marked	Total Rel.	WT. (gm)
Mayo River	1991	Mayo R	NOCN9147	Spring Fry	Mayo R	92/06/	92/06/	0	0	13000	13000	0
Mayo River	1992	Mayo R	NOCN9292	Spring Fry	Mayo R	93/07/	93/07/	0	0	500	500	0
McIntyre Cr	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	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	1991	Takhini R	02-01-01-03-08	Spring Fry	Flat Ck.	NA	92/07/04	12141	143	3425	15709	0.98
McIntyre Cr	1991	Takhini R	02-01-01-03-09	Spring Fry	Flat Ck.	NA	92/07/04	13102	466	1398	14966	0.98
McIntyre Cr	1991	Takhini R	02-01-01-03-10	Spring Fry	Flat Ck.	NA	92/07/04	4955	261	601	5817	0.98
McIntyre Cr	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	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	1992	Takhini R	02-34-24	Spring Fry	Flat Ck.	93/08/17	93/08/17	9532	823	95	10450	2.71
McIntyre Cr	1992	Takhini R	02-34-23	Spring Fry	Flat Ck.	93/08/17	93/08/17	9822	850	218	10890	2.71
McIntyre Cr	1992	Takhini R	18-14-54	Spring Fry	Flat Ck.	93/08/17	93/08/17	10925	567	227	11719	2.71
McIntyre Cr	1992	Takhini R	18-14-53	Spring Fry	Flat Ck.	93/08/17	93/08/17	10658	865	226	11749	2.71
McIntyre Cr	1992	Takhini R	02-02-17	Spring Fry	Flat Ck.	93/08/17	93/08/17	2291	114	37	2442	2.71
McIntyre Cr	1992	Takhini R	02-34-22	Spring Fry	Flat Ck.	93/08/17	93/08/17	10355	314	40	10709	2.71
McIntyre Cr	1992	Tatchun Ck.	02-01-01-04-02	Spring Fry	Tatchun Ck.	93/06/17	93/06/17	4654	633	335	5622	0.76
McIntyre Cr	1993	Takhini R	18-17-51	Spring Fry	Flat Ck.	94/08/26	94/08/31	7410	46	222	7678	2.6

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Project	Brood Year	Stock	Mark	Stage	Release Site	Start Date	End Date	# Tagged	# Ad Only	# Un-Marked	Total Rel.	WT. (gm)
McIntyre Cr	1993	Takhini R	18-17-50	Spring Fry	Flat Ck.	94/08/26	94/08/31	11227	40	87	11354	2.6
McIntyre Cr	1993	Takhini R	18-17-49	Spring Fry	Flat Ck.	94/08/26	94/08/31	11071	159	142	11372	2.6
McIntyre Cr	1993	Takhini R	18-17-48	Spring Fry	Flat Ck.	94/08/26	94/08/31	11375	0	104	11479	2.6
McIntyre Cr	1993	Takhini R	18-17-52	Spring Fry	Flat Ck.	94/08/26	94/08/31	10668	21	198	10887	2.6
McIntyre Cr	1993	Takhini R	02-02-16	Spring Fry	Takhini R	94/08/30	94/08/30	9343	271	36	9650	2.8
McIntyre Cr	1993	Takhini R	02-01-63	Spring Fry	Takhini R	94/08/30	94/08/30	10899	222	62	11183	2.8
McIntyre Cr	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	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	1994	Takhini R	02-01-01-04-12	Spring Fry	Flat Ck.	95/08/14	95/08/14	14193	59	281	14533	2.2
McIntyre Cr	1994	Takhini R	02-01-01-04-14	Spring Fry	Flat Ck.	95/08/14	95/08/14	13586	130	295	14011	2.2
McIntyre Cr	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	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	1995	Takhini R	02-01-01-05-10	Spring Fry	Flat Ck.	96/08/07	96/08/07	10727	65	170	10962	2.01
McIntyre Cr	1995	Tatchun Ck.	02-01-01-02-10	Spring Fry	Tatchun Ck.	96/06/27	96/06/27	14530	49	62	14641	0.81
McIntyre Cr	1995	Tatchun Ck.	02-01-01-02-11	Spring Fry	Tatchun Ck.	96/06/27	96/06/27	13526	91	294	13911	0.81
McIntyre Cr	1996	Takhini R	02-01-01-06-14	Spring Fry	Flat Ck.	97/07/02	97/07/04	15622	158	382	16162	0.8
McIntyre Cr	1996	Takhini R	02-01-01-04-06	Spring Fry	Flat Ck.	97/07/02	97/07/04	14845	37	280	15162	0.8
McIntyre Cr	1996	Tatchun Ck.	02-01-01-07-03	Spring Fry	Tatchun Ck.	97/06/27	97/06/27	1521	15	148	1684	1

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Project	Brood Year	Stock	Mark	Stage	Release Site	Start Date	End Date	# Tagged	# Ad Only	# Un-Marked	Total Rel.	WT. (gm)
McIntyre Cr	1997	Tatchun Ck.	02-01-01-06-08	Spring Fry	Tatchun Ck.	98/06/19	98/06/19	9284	150	74	9508	1.1
McIntyre Cr	1997	Tatchun Ck.	02-01-01-06-09	Spring Fry	Tatchun Ck.	98/06/19	98/06/19	10318	211	188	10717	1.1
McIntyre Cr	1997	Tatchun Ck.	02-01-01-07-02	Spring Fry	Tatchun Ck.	98/06/19	98/06/19	2536	52	0	2588	1.1
McIntyre Cr	1997	Takhini R	02-01-01-07-09	Spring Fry	Flat Ck.	98/06/22	98/06/22	11374	115	115	11604	1.1
McIntyre Cr	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	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	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	1998	Tatchun Ck.	02-01-01-06-12	Spring Fry	Tatchun Ck.	NA	99/07/08	10363	0	67	10430	
McIntyre Cr	1998	Tatchun Ck.	02-01-01-06-13	Spring Fry	Tatchun Ck.	NA	99/07/08	4733	0	82	4815	
McIntyre Cr	1998	Takhini R.	02-01-01-07-10	Spring Fry	Takhini R.	NA	99/07/14	13753	28	148	13929	
McIntyre Cr	1998	Takhini R.	02-01-01-07-11	Spring Fry	Flat Ck.	NA	99/07/15	11273	23	206	11502	
McIntyre Cr	1999	Takhini River	02-01-0-07-07	Spring Fry	Flat Ck.	NA	06/23/00	11333	114	219	11666	0.8
McIntyre Cr	1999	Takhini River	02-01-01-07-12	Spring Fry	Flat Ck.	NA	06/23/00	12246	0	214	12460	0.8
McIntyre Cr	1999	Takhini River	02-01-01-06-04	Spring Fry	Takhini River	NA	06/24/00	11105	0	147	11252	0.9
McIntyre Cr	1999	Takhini River	02-01-01-06-05	Spring Fry	Takhini River	NA	06/24/00	12044	0	88	12132	0.9
McIntyre Cr	1999	Takhini River	02-01-01-06-06	Spring Fry	Takhini River	NA	06/24/00	4561	0	0	4561	0.9
McIntyre Cr	1999	Tatchun Ck.	02-01-01-07-05	Spring Fry	Tatchun Ck.	NA	06/19/00	12239	188	409	12836	1
McIntyre Cr	1999	Tatchun Ck.	02-01-01-07-06	Spring Fry	Tatchun Ck.	NA	06/19/00	987	10	0	997	1

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Project	Brood Year	Stock	Mark	Stage	Release Site	Start Date	End Date	# Tagged	# Ad Only	# Un-Marked	Total Rel.	WT. (gm)
McIntyre Cr	2000	Takhini River	02-01-01-08-01	Spring Fry	Takhini River	NA	07/25/01	11724	163	123	12010	1.1
McIntyre Cr	2000	Takhini River	02-01-01-08-02	Spring Fry	Flat Ck.	NA	07/26/01	9995	101	60	10156	1.1
McIntyre Cr	2000	Tatchun Ck.	02-01-01-07-05	Spring Fry	Tatchun Ck.	NA	07/09/01	11654	360	10	12024	1.1
McIntyre Cr	2000	Tatchun Ck.	02-01-01-07-06	Spring Fry	Tatchun Ck.	NA	07/09/01	6321	329	14	6664	1.1
McIntyre Cr	2001	Takhini River	02-01-01-08-04	Spring Fry	Takhini River	NA	06/29/02	10109	314	301	10724	1
McIntyre Cr	2001	Takhini River	02-01-01-08-05	Spring Fry	Takhini River	NA	06/29/02	9814	100	405	10319	1
McIntyre Cr	2001	Takhini River	02-01-01-08-07	Spring Fry	Flat Ck.	NA	06/28/02	4161	42	0	4203	1
McIntyre Cr	2001	Tatchun Ck.	02-01-01-08-03	Spring Fry	Tatchun Ck.	NA	06/27/02	6432	415	279	7126	1
McIntyre Cr	2002	Takhini River	02-11-22-31-41	Spring Fry	Takhini River	NA	07/21/03	8431	0	55	8486	1.7
McIntyre Cr	2002	Takhini River	02-11-22-31-42	Spring Fry	Takhini River	NA	07/21/03	14017	0	76	14093	1.7
McIntyre Cr	2002	Takhini River	02-01-01-07-01	Spring Fry	Takhini River	NA	07/21/03	11589	13	104	11706	1.7
McIntyre Cr	2002	Takhini River	02-11-21-38-46	Spring Fry	Flat Ck.	NA	07/22/03	6426	65	0	6491	1.7
McIntyre Cr	2002	Tatchun Ck.	02-01-01-07-14	Spring Fry	Tatchun Ck.	NA	07/04/03	10746	50	79	10875	1.4
McIntyre Cr	2002	Tatchun Ck.	02-01-01-07-15	Spring Fry	Tatchun Ck.	NA	07/04/03	13261	0	166	13427	1.4
McIntyre Cr	2003	Tatchun Cr.	02-01-02-01-05	Spring Fry	Tatchun Ck.	NA	06/27/04	10701	805	0	11506	1.1
McIntyre Cr	2003	Tatchun Cr.	02-01-02-01-04	Spring Fry	Tatchun Ck.	NA	06/27/04	9919	556	0	10475	1.1
McIntyre Cr	2003	Tatchun Cr.	02-01-02-01-03	Spring Fry	Tatchun Ck.	NA	06/27/04	5249	395	0	5644	1.1
McIntyre Cr	2003	Takhini River	02-01-02-02-01	Spring Fry	Takhini River	NA	07/12/04	10449	268	0	10717	1.3

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Project	Brood Year	Stock	Mark	Stage	Release Site	Start Date	End Date	# Tagged	# Ad Only	# Un-Marked	Total Rel.	WT. (gm)
McIntyre Cr	2003	Takhini River	02 01 02 01 06	Spring Fry	Takhini River	NA	07/12/04	11685	178	0	11863	1.3
McIntyre Cr	2003	Takhini River	02-01-02-01-08	Spring Fry	Flat Ck.	NA	08/16/04	7785	95	0	7880	1.1
McIntyre Cr	2003	Tatchun Ck.	02-01-01-09-01	Spring Fry	Tatchun Ck.	NA	08/20/04	9381	143	0	9524	1.3
McIntyre Cr	2003	Tatchun Ck.	02-01-01-08-08	Spring Fry	Tatchun Ck.	NA	08/20/04	5216	79	0	5295	1.5
McIntyre Cr	2003	Takhini River	02-01-01-09-03	Spring Fry	Takhini River	NA	08/21/04	10112	154	0	10266	1.2
McIntyre Cr	2003	Takhini River	02-01-01-09-02	Spring Fry	Takhini River	NA	08/21/04	10180	155	0	10335	1.2
McIntyre Cr	2003	Takhini River	02-01-02-01-03	Spring Fry	Takhini River	NA	08/21/04	5390	82	0	5472	1.2
McIntyre Cr	2004	Tatchun Cr.	02-01-01-08-09	Spring Fry	Tatchun Ck.	NA	06/27/05	2361	426	0	2787	1.3
McIntyre Cr	2004	Takhini River	02-01-02-02-02	Spring Fry	Takhini River	NA	07/14/05	23068	2175	1100	26343	1.3
McIntyre Cr	2004	Takhini River	02-01-02-02-03	Spring Fry	Takhini River	NA	07/14/05	9146	1016	1100	11262	1.3
McIntyre Cr	2004	Takhini River	02-01-02-01-08	Spring Fry	Flat Ck.	NA	07/07/05	5592	233	0	5825	1.3
McIntrye Cr	2005	Takhini River	02-1-2-2-5	Spring Fry	Takhini River	NA	07/10/06	10766	748	0	11514	1.3
McIntrye Cr	2005	Takhini River	02-1-2-1-9	Spring Fry	Takhini River	NA	07/10/06	10952	534	0	11486	1.6
McIntrye Cr	2005	Takhini River	02-1-2-2-6	Spring Fry	Takhini River	NA	07/10/06	11108	394	0	11502	1.6
McIntrye Cr	2005	Takhini River	02-1-2-3-4	Spring Fry	Takhini River	NA	07/18/06	2520	152	0	2672	1.6
McIntrye Cr	2005	Tatchun Ck.	02-1-2-1-7	Spring Fry	Tatchun Ck.	NA	07/07/06	9243	182	0	9425	2.4
McIntrye Cr	2005	Tatchun Ck.	02-1-2-3-3	Spring Fry	Tatchun Ck.	NA	07/23/06	26094	847	0	26941	2.4
McIntyre Cr	2006	Takhini River	02-01-02-03-09	Spring Fry	Takhini River	07/17/07	07/20/07	8422	936	552	9910	~1.6*

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Project	Brood Year	Stock	Mark	Stage	Release Site	Start Date	End Date	# Tagged	# Ad Only	# Un-Marked	Total Rel.	WT. (gm)
McIntyre Cr	2006	Takhini River	02-01-02-03-07	Spring Fry	Takhini River	07/17/07	07/20/07	10108	645	185	10938	~1.6*
McIntyre Cr	2006	Takhini River	02-01-02-03-08	Spring Fry	Takhini River	07/17/07	07/20/07	10080	420	183	10683	~1.6*
McIntyre Cr	2006	Takhini River	02-01-02-04-01	Spring Fry	Takhini River	07/17/07	07/20/07	8881	567	688	10136	~1.6*
McIntyre Cr	2006	Takhini River	02-01-02-04-04	Spring Fry	Takhini River	07/17/07	07/20/07	1500	131	55	1686	~1.6*
McIntyre Cr	2006	Tatchun Ck.	02-01-02-04-02	Spring Fry	Tatchun Ck.	07/21/07	07/26/07	9775	182	185	10142	>2.4**
McIntyre Cr	2006	Tatchun Ck.	02-01-02-04-03	Spring Fry	Tatchun Ck.	07/21/07	07/26/07	9450	476	113	10039	>2.4**
McIntyre Cr	2006	Tatchun Ck.	02-01-02-03-05	Spring Fry	Tatchun Ck.	07/21/07	07/26/07	8972	955	196	10123	>2.4**
McIntyre Cr	2006	Tatchun Ck.	02-01-02-03-06	Spring Fry	Tatchun Ck.	07/21/07	07/26/07	6261	261	101	6623	>2.4**
McIntyre Cr	2007	Tatchun Ck.	Tatchun Ck.	Spring Fry	Tatchun Creek	06/27/08	06/27/08	10170	103	145	10418	1.6
McIntyre Cr	2007	Tatchun Ck.	Tatchun Ck.	Spring Fry	Tatchun Creek	06/27/08	06/27/08	10056	311	228	10595	1.6
McIntyre Cr	2007	Tatchun Ck.	Tatchun Ck.	Spring Fry	Tatchun Creek	06/27/08	06/27/08	4345	44	328	4717	1.6
McIntyre Cr	2007	Takhini R.	Takhini R.	Spring Fry	Takhini River	07/02/08	07/02/08	6756	209	197	7162	1.4
McIntyre Cr	2007	Takhini R.	Takhini R.	Spring Fry	Takhini River	07/02/08	07/02/08	9490	293	119	9902	1.4
McIntyre Cr	2008	Tatchun Ck.	02-01-02-05-06	Spring Fry	Tatchun Creek	06/30/09	06/30/09	2576	136	37	2749	1.3
McIntyre/Fox	2008	Whitehorse Fishway	02-01-02-05-01	Spring Fry	Fox Creek	07/03/09	07/03/09	10141	459	0	10600	1.4
McIntyre/Fox	2008	Whitehorse Fishway	02-01-02-05-02	Spring Fry	Fox Creek	07/03/09	07/03/09	10019	459	0	10478	1.4
McIntyre/Fox	2008	Whitehorse Fishway	02-01-02-05-03	Spring Fry	Fox Creek	07/03/09	07/10/09	9739	1253	0	10992	1.4
McIntyre/Fox	2008	Whitehorse Fishway	02-01-02-05-04	Spring Fry	Fox Creek	07/09/09	07/10/09	9194	1417	0	10611	1.4
McIntyre/Fox	2008	Whitehorse Fishway	02-01-02-05-05	Spring Fry	Fox Creek	07/09/09	07/10/09	9747	1126	0	10873	1.4

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Project	Brood Year	Stock	Mark	Stage	Release Site	Start Date	End Date	# Tagged	# Ad Only	# Un-Marked	Total Rel.	WT. (gm)
McIntyre Cr	2009	Tatchun Ck.	02-1-2-5-7	Spring Fry	Tatchun Creek	6/21/2010	6/21/2010	1373	131	0	1504	1.3
McIntyre/Fox	2009	Whitehorse Fishway	02-1-2-59	Spring Fry	Fox Creek	6/18/2010	6/18/2010	7930	1251	0	9181	1.1
McIntyre/Fox	2010	Tatchun Ck.	02-01-02-06-02	Spring Fry	Tatchun Creek	6/27/2011	6/27/2011	9378	152	0	9530	1.2
McIntyre/Fox	2010	Tatchun Ck.	02-01-02-06-04	Spring Fry	Tatchun Creek	6/27/2011	6/27/2011	10594	3567	0	14161	1.2
McIntyre/Fox	2010	Whitehorse Fishway	02-01-02-06-06	Spring Fry	Fox Creek	5/7/2011	5/7/2011	2864	2362	0	5226	1.2
McIntyre/Fox	2010	Whitehorse Fishway	02-01-02-06-07	Spring Fry	Fox Creek	5/7/2011	5/7/2011	1161	826	0	1987	1.2

Notes for 2003 Brood Year Releases:

02-01-02-01-03	11506	thermal marked.
02-01-02-01-04	10475	not thermal marked.
02-01-02-01-03	5644	not thermal marked.
02-01-02-01-08	7880	a portion actually released July 12.
02-01-01-09-01	9524	not thermal marked.
02-01-01-08-08	5295	thermal marked.
02-01-02-01-03	5472	error resulted in having the same code as some Tatchun fry.

NA= Not Available.

* WT. Not taken at release, but were on similar growth curve to 2006.

** WT. Not taken at release, but averaging slightly larger size than in 2006.

Appendix A17.–Yukon River fall chum salmon estimated brood year production and return per spawner estimates 1974–2011.

				Estimated Brood Year Return								(R)	(R/P)
	(P)	Estimated Annual Totals		Number of Salmon [a]				Percent				Total Brood	Return/
Year	Escapement [b]	Catch	Run	Age 3	Age 4	Age 5	Age 6	Age 3	Age 4	Age 5	Age 6	Year Return [a]	Spawner
1974	436,485	478,875	915,360	91,751	497,755	68,693	0	0.139	0.756	0.104	0.000	658,199	1.51
1975	1,465,213	473,062	1,938,275	150,451	1,225,440	61,401	123	0.105	0.853	0.043	0.000	1,437,415	0.98
1976	268,841	339,043	607,884	102,062	587,479	137,039	4,316	0.123	0.707	0.165	0.005	830,895	3.09
1977	514,843	447,918	962,761	102,660	1,075,198	175,688	4,189	0.076	0.792	0.129	0.003	1,357,735	2.64
1978	320,487	434,030	754,517	22,222	332,230	90,580	0	0.050	0.747	0.204	0.000	445,032	1.39
1979	780,818	615,377	1,396,195	41,114	769,496	274,311	3,894	0.038	0.707	0.252	0.004	1,088,814	1.39
1980	263,167	488,373	751,540	8,377	362,199	208,962	3,125	0.014	0.622	0.359	0.005	582,663	2.21
1981	551,192	683,391	1,234,583	45,855	955,725	278,386	8,888	0.036	0.742	0.216	0.007	1,288,853	2.34
1982	179,828	373,519	553,347	11,327	400,323	166,754	679	0.020	0.691	0.288	0.001	579,083	3.22
1983	347,157	525,485	872,642	12,569	875,355	223,468	2,313	0.011	0.786	0.201	0.002	1,113,704	3.21
1984	270,042	412,323	682,365	7,089	408,040	174,207	8,516	0.012	0.683	0.291	0.014	597,852	2.21
1985	664,426	515,481	1,179,907	46,635	874,819	270,984	3,194	0.039	0.732	0.227	0.003	1,195,632	1.80
1986	376,374	318,028	694,402	0	429,749	368,513	4,353	0.000	0.535	0.459	0.005	802,614	2.13
1987	651,943	406,143	1,058,086	12,413	617,519	290,767	7,720	0.013	0.665	0.313	0.008	928,418	1.42
1988	325,137	353,685	678,822	41,003	175,236	152,368	10,894	0.108	0.462	0.401	0.029	379,501	1.17
1989	506,173	545,166	1,051,339	2,744	282,905	345,136	19,661	0.004	0.435	0.531	0.030	650,446	1.29
1990	369,654	352,007	721,661	710	579,452	405,472	30,095	0.001	0.570	0.399	0.030	1,015,729	2.75
1991	591,132	439,096	1,030,228	3,663	993,021	364,812	11,921	0.003	0.723	0.266	0.009	1,373,416	2.32
1992	324,253	148,846	473,099	6,554	646,049	193,073	3,768	0.008	0.761	0.227	0.004	849,444	2.62
1993	352,688	91,015	443,703	7,655	442,167	98,767	3,195	0.014	0.801	0.179	0.006	551,784	1.56
1994	769,920	169,225	939,145	4,234	217,211	147,685	1,603	0.011	0.586	0.398	0.004	370,733	0.48
1995	963,560	461,147	1,424,707	2,286	263,666	68,918	381	0.007	0.786	0.206	0.001	335,252	0.35
1996	787,688	260,923	1,048,611	415	165,691	136,431	8,274	0.001	0.533	0.439	0.027	310,810	0.39

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	(P)	Estimated Annual Totals		Estimated Brood Year Return								(R)	(R/P)
				Number of Salmon [a]				Percent				Total Brood	Return/
Year	Escapement [b]	Catch	Run	Age 3	Age 4	Age 5	Age 6	Age 3	Age 4	Age 5	Age 6	Year Return [a]	Spawner
1997	481,336	170,059	651,395	3,087	243,950	118,044	3,326	0.008	0.662	0.320	0.009	368,407	0.77
1998	251,213	70,820	322,033	648	268,971	57,858	6,678	0.002	0.805	0.173	0.020	334,155	1.33
1999	283,786	131,175	414,961	29,023	703,881	173,990	13,683	0.032	0.765	0.189	0.015	920,577	3.24
2000	210,756	28,543	239,299	8,431	296,273	115,162	0	0.020	0.706	0.274	0.000	419,866	1.99
2001	336,435	44,976	381,411	135,700	2,151,589	679,544	33,497	0.045	0.717	0.226	0.011	3,000,330	8.92
2002	396,901	27,411	424,312	0	447,044	235,927	15,115	0.000	0.640	0.338	0.022	698,086	1.76
2003	693,967	79,529	773,496	24,401	847,126	502,783	16,581	0.018	0.609	0.361	0.012	1,390,892	2.00
2004	536,344	76,296	612,640	0	384,577	150,381	2,183	0.000	0.716	0.280	0.004	537,141	1.00
2005	1,990,251	290,183	2,280,434	2,625	383,552	99,322	5,308	0.005	0.781	0.202	0.011	490,807	0.25
2006	880,503	270,486	1,150,989	25,217	416,994	341,785	0	0.032	0.532	0.436		783,996 [d]	>0.89
2007	910,883	205,667	1,116,550	87,862	849,334	373,568						1,310,764 [e]	>1.44
2008	687,153	217,947	905,100	10,013									
2009	482,411	93,319	575,730										
2010	526,355	80,005	606,360										
2011	881,309	325,132	1,206,441										
Average-10	560,792	300,502	861,294										
Min-05	179,828	27,411	239,299	0	165,691	57,858	0	0.000	0.435	0.043	0.000	310,810	0.25
Max-05	1,990,251	683,391	2,280,434	150,451	2,151,589	679,544	33,497	0.139	0.853	0.531	0.030	3,000,330	8.92
	539,438	All Brood Years (1974-2005)		28,991	590,740	213,607	7,421	0.030	0.690	0.271	0.009	840,759	1.99
	380,443	Even Brood Years (1974-2005)		19,052	387,392	175,569	6,225	0.032	0.657	0.300	0.011	588,238	1.83
	698,432	Odd Brood Years (1974-2005)		38,930	794,088	251,645	8,617	0.028	0.722	0.241	0.008	1,093,280	2.16

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[a] The estimated number of salmon which returned are based upon annual age composition observed in lower Yukon test nets each year, weighted by test fish CPUE.

[b] Contrast in escapement data is 11.10.

[c] Based upon expanded test fish age composition estimates for years in which the test fishery terminated early both in 1994 and 2000.

[d] Brood year return for 3, 4, and 5 year fish, indicate that production (R/P) from brood year 2006 was at least 0.89. Recruits estimated for incomplete brood year age-6.

[e] Brood year return for 3 and 4 year fish, indicate that production (R/P) from brood year 2007 was at least 1.44. Recruits estimated for incomplete brood year age-5.

Appendix A18.–Canadian Yukon River mainstem fall chum salmon estimated brood year production and return per spawner estimates 1982–2011.

Brood	Return by Age					Total	Return/ Spawner
Year	3	4	5	6	Escapement	Brood Year	(R/S)
1982	4,098	142,640	30,840	719	31,958	178,296	5.58
1983	2,355	165,499	66,390	637	90,875	234,881	2.58
1984	6,566	70,181	28,367	212	56,633	105,325	1.86
1985	2,712	111,346	26,190	689	62,010	140,938	2.27
1986	141	120,963	82,832	629	87,940	204,565	2.33
1987	1,015	118,092	36,000	2,839	80,776	157,946	1.96
1988	394	60,209	24,764	1,656	36,786	87,023	2.37
1989	1,258	27,678	56,516	4,507	35,750	89,959	2.52
1990	299	101,440	79,702	5,041	51,735	186,482	3.60
1991	207	201,389	87,223	2,893	78,461	291,712	3.72
1992	9,251	96,723	54,264	742	49,082	160,980	3.28
1993	306	71,619	18,395	746	29,743	91,066	3.06
1994	231	41,537	35,079	1,642	98,358	78,490	0.80
1995	742	61,762	47,115	363	158,092	109,982	0.70
1996	840	13,895	18,977	397	122,429	34,108	0.28
1997	189	24,909	60,130	948	85,419	86,177	1.01
1998	757	49,025	27,495	0	46,252	77,276	1.67
1999	520	142,025	93,080	0	58,552	235,626	4.02
2000	758	85,513	19,855	1,187	53,732	107,314	2.00
2001	2,775	490,800	181,032	13,385	33,491	687,991	20.54
2002	4,325	99,419	122,373	4,322	98,679	230,439	2.34
2003	3,561	165,203	154,568	3,759	143,133	327,091	2.29
2004	2,677	79,572	34,088	2,897	154,080	119,234	0.77
2005	0	86,942	23,173	772	437,498	110,887	0.25
2006	5,716	98,487	121,951		211,994		
2007	20,277	258,952			254,649		
2008	4,245				174,267		
2009					93,626		
2010					117,871		
2011					205,617		
Average (1982-2005)					90,894	172,386	2.99
			Contrast (up to 2005):		14.71		

Note: Data in grey-shaded boxes are from Eagle Sonar project test fishery samples; earlier data is from fish wheel mark–recapture samples.

Appendix A19.–Escapement, rebuilding and interim goals for Canadian origin Chinook and fall chum salmon stocks, 1985–2012.

	Canadian Origin Stock Targets					
	Chinook Salmon		Fall Chum Salmon			
Year	Escapement Goal	Stabilization/ Rebuilding	Mainstem Escapement Goal	Stabilization/ Rebuilding	Fishing Branch Escapement Goal	Fishing Branch Interim Goal
1985	33,000-43,000					
1986	33,000-43,000					
1987	33,000-43,000		90,000-135,000		50,000-120,000	
1988	33,000-43,000		90,000-135,000		50,000-120,000	
1989	33,000-43,000		90,000-135,000		50,000-120,000	
1990	33,000-43,000	18,000	80,000		50,000-120,000	
1991	33,000-43,000	18,000	80,000		50,000-120,000	
1992	33,000-43,000	18,000	80,000	51,000	50,000-120,000	
1993	33,000-43,000	18,000	80,000	51,000	50,000-120,000	
1994	33,000-43,000	18,000	80,000	61,000	50,000-120,000	
1995	33,000-43,000	18,000	80,000	80,000	50,000-120,000	
1996	33,000-43,000	28,000	80,000	65,000	50,000-120,000	
1997	33,000-43,000	28,000	80,000	49,000	50,000-120,000	
1998	33,000-43,000	28,000	80,000	80,000	50,000-120,000	
1999	33,000-43,000	28,000	80,000	80,000	50,000-120,000	
2000	33,000-43,000	28,000	80,000	80,000	50,000-120,000	
2001	33,000-43,000	28,000	80,000	80,000	50,000-120,000	
2002	33,000-43,000	28,000	80,000	60,000	50,000-120,000	
2003	33,000-43,000	28,000 [a]	80,000	65,000	50,000-120,000	15,000
2004	33,000-43,000	28,000	80,000	65,000	50,000-120,000	13,000
2005	33,000-43,000	28,000	80,000	65,000	50,000-120,000	24,000
2006	33,000-43,000	28,000	80,000	80,000	50,000-120,000	28,000
2007	33,000-43,000	33,000-43,000	80,000	80,000	50,000-120,000	34,000
2008	45,000 [b]	45,000 [b]	80,000	80,000	50,000-120,000	22,000-49,000 [c]
2009	45,000 [b]	45,000 [b]	80,000	80,000	50,000-120,000	22,000-49,000 [c]
2010	42,500-55,000 [d]		70,000-104,000 [e]			22,000-49,000 [c]
2011	42,500-55,000 [e]		70,000-104,000 [e]			22,000-49,000 [c]
2012	42,500-55,000		70,000-104,000			22,000-49,000 [c]

[a] In 2003 the goal was set at 25,000. However, if the U.S. decided on a commercial opening the goal would be increased to 28,000 fish.

[b] Interim Management Escapement Goal (IMEG) using Eagle sonar estimates of Canadian border passage, previous years were measured by mark–recapture abundance estimates.

[c] Interim Management Escapement Goal (IMEG) established for 2008–2013.

[d] The IMEG goal of 42,500 to 55,000 was chosen at the Spring 2010 Yukon River Panel meeting to include a precautionary approach to put more large older fish on the spawning grounds. The Panel eventually agreed with 42,500 for the lower end of the range based on an average of the 2 proposed lower goals of 40,000 and 45,000 discussed.

[e] The IMEGs from 2010 were recommended to continue in 2012.

Appendix A20.–Recoveries of Chinook salmon coded wire tags from the Whitehorse Rapids Fish hatchery in the U.S. domestic groundfish fisheries and research trawl surveys.

Brood Year	Release Location	Release Date	Recovery Date	Age (yrs)	Latitude	Longitude	Gear Type
1988	Michie Cr.	06/06/89	03/25/92	4	56° 44’	173° 15’	Domestic Trawl
1988	McClintock R.	06/06/89	03/19/94	6	Area 513		Domestic Trawl
1990	Wolf Cr.	08/08/91	03/14/94	4	60° 06’	178° 58’	Domestic Trawl
1991	Michie Cr.	06/04/92	02/24/95	4	55° 19’	164° 43’	Domestic Trawl
1992	Wolf Cr.	06/06/93	12/06/94	2	56° 52’	171° 18’	Domestic Trawl
1992	Yukon R.	06/15/93	06/02/97	5	59° 29’	167° 49’	Domestic Trawl
1993	Michie Cr.	06/01/94	03/10/98	5	59° 26’	178° 05’	Domestic Trawl
1995	Fox Cr.	06/04/96	03/29/98	3	58° 56’	178° 06’	Domestic Trawl
1995	Judas Cr.	06/04/96	03/30/99	4	57° 43’	173° 34’	Domestic Trawl
1995	Michie Cr.	06/11/97	03/16/00	4	55° 56’	168° 52’	Domestic Trawl
1997	Judas Cr.	06/12/98	03/28/01	4	56° 18’	170° 33’	Domestic Trawl
1999	Wolf Creek	06/10/00	03/03/03	4	56° 26’	169° 55’	Domestic Trawl
2000	McClintock R.	06/08/01	02/15/02	2	56° 10’	166° 00’	Domestic Trawl
2001	Michie Cr.	06/10/02	10/03/02	1	64° 06’	164° 31’	Research Trawl
2001	Wolf Cr.	06/02/02	10/03/02	1	64° 06	164° 31’	Research Trawl
2001	Michie Cr.	06/10/02	10/04/02	1	63° 00’	165° 58’	Research Trawl
2001	Michie Cr.	06/10/02	02/08/03	2	56° 44’	167° 00’	Domestic Trawl
2001	Wolf Cr.	05/23/02	10/08/04	3	54°01’	166° 29’	Domestic Trawl
2001	Michie Cr.	06/10/02	03/15/05	4	57° 21’	171° 39’	Domestic Trawl
2003	Yukon R.	--	09/11/04	1	64° 01’	166° 01’	Research Trawl
2006[a,b]	Yukon R.	--	09/13/07	1	65° 12’	168° 06’	Research Trawl
2006[a,b]	Yukon R.	--	09/13/07	1	65° 12’	168° 06’	Research Trawl
2006[a,b]	Yukon R.	--	09/13/07	1	65° 12’	168° 06’	Research Trawl
2009[a,b]	Yukon R.	--	09/24/10	1	63° 49’	162° 47’	Research Trawl
2009[a,b]	Yukon R.	--	09/25/10	1	64° 04’	162° 43’	Research Trawl
Unknown[a]	Yukon R.	--		--	56°	172°	Domestic Trawl[c]
Unknown[a]	Yukon R.	--		--	56°	172°	Domestic Trawl[c]

[a] Agency only tag code (code 18).

[b] Brood year inferred from size.

[c] Reported in (Celewycz et al. 2010).

Appendix A21.–South Unimak and Shumagin Islands June commercial sockeye and chum salmon harvest, all gear combined, by year, 1980–2011.

	Sockeye [a]			Chum [a]		
Year	South Unimak	Shumagin Islands	Total	South Unimak	Shumagin Islands	Total
1980	2,731,148	475,127	3,206,275	458,499	50,366	508,865
1981	1,470,393	350,572	1,820,965	509,876	54,071	563,947
1982	1,668,153	450,548	2,118,701	933,728	161,316	1,095,044
1983	1,545,075	416,494	1,961,569	616,354	169,277	785,631
1984	1,131,365	256,838	1,388,203	227,913	109,207	337,120
1985	1,454,969	336,431	1,791,400	324,825	109,004	433,829
1986	315,370	156,027	471,397	252,721	99,048	351,769
1987	652,397	140,567	792,964	405,955	37,064	443,019
1988	474,457	282,230	756,687	464,765	61,946	526,711
1989	1,347,547	396,958	1,744,505	407,635	47,528	455,163
1990	1,088,944	255,585	1,344,529	455,044	63,501	518,545
1991	1,215,658	333,272	1,548,930	670,103	102,602	772,705
1992	2,046,022	411,834	2,457,856	323,891	102,312	426,203
1993	2,366,573	607,171	2,973,744	381,941	150,306	532,247
1994	1,001,250	460,013	1,461,263	374,409	207,756	582,165
1995	1,451,490	653,831	2,105,321	342,307	195,126	537,433
1996	572,495	456,475	1,028,970	129,889	229,931	359,820
1997	1,179,179	449,002	1,628,181	196,016	126,309	322,325
1998	974,628	314,097	1,288,725	195,454	50,165	245,619
1999	1,106,208	269,191	1,375,399	186,886	58,420	245,306
2000	892,016	359,212	1,251,228	168,888	70,469	239,357
2001	121,547	29,085	150,632	36,099	12,251	48,350
2002	356,157	234,949	591,106	201,211	177,606	378,817
2003	335,903	117,244	453,147	121,169	161,269	282,438
2004	531,955	816,118	1,348,073	130,626	351,683	482,309
2005	437,443	566,952	1,004,395	143,799	284,031	427,830
2006	491,053	441,238	932,291	96,016	203,811	299,827
2007	737,642	852,198	1,589,840	153,334	144,205	297,539
2008	1,064,570	649,005	1,713,575	284,449	126,483	410,932
2009	595,221	572,697	1,167,918	200,783	495,992	696,775
2010	487,880	330,985	818,865	100,427	171,273	271,700
2011	937,168	422,273	1,359,441	231,081	192,254	423,335
1992-2011 Average	884,320	450,679	1,334,999	199,934	175,583	375,516
2002-2011 Average	597,499	500,366	1,097,865	166,290	230,861	397,150

[a] Does not include test fish harvest.

Appendix A22.–Estimated bycatch (numbers) of Pacific salmon by species, year, and region in United States groundfish fisheries in the Bering Sea-Aleutian Islands (BSAI) and Gulf of Alaska (GOA) management areas, 1991–2011.

Region	Year	Chinook	Chum	Coho	Sockeye	Pink	Total Non-Chinook
BSAI	1991	48,880[a]	28,270[a]	656[a]	1,310[a]	26[a]	30,262[a]
	1992	41,955	40,090[a]	1,266[a]	14[a]	80[a]	41,450[a]
	1993	46,014	242,916[a]	324[a]	22[a]	8[a]	243,270[a]
	1994	43,821	94,107	228	20	193	94,548
	1995	23,436	20,983	871	0	21	21,875
	1996	63,204	77,819	234	5	2	78,060
	1997	50,530	66,816	109	3	66	66,994
	1998	55,431	--	--	--	--	65,697
	1999	14,599	--	--	--	--	47,132
	2000	8,223	--	--	--	--	59,327
	2001	40,547	--	--	--	--	60,731
	2002	39,684	--	--	--	--	82,483
	2003	53,571	--	--	--	--	197,150
	2004	59,967	--	--	--	--	450,553
	2005	74,267	--	--	--	--	709,386
	2006	87,084	--	--	--	--	325,181
	2007	129,567	--	--	--	--	97,352
	2008	23,133	--	--	--	--	16,901
	2009	14,088	--	--	--	--	47,497
	2010	12,530	--	--	--	--	14,977
	2011	26,672					192,871
GOA	1991	38,894	13,711	1,133	46	64	14,954
	1992	16,794	11,140	55	21	0	11,216
	1993	24,465	55,268	306	15	799	56,388
	1994	13,613	36,782	42	96	306	37,226
	1995	14,647	64,067	668	41	16	64,792
	1996	15,761	3,969	194	2	11	4,176
	1997	15,119	3,349	41	7	23	3,420
	1998	16,984	--	--	--	--	13,544
	1999	30,600	--	--	--	--	7,529
	2000	26,705	--	--	--	--	10,995
	2001	15,104	--	--	--	--	6,063
	2002	12,920	--	--	--	--	3,219
	2003	15,369	--	--	--	--	9,530
	2004	17,745	--	--	--	--	5,809
	2005	31,270	--	--	--	--	6,608
	2006	19,004	--	--	--	--	4,226
	2007	40,359	--	--	--	--	3,421
	2008	16,176	--	--	--	--	2,156
	2009	8,397	--	--	--	--	2,355
	2010	54,559	--	--	--	--	2,008[b]
	2011	20,773					NA

Note: (Berger, 2010; NMFS 2011)

[a] Community Development Quota (CDQ) bycatch not included.

[b] Bycatch estimates provided by NMFS Catch Accounting Division. Available at: (http://alaskafisheries.noaa.gov/2010/car260_psc_salmon.csv).

Appendix A23.–Estimated bycatch (numbers) of Chinook and non-Chinook salmon in the Bering Sea-Aleutian Islands (BSAI) groundfish fisheries by season, 1991-2011.

	BSAI Chinook Salmon Bycatch				BSAI Non-Chinook Salmon Bycatch			
	A-season		B-season		A-season		B-season	
Year	Pollock Fisheries	Other Fisheries	Pollock Fisheries	Other Fisheries	Pollock Fisheries	Other Fisheries	Pollock Fisheries	Other Fisheries
1991	38,791[a]	7,601[a]	2,114[a]	374[a]	2,850[a]	166[a]	26,101[a]	1,145[a]
1992	25,691	5,728	10,259	277	1,951[a]	169[a]	38,324[a]	1,005[a]
1993	17,264	7,424	21,252	74	1,594[a]	254[a]	240,597[a]	825[a]
1994	28,451	10,470	4,686	214	3,991	1,608	88,681	268
1995	10,579	8,360	4,405	92	1,708	1,325	17,556	1,286
1996	36,068	7,248	19,554	334	222	443	77,014	381
1997	10,935	5,466	33,973	156	2,083	627	63,904	381
1998	15,193	3,737	36,130	371	4,002	518	60,040	1,137
1999	6,352	2,442	5,627	178	362	31	44,810	1,929
2000	3,422	3,146	1,539	116	213	137	58,358	619
2001	18,484	6,387	14,961	715	2,386	517	54,621	3,207
2002	21,794	4,483	12,701	706	1,377	321	79,404	1,381
2003	32,609	7,435	12,977	550	3,834	279	185,351	1,686
2004	23,093	7,624	28,603	647	422	606	440,037	9,488
2005	27,331	6,305	40,030	601	595	443	703,991	4,367
2006	58,391	4,191	24,305	197	1,326	985	308,318	14,552
2007	69,409	7,699	52,349	110	8,523	1,116	85,263	2,450
2008	16,647	2,366	4,853	267	319	197	14,823	1,562
2009	9,688	1,387	2,736	197	48	115	46,081	1,253
2010	7,651	1,852	2,084	943	48	182	13,258	1,489
2011	7,137	514	18,363	658	256	118	191,190	1,307

Note: A-season (winter; January 20–June 10) B-season (summer/fall; June 10–November 1). Actual fishing dates when fishing starts and stops varies by year.

Source: NMFS 2010.

[a] Community Development Quota (CDQ) bycatch not included.

Appendix A24.–United States Coast Guard enforcement patrols and vessel seizures (1999–1010) related to the United Nations Moratorium on Large Scale-High Seas Driftnet (HSDN) fishing within the North Pacific Anadromous Fisheries Commission (NPAFC) Convention Area.

Year	Cutter Operating Days	Aircraft Operating Hours	HSDN Vessels Apprehended
1999	50	236	3
2000	10	151	1
2001	0	117	0
2002	0	125	0
2003	60	195	6
2004	0	109	0
2005	46	138	0
2006	31	123	0
2007	66	121	6
2008	97	115	2
2009	70	93	0
2010	75	115	0
2011	80	150	1

APPENDIX B: TABLES

Appendix B1.–Alaskan and Canadian total utilization of Yukon River Chinook, chum and coho salmon, 1961–2011.

	Alaska [a,b]			Canada [d]			Total		
Year	Chinook	Other Salmon [c]	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	76,705	1,307,037	1,383,742	6,000	20,600	26,600	82,705	1,327,637	1,410,342
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 [e]	46,564	220,511	1,754,678	1,975,189
1981	188,477	2,097,871	2,286,348	18,109	22,781 [e]	40,890	206,586	2,120,652	2,327,238
1982	152,808	1,265,457	1,418,265	17,208	16,091 [e]	33,299	170,016	1,281,548	1,451,564

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	Alaska [a,b]			Canada [d]			Total		
Year	Chinook	Other Salmon [c]	Total	Chinook	Other Salmon	Total	Chinook	Other Salmon	Total
1983	198,436	1,678,597	1,877,033	18,952	29,490 [e]	48,442	217,388	1,708,087	1,925,475
1984	162,683	1,548,101	1,710,784	16,795	29,767 [e]	46,562	179,478	1,577,868	1,757,346
1985	187,327	1,657,984	1,845,311	19,301	41,515 [e]	60,816	206,628	1,699,499	1,906,127
1986	146,004	1,758,825	1,904,829	20,364	14,843 [e]	35,207	166,368	1,773,668	1,940,036
1987	188,386	1,246,176	1,434,562	17,614	44,786 [e]	62,400	206,000	1,290,962	1,496,962
1988	148,421	2,325,377	2,473,798	21,427	33,915 [e]	55,342	169,848	2,359,292	2,529,140
1989	157,616	2,289,501	2,447,117	17,944	23,490 [e]	41,434	175,560	2,312,991	2,488,551
1990	149,433	1,055,515	1,204,948	19,227	34,302 [e]	53,529	168,660	1,089,817	1,258,477
1991	154,651	1,335,111	1,489,762	20,607	35,653 [e]	56,260	175,258	1,370,764	1,546,022
1992	168,191	863,575	1,031,766	17,903	21,310 [e]	39,213	186,094	884,885	1,070,979
1993	160,289	341,593	501,882	16,611	14,150 [e]	30,761	176,900	355,743	532,643
1994	170,829	551,743	722,572	21,198	38,342	59,540	192,027	590,085	782,112
1995	177,663	1,437,837	1,615,500	20,884	46,109	66,993	198,547	1,483,946	1,682,493
1996	139,284	1,121,273	1,260,557	19,612	24,395 [e]	44,007	158,896	1,145,668	1,304,564
1997	174,886	545,066	719,952	16,528	15,880 [e]	32,408	191,414	560,946	752,360
1998	99,369	199,735	299,104	5,937 [f]	8,165 [e]	14,102	105,306	207,900	313,206
1999	124,316	236,464	360,780	12,468	19,736 [e]	32,204	136,784	256,200	392,984
2000	45,307	106,936	152,243	4,879 [g]	9,273 [e]	14,152	50,186	116,209	166,395
2001	53,738	116,523	170,261	10,144	9,822 [e]	19,966	63,882	126,345	190,227
2002	67,888	122,360	190,248	9,258	8,493 [e]	17,751	77,146	130,853	207,999
2003	99,150	199,917	299,067	9,619	11,885 [e]	21,504	108,769	211,802	320,571
2004	112,332	206,099	318,431	11,238	9,930 [e]	21,168	123,570	216,029	339,599
2005	85,521	478,749	564,270	11,371	18,348 [e]	29,719	96,892	497,097	593,989

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	Alaska [a,b]			Canada [d]			Total		
Year	Chinook	Other Salmon [c]	Total	Chinook	Other Salmon	Total	Chinook	Other Salmon	Total
2006	95,184	520,243	615,427 [h]	9,072	11,907 [e]	20,979	104,256	532,150	636,406
2007	89,555	532,103	621,658 [h]	5,094	14,030 [e]	19,124	94,649	546,133	640,782
2008	48,870	481,639	530,509	3,713	9,566	13,279	52,583	491,205	543,788
2009	34,206	355,231	389,437	4,758	2,011	6,769	38,964	357,242	396,206
2010	53,792	393,233	447,025 [h]	2,706	5,891 [e]	8,597	56,498	399,124	455,622
2011	41,071	764,282	805,353 [h,i]	4,884	8,226 [e]	13,110 [h]	45,955	772,508	818,463
Average									
2006-2010	64,321	456,490	520,811	5,069	8,681	13,750	69,390	465,171	534,561
2001-2010	74,024	340,610	414,633	7,697	10,188	17,886	81,721	350,798	432,519
1961-2010	125,728	854,228	979,955	11,450	17,784	29,234	137,178	872,102	1,009,190

[a] Catch in number of salmon. Includes estimated number of salmon harvested for the commercial production of salmon roe.

[b] Commercial, subsistence, personal-use, test fish retained for subsistence, and sport catches combined. Does not include harvest from the Coastal District communities of Hooper Bay and Scammon Bay.

[c] Alaska Other Salmon is the sum of summer chum, fall chum, and coho salmon..

[d] Catch in number of salmon. Commercial, Aboriginal, domestic, and sport catches combined.

[e] 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] Includes the previous 5 year average of Sport Fish harvest data.

Appendix B2.–Alaskan catch of Yukon River Chinook salmon, 1961–2011.

Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales [e]	Sport Fish [f]	Yukon River Total	Yukon Area Total [g]
1961	21,488	119,664					141,152	141,152
1962	11,110	94,734					105,844	105,844
1963	24,862	117,048					141,910	141,910
1964	16,231	93,587					109,818	109,818
1965	16,608	118,098					134,706	134,706
1966	11,572	93,315					104,887	104,887
1967	16,448	129,656					146,104	146,104
1968	12,106	106,526					118,632	118,632
1969	14,000	91,027					105,027	105,027
1970	13,874	79,145					93,019	93,019
1971	25,684	110,507					136,191	136,191
1972	20,258	92,840					113,098	113,098
1973	24,317	75,353					99,670	99,670
1974	19,964	98,089					118,053	118,053
1975	12,867	63,838					76,705	76,705
1976	17,806	87,776					105,582	105,582
1977	17,581	96,757				156	114,494	114,494
1978	30,297	99,168				523	129,988	130,476
1979	31,005	127,673				554	159,232	159,232
1980	42,724	153,985				956	197,665	197,665
1981	29,690	158,018				769	188,477	188,477
1982	28,158	123,644				1,006	152,808	152,808
1983	49,478	147,910				1,048	198,436	198,436
1984	42,428	119,904				351	162,683	162,683
1985	39,771	146,188				1,368	187,327	187,327
1986	45,238	99,970				796	146,004	146,004
1987	51,418	134,760 [h]		1,706		502	188,386	192,007
1988	43,907	100,364		2,125	1,081	944	148,421	150,009
1989	48,446	104,198		2,616	1,293	1,063	157,616	157,632
1990	48,587	95,247 [i]	413	2,594	2,048	544	149,433	149,433

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Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales [e]	Sport Fish [f]	Yukon River Total	Yukon Area Total [g]
1991	46,773	104,878 [j]	1,538		689	773	154,651	154,651
1992	45,626	120,245 [k]	927		962	431	168,191	169,642
1993	62,486	93,550	560	426	1,572	1,695	160,289	161,718
1994	53,077	113,137	703		1,631	2,281	170,829	171,654
1995	48,535	122,728	1,324	399	2,152	2,525	177,663	179,748
1996	43,306	89,671	521	215	1,698	3,873	139,284	141,649
1997	55,978	112,841	769	313	2,811	2,174	174,886	176,025
1998	53,733	43,618	81	357	926	654	99,369	99,760
1999	52,194	69,275	288	331	1,205	1,023	124,316	125,427
2000	35,841	8,518	0	75	597	276	45,307	45,870
2001	52,937	- [l]	0	122	0	679	53,738	56,620
2002	42,620	24,128	0	126	528	486	67,888	69,010
2003	55,109	40,438	0	204	680	2,252	98,683	100,533
2004	53,675	56,151	0	201	792	1,513	112,332	114,370
2005	52,561	32,029	0	138	310	483	85,521	86,369
2006	47,710 [m]	45,829	0	89	817	739	95,184	96,067
2007	53,976 [m]	33,634	0	136	849	960	89,555	90,753
2008	43,694	4,641	0	126	0	409	48,870	50,362
2009	32,900	316	0	127	0	863	34,206	35,111
2010	43,259 [m]	9,897	0	162	0	474	53,792	55,092
2011	40,211 [m]	82 [n]	0	89	0	689 [o]	41,071	41,840
Average								
2006-2010	44,308	18,863	0	128	333	689	64,321	65,477
2001-2010	47,844	27,451	0	143	398	886	74024	74,475
1961-2010	36,078	89,888	339	599	984	1,034	125,728	126,360

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[a] Includes test fish harvest and commercial retained fish (not sold) that were utilized for subsistence. Does not include harvest from the Coastal District communities of Scammon Bay and Hooper Bay.

[b] Includes ADF&G test fish sales prior to 1988.

[c] Includes an estimate of the number of salmon harvested for the commercial production of salmon roe; including carcasses from subsistence caught fish. These data are only available since 1990.

[d] Prior to 1987, and 1990, 1991, and 1994 personal use was considered part of subsistence.

[e] ADF&G test fish that were sold commercially.

[f] Sport fish harvest for the Alaskan portion of the Yukon River drainage. Most of this harvest is taken within the Tanana River drainage (see Brase 2009 and Burr 2009).

[g] Yukon Area Total includes subsistence harvest from the Coastal District communities of Hooper Bay and Scammon Bay (1978, 1987-1989 and 1992-2011).

[h] Includes 653 and 2,136 Chinook salmon illegally sold in Districts 5 (Yukon River) and 6 (Tanana River), respectively.

[i] Includes the illegal sales of 1,101 Chinook salmon.

[j] Includes the illegal sales of 2,711 Chinook salmon in District 1, and 284 Chinook salmon in District 2.

[k] Includes the illegal sales of 1,218 Chinook salmon in District 1, and 207 Chinook salmon in District 2.

[l] Summer season commercial fishery was not conducted.

[m] Data are preliminary.

[n] No Chinook salmon were sold in the summer season. A total of 82 Chinook salmon were sold in District 1 and 2 in the fall season.

[o] Data are unavailable at this time. Estimated based on the previous 5-year average.

Appendix B3.–Alaska catch of Yukon River summer chum salmon, 1970–2011.

Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales [e]	Sport Fish [f]	Yukon River Total	Yukon Area Total [g]
1970	166,504	137,006					303,510	303,510
1971	171,487	100,090					271,577	271,577
1972	108,006	135,668					243,674	243,674
1973	161,012	285,509					446,521	446,521
1974	227,811	589,892					817,703	817,703
1975	211,888	710,295					922,183	922,183
1976	186,872	600,894					787,766	787,766
1977	159,502	534,875				316	694,693	694,693
1978	171,383	1,052,226	25,761			451	1,249,821	1,266,630
1979	155,970	779,316	40,217			328	975,831	975,831
1980	167,705	928,609	139,106			483	1,235,903	1,235,903
1981	117,629	1,006,938	272,763			612	1,397,942	1,397,942
1982	117,413	461,403	255,610			780	835,206	835,206
1983	149,180	744,879	250,590			998	1,145,647	1,145,647
1984	166,630	588,597	277,443			585	1,033,255	1,033,255
1985	157,744	516,997	417,016			1,267	1,093,024	1,093,024
1986	182,337	721,469	467,381			895	1,372,082	1,372,082
1987	170,678	442,238	180,303	4,262		846	798,327	827,995
1988	196,599	1,148,650	468,032	2,225	3,587	1,037	1,820,130	1,851,360
1989	167,155	955,806 [h]	496,934	1,891	10,605	2,132	1,634,523	1,636,864
1990	115,609	302,625 [i]	214,552	1,827	8,263	472	643,348	643,348
1991	118,540	349,113 [j]	308,989		3,934	1,037	781,613	781,613
1992	125,497	332,313 [k]	211,264		1,967	1,308	672,349	689,044
1993	104,776	96,522	43,594	674	1,869	564	247,999	268,797
1994	109,904	80,284	178,457		3,212	350	372,207	387,110

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Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales [e]	Sport Fish [f]	Yukon River Total	Yukon Area Total [g]
1995	118,723	259,774	558,640	780	6,073	1,174	945,164	962,524
1996	102,503	147,127	535,106	905	7,309	1,946	794,896	817,131
1997	97,109	95,242	133,010	391	2,590	662	329,004	344,715
1998	86,004	28,611	187	84	3,019	421	118,326	119,688
1999	70,323	29,389	24	382	836	555	101,509	114,970
2000	64,895	6,624	0	30	648	161	72,358	85,535
2001	58,239	- [l]	0	146	0	82	58,467	72,383
2002	72,260	13,558	19	175	218	384	86,614	101,410
2003	68,304	10,685	0	148	119	1,638	80,894	94,862
2004	69,672	26,410	0	231	217	203	96,733	104,995
2005	78,902	41,264	0	152	134	435	120,887	135,244
2006	90,907 [m]	92,116	0	262	456	583	184,324	208,495
2007	76,805 [m]	198,201	0	184	10	245	275,445	291,566
2008	68,394	151,186	0	138	80	371	220,169	238,289
2009	67,742	170,272	0	308	0	174	238,496	251,293
2010	65,948 [m]	232,888	0	319	0	1,183	300,338	322,763
2011	77,715 [m]	275,161	0	439	0	511 [n]	353,826	372,131
Average								
2006-2010	73,959	168,933	0	242	109	511	243,754	262,481
2001-2010	71,717	104,064	2	206	123	530	166,237	182,130
1970-2010	125,477	377,639	165,909	739	2,398	726	629,767	638,906

-continued-

[a] Includes test fish harvest and commercial retained fish (not sold) that were utilized for subsistence. Does not include harvest from the Coastal District communities of Scammon Bay and Hooper Bay.

[b] Includes ADF&G test fish sales prior to 1988.

[c] Includes an estimate of the number of salmon harvested for the commercial production of salmon roe and the carcasses used for subsistence. In prior JTC reports subsistence plus commercial related harvests are notes as subsistence "use".

[d] Prior to 1987, 1990, 1991, and 1994 personal use was considered part of subsistence.

[e] ADF&G test fish that were sold commercially.

[f] The majority of the sport fish harvest is taken in the Tanana River Drainage (see Brase (2009) and Burr (2009)). Division of Sport Fish does not differentiate between the 2 races of chum salmon. Sport fish harvest is assumed to be primarily summer chum salmon caught incidental to directed Chinook salmon fishing.

[g] Yukon Area Total includes subsistence harvest from the Coastal District communities of Hooper Bay and Scammon Bay (1978, 1987-89 and 1992-2011).

[h] Includes illegal sales of 150 summer chum salmon in District 1.

[i] Does not include 1,233 female summer chum salmon sold in Subdistrict 6-C with roe extracted and roe sold separately.

[j] Includes the illegal sales of 1,023 summer chum salmon.

[k] Includes the sales of 31 summer chum salmon in District 1, and 91 summer chum salmon in District 2.

[l] Summer season commercial fishery was not conducted.

[m] Data are preliminary.

[n] Data are unavailable at this time. Estimated based on the previous 5-year average.

Appendix B4.–Alaskan harvest of Yukon River fall chum salmon, 1961–2011.

Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales [e]	Yukon River Total	Yukon Area Total [f]
1961	101,772 [g, h]	42,461	0			144,233	144,233
1962	87,285 [g, h]	53,116	0			140,401	140,401
1963	99,031 [g, h]		0			99,031	99,031
1964	120,360 [g, h]	8,347	0			128,707	128,707
1965	112,283 [g, h]	23,317	0			135,600	135,600
1966	51,503 [g, h]	71,045	0			122,548	122,548
1967	68,744 [g, h]	38,274	0			107,018	107,018
1968	44,627 [g, h]	52,925	0			97,552	97,552
1969	52,063 [g, h]	131,310	0			183,373	183,373
1970	55,501 [g, h]	209,595	0			265,096	265,096
1971	57,162 [g, h]	189,594	0			246,756	246,756
1972	36,002 [g, h]	152,176	0			188,178	188,178
1973	53,670 [g, h]	232,090	0			285,760	285,760
1974	93,776 [g, h]	289,776	0			383,552	383,552
1975	86,591 [g, h]	275,009	0			361,600	361,600
1976	72,327 [g, h]	156,390	0			228,717	228,717
1977	82,771 [h]	257,986	0			340,757	340,757
1978	84,239 [h]	236,383	10,628			331,250	331,915
1979	214,881	359,946	18,466			593,293	593,293
1980	167,637	293,430	5,020			466,087	466,087
1981	177,240	466,451	11,285			654,976	654,976
1982	132,092	224,187	805			357,084	357,084
1983	187,864	302,598	5,064			495,526	495,526
1984	172,495	208,232	2,328			383,055	383,055
1985	203,947	267,744	2,525			474,216	474,216
1986	163,466	139,442	577			303,485	303,485
1987	342,597 [i]	[j]		19,066		361,663	361,885

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Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales [e]	Yukon River Total	Yukon Area Total [f]
1988	151,586	133,763	3,227	3,881	27,663	320,120	322,382
1989	211,147	270,195	14,749	5,082	20,973	522,146	522,302
1990	167,900	124,174	12,168	5,176	9,224	318,642	318,642
1991	145,524	230,852	23,366	0	3,936	403,678	403,678
1992	107,602	15,721 [k]	3,301	0	1,407	128,031	128,237
1993	76,762	[j]		163	0	76,925	77,045
1994	123,218	3,631	4,368	0	0	131,217	131,564
1995	130,506	250,733	32,324	863	1,121	415,547	415,901
1996	128,866	88,342	17,288	356	1,717	236,569	236,961
1997	95,141	56,713	1,474	284	867	154,479	154,479
1998	62,867	[j]		2	0	62,869	62,903
1999	89,736	20,371	0	261	1,171	111,539	111,743
2000	19,306	[j]		1	0	19,307	19,396
2001	35,144	[j]		10	0	35,154	35,713
2002	19,390	[j]		3	0	19,393	19,677
2003	56,784	10,996	0	394	0	68,174	68,320
2004	62,206	4,110	0	230	0	66,546	66,866
2005	91,464	180,249	0	133	0	271,846	271,916
2006	83,815 [l]	166,179	0	333 [l]	0	250,327	250,514
2007	100,987 [l]	90,677	0	173 [l]	0	191,837	192,071
2008	88,971	119,497	0	181	0	208,649	209,035
2009	65,961	25,876	0	78	0	91,915	92,073
2010	68,459 [l]	2,550	0	3,209 [l]	0	74,218	74,404
2011	79,887 [l]	240,629	0	347 [l]	0	320,863	321,178

-continued-

Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales [e]	Yukon River Total	Yukon Area Total [f]
Average							
2006-2010	81,639	80,956	0	795	0	163,389	163,619
2001-2010	67,318	75,017 [m]	0	474	0	127,806	128,059
1961-2010	106,105	150,615 [m]	3,840	1,662	2,960	241,173	241,324

[a] Includes test fish harvest and commercial retained fish (not sold) that were utilized for subsistence. Does not include harvest from the Coastal District communities of Scammon Bay and Hooper Bay.

[b] Includes fish sold in the round and estimated numbers of female salmon commercially harvested for production of salmon roe (see Bergstrom et. al 1992:1990). Includes ADF&G test fish prior to 1988. Beginning in 1999 commercial harvest may include some commercial related harvest.

[c] Includes an estimate of the number of salmon harvested for the commercial production of salmon roe and the carcasses used for subsistence. In prior JTC reports subsistence plus commercial related harvests are noted as subsistence "use".

[d] Prior to 1987, and in 1991, 1992 and 1994 personal use was considered part of subsistence.

[e] Test fish sales is the number of salmon sold by ADF&G test fisheries.

[f] Yukon Area includes harvest from the Coastal District communities of Scammon Bay and Hooper Bay (1978, 1987–1989 and 1992–2010).

[g] Catches estimated because harvests of species other than Chinook salmon were not differentiated.

[h] Minimum estimates from 1961-1978 because subsistence surveys were conducted prior to the end of the fishing season.

[i] Includes an estimated 95,768 and 119,168 fall chum salmon illegally sold in Districts 5 (Yukon River) and 6, respectively.

[j] Commercial fishery was not conducted .

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

[l] Data are preliminary.

[m] Averages do not include data from years no commercial fishery was conducted.

Appendix B5.–Alaskan harvest of Yukon River coho salmon, 1961–2011.

Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales [e]	Sport Fish [f]	Yukon River Total	Yukon Area Total [g]
1961	9,192 [h, i]	2,855	0				12,047	12,047
1962	9,480 [h, i]	22,926	0				32,406	32,406
1963	27,699 [h, i]	5,572	0				33,271	33,271
1964	12,187 [h, i]	2,446	0				14,633	14,633
1965	11,789 [h, i]	350	0				12,139	12,139
1966	13,192 [h, i]	19,254	0				32,446	32,446
1967	17,164 [h, i]	11,047	0				28,211	28,211
1968	11,613 [h, i]	13,303	0				24,916	24,916
1969	7,776 [h, i]	15,093	0				22,869	22,869
1970	3,966 [h, i]	13,188	0				17,154	17,154
1971	16,912 [h, i]	12,203	0				29,115	29,115
1972	7,532 [h, i]	22,233	0				29,765	29,765
1973	10,236 [h, i]	36,641	0				46,877	46,877
1974	11,646 [h, i]	16,777	0				28,423	28,423
1975	20,708 [h, i]	2,546	0				23,254	23,254
1976	5,241 [h, i]	5,184	0				10,425	10,425
1977	16,333 [i]	38,863	0			112	55,308	55,308
1978	7,787 [i]	26,152	0			302	34,241	34,330
1979	9,794	17,165	0			50	27,009	27,009
1980	20,158	8,745	0			67	28,970	28,970
1981	21,228	23,680	0			45	44,953	44,953
1982	35,894	37,176	0			97	73,167	73,167
1983	23,905	13,320	0			199	37,424	37,424
1984	49,020	81,940	0			831	131,791	131,791
1985	32,264	57,672	0			808	90,744	90,744
1986	34,468	47,255	0			1,535	83,258	83,258
1987	82,371 [j]	[k]		2,523		1,292	86,186	86,186

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Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales [e]	Sport Fish [f]	Yukon River Total	Yukon Area Total [g]
1988	67,830	99,907	0	1,250	13,720	2,420	185,127	186,976
1989	40,711	85,493	0	872	3,945	1,811	132,832	133,045
1990	43,460	41,032	3,255	1,181	2,650	1,947	93,525	93,525
1991	37,388	103,180	3,506	0	2,971	2,775	149,820	149,820
1992	51,921	6,556 [l]	1,423	0	1,629	1,666	63,195	63,254
1993	15,772	[k]		0	0	897	16,669	16,709
1994	41,694	120	4,331	0	0	1,893	48,038	48,119
1995	28,225	45,939	1,074	417	193	1,278	77,126	77,278
1996	30,312	52,643	3,339	198	1,728	1,727	89,947	90,039
1997	23,945	35,320	0	350	498	1,408	61,521	61,521
1998	17,772	1	0	9	0	758	18,540	18,889
1999	20,823	1,601	0	147	236	609	23,416	23,484
2000	14,717	[k]		0	0	554	15,271	15,493
2001	21,620	[k]		34	0	1,248	22,902	23,404
2002	15,241	[k]		20	0	1,092	16,353	16,601
2003	23,580	25,243	0	549	0	1,477	50,849	51,141
2004	20,732	20,232	0	233	0	1,623	42,820	42,883
2005	26,971	58,311	0	107	0	627	86,016	86,295
2006	19,371 [m]	64,942	0	279 [m]	0	1,000	85,592	85,927 [m]
2007	19,514 [m]	44,575	0	135 [m]	0	597	64,821	64,931 [m]
2008	16,739	35,691	0	50	0	341	52,821	52,937
2009	15,760	8,026	0	70	0	964	24,820	25,066
2010	12,921 [m]	3,750	0	1,062 [m]	0	944	18,677	18,801
2011	12,289 [m]	76,303	0	232 [m]	0	769 [n]	89,593	89,648 [m]

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Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales [e]	Sport Fish [f]	Yukon River Total	Yukon Area Total [g]
Average								
2006-2010	16,861	31,397	0	319	0	769	49,346	49,532
2001-2010	19,245	32,596 [o]	0	254	0	991	46,567	46,799
1961-2010	23,131	28,581 [o]	376	395	1,199	1,035	50,638	50,749

[a] Includes test fish harvest and commercial retained fish (not sold) that were utilized for subsistence. Does not include harvest from the Coastal District communities of Scammon Bay and Hooper Bay.

[b] Includes 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). Includes ADF&G test fish prior to 1988. Beginning in 1999 commercial harvest may include some commercial related harvest (see footnote c).

[c] Includes an estimate of number of salmon harvested for the commercial production of salmon roe and the carcasses used for subsistence.

[d] Prior to 1987, and 1991, 1992 and 1994 personal use was considered part of subsistence.

[e] Test fish sales is the number of salmon sold by ADF&G test fisheries.

[f] The majority of the sport-fish harvest is taken in the Tanana River drainage (Brase 2009 and Burr 2009).

[g] Yukon Area includes harvest from the Coastal District communities of Scammon Bay and Hooper Bay (1978, 1987-89 and 1992-2010).

[h] Catches estimated because harvests of species other than Chinook salmon were not differentiated.

[i] Minimum estimates from 1961-1978 because subsistence surveys were conducted prior to the end of the fishing season.

[j] Includes an estimated 5,015 and 31,276 coho salmon illegally sold in Districts 5 and 6 (Tanana River), respectively.

[k] Commercial fishery was not conducted.

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

[m] Data are preliminary.

[n] Data are unavailable at this time. Estimated based on the previous 5-year average, personal use excluding 2010.

[o] Averages do not include data from years where no commercial fishery was conducted.

Appendix B6.–Alaskan and Canadian total utilization of Yukon River Chinook and fall chum salmon, 1961–2011.

	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	76,705	82,705	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	320,120	353,685
1989	17,944	157,616	175,560	23,020	522,146	545,166
1990	19,227	149,433	168,660	33,622	318,642	352,264
1991	20,607	154,651	175,258	35,418	403,678	439,096
1992	17,903	168,191	186,094	20,815	128,031 [e]	148,846
1993	16,611	160,289	176,900	14,090	76,925 [d]	91,015
1994	21,198	170,829	192,027	38,008	131,217	169,225
1995	20,884	177,663	198,547	45,600	415,547	461,147
1996	19,612	139,284	158,896	24,354	236,569	260,923
1997	16,528	174,886	191,414	15,600	154,479	170,079
1998	5,937	99,369	105,306	7,954	62,869	70,823
1999	12,468	124,316	136,784	19,636	111,539	131,175

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Year	Chinook			Fall Chum		
	Canada [a]	Alaska [b,c]	Total	Canada [a]	Alaska [b,c]	Total
2000	4,879	45,307	50,186	9,246	19,307 [d]	28,553
2001	10,144	53,738 [f]	63,882	9,872	35,154 [d]	45,026
2002	9,258	67,888	77,146	8,092	19,393 [d]	27,485
2003	9,619	99,150	108,769	10,905	68,174	79,079
2004	11,238	112,332	123,570	9,750	66,546	76,296
2005	11,371	85,521	96,892	18,572	271,846	290,418
2006	9,072	95,184 [g]	104,256	11,796	250,327 [g]	270,486
2007	5,094	89,555 [g]	94,649	13,830	191,837 [g]	205,667
2008	3,713	48,870	52,583	9,566	208,649	217,983
2009	4,758	34,206	38,964	2,011	91,915	93,319
2010	2,706	53,792 [g]	56,498	5,787	74,218 [g]	78,427
2011 [g]	4,884	41,071	45,877	8,163	320,863	326,411
Average						
2006-2010	5,069	64,321	69,390	8,598	163,389	173,176
2001-2010	7,697	74,024	81,721	10,018	127,806	138,419
1961-2010	11,450	125,728	137,178	17,607	241,173	258,899

Note: Canadian managers do not refer to chum as fall chum salmon since they only have one run.

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

[b] Catch in number of salmon. Includes estimated number of salmon harvested for the commercial production of salmon roe (see Bergstrom et al. 1992: 1990 Yukon Area AMR).

[c] Commercial, subsistence, personal-use, test fish, and sport catches combined. Does not include the subsistence harvest from the Coastal District communities of Hooper Bay and Scammon Bay.

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

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

[f] No commercial fishery was conducted during the summer season.

[g] Data are preliminary.

Appendix B7.–Canadian catch of Yukon River Chinook salmon, 1961–2011.

	Mainstem Yukon River Harvest							Porcupine River Aboriginal Fishery	Total Canadian
Year	Commercial	Domestic	Aboriginal Fishery	Sport [a]	Test Fishery	Combined Non-Commercial	Total	Harvest	Harvest
1961	3,446		9,300			9,300	12,746	500	13,246
1962	4,037		9,300			9,300	13,337	600	13,937
1963	2,283		7,750			7,750	10,033	44	10,077
1964	3,208		4,124			4,124	7,332	76	7,408
1965	2,265		3,021			3,021	5,286	94	5,380
1966	1,942		2,445			2,445	4,387	65	4,452
1967	2,187		2,920			2,920	5,107	43	5,150
1968	2,212		2,800			2,800	5,012	30	5,042
1969	1,640		957			957	2,597	27	2,624
1970	2,611		2,044			2,044	4,655	8	4,663
1971	3,178		3,260			3,260	6,438	9	6,447
1972	1,769		3,960			3,960	5,729		5,729
1973	2,199		2,319			2,319	4,518	4	4,522
1974	1,808	406	3,342			3,748	5,556	75	5,631
1975	3,000	400	2,500			2,900	5,900	100	6,000
1976	3,500	500	1,000			1,500	5,000	25	5,025
1977	4,720	531	2,247			2,778	7,498	29	7,527
1978	2,975	421	2,485			2,906	5,881		5,881
1979	6,175	1,200	3,000			4,200	10,375		10,375
1980	9,500	3,500	7,546	300		11,346	20,846	2,000	22,846
1981	8,593	237	8,879	300		9,416	18,009	100	18,109
1982	8,640	435	7,433	300		8,168	16,808	400	17,208
1983	13,027	400	5,025	300		5,725	18,752	200	18,952
1984	9,885	260	5,850	300		6,410	16,295	500	16,795
1985	12,573	478	5,800	300		6,578	19,151	150	19,301
1986	10,797	342	8,625	300		9,267	20,064	300	20,364
1987	10,864	330	6,069	300		6,699	17,563	51	17,614
1988	13,217	282	7,178	650		8,110	21,327	100	21,427
1989	9,789	400	6,930	300		7,630	17,419	525	17,944
1990	11,324	247	7,109	300		7,656	18,980	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

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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		
1994	12,028	373	8,069	300		8,742	20,770	428	21,198
1995	11,146	300	7,942	700		8,942	20,088	796	20,884
1996	10,164	141	8,451	790		9,382	19,546	66	19,612
1997	5,311	288	8,888	1,230		10,406	15,717	811	16,528
1998	390	24	4,687		737	5,448	5,838	99	5,937
1999	3,160	213	8,804	177		9,194	12,354	114	12,468
2000 [b]			4,068		761	4,829	4,829	50	4,879
2001	1,351	89	7,421	146	767	8,423	9,769	370	10,144
2002	708	59	7,139	128	1,036	8,362	9,069	188	9,258
2003	2,672	115	6,121	275	263	6,774	9,446	173	9,619
2004	3,785	88	6,483	423	167	7,161	10,946	292	11,238
2005	4,066	99	6,376	436		6,911	10,977	394	11,371
2006	2,332	63	5,757	606		6,426	8,758	314	9,072
2007			4,175	2	617	4,794	4,794	300	5,094
2008	1		2,885		513	3,398	3,399	27	3,426
2009	364	17	3,791	125		3,933	4,297	461	4,758
2010 [c,d]			2,455 [e]			2,455	2,455	250	2,705
2011 [c,d]	4		4,550 [e]	40		4,590	4,594	290	4,884
Average									
1961-2010	5,595	393	5,393	366	608	5,948	11,207	252	11,444
2001-2010	2,183 [f]	76	5,422	268	589	6,101	7,628	257	7,886
2006-2010	2,254 [f]	60	4,597	292	565	5,092	6,445	299	6,744

[a] Sport fish harvest unknown before 1980.

[b] A test fishery and aboriginal fishery took place, but all other fisheries were closed.

[c] An aboriginal fishery took place, but all other fisheries were closed.

[d] Data are preliminary.

[e] Adjusted to account for underreporting.

[f] 2007, 2008 and 2010 were not included in the average.

[g] Fishery was closed, 1 fish mistakenly caught.

Appendix B8.–Canadian catch of Yukon River fall chum salmon, 1961–2011.

	Mainstem Yukon River Harvest						Porcupine River	Total
				Aboriginal	Combined		Aboriginal	Canadian
Year	Commercial	Domestic	Test	Fishery	Non-Commercial [c]	Total [c]	Fishery Harvest	Harvest
1961	3,276			3,800	3,800	7,076	2,000	9,076
1962	936			6,500	6,500	7,436	2,000	9,436
1963	2,196			5,500	5,500	7,696	20,000	27,696
1964	1,929			4,200	4,200	6,129	6,058	12,187
1965	2,071			2,183	2,183	4,254	7,535	11,789
1966	3,157			1,430	1,430	4,587	8,605	13,192
1967	3,343			1,850	1,850	5,193	11,768	16,961
1968	453			1,180	1,180	1,633	10,000	11,633
1969	2,279			2,120	2,120	4,399	3,377	7,776
1970	2,479			612	612	3,091	620	3,711
1971	1,761			150	150	1,911	15,000	16,911
1972	2,532				0	2,532	5,000	7,532
1973	2,806			1,129	1,129	3,935	6,200	10,135
1974	2,544	466		1,636	2,102	4,646	7,000	11,646
1975	2,500	4,600		2,500	7,100	9,600	11,000	20,600
1976	1,000	1,000		100	1,100	2,100	3,100	5,200
1977	3,990	1,499		1,430	2,929	6,919	5,560	12,479
1978	3,356	728		482	1,210	4,566	5,000	9,566
1979	9,084	2,000		11,000	13,000	22,084		22,084
1980	9,000	4,000		3,218	7,218	16,218	6,000	22,218
1981	15,260	1,611		2,410	4,021	19,281	3,000	22,281
1982	11,312	683		3,096	3,779	15,091	1,000	16,091
1983	25,990	300		1,200	1,500	27,490	2,000	29,490
1984	22,932	535		1,800	2,335	25,267	4,000	29,267
1985	35,746	279		1,740	2,019	37,765	3,500	41,265
1986	11,464	222		2,200	2,422	13,886	657	14,543
1987	40,591	132		3,622	3,754	44,345	135	44,480
1988	30,263	349		1,882	2,231	32,494	1,071	33,565
1989	17,549	100		2,462	2,562	20,111	2,909	23,020
1990	27,537	0		3,675	3,675	31,212	2,410	33,622
1991	31,404	0		2,438	2,438	33,842	1,576	35,418
1992	18,576	0		304	304	18,880	1,935	20,815
1993	7,762	0		4,660	4,660	12,422	1,668	14,090
1994	30,035	0		5,319	5,319	35,354	2,654	38,008

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	Mainstem Yukon River Harvest						Porcupine River	Total
Year	Commercial	Domestic	Test	Aboriginal Fishery	Combined Non-Commercial [c]	Total [c]	Aboriginal Fishery Harvest	Canadian Harvest
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		1,238	1,238	9,306	6,294	15,600
1998[a]				1,795	1,795	1,795	6,159	7,954
1999	10,402	0		3,234	3,234	13,636	6,000	19,636
2000	1,319	0		2,927	2,927	4,246	5,000	9,246
2001	2,198	3	1 [b]	3,077	3,080	5,278	4,594	9,872
2002	3,065	0	2,756 [b]	3,167	3,167	6,232	1,860	8,092
2003	9,030	0	990 [b]	1,493	1,943	10,523	382	10,905
2004	7,365	0	995 [b]	2,180	2,180	9,545	205	9,750
2005	11,931	13		2,035	2,048	13,979	4,593	18,572
2006	4,096	0		2,521	2,521	6,617	5,179	11,796
2007	7,109	0	3,765 [b]	2,221	2,221	9,330	4,500	13,830
2008	4,062	0	[f]	2,068	2,068	6,130	3,436	9,566
2009	293	0		820	820	1,113	898	2,011
2010[c]	2,186	0		1,523[e]	1,523	3,709	500	4,209
2011	5,312	0		1,000[e]	1,000	6,312	1,851	8,163
Average								
1961-2010	10, 558	514	2,127	2,459	2,780	13,126	4,540	17,576
2001-2010	5,134	2	1,701	2,111	2,112	7,246	2,615	9,860
2006-2010	3,549	-	3,765	1,831	1,831	5,380	2,903	8,282

[a] A test fishery and aboriginal fisheries took place, but all other fisheries were closed.
[b] The chum salmon test fishery is a live-release test fishery.
[c] Test fishery was not included in totals as it was live-release.
[d] Data are preliminary.
[e] Adjusted to account for underreporting.
[f] Test fishery was in operation from 2001 to 2007.

Appendix B9.–Chinook salmon aerial survey indices for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1961–2011.

	Andreafsky River				Anvik River				Nulato River							
Year	East Fork		West Fork		Drainagewide Total		Index Area		North Fork		South Fork		Both Forks		Gisasa River	
1961	1,003				1,226				376	[a]	167		543		266	[a]
1962	675	[a]	762	[a]												
1963																
1964	867		705													
1965			355	[a]	650	[a]										
1966	361		303		638											
1967			276	[a]	336	[a]										
1968	380		383		310	[a]										
1969	231	[a]	231	[a]	296	[a]										
1970	665		574	[a]	368											
1971	1,904		1,682													
1972	798		582	[a]	1,198											
1973	825		788		613											
1974			285		471	[a]			55	[a]	23	[a]	78	[a]	161	
1975	993		301		730				123		81		204		385	
1976	818		643		1,053				471		177		648		332	
1977	2,008		1,499		1,371				286		201		487		255	
1978	2,487		1,062		1,324				498		422		920		45	[a]
1979	1,180		1,134		1,484				1,093		414		1,507		484	
1980	958	[a]	1,500		1,330		1,192		954	[a]	369	[a]	1,323	[a]	951	
1981	2,146	[a]	231	[a]	807	[a]	577	[a]			791		791			
1982	1,274		851												421	
1983					653	[a]	376	[a]	526		480		1,006		572	
1984	1,573	[a]	1,993		641	[a]	574	[a]								
1985	1,617		2,248		1,051		720		1,600		1,180		2,780		735	
1986	1,954		3,158		1,118		918		1,452		1,522		2,974		1,346	
1987	1,608		3,281		1,174		879		1,145		493		1,638		731	
1988	1,020		1,448		1,805		1,449		1,061		714		1,775		797	
1989	1,399		1,089		442	[a]	212	[a]								
1990	2,503		1,545		2,347		1,595		568	[a]	430	[a]	998	[a]	884	[a]
1991	1,938		2,544		875	[a]	625	[a]	767		1,253		2,020		1,690	
1992	1,030	[a]	2,002	[a]	1,536		931		348		231		579		910	
1993	5,855		2,765		1,720		1,526		1,844		1,181		3,025		1,573	
1994	300	[a]	213	[a]			913	[a]	843		952		1,795		2,775	
1995	1,635		1,108		1,996		1,147		968		681		1,649		410	
1996			624		839		709				100		100			
1997	1,140		1,510		3,979		2,690								144	[a]
1998	1,027		1,249	[a]	709	[a]	648	[a]	507		546		1,053		889	[a]

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	Andreafsky River		Anvik River		Nulato River			Gisasa River
Year	East Fork	West Fork	Drainagewide Total	Index Area	North Fork	South Fork	Both Forks	
1999		[b] 870 [b]		[b] 950 [b]		[b]	[b]	
2000	1,018	427	1,721	1,394		[b]	[b]	[b]
2001	1,059	565	1,420	1,177	1,116	768	1,884 [c]	1,298 [b]
2002	1,447	917	1,713	1,329	687	897	1,584	506
2003	1,116 [b]	1,578 [b]	1,100 [b]	973 [b]		[b]	[b]	
2004	2,879	1,317	3,679	3,304	856	465	1,321	731
2005	1,715	1,492	2,421	1,922	323	230	553	958
2006	591 [b]	824	1,876	1,776 [d]	1,292	-	1,292	843
2007	1,758	976	1,529	1,497	2,583	-	2,583	593
2008	278 [b]	262 [b]	992 [b]	827 [b]	922	-	922	487
2009	84 [b]	1,678	832	590	2,260	-	2,260	515
2010	537	858	974	721	356	355	711	264
2011	620	1,173	642	501	788	613	1,401	906
SEG	[e] 960-1,900	640-1,600		1,100-1,700			940-1,900	
Average								
1990-2010	1,469	1,206	1,698	1,297	1,015	622	1,431	910
2001-2010	1,146	1,047	1,654	1,412	1,155	543	1,457	688
2006-2010	650	920	1241	1082	1483	355	1554	540

Note: Aerial survey counts are peak counts only. Survey rating was fair or good unless otherwise noted. Anvik River Index Area includes mainstem counts between Yellow River and McDonald Creek.

[a] Nulato River mainstem aerial survey counts below the forks are included with the North Fork.

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

[c] In 2001, the Nulato River escapement goal was established for both forks combined.

[d] Index area includes counts from Beaver Creek to McDonald Creek.

[e] Sustainable Escapement Goal (SEG).

Appendix B10.–Chinook salmon escapement counts for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1986–2011.

	Andreafsky River		Nulato River Tower	Henshaw Creek Weir		Gisasa River Weir		Chena River		Salcha River	
	No.	%	No.	No.	%	No.	%	No.	%	No.	%
Year	Fish	Fem.	Fish	Fish	Fem.	Fish	Fem.	Fish	Fem. [a]	Fish	Fem. [a]
1986	1,530	23.3 [b]						9,065 [c]	25.4		
1987	2,011	56.1 [b]						6,404 [c]	48.2	4,771 [c]	52.0
1988	1,339	38.7 [b]						3,346 [c]	33.9	4,562 [c]	45.3
1989		13.6 [d]						2,666 [c]	45.3	3,294 [c]	43.8
1990		41.6 [d]						5,603 [c]	36.3	10,728 [c]	36.2
1991		33.9 [d]						3,025 [c]	31.5	5,608 [c]	40.7
1992		21.2 [d]						5,230 [c]	21.6	7,862 [c]	36.0
1993		29.9 [d]						12,241 [b]	11.7	10,007 [b]	22.9
1994	7,801	35.5 [e,f]	1,795 [f]			2,888	[f]	11,877 [b]	32.4	18,399 [b]	40.4
1995	5,841	43.7 [e]	1,412			4,023	46.0	9,680 [c]	51.7	13,643 [b]	48.4
1996	2,955	41.9 [e]	756			1,991	19.5	7,153 [c]	26.8	7,570 [b]	26.2
1997	3,186	36.8 [e]	4,766			3,764	26.0	13,390 [c]	25.6	18,514 [b]	41.8
1998	4,034	29.0 [e]	1,536			2,414	16.2	4,745 [b]	28.4	5,027 [b]	26.1
1999	3,444	28.6 [e]	1,932			2,644	26.4	6,485 [b]	45.6	9,198 [b]	44.6
2000	1,609	54.3 [e]	908	244	29.7	2,089	34.4	4,694 [c]	21.7	4,595 [b]	34.3
2001		[f]	[f]	1,103	36.3	3,052	49.2 [f]	9,696 [b]	30.1	13,328 [b]	32.1
2002	4,123	21.1 [e]	2,696	649	30.8	2,025	20.7	6,967 [c]	27.3	9,000 [b,g]	29.8
2003	4,336	45.3 [e]	1,716 [e]	763	38.4	1,901	38.1	11,100 [b,h]	31.8	15,500 [b,g]	36.6
2004	8,045	37.3	[i]	1,248	21.3	1,774	30.1	9,696 [b]	43.9	15,761 [b]	54.2
2005	2,239	50.2	[i]	1,059	41.4	3,111	34.0	[b,e]	30.6	5,988 [b]	47.5
2006	6,463	42.6	[i]		[e]	3,030	28.2	2,936 [b]	32.1	10,679 [b]	38.1
2007	4,504	44.7	[i]	740	24.9	1,425	39.0	3,806 [b]	27.3	6,425 [b]	31.0
2008	4,242	34.8	[i]	766	27.7	1,735	16.2	3,208 [b]	29.0	5,415 [b,g]	33.7
2009	3,004	46.0	[i]	1,637	49.0	1,955	29.3	5,253 [b]	40.0	12,774 [b]	33.9
2010	2,413	48.6	[i]	857	49.6	1,516	29.0	2,382 [b]	20.6	6,135 [b]	26.6
2011	5,213	20.2	[i]	1,796	33.9	2,692	19.5	[j]	22.7 [k]	[j]	42.1
BEG [l]								2,800-5,700		3,300-6,500	

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	Andreafsky River		Nulato River Tower	Henshaw Creek Weir		Gisasa River Weir		Chena River		Salcha River	
Year	No. Fish	% Fem.	No. Fish	No. Fish	% Fem.	No. Fish	% Fem.	No. Fish	% Fem. [a]	No. Fish	% Fem. [a]
Average											
1990-2010	4,321	38.4	1,946	907	34.9	2,446	30.1	6,956	30.8	10,103	36.2
2001-2010	4,374	41.2	2,206	980	35.5	2,152	31.4	6,110	31.3	10,101	36.4
2006-2010	4,125	43.3	-	1,000	37.8	1,932	28.3	3,517	29.8	8,286	32.7

[a] In years when only carcass surveys were conducted, proportions of males and females were adjusted based on the average of ratios of unbiased estimates from mark–recapture experiments to estimates from carcass samples over those years when mark–recapture studies were conducted. In years when mark–recapture experiments were conducted, proportions of males and females were estimated as the ratio of the abundance estimate of each gender to the abundance estimate of all fish.

[b] Tower counts.

[c] Mark–recapture population estimate.

[d] Counting project terminated due to budget constraints.

[e] Weir counts.

[f] No estimate due to extreme high water conditions.

[g] Estimate includes an expansion for missed counting days based on average run timing. Minimum documented abundance from successful counting days were 4,644 in 2002, 11,758 in 2003, and 5,415 in 2008.

[h] Estimate includes an expansion for missed counting days based on average run timing. Minimum documented abundance from successful counting days was 8,739 (SE=653) fish.

[i] Project did not operate.

[j] No estimate due to high water conditions that prevented counting for much of the season.

[k] Adjusted % female based upon 8 years of paired electrofishing and carcass survey data, which indicated % female from carcass surveys were biased high.

[l] Biological Escapement Goals (BEG) established by the Alaska Board of Fisheries, January 2001.

Appendix B11.–Chinook salmon estimated U.S.-Canada border passage, total Canadian harvest, and spawning escapement in Canada, 1961–2011.

	Canadian Mainstem			
Year	Border Passage Estimate		Harvest	Spawning Escapement Estimate[e]
1982	60,346	[a]	16,808	43,538
1983	63,227	[a]	18,752	44,475
1984	66,300	[a]	16,295	50,005
1985	59,586	[a]	19,151	40,435
1986	61,489	[a]	20,064	41,425
1987	58,870	[a]	17,563	41,307
1988	61,026	[a]	21,327	39,699
1989	77,718	[a]	17,419	60,299
1990	78,192	[a]	18,980	59,212
1991	63,172	[a]	20,444	42,728
1992	56,958	[a]	17,803	39,155
1993	52,713	[a]	16,469	36,244
1994	77,219	[a]	20,770	56,449
1995	70,761	[a]	20,088	50,673
1996	93,606	[a]	19,546	74,060
1997	69,538	[a]	15,717	53,821
1998	41,335	[a]	5,838	35,497
1999	49,538	[a]	12,354	37,184
2000	30,699	[a]	4,829	25,870
2001	62,333	[a]	9,769	52,564
2002	51,428	[b,c]	9,069	42,359
2003	90,037	[b,c]	9,443	80,594
2004	59,415	[b,c]	10,946	48,469
2005	78,962	[c,d]	10,977	67,985
2006	71,388	[c,d]	8,758	62,630
2007	39,698	[c,d]	4,794	34,904
2008	37,282	[d]	3,399	33,883
2009	69,575	[d]	4,297	65,278
2010	34,465	[d]	2,455	32,010
2011	50,901	[d]	4,594	46,307
Averages				
1982-2011	61,259		13,291	47,968
2002-2011	58,314		6,873	51,441
2007-2011	46,382		3,908	42,474

Appendix B12.–Chinook salmon escapement counts for selected spawning areas in the Canadian portion of the Yukon River drainage, 1961–2011.

Year	Tincup Creek	Tatchun Creek	Little Salmon River	Big Salmon River	Nisutlin River	Ross River	Wolf River	Blind Creek Weir	Big Salmon Sonar	Klondike River Sonar	Chandindu River Weir	Whitehorse Fishway Count	Whitehorse Fishway Percent Hatchery Contribution
1961												1,068	0
1962												1,500	0
1963												483	0
1964												595	0
1965												903	0
1966		7 [g]										563	0
1967												533	0
1968			173 [g]	857 [c,g]	407 [g]	104 [g]						414	0
1969			120	286	105							334	0
1970		100		670 [c]	615		71 [g]					625	0
1971		130	275	275 [c]	650		750 [j]					856	0
1972		80	126	415	237		13 [j]					391	0
1973		99	27 [g]	75 [g]	36 [g]							224	0
1974		192		70 [g]	48 [g]							273	0
1975		175		153 [g]	249		40 [g]					313	0
1976		52		86 [g]	102							121	0
1977		150	408	316 [g]	77							277	0
1978		200	330	524	375							725	0
1979		150	489 [g]	632	713		183 [k]					1,184	0
1980		222	286 [g]	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
1983	100	264	101 [g]	540	701	43 [g,h]	95					905	0
1984	150	153	434	1,044	832	151 [g]	124					1,042	0
1985	210	190	255	801	409	23 [g]	110					508	0
1986	228	155	54 [g]	745	459 [k]	72 [g,i]	109					557	0
1987	100	159	468	891	183	180 [g]	35					327	0
1988	204	152	368	765	267	242	66					405	0

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Year	Tincup Creek	Tatchun Creek	Little Salmon River	Big Salmon River	Nisutlin River	Ross River	Wolf River	Blind Creek Weir	Big Salmon Sonar	Klondike River Sonar	Chandindu River Weir	Whitehorse Fishway Count	Whitehorse Fishway Percent Hatchery Contribution
1989	88	100	862	1,662	695	433 [i]	146					549	19
1990	83	643	665	1,806	652	457 [g]	188					1,407	24
1991			326	1,040		250	201 [r]					1,266 [k]	51 [k]
1992	73	106	494	617	241	423	110 [r]					758 [k]	84 [k]
1993		183	184	572	339	400	168 [r]					668 [k]	73 [k]
1994	101 [g]	477	726	1,764	389	506	393 [r]					1,577 [k]	54 [k]
1995	121	397	781	1,314	274	253 [g]	229 [r]					2,103	57
1996	150	423	1,150	2,565	719	102 [g]	705 [r]					2,958	35
1997	193	1,198	1,025	1,345	277		322 [r]	957				2,084	24
1998	53	405	361	523	145		66	373			132	777	95
1999		252	495	353	330		131	892			239	1,118	74
2000	19 [l]	276 [m]	46	113	20		32				4 [n]	677	69
2001	39 [l]		1,035	1,020	481		154				129 [o]	988	36
2002			526	1,149	280		84				[p]	605	39
2003			1,658	3,075	687		292	1,115			185 [q]	1,443	70
2004			1,140	762	330		226	792				1,989	76
2005			1,519	952	807	363	260	525	5,584			2,632	57
2006			1,381	1,140	601		114	677	7,308			1,720	47
2007			451	601	137		54	304	4,450			427	56
2008			93	303			22	276	1,329			399	54
2009			821	1,827	497		134	716	9,261	4,725		828	47
2010			63 [g]	656	288		94	270	3,817	803		672	49
2011 [r]			38 [g]	405			81	360	5,156	1,181		1,534	48
Averages													
1961-2011	120	235	521	894	435	284	180	605	5,272	2,236		936	24
2002-2011			769	1,087	453	363	136	559	5,272	2,236		1,225	54
2007-2011			293	758	307		77	385	4,803	2,236		772	51

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Note: Canadian mainstem border passage and spawning escapement estimates are based on a 3-Area escapement index, radiotelemetry (local) (2002–2004), and Eagle Sonar (2005–2007).

[a] Weir count unless otherwise indicated.

[b] Aerial survey, unless otherwise indicated.

[c] Index area includes Tatchun Creek to Fort Selkirk.

[d] Index area includes Duke River to end of spawning sloughs below Swede Johnston Creek.

[e] Index area includes Boswell Creek area (5 km below to 5 km above confluence).

[f] Excludes Fishing Branch River escapement (estimated border passage minus Canadian mainstem harvest).

[g] Total escapement estimated using weir to aerial survey expansion factor of 2.72, unless otherwise indicated.

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

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

[j] Foot survey, unless otherwise indicated.

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

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

[m] Boat survey.

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

[o] 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.

[p] Incomplete count caused by late installation and/or early removal of project or high water events.

[q] 1999 to 2004 border passage estimates were revised using a stratified "SPAS" analysis.

[r] 2006 to present border passage estimate is based on sonar minus harvest from Eagle residents upstream of deployment.

[s] Mark–recapture border passage estimates include 217,810, 235,956, and 132,048 from 2006 to 2008 respectively, during transition to sonar.

[t] The 2008 estimate was based on mark–recapture estimate.

[u] Run timing was late and counts were expanded to represent the remainder of the run after the project was terminated for the season.

[v] The 2009 estimate was based on Eagle sonar.

[w] Data are preliminary.

[x] Escapement Objective (EO) based on US/Canada Treaty Obligations, some years stabilization or rebuilding goals are applied.

[y] Interim Management Escapement Goal (IMEG) established for 2008-2010 based on percentile method.

[z] Interim Management Escapement Goal (IMEG) established for 2010 based on brood table of Canadian origin mainstem stocks (1982 to 2003).

Appendix B13.–Summer chum salmon ground based escapement counts for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1973–2011.

	Andreafsky River					Anvik River		Rodo River		Kaltag Creek	Nulato River			
	East Fork			West Fork							South Fork		North Fork [a]	Mainstem
Year	Aerial	[b]	Sonar, Tower, or Weir Counts	Aerial	[b]	Tower & Aerial [c]	Sonar	Aerial	[b]	Tower	Aerial	[b]	Aerial [b]	Tower
1973	10,149	[d]		51,835		249,015								
1974	3,215	[d]		33,578		411,133		16,137			29,016		29,334	
1975	223,485			235,954		900,967		25,335			51,215		87,280	
1976	105,347			118,420		511,475		38,258			9,230	[d]	30,771	
1977	112,722			63,120		358,771		16,118			11,385		58,275	
1978	127,050			57,321		307,270		17,845			12,821		41,659	
1979	66,471			43,391		-	277,712	-			1,506		35,598	
1980	36,823	[d]		114,759		-	482,121	-			3,702	[d]	11,244 [d]	
1981	81,555		147,312 [e]	-		-	1,479,582	-			14,348		-	
1982	7,501	[d]	180,078 [e]	7,267	[d]	-	444,581	-			-		-	
1983	-		110,608 [e]	-		-	362,912	-			1,263	[d]	19,749	
1984	95,200	[d]	70,125 [e]	238,565		-	891,028	-			-		-	
1985	66,146		-	52,750		-	1,080,243	24,576			10,494		19,344	
1986	83,931		167,614 [f]	99,373		-	1,085,750	-			16,848		47,417	
1987	6,687	[d]	45,221 [f]	35,535		-	455,876	-			4,094		7,163	
1988	43,056		68,937 [f]	45,432		-	1,125,449	13,872			15,132		26,951	
1989	21,460	[d]	-	-		-	636,906	-			-		-	
1990	11,519	[d]	-	20,426	[d]	-	403,627	1,941	[d]		3,196	[d,g]	1,419 [d]	
1991	31,886		-	46,657		-	847,772	3,977			13,150		12,491	
1992	11,308	[d]	-	37,808	[d]	-	775,626	4,465			5,322		12,358	
1993	10,935	[d]	-	9,111	[d]	-	517,409	7,867			5,486		7,698	
1994	-		200,981 [h,i]	-		-	1,124,689	-		47,295	-		-	148,762
1995	-		172,148 [h]	-		-	1,339,418	12,849		77,193	10,875		29,949	236,890
1996	-		108,450 [h]	-		-	933,240	4,380		51,269	8,490	[d,h]	-	129,694

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	Andreafsky River				Anvik River		Rodo River		Kaltag Creek	Nulato River		
	East Fork		West Fork							South Fork	North Fork [a]	Mainstem
Year	Aerial [b]	Sonar, Tower, or Weir Counts	Aerial [b]		Tower & Aerial [c]	Sonar	Aerial [b]		Tower	Aerial [b]	Aerial [b]	Tower
1997	-	51,139 [h]	-		-	605,752	2,775 [d]		48,018	-	-	157,975
1998	-	67,720 [h]	-		-	487,301	-		8,113	-	-	49,140
1999	-	32,587 [h]	-		-	437,356	-		5,339	-	-	30,076
2000	2,094 [d]	24,785 [h]	18,989 [d]		-	196,349	-		6,727	-	-	24,308
2001	-	2,134 [h,i]	-		-	224,058	-		- [j]	-	-	-
2002	-	44,194 [h]	-		-	459,058	-		13,583	-	-	72,232
2003	-	22,461 [h]	-		-	256,920	-		3,056	-	-	19,590
2004	-	64,883 [h]	-		-	365,353	-		5,247	-	-	-
2005	-	20,127	-		-	525,391	-		22,093	-	-	-
2006	3,100 [d]	102,260	617		-	605,485	-		- [j]	7,772	11,658	-
2007	-	69,642	-		-	460,121	-		- [j]	21,825	15,277	-
2008	9,300	57,259	25,850		-	374,928	-		- [j]	12,070	10,715	-
2009	736	8,770	3,877		-	193,099	621		- [j]	2,120	567	-
2010	1,982	72,839	24,380		-	396,173	-		- [j]	1,891	1,038	-
2011	12,889	100,473	10,020		-	642,527	6,011		- [j]	9,454	8,493	-
E. O.	>40 [l]		>116 [m]			350-700 [l]					>53 [n]	

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Year	Henshaw Creek	Gisasa River		Hogatza River			Tozitna River	Chena River			Salcha River		
				Clear & Caribou Cr.		Clear Creek							
	Weir	Aerial	Weir	Aerial		Tower	Weir and Aerial	Aerial		Tower	Aerial		Tower
1973								79 [d]			290		
1974		22,022					1,823	4,349			3,510		
1975		56,904		22,355			3,512	1,670			7,573		
1976		21,342		20,744			725 [d]	685			6,484		
1977		2,204 [d]		10,734			761 [d]	610			677 [d]		
1978		9,280 [d]		5,102			2,262	1,609			5,405		
1979		10,962		14,221			-	1,025 [d]			3,060		
1980		10,388		19,786			580	338			4,140		
1981		-		-			-	3,500			8,500		
1982		334 [d]		4,984 [d]			874	1,509			3,756		
1983		2,356 [d]		28,141			1,604	1,097			716 [d]		
1984		-		184 [d]			-	1,861			9,810		
1985		13,232		22,566			1,030	1,005			3,178		
1986		12,114		-			1,778	1,509			8,028		
1987		2,123		5,669 [d]			-	333			3,657		
1988		9,284		6,890			2,983	432			2,889 [d]		
1989		-		-			-	714 [d]			1,574 [d]		
1990		450 [d]		2,177 [d]			36	245 [d]			450 [d]		
1991		7,003		9,947			93	115 [d]			154 [d]		
1992		9,300		2,986			794	848 [d]			3,222		
1993		1,581		-			970	168		5,400	212		5,809
1994		6,827	51,116 [i]	8,247 [o]			-	1,137		9,984	4,916		39,450
1995		6,458	136,886	-		116,735	4,985	185 [d]		3,519 [i]	934 [d]		30,784
1996		-	158,752	27,090 [o]		100,912	2,310	2,061		12,810 [i]	9,722		74,827
1997		686 [d]	31,800	1,821 [d]		76,454	428 [d]	594 [d]		9,439 [i]	3,968 [d]		35,741
1998		-	21,142	120 [d,p]		212 [l]	7 [d]	24 [d]		5,901	370 [d]		17,289
1999		-	10,155	-		11,283	-	520		9,165	150		23,221

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	Henshaw Creek	Gisasa River		Hogatza River			Tozitna River	Chena River			Salcha River		
				Clear & Caribou Cr.		Clear Creek							
Year	Weir	Aerial [b]	Weir	Aerial [b]		Tower	Weir and Aerial [b]	Aerial [b]		Tower	Aerial [b]		Tower
2000	27,271	-	11,410	-		19,376	480	105		3,515	228		20,516
2001	35,031	-	17,946	-		3,674	12,527	2		4,773	-		14,900 [l]
2002	25,249	-	33,481	-		13,150	18,789	-		1,021 [i]	78		20,837 [l]
2003	22,556	-	25,999	-		6,159	8,487	-		573 [i]	-		-
2004	86,474	-	37,851	-		15,661	25,003	-		15,162 [i]	-		47,861
2005	237,481	-	172,259	-		26,420	39,700	219		2,928 [i]	4320		193,085
2006	-	1,000	261,305	-		29,166	22,629	469		35,109 [i]	152		111,869
2007	44,425	-	46,257	-		6,029 [q]	8,470	-		4,999	4	[d]	13,069
2008	97,281	20,470	36,938	-		- [j]	9,133	37		1,300 [i]	0	[d]	2,212 [i]
2009	156,201	1,060	25,904	3,981		- [j]	8,434	-		16,516	-		31,035 [r]
2010	105,398	1,096	47,669	840		- [j]	-	-		7,560	-		22,185 [r]
2011	248,247	13,228	95,796	3,665		- [j]	11,351		[d]	[s]		[d]	[s]
E. O.				>17 [t]							>3.5 [m]		

Note: Unless otherwise noted blank cells indicate years prior to the project being operational. Endash indicates years in which no information was collected.

[a] Includes mainstem counts below the confluence of the North and South Forks, unless otherwise noted.

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

[c] From 1972-1979 counting tower operated; escapement estimate listed is the tower counts plus expanded aerial survey counts below the tower (see Buklis 1982).

[d] Incomplete survey and/or poor survey timing or conditions resulted in minimal or inaccurate count..

[e] Sonar count.

[f] Tower count..

[g] Mainstem counts below the confluence of the North and South Forks of the Nulato River included in the South Fork counts.

[h] Weir count.

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

[j] Project did not operate.

[k] No counts due to incomplete operations.

[l] Biological Escapement Goals (in thousands of fish) established by the Alaska Board of Fisheries, Jan. 2010.

[m] Interim escapement objective (in thousands of fish).

[n] Interim escapement objective (in thousands of fish) for North Fork Nulato River only.

[o] BLM helicopter survey.

[p] Consists of Clear Creek only.

[q] Project operated as a video monitoring system.

[r] Data are preliminary.

[s] No estimates due to high water conditions that prevented counting for much of the season.

[t] Consists of Clear and Caribou Creeks interim escapement objectives (in thousands of fish) of 9,000 and 8,000, respectively.

Appendix B14.–Fall chum salmon abundance estimates or escapement estimates for selected spawning areas in Alaskan portions of the Yukon River Drainage, 1971–2011.

		Alaska							
		Tanana River Drainage						Upper Yukon River Drainage	
Year	Yukon River Mainstem Sonar Estimate	Toklat River [a]	Kantishna River Abundance Estimate [b]	Delta River [c]	Bluff Cabin Slough [d]	Upper Tanana River Abundance Estimate [e]	Tanana River Estimate [f]	Chandalar River [g]	Sheenjek River [h]
1971									
1972				5,384					
1973				10,469					
1974		41,798		5,915					89,966 [i]
1975		92,265		3,734 [j]					173,371 [i]
1976		52,891		6,312 [j]					26,354 [i]
1977		34,887		16,876 [j]					45,544 [i]
1978		37,001		11,136					32,449 [i]
1979		158,336		8,355					91,372 [i]
1980		26,346 [k]		5,137	3,190 [l]				28,933 [i]
1981		15,623		23,508	6,120 [l]				74,560 [m]
1982		3,624		4,235	1,156				31,421 [m]
1983		21,869		7,705	12,715				49,392 [m]
1984		16,758		12,411	4,017				27,130 [m]
1985		22,750		17,276 [j]	2,655 [l]				152,768 [m, n]
1986		17,976		6,703 [j]	3,458			59,313	84,207 [n, o]
1987		22,117		21,180	9,395			52,416	153,267 [n, o]
1988		13,436		18,024	4,481 [l]			33,619	45,206 [o]
1989		30,421		21,342 [j]	5,386 [l]			69,161	99,116 [o]
1990		34,739		8,992 [j]	1,632			78,631	77,750 [o]
1991		13,347		32,905 [j]	7,198				86,496 [p]
1992		14,070		8,893 [j]	3,615 [l]				78,808
1993		27,838		19,857	5,550 [l]				42,922
1994		76,057		23,777 [j]	2,277 [l]				150,565
1995	1,053,248	54,513 [k]		20,587	19,460	268,173	230,643	280,999	241,855

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Year	Yukon River Mainstem Sonar Estimate	Alaska: Tanana River Drainage: Toklat River [a]	Kantishna River Abundance Estimate [b]	Delta River [c]	Bluff Cabin Slough [d]	Upper Tanana River Abundance Estimate [e]	Tanana River Estimate [f]	Upper Yukon River Drainage: Chandalar River [f]	Sheenjek River [g]
1996		18,264		19,758 [j]	7,074 [l]	134,563	132,922	208,170	246,889
1997	506,621	14,511		7,705 [j]	5,707 [l]	71,661	88,641	199,874	80,423 [q]
1998	372,927	15,605		7,804 [j]	3,549 [l]	62,384	82,475	75,811	33,058
1999	379,493	4,551	27,199	16,534 [j]	7,037 [l]	97,843	109,309	88,662	14,229
2000	247,935	8,911	21,450	3,001 [j]	1,595	34,844	55,983	65,894	30,084 [r]
2001	376,182	6,007 [s]	22,992	8,103 [j]	1,808 [l]	96,556 [t]	116,012	110,971	53,932
2002	326,858	28,519	56,719	11,992 [j]	3,116	109,970	163,421	89,850	31,642
2003	889,778	21,492	87,359	22,582 [j]	10,600 [l]	193,418	263,302	214,416	44,047 [u]
2004	594,060	35,480	76,163	25,073 [j]	10,270 [l]	123,879	187,409	136,706	37,878
2005	1,813,589	17,779 [k]	107,719	28,132 [j]	11,964 [l]	337,755	372,758	496,484	561,863 [n, v, w]
2006	790,563		71,135	14,055 [j]		202,669	233,193	245,090	160,178 [n, v]
2007	684,011		81,843	18,610 [j]		320,811	357,016	228,056	65,435 [n, v]
2008	615,127			23,055 [j]	1,198 [l]		264,200	178,278 [x]	50,353 [n, v, x]
2009	240,449 [y]			13,492 [j]	2,900 [l]		159,828		54,126 [n, v, x]
2010	350,981			17,933 [j]	1,610 [l]		212,660	157,998	22,053
2011	698,762 [z]			23,639 [j]	2,655 [l]		270,846	295,335 [z]	97,976 [n, v, x, z]
Escapement [aa]	300,000	15,000 [ab]		6,000		46,000 [ac]	61,000	74,000	50,000
Objective	600,000	33,000		13,000		103,000	136,000	152,000	104,000
Average									
1971-2010	642,955 [ad]	31,243	61,398	14,322	5,543	158,040	189,361	153,520	91,071
2001-2010	715,683 [ad]	21,855	71,990	18,303	5,433	197,865	232,980	206,428	108,151
2006-2010	610,171 [ad]	-	76,489	17,429	1,903	261,740	245,380	202,356	70,429

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[a] 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.

[b] 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 4 fish wheels; 2 located 8 miles upstream of the mouth of the Toklat River (1999–2005) and one fish wheel on the Kantishna River (2000–2002, 2006–2007) and 2 fish wheels in 2003–2005.

[c] Estimates are a total spawner abundance, using migratory time density curves and stream life data, unless otherwise indicated.

[d] Foot survey, unless otherwise indicated.

[e] 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 (2 fish wheels in 1995) located just upstream of the Kantishna River and recaptures are collected from one fish wheel (2 fish wheels in 1995) located downstream from the village of Nenana.

[f] Tanana River abundance estimates prior to 1995 can be found in Eggers (2001) but are based on Upper Tanana plus Toklat River escapement. Estimates from 1995-1998 are based on the relationship of the Upper Tanana to the Kantishna river abundance estimates, and 2008-2011 are based on the relationship of the Tanana estimate (1995-2007) with the Delta River escapements. The harvests from the Tanana River fisheries are removed to estimate escapement.

[g] Single-beam sonar estimate for 1986 to 1990, split-beam sonar estimate 1995 to 2006. DIDSON in 2007 and 2008, project was aborted in 2009.

[h] Single-beam sonar estimate beginning in 1981, split-beam sonar estimate 2002 to 2004, DIDSON since 2005.

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

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

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

[l] Aerial survey count, unless otherwise indicated.

[m] Project started late, estimated escapements expanded for portion missed using average run timing curves based on Chandalar (1986-1990) and Sheenjek (1991-1993) rivers.

[n] Sonar counts include both banks in 1985-1987 and 2005-2009.

[o] Expanded estimates for period approximating second week August through fourth week September, using annual Chandalar River run timing data (1986-1990).

[p] Total abundance estimates are for the period approximating second week August through fourth week of September (1991 to present). Comparative escapement estimates before 1986 are considered more conservative; approximating the period end of August through September.

[q] Data interpolated due to high water from 29 August until 3 September 1997, during buildup to peak passage.

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

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

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

[u] Project ended on peak daily passages due to late run timing, estimate was expanded based on run timing (87%) at Rampart.

[v] In addition to the historical right bank count, the left bank was enumerated with DIDSON (right bank count for 2005-2009 was 266,963, 106,397, 39,548, 35,912, and 28,480 respectively, not including expansions by bank).

[w] Project ended while still counting >10,000 fish per day, estimate was expanded based on run timing (73%) at Rampart.

-continued-

[x] Run timing was late and counts were expanded to represent the remainder of the run after the project was terminated for the season.

[y] Pilot Station sonar project encountered record low water levels during the fall season causing difficulties with species apportionment and catchability. Fall chum salmon estimate is suspected of being conservative and should not be used in averages or run reconstructions.

[z] Data are preliminary.

[aa] Escapement Goal (EG) includes individual tributary BEGs and drainagewide SEG from 2010..

[ab] EG discontinued in 2010.

[ac] The BEG for the Tanana River as a whole is 61,000 to 136,000. However it includes the Toklat plus and the Upper Tanana which was broke out for comparison to the upper Tanana River abundance estimates.

[ad] Does not include 2009.

Appendix B15.–Fall chum salmon abundance estimates or escapement estimates for selected spawning areas in Canadian portions of the Yukon River Drainage, 1971–2011.

	Porcupine Drainage						Canadian Mainstem		
Year	Fishing Branch River [a]	Porcupine River Sonar	Mainstem Yukon River Index [b]	Koidern River [b, c]	Kluane River [b, d]	Teslin River [b, e]	Border Passage Estimate	Harvest	Spawning Escapement Estimate [f]
1971	312,800 [g]								
1972	35,230 [h]				198 [i, j]				
1973	15,991		383		2,500				
1974	31,841				400				
1975	353,282		7,671		362 [j]				
1976	36,584 [f]				20				
1977	88,400 [f]				3,555				
1978	40,800 [f]				0 [j]				
1979	119,898 [f]				4,640 [j]				
1980	55,268 [f]				3,150		39,130	16,218	22,912
1981	57,386 [k]				25,806		66,347	19,281	47,066 [l]
1982	15,901 [f]		1,020 [m]		5,378		47,049	15,091	31,958
1983	27,200 [f]		7,560		8,578 [j]		118,365	27,490	90,875
1984	15,150 [f]		2,800 [n]	1,300	7,200	200	81,900	25,267	56,633 [l]
1985	56,223		10,760	1,195	7,538	356	99,775	37,765	62,010
1986	31,810		825	14	16,686	213	101,826	13,886	87,940
1987	49,038		6,115	50	12,000		125,121	44,345	80,776
1988	23,645		1,550	0	6,950	140	69,280	32,494	36,786
1989	44,041		5,320	40	3,050	210 [a]	55,861	20,111	35,750
1990	35,000 [o]		3,651	1	4,683	739	82,947	31,212	51,735
1991	37,870		2,426	53	11,675	468	112,303	33,842	78,461
1992	22,539		4,438	4	3,339	450	67,962	18,880	49,082
1993	28,707		2,620	0	4,610	555	42,165	12,422	29,743
1994	65,247		1,429 [a]	20 [a]	10,734	209 [a]	133,712	35,354	98,358
1995	51,971 [p]		4,701	0	16,456	633	198,203	40,111	158,092

-continued-

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	Porcupine Drainage								Canadian Mainstem			
Year	Fishing Branch River	[a]	Porcupine River Sonar	Mainstem Yukon River Index	[b]	Koidern River	[b, c]	Kluane River	[b, d]	Teslin River	[b, e]	Border Passage Estimate		Harvest	Spawning Escapement Estimate	[f]
1996	77,302			4,977				14,431		315		143,758		21,329	122,429	
1997	27,031			2,189				3,350		207		94,725		9,306	85,419	
1998	13,687			7,292				7,337		235		48,047		1,795	46,252	
1999	12,958							5,136		19	[a]	72,188	[q]	13,636	58,552	
2000	5,057			933	[a]			1,442		204		57,978	[q]	4,246	53,732	
2001	21,737			2,453				4,884		5		38,769	[q]	5,278	33,491	
2002	13,600			973				7,147		64		104,853	[q]	6,174	98,679	
2003	29,713			7,982				39,347		390		153,656	[q]	10,523	143,133	
2004	20,417			3,440				18,982		167		163,625	[q]	9,545	154,080	
2005	119,058			16,425				34,600		585		451,477		13,979	437,733	
2006	30,954			6,553				18,208		620		218,611	[r, s]	6,617	211,994	
2007	32,150			no survey								263,979	[r, s]	9,330	254,649	
2008	19,086	[p]		no survey								181,642	[r, s]	6,130	174,267	[t]
2009	25,828	[u]		no survey								94,739	[r]	1,115	93,626	[v]
2010	15,773	[u]										121,580	[s]	3,709	117,871	
2011	13,085	[u]	12,438									211,929		6,312	205,617	
EO [x]	50,000-120,000														>80,000	
IMEG [y]	22,000-49,000														70,000-104,000	[z]
Average																
1971-2010	52,904			4,480		223		9,142		317		117,793		17,628	100,132	
2001-2010	32,832			6,304				20,528		305		179,293		7,240	171,952	
2006-2010	24,758			6,553				18,208		620		176,110		5,380	170,481	

-continued-

[a] Weir count, unless otherwise indicated.
[b] Aerial survey, unless otherwise indicated.
[c] Index area includes Tatchun Creek to Fort Selkirk.
[d] Index area includes Duke River to end of spawning sloughs below Swede Johnston Creek.
[e] Index area includes Boswell Creek area (5 km below to 5 km above confluence).
[f] Excludes Fishing Branch River escapement (estimated border passage minus Canadian mainstem harvest).
[g] Total escapement estimated using weir to aerial survey expansion factor of 2.72, unless otherwise indicated.
[h] Weir installed September 22. Estimate consists of weir count of 17,190 after September 22, and tagging passage estimate of 17,935 before weir installation.
[I] Incomplete and/or poor survey conditions resulting in minimal or inaccurate counts.
[j] Foot survey, unless otherwise indicated.
[k] Initial aerial survey count doubled before applying the weir/aerial expansion factor of 2.72 since only half of the spawning area was surveyed.
[l] Escapement estimate based on mark–recapture program unavailable. Estimate based on assumed average exploitation rate.
[m] Boat survey.
[n] Total index not surveyed. Survey included the mainstem Yukon River between Yukon Crossing to 30 km below Fort Selkirk.
[o] 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.
[p] Incomplete count caused by late installation and/or early removal of project or high water events.
[q] 1999 to 2004 border passage estimates were revised using a stratified "SPAS" analysis.
[r] 2006 to present border passage estimate is based on sonar minus harvest from Eagle residents upstream of deployment.
[s] Mark–recapture border passage estimates include 217,810, 235,956, and 132,048 from 2006 to 2008 respectively, during transition to sonar.
[t] The 2008 estimate was based on mark–recapture estimate.
[u] Run timing was late and counts were expanded to represent the remainder of the run after the project was terminated for the season.
[v] The 2009 estimate was based on the Eagle sonar estimate.
[w] Data are preliminary.
[x] Escapement Objective (EO) based on US/Canada Treaty Obligations, some years stabilization or rebuilding goals are applied.
[y] Interim Management Escapement Goal (IMEG) established for 2008-2010 based on percentile method.
[z] Interim Management Escapement Goal (IMEG) established for 2010 based on brood table of Canadian origin mainstem stocks (1982 to 2003).

Appendix B16.–Coho salmon passage estimates or escapement estimates for selected spawning areas in the Alaskan portion of the Yukon River Drainage, 1972–2011.

								Upper Tanana River Drainage				
	East Fork Andreafsky River [a]	Yukon River Mainstem Sonar Estimate [b]	Kantishna River Drainage	Nenana River Drainage				Delta Clearwater River [e]	Delta Clearwater River Tributaries [f]	Clearwater Lake and Outlet	Richardson Clearwater River [g]	
Year			Geiger Creek [c]	Lost Slough	Nenana Mainstem [d]	Wood Creek	Seventeen Mile Slough					
1972								632		417	454	[h]
1973								3,322		551	375	
1974				1,388			27	3,954	[h]	560	652	
1975				943			956	5,100		1,575	[i]	4 [h]
1976			25	[g, h]	118			281	1,920		1,500	[i] 80 [h]
1977			60		524	[g]		310 [c]	1,167	4,793		730 [i] 327
1978				350			300 [c]	466	4,798		570	[i]
1979				227				1,987	8,970		1,015	[i] 372
1980			3	[g, h]	499	[g]		1,603 [c]	592	3,946		1,545 [i] 611
1981	1,657	[g]		274			849	[a, j]	1,005	8,563	[k]	459 [g] 550
1982			81				1,436	[a, j]		8,365	[k]	
1983			42	766			1,042 [a]	103	8,019	[k]	253	88
1984			20	[g, h]	2,677			8,826 [a]		11,061	1,368	428
1985			42	[g, h]	1,584			4,470 [a]	2,081	6,842	750	
1986			5	794			1,664	[a]	218	[i] 10,857	1,800	146 [h]
1987			1,175	2,511			2,387	[a]	3,802	22,300		4,225 [i]

-continued-

								Upper Tanana River Drainage				
	East Fork Andreafsky	Yukon River Mainstem Sonar	Kantishna River Drainage	Nenana River Drainage				Delta Clearwater	Delta Clearwater River	Clearwater Lake and	Richardson Clearwater	
Year	River [a]	Estimate [b]	Geiger Creek [c]	Lost Slough	Nenana Mainstem [d]	Wood Creek	Seventeen Mile Slough	River [e]	Tributaries [f]	Outlet	River [g]	
1988	1,913 [l]		159	348		2,046 [a]		21,600		825 [i]		
1989			155			412 [a]	824 [g]	12,600		1,600 [i]	483	
1990			211	688	1,308		15 [g]	8,325		2,375 [i]		
1991			427	564	447		52	23,900		3,150 [i]		
1992			77	372			490	3,963		229 [i]	500	
1993			138	484	419	666 [a, m]	581	10,875		3,525 [i]		
1994			410	944	1,648	1,317 [a, n]	2,909	62,675	17,565	3,425 [i]	5,800	
1995	10,901	100,664	142	4,169	2,218	500 [a]	2,972 [g]	20,100	6,283	3,625 [i]		
1996	8,037		233	2,040	2,171	201 [g, h]	3,666 [i]	14,075	3,300	1,125 [h]		
1997	9,472	105,956	274	1,524 [o]	1,446	[p]	1,996	11,525	2,375	2,775 [i]		
1998	7,193	129,076	157	1,360 [h]	2,771 [h]	[p]	1,413 [q]	11,100	2,775	2,775 [i]		
1999	2,963	60,886	29	1,002 [h]	745 [h]	370	662 [h]	10,975	2,805			
2000	8,451	169,392	142	55 [g, h]	68 [g, h]	[p]	879 [g, h]	9,225	2,358	1,025 [i]	2,175	
2001	15,896	132,283	578	242	859	699	3,753	46,875	11,982	4,425 [i]	1,531	
2002	3,577	117,908	744	0	328	935	1,910	38,625	9,873	5,900	874	
2003	8,231	265,119	973	85	658	3,055	4,535	105,850	27,057	8,800	6,232	
2004	11,146	199,884	583	220	450	840	3,370	37,950	9,701	2,925	8,626	
2005	5,303	184,071	625	430	325 [h]	1,030	3,890	34,293	8,766	2,100	2,024	
2006		131,919		194	160 [h]	634	1,916	16,748	4,281	4,375	271	
2007		173,289		63	520	605	1,733	14,650	3,961	2,075	553	
2008		135,570	183	1,342	1,539	578	1,652	7,500	1,917	1,275	265	
2009		205,278 [r]	137	410		470	680	16,850	4,307	5,450	155	

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Year	East Fork Andreafsky River [a]	Yukon River Mainstem Sonar Estimate [b]	Kantishna River Drainage	Nenana River Drainage				Upper Tanana River Drainage			
			Geiger Creek [c]	Lost Slough	Nenana Mainstem [d]	Wood Creek	Seventeen Mile Slough	Delta Clearwater River [e]	Delta Clearwater River Tributaries [f]	Clearwater Lake and Outlet	Richardson Clearwater River [g]
2010		142,149 [s]		1,110	280	340	720	5,867		813	1,002
2011		118,453 [s]		369			912	6,180		2,092	575
SEG [t]								5,200-17,000 [z]			
Average											
1972-2010	8,288	146,298 [r]	270	866	966	1,392	1,568	16,913	7,457	2,214	1,330
2000-2010	8,831	164,688 [r]	546	410	569	919	2,416	32,521	9,094	3,814	2,153
2005-2010	-	145,732 [r]	160	624	625	525	1,340	12,323	3,617	2,798	449

Note: Only peak counts presented. Survey rating is fair to good, unless otherwise noted.

[a] Weir count, unless otherwise indicated.

[b] Passage estimates for coho salmon are incomplete. The sonar project is terminated prior to the end of the coho salmon run.

[c] Foot survey, unless otherwise indicated.

[d] Index area includes mainstem Nenana River between confluence's of Lost Slough and Teklanika River.

[e] Boat survey counts of index area (lower 17.5 river miles), unless otherwise indicated.

[f] 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.

[g] Aerial survey, fixed wing or helicopter.

[h] Poor survey.

[i] Boat Survey.

[j] Weir was operated at the mouth of Clear Creek (Shores Landing).

[k] Expanded estimate based on partial survey counts and historic distribution of spawners from 1977 to 1980.

[l] The West Fork Andreafsky was also surveyed and 830 chum salmon were observed.

[m] Weir project terminated on October 4, 1993. Weir normally operated until mid- to late October.

[n] Weir project terminated September 27, 1994. Weir normally operated until mid-October.

[o] Survey of western floodplain only.

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

[q] Combination foot and boat survey.

[r] Pilot Station sonar project encountered record low water levels during the fall season causing difficulties with species apportionment and catchability. Coho salmon are suspected of being over estimated therefore this value should not be used in averages or run reconstructions.

[s] Data preliminary.

[t] Sustainable escapement goal (SEG) established January 2004, (replaces BEG of greater than 9,000 fish established March, 1993) based on boat survey counts of coho salmon in the lower 17.5 river miles during the period October 21 through 27.

[u] Average only includes years of weir operations beginning in 1995.

Appendix B17.–Historic Canadian border fish wheel mark–recapture passage, reconstructed mainstem border passage, and escapement estimates of Chinook salmon, from 1982 to 2011.

Year	Historic Wheel Mark–recapture Border Passage Esimtate [a]	Revised Canadian Mainsten Border Passage Estimate [b]	Canadian Harvest	Spawning Escapement Estimate
1982	36,598	60,346	16,808	43,538
1983	47,741	63,227	18,752	44,475
1984	43,911	66,300	16,295	50,005
1985	29,881	59,586	19,151	40,435
1986	36,479	61,489	20,064	41,425
1987	30,823	58,870	17,563	41,307
1988	44,445	61,026	21,327	39,699
1989	42,620	77,718	17,419	60,299
1990	56,679	78,192	18,980	59,212
1991	41,187	63,172	20,444	42,728
1992	43,185	56,958	17,803	39,155
1993	45,027	52,713	16,469	36,244
1994	46,680	77,219	20,770	56,449
1995	52,353	70,761	20,088	50,673
1996	47,955	93,606	19,546	74,060
1997	53,400	69,538	15,717	53,821
1998	22,588	41,335	5,838	35,497
1999	23,716	49,538	12,354	37,184
2000	16,173	30,699	4,829	25,870
2001	52,207	62,333	9,769	52,564
2002	49,214	51,428	9,069	42,359
2003	56,929	90,037	9,443	80,594
2004	48,111	59,415	10,946	48,469
2005	42,245	78,962	10,977	67,985
2006	36,748	71,388	8,758	62,630
2007	22,120	39,698	4,794	34,904
2008	14,666	37,282	3,399	33,883

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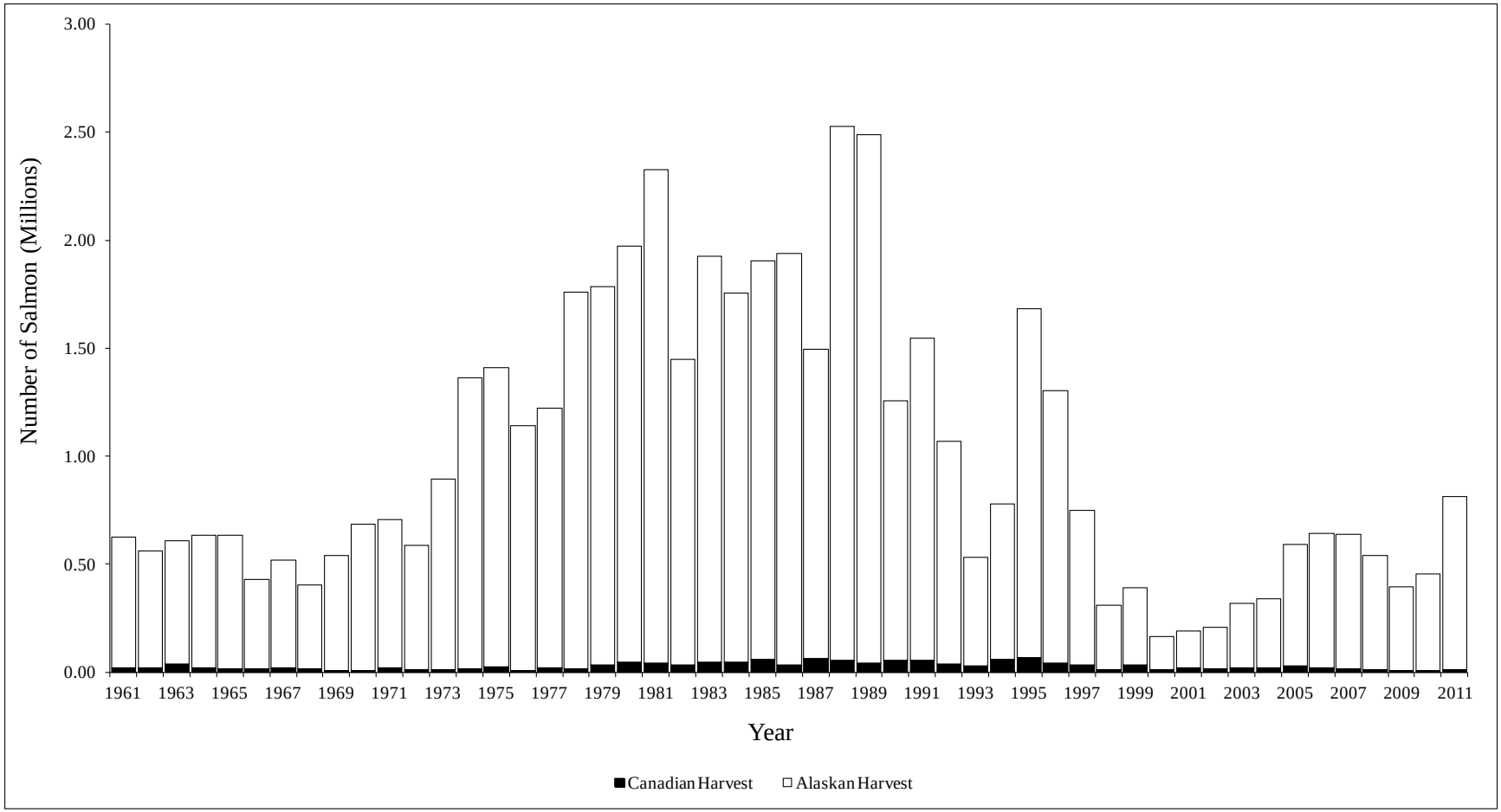
Year	Historic Wheel Mark–recapture Border Passage Esimtate [a]	Revised Canadian Mainsten Border Passage Estimate [b]	Canadian Harvest	Spawning Escapement Estimate
2009		69,575	4,297	65,278
2010		34,465	2, 647	32,010
2011		50,901	4,594	46,307
Averages				
1982-2009	40,136	62,586	13,988	48,598
2000-2009	37,601	59,082	7,628	51,454
2005-2009	4,725	59,381	6,445	52,936

[a] From 1982 to 2008, a mark–recapture program was used to determine border passage. Fish wheels near the US/Canada border captured and tagged fish and recaptures were collected from upstream fisheries. After Eagle sonar operations initiated in 2005, it became obvious that the mark–recapture estimates were biased low and the JTC recommended future fish passage estimates be based on Eagle sonar passage estimates.

[b] Revised database adopted by JTC in 2008. Canadian mainstem border passage estimate based on 3-Area escapement index, Eagle sonar (2005–2010), and radiotelemetry (local) (2002–2004).

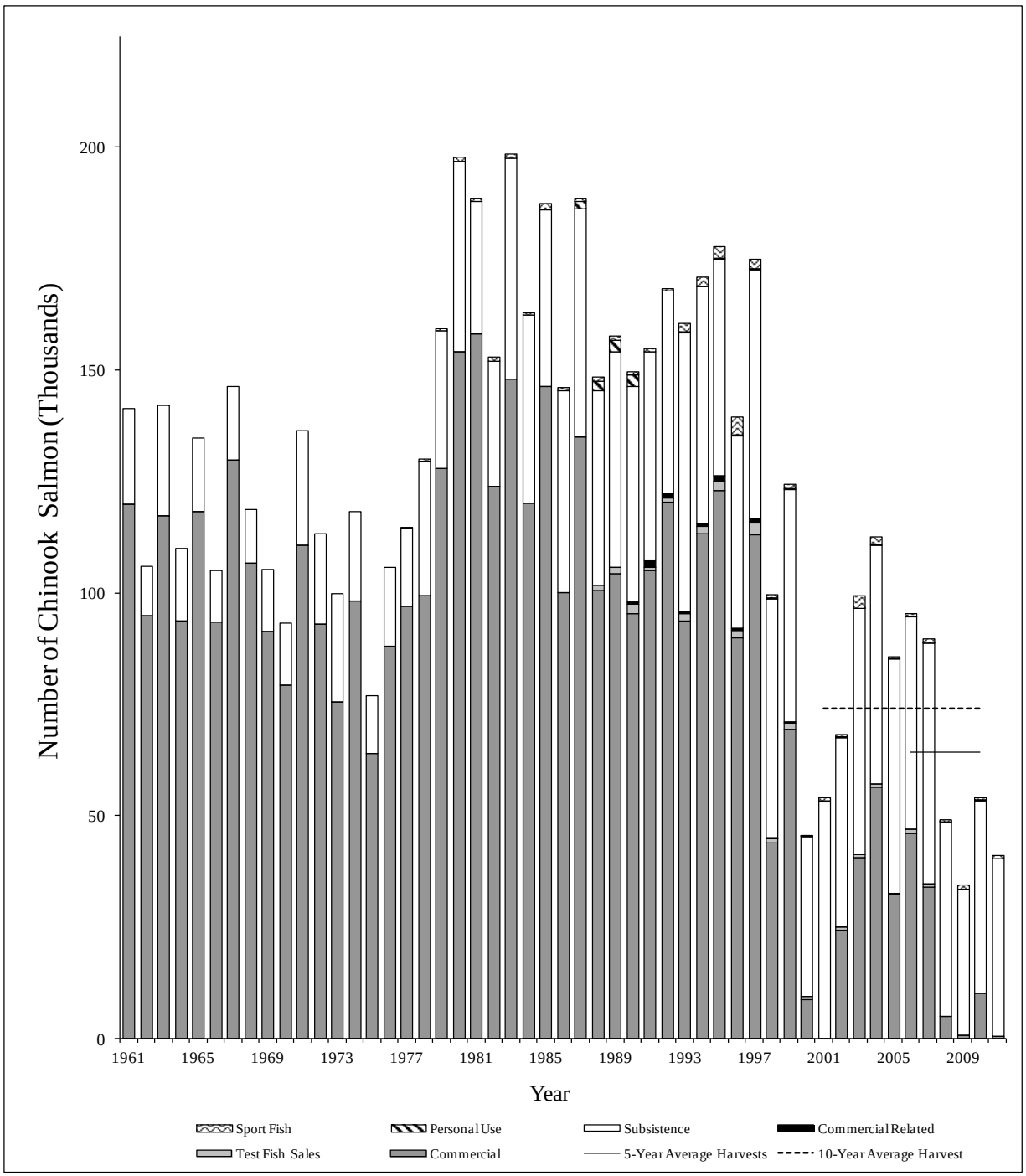
[c] Estimated total spawning escapement, excluding Porcupine River, based on revised database (estimated border passage minute the Canadian harvest).

APPENDIX C: FIGURES



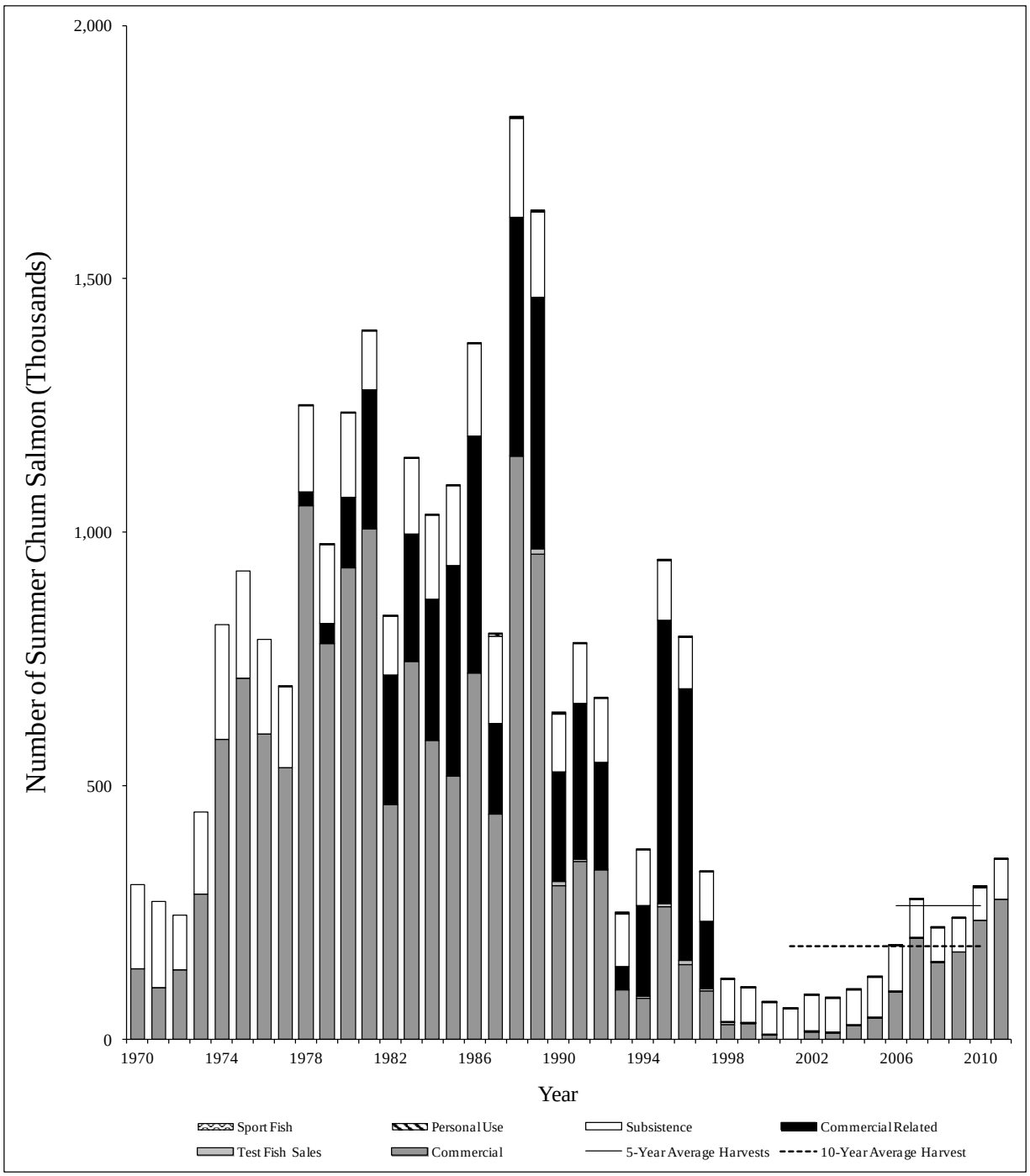
Note: The 2011 Alaskan harvest estimates are preliminary.

Appendix C1.–Total utilization of salmon, Yukon River, 1961–2011.



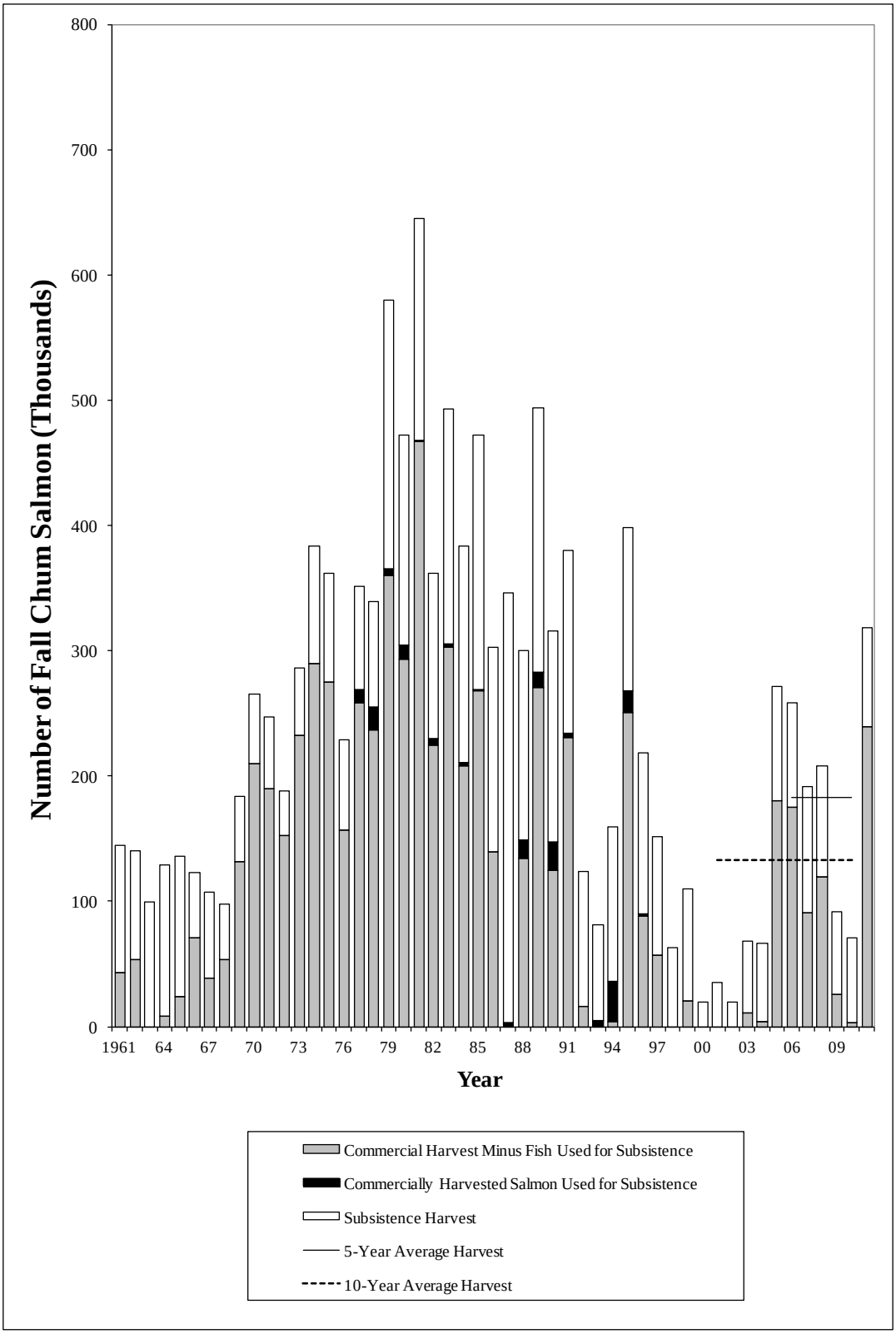
Note: No commercial fishery occurred in 2001. The 2011 Alaskan harvest estimates are preliminary.

Appendix C2.–Alaskan harvest of Chinook salmon, Yukon River, 1961–2011.



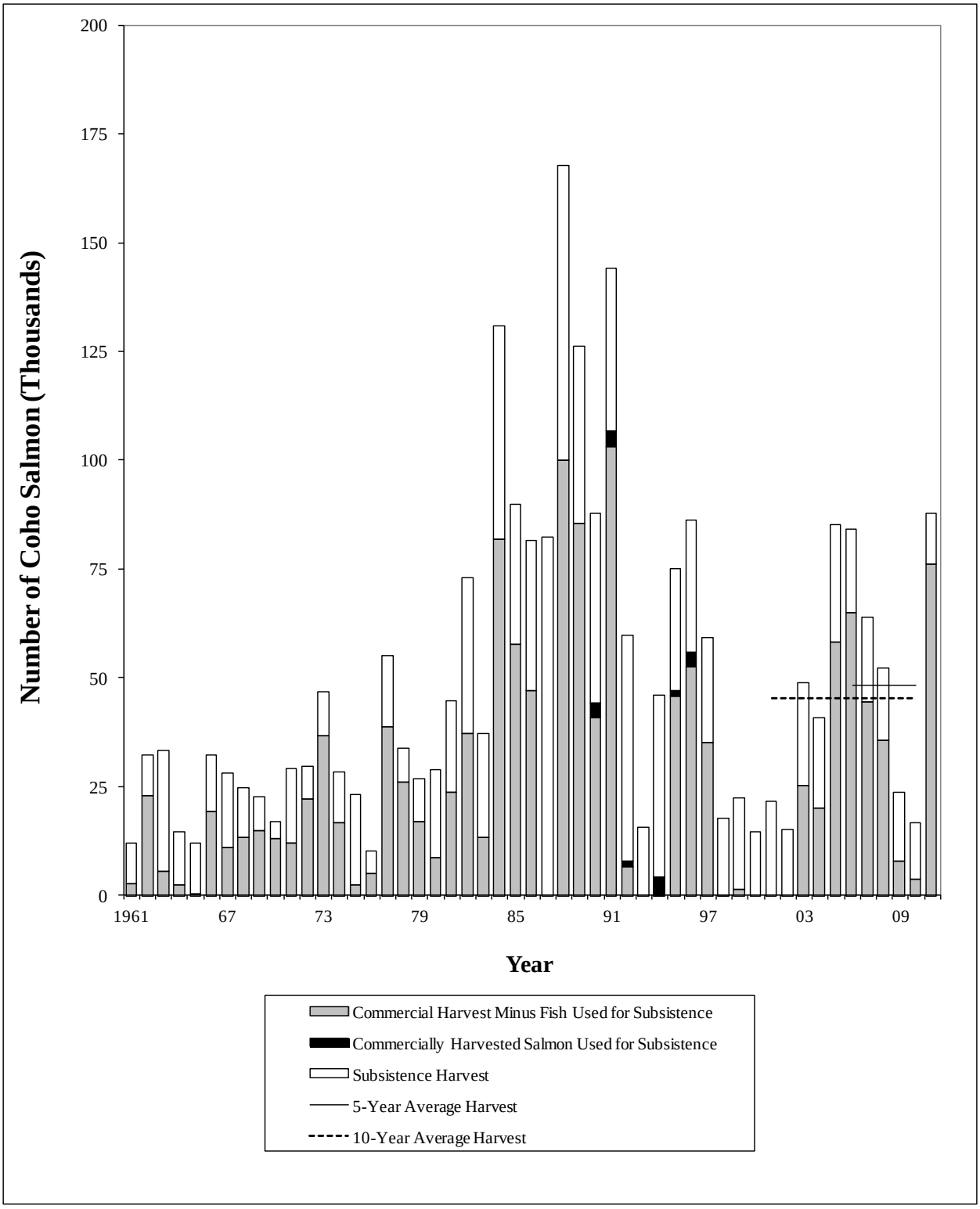
Note: The 2011 Alaskan harvest estimates are preliminary.

Appendix C3.–Alaskan harvest of summer chum salmon 1961–2011.



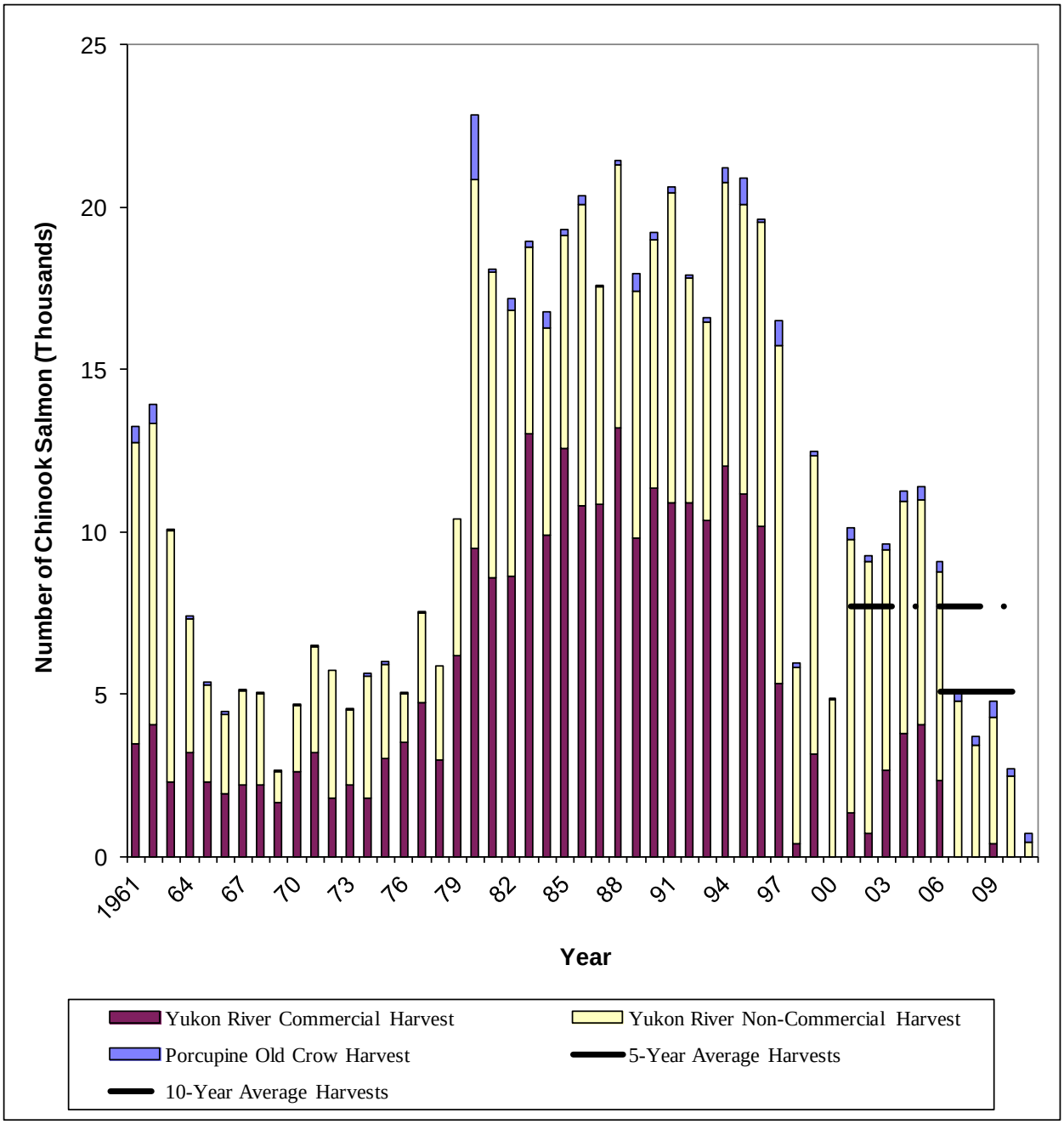
Note: The commercial fishery was closed 2000–2002. The 2011 subsistence harvest is a preliminary estimate.

Appendix C4.–Alaskan harvest of fall chum salmon, Yukon River, 1961–2011.



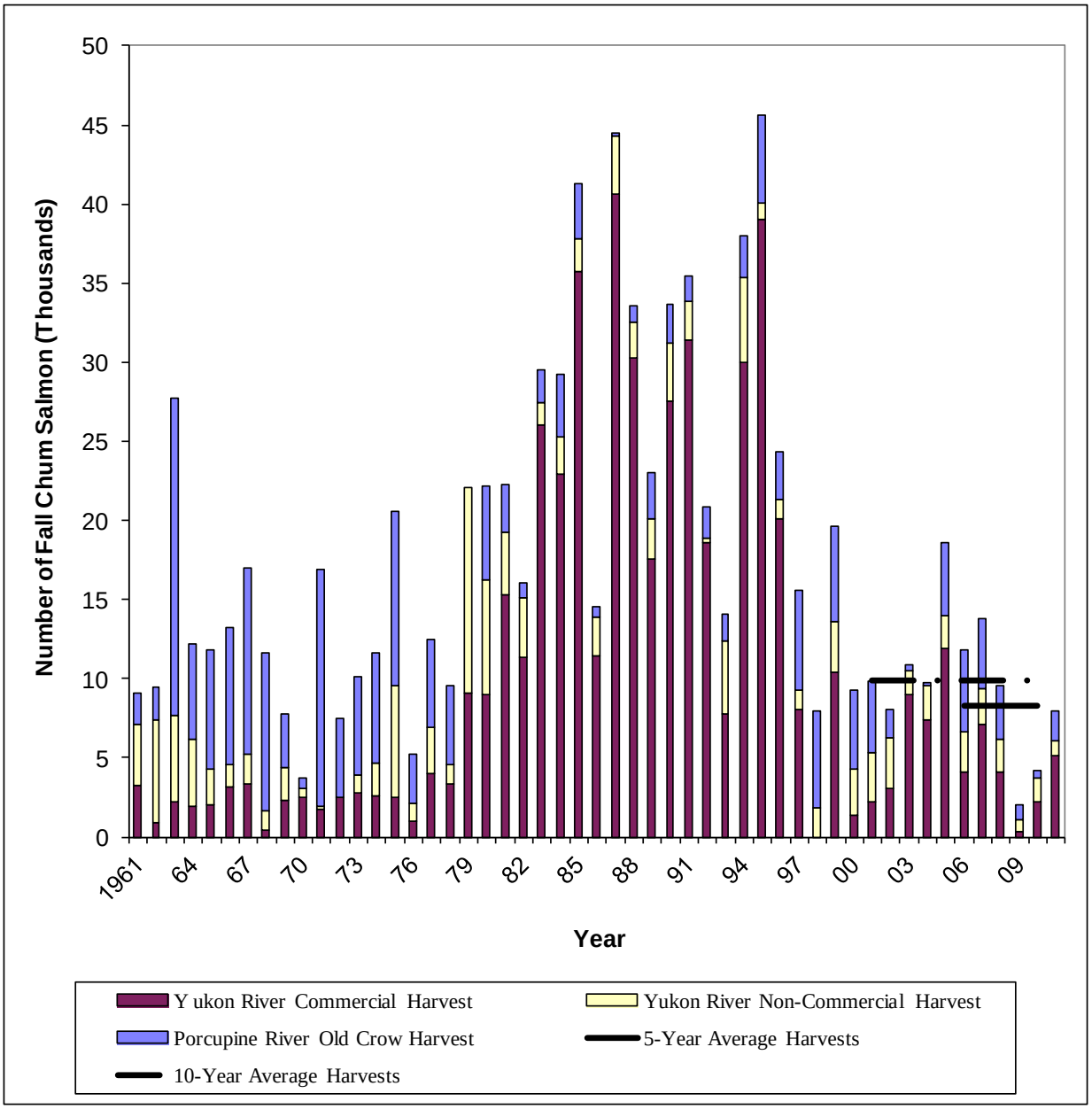
Note: The commercial fishery was closed 2000–2002. The 2011 subsistence harvest is a preliminary estimate.

Appendix C5.–Alaskan harvest of coho salmon, Yukon River, 1961–2011.



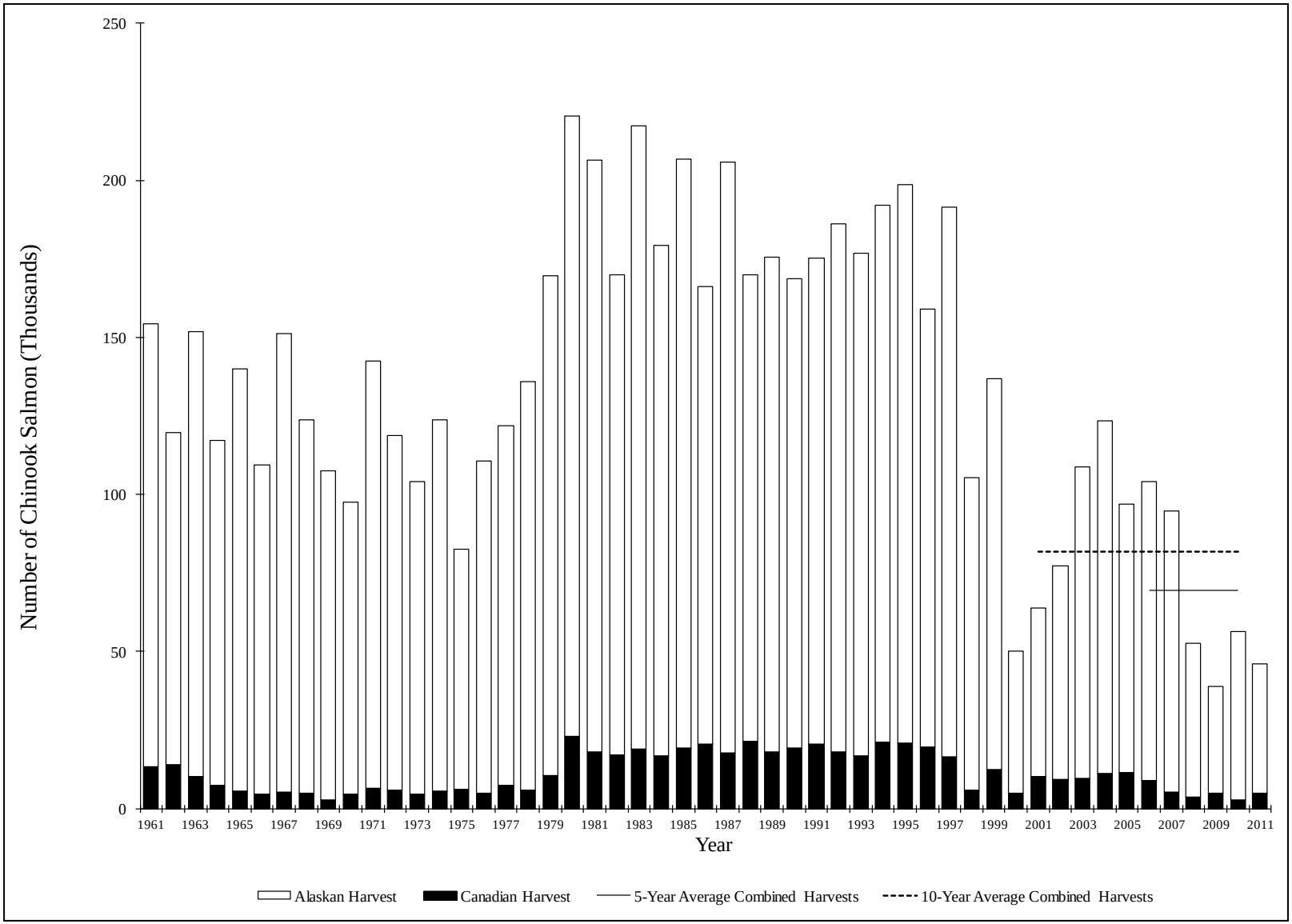
Note: Catch data for 2011 are preliminary.

Appendix C6.–Canadian harvest of Chinook salmon, Yukon River, 1961–2011.



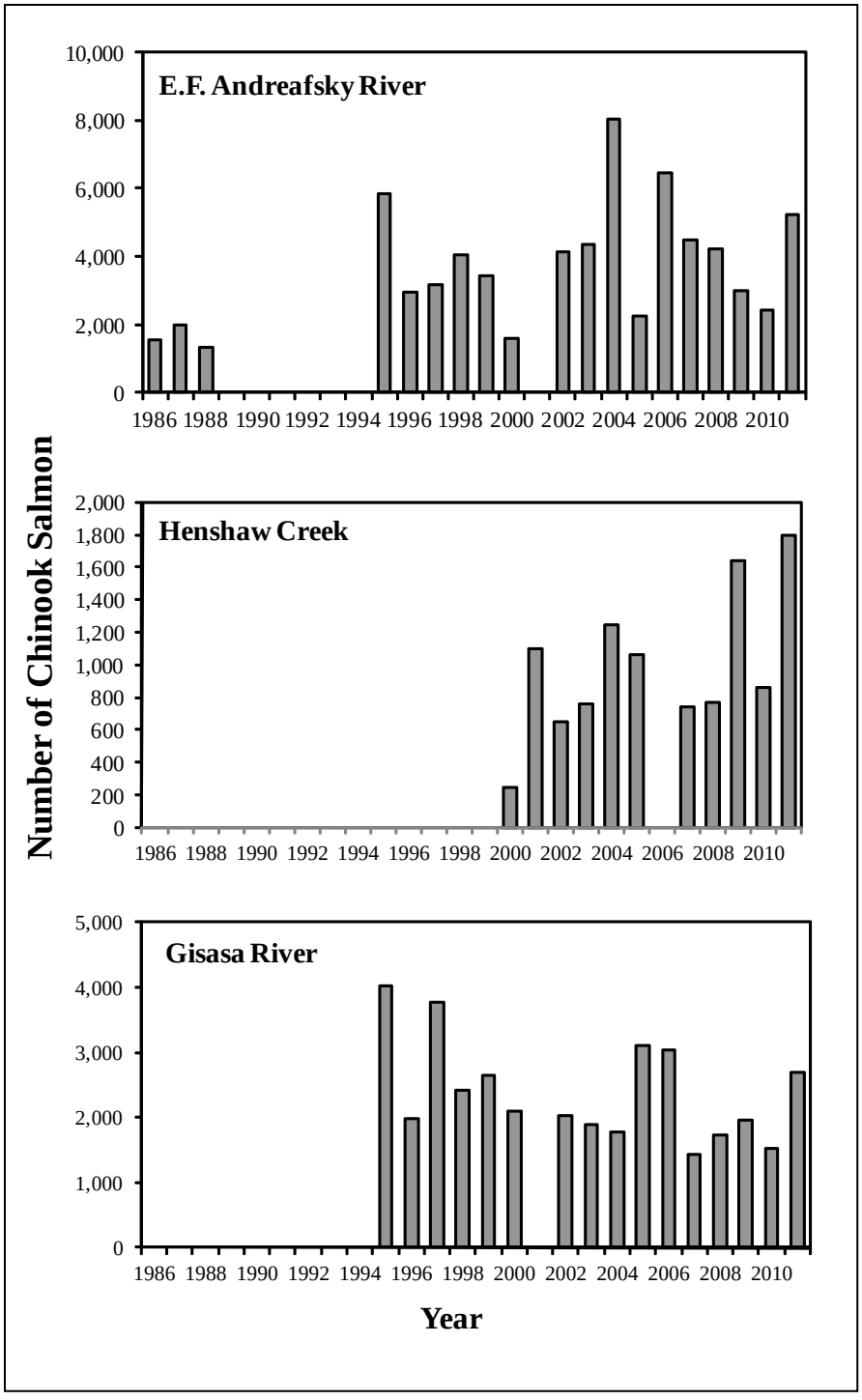
Note: Catch data for 2011 are preliminary.

Appendix C7.–Canadian harvest of fall chum salmon, Yukon River, 1961–2011.



Note: Catch data for 2011 are preliminary.

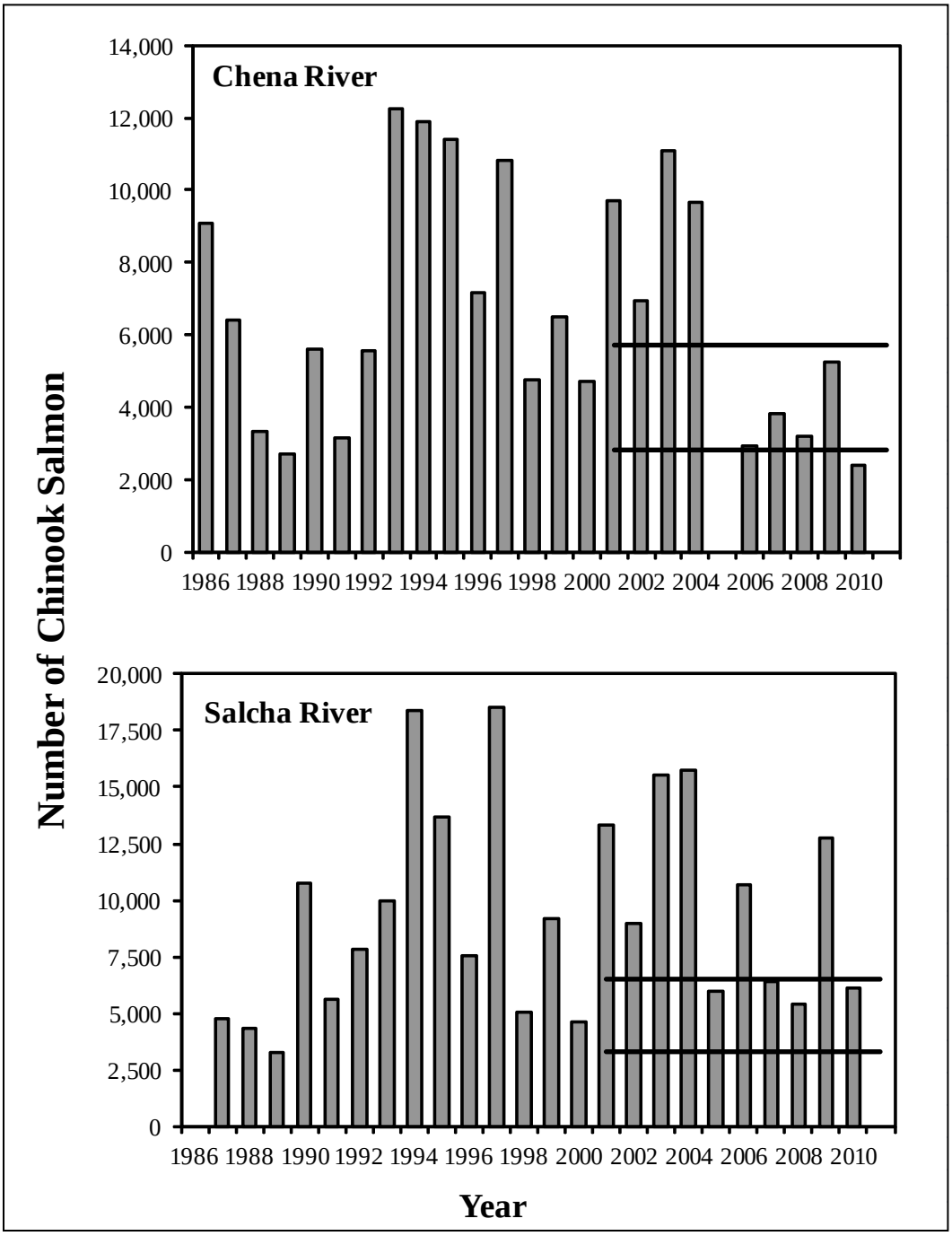
Appendix C8.–Total utilization of Chinook salmon, Yukon River, 1961–2011. Catch data for 2011 are incomplete and preliminary.

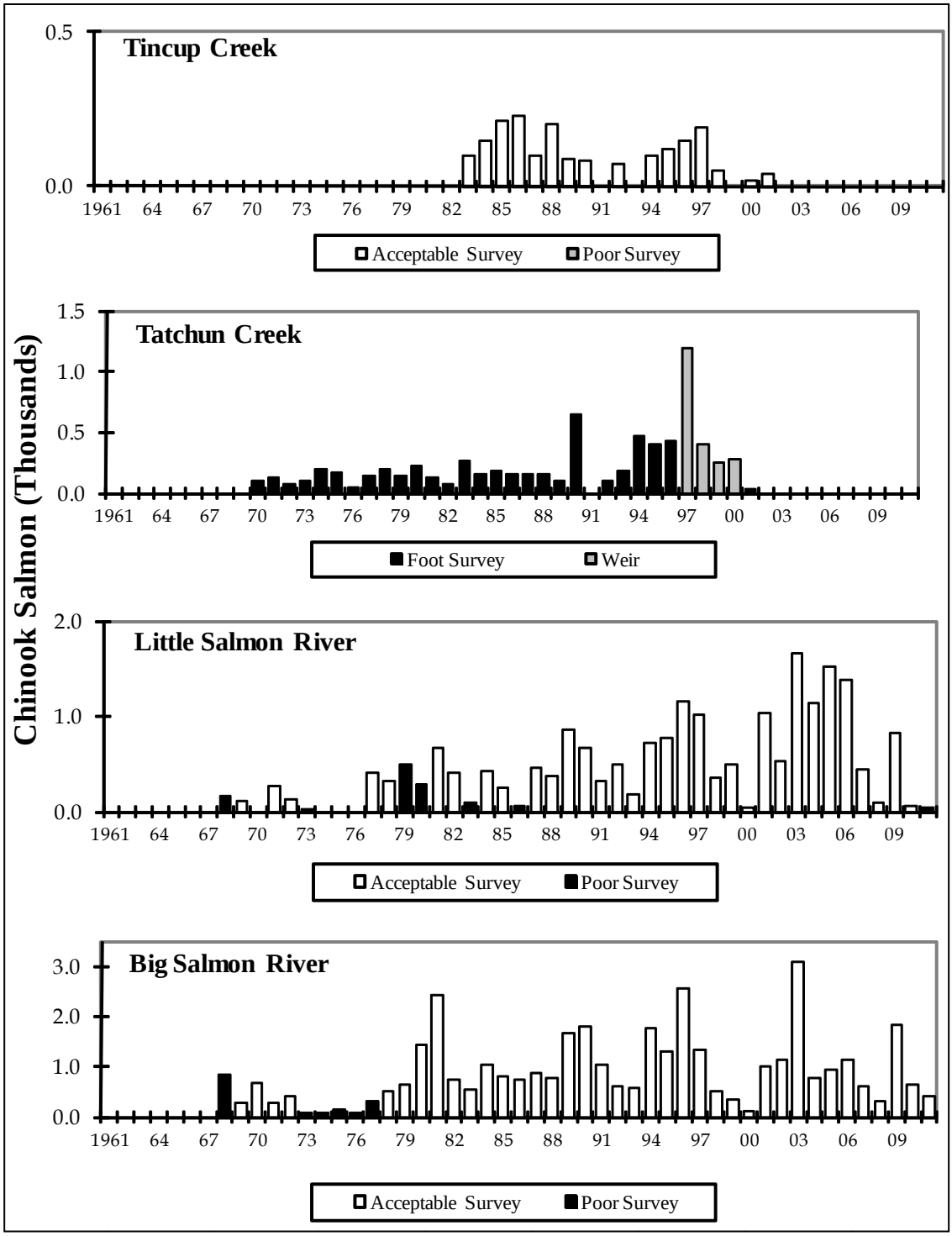


Note: Incomplete counts caused by late installation and/or early removal of project or high water events are excluded from the graphs. The BEG range is indicated by the horizontal lines for tributaries with BEGs. The vertical scale is variable.

Appendix C9.–Chinook salmon ground based escapement estimates for selected tributaries in the Alaska portion of the Yukon River drainage, 1986–2011.

-continued-

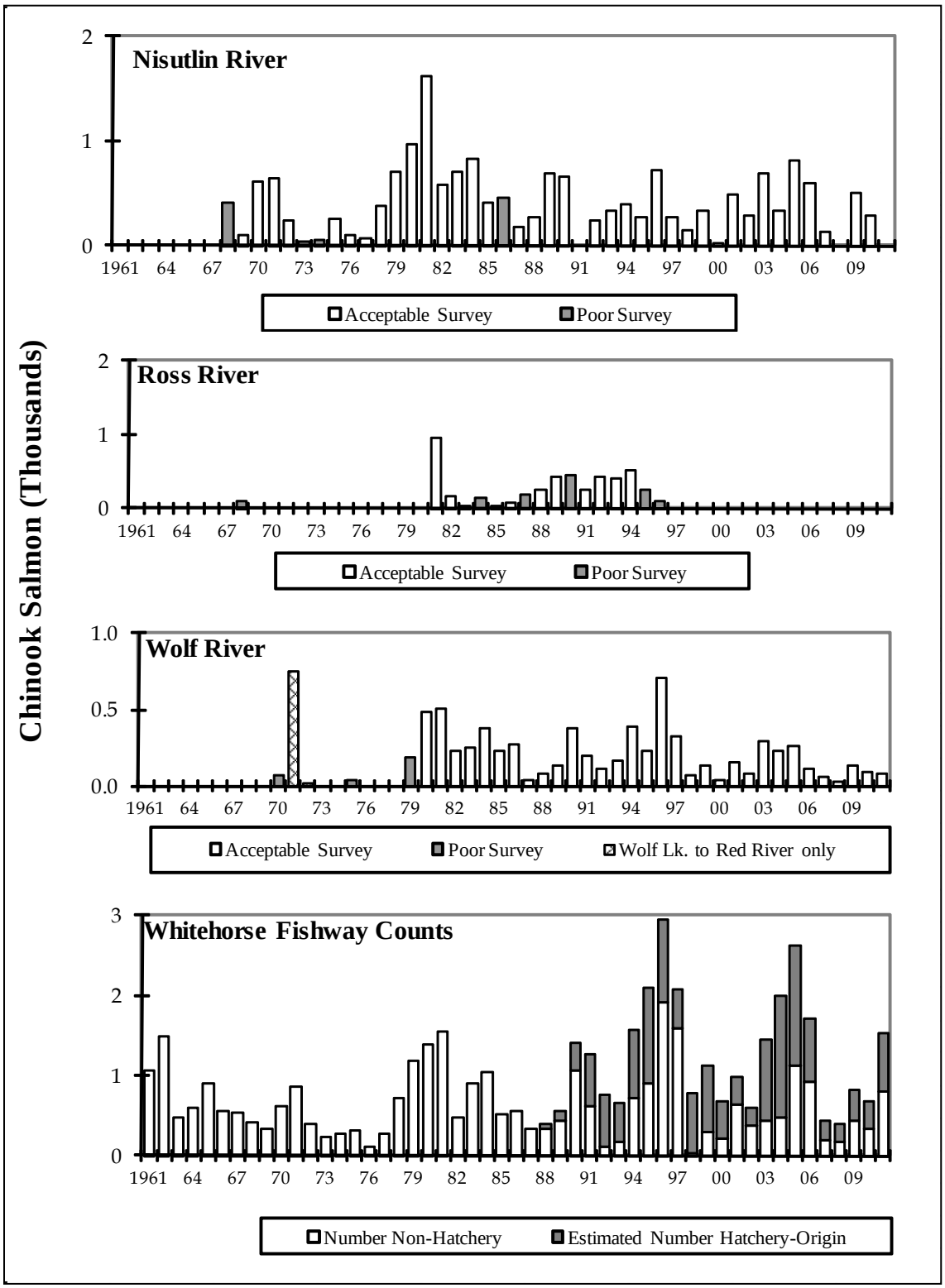

Chena River
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010
Salcha River
20,000
17,500
15,000
12,500
10,000
7,500
5,000
2,500
0
1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010
Number of Chinook Salmon
Year

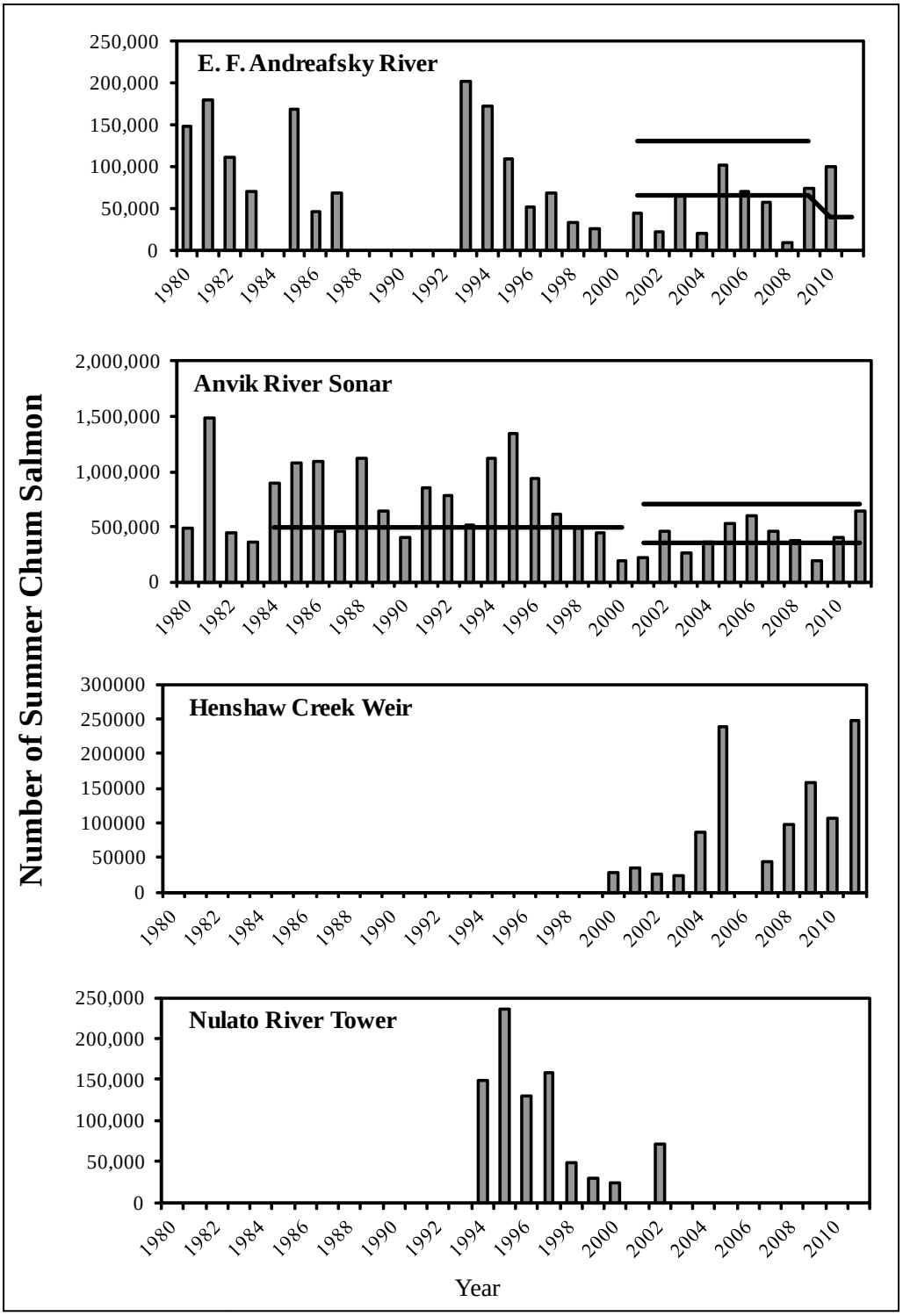


Note: Data are aerial survey observations unless noted otherwise. The vertical scale is variable.

Appendix C10.–Chinook salmon escapement data for selected spawning areas in the Canadian portion of the Yukon River drainage, 1961–2011.

-continued-

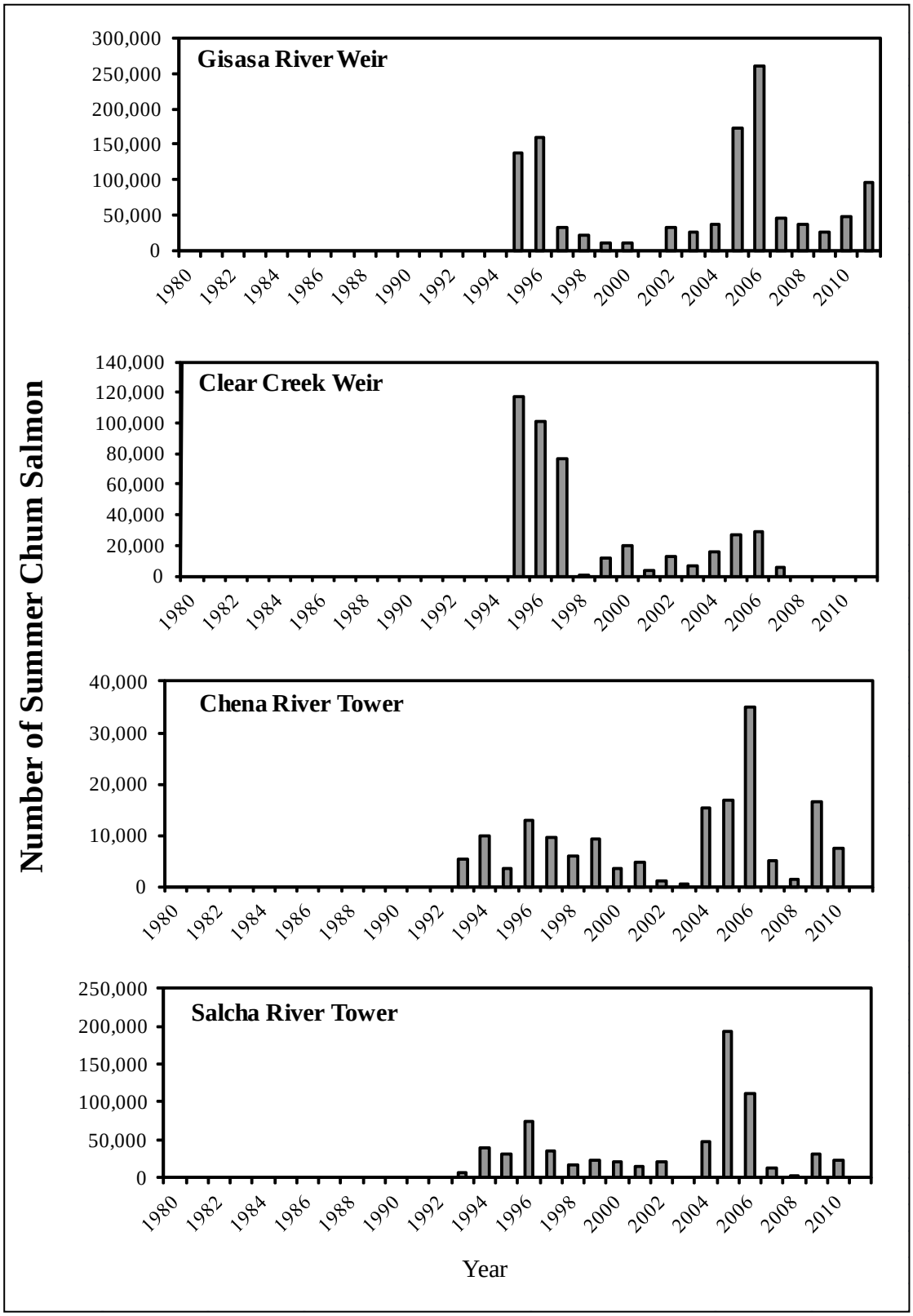

Chinook Salmon (Thousands)
Nisutlin River
2
1
0
1961 64 67 70 73 76 79 82 85 88 91 94 97 00 03 06 09
Acceptable Survey
Poor Survey
Ross River
2
1
0
1961 64 67 70 73 76 79 82 85 88 91 94 97 00 03 06 09
Acceptable Survey
Poor Survey
Wolf River
1.0
0.5
0.0
1961 64 67 70 73 76 79 82 85 88 91 94 97 00 03 06 09
Acceptable Survey
Poor Survey
Wolf Lk. to Red River only
Whitehorse Fishway Counts
3
2
1
0
1961 64 67 70 73 76 79 82 85 88 91 94 97 00 03 06 09
Number Non-Hatchery
Estimated Number Hatchery-Origin

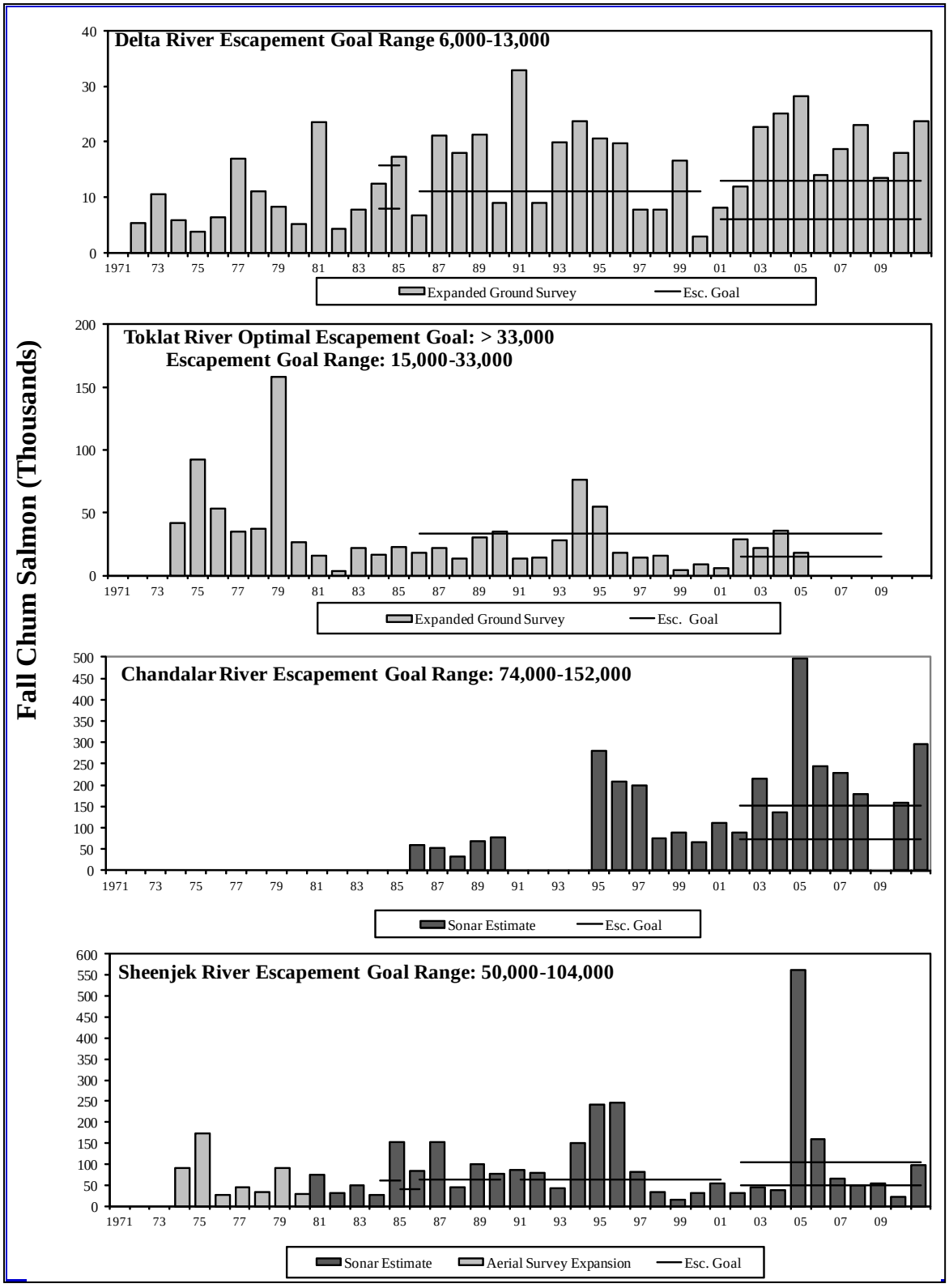


Note: Incomplete counts caused by late installation and/or early removal of project or high water events are excluded from graphs. The BEG range is indicated by the horizontal lines for tributaries with BEGs. The vertical scale is variable.

Appendix C11.–Summer chum salmon ground based escapement estimates for selected tributaries in the Alaskan Yukon River drainage, 1980–2011.

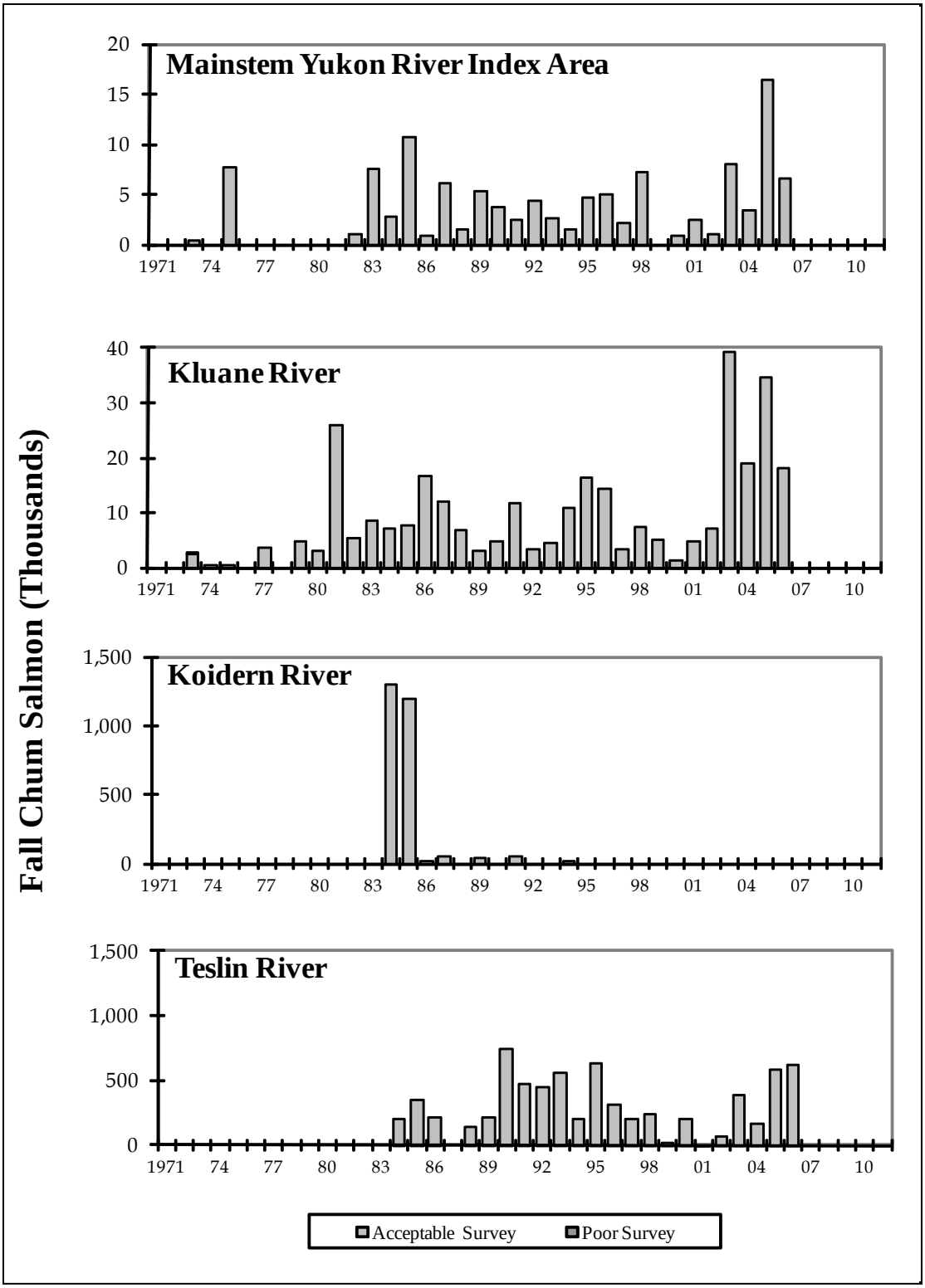
-continued-


Gisasa River Weir
Clear Creek Weir
Chena River Tower
Salcha River Tower
Number of Summer Chum Salmon
Year



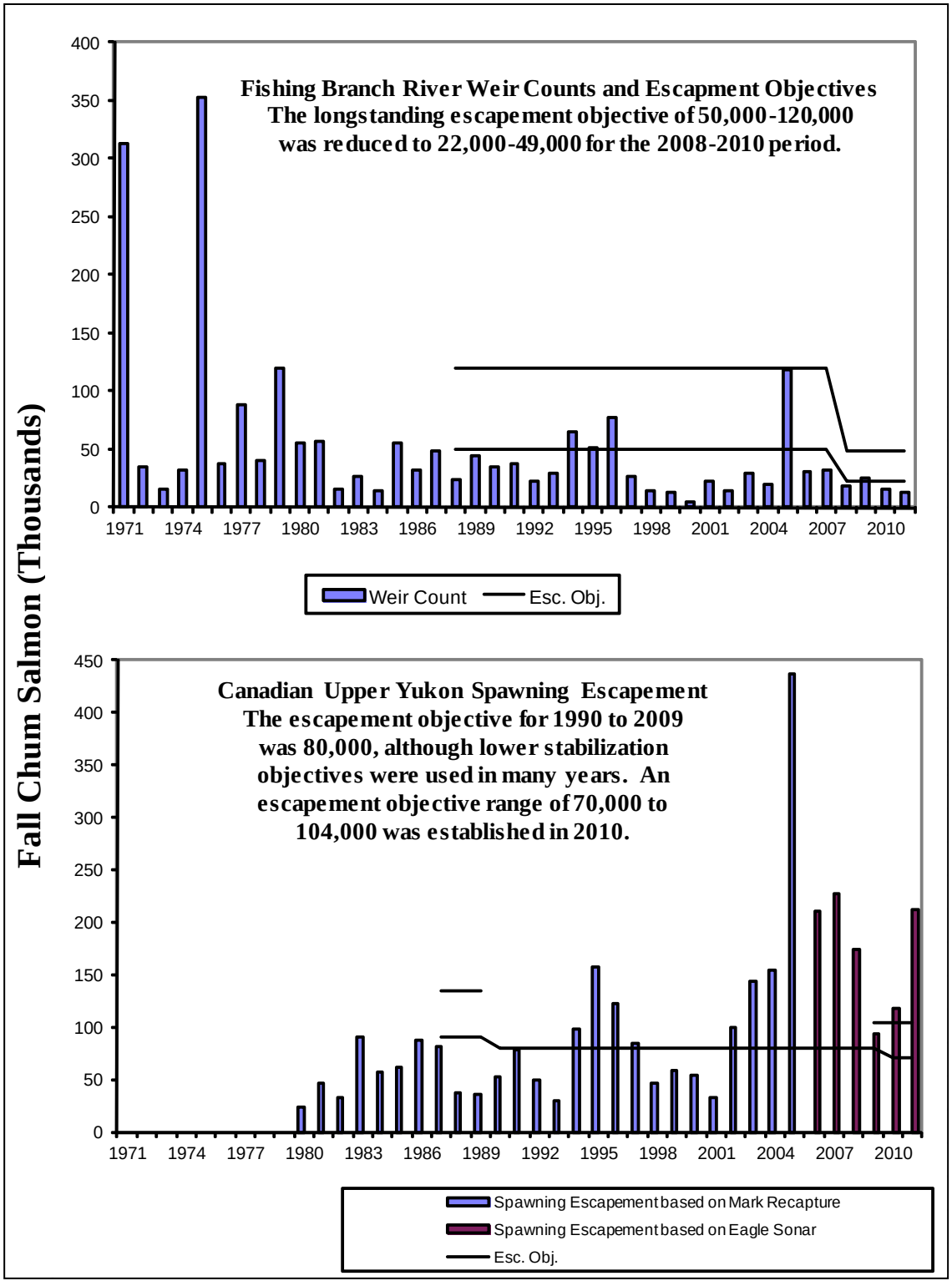
Note: Horizontal lines represent biological escapement goals or ranges. Note, vertical scale is variable.

Appendix C12.–Fall chum salmon escapement estimates for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1971–2011.



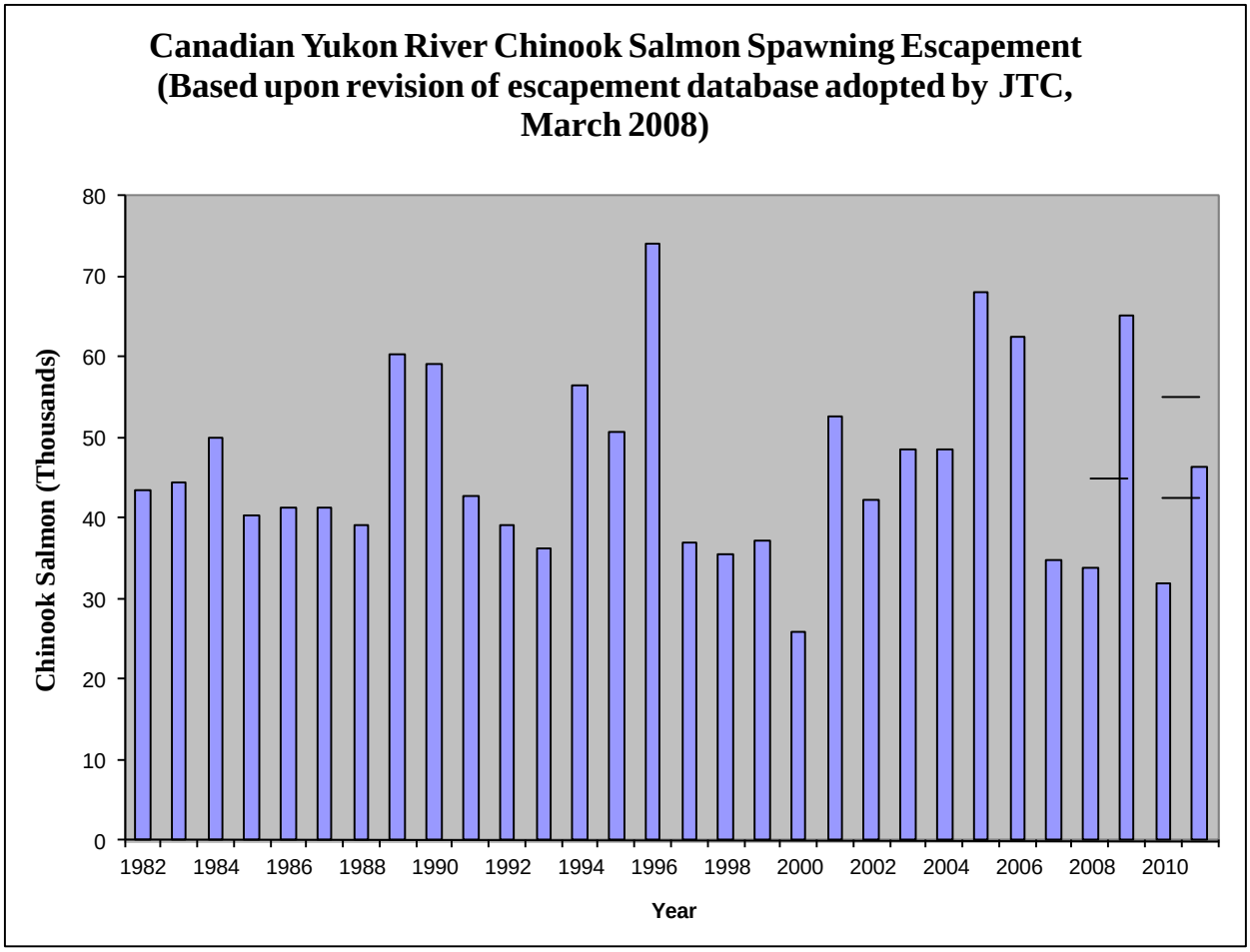
Note: The vertical scale of Mainstem and Kluane is shown in thousands, while the Koidern and Teslin are in hundreds. Genetic stock identification was used to determine relative tributary spawning abundance from 2007 to 2011.

Appendix C13.–Chum salmon aerial survey data for selected spawning areas in the Canadian portion of the Yukon River drainage, 1971–2011.



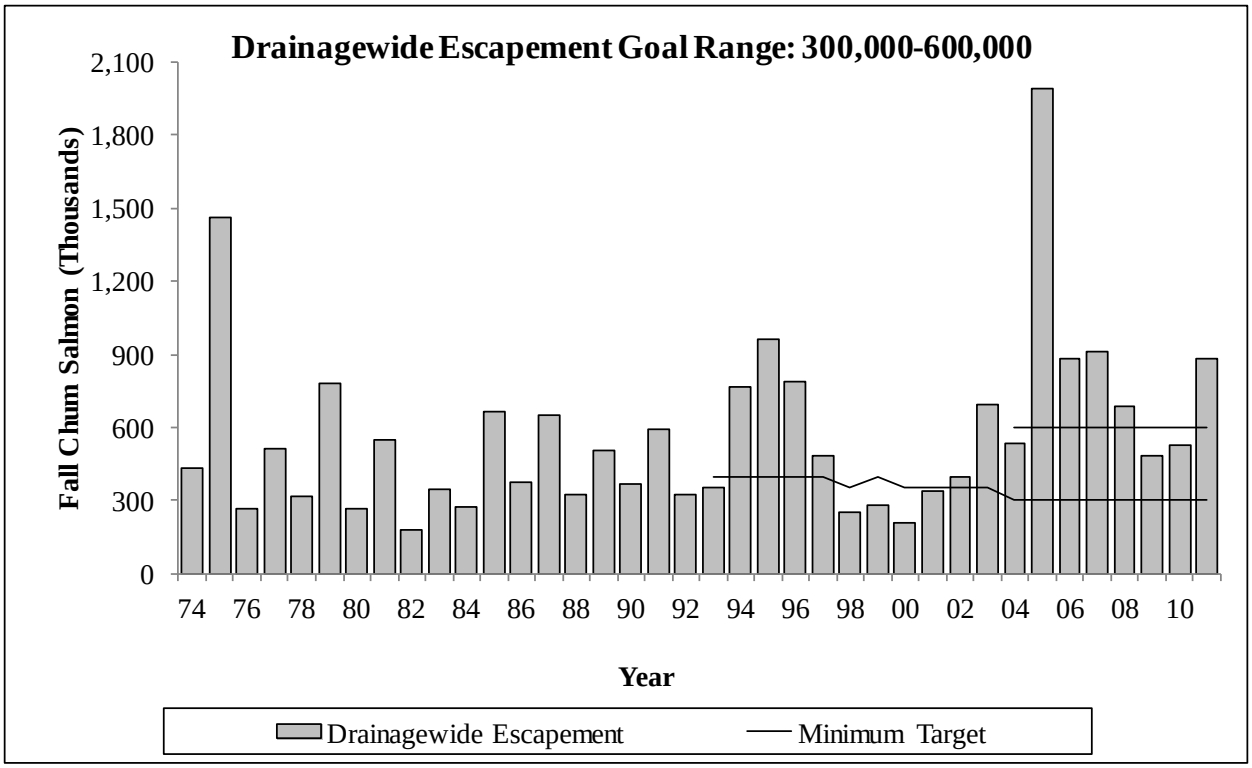
Note: Sonar estimates have been used since 2006. Horizontal lines represent escapement goal objectives or ranges. The interim stabilization or rebuilding objectives are also shown.

Appendix C14.–Chum salmon spawning escapement estimates for Canadian portion of the Yukon River drainage, 1971–2011.



Note: The JTC adopted a revised escapement database in March 2008. The 2008 and 2009 Interim Management Escapement Goal (IMEG) was set at 45,000. The IMEG for 2010 and 2011 was 42,500 to 55,000 salmon.

Appendix C15.–Estimated total Chinook salmon spawning escapement in the Canadian portion of the mainstem Yukon River drainage, 1982–2011.



Appendix C16.–Estimated drainagewide escapement of fall chum salmon, Yukon River, 1974–2011.