YUKON RIVER SALMON 2009 SEASON SUMMARY AND 2010 SEASON OUTLOOK

Prepared by

THE UNITED STATES AND CANADA
YUKON RIVER JOINT TECHNICAL COMMITTEE

March 2010
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Alaska Department of Fish and Game
333 Raspberry Road
Anchorage, AK 99518, USA

Symbols and Abbreviations

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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)

Measures (fisheries)

fork length	FL
mideye-to-fork	MEF
mideye-to-tail-fork	METF
standard length	SL
total length	TL

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

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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.sf.adfg.ak.us/statewide/divreprots/htlm/intersearch.cfm.

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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. The report summarizes the status of salmon stocks (Chinook, coho, summer and fall chum salmon) in 2009 with reference to historical data, presents an outlook for the 2010 season, and provides data on the utilization of salmon species by commercial, subsistence, aboriginal, personal use, domestic and sport/recreational fisheries. The report further compiles 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. Yukon River escapement goals for Chinook, chum and coho salmon remained unchanged for 2009.

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 16–18, 2009 at the Canadian Department of Fisheries and Oceans (DFO) Board Room in Whitehorse, Yukon Territory. Topics discussed included: the 2009 season summary; an environmental conditions summary; a marine update (including BSAI salmon bycatch and BASIS studies); a review of the conceptual proposals for the Restoration and Enhancement Fund (R&E) which was initially conducted by the R&E sub-committee; a presentation by Katie Howard regarding results of a lower Yukon River mesh size study; a summary of the *Ichthyophonus* sampling activities in 2009 by Lara Dehn; a discussion on the status of the Upper Yukon Chinook and fall chum salmon escapement goals and the possibility of moving to escapement goal ranges. The write-up of previous work involving historical run reconstructions of upper Yukon Chinook salmon and subsequent stock-recruitment analyses is in progress and DFO is continuing to examine habitat-based parameters which potentially can be incorporated into the development of a revised escapement goal. The final discussion was a summary of the Alaska Board of Fish proposals and State comments.

The spring JTC meeting was held March 2-4, 2010 at the Alpine Lodge in Fairbanks, Alaska. The 2010 preseason outlooks for systemwide and/or Canadian-origin stocks were summarized for Chinook (Katie Howard and Pat Milligan), fall chum salmon (Bonnie Borba and Pat Milligan) and coho salmon (Bonnie Borba). Steve Hayes presented a summary of the recent regulatory changes adopted by the Alaska Board of Fish, and Jason Hale outlined the current plan for Alaskan preseason teleconferences and meetings. Jim Murphy gave an update on the BSAI and GOA salmon bycatch and presented an analysis using the juvenile Chinook salmon index to forecast returns. Hamachan Hamazaki presented on the effects of *Ichthyophonus* infection on management of Yukon River Chinook salmon. Shortly after, the *Ichthyophonus* subcommittee met and developed a long-term study plan for monitoring infection, examining mortality in Canadian tributaries, and exploring non-lethal methods of detecting infections such as measuring cortisol levels in blood. The escapement goal subcommittee met to discuss the Chinook and fall chum salmon escapement goals for the upcoming season. The JTC reached consensus on recommending an escapement goal range of 70,000 to 104,000 Canadian-origin

upper Yukon (i.e. mainstem) fall chum salmon, and a Fishing Branch range of 22,000 to 49,000 fall chum salmon. The JTC was unable to reach consensus for upper Yukon Chinook salmon but agreed a range was also appropriate to recognize the uncertainty in management and monitoring projects. The JTC did reach consensus on an upper bound of 55,000 for a Chinook escapement goal range. For the lower bound, two options, 40,000 and 45,000, were left on the table without JTC consensus. Dani Evenson, Pat Milligan, and Trix Tanner reported on the deliberations by the R&E subcommittee and presented an overview of preliminary recommendations regarding the detailed project proposals and these were discussed by the JTC as a whole. The meeting concluded with a status update on the 2010 JTC report from Heather Leba and the development of the list of presentations to be given at the upcoming Panel meeting to be held March 29-April 2.

Meeting participants and affiliations: Meeting Attended:

* Fall only
# Spring only

Fisheries and Oceans Canada (DFO)

Sandy Johnston (JTC Co-Chair)	Patrick Milligan
Al Macleod	Al von Finster*
Bonnie Huebschwerlen	Trix Tanner#

Alaska Department of Fish and Game (ADF&G)

Carl Pfisterer (JTC Co-Chair)	Dani Evenson
John Linderman	Hamachan Hamazaki#
Bonnie Borba	Steve Hayes
Katie Howard	Heather Leba
Dayna Norris#	Audra Brase#
Tom Taube	John Burr#
Amy Marsh*	

U.S. Fish and Wildlife Service (USFWS)

Gerald Maschman
Aaron Martin#

Bureau of Land Management (BLM)

Bob Karlen

National Ocean and Atmospheric Administration (NOAA)

Jim Murphy

Association of Village Council Presidents (AVCP)

Gene Sandone

Tanana Chiefs Conference (TCC)

Paige Drobny

Lisa Kangas#

Mike Smith#

Bering Sea Fishermen's Association (BSFA)

Art Nelson#

Chris Stark*

Yukon River Drainage Fisheries Association (YRDFA)

Jason Hale#

Becca Robbins-Gisclair*

Shelley Woods#

Oasis Environmental

John O'Brien

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). The Alaska Department of Fish and Game (ADF&G) uses an adaptive management strategy that evaluates run strength in season 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 described in the annual information sheet. Before implementing this schedule, subsistence fishing would be 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 fishers for reductions to the subsistence salmon fishing schedule or to allow for a small commercial fishery contingent on how the runs develop. 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 presented 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 Chinook Salmon

The Canadian spawning escapements in 2003 and 2004, the brood years producing age-6 and age-5 fish returning in 2009, were well above average and near the 1999-2008 average, respectively. However, the run of Canadian-origin Chinook salmon in 2009 was expected to be below average to poor, with a run outlook of 60,700–71,600 fish based on anticipated low production as observed in 2007 and 2008. For comparison, the average run size from 2000 to 2008 was 97,000 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 2007 and 2008 proportions of Canadian origin fish in the total run were below average (approximately 50%) at 37% and 36%, respectively. Since recent run sizes are considered the best indicators of upcoming run size, the 2009 run outlook estimate was based on the 2007 and 2008 proportions. Using this method, the expected total Yukon River run size was 166,000 based on sibling and the Ricker models, but could be as low as 149,000. Note that there is a lot of uncertainty associated with this methodology.

The 2009 Yukon River Chinook salmon run was projected to be below average to poor with the primary concern being for a poor run of Canadian-origin fish. It was expected that subsistence conservation measures, beyond those used in 2008, would be required in an effort to share the available subsistence harvest and meet escapement goals. Before the 2009 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 event of a low run. ADF&G and USFWS staff distributed the inseason management approaches as the 2009 Yukon River Salmon Fisheries informational flyer. The resulting preseason strategy included delaying the subsistence fishing schedule, reduced subsistence fishing time by half, complete subsistence closures during the first Chinook salmon pulse, no

directed Chinook salmon commercial fishing, Federal Special Actions limiting the harvest of Chinook salmon to federally qualified rural users, and the bag and possession limit reduced in the sport fishery in Yukon River tributaries, excluding the Tanana River.

During YRDFA inseason weekly teleconferences, ADF&G and USFWS staff provided run assessment and management strategies. Subsistence fishermen provided reports on fishing efforts and were encouraged to provide input on management strategies.

Ice break up in the lower river occurred with near average timing around May 26. Persistent high water conditions affected early season subsistence fishing efforts. In response to these conditions, implementation of the reduced subsistence schedule was delayed until June 8, beginning in District 1, to allow subsistence fishermen more opportunity to harvest whitefish species and earlier returning Chinook salmon. Historically, the schedule is implemented around May 28. The reduced schedule was implemented chronologically with the upriver migration. The Coastal District subsistence schedule remained 7 days per week, but was restricted to a maximum of 6-inch mesh size beginning June 8.

The Tanana (District 6), Koyukuk and Innoko Rivers subsistence fishing schedules were not reduced because these areas do not harvest Canadian-bound Chinook salmon.

Lower Yukon Test Fishery (LYTF) indices, subsistence harvest reports, and Pilot Station sonar passage estimates provided information ADF&G used to assess the inseason salmon run. As the run progressed upriver, other projected provide additional run assessment information.

The first reported subsistence caught Chinook and summer chum salmon were reported near Emmonak on June 7. The LYTF recorded the first Chinook salmon catches on June 5.

Subsistence closures were initiated in District 1 beginning June 15 to protect the first pulse of Chinook salmon. Two subsistence fishing periods were closed and similar actions were implemented in upriver fishing districts and subdistricts based on migratory timing. Following the pulse closures, each fishing district was returned to the reduced subsistence salmon fishing schedule and remained on the reduced schedule until approximately 80% of the Chinook salmon had passed through that district. In an effort to further conserve Chinook salmon while allowing for the opportunity to target summer chum salmon, gillnets were restricted to a maximum of 6-inch mesh size when Districts 1–3 returned to the reduced fishing schedule. This gear restriction was in place for two fishing periods in Districts 1 and 2 and one period in District 3.

Effective July 1, due to the conservation concern for Chinook salmon and to provide opportunity for a directed summer chum salmon commercial fishery, the Alaska Board of Fisheries adopted an emergency regulation specifying that during the commercial summer chum salmon season in Districts 1–5 Chinook salmon taken may be retained but not sold. This emergency regulation was discontinued effective July 16 when the majority of the Chinook salmon run had passed the lower river districts.

A total of 944 Chinook salmon were reported as caught but not sold on fish tickets in District 1, 2,596 in District 2, 200 in Subdistrict 4-A and 12 in District 6.

The LYTF concluded operations on July 15 with a cumulative CPUE of 11.51, which was well below the average of 22.76. The first quarter point, midpoint, and third quarter point are June 16 (1 day late), June 22 (2 days late), and June 28 (2 days late) respectively.

The Pilot Station sonar project preliminary cumulative passage estimate from June 1 to August 9 was 122,990 Chinook salmon. The first quarter point, midpoint, and third quarter point were on June 24, June 27, and July 1 respectively.

The estimates provided by Pilot Station sonar were considered to be conservative through June 23 due to high water conditions, making assessment of the early portion of the run challenging. As the water level dropped, the ability of this project to more accurately assess the run improved. Estimates provided by LYTF were also considered to be conservative due to high water conditions and debris. Inseason management decisions incorporated this uncertainty and these values were considered conservative estimates of the true abundance of the run. Also, for this reason, fishery managers relied on an aggregate of data sources, including the LYTF, Pilot Station sonar, subsistence harvest reports, age composition data, and information on run timing and abundance from other western Alaskan stocks.

No directed Chinook salmon commercial fishery occurred in 2009. However, based on the projected average run estimate for summer chum salmon, the department initiated short commercial periods restricted to 6-inch maximum mesh size in the lower river districts directed at chum salmon beginning in District 1 on July 2. Additionally, the department attempted to schedule these chum salmon-directed commercial periods when Chinook salmon abundance was low. The incidental Chinook salmon commercial harvest was 99% below the 1999–2008 average harvest of 34,960 fish (Appendix B2).

The border passage estimate from the Eagle sonar project was approximately 70,000 Chinook salmon which was above the interim management escapement goal (IMEG) of >45,000 fish into Canada. In summary, the 2009 Chinook salmon run was below average and below the recent 10-year drainage-wide average of 99,400 Chinook salmon.

3.1.2 Summer Chum Salmon

The strength of the summer chum salmon run in 2009 was dependent on production from the 2005 (age-4) and 2004 (age-5) escapements, as these age classes dominate the run. The total run during 2004 and 2005 was approximately 1.5 and 2.5 million summer chum salmon respectively, though tributary escapements were highly variable.

Since summer chum salmon exhibit a strong every other year pattern with alternating annual dominance of age-4 fish and age-5 fish, an above average percentage of age-4 fish was expected in 2009. The 2009 run was estimated using the Anvik River brood table, sibling relationships between age-4 and age-5 fish, and the 5-year average ratio between the Anvik River and Pilot Station Sonar. It was expected that the total run in the Yukon River would be approximately 1.5-2.0 million summer chum salmon in 2009, which constitutes an average run.

The 2009 summer chum salmon run was expected to provide for escapements, support a normal subsistence harvest, and a surplus for commercial harvest. Summer chum salmon runs have exhibited steady improvements since 2001, with a harvestable surplus in each of the last 6 years (2003–2008). The commercially harvestable surplus in Alaska was expected to range from 500,000 to 900,000 summer chum salmon. However, it was likely that the actual commercial harvest of summer chum salmon in 2009 would be affected by a potentially poor Chinook salmon run, as Chinook salmon are incidentally harvested in chum salmon-directed fisheries.

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 1.28 million fish (Appendix A2). The summer chum salmon entry in 2009 was average in run timing. The first quarter point, midpoint, and third quarter point were on June 26, June 28, and July 4, respectively. The average midpoint is June 28.

Since 2007, there has been a renewed market interest for summer chum salmon in the lower river districts. Based on the projected average run estimate for summer chum salmon, the department initiated eleven short commercial periods restricted to 6-inch maximum mesh size in Districts 1 and 2 directed at chum salmon. Additionally, seven commercial periods were established in Subdistrict 4-A. Six commercial periods were established in District 6 directed at summer chum salmon, but due to high water events, fishing effort was limited. In 2009 the total commercial harvest was 170,272 summer chum salmon for the Yukon River drainage.

3.1.3 Harvest and Value

A total of 387 permit holders participated in the summer chum salmon fishery, which was approximately 33% below the 1999–2008 average of 575 permit holders. 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 376 permit holders fished in the Lower Yukon Area in 2009, which was approximately 32% below the 1999–2008 average of 555. In the Upper Yukon Area, 11 permit holders fished, which was approximately 48% below the 1999–2008 average of 21 (Appendix A4).

Yukon River fishermen in Alaska received an estimated $556,000 for their Chinook and summer chum salmon harvest in 2009, approximately 73% below the 2004–2008 average of $2.1 million. Two buyer-processors operated in the Lower Yukon Area. Lower Yukon River fishermen received an estimated average price per pound of $5.00 for incidentally harvested Chinook and $0.50 for summer chum salmon. The average income for Lower Yukon Area fishermen in 2009 was $1,425. Two buyer-processors and one catcher-seller operated in the Upper Yukon Area. Upper Yukon Area fishermen received an estimated average price per pound of $0.26 for summer chum salmon sold in the round and $3.00 for summer chum salmon roe. The average price paid for summer chum salmon sold in the round in the Upper Yukon Area was approximately 8% above the 1999–2008 average of $0.24 per pound. No Chinook salmon were sold in the Upper Yukon Area. The average income for Upper Yukon Area fishermen that participated in the 2009 fishery was $1,857.

3.1.4 Results by District

3.1.4.1 Districts 1–3

No directed Chinook salmon commercial fishery occurred in 2009. However, based on the projected average run estimate for summer chum salmon, the department initiated short commercial periods restricted to 6-inch maximum mesh size in the lower river districts directed at chum salmon beginning in District 2 on June 29. The department scheduled thirteen commercial

fishing periods in Districts 1 and 2 directed at summer chum salmon. The preliminary cumulative commercial harvest is 157,906 summer chum salmon.

A total of 131 Chinook salmon were incidentally harvested in one restricted period in District 2. The combined total harvest of all openings in Districts 1 and 2 was 316 (includes 185 Chinook salmon harvested in the fall season) Chinook salmon.

The Chinook salmon age composition from the LYTF 8.5 inch set gillnet test fishery for the season was 3% age-4, 9% age-5, 86% age-6, and 2% age-7 fish. The sample size was 1,037 fish. Age-6 fish were 20% above average. Females comprised 60% of the sample; 7% above average.

The summer chum salmon age composition from the 5.5 inch drift gillnet test fishery for the season was 1% age-3, 49% age-4, 48% age-5, and 2% age-6 fish. The sample size was 1,035 fish and females comprised 54%.

The summer chum salmon age composition from the District 1 restricted commercial harvest, periods 1 through 6, was 2% age-3, 47% age-4, 49% age-5, and 2% age-6 fish. The sample size was 957 fish and females comprised 50%.

The summer chum salmon age composition from the District 2 restricted commercial harvest, periods 1 through 7, was 1% age-3, 48% age-4, 49% age-5, and 2% age-6 fish. The sample size was 946 fish and females comprised 48%.

3.1.4.2 Districts 4–6

Limited salmon markets resulted in lower effort and subsequently lower harvest rates in District 4. The Anvik River had an escapement of approximately 182,988 summer chum salmon. The projection required to allow an inriver commercial fishery is 500,000 fish, and the Anvik River Management Area remained closed to commercial fishing in 2009.

However, a market for summer chum salmon roe existed in Subdistrict 4-A. Management of the summer chum salmon commercial fishery was dependent on the available surplus, fishing effort, and buyer input. Based upon preseason contacts with potential buyers in Subdistrict 4-A, directed commercial fishing for summer chum salmon began July 5 and was concurrent with subsistence salmon fishing periods. Additionally, the department delayed these chum salmon-directed commercial periods until more than 85% of the Chinook salmon run had passed through Subdistrict 4-A. During concurrent subsistence and commercial openings, Chinook salmon were kept for subsistence use. Approximately 200 Chinook salmon were reported as caught but not sold during commercial periods. The department scheduled four commercial fishing periods in Subdistrict 4-A resulting in a preliminary cumulative harvest of 4,589 summer chum salmon (Appendix A3).

In Subdistrict 4-A summer chum salmon commercial harvest, 381 fish were sampled. The summer chum salmon age composition from the samples was 56.1% age-4, 39.2% age-5, and 2.1% age-6. All the samples were from females.

There were no buyers interested in purchasing chum salmon roe from Subdistricts 4-B and 4-C. Additionally, no commercial fishing periods were announced for District 5 in an effort to provide adequate numbers of Canadian-origin Chinook salmon to the spawning grounds.

District 6 was managed using inseason assessment information provided by projects operated in the Tanana River drainage. Catch information observed at the test fish wheel operated near the community of Nenana and escapement estimates collected by tower counting projects on the

Chena and Salcha Rivers were used as indicators of run strength and timing. By July 24, a harvestable surplus of summer chum salmon was identified. Based on the available surplus and market interest, the department scheduled the first commercial fishing period to target chum salmon in District 6 on July 25. The department scheduled six commercial fishing periods in District 6 and the preliminary cumulative harvest was 7,777 summer chum salmon (Appendix A3).

In the District 6 summer chum salmon commercial harvest, 679 fish were sampled. The summer chum salmon age composition from the samples was 71.1% age-4, 23.6% age-5, and 1.3% age-6. The percentage of females was 55.9%.

3.2 FALL CHUM AND COHO SALMON

The State of Alaska manages fisheries based on the guidelines established in the *Policy for the Management of Sustainable Salmon Fisheries.* The *Yukon River Drainage Fall Chum Salmon Management Plan* (Appendix A6) incorporates the U.S./Canada treaty obligations for border passage of fall chum salmon and provides guidelines necessary for escapement and prioritized uses. There are incremental provisions in the plan to allow varying levels of subsistence salmon fishing balanced with requirements to attain escapement objectives. Commercial fishing is generally only allowed on the portion of the surplus above the upper end of the drainage-wide biological escapement goal (BEG) range of 300,000 to 600,000. The intent of the plan is to align management objectives with the established BEGs, provide flexibility in managing subsistence harvest when the stocks are low, and bolster salmon escapement as run abundance increases. The extremely pulsed entry pattern of fall chum salmon and the run size disparity between fall chum salmon with overlapping coho salmon runs add to the complexity of Yukon River fall season management.

3.2.1 Fall Chum Salmon Management Overview

The estimated inseason summer chum salmon run size and preseason projection of fall chum salmon influences early fall season management. However, the Pilot Station sonar project is the primary inseason assessment tool used for fall season management. Pilot Station sonar provides daily passage estimates of fall chum salmon that are used to derive inseason run size projections that, in turn, trigger management actions as dictated by the fall chum salmon management plan. Additional lower river index projects, including the drift gillnet test fisheries located at Emmonak (operated by ADF&G and cooperators) and Mountain Village (operated by Asacarsarmiut Traditional Council), provide run timing information. Relationships in run timing and run strength from the various index projects, as well as subsistence fishing reports, are compared for consistency with the Pilot Station sonar estimates as a method to check that all projects appear to be operating correctly. Individual pulses are tracked as they move upriver and Pilot Station sonar is used to estimate the abundance of each pulse (Figure 3).

In 2009 Pilot Station sonar daily passage estimates and the other assessment projects in the Lower Yukon Area correlated well for fall chum salmon run timing, but less well for relative magnitude, particularly during the third pulse. There was concern that extremely low water levels were changing fish movement patterns and therefore the sonar beam range was extended to include a total of 300 meters offshore on the left bank. The 2009 fall chum salmon passage estimate is thought to be conservative due to difficulties test fishing and apportionment issues. If fall chum salmon passage was underestimated due to species apportionment difficulties, then the affect may have resulted in over-estimation of coho salmon and other non-salmon species.

Although there was concern for poor production of the age-4 component of the run, the sheer size of the primary parent year escapement in 2005 was taken into account and the preseason management strategy to begin the fall season using the pre-2001 subsistence fishing regulations in accordance with the management plan was implemented on July 16. Subsistence fishing in the Coastal District and Districts 1, 2, and 3, was open 7 days a week, 24-hours a day except for closures of 12-hours before, during, and 12-hours after each commercial salmon fishing period. The Innoko River was open 7 days per week and pre-2001 subsistence salmon fishing regulations were applied in the Upper Yukon Area.

The run size projection, along with 2009 commercial buyers willing to purchase fish harvested during the overlap of summer and fall chum salmon, resulted in a continuation of commercial fishing periods immediately following the summer season. The harvests took advantage of unusually good quality late summer chum salmon when they were mixed with overlapping early fall chum salmon. The relationship between the summer and fall chum salmon runs suggested the fall run would perform similarly and thereby provided confidence that there would be surplus fall chum salmon available for commercial harvest.

Districts 1, 2, Subdistricts 5-B and 5-C, and District 6 had commercial buyer commitments prior to the season. The first fall season commercial fishing periods began on July 17 in District 1 and July 20 in District 2. Commercial fishing periods continued to be scheduled in both District 1 and District 2 until August 5 and August 3, respectively. Fall chum salmon were harvested commercially prior to and during the first small pulse of fish. Seven commercial fishing periods were opened, four in District 1 and three in District 2 through August 5. The Pilot Station sonar cumulative estimate through August 5 of 57,000 fish was well below the historical average of 243,000 fall chum salmon for that date of operation. According to the management plan, additional fish were needed to achieve the run passage necessary to support normal escapement and meet subsistence requirements before additional commercial harvest could take place. Consequently, commercial fishing activity was suspended.

The first small pulse of approximately 37,000 fall chum salmon began entering the mouth of the river on July 30 and lasted 2 days. A second more significant pulse of salmon began entering the mouth of the Yukon River on August 8. The Pilot Station sonar estimated the pulse to be approximately 104,000 fall chum salmon. The third pulse was small and represented only 18,000 fall chum salmon passing on August 21–22. As of August 30, the cumulative fall chum salmon passage was estimated to be a record low of approximately 211,000 fish by the Pilot Station sonar, which is well below the average of 652,000 for that date (Figure 3). The 90% confidence interval around the point estimate suggests the passage could range from 176,000 to 247,000 fall chum salmon.

Annual reconstruction of previous runs suggests the point estimate based on Pilot Station sonar is typically conservative and therefore run passage was estimated to be near the upper end of the estimated range. Furthermore, during August and early September, unusually shallow water on the left bank sonar site appeared to be causing salmon to spread out and migrate farther offshore. Fish detection did not appear to be a problem, but the sonar range was extended to watch for fish possibly passing further offshore. Additionally, species apportionment was problematic due to very low test fish catches: some days there was no catch of fall chum salmon. Because most of the few fish caught on the left bank were coho salmon and whitefish, counts may have been underestimated for fall chum salmon on the left bank. Attempts were also made to test fish below and above the left bank sonar site to increase test fishing catches. Additionally, local fishermen

were contracted to conduct drifts with longer gillnets in an effort to determine fish distribution. Flat Island, Big Eddy, and Middle Mouth, as well as Mountain Village test fisheries and subsistence catch reports, indicated a higher proportion of coho to fall chum salmon. Taking this into account, the fall chum salmon run abundance was assessed to be weak with a projected run size of 300,000 to 325,000 fish inseason.

Concerns for achieving escapement goals prompted reductions in subsistence fishing time in the lower river in an effort to attain most goals while continuing to provide opportunity to harvest the more abundant coho salmon. Similar management actions of reducing fishing time by one third of the standard windows schedule were applied sequentially as the salmon moved upstream. Subsistence fishing time in Districts 1, 2, and 3 was reduced to a schedule of two 24-hour periods per week on August 18 and returned to their 7 day per week schedule on September 3. Subsistence fishing in the Coastal District and the Innoko and Koyukuk River drainages remained open 24 hours a day, 7 days a week because of low fishing effort and inefficient fishing conditions in these areas. District 4 began a reduced schedule of two 32-hour periods per week on August 27 and went to 7 days per week on September 9. Subdistricts 5-A, 5-B, and 5-C began a reduced schedule of two 32-hour periods per week on September 2, returned to a schedule of 5 days a week on September 15, and opened to 7 days per week on September 27. The lower portion of Subdistrict 5-D, including the Porcupine River, Fort Yukon, Beaver, and Stevens Village, began a reduced weekly fishing schedule of 4.5 days per period on September 6 and returned to 7 days per week on September 23. The upper portion of Subdistrict 5-D, including the communities of Circle, Central, and Eagle, began a reduced weekly fishing schedule of 4.5 open days per period on September 15 and returned to 7 days per week on September 25. District 6 began a reduced weekly fishing schedule of two 28-hour periods per week on September 4 and returned to two 42-hour periods per week on September 18. Additionally, personal use salmon fishing in the Tanana River closed September 2 and reopened on September 18. The retention of chum salmon in the sport fishery was prohibited in both the Yukon and Tanana river drainages on September 4 and continued for the remainder of the season.

Most assessment projects indicated the third pulse was relatively small, however test fishing at Pilot Station sonar suggested even fewer fall chum salmon were present with a higher proportion of coho salmon. The Pilot Station sonar cumulative total estimate of fall chum salmon for the 2009 season was approximately 240,000 fish through September 7, the last day of operation (Appendices A2 and B13). Based on the uncertainties, the estimated fall chum salmon run size at Pilot Station sonar was considered conservative, and the inseason run size estimate was increased to a range of 316,000 to 336,000 based on historical average run sizes for coho salmon and other fish species. The delayed arrival of the first pulse, which occurred after the average first quarter-point in run timing, resulted in the run shifting 7 days late at the first quarter point, 2 days late at the midpoint, and average timing at the three-quarter point. The magnitude of pulse three was small at Pilot Station sonar but appeared to sustain itself longer than expected past upriver projects even with fish migrating through a high water event between pulses 2 and 3 in the upper river.

Run reconstruction based on upriver projects appears to substantiate an under estimated abundance of fall chum salmon at Pilot Station sonar and possible over estimation of coho salmon. Because of known difficulties in catching fish at the Pilot Station sonar site, mixed stock analysis (MSA) samples may not reflect the stock composition as well as in previous years and there is little confidence they adequately represented the run.

After the majority of the fall chum salmon passed the lower Yukon River districts, commercial fishing was once again initiated (September 6 in District 1) to take advantage of the average to above average and later run timing coho salmon stock. The Tanana River is managed under the *Tanana River Salmon Management Plan*, which provides guidelines to manage District 6 as a terminal fishery based on the assessed strength of the stocks in the Tanana River drainage. Commercial fisheries also occurred in District 6 and the harvest was completely comprised of female salmon with the primary product bound for roe markets. A total of four commercial periods were scheduled in District 6 from September 18 to September 30. Subsistence and personal use fishing was open concurrent with the commercial fishing periods. Personal use periods in Subdistrict 6-C remained on the two 42-hour fishing periods per week while subsistence fishing in Subdistricts 6-A and 6-B was relaxed to 7 days a week effective October 1, in accordance with the management plan at the close of the commercial fishing season. The Tanana River commercial harvest of 1,286 fall chum salmon (Appendix A3) was below the guideline harvest range (GHR) of 2,750 to 20,500. The male portion of the harvest was reported as "caught but not sold", subsequently used for subsistence, and was not counted towards the commercial harvest. Additionally, female carcasses from the roe fisheries were available for subsistence use.

Overall, the fall season fishery was extremely challenging. The fall chum salmon pulses were spread out over the length of the season, separated with long durations of low passage rates of fish entering the river and relatively small pulses, which made inseason run size projection difficult in 2009. Management struggled between meeting escapement needs and providing opportunity for subsistence fishing during the entire second half of the fall chum salmon run. The estimated overall harvest resulted in an exploitation rate (approximately 17%) that was equal to the recent 10 year average from 1999-2008 and slightly more than one half the previous 1989–1998 10-year average of 31%. The amount of commercial opportunity was low and fragmented with moderate effort while subsistence opportunity was restricted for a portion of the season. The drainage-wide escapement is anticipated to be within the targeted range and, although the border commitments were met along with most tributary escapement goals, it was the reduced overall harvest that provided the necessary escapement levels.

3.2.2 Coho Salmon Management Overview

The 2009 coho salmon run was managed to provide for escapement needs, as well as subsistence, personal use, and commercial harvests. However, the commercial harvest was dependent to a large extent upon the abundance of fall chum salmon and the accompanying management strategies. The coho salmon outlook for 2009 was for a continuation in the trend of average to above average runs. Subsistence harvests were expected to be below average because of low effort and a potential commercial harvest of 30,000 to 70,000 fish was anticipated.

The coho salmon run exhibited slightly early run timing (by 2 days for most assessment projects), with an above average run size based on Pilot Station sonar (Figure 8). Test fishery projects at Emmonak, Mountain Village, and in the Tanana River provided similar assessment of run timing, but all test fishery projects were below average in relative abundance. The Pilot Station sonar cumulative passage estimate through September 7 of 205,000 coho salmon is well above the average of 163,000 for this date but is suspected to be an over-estimation (Appendices A2 and B14). Department and cooperating fishermen conducted additional test fishing to supplement assessment project information. Additional catches agreed with other assessment projects: coho salmon abundance was high relative to fall chum salmon, which

typically dominate the fall season. Because of species apportionment difficulties at the Pilot Station sonar site, the overall postseason assessment of coho salmon run size is not considered to be above average.

On September 6, commercial fishing in the District 1 was reopened in an attempt to harvest coho salmon after most of the fall chum salmon had passed this location although this action was not specified within the *Yukon River Coho Salmon Management Plan*. Additionally, on September 8, 2009, the Alaska Board of Fisheries (BOF) responded to a request for an emergency regulation and met by teleconference to discuss the same issue. The BOF passed an emergency regulation to allow for a directed coho salmon commercial fishery if ADF&G determined that there was a harvestable surplus above escapement needs and those necessary for subsistence uses and that a directed coho salmon commercial fishery would not have a significant impact on escapement or allocation of fall chum salmon. The BOF action affirmed fishery managers' decision to open the late-season coho salmon commercial fishery. The resulting harvest averaged 77% coho salmon during the late season commercial fishing periods in the lower river districts. In the upper river, four commercial fishing periods were announced for District 6 after September 18, when the majority of fall chum salmon had passed. The potential for commercial harvests of coho salmon would have been greater in 2009 if not for the fall chum salmon conservation concerns and actions.

3.2.3 Harvest and Value

The 2009 total commercial harvest for the Yukon River fall season included 25,269 fall chum and 8,026 coho salmon for the Alaskan portion of the drainage (Appendix A3). A total of 23,983 fall chum and 7,569 coho salmon were harvested in the Lower Yukon Area and 1,286 fall chum and 457 coho salmon were harvested in the Upper Yukon Area. All salmon were sold in the round and no salmon roe was sold separately. However, in District 6, whole female salmon were selectively purchased for roe extraction during the fall season. The 2009 Yukon Area fall chum salmon commercial harvest was approximately 71% below the previous 10-year average (1999-2008) of 85,732 fish and 78% below the 10-year average of 35,799 coho salmon (Appendices B4 and B5).

There were 10 fall season commercial fishing periods in the Yukon River Districts 1 and 2 combined (seven periods in District 1; 3 periods in District 2). After the halt of commercial fishing in August, buyers were only available in District 1 when fishing reopened in September. Period length varied from 6 to 10 hours in District 1 and from 4 to 9 hours in District 2. No periods were scheduled in District 3 and 4 due to the lack of a market and District 5 due to conservation measures. In the Tanana River, District 6, there were four 42-hour commercial salmon fishing periods September 18 through September 30.

The preliminary 2009 commercial fall chum and coho salmon season value for the Yukon Area was $164,400 ($162,700 for the Lower Yukon Area, $1,700 for the Upper Yukon Area) (Appendix A5). The previous 5 year average value for the Yukon Area was $344,700 ($312,000 for the Lower Yukon Area, $32,700 for the Upper Yukon Area). Yukon River fishers received an average price of $0.70 per pound for fall chum salmon in the Lower Yukon Area and $0.19 per pound in the Upper Yukon Area in 2009. This compares to the 1999–2008 average of $0.28 per pound in the Lower Yukon Area and $0.16 per pound in the Upper Yukon Area. For coho salmon, fishermen in the Lower and Upper Yukon Areas received an average price of $1.00 per pound and $0.15 per pound compared to the recent 10-year average price of $0.39 and $0.12 per pound, respectively (Appendix A5).

Fishing effort has increased in recent years (Appendix A4). A total of 294 fishermen participated in the 2009 fall chum and coho salmon fishery (292 for the Lower Yukon Area, 2 for the Upper Yukon Area) compared to the recent 10 year average of 167 permit holders (160 for the Lower Yukon Area, 7 for the Upper Yukon Area). Even though the effort appears higher than average, participation is concentrated around a few buying stations rather than spread throughout the drainage as it was prior to 1997.

4.0 COMMERCIAL FISHERY–CANADA

4.1 CHINOOK SALMON

The commercial fishery was closed throughout most of the 2009 Chinook salmon season. A total of 364 Chinook salmon were harvested during two commercial fishery openings (Appendix A7). The average commercial Chinook salmon catch for the 1999–2008 period was 2,582. In 2009, the inseason run status of the Chinook salmon return resulted in commercial fishing opportunities taking place very late in the fishing season. Since 1997, there has been a marked decrease in commercial catch of Upper Yukon River[1] Chinook salmon, resulting from a limited market as well as reduced fishing opportunities in some years due to below average run sizes.

Canadian upper Yukon River commercial harvests for the 1961 to 2009 period are presented in Appendix B7. In 2009, 18 of 21 eligible commercial fishing licenses were issued. Eighteen commercial licenses were issued in 2008, 17 in 2007, 20 in 2005 and 2006, and 21 in 2003 and 2004.

The total run size of Canadian-origin upper Yukon River Chinook salmon in 2009 was expected to be below average. Although the preseason outlook range was 89,500 to 99,800 Chinook salmon, the outlook range was reduced to a range of only 60,700 to 71,600 to reflect a recent trend where actual runs were lower than the preseason outlooks.

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). The Yukon River Panel accepted the JTC recommendation for a minimum Interim Management Escapement Goal (IMEG) of >45,000 Canadian-origin upper Yukon Chinook salmon in 2009. Following meetings with the Yukon Salmon Sub-Committee (SSC)[2], this goal was adopted by DFO and included in the 2009 Integrated Fisheries Management Plan (IFMP) for Yukon River Chinook salmon in Canada. This is the second year that this IMEG has been used. In 2009, the success of achieving this 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 2009 were dependent upon inseason assessments of run strength. As in previous years, a Chinook salmon decision matrix was developed preseason following consultation with the SSC and included as part of the IFMP. The decision matrix provided detailed

1 The Upper Yukon River is defined as the Canadian portion of the Yukon River drainage excluding the Porcupine River drainage.

2 The Salmon Sub-Committee (SSC) is a public advisory body set up under the Umbrella Final Agreement. The Committee's main concern is the conservation of Yukon salmon stocks. With this guiding principle in mind, this Committee may make recommendations to the Minister of Fisheries and Oceans and/or to Yukon First Nations on all matters related to Yukon salmon.

guidance for the management of fisheries linked to specific inseason run abundance levels. The 2009 decision matrix summarized the management reference points, general allocation plans, and anticipated management responses under different run size scenarios (Table 1).

It is important to note that the incorporation of a minimum escapement goal of >45,000 in 2009 resulted in the following decision thresholds:

i. The recreational, commercial and domestic fisheries would not open unless it was expected that the border escapement would be greater than 54,000 Chinook salmon based on the Eagle sonar program. A border escapement of this magnitude 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 19,000 to 54,000 range. All other fisheries, with the exception of the test fishery, would not be permitted to target Chinook salmon; and
iii. Closures in First Nation fisheries would be expected if the run projection was <19,000. Test fishing could occur within the RED ZONE for assessment purposes.

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

Table 1.–2009 Inseason fishery management decision matrix for Upper Yukon Chinook salmon.

	Border Escapement Projections	Fishery	Guideline Harvest	Anticipated Management Action
RED ZONE	<11,000	All	0	No fishing; assessment test fishery closed.
	11,000–19,000	TF	1000	Assessment test fishery only: fish to be distributed by Tr'ondëk Hwëch'in FN.
		FN	0	Closures considered.
		CF	0	Closed.
		RF	0	Closed, i.e. Chinook salmon quota varied to zero.
		DF	0	Closed.
YELLOW ZONE	19,000–54,000	TF	1000	
		FN	0 to 8,000	Catch target to vary with abundance within zone: 0 at run size of 19,000; 8,000 catch at run of 54,000. 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	>54,000	TF	0	Not required. Assessment data collected through commercial fishery.
		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.				

In recent years, the opening of the commercial fishery has frequently been delayed in response to conservation concerns and/or uncertainties concerning the status of the run. Although assessment

of the 2009 Chinook salmon run was based on information from the Eagle sonar program, there was a desire by DFO to continue the mark–recapture program for comparative information for a final year. However, a flood which occurred in early May 2009 damaged the DFO tagging camp, and it was not possible to conduct the tagging program.

4.1.3 Upper Yukon Chinook Salmon Decisions and Management

Early in the 2009 season, information from the U.S. test fishery at Emmonak and the Pilot Station sonar program on the lower Yukon River suggested that the 2009 run would be similar to the reduced preseason outlook range (60,700 to 71,600 Chinook salmon). Further upriver, as the run was migrating into Canada, inseason border escapement run projections were usually produced twice weekly based on data from the Eagle sonar estimate. Early season run size projections can be very sensitive to the run timing information used because the early timing information represents a very small proportion of the total run. 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 scenarios.

In 2009, the inseason Chinook salmon run projections were consistently within the Yellow Zone, and were well below the decision threshold that would have triggered a commercial fishery. Consequently, the Chinook salmon commercial fishery was closed throughout most of the 2009 season. Towards the end of July, the run size projections increased into the Green Zone resulting in two commercial fishery openings: from July 30–31 (1.5 days); and from August 2005–2007 (2.0 days). A total of 364 Chinook salmon were harvested (Appendix A7). For comparison, the previous 10–year average (1999–2008) commercial catch was 2,582 Chinook salmon (Appendix B7). The average does not include years 2000, 2007 and 2008, when the fishery was closed; however, it includes very low catches in 1998 and 2002 when the commercial fishery was severely restricted.

4.2 Fall Chum and Coho Salmon

Below average run strength and late timing resulted in limited opportunities for commercial fishery openings during the fall chum salmon season. Only 293 fall chum salmon were harvested in the commercial fishery (Appendix A7). 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.

Canadian upper Yukon River commercial fall salmon harvests for the 1961 to 2009 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 2009 was a run of 150,000 to 240,000 fish. A run near the lower end of this range would constitute a below average run, whereas, a run near the upper end of this range would constitute an above average run.

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 adopted the JTC recommendation for an escapement goal of >80,000 fall chum salmon in 2009. This is the same goal as was used from 2006 to 2008 (Appendix A19). 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 for the management of upper Yukon chum salmon and included in the 2009 IFMP was the same as the matrix used from 2006 to 2008 (Table 2). The Red Zone included run projections of less than 40,000 fall chum salmon when closures in all fisheries except for a live release test fishery could be expected. The Yellow Zone included run projections within the 40,000 to 83,000 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 included run size projections greater than 83,000 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 escapement goal (>80,000) 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 2.–Inseason fishery management decision matrix for Upper Yukon fall chum salmon.

	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	40,000-83,000	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	>83,000	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 run size to the upper Yukon River drainage. These data have been useful in recent years since it provides 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 2009, projections from the Eagle sonar program were used for the second year for inseason management. Prior to 2008, the Canadian inseason management regime was based primarily on the DFO tagging program. The 2009 upper Yukon fall chum salmon run was late and very difficult to assess.

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 as those for Chinook salmon. It was apparent early in the 2009 season that it would likely be very late in the fall season before the upper Yukon run would be of sufficient strength to offer commercial fishing opportunities, if at all.

As per the decision matrix, a "border escapement" projection of >83,000 was required before fishing opportunities were provided in the commercial fishery. Since it was anticipated the Alaskan subsistence fishery upstream of the Eagle sonar program would take about 15,000 chum salmon, a projection of >98,000 at the Eagle sonar site was required to meet the border escapement objective. The average subsistence catch above the Eagle sonar program from 2006 to 2008 was 16,500, with a range from 13,000 to 18,700.

Appropriate management actions were taken to ensure that the conservation objective (>80,000 escapement goal) was achieved. Run projections prior to October 6, the date the Eagle sonar program ended, were consistently within the Yellow Zone resulting in the commercial fishery being closed. As the sonar program ended, it was apparent that the daily estimates were sufficiently high that run projections would soon fall within the Green Zone resulting in limited fishing opportunities. The commercial and domestic fisheries were opened for 4 days from October 8–12 which is exceptionally late in the season for the first opening of these fisheries.

The total 2009 commercial fall chum salmon catch of 293 fish was only 4.8% of the 1999 to 2008 average of 6,058 (Appendix B8). Within the 1999–2008 period, the commercial fall chum salmon catch ranged from 1,319 in 2000, when 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. License holders use most of the catch to feed their personal sled dog teams. This situation could change with the 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 2009 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 Yukon Area in May and in the Upper Yukon 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 two 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 Yukon Area are primarily utilized for human consumption and are also dried, smoked, or frozen for later use. In the Upper Yukon 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).

Concerns about a weak Chinook salmon run, particularly the Canadian bound stocks, prompted development of a modified subsistence salmon schedule; to begin approximately 7 days after ice out in Alakanuk and implemented chronologically as salmon migrated upstream. 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.* Ice out occurred on May 26 in Alakanuk, which was near average timing. However, spring flooding and slowly receding high water affected early fishing efforts, and implementation of the reduced schedule was delayed until June 8 in District 1. The schedules for the Coastal District and the Tanana, Koyukuk, and Innoko rivers remained open on their regulatory schedules (7 days a week), as these areas do not harvest Canadian-bound salmon.

To protect the first pulse of Chinook salmon, two subsistence fishing periods were closed in District 1, and similar actions were enacted in upriver districts. Based on inseason estimates of a poor abundance of Chinook salmon, further conservation measures were enacted in Districts 1–3 by restricting gillnets to a maximum of 6-inch mesh for a portion of the subsistence and commercial openings. Incidental harvests of Chinook salmon during summer chum salmon commercial openings were to be shared with households falling short of their harvest goals, however, some fishermen turned them over to the buyer to be processed and shipped to up river communities in need. Chinook salmon run assessment to the Tanana River was judged to be strong enough to achieve escapement and subsistence obligations and provide a commercially harvestable surplus of less than 1,000 Chinook salmon.

The preseason run size projection and the inseason relationship between summer and fall chum salmon suggested that fall chum salmon subsistence and escapement goals would be met with some limited commercial fishing opportunity. Therefore, the inseason management strategy was to continue the pre-2001 subsistence summer fishing schedule during the fall season. Coho

salmon preseason abundance was assessed as being average to above average, sufficient to meet escapement objectives, and able to provide for additional subsistence and commercial salmon fishing opportunities. However, as the season progressed, low abundance and concerns for meeting escapement goals led to a more conservative management approach. Subsistence fishing time in the lower river was reduced by one third with similar restrictions implemented as the salmon migrated upriver. Fall season subsistence openings were resumed sequentially as fall chum salmon left each area and commercial fishing directed at coho salmon was prosecuted in District 1 in September and in District 6 as a terminal harvest area.

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.

In 2009, inseason fishermen's reports suggested that most Yukon Area subsistence fishing households did not meet all their subsistence needs for salmon. The poor 2009 Chinook salmon and fall chum salmon runs resulted in management actions that reduced subsistence salmon fishing opportunities during both fishing seasons. Closures on the first pulse and fishing restrictions in the mainstem Yukon River were mentioned by some fishermen on tributary rivers as contributing to good abundance and better quality of Chinook salmon in their areas.

Generally, surveyed households in the lower Yukon River and in some middle Yukon River communities fared better in harvesting Chinook and summer chum salmon than the upper mainstem Yukon River and tributary communities. During the fall season, surveyed households in most communities drainage-wide equally indicated that their fall chum and coho salmon subsistence needs were not met.

Other 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, fishing took place during poor weather conditions for fish preservation. Additional factors contributing to the inability to meet subsistence salmon needs included fuel shortages, high fuel prices, health, elders unable to fish, lack of fishing gear, participating on fire-fighting crews, and mechanical problems. Flooding during breakup in 2009 affected many communities along the river. Some communities lost fish wheels or other gear, and fishermen may have spent time and resources cleaning up flood damages. In response to the low Chinook salmon run, Federal Special Actions restricted Chinook salmon harvest in waters adjacent to federal lands to federally qualified rural users. This resulted in confusion as to where federal waters were located and how non-federally qualified users could participate in family fishing activities.

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 affect of the management actions taken to meet escapement needs 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 (Busher et al. 2009). Typically 33 communities are surveyed following the salmon

fishing season beginning in early September and continuing through early November. 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 one of five 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. Data obtained from subsistence permits are added to the total estimate of the subsistence salmon harvest provided by the survey portion. 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 1,500 households annually in the non-permit portions of the Yukon River drainage. Calendars supplement the survey information, assist households in recounting their catches when surveyed, and also provide harvest timing information by fish species.

Data compilation of the 2009 survey and subsistence permit information is ongoing. A summary of preliminary results as of February 19, 2010 is presented below. In 2009, 1,272 households were selected to be surveyed and a preliminary estimate of 1,151 households fished for salmon from 33 communities (including the Coastal District communities of Hooper Bay and Scammon Bay). Additionally, 419 subsistence permits were issued and 399 household subsistence permit holders reported to have fished for salmon and other non-salmon fish species in portions of the Yukon Area drainage requiring a permit. The preliminary 2009 estimated subsistence salmon harvest in the Alaska portion of the Yukon River drainage totaled approximately 33,000 Chinook, 79,100 summer chum, 63,000 fall chum, and 15,500 coho salmon (Deena Jallen, Yukon Area Commercial Fisheries Biologist, ADF&G, Fairbanks; personal communication). Included in the estimated total subsistence harvest are 2,217 Chinook, 4,051 summer chum, 770 fall chum, and 579 coho salmon distributed for subsistence use from the various test fish projects. The recent 5 year average (2004–2008) subsistence salmon harvest is estimated at 51,611 Chinook, 93,138 summer chum, 83,472 fall chum, and 21,297 coho salmon (Appendices B2–B5) 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.

The management area known as Subdistrict 6-C is completely within the Fairbanks Nonsubsistence Area and therefore falls under personal use fishing regulations. Personal use salmon and 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 2009 personal use permit information is ongoing and preliminary results as of February 19, 2010 are as follows. In 2009, the personal use salmon fishery followed the regulatory fishing time of two 42-hour periods per week except during the time period September 3–17 when it was closed to conserve fall chum salmon with precedence for subsistence fisheries and escapement requirements. A total of 57 personal use salmon and 11 personal use whitefish and sucker household permits were issued. The 2009 preliminary harvest results based on 67 of 68 (99%) personal use household permits returned in Subdistrict 6-C included 127 Chinook, 308 summer chum, 78 fall chum, and 70 coho salmon (D. L. Norris, Yukon Area Fall Season Assistant Management Biologist, ADF&G, Fairbanks; personal communication). The recent 5 year (2004–2008) average personal use harvest was 138 Chinook, 193 summer chum, 210 fall chum, and 161 coho salmon (Appendices B2–B5) in the Yukon River drainage. In addition, personal use permit holders reported harvesting 48 whitefish, 1 sheefish, and 315 suckers.

5.1.3 Sport Fishery

Sport fishing effort for anadromous salmon in the remainder of 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 fishers, 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.

Most of the drainage's sport fishing effort occurs in the Tanana River drainage along the road system. From 2004–2008 the Tanana River on average made up 79% of the total Yukon River drainage Chinook salmon harvest, 36% of the summer chum salmon harvest, and 51% of the coho salmon harvest. 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.

In 2009, an Emergency Order was issued on May 28 that reduced the sport fish daily bag and possession limit from 3 to 1 Chinook salmon on the Alaskan portion of the Yukon River tributaries (excluding the Tanana River drainage) and prohibited the retention of Chinook salmon in the mainstem Yukon River. On September 1 two Emergency Orders were issued to close all waters of the Yukon and Tanana river drainages to the retention of chum salmon. All of these actions remained in effect throughout the entire 2009 salmon season.

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 2009 harvest estimates will not be available in this report. The total 2008 sport harvest of salmon in the Alaskan portion of the Yukon River drainage (including the Tanana River) was estimated at 409 Chinook, 371 summer chum, and 341 coho salmon (Appendices B2, B3, and B5). The recent 5 year (2004–2008) average Yukon

River drainage sport salmon harvest was estimated at 821 Chinook, 367 summer chum and 838 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 2006–2008, guided sport harvests in the Yukon River drainage (excluding the Tanana River drainage) averaged 98 Chinook and 246 coho salmon (Sigurdsson and Powers 2009).

5.2 CANADA

5.2.1 Aboriginal Fishery

In 2009, 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, one to three times weekly. In most cases, weekly summaries were completed by the surveyors and e-mailed to the Department of Fisheries and Oceans Canada (DFO) office in Whitehorse. Late or incomplete information was obtained postseason and reviewed by First Nation staff in conjunction with DFO.

Based on a preseason outlook for a below average to poor run of 60,700 to 71,600 upper Yukon River Chinook salmon in 2009, the Yukon River Panel was advised that it was prudent to consider that conservation measures would likely be required in Canadian fisheries (i.e. commercial, domestic and recreational fisheries). DFO hosted 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. Using the decision matrix described in Section 4.1.2 (Table 1), DFO recommended that Yukon First Nations reduce their Chinook salmon harvest to one half to three-quarters of recent levels by developing individual community harvest plans. In response to this, management strategies were developed by individual communities to meet the recommended harvest guideline. Approaches to reductions in harvest varied, but generally the First Nations accepted the harvest guidelines provided by DFO and implemented harvest monitoring measures in order to stay within or below the recommended guidelines. Overall, the combined total season harvest by the aboriginal fishery on the upper Yukon River (3,791) fell short of the recommended guideline harvest of 4,000 to 6000 Chinook salmon.

As inseason information became available it was apparent that the 2009 border escapement would be met and the aboriginal fisheries could operate as a normal, unrestricted fishery. Yukon First Nations were notified on July 22 that the Chinook salmon run would support a full fishery. Fish harvesters and First Nation staff commented that the Chinook salmon run was stronger in 2009 than in recent years. Unfortunately, the majority of camps decided not to open given the preseason outlook and the needs of Yukon aboriginal communities were not met in 2009.

In 2009, the upper Yukon River aboriginal Chinook salmon catch was 3,791, 36% below the recent 10-year average (1999–2008) of 5,922 fish but 31% above the 2008 total of 2,885 fish (Appendix B7).

The 2009 harvest recorded by Tr'ondëk Hwëch'in in the Dawson area was 957 Chinook salmon and was 5% below the recent 10-year average. Ross River Dena Council, fishing on the upper Pelly River, reported a harvest of 188, 34% below their 1999–2008 average. The harvests reported by Selkirk First Nation in the Pelly area and Little Salmon Carmacks First Nation in the Carmacks area, normally the two largest aboriginal fisheries in the mid-area of upper Yukon River drainage, were 921 and 495 salmon, respectively; these catches were 38% and 69% below the 1999–2008 averages of 1,476 and 1,609 fish, respectively. Both of these communities limited their fishing effort by encouraging citizens to reduce the total time that their remote camps were in operation. An above average catch was reported by the First Nation of Na-Cho Nyäk Dun on the Stewart River; the 2009 harvest was 932 Chinook salmon, slightly above the 1999–2008 average of 833 fish. The Teslin Tlingit Council (TTC) reported a total of 190 Chinook salmon, 70% below the 1999–2008 average of 634 fish. The Ta'an Kwach'an Council (TKC), fishing in the vicinity of Lake Laberge near Whitehorse, reported a catch of 108 Chinook salmon, 40% above the recent 10-year average of 77. The increase in harvest from TKC was largely due to the creation of a culture camp.

For upper Yukon River fall chum salmon, there was uncertainty concerning the 2009 preseason run projection, although First Nation fishing restrictions were not expected. As inseason information became available it became apparent that the run was weaker than anticipated and restrictions were imposed on Upper Yukon First Nation fisheries. 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 2.

The 2009 Upper Yukon River fall chum salmon harvest in the aboriginal fishery totaled 820. The Tr'ondëk Hwëch'in First Nation fishery in the Dawson area, reported 610 fall chum salmon plus a donation of another 200 that resulted from of an enforcement action (Appendix B8). The total for Dawson of 810 is 57% lower than the previous 10-year average of 1,879 fall chum salmon. Little Salmon Carmacks reported a harvest of 10 fall chum salmon. In 2009, the Selkirk First Nation at Pelly Crossing reported a zero harvest, although historically both Carmacks and Pelly regularly harvested a significant amount of fall chum salmon. There is an ongoing effort to finalize the 2009 fall chum salmon catch data. The recent catch of fall chum salmon in the Pelly and Carmacks areas were 433 and 460, respectively; these averages were derived from a 7-year harvest study conducted by LGL Limited from 1996 to 2002. Data from the Yukon River Drainage Basin Harvest Study were chosen to calculate average catches for Pelly and Carmacks because the reporting of chum salmon harvests from these communities has been inconsistent and/or incomplete since 2003.

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. This year, the Vuntut Gwitch'in Government (VGG) also conducted intensive door to door surveys, post season.

To address conservations concerns for Chinook salmon within the Porcupine River drainage, DFO and the Vuntut Gwitch'in Government closed the fishery for an extensive period in July, except for two short openings when the community was able to harvest 461 Chinook salmon. This is 88 % above the 10-year average of 245 Chinook salmon.

Preseason run-size forecasts indicated that conservation measures might be required for Porcupine River chum salmon. Inseason information from the CPUE program, the Fishing

Branch River weir and projects elsewhere in the Yukon River drainage indicated that restrictions in the Old Crow aboriginal fishery were required to address conservation concerns. The Porcupine River fall chum salmon fishery closed at 1200 hours (noon) September 21 and was expected to be closed until noon October 5; however, due to a late surge of fish at the Fishing Branch River weir, restrictions were lifted at noon October 1.

Unfortunately, VGG citizens were not able to fulfill their needs in 2009. A total of 898 fall chum salmon was reported in the Old Crow aboriginal fishery, 75% below the 1999–2008 average harvest of 3,575[3] chum salmon.

There was zero harvest of coho salmon on the Porcupine River in 2009 compared to the 1999-2008 average of 228 fish.

5.2.1.1 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. Fisheries and Oceans Canada 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. 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 (Smsy)) tends to overlap with the historical spawning escapement range. This analyses 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 contrast ratio of 24:1. The IMEG reflects the approximated 25 and 75 percentiles of 22 years of Fishing Branch River weir counts.

5.2.1.2 Porcupine Chinook Salmon Decisions and Management

To address conservations concerns for Chinook salmon within the Porcupine River drainage in 2009, DFO and the VGG prohibited fishing from 0001 hours July 13 to 2359 hours July 31 with the exception of the following two open periods; from 0001 hours July 17 to 2359 hours July 19; and from 0001 hours July 24 to 2359 hours July 26.

5.2.1.3 Porcupine Fall Chum Salmon Inseason Decision Matrix

The Porcupine River Working Group (PRWG) of the YSSC met in Old Crow on March 19, 2008 prior to the Yukon Panel meeting which took place in April 2008. The results of the JTC analyses associated with the IMEG were reviewed during the PRWG meeting and it was surmised that the suggested IMEG range would be adopted by the Yukon Panel for 2008 through 2010.

[3] This average includes below average catches within the 2002 to 2004 period when voluntary restrictions were used to conserve the Fishing Branch River fall chum salmon run.

The following decision rules for the First Nation fishery in the Porcupine River were developed 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 3.–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.

5.2.1.4 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 to the Canadian section of the Porcupine River drainage, although these data have consistently underestimated the strength of the Porcupine/Fishing Branch River return.

Once fall chum salmon arrived near Old Crow, attention shifted to a Catch per Unit Effort (CPUE[4]) assessment program operated by the VGG and Environmental Dynamics Incorporated (EDI), an environmental consulting firm, and the Fishing Branch River enumeration weir. Old Crow is located approximately 2,014 km upstream of the mouth of the river while the Fishing Branch River weir is located approximately 2,560 km from the mouth. The chum salmon migration time between Old Crow and the weir is approximately 2 weeks.

As the fall chum salmon season progressed, it became apparent that the cumulative Fishing Branch River weir counts were much higher than estimates of run strength derived from the CPUE assessment program. With this in mind, Canadian management then focused on using the most appropriate run timing scenarios to develop total season projections of the Fishing Branch River weir count.

5.2.1.5 Porcupine Fall Chum Salmon Decisions and Management

Management actions were taken to ensure that the lower end of the escapement goal range of 22,000 to 49,000 fall chum salmon to the Fishing Branch River was achieved. During most of September, projections suggested the run would be in the Red or Yellow management zone. In response, the First Nation fishery was closed for the September 21 to October 1 period. However, this fishery subsequently reopened based on improved run projections.

5.2.1.6 Coho Salmon

Coho salmon were not recorded in the upper Yukon fisheries (aboriginal, commercial, domestic and recreational) or in the Porcupine aboriginal fishery. 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; there are no reports of coho fishing in 2009.

5.2.2 Domestic Fishery

The domestic fishery was open concurrently with the commercial fishery for two openings during the Chinook salmon season and one opening 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. The 2009 domestic catch was 17 Chinook salmon. The average domestic fishery catch of Chinook and fall chum salmon for the 1974 to 2008 period is 405 and 545, 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 2009, due to conservation concerns, the daily catch and possession limits of Chinook salmon in the recreational fishery were reduced to zero effective 2400 hours July 17. Chinook salmon

4 An earlier version of the CPUE program involved in-season mark-recapture estimates which were available for the 2003 to 2008 period.

had not yet reached the areas where most recreational fishing normally occurs by this date. Due to improved run status information, the daily catch and possession limits of Chinook salmon were subsequently reduced to one daily and two in possession effective 1200 hours (noon) July 30. The preliminary estimate of the 2009 recreational catch is 125 Chinook salmon caught and retained, and 50 caught and released. The retained and released catches were 12.8% and 22.9% female, respectively. The average retained Chinook salmon catch within the 1999–2008 period was 313[5] fish. The 2009 catch was constrained by the early season closure and reduced opportunity that resulted from the late date (July 30) when retention was allowed.

Most recreational fishing occurs on the mainstem Yukon River in close proximity to the Tatchun Creek confluence; 73.6% of the fish retained and 56.0% of the fish released were recorded in this area. The Teslin River accounted for 20% of the retained catch and 36% of the released catch. Limited recreational fishing for Chinook salmon also took place in Blind Creek, and the Klondike, Mayo and Morley rivers. The number of locations where catches were recorded was constrained somewhat by the reduced fishing period.

Due to a conservation concern for fall chum salmon and guidance from the inseason fishery management decision matrix, the daily catch and possession limits of chum salmon in the recreational fishery were reduced to zero, effective 1200 hours (noon) Monday, September 21, 2009. The status of the fall chum salmon run subsequently improved and effective 2400 hours (midnight) October 9 the daily and possession limits of chum salmon returned to two and four, respectively.

6.0 STATUS OF SPAWNING STOCKS IN 2009

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 A8 and A9).

6.1 CHINOOK SALMON

6.1.1 Alaska

Conservative management of the 2009 Chinook salmon fishery enabled most escapement goals to be met, despite a poor run. Chena River escapement counts were near the upper end of its BEG, while Salcha River escapement counts were double the upper end of its BEG. The Chena and Salcha rivers produce the largest numbers of Chinook salmon in the Alaska portion of the Yukon drainage. Typically, about 50% of the Chinook salmon production occurs in Canada; hence, the US/Canada Yukon River Panel agreed to a 1 year Canadian Interim Management Escapement Goal (IMEG) of >45,000 Chinook salmon based on the Eagle sonar program as a

5 This total excludes 2007; 2 Chinook salmon were caught in 2007, although the fishery was closed most of the season.

top priority. Eagle sonar passage was almost 70,000 Chinook salmon, which more than satisfied the escapement and harvest sharing obligations mandated by the US/Canada Yukon River Agreement. A summary of escapements can be found in Appendices B9 and B10 and Appendix C9. Age and sex information collected from escapement projects in 2009 are presented in Appendix A11.

6.1.2 Canada

The Yukon River Panel adopted an Interim Management Escapement Goal (IMEG) of >45,000 for 2009, assessed using information from the Eagle sonar passage estimate. The estimated spawning escapement based on the Eagle sonar count was 65,278[6], approximately 45% higher than the IMEG (details are presented in Section 7.1.6).

Aerial surveys of the Little Salmon, Big Salmon, Nisutlin and Wolf river index areas were conducted by the Department of Fisheries and Oceans Canada (Appendix B11; Appendix C10). The Little Salmon aerial survey was flown on August 13. Survey conditions were rated as being good and surveyors counted 821 Chinook salmon, 98.4% of the 1999–2008 (10-year) average count of 834 fish. The Big Salmon, Nisutlin and Wolf river index areas were surveyed on August 18 under good to excellent survey conditions. The Big Salmon count of 1,827 was 92.9% higher than the 10-year average 947 fish. The Nisutlin River count of 497 was 21.8% higher than the 10-year average count of 408 fish. The Wolf River count of 134 was 97.8% of the 10-year average count of 137 fish. 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 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 2009, a DIDSON sonar program was operated for the first time on the Klondike River. A total of 4,725 targets identified as Chinook salmon were counted at the sonar station representing 7.2% of the upper Yukon spawning estimate of 65,278.

DIDSON sonar was operated for the fifth year on the Big Salmon River. A total of 9,261 targets identified as Chinook salmon was counted between July 18 and August 23, 2009. This estimate represents 14.1% of the upper Yukon spawning escapement estimate of 65,278. The Big Salmon sonar estimates for the 2005 to 2008 period were 5,584, 7,308, 4,450, and 1,329, respectively (Appendix B11).

The 2009 Whitehorse Rapids Fishway Chinook salmon count of 828 was 69% of the 1999–2008 average count of 1,200 fish (Appendix B11). The overall sex ratio was 13% female (108 fish). Hatchery-produced fish accounted for 46.9% of the return, and consisted of 360 males and 28 females. The non-hatchery count consisted of 440 fish, 360 wild males and 80 wild females. Historical fishway counts are presented in Appendix B11.

In 2009, 716 Chinook salmon were counted at the Blind Creek weir; the 1999–2008 average count is 654.

6 This was based on a sonar estimate of 69,957, Eagle subsistence catch of 382 and Canadian Upper Yukon catch of 4297 which included: 3,791 aboriginal, 364 commercial, 17 domestic, and 125 recreational

More detailed information on the Klondike sonar program, Blind Creek weir, Big Salmon sonar program, and the Whitehorse Rapids Fishway are presented in sections 7.2.2 to 7.2.5, respectively.

6.2 SUMMER CHUM SALMON ALASKA

Summer chum salmon escapement was variable among projects despite an adequate run size in 2009. The Pilot Station sonar project exceeded the OEG of 600,000 summer chum salmon with a below average cumulative passage estimate through July 18 of 1,285,437 fish. Summer chum salmon escapements in Gisasa and Tozitna rivers were below expected levels. East Fork Andreafsky and Anvik River escapements experienced historic lows and failed to meet their respective BEGs (Appendix C11). Henshaw Creek escapement, however, was twice the expected counts, and attained the second highest escapement recorded for this project (1999–2008 mean escapement was 77,000 excluding 3 years hampered by high water). On Tanana River, summer chum salmon escapements exceeded expected counts for Chena and Salcha rivers (Appendix B12). These escapement patterns seem to signal a shift in summer chum salmon production. Age and sex composition data collected from escapement projects in 2009 are presented in Appendix A12.

6.3 FALL CHUM SALMON

6.3.1 Alaska

The preliminary 2009 Yukon River drainage-wide total run size estimate of 560,000 fall chum salmon is based on the postseason expanded escapement and estimated harvests. This run size is below the preseason projection of 600,000 to 980,000 salmon and within the range provided by the summer to fall chum salmon relationship (450,000 to 900,000). Although final assessments of overall run size, spawner distribution, and age composition are not available at this time, preliminary assessments of run size can be made using two 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 240,449 fish with a 90% confidence interval of 203,331 to 277,567 fish (Figure 3; Appendix A2). However due to difficulties the 2009 estimate is suspected of being extremely conservative. Typically a check on total run size is determined based on the Pilot Station sonar abundance estimate with the addition of estimated commercial and subsistence harvests and test fishery catches downstream of the sonar site (approximately 25,000 fish). In 2009 this method would have produced a total run size of 265,000 fall chum salmon. Based on the location of the project (river mile 123), the abundance estimate includes Koyukuk River drainage stocks.

A second method to calculate run size utilizes the individually monitored spawning escapements in the upper Yukon and Tanana River, including estimated U.S. and Canadian harvests where appropriate. In 2009 the Fishing Branch River weir, as well as the Sheenjek and Eagle sonar estimates, were extrapolated to include the projected end of the run. The Chandalar River sonar was not operated through the bulk of the run and had to be estimated based on the relationship between the US border MSA (proportion of Sheenjek to total Sheenjek and Chandalar rivers) and the relationship of Chandalar to the other upper river contributing stocks (Mainstem Yukon, Fishing Branch and Sheenjek rivers). Based on these relationships the 2009 escapement to the Chandalar River was estimated to be 150,000 fall chum salmon. Additionally the Tanana River

component was not adequately monitored and, because of concerns about estimating this late running stock, MSA was not used as in 2009 The Tanana River estimate was based on the relationship of the Delta River escapement to upper Tanana River mark–recapture from 1995 to 2007, which is approximately 10%. The Tanana River estimate of 150,000 fall chum salmon is also considered to be conservative based on an estimated 130,000 fish to the upper Tanana River and 20,000 for the Kantishna River component. This method does not include an escapement estimate of 15,000 for stocks located in tributaries downstream of the confluence of the Tanana River such as in the Koyukuk River (MSA). The 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 a 10% disagreement between the Pilot Station sonar (1995, 1997–2005) estimates and the collective escapement and harvest assessment projects. However, in 2009, the estimate based on collective projects is 53% higher than the estimate using Pilot Station sonar.

In 2009, the proportions of age-3 (4%), age-4 (67%) and age-5 (26%) fish were average while the age-6 (2.9%) fish were slightly higher than average (0.9%) based on the Lower Yukon Test Fishery weighted averages for the years 1977 to 2008. The run size in 2009 was lower than the preseason projection, with a weak age-4 component that had been expected to contribute up to 80% of the run. Age and sex composition data collected from escapement projects in 2009 are presented in Appendix A25. Total return of fall chum salmon in 2009 was well below average for odd-numbered year runs. The summer and fall chum salmon runs are split by a calendar date (July 15, at the mouth of the Yukon River), where overlap is known to occur. In 2009, the upper Yukon River components appeared to have run timings averaging 7 days late whereas the Tanana River component appeared to be near average. Three groups of fish passed Pilot Station sonar and, along with other lower river projects, were not more than 2 days late in run timing. As in 2008 Pilot Station sonar operated an additional week into September, and Mt. Village test fishery operating through September 10, 2009 did not detect any other significant pulses.

Currently, the estimates of drainage-wide escapement are based on preliminary U.S. and Canada commercial (26,000) as well as subsistence and Aboriginal (72,000) harvests of fall chum salmon. Based on these levels of harvest the drainage-wide escapement is estimated to be approximately 463,000 fall chum salmon. Biological Escapement Goals (BEG) were not met in the Sheenjek River, however, the majority of the other areas are believed to have been achieved.

In 2009 the operations of the Fishing Branch River weir began later than normal but the fish were late, thus not affecting the count appreciably. The project operated from September 6 to October 12, however, data were extrapolated through October 25. This extrapolation represents 4.4% of the run that passed after the project ended for the winter. 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 2010. This goal uses percentiles and uses weir data only, excluding all years with extrapolations based on other methods of measurement. The 2009 estimated weir passage of approximately 26,000 fish slightly surpassed the low end of the IMEG (with or without the expansion; Appendix C14).

The Sheenjek River escapement was monitored by a sonar project operated from August 15 through September 24, 2009. As with the Fishing Branch River, the project started late but was unaffected due to the low passage of fish in the beginning of the run. Sheenjek River counts were extrapolated for late run timing through October 9. Since 2005 the project uses Dual-Frequency Identification Sonar (DIDSON) gear on both right and left banks. Most of the historical Sheenjek

River escapement estimates were only derived from right bank operations with old technology, with counts ranging from 14,000 in 1999 to 247,000 fall chum salmon in 1996, and a high of 562,000 fish observed on both banks combined in 2005 (Appendix B13). The right bank estimated escapement of approximately 33,000 fish in 2009 was 34% below the lower end of the BEG range of 50,000 to 104,000 fall chum salmon, based on the historical right bank data. The left bank estimate of 21,000 fish represented approximately 38% of the two bank combined estimate in 2009. During the 41-day period of operation, the combined cumulative count at termination was approximately 47,000 chum salmon. The cumulative estimate at the project termination was then further expanded to compensate for late run timing and resulted in a post season estimate of 54,126 chum salmon for both banks combined (Appendix C12).

The Chandalar River sonar project operated from August 8 through August 23, 2009 and only counted 6,000 fish before the project was aborted at less than 14% of the average run passage. The BEG range for the Chandalar River is 74,000 to 152,000 fall chum salmon (Appendix B13; Appendix C12). A conservative estimate of 150,000 was derived based on the relationship between the U.S. border MSA (proportion of Sheenjek to total Sheenjek and Chandalar rivers) and the relationship of Chandalar to the other upper river contributing stocks (Mainstem Yukon, Fishing Branch and Sheenjek rivers). This level fell within the BEG range for this system and is used for run reconstruction purposes.

The Yukon River mainstem sonar at Eagle operated into the fall season from August 21 through October 6 and was extrapolated through October 18, 2009. The resulting estimate of passage at Eagle was 102,000 fall chum salmon. An estimated harvest of 7,000 fall chum salmon from the community of Eagle, who fished upstream of the U.S./Canada border, resulted in a border passage estimate of 95,000 fall chum salmon. Conservative harvests in Canada resulted in an escapement estimate of approximately 94,000 fall chum salmon slightly exceeding (15%) the escapement goal of greater than 80,000 fall chum salmon (Appendix C14).

The Delta River, a tributary in the upper Tanana River drainage, has a BEG range of 6,000 to 13,000 fall chum salmon. Evaluation of the run to the Delta River in 2009 was based on eight replicate foot surveys conducted between October 5 and December 3. The Delta River escapement was estimated to be approximately 13,492 fall chum salmon based on the area under the curve method. This level of escapement was slightly above the upper end of the BEG range (Appendices B13 and C12).

In 2009, inseason monitoring of the Tanana River drainage consisted of monitoring fall chum salmon run timing at the various test fish wheel locations near the villages of Tanana and Nenana, as well as monitoring subsistence and commercial harvest in the fisheries. Due to concerns of estimation of the Tanana River stocks in 2009 based on MSA, other methods were used to determine the run size. The Delta River is a tributary of the Tanana River and is used as an index area for the system, representing approximately 10% of the total population of the upper Tanana River according to a mark–recapture project operated from 1995 and 2007. For 2009, this relationship results in a run size estimation of at least 130,000 fall chum salmon. However this is only for the portion of the river upstream of the Kantishna River. Considering the Kantishna River component of the run plus harvests, another 20,000 fish was included resulting in a conservative estimate for total Tanana River of 150,000 fall chum salmon. Typically the Tanana River drainage produces 30% of the total fall chum salmon run. This run size is slightly 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 93,626[7] (details are presented in Section 7.1.6). 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.

A final year of the mark–recapture program was planned for 2009, however a flood damaged the camp and it was not possible to initiate the program. Mark–recapture estimates for the 1980 to 2008 period are presented in Appendix B13. 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 in 2007, 2008 or 2009. 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 B13, C13 and C14.

In the Porcupine River drainage, the Fishing Branch River weir was operated from September 6 to October 12. The count through midnight October 12, the last full day of operation, was 24,670 fall chum salmon and included 14,007 females and 10,663 males. Since chum salmon were still present in low numbers at the weir when it was dismantled, an estimate of 1,158 chum salmon was made to account for fish that may have migrated after October 12. This estimate was based on interpolated run timing data. Thus the total estimated 2009 Fishing Branch River escapement is 25,828 fall chum salmon (Appendix A13), which is very close to the lower end of the escapement target of 22,000 to 49,000 fall chum salmon. Details of the 2009 weir operation are presented in Section 7.2.5.1.

7.0 PROJECT SUMMARIES

7.1 ALASKA

7.1.1 Pilot Station Sonar

The goal of the mainstem 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 existing sonar equipment to operate at a frequency of 120 kHz to allow greater insonification 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.

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

7 This was based on a sonar estimate of 92,462 through October 6 and an estimate of 9,272 additional fish missed for the October 7-18 period (after the sonar program ended), for a total sonar count of 101,734. After removing the upstream harvest of 6,995 fall chum salmon for Eagle subsistence fishery and 1,113 fish harvested in Canada- including 820 aboriginal, 293 commercial, 0 domestic, and 0 recreational, the spawning escapement was estimated at 93,626.

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 2009 are not directly comparable to previous years. In 2001, the equipment changed from the 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 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 250 m range is sampled by the split-beam. The use of the DIDSON has not been necessary on the right bank.

During the 2008 season, ADF&G implemented a feasibility study to validate a complete switch from paper charts to electronic echograms for enumerating fish traces. Postseason linear regression analysis comparing split beam data recorded on electronic echograms and paper charts proved the overall effectiveness of using echograms was suitable for the project, and replaced digital chart recorders for counting fish traces this season.

In 2009, split-beam sonar was operated on both banks from June 3 through September 7. Test fishing began on May 30, 7 days before the first Chinook salmon was caught at Pilot Station. Use of the DIDSON accounted for 2.1% of the Chinook salmon, 3.0% of the summer chum, and 0.7% of the fall chum total passage. The DIDSON estimate contributed 2.7% of the total passage, which is the lowest contribution since the DIDSON has been incorporated in the project's sampling plan.

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. In past seasons, on designated days, sonar sampling was expanded to a single 24-hour period as a simple qualitative assessment. Estimates obtained in the regular 3-hour intervals were then compared with those found when the sonar runs continuously. Between 1998 and 2007, 47 continuous 24-hour periods were conducted. Of the estimates produced in these periods, 39 agreed within +/- 10% of the three 3-hour estimates. This general agreement between the 24-hour estimates and the standard estimates indicate that continued testing of the performance of the sampling plan is unnecessary. Furthermore, the costs of running the 24-hour periods are high, and for these reasons have been discontinued at the project. However, in 2009 three 24-hour sonar sampling periods where conducted during the fall season. Because of low passage estimates during these days, data will not be assessed as a quantitative comparison to the regular 3-hour intervals.

The test fishing program, used to apportion the sonar counts to species, utilizes an assortment of gillnets, 25 fathoms long with mesh sizes ranging from 7.0 cm to 21.6 cm (2.75 inches to 8.5 inches), drifted through the sonar sampling areas twice daily between sonar data collection

periods. During 2007–2009 seasons, as part of a separate Capital Improvement Project (CIP) funded genetic study, an extra period of gillnetting was conducted in order to collect additional Chinook salmon samples. The drifts were located upriver of the area sampled by the sonar, and three gillnet mesh sizes (6.5, 7.5, and 8.5 inches) were used to target all size classes of Chinook salmon. All other species captured during this extra period were immediately released, and not sampled.

Drift gillnetting resulted in a catch of 6,101 fish including: 875 Chinook salmon (234 Chinook salmon caught during the additional test fishing period); 2,569 summer chum salmon; 440 fall chum salmon; 1004 coho salmon; and 1213 other species. Chinook salmon were sampled for age, sex and length, and genetic samples were taken from both Chinook and chum salmon. Any captured fish that were not successfully released alive were distributed daily to residents in Pilot Station.

Because of record high water levels and flooding in many areas of the Yukon after break up, the left bank substrate was unstable in 2009 and problems with a reverberation band were encountered. From June 3 to approximately June 23, bank erosion upstream caused large plumes of silt to pass through the sonar sampling area, undermining optimal detection of targets. Estimates during this period are considered conservative. As in previous years, the right bank substrate was consistently stable, so problems of this nature were not encountered on that bank.

Cumulative passage estimates for each targeted species, through September 7, were: 92,648 large Chinook; 30,342 small Chinook; 1,285,437 summer chum; and 240,449 fall chum salmon. Additionally, passage estimates for non-target targeted fish species include 205,278 coho salmon and 677,860 other fish species. Detailed historical passage estimates for 1995 and 1997–2009, are listed in Appendix A2. Historical passage estimates were revised using the most current apportionment model to allow direct comparison between the years 1995 and 1997–2009.

In 2009 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 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 paired with age data. Genetic analysis was performed by age group, age-1.3 and -1.4, when adequate samples were available or using all samples combined. Results from these analyses were combined with specific harvest age composition to provide the stock composition by harvest. Age groups not used for genetic analysis were apportioned to stock groups using stock composition of analogous age groups, harvest age composition, and escapement age composition. Harvests from the Tanana River, the upper Koyukuk River, and Alaskan tributaries upstream from the confluence of the Yukon and Tanana rivers were assigned

to the middle stock group based on geographic location. Harvests occurring in Fort Yukon and upstream were assigned to the upper stock group under the assumption that these fish were bound for Canada.

Historical percentages by stock group for the total Chinook salmon harvest (U.S. and Canada) are presented in Appendix A13, U.S.-only harvests are in Appendix A14, and upper stock group harvests (U.S. and Canada) are in Appendix A15. Drainage-wide harvest estimates for 2008 were 17.0% from the lower stock group, 28.0% from the middle stock group, and 55.0% from the upper stock group (Appendix A13). Alaskan harvest estimates from the lower, middle and upper stock groups were 18.2%, 30.0%, and 51.8%; respectively (Appendix A14). The upper stock group harvest estimates for 2008 were 88.1% in Alaska and 11.9% in Canada (Appendix A15). Comparing the 2008 percentage to the 1981 through 2007 average, the lower stock group was below average, the middle stock group was above average, and the upper stock group was near average. The 2009 estimates by stock group will not be available until the following year.

7.1.3 Lower Yukon River Chinook and Chum Salmon Genetic Sampling

7.1.3.1 Chinook salmon

ADF&G field crews, along with other collaborators, collected samples (axillary process tissue preserved in ethanol) from Chinook salmon harvested by test, commercial, and subsistence fisheries in 2009. These samples were from mixed-stock fisheries in the mainstem Yukon River in Districts 1 through 5. Samples from test fisheries totaled 3,039 fish: 3 from Hooper Bay, 1,040 from Big Eddy and Middle Mouth combined, 480 from the Mesh Size Study, 868 from Pilot Station, and 648 from Eagle Sonar. Samples from chum salmon-directed commercial fisheries in the lower river totaled 21 fish. Samples from subsistence fisheries totaled 2,691 fish: 174 from Emmonak, 239 from Holy Cross by Tanana Chiefs Conference (TCC), 205 from Kaltag (City of Kaltag), 384 from Nulato (TCC), 191 from Bishop Rock (TCC), 312 from Galena (TCC), 144 from Ruby (Ruby Tribal Council), 189 near Hess Creek (TCC), 701 from Rampart Rapids (Rapids Research Center), and 152 from Fort Yukon (TCC).

Baseline samples from 49 Chinook salmon were collected from the following drainages: 6 from Central Creek and 24 from Goodpaster River by Tech Pogo Inc., and 19 from the Kandik River.

7.1.3.2 Chum salmon

In 2009, ADF&G collected 1,561 chum salmon samples from commercial fisheries in District 1 as part of the Western Alaska Salmon Stock Identification Program (WASSIP). These consisted of 957 samples from the summer run and 610 samples from the fall run. ADF&G, in cooperation with USFWS, collected samples from the Pilot Station test fishery from 2,565 summer and 491 fall run chum salmon. In addition, 367 chum salmon were sampled from the fall run in the Eagle sonar test fishery. Baseline samples from 78 fish were collected from Toklat River chum salmon.

7.1.4 Yukon River Chum Salmon Mixed-Stock Analysis

Since 2004, the stock compositions of chum salmon have been estimated from samples collected from Pilot Station sonar test fisheries for the period spanning July 1 through August 31. In 2008 and 2009, sampling began in the first week of June to estimate the stock composition for the entire summer chum salmon run as well (through the first week of September for fall chum salmon). 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 86% of the run while the middle river stock group comprised 14%. Within the middle river stock group, the Tanana component comprised 8% and peaked in passage past Pilot Station sonar during the sampling period of July 19 to 27. For fall chum salmon, 64% of the run was of U.S.-origin and 36% of Canadian-origin. The composition of the U.S. contribution was 26% Tanana and 38% U.S. border. The composition of the Canadian contribution was 20% mainstem, 4% Porcupine, 11% White, and 1% Teslin. 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 2004–2008. 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 2006–2008 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. An analysis is ongoing for the 2009 data, and preparations are underway to continue the project for the 2010 season.

7.1.5 *Ichthyophonus*

Ichthyophonus hoferi (*Ichthyophonus* here after) is a marine-derived protozoan parasite infecting a variety of marine and anadromous fish species including salmonids (Kocan et al. 2004; Tierney and Farrell 2004; Gavryuseava 2007). While the parasite is not harmful to humans, the effects on the fish host can be devastating and mass mortalities of herring have been attributed to infection with *Ichthyophonus* (Sindermann 1965; Mellergaard and Spanggaard 1997; Kocan et al. 1999). Prior research suggests that *Ichthyophonus* is a newly emerging parasite in the AYK region and may cause pre-spawning mortality of Yukon River Chinook salmon (Kocan et al. 2004, 2006, 2009).

In 2009, Chinook salmon *Ichthyophonus* sampling continued in Emmonak and Eagle, Alaska funded by the U.S./Canada Restoration and Enhancement Fund. Sampling in 2009 was successful and all sampling targets were reached. Chinook salmon tissues were collected near the community of Emmonak (close to the mouth of the Yukon River) as part of the Big Eddy test fishery operated by ADF&G. The Big Eddy test fishery project utilizes set gillnets with an 8.5 inch mesh size. Samples of cardiac muscle (n=150) were collected over the course of the Chinook salmon run from June 4 to July 8. Collection of samples over the entire run is critical as Kocan et al. (2004) noted that salmon returning early in the season seem to be relatively free of the typical clinically observed *Ichthyophonus* lesions, while fish tend to be more severely infected with these lesions later in the season.

In addition, samples of Chinook salmon (n=201) were collected from subsistence fishermen in the community of Eagle near the U.S.-Canadian border. Samples (n=100) were obtained over the course of the Chinook salmon run from July 11 to July 16 (before the closure of the subsistence fishery), and from July 27 to August 2 (n=101) (after the subsistence fishery closure). Subsistence fishing gear used at Eagle included fish wheels and set gillnets with mesh sizes ranging from 6 to 8 inches. Fishing sites varied, however, most subsistence gear was located on the right bank of the Yukon River in close vicinity to the community.

Cardiac muscle samples were collected with extreme care using sterile, disposable supplies to avoid cross-contamination between samples. Morphometric data were recorded (i.e., length, sex, weight, and girth), scales were collected for age estimation, and axillary fin clips were taken for genetic analysis. Sex composition was 63.3% and 21.9% female for Emmonak and Eagle, respectively, as determined by internal examination of gonads. Fish sampled at Emmonak had a mean length of 851 ± 63 mm (mideye to tail fork), mean weight of 21.8 ± 5 lbs, and mean girth was 518 ± 44 mm. At Eagle, the mean length was 725 ± 118 mm, mean weight was 11.9 ± 6 lbs, and mean girth was 379 ± 72 mm. At Emmonak, age-6 (89.3%) fish were strongly represented, followed by age-5 (6%). Age composition of the fish sampled in Eagle was 25.4% age-4, 29.4% age-5, and 38.3% age-6 fish. Proportions of age-3 and age-7 fish were small (0.5% and 1.5%, respectively). Due to advanced resorption of scales at later migratory stages, 5.0% of Chinook salmon could not be aged from Eagle samples. It is important to note that comparisons between sites are not possible because of differences in stock composition and gear types. Differences in catch characteristics between sampling locations likely reflects multiple factors, including disparate gear biases, and dissimilar stock compositions sampled (all stocks pass the Emmonak site and only Upper Yukon stocks pass the Eagle site).

Clinical signs typical for *Ichthyophonus* infection were noted at the time of collection in 5.3% (8 of 150) of fish sampled in Emmonak. Clinical signs of *Ichthyophonus* infection were recorded in 11% (22 of 201) of Chinook salmon collected in Eagle. However, white, granulomatous lesions are a general inflammatory response of fish to foreign bodies and do not necessarily establish actual infection with the parasite (Corbel 1975). PCR analysis indicated low infection prevalence of 8% in Emmonak (12 of 150) and 13% in Eagle (26 of 201). *Ichthyophonus* prevalence over time for both Emmonak and Eagle is provided in Figure 10. Cyclic *Ichthyophonus* epizootics have been described in herring (Sindermann 1965) and a similar cyclic pattern is suggested by Chinook salmon time series data from Emmonak.

The effect of *Ichthyophonus* on salmon health, egg quality, and juvenile survival remains poorly understood. Fish egg and embryo vitality is correlated to body condition of spawning females. Condition is, in turn, dependent on physiological status and energy demands, and generally fish exposed to stress or disease show an increase in energetic costs (King et al. 2003; Rand et al. 2006). Potentially, lipids could be re-routed from gonads of *Ichthyophonus*-positive fish to provide additional energy needed to complete the spawning migration. Such females could then produce either fewer or lower quality eggs. Samples from Eagle were therefore paired with egg counts and egg quality data (as determined by proximate analyses; %water, %lipid, %Nitrogen, and ash) to assess fecundity (Figure 11), gonad energy storage, and potential links to *Ichthyophonus* infection. In 2009, 44 females (22% of sampled fish) were available for study.

There was no statistical difference in length or girth adjusted *Ichthyophonus*-positive compared to healthy females ($p=0.47$, difference in slope and $p=0.11$, difference in intercept). However, only 8 of the 44 females sampled were infected with *Ichthyophonus* (based on culture)

illustrating the need for larger sample sizes to obtain the statistical power necessary to make such comparisons. In addition, egg quality (as determined by proximate analyzes) was investigated between healthy and infected females in 2009. No statistical differences were found in the parameters analyzed to determine egg quality between healthy and *Ichthyophonus*-positive females. However, samples sizes were small and stock-specific variability, in particular in lipid contents of ova may have to be considered.

7.1.6 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 the current 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 two 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 2009). The 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 near shore, while still adequately detecting targets out to 150 m.

In 2009, the total Chinook salmon passage estimate at the Eagle sonar site was 69,957 for the dates July 5 through August 20 (Table 4). The preliminary Eagle area Chinook salmon subsistence harvest of 382 (Deena Jallen, Fisheries Biologist, ADF&G, Fairbanks, Alaska; personal communication) is subtracted from the sonar estimate to derive the border passage estimate of 69,575. This is 35% above the interim management escapement goal (IMEG) of >45,000 Chinook salmon. The total fall chum salmon passage estimate at the Eagle sonar site was 95,462 for the dates August 21 through October 6 (Table 4). Because of the high passage of chum salmon when the project was terminated the sonar estimate was subsequently adjusted to 101,734. The expansion was calculated using a 2^{nd} order polynomial calculated to the date October 18 (Bonnie Borba, Fisheries Biologist, ADF&G, Fairbanks, Alaska; personal communication). The preliminary Eagle area chum salmon subsistence harvest of 6,995 (Deena Jallen, Fisheries Biologist, ADF&G, Fairbanks, Alaska; personal communication) is removed from the sonar estimate, to derive a border passage estimate of 94,739. This is 18% above the Canadian spawning escapement goal of >80,000 fall chum salmon.

In 2009 there was one high water event that included large amounts of woody debris and necessitated removal of the right bank weir from the river to prevent damage or loss. Sonar counts were compromised from 1900 hours on September 18 to 0900 hours on September 20 and were subsequently adjusted to account for fish that may have been missed.

Table 4.–Eagle sonar project passage estimates, and border passage estimates, 2005–2009.

	Sonar Estimate		Eagle Area Subsistence Harvest[a]		U.S. Sonar Mainstem Border Passage Estimate		Canadian Mainstem Border Passage Estimate[b]	
Date	Chinook	chum	Chinook	chum	Chinook	chum	Chinook	chum
2005	81,528	NA	2,566	NA	78,962	NA	42,245	451,477
2006	73,691	236,386	2,303	17,775	71,388	218,611	36,748	217,810
2007	41,697	282,670 [c]	1,999	18,691	39,698	263,979	22,120	235,956
2008	38,097	193,397 [c]	690	13,000	37,407	180,397	14,666	132,048
2009	69,957	101,734 [c]	382	6,995	69,575	95,462	Did not operate.	

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 and 2008, subsistence estimates are preliminary.

[b] Department of Fisheries and Oceans Canada (DFO) mark–recapture tagging program. Estimates from JTC 2009.

[c] 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 ranging from 5.25 to 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 fish results, local knowledge of catches, and data collected in Canada.

7.1.7 Sheenjek River Sonar

The Sheenjek River sonar project has estimated fall chum salmon escapement since 1981 and has undergone a number of changes in recent 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 to continue providing the best possible data to fishery managers. 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 chum salmon in the Sheenjek River.

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, the fall chum salmon passage estimate at the Sheenjek River sonar site was 46,926 for the dates August 15 through September 24. Because of high passage when the project was terminated the sonar estimate was subsequently adjusted to 54,126 fall chum salmon. The expansion was calculated using a 2nd order polynomial calculated to the date October 9 (Bonnie Borba, Commercial Fisheries Biologist, ADF&G, Fairbanks, Alaska; personal communication). For comparison with past years, only the expanded right bank estimate of 33,203 was used to evaluate whether the biological escapement goal (BEG) was obtained. The 2009 right bank estimate was 34% below the low end of the Sheenjek River biological escapement goal of 50,000 to 104,000 fall chum salmon.

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. 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. The transition from split-beam to DIDSON has gone smoothly and this equipment should continue to provide accurate escapement estimates in future years.

7.1.8 Yukon River Chinook Salmon Comparative Mesh Size Study

This 3-year (2007–2009) study investigated catch composition from 7, 7.5 and 8 inch stretch-mesh drift gillnets from a test fishery in District 1 near Emmonak. This was a cooperative effort between ADF&G and Yukon Delta Fisheries Development Association (YDFDA). Objectives of this study included: 1) comparison of species composition (Chinook salmon vs. chum salmon) of catch, 2) comparison of age composition of Chinook salmon, 3) comparison of sex ratios of Chinook salmon, and 4) comparison of size composition of Chinook salmon (length, weight, and girth). Additionally, marketability of the catch from each mesh size was examined.

Sampling for this study occurred from June 15 through June 30 in 2007, June 15 through June 20 in 2008, and June 12 through July 4 in 2009. The sampling period for 2008 was truncated because of an unexpected poor run and need to support inseason management strategies. Sample sizes are shown in Table 5. Actual sample sizes are less than those targeted, primarily because of the shortened sampling period in 2008. However, as samples were pooled across years, overall sample sizes are still sufficient for statistical assessment.

Table 5.–Number of Chinook and summer chum salmon harvested in the Lower Yukon River test fishery by mesh size, 2007-2009.

Mesh Size	Chinook Salmon	Chum Salmon
7.0 inch	400	714
7.5 inch	388	325
8.0 inch	344	298
Total	1,132	1,337

Overall patterns indicate that as mesh size increases, the catch contains more Chinook salmon relative to chum salmon, a greater proportion of older fish, a greater proportion of females, and more larger fish in respect to length, weight and girth. This study suggests that a reduction to 7 inch mesh would likely change the species composition (fewer Chinook salmon than chum

salmon in the catch), and age and phenotypic compositions (smaller and younger individuals) of the fishery. A reduction to 8 inch mesh would not significantly change the age, gender or phenotypic composition of the catch relative to the current fishing practices, but would decrease the proportion of larger sized Chinook salmon (>900 mm) caught. A reduction to 7.5 inch mesh would likely target younger and smaller individuals on average and even fewer large size class Chinook salmon, without impairing the Chinook salmon catchability beyond what it would be for an 8 inch maximum mesh size fishery.

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

The rearing of sub-yearling Chinook salmon in non-natal streams is well documented in the upper Canadian portion of the Yukon River drainage. Further downstream in U.S. waters, little information is available concerning the utilization of non-natal rearing habitat by juvenile salmon. In the summers of 2006 and 2007, a pilot study by USFWS, Fairbanks Field Office, documented the use of non-natal U.S. streams by Canadian-origin Chinook salmon for rearing. Most of these juveniles originated from the Carmacks/mainstem regional genetic group, 300 to 400 km upstream of the U.S./Canada border, with some individuals moving downstream over 1,200 km. In 2008, a comprehensive 3-year study (funded by AKSSF) was initiated to inventory potential non-natal rearing streams for the presence of juvenile Chinook salmon between the U.S./Canada border and the Tanana River confluence. During the 2009 sampling period 45 streams were visited between the Charley River and the village of Rampart. Due to the severe drought experienced in the Alaskan Interior in 2009, 24 creeks were completely dry. Eleven of 16 sampled streams contained age-0 rearing Chinook salmon and were nominated for inclusion into the Alaska Anadromous Waters Catalog (a 2-year cumulative total of 25 streams nominated). Over 130 genetic samples were collected in 2009 and were archived for future analysis (a 2-year cumulative collection of 399 fin-clips). Also in 2009, trapping stations were established 800 km apart in two small tributary streams of the mainstem Yukon River to monitor colonization timing by downstream age-0 Chinook salmon migrants. The first migrants were captured in the lower station on July 15, 30 days after the first upriver site capture, suggesting a prolonged downstream dispersal by some individuals. Students from the Eagle Community School and Rapids Research Center (Rampart Rapids) monitored the trapping stations throughout the summer. In 2010, juvenile sampling will continue from Rampart downstream to the Tanana River confluence.

7.2 CANADA

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.

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 2009. The preliminary border passage estimate for 2009 is 69,575 Chinook salmon

based on the Eagle sonar estimate of 69,957 minus an estimated Alaskan subsistence harvest upstream of the sonar site of 382 fish[8] (Deena Jallen, Fisheries Biologist, ADF&G, Fairbanks, Alaska; personal communication). After subtracting the Canadian upper Yukon River Chinook salmon harvest of 3,791 aboriginal, 364 commercial, 17 domestic, and 125 recreational, a total of 65,278 Chinook salmon is estimated to have reached Canadian spawning areas. The spawning escapement is approximately 45% higher than Interim Management Escapement Goal (IMEG) of >45,000 adopted by the Yukon River Panel. The IMEG was exceeded due to admirable conservation efforts in the Alaskan and Canadian portions of the Yukon River drainage.

A preliminary reconstruction suggests that the total upper Yukon Canadian-origin Chinook salmon run size was approximately 84,900 fish. A run size of this magnitude is closer to the lower end of the preseason outlook range of 89,500 to 99,800, based on stock-recruitment (S/R) and sibling models, than to the lower precautionary outlook range of 61,000 to 72,000. The estimated 2009 run size is 5% below the lower end of the outlook range of 89,500, and 15% below the upper end of the outlook range of 99,800. Similarly, the estimated 2009 run size is approximately 18–39% higher than the lower precautionary range of 61,000–72,000. The lower precautionary outlook range was developed and presented to the Yukon Panel to demonstrate the uncertainty associated with the 2009 run outlook because recent preseason outlooks were higher than the observed returns.

7.2.1.2 Fall Chum Salmon

The Eagle sonar program was also used to determine the Canadian upper Yukon chum salmon border passage estimate in 2009.

The preliminary 2009 estimate at the Eagle sonar program is 101,734 fall chum salmon. This estimate is based on the Eagle sonar estimate of 95,462 to October 6, plus an additional 9,272 chum salmon estimated to have migrated after October 7 when the sonar project ended (Bonnie Borba, Fisheries Biologist, ADF&G, Fairbanks, Alaska; personal communication). A preliminary border passage estimate of 94,739 has been calculated by subtracting the estimated Alaskan subsistence harvest (6,995[9] fish) upstream of the sonar site (Deena Jallen, Commercial Fisheries Biologist, ADF&G, Fairbanks, Alaska; personal communication).

A total of 93,626 fall chum salmon was estimated to have reached Canadian spawning areas in the upper Yukon drainage. This estimate is derived by subtracting the Canadian harvest of 1,113 upper Yukon River fall chum salmon, which includes 820 harvested in the aboriginal fishery and 293 harvested in the commercial fishery, from the border passage estimate of 94,739. The spawning escapement estimate is approximately 17% higher than the spawning escapement goal of >80,000 adopted by the Yukon River Panel.

A preliminary reconstruction of the 2009 fall chum salmon run suggests the total upper Yukon River Canadian-origin fall chum salmon run size was approximately 129,500 fish. This reconstruction is approximately 14% below the lower end of the preseason outlook range of 150,000 to 240,000 upper Yukon fall chum salmon. The 2009 preseason outlook range was based on the ADF&G drainage wide outlook range of 600,000 to 980,000 fall chum salmon and an assumption that upper Yukon Canadian-origin fall chum salmon would constitute at least 25% of the drainage-wide return. There was great uncertainly associated with the 2009 upper Yukon

[8] Eagle subsistence harvest of Chinook salmon upstream of sonar site provided by ADF&G, Fairbanks, Alaska.
[9] Eagle subsistence harvest of fall chum salmon upstream of sonar site provided by Dayna Norris, ADF&G, Fairbanks, Alaska.

outlook due to the exceptionally high spawning escapement of 437,500 observed in 2005, the dominant year contributing to the 2009 return. The potential return from an escapement as high as the one observed in 2005 was outside of our experience.

7.2.2 Klondike Sonar

A feasibility study for a Klondike River Chinook salmon sonar program was conducted in 2008. During the feasibility study, a suitable sonar site was found approximately 4.5 km upstream of the mouth of the Klondike River; this was used for a fully operational program in 2009. The project was conducted by Mercer and Associates and funding for the 2008 and 2009 programs was provided by the Restoration and Enhancement Fund (project numbers CRE-16-08 and -09).

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 short weir structures were constructed on each side of the river to reduce the effective migration width to 38 m. The standard DIDSON sonar unit used the maximum ensonification range of 40 m and was fitted with an 8 concentrator lens.

The sonar program was operational from July 6 through August 14. With the exception of a 36 hour[10] period when the sonar unit malfunctioned and replacement parts had to be acquired, the sonar program was operational 24 hours per day. All the files from each 24 hour period were examined and all Chinook salmon targets counted. A total of 4,725 targets identified as Chinook salmon was counted at the sonar station representing 7.2% of the upper Yukon spawning estimate of 65,278. The dates when 10%, 50% and 90% of the fish had passed were July 14, 21, and 29, respectively. The Klondike River Chinook salmon run has one of the earliest migration timing patterns of upper Yukon River Chinook salmon stocks.

No ASL information was collected in 2009, however a carcass pitch survey of the upper Klondike River is proposed as a component of the 2010 sonar program. Chinook salmon carcasses will be sampled for age, length, sex and possibly genetic samples.

7.2.3 Blind Creek Weir

A weir was operated in Blind Creek by Jane Wilson and Associates to enumerate the 2009 Chinook salmon escapement and obtain information on stock characteristics. The weir site was located in the same general area as in previous years, approximately 1 km upstream of the confluence with the Pelly River. Operation of the weir began on July 20 and continued until August 19. The first Chinook salmon passed through the weir on July 27. In total, 716 Chinook salmon were counted. Fifty percent of the run had passed through the weir by August 6 and 90% by August 10. The midpoint of the run was similar to average in timing, although the 90% point in the run was approximately 3 days earlier than average. Chinook spawners were sampled randomly throughout the weir operation to obtain ASL information. A total of 245 Chinook salmon (34% of the run) was sampled of which 106 (43%) were female and 139 (57%) were male. Jacks (males with a snout to fork length $\leq$ 630 mm) comprised 23% of the males sampled. The mean fork length of females and males sampled was 860 mm and 753 mm, respectively. Age data were determined from 147 Chinook salmon sampled. Of these, age-6 and age-5 fish

[10] The estimated number of fish missed was derived from visual extrapolated visual counts

were the predominant age classes comprising 44.9% and 33.3% of the sample, respectively. Age-3, -4 and -7 fish represented 4.1%, 16.3% and 1.4%, respectively.

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 2009. This was the fifth year a sonar program has been conducted at this site by Mercer and Associates with funding from the Restoration and Enhancement Fund (Project number CRE-41-09). 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 2008 programs. Partial weirs placed on both sides of the river were used to constrict fish movement through a 34 m opening. The sonar unit was configured to provide a 29º wide by 8º deep ensonified field. The start window was a distance of 5 m from the sonar unit and the ensonified area was set for 40 m. This resulted in the far end of the ensonified area being a distance of 45 m from the sonar unit.

The sonar device was installed on a submerged adjustable mounting platform and secured to a tree onshore using a 6 mm stainless steel safety cable. A 24 hour recording began on July 18 and continued until August 23, 2009 and a total of 9,261 targets were identified as Chinook salmon. This estimate represents 14.2% of the 65,278 upper Yukon spawning escapement estimate. The first Chinook salmon was observed at 2400 hours on July 19. The peak daily passage of 715 fish was observed on August 2; 50% and 90% of the run had passed the station by August 5 and August 10, respectively. The dates for the 50% and 90% passage were 2 and 4 days, respectively, earlier than the 2005–2008 average. The 2009 estimate is higher than estimates from previous years. For comparison, the 2005 to 2008 counts were 5,584, 7,308, 4,450 and 1,329 salmon, respectively.

A carcass pitch was conducted over approximately 100 km of the Big Salmon River, yielding 182 Chinook salmon carcasses. Each carcass was sampled for age, sex and length (ASL data). Of the 182 fish sampled, 97 (53%) were female and 85 (47%) were male. The mean mideye to tail fork length of females and males sampled was 822 mm and 763 mm, respectively. Age data were determined from 145 fish sampled. Age-6 (69%) was the dominant age class, followed by age-5 (23%) fish. Age-4 and age-7 fish represented 6% and 1% of the sample, respectively.

7.2.5 Whitehorse Rapids Fishway Chinook Salmon Enumeration

A total of 828 Chinook salmon ascended the Whitehorse Rapids Fishway between July 30 and September 5, 2009. This total was 69% of the 1999–2008 average count of 1,200 fish. The overall sex ratio was 13% female (108 fish). Hatchery-produced fish accounted for 46.9% of the return, and consisted of 360 males and 28 females. The non-hatchery count consisted of 440 fish, 360 wild males and 80 wild females. The run midpoint occurred on August 13 and the peak daily count occurred on August 16 when 81 fish were counted. The midpoint of the 2009 run occurred 2 days later than average, although the timing was average at the 90% point.

In 2009, fish 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 2009.

The Whitehorse Rapids Fishway program is a joint Yukon Fish and Game Association and DFO initiative that has a number of components relating 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.

7.2.6 Whitehorse Hatchery Operations

Eight Capillano 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 Capillano 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 2002–2008 was approximately 144,800 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 2009. This was the third 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 169,646 Chinook salmon fry from the 2008 brood year reared at the Whitehorse Rapids Fish Hatchery were released between May 31 and, June 11 2009. All fish were marked with an adipose fin clip. The fry[11] were released into various locations upstream of the Whitehorse Rapids hydroelectric dam (Appendix A16).

Included in the Wolf Creek release total was 2,672 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 11, 2009. A summary of Chinook salmon releases into the upper Yukon River from instream incubation and rearing sites is presented in Appendix A16. Fry weight at time of release ranged from 2.52 grams to 3.0 grams with an average weight of 2.83 grams.

The 2009 release was the 14th year in which all fit fish released from the Whitehorse Rapids Fish Hatchery into the Yukon River were marked, i.e., the 1995–2008 brood years. With the exception of all fish released from the 1998 BY, which were adipose-clipped but not tagged, all of the 1995–2008 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

11 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.

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. The marking is also consistent with a protocol recommended by the Yukon River Panel to mark all artificially propagated salmon.

Tag retention for the fish tagged for the 2009 release (2008 brood year) was calculated to be 99.23%. This calculation is derived from information that suggests that 1,288 of the 166,974 tagged fish did not retain their tag. The total 2009 release includes 165,686 adipose-clipped fish with intact coded wire tags, 1,288 fish estimated to have lost their tags, and 2,672 small (or unfit) fish that were clipped but not tagged for a total release of 169,646 fish.

Brood stock collection began on August 11 after 96 Chinook salmon had migrated through the Whitehorse Rapids Fishway and ended on August 31. An attempt was made to collect two males for each female during brood stock collection to allow matrix spawning. Matrix spawning has been used for 21 years in an effort to maintain genetic diversity.

A total of 52 males was retained and used for the brood stock program; 19 of these fish were adipose-clipped (hatchery) and 33 had intact adipose fins (wild). This total represents 7.2% of the total male return of 720.

A total of 34 females were collected from the Whitehorse Rapids Fishway (26 wild and 8 hatchery-origin). In total, 31 females were successfully spawned for the Whitehorse Rapids Hatchery program with an estimated total of 148,600 green eggs being collected. Two of the females perished during holding and one was released because it was not maturing. Average fecundity was estimated at 5,014 eggs per female with a range from 2,296 to 6,111. Some of these fish were partials, i.e. fish with less than a full complement of eggs. The fertilization rate was estimated to be 93%. Shocking and second inventory of the eggs began on October 11 and was completed by October 27, 2009. An estimated total of 140,342 eyed eggs were on hand as of October 27, 2009. The overall survival from green egg-to-eyed egg was estimated to be 94%.

On November 9, 2009 a representative sample of 10,060 eggs was transferred from the Whitehorse Rapids Hatchery to the McIntyre Creek Hatchery (Appendix A17). These eggs will be used for the Fox Creek restoration program funded by the Yukon River Panel Restoration and Enhancement fund (CRE-54-09).

7.2.7 Porcupine River Investigations

7.2.7.1 Fishing Branch River Fall Chum Salmon Weir

Fall chum salmon returns to the Fishing Branch River have been assessed since 1971 when an aerial survey count of 115,000 was adjusted to a total estimated return of approximately 250,000 to 300,000. A weir established to enumerate fall chum salmon escapement to the Fishing Branch River has operated during the following periods: 1972–1975; 1985–1989; and annually since 1991 in a cooperative effort between the Department of Fisheries and Oceans Canada 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 fall chum salmon in 2000, to 353,300 chum salmon in 1975 (Appendix B13).

The Fishing Branch River weir provides the primary assessment of the fall chum salmon return to the Porcupine River drainage. In 2009, the Fishing Branch River weir was operated from

September 6 to October 12. The weir was installed approximately 1 week later than planned due to high water conditions. The count through midnight October 12, the last full day of operation, was 24,670 fall chum salmon and included 14,007 females and 10,663 males. The Fishing Branch weir counts were higher than expected late in the season similar to what was observed in the upper Yukon River based on information from the Eagle sonar program. The daily Fishing Branch weir counts over the last 5 days of enumeration ranged from 288 (October 11) to 511 (October 9). Daily weir counts for the October 13–25 period were developed using a parabolic expansion function[12] provided by ADF&G (Bonnie Borba, Commercial Fisheries Biologist, ADF&G, Fairbanks, Alaska; personal communication). After extending the daily counts to October 25, the total estimated 2009 Fishing Branch escapement is 25,828 fall chum salmon. The 2009 escapement is 15% below the 1999–2008 average of 30,473 fall chum salmon.

The estimated midpoint of the run occurred on September 27, the same day that the peak daily count of 1,815 was observed. The recent 10-year average midpoint in the run occurred on September 19. Based on run timing, genetic and other data, it is unlikely that many fish arrived before the weir was installed. The Fishing Branch River weir is often removed before the run has ended; previous extrapolations for the missing portion of the run have involved the work of a number of people using different techniques. The formula used to expand the 2009 Fishing Branch River weir count will be used to consistently expand the historical database and the updated numbers will be presented in the next JTC report. While providing a consistent extrapolation technique, the updated numbers are not expected to vary significantly from previous extrapolations.

The 2009 Fishing Branch River escapement falls just above the lower end of the Fishing Branch River Interim Management Escapement Goal (IMEG) range of 22,000 to 49,000, which was established for the 2008–2010 period. Prior to the analyses which established the IMEG for 2008 to 2010, the longstanding spawning escapement goal for the Fishing Branch River was 50,000 to 120,000.

7.2.7.2 Porcupine River Fall Chum Salmon Catch Per Unit Effort Program

A mark–recapture program was conducted on the upper Porcupine River near the community of Old Crow from 2004 to 2008 with funding provided by the Yukon River Panel Restoration and Enhancement fund. Fall chum salmon captured with small mesh gillnets at a site located 23 km downstream of Old Crow were tagged with spaghetti tags. The tag recovery component of the program involved a test fishery and tag recoveries from the Vuntut Gwitchin aboriginal fishery. Tags were also observed and recovered at the Fisheries and Oceans Canada weir located on the Fishing Branch River.

In 2009, this program (CRE-27-09) was changed from a mark–recapture to a catch per unit effort (CPUE) index program. The relationship between test fishery CPUE data and Fishing Branch River weir counts for the 2004–2008 period was used to determine an index of abundance based on test fishery CPUE. Funding for the 2009 program was provided by the Yukon River Panel and the principal objective was to provide an inseason estimate of the abundance of fall chum salmon passing the community of Old Crow.

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[12] The equation used which 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.

The 2009 inseason CPUE index program underestimated the fall chum salmon run strength since the results were substantially lower than the Fishing Branch River weir counts. A total of 8,051 (95% confidence interval 7,246–8,826) fall chum salmon was estimated to have passed Old Crow between September 1 and 30, 2009. During the corresponding time frame, assuming an average travel time of 13 days between the test fishery and weir location, 23,896 chum salmon were counted at the Fishing Branch River weir.

Environmental Dynamics Inc. (EDI) has since conducted an extensive postseason analysis of CPUE data for the 2004–2009 period; this analysis has provided an understanding of how the CPUE index is influenced by high water levels. The low estimate derived from CPUE data in 2009 has been attributed to very high water levels which presumably made the capture of chum salmon using gillnets less effective. The original aggregate CPUE index excluded 2006 data due to low catchability of fish associated with high water conditions. The addition of the 2009 data increased the variation in the aggregate CPUE model. The addition of the 2006 data further increased the variation in the model. The aggregate CPUE model was unsuccessful in correlating CPUE index catches during high water events with the corresponding daily counts at the Fishing Branch River weir. Due to these shortcomings, the relationship between cumulative CPUE and cumulative weir counts was re-examined. Cumulative counts at the Fishing Branch River weir, adjusted for an average travel time of 13 days, were plotted against the cumulative CPUE index. Two distinct groups of data were apparent. Patterns in the data in the high water years, 2006 and 2009 had a similar distribution. Similarly, data for low water years, 2004, 2007 and 2008 had a similar distribution. Catches in 2005 were unusually high and did not relate well to either group when modelled. It has been suggested that a smaller proportion of the run is captured when fish numbers are unusually high.

A high water cumulative model was created from 2006 and 2009 data, and a low water cumulative model was created from 2004, 2007, and 2008 data. Using the high water model for 2006/2009 and the low water model for 2004, 2007, and 2008, comparisons were made with Fishing Branch River weir counts. The weir counts were within the range of the CPUE-produced estimates for these years (Table 6). EDI has concluded that data collected from high water periods should not be pooled with data from low water periods. The 2009 final EDI report suggests that the two new cumulative models will allow for more precise inseason estimates. The low water model will be used when the water depth is <8 m while the high water model will be used when water depth is >8 m; water level data, which is available inseason, is collected by Environment Canada, Water Survey near the Yukon/Alaska border. In years of exceptionally high returns, the model can be used with the understanding that it will produce an underestimate of run strength.

Using cumulative CPUE and cumulative weir counts for 2006 and 2009, a regression relationship was calculated for high water years with a R^2 value of 0.8903. The equation for this relationship is $y = 45.922x + 3175.5$, where x is the cumulative CPUE at a given point in the program and y is the corresponding estimate of the expected cumulative Fishing Branch River weir count, recognizing a 13-day average travel time. Similarly, the regression relationship for low water years is $y = 7.6747x + 2889.7$ ($R^2=0.8851$). Although the analyses show promise, it is acknowledged and cautioned that a low number of data points describe these relationships and data from additional years is required to better define them.

Table 6.–Comparison of estimates derived using a cumulative CPUE model with the 2004-2009 and end-of-year counts at the Fishing Branch River Weir.

Year	2004	2005	2006	2007	2008	2009
Corresponding Count at the Fishing Branch River Weir	18,152	111,099	28,530	29,459	18,423	23,896
Estimate derived from cumulative CPUE index models (min/max)[13]	16,181 (10,391/23,087)	36,251[14]	32,585 (26,895/40,518)	31,714 (22,534/41,302)	14,783 (9,298/21,447)	29,126 (23,732/36,753)

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

7.2.8.1 Chinook Salmon

Genetic stock identification of the 2009 Chinook salmon migration bound for Canada was developed using genetic samples collected from the Eagle sonar test drift gillnet program. Variation of 15 microsatellite loci was surveyed for 649 Chinook salmon from the Eagle test drift gillnet program.

The populations and regional reporting groups for Chinook salmon are presented in Table 7. The estimated stock composition and the associated standard errors for the period from early July to August 16 are presented in Table 8. The estimated relative abundance by period is presented in Table 9 and Figure 5.

Table 7.–Baseline comprised of 24 stocks used to estimate stock compositions of Chinook salmon collected at the Eagle sonar test drift gillnet program, 2009.

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 eight regional reporting groups (stock aggregates) for specific time periods as summarized in Table 8 and the final

[13] Note: to calculate total run passing by index site the CPUE estimate should be multiplied by 1.538 (assuming 65% of fish returning to Fishing Branch River weir).

[14] This was a notable underestimate due to saturation of the fishing gear (for much of the run maximum numbers of fish could be captured/processed), no min/max parameter estimate was provided.

corresponding sonar estimates, the estimated contributions of the stock aggregates to the total 2009 Eagle sonar estimate were as follows: Carmacks Area Tributaries (21.3%); Teslin River (18.6%); Pelly River (17.2%); Mid-mainstem Tributaries (17.1%); Stewart River (8.8%); North Yukon Tributaries (8.6%); White River (6.0%); and Upper Yukon River tributaries (2.5%).[15]

The estimated relative abundance for the three sample periods (i.e. to July 16, July 17–22 and July 23–Aug 16) presented in Table 9 and Figure 5 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.

The number of samples (N=646) available from the test fishery is limited; future analyses should involve a larger sample size and lower number of sample periods.

Table 8.–Estimated percentage stock composition of Chinook salmon migrating past the Eagle sonar site in 2009 by time period. Stock compositions were estimated using 15 microsatellite loci outlined in Table 7. The standard error (SE) of the estimates is also provided.

Period	to July 16		July 17–22		July 23–Aug 16	
Sample Size	n=169		n=277		n=200	
Region	Estimate	SE	Estimate	SE	Estimate	SE
North Yukon Tributaries	15.0	2.8	11.2	2.1	4.3	1.6
Mainstem	4.0	1.9	2.0	1.7	33.5	6.2
Carmacks Area Tributaries	16.1	3.4	19.4	3.2	24.6	5.1
White	16.9	3.4	7.6	3.1	0.9	0.8
Stewart	13.0	3.3	12.2	2.9	4.7	2.2
Pelly	22.2	4.1	26.9	4.1	7.8	2.9
Upper Yukon Tributaries	0.0	0.2	3.9	1.2	2.2	1.3
Teslin	12.7	2.9	16.7	2.8	22.1	5.4

Table 9.–Estimated relative abundance of Chinook salmon migrating past the Eagle sonar site in 2009.

Region	to July 16	July 17–22	July 23–Aug 16	Season Total
North Yukon Tributaries	1,715	2,884	1,406	6,005
Mainstem	457	522	10,960	11,940
Carmacks Area Tributaries	1,839	5,007	8,039	14,885
White	1,933	1,966	282	4,182
Stewart	1,483	3,141	1,530	6,154
Pelly	2,532	6,952	2,557	12,041
Upper Yukon Tributaries	2	1,009	729	1,740
Teslin	1,455	4,319	7,236	13,011
TOTAL	11,416	25,801	32,740	69,957

[15] These season total estimates differ slightly from those presented in the final report for REF project CRE-79-09 since updated sonar estimates were used for this report.

7.2.8.2 Fall Chum Salmon

Genetic stock identification of the 2009 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 366 fall chum salmon from the Eagle test drift gillnet program.

The populations and regional reporting groups for fall chum salmon are presented in Table 10. The estimated percentage stock composition and the associated standard errors for the various sampling periods from August 19 to October 4 are presented in Table 11. The estimated abundance by period is presented in Table 12 and Figure 6.

An estimated 66.1% of the return that passed the sonar site to October 4 originated from the Mainstem Yukon River reporting group, which includes a number of mainstem Yukon River spawning populations and 32.7% were from the White River aggregate (Table 10). The two remaining reporting groups contributing to the run were the Teslin River (1.0%) and the Yukon Early group, which is represented by the Chandindu River population (0.2%). The estimated abundance for the three sample periods (i.e. August 19–September 18, September 20–25, and September 26–October 04) presented in Table 10 and Figure 6 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.

The number of samples (n=336) available from the test fishery is limited; future analyses should involve a larger sample size and there should be an effort to lower the number of sample periods.

Table 10.–Baseline comprised of 9 stocks used to estimate stock compositions of fall chum salmon collected at the Eagle sonar test netting program, 2009.

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 11.–Estimated percentage composition of fall chum salmon migrating past the Eagle sonar site in 2009. Stock compositions were estimated using 14 microsatellite loci outlined in Table 10. Standard error of the estimates is also provided.

Period	Aug 19–Sept 18		Sept 20–25		Sept 26–Oct 4	
Sample Size	n=113		n=113		n=140	
Region	Estimate	SE	Estimate	SE	Estimate	SE
Yukon Early	0.4	1.0	0.2	0.8	0.1	0.5
White	46.1	4.9	33.0	4.6	16.9	3.6
Mainstem	53.4	5.0	64.1	5.0	82.5	3.8
Teslin	0.1	0.4	2.6	2.2	0.4	1.1

Table 12.–Estimated relative abundance of fall chum salmon migrating past the Eagle sonar site in 2009 to October 4. Genetic sampling did not occur for the final 2 days of the sonar program (October 5-6) or during the October 7-18 period; an additional 10,305 fall chum salmon were estimated to have passed the sonar site during these periods for a season total of 101,734.

Period Region	Aug 19–Sept 18	Sept 20–25	Sept 26–Oct 4	Total
Yukon Early	133	60	36	229
White	15,215	9,736	4,906	29,856
Mainstem	17,629	18,900	23,899	60,427
Teslin	20	767	130	917
Total	32,997	29,462	28,970	91,429

7.2.9 Yukon Education Program 2008–2009

Fisheries and Oceans Canada continues to support the Stream to Sea program, and make classroom salmon incubation available in all Yukon Schools. Sixteen Yukon schools in eight Yukon communities participated in classroom incubation projects in the 2008–2009 school year. Fry releases occurred between April 24th and June 5th, 2009.

Eight Whitehorse area classes reared fry produced from Whitehorse Fishway Chinook. Four classes had their fry injected with elastomer marks and then released them into Fox Creek between May 20th and June 4th, 2009; the other schools brought them to the McIntyre facility for subsequent release to Fox Creek by Ta'an Kwachan and the Northern Research Institute. Two schools released fish back to Tatchun Creek on April 24 and June 3. Three schools released chum salmon fry to Kluane River. Teslin students brought their chum to the McIntyre facility for subsequent release by another class.

Classroom incubation equipment is being used in 16 Yukon schools in the 2009–2010 school year: Dawson is incubating Klondike River eggs; Destruction Bay, Beaver Creek, Haines Junction and a Whitehorse School are incubating Kluane River chum salmon eggs; Teslin, Faro and Ross River are incubating Morley River Chinook salmon eggs. One Whitehorse School is incubating Tatchun eggs. Six Whitehorse Schools are incubating Whitehorse Fishway Chinook salmon eggs. Eyed Chinook salmon eggs were delivered to schools in October and November 2009. Two schools participated in broodstock capture and egg collection in October 2009, and 2 schools received eyed chum salmon eggs in January. Fry releases will take place in May and June 2010. Whitehorse Rapids Fishway fish will be released at Fox Creek.

7.2.10 Chinook Salmon Habitat Investigations

7.2.10.1 Klondike River Groundwater Channels: Juvenile Chinook Salmon Utilization

Development of ground water channels is a primary method of salmon habitat enhancement/stock restoration in the U.S. Pacific Northwest and the Canadian Pacific Southwest. There has been a single project of this type in the Yukon River Canadian sub-basin. An intermittently flowing side channel downstream of the Mayo hydro-electrical dam was deepened to provide additional habitat during low flows. The regulated nature of the Mayo River does not reflect natural flow regimes. Findings from the monitoring of this project may not be entirely transferable to areas with non-regulated rivers. Additionally, seasonal use of natural groundwater channels by juvenile Yukon River Chinook salmon has received little investigation.

To address these concerns, studies were initiated by DFO Oceans, Habitat and Enhancement Branch (OHEB) Salmon Enhancement Program (SEP) staff.

A pilot study commenced in 2004 on two groundwater channels in the Klondike River watershed near Dawson City. The Germaine Creek Groundwater Channel (GCGC) flows into a seasonally abandoned channel of the Klondike River. The channel intercepts both hyporheic and regional groundwater. The Viceroy Groundwater Channel (VGC) intercepts predominantly hyporheic flows from the North Klondike River and returns them to the river downstream. Data loggers were deployed in each channel in July 2005 and have been downloaded annually.

The waters of the channels are cooler than adjacent surface waters in the summer. The difference is greatest at the groundwater discharge sites, and least in the lowest sections of the channels. As air temperatures decline in the autumn, the water in the groundwater channels becomes warmer than the adjacent surface waters. Sampling in 2005 implied that 0+ juvenile Chinook salmon entered these channels in July. They then moved slowly upstream in the channels during the summer and autumn. By early October they were present at the extreme upstream end of the channels.

Sampling has been conducted annually to determine juvenile salmon behavior under a range of environmental and supply conditions. In 2006 a beaver dam was constructed across the VGC near the confluence with the North Klondike River. No juvenile Chinook salmon were captured in the channel in 2007 or 2008, implying that the dam was a complete obstruction to upstream migration. The dam was breached in August 2009. No juvenile Chinook salmon were captured in sampling conducted in mid-September 2009. However, sampling in the Klondike River watershed indicated low numbers of fry, and the lack of captures may be related to supply rather than access.

Volumes of flow in the GCGC continued to decline in 2009. A second kill of juvenile Chinook salmon and slimy sculpin was documented in the extreme upstream end of the channel in May 2009. Very few juvenile Chinook salmon were captured in the GCGC or in the Klondike mainstem during the open water period of 2009. It is probable that there were multiple causes for this, including the supply of juveniles resulting from the low 2008 spawning escapement. High flows in the Klondike following spawning in 2008, and the early and extreme breakup of the river in late April 2009 may also have negatively affected incubating and emerging Chinook salmon fry. Water temperatures continue to be monitored.

7.3 RESTORATION AND ENHANCEMENT FUND

7.3.1 Status of R&E Projects 2009

Project No.	Project Title	Contractor	Funding $US/Cdn[16]	TC[17]
CRE-06-09	Yukon River North Mainstem Stewardship	DDRRC[18]	26,200 CAD	A

Project conducted, final report approved and received.

[16] The values noted are those approved by the Panel - $US and $Cdn respectively; while * indicates an adjustment to the approved project budget, with the appropriate detail noted.

[17] Technical Contact A/ Al Von Finster, P/ Pat Milligan – (DFO) D/ Dani Evenson- (ADF&G)

[18] Dawson District Renewable Resource Council

CRE-07-09	2009 'First Fish' Youth Camp	THFN[19]	10,000 CAD	A
Project completed, final report approved and received.				
CRE-09-09	Tr'ondek Hwech'in Student Steward	THFN	5300 CAD	A
Project completed, final report approved and received.				
CRE-10-09	Size Selective Fishing Using Fish wheels	YRCFA[20]	29,700 CAD	P
No work done this year. De-commitment of full amount.				
CRE-11-09	In-season Management Fund	YRCFA & THFN	35,000 CAD	A
Project not initiated. Decommitment of full amount.				
CRE-16-09	Klondike River Chinook Sonar	B. Mercer[21]	76,500 CAD	P
Project completed. Final report is pending.				
CRE-17-09	Eagle Sonar Joint Project- Canadian	DFO	88,000 CAD	P/D
Project completed. Final report is pending.				
CRE-19-09	Mayo River Channel Reconstruction	NND[22]	25,200 CAD	A
Project completed. Final report is pending.				
CRE-27-09	Porcupine River Chum CPUE Project	VGG[23]	43,600 CAD	P
Project completed. Final report is pending.				
CRE-29-09	Chum Spawning Ground Recoveries	SRRC[24]	12,000 CAD	P
Project completed, final report approved and received.				
CRE-37-09	Blind Creek Chinook Salmon Weir	J. Wilson[25]	47,700 CAD	P
Project completed. Final report is complete.				
CRE-41-09	Chinook Sonar Big Salmon River	J. Wilson	86,200 CAD	P

[19] Tr'ondek Hwech'in FN
[20] Yukon River Commercial Fishing Association
[21] B. Mercer and Associates
[22] First Nation of Na-Cho Nyak Dun
[23] Vuntut Gwitchin Government
[24] Selkirk Renewable Resource Council
[25] J. Wilson & Associates

Project completed. Final report is complete.

CRE-51-09 Michie Ck. Salmon & Habitat Monitoring KDFN[26] 32,800 CAD A
Project completed. Draft report received. Final report is pending.

CRE-54-09 Ta'an Kwach'an Council Community Steward TKC[27] 45,700 CAD A
Project completed. Final report approved and received.

CRE-63-09 Whitehorse Rapids Hatchery Coded W. Tagging YFGA[28] 47,400 CAD P
Project completed. Final report approved and received.

CRE-65-09 McIntyre Creek Salmon Incubation Project NRI[29] 46,000 CAD A
Project is in progress.

CRE-67-09 Yukon Schools Fry Releases & Habitat Study SKNS[30] 5,000 CAD A
Project is in progress.

CRE-78-09 Canadian Collection of DNA Baseline Samples DFO[31] 30,000 CAD P
Project completed. Final report is pending.

CRE-78-09 U.S. Collection of DNA Baseline Samples ADF&G[32] 30,000 CAD P
Project completed.

CRE-79-09 Stock ID Microsatellite Var.-Chin & Chum DFO[33] 30,000 CAD P
Project completed. Final report is pending.

CRE-113N-09 Miner River Chinook Index VGG 18,400 CAD P
Project completed. Final report approved and received.

CRE-114N-09 Porcupine River Sonar Feasibility VGG 18,900 CAD P

[26] Kwanlin Dun First Nation
[27] Ta'an Kwach'an Council
[28] Yukon Fish and Game Association
[29] Northern Research Institute
[30] Streamkeepers North Society
[31] Fisheries and Oceans Canada- Whitehorse
[32] Alaska Department of Fish and Game
[33] Fisheries and Oceans Canada- Genetics Lab, Nanaimo B.C.

Project completed. Final report approved and received.

CRE-118N-09 Viable Fishery- Blast Freezer THFN 16,000 CAD P
Project completed. Report not required.

CRE-122N-09 Whitehorse Rapids Fishway Interpretive Panels YEC[34] 4800 CAD A
Project completed. Final report approved and received.

CRE-123N-09 Whitehorse Fishway Salmon Cam YEC 5,000 CAD A
Project completed. Final report approved and received.

CRE-124-09 Value Added Chum Products David Curtis 19,600 CAD P
Project is in progress.

URE-04-09 Ruby Salmon Data Collection Ruby Tribal Council 15,000 US D
Project completed. Final report is pending.

URE-08-09 Tech Assist, Dev & Support-Fish Wheel Video USFWS[35] 5,500 US D
Project completed. Final report is pending.

URE-09-09 Rampart-Rapids Full Season Video Monitoring Stan Zuray 46,100 US D
Project completed. Final draft report approved.

URE-13-09 Ichthyophonus Sampling- Emmonak & Eagle L. Dehn[36] 47,200 US D
Project completed. Final report is pending.

URE-16N(a)-09 Eagle Sonar operations ADF&G 115,700 US P/D
Project completed. Final report is pending.

URE-16(b)-09 Yukon River Border Chinook ASL Collection ADF&G 20,100 US D
Project completed. Final report is pending.

[34] Yukon Energy Corporation
[35] U.S. Fish and Wildlife Service
[36] University of Alaska

URE-19N-09	In-Season Chin Stock ID Pilot	ADF&G	35,000 US	D

Project completed. Final report is pending.

URE-20N-09	Radio Tower Retrieval in Canada	ADF&G	36,800 US	D

Project completed. Final report is pending.

Communications Committee Projects

CC-01-09 YRDFA Teleconference	YRDFA	10,000

Project completed. Final report approved and received.

CC-02-09 YRDFA Educational Exchange	YRDFA	30,000

Project is in progress.

8.0 YUKON RIVER SALMON RUN OUTLOOKS 2010

8.1 CHINOOK SALMON

8.1.1 Canadian-Origin Upper Yukon Chinook Salmon

The Canadian-origin upper Yukon River Chinook salmon spawning escapements in 2004 and 2005, the brood years producing the age-6 and age-5 fish returning in 2010, were above average at 48,469 and 68,551, respectively. However, the 2010 run of Canadian-origin upper Yukon River Chinook salmon is expected to be below average to average; the average run size for the 2000–2009 period was 96,900.

Stock-recruitment (S/R) and sibling models suggest that the 2010 total run size of Canadian-origin Chinook salmon may be as high as 113,000[37]. However, this does not include the uncertainty associated with lower productivity observed in recent years. Recently, observed returns have been lower than the preseason outlooks. For example, over the past 3 years, observed returns were approximately 28% lower than preseason outlooks developed with a stock-recruitment (S/R) model and approximately 35% lower than preseason outlooks developed with a sibling model. It is important to note that neither model incorporates environmental variables such as oceanic or freshwater conditions. Based upon discrepancies between observed and expected run sizes over the past 3 years, the 2010 Canadian-origin upper Yukon River Chinook salmon run could be as low as 77,800[38] fish.

The 2010 outlook has been adjusted to reflect the likelihood that low productivity may decrease the potential return based on the relative performance of the preseason run outlooks to actual run sizes over the past 3 years; during this period, preseason run outlooks based on historical models have over-estimated the actual run size. The 2010 outlook has been adjusted to a range of 77,800

[37] Represents a rounded average (to nearest 1,000) of the two model estimates. The S/R unadjusted estimate for Canadian-origin Chinook salmon in 2010 is 109,797 while the sibling model yields an estimate of 116,346 fish. In recent years these estimates have been adjusted to account for what may be a short-lived lower productivity period, which is not inherent in the models.

[38] Represents an average of the two model estimates. Adjusted estimates based upon the discrepancy between expected and observed runs over the 2007-09 period yield 79,500 for the 2010 S/R estimate and 76,200 for the sibling estimate.

to 113,000[39]. These outlooks suggest that the 2010 Canadian-origin upper Yukon River Chinook salmon run may be a below average to average run. Additionally, JTC members have initiated exploratory analyses to incorporate juvenile Chinook salmon abundance information from the Bering Arctic Subarctic Integrated Survey (BASIS) in the existing forecasting models.

Environmental factors, poor marine survival, and increased Chinook salmon bycatch from 2005-2007 in the Bering Sea trawl fishery targeting Alaskan Pollock could be associated with recent runs returning at levels below the preseason outlooks. Based on this additional information, it is advisable to enter the 2010 season with the prospect that the higher end of this range may be unlikely, and conservation measures less severe than those applied in 2009 may be necessary to meet the Canadian-origin upper Yukon Chinook salmon escapement goal.

8.1.1.1 Development of Revised Canadian-origin Chinook Salmon Database

Information from a number of sources suggested 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, radio telemetry and aerial survey data. Border passage estimates were developed from a combination of Eagle Sonar estimates (2005–2007) and radio-telemetry 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 estimate historical Canadian spawning escapement estimates back to 1982. 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.

8.1.1.2 Performance of Stock-Recruitment Models for the Years 2000–2009

The performance of run outlooks developed using S/R and models for the 2000–2009 period is presented in Table 13. Revised historical Canadian run size estimates were used to reconstruct the 2000 and 2001 runs; border passage estimates for the 2002–2004 period were based on radio telemetry estimates while border escapement estimates for the 2005–2009 period 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 13, the average of the preseason outlooks derived using Ricker and sibling model projections is compared to postseason estimates of run size. The averaged model projection for 2010 is 113,000. Despite good brood year escapements, the observed run sizes were relatively low from 2000 to 2002 and from 2007 to 2009. The causes of low returns are unknown but likely involve a number of factors in the marine and/or freshwater environments. It will be important to determine if the low run sizes observed in the 2007 to 2009 period develop into a long-term trend.

[39] This range represents the averaged lower and averaged upper estimates for both models. The 2010 S/R outlook has been adjusted to a range of 79,500 to 109,800, while the sibling-based outlook has been adjusted to a range of 76,200 to 116,400.

Table 13.–Preseason upper Yukon River Chinook salmon outlooks for 2000 to 2010 and the observed run sizes for the 2000 to 2009 period. Run sizes incorporated: radio-telemetry data (2002–2004); Eagle Sonar estimates (2005–2009); 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.

Year	Expected Run Size S/R (Preseason)	Expected Run Size Sibling (Preseason)	Expected Run Size Avg. (S/R & Sib.) (Preseason)	Estimated Run Size (Postseason)	Performance of Preseason Outlooks
2000	127,784	85,889	107,000	53,000	2.02
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	118,000	1.05
2005	121,764	117,860	120,000	124,000	0.97
2006	115,995	123,132	120,000	120,000	1.00
2007	118,557	139,934	129,000	88,000	1.47
2008	111,551	122,435	117,000	63,000	1.86
2009	98,172	103,541	101,000	85,000	1.19
2010	109,797	116,346	113,000		
Avg. (2000–2009)	117,464	108,527	113,100	96,900	1.27

Example: the 2000 outlook of 107,000 overestimated the run size by a factor of 2.02; the preseason outlook was size 102% above the actual run.

8.1.2 Drainage-Wide 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%. Using this method, the expected total Yukon River run size is 226,200[40], but could be as low as 155,600[41] based on low productivity since 2007. As previously mentioned, there is a lot of uncertainty associated with this methodology and, due to apparent reductions in productivity in recent years, environmental factors and other phenomena not incorporated into the models, the upper end of this range is unlikely.

Thus, the 2010 Yukon River Chinook salmon run will likely be below average to average. It is therefore prudent to enter the 2010 season with the prospect that subsistence conservation measures, much less severe than those used in 2009, may be necessary in an effort to share the available subsistence harvest and meet escapement goals. Conservation measures may include promoting voluntary reductions such as encouraging a shift in harvest to other species, spreading harvest out over the duration of the run, reductions in extended sharing, and keeping fish harvested within the village or local area.

[40] Based on the averaged value for both sibling and Ricker models. Values for each model separately are 220,000 and 233,00 for Ricker and sibling models respectively.

[41] Based on the averaged value for both sibling and Ricker models. Values for each model separately are 159,000 and 152,200 for Ricker and sibling models respectively.

Some reductions in subsistence fishing time may be necessary; however, reductions similar to those implemented in 2009 are not anticipated. It is unlikely that there will be a directed Chinook salmon commercial fishery in 2010 on the mainstem Yukon River, but there may be opportunity to commercially harvest less than 1,000 Chinook salmon on the Tanana River, as the Tanana River is managed independently as a terminal fishery.

Currently, the Yukon River Drainage Fisheries Association (YRDFA) is facilitating a series of regional teleconferences to provide managers, fishermen, tribal council representatives, and other stakeholders the opportunity to share information, provide input, and discuss management options. The purpose of these calls is to work cooperatively to identify options and practical management strategies for 2010 that will assist in getting adequate numbers of fish to the spawning grounds should the 2010 Chinook salmon run be similar to the below average runs of 2007–2009.

8.2 SUMMER CHUM SALMON

The strength of the summer chum salmon runs in 2010 will be dependent on production from the 2006 (age-4 fish) and 2005 (age-5-fish) escapements as these age classes generally dominate the run. The total run sizes during 2005 and 2006 were approximately 2.6 and 4.0 million summer chum salmon respectively, though tributary escapements were highly variable. However, it is worth noting that poor runs have resulted from large escapements. It appears that production has shifted from major spawning tributaries in the lower portion of the drainage, such as the Andreafsky and Anvik rivers over the last 8 years, to higher production in spawning tributaries upstream.

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 2009 run of approximately 1.3 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. Chum salmon collected in the BASIS study in 2006 and 2007 would correspond to the dominant age class returns (age-5 and age-4, respectively) in 2010. 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 2010 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 7 years (2003–2009). 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 250,000 to 500,000 summer chum salmon. The actual commercial harvest of summer chum salmon in 2010 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 Drainage-Wide Fall Chum Salmon

Yukon River drainage-wide estimated escapements of fall chum salmon for the period 1974 through 2003 have ranged from approximately 180,000 (1982) to 1,500,000 (1975), 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 2.1 for all years combined (1974–2003).

A considerable amount of uncertainty has been associated with these run projections particularly recently because of unexpected run failures (1998 to 2002) followed by a strong improvement in productivity from 2003 through 2007. Weakness in salmon runs prior to 2003 has generally been attributed to reduced productivity in the marine environment and not as a result of low levels of parental escapement. Similarly, the recent improvements in productivity may be attributed to the marine environment. Projections 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 (Table 14). In 2005, the average ratio of the years 2001 to 2004 was used, in attempts 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 and 2009 used 1984 to current year odd/even maturity schedules to represent years of lower production.

Table 14.–Preseason drainage-wide fall chum salmon outlooks and observed run sizes for the Yukon River, 1998–2009.

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	760,000	0.72
2009	790,844	560,585	0.71
Avg. (1998-2009)	923,487	756,465	0.87

Yukon River fall chum salmon return primarily as age-4 and age-5 fish, although age-3 and age-6 fish also contribute to the run (Appendix A18). The 2010 run will be comprised of parent years 2004 to 2007 (Table 15). Estimates of returns per spawner (R/S) based on brood year return were used to estimate production for 2004 and 2005. An auto-regressive Ricker spawner-recruit model was used to predict returns from 2006 and 2007. The point projections in 2010 will use 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 690,000 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 2009. Therefore, the 2010 run size projection is expressed as a range from 552,000 to 828,000 fall chum salmon. This projected run size is near average in magnitude for even-numbered year returns.

Table 15.–Projected 2010 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, 2004–2007.

Brood Year	Escapement	Estimated production (R/S)	Estimated Production	Contribution based on age	Current Return
2004	537,873	0.90	484,086	1.1%	7,363
2005	1,996,513	0.26	519,093	20.9%	144,143
2006	873,987	0.95	830,843	75.6%	521,282
2007	928,430	1.00	929,230	2.5%	17,032
Total expected run (unadjusted)					689,820
Total 2010 run size expressed as a range based on the forecasted vs. observed returns from 1987 to 2009 (80% CI):					552,000 to 828,000

The 2004 escapement was within the drainage-wide escapement goal range of 300,000 to 600,000 fall chum salmon, while escapements for the other three contributing parent years 2005 through 2007 all exceeded the upper end of the drainage-wide escapement goal range. All of the parent year's returns per spawner are less than one, with a failure in the 2005 brood year based on an estimated 0.26 R/S. The major contributor to the 2010 fall chum salmon run is anticipated to be age-4 fish returning from 2006 parent year (Appendix A18). Although the age-4 component is expected to dominate the run, there is still concern that the projection could be insensitive to the fluctuations as observed in the 2005 brood year. The northern Bering shelf juvenile chum salmon index showed declines since the 2001 brood year with the lowest abundance in 2004, followed by increases in 2005 and 2006 (Figure 13). Brood year 2007 was unmonitored and 2008, although preliminary, appeared to be similar to 2005 in abundance. At this time it is unknown if this measure of abundance correlates with future returns.

The sibling relationship between the age-3 to age-4 fish (R^2=0.48) is slightly better than the age-4 to age-5 fish (R^2=0.40). Brood year returns of age-3 fish range from zero to 150,000 chum salmon. The age-3 components are not typically good indicators of future production levels, but nonetheless it was encouraging that there appeared to be an average return in the 2009 run. Returns of age-4 fish from even-numbered brood years during the time period 1974 to 2003 typically averaged 389,000 chum salmon, and ranged from a low of 166,000 for brood year 1996 to a high of 654,000 for brood year 1992. Return of age-5 fish from even-numbered brood years during the time period 1974 to 2003 typically averaged 179,000 chum salmon, and ranged from a low of 58,000 for brood year 1998 to a high of 418,000 for brood year 1990. For fall chum salmon the sibling relationship is best between the age-5 to age-6 component (R^2=0.64).

There is uncertainty as to how well the 2005 fall chum salmon run will be represented in the coming generation. As examples, the returns off of the record escapements achieved in 1975 and 1995 resulted in very different production levels. Good survival was realized for the 1975 brood year with age-4 fish comprising 88% of the 1979 run while in 1995 brood year, the age-4 comprised only 64% of the 1999 run indicating much lower survival. Recent production levels at 2.0 return/spawner (average R/S 1998 to 2003 excluding 2001) are well above the poor returns

observed in 1994–1997 (0.49 average R/S), however they appear to be in a declining mode. That said, even a return of 1.0 R/S would provide a substantial run size for returns in 2010.

During the season, strength of the run will be monitored using the strength of the summer chum salmon run as a precursor of the fall chum salmon run, along with additional inseason monitoring projects that are used to determine appropriate management actions and levels of harvest based on stipulations in the Alaska Yukon River Drainage Fall Chum Salmon Management Plan (Appendix A6). With a range in run size from 552,000 to 828,000 fall chum salmon, it is anticipated that escapement goals would be met while supporting normal subsistence fishing activities. Commercial harvestable surpluses will have to be determined inseason and the run is expected to provide limited commercial ventures where markets exist.

8.3.2 Canadian-Origin Upper Yukon River Fall Chum Salmon

The outlook for the 2010 upper Yukon River fall chum salmon run is for a below average to average run of 136,900 to 207,000 fish. The average upper Yukon River fall chum salmon run size for the 1998–2009 period was approximately 202,000 fish.

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 which were followed by improved productivity and higher runs observed within the 2003–2007 period. 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 has added to the uncertainty and complexity of both the 2009 and 2010 preseason outlooks are recent high spawning escapements which are well above levels previously observed. For example, the 2005 escapement of approximately 437,500 is the highest observed within the 1982 to 2009 period, while the 2006 and 2007 escapements are the fourth and third highest observed, respectively. Returns from these recent high escapements will help 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. Based on preliminary analyses, the return from the large spawning escapement observed in 2005 will indeed influence the S/R relationships, however interpreting this data is difficult since only one substantive year class (age-4 fish) has returned from this brood year (BY) to date; the age-5 component will return in 2010. In addition, there have been no substantive year class returns from the large escapements observed in 2006 and 2007. The following table shows the brood year escapements which will contribute to the 2010 run. For even-year upper Yukon fall chum salmon runs, the average age composition is comprised of 52% age-4 and 46.2% age-5 fish.

Table 16.–Summary of upper Yukon fall chum salmon brood year spawning escapements for the 2004–2007 period and the average even-year contribution for age-3 to age-6 fish returning in 2010.

Brood Year	Escapement	Age	Avg. Even-Year Age Structure
2004	154,080	6	1.1%
2005	437,498	5	46.2%
2006	211,994	4	52.0%
2007	254,649	3	0.8%

The base level spawning escapement for the 2010 run is approximately 325,000 fish; this is the weighted average (weighted by the average age composition) of the brood year escapements. The potential 2010 preseason outlook was developed using three approaches.

1. Based on the S/R model for upper Yukon stocks which incorporated 1982–2005 data including provisional estimates of the return of age-5 and age-6 fish from the 2005 BY in 2010 and 2011, respectively, the expected run size is approximately 136,900 fish. A run size of this magnitude would be far less than replacement but is consistent with the preliminary returns for the 2005 BY as observed in the age-4 return. However, there is some concern about this approach since it relies on the extrapolated data for the remainder of the 2005 BY return.

2. Due to the considerable uncertainty associated with the potential total return from the 2005 escapement, and a longer time series which is used in the ADF&G drainage wide outlook analyses, the ADF&G drainage wide outlook range of 552,000 to 828,000 fall chum salmon was also used to develop an upper Yukon fall chum salmon outlook. The analyses undertaken to develop the drainage wide outlook range is outlined in Section 8.3.1. There is a longstanding assumption that the Canadian contribution to the drainage wide return of fall chum salmon is approximately 30%. Recent genetic stock identification analyses have confirmed that this assumption is reasonably close (average of years, 2004 to 2009, after July 19, which have genetic stock identification estimates, is 25%), although there is inter-annual variation (range is 21% to 29%). For the purpose of developing a 2010 outlook, it was assumed that the upper Yukon Canadian-origin component is likely to be at least 25% of the drainage wide return while the Fishing Branch River component will be approximately 5% of the drainage wide return. Based upon the ADF&G drainage wide outlook range of 552,000 to 828,000 and an assumed 25% contribution, the upper Yukon outlook range is 138,000 to 207,000 fall chum salmon. The lower end of this outlook is similar to the S/R outlook of 136,900 derived from 1982–2005 data.

3. An Upper Yukon fall chum salmon outlook range of 136,900 to 207,000 was adopted which covers the ranges identified in the above mentioned analyses. A run near the lower end of this range constitutes a below average run whereas a run near the upper end of this range is close to the 1998–2009 average run size of 202,000.

Given the uncertainly associated with the 2010 Upper Yukon fall chum salmon return, it is prudent to enter the 2010 season with the expectation that inseason assessment programs will determine the run strength and appropriate management actions will be undertaken to ensure conservation and harvest sharing objectives are achieved. In Canada, a decision matrix will be developed within the Integrated Fisheries Management Plan (IFMP) to provide detailed guidance for specific inseason run abundance levels.

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. Genetic stock identification data (i.e., mixed stock analyses) has only recently been available to accurately estimate the annual U.S. catch of upper Yukon River fall chum salmon; however, 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 2010 period are presented in Table 17.

Table 17.–Preseason upper Yukon River fall chum salmon outlooks for 1998 to 2010 and observed run sizes for the 1998–2009 period. Run sizes are rounded to nearest one thousand. The 2009 and 2010 outlooks are the average of the expected outlook range.

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		
Avg. (1998-2009)	197,667	201,750	1.84

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.

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 1990's and were heightened in year 2000 when the count through the Fishing Branch River weir was only 5,057 fish, the lowest on record. 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 18 shows the brood year escapements which will contribute to the 2010 run. For even-year upper Fishing Branch River fall chum salmon runs, the average age composition is comprised of 48.4% 4-year old fish and 48.2% 5-year old fish.

Table 18.–Summary of Fishing Branch River fall chum salmon brood year spawning escapements for the 2004–2007 period and the average even-year contribution for age-3 to age-6 fish returning in 2010.

Brood Year	Escapement	Age	Avg. Even-Year Age Structure
2004	20,417	6	1.8%
2005	119,058	5	48.2%
2006	30,954	4	48.4%
2007	32,150	3	1.6%

The weighted average (by age) base level escapement for the 2010 Fishing Branch River fall chum salmon run is approximately 74,900 fish; however, as with the upper Yukon mainstem stock group, the return from the 2005 BY escapement is expected to be well below replacement. 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 preliminary analysis of the 2009 run which indicates poor production from the 2005 BY escapement of 119,058 chum salmon, a return/spawner value of 2.5 is highly unlikely.

The 2009 Fishing Branch River preseason outlook range was 30,000 to 49,000 chum salmon while the preliminary estimated reconstructed run was approximately 32,300 fish. Conservation measures were employed to ensure the spawning escapement goal of 22,000–49,000 to the Fishing Branch River weir was achieved; the post season estimate of the spawning escapement was 25,828.

The 2010 Fishing Branch River outlook range is from 27,600 to 41,400 (midpoint 34,500) based on the ADF&G drainage wide outlook range of 552,000 to 828,000 and an assumption that approximately 5% of the drainage wide outlook will be Fishing Branch River fall chum salmon. The average contribution of Porcupine stock to the total Yukon River fall chum salmon run is 3% based on the years 2004 to 2009, after July 19, although it is apparent that the genetic analysis underestimates the contribution of this stock component.

The 2010 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 incidental 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 2010 Fishing Branch River outlook range will only provide minimal harvest relative to an escapement goal of 22,000 to 49,000 fish. Given the uncertainty associated with the 2010 Fishing Branch River run outlook, it is prudent to enter the 2010 season with the expectation that inseason assessment programs will determine the run strength and appropriate management actions will be taken to ensure conservation and harvest sharing objectives are achieved. In Canada, a decision matrix will be developed within the Integrated Fisheries Management Plan (IFMP) to provide detailed guidance for specific inseason run abundance levels.

As was observed with the Upper Yukon River fall chum salmon stocks, the postseason estimates of the Porcupine[42] River fall chum salmon run sizes were consistently below preseason outlooks

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

throughout the 1998–2002 period (Table 19). Canadian postseason estimates of the Porcupine drainage fall chum salmon return consistently exceeded preseason outlooks from 2003 to 2005 while the 2006–2009 postseason estimates were lower than the preseason estimates.

Table 19.–Preseason Porcupine River fall chum salmon outlooks for 1998 to 2010 and observed run sizes for the 1998–2009 period. Run sizes are rounded to nearest one thousand. The 2009 and 2010 outlooks are the average of an outlook range.

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		
Avg. (1998-2009)	74,000	46,000	2.88

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.

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-4 fish and overlap in run timing with fall chum salmon. The major contributor to the 2010 coho salmon run will be the age-4 fish returning from the 2006 parent year. Based on run reconstruction using Pilot Station sonar estimates, the 2006 passage estimate of 173,000 coho salmon was slightly below average (176,000). The commercial harvest in 2006 was the second highest since 1991, but was primarily driven by harvests in the Lower Yukon Area while harvests in the Upper Yukon Area were average.

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 17,000 fish in 2006 was equal to the upper end of the Sustainable Escapement Goal (SEG) range of 5,200 to 17,000 coho salmon. DCR escapement has increased since 1972, and particularly within the last decade when

fishing effort in river has been low. Coho salmon escapements in the Nenana River complex were nearly average. Assuming average survival, the 2010 coho salmon run, is anticipated to be average based on escapements observed in 2006.

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

8.5 Spawning Escapement Target Options in 2010: 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. 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 a new and 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 recommended using the Eagle sonar project in 2008 as the primary assessment tool for the border passage estimate and reviewed the best approach to transition from the mark-recapture based escapement goal to a new goal based on and assessed by the sonar program. Considerable analyses were conducted to construct a new database of stock and recruitment information that was not solely based on mark–recapture estimates. These have included examining the relationships between aerial survey indices (three scenarios: 3-area index; 4-area index; and a single index) and independent border passage estimates (two scenarios: Eagle sonar passage estimates; and passage estimates derived from a radio-telemetry program). A JTC working group reviewed extensive analyses undertaken by Gene Sandone and after thorough discussion at the March 2008 JTC meeting, made proposals to the JTC as a whole.

The JTC discussed recommendations provided by the Chinook Salmon Escapement Goal working group for a minimum Interim Management Escapement Goal (IMEG) in 2008. Although working group members could justify IMEG targets ranging from 45,000 to 50,000, consensus was eventually achieved. The JTC recommended that the Yukon River Panel adopt an IMEG of >45,000 Canadian-origin upper Yukon River Chinook salmon for 2008 to be assessed using information from the Eagle sonar program. This recommendation was established for one year only 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.

For 2010, the JTC recommends 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. The JTC was not able to reach consensus on the lower bound and will present two options to the Yukon River Panel, 40,000 and 45,000. The Chinook Salmon Escapement Goal working group will continue to examine other data that may be used in recommending a

revised escapement goal for future years. Ongoing analysis includes the use of a habitat capacity approach which may be useful in improving other analyses.

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. This goal was achieved 15 times within the 28 year period from 1982–2009. The Fisheries and Oceans Canada fall chum salmon mark–recapture program was conducted from 1982 to 2008[43] while the joint U.S./Canada Eagle sonar program was conducted from 2006 to 2009. The mark–recapture estimates generally agreed with the Eagle sonar estimates within the 2006–2008 period when the two 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 2010, the JTC recommends that the upper Yukon fall chum salmon escapement goal be established as a range from 70,000 to 104,000. This range was developed as 0.8 to 1.2 times the estimated spawners at maximum sustained yield (86,600) which is derived from recent data that incorporates the observed and expected return from the exceptional spawning escapement of 477,498 observed in 2009.

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 five 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 two fall chum salmon 4-year-cycles preceding 2008 when escapements to the upper Yukon River in Canada were rebuilding, led the JTC to question if the lack of success was more related to an unrealistically high goal rather than other factors. 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 of the 2001 recommendation (Eggers 2001) which ultimately led to its rejection. 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 are documented.

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

The majority of fish returning from 2005 returned as 4-year olds in 2009 while the age-5 component of this brood year will return in 2010. The JTC accepted the working group's recommendation and plans to continue the BEG analysis with the objective of having a revised goal ready for peer review prior to the 2011 season.

For the 2008–2010 period, the JTC has recommended an Interim Management Escapement Goal (IMEG) range of 22,000 to 49,000 Fishing Branch River fall chum salmon. This recommendation 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 incorporated 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 JTC Escapement Goal Working Group will continue to examine other data that may be used in recommending a revised escapement goal for future years.

9.0 STATUS OF ESCAPEMENT GOALS

ADF&G undertakes a triennial review of salmon escapement goals in preparation for its triennial Board of Fisheries (BOF) meeting. Chinook, summer chum, and fall chum salmon were reviewed for the 2010 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 sets 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 the department'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. An escapement goal review team, consisting of staff from the Divisions of Sport Fish and Commercial Fisheries, met five times over a 14-month period. Federal agency biologists and representatives of Tribal and fishing groups were invited to attend and participate in the meetings. The team's recommendations were presented to the Alaska Board of Fisheries in January 2004 and formally adopted by ADF&G in 2005. During this review, analyses for escapement goals established in 2001 were updated with the latest information and most goals were brought into compliance with the policies by making them ranges, rather than point goals. Because of the thorough review of escapement goals in 2001 and 2004 and only a couple of years of additional data collected, no changes to escapement goals were recommended for the February 2007 BOF meeting.

In preparation for the January 2010 Alaska Board of Fisheries meeting, ADF&G is again in the process of reviewing escapement goals. Formal meetings, open to agencies and the public, were held in October and December of 2008 and January of 2009. Draft analyses are being distributed for review and comment and a public review draft of recommendations for changes is anticipated to be distributed in March 2009. A final document summarizing the escapement goal review will be submitted in April 2009.

9.1 CHINOOK SALMON

Five Chinook salmon aerial survey goals were converted to ranges and formally adopted in 2005 using the method devised by Bue and Hasbrouck (*Unpublished*). In the case of Nulato River, the goals for the two forks were combined into a single goal (Table 20). The escapement goal review team recommended no changes to these escapement goals for 2008 and 2009 and none were adopted by the Alaska Board of Fisheries. The team recommended revision of the Chinook salmon SEG for the East Fork Andreafsky River from an aerial survey-based goal to a weir-based goal in 2010 (Volk et al. 2009). The new SEG is 2,100–4,900 Chinook salmon and was derived using the percentile approach (Bue and Hasbrouck 2001). The 2010 team recommended elimination of the Gisasa River aerial survey goal for Chinook salmon because aerial surveys do not appear to track true abundance based on comparisons with recent weir counts (Volk et al. 2009). All other existing goals will continue without revision.

Table 20.–List of previous and current BEGs and SEGs for Yukon River Chinook salmon.

Stream (Project Type)	2009 Goal	2010 Goal	Type of Goal
East Fork Andreafsky River (Aerial)[a]	960–1,900	2,100–4,900	SEG
West Fork Andreafsky River (Aerial)	640–1,600	No Revision	SEG
Anvik River Index (Aerial)	1,100–1,700	No Revision	SEG
Nulato River (Aerial) (Forks Combined)	940–1,900	No Revision	SEG
Gisasa River (Aerial)	420–1,100	Eliminate	SEG
Chena River (Tower)	2,800–5,700	No Revision	BEG
Salcha River (Tower)	3,300–6,500	No Revision	BEG

[a] Change from aerial survey to weir.

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 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)). Available information on the return per spawner data for Yukon River Chinook salmon is presented in Appendix A10 and Figure 7.

9.1.1.1 Objective

Cooperative Canada/U.S. management of Canadian origin Yukon River Chinook salmon utilized 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 developed a new and improved estimation technique, the Eagle sonar program, to assess the abundance of Chinook salmon migrating into Canada. Comparisons between estimates derived from the mark–recapture and sonar programs suggest that the mark–recapture program underestimated Chinook salmon abundance. In progression towards the transition from mark–recapture to sonar based assessment, it is necessary to develop a new spawning escapement goal that: a) is applicable to sonar; and b) is biologically defensible with regard to data collected to date regarding escapement, returns, and factors known to limit production such as habitat capacity. At the present time, there are known technical concerns with the standard methodology used to assess escapement goals for Canadian-origin Yukon River Chinook salmon that 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 recommends that this work be a high priority in refining a biologically-based escapement goal.

9.2 SUMMER CHUM SALMON

The escapement goal review team recently evaluated the type, quality, and amount of data for summer chum salmon stocks to determine appropriate types of escapement goals as defined by the statewide salmon escapement goal policy (Volk et al. 2009). A lower bound SEG will replace the current BEG range for the East Fork Andreafsky River stock, primarily because is would be difficult or undesirable to hold escapements below the upper bound of a range through inseason management actions (Fleischman and Evenson *In prep*). Because of Andreafsky River's geographic location, it is unlikely sufficient fishing power could be generated in a timely manner to prevent escapement from exceeding an upper limit, and a lower-bound SEG is most appropriate for this stock. Information garnered from run reconstruction and spawner-recruit analyses suggests that the current escapement goal could safely be changed to a lower bound SEG of 40,000 (Table 21). The new goal will improve yield potential and reduce disruptions to the lower Yukon River summer chum salmon fishery. No additional goals or changes to the existing Anvik River BEG are recommended for 2010 (Table 21).

Table 21.–Previous and current BEGs and SEGs for Yukon River summer chum salmon.

Stream (Project Type)	2009 Goal	2010 Goal	Type of Goal
East Fork Andreafsky River (Weir)	65,000–130,000	>40,000	SEG
Anvik River Index (Sonar)	350,000–700,000	No Revision	BEG

9.3 FALL CHUM SALMON

Analyses for all biological escapement goals for Alaskan fall chum salmon stocks were updated in 2005 using the most recent data. There have been no changes to the Biological Escapement Goals (BEG's) established in 2001 for Alaskan fall chum salmon stocks (Table 22). There are no

fall chum salmon BEG's for Canadian-origin stocks within the Upper Yukon River (mainstem) and Porcupine River drainages. The BEG's recommended by ADF&G 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, due to concerns with the quality of the data.

Table 22.–Yukon River escapement goals set for fall chum salmon in 2009 and recommendations for 2010.

Fall Chum Salmon Stock	Previous Goal (Type) Established in 2001	2009 Goals	Goal Recommended in 2010
Yukon Drainage	300,000–600,000 (BEG)	No Change	Change to SEG
Tanana River	61,000–136,000 (BEG)	No Change	No Change
Delta River	6,000–13,000 (BEG)	No Change	No Change
Toklat River	15,000–33,000 (BEG)	No Change	Discontinue
Upper Yukon R. Tributaries	152,000–312,000 (BEG)	No Change	No Change
Chandalar River	74,000–152,000 (BEG)	No Change	No Change
Sheenjek River	50,000–104,000 (BEG)	No Change	No Change
Canadian Upper Yukon River	>80,000 (Yukon Salmon Agreement)	No Change	70,000–104,000
Fishing Branch River	50,000–120,000 (Yukon Salmon Agreement)	22–49,000	22,000–49,000

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 2010 and a Fishing Branch River IMEG range of 22,000 to 49,000 from 2008 to 2010. 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. The recent spawner-recruit analysis for fall chum salmon in the Yukon River drainage was for the drainage-wide goal and did not address individual stocks. Because of the recommendation to not change the existing drainage-wide goal developed by Eggers (2001), individual goals will still apply. The current poor return from the record 2005 brood year will help further define a stock model.

For Canadian stocks, the JTC will analyze the range supplied by the IMEG for the Fishing Branch River, and it will develop a range around the mainstem Yukon border escapement goal as well. A preliminary review based on mainstem border escapements from 1980 to 2009 and using the Bue and Hasbrouck method suggested a SEG range of 48,000 to 99,000 fall chum salmon (Appendix A19).

9.4 COHO SALMON

The Delta Clearwater River boat survey goal was revised from >9,000 to a sustainable escapement goal range of 5,200 to 17,000 using the Bue and Hasbrouck (*Unpublished*) method, effective during the 2005 season. No changes were made to the escapement goal by the Alaska Board of Fisheries and, therefore, the existing goal will remain in effect for 2010.

10.0 MARINE FISHERIES INFORMATION

10.1 INTRODUCTION

Yukon River salmon migrate into the Bering Sea during the spring and summer after typically spending one winter rearing in fresh water. 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.

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.

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 two 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 2007 averaged 549,523 in the South Unimak and 669,127 in the Shumagin Islands June fisheries for an average total harvest of 1,218,650. This average total harvest was lower than the 1975–2000 average, but above the 2001–2003 average. Chum salmon harvests from 2004 through 2007 for the South Unimak and Shumagin Islands June fisheries average 130,944 and 245,933, 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 2009a). Bycatch of Chinook and non-Chinook salmon (principally chum salmon) in the BSAI and GOA groundfish fisheries remained near historic low levels in 2009 (Appendix A21). Estimated bycatch of Chinook salmon during 2009 was 13,985 in BSAI groundfish fisheries and 7,900 in GOA groundfish fisheries. Estimated bycatch of non-Chinook salmon species during 2009 was 47,531 in BSAI groundfish fisheries and 2,556 in GOA groundfish fisheries.

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 bycatch in the BSAI groundfish fisheries (NMFS 2009a). 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 two 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 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 are currently used to limit salmon bycatch in the GOA and BSAI groundfish fisheries (NMFS 2009b, NMFS 2009c). 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-1990's and cap-and-closure measures were implemented 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 fishing industry to minimize salmon bycatch by adaptively defining area closures with inseason bycatch rate 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 in the Bering Sea pollock fishery (NMFS 2009b, NMFS 2009c). Following these reviews, the NPFMC adopted amendment 91 (Salmon bycatch motion 409) to the BSAI Groundfish Fisheries Management Plan in 2009. Amendment 91 establishes a 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). Caps are allocated to each season and sector of the fishery based on historical Chinook salmon bycatch and pollock harvest allocations. Directed fishing for pollock will close for a given sector once it reaches its allocated proportion of the hard cap. Performance caps establish the benchmark performance of the IPAs. Sectors that exceed their proportion of the performance cap more than two times in any 7-year period while participating in an IPA will have their hard cap reduced to their proportion of the performance cap.

10.4 BERING ARCTIC SUBARCTIC INTEGRATED SURVEY (BASIS)

The Bering Arctic Subarctic Integrated Survey was a 5-year study initiated in 2002 by member nations of the North Pacific Anadromous Fish Commission (NPAFC) to improve our understanding of marine ecology of salmon in the Bering Sea. The United States BASIS surveys focused on the eastern Bering Sea shelf and the juvenile life-history stages of western Alaska salmon populations and continued it surveys on the shelf for 6 years (2002–2007). Figures 12 and 13 summarize the relative abundance (abundance is relative to trawl catchability) of juvenile Chinook and chum salmon within the northern Bering Shelf rearing area (60N–64.5N). These estimates are assumed to reflect salmon production within the northern shelf region (primarily Yukon River and Norton Sound stocks). The highest juvenile abundance in both Chinook and chum salmon was produced by the 2001 brood; the lowest juvenile abundance was produced by the 2004 brood. The 2004 and 2005 brood years will be the primary contributors to the Chinook salmon returns in 2010; the 2005 and 2006 brood years will be the primary contributors to the 2010 chum salmon return.

10.5 ENFORCEMENT OF HIGH SEAS DRIFTNET FISHING MORATORIUM

Provided by Captain Micheal Cerne of the U.S. Coast Guard.

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 Watch 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 fishing.

Operation North Pacific Watch 2009 commenced in August with the patrol of USCG Cutter RUSH. Coast Guard cutter patrols were augmented with several USCG HC-130 flights from Shemya Island, Alaska. The Canadian Air Force and Department of Fisheries and Oceans also made an extended CP-140 deployment from Honolulu, Hawaii. In addition, Japan Coast Guard aircraft also patrolled the Convention Area and coordinated surveillance efforts with the USCG RUSH. USCG aircraft flew a total of 93 surveillance hours and the USCG cutter RUSH dedicated a total of 70 days (35 patrol days in the Convention Area) in direct support of Operation North Pacific Watch. A total of 188 ship patrol days and 279 aerial patrol hours were conducted by NPAFC member nations within the NPAFC convention area in 2009. Enforcement patrols by NPAFC member nations did not detect vessels rigged for HSDN fishing contrary to the NPAFC Convention and no vessels were apprehended in 2009 (Appendix A24). A similar level of enforcement effort to IUU fishing in the NPAFC Convention Area is planned for 2010. The NPAFC Enforcement Committee will meet in Russia this coming April to plan and coordinate 2010 patrol efforts.

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FIGURES

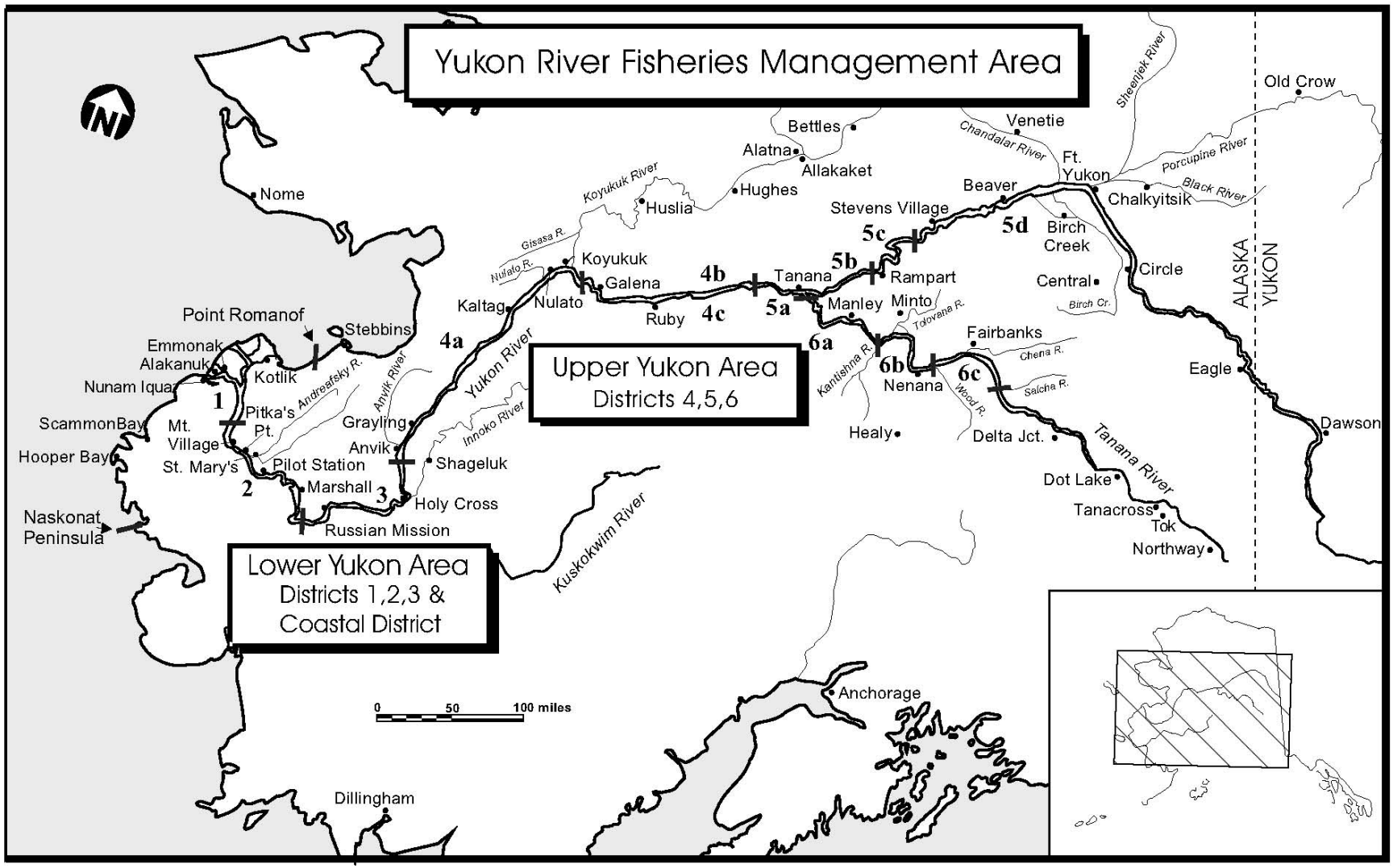
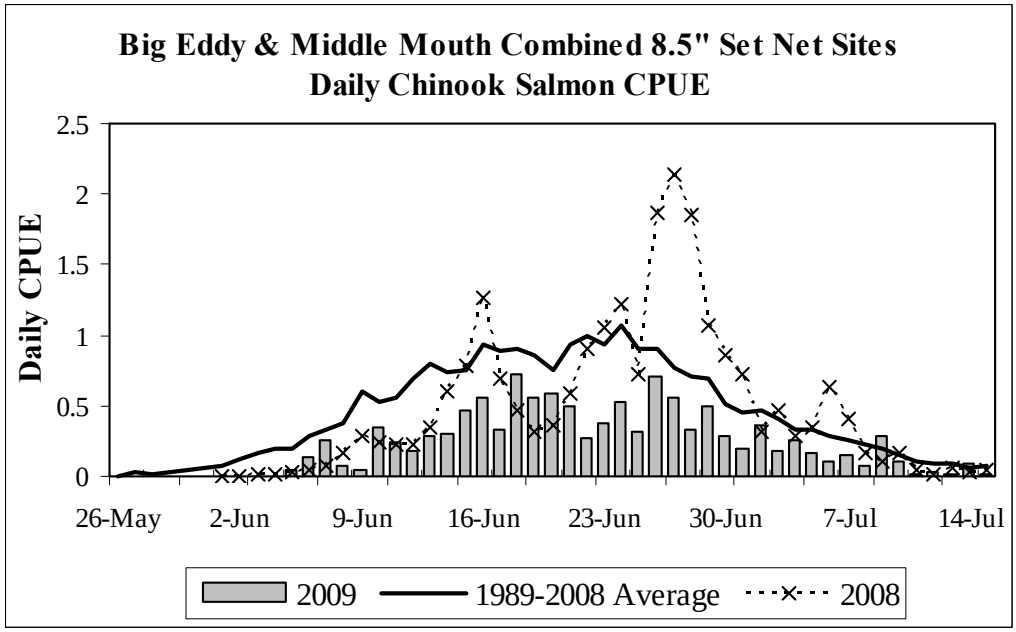
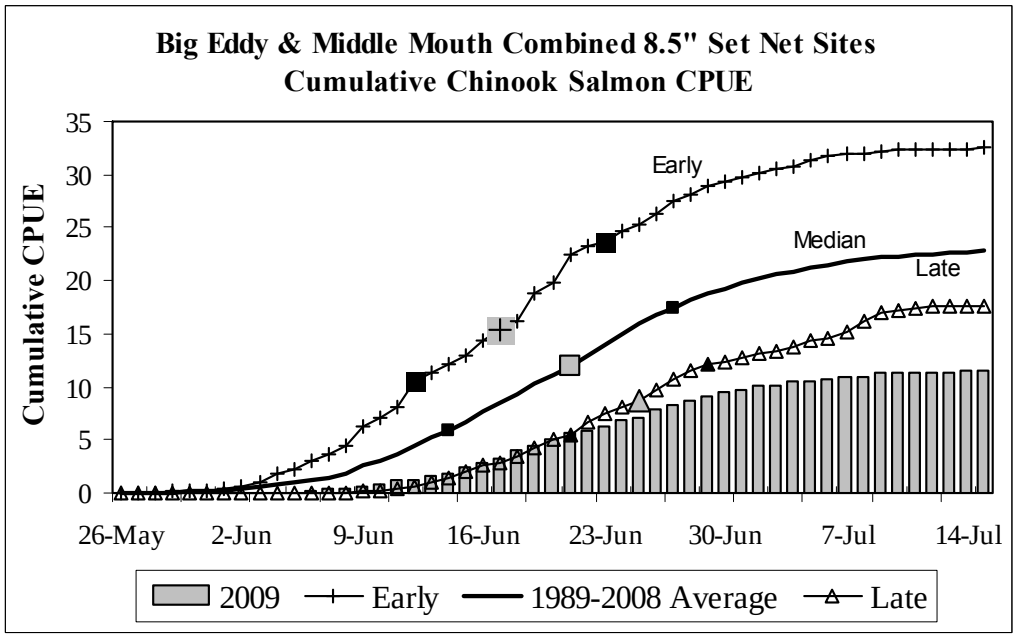


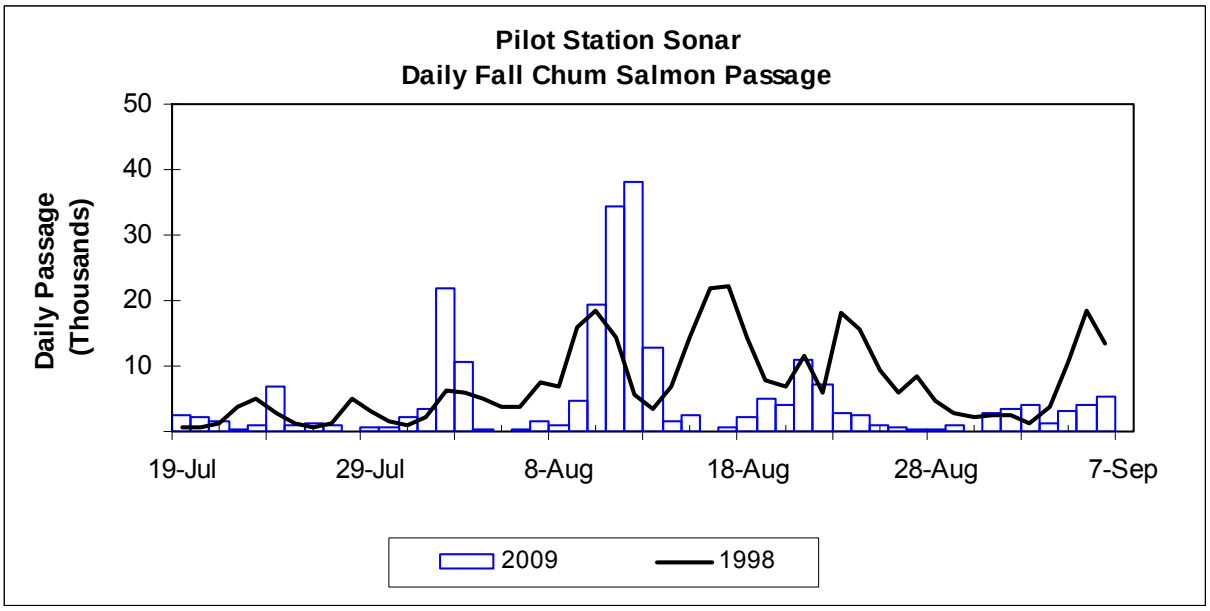
Figure 1.–Map of the Alaskan portion of the Yukon River drainage showing communities and fishing districts.





Note: 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.

Figure 2.–Daily test fishery CPUE for Chinook salmon in 2009 compared to the 1989 to 2008 average (above). The 2009 cumulative CPUE compared to the 1989 to 2008 average early, and late run timing (below).



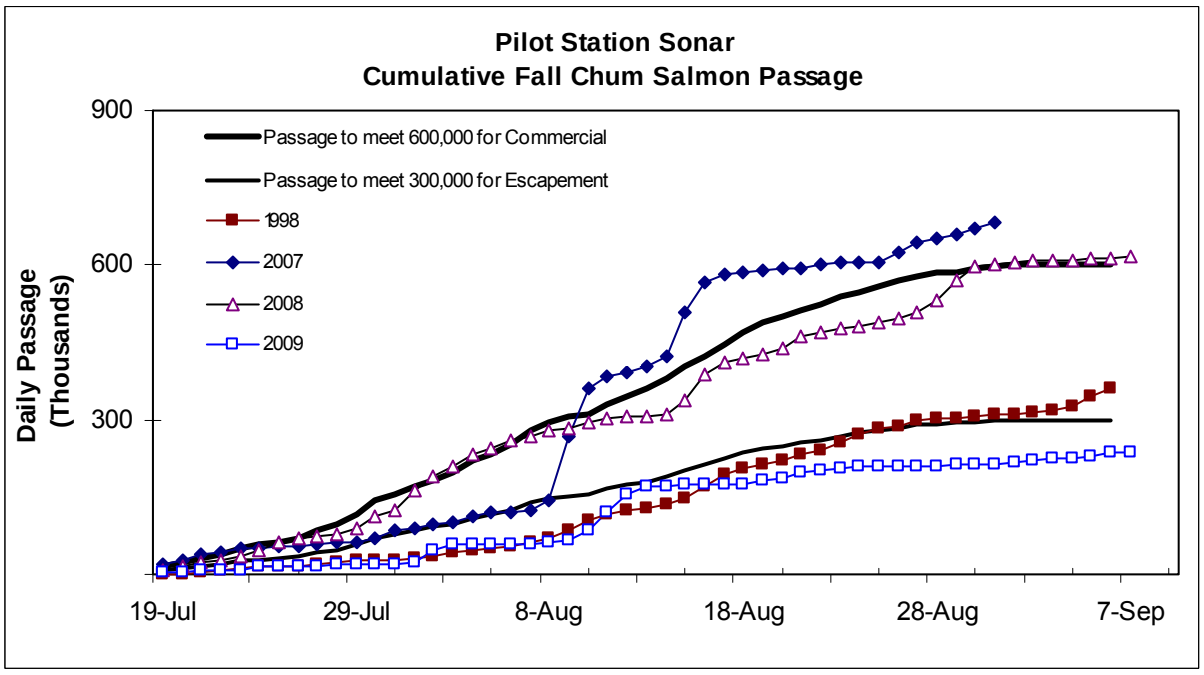


Figure 3.–Daily Pilot Station sonar passage estimates attributed to fall chum salmon in 2009 (top), compared to 1998. Cumulative Pilot Station sonar passage counts attributed to fall chum salmon in 2009 (bottom), compared to 1998, 2007, and 2008 with average timing to obtain threshold passages at the 300,000 and 600,000 run sizes.

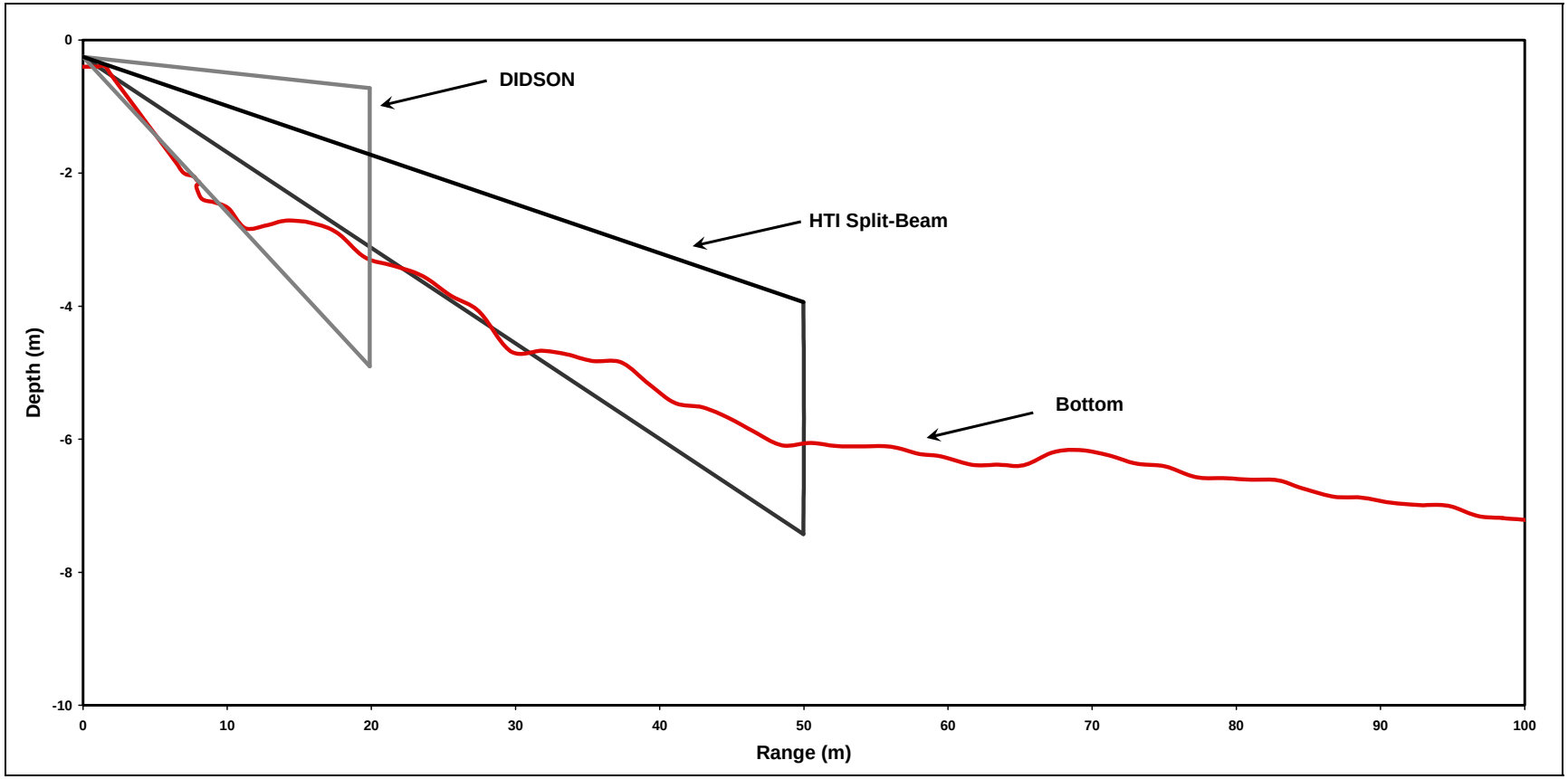


Figure 4.–Schematic representation of the approximate river profile in 2005 and associated nominal beam-width of the DIDSON and split-beam sonar of the first sampling stratum on the left bank used from 2005 through 2009.

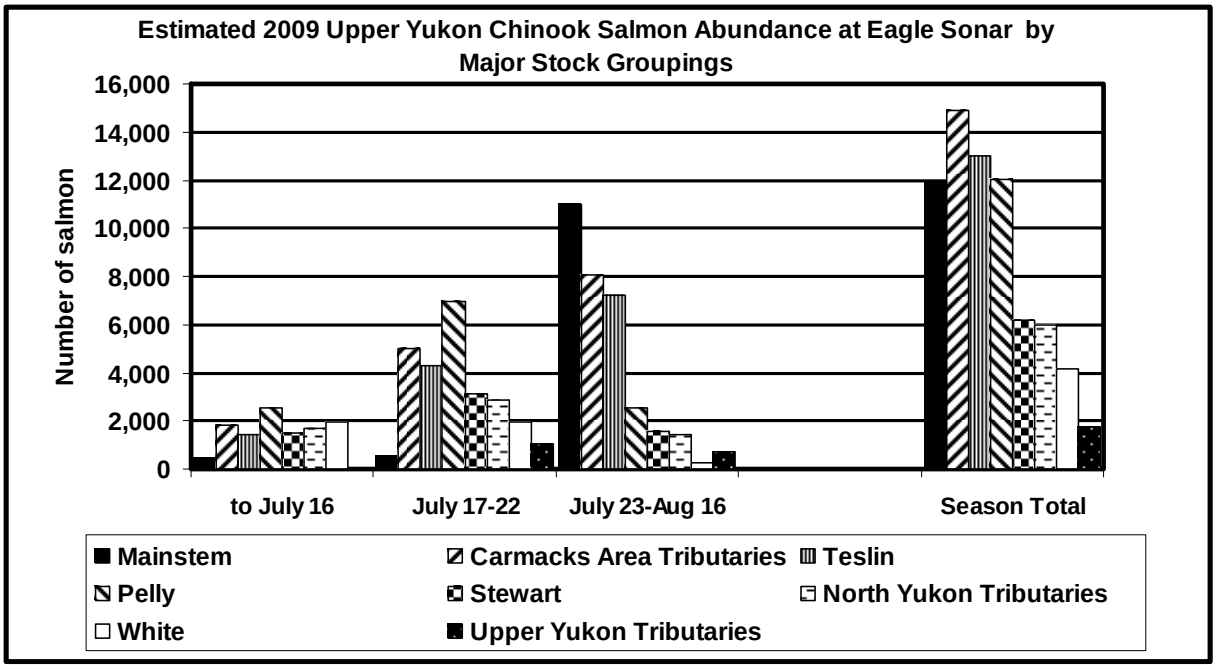


Figure 5.–Relative abundance of upper Yukon Chinook salmon stocks at Eagle sonar site in 2009 determined by Genetic Stock Identification analyses. This figure shows the abundance for each sample period as well as total seasonal abundance for 8 regional stock aggregates.

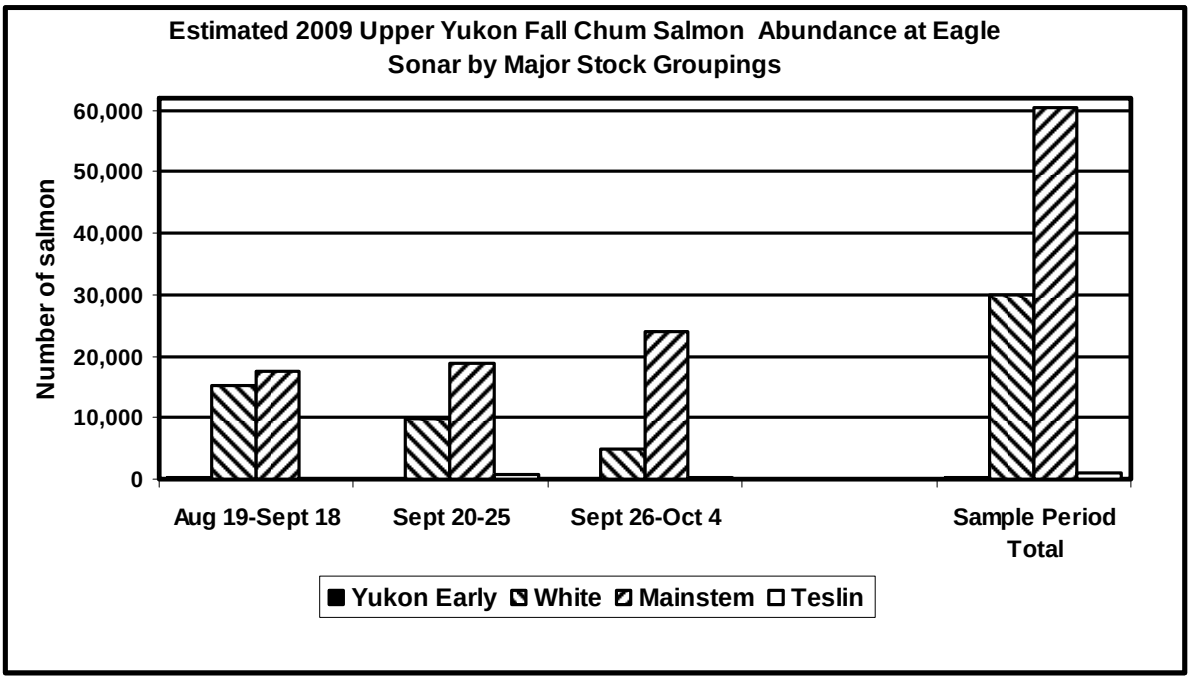


Figure 6.–Relative abundance of upper Yukon fall chum salmon stocks at Eagle sonar site in 2009 to October 4 determined by Genetic Stock Identification analyses. This figure shows the abundance for each sample period as well as the total to October 04 for 4 regional stock aggregates.

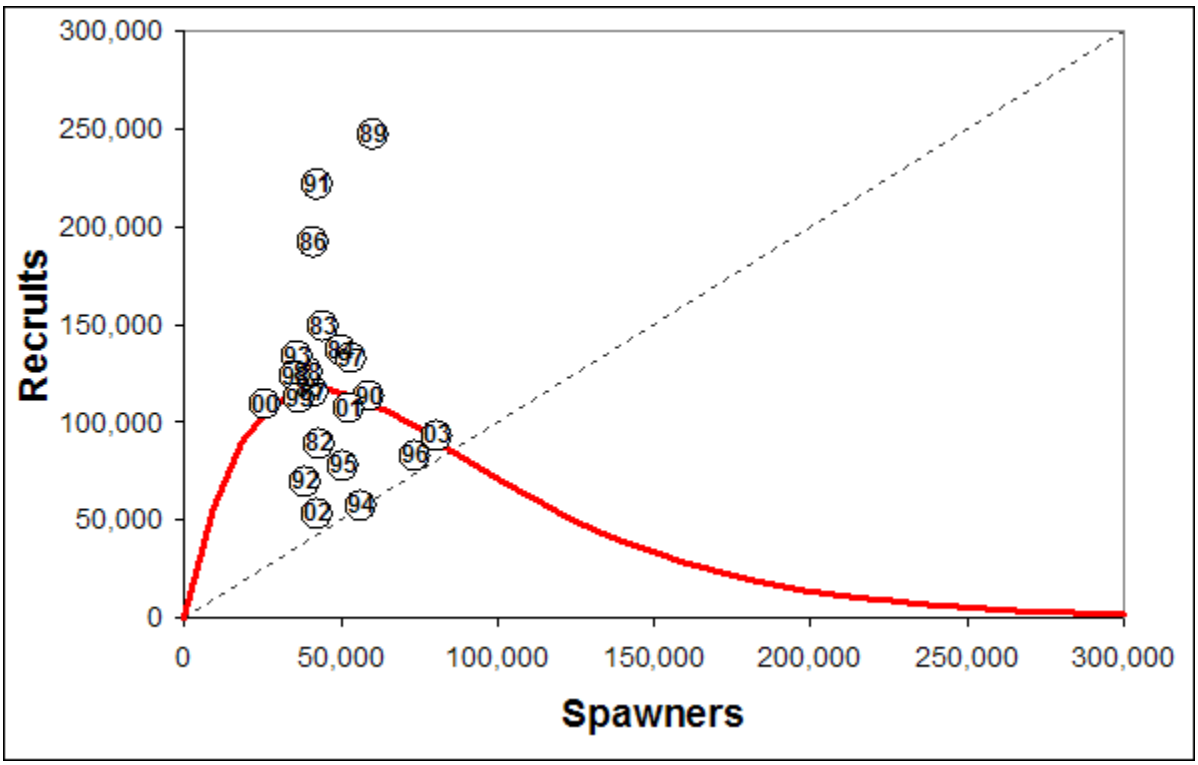


Figure 7.–Yukon River Canadian-origin Chinook salmon recruits versus spawners, Ricker curve, and 1:1 replacement line.

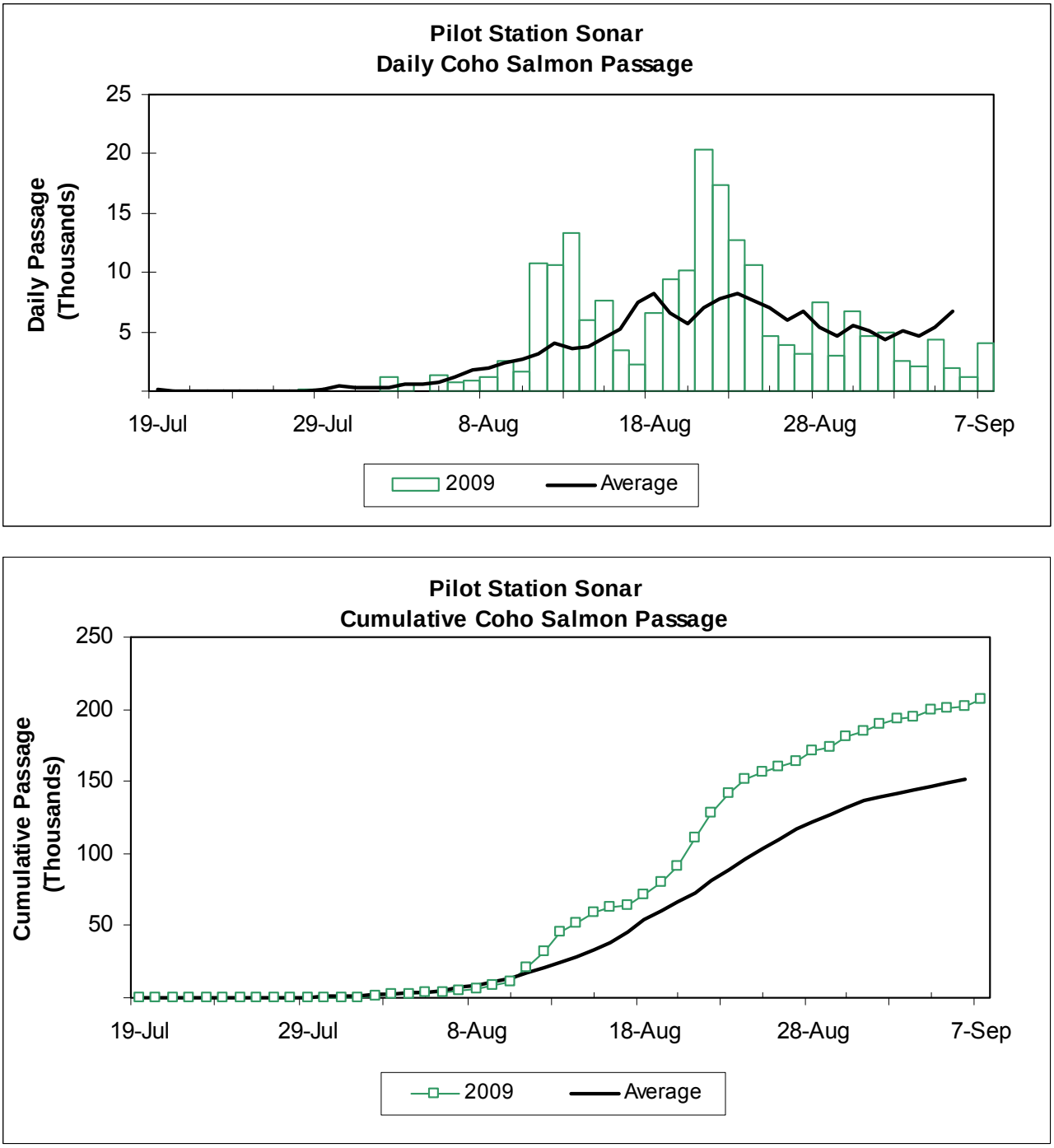


Figure 8.–Daily Pilot Station sonar passage estimates attributed to coho salmon in 2009 (top), compared to 1995 and 1997 through 2008 average. Cumulative Pilot Station sonar passage counts attributed to coho salmon in 2009 (bottom), compared to 1995 and 1997 though 2008 average.

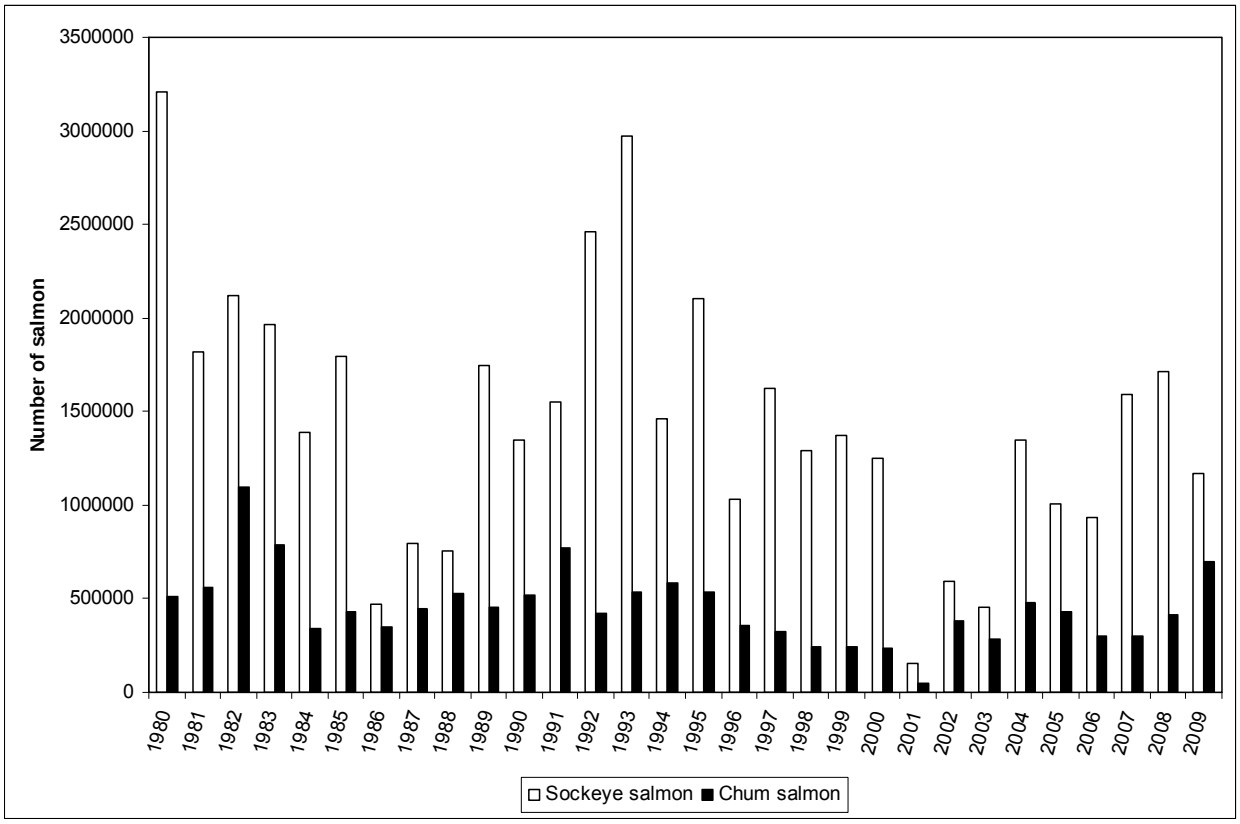


Figure 9.–South Unimak and Shumagin Islands, June commercial sockeye and chum salmon harvest, all gear combined, by year, 1980–2009.

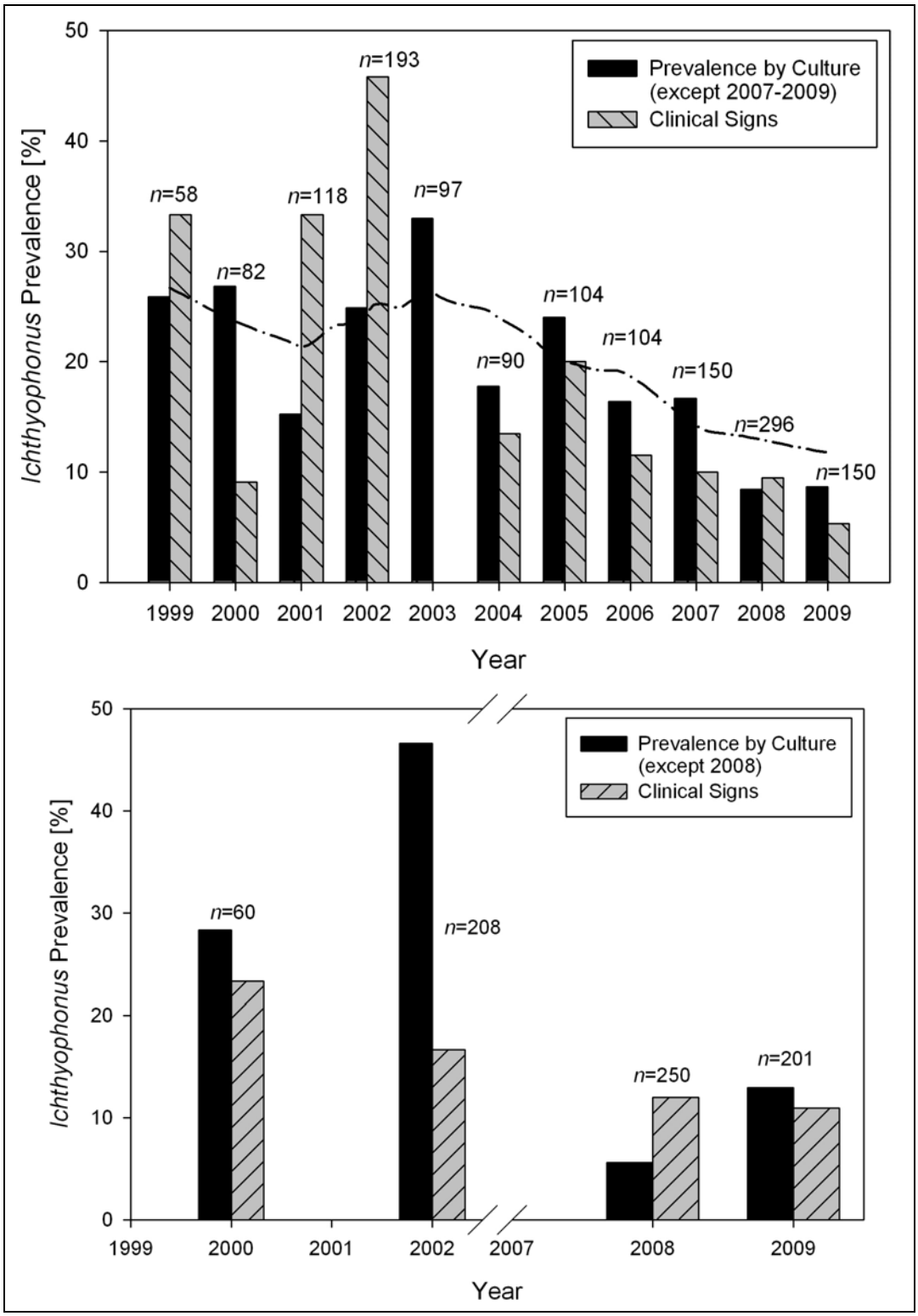


Figure 10.–Time series of *Ichthyophonus* prevalence at Emmonak (top) and Eagle (bottom) based on heart culture and PCR in Chinook salmon (*n* = sample size). LOESS non-parametric smoothing (dashed line) was applied to visualize temporal trends of parasite prevalence. Data from 1999 to 2003 is based on studies by Kocan et al. (2004), Kocan and Hershberger (2006) in Eagle and Emmonak and data from 2004–2006 in Emmonak after Kahler et al. (2007).

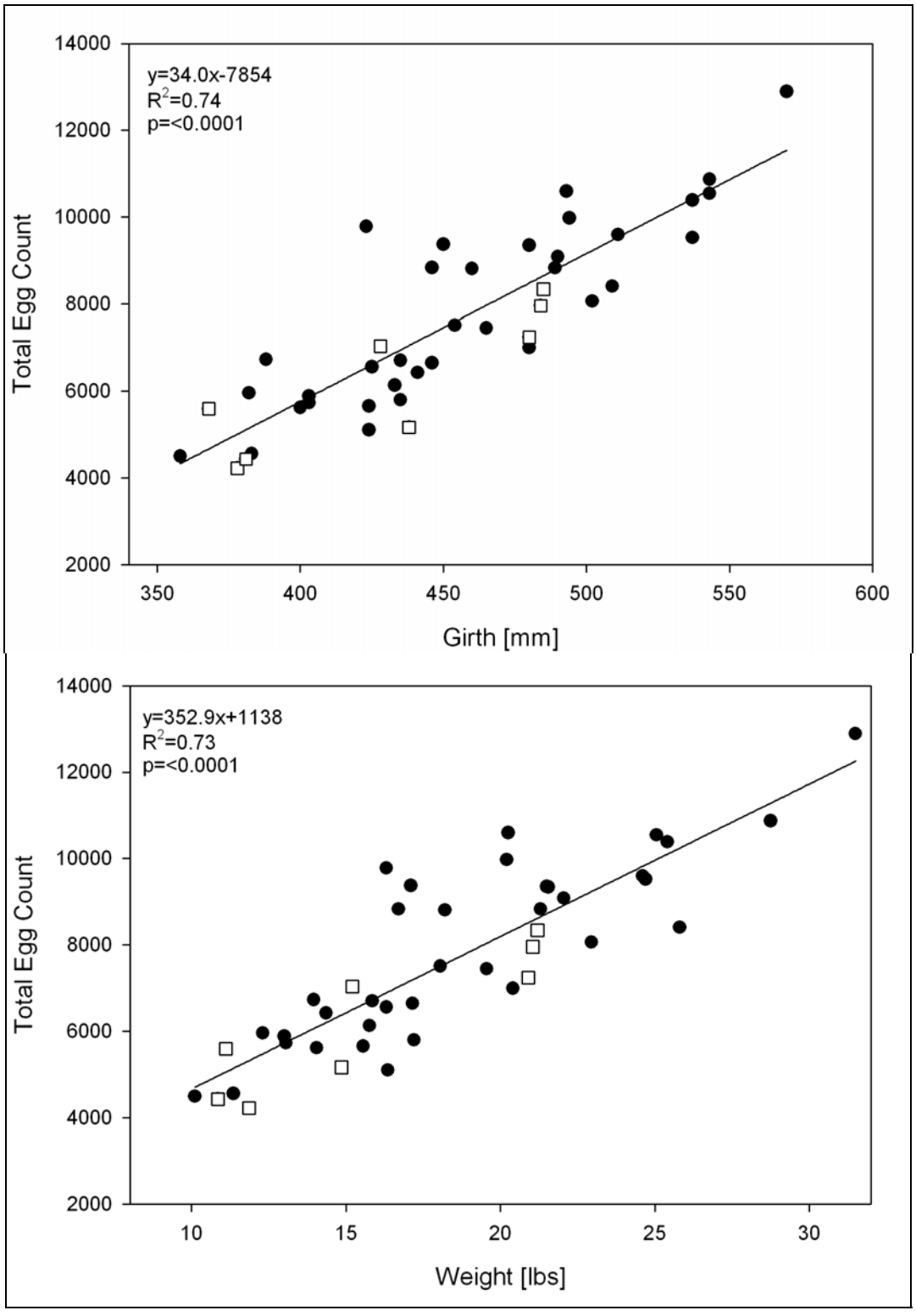


Figure 11.–Total egg count versus girth (top) and weight (bottom) in Yukon River Chinook salmon caught during the subsistence harvest in Eagle, Alaska in 2009. Squares indicate *Ichthyophonus*-positive females determined by culture. Linear regression parameters are provided in the graph.

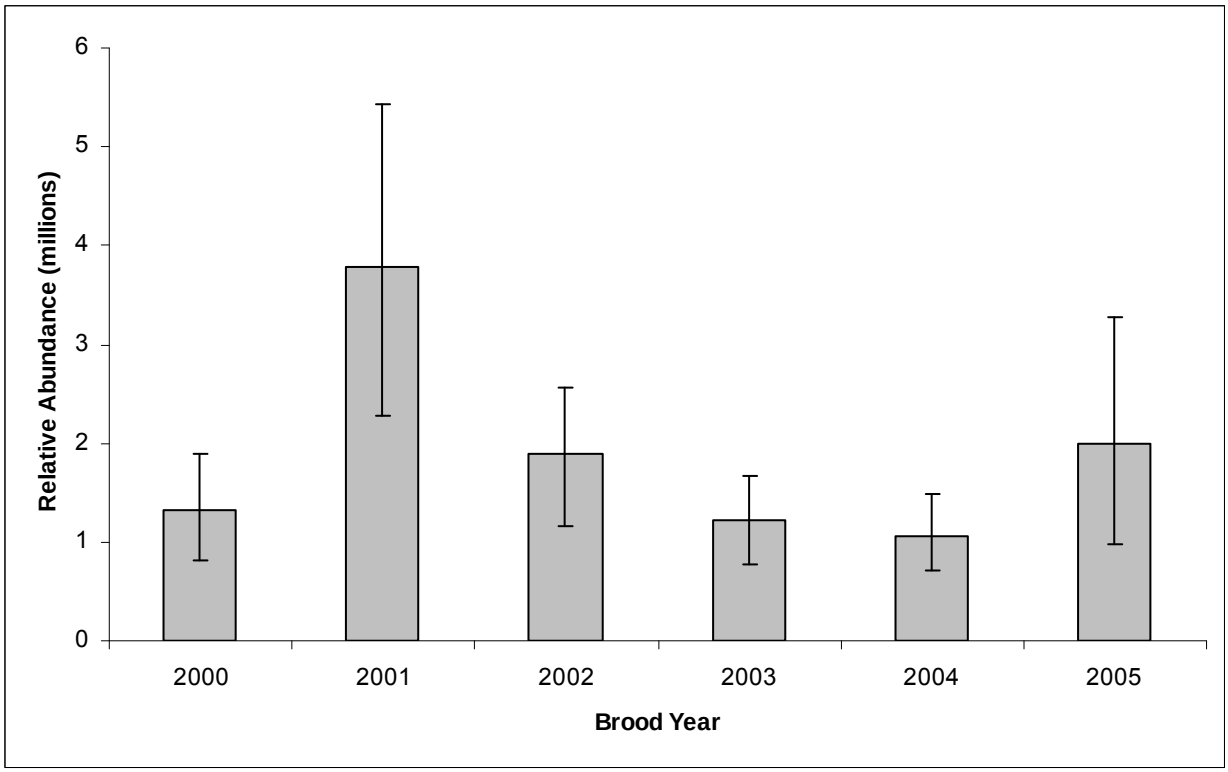


Figure 12.–Relative abundance estimates of juvenile Chinook salmon within the northern Bering Shelf rearing area (latitudes 60N–64.5N). Abundance estimates are relative to the trawl catchability and represent a minimum abundance estimates. Estimates are based on surface trawl catch data from the United States Bering Arctic Subarctic Integrated Survey (BASIS). Bootstrap 95% confidence intervals are included.

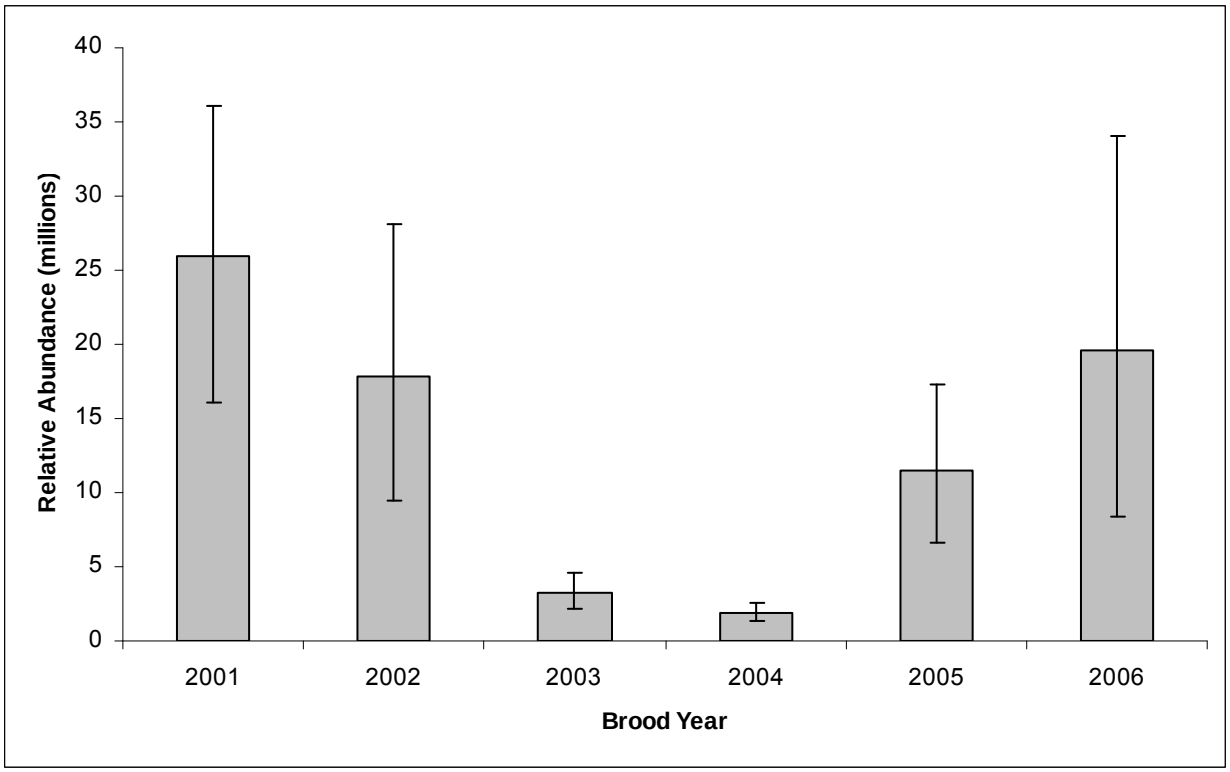


Figure 13.–Relative abundance estimates of juvenile chum salmon within the northern Bering Shelf rearing area (latitudes 60N–64.5N). Abundance estimates are relative to the trawl catchability and represent a minimum abundance estimates. Estimates are based on surface trawl catch data from the United States Bering Arctic Subarctic Integrated Survey (BASIS). Bootstrap 95% confidence intervals are included.

APPENDIX A: TABLES

Appendix A1.–Yukon River drainage summer chum salmon management plan overview, 2009.

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

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

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

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

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

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

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

Appendix A2.–Pilot Station sonar project passage estimates, Yukon River drainage, 1995 and 1997–2009 [a].

	Chinook			Chum						
Year [b]	Large [c]	Small	Total	Summer [d]	Fall [d]	Total	Coho [e]	Pink	Other [f]	Total
2009 [e]	92,648	30,342	122,990	1,285,437	240,449	1,525,886	205,278	16,380	677,860	2,548,394
LCI (90%)	72,630	22,528	101,501	1,222,530	203,331	1,452,845	175,780	8,355	615,186	
UCI (90%)	112,666	38,156	144,479	1,348,344	277,567	1,598,927	234,776	24,405	740,535	
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 [g]	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 [h]	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	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

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

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

[c] Chinook salmon >655 mm.

[d] All chum through 7/18 are classified as summer chum. All chum from 7/19 onward are classified as fall chum.

[e] In most years the coho run continues well after Pilot Station ceases operations, so this estimate may not accurately reflect total cumulative passage.

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

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

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

Appendix A3.–Alaskan commercial salmon sales and estimated harvest by district 2009[a].

District/ Subdistrict	Number of Fishermen[b]	Chinook Total Harvest[c]	Summer Chum Total Harvest[c]	Summer Chum Pounds of Roe Recovered[d]	Fall Chum Total Harvest[c]	Fall Chum Pounds of Roe Recovered[d]	Coho Total Harvest[c]	Coho Pounds of Roe Recovered[d]
1	226	90	71,335	0	11,911	0	5,992	0
2	172	226	86,571	0	12,072	0	1,577	0
Subtotal	391	316	157,906	0	23,983	0	7,569	0
3	0	0	0	0	0	0	0	0
Total Lower Yukon	391	316	157,906	0	23,983	0	7,569	0
Anvik River	0	0	0	0	0	0	0	0
4-A	6	0	4,589	3,906	0	0	0	0
4-BC	0	0	0	0	0	0	0	0
4-D	0	0	0	0	0	0	0	0
Subtotal	6	0	4,589	3,906	0	0	0	0
5-ABC	0	0	0	0	0	0	0	0
5-D	0	0	0	0	0	0	0	0
Subtotal District 5	0	0	0	0	0	0	0	0
6	6	0	7,777	4	1,286	0	457	0
Total Upper Yukon	12	0	12,366	3,906	1,286	0	457	0
Total Alaska	403	316	170,272	3,906	25,269	0	8,026	0

Note: See Appendices B1-B5 and B8.

[a] Does not include ADF&G test fishery sales.

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

[c] Total commercial harvest, in numbers of fish, including carcasses used to produce roe recovered.

[d] Pounds of roe recovered from total harvest in directed roe fishery.

Appendix A4.–Number of commercial salmon fishing gear permit holders by district and season, Yukon Area, 1971–2009[a].

Chinook and Summer Chum Salmon Season									
	Lower Yukon Area				Upper Yukon Area				Yukon
Year	District 1	District 2	District 3	Subtotal [b]	District 4	District 5	District 6	Subtotal	Area Total
1971	405	154	33	592	-	-	-	-	592
1972	426	153	35	614	-	-	-	-	614
1973	438	167	38	643	-	-	-	-	643
1974	396	154	42	592	27	31	20	78	670
1975	441	149	37	627	93	52	36	181	808
1976	453	189	42	684	80	46	29	155	839
1977	392	188	46	626	87	41	18	146	772
1978	429	204	22	655	80	45	35	160	815
1979	425	210	22	657	87	34	30	151	808
1980	407	229	21	657	79	35	33	147	804
1981	448	225	23	696	80	43	26	149	845
1982	450	225	21	696	74	44	20	138	834
1983	455	225	20	700	77	34	25	136	836
1984	444	217	20	613	54	31	27	112	725
1985	425	223	18	666	74	32	27	133	799
1986	441	239	7	672	75	21	27	123	795
1987	440	239	13	659	87	30	24	141	800
1988	456	250	22	678	95	28	33	156	834
1989	445	243	16	687	98	32	29	159	846
1990	453	242	15	679	92	27	23	142	821
1991	489	253	27	678	85	32	22	139	817
1992	438	263	19	679	90	28	19	137	816
1993	448	238	6	682	75	30	18	123	805
1994	414	250	7	659	55	28	20	103	762
1995	439	233	0	661	87	28	21	136	797
1996	448	189	9	627	87	23	15	125	752
1997	457	188	0	639	39	29	15	83	722
1998	434	231	0	643	0	18	10	28	671
1999	412	217	5	631	5	26	6	37	668
2000	350	214	0	562	0	0	0	0	562
2001 [c]									
2002	322	223	0	540	0	18	6	24	564
2003	351	217	0	556	3	16	7	26	582
2004		212	0	549	0	14	6	20	569
2005	370	228	0	578	0	12	5	17	595
2006	374	214	6	568	0	15	10	25	593
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
1999-2008 Average [d]	356	214	2	555	2	12	6	21	575

Fall Chum and Coho Salmon Season									
	Lower Yukon Area				Upper Yukon Area				Yukon Area
Year	District 1	District 2	District 3	Subtotal [b]	District 4	District 5	District 6	Subtotal	Total
1971	352	-	-	352	-	-	-	-	352
1972	353	75	3	431	-	-	-	-	431
1973	445	183		628	-	-	-	-	628
1974	322	121	6	449	17	23	22	62	511
1975	428	185	12	625	44	33	33	110	735
1976	422	194	28	644	18	36	44	98	742
1977	337	172	37	546	28	34	32	94	640
1978	429	204	28	661	24	43	30	97	758
1979	458	220	32	710	31	44	37	112	822
1980	395	232	23	650	33	43	26	102	752
1981	462	240	21	723	30	50	30	110	833
1982	445	218	15	678	15	24	25	64	742
1983	312	224	18	554	13	29	23	65	619
1984	327	216	12	536	18	39	26	83	619
1985	345	222	13	559	22	39	25	86	645
1986	282	231	14	510	1	21	16	38	548
1987	0	0	0	0	0	0	0	0	0
1988	328	233	13	563	20	20	32	72	635
1989	332	229	22	550	20	24	28	72	622
1990	301	227	19	529	11	11	27	49	578
1991	319	238	19	540	8	21	25	54	594
1992	0	0	0	0	0	0	22	22	22
1993	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	1	11	12	12
1995	189	172	0	357	4	12	20	36	393
1996	158	109	0	263	1	17	17	35	298
1997	176	130	0	304	3	8	0	11	315
1998	0	0	0	0	0	0	0	0	0
1999	146	110	0	254	4	0	0	4	258
2000 [c]									
2001 [c]									
2002 [c]									
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	218	71	0	285	0	5	12	17	302
2007	181	122	0	300	0	2	8	10	310
2008	251	177	0	428	0	3	9	12	440
2009	165	130	0	292	0	0	2	2	294
1999-2008 Average [e]	118	43	0	160	1	1	5	7	167

-continued-

COMBINED SEASON									
	Lower Yukon Area				Upper Yukon Area				Yukon Area
Year	District 1	District 2	District 3	Subtotal [b]	District 4	District 5	District 6	Subtotal	Total
1971	473	154	33	660	-	-	-	27	687
1972	476	153	35	664	-	-	-	-	664
1973	529	205	38	772	-	-	-	47	819
1974	485	190	42	717	28	43	27	98	815
1975	491	197	39	727	95	57	46	198	925
1976	482	220	44	746	96	62	56	214	960
1977	402	208	54	609	96	53	39	188	797
1978	472	221	29	650	82	53	38	173	823
1979	461	230	33	661	90	49	40	179	840
1980	432	247	27	654	88	51	38	177	831
1981	507	257	26	666	94	56	31	181	847
1982	455	244	22	664	76	53	27	156	820
1983	458	235	26	655	79	47	31	157	812
1984	453	236	26	676	58	45	33	136	812
1985	434	247	24	666	76	48	33	157	823
1986	444	259	18	672	75	30	27	132	804
1987	440	239	13	659	87	30	24	141	800
1988	460	260	24	683	97	35	38	170	853
1989	452	257	23	687	99	38	32	169	856
1990	459	258	22	679	92	31	30	153	832
1991	497	272	29	680	85	33	28	146	826
1992	438	263	19	679	90	28	25	143	822
1993	448	238	6	682	75	30	18	123	805
1994	414	250	7	659	55	28	20	103	762
1995	446	254	0	664	87	31	24	142	806
1996	455	217	9	628	87	29	19	135	763
1997	463	221	0	640	39	31	15	85	725
1998	434	231	0	643	0	18	10	28	671
1999	422	238	5	632	6	26	6	38	670
2000	350	214	0	562	0	0	0	0	562
2001 [c]									
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	582	0	12	9	21	603
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
1999-2008 Average [d]	382	225	2	579	2	15	8	25	603

-continued-

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

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

[c] No commercial fishery was conducted.

[d] Average does not include data from 2001 due to no commercial fishery being conducted.

[e] Average does not include data from 2000, 2001 and 2002 due to no commercial fishery being conducted.

Appendix A5.–Value of commercial salmon fishery to Yukon Area fishermen, 1977–2009.

	Summer Season						
	Chinook			Summer Chum			
	Lower Yukon	Upper Yukon		Lower Yukon	Upper Yukon		Total
Year	Value	Value	Subtotal	Value	Value	Subtotal	Season
1977	1,841,033	148,766	1,989,799	1,007,280	306,481	1,313,761	3,303,560
1978	2,048,674	66,472	2,115,146	2,071,434	655,738	2,727,172	4,842,318
1979	2,763,433	124,230	2,887,663	2,242,564	444,924	2,687,488	5,575,151
1980	3,409,105	113,662	3,522,767	1,027,738	627,249	1,654,987	5,177,754
1981	4,420,669	206,380	4,627,049	2,741,178	699,876	3,441,054	8,068,103
1982	3,768,107	162,699	3,930,806	1,237,735	452,837	1,690,572	5,621,378
1983	4,093,562	105,584	4,199,146	1,734,270	281,883	2,016,153	6,215,299
1984	3,510,923	102,354	3,613,277	926,922	382,776	1,309,698	4,922,975
1985	4,294,432	82,644	4,377,076	1,032,700	593,801	1,626,501	6,003,577
1986	3,165,078	73,363	3,238,441	1,746,455	634,091	2,380,546	5,618,987
1987	5,428,933	136,196	5,565,129	1,313,618	323,611	1,637,229	7,202,358
1988	5,463,800	142,284	5,606,084	5,001,100	1,213,991	6,215,091	11,821,175
1989	5,181,700	108,178	5,289,878	2,217,700	1,377,117	3,594,817	8,884,695
1990	4,820,859	105,295	4,926,154	497,571	506,611	1,004,182	5,930,336
1991	7,128,300	97,140	7,225,440	782,300	627,177	1,409,477	8,634,917
1992	9,957,002	168,999	10,126,001	606,976	525,204	1,132,180	11,258,181
1993	4,884,044	113,217	4,997,261	226,772	203,762	430,534	5,427,795
1994	4,169,270	124,270	4,293,540	79,206	396,685	475,891	4,769,431
1995	5,317,508	87,059	5,404,567	241,598	1,060,322	1,301,920	6,706,487
1996	3,491,582	47,282	3,538,864	89,020	966,277	1,055,297	4,594,161
1997	5,450,433	110,713	5,561,146	56,535	96,806	153,341	5,714,487
1998	1,911,370	17,285	1,928,655	26,415	821	27,236	1,955,891
1999	4,950,522	74,475	5,024,997	19,687	1,720	21,407	5,046,404
2000	725,606	0	725,606	8,633	0	8,633	734,239
2001 [a]	0	0	0	0	0	0	0
2002	1,691,105	20,744	1,711,849	4,342	6,176	10,518	1,722,367
2003	1,871,202	40,957	1,912,159	1,585	6,879	8,464	1,920,623
2004	3,063,667	38,290	3,101,957	8,884	9,645	18,529	3,120,486
2005	1,952,109	24,415	1,976,524	11,004	13,479	24,483	2,001,007
2006	3,290,367	32,631	3,322,998	23,862	42,988	66,850	3,389,848
2007	1,939,114	27,190	1,966,304	220,715	34,421	255,136	2,221,440
2008	325,484	0	325,484	326,930	65,840	392,770	718,254[bc]
2009	20,970	0	20,970	514,856	20,430	535,286	556,256
2004-2008 Average	2,114,148	24,505	2,138,653	118,279	33,275	151,554	2,290,207

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	Fall Season							
	Fall Chum			Coho				
	Lower Yukon	Upper Yukon		Lower Yukon	Upper Yukon		Total	Total
Year	Value	Value	Subtotal	Value	Value	Subtotal	Season	Value [d]
1977	718,571	102,170	820,741	140,914	2,251	143,165	963,906	4,267,466
1978	691,854	103,091	794,945	96,823	6,105	102,928	897,873	5,740,191
1979	1,158,485	347,814	1,506,299	83,466	6,599	90,065	1,596,364	7,171,515
1980	394,162	198,088	592,250	17,374	2,374	19,748	611,998	5,789,752
1981	1,503,744	356,805	1,860,549	87,385	4,568	91,953	1,952,502	10,020,605
1982	846,492	53,258	899,750	135,828	18,786	154,614	1,054,364	6,675,742
1983	591,011	128,950	719,961	17,497	11,472	28,969	748,930	6,964,229
1984	374,359	103,417	477,776	256,050	12,823	268,873	746,649	5,669,624
1985	634,616	178,125	812,741	176,254	26,797	203,051	1,015,792	7,019,369
1986	399,321	30,309	429,630	211,942	556	212,498	642,128	6,261,115
1987	0	0	0	0	0	0	0	7,202,358
1988	638,700	151,300	790,000	734,400	34,116	768,516	1,558,516	13,379,691
1989	713,400	223,996	937,396	323,300	33,959	357,259	1,294,655	10,179,350
1990	238,165	174,965	413,130	137,302	37,026	174,328	587,458	6,517,794
1991	438,310	157,831	596,141	300,182	21,556	321,738	917,879	9,552,796
1992	0	54,161	54,161	0	19,529	19,529	73,690	11,331,871
1993	0	0	0	0	0	0	0	5,427,795
1994	0	8,517	8,517	0	8,739	8,739	17,256	4,786,687
1995	185,036	167,571	352,607	80,019	11,292	91,311	443,918	7,150,405
1996	48,579	45,438	94,017	96,795	13,020	109,815	203,832	4,797,993
1997	86,526	7,252	93,778	79,973	1,062	81,035	174,813	5,889,300
1998	0	0	0	0	0	0	0	1,955,891
1999	35,639	876	36,515	3,620	0	3,620	40,135	5,086,539
2000	0	0	0	0	0	0	0	734,239
2001 [a]	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	1,722,367
2003	5,993	3,398	9,391	18,168	5,095	23,263	32,654	1,953,277
2004	1,126	848	1,974	2,774	6,372	9,146	11,120	3,131,606
2005	316,698	48,159	364,857	83,793	19,182	102,975	467,832	2,468,839
2006	202,637	33,806	236,443	50,299	11,137	61,436	297,879	3,687,727
2007	144,256	16,907	161,163	127,869	1,368	129,237	290,400	2,511,840
2008	428,969	22,089	451,058	216,777	3,717	220,494	671,552	1,389,806
2009	110,408	1,262	111,670	52,303	467	52,770	164,440	720,696
2004-2008 Average	218,737	24,362	243,099	93,302	8,355	104,658	347,757	2,637,964

[a] No commercial salmon fisheries occurred in the Yukon River in 2001.

[b] Includes $4,656 in sales of pink salmon during summer season in Districts 1 and 2.

[c] Includes $14.40 in sales of sockeye salmon during summer season in District 1.

[d] Total value is the sum of the summer season and the fall season totals.

Appendix A6.–Yukon River drainage fall chum salmon management plan, 5AAC 01.249, 2009.

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

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

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

[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 drainage-wide escapement goal of 300,000 fall chum salmon.

[e] Drainage-wide commercial fisheries may be open and the harvestable surplus above 600,000 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 A7.–Canadian weekly commercial catches of Chinook, fall chum and coho salmon in the Yukon River in 2009.

Statistical Week	Week Ending	Start Date	Finish Date	Days Fished	Number Fishing	Boat Days	Chinook Salmon	Chum Salmon	Coho Salmon
27	7/4			closed					
28	7/11			closed					
29	7/18			closed					
30	7/25			closed					
31	8/1	7/30	7/31	1.5	7	10.5	172	0	0
32	8/8	8/5	8/7	2	7	14	132	2	0
33	8/15			closed					
34	8/22			closed					
35	8/329			closed					
36	9/5			closed					
37	9/12			closed					
38	9/19			closed					
39	9/26			closed					
40	10/3			closed					
41	10/10	10/8	10/12	4	2	8	0	291	0
42	10/17			closed					
Dawson Area Subtotal				8	7	33	304	293	0
Upriver Commercial Subtotal				4	1	4	60	0	0
Total Commercial Harvest							364	293	0
Chinook & Chum Test Fisheries (Chum is live release)									
Domestic Harvest							17	0	0
Estimated Recreational Harvest							125	0	0
Aboriginal Fishery Catch							3,791	820	0
Total Upper Yukon Harvest							4,297	1,113	0
Old Crow Aboriginal Fishery							461	898	0
Old Crow Test Fishery								NA	

Note: NA=not available.

Appendix A8.–Salmon fishery projects conducted in the Alaskan portion of the Yukon River drainage in 2009.

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Commercial Catch and Effort Assessment	Alaskan portion of the Yukon River drainage	-Document and estimate the catch and associated effort of the Alaskan Yukon River and -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	-Determine age, sex, and size of Chinook, chum and coho salmon harvested in Alaskan Yukon River commercial fisheries and -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	All aspects
Sport Catch, Harvest and Effort Assessment	Alaskan portion of the Yukon River drainage	-Document and estimate the catch, harvest, and associated effort of the Alaskan Yukon River sport fishery via post-season mail-out questionnaires.	Postseason	ADF&G	All aspects
Yukon River Chinook Microsatellite Baseline	Yukon River drainage	-Survey standardized microsatellites and Yukon River Chinook salmon populations.	Ongoing	ADF&G USFWS DFO	U.S. populations Canada populations R&E Funding R&M Funding
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 fishers 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	-Index Chinook salmon run timing and abundance using set gillnets and -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	-Index Chinook, summer and fall chum, and coho salmon run timing and abundance using drift gillnets and -Sample captured salmon for age, sex, size composition information.	June - Aug.	ADF&G	All aspects
Mountain Village Drift Gillnet Test Fishing	Mainstem Yukon River, RM 87	-Index fall chum and coho salmon run timing and relative abundance using drift gillnets and -Sample captured salmon for age, sex, 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	-Estimate daily escapement, with age, sex and size composition, of Chinook and summer chum salmon into the East Fork of the Andreafsky River.	June - Aug.	USFWS	All aspects OSM funding
Yukon River Sonar	Pilot Station, RM 123	-Estimate Chinook and summer and fall chum salmon passage in the mainstem Yukon River. Apportionment of species including coho salmon and other finfish.	June - Aug.	ADF&G	All aspects YDFDA and R&M funded- extended operations
Anvik River Sonar	Mile 40 Anvik River, RM 358	-Estimate daily escapement of summer chum salmon to the Anvik River and -Estimate age, sex, and size composition of the summer chum salmon escapement.	June - July	ADF&G	All aspects
Chandalar River Sonar	RM 14 Chandalar River, RM 43 Chandalar River RM 996 Yukon River	-Estimate fall chum salmon passage using DIDSON sonar in the Chandalar River, -Estimate sex and size composition of fall chum salmon escapement, and -Collect ASL data including vertebrae.	Aug. - Sept.	USFWS	All aspects TI Funding R&M funding-ASL
Gisasa River Weir	Mile 3 Gisasa River, Koyukuk River drainage, RM 567	-Estimate daily escapement of Chinook and summer chum salmon into the Gisasa River and -Estimate age, sex, and size composition of the Chinook and summer chum salmon escapements.	June - Aug.	USFWS	All aspects OSM funding
Henshaw Creek Weir	Mile 1 Henshaw Creek, RM 976	-Estimate daily escapement of Chinook and summer chum salmon into Henshaw Creek and -Estimate age, sex, and size composition of the Chinook and summer chum salmon escapements (OSM 2005-2007).	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

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Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Sheenjek River Sonar	Mile 6 Sheenjek River Porcupine River drainage, RM 1,060,	-Estimate daily escapement of fall chum salmon into the Sheenjek River using DIDSON sonar and counted both left and right banks and -Estimate age, sex, and size composition of the fall chum salmon escapement.	Aug. - Sept.	ADF&G	All aspects
Eagle Sonar	Mainstem Yukon River Eagle, RM 1,213	-Estimate daily passage of Chinook and chum salmon in the mainstem Yukon River using both split-beam and DIDSON and -Estimate age, sex, and size composition of salmon captured in the test nets.	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 USFWS-OSM	All aspects
Nenana River Escapement Surveys	Nenana River drainage, above RM 860	-Aerial and ground surveys for numbers and distribution of coho and chum salmon in 10 tributaries of the Nenana below Healy Creek.	Sept. - Oct.	BSFA ADF&G	Field aspects Database
Rapids Test Fish Wheel	Mainstem Yukon River RM 730	-Index run timing of Chinook and fall chum salmon runs as well as non-salmon species using video monitoring techniques and -Characterize the sex, weight 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.	June - Sept.	ADF&G USFWS	All aspects R&E funded tech support
Tozitna River Weir	Mile 50 Tozitna River Yukon River, RM 681	-Estimate daily escapement of Chinook and summer chum salmon into the Tozitna River and -Estimate age, sex and size comp of the Chinook and summer chum salmon escapement.	June - Aug.	BLM	All aspects
Toklat River Escapement Sampling	Toklat River, between RM 848 and 860.	-Evaluate fall chum and coho salmon spawning distribution in Toklat River and -Sample fall chum salmon carcasses for age, sex, and size composition information.	Oct.	TCC ADF&G	Survey aging
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	-Estimate fall chum salmon spawning escapement in Delta River, -Recover tags from the Tanana fall chum salmon radio telemetry project, and -Sample fall chum salmon carcasses for age, sex, and size composition information.	Oct. - Dec.	ADF&G	All aspects
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
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

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Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Goodpaster River Tower	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. OSM 2006-2008.	June - Oct	USFWS	All aspects
Ichthyophonus Sampling	Emmonak, RM 20, Eagle RM 1,213	-Determine prevalence of Ichthyophonus in lower Yukon at Emmonak and in upper Yukon at Eagle.	May - July	UAF ADF&G TCC	All aspects, TI funding, R&E funding
Yukon River Inseason Salmon Harvest Interviews	Emmonak, Holy Cross, Nulato, Huslia, Galena, and Beaver Primary	-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, microsatellites, allozyme. Can. Collections, microsatellites.	June - Aug.	USFWS ADF&G DFO OSM	All aspects
Juvenile Chinook Rearing in non-natal streams	Yukon River down stream of the Canadian border	-Capture juvenile Chinook salmon in non-natal Yukon River tributary streams, -Determine whether Canadian-origin juvenile Chinook salmon rear in Yukon River tributary streams of the United States using genetic techniques, and -Describe non-natal stream rearing habitat characteristics for habitat characteristics for Yukon River Chinook salmon.	July - Aug.	USFWS	All aspects AKSSF Funding
Comparative Mesh Size Study	Y-1 near Emmonak	-Determine if the proportion of Chinook and chum salmon caught varies by mesh size, -Determine if age, sex, length, weight, and girth of individual Chinook salmon caught varies by mesh size, and -Evaluate the marketability of the catch from the various mesh sizes.	June - July	ADF&G YDFDA	All aspects (07-09)

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Agency Acronyms:

ADF&G	= Alaska Department of Fish and Game
ADPS	= Alaska Department of Public Safety
AVCP	= Association of Village Council Presidents, Inc.
BSFA	= Bering Sea Fishermen's Association
BLM	= Bureau of Land Management
DFO	= Department of Fisheries and Oceans (Canada)
NPS	= National Park Service
TCC	= Tanana Chiefs Conference, Inc.
TTC	= Tanana Tribal Council
UAF	= University of Alaska Fairbanks
USFWS	= United States Fish and Wildlife Service
USFWS-OSM	= United States Fish and Wildlife Service, Office of Subsistence Management
USGS	= United States Geological Survey
YRDFA	= Yukon River Drainage Fisheries Association

Appendix A9.–List of harvest/escapement monitoring and incubation/rearing projects involving salmon in the Canadian portion of the Yukon River drainage in 2009.

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Chinook and Chum Test Fishery	Yukon River near Dawson City	-This program previously supplied tag recovery data for the fish wheel tagging program which could not operate in 2009 due to a flood which damaged the field camp, -Chinook test fishery uses gill nets while the chum salmon test fishery uses live release fish wheels, and -Program may be used to provide age, sex and length information and genetic data in the future.	July-Oct.	YRCFA THFN	All aspects
Commercial Catch Monitoring	Yukon River near Dawson City	-To determine weekly catches and effort in the Canadian commercial fishery (Chinook, chum and coho salmon), and -To collect other information as required.	July – Oct.	DFO	All aspects
Aboriginal Catch Monitoring	Yukon communities	-To determine weekly catches and effort in the aboriginal fishery, and -To implement components of the UFA and AFS.	July – Oct.	YFN's DFO	Joint project
Recreational Catch Monitoring	Yukon R mainstem and tributaries	-To determine the recreational harvest by species including the date, sex, whether released or retained, and fishing location, and -Salmon caught are reported through the Yukon Salmon Conservation Catch Card (YSCCC) 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	-To conduct surveys of spawning fish by foot, boat, air etc., -To collect DNA samples from spawning population, and -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

-continued-

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Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
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	-Installation and operation of a DIDSON sonar program for Chinook salmon, and -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
Porcupine Catch Per Unit Effort Program	Porcupine River	-To obtain CPUE data from a fall chum salmon test fishery and tag all fish caught, -To provide inseason projections of run strength from relationship Between CPUE and Fishing Branch River Weir counts, and -First year of program, previous program involved mark-recapture.	Aug. –Oct.	EDI & VGG	All aspects
Whitehorse Rapids Fish Hatchery and Coded-Wire Tagging Project	Whitehorse	-To rear and release ~150K Chinook salmon fry produced from Whitehorse Rapids Fishway broodstock, and -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 tagging
MacIntyre Incubation Box and Coded-Wire Tagging Project	Whitehorse	-To rear up to 120K Chinook salmon fry from brood stock collected from the Takhini River and/or Tatchun Creek, and -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
DFO = Department of Fisheries and Oceans Canada
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

-continued-

TKC = Ta'an Kwach'an Council
VGG = Vuntut Gwitchin Government
THFN = Tr'ondek Hwech'in First Nation
YC = Yukon College
YEC = Yukon Energy Corporation
YFN's = Yukon First Nation's
YF&GA = Yukon Fish and Game Association
YRCFA = Yukon River Commercial Fishers Association
YSS = Yukon Salmon Sub-committee
UFA = Umbrella Final Agreement

Appendix A10.–Yukon River Canadian Chinook salmon total run by brood year, and escapement by year, 1983–2003 based on 3-Area Index, Eagle Sonar (2005–2008), and radio-telemetry (local) (2002-2004).

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	247,110	60,299	4.10
1990	56	6,343	24,873	71,641	10,816	9	113,738	59,212	1.92
1991	501	7,108	82,332	121,590	10,104	0	221,635	42,728	5.19
1992	6	2,608	23,981	41,407	1,831	0	69,833	39,155	1.78
1993	14	5,313	35,999	86,880	5,880	0	134,086	36,244	3.70
1994	0	730	19,932	30,684	6,192	0	57,538	56,449	1.02
1995	34	1,784	15,989	52,922	7,058	10	77,797	50,673	1.54
1996	20	276	23,303	44,564	14,628	2	82,792	74,060	1.12
1997	14	3,568	26,485	94,514	7,838	14	132,433	53,821	2.46
1998	0	3,505	39,307	76,688	4,380	0	123,879	35,497	3.49
1999	134	1,693	30,203	77,073	2,883	0	111,987	37,184	3.01
2000	0	2,801	40,913	63,763	1,530	0	109,006	25,870	4.21
2001	8	1,819	51,123	51,978	2,007	1	106,936	52,564	2.03
2002	76	2,269	28,787	21,451	663	0	53,246	42,359	1.26
2003	63	5,901	37,477	49,353	0	0	92,793	80,594	1.15
2004	3	1,785	29,158					48,469	
2005	9	5,757						68,551	
2006	3							62,933	
2007								34,903	
2008								33,360	
2009								65,278	
Average	(1982-2003)						120,840	47,618	2.54

Contrast	**3.12**

Note: Data highlighted in grey are preliminary.

Appendix A11.–Chinook salmon age and sex percentages from selected Yukon River escapement projects, 2009.

Location	Sample Size		Age 3	4	5	6	7	8	Total
Anvik River [a]	220	Males	0.0	17.3	13.6	15.9	0.5	0.0	47.2
		Females	0.0	0.0	2.7	49.1	0.5	0.0	52.3
		Total	0.0	17.3	16.3	65.0	0.9	0.0	99.5
Chena River [a]	442	Males	0.0	14.1	13.2	17.7	0.0	0.0	45.0
		Females	0.0	0.5	3.9	50.1	0.7	0.0	55.2
		Total	0.0	14.6	17.1	67.8	0.7	0.0	100.2
East Fork Andreafsky River [a]	376	Males	0.3	17.0	11.7	17.0	0.0	0.0	46.0
		Females	0.0	0.0	2.4	50.3	1.3	0.0	54.0
		Total	0.0	17.0	14.1	67.3	1.3	0.0	100.0
East Fork Andreafsky River [b]	2,312	Males	0.1	24.3	13.1	16.4	0.1	0.0	54.0
		Females	0.0	0.8	2.4	42.3	0.4	0.0	46.0
		Total	0.1	25.0	15.5	58.7	0.5	0.0	100.0
Gisasa River [b]	521	Males	0.0	42.2	21.3	7.2	0.0	0.0	70.7
		Females	0.0	0.4	2.8	25.9	0.2	0.0	29.3
		Total	0.0	42.6	24.1	33.1	0.2	0.0	100.0
Salcha River [a]	458	Males	0.0	31.7	19.2	10.0	0.0	0.0	60.9
		Females	0.0	0.0	2.2	36.7	0.2	0.0	39.1
		Total	0.0	31.7	21.4	46.7	0.2	0.0	100.0
Tozitna River [b]	227	Males	0.0	55.1	18.6	8.2	0.0	0.0	82.1
		Females	0.0	1.5	0.9	15.5	0.0	0.0	17.9
		Total	0.0	56.6	19.5	23.7	0.0	0.0	100.0

[a] Samples were collected from carcasses.

[b] Samples were collected from a weir trap.

Appendix A12.–Summer chum salmon age and sex percentages from selected Yukon River escapement projects, 2009.

			Age					
Location	Sample Size		3	4	5	6	7	Total
Anvik River [a]	338	Males	0.5	24.1	18.3	2.4	0.0	45.3
		Females	1.9	33.4	17.8	1.6	0.0	54.7
		Total	2.4	57.5	36.1	4.0	0.0	100.0
East Fork	718	Males	5.0	18.6	25.6	10.5	0.5	60.2
Andreafsky River [b]		Females	4.0	17.5	14.6	3.8	0.0	39.9
		Total	9.0	36.1	40.1	14.3	0.5	100.0
Gisasa River [b]	619	Males	0.8	27.0	16.7	1.6	0.0	46.1
		Females	2.3	34.4	16.4	0.7	0.0	53.8
		Total	3.1	61.5	33.1	2.3	0.0	100.0
Tozitna River [b]	542	Males	1.8	36.4	18.5	0.2	0.0	56.9
		Females	1.6	30.8	10.7	0.0	0.0	43.1
		Total	3.4	67.2	29.2	0.2	0.0	100.0
Salcha River [c]	180	Males	1.7	18.9	13.3	3.3	0	37.2
		Females	2.2	36.1	18.3	5.6	0.6	62.8
		Total	3.9	55.0	31.7	8.9	0.6	100.0

[a] Samples were collected by beach seine.
[b] Samples were collected from a weir trap.
[c] Samples were handpicked carcasses.

Appendix A13.–Total (U.S. and Canada) Yukon River Chinook salmon harvest percent by stock group, 1981–2009.

	Stock Group [a]		
Year [b]	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	12.4	31.3	56.3
2008 [c]	17.0	28.0	55.0
2009 [d]			
Average (1981-2008)	21.0	23.1	55.9

[a] Upper denotes Canadian-origin fish and Lower and Middle denote U.S.-origin fish.

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

[c] Estimates are preliminary.

[d] Estimates are not available until the following year.

Appendix A14.–Yukon River Chinook salmon harvest percent by stock group in Alaska, 1981–2009.

	Stock Group [a]		
Year [b]	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	43.4
2002	22.1	33.2	44.7
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	13.1	33.1	53.8
2008[c]	18.2	30.0	51.8
2009[d]			
Average (1981-2007)	23.4	25.6	51.0

[a] Upper denotes Canadian-origin fish and Lower and Middle denote U.S.-origin fish.

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

[c] Estimates are preliminary.

[d] Estimates are not available until the following year.

Appendix A15.–Upper stock group percent, by country, from the Yukon River Chinook salmon harvest, 1981–2009.

	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	90.4	9.6
2008 [b]	88.1	11.9
2009 [c]		
Average (1981-2007)	81.8	18.2

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

[b] Estimates are preliminary.

[c] Estimates are not available until the following year.

Appendix A16.–Summary of releases for coded wire tagged Chinook salmon from Whitehorse Hatchery, 1985–2009.

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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Appendix A16.–Page 4 of 7.

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
TOTAL			4,034,438	302,302			4,336,740		1,180,189	5,516,929

[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 A17.–Summary of releases of Chinook salmon from Yukon Territory in stream incubation/rearing sites 1991–2009.

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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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 A18.–Yukon River fall chum salmon estimated brood year production and return per spawner estimates 1974–2009.

				Estimated Brood Year Return								(R)	(R/P)
	(P)	Estimated Annual Totals		Number of Salmon [a]				Percent				Total Brood	Return/
Year	Escapement [b]	Catch	Return	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 [c]	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 [c]	20,290	0.004	0.435	0.530	0.031	651,075	1.29
1990	369,654	352,007	721,661	710	579,452 [c]	418,448	30,449	0.001	0.563	0.407	0.030	1,029,059	2.78
1991	591,132	439,096	1,030,228	3,663 [c]	1,024,800	369,103	12,167	0.003	0.727	0.262	0.009	1,409,733	2.38
1992	324,253	148,846	473,099	6,763	653,648	197,073	3,907	0.008	0.759	0.229	0.005	861,392	2.66
1993	352,688	91,015	443,703	7,745	451,327	102,420	3,235	0.014	0.799	0.181	0.006	564,727	1.60
1994	769,920	169,225	939,145	4,322	225,243	149,527	1,603 [c]	0.011	0.592	0.393	0.004	380,695	0.49
1995	1,009,155	461,147	1,470,302	2,371	266,955	68,918 [c]	383	0.007	0.788	0.204	0.001	338,627	0.34
1996	800,022	260,923	1,060,945	420	165,691 [c]	136,906	8,295	0.001	0.532	0.440	0.027	311,312	0.39

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	(P)	Estimated Annual Totals		Estimated Brood Year Return: Number of Salmon [a]				Estimated Brood Year Return: Percent				(R)	(R/P)
Year	Escapement [b]	Catch	Return	Age 3	Age 4	Age 5	Age 6	Age 3	Age 4	Age 5	Age 6	Total Brood Year Return [a]	Return/ Spawner
1997	494,831	170,059	664,890	3,087 [c]	244,801	118,343	3,332	0.008	0.662	0.320	0.009	369,563	0.75
1998	263,121	70,820	333,941	651	269,653	57,962	6,694	0.002	0.805	0.173	0.020	334,960	1.27
1999	288,962	131,175	420,137	29,097	705,152	174,424	13,721	0.032	0.764	0.189	0.015	922,392	3.19
2000	210,756	28,543	239,299	8,446	297,012	115,488	0	0.020	0.706	0.274	0.000	420,937	2.00
2001	337,765	44,976	382,741	136,038	2,157,674	675,688	33,600	0.045	0.719	0.225	0.011	3,003,179	8.89
2002	397,977	27,411	425,388	0	444,507	239,154	13,067	0.000	0.651	0.346	0.019	696,728	1.75
2003	695,363	79,529	774,892	24,263	858,714	434,639	16,145	0.018	0.644	0.326	0.012	1,333,761	1.92
2004	537,873	76,296	614,169	0	332,454	146,425	7,396	0.000	0.684	0.301		486,275 [d]	>0.9
2005	1,996,513	290,183	2,286,696	2,269	373,462	152,112						527,843 [e]	>0.26
2006	873,987	270,471	1,144,458	24,554									
2007	916,606	203,393	1,131,823										
2008	564,482	217,947	782,429										
2009	462,583	98,002	560,585										
Average-08	563,686	312,656	876,342										
	494,258	All Brood Years (1974-2003)		30,862	607,131	218,178	7,648	0.0319	0.6870	0.2716	0.0095	863,818	2.08
	371,738	Even Brood Years (1974-2003)		20,343	388,548	178,778	6,393	0.0340	0.6531	0.3020	0.0109	594,062	1.89
	616,777	Odd Brood Years (1974-2003)		41,380	825,714	257,578	8,903	0.0299	0.7209	0.2412	0.0080	1,133,575	2.28
	512,803	All Brood Years (1974-1983)		58,839	708,120	168,528	2,753	0.0611	0.7401	0.1960	0.0027	938,239	2.20
	293,762	Even Brood Years (1974-1983)		47,148	435,997	134,406	1,624	0.0692	0.7045	0.2239	0.0023	619,175	2.28
	731,845	Odd Brood Years (1974-1983)		70,530	980,243	202,651	3,881	0.0530	0.7757	0.1681	0.0031	1,257,304	2.11
	484,985	All Brood Years (1984-2003)		16,873	556,636	243,003	10,096	0.0173	0.6605	0.3094	0.0129	826,608	2.02
	410,726	Even Brood Years (1984-2003)		6,940	364,823	200,964	8,778	0.0163	0.6274	0.3411	0.0152	581,505	1.69
	559,244	Odd Brood Years (1984-2003)		26,805	736,217	268,420	10,849	0.0183	0.6935	0.2777	0.0105	1,071,711	2.36

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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 2004 was at least 0.90. 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 2005 was at least 0.26. Recruits estimated for incomplete brood year age-5.

Appendix A19.–Escapement, rebuilding and interim goals for Canadian origin Chinook and fall chum salmon stocks, 1985–2010.

	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	[d]		70,000-104,000 [e]			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] Canadian Interim Management Escapement Goal (IMEG) using Eagle sonar estimates of border passage, previous years were measured by mark–recapture abundance estimates.

[c] Canadian Interim Management Escapement Goal (IMEG) established for 2008–2009.

[d] Two goals were put before the Panel a range of 40,000–55,000 encompassing the point goal of 45,000 and a range of 45,000 to 55,000 to include precautionary approach to put more large older fish on the spawning grounds.

[e] Recommended goal range for 2010.

Appendix A20.–South Unimak and Shumagin Islands June commercial sockeye and chum salmon harvest, all gear combined, by year, 1980–2009.

	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	593,825	572,697	1,166,522	200,783	495,992	696,775
1989-2008 Average	965,914	433,672	1,399,586	249,958	143,288	393,247
1999-2008 Average	607,449	433,519	1,040,969	152,248	159,023	311,271

Source: Poetter et al. 2009.

[a] Does not include test fish harvest.

Appendix A21.–Estimated total bycatch (numbers) of Pacific salmon in United States groundfish fisheries in the Bering Sea-Aleutian Islands (BSAI) and Gulf of Alaska (GOA) management areas, 1991-2009 (NMFS 2009 [a]; Berger 2009).

Region	Year	Chinook	Chum	Coho	Sockeye	Pink	Total Non-Chinook Salmon
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	63,205	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	--	--	--	--	197,111
	2004	60,442	--	--	--	--	450,386
	2005	74,281	--	--	--	--	709,386
	2006	87,084	--	--	--	--	325,177
	2007	129,534	--	--	--	--	97,224
	2008	23,195	--	--	--	--	16,930
	2009	13,98b	--	--	--	--	47,531b
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	15,860	--	--	--	--	10,548
	2004	18,087	--	--	--	--	5,878
	2005	31,598	--	--	--	--	7,094
	2006	19,158	--	--	--	--	4,499
	2007	39,757	--	--	--	--	3,705
	2008	13,344	--	--	--	--	2,035
	2009	7,900b	--	--	--	--	2,556b

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

[b] Bycatch estimates in 2009 are based on inseason harvest statistics through December 31, 2009 (available at: http://alaskafisheries.noaa.gov/2009/car260_psc_salmon.csv).

Appendix A22.–Recoveries of Chinook salmon coded wire tags from the Whitehorse Rapids Fish hatchery in the U.S. groundfish fisheries.

Brood Year	Release Location	Release Date	Recovery Date	Latitude	Longitude	Gear Type
1995	Michie Cr.	06/11/97	03/16/00	55° 56’	168° 52’	Domestic Trawl
1997	Judas Cr.	06/12/98	03/28/01	56° 18’	170° 33’	Domestic Trawl
2000	McClintock R.	06/08/01	02/15/02	56° 10’	166° 00’	Domestic Trawl
2001	Michie Cr.	06/10/02	10/03/02	64° 06’	164° 31’	Research Trawl
2001	Wolf Cr.	06/02/02	10/03/02	64° 06’	164° 31’	Research Trawl
2001	Michie Cr.	06/10/02	10/04/02	63° 00’	165° 58’	Research Trawl
2001	Michie Cr.	06/10/02	02/08/03	56° 44’	167° 00’	Domestic Trawl
1988	Michie Cr.	06/06/89	03/25/92	56° 44’	173° 15’	Domestic Trawl
1990	Wolf Cr.	08/08/91	03/14/94	60° 06’	178° 58’	Domestic Trawl
1992	Wolf Cr.	06/06/93	12/06/94	56° 52’	171° 18’	Domestic Trawl
1991	Michie Cr.	06/04/92	02/24/95	55° 19’	164° 43’	Domestic Trawl
1992	Yukon R.	06/15/93	06/02/97	59° 29’	167° 49’	Domestic Trawl
1993	Michie Cr.	06/01/94	03/10/98	59° 26’	178° 05’	Domestic Trawl
1995	Fox Cr.	06/04/96	03/29/98	58° 56’	178° 06’	Domestic Trawl
1995	Judas Cr.	06/04/96	03/30/99	57° 43’	173° 34’	Domestic Trawl
1999	Wolf Creek	06/10/00	03/03/03	56° 26’	169° 55’	Domestic Trawl
1988	McClintock R.	06/06/89	03/19/04	Area 513		Domestic Trawl
2001	Michie Cr.	06/10/02	03/15/05	57° 21’	171° 39’	Domestic Trawl
2001	Wolf Cr.	05/23/02	10/08/04	54°01’	166° 29’	Domestic Trawl

Appendix A23.–Estimated bycatch (numbers) of Chinook and non-Chinook salmon in the Bering Sea-Aleutian Islands (BSAI) groundfish fisheries by season, 1991-2009 (NMFS 2009a). A-season (winter; January 1–June 10) B-season (summer/fall; June 10–December 31).

	Chinook Salmon		Chum Salmon	
Year	A-season	B-season	A-season	B-season
1991	46,392[a]	2,488[a]	3,016[a]	27,246[a]
1992	31,419	10,536	2,120[a]	39,329[a]
1993	24,688	21,326	1,848[a]	241,422[a]
1994	38,921	4,900	5,599	88,949
1995	18,939	4,497	3,033	18,842
1996	43,316	19,888	665	77,395
1997	16,401	34,129	2,710	64,285
1998	18,930	36,501	4,520	61,177
1999	8,794	5,805	393	46,739
2000	6,568	1,655	350	58,977
2001	24,871	15,676	2,903	57,828
2002	26,277	13,407	1,698	80,785
2003	40,044	13,527	4,113	192,998
2004	31,025	29,417	1,021	449,567
2005	33,651	40,630	1,038	708,348
2006	62,582	24,502	3,501	321,676
2007	77,108	52,426	9,638	87,586
2008	18,067	5,128	517	16,413
2009	11,046[b]	2,940[b]	161[b]	47,370[b]

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

[b] Bycatch estimates in 2009 are based on inseason harvest statistics through December 31, 2009. (available at: http://alaskafisheries.noaa.gov/2009/car260_psc_salmon.csv)

Appendix A24.–U.S. Coast Guard and NOAA/NMFS high seas driftnet (HSDN) Enforcement Effort.

	Cutter (Days)	Aircraft (Days)	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	3
2008	97	115	2
2009	70	93	0

Appendix A25.–Fall chum salmon age and sex percentages from selected Yukon River escapement projects, 2009.

Location	Sample Size		Age 3	4	5	6	7	Total
Chandalar River [a]	180	Males	3.3	23.9	12.8	1.7	0.6	42.2
		Females	5.6	38.9	12.8	0.6	0	57.8
		Total	8.9	62.8	25.6	2.2	0.6	100
Delta River [b]	180	Males	6.7	25.6	20	2.2	0	54.4
		Females	4.4	22.8	13.3	4.4	0.6	45.6
		Total	11.1	48.3	33.3	6.7	0.6	100
Toklat River [c]	150	Males	6.0	22.0	8.0	3.3	0.7	40.0
		Females	8.0	40.7	8.0	2.7	0.7	60.0
		Total	14.0	62.7	16.0	6.0	1.3	100.0

[a] Samples were handpicked carcasses by USFWS.

[b] Samples were handpicked carcasses by ADF&G.

[c] Samples were handpicked carcasses by TCC.

APPENDIX B: TABLES

Appendix B1.–Alaskan and Canadian total utilization of Yukon River Chinook, chum and coho salmon, 1961–2009.

	Alaska[a,b]			Canada[c]			Total		
Year	Chinook	Other Salmon	Total	Chinook	Other Salmon	Total	Chinook	Other Salmon	Total
1961	141,152	461,597	602,749	13,246	9,076	22,322	154,398	470,673	625,071
1962	105,844	434,663	540,507	13,937	9,436	23,373	119,781	444,099	563,880
1963	141,910	429,396	571,306	10,077	27,696	37,773	151,987	457,092	609,079
1964	109,818	504,420	614,238	7,408	12,187	19,595	117,226	516,607	633,833
1965	134,706	484,587	619,293	5,380	11,789	17,169	140,086	496,376	636,462
1966	104,887	309,502	414,389	4,452	13,192	17,644	109,339	322,694	432,033
1967	146,104	352,397	498,501	5,150	16,961	22,111	151,254	369,358	520,612
1968	118,632	270,818	389,450	5,042	11,633	16,675	123,674	282,451	406,125
1969	105,027	424,399	529,426	2,624	7,776	10,400	107,651	432,175	539,826
1970	93,019	585,760	678,779	4,663	3,711	8,374	97,682	589,471	687,153
1971	136,191	547,448	683,639	6,447	16,911	23,358	142,638	564,359	706,997
1972	113,098	461,617	574,715	5,729	7,532	13,261	118,827	469,149	587,976
1973	99,670	779,158	878,828	4,522	10,135	14,657	104,192	789,293	893,485
1974	118,053	1,229,678	1,347,731	5,631	11,646	17,277	123,684	1,241,324	1,365,008
1975	76,705	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	1,090,771	1,205,265	7,527	12,479	20,006	122,021	1,103,250	1,225,271
1978	130,476	1,632,875	1,763,351	5,881	9,566	15,447	136,357	1,642,441	1,778,798
1979	159,232	1,596,133	1,755,365	10,375	22,084	32,459	169,607	1,618,217	1,787,824
1980	197,665	1,730,960	1,928,625	22,846	23,718 [d]	46,564	220,511	1,754,678	1,975,189
1981	188,477	2,097,871	2,286,348	18,109	22,781 [d]	40,890	206,586	2,120,652	2,327,238
1982	152,808	1,265,457	1,418,265	17,208	16,091 [d]	33,299	170,016	1,281,548	1,451,564
1983	198,436	1,678,597	1,877,033	18,952	29,490 [d]	48,442	217,388	1,708,087	1,925,475
1984	162,683	1,548,101	1,710,784	16,795	29,767 [d]	46,562	179,478	1,577,868	1,757,346
1985	187,327	1,657,984	1,845,311	19,301	41,515 [d]	60,816	206,628	1,699,499	1,906,127
1986	146,004	1,758,825	1,904,829	20,364	14,843 [d]	35,207	166,368	1,773,668	1,940,036
1987	192,007	1,276,035	1,468,042	17,614	44,786 [d]	62,400	209,621	1,320,821	1,530,442
1988	150,009	2,364,048	2,514,057	21,427	33,915 [d]	55,342	171,436	2,397,963	2,569,399
1989	157,622	2,292,352	2,449,974	17,944	23,490 [d]	41,434	175,566	2,315,842	2,491,408
1990	149,433	1,055,515	1,204,948	19,227	34,302 [d]	53,529	168,660	1,089,817	1,258,477
1991	154,651	1,335,111	1,489,762	20,607	35,653 [d]	56,260	175,258	1,370,764	1,546,022
1992	169,642	880,535	1,050,177	17,903	21,310 [d]	39,213	187,545	901,845	1,089,390
1993	161,718	362,551	524,269	16,611	14,150 [d]	30,761	178,329	376,701	555,030
1994	171,654	567,074	738,728	21,198	38,342	59,540	192,852	605,416	798,268
1995	179,748	1,455,703	1,635,451	20,884	46,109	66,993	200,632	1,501,812	1,702,444
1996	140,927	1,143,900	1,284,827	19,612	24,395	44,007	160,539	1,168,295	1,328,834
1997	175,764	560,590	736,354	16,528	15,880	32,408	192,292	576,470	768,762

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Appendix B1.–Page 2 of 2.

Year	Alaska[a,b] Chinook	Alaska[a,b] Other Salmon	Alaska[a,b] Total	Canada[c] Chinook	Canada[c] Other Salmon	Canada[c] Total	Total Chinook	Total Other Salmon	Total Total
1998	99,760	201,480	301,240	5,937 [e]	8,165	14,102	105,697	209,645	315,342
1999	125,427	250,197	375,624	12,468	19,736	32,204	137,895	269,933	407,828
2000	45,870	120,424	166,294	4,879 [f]	9,273	14,152	50,749	129,697	180,446
2001	56,620	131,646	188,266	10,139	9,822	19,961	66,759	141,468	208,227
2002	69,010	137,688	206,698	9,257	8,493	17,750	78,267	146,181	224,448
2003	101,000	214,323	315,323	9,619	11,885	21,504	110,619	226,208	336,827
2004	114,370	214,744	329,114	11,238	9,930	21,168	125,608	224,674	350,282
2005	86,355	493,455	579,810	11,371	18,348	29,719	97,726	511,803	609,529
2006 [g]	96,067	553,345	649,412	9,072	11,907	20,979	105,139	565,252	670,391
2007 [g]	90,735	548,513	639,248	5,917	14,309	20,226	96,652	562,822	659,474
2008 [h]	50,357	491,055 [i]	541,412	3,426	9,409	12,835	53,783	500,464	554,247
2009 [g, i]	34,241	362,307	396,548	4,758	2,011	6,769	38,999	364,318	403,317
Average									
2004-2008	47,129	505,702	422,081	5,284	10,514	7,154	41,680	481,300	374,214
1999-2008	83,581	315,539	399,120	8,739	12,311	21,050	92,320	327,850	420,170
1961-2008	129,724	881,609	1,011,333	11,783	18,363	30,146	141,507	899,972	1,041,479

[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. Includes the Coastal District communities of Hooper Bay and Scammon Bay.

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

[d] Includes the Old Crow Aboriginal fishery harvest of coho salmon.

[e] Catch includes 761 Chinook salmon taken in the mark–recapture test fishery.

[f] Catch includes 737 Chinook salmon taken in the test fishery.

[g] Data are preliminary.

[h] Catch includes 3 sockeye and 14,100 pink salmon commercially harvested in Districts 1 and 2 in 2008.

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

Appendix B2.–Alaskan catch of Yukon River Chinook salmon, 1961–2009.

Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales [e]	Sport Fish [f]	Total
1961	21,488	119,664					141,152
1962	11,110	94,734					105,844
1963	24,862	117,048					141,910
1964	16,231	93,587					109,818
1965	16,608	118,098					134,706
1966	11,572	93,315					104,887
1967	16,448	129,656					146,104
1968	12,106	106,526					118,632
1969	14,000	91,027					105,027
1970	13,874	79,145					93,019
1971	25,684	110,507					136,191
1972	20,258	92,840					113,098
1973	24,317	75,353					99,670
1974	19,964	98,089					118,053
1975	12,867	63,838					76,705
1976	17,806	87,776					105,582
1977	17,581	96,757				156	114,494
1978	30,785	99,168				523	130,476
1979	31,005	127,673				554	159,232
1980	42,724	153,985				956	197,665
1981	29,690	158,018				769	188,477
1982	28,158	123,644				1,006	152,808
1983	49,478	147,910				1,048	198,436
1984	42,428	119,904				351	162,683
1985	39,771	146,188				1,368	187,327
1986	45,238	99,970				796	146,004
1987	55,039	134,760 [g]		1,706		502	192,007
1988	45,495	100,364		2,125	1,081	944	150,009
1989	48,462	104,198		2,616	1,293	1,053	157,622
1990	48,587	95,247 [h]	413	2,594	2,048	544	149,433
1991	46,773	104,878 [i]	1,538		689	773	154,651
1992	47,077	120,245 [j]	927		962	431	169,642
1993	63,915	93,550	560	426	1,572	1,695	161,718
1994	53,902	113,137	703		1,631	2,281	171,654
1995	50,620	122,728	1,324	399	2,152	2,525	179,748
1996	45,671	89,671	521	215	1,698	3,151	140,927
1997	57,117	112,841	769	313	2,811	1,913	175,764
1998	54,124	43,618	81	357	926	654	99,760
1999	53,305	69,275	288	331	1,205	1,023	125,427
2000	36,404	8,518	0	75	597	276	45,870
2001	55,819	[k]	0	122	0	679	56,620

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Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales [e]	Sport Fish [f]	Total
2002	43,742	24,128	0	126	528	486	69,010
2003	56,959	40,438	0	204	680	2,719	101,000
2004	55,713	56,151	0	201	792	1,513	114,370
2005	53,409	32,029	0	138	296	483	86,355
2006	48,593	45,829	0	89	817	739	96,067
2007	55,156	33,634	0	136	849	960	90,735
2008	45,186	4,641	0	121	0	409	50,357
2009 [l]	32,977	316	0	127	0	821 [m]	34,241
Average							
2004-2008	51,611	34,457		137	551	821	87,577
1999-2008	50,429	34,960	29	154	576	929	83,581
1961-2008	36,607	93,496	375	647	1,077	1,040	129,724

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

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

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

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

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

[k] Summer season commercial fishery was not conducted.

[l] Data are preliminary.

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

Appendix B3.–Alaska catch of Yukon River summer chum salmon, 1970–2009.

Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales [e]	Sport Fish [f]	Total
1970	166,504	137,006					303,510
1971	171,487	100,090					271,577
1972	108,006	135,668					243,674
1973	161,012	285,509					446,521
1974	227,811	589,892					817,703
1975	211,888	710,295					922,183
1976	186,872	600,894					787,766
1977	159,502	534,875				316	694,693
1978	188,192	1,052,226	25,761			451	1,266,630
1979	155,970	779,316	40,217			328	975,831
1980	167,705	928,609	139,106			483	1,235,903
1981	117,629	1,006,938	272,763			612	1,397,942
1982	117,413	461,403	255,610			780	835,206
1983	149,180	744,879	250,590			998	1,145,647
1984	166,630	588,597	277,443			585	1,033,255
1985	157,744	516,997	417,016			1,267	1,093,024
1986	182,337	721,469	467,381			895	1,372,082
1987	200,346	442,238	180,303	4,262		846	827,995
1988	227,829	1,148,650	468,032	2,225	3,587	1,037	1,851,360
1989	169,496	955,806 [g]	496,934	1,891	10,605	2,132	1,636,864
1990	115,609	302,625 [h]	214,552	1,827	8,263	472	643,348
1991	118,540	349,113 [i]	308,989		3,934	1,037	781,613
1992	142,192	332,313 [j]	211,264		1,967	1,308	689,044
1993	125,574	96,522	43,594	674	1,869	564	268,797
1994	124,807	80,284	178,457		3,212	350	387,110
1995	136,083	259,774	558,640	780	6,073	1,174	962,524
1996	124,738	147,127	535,106	905	7,309	1,854	817,039
1997	112,820	95,242	133,010	391	2,590	475	344,528
1998	87,366	28,611	187	84	3,019	421	119,688
1999	83,784	29,389	24	382	836	555	114,970
2000	78,072	6,624	0	30	648	161	85,535
2001	72,301	[k]	0	146	0	82	72,529
2002	87,056	13,558	19	175	218	384	101,410
2003	82,272	10,685	0	148	119	1,638	94,862
2004	77,934	26,410	0	231	217	203	104,995
2005	93,259	41,264	0	152	134	435	135,244
2006	115,093	92,116	0	262	502	583	208,556

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Year	Subsistence [a]	Commercial	Commercial Related [b]	Personal Use [c]	Test Fish Sales [d]	Sport Fish [e]	Total
2007	92,891	198,201	0	184	10	245	291,531
2008	86,514	151,201	0	138	80	371	238,304
2009 [l]	79,100	170,272	0	308	0	367 [m]	250,047
Average							
2004-2008	93,138	101,838		193	189	367	195,726
1999-2008	86,918	63,272	4	185	276	466	144,794
1970-2008	137,191	386,906	176,613	784	2,628	720	656,949

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

[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 two races of chum salmon. Sport fish harvest is assumed to be primarily summer chum salmon caught incidental to directed Chinook salmon fishing.

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

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

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

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

[k] Summer season commercial fishery was not conducted.

[l] Data are preliminary.

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

Appendix B4.–Alaskan harvest of Yukon River fall chum salmon, 1961–2009.

Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales [e]	Sport Fish [f]	Total
1961	101,772 [g, h]	42,461					144,233
1962	87,285 [g, h]	53,116					140,401
1963	99,031 [g, h]						99,031
1964	120,360 [g, h]	8,347					128,707
1965	112,283 [g, h]	23,317					135,600
1966	51,503 [g, h]	71,045					122,548
1967	68,744 [g, h]	38,274					107,018
1968	44,627 [g, h]	52,925					97,552
1969	52,063 [g, h]	131,310					183,373
1970	55,501 [g, h]	209,595					265,096
1971	57,162 [g, h]	189,594					246,756
1972	36,002 [g, h]	152,176					188,178
1973	53,670 [g, h]	232,090					285,760
1974	93,776 [g, h]	289,776					383,552
1975	86,591 [g, h]	275,009					361,600
1976	72,327 [g, h]	156,390					228,717
1977	82,771 [h]	257,986					340,757
1978	84,904 [h]	236,383	10,628				331,915
1979	214,881	359,946	18,466				593,293
1980	167,637	293,430	5,020				466,087
1981	177,240	466,451	11,285				654,976
1982	132,092	224,187	805				357,084
1983	187,864	302,598	5,064				495,526
1984	172,495	208,232	2,328				383,055
1985	203,947	267,744	2,525				474,216
1986	163,466	139,442	577				303,485
1987	342,597 [i]	[j]		19,066			361,663
1988	157,075	133,763	3,227	3,881	27,663		325,609
1989	211,303	270,195	14,749	5,082	20,973		522,302
1990	167,900	124,174	12,168	5,176	9,224		318,642
1991	145,524	230,852	23,366	0	3,936		403,678
1992	107,808	15,721 [k]	3,301	0	1,407		128,237
1993 [i]	76,882			163	0		77,045
1994	123,565	3,631	4,368	0	0		131,564
1995	130,860	250,733	32,324	863	1,121		415,901
1996	129,258	88,342	17,288	356	1,717		236,961

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Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales [e]	Sport Fish [f]	Total
1997	95,141	56,713	1,474	284	867		154,479
1998	62,901	0 [j]		2	0		62,903
1999	89,940	20,371		261	1,171		111,743
2000 [i]	19,395	[j]		1	0		19,396
2001 [i]	35,703	[j]		10	0		35,713
2002 [i]	19,674	[j]		3	0		19,677
2003	56,930	10,996		394	0		68,320
2004	62,526	4,110		230	0		66,866
2005	91,534	180,162		133	0		271,916
2006	83,987	174,542		333	0		258,862
2007	98,947	90,677		173	0		189,797
2008	80,368	119,265		181	0		199,814
2009 [l]	62,917	25,269		78	0		88,264
Average							
2004-2008	83,472	113,751	0	210	0		197,451
1999-2008	63,900	85,732 [m]	0	172	117		124,202
1961-2008	107,704	157,465 [m]	9,387	1,663	3,242		247,907

[a] Includes harvest from the Coastal District communities of Scammon Bay and Hooper Bay (1978, 1987–1989 and 1992 to present), test fish harvest and commercial retained fish (not sold) that were used for subsistence.

[b] Includes fish sold in the round and estimated numbers of female salmon commercially harvested for production of salmon roe (see Brase 2009 and Burr 2009). 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 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 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). Angler surveys conducted by Division of Sport Fish do not differentiate between the two races of chum salmon and most harvests are believed to be summer chum salmon (Appendix B3).

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

[h] Minimum estimates because 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] Fall season commercial fishery was not conducted.

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

[l] Data are preliminary.

Appendix B5.–Alaskan harvest of Yukon River coho salmon, 1961-2009.

Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales [e]	Sport Fish [f]	Total
1961	9,192 [g, h]	2,855					12,047
1962	9,480 [g, h]	22,926					32,406
1963	27,699 [g, h]	5,572					33,271
1964	12,187 [g, h]	2,446					14,633
1965	11,789 [g, h]	350					12,139
1966	13,192 [g, h]	19,254					32,446
1967	17,164 [g, h]	11,047					28,211
1968	11,613 [g, h]	13,303					24,916
1969	7,776 [g, h]	15,093					22,869
1970	3,966 [g, h]	13,188					17,154
1971	16,912 [g, h]	12,203					29,115
1972	7,532 [g, h]	22,233					29,765
1973	10,236 [g, h]	36,641					46,877
1974	11,646 [g, h]	16,777					28,423
1975	20,708 [g, h]	2,546					23,254
1976	5,241 [g, h]	5,184					10,425
1977	16,333 [h]	38,863				125	55,321
1978	7,876 [h]	26,152				302	34,330
1979	9,794	17,165				50	27,009
1980	20,158	8,745				67	28,970
1981	21,228	23,680				45	44,953
1982	35,894	37,176				97	73,167
1983	23,905	13,320				199	37,424
1984	49,020	81,940				831	131,791
1985	32,264	57,672				808	90,744
1986	34,468	47,255				1,535	83,258
1987	82,562 [i]	[j]		2,523		1,292	86,377
1988	69,782	99,907		1,250	13,720	2,420	187,079
1989	41,065	85,493		872	3,945	1,811	133,186
1990	43,460	41,032	3,255	1,181	2,650	1,947	93,525
1991	37,388	103,180	3,506	0	2,971	2,775	149,820
1992	51,980	6,556 [k]	1,423	0	1,629	1,666	63,254
1993	15,812	[j]		0	0	897	16,709
1994	41,775	120	4,331	0	0	2,174	48,400
1995	28,377	45,939	1,074	417	193	1,278	77,278
1996	30,404	52,643	3,339	198	1,728	1,588	89,900

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Year	Subsistence [a]	Commercial [b]	Commercial Related [c]	Personal Use [d]	Test Fish Sales [e]	Sport Fish [f]	Total
1997	23,945	35,320		350	498	1,470	61,583
1998	18,121	1 [j,l]		9	0	758	18,889
1999	20,891	1,601		147	236	609	23,484
2000	14,939	[j]		0	0	554	15,493
2001	22,122	[j]		34	0	1,248	23,404
2002	15,489	[j]		20	0	1,092	16,601
2003	23,872	25,243		549	0	1,477	51,141
2004	20,795	20,232		233	0	1,623	42,883
2005	27,250	58,311		107	0	627	86,295
2006	19,706	64,942		279	0	1,000	85,927
2007	21,878	44,575		135	0	597	67,185
2008	16,855	35,691		50	0	341	52,937
2009 [m]	15,460	8,026		70	0	838 [n]	24,394
Average							
2004-2008	21,297	44,750		161	0	838	67,045
1999-2008	20,380	35,799		155	24	917	46,535
1961-2008	23,661	29,637	2,821	380	1,253	1,041	52,006

[a] Includes harvest from the Coastal District communities of Scammon Bay and Hooper Bay (1978, 1987-1989 and 1992-2008), and test fish harvest and commercial retained fish (not sold) that were utilized for subsistence.

[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. In prior JTC reports subsistence plus commercial related harvests are noted as subsistence "use".

[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] The majority of the sport-fish harvest is taken in the Tanana River drainage; see Brase 2009, Burr 2009 and Parker 2009.

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

[h] Minimum estimates because surveys were conducted before the end of the fishing season.

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

[j] Fall season commercial fisher was not conducted.

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

[l] Caught during summer fishery.

[m] Data are preliminary.

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

Appendix B6.–Alaskan and Canadian total utilization of Yukon River Chinook and fall chum salmon, 1961–2009.

	Chinook			Fall Chum		
Year	Canada [a]	Alaska [b, c]	Total	Canada [a]	Alaska [b, c]	Total
1961	13,246	141,152	154,398	9,076	144,233	153,309
1962	13,937	105,844	119,781	9,436	140,401	149,837
1963	10,077	141,910	151,987	27,696	99,031 [d]	126,727
1964	7,408	109,818	117,226	12,187	128,707	140,894
1965	5,380	134,706	140,086	11,789	135,600	147,389
1966	4,452	104,887	109,339	13,192	122,548	135,740
1967	5,150	146,104	151,254	16,961	107,018	123,979
1968	5,042	118,632	123,674	11,633	97,552	109,185
1969	2,624	105,027	107,651	7,776	183,373	191,149
1970	4,663	93,019	97,682	3,711	265,096	268,807
1971	6,447	136,191	142,638	16,911	246,756	263,667
1972	5,729	113,098	118,827	7,532	188,178	195,710
1973	4,522	99,670	104,192	10,135	285,760	295,895
1974	5,631	118,053	123,684	11,646	383,552	395,198
1975	6,000	76,883	82,883	20,600	361,600	382,200
1976	5,025	105,582	110,607	5,200	228,717	233,917
1977	7,527	114,494	122,021	12,479	340,757	353,236
1978	5,881	130,476	136,357	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	192,007	209,621	44,480	361,663 [d]	406,143
1988	21,427	150,009	171,436	33,565	319,677	353,242
1989	17,944	157,622	175,566	23,020	518,157	541,177
1990	19,227	149,433	168,660	33,622	316,478	350,100
1991	20,607	154,651	175,258	35,418	403,678	439,096
1992	17,903	168,191	186,094	20,815	128,031 [e]	148,846
1993	16,611	163,078	179,689	14,090	76,925 [d]	91,015
1994	21,198	172,315	193,513	38,008	131,217	169,225
1995	20,884	177,663	198,547	45,600	415,547	461,147
1996	19,612	138,562	158,174	24,354	236,569	260,923
1997	16,528	174,625	191,153	15,600	154,479	170,059
1998	5,937	99,369	105,306	7,954	62,869	70,820
1999	12,468	124,315	136,783	19,636	110,369	130,005
2000	4,879	45,308	50,187	9,246	19,307 [d]	28,543
2001	10,139	53,738 [f]	63,877	9,872	35,154 [d]	44,976
2002	9,257	67,888	77,145	8,034	19,393 [d]	27,411
2003	9,616	101,000	110,616	10,905	68,174	79,529
2004	11,238	114,370	125,608	9,750	66,546	76,296
2005	11,371	86,355	97,726	18,572	271,846	290,183
2006	9,072	96,067	105,139	11,796	258,342	270,138
2007	5,094	90,735	95,829	13,830	189,390	203,220
2008	3,426	48,978	52,404	9,566	199,284	208,850

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Year		Chinook			Fall Chum		
		Canada	Alaska	Total	Canada	Alaska	Total
2009	[g]	4,758	34,241	38,999	2,011	88,264	90,275
Average							
1961-2008		11,783	129,468	141,251	18,182	247,520	265,702
1999-2008		8,739	82,875	91,614	12,147	123,781	135,927
2004-2008		8,205	87,301	95,506	12,680	197,082	209,762

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 annual management report).

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

[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, 1961–2009.

	Mainstem Yukon River Harvest							Porcupine River	Total
			Aboriginal		Test	Combined		Aboriginal	Canadian
Year	Commercial	Domestic	Fishery	Sport[a]	Fishery	Non-Commercial	Total	Fishery 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
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

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	Mainstem Yukon River Harvest							Porcupine River	Total
Year	Commercial	Domestic	Aboriginal Fishery	Sport[a]	Test Fishery	Combined Non-Commercial	Total	Aboriginal Fishery Harvest	Canadian Harvest
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	7,416	146	767	8,418	9,769	370	10,139
2002	708	59	7,138	128	1,036	8,361	9,069	188	9,257
2003	2,672	115	6,121	275	263	6,774	9,446	173	9,616
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[c]	364	17	3,791	125		3,933	4,297	461	4,758
Average									
1961-2008	5,709	405	5,488	376	608	6,063	11,534	247	11,765
1999-2008	2,582	104	5,922	274	589	6,627	8,434	222	8,656
2004-2008	3,394	83	5,135	367	432	5,738	7,775	265	8,040

[a] Sport fish/Recreational harvest unknown before 1980.

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

[c] Data are preliminary.

Appendix B8.–Canadian catch of Yukon River fall chum salmon, 1961–2009.

	Mainstem Yukon River Harvest						Porcupine River	Total
Year	Commercial	Domestic	Test	Aboriginal Fishery	Combined Non-Commercial	Total	Aboriginal Fishery Harvest	Canadian 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	Total	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		1,218	1,218	9,286	6,294	15,600
1998[a]				1,795	1,792	1,792	6,159	7,954
1999	10,402	0		3,234	3,234	13,636	6,000	19,636
2000	1,319	0		2,927	2,917	4,236	5,000	9,246
2001	2,198	3	1 [b]	3,077	3,030	5,228	4,594	9,872
2002	3,065	0	2,756 [b]	3,109	3,093	6,158	1,860	8,034
2003	9,030	0	990 [b]	1,493	1,943	10,973	382	10,905
2004	7,365	0	995 [b]	2,180	2,180	9,545	205	9,750
2005	11,931	13		2,035	1,813	13,744	4,593	18,572
2006	4,096	0		2,521	2,521	6,617	5,179	11,796
2007	7,109	0	3,765	2,221	2,221	9,330	4,500	13,830
2008	4,062	0		2,068	2,068	6,130	3,436	9,566
2009[c]	293	0		820	820	1,113	898	2,011
Average								
1961-2008	10,954	545	2,127	2,512	2,846	13,572	4,703	18,177
1999-2008	6,058	2	2,127	2,487	2,488	8,546	3,575	12,121
2004-2008	6,913	3	2,380	2,205	2,208	9,120	3,583	12,703

[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] Data are preliminary.

Appendix B9.–Chinook salmon aerial survey indices for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1961–2009.[a]

	Andreafsky River		Anvik River		Nulato River			
Year	East Fork	West Fork	Drainage Wide Total	Index Area	North Fork	South Fork	Both Forks	Gisasa River
1961	1,003		1,226		376 [b]	167		266 [b]
1962	675 [b]	762 [b]						
1963								
1964	867	705						
1965		344 [b]	650 [b]					
1966	361	303	638					
1967		276 [b]	336 [b]					
1968	380	383	310 [b]					
1969	274 [b]	231 [b]	296 [b]					
1970	665	574 [b]	368					
1971	1,904	1,682						
1972	798	582 [b]	1,198					
1973	825	788	613					
1974		285	471 [b]		55 [b]	23 [b]	[b]	161
1975	993	301	730		123	81		385
1976	818	643	1,053		471	177		332
1977	2,008	1,499	1,371		286	201		255
1978	2,487	1,062	1,324		498	422		45 [b]
1979	1,180	1,134	1,484		1,093	414		484
1980	958 [b]	1,500	1,330	1,192	954 [b]	369 [b]	[b]	951
1981	2,146 [b]	231 [b]	807 [b]	577 [b]		791		
1982	1,274	851						421
1983			653 [b]	376 [b]	526	480		572
1984	1,573 [b]	1,993	641 [b]	574 [b]				
1985	1,617	2,248	1,051	720	1,600	1,180		735
1986	1,954	3,158	1,118	918	1,452	1,522		1,346
1987	1,608	3,281	1,174	879	1,145	493		731
1988	1,020	1,448	1,805	1,449	1,061	714		797
1989	1,399	1,089	442 [b]	212 [b]				
1990	2,503	1,545	2,347	1,595	568 [b]	430 [b]	[b]	884 [b]
1991	1,938	2,544	875 [b]	625 [b]	767	1,253		1,690
1992	1,030 [b]	2,002 [b]	1,536	931	348	231		910
1993	5,855	2,765	1,720	1,526	1,844	1,181		1,573
1994	300 [b]	213 [b]		913 [b]	843	952		2,775
1995	1,635	1,108	1,996	1,147	968	681		410
1996		624	839	709		100		
1997	1,140	1,510	3,979	2,690				144 [b]
1998	1,027	1,249 [b]	709 [b]	648 [b]	507	546		889 [b]

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	Andreafsky River			Anvik River			Nulato River				
Year	East Fork	West Fork		Drainage Wide Total	Index area		North Fork	South Fork	Both Forks		Gisasa River	
1999		[b] 870	[b]		[b] 950	[b]	[b]	[b]				[b]
2000	1,018	427		1,721	1,394		[b]	[b]				[b]
2001	1,065	570		1,420	1,172				1,884	d	1,298	
2002	1,447	917		1,713	1,329				1,584		506	
2003	1,116	[b] 1,578	[b]	1,100	[b] 973	[b]						
2004	2,879	1,317		3,679	3,475				1,321		731	
2005	1,715	1,492		2,421	2,421				553		958	
2006	590	[b] 824		1,876	1,776				1,292		843	
2007	1,758	976		1,529	1,580				2,583		593	
2008	278	[b] 262	[b]	992	[b] 992	[b]			922		487	[a]
2009	80	[b] 1,664		827	590				2,251		515	
SEG [c]	960-1,900	640-1,600			1,100-1,700				940-1,900		420-1,100	

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

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

[c] Sustainable Escapement Goal

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

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

Appendix B10.–Chinook salmon escapement counts for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1986–2009.

	Andreafsky River		Nulato River Tower	Gisasa River Weir		Chena River w/adjusted percent females		Salcha River w/adjusted percent females	
Year	No. Fish	% Fem.	No. Fish	No. Fish	% Fem.	No. Fish	% Fem.	No. Fish	% Fem.
1986	1,530	23.3 [a]				9,065 [d]	20.0		35.8
1987	2,011	56.1 [a]				6,404 [d]	43.8	4,771 [d]	47.0
1988	1,339	38.7 [a]				3,346 [d]	46.0	4,562 [d]	36.6
1989		13.6				2,666 [d]	38.0	3,294 [d]	46.8
1990		41.6				5,603 [d]	35.0	10,728 [d]	35.4
1991		33.9				3,025 [d]	31.5	5,608 [d]	34.0
1992		21.2				5,230 [d]	27.8	7,862 [d]	27.3
1993		29.9				12,241 [a]	11.9	10,007 [a]	24.2
1994	7,801	35.5 [b, c]	1,795 [c]	2,888	[c]	11,877 [a]	34.9	18,399 [a]	35.2
1995	5,841	43.7 [b]	1,412	4,023	46.0	9,680 [d]	50.3	13,643 [a]	42.2
1996	2,955	41.9 [b]	756	1,991	19.5	7,153 [d]	27.0	7,570 [d]	26.3
1997	3,186	36.8 [b]	4,766	3,764	26.0	13,390 [a]	17.0	18,514 [a]	36.3
1998	4,034	29.0 [b]	1,536	2,414	16.2	4,745 [a]	30.5	5,027 [a]	22.4
1999	3,444	28.6 [b]	1,932	2,644	26.4	6,485 [a]	47.0	9,198 [a]	38.8
2000	1,609	54.3 [b]	908	2,089	34.4	4,694 [d]	20.0	4,595 [a]	29.9
2001		[c]	[c]	3,052	49.2 [c]	9,696 [a]	31.5	13,328 [a]	37.0
2002	4,123	21.1 [b]	2,696	2,025	20.7	6,967 [d]	27.0	4,644 [c]	34.4
2003	4,336	45.3 [b]	1,716 [c]	1,901	38.1	8,739 [c]	34.0	15,500 [f]	42.2
2004	8,045	37.3	[g]	1,774	30.1	9,645	47.0	15,761 [a]	62.5
2005	2,239	50.2	[g]	3,111	34.0	N/A [c]		5,988 [a]	54.8
2006	6,463	42.6	[g]	3,030	28.2	2,936 [a,c]	33.5	10,679 [a]	43.9
2007	4,504	44.7	[g]	1,425	39.0	3,806 [a]	28.5	6,425 [a,c]	35.7
2008	4,242	34.8	[g]	1,735	16.2	3,208 [a]	29.0	2,731 [a,c]	33.8
2009	3,004	46.0 [k]	[g]	1,955	29.3 [k]	5,250 [a]	[h]	12,788 [a]	[h]
BEG [j]						2,800-5,700		3,300-6,500	

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[a] Tower counts.
[b] Weir counts.
[c] Incomplete count caused by late installation and/or early removal of project or high water events.
[d] Mark-recapture population estimate.
[f] Expanded counts based on average run timing.
[g] Project did not operate.
[h] Data are preliminary.
[j] Biological Escapement Goals (BEG) established by the Alaska Board of Fisheries, January 2001.
[k] Data not available.

Appendix B11.–Chinook salmon escapement counts for selected spawning areas in the Canadian portion of the Yukon River drainage, 1961–2009. Canadian mainstem border passage and spawning escapement estimates are based on a 3-Area escapement index, Eagle Sonar (2005–2007), and radio-telemetry (local) (2002–2004).

										Whitehorse Fishway		Canadian Mainstem		
Year	Tincup Creek [a]	Tatchun Creek [b]	Little Salmon River [a]	Big Salmon River [a, c]	Nisutlin River [a, d]	Ross River [a, f]	Wolf River [a, g]	Blind Creek	Chandindu River	Count	Percent Hatchery Contribution	Border Passage Estimate	Harvest	Spawning Escapement Estimate [j]
1961										1,068	0			
1962										1,500	0			
1963										483	0			
1964										595	0			
1965										903	0			
1966		7 [k]								563	0			
1967										533	0			
1968			173 [k]	857 [k]	407 [k]	104 [k]				414	0			
1969			120	286	105					334	0			
1970		100		670	615		71 [k]			625	0			
1971		130	275	275	650		750			856	0			
1972		80	126	415	237		13			391	0			
1973		99	27 [k]	75 [k]	36 [k]					224	0			
1974		192		70 [k]	48 [k]					273	0			
1975		175		153 [k]	249		40 [k]			313	0			
1976		52		86 [k]	102					121	0			
1977		150	408	316 [k]	77					277	0			
1978		200	330	524	375					725	0			
1979		150	489 [k]	632	713		183 [k]			1,184	0			
1980		222	286 [k]	1,436	975		377			1,383	0			
1981		133	670	2,411	1,626	949	395			1,555	0			
1982		73	403	758	578	155	104			473	0	60,346	16,808	43,538
1983	100	264	101 [k]	540	701	43 [k]	95			905	0	63,227	18,752	44,475
1984	150	153	434	1,044	832	151 [k]	124			1,042	0	66,300	16,295	50,005
1985	210	190	255	801	409	23 [k]	110			508	0	59,586	19,151	40,435
1986	228	155	54 [k]	745	459 [k]	72 [p]	109			557	0	61,489	20,064	41,425

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Year	Tincup Creek [a]	Tatchun Creek [b]	Little Salmon River [a]	Big Salmon River [a, c]	Nisutlin River [a, d]	Ross River [a, f]	Wolf River [a, g]	Blind Creek	Chandindu River	Whitehorse Fishway Count	Whitehorse Fishway Percent Hatchery Contribution	Canadian Mainstem Border Passage Estimate	Canadian Mainstem Spawning Escapement Harvest	Canadian Mainstem Spawning Escapement Estimate [j]
1987	100	159	468	891	183	180 [k]	35			327	0	58,870	17,563	41,307
1988	204	152	368	765	267	242	66			405	16	61,026	21,327	39,699
1989	88	100	862	1,662	695	433 [p]	146			549	19	77,718	17,419	60,299
1990	83	643	665	1,806	652	457 [k]	188			1,407	24	78,192	18,980	59,212
1991			326	1,040		250	201 [r]			1,266 [h]	51 [h]	63,172	20,444	42,728
1992	73	106	494	617	241	423	110 [r]			758 [h]	84 [h]	56,958	17,803	39,155
1993		183	184	572	339	400	168 [r]			668 [h]	73 [h]	52,713	16,469	36,244
1994	101 [k]	477	726	1,764	389	506	393 [r]			1,577 [h]	54 [h]	77,219	20,770	56,449
1995	121	397	781	1,314	274	253 [k]	229 [r]			2,103	57	70,761	20,088	50,673
1996	150	423	1,150	2,565	719	102 [k]	705 [r]			2,958	35	93,606	19,546	74,060
1997	193	1,198	1,025	1,345	277		322 [r]	957		2,084	24	69,538	15,717	53,821
1998	53	405	361	523	145		66	373	132	777	95	41,335	5,838	35,497
1999		252	495	353	330		131	892	239	1,118	74	49,538 [v]	12,354	37,184
2000	19 [t]	276 [e]	46	113	20		32		4 [u]	677	69	30,699 [v]	4,829	25,870
2001	39 [t]		1,035	1,020	481		154		129 [m]	988	36	62,333 [v]	9,769	52,564
2002			526	1,149	280		84		[l]	605	39	51,428 [v]	9,069	42,359
2003			1,658	3,075	687		292	1115	185 [i]	1,443	70	90,037 [v]	9,443	80,594
2004			1,140	762	330		226	792		1,989	76	59,415 [v]	10,946	48,469
2005			1,519	952	807	363	260	525		2,632	57	79,528 [v]	10,977	68,551
2006			1,381	1,140	601		114	677		1,720	47	71,691	8,758	62,933
2007			451	601	137		54	304		427	56	39,697	4,794	34,903
2008 [s]			93	303			22	276		399	54	37,029	3,399	33,630
2009			821	1,827	497		134	716		828	47	69,575	4,297	65,278
Escapement Objective														>45,000 [q]
Averages														
1961-2008	120	235	538	888	437	284	187	657	138	931	23	62,350	14,347	48,003
1999-2008	29	264	834	947	408	363	137	654	139	1,200	58	57,140	8,434	48,706
2004-2008			917	752	469	363	135	515		1,433	58	57,472	7,775	49,697

-continued-

[a] Data obtained by aerial survey unless otherwise noted. Only peak counts are listed. Survey rating is fair to good, unless otherwise noted.

[b] All foot surveys prior to 1997 except 1978 (boat survey) and 1986 (aerial survey). The 1997-2000 data were from weir counts.

[c] For 1968, 1970, and 1971 counts are from mainstem Big Salmon River. For all other years counts are from the mainstem Big Salmon River between Big Salmon Lake and the vicinity of Souch Creek.

[d] One Hundred Mile Creek to Sidney Creek.

[e] Flood conditions caused early termination of this program, count expanded.

[f] Index area includes Big Timber Creek to Lewis Lake.

[g] Index area includes Wolf Lake to Red River.

[h] Counts and estimated percentages may be biased high. In some or all of these years a number of adipose-clipped fish ascended the fishway, and were counted more than once. These fish would have been released into the fishway as fry between 1989 and 1994, inclusive.

[i] Combination RBW and conduit weir tested and operational from July 10–30.

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

[k] Incomplete and/or poor survey conditions resulting in minimal or inaccurate counts. Estimated spawning escapement from the DFO tagging study for years 1983, and 1985–1989.

[l] RBW tested for 3 weeks.

[m] Conventional weir July 1-September 8, but was breached from July 31–August 7.

[n] Information on area surveyed is unavailable.

[p] Counts are for Big Timber Creek to Sheldon Lake.

[q] Interim Management Escapement Goal (IMEG) of >45,000 was established for 2008 and used for a second year in 2009; this goal was to be assessed using information from the Eagle sonar program.

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

[s] Data are preliminary.

[t] Foot survey.

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

[v] The 1999 to 2007 Chinook border estimates were revised using a stratified “SPAS” analysis.

Appendix B12.–Summer chum salmon ground based escapement counts for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1973–2009.

	East Fork Andreafsky R.		Anvik R. Sonar		Kaltag Crk. Tower	Nulato R. Tower		Gisasa R. Weir		Clear Crk. Weir		Chena R. Tower	Salcha R. Tower
Year	No. Fish	% Fem.	No. Fish	% Fem.	No. Fish	No. Fish	% Fem.	No. Fish	% Fem.	No. Fish	% Fem.	No. Fish	No. Fish
1980			492,676	60.7									
1981	147,312	[a]	1,486,182	54.7									
1982	181,352	64.6 [a]	444,581	69.4									
1983	110,608	57.4 [a]	362,912	56.5									
1984	70,125	50.7 [a]	891,028	60.9									
1985		58.1 [d]	1,080,243	55.8									
1986	167,614	55.4 [b]	1,189,602	57.8									
1987	45,221	58.6 [b]	455,876	65.1			44.9						
1988	68,937	49.3 [b]	1,125,449	66.1			60.9						
1989			636,906	65.6									
1990			403,627	51.3									
1991			847,772	57.9									
1992			775,626	56.6									
1993		48.6	517,409	52.0								5,400	5,809
1994	200,981	65.2 [c]	1,124,689 [d]	59.1	47,295	148,762	47.7	51,116 [d]				9,984	39,450
1995	172,148	48.9 [c]	1,339,418	40.1	77,193	236,890	55.6	136,886	45.7	116,735	62.1	3,519 [d]	30,784
1996	108,450	51.4 [c]	933,240	47.3	51,269	129,694	51.9	157,589	49.3	100,912	59.0	12,810 [d]	74,827
1997	51,139	[c]	609,118	53.6	48,018	157,975	51.9	31,800		76,454		9,439 [d]	35,741
1998	67,591	57.3 [c]	471,865	55.9	8,113	49,140	64.2	18,228	50.8	212	[d]	5,901 [d]	17,289
1999	32,229	56.4 [c]	437,631	58.1	5,300	30,076	63.0	9,920	53.1	11,283	[d]	9,165 [d]	23,221
2000	22,918	48.2 [c]	196,349	61.6	6,727	24,308	62.6	14,410	49.9	19,376	43.6	3,515	20,516
2001		52.0 [d]	224,058	55.3	[d]		[d]	17,936	50.3 [d]	3,674	32.4	4,773 [d]	14,900
2002	45,019	52.9	462,101	60.2	13,583	72,232	27.0	32,943	47.7	13,150	51.6	1,021 [d]	20,837 [d]
2003	22,603	44.8	251,358	55.3	3,056 [d]	17,814	[d]	24,379	45.9	5,230	40.5	573 [d]	[d]
2004	62,730	51.4	365,691	53.3	5,247		[e]	37,851	44.9	15,661	44.5	15,162	47,861
2005	20,127	44.0	525,391	48.0	22,093		[e]	172,259	46.3	26,420	45.8	[d]	193,085

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	East Fork Andreafsky R.		Anvik R. Sonar		Kaltag Crk. Tower	Nulato R. Tower		Gisasa R. Weir		Clear Crk. Weir		Chena R. Tower	Salcha R. Tower
Year	No. Fish	% Fem.	No. Fish	% Fem.	No. Fish	No. Fish	% Fem.	No. Fish	% Fem.	No. Fish	% Fem.	No. Fish	No. Fish
2006	101,465	48.6	992,378	50.7 [f]	[e]	[e]		225,225	52.2	29,166	43.4 [g]	35,109 [d]	111,869
2007	69,642	46.8	459,038	58.2	[e]	[e]		46,257	55.6		[e]	4,705	11,196
2008	57,259	47.8	374,929	54.9	[e]	[e]		36,758	49.6		[e]	1,333 [d]	1,251 [d]
2009	8,770	39.8 [h]	191,566	54.7 [h]	[e]	[e]		25,833	53.8 [h]		[e]	16,516 [h]	30,490 [h]
BEG [i]	65-130		350-700										

[a] Sonar count.

[b] Tower count.

[c] Weir count.

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

[e] Project did not operate.

[f] HTI and DIDSON sonar equipment were both used in 2006. The estimate reported is DIDSON derived while the % female was calculated using the previously reported HTI estimate.

[g] Videography count.

[h] Data are preliminary.

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

[j] Data unavailable at this time.

Appendix B13.–Fall chum salmon abundance estimates or escapement estimates for selected spawning areas in Alaskan and Canadian portions of the Yukon River Drainage, 1971–2009.

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

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	Alaska							
	Yukon	Tanana River Drainage					Upper Yukon River Drainage	
Year	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]	Chandalar River [f]	Sheenjek River [g]
1996		18,264		19,758 [r]	7,074 [r]	134,563	208,170	246,889
1997	506,621	14,511		7,705 [r]	5,707 [r]	71,661	199,874	80,423 [ad]
1998	372,927	15,605		7,804 [r]	3,549 [r]	62,384	75,811	33,058
1999	379,493	4,551	27,199	16,534 [r]	7,037 [r]	97,843	88,662	14,229
2000	247,935	8,911	21,450	3,001 [r]	1,595	34,844	65,894	30,084 [af]
2001	376,182	6,007 [ag]	22,992	8,103 [r]	1,808 [i]	96,556 [ah]	110,971	53,932
2002	326,858	28,519	56,719	11,992 [r]	3,116	109,970	89,850	31,642
2003	889,778	21,492	87,359	22,582 [r]	10,600 [i]	193,418	214,416	44,047 [ai]
2004	594,060	35,480	76,163	25,073 [r]	10,270 [i]	123,879	136,706	37,878
2005	1,813,589	17,779 [s]	107,719	28,132 [r]	11,964 [i]	337,755	496,484	561,863 [y, aj, ak]
2006	790,563		71,135	14,055 [r]		202,669	245,090	160,178 [y, aj]
2007	684,011		81,843	18,610 [r]		320,811	228,056	65,435 [y, aj]
2008	615,127			23,055 [r]	1,198 [i]		178,278 [al]	50,353 [y, aj, al]
2009 [am]	240,449 [an]			13,492 [r]	2,900 [i]			54,126 [y, aj, al]
BEG [ao]	300,000-600,000	15,000-33,000		6,000-13,000		46,000-103,000 [ap]	74,000-152,000	50,000-104,000
Average								
1971-2008	665,415	31,243	61,398	14,246	5,683	153,284	94,099	94,099
1999-2008	671,760	17,534	61,398	17,114	5,949	168,638	104,964	104,964
2004-2008	899,470	26,630	84,215	21,785	7,811	256,923	175,141	173,880

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	Canada															
	Porcupine Drainage										Canadian Mainstem					
Year	Fishing Branch River		Mainstem Yukon River Index		Koidern River		Kluane River		Teslin River		Border Passage Estimate		Harvest	Spawning Escapement Estimate		
1971	312,800	n														
1972	35,230	o					198	p, d								
1973	15,991		383				2,500									
1974	31,841						400									
1975	353,282		7,671				362	d								
1976	36,584	n					20									
1977	88,400	n					3,555									
1978	40,800	n					0	d								
1979	119,898	n					4,640	d								
1980	55,268	n					3,150				39,130		16,218	22,912		
1981	57,386	u					25,806				66,347		19,281	47,066	v	
1982	15,901	n	1,020	w			5,378				47,049		15,091	31,958		
1983	27,200	n	7,560				8,578	d			118,365		27,490	90,875		
1984	15,150	n	2,800	x	1,300		7,200		200		81,900		25,267	56,633	v	
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	h	55,861		20,111	35,750		
1990	35,000	aa	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	h	20	h	10,734		209	h	133,712		35,354	98,358		

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	Canada									
	Porcupine Drainage						Canadian Mainstem			
Year	Fishing Branch River [h]	Mainstem Yukon River Index [i, j]	Koidern River [i]	Kluane River [i, k]	Teslin River [i, l]	Border Passage Estimate		Harvest	Spawning Escapement Estimate [m]	
1995	51,971 [ac]	4,701	0	16,456	633	198,203		40,111	158,092	
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	72,188	[ae]	13,636	58,552	
2000	5,057	933		1,442	204	57,978	[ae]	4,246	53,732	
2001	21,737	2,453		4,884	5	38,769	[ae]	5,278	33,491	
2002	13,600	973		7,147	64	104,853	[ae]	6,174	98,679	
2003	29,713	7,982		39,347	390	153,656	[ae]	10,523	143,133	
2004	20,417	3,440		18,982	167	163,625	[ae]	9,545	154,080	
2005	119,058	16,425		34,600	585	451,477	[ae]	13,979	437,733	
2006	30,954	6,553		18,208	620	218,611	[aq,ar]	6,617	211,994	
2007	32,150	no survey		no survey	no survey	263,979	[aq,ar]	9,330	254,649	
2008	19,086 [ac]	no survey		no survey	no survey	180,379	[aq,ar]	6,130	174,267 [au]	
2009 [am]	25,828 [al]	no survey		no survey	no survey	94,739	[aq]	1,113	93,626 [av]	
EO [as]	50,000-120,000								>80,000	
IMEG [at]	22,000-49,000									
Average										
1971-2008	54,594	4,480	223	8,982	317	118,414		18,678	99,736	
1999-2008	30,473	5,737	--	16,218	254	170,553		8,546	162,008	
2004-2008	44,333	8,806	--	23,930	457	255,618		9,120	246,498	

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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 four fish wheels; two 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 two 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 (two fish wheels in 1995) located just upstream of the Kantishna River and recaptures are collected from one fish wheel (two fish wheels in 1995) located downstream from the village of Nenana.

[f] 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.

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

[h] Weir count, unless otherwise indicated. Late season adjustments have been made for the Fishing Branch River for the period when weir was not operating for most years.

[i] Aerial survey count, unless otherwise indicated.

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

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

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

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

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

[o] 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.

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

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

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

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

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

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

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

[w] Boat survey.

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

[y] Sonar counts include both banks in 1985–1987 and 2005-present.

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

[aa] 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.

[ab] 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.

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

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

[ae] 1999 to 2005 border passage mark–recapture estimates were revised using a stratified "SPAS" analysis.

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

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

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

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

[aj] In addition to the historical right bank count, the left bank was enumerated with DIDSON (right bank count for 2005–2008 was 266,963, 106,397, 39,548 and 35,912, respectively, not including expansions by bank).

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

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

[am] Data are preliminary.

[an] 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.

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

[ap] 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 separated out for comparison to the upper Tanana River abundance estimates.

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

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

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

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

[au] The 2008 estimate based on a mark–recapture estimate.

[av] The 2009 estimate based on the Eagle sonar estimate.

Appendix B14.–Coho salmon passage estimates or escapement estimates for selected spawning areas in the Alaskan portion of the Yukon River Drainage, 1972–2009.

								Upper Tanana River Drainage				
		Yukon	Kantishna									
	East	River	River						Delta			
	Fork	Mainstem	Drainage	Nenana River Drainage				Delta	Clearwater	Clearwater	Richardson	
	Andreafsky	Sonar	Geiger	Lost	Nenana	Wood	Seventeen	Clearwater	River	Lake and	Clearwater	
Year	River [a]	Estimate [b]	Creek [c]	Slough	Mainstem [d]	Creek	Mile Slough	River [e]	Tributaries [f]	Outlet	River [g]	
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]		

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		Yukon	Kantishna					Upper Tanana River Drainage			
	East Fork	River Mainstem	River Drainage		Nenana River Drainage			Delta	Delta Clearwater	Clearwater	Richardson
	Andreafsky	Sonar	Geiger	Lost	Nenana	Wood	Seventeen	Clearwater	River	Lake and	Clearwater
Year	River [a]	Estimate [b]	Creek [c]	Slough	Mainstem [d]	Creek	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	[q]	1,996	11,525	2,375	2,775 [i]	
1998	7,193	129,076	157	1,360 [h]	2,771 [h]	[q]	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]	[q]	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

-continued-

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]
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	137	410		470	680	16,850	4,307	5,450	155
SEG [s]								5,200-17,000 [z]			
Average 1972-2008	8,288	146,617	275	872	1,004	1,471	1,622	17,213	7,667	2,161	1,393

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.

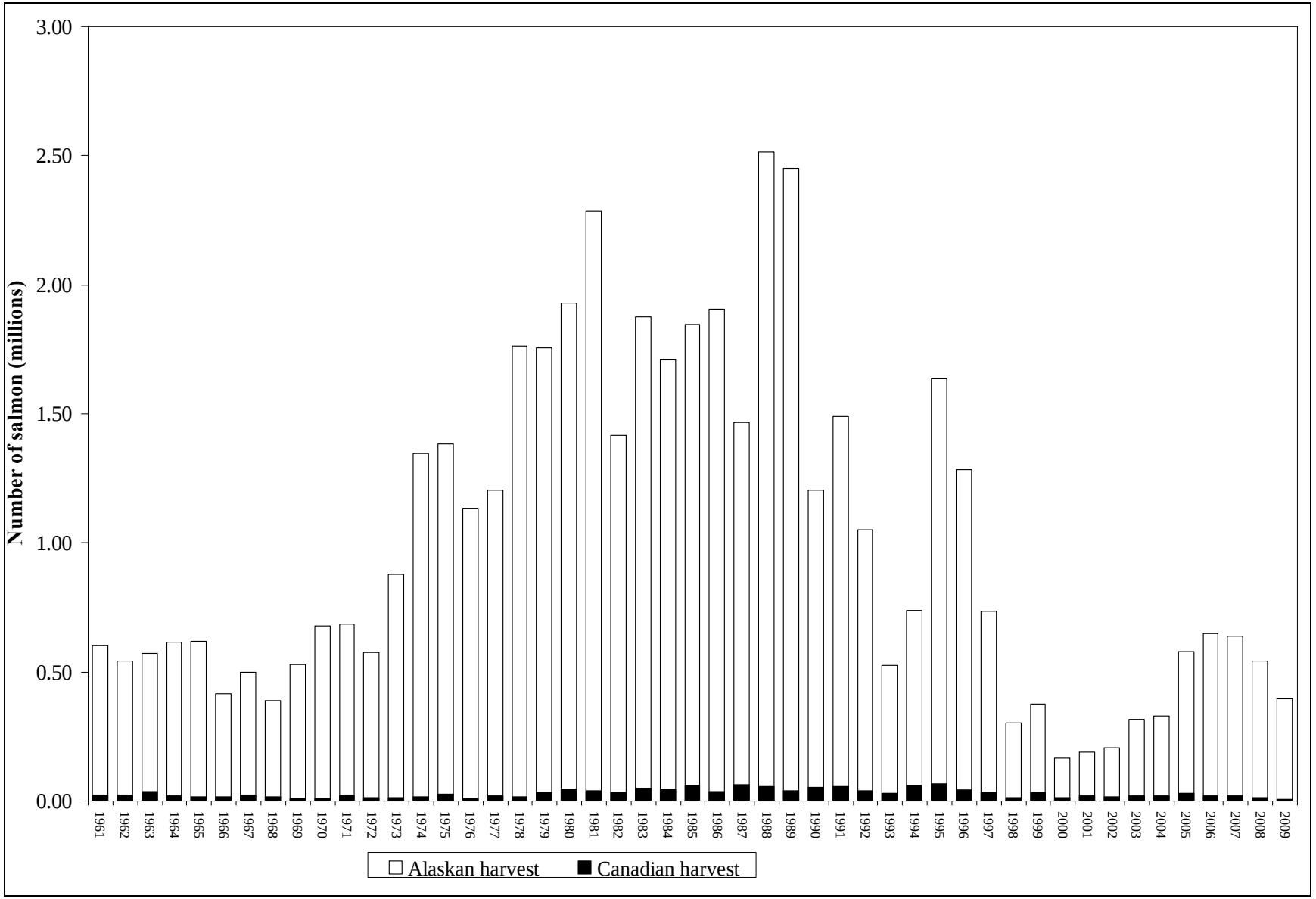
[q] Combination foot and boat survey.

r Data preliminary.

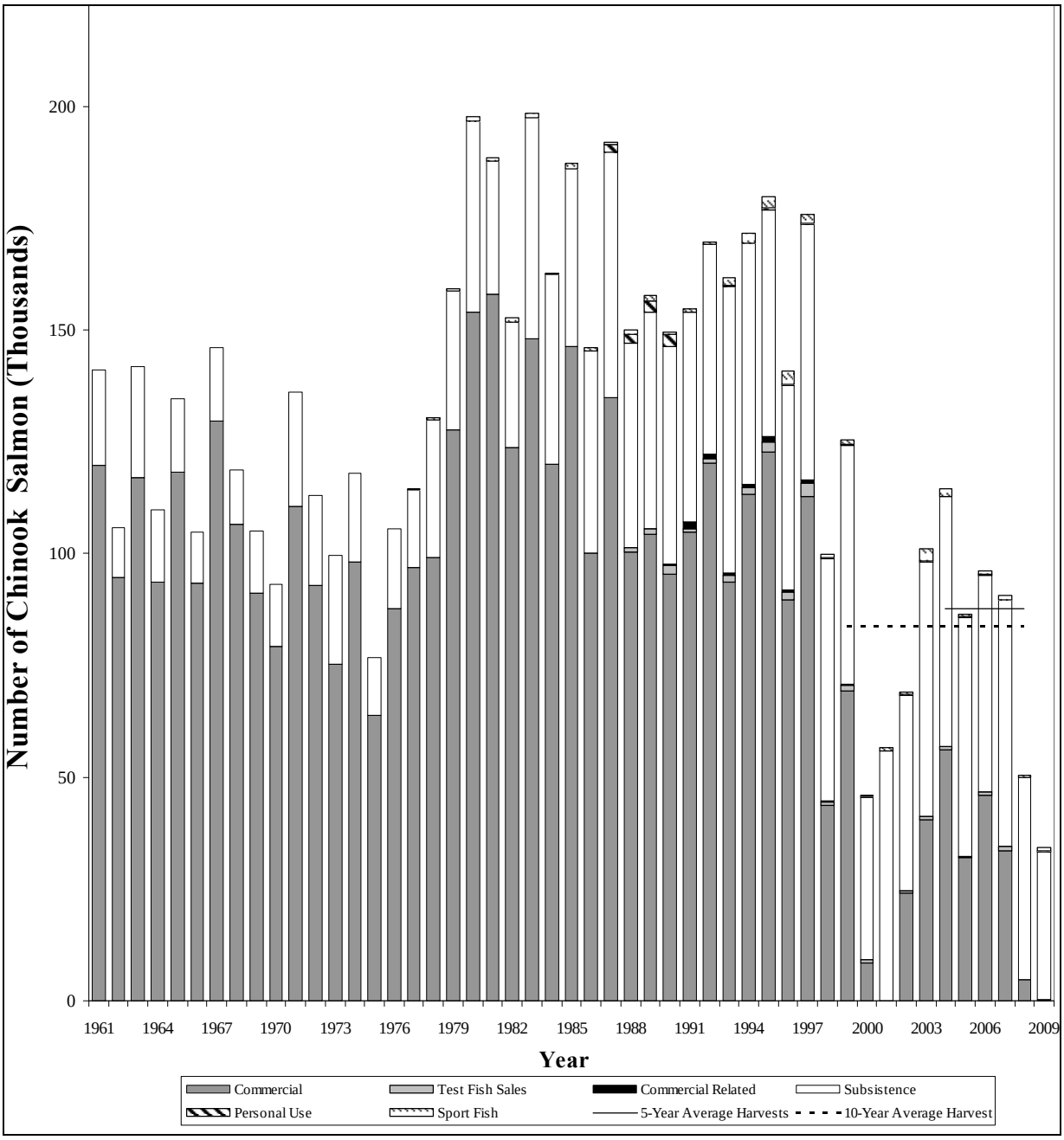
[s] Pilot Station sonar project encountered record low water levels during the fall season causing difficulties with species apportionment and catchability. Coho salmon are suspected of being over estimated, therefore this value should not be used in averages or run reconstructions.

[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.

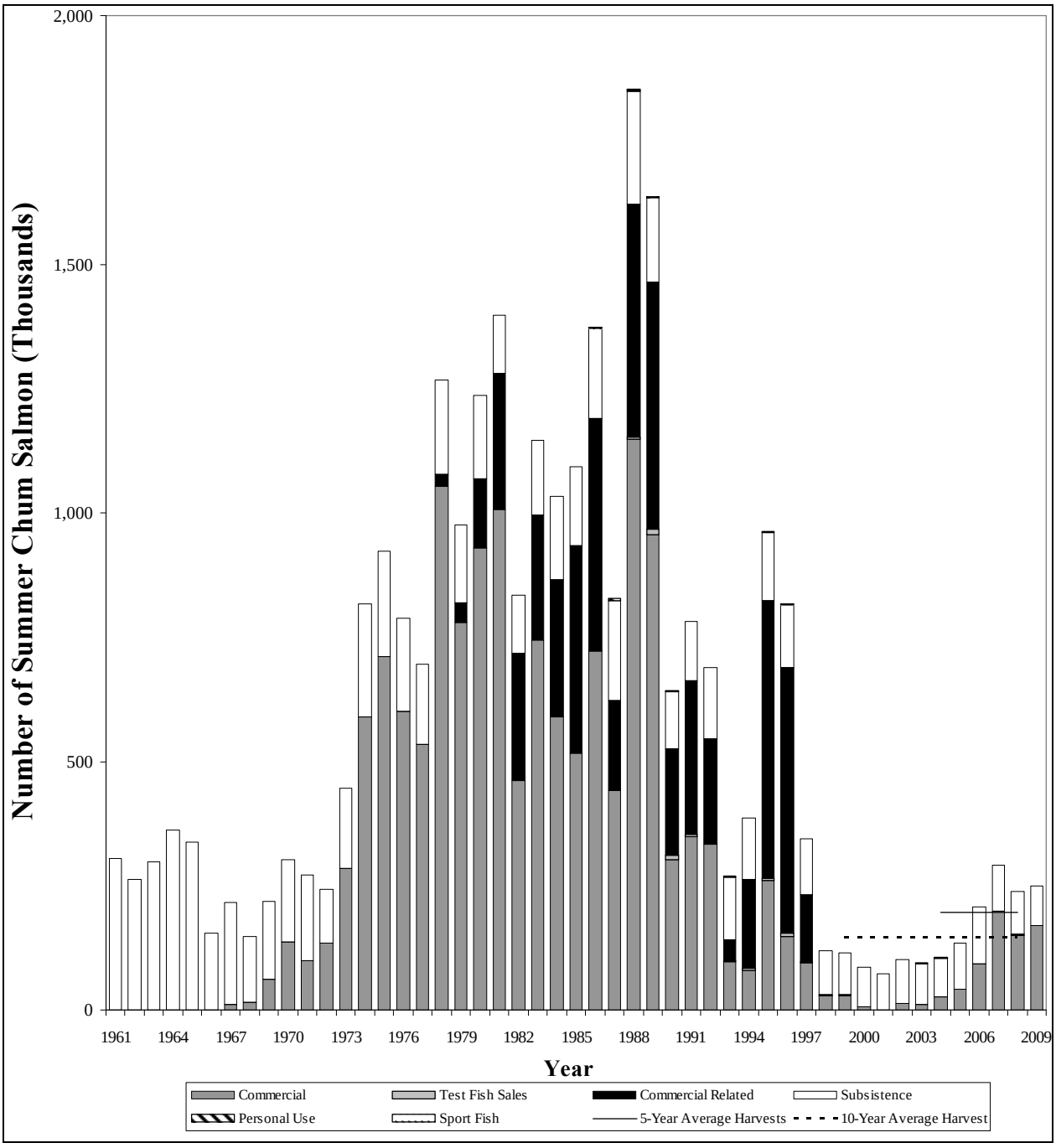
APPENDIX C: FIGURES



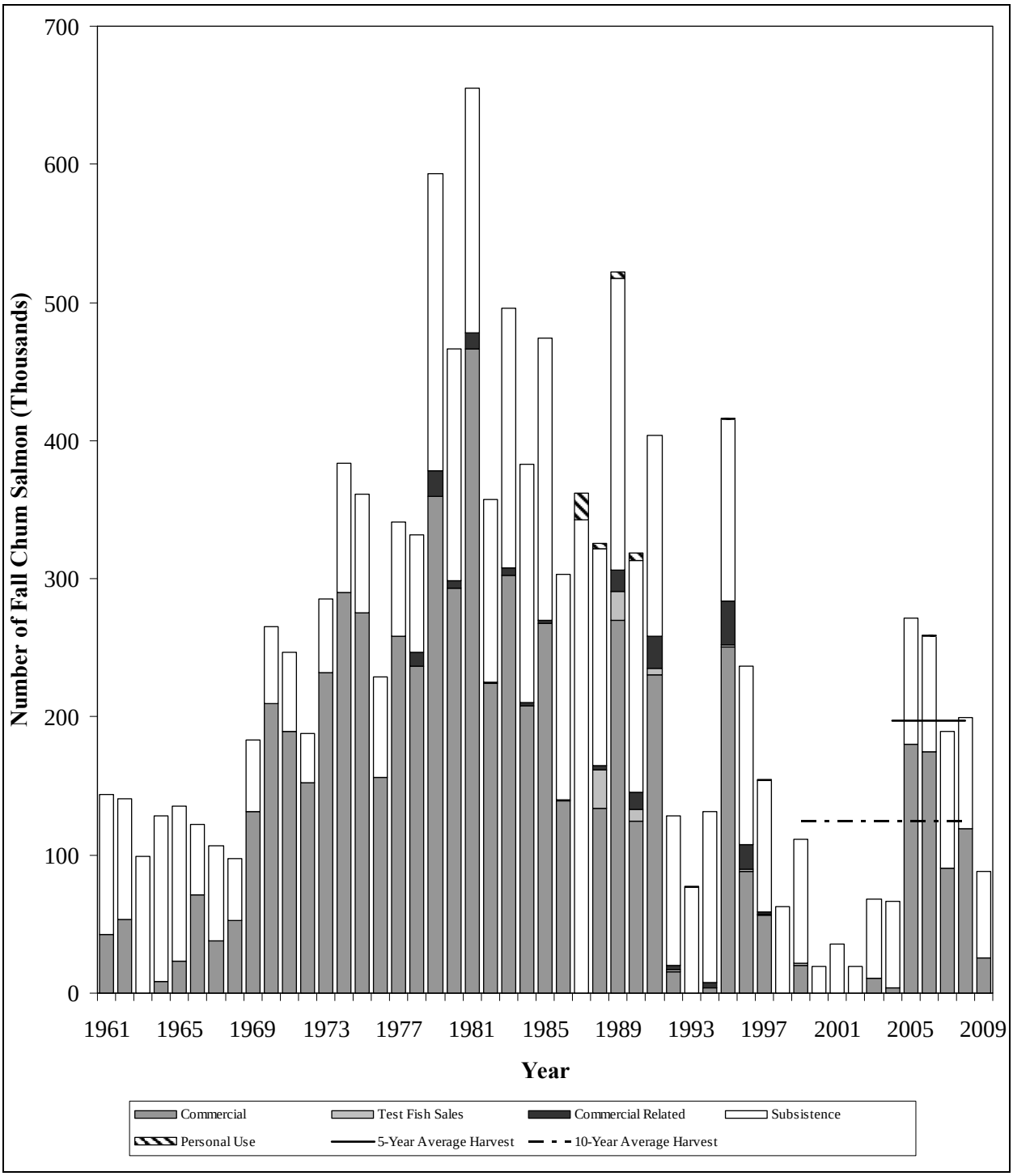
Appendix C1.–Total utilization of salmon, Yukon River, 1961–2009. 2009 Alaskan harvest estimates other than commercial are preliminary.



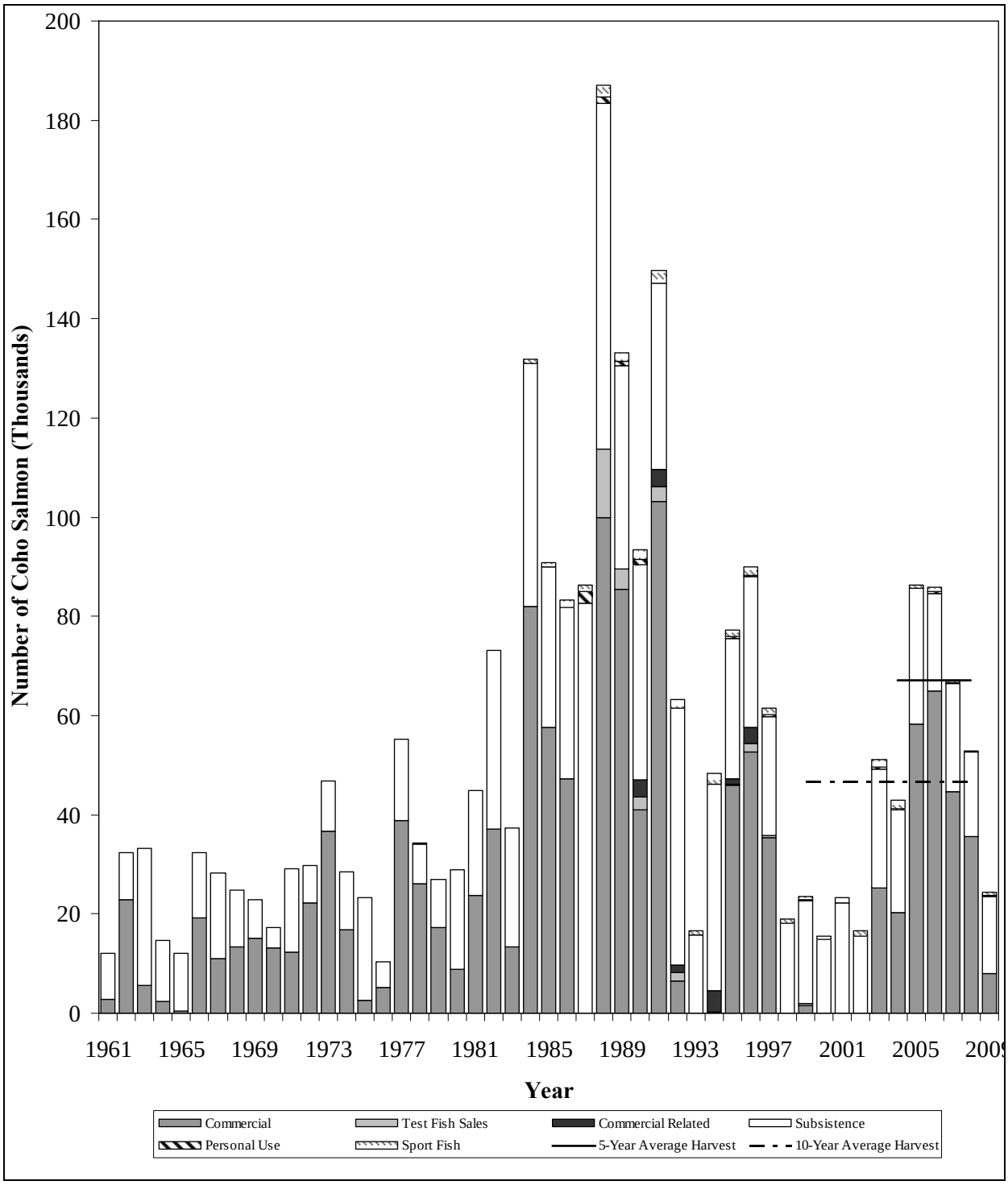
Appendix C2.–Alaskan harvest of Chinook salmon, Yukon River, 1961–2009. No commercial fishery occurred in 2001. 2009 harvest estimates are preliminary.



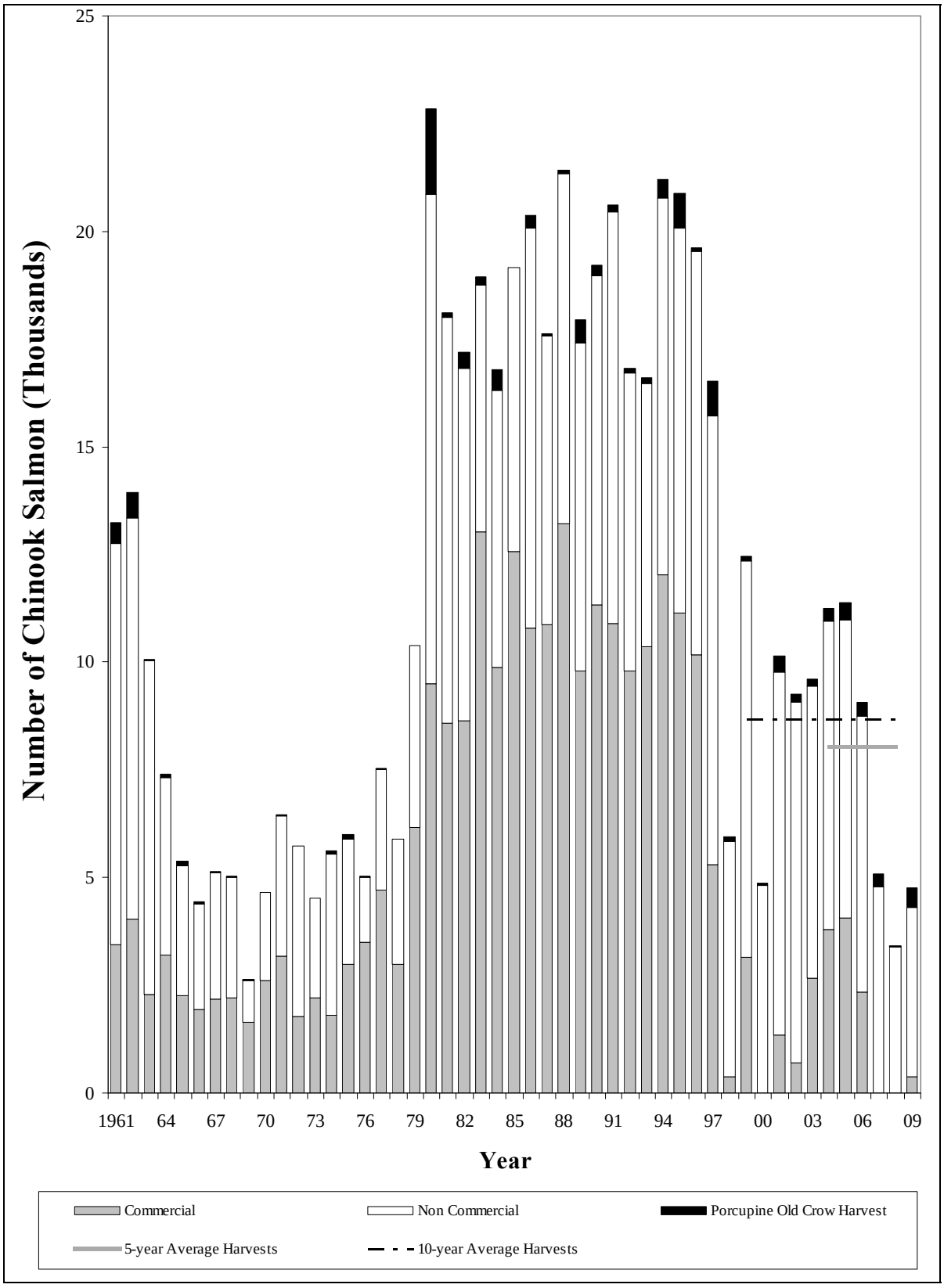
Appendix C3.–Alaskan harvest of summer chum salmon 1961–2009. The 2009 harvest estimates other than commercial are preliminary.



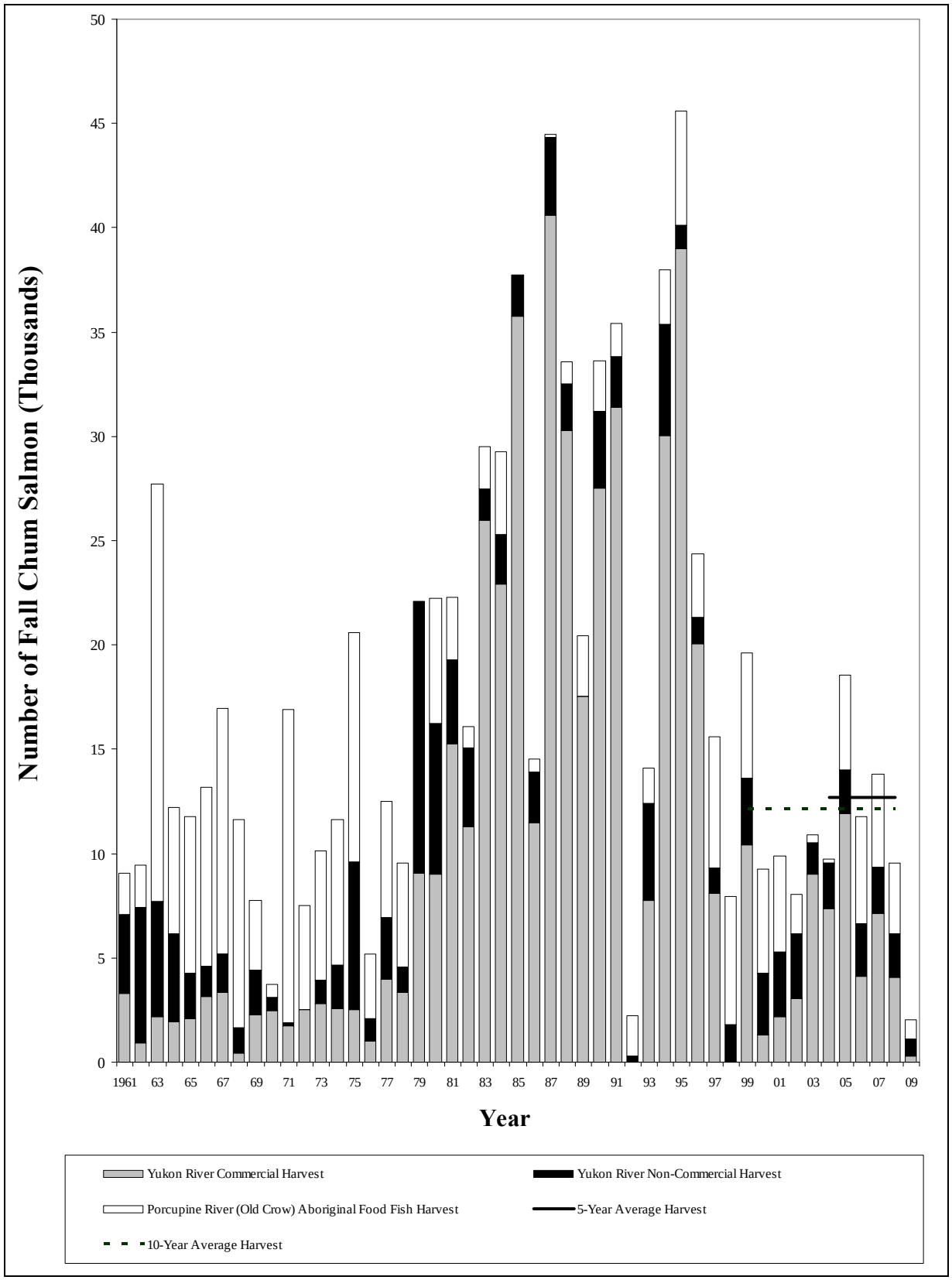
Appendix C4.–Alaskan harvest of fall chum salmon, Yukon River, 1961–2009. The commercial fishery was closed 2000–2002. The 2009 subsistence harvest estimates are preliminary and based on an estimate of something less than average due to subsistence regulations.



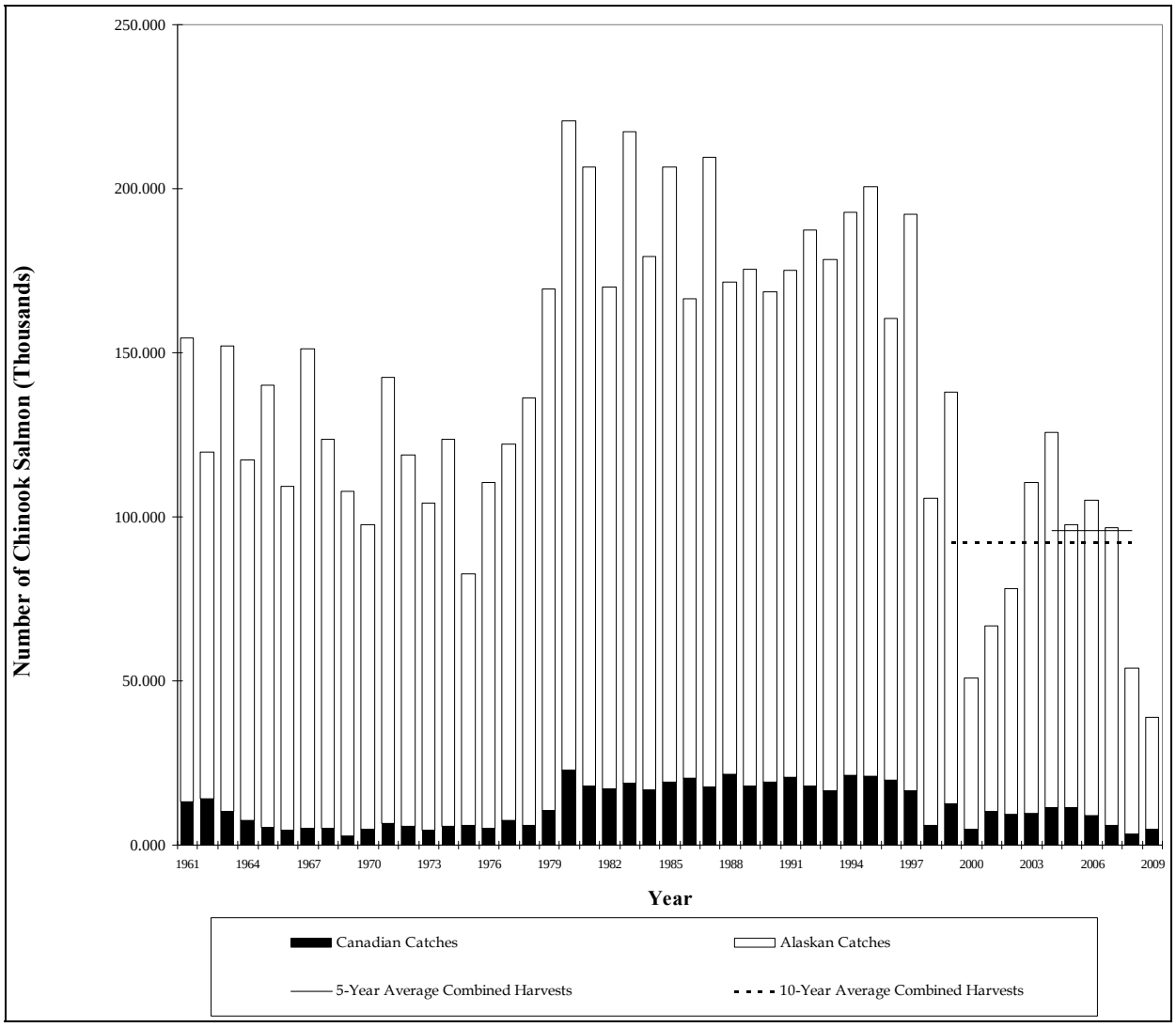
Appendix C5.–Alaskan harvest of coho salmon, Yukon River, 1961–2009. The commercial fishery was closed 2000-2002. The 2009 subsistence harvest estimates are preliminary. Commercial harvest is not adjusted for subsistence use of commercially caught fish.



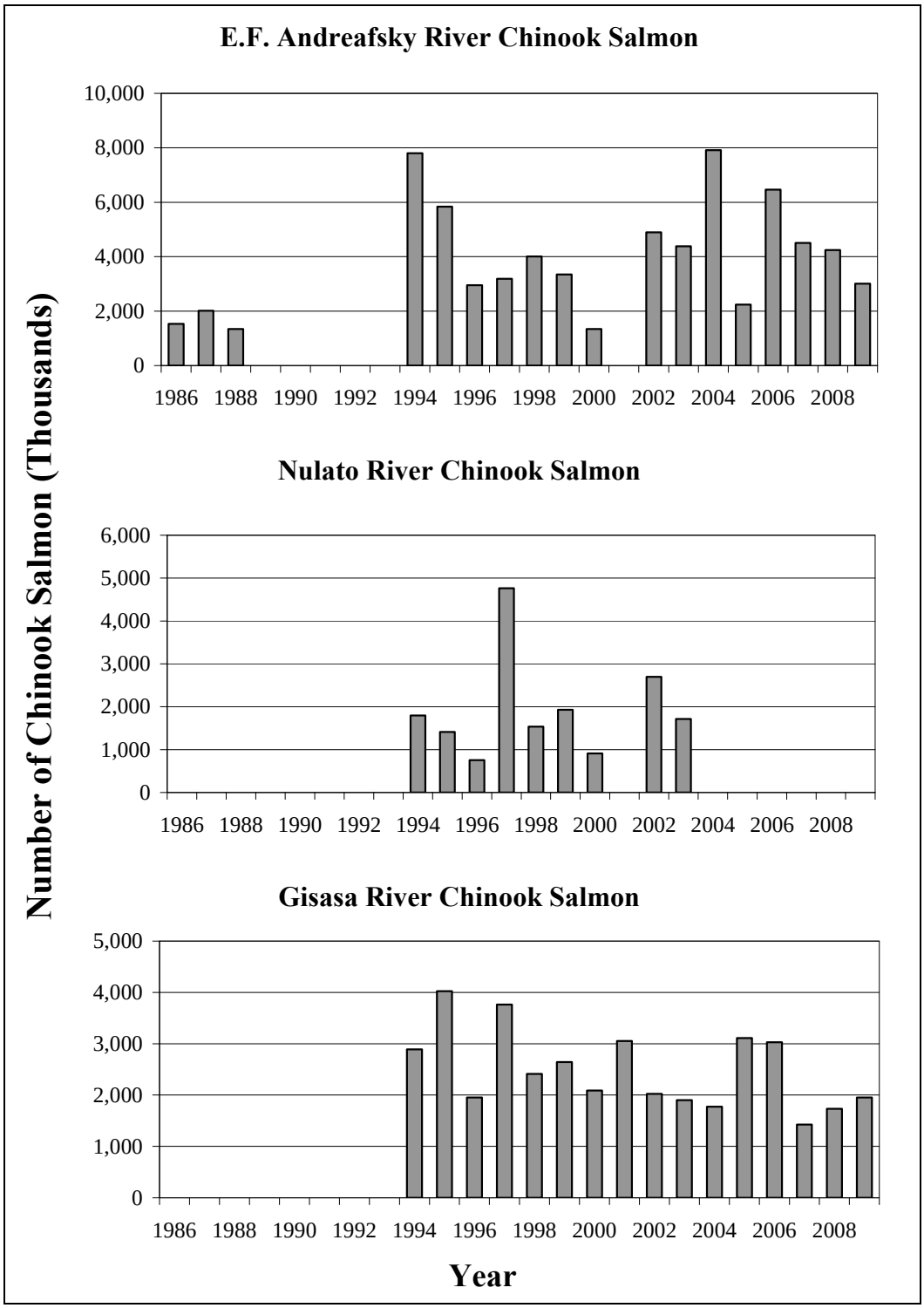
Appendix C6.–Canadian harvest of Chinook salmon, Yukon River, 1961–2009. Catch data for 2009 are preliminary.



Appendix C7.–Canadian harvest of fall chum salmon, Yukon River, 1961–2009. Catch data for 2009 are preliminary.



Appendix C8.–Total utilization of Chinook salmon, Yukon River, 1961–2009. Catch data for 2009 are incomplete and preliminary.



Appendix C9.–Chinook salmon ground based escapement estimates for selected tributaries in the Alaska portion of the Yukon River drainage, 1986–2009.

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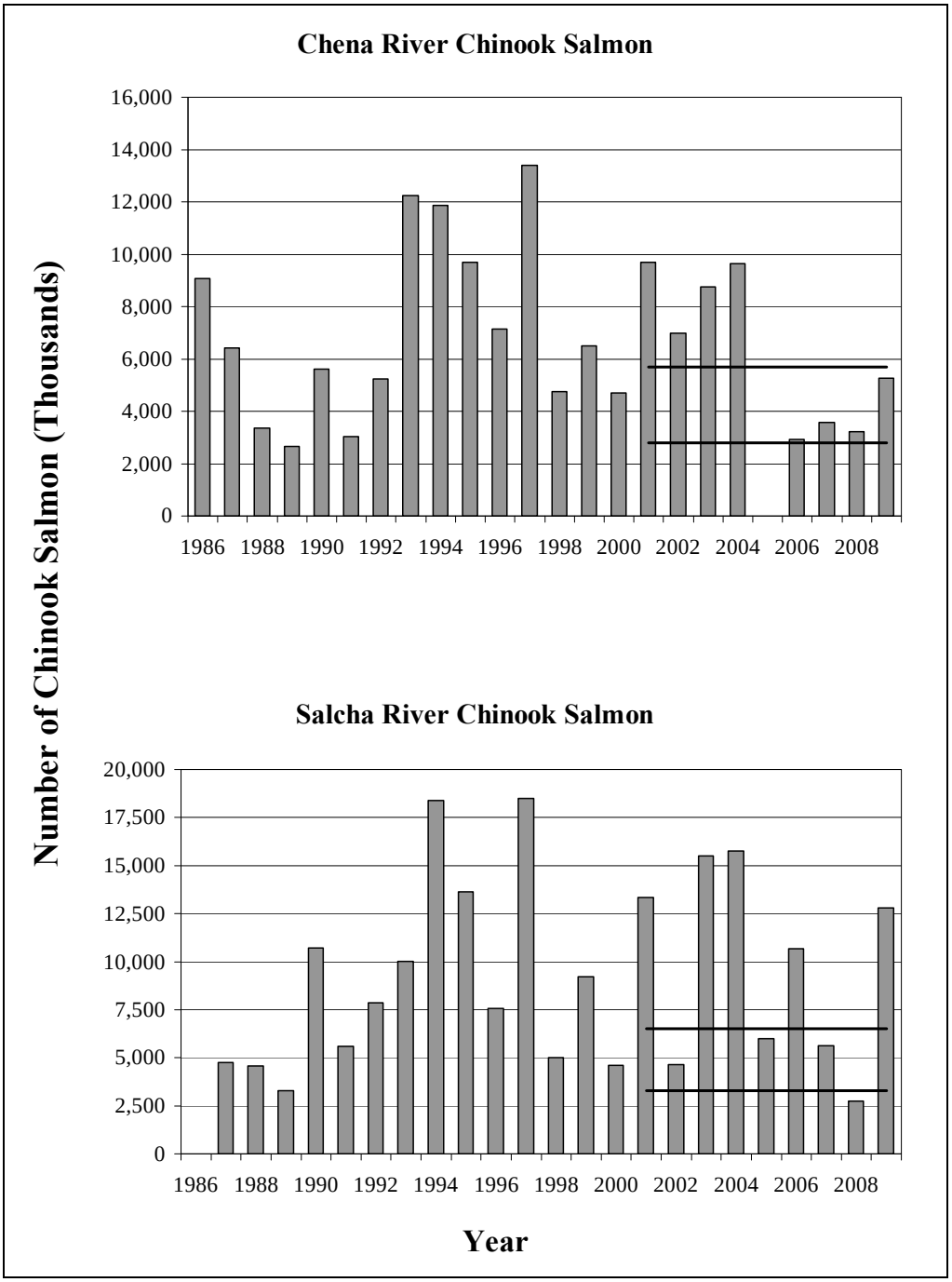
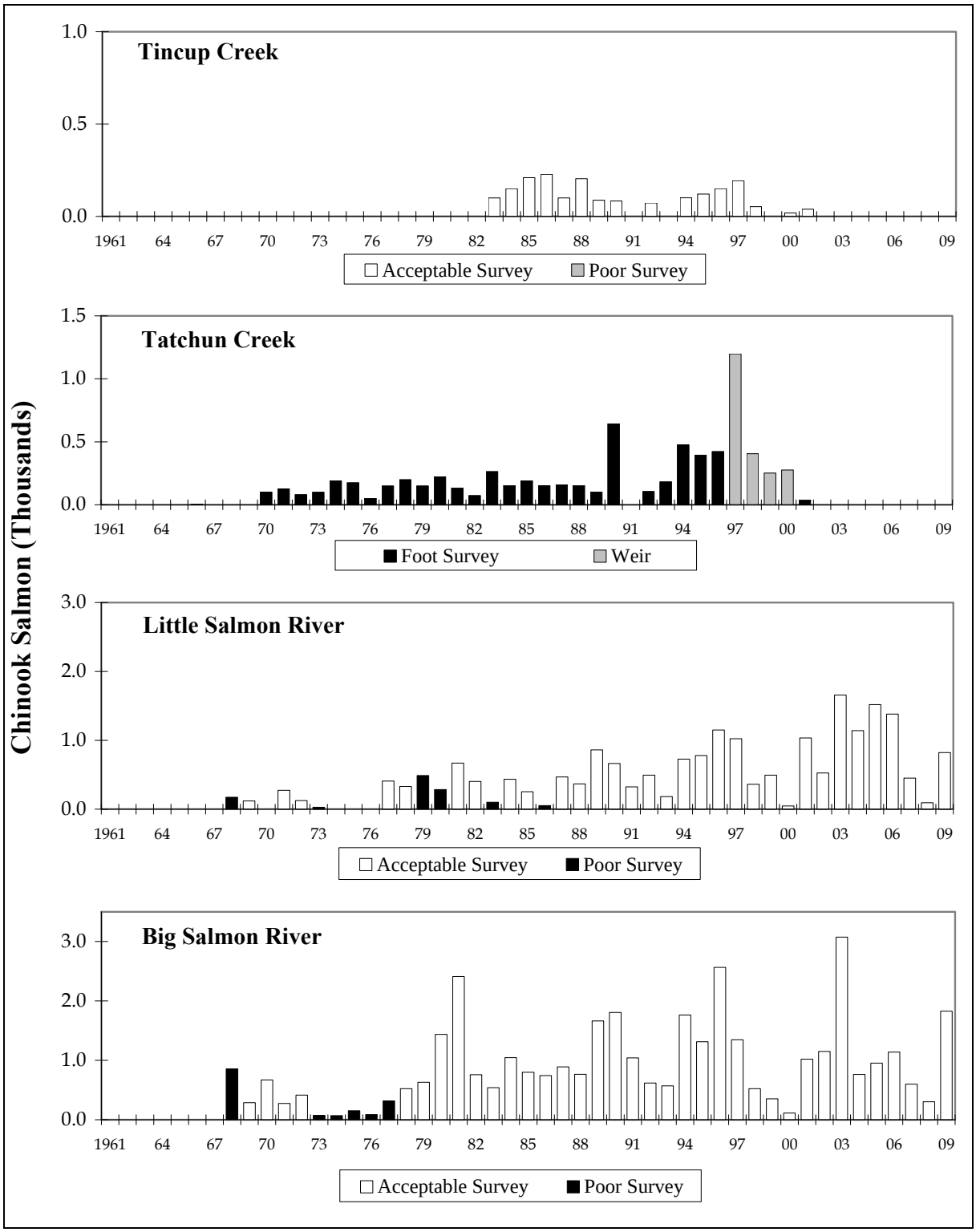
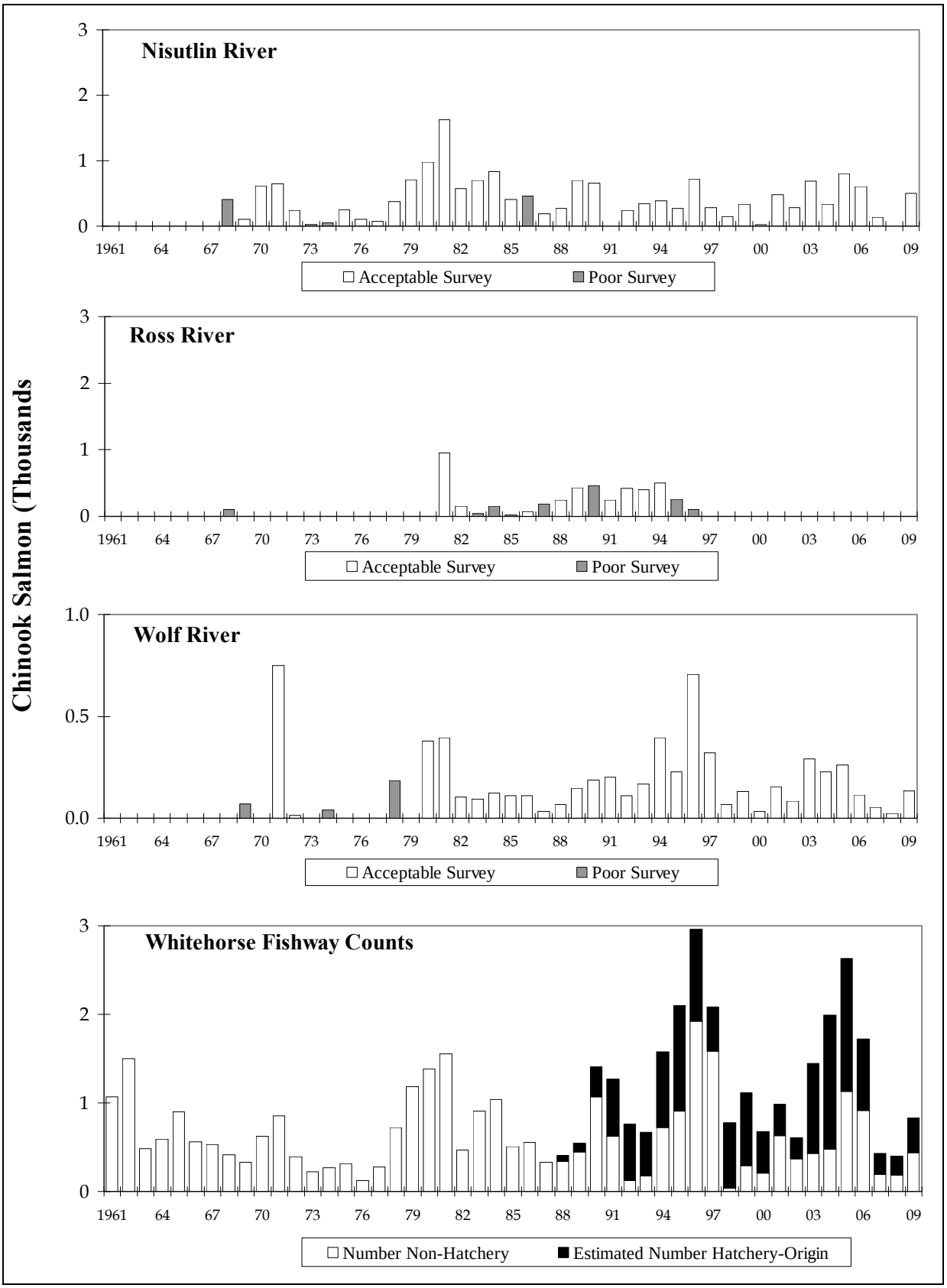


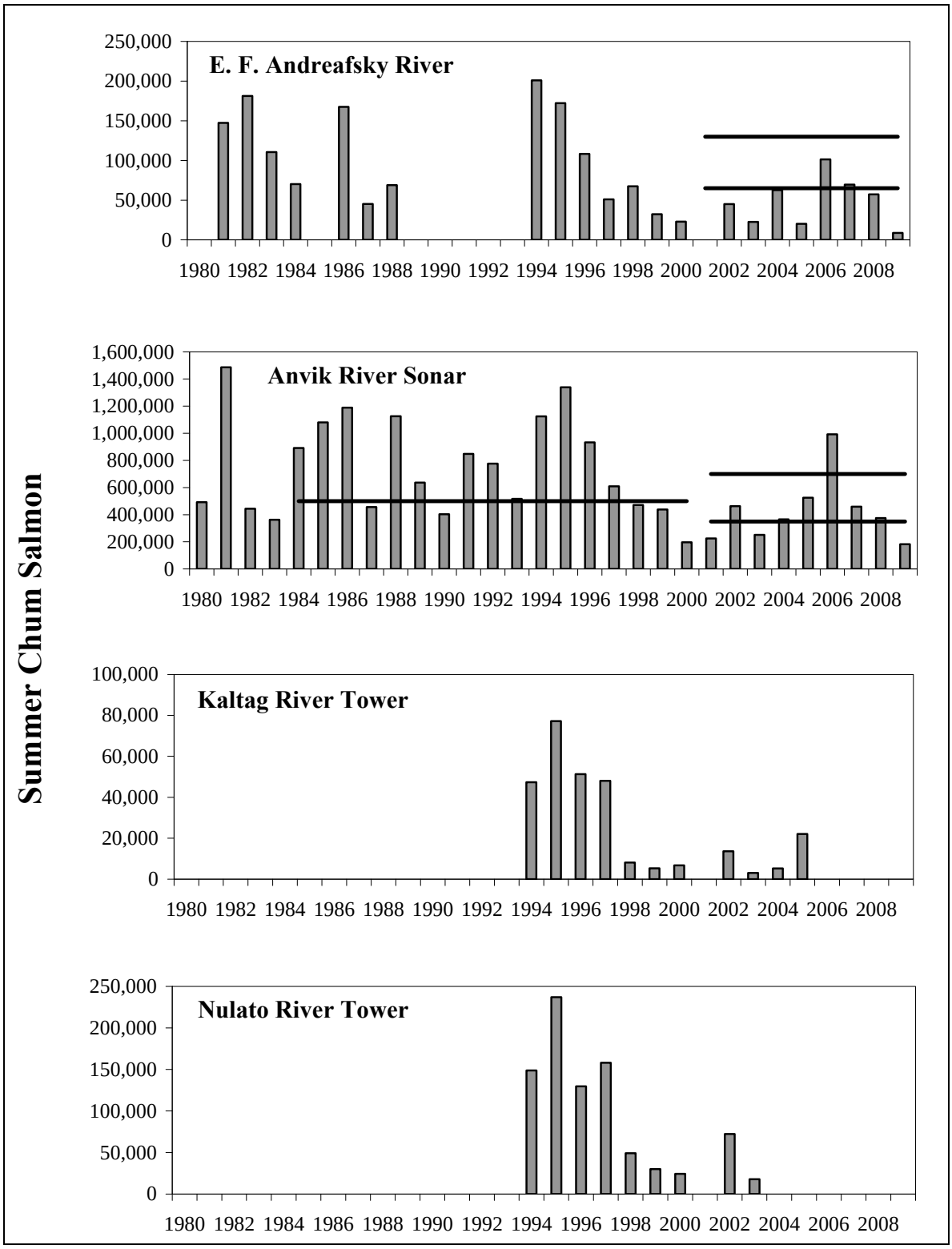
Note: The BEG range is indicated by the horizontal lines for tributaries with BEGs. The vertical scale is variable.



Appendix C10.–Chinook salmon escapement data for selected spawning areas in the Canadian portion of the Yukon River drainage, 1961–2009. Data are aerial survey observations unless noted otherwise. The vertical scale is variable.

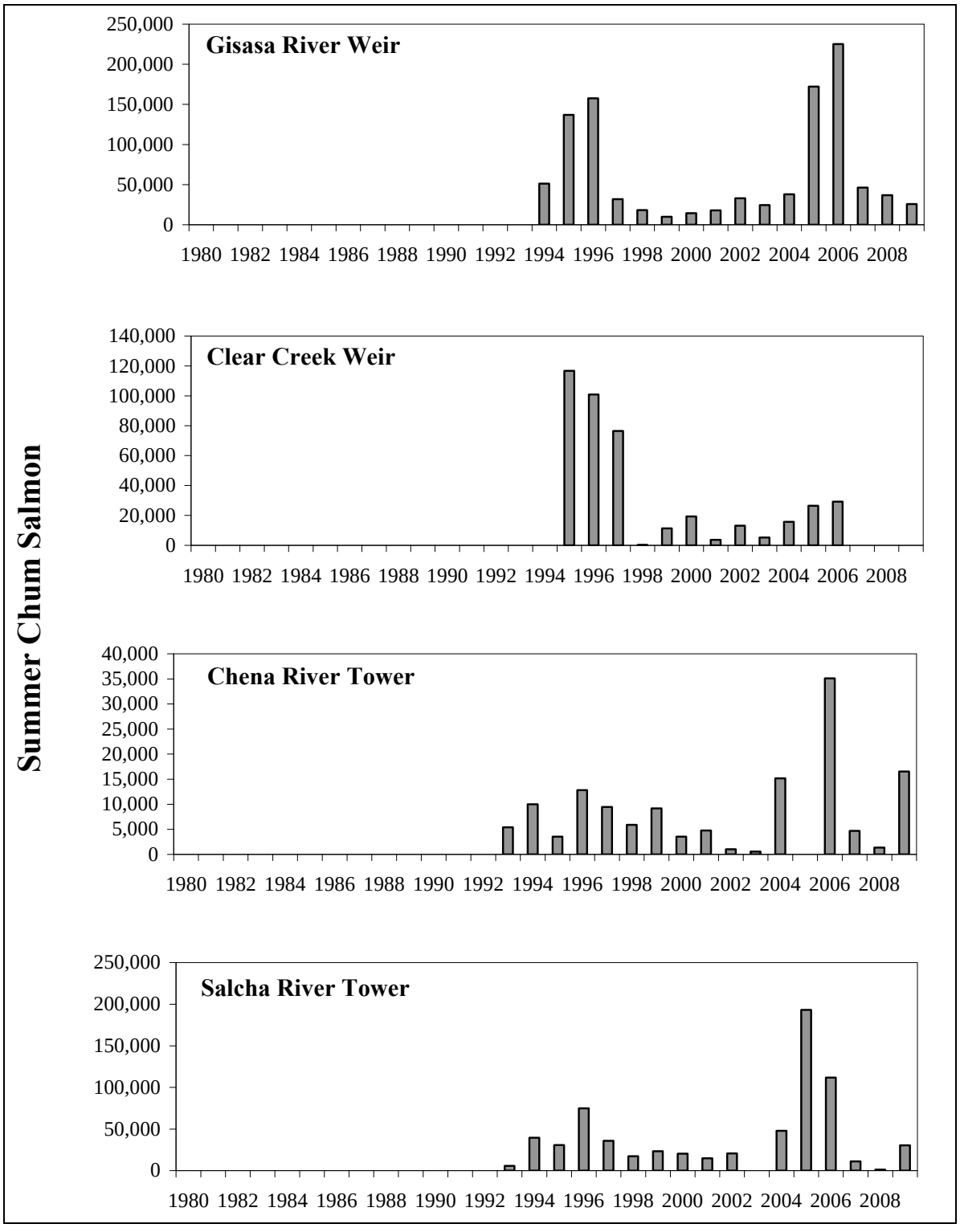
-continued-

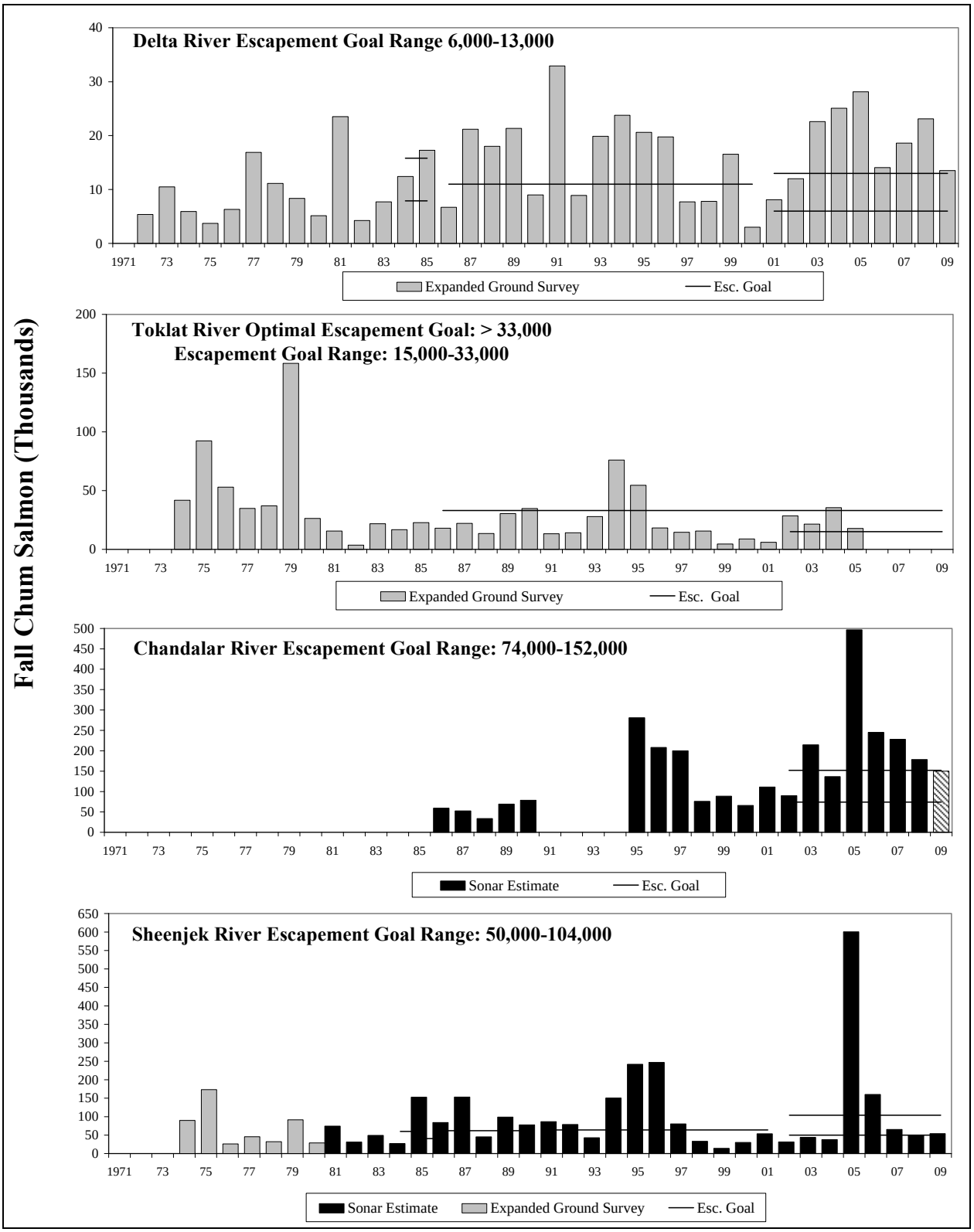

Chinook Salmon (Thousands
Nisutlin River
Acceptable Survey
Poor Survey
Ross River
Acceptable Survey
Poor Survey
Wolf River
Acceptable Survey
Poor Survey
Whitehorse Fishway Counts
Number Non-Hatchery
Estimated Number Hatchery-Origin
1961
64
67
70
73
76
79
82
85
88
91
94
97
00
03
06
09



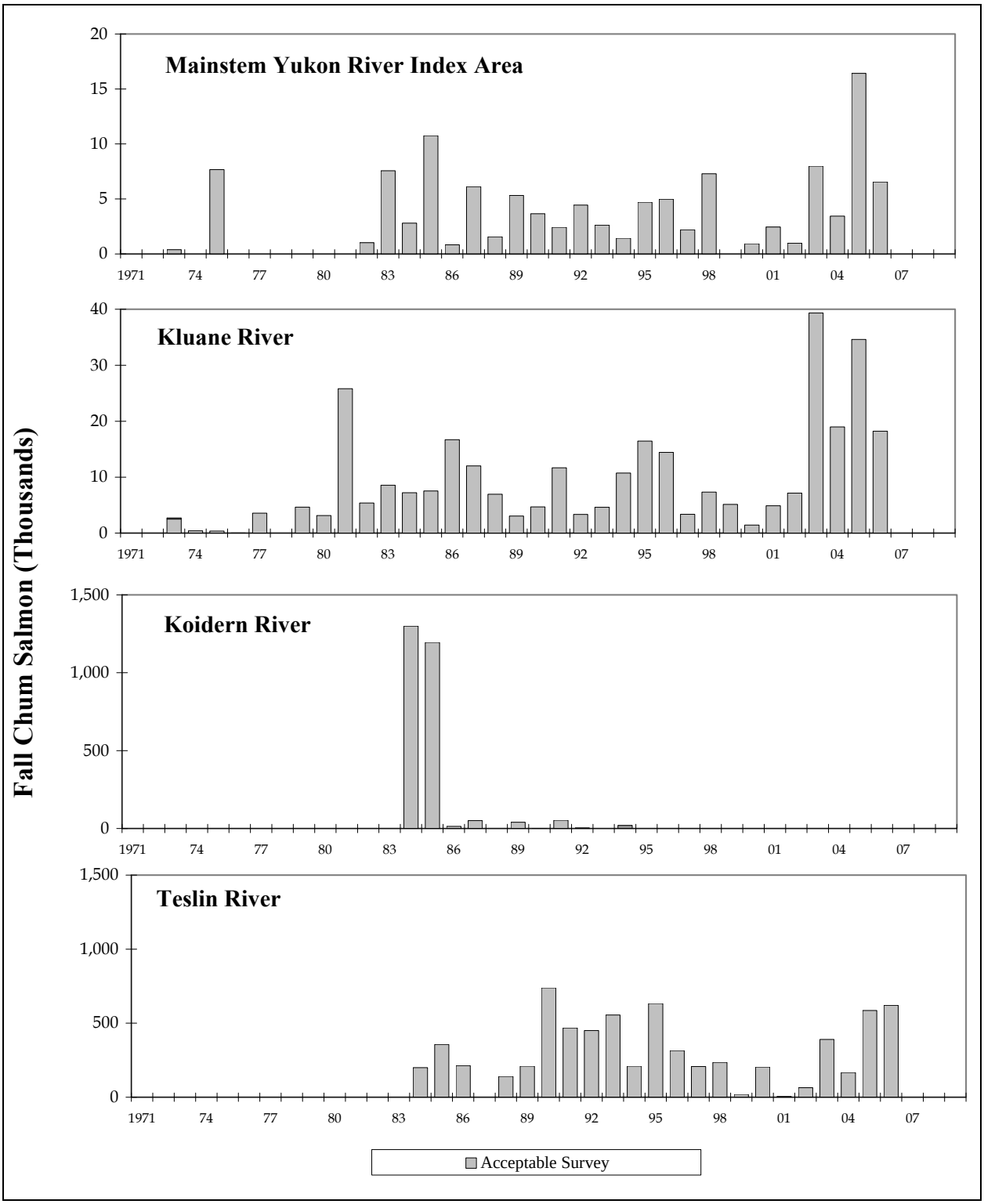
Appendix C11.–Summer chum salmon ground based escapement estimates for selected tributaries in the Alaskan Yukon River drainage, 1980–2009. The BEG range is indicated by the horizontal lines for tributaries with BEGs. The vertical scale is variable.

-continued-

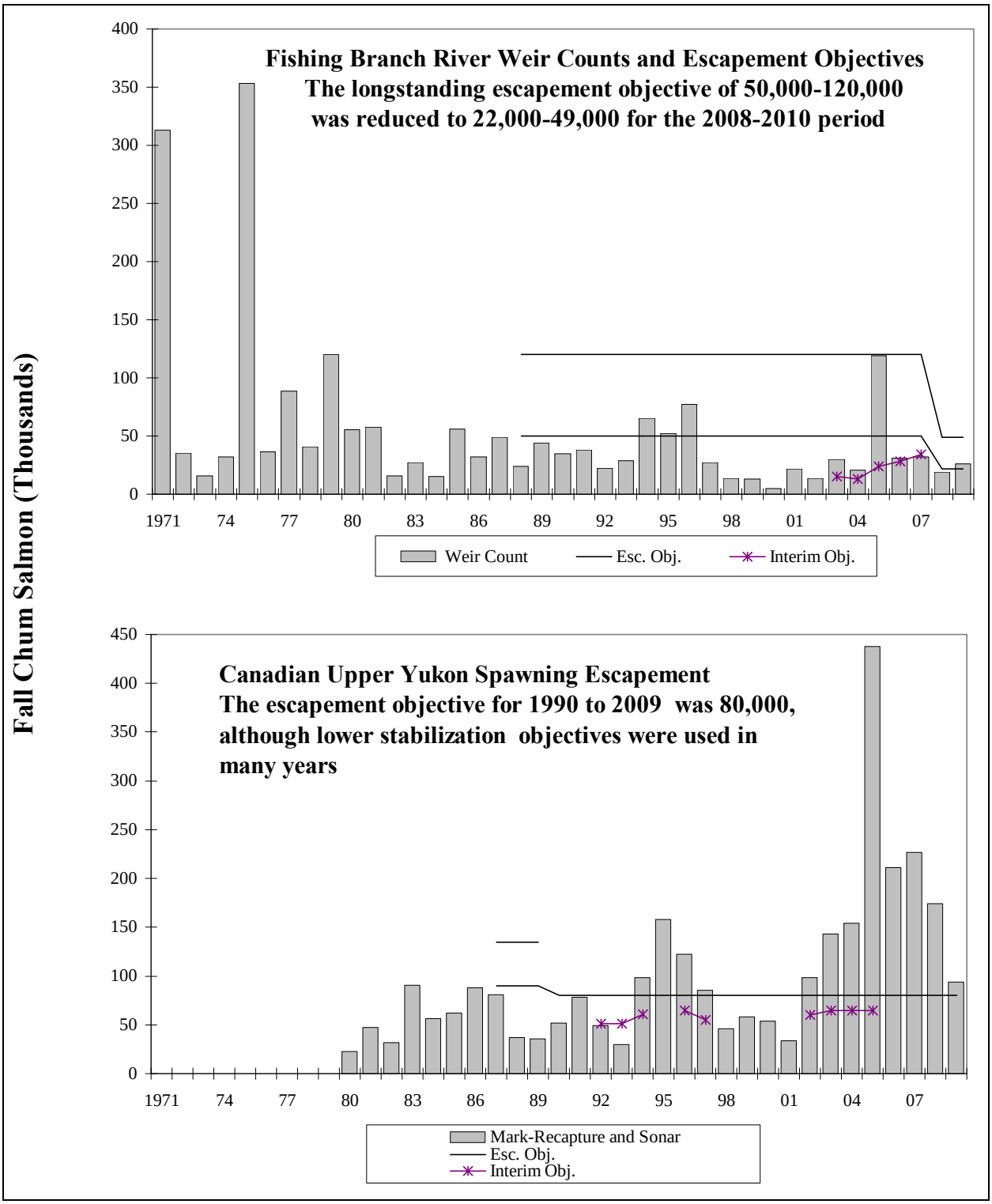

Summer Chum Salmon
Gisasa River Weir
250,000
200,000
150,000
100,000
50,000
0
1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008
Clear Creek Weir
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008
Chena River Tower
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008
Salcha River Tower
250,000
200,000
150,000
100,000
50,000
0
1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008



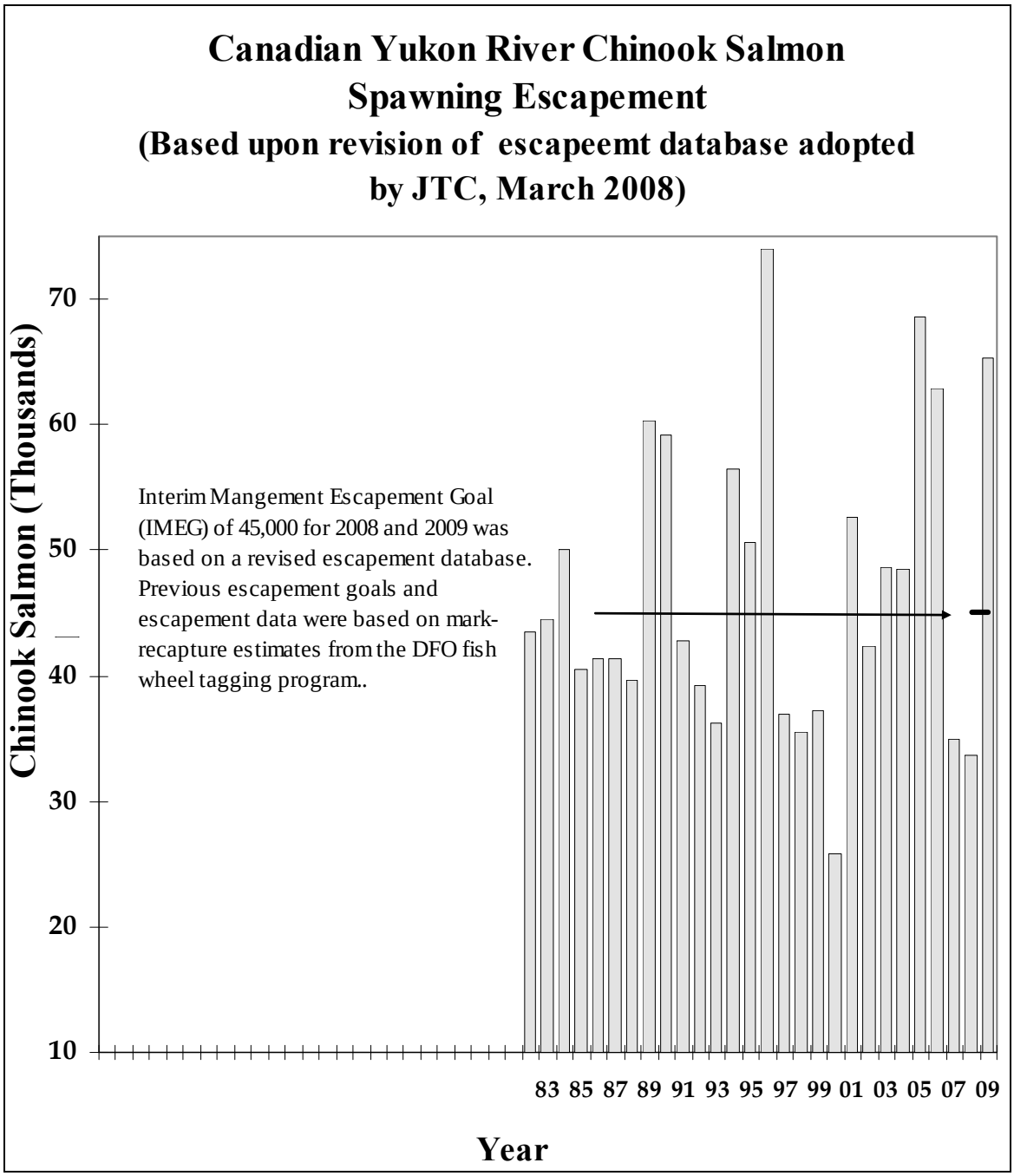
Appendix C12.–Fall chum salmon escapement estimates for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1971–2009. Horizontal lines represent biological escapement goals or ranges. The vertical scale is variable.



Appendix C13.–Chum aerial survey data for selected spawning areas in the Canadian portion of the Yukon River drainage, 1971–2009. 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 in 2007, 2008 and 2009.



Appendix C14.–Chum salmon escapement estimates for spawning areas in the Canadian portion of the Yukon River drainage, 1971–2009. Sonar estimates were used in 2008 and 2009. Horizontal lines represent escapement goal objectives or ranges. The interim stabilization or rebuilding objectives are shown.



Note: The JTC adopted a revised escapement database in March 2008. The 2008 and 2009 Interim Management Escapement Goal was set at 45,000.

Appendix C15.–Estimated total Chinook salmon spawning escapement in the Canadian portion of the mainstem Yukon River drainage, 1982–2009.