YUKON RIVER SALMON 2008 SEASON SUMMARY AND 2009 SEASON OUTLOOK

Prepared by

THE UNITED STATES AND CANADA
YUKON RIVER JOINT TECHNICAL COMMITTEE

March 2009
Regional Information Report No. 3A09-01
Alaska Department of Fish and Game
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Symbols and Abbreviations

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

Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

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.

This document should be cited as:

JTC (Joint Technical Committee of the Yukon River US/Canada Panel). 2009. Yukon River salmon 2008 season summary and 2009 season outlook. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A09-01, Anchorage.

TABLE OF CONTENTS

Page

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF APPENDICES (Continued)

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 2008 with reference to historical data, presents an outlook for the 2009 season, and provides data on the utilization of salmon species by commercial and subsistence (aboriginal) harvests, personal use (domestic) and sport (recreational) fishery. 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, (*Oncorhynchus tshawytscha*), chum (*O. keta*) and coho (*O. kisutch*) salmon remained unchanged for 2008.

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

2.0 INTRODUCTION

The United States and Canada 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 6–7, 2008 at the Canadian Department of Fisheries and Oceans Board Room in Whitehorse, Yukon Territories. Topics discussed included: the 2008 season summary; an environmental conditions summary; the marine update (including BSAI salmon bycatch and BASIS studies); Jeff Bromaghin presented a model describing the effects of size selective exploitation; the R&E sub-committee summarized their review of the conceptual proposals; Lara Dehn gave a summary on the Ichthyophonus sampling activities from 2008; Pat Milligan gave a CWT sampling update; there was a discussion on the status of the Upper Yukon Chinook Escapement Goal – the current goal is for 1 year only and DFO is looking at a habitat-based approach but results will not be ready until spring. The final topic of discussion was about the need for administrative support to replace Hugh Monaghan. The R&E sub-committee was tasked with developing a list of expectations for the position.

The spring JTC meeting was held February 24–26, 2008 at the Alpine Lodge in Fairbanks, Alaska. The Canadian preseason outlooks for 2009 were summarized for both Chinook and fall chum salmon by Pat Milligan. Bonnie Borba provided the 2009 outlook for the U.S. fall chum and coho salmon. There is additional uncertainty in both the U.S. and Canadian fall chum projections for the upcoming year because the large escapements observed in 2005 are outside the range of the data in the historical brood table. Bob Dubey presented a summary of the Alaskan preseason teleconferences and the suggestions from communities to lower overall harvest. Representatives from the agencies presented their lists of projects for the upcoming 2009 field season. Steve Cox Rogers (DFO) presented the current status of the habitat based escapement goal analysis by teleconference. Following the presentation, the escapement goal working group met to discuss the current interim management escapement goal (IMEG) and to develop a recommendation for 2009. Dani Evenson presented a proposal from Gene Sandone to document the analysis that went into developing the current IMEG, the JTC discussed the importance and time-frame for the project. Bob Dubey presented the results of the Yukon River Drainage Fisheries Association (YRDFA) weight and girth study (URE-07N-08). The JTC reviewed the priorities for genetic baseline sampling. It was noticed that some baseline samples

had not been shared between the U.S. and Canadian labs and is a problem that will need to be addressed. Dani Evenson presented the proportion of Canadian origin Chinook salmon in the Y-3 and Y-4 subsistence harvest. The JTC discussed and created a list of potential community projects for possible R&E funding. The JTC deliberated trends in Chinook salmon ASL and there was general consensus that there is a decrease in size of fish on the spawning grounds that should be reversed. Dani Evenson and Pat Milligan reported on deliberations by the R&E subcommittee and presented an overview of decisions on project proposals and there was brief discussion about guidelines for the 2010 R&E call for proposals. Jeff Adams summarized the current hydro-kinetic proposals for the Yukon River drainage. Jim Murphy presented the NOAA marine update via teleconference. Jacob LaCroix gave a status update on the 2009 JTC report. The meeting concluded with a discussion of presentations to be presented at the upcoming Panel meeting March 24–28.

Meeting participants and affiliations:

Meeting Attended:

* Fall only
# Spring only

Fisheries and Oceans Canada (DFO)

Sandy Johnston (JTC Co-Chair)	Patrick Milligan
Mary Ellen Jarvis	Al von Finster[#]

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Tanana Chiefs Conference (TCC)

Paige Drobny

Bering Sea Fishermen's Association (BSFA)

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Yukon River Drainage Fisheries Association (YRDFA)

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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 was developed in cooperation with federal subsistence managers that outlined run and harvest outlooks along with the regulatory subsistence salmon fishing schedule described in an information sheet. The strategy was to implement the subsistence salmon fishing schedule as salmon began to arrive in each district or sub-district in a stepwise manner. Before implementing this schedule, subsistence fishing would be allowed 7 days a week to provide opportunity to harvest non-salmon species, such as whitefish (*Coregonus sp.*), sheefish (*Stenodus leucichthy*s), pike (*Esox lucius*), and suckers (*Catostomus catostomus*). Additionally, an informational sheet was used to prepare fishers for possible reductions to the subsistence salmon fishing schedule or to allow for a small commercial fishery contingent on how the runs developed. The information sheet was 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

In 2002–2005, preseason management strategies were developed to not allow commercial fishing until near the midpoint of the Chinook salmon run. This interim strategy was designed to pass fish upstream for escapement, cross-border commitments to Canada, and subsistence uses in the event of a very poor run as occurred in 2000. However, a drawback to this approach is the harvest is not spread out over the entire run and commercial fishing maybe concentrated on only those stocks migrating during the latter half of the run. Furthermore, if the run is strong, delaying commercial fishing can result in foregone commercial harvest opportunities. The preferred strategy for managing commercial fisheries is to spread the harvest over the middle 50% of the run, starting near the first quarter point of the run. This strategy was in place before the decline in 1998. Additional harvest after the third quarter point can occur late in the season based on information from escapement projects. In 2008, based on the preseason projections, if a harvestable surplus beyond escapement and subsistence needs was identified, it was anticipated the Chinook salmon directed commercial fishery would open near the midpoint of the run.

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

Yukon River Chinook salmon return primarily as age-5 and age-6 fish, although age-4 and age-7 fish also contribute to the run[1]. Yukon River Chinook salmon demonstrate a strong sibling relationship between age-4, -5, and -6 fish. Though the overall number of Chinook salmon was low in 2007, the age-4 and age-6 proportions of the run were above average, whereas the age-5

[1] Salmon ages contained in this document represent the combined freshwater and saltwater age.

proportion was below average. Spawning ground escapements in 2002 and 2003, the brood years producing age-6 and age-5 fish returning in 2008, respectively, were well above average throughout the drainage. High escapements were observed in the Chena and Salcha rivers, the largest Chinook salmon producing rivers in the U.S. portion of the drainage, and near record escapements were estimated into Canada.

The 2008 run was expected to be below average and similar to the 2007 run. It was anticipated that the 2008 run would provide for escapements, support a normal subsistence harvest, and a below average commercial harvest. Fishery management would be based on inseason assessments of the run. However, there was a possibility that the run would not be large enough to support even a small Chinook salmon directed commercial fishery. If inseason indicators of run strength suggested sufficient abundance existed to have a commercial Chinook salmon fishery, the commercial harvest could have ranged from 5,000 to 30,000 Chinook salmon including the incidental harvest taken during anticipated summer chum salmon directed periods. This range of commercial catch is below the 10-year (1998-2007) average of approximately 35,399 Chinook salmon.

ADF&G and United States Fish and Wildlife Service (USFWS) staff cooperatively developed the preseason and inseason management approaches which were distributed in May, as the 2008 Yukon River Salmon Fisheries informational flyer. The subsistence salmon fishing schedule was initiated on May 26 in District 1 and implemented upriver chronologically, consistent with migratory timing as the run progressed upstream.

Ice breakup in the lower river occurred with near average timing around May 24. River conditions in the lower river early in the season were characterized as being higher than normal water levels. The first reported subsistence caught Chinook salmon was reported near Alakanuk on June 2 and the first subsistence caught summer chum salmon was reported near Emmonak on June 6. The LYTF recorded the first Chinook salmon catches on June 3.

All available run assessment information was reviewed on a daily basis, including the Lower Yukon Test Fishery (LYTF), Pilot Station sonar, Marshall Test Fishery, subsistence harvest reports, age composition data, and abundance and run timing information from other western Alaska rivers. This information was used to evaluate abundance, run timing, and quality of the Chinook salmon run. By June 20, the historical midpoint of the run, most indicators pointed to a weak Chinook salmon run.

The LYTF detected the first pulse of Chinook salmon entering the Yukon River from the evening of June 14 through June 17, followed by 5 days of low catch rates (Figure 2). On June 20, the cumulative catch per unit effort (CPUE) was approximately half the historic average for that date. The first pulse of Chinook salmon yielded a lower than expected estimate of approximately 10,000 fish at Pilot Station sonar. The estimated run projection based on Pilot Station sonar passage at that time appeared to be as low as 80,000 fish. These data raised concerns about the magnitude of the run. The projected Chinook salmon run abundance would not support average subsistence harvests in Alaska (approximately 50,000 Chinook salmon) and meet escapement goals in Alaska and meet the interim management escapement goal (IMEG) of >45,000 fish in Canada agreed to by the Yukon River Panel.

During Yukon River Drainage Fisheries Association (YRDFA) weekly teleconferences, ADF&G and USFWS staff provided run assessment and potential management strategies. Subsistence fishers provided reports on fishing efforts and were encouraged to provide input on management strategies.

In an effort to conserve Chinook salmon, management actions were implemented that reduced subsistence salmon fishing period duration chronologically from downriver to upriver after the first pulse of Chinook salmon had passed consistent with the migratory timing as the run progressed. These reductions beginning June 23 in District 1, while unfortunate, were needed to provide increased numbers of Chinook salmon on the spawning grounds.

The inseason management strategy was to protect the second and third pulses throughout the Yukon River mainstem by attempting to implement subsistence fishing period reductions equally among each of the districts and subdistricts to conserve Chinook salmon as these pulses migrated upriver. This entailed reducing the regulatory fishing periods by half for 3 consecutive periods in Districts 1–4 and Subdistricts 5-A, B, and C. Because Subdistrict 5-D has a regulatory schedule of 7 days per week, the schedule was reduced by half for 2 weeks. Additionally, gillnet mesh size was restricted to 6 inch or smaller in Districts 1–3 to target chum salmon. This management action was taken to account for the opportunity lower river fishers had to harvest Chinook salmon during the first pulse and was implemented when good quality chum salmon were available for harvest. This strategy may have impacted District 3 fishers more, because historically fewer chum salmon are harvested for subsistence than in Districts 1 and 2.

During the YRDFA weekly teleconferences, there were discussions about applying similar mesh size restrictions in upriver districts consistent with the lower river and establishing fish wheel restrictions requiring release of Chinook salmon. However, it was determined that fewer fishers upriver had access to smaller mesh size gillnets and the presence of poor quality chum salmon would not be utilized for subsistence. Therefore, subsistence periods were reduced in Districts 4 and 5, but no gear restrictions were established. Subsistence fishing restrictions were not implemented in the Tanana and Koyukuk River drainages, because of low fishing effort, and in the case of the Tanana River, assessment projects are available to manage this river separately.

No directed Chinook salmon commercial fishery occurred in 2008. 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-directed commercial periods when Chinook salmon abundance was low. The Chinook salmon commercial harvest was 88% below the 1998–2007 average harvest of 39,332 fish.

The border passage estimate from the Eagle sonar project was approximately 34,000 Chinook salmon which was below the interim management escapement goal (IMEG) of >45,000 fish in Canada. In summary, the 2008 Chinook salmon run was weak and below the recent 10-year average of 210,000 Chinook salmon.

3.1.2 Summer Chum Salmon

The summer chum salmon runs have exhibited steady improvements since 2001 with harvestable surpluses in each of the past 7 years (2002–2008). However, it appears that production was poorer for spawning tributaries in the lower portion of the drainage such as the Andreafsky and Anvik rivers during this time period, whereas production was much higher for spawning tributaries upstream of the Anvik River. Weak chum salmon runs from 1998 through 2001 are attributed to poor productivity, and not the result of low levels of parent year escapements as spawning escapements were well above average from 1994–1996.

The 2008 run outlook was for an average run, which would provide for escapements, support a normal subsistence and commercial harvest. Summer chum salmon runs have exhibited steady improvements since 2001 with a harvestable surplus in each of the last 5 years (2003–2007). If inseason indicators of run strength suggested sufficient abundance existed to allow for a commercial fishery, the commercial harvest surplus in Alaska was expected to range from 500,000 to 900,000 summer chum salmon. The actual commercial harvest of summer chum salmon in 2008 was dependent on market conditions and affected by the poor Chinook salmon run, as Chinook salmon are incidentally harvested in fisheries directed at chum salmon.

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 1.7 million fish, (Appendix A2). By June 29, the summer chum salmon run at Pilot Station was projected to be 1.2 to 1.6 million fish, a level that would allow a directed summer chum salmon fishery. The summer chum salmon entry in 2008 was average in run timing. The first quarter point, midpoint, and third quarter point were on June 26, June 30, and July 8, respectively.

In 2008, there was a renewed market interest for summer chum salmon. Based on the projected near average run estimate for summer chum salmon, ADF&G initiated 11 short commercial fishing periods. These were restricted to 6-inch maximum mesh size in Districts 1 and 2 and directed at chum salmon. Additionally, 7 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. The total commercial harvest was 151,201 summer chum salmon for the Alaskan portion of the Yukon River drainage.

3.1.3 Harvest and Value

In 2008, a total of 4,641 Chinook and 151,201 summer chum salmon were commercially harvested (Appendix A3) and sold in the round in the Alaskan portion of the Yukon River drainage. The historical commercial harvest includes the number of salmon sold in the round and the estimated number of salmon harvested to produce roe sold. The Chinook salmon commercial harvest was well below the 1998–2007 average harvest of 39,367 fish. The summer chum salmon harvest was well above the 1998–2007 average harvest of 49,675 fish.

A total of 457 permit holders participated in the Chinook and summer chum salmon fishery, which was 24% below the 1998–2007 (not including 2001) average of 599 permit holders (Appendix A4). The Lower Yukon Area (Districts 1–3) and Upper Yukon Area (Districts 4–6) in Alaska are separate Commercial Fisheries Entry Commission (CFEC) permit areas. A total of 444 permit holders fished in the Lower Yukon Area in 2008, which was 23% below the 1998–2007 average of 577 permit holders. In the Upper Yukon Area in Alaska, 13 permit holders fished, which was 48% below the 1998–2007 (not including 2001) average of 25 permit holders. Yukon River fishermen in Alaska received an estimated $718,000 for their Chinook and summer

chum salmon harvest in 2008, approximately 71% below the 1998–2007 average of $2.5 million (Appendix A5).

3.1.4 Results by District

3.1.4.1 Districts 1–3

Similar to the management strategies utilized in 2002–2005, preseason management strategies were developed to delay commercial fishing until near the midpoint of the Chinook salmon run. This interim strategy was designed to pass fish upstream for escapement, cross-border commitments to Canada, and subsistence uses in the event of a very poor run as occurred in 2007.

No directed Chinook salmon commercial fishery occurred in 2008. 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.

A total of 4,348 Chinook salmon were incidentally harvested in 11 restricted periods in Districts 1 and 2. The combined total harvest of all openings in Districts 1 and 2 was 4,641 (includes 293 Chinook salmon harvested in the fall season) Chinook salmon.

The Chinook salmon age composition from all periods in the District 1 restricted commercial harvest was estimated from 524 samples collected in 5 of the 6 periods. The harvest age composition was 0.4% age-3, 11.9% age-4, and 58.1% age-5, 27.4% age-6, and 2.2% age-7 fish. The percentage of females was 38.0%.

In the District 2 restricted commercial harvest only the first period was sampled. The Chinook salmon age composition from this period was 11.4% age-4, 58.1% age-5, 29.6% age-6, and 1.0% age-7 fish. The percentage of females was 39.0%.

The summer chum salmon age composition from all periods in the District 1 restricted commercial harvest was estimated from 950 samples collected in all 6 periods. The harvest age composition was 0.1% age-3, 37.5% age-4, and 55.8% age-5, 6.5% age-6, and 0.1% age-7 fish. The percentage of females was 52.2%.

In the District 2 restricted commercial harvest only the first period was sampled. The summer chum salmon age composition from this period was 30.0% age-4, 63.8% age-5, 5.6% age-6, and 0.6% age-7 fish. The percentage of females was 49.4%.

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 374,929 summer chum salmon. The projection required to allow an in river commercial fishery is 500,000 fish, and the Anvik River Management Area remained closed to commercial fishing in 2008.

Historically, the Subdistrict 4-A fishery targets summer chum salmon. The dominant gear type, fish wheels, and the location of the fishery, result in a very high chum-to-Chinook salmon ratio. Commercial fishing in Subdistrict 4-A consisted of 7 periods for a total of 312 hours in 2008. A total of 8 fishers harvested 24,746 summer chum salmon and a total of 21,624 pounds of summer chum salmon roe recovered from total harvest in a directed roe fishery in Subdistrict 4-A (Appendix A1). In an effort to reduce harvest of Chinook and male chum salmon, commercial fishers volunteered to tend fish wheels in an effort to release those fish immediately to the water

alive. All commercial set gillnet gear was restricted to 6-inch mesh or less. Since 2007, there has been a renewed summer chum salmon commercial fishery. However, no commercial deliveries were reported in 2008 in Subdistrict 4-B and 4-C because of a lack of a market.

In the District 4-A summer chum salmon commercial harvest, 72 fish were sampled from 2 of 7 periods. This sample size is considered inadequate to estimate the total harvest by age. The summer chum salmon age composition from the samples was 63.9% age-4, 31.9% age-5, and 4.2% age-6. All the samples were from females.

No commercial fishing periods were announced for District 5 in an effort to provide increased numbers of Chinook salmon on the spawning grounds.

In 2008, commercial fishing in District 6 consisted of 6 periods for a total of 432 hours. Summer chum salmon were targeted during these commercial fishing periods. Due to high water events, fishing effort was limited. A total of 5 fishers harvested 1,857 summer chum salmon and a total of 4 pounds of summer chum salmon roe were recovered in District 6 **(**Appendix A1).

In the District 6 summer chum salmon commercial harvest, 45 fish were sampled from 1 of 6 periods. This sample size is considered inadequate to estimate the total harvest by age. The summer chum salmon age composition from the samples was 60.0% age-4, 37.8% age-5, and 2.2% age-6. The percentage of females was 33.3%.

3.2 FALL CHUM AND COHO SALMON

In response to the guidelines established in the *Policy for the Management of Sustainable Salmon Fisheries*, the Alaska Board of Fisheries (BOF) discontinued the stock of yield concern classification for the Yukon River fall chum salmon in February 2007, after reviewing stock status information and public input during the regulatory meeting. The determination was based on the availability of a near historical average harvestable surplus of fall chum salmon above escapement needs since 2003, a record run in 2005, an above average run in 2006, and a near-average run anticipated for 2007 which materialized above average. These runs indicated a return to near average production levels.

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, which are 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 run adds to the complexity of Yukon River fall season management.

3.2.1 Fall Chum Salmon Management Overview

Summer season results and the preseason projection influence early fall season management. However, the Pilot Station sonar project is the primary inseason assessment tool for management of the fall season by providing daily passage estimates of fall chum salmon used to derive run size projections as the run develops. Inseason run projections based on passage estimates

provided by Pilot Station sonar 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), Mountain Village (operated by Asacarsarmiut Traditional Council) and in the middle Yukon River at Kaltag (operated by the City of Kaltag) provide run timing information. Relationships in run timing and run strength from the various index projects and subsistence fishing reports were compared for consistency with the Pilot Station sonar estimates as a method to check that projects appeared to be operating correctly. Individual pulses were tracked as they moved up river and the Pilot Station sonar was used to estimate the abundance of each pulse. In 2008, each pulse of fall chum salmon appeared to correlate well between the Pilot Station sonar daily passage estimates and the other assessment projects for run timing and relative magnitude. There was some uncertainty concerning the apportionment of sonar passage in the early portion of the season due to exceptionally high pink salmon abundance. However, after thorough inseason evaluation of the sonar data and operations, confidence was restored in the estimates provided.

Similar to 2007, the 2008 preseason run size projection ranged from about 900,000 to 1.2 million fall chum salmon. The projection range was based on the upper and lower values of the 80% confidence bounds for the point projection. The point estimate of 1.0 million was derived by utilizing the 1984 to 2001 even/odd maturity schedules to represent the expected lower trend in production. However, the production models used to determine the 2008 preseason point estimate was suspect because of evidence of the drastic drop in high seas chum salmon catches as well as the low odds of that run size for an even-numbered year. At a run size of 1 million, the outlook was for a run that would provide for escapement requirements and for subsistence and personal use fisheries with a surplus of 50,000 to 400,000 fall chum salmon available for commercial harvest. The projection was refined as the fall season approached based on the summer to fall chum salmon relationship which reduced the commercially harvestable surpluses to less than 300,000 fish. Once inseason management begins, it becomes increasingly more dependent upon the projections from the cumulative passage which initially fluctuate drastically due to the irregular pulsing entry pattern of fall chum salmon and become more stable between the first quarter and mid-points.

The Pilot Station sonar cumulative total estimate of fall chum salmon for the 2008 season was approximately 615,000 fish through September 7, the last day of operation (Appendix A2). The delayed arrival of the first pulse (Figure 3) which occurred near the average first quarter-point in run timing resulted in the run shifting 3 days late at that point, 5 days late at the mid-point and continued to be 4 days late at the average three-quarter point. The Pilot Station sonar estimate was combined with the estimated subsistence and commercial harvests downstream of the project to reconstruct the run postseason. Based on this method the preliminary total fall chum salmon run size was estimated postseason to be approximately 730,000 fish.

With an expectation of continued good production, the 2008 preseason management strategy was to begin the fall season using the pre-2001 subsistence fishing regulations in accordance with the management plan. In 2007, when early periods were delayed to allow time for poor quality late summer chum salmon to move out of the area and provide early upriver fall chum salmon stocks safe passage, the 2008 fall season began with commercial fishing periods immediately following the summer season. This took advantage of harvesting 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 increased confidence that there would be surplus fall chum salmon available for commercial harvest.

On July 16, the fall chum salmon management plan went into effect and subsistence fishing management actions, initiated during the summer season, were continued into the fall season. 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 the pre-2001 subsistence salmon fishing regulations were applied in the Upper Yukon Area.

Districts 1 and 2, and Subdistricts 5-B and 5-C, and District 6 had commercial buyer commitments prior to the season with an additional buyer expressing interest in purchasing salmon in Subdistrict 4-A. 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 1 and July 30, respectively. Fall chum salmon were harvested commercially prior to and during the first pulse of fish. Nine commercial fishing periods were opened, 5 in District 1 and 4 in District 2 through August 1. The Pilot Station sonar cumulative estimate through August 1 of 162,000 was below the historical average of 188,000 for that date. At the time, the total season run size was projected to be near 530,000 fish based on average run timing. According to the management plan, additional fish were needed to catch-up with 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 second pulse of fall chum salmon entered the river on August 12–14 and was allowed to pass through the Lower Yukon Area with little exploitation which was intended to contribute to escapement and provide upriver fishers comparable harvest shares. The sonar estimated the second pulse to be approximately 100,000 fall chum salmon bringing the cumulative passage estimate through August 17 to 412,000 fish which was below the historical average of 505,000 for that date. Unfortunately, the addition of the second pulse was late and not large enough to warrant additional commercial fishing at that time.

On August 22–24, a small bump of fall chum salmon was detected entering the river. Pilot Station sonar estimated this group to number about 25,000 fish. As of August 24, the overall fall chum salmon projected run size had continued to decline to between 520,000 and 579,000 fish. With the outlook for only an additional 10% fall chum salmon still to enter the river, management turned to the possibilities of coho salmon directed fishing. With the expectation that the fall chum salmon run would total around 550,000 to 600,000 fish, the coho salmon management plan would allow a limited directed commercial harvest for coho salmon without substantially impacting the fall chum salmon. Commercial fishing periods were scheduled for August 25 and August 26 for District 2 and District 1, respectively to provide opportunity to target coho salmon.

A late and moderate sized third pulse of fall chum salmon began entering the river on August 25 and continued through to August 27. The Pilot Station sonar project estimated about 90,000 fall chum salmon in the third pulse and the cumulative total passage estimate increased to 597,000 fish. With the unanticipated late timing of the third pulse, management shifted back to the fall chum management plan. Additional, commercial periods were scheduled and the commercial

fishing season was extended until September 10. A total of 12 additional periods were opened, 6 in both District 1 and District 2 between August 25 and September 10.

In an effort to maximize fishing efficiency, fishing times in District 1 were scheduled to coincide with daily high tides which typically carry new fish into the river. Daylight fishing times were scheduled in the late part of the season to maintain fishermen safety. No commercial fishing periods were opened in District 3 due to lack of market, but some District 3 residents traveled to fish in Districts 1 and 2.

The commercial salmon fishing season was initially opened in District 4 during the summer season with the only fall season fishing period occurring in Subdistrict 4-A. The buyer showed interest to continue into the fall season, but delayed the commitment in hopes of having a large volume of fish to process. At the buyer's request, the department scheduled one 120-hour commercial period to begin on September 9 in Subdistrict 4-A. However, most commercial fishers' interests had diminished or they were unavailable to fish late in the season. Consequently, no fish were harvested during the 1 fall season commercial fishing period. Subsistence fishing was on a schedule of 5-days a week in District 4 and concurrent with the commercial period. Later, subsistence period length was extended to 7-days a week beginning October 3 to provide increased opportunity for subsistence fishers to harvest late running fish since high water hampered their efforts earlier in the season.

A total of 11 fall season commercial periods were opened in Subdistricts 5-B and 5-C with the first commercial fishing period beginning on August 8. A total of 561 fall chum salmon were harvested which mostly comprised the early portion of the fall chum salmon run moving upriver, but also included some late local summer chum salmon stocks. Two additional early periods were scheduled on August 12 and August 15 which yielded 653 and 677 fall chum salmon, respectively. The 3 early commercial periods provided for a small flesh market. Beginning September 5, the first of 8 additional 48-hours periods in Subdistrict 5-B were scheduled primarily to target female fall chum salmon for roe product. A total of 2,665 female fall chum salmon were reported harvested for commercial purposes. Poor weather and low catches attributed to no commercial harvest during the final 2 scheduled 48-hour periods, the last ending on October 2. Subsistence fishing was on a schedule of 5-days a week in Subdistricts 5-A, 5-B, and 5-C during most of the fall season and was then liberalized to 7-days a week beginning October 3 to provide additional opportunity for subsistence fishers to harvest late running fish. Subdistrict 5-D was returned to the normal 7-day per week subsistence fishing schedule on July 31 and remained on that schedule throughout the fall fishing season.

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. The commercial harvest in District 6 was comprised of predominantly female salmon with the primary product bound for roe markets. A total of 9 commercial periods were scheduled in District 6, the first beginning on August 15. The initial commercial period of 42-hours was scheduled, however due to flooding events and continued high water, much of the commercial fishing gear was lost or destroyed and consequently no fishing activity took place. After water levels subsided and some fishers were able to resurrect or build new fish wheels, additional periods were scheduled in early September which corresponded with the peak run timing of fall chum and coho salmon. On September 6, two 24-hour periods were announced followed by six 42-hour periods. The commercial harvest for all 9 fall season periods was 5,856 fall chum and 3,177 coho salmon. The commercial fishing season

in the Tanana River ended on October 1, due to freezing temperatures which decreased product value. 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 2 in accordance with the management plan at the close of the commercial fishing season. The Tanana River commercial harvest of 5,856 fall chum salmon was within the guideline harvest range (GHR) of 2,750 to 20,500. A majority of the male portion of the harvest was reported as "caught but not sold" and subsequently used for subsistence and was not counted towards the commercial harvest. Additionally, an undetermined amount of carcasses from the roe fisheries was also utilized in the subsistence fisheries. Postseason assessment indicated that escapement goals were exceeded in the Tanana River.

The nature of the fall chum salmon pulses spread out over the length of the season separated with long durations of low passage rates of fish entering the river made inseason run size projection difficult. The late arrival of the third moderate sized fall chum salmon pulse at the end of August shifted the run timing 5 days later than average and provide enough surplus of fish to schedule additional commercial fishing opportunities into September. The overall harvest resulted in an exploitation rate (approximately 32%) nearly doubling the recent 10-year average from 1998–2007 and nearly equaling the previous 10-year average from 1988–1997. The amount of commercial opportunity was high with moderate effort and subsistence opportunity was liberal. The drainage-wide escapement was within the targeted range and most of the tributary goals and border commitments were met.

3.2.2 Coho Salmon Management Overview

The 2008 coho salmon run was managed to provide for escapement, 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 2008 coho salmon outlook was for a continuation in the trend of average to above average runs, below average subsistence harvests because of low effort, with a potential commercial harvest of 50,000 to 70,000 fish.

The coho salmon run exhibited normal run timing and slightly below average run size based on Pilot Station sonar (Figure 4). Test fishery projects at Emmonak, Mountain Village, Kaltag, and in the Tanana River provided similar run assessment of magnitude and run timing. The run size estimate at Pilot Station sonar through September 7 was approximately 136,000 fish, which was below the historical average (1998–2007) passage estimate of 148,000 coho salmon (Appendix A2).

Even though the primary focus of commercial fishing was to target fall chum and summer chum salmon early in the run, fishing periods were also controlled to spread harvest impacts late in the season across the smaller and overlapping coho salmon stock. As with fall chum salmon, transportation costs were a major limiting factor in the coho salmon fishery. Fish buyers only operated near the transportation hubs in the lower river Districts 1 and 2 and upriver in Subdistricts 5-B and 5-C, and in District 6 near Manley, Nenana, and Fairbanks. Fishers had to weigh the price of gas in relation to the benefits of potential commercial harvests. The liberalized subsistence fishing time increased fishing opportunity for coho salmon throughout the drainage.

3.2.3 Harvest and Value

The 2008 total commercial harvest for the Yukon River fall season included 119,265 fall chum and 35,691 coho salmon for the Alaskan portion of the drainage (Appendix A3). The fall chum and coho salmon harvests were the third and fifth highest, respectively, since 1995. A total of 108,974 fall chum and 33,192 coho salmon were harvested in the Lower Yukon Area and 10,291 fall chum and 2,499 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 Subdistrict 5-B and District 6, whole female salmon were selectively purchased for roe extraction during the fall season. The 2008 Yukon Area fall chum salmon commercial harvest was about 148% above the previous 10-year average (1998–2007) of 48,086 fish and 66% above the 10-year average of 21,490 coho salmon (Appendix Tables B4 and B5).

There was a total of 21 fall commercial fishing periods in the Yukon River Districts 1 and 2 combined (11 periods in Y-1; 10 periods in Y-2). Period length varied from 4 to 12 hours in District 1 and from 4 to 9 hours in District 2. No periods were scheduled in District 3 due to the lack of a market. The commercial fishing season was open in District 4 with only one 120-hour period opened in Subdistrict 4-A which had no harvest due to lack of fishers. Subdistricts 5-B and 5-C had eleven 48-hour commercial periods in the fall season with fishers landing 4,556 fall chum salmon and 91 coho salmon. No fishing took place during the last 2 commercial periods in Subdistricts 5-B and 5-C because of lack of effort, due primarily to cold weather conditions and reduced number of fish. In the Tanana River, District 6, there were 9 commercial salmon fishing periods (two 24-hour and seven 42-hour periods) from August 15 through October 1 until the weather became too cold to hold fish outdoors without freezing thereby damaging the catch.

The preliminary 2008 commercial fall chum and coho salmon season value for the Yukon Area was $671,600 ($645,800 for the Lower Yukon Area, $25,800 for the Upper Yukon Area) (Appendix A5). The previous 10-year average value for the Yukon Area was $114,000 ($99,300 for the Lower Yukon Area, $14,700 for the Upper Yukon Area). Yukon River fishers received an average price of $0.55 per pound for fall chum salmon in the Lower Yukon Area and $0.27 per pound in the Upper Yukon Area in 2008. This compares to the 1998–2007 average of $0.24 per pound and $0.14 per pound, respectively. For coho salmon, fishers in the Lower and Upper Yukon Areas received an average price of $0.97 per pound and $0.20 per pound compared to the recent 10-year average price of $0.29 and $0.10 per pound, respectively (Appendix A5).

Fishing effort has increased in recent years (Appendix A4). A total of 439 fishers participated in the 2008 fall chum and coho salmon fishery (428 for the Lower Yukon Area, 11 for the Upper Yukon Area) compared to the recent 10 year average of 117 permit holders (112 for the Lower Yukon Area, 5 for the Upper Yukon Area). Even though the effort appears high, 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

Low run strength resulted in a closure of the commercial fishery during the Chinook salmon season. One Chinook salmon and 4,062 fall chum salmon were harvested in the fall chum salmon commercial fishery (Appendix A7). The average Chinook salmon commercial catch for the years 1998–2007 was 2,308. The combined species catch of 4,063 salmon was 45.8% below

the 1998–2007 average commercial harvest of 7,500 salmon. Since 1997, there has been a marked decrease in commercial catches of Upper Yukon River Chinook and fall chum salmon that has 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, non-commercial and Porcupine River Chinook salmon harvests for the years 1961–2008 are presented in Appendix B7, while similar information for fall chum salmon is presented in Appendix B8. In 2008, 18 of 21 eligible commercial fishing licenses were issued. Seventeen commercial licenses were issued in 2007, 20 in 2005 and 2006, and 21 in 2003 and 2004.

The total run size of Canadian-origin Upper Yukon[2] River Chinook salmon in 2008 was expected to be below average with a preseason outlook of 80,000 to 111,000 fish. This outlook was based on: a) a stock-recruitment (S/R) model developed from estimates of total spawning escapement and age-specific returns; and b) an adjustment based on the relationship between the expected and observed run size in 2007.

4.1.1 2008 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 adopted the JTC recommendation for a minimum Interim Management Escapement Goal (IMEG) of 45,000 Canadian-origin Upper Yukon Chinook salmon in 2008. The IMEG was implemented as a 1-year only[3] goal which was to be re-assessed by the JTC. The success of achieving this goal was to be assessed using the Eagle sonar estimate minus catch data 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. The recommended IMEG was approximately 10,000 more fish than were estimated to have reached Canadian spawning areas in 2007 (based on the Eagle sonar estimate).

4.1.2 Inseason Decision Matrix

Canadian fishing opportunities in 2008 were dependent upon inseason assessments of run strength. As in previous years, a Chinook salmon decision matrix was developed as part of the Integrated Fisheries Management Plan (IFMP). The decision matrix provided detailed guidance for specific inseason run abundance levels. The 2008 decision matrix summarized the management reference points, general allocation plans and anticipated management responses for 2008 under different run size scenarios (Table 1).

It is important to note that the incorporation of a minimum escapement goal of 45,000 in 2008 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;

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

[3] It is anticipated that a new escapement goal range will eventually be developed.

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;

iii. Closures in First Nation fisheries would be expected if the run projection was <19,000. The range of border escapement projections used to delineate the RED ZONE in 2008 was similar to previous years. 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.–2008 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 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 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 2008 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. When tag recoveries for the mark–recapture program are unavailable due to the absence of a commercial fishery, there is a need to implement a test fishery to provide catch and tag recovery information which is used to calculate the mark–recapture estimate.

Early in the 2008 season, information from the U.S. test fishery at Emmonak and the Pilot Station sonar program on the lower Yukon River suggested that the 2008 run was lower than the preseason outlook range. 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. The 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 2008, the inseason Chinook salmon run projections were consistently within the Yellow Zone, well below the decision threshold that would have triggered a commercial fishery. Consequently, the Chinook salmon commercial fishery was closed throughout the 2008 season. Only 1 Chinook salmon was harvested during the fall chum salmon commercial fishery (Appendix A7). For comparison, the previous 10-year average (1998–2007) commercial catch was 2,308 Chinook salmon (Appendix B7). The average does not include years 2000 and 2007, 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

Average to above average run strength resulted in a number of commercial fishery openings during the fall chum salmon season. In 2008, the fall chum salmon commercial fishery was opened earlier than usual based on stock assessment information, primarily the Eagle sonar estimate. A total of 4,062 fall chum salmon was 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, non-commercial and Porcupine River fall salmon harvests for the years 1961–2008 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 based on migration timing.

The preseason outlook for the 2008 Upper Yukon fall chum salmon run was an above average run of 229,000 fish.

In 2008, funding was available from the Yukon River Restoration and Enhancement fund for a live-release fall chum salmon test fishery in the Dawson City area. This program was not initiated since catch and tag recovery data for the DFO mark–recapture program was available from the commercial fishery.

4.2.1 2008 Upper Yukon fall Chum Salmon 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 stock, the Panel recommended an escapement goal of >80,000 fish for 2008. This was the same goal as was used in 2006 and 2007

and escapement was to be measured using Eagle sonar estimates minus catch data from fisheries occurring upstream of the sonar.

4.2.2 Inseason Decision Matrix

Canadian fishing opportunities in 2008 were dependent upon inseason assessments of run strength. As in previous years, a fall chum salmon decision matrix was developed as part of the Integrated Fisheries Management Plan (IFMP). The decision matrix has been developed to summarize management reference points, general allocation plans and anticipated management responses under different run size scenarios (Table 2). The matrix is color coded with Red, Yellow and Green management zones. The 2008 matrix was the same as the matrix used in 2006 and 2007. The Red Zone included run projections of less than 40,000 fall chum salmon when closures in all fisheries except for the 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 was 3,000 fall chum salmon, which was the number of chum needed to allow an unrestricted Canadian aboriginal fishery. Management discretion is used when the inseason projections were 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.
		RF	0	Closed, i.e. chum quota varied to zero.
		DF	0	Closed.
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 quota varied to zero.
		DF	0	Closed.
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.
Legend: FN = First Nation fishery; CF = commercial fishery; RF = recreational fishery; DF = domestic fishery.				

4.2.3 Determination of Inseason Run Status

Genetic stock identification data was 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. This data has 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. This was the first year that projections from the Eagle sonar program were used for inseason management. In previous years, the Canadian inseason management regime was based primarily on the DFO tagging program. Inseason projections based on the Eagle sonar program were available earlier in the 2008 season than previous years when the mark–recapture program was used for assessment.

4.2.4 2008 Fall Chum Salmon 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. Early in the 2008 season, assessment data suggested that the border escapement would exceed 83,000 chum salmon and the first commercial fishery opening (4 day fishery) was initiated August 31. The opening was followed by two, 4-day fisheries conducted from September 5–9 and September 12–16, and two 14-day fisheries from September 19–October 3 and October 3–7. The last 14-day opening followed the one prior to it thus the fishery was open for a 28 day period. Despite liberal fishing opportunities, the number of fishers participating in the 2008 commercial fishery was very low. Similar to most previous years, no domestic fishers fished for fall chum salmon (Appendix A7).

The total 2008 commercial fall chum salmon catch of 4,062 fish was 35.3% lower than the 1998 to 2007 average of 6,279 (Appendix B8; Appendix C7). Within the years 1998–2007, the commercial fall chum salmon catch ranged from zero in 1998, when the fishery was closed 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.

4.2.5 Coho Salmon

No coho salmon were recorded in the 2008 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. Salmon fishing 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 2 or more households, often work together (to harvest, cut, and preserve salmon) for subsistence use. Some households from tributary communities travel to the mainstem Yukon River to harvest fish.

Throughout the drainage most Chinook salmon harvested for subsistence use are dried, smoked or frozen for later human consumption. Summer chum, fall chum and coho salmon harvested in the lower 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 source of food for humans, but a larger portion of the harvest is fed to dogs which are 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).

In 2008, summer chum, fall chum, and coho salmon runs were judged sufficient to provide for escapement and subsistence needs within Alaska, as well as meeting border passage commitments for fall chum salmon to Canada. However, the Chinook salmon run was poor, resulting in the implementation of restrictions on subsistence fishing in Alaska.

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*. Since 2001, the plan enforces a regulatory window schedule which in 2008 began on May 26 in District 1. The subsistence fishing schedule was in place for approximately 4 weeks and was implemented sequentially from downriver to upriver districts according to dates consistent with Chinook salmon migratory timing. The Chinook salmon run was reassessed to be of poorer abundance than anticipated, below the level needed to support any Chinook salmon directed commercial fishery, and likely unable to meet all escapement objectives and fulfill all subsistence needs. Consequently, beginning June 23 in District 1, the subsistence fishing periods were reduced in time by one-half and implemented sequentially from downriver to upriver districts, except in District 6. Additionally, in Districts 1 and 2, gillnet mesh size was restricted to 6 inches or less in order to reduce Chinook salmon subsistence harvest. District 6 is managed as a terminal fishery; Chinook salmon run assessment to the Tanana River was judged to be strong enough to achieve escapement and subsistence obligations. Subsequent to the passage of the majority of the Chinook salmon run through the lower Yukon Area Districts 1 and 2, beginning July 2 in District 1, and July 4 in District 2, a directed commercial fishery was opened to harvest the more plentiful run of summer chum salmon. Commercial fishers were restricted to using gillnets with a mesh size of 6 inches or less to aid in reducing the incidental harvest of Chinook salmon.

The inseason management strategy for the fall season was to continue the pre-2001 subsistence summer fishing schedule. This management decision was based on the favorable performance of the summer chum salmon run, which in turn provided confidence in the 2008 preseason projection for a fall chum salmon run large enough to meet escapement goals and subsistence needs, and provide for commercial fishing opportunities. Coho salmon preseason abundance assessment was also assessed as being average and sufficient enough to meet escapement objectives and provide for additional subsistence and commercial salmon fishing opportunities.

The 2008 fall chum salmon run was difficult to assess inseason. Three pulses of fall chum salmon entered the Yukon River on approximately July 31, August 13, and August 35, wherein lengthy periods of low fish passages followed the first 2 pulses. This unpredictable entry pattern

led to a more conservative management approach. Subsistence fishing opportunity remained on the pre-2001 schedule during the fall season with some early commercial fishing periods taking advantage of the late summer chum salmon and early arriving fall chum salmon. However, the low abundance of fall chum salmon during the middle portion of run was cause for concern, prompting the department to delay further commercial fishing until more fish entered the river. As the fall season developed, the late arrival of the fall chum salmon run provided managers with confidence to continue and eventually extend the commercial fishing season in accordance with the *Yukon River Drainage Fall Chum Salmon Management Plan.* In much of the Yukon Area drainage where commercial fishing did not occur, subsistence salmon fishing opportunities were open 7-days per week. In districts and subdistricts where fall commercial salmon fishing took place, the amount of subsistence salmon fishing time was increased by allowing additional openings around the commercial fishing periods.

Throughout the summer and fall fishing seasons, additional subsistence fishing opportunities for nonsalmon fish species were also available during subsistence salmon period closures. Stipulations for harvesting nonsalmon species during closed salmon periods required the use of gillnets with 4 inch or less stretch mesh, and prohibited the operation of fish wheels.

In 2008, inseason fishers' reports suggested that most Yukon Area subsistence fishing households did not meet all their subsistence needs for salmon. The poor 2008 Chinook salmon run resulted in management actions that reduced subsistence salmon fishing opportunity during the summer season. This contributed to lower numbers of Chinook salmon being harvested, and influenced the summer chum salmon harvest as well. In spite of the poor Chinook salmon run, the flesh quality was reported as being generally better than in recent years, while fish size ranged from small to medium. Some upper main-stem Yukon River fishers reported harvesting smaller Chinook salmon than in recent years.

Generally, surveyed households in the lower Yukon River communities and in some middle Yukon communities fared better in harvesting Chinook and summer chum salmon than the upper main-stem 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. In addition to the poor Chinook salmon run, high fuel prices limited river travel and some fishermen were unable to go to traditional fishing locations. To reduce costs, subsistence fishers indicated they fished near their home community or waited until the salmon pulses migrated in close proximity to their area before they attempted to fish. In the upper Yukon River and Tanana River communities, untimely poor river conditions (extremely high water and debris) disrupted fishing efforts.

Other commonly cited reasons for not meeting needs was that the fishing schedule conflicted with work opportunities, the fishing periods were too short and families could not afford to travel back and forth to fish camps, or 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, and mechanical problems. Similarly, as in the past few years, many individuals took advantage of work opportunities on fire-fighting crews outside of Alaska or other jobs. They consequently did not fish and relied on others to provide them with fish.

Documentation of the subsistence salmon harvest is necessary to determine if subsistence needs are being met. 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 subsistence salmon harvest is voluntary participation in the annual survey conducted by ADF&G (Busher et al. 2007). 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 make available the most current information. All households in each community are assigned to 1 of 5 harvest use groups based on their recent historical harvest pattern. Households are preselected for survey, although, the head of households are the primary target for interviews, another knowledgeable household member may also 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, fishers 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 nonsalmon harvest and demographic information. In addition to postseason surveys and permits, subsistence "catch calendars" are mailed to approximately 1,600 households annually in the non-permit portions of the Yukon River drainage. Calendars supplement the survey information and provide harvest records for households to assist in recounting their catches when surveyed. Calendar data also provides timing of harvests (catch by day) information by salmon species.

Data compilation of the 2008 survey and subsistence permit information is ongoing. A summary of preliminary results as of February 12, 2009 is presented below. In 2008, 1,401 households were selected to be surveyed and a preliminary estimate of 1,275 households fished for salmon from 33 communities (including the Coastal District communities of Hooper Bay and Scammon Bay). Additionally, 500 subsistence permits were issued and 271 household subsistence permit holders reported to have fished for salmon and other nonsalmon fish species in portions of the Yukon Area drainage requiring a permit. The preliminary 2008 estimated subsistence salmon harvest in the Alaska portion of the Yukon River drainage totaled approximately 45,300 Chinook, 85,700 summer chum, 80,400 fall chum, and 15,500 coho salmon (W. H. Busher, Yukon Area Fall Season Assistant Management Biologist, ADF&G, Fairbanks; personal communication). Included in the estimated total subsistence harvest are 3,277 Chinook, 4,276 summer chum, 2,592 fall chum, and 605 coho salmon distributed for subsistence use from the various test fish projects. The recent 5 year average (2003–2007) of subsistence salmon harvest in the Yukon River drainage is estimated to be 53,966 Chinook, 92,290 summer chum, 78,785 fall chum, and 22,700 coho salmon (Appendix Tables B2, B3, B4, and B5).

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 salmon, 5,000 summer chum salmon, and 5,200 fall chum and coho salmon combined.

Data compilation of the 2008 personal use permit information is ongoing and a summary of preliminary results as of February 12, 2009 is presented below. In 2008, the personal use salmon fishery followed the regulatory fishing time of two 42-hour periods per week. A total of 51 personal use salmon and 5 personal use whitefish and sucker household permits were issued. The 2008 preliminary harvest results based on 52 of 56 (93%) personal use household permits returned in Subdistrict 6-C included 121 Chinook, 138 summer chum, 181 fall chum, and 50 coho salmon (W. H. Busher, Yukon Area Fall Season Assistant Management Biologist, ADF&G, Fairbanks; personal communication). The recent 5-year (2003–2007) average personal use harvests in the Yukon River drainage was 154 Chinook, 195 summer chum, 253 fall chum, and 261 coho salmon (Appendix Tables B2, B3, B4, and B5). In addition, personal use permit holders reported harvesting 4 whitefish, 1 sheefish, and 1 pike.

5.1.3 Sport Fishery

Sport fishing effort for anadromous salmon in the Yukon River drainage is directed primarily at Chinook and coho salmon, with little effort directed at chum salmon. 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 2003–2007 the Tanana River on average made up 80% of the total Yukon River drainage Chinook salmon harvest, 21% of the summer chum salmon harvest, and 61% 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 most sport fishing effort takes place on the Anvik and Andreafsky Rivers.

In 2008, an Emergency Order was issued on July 3 which reduced the sport fish daily bag & possession limit from 3 to 1 king salmon on the Alaskan portion of the Yukon River and its tributaries (excluding the Tanana). Alaskan sport fishing effort and harvests are monitored annually through a statewide sport fishery postal survey. Harvest estimates are typically not available until approximately 1 calendar year after the fishing season; therefore, the 2008 harvest estimates will be available in the 2009 JTC report. The total sport harvest of salmon in the Alaskan portion of the Yukon River drainage in 2007 was estimated at 960 Chinook, 245 summer chum, and 597 coho salmon (Appendix Tables B2, B3, and B5). The recent 5-year (2003–2007) average sport salmon harvest in the Yukon River drainage was estimated at 1,283 Chinook, 620 summer chum and 1,065 coho salmon (Appendix Tables B2, B3, and B5).

5.2 CANADA

5.2.1 Aboriginal Fishery

In 2008, 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, location and tag recovery information at fish camps or in the community, 1 to 3 times weekly. In most cases, weekly summaries were completed by the surveyors and sent to the Department of Fisheries and Oceans Canada (DFO) office in Whitehorse by fax or e-mail. Late or incomplete information was obtained post season and reviewed by First Nation staff in conjunction with DFO.

Based on a preseason outlook for a below average run of 80,000 to 111,000 Upper Yukon River Chinook salmon in 2008, 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). As inseason information became available it was apparent that the 2008 run strength was well below average and conservation measures would be required in the aboriginal 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 harvest by approximately 50% of recent levels by developing individual community harvesting 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 recommended guidelines. Overall, the combined total season harvest by the aboriginal fishery on the Upper Yukon River (2,885) fell short of the recommended harvest guideline of 4,000 Chinook salmon.

Fish harvesters and First Nation staff commented that the Chinook salmon run was late, and it was a very poor fishing season. The majority of remote camps were closed down earlier than usual and the needs of Yukon aboriginal communities were not met in 2008.

In 2008, the Upper Yukon River aboriginal Chinook salmon catch was 2,885, 53% below the recent 10-year average of 6,103 fish and 31% below the 2007 total of 4,175 fish (Appendix B7). In addition to 2,885 Chinook salmon caught in the aboriginal fishery, 513 Chinook salmon caught in the test fishery were distributed to Yukon River First Nations by the Tr'ondëk Hwëch'in First Nation.

The 2008 harvest recorded by Tr'ondëk Hwëch'in in the Dawson area was 846 Chinook salmon and was 15% below the recent 10-year average. Ross River Dena Council, fishing on the Upper Pelly River, reported a harvest of 170, 41% below their 1998-2007 average. The harvests reported by Selkirk First Nation in the Pelly area and Little Salmon Carmacks First Nation in the Carmacks area, normally the 2 largest aboriginal fisheries in the mid-area of Upper Yukon River drainage, were 775 and 448 fish, respectively; these catches were 48% and 74% below the 1998–2007 averages of 1,490 and 1,720 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. A below average catch was also reported by the First Nation of Na-Cho Nyäk Dun on the Stewart River; the 2008 harvest was 436 Chinook salmon, 50% below the 1998–2007 average of 868. The Teslin Tlingit Council (TTC) reported their lowest harvest on record, reporting a total of only 160 Chinook salmon, 75% below the 1998–2007 average of 646 fish. While the TTC did permit a limited fishery in their area, they also purchased Chinook and sockeye salmon from a commercial harvester on the Upper Stikine River in Northern British Columbia for distribution within the community as an added incentive for their members to voluntarily curtail their fishing effort. The Ta'an Kwach'an Council, fishing in the vicinity of Lake Laberge near Whitehorse, reported a catch of 50 Chinook salmon, 37% below the recent 10-year average of 80.

For fall chum salmon, inseason run assessment information indicated that there were no apparent conservation concerns and First Nations were notified that a normal harvest level would be permitted. This fishery is managed in a similar fashion to the Chinook fishery using an abundance-based approach as described in Section 4.2.2 and presented in Table 2.

The 2008 Upper Yukon River fall chum salmon harvest in the aboriginal fishery, all reported by Tr'ondëk Hwëch'in fishing in the Dawson area, was 2,068 (Appendix B8); this is 16% lower than the previous 10-year average of 2,473 fall chum salmon. The 2008 total does not include harvest data from the Carmacks or Pelly areas although anecdotal reports from these areas indicate that fishing was very good. There is an ongoing effort to finalize the 2008 catch data for fall chum salmon. Recent catches of fall chum salmon average 433 for the Pelly area and 460 in Carmacks. These averages are derived from a 7-year harvest study conducted by LGL Limited from 1996–2002. 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. Data collection effort was more intensive during the fall chum salmon fishing season, as timely catch and tag recovery information was collected for use in the mark–recapture program.

To address conservations concerns for Chinook salmon on the Porcupine River, DFO recommended that the community of Old Crow reduce their harvest to 50% of recent average. The Vuntut Gwitch'in Government (VGG) managed the fishery in Old Crow by allowing only appointed persons to fish a community net to a maximum harvest guideline of 150 Chinook salmon. However, due to the combination of a number of community events and high water conditions on the Porcupine River in 2008, the VGG was able to harvest only 27 Chinook salmon. The 2008 Chinook salmon harvest did not meet the needs of VGG citizens.

In 2008, with assistance from the Yukon River Restoration and Enhancement Fund, the Vuntut Gwitchin Government conducted a mark–recapture program on the Porcupine River near the community of Old Crow, Yukon Territory. The main purpose of this project is to develop a tool that quantifies the inseason Porcupine River fall chum salmon run size at Old Crow thus enabling effective management of the local aboriginal fishery. Options to guide harvesting activity at various run sizes, and minimum spawning escapement thresholds for the Fishing Branch River are annually discussed with the VGG, Yukon Salmon Sub-committee, and DFO. For example, if the mark–recapture program estimate indicated a low abundance of fall chum salmon, the allowable aboriginal harvest at Old Crow could be lowered accordingly. This approach mirrors the abundance-based management system used on the Upper Yukon River in

Canada for Chinook and fall chum salmon. In 2008, inseason information from the Porcupine mark–recapture program, the Fishing Branch River weir, and projects elsewhere in the Yukon River drainage indicated that restrictions in the Old Crow aboriginal fishery were not required.

A total of 3,436 fall chum salmon was reported in the 2008 Old Crow aboriginal fishery, 11% below the 1998–2007 average harvest of 3,847[4] chum salmon (Appendix B7).

The harvest of coho salmon on the Porcupine River was 200 in 2008 compared to the 1998–2007 average of 249 fish.

5.2.1.1 Fishing Branch River Fall Chum Salmon Escapement Goal

Harvest sharing of Canadian-origin Porcupine River chum salmon is not specified in the YRSA. To ensure maximum benefits accrue to Porcupine River spawning escapements, the YRSA does stipulate that:

a) The Parties shall not initiate new fisheries on Canadian origin stocks within the Porcupine River drainage before December 31, 2006; and

b) Following this period, any Party that intends to initiate a new fishery on the Porcupine River shall inform the Yukon River Panel, which shall recommend conservation and management measures.

At the April 2008 meeting, the Yukon River Panel accepted the JTC recommendation to adopt an IMEG range of 22,000 to 49,000 Fishing Branch chum salmon for the years 2008 through 2010. This goal is considerably lower than the long standing goal range of 50,000 to 120,000 which was in place from 1987 to 2007; preliminary analyses suggested the previous range was too high. It is expected a revised biological escapement goal will be developed once the returns from the Fishing Branch escapement of 121,413 chum salmon in 2005 are documented.

The analyses used to determine the IMEG is based on a technique which assumes that when fishery exploitation has been low to moderate and the production regime has been somewhat stable, a sustainable escapement goal (not necessarily the number of spawners at maximum sustained yield (Smsy)) range tends to overlap with the historical 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 25th and 75th percentiles of the 22 years of weir counts.

5.2.1.2 Porcupine Fall Chum Salmon Inseason Decision Matrix

The Porcupine River Working Group (PRWG) of the SSC met in Old Crow on March 19 2008 prior to the April Yukon Panel meeting. At that time, the results of the JTC analyses associated with the Interim Management Escapement Goal were reviewed and it was surmised the suggested escapement goal range would be adopted by the Yukon Panel. Decision rules for the Porcupine fishery were developed after the escapement goal range had been agreed to by the Panel. If the inseason Fishing Branch River escapement projections exceeded 22,000 chum salmon, the run was considered to be in the GREEN ZONE. No restrictions in the VGFN fishery

[4] 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.

would be required for projections in the GREEN ZONE. Escapement projections within the 10,000 to 22,000 range would constitute the YELLOW ZONE and restrictions may be required, the severity of which will depend how close the projections are to the lower end of this range. Escapement projections of less than 10,000 chum salmon would constitute the RED ZONE and there would be consideration for a fishery closure. If inseason information suggested that restrictions were required within the First Nation fishery (projections in the yellow or red zone), there was an expectation that DFO and the VGG would discuss potential conservation options before restrictions were implemented.

5.2.1.3 Determination of Porcupine Inseason Run Status

Canadian fishery management considered U.S. information including the Ramparts Rapids fish wheel data, sonar information from Pilot Station, and fishery information. U.S. genetic stock ID data was used in conjunction with the Pilot Station sonar counts to develop a preliminary index of the Canadian run size to the Porcupine River drainage. As in 2007, a mark–recapture program was conducted on the Porcupine River in 2008 near the community of Old Crow by the Vuntut Gwitch'in Government and a consulting firm, Environmental Dynamics Incorporated (EDI). This program was initiated in 2003 (funded by the R&E Fund) with the purpose of developing an inseason fall chum salmon management tool for the community of Old Crow and DFO fishery managers. Inseason run size estimates from this program and inseason counts at the Fishing Branch River weir are used to determine harvest opportunities and promote the conservation of the Fishing Branch River chum salmon resource.

5.2.2 Domestic Fishery

There was no catch recorded in the domestic fishery in 2008. This fishery was closed during the Chinook salmon season and open for 40 days during the fall season concurrently with the fall chum salmon commercial fishery. In recent years domestic fish harvesters have targeted Chinook salmon, although historically chum salmon have been targeted in some years. The average domestic fishery catches of Chinook and fall chum salmon for the years 1974–2007 include 405 and 561 fish, respectively (Appendix Tables B7, B8).

5.2.3 Recreational Fishery

In 1999, the Yukon Salmon Committee (YSC) 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 were 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 2008, due to conservation concerns, the daily catch and possession limits of Chinook salmon in the recreational fishery were reduced to zero effective 2400 hrs July 11. Chinook salmon had not yet reached the areas where most recreational fishing occurs by this date. In addition, all angling was prohibited in the Yukon River near the confluence of Tatchun Creek, within an area marked by boundary signs located approximately 30 meters upstream from the Yukon River/Tatchun Creek confluence and 800 meters downstream of the confluence. This is the principal area is where Chinook salmon recreational fishing occurs within the Yukon River drainage in Canada. All angling was also prohibited within Tatchun Creek.

The preliminary 2008 estimate of the recreational catch based on YSCCC information indicates that no Chinook salmon were caught, i.e. no Chinook salmon were caught and released or caught

and retained. Limited recreational fishing for Chinook salmon was reported in only one location in 2008, the Teslin River. An interpretation of the YSCCC data suggests that conservation measures implemented in 2008 were effective and there was little recreational fishing for Chinook salmon, including catch and release fishing. In 2007, two Chinook salmon were caught and retained while 50 were caught and released. The average retained Chinook salmon catch within the years 1998–2007 is 274 fish.

6.0 STATUS OF SPAWNING STOCKS IN 2008

Alaskan and Canadian researchers have developed projects to monitor escapement and to determine genetic composition, relative abundances, 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 sex 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 (Appendix Tables A8 and A9).

6.1 CHINOOK SALMON

6.1.1 Alaska

High water hampered efforts to accurately quantify escapement in 2008 via tower counts and aerial surveys; thus, most escapement goals could not be assessed. Based on available data, it appears that the lower end of the BEGs in the Chena and Salcha rivers, the largest producing tributaries of Chinook salmon in the Alaska portion of the drainage, were met. A summary of escapements can be found in Appendix Tables B9 and B10 and Appendix C9. Age and sex information collected from escapement projects in 2008 are presented in Appendix A11.

6.1.2 Canada

The Yukon River Panel adopted an Interim Management Escapement Goal (IMEG) of 45,000 for 2008 which was assessed using information from the Eagle sonar passage estimate. The estimated spawning escapement based on the Eagle sonar count was 34,008[5], approximately 24% lower than the IMEG.

Aerial surveys of the Little Salmon, Big Salmon, 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 19. Survey conditions were rated as being excellent and surveyors counted 93 Chinook salmon, 10.8% of the 1998–2007 average count of 861 fish. The Big Salmon and Wolf river index areas were surveyed on August 18 under fair to good survey conditions. The Big Salmon count of 303 was 31.3% of the 10-year average 961 fish. The Wolf River count of 22 was 15.6% of the 10-year average count of 141 fish. The Nisutlin River index area was not surveyed due to high water and turbid water conditions. Single (or multiple) aerial surveys do not count the entire escapement within an aerial index area as runs are

[5] This was based on a sonar count of 38,097, Eagle subsistence catch of 690 and Canadian Upper Yukon catch of 3,399.

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 2008, a total of 276 Chinook salmon were counted through the Blind Creek weir; the 1998–2007 average count is 668 (Appendix B11). A total of 191 Chinook salmon (69% of the run) was sampled of which 88 (46%) were female and 103 (54%) were male. Jacks comprised 10% of the males sampled. The mean fork length of females and males sampled was 837 mm and 773 mm, respectively. Scale samples are currently undergoing age analysis. Tissue samples for DNA analysis were collected from 25 of the fish sampled. The weir was operational from July 25 to August 19 and the first fish passed through the weir on July 28. Fifty percent of the run had passed through the weir by August 12 and 90% by August 17. The weir was scheduled to be installed on July 16; however, unusually high water conditions delayed installation until July 25 after the water level had subsided. The weir was placed in the same general location as in previous operations, approximately 1 km upstream of the creek mouth and 30 m downstream of the first bridge crossing. The weir was monitored daily from first light until dark. To allow Chinook salmon to pass through the counting chamber, 2 or 3 pieces of conduit were removed from both the downstream and upstream end of the chamber. After a number of fish had passed through, the upstream opening was closed and the next fish moving in was held for sampling.

A total of 1,329 Chinook salmon were counted at the Big Salmon sonar station between July 16 and August 25, 2008. A peak daily migration of 122 fish occurred on August 11 and 90% of the run had passed the station by August 17. The counts for the years 2005–2007 were 5,584, 7,308 and 4,450, respectively (Appendix B11).

The Whitehorse Rapids Fishway Chinook salmon count of 399 was 32.2% of the 1998–2007 average count of 1,238 fish (Appendix B11). The overall sex composition observed at the fishway was 37.1% female (n=148). Hatchery-produced fish accounted for 54.4% of the run through the fishway and included 144 males and 73 females. The non-hatchery count accounted for 45.6% of the run and consisted of 107 wild males and 75 wild females. The run midpoint occurred on August 23 and the peak daily count occurred on August 20 when 46 fish were counted. Historical fishway counts are presented in Appendix B11.

6.2 SUMMER CHUM SALMON ALASKA

In 2008 there was an exceptionally large run of pink salmon and, for the period of approximately June 30 through July 3, a significant number of pink salmon may have been initially incorrectly apportioned by Pilot Station sonar as summer chum salmon. These estimates were corrected post summer season, reducing the final estimate for summer chum salmon from 1,858,000 to 1,665,667, (Appendix A2) still well above the drainage wide optimum escapement goal of 600,000 for the Yukon River.

Post-season analysis indicates summer chum escapements were generally good in many lower river tributaries and the Koyukuk River drainage (Appendix B12; Appendix C11). Escapement goals have been established for the Andreafsky and Anvik Rivers. The estimated escapement of 57,259 summer chum salmon for the East Fork Andreafsky River was below the BEG range of 65,000–135,000. The Anvik River sonar-based escapement count of 374,929 summer chum salmon was within the BEG range of 350,000 to 700,000. Once again, the large number of pink

salmon in the Anvik River precluded accurate inseason estimates, and a postseason adjustment was necessary. Age and sex composition data collected from escapement projects in 2008 are presented in Appendix A12.

6.3 FALL CHUM SALMON

6.3.1 Alaska

The preliminary Yukon River drainage-wide total run size estimate of 760,000 fall chum salmon is based on the post-season expanded escapement and estimated harvests. This run size is below the preseason projection of 899,000 to 1.2 million salmon and within the range provided by the summer to fall chum salmon relationship (591,000 to 885,000). 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 2 methods. Fishery management initially places a considerable amount of weight on the Pilot Station sonar abundance estimate until upriver monitoring projects can provide data. The preliminary fall chum salmon passage estimate, based on Pilot Station sonar for the period July 19 through September 7, was 615,127 fish with a 90% confidence interval of 581,958 to 648,296 fish (Figure 3; Appendix A2). One method to determine total run size is based on the Pilot Station sonar abundance estimate with the addition of estimated commercial and subsistence harvests downstream of the sonar site including test fisheries (approximately 115,000 fish). Therefore, the preliminary total run size for the Yukon River drainage, primarily calculated from the main river sonar at Pilot Station, is estimated to be approximately 730,000 fall chum salmon. Based on the location of the project, in this case, Pilot Station (river mile 123), the abundance estimate includes Koyukuk River drainage stocks. This is the method used inseason to project run size before all the escapements are enumerated.

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 2008 two projects were changed, one being that the Canadian mainstem passage was estimated using the sonar estimate at Eagle, Alaska and the other was to estimate fall chum abundance based on genetic apportionment to replace the loss of the Tanana and Kantishna River mark–recapture project estimates. Estimated harvest of Tanana River stocks is lacking downstream of its confluence. For 2008, this tributary escapement method resulted in a preliminary estimate of 760,000 fall chum salmon. This method however, does not include an escapement estimate of possibly 25,000 for stocks located in tributaries downstream of the confluence of the Tanana River such as in the Koyukuk River. The use of the Eagle sonar passage estimate instead of the border mark–recapture project only changes the amount of harvest included based on the locations of the individual projects. The estimate of run size based on individual projects is typically higher than that based on Pilot Station sonar. In this case, the estimate based on projects is only 4% greater than the estimate based on Pilot Station sonar without consideration for stocks below the Tanana River confluence.

In 2008, the proportion of age-4 (42%) fish was well below average (68%) and correspondingly age-5 (56%) fish were well above average (27%) while the age-6 (1.7%) fish were also higher than average (0.8%) based on the Lower Yukon Test Fishery weighted averages for the years 1977 to 2007. The run size in 2008 was diminished from the preseason projection by the weakness in the age-4 component. Age and sex composition data collected from escapement projects in 2008 are presented in Appendix A23. Total return of fall chum salmon in 2008 was

slightly above average for even-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 2008, the upper Yukon River components appeared to have normal timing whereas the Tanana River component appeared up to 8 days late for the portion that projects were able to monitor prior to onset of winter. Pilot Station sonar passed 3 substantial groups of fish the last one entered after August 19 and resulted in 5 days late run timing this last pulse of fish was composed of 54% Tanana River stocks. Operation of Pilot Station sonar an additional week provided more confidence that the last pulse of the fall chum salmon run was estimated in its entirety.

Currently, the estimates of drainage-wide escapement are based on preliminary U.S. and Canada commercial (123,000) as well as subsistence and Aboriginal (89,000) harvests of fall chum salmon. Based on these levels of harvest the drainage-wide escapement is estimated to be approximately 550,000 fall chum salmon. The near average sized run for an even-numbered year combined with a conservative harvest provided sufficient strength to meet or exceed the majority of the fall chum salmon Biological Escapement Goals (BEG). However, weakness is still evident in the Porcupine River system. An Interim Management Escapement Goal (IMEG) of 22,000 to 49,000 fish was established for the Fishing Branch River prior to the 2008 season, to apply through 2010. This goal uses percentiles and was a reanalysis using weir data only, excluding all years with extrapolations based on other methods of measurement. The 2008 estimated weir passage of approximately 20,000 fish was 91% of the low end of the IMEG. The weir was installed later then normal and pulled earlier however; because a component of the fish arrived late the passage estimate includes an expansion to compensate for the end of the run.

The Sheenjek River, also a system in the Porcupine River, escapement was monitored by a sonar project operated from August 9 through September 24, 2008. The project was upgraded in 2005 to 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 which has ranged from 14,000 in 1999 to 247,000 fall chum salmon in 1996, with the high of 562,000 fish observed on both banks combined in 2005 (Appendix B13; Appendix C12). The right bank estimated escapement of approximately 36,000 fish in 2008 was 28% below the lower end of the BEG range of 50,000 to 104,000 fall chum salmon which was based on the historical right bank data. The new left bank estimate of 6,930 fish represented approximately 16% of the 2 bank combined estimate in 2008. During the 47-day period of operation, the combined cumulative count at termination was approximately 43,000 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 50,353 chum salmon for both banks combined.

The Chandalar River sonar project ran from August 8 through September 26, 2008. The preliminary escapement estimate was approximately 162,000 fall chum salmon however, the project was still estimating passage of over 4,000 fish a day at the time of termination and therefore expansion for late run timing was warranted. The expanded passage estimate for Chandalar River resulted in a post season estimate of 178,000 chum salmon. This estimate is approximately 3% lower than the 1995–2006 average of 184,000 fish, using split-beam sonar technology, and 22% lower than 2007, the first year using DIDSON sonar technology. Chandalar River split-beam sonar estimates of fall chum salmon range from a low of 66,000 fish in 2000, to a high of 497,000 fish in 2005. The 2008, post season expanded estimate of escapement in the

Chandalar River was approximately 17% above the upper end of the BEG range of 74,000 to 152,000 fall chum salmon (Appendix B13; Appendix C12).

The Eagle sonar was operated into the fall season for the third year in 2008 to enumerate chum salmon. At the preseason U.S./Canada meetings it was agreed to use the Eagle sonar units to determine mainstem border passage. In 2008, the Eagle sonar passage estimate through October 6 was 171,000, but was still passing 4,000 fall chum salmon a day at the end of the project. Due to the late timing, an expansion to typical cessation of the run was conducted to estimate passage through October 18. The resulting estimate of passage based on late timing is approximately 193,000 fall chum salmon, and with the removal of approximately 13,000 fish estimated for Eagle residence harvest above the sonar site, the border passage estimate is approximately 180,400 fall chum salmon. Further, the removal of Canadian commercial and aboriginal harvests, estimated to be less than 6,000 fall chum salmon, results in a preliminary escapement estimate of 174,300 chum salmon. The estimated escapement based on the Eagle sonar passage estimate is approximately 1.2 times higher than the mainstem goal of greater than 80,000 fall chum salmon. Overall the relative contribution of Canadian origin stock represents approximately 31% to the total run in 2008.

Due to lack of funding in 2008, the Tanana/Kantishna River mark–recapture project was unavailable to management for use in assessing fall chum salmon run abundance. In 2008, inseason monitoring of the Tanana River drainage consisted of monitoring fall chum salmon run timing at the various test fish wheel locations near Tanana Village, Kantishna River mouth, and Nenana, as well as monitoring subsistence and commercial harvest in the fisheries. With a lack of other methods to determine run size in the Tanana River, the genetic apportionment at Pilot Station was used which resulted in a preliminary estimate of 162,000 fish. With the removal of the estimated harvests from at least Subdistrict 5-A and District 6 (23,000) and some undetermined amount of mixed harvest in downstream fisheries, the level of the Tanana River return was believed to be sufficient to fall within the Tanana River BEG range of 61,000 to 136,000 fall chum salmon (Appendix B13; Appendix C12). The relative contribution of Tanana River stocks to the total Yukon River fall chum salmon run is approximately 29%.

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 2008 was based on 8 replicate foot surveys conducted between October 6 and November 26. The Delta River escapement was estimated to be approximately 23,000 fall chum salmon based on the area under the curve method. This level of escapement was 77% above the upper end of the BEG range (Appendix B13; Appendix C13).

6.3.2 Canada

The preliminary fall chum salmon mainstem spawning escapement estimate based on mark–recapture data is 132,048 fish (details are presented in Section 7.2.1.2). The average mark–recapture estimate for the years 1998–2007 was 146,310 (Appendix B13). Mark–recapture estimates for the years 1980 to 2007 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 or 2008. Estimates of the relative abundance of fall chum salmon in these areas were developed from GSI collected in conjunction with the DFO tagging program. Historical aerial survey data are presented in Appendix B13 and Appendix Figures C13 and C14.

In the Porcupine River drainage, the Fishing Branch River weir was operated from September 9 to October 11. An estimated 20,055 chum salmon passed the weir site (includes an adjustment for uncounted fish) which is close to the lower end of the escapement target of 22,000 to 49,000 fall chum salmon established by the Yukon River Panel for the years 2008 through 2010. Details of the 2008 weir operation are presented in Section 7.2.5 (Appendix B13).

7.0 PROJECT SUMMARIES

7.1 ALASKA

7.1.1 Pilot Station Sonar

The goal of the Yukon River sonar project at Pilot Station is to estimate the daily upstream passage of Chinook, chum and coho salmon. The project has been in operation since 1986. Sonar equipment is used to estimate total fish passage, and CPUE from the drift gillnet test fishing portion of the project is used to estimate species composition.

Prior to 1993, ADF&G used dual-beam sonar equipment that operated at 420 kHz. In 1993, ADF&G changed the existing sonar equipment to operate at a frequency of 120 kHz to allow greater ensonification range and to minimize signal loss. The newly configured equipment's performance was verified using standard acoustic targets in the field in 1993. Use of lower frequency equipment increased fish detection at long range.

Up until 1995, ADF&G attempted to identify direction of travel of detected targets by aiming the acoustic beam at an upstream or downstream angle relative to fish travel. This technique was discontinued in 1995. Significant enhancements that year included refinements to the species apportionment process and implementation of an aiming strategy designed to consistently maximize fish detection. Because of these changes in methodology, data collected from 1995 to 2007 are not directly comparable to previous years. In 2001, the equipment was 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 near shore, and was operated for the remainder of the season (Figure 4).

Starting in 2006, the DIDSON has been 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.

In 2008, split-beam sonar was operated on both banks from June 1 through September 7. Test fishing began on June 1, six days before the first Chinook was caught at the Pilot Station camp. Use of the DIDSON accounted for 35.9% of the Chinook, 30.4% of the summer chum and 18.1% of the fall chum total passage.

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 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 24h periods were conducted. Of the estimates produced in these periods, 39 agreed within +/- 10% of the 3-3h estimates. This general agreement between the 24 h 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 hr periods are high, and for these reasons have been discontinued at the project.

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. In the 2008 season, 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 3 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 9,620 fish including: 728 Chinook salmon; 3,166 summer chum salmon; 2,406 fall chum salmon; 844 Coho salmon; and 2,476 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 nearby residents in Pilot Station.

The left bank substrate continued to be unstable this season, and problems with a reverberation band were encountered. For brief periods, bank erosion upstream caused large plumes of silt to pass through the sonar sampling area, undermining optimal detection of targets. However, project leaders were able to adjust aims and settings to minimize its effects, and estimates were comparable with CPUE from the test fishery indicating that interpolation was unnecessary. This was further verified by dragging known targets at various ranges through the sonar. 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: 106,708 large Chinook salmon; 23,935 small Chinook salmon; 1,665,667 summer chum salmon; and 615,127 fall chum salmon. Additionally, passage estimates for non-target targeted fish species include 135,570 coho salmon and 1,143,353 other fish species. Detailed historical passage estimates for 1995 and 1997–2008, are listed in Appendix A2. Historical passage estimates were revised in 2006 using the most current apportionment model to allow direct comparison between the years 1995 and 1997–2008.

In 2008 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 of harvests 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, have 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 from Districts 1 through 5 and some of 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 above were assigned to the upper stock group under the assumption that these fish were bound for Canada.

The historical proportions by stock group for the total Chinook salmon harvest (U.S. and Canada) are presented in Appendix A13. The U.S. only harvest proportions are presented in Appendix A14 and the upper stock group proportions (U.S. and Canada) are presented in Appendix A15. Current year estimates by stock group are not available and they will be presented in the 2009 JTC report.

The drainage wide harvest proportions in 2007 were: 0.124 from the lower stock group, 0.313 from the middle stock group, and 0.563 from the upper stock group Appendix A13. Comparing the 2007 harvest stock proportion estimates to the average 1981–2006 average estimates, the lower stock group was below average, the middle stock group was above average, and the upper stock group was near average.

The Alaskan harvest proportions from the lower, middle and upper stock groups in 2007 were 0.131, 0.331, and 0.538, respectively (Appendix A14). Comparing the 2007 Alaskan harvest stock proportions to the 1981–2006 average estimates, the lower stock group was below average, and both the middle and upper stock groups were above average (Appendix A14).

The 2007 upper stock group harvest proportion by country in was 0.904 harvested in the US (Alaska) and 0.096 harvested in Canada. Comparing these 2007 proportions to the 1981–2006 average estimates, the Alaskan proportion was the highest on record while the Canadian proportion while the lowest on record (Appendix A15).

7.1.3 Lower Yukon River Chinook and Chum Salmon Genetic Sampling

7.1.3.1 Chinook salmon

In 2008, ADF&G field crews, along with other collaborators (in parentheses), collected tissue samples (axillary processes preserved in ethanol) from Chinook salmon harvested by test, subsistence, and commercial fisheries in the U.S. portion of the Yukon River. Tissue collections consisted of 1,290 samples from the Lower River Test Fishery; 712 samples from the Pilot

Station Test Fishery (USFWS); 458 samples from the Eagle Sonar Test Fishery; 2,244 samples from the subsistence harvest in Districts 1, 3, 4, and 5 (Tanana Chiefs Conference, City of Kaltag, Rapids Research Center, and an independent fish wheel operator); and 3,844 samples from the commercial harvest in Districts 1 and 2. Baseline samples from 40 Chinook salmon were collected in the following drainages: Big Salmon River, Blind Creek, and Morley River (DFO); and Kateel River (YRDFA).

The baseline used to estimate stock proportions from 2006 through 2008 was updated with 2 additional collections; the Chatanika River, Alaska and a mainstem spawning population collected near Minto, Yukon Territory. Additionally, 28 SNP markers were added to the 27 populations comprising the baseline. This version of the baseline will be used to estimate stock proportions in fishery samples collected in 2009.

7.1.3.2 Chum salmon

In 2008, ADF&G collected 2,663 chum salmon samples from commercial fisheries in District 1 as part of the Western Alaska Salmon Stock Identification Program (WASSIP). As described for Chinook salmon, ADF&G in cooperation with USFWS collected samples at Pilot Station from 5,556 chum salmon. In addition, 463 chum salmon were sampled from the fall run in the Tanana River and 350 from the Eagle Sonar Test Fishery. Baseline samples from 4 chum salmon were collected from the Kateel River by YRDFA.

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, sampling began on June 1 to estimate the stock composition for the entire summer chum salmon run as well. A baseline of standardized data collected at 21 microsatellite loci was constructed from the following stocks: Andreafsky River (N=261), Chulinak River (N=100), Anvik River (N=100), Nulato River (N=100), Gisasa River (N=200), Henshaw River (N=200), South Fork Koyukuk River (N=200), Jim Creek (N=160), Melozitna River (N=146), Tozitna River (N=200), Chena River (N=172), Salcha River (N=185), Big Salt River (N=71), Kantishna River (N=161), Toklat River (N=192), Delta River (N=80), Chandalar River (N=338), Sheenjek River (N=263), Black River (N=112), Fishing Branch (N=481), Big Creek (N=200), Minto River (N=166), Pelly River (N=84), Tatchun River (N=175), Kluane River (N=462), Donjek River (N=72), and Teslin River (N=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 75% of the run while the middle river stock group comprised 25%. Within the middle river stock group, the Tanana component comprised 6% and peaked in passage past Pilot Station sonar during the sampling period of July19 to July 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 25% Tanana and 39% U.S. border. The composition of the Canadian contribution was 14.4% mainstem, 4.4% Porcupine, 16.4% White, and 0.8% 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 data were concordant for 2004–2007. An analysis is ongoing for the 2008 data, and preparations are underway to

continue the project for the 2009 season. Preliminary timing for select summer and fall chum salmon stocks for 2008 is presented in Figure 3.

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 (McVicar 1999; Kocan et al. 2004; Tierney and Farrell 2004; Gavryuseava 2007).

Ichthyophoniasis has led to mass mortalities in herring. The low returns of Yukon River Chinook salmon observed in recent year's raises the question of the potential contribution of *Ichthyophonus* to these declines due to pathogen-induced mortality, reduced fecundity, and the inability of fish to successfully migrate to and spawn in tributaries.

Research conducted on the Yukon River from 1999 to 2003 suggests that Ichthyophonus may be an emerging disease of Chinook salmon within the AYK region (Kocan et al. 2004). As Chinook salmon approached the upper reaches of the Yukon River in Canada and spawning areas of the Chena and Salcha rivers in Alaska, infection prevalence dropped significantly to less than 15% in females in the Yukon River and less than 10% for both sexes in the Chena and Salcha rivers, presumably because of mortality among infected prespawn fish (Kocan et al. 2004). Moreover, Yukon River Chinook salmon appear to be more susceptible to Ichthyophonus than some British Columbia Chinook salmon populations (Jones and Dawe 2002). Exposure of fish with naive immune systems to Ichthyophonus results in high mortality (Kocan et al. 1999).

In 2008, Chinook salmon *Ichthyophonus* sampling (funded by the U.S./Canada Restoration and Enhancement Fund and the US Fish and Wildlife Service) continued near the community of Emmonak near the mouth of the Yukon River as part of the Big Eddy test fishery operated by ADF&G. The Big Eddy test fish project utilizes set gillnets with an 8.5" mesh size. Samples of cardiac muscle (n=296) were collected over the course of the Chinook salmon run from June 8 to July 14. 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 cardiac muscle (n=150).were collected in collaboration with Stan Zuray (Rapids Research Center) from subsistence fish wheel catches at the Rampart Rapids (RM 731) from June 25 to July 28. The poor 2008 run strength of Chinook salmon did not allow for sampling during test fishery catches at the Eagle sonar project (US-Canada border). Therefore, samples were collected near the community of Eagle (RM 1213) in collaboration with local subsistence fishermen. Subsistence fishing gear used at Eagle included fish wheels and set gillnets with mesh sizes ranging from 6" to 8.5". Fishing sites varied and were dependent upon the use of traditional sites by individual and personal preference; however, most subsistence gear was located on the North bank of the Yukon River in close vicinity to the community. A total of 250 samples were collected near Eagle from July 9 to July 27, mainly from fish wheels and set gillnets with >8" mesh size.

Cardiac muscle samples were collected from Chinook salmon with extreme care using sterile, disposable sampling supplies to avoid cross-contamination with *Ichthyophonus* DNA between samples. Concurrently, fish morphometric data was recorded (i.e., length, sex, weight, and girth). At both the Emmonak and Eagle sample locations, *Ichthyophonus* samples were paired with fin

clips for genetic analyses and scales for age estimation. The genetic analyses, which will assign the Chinook salmon sampled for *Ichthyophonus* to baseline stocks, is currently underway. The sex composition of the acquired samples was 45.6%, 12.7%, and 15.2% female for Emmonak, Rapids, and Eagle, respectively, as determined by internal examination of gonads. Fish sampled at Emmonak had a mean length of 805 ± 75 mm (mideye to tail fork); mean weight of 19.4 ± 5 lbs and the mean girth was 495.7 ± 55 mm. At the Rapids, mean length and girth was 681 ± 93 mm and 387.4 ± 66 mm, respectively and mean weight was 10.4 ± 4 lbs. At Eagle Chinook the mean length was 710 ± 89 mm, and mean weight was 10.7 ± 5 lbs. Mean girth was 370.2 ± 55 mm. Age was estimated by scale pattern analysis with scales collected from the preferred area on the left side of the fish above the lateral line (Bales 2007). At Emmonak, both age-6 (47.6%) and age-5 (43.6%) fish were strongly represented, followed by age-7 (3%). Age composition of the fish sampled in Eagle was 59.2% age-5 and only 24.3% age-6 fish. However, due to advanced resorption of scales at later migratory stages, 14.2% of Chinook salmon could not be aged. The average water temperature at Emmonak in 2008 in June and July was 12.8ºC and 15.3ºC, respectively. At Eagle, temperature measurements started in July 8 and the mean water temperature was 13.9ºC in July and 12.6ºC in August.

Heart samples were fixed in 95% ethanol at time of collection and were analyzed for the presence of *Ichthyophonus* 18s rDNA using polymerase chain reaction (PCR) following the procedure described by Whipps et al. (2006). Briefly, approximately 50 mg of ethanol fixed tissue was placed in a 1.5 ml microfuge tube. Nucleic acid extractions were conducted following the manufacturers protocol for the DNeasy Tissue kit (QIAGEN Inc. Valencia, California). Clinical signs typical for *Ichthyophonus* infection were noted at the time of collection in 9.5% (28 of 296) of fish sampled in Emmonak. Clinical signs of *Ichthyophonus* infection were recorded in 8.7% (13 of 150) of Chinook salmon collected at the Rapids and 12% (30 of 250) 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 of tissues obtained from these sampling locations is underway at the State University of New York and Purdue University. Preliminary data from Emmonak indicate very low infection prevalence in 2008 of approximately 7%, however re-runs of some samples are in progress and actual prevalence may be higher or lower. For comparison, infection prevalence in Emmonak in 2007 was 16.7%. DNA has been extracted from all remaining samples (Emmonak, Eagle, and Rapids) and PCR analysis is in progress. Collections in Eagle were further paired with skein morphometrics and egg counts to assess fecundity and potential links to *Ichthyophonus* infection. To determine the fecundity of infected and healthy Canadian-origin female Chinook salmon near Eagle, both ovaries were weighed to the nearest 0.1g following the method of Kinnison et al. (1998). Two sub-samples of fresh ova from each skein (approximately 10% of the total skein weight) were weighed to the nearest 0.1g and preserved in 10% buffered formalin for later egg counts. Average count per skein was 3,600 ± 1,000 eggs. Combined egg count for both skeins was significantly positively correlated to both length and girth (p=<0.0001 for both length and girth). Further, the total number of eggs did not differ significantly between healthy and clinically diseased fish (p=0.08), however, egg quality as determined by lipid and protein content has not yet been evaluated.

At Emmonak, 53.6% of Chinook salmon with clinical signs of *Ichthyophonus* infection were female. Mean length, girth, and weight of visibly infected fish were 816.6 ± 53 mm, 501.8 ± 40 mm, and 20 ± 4 lbs, respectively. Most of the infected fish were age-6 (60.7%) followed by age-5 (35.7), and age-7 fish (3.6%). At Eagle, 16.7% of the clinically infected fish were female. Mean

length, girth, and weight of infected fish was 709.8 ± 78 mm, 367.9 ± 51 mm, and 10.4 ± 4 lbs, respectively. The majority of clinically infected salmon were age-5 (66.7%), followed by 13.3% age-6. Age was not determined from fish sampled at the Rapids, but visible signs of *Ichthyophonus* infection were recorded for 8 of 13 female (61.5%). Average length, girth, and weight of clinically diseased fish was 752.5 ± 135 mm, 422.6 ± 87 mm, and 14.3 ± 7 lbs, respectively.

It should be noted that the 2008 *Ichthyophonus* data reported at this point are preliminary and the results are based mainly on clinical signs of *Ichthyophonus* infection. PCR analysis which will more accurately determine infection prevalence at the 3 sample sites is currently pending. Kocan and Hershberger (2006) suggested that within the Yukon River drainage, Canadian-origin Chinook salmon stocks have an increased prevalence of *Ichthyophonus* and higher infection severity than Tanana River stocks. These authors further noted that severe *Ichthyophonus* infection combined with diminishing endurance and energy reserves in Canada-bound Chinook salmon likely results in mortality. Preliminary comparison of *Ichthyophonus* prevalence between Emmonak and Eagle in 2008 did not show a site-specific difference in prevalence. However, variability in prevalence of returning stocks over the years as well as variable environmental conditions within the ocean and the river could impact susceptibility to infection by the pathogen and the survival of fish which are infected. A more detailed analysis of disease susceptibility based on correlations between *Ichthyophonus* prevalence and the genetic stock assignments of returning Chinook salmon is currently underway.

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 when reviewing whether the annual objectives of the United States/Canada salmon treaties have been met. A suitable section of river was identified near Eagle, Alaska for a potential sonar project. In 2004, ADF&G carried out a 2-week study to evaluate the performance of sonar at 2 preferred sites, Calico Bluff and Six-Mile Bend (Carroll et al. 2007). 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. 2007). Since 2006 both Chinook and fall chum salmon passage has been estimated at the same location (Dunbar and Crane 2007). 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 2008, the total Chinook salmon passage estimate at the Eagle sonar site was 38,097 for the dates July 6 through August 16 (Table 3). When the Eagle (690) and Canadian Chinook salmon catch (3,399) is subtracted from the sonar estimate, the resulting Canadian escapement is 34,008 fish. This is 24% below the interim management escapement goal (IMEG). The total fall chum salmon passage estimate at the Eagle sonar site was 171,347 for the dates August 17 through October 6 (Table 3). Because of the high passage of chum salmon when the project was terminated the sonar estimate was subsequently adjusted to 193,397. The expansion was calculated using a linear relationship to the date October 18 (Bonnie Borba, Fisheries Biologist,

ADF&G, Fairbanks, Alaska; personal communication). When the Eagle (13,000) and Canadian chum salmon catch (6,130) is removed from the sonar estimate, the resulting Canadian escapement is 174,267. This is well above the Canadian spawning escapement goal of 80,000 fall chum salmon.

In 2008 there were a few high water events that included large amounts of woody debris. One of the high water events necessitated removal of the weir and sonar equipment from the river to prevent damage or loss. Sonar operations were stopped temporarily from 2400 on August 27 to 0900 August 31 on the left bank and 1000 August 31on the right bank because of high water and floating debris. The sonar estimate for this period was subsequently adjusted using linear interpolation.

Table 3.–Eagle sonar project passage estimates, and border passage estimates, 2005–2008.

	Sonar Estimate		Eagle Area Subsistence Harvest [a]		U.S. Sonar Mainstem Border Passage Estimate		Canadian Mainstem Border Passage Estimate	
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 [b]	1,999	18,691	39,698	263,979	22,120	235,956
2008	38,097	193,397 [b]	690	13,000	37,407	180,397	14,666	132,048

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, subsistence estimates are preliminary.

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

In addition to operating the sonar, a drift gillnet program was conducted at Six-Mile Bend to monitor species composition, and collect samples of the fish passing the sonar site. Standard age, sex and length (ASL) data, and genetic samples were collected from captured Chinook and chum salmon. Five gillnets, 25 fathoms in length and mesh sizes ranging from 5.25 to 8.5 inches, were fished daily to collect the samples. Although there were some chum salmon present in the river during the Chinook run and vice versa, 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 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. 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. The new equipment was both easier to use and produced more accurate estimates.

In 2008, the combined passage estimate for both banks from August 9 through September 24 was 42,842 chum salmon, with an estimate for the right bank alone of 35,912. Because of the high passage when the project was terminated the sonar estimate was subsequently adjusted to 50,353 chum salmon. The expansion was calculated using a 2nd order polynomial calculated to the date October 9 (Bonnie Borba, Fisheries Biologist, ADF&G, Fairbanks, Alaska; personal communication). For comparison with past years, only the expanded right bank estimate of 43,968 was used to evaluate whether the biological escapement goal (BEG) was obtained. The left bank estimate was calculated as 16% of the total (see below). If only the right bank estimate is used, as in past years, the estimate is 12% below the lower end of the BEG range of 50,000 to 104,000.

From 2005 through 2007 the left bank consistently contributed about 40% to the overall chum salmon run on the Sheenjek River. In 2008 only 16 % of the fish migrated on the left bank. It will take several more years of data collection to determine how best to treat the historical estimates, but in order to provide the best escapement number possible the left bank must continue to be monitored.

7.1.8 Yukon River Chinook Salmon Comparative Mesh Size Study

The goal of this 3-year study is to gain information about catch composition from 7, 7.5 and 8 inch stretch-mesh drift gillnets from a test fishery in District 1 near Emmonak. The objectives of this study are to determine whether the proportion of Chinook salmon and chum salmon caught varies by mesh size, determine whether the age, sex, length, weight, and girth of individual Chinook salmon caught varies by mesh size, and to evaluate the marketability of the catch from the various mesh sizes. This information may provide insight into ways to implement management strategies and regulations to sustain Yukon River Chinook salmon while continuing to maintain subsistence and commercial fisheries.

The project operated from June 15 to July 1, 2007 and from June 15 to June 21 in 2008. The project halted operations early in 2008 to conserve Chinook salmon. A 2007 and 2008 combined total of 652 Chinook salmon and 825 summer chum salmon were caught using 7.0, 7.5, and 8.0 inch mesh (Table 4). Since the sample size was considerably less than the targeted sample size of 400 Chinook salmon per mesh size, samples will be pooled across years in the final analysis in 2009. All Chinook salmon harvested were measured for age, sex, length, weight and girth.

Table 4.–Number of Chinook and summer chum salmon harvested in the Lower Yukon River test fishery by mesh size, 2007 and 2008.

Mesh Size	Chinook Salmon	Chum Salmon
7.0 inch	220	417
7.5 inch	246	205
8.0 inch	186	203
Total	652	825

7.1.9 Tanana Fall Chum Radio Telemetry

Fall chum salmon originating in the Tanana River represent on average 30% of the total run abundance within the Yukon River drainage. Fall chum salmon are harvested in important subsistence, personal use and commercial fisheries enroute to spawning locations. The relationship between known tributary escapements and drainage abundance estimates suggest that a significant contribution to the fall chum salmon population maybe from Tanana River mainstem spawners. Previous telemetry results (Barton, 1992) indicate large concentrations of adult chum salmon in the mainstem Tanana, but the extent of spawning remained poorly understood.

The Alaska Department of Fish and Game (ADF&G) and the Tanana Chiefs Conference (TCC), in conjunction with the University of Alaska, Fairbanks (UAF), the U.S. Geological Survey (USGS) and the U.S. Fish and Wildlife Service (USFWS), are conducting a radio telemetry project on fall chum salmon in the Tanana River (Figure 5). The main objectives of this research include: 1) confirm that fall chum salmon are using the mainstem Tanana River for spawning; 2) identify and characterize mainstem spawning habitats used by fall chum salmon; 3) determine relative contributions of mainstem spawners to overall upper Tanana River fall chum salmon populations; 4) construct mainstem spawning habitat location prediction models; 5) identify areas that may need inclusion in the genetic baseline derived from tissue samples of tagged fish and final locations; and 6) estimate the stock specific run timing, migration rate, and movement patterns. The impacts of urbanization and resource development, including agriculture, timber, minerals, and petroleum are greatest within the Tanana River drainage. This study will assist with resource development in the area while simultaneously protecting habitat supporting the fishery resource.

Based on the tag size testing conducted in 2007 (JTC 2008), medium sized tags were chosen for the 2008 program work to be conducted the following year as they appeared to have the best stomach seat and adequate battery life for the length of the project. In 2008, a total of 413 chum salmon were tagged; 366 female and 12 male were tagged with regular radio tags between August 16 and September 28, 2008, and 35 female fish were tagged with archival tags, which record temperature and depth (Figure 6). Travel through the mainstem Tanana River upstream of the tagging location to the area of interest was primarily monitored by 3 radio tracking stations (RTS). Approximately 365 (88%) passed the mainstem gateway RTS, 330 (80%) passed the Nenana RTS and 148 (36%) tagged fish traveled to or past the upper Tanana RTS located near Delta Creek on the mainstem Tanana River.

Approximately 22 tagged fish were harvested in Nenana; 9 of the returned tags were redeployed. Fourteen tagged fish traveled up the Tolovana and Chatanika Rivers, 10 tagged fish traveled up the Nenana and Teklanika Rivers, 15 tagged fish traveled up the Chena River, 18 tagged fish

traveled up the Salcha River, 25 tagged fish were located and recovered in the Delta River, 3 tagged fish traveled up the Goodpaster River, 19 tagged fish traveled to the Bluff Cabin Slough area, and 1 tagged fish traveled past the upper most remote tracking station (RTS) near the Johnson River mouth. Over 200 salmon were tracked to mainstem spawning areas between Fairbanks and the upper reaches of the project area.

Twenty-five aerial flights were flown between August 22 and December 12, 2008. Additional flights were conducted for archival tag retrieval and habitat monitoring work. To date a total of 16 archival tags and 55 regular tags have been recovered for a total of 71 tag recoveries. These recovered tags can be refurbished and used again in other projects. TCC forestry department maintains a database that shows the locations of the tagged fish throughout the tagging period and drainage over a time series. Access to the data from both 2007 and 2008 can be located at the TCC website: www.tananachiefs.org, under the Natural Cultural Resources link and then GIS maps.

The USGS returned to Tanana River habitat monitoring sites established in 2007 to recover tidbit temperature data loggers, measure hydraulic gradient, and dissolved oxygen. Two of the 4 data loggers were unrecoverable in the spring of 2008 due to ice and overflow conditions. As part of habitat monitoring objectives for 2008–2009, conducted by USGS, active spawning sites were located at 11 sites along the mainstem Tanana River. At each site temperature recorders were inserted to monitor subsurface redd temperatures at 40 cm depth and surface water temperatures. Piezometers were installed to measure upwelling/downwelling, and freeze vials to record substrate freeze depth. Twenty four additional habitat monitoring sites were assessed and surface water temperature probes were installed by the UAF graduate student. Data recorders will be retrieved in spring of 2009, followed by data analysis.

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

The rearing of subyearling 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 study by USFWS, Fairbanks Fish and Wildlife 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. In 2008, a 3-year study (funded by AKSSF) was initiated to inventory potential rearing streams for the presence of juvenile Chinook salmon between the U.S./Canada border and the Tanana River. During the summer, 20 streams were sampled upstream of the Charley River. Juvenile Chinook salmon were found in 16 of the 20 streams. Fifteen of these streams were nominated for inclusion into the Alaska Anadromous Waters Catalog for juvenile Chinook salmon rearing habitat. Over 230 genetic samples were collected and archived for future analysis. Students from the Eagle Community School monitored Mission Creek throughout the summer to determine colonization timing of non-natal juvenile Chinook salmon. The first juvenile was captured on June 24, with a peak catch on July 16. Juveniles were still present in the river on September 9. In 2009, juvenile sampling will continue from the Charley River area downstream to the Dalton Highway Bridge.

7.2 CANADA

7.2.1 Upper Yukon River Salmon Tagging Program (Yukon Territory)

The Department of Fisheries and Oceans Canada (DFO) has conducted a tagging program on salmon stocks in the Canadian section of the Upper Yukon River drainage since 1982 (excluding 1984). The objectives of this program are to provide inseason estimates of the border escapement of Chinook and fall chum salmon for management purposes and to provide postseason estimates of the total spawning escapements, harvest rates, migration rates and run timing. Spaghetti tags are applied to salmon live-captured in 2 fish wheels located upstream from the Canada/U.S. border. The 2 fish wheels, White Rock and Sheep Rock, are situated approximately 7 kilometers apart on the north bank of the river. Tagging methodology for many years involved 2 daily tagging events, morning and evening. In recent years, additional tagging shifts have been implemented for both the Chinook and fall chum salmon migratory periods to reduce the stress on fish held in the live-boxes prior to tagging. For example, the Chinook salmon tagging schedule now involves 3 to 4 tagging events each day (i.e., wheel checks every 6–8 hours) throughout most of the run, while the fall chum salmon tagging schedule usually involves 3 tagging events per day. Subsequent tag recoveries are made in the different fisheries and spawning areas located upstream and infrequently, in downstream fisheries in Alaska. Each year, less than 3 tag recoveries are reported downstream of the tagging site near the community of Eagle, Alaska where active Chinook and fall chum salmon subsistence fisheries take place.

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 is 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.

Although consistency in the fish wheel sites and fishing methods permits some inter-annual and inseason comparisons, the primary purpose of the fish wheels is to live-capture salmon for the mark–recapture program. In the absence of recapture information, fish wheel catch data is generally not useful for assessing Chinook salmon run abundance. In general, fish wheel counts have limited correlation with border escapement estimates derived from mark–recapture estimates, particularly with respect to Chinook salmon runs. Chinook salmon catches tend to be highest during high water conditions when the fish are most vulnerable to the shore-based gear and lower during low water conditions. Similarly, fall chum salmon fish wheel catches are often influenced by water levels, although the fish wheels are highly efficient at capturing fall chum salmon which migrate close to shore. In 2006, 2007 and 2008, the daily wheel catches of fall chum salmon were highly correlated with the daily counts of fall chum salmon derived from a sonar estimate at Eagle, Alaska. The fish wheels appear to be less efficient at capturing fall chum salmon during the latter part of the migration period, usually in late September and early October. During this period most fish are caught overnight. It is assumed that migrating fall chum salmon are better able to avoid the gear during the daylight hours due to an increase in water clarity associated with less turbid water conditions.

In 2008, with the exception of short periods that involved maintenance and repair, both fish wheels ran 24 hours per day during an operational period that started in late June[6] and ended in early October. Chinook salmon were tagged 4 times per day throughout most of the 2008 season while fall chum salmon were usually tagged 3 times per day (morning, afternoon and evening). Preliminary 2008 population estimates have been developed using spaghetti tag recoveries from a test fishery during the Chinook salmon run and a commercial fishery which took place during the fall chum salmon run. The inseason management of both Chinook and fall chum salmon in 2008 was based on sonar information rather than the DFO tagging program.

7.2.1.1 Chinook Salmon

On July 3, the first Chinook salmon was caught in the White Rock fish wheel, 3 days later than the average date of June 30. The combined total fish wheel catch of 1,788 Chinook salmon was 16.5% higher than the 1998–2007 average of 1,535 fish. The sex composition was 22.1% female. A peak weekly catch of 580 fish was recorded in statistical week 31, July 27 to August 2.

In 2008, the tag recovery component of the Chinook salmon mark–recapture study involved data from a gillnet test fishery conducted by the Yukon River Commercial Fishing Association and the Tr'ondëk Hwëch'in First Nation with funding provided by the Yukon River Panel. Due to the low run strength, a commercial fishery was not initiated for Upper Yukon Chinook salmon thus commercial catch and tag recovery data were unavailable for the mark–recapture estimate. The information used to determine the mark–recapture estimate of border escapement involved the number of effective tags deployed (1,711), a test fishery catch of 513 fish examined for tags, and 59 tag recoveries. The recovery data used to calculate this estimate, i.e., the number of fish examined for tags and number of tags recovered, was much lower than desired. This was due to the test fishery catch being lower than expected due to low run strength in 2008 as well as issues associated with fielding a full complement of test fishers.

The preliminary border passage estimate for 2008 based on mark–recapture is 14,666 (95% CI 11,563–19,239) Chinook salmon. This estimate was derived from an adjusted Petersen estimate using all data without any stratification. A stratified approach (Stratified Population Analyses System (SPAS)) may be used to develop the final 2008 estimate, when the field data is finalized. However, it should be noted that the number of fish examined for tags and the number of tags recovered was sparse.

After subtracting the Upper Yukon River Chinook salmon harvest of 3,399 (1 commercial, 0 domestic, 0 recreational, 2,885 aboriginal, and 513 test), a total of 11,267 Chinook salmon was estimated to have reached spawning areas based on the mark–recapture program. This was the second lowest estimate of spawning escapement based on mark–recapture within the years 1982–2008. A spawning escapement goal applicable to the mark–recapture program was not established in 2008. The Yukon River Panel adopted an Interim Management Escapement Goal (IMEG) of >45,000 for 2008 which was based on the Eagle sonar estimate. The estimated spawning escapement based on the Eagle sonar count was 34,008 (Appendix B11); this estimate was derived from the Eagle sonar count (38,097; Table 3) minus the estimated catch in the Eagle subsistence fishery upstream of the sonar program (690) and the total Canadian catch (3,399).

[6] The White Rock fish wheel was operational from June 29 to October 6 while the Sheep Rock fish wheel was operational from July 3 to October 8.

The Eagle sonar program was used to determine the Canadian Upper Yukon border and spawning escapement estimates in 2008 because the Chinook salmon mark–recapture program was deemed to be biased low. Preliminary reconstructions of the 2008 Chinook salmon run suggests that total run size of Upper Yukon River Canadian-origin Chinook salmon was substantively lower than the preseason outlook; approximately 54,800[7] to 58,500[8] Chinook were estimated to have entered the river vs. the preseason outlook range of 80,000 to 111,000 Chinook salmon. Using 56,600, the mid-point of the 2 run reconstructions presented, the 2008 run was approximately 29% below the lower end of the outlook range (80,000) and 49% below the upper end of the outlook range (111,000).

7.2.1.2 Fall Chum Salmon

The 2008 fall chum salmon run into the Upper Yukon River drainage was slightly later than average. A total of 6,165 fall chum salmon was caught in the DFO fish wheels between July 23 and October 08. The midpoint of the fish wheel catch occurred on September 17. After September 27 most fish were caught overnight; it is assumed that increased water clarity during this period resulted in gear avoidance during daylight hours. High daily fish wheel catches were recorded in the last few days of the 2008 program suggesting that a considerable portion of the run was not assessed. The 2008 fish wheel catch was close to the 10-year average total of 6,201 fall chum salmon.

In 2008, 5,979 of the 6,165 fall chum salmon captured in the DFO fish wheels were marked with spaghetti tags. The tag recovery effort involved a commercial fishery. A live-release test fishery was not initiated to supplement the commercial catch and tag recovery information for the mark–recapture program as was done in 2007.

The commercial fishery occurred over portions of 7 statistical weeks (statistical weeks 36–42). The total commercial catch was 4,062 fish and 183 tags were recovered. In summary, the effective number of tagged fish released (5,979), commercial catch (4,062) and tag recoveries (183), were used to determine a preliminary fall chum salmon estimate of 132,048 with a 95% confidence interval range from 114,875 to 153,453 fish. The average mark–recapture estimate for the years 1998–2007 was 146,310 (Appendix B13). Mark–recapture estimates for the 1980 to 2007 period are presented in Appendix B13. The high daily fish wheel catches during the last few days of the 2008 tagging program and high daily Eagle sonar estimates during the same period, suggest that the operational period of the Canadian tagging program missed a significant portion of the migration period, i.e. the program terminated before the run had subsided. The Eagle sonar estimate to October 6 (171,347) was expanded to 193,397 based on linear interpolation to the end date of October 18 (Bonnie Borba, personal communication). The preliminary mark–recapture estimate is lower than the estimated border passage of 158,347 to October 6 derived from the Eagle sonar estimate; the sonar border passage estimate was calculated from the sonar estimate to October 6 (171,347) minus the estimated subsistence catch upstream of the sonar program of 13,000 fish. Since fall chum salmon were tagged in the fish wheels up to the morning of October 8 and the estimated travel time from the sonar program to the fish wheel program is approximately 1 day, the mark–recapture estimate generally covers the same time period as the unexpanded sonar estimate.

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[7] Based in Y1 & Y2 commercial (1,230), Y1 & Y2 subsistence (7,209) and Pilot Station (46,377).

[8] Based in Y1 & Y2 commercial (1,230), 40% of 48,000 U.S. subsistence (19,200) and Eagle sonar (38.097).

The 2008 spawning escapement estimate based on mark–recapture was well above the spawning escapement target of >80,000 Upper Yukon River fall chum salmon established by the Yukon River Panel. Comparative border and spawning escapement estimates for the mark–recapture program for the years 1980 to 2007 are presented in Appendix B13. For 2008 and subsequent years, the Eagle sonar estimate will be used for the assessment of Upper Yukon border and spawning escapement estimates based on a JTC decision to transition from the mark–recapture program to the sonar program. Although the 2008 sonar estimate was expanded to account for a substantive number of fish thought to have migrated after the sonar program ended, a similar expansion has not yet been completed for the 2006 and 2007 mark–recapture estimates which were also influenced by usually late run strength. The 2006 and 2007 mark–recapture estimates were similar to the independently derived Eagle sonar estimates.

7.2.2 Big Salmon Sonar

A long range Dual Frequency Identification Sonar (DIDSON-LR) was used by Jane Wilson and Associates to enumerate Chinook salmon returning to the Big Salmon River in 2008, as well as determining run timing, and diel migration patterns. This was the fourth year a sonar program operated at this site with funding from the Yukon River Panel's Restoration and Enhancement Fund (Project number CRE-41-08). The sonar site was located on the Big Salmon River approximately 1.5 km upstream of the Yukon River confluence, the same location used for the 2005–2007 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 conical ensonified field that extended outwards for a distance of 40 m.

Due to flood conditions during sonar set-up, it was not possible to place the sonar unit at the site used in previous years. The sonar unit was set-up temporarily in a protected eddy in close proximity to the camp where it could be monitored closely until the water level lowered. By July 21, water levels had lowered somewhat enabling the sonar unit to be returned to the usual site. 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.

Twenty-four hour sonar recording was scheduled to begin on July 16. However, due to the large amount of debris in the river at this time, the sonar unit was initially operated only during the day and removed overnight until water levels lowered and the debris load lessened. Twenty-four hour recording began at 8:00 on July 22. High water levels persisted throughout July delaying construction of a partial weir to divert shoreline migrating Chinook salmon through the ensonified area. Weir construction was initiated on August 8 after water levels had lowered enough to enable installation and completed the following day. As in previous years, 2 diversion weirs were constructed one on each side of the river.

A total of 1,329 targets identified as Chinook salmon was counted between July 16 and August 25. The first Chinook was observed at 20:00 on July 19. The peak passage was on August 11, and 90% of the run had passed the station on August 17. The 2005 to 2007 counts were 5,584, 7,308 and 4,450, respectively.

7.2.3 Whitehorse Rapids Fishway Chinook Salmon Enumeration

A total of 399 Chinook salmon ascended the Whitehorse Rapids Fishway between August 9 and September 4, 2008. This total was 32.2 % of the 1998–2007 average count of 1,238 fish. The sex ratio was 37.1% female (148 fish). Hatchery-produced fish accounted for 54.4% of the return,

144 males and 73 females. The non-hatchery count consisted of 182 fish, 107 wild males and 75 wild females. The run midpoint occurred on August 23 and the peak daily count occurred on August 20 when 46 fish were counted.

The 2008 return represents the first year that 6-year old adult fish could potentially return from a recent series of lower hatchery releases. As a result of hatchery modifications that resulted in a change from Capillano troughs to circular tanks, the annual hatchery fry release goal was reduced to a target of 150,000 effective in brood year 2002. The average fry release from the Whitehorse Rapids Hatchery prior for brood years 1984–2001 was approximately 250,200; the highest releases within this period were 400,449 fry in 1992 and 441,455 fry in 1993. The average release for brood years 2002–2007 was approximately 140,700 fish.

In 2008, 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., Wolf or Michie creeks) were operated in the drainage upstream of the Whitehorse Rapids Fishway in 2008.

7.2.4 Whitehorse Hatchery Operations

All 85,306 fry of the 2007 brood year Chinook salmon reared at the Whitehorse Rapids Fish Hatchery were released between June 01 and, June 28, 2008. All fish released were coded-wire tagged and marked with an adipose fin clip. The fry[9] were released into various locations upstream of the Whitehorse Rapids hydroelectric dam. The numbers of fry released by location are listed in Table 5.

Table 5.–Chinook salmon fry release locations, incubated in Whitehorse Rapids Fish Hatchery, 2008.

Release Site	Number
Wolf Creek	13,557
Michie Creek	25,117
M'Clintock River	25,716
Mainstem Yukon River	20,916
TOTAL	85,306

Included in the above numbers were 2,618 fry that were considered to be too small or unfit for tagging. These fish had their adipose fins removed, and they were released in Wolf Creek on June 26, 2008. A summary of Chinook salmon releases into the Upper Yukon River from instream incubation and rearing sites is presented in Appendix A16.

The marking and release of all fit fish from the Whitehorse Rapids Fish Hatchery has occurred since brood year 1995 for a total of 13 years in 2008. With the exception of all fish released from the 1998 brood year (BY), which were adipose-clipped but not tagged, all of the 1995–2007 brood year releases involved adipose fin removal and application of coded wire tags to all fit fish. The initiative to mark all of the fish released from the hatchery provides an opportunity to

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

accurately determine the hatchery contribution as adult fish migrate upstream through the Whitehorse Rapids Fishway and it is also helpful during brood stock collection.

Tag retention for the fish tagged for the 2008 release (2007 brood year) was calculated to be 97.6%. This calculation is derived from information that suggests that 1,949 of the 82,688 tagged fish did not retain their tag. The total 2008 release includes 80,739 adipose-clipped with tags, 1,949 fish which were estimated to have lost their tags and 2,618 small (or unfit) fish which were clipped but not tagged for a total release of 85,306 fish.

Brood stock collection began on August 16 after 44 Chinook salmon had migrated through the Whitehorse Rapids Fishway and ended on August 30 2008. An attempt was made to collect 2 males for each female during brood stock collection to allow matrix spawning. Matrix spawning has been used for 20 years in an effort to maintain genetic diversity.

A total of 18 males were retained and used for the brood stock program; 6 of these fish were adipose-clipped (hatchery) and 12 had intact adipose fins (wild). This total represents 6.4% of the total male return of 281. Milt was also collected from an additional 60 males which were removed and subsequently returned to the fishway. The total number of males used as Whitehorse Rapids Hatchery brood stock in 2008 was therefore 78 fish, 27.8% of the total male return.

A total of 36 females were collected from the Whitehorse Rapids Fishway (21 wild and 15 hatchery-origin); 27 of these were collected for the Whitehorse Rapids Hatchery and 9[10] were collected for the McIntyre Creek facility.

An additional 20 females classified as ladder mortalities were opportunistically salvaged from the ladder. These fish had ceased their upstream migration; 7 of these fish were used for the Whitehorse hatchery program (3 wild and 4 hatchery). The remaining 13 females were available for the McIntyre Creek facility.

In total, 34 females were successfully spawned for the Whitehorse Rapids Hatchery program with an estimated total of 182,900 green eggs being collected. Average fecundity was estimated at 5,545 eggs per female with a range from 3,901 to 9,663. Some of these fish were partials, i.e. fish with less than a full complement of eggs. The fertilization rate was estimated to be 100%. Shocking and second inventory of the eggs began on October 11 and was completed by October 27, 2008. An estimated total of 169,100 alevins were on hand as of December 31, 2008. The overall survival from green egg to alevin stage was estimated to be 92%.

Fry from the McIntyre Creek facility will be used to stock Fox Creek as part of a restoration program funded by the Yukon River Panel Restoration and Enhancement fund. Approximately 45,000 eggs are being incubated. Survival from the green egg stage to the time the eggs hatched was 92% for the adults which were initially held at the hatchery. Similar survival for eggs opportunistically salvaged from females which had ceased migration in the fishway ranged from 0 % (3 batches) to 95 %.

[10] Seven were spawned between Sept 6 and Sept 9, 2008 and two fish had un-salvageable eggs.

7.2.5 Porcupine River Investigations

7.2.5.1 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 250,000-300,000. 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 when Fisheries and Oceans Canada and the Vuntut Gwitchin Government have conducted the weir program cooperatively. 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; Appendix C14).

In 2008, the weir was operated from September 9 to October 11. An attempt to install the weir earlier in the season was unsuccessful due to high water conditions. A total of 18,551 fall chum salmon were counted. The observed count was expanded to 20,055 to account for fish which were believed to have migrated after the 2008 program ended. The estimated midpoint of the 2008 run occurred on September 21. The peak daily weir count of 1,446 fish occurred on September 18. Based on genetic and other data, it is unlikely that many fish arrived before the weir was installed.

The expanded 2008 count (20,055) is approximately 34% lower than the recent average of 30,256; however, the recent average is influenced by the exceptional count of 121,413 observed in 2005. The 2008 count was 8.8% below the lower end of the Fishing Branch River escapement goal range of 22,000 to 49,000 which was established for the years 2008 through 2010. Prior to the analyses which set the 2008–2010 goal, the longstanding goal for the Fishing Branch River was 50,000 to 120,000.

7.2.5.2 Porcupine River Fall Chum Salmon Mark–Recapture Program

A mark–recapture program, funded by the Yukon River Panel Restoration and Enhancement Fund, was conducted on the Porcupine River near the community of Old Crow, Yukon, in 2008 by the Vuntut Gwitchin Government (VGG) and Environmental Dynamics Incorporated (EDI), a consulting firm. The purpose of this project was to continue the development of an inseason fall chum salmon management tool for the community of Old Crow and Fisheries and Oceans Canada (DFO) fishery managers. It was hoped that inseason information from this program and the Fishing Branch River weir could be used to determine inseason harvest opportunities and promote conservation of the Fishing Branch River chum salmon returns.

In 2008, 528 fall chum salmon were captured by gillnet, tagged, and released downstream of the community of Old Crow. A total of 1,269 chum salmon were caught in a test fishery and 34 tagged fish were observed. Weekly mark–recapture estimates were developed throughout this program as well as a total estimate of 23,036 (95% CI 17,045 to 29,027) (Table 6). One limitation of this program was the relatively low number of tag recoveries (*n=34*) observed in the test fishery catch. Because additional catch and tag recovery information was available from the aboriginal fishery (AF) centered around the community of Old Crow, catch and tag recovery information from this fishery was added to the existing data and a second population estimate was calculated (Table 7). The combined data included an examined catch of 5,005 (1,269 test fishery

catch and 3,736[11] AF) and 49 associated tag recoveries. The total estimate using the combined fishery was 52,962 with a 95% confidence interval from 39,165 to 66,760 (Table 7). This estimate is substantively higher than the estimate calculated using only test fishery data and there is no overlap in the 95% confidence limited calculated for the 2 estimates.

Table 6.–Estimation of the number of fall chum salmon at Old Crow Y.T. derived from a mark–recapture program using test fishery tag recovery data..

Week	Period	# Tagged	# Test	Tags Recovered	Chapman's Estimate	Var (Nc)	95% CI	95% Run Est (-)	95% Run Est (+)
1	26 Aug–1 Sept	19	41	4	167	3108	110	57	277
2	3 Sep–8 Sept	195	489	14	6,408	2293622	2,976	3,426	9,378
3	10 Sep–15 Sep	144	375	3	13,629	35746038	11,748	1,881	25,377
4	17 Sep–22 Sep	126	312	13	2,838	456826	1,328	1,510	4,166
5	24 Sep–28 Sep	44	52	0	NA	NA	NA	NA	NA
Project Total		528	1,269	34	23,036	9294258	5.991	17,045	29,027

Table 7.–Estimation of the number of fall chum salmon at Old Crow Y.T. derived from a mark–recapture program using test fishery and Vuntut Gwitchin aboriginal fishery catch and tag recovery data.

Period	# Tagged	# Test & Aboriginal	Tags recovered	Chapman's Estimate	Var (Nc)	95% CI	95% Run Est (-)	95% Run Est (+)
28 Aug–28 Sep	528	5,005	49	52,962	49306383	13,798	39,165	66,760

The estimates in Tables 4 and 5 are an attempt to quantify all populations of fall chum salmon within the Porcupine River upstream of Old Crow. A total of 216 of the tagged fish which potentially migrated past Old Crow were observed and/or recovered during the operation of the Fishing Branch River weir in 2008; this total represents 42% of the 513 tagged fish which potentially moved upstream of Old Crow. The proportion of tags observed at the weir was lower than was observed in most previous years; the percentage of tags observed at the Fishing Branch River weir in the years 2003–2007 was as follows: 88% in 2003; 59% in 2004; 71% in 2005, 2006 data not available[12]; and 40% in 2007. The low percentage of tags observed at the Fishing Branch weir in 2008 could be attributable to a combination of factors. However, the draft report prepared by EDI suggests that the lower mark–recapture estimate which included data from the test fishery is likely the more reliable estimate Table 6). The draft EDI report also noted that there is a possibility that some tags recovered in the aboriginal fishery were unreported, and a small change in the number of tags recovered could have produced estimates with overlapping 95% confidence internals for the estimates presented in Tables 6 and 7. On the other hand, additional estimates can be obtained by: a) using just the tag recovery data collected at the weir in conjunction with the number of tags available (tags deployed minus recoveries in the aboriginal fishery); and b) combining all recovery data (weir plus fishery). At total of 216 tags was accounted for at the weir from a count of 18,551 chum salmon. The total number of tags

[11] This total is 300 fish greater than the catch reported by the VGG.

[12] 2006 data is not available because the weir was not continuously operated due to flooding.

deployed was 528 of which 49 were recovered in fisheries; the number of tags available was therefore 479. A modified Petersen estimate based on these data is 41,037 chum salmon. Combining all the data (528 tags applied, 5005 fish examined for tags in fisheries, 18,551 fish observed for tags at the weir, 49 recoveries in fisheries, and 216 tags recovered at the weir) gives an estimate of 46,848 chum salmon.

Its apparent that the Fishing Branch weir enumerates the major spawning stock within the Porcupine River drainage; however, results form the mark–recapture program in recent years suggest that there may be substantial numbers of fall chum salmon spawning in other locations.

The Yukon River Panel requested that the Porcupine mark–recapture program be examined to determine if test fishery CPUE data could be used as an index of fall chum salmon abundance within the Porcupine River near Old Crow. This analysis was initiated to determine if a more cost-effective program could be developed. A fairly strong correlation was found between the test fishery CPUE data and the weir counts in 2005, 2007 and 2008 but not in 2004 and 2006. The reason for a lower correlation in 2004 is unknown; however, the lower correlation observed in 2006 may be related to the extremely high water levels which occurred that year.

There appears to be a logarithmic relationship between the test fishery CPUE and the Fishing Branch River weir counts (Figure 7) (Ben Snow, personal communication). The relationship presented in Figure 7 includes the weir counts as well as average proportion (36%) of fall chum salmon that do not spawn upstream of the weir (i.e. fish removed from the population through harvesting or those which spawn in other areas). Inseason CPUE data from the test fishery program could potentially be used to calculate fall chum salmon abundance within the Porcupine River using the relationship shown in Figure 7. At this time, a weekly estimate with a 75% confidence interval could be calculated. Although a higher confidence interval (i.e. 95%) is desirable, the relatively small data set does not provide this precision at this time. It is likely that a 95% confidence interval will be available as additional data becomes available.

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

7.2.6.1 Chinook Salmon

Genetic stock identification of the 2008 Chinook salmon migration into Canada was developed using genetic samples collected from the ADF&G test netting program conducted in association with the Eagle sonar program and samples collected at the DFO fish wheel tagging program located at Bio Island, near the Yukon-Alaska border. Variation of 12 microsatellite loci was surveyed for 453 Chinook salmon from the Eagle test netting program and 305 Chinook salmon from the fish wheel tagging program. The test netting and fish wheel programs are located approximately 43 km apart, a distance which represents approximately 1 day of travel time for this species. The genetic samples collected were weighted using weekly and seasonal abundance estimates derived from the Eagle sonar program.

The populations and regional reporting groups for Chinook salmon are presented in Table 8. The estimated percentage stock composition by statistical week and the associated standard errors for Chinook salmon from the Eagle sonar test netting program (*n=453*) for the period from July 6 to August 16 is presented in Table 9. Chinook salmon genetic samples collected from both projects during statistical weeks 30–32 were compared and include the DFO fish wheel tagging program (*n=305*; Table 10) and the Eagle test fishery program (n=311; Table 11). The data presented in

Table 11 is a subset of the data presented in Table 9 for comparison by statistical week. Since the Eagle test fishery sample was limited, funding was available to compare samples collected from 2 different gear types, fish wheels (Table 10) and gillnets (Table 11).

Table 8.–Baseline comprised of 21 stocks used to estimate stock compositions of Chinook salmon collected at the Alaska Department of Fish and Game (ADF&G) Eagle test netting program and the Fisheries and Oceans Canada (DFO) fish wheel tagging program, 2008.

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

For Chinook salmon, the 8 regional reporting groups (stock aggregates) contributing to the 2008 run were as follows: Mid-mainstem Tributaries (32.3%); Pelly River (20.7%); Carmacks area tributaries (15.1%); Teslin River (13.4%); North Yukon Tributaries (9.1%); Stewart River (7.8%); Upper Yukon River tributaries (1.1%); and White River (0.5%) (Table 9). Figure 8 shows the timing (and relative abundance) of the dominant 5 aggregate stocks in 2008. The comparison of samples collected from fish wheels vs. gillnets (Tables 10 and 11) suggests that there may be bank orientation associated with the fish wheel capture of Chinook salmon bound for the North Yukon Tributaries since this stock aggregate comprised a higher proportion of the fish wheel sample than the gillnet sample. This likely occurs since the fish wheels are both located on the right bank in close proximity to the 2 tributaries within this stock aggregate, the Chandindu and Klondike rivers, which are located on the same bank. Overall, there are major differences in the stock composition data for the 2 gear types within the same sample periods which could be related to a number of factors relating to, but not limited to, sampling bias and gear selectivity (Tables 10 and 11).

Since there are many stocks which are currently not in the Chinook salmon baseline, individual stock proportions are likely biased high. Due to low run abundance in 2008, there was minimal effort expended towards augmenting the existing baseline.

Table 9.–Estimated percentage stock composition of Chinook salmon migrating past the sonar program at Eagle Alaska, 2008.

Statistical Week	**28**		**29**		**30**		**31**		**32**		**33**		**28-33**	
Date	**July 6-12**		**July 13-19**		**July 20-26**		**July 27-Aug 2**		**Aug 3-9**		**Aug 10-16**		**All**	
Sample Size	***n=14***		***n=103***		***n=81***		***n=137***		***n=93***		***n=25***		***n=453***	
Region		**SE**		**SE**		**SE**		**SE**		**SE**		**SE**		**SE**
North Yukon Tributaries	49.6	13.5	27.7	4.9	3.7	2.5	2.2	1.5	0.7	1.0	4.0	4.2	9.1	1.5
Mid-mainstem Tributaries	0.3	2.2	4.5	3.9	7.6	4.6	23.1	9.4	66.4	9.3	35.4	20.5	32.3	4.2
Carmacks Area Tributaries	33.3	13.7	12.2	6.6	15.1	7.0	31.9	8.9	2.9	4.5	12.8	13.7	15.1	3.7
White	0.5	2.8	0.5	1.5	0.5	1.6	0.7	1.6	0.2	0.8	0.0	0.9	0.5	0.9
Stewart	8.2	9.5	15.5	6.8	10.9	6.1	1.7	2.9	8.1	4.7	1.2	4.1	7.8	2.3
Pelly	7.7	10.3	36.2	7.1	27.6	7.2	17.9	4.9	0.9	2.0	9.5	7.2	20.7	3.0
Upper Yukon Tributaries	0.0	2.4	0.0	0.3	0.1	0.5	3.0	2.2	3.4	3.7	0.4	2.2	1.1	0.9
Teslin	0.4	3.7	3.3	3.1	34.6	7.4	19.4	6.2	17.4	7.1	36.7	16.1	13.4	2.7

Note: Stock compositions were estimated using 12 microsatellite loci and the baseline outlined in Table 8 (SE=Standard error of estimate). All samples were collected in the test fishery associated with the sonar program and weighting derived using the Eagle Sonar estimate.

Table 10.–Estimated percentage stock composition of Chinook salmon migrating past the fish wheel tagging program at Bio Island Yukon during statistical weeks 30–32, 2008.

Statistical week	30		31		32		30-32	
Date	July 20-26		July 27-Aug. 2		Aug. 3-9		All	
Sample size	n=99		n=138		n=68		n=305	
Region		SE		SE		SE		SE
North Yukon Tributaries	23.5	4.6	13.4	3.1	1.6	2.2	14.6	2.3
Mid-Mainstem Tributaries	0.1	0.7	7.1	5	29.9	8.4	11.6	8.1
Carmacks Area Tributaries	24.6	6.8	36.1	6.8	7.9	8.3	20.4	10.4
White	0.1	0.6	3.4	2.8	1	1.9	1.7	1.6
Stewart	16.1	6.3	9.6	5.2	24.1	9.3	13.1	3.7
Pelly	33.5	6.6	20.8	5.7	4.6	5.2	23.9	4.4
Upper Yukon Tributaries	0	0.4	0	0.3	0	0.5	0	0.2
Teslin	2	3.3	9.5	3.2	30.9	8.9	14.7	3.8

Note: Stock compositions were estimated using 12 microsatellite loci and the baseline outlined in Table 8 (SE=Standard error of estimate). All samples were collected from fish caught in the fish wheels and weighting derived using the Eagle Sonar estimate.

Table 11.–Estimated percentage stock composition of Chinook salmon migrating past the sonar program at Eagle Alaska, during statistical weeks 30–32, 2008.

Statistical Week	30		31		32		30-32	
Date	July 20-26		July 27-Aug. 2		Aug. 3-9		All	
Sample Size	n=81		n=137		n=93		n=311	
Region	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Yukon upper	0.1	(0.5)	3.0	(2.2)	3.4	(3.7)	2.0	(1.4)
Yukon Teslin	34.6	(7.4)	19.4	(6.2)	17.4	(7.1)	17.3	(3.9)
Yukon Carmacks	15.1	(7.0)	31.9	(8.9)	2.9	(4.5)	13.3	(4.1)
Yukon mainstem	7.6	(4.6)	23.1	(9.4)	66.4	(9.3)	41.7	(5.4)
Yukon Pelly	27.6	(7.2)	17.9	(4.9)	0.9	(2.0)	15.2	(3.1)
Yukon Stewart	10.9	(6.1)	1.7	(2.9)	8.1	(4.7)	7.9	(2.7)
Yukon Lower Canada	3.7	(2.5)	2.2	(1.5)	0.7	(1.0)	2.1	(0.9)
Yukon White-Kluane	0.5	(1.6)	0.7	(1.6)	0.2	(0.8)	0.4	(0.9)

Note: Stock compositions were estimated using 12 microsatellite loci and the baseline outlined in Table 8 (SE=Standard error of estimate). This table is a subset of the data presented in Table 9 which allows for a comparison of 2 gear types; the data presented in Table 10 was collected from a fish wheel program whereas the data presented in Table 11 was collected from a gillnet test fishery.

7.2.6.2 Fall Chum Salmon

Genetic stock identification of the 2008 fall chum salmon migration into Canada was developed using genetic samples collected at the Fisheries and Oceans Canada (DFO) fish wheel tagging program located at Bio Island, near the Yukon-Alaska border. Variation of 14 microsatellite loci was surveyed for 745 chum salmon. The genetic samples collected were weighted using weekly and seasonal abundance estimates derived from the Eagle sonar program. The populations and regional reporting groups for fall chum salmon are presented in Table 12.

An estimated 49.9% (SE 1.9) of the return for the period sampled originated from the regional reporting group referred to as the White River aggregate and 48.0% (SE 2.0) were from the Mainstem Yukon River reporting group which includes a number of mainstem Yukon River spawning populations (Table 13). The 2 remaining reporting groups contributing to the run were the Teslin River (2.1%, SE 0.8) and the Yukon Early group which is represented by the Chandindu River population (0.1%; SE 0.2). The standard errors associated with the White River and Mainstem Yukon reporting groups were low suggesting that the 95% confidence intervals for these groups were narrow (Table 13). The timing and relative abundance of Upper Yukon River fall chum salmon stocks based on genetic analyses are presented in Figure 9.

Table 12.–Baseline comprised of 9 stocks used to estimate stock compositions of fall chum collected at the Fisheries and Oceans Canada fish wheel tagging program at Bio Island, 2008.

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 R., Tatchun Creek, Big Creek, Minto
Teslin River	Teslin River

Table 13.–Estimated percentage stock composition of fall chum salmon migrating past the fish wheel tagging program at Bio Island, 2008.

Statistical Week*	33		34		35		36		37		37		39		40		33-40	
Date	Aug 8-17		Aug 18-24		Aug 25-31		Sept 1-7		Sept 8-15		Sept 16-21		Sept 22-28		Sept 29-Oct 8		All	
Sample Size	*n=1*		*n=8*		*n=8*		*n=55*		*n=201*		*n=125*		*n=163*		*n=184*		*n=745*	
Region		SE		SE		SE		SE		SE		SE		SE		SE		SE
Yukon Early	99.3	28.6	0.7	4.9	13.8	15.7	0.0	0.6	0.2	0.6	0.1	0.4	0.1	0.4	0.0	0.3	0.1	0.2
White River	0.0	21.5	73.9	15.6	52.7	17.6	69.9	6.6	60.1	3.7	48.4	4.7	44.7	4.1	41.5	3.9	49.9	1.9
Mainstem Yukon River	0.7	24.2	21.2	16.3	33.5	20.7	30.1	6.6	37.7	3.7	47.2	5.2	52.8	4.5	57.1	4.2	48.0	2.0
Teslin	0.0	13.3	4.2	9.8	0.0	3.5	0.1	0.8	2.0	1.2	4.3	2.9	2.4	2.0	1.4	1.6	2.1	0.8

Note: Stock compositions were estimated using 14 microsatellite loci and the baseline outlined in Table 12 (SE=Standard error of estimate). Samples collected at the Bio Island fish wheels with weighting derived from the Eagle Sonar estimate.

7.2.7 Yukon Education Program 2007–2008

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 7 Yukon communities participated in classroom incubation projects in the 2007–2008 school year. Fry releases occurred between May 9 and June 6, 2008. Nine classes released fry back to the Takhini River drainage, or to the McIntyre facility for subsequent release to the Takhini River by the Northern Research Institute. One school released fish back to Tatchun Creek and one back into the Klondike River. Four schools released chum salmon fry to Kluane River. Dawson students released their fry into the Klondike River. Students in Pelly Crossing participated in a spring field trip but did not incubate fry as planned.

Classroom incubation equipment is being used in 16 Yukon schools in the 2008–2009 school year: Destruction Bay, Beaver Creek, Haines Junction are (and Teslin and Carcross will be) incubating chum salmon; Ross River and Carmacks are incubating Tatchun Chinook eggs; Whitehorse classes are incubating Whitehorse fishway Chinook salmon. Morley River and Klondike River eggs were not available this year, as few adult Chinook salmon were observed and no eggs were taken in 2008. Eyed Chinook eggs were delivered to schools in October and November 2008. Eyed chum salmon eggs were to be delivered in January. Three schools incubated chum salmon eggs from the newly fertilized stage, and 2 schools participated in chum salmon broodstock capture in late October 2008. Fry releases will take place in May and June 2009. Whitehorse Rapids Fishway fish will be released at Fox Creek.

7.2.8 Chinook Salmon Habitat Investigations

7.2.8.1 Croucher Creek: Juvenile Chinook Salmon/Beaver Interactions

Juvenile Chinook salmon enter and ascend small streams in the upper Yukon River Basin to rear and overwinter. Beaver dams may obstruct access to these habitats. Concerns have been raised regarding the active management of beaver and their structures to maintain or restore access by fish to upstream habitats. Investigations are being conducted by DFO Oceans, Habitat and Enhancement Branch (OHEB) staff to address these concerns. Collaterally, the timing and characteristics of the upstream and downstream migration of juvenile Chinook salmon are being tracked.

In 2004, a pilot project was conducted in the lower 2 km of Croucher Creek, near Whitehorse. There was intense beaver activity in the study area, with 2 new beaver colonies established. A total of 12 cross-channel dams were built between early July and late August. High densities of young-of-year (0+) juvenile Chinook salmon were captured immediately downstream of the larger dams, implying delay or obstruction of the upstream migration.

In 2005, daily sampling was conducted from May 29–June 19 to monitor the migration of 1+ from the creek and the migration of 0+ juveniles into the creek. The 1+ downstream migration was completed by June 11. Upstream migrating 0+ juveniles reached a sampling point 500 meters from the mouth on June 2. Sampling was then conducted at lower intensity throughout the open water period. Beaver activity declined in 2005 relative to 2006. The first pulse of 0+ Chinook salmon was delayed for approximately 2 weeks by the furthest downstream beaver dam. Movement into the area upstream of the dam was then rapid. None of the 1,665 juveniles captured were of Whitehorse Rapids Hatchery origin.

In 2006, daily sampling was conducted from May 25–July 14. The 1+ migration was completed on June 21. Upstream migrating 0+ juveniles reached the sampling point 500 meters from the mouth on June 18. Sampling was then conducted at a lower intensity throughout the open water period. The status of each beaver colony and dam was monitored. Some dams built in 2005 degraded significantly due to abandonment of area by the beaver. Movement of juveniles to upstream sampling areas was slow throughout the summer. None of the 1,397 juveniles captured were of Whitehorse Rapids Hatchery origin.

In 2007, daily sampling was conducted from May 29–July 9. The 1+ downstream migration was completed by June 18. Upstream migrating 0+ juveniles reached a sampling point 500 meters from the mouth on June 8. Sampling was then conducted at lower intensity throughout the open water period. The status of each beaver colony and dam was monitored. A chute had formed at the location of the furthest downstream dam and appeared to delay the upstream migration by about 1 week. Movement into the area upstream was then very rapid. None of the 3,377 juveniles captured were of Whitehorse Rapids Hatchery origin. Water temperatures have been recorded hourly since July, 2006. Monitoring continues through the winter of 2007–2008.

In 2008, fish sampling and beaver activity monitoring was not conducted due to staff shortages. Water temperatures were measured hourly over the winter of 2007–2008 and the spring of 2008. Water temperature monitoring continues.

7.2.8.2 Klondike River Ground Water 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 North West and the Canadian Pacific South West. 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 river does not reflect natural flow regimes. Findings from the monitoring of this project may not be entirely transferable to areas with non-regulated flows. Additionally, seasonal use of natural ground water channels by juvenile Yukon River Chinook salmon has not been intensively investigated. To address these concerns, investigations were initiated by DFO Oceans, Habitat and Enhancement Branch (OHEB) Salmon Enhancement Program (SEP) staff.

A pilot investigation commenced in 2004 on 2 ground water 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 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 ground water discharge areas, and least in the lowest section of the channel. As temperatures decline in the autumn, the water in the ground water 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, autumn and into the early winter.

Sampling is conducted annually to determine juvenile salmon behavior under a range of conditions. In 2006 and 2007 results supported the 2005 investigation. However, in 2006 a beaver dam was constructed across the VGC near it's confluence with the NKR. No juvenile Chinook have been captured in the channel since, implying that the dam is a complete obstruction to upstream migration. Volumes of flow in the GCGC have been declining. As ice rotted from the channel in the spring of 2008, an estimated 200+ dead juvenile Chinook salmon and an equivalent number of dead slimy sculpin was observed at the extreme upstream end of the channel.

Very few juvenile Chinook were captured in the GCGC in the open water period of 2008. This was typical of the other sites which are sampled in the Canadian Yukon River North Mainstem Watershed. It is probable that there are multiple causes for this, including a low supply of juveniles and environmental conditions during incubation and summer rearing.

Water temperatures continue to be monitored.

7.3 RESTORATION AND ENHANCEMENT FUND

7.3.1 Status of R&E Projects 2008

Project No.	Project Title	Contractor	Funding $US/Cdn[13]	TC[14]
CRE-06-08	**2008 Yukon River North Mainstream Stewardship**	DDRC[15]	24,000	A
Project completed, final report approved and received.				
CRE-07-08	**Tr'ondëk Hwëch'in First Fish Camp**	THFN[16]	10,000	A
Project completed, final report approved and received.				

[13] 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.

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

[15] Dawson District Renewable Resource Council

[16] Tr'ondëk Hwech'in First Nation

CRE-09-08 **Tr'ondëk Hwëch'in Student Steward** THFN 4,600 A

Project completed, final report approved and received.

CRE-10-08 **Size Selective Fishing Using Live Catch Fish Wheels** YRCFA[17] 29,700 P

No work done this year. De-commitment of full amount.

CRE-11-08 **Inseason Management Fund** YRCFA & THFN 50,000 P

Project conducted. Initial payment made of $30K. Waiting for final invoice for minimal amount and will be de-committing the remainder.

CRE-16N-08b **Klondike River Chinook Sonar** B. Mercer 18,100 P

Project in progress. Early summer field component completed. Suitable sonar site located. Contractor not able to complete fall component. Final report pending.

CRE-19-08 **Mayo River Secondary Channel Reconstruction Year 4** FN NND[18] 14,500 A

Final report is in progress expected December 31, 2008.

CRE-27-08 **Porcupine River Chum Salmon Mark–recapture Program** VGFN 52,200 P

Progress report received and approved, final report in progress expected in December, 2008.

CRE-29-08 **Chum Spawning Ground Tag Recovery-Minto Area** SRRC[19] 12,000 P

Program complete. Recoveries were difficult due to high water conditions. Final report in progress.

CRE-37-08 **Blind Creek Chinook Salmon Enumeration Weir** Jane Wilson & Assoc. 47,100 P

Project in progress, final report in progress expected February 19, 2009.

CRE-41-08 **2008 Chinook Enumeration on Big Salmon River** Jane Wilson & Assoc. 77,700 P

Project completed. *Additional funding of 2.2K requested to recover weir materials washed downstream by high water levels. Final report in progress expected February 15, 2009.

CRE-46N-08 **Upper Teslin Fall Chum Salmon Capture Feasibility Study** TTC[20] 5,000 P

[17] Yukon River Commercial Fishing Association
[18] First Nation of the Na Cho Nyak Dun
[19] Selkirk Renewable Resource Council
[20] Teslin Tlingit Council

Project completed. Low number of chum salmon caught. Final report received.

CRE-51-08 **KDFN Michie Creek Monitoring Project** KDFN[21] 30,000 A/P

Field project completed, progress report received, final report due December 31, 2008.

CRE-54-08 **Ta'an Kwach'an Council Community Stewardship Ta'an** Kwach'an C. 46,200 A/P

Project completed. Final report approved and received.

CRE-63-08 **Whitehorse Rapids Hatchery Coded Wire Tagging & Recovery** YF&GA[22] 41,800 P

Project completed, final report in progress expected February 1, 2009.

CRE-64N-08 **Incubation Temperatures and Sex Ratio Assessment** KDFN 5,500 A/P

Project in progress. Project status reports received and approved with final report in progress and expected December 31, 2008.

CRE-65-08 **McIntyre Creek Salmon Incubation Project** Yukon College-NRI 45,300 A

Project underway, status report expected December 8, 2008 and final report due March 15, 2009.

CRE-66N-08 **Salmon in the Classroom Incubator Chillers** SKNS[23] 4,700 A

Received and paid for.

CRE-67-08 **Yukon Schools Fry Releases and Habitat Studies** SKNS 4,000 A

Project in progress, final report expected March 31, 2009.

CRE-78-08 **Collection and of Yukon River Baseline DNA Samples** DFO/ADF&G 60,000 P/D

Due to low spawning numbers no work done for Canadian portion of project. 40K will be de-committed. US portion will be paid in full with completion of their portion.

CRE-79-08 **Stock Identification of Yukon River Chum and Chinook Sal.** DFO 30,000 P

Analysis complete and final report pending. Full payment made.

URE-04N-08 **Ruby Salmon Data Collection Project** RTC[24] 14,900 D

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[21] Kwanlin Dun First Nation
[22] Yukon Fish and Game Association
[23] Streamkeepers North Society
[24] Ruby Tribal Council

Progress report received and approved, final report expected in February 2009.

URE-05-08 **Marshall Cooperative Chinook Salmon Drift Test Fishery** YRDFA[25] 28,000 D

Project progress report received, final report expected in February 2009.

URE-06-08 **Kaltag Drift Gillnet Salmon Test Fishery Fall Season 2008** City of Kaltag 21,000 D

Project completed. Final report received.

URE-07-08 **Gillnet Catch Composition in Lower and Middle YR Fisheries** YRDFA 7,600 D

Progress report received and approved, final report expected in February 2009.

URE-08-08 **Tech. Assistance, Dev., & Support – Fish Wheel Video** USFWS[26] 5,500 D

Project completed. Paid in full.

URE-09-08 **Rampart Rapids Full Season Video Monitoring 2008** Stan Zuray 46,100 D

Project completed. Final report received.

URE-13-08 **Ichthyophonus Sampling Emmonak and Eagle Alaska** ADF&G[27] 34,200 D

Project in progress, final report due in March 2009.

URE-16-08 A&B **Eagle Sonar** ADF&G 119,600 D

Project in progress, final report due in March 2009.

URE-16-08 C **Eagle Sonar** DFO 69,000 D

Full payment made to DFO. Project complete and full funds utilized.

URE-19N-08 **Inseason Chinook MSA** ADF&G 45,000 D

Project in progress, final report due in March 2009.

Communications Committee Projects

CC-01-08 Teleconferences YRDFA 9000 pd

CC-02-08 Educational Exchange YRDFA 27,000 pd

[25] Yukon River Drainage Fishing Association
[26] United States Department Fish and Wildlife Service
[27] Alaska Department of Fish and Game

8.0 YUKON RIVER SALMON RUN OUTLOOKS 2008

8.1 CHINOOK SALMON

8.1.1 Canadian-Origin Upper Yukon 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 and near the 1999–2008 average, respectively. However, the run of Canadian-origin Upper Yukon River Chinook salmon in 2009 is expected to be below average to poor with a run outlook of 60,700–71,600 fish based on anticipated low production. For comparison, the average run size from 2000 to 2008 is 97,000 Chinook salmon.

The preseason outlook for 2009 based on sibling and stock-recruitment (S/R) models suggest that the total run size of Canadian-origin fish may range from 89,500 to 99,800. However, this range does not include the uncertainly associated with anticipated low production based on recent experience where runs have been at much lower levels than the preseason outlooks. For example, the 2007 run was approximately 30% lower than the preseason outlook while the 2008 run was approximately 29% below the lower end of the outlook range of 80,000–111,000. Despite U.S. and Canadian conservation measures, the escapement targets for Canadian-origin Chinook salmon were not achieved in 2007 and 2008. Hence, the 2009 outlook has been adjusted to reflect the likelihood that low productivity will influence the 2009 run based on the relative performance of the preseason run outlooks to actual run sizes over the past 2 years. The 2009 sibling outlook has been adjusted to an outlook range of 71,600 to 89,500, while the stock-recruitment (S/R) based outlook has been adjusted to a range of 60,700 to 99,800 Chinook salmon.

Environmental factors, poor marine survival, and an increased Chinook salmon bycatch in the Bering Sea trawl fishery targeting Alaskan Pollock could be associated with the low returns observed in 2007 and 2008. If similar effects influence the 2009 return, a run of Canadian-origin Upper Yukon River Chinook salmon as low as 60,700 to 71,600, the lower end of the sibling and stock-recruitment (S/R) outlook ranges, may occur. Based on the severity of the adjusted outlooks it is advisable to enter the 2009 season with the expectation that conservation measures will likely be required to meet the agreed minimum Interim Management Escapement Goal (IMEG) of 45,000 Canadian-origin Upper Yukon Chinook salmon.

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 2000–2008

The performance of run outlooks developed using S/R models for 2000–2008 are presented in Table 14. The revised historical Canadian run size estimates were used to reconstruct the 2000 and 2001 runs; border passage estimates for the years 2002–2004 were based on telemetry data while border escapement estimates for the years 2005–2008 were based on Eagle sonar data. 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. Despite good brood year escapements, the observed run sizes were relatively low from 2000 to 2002 and 2007 to 2008. The causes of low returns are unknown but likely involve a number of factors in the marine and/or freshwater environments. It will be interesting and important to determine if the low returns observed in 2007 and 2008 develop into a long-term trend.

Table 14.–Preseason Upper Yukon River Chinook salmon outlooks and observed run sizes for the years 2000–2008 period. Run sizes incorporated: radio-telemetry data (2002–2004); Eagle Sonar estimates (2005–2008); and the relationship between telemetry/sonar to aerial surveys for 2000 and 2001. Run sizes are rounded to nearest one thousand.

Year	Expected Run Size (Preseason)	Estimated Run Size (Postseason)	Proportion of Expected Run
2000	128,000	53,000	0.41
2001	127,000	86,000	0.68
2002	114,000	82,000	0.72
2003	117,000	150,000	1.28
2004	123,000	120,000	0.98
2005	122,000	124,000	1.02
2006	116,000	120,000	1.03
2007	118,000	83,000	0.70
2008	111,000	57,000	0.51
Average	120,000	97,000	0.82

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 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 the best indicators of upcoming run size, it would be sensible to estimate the 2009 outlook based on the 2007 and 2008 proportions. Using this method, the expected total Yukon River run size is 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.

Thus, the 2009 Yukon River Chinook salmon run will likely be below average to poor. It is therefore prudent to enter the 2009 season with the expectation that subsistence conservation measures, beyond those used in 2008, will likely be required in an effort to share the available subsistence harvest amount and meet escapement goals. It is unlikely that there will be a directed

Chinook salmon commercial fishery in 2009 on the mainstem 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, fishers, 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 2009 that will assist in getting adequate numbers of fish to the spawning grounds should the 2009 Chinook salmon run be similar to the unexpected low runs of 2007 and 2008.

8.2 SUMMER CHUM SALMON

The strength of the summer chum salmon runs in 2009 will be dependent on production from the 2005 (age-4 fish) and 2004 (age-5 fish) escapements as these age classes generally 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. 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.

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 is expected in 2009. The 2009 run is 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 is expected that the total run in the Yukon River could be approximately 1.5–2.0 million summer chum salmon in 2009 which constitutes an average run. However, the BASIS surveys in Norton Sound in fall 2006 indicated that juvenile chum salmon were less abundant and did not appear to be as healthy as previous years. This may indicate the 2009 return of age-4 fish may be less than anticipated.

The 2009 summer chum salmon run is anticipated 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). If inseason indicators of run strength suggest sufficient abundance exists to allow for a commercial fishery, the commercially harvestable surplus in Alaska could range from 500,000 to 900,000 summer chum salmon. The actual commercial harvest of summer chum salmon in 2009 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 to approximating overall escapement. Corresponding return per spawner rates ranged from 0.3 to 9.0, averaging 2.1 for all years combined (1974–2002).

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 15). 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. The point estimate for 2008 used the 1984 to 2001 odd/even maturity schedules to represent years of reduced production.

Table 15.–Preseason drainage-wide fall chum salmon outlooks and observed run sizes for the Yukon River, 1998–2008.

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
Average (1998 to 2008)			0.89

Escapements for the 2003 and 2006 parent years, which will contribute to the age classes of fish returning in 2009, were within or above the upper end of the drainage-wide escapement goal of 300,000 to 600,000 fall chum salmon. The 2005 escapement exceeded the upper end of the drainage-wide escapement goal range by more than 3 times. 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 major contributor to the 2009 fall chum salmon run is anticipated to be age-4 fish returning from the 2005 record parent year. Estimates of returns per spawner (R/S) based on brood year return were used to estimate production for 2003 and 2004. An auto-regressive Ricker spawner-recruit model was used to predict returns from 2005 and 2006. The point projections for 2009 used the 1984 to 2002 brood year returns applied to the odd/even maturity schedule, because current production is reduced from the pre-1984 level.

The 2005 run was the largest on record and the age-3 component that returned in 2008 was not substantial however this age class is not typically a good indicator of future production levels. Returns of age-4 fish from odd-numbered brood years during the time period 1974 to 2002 typically average 823,000 chum salmon, and ranges from a low of 245,000 for brood year 1997 to a high of 2.2 million for brood year 2001. Return of age-5 fish from odd-numbered brood years during the time period 1974 to 2002 typically averages 245,000 chum salmon, and ranges from a low of 61,000 for brood year 1975 to a high of 675,000 for brood year 2001.

The estimated 2003 brood year returns appears to be slightly above average for an odd-numbered year return while the 2004 brood year return is estimated to be below average for even-numbered year returns. There is greater uncertainty as to how well the 2005 fall chum salmon run will be represented in the coming generation. As examples, the returns from the record escapements achieved in 1975 and 1995 resulted in very different production levels. Good survival was realized for the 1975 brood year with an estimated return per spawner of 1.0 while lower survival was evident in 1995 brood year which resulted in a record low return per spawner of 0.34 fish. Recent production levels at 2.0 return per spawner (average R/S 1998 to 2002 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.

Because returns from the 2005 brood year are extremely uncertain, a range of return was developed in the following manner. The lower bound of the range was based on expected return from the Spawner-Recruit model, which was 0.29 return per spawner, and the upper bound was based on the point of equilibrium of the Spawner-Recruit model which was estimated to be 0.56 return per spawner (Figure 10). These 2 return per spawner, rates were applied to the 1984–2002 odd/even maturity schedule. This resulted in a range of projected run size between 600,000 and 980,000 fall chum salmon. The midpoint of these 2 estimates is 790,000 fall chum salmon with contributions from the 2005 brood year ranging from 66% to 79% age-4 fish. These estimates of age-4 returns represent 400,000 to 800,000 fall chum salmon contributing to the 2009 run.

During the season, strength of the run will be monitored using the strength of 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 600,000 and 980,000 fall chum salmon, it is anticipated that escapement goals would be met while supporting normal subsistence fishing activities however; commercial harvestable surpluses will have to be determined inseason.

8.3.2 Canadian-Origin Upper Yukon River Fall Chum Salmon

It was very difficult to determine the 2009 Upper Yukon fall chum salmon outlook because there is not much information on the production (i.e. returns) from the high escapements which have occurred in recent years. The 2009 run will originate primarily from the 2004 and 2005 brood years. The estimated escapements from these years were 154,080 and 437,733 fish, respectively, based on the DFO mark–recapture program. The escapements in both 2004 and 2005 exceeded the escapement goal for rebuilt Upper Yukon River fall chum salmon of >80,000 fish and the 2005 escapement was the highest recorded in the 1982–2008 period (Appendix A19).

The weighted average (by age) brood escapement (2003–2006 BYs) that will contribute to the 2009 Upper Yukon fall chum salmon run is approximately 342,000 fish. For comparison, the

average escapement for the 1998–2007 period was 146,300 and the estimated average total run size for the same period was 180,400.

Due to the considerable uncertainty associated with the potential return from the 2005 escapement and the longer time series used in the ADF&G drainage wide outlook analyses, the ADF&G drainage wide outlook range of 600,000 to 980,000 fall chum salmon was used to determine the potential Canadian-origin fall chum salmon run. The analyses undertaken to develop this outlook range is outlined in Section 8.3.1. There has been a longstanding assumption that the total 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, although there is inter-annual variation. For the purpose of developing the 2009 outlook, we have used the assumption that the Upper Yukon Canadian-origin component is likely to be at least 25% of the drainage wide return while the Fishing Branch component will be approximately 5% of the total drainage wide return.

The Upper Yukon outlook range is from 150,000 to 240,000 fall chum salmon based on the ADF&G drainage wide outlook range of 600,000 to 980,000 fall chum and an assumed 25% contribution of Canadian-origin Upper Yukon fall chum salmon. 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. Given the uncertainly associated with the 2009 Upper Yukon fall chum salmon return, it is prudent to enter the 2009 season with the expectation that in-season 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 in-season run abundance levels.

Returns over the next few years from the recent high escapements should improve and provide better definition to the DFO stock-recruitment database and model. The recent 5-year (1999–2003) and 10-year (1994–2003) return per spawners values were 2.6 and 1.7, respectively[28].

A summary of preseason outlooks, postseason run size estimates and the proportion of the expected run size observed for the 1998 to 2008 period are presented in Table 16.

Table 16.–Preseason Upper Yukon River fall chum salmon outlooks and observed run sizes from 1998 to 2008. Run sizes are rounded to nearest one thousand.

Year	Expected Run Size	Estimated Run Size	Proportion of Expected Run
1998	198,000	61,000	0.31
1999	336,000	98,000	0.29
2000	334,000	63,000	0.19
2001	245,000	45,000	0.18
2002	144,000	110,000	0.76
2003	145,000	180,000	1.18
2004	147,000	181,000	1.24
2005	126,000	515,000	4.09
2006	126,000	284,000	2.26
2007	147,000	278,000	1.87
2008	229,000	237,000	1.03
Average	198,000	186,000	1.22

[28] An outlier (BY 2001) with an exceptional R/S value was excluded from these averages since it appeared to be an anomaly.

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 the year 2000 when the count through the Fishing Branch River weir was only 5,053 fish, the lowest on record. However, run sizes improved between the years 2001 to 2008 when counts ranged from a low of 13,563 in 2002 to a high of 121,413 in 2005. Based on recent analyses, the Fishing Branch River escapement goal range for the 2008–2010 period has been decreased from a longstanding goal of 50,000–120,000 to a much lower range of 22,000–49,000 fall chum salmon (JTC 2008).

The 2009 fall chum salmon run to Canadian portions of the Porcupine River drainage should originate primarily from the 2004 and 2005 escapements. The Fishing Branch River weir counts for these years were 20,274 and 121,413 fall chum salmon, respectively. The 2004 count was 33% below the 1998–2007 average of 30,256 while the 2005 count was approximately 4 times the average. Approximately 71% of the average odd-year returns are comprised of 4-year fish.

The approach taken to determine the 2009 Fishing Branch River fall chum outlook is similar to the approach taken for the Upper Yukon. The 2009 Fishing Branch outlook range is from 30,000 to 49,000 based on the ADF&G drainage wide outlook range of 600,000 to 980,000 fall chum salmon and an assumed 5% contribution of Fishing Branch fall chum salmon.

The 2009 outlook is the estimated number of chum salmon entering the mouth of the Yukon River bound for the Fishing Branch River; this number will be decreased by U.S. and Canadian fisheries prior to the fish being counted at the Fishing Branch River 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. Nevertheless, the 2009 Fishing Branch River fall chum salmon run may be sufficiently strong enough to achieve the lower end of the 22,000 to 49,000 escapement goal range. Given the uncertainly associated with the 2009 Fishing Branch run outlook, it is prudent to enter the 2009 season with the expectation that in-season 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 estimated Porcupine River fall chum salmon run sizes were consistently below preseason outlooks throughout the 1998–2002 period (Table 17). The Fishing Branch River enumeration weir monitors the escapement to what is believed to be the dominant spawning stock within the Porcupine drainage. Canadian postseason estimates of the Porcupine drainage fall chum salmon return consistently exceeded preseason outlooks from 2003 to 2005 while the 2006 postseason estimate was 11% lower than the preseason estimate. The 2007 and 2008 postseason run size estimates were 34% and 60% lower than the preseason outlooks, respectively. However, unusually late run timing may have adversely affected the Fishing Branch River weir in 2007; there was no reliable timing information that could be used to expand the 2007 weir count which ended before the run had completely passed upstream.

Table 17.–Preseason Porcupine River fall chum salmon outlooks and observed run sizes for the years 1998–2008. Run sizes are rounded to nearest one thousand.

Year	Expected Run Size (Preseason)	Estimated Run Size (Postseason)	Proportion of Expected Run
1998	112,000	25,000	0.22
1999	124,000	24,000	0.19
2000	150,000	13,000	0.09
2001	101,000	33,000	0.33
2002	41,000	20,000	0.46
2003	29,000	46,000	1.59
2004	22,000	32,000	1.45
2005	48,000	190,000	3.96
2006	54,000	48,000	0.89
2007	80,000	53,000	0.66
2008	78,000	31,000	0.40
Average	76,000	47,000	0.93

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 2009 coho salmon run will be the age-4 fish returning from the 2005 parent year. Based on Pilot Station sonar operations from 1995, and 1997 through 2008, the 2005 passage estimate of 184,000 coho salmon was above average (Figure 11). The Delta Clearwater River (DCR) is a major producer of coho salmon in the upper Tanana River drainage which has comparative escapement monitoring data since 1972. The parent year escapement of 34,000 fish in 2005 was the sixth highest on record and 2 times the upper end of the Sustainable Escapement Goal (SEG) range of 5,200 to 17,000 coho salmon. DCR escapement has been on the increase since 1972, in particular within the last decade. Evaluations of coho salmon escapements in the Nenana and Richardson Clearwater rivers also indicated the run was average to above average. Assuming average survival, the 2009 coho salmon run, is anticipated to be average to above average based on good escapements in 2005.

The Alaska *Yukon River Coho Salmon Management Plan* allows a directed commercial coho salmon fishery, but only under unique 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 2009: 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 have consistently been 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 (3 scenarios: 3-area index; 4-area index; and a single index) and independent border passage estimates (2 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, and the working group recommended a target of 45,000. The JTC then 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 for 1 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.

The JTC recommends that the Minimum Interim Management Escapement Goal (IMEG) of 45,000 Chinook salmon established for 2008 be used in 2009. The Chinook Salmon Escapement Goal working group will continue to examine other data which can 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.

Table 18 summarizes the management and harvest targets associated with the expected run sizes and the minimum Interim Management Escapement Goal (IMEG) of 45,000 in 2009. The lower range of the 2009 stock-recruitment and sibling outlooks are presented in Table 18. The lower range of the expected run sizes are presented because they integrate how recent runs have returned at levels which were much lower than the preseason outlooks.

Table 18.–U.S. and Canadian allowable catches (AC) of Canadian-origin Upper Yukon River Chinook salmon based on the preseason run outlook and recommended Interim Management Escapement Goal (IMEG).

Expected Run Size	Interim Management Escapement Goal	TAC	CDN Share (23%)	U.S. AC (CDN stock)	Estimated Total U.S. Harvest	Minimum Border Passage Target	Allowable U.S. Harvest Rate
61,000- L. S/R	45,000	16,000	3,700	12,300	24,600	48,700	20%
72,000- L Sibling	45,000	27,000	6,200	20,800	41,600	51,200	29%

8.5.2 Upper Yukon River Fall Chum Salmon

The 2009 run of Upper Yukon River fall chum salmon is considered to be a rebuilt run as the primary brood year spawning escapements achieved the level for a rebuilt stock as defined by the Yukon River Salmon Agreement, i.e., >80,000 fish. Since the mark–recapture estimates generally agreed with the Eagle sonar estimates within the 2006 to 2008 period, the recommended target for 2009 is a spawning escapement of >80,000 fish which will be calculated using border passage estimates from the Eagle sonar program.

The Upper Yukon outlook range is from 150,000 to 240,000 fall chum salmon. 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. Given the uncertainly associated with the 2009 Upper Yukon fall chum salmon return, in-season assessment programs will determine the run strength and appropriate management actions will be taken in response to the run strength. A decision matrix will be developed within the Integrated Fisheries Management Plan (IFMP) to provide detailed guidance for specific in-season run abundance levels.

8.5.3 Fishing Branch River Fall Chum Salmon

The Yukon River Salmon Agreement lists an escapement goal range of 50,000 to 120,000 fall chum salmon for the Fishing Branch River. This goal was achieved only 5 times since 1985. The 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 chum salmon. However, due to concerns over the quality of the data and analytical issues, the BEG recommendation was not accepted.

The inability to reach the 50,000–120,000 goal, particularly when considering the goal was achieved once over the 2 fall chum salmon 4-year-cycles preceding 2008 when escapements to the Upper Yukon River in Canada were rebuilding, led the JTC to question 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 peer 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 121,413 fall chum salmon in 2005 are documented. The majority of fish returning from 2005 will return 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 BEG ready for peer review prior to the 2011 season.

For the years 2008–2010, 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 25th and 75th percentiles of the 22 years of weir counts.

The 2009 Fishing Branch River Upper Yukon outlook range is from 30,000 to 48,000 fall chum salmon. The base level escapement for the 2009 run is approximately 94,000. Given the uncertainly associated with the 2009 Upper Yukon fall chum salmon return, in-season assessment programs will determine the run strength and appropriate management actions will be taken in response to the run strength. A decision matrix will be developed within the Integrated Fisheries Management Plan (IFMP) to provide detailed guidance for specific in-season run abundance levels.

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 are currently under review 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 5 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 2 forks were combined into a single goal (Table 19). The escapement goal team recommended no changes to these escapement goals for 2008 and 2009 and none were adopted by the Alaska Board of Fisheries. In the upcoming 2010 Board cycle, the BEGs for the Chena and Salcha rivers are under review. The SEGs for the East Fork and West Fork Andreafsky, Anvik, Nulato, and Gisasa rivers are also slated for review.

Table 19.–Yukon River escapement goals set for Chinook salmon in 2005 were continued from 2006 through 2008.

Chinook Salmon Stock	Previous Goal (Type) Year Established	Goal Adopted in 2005 (Type)
E. Fork Andreafsky River	>1,500 (EO[a]) 1992	960–1,700 (SEG)
W. Fork Andreafsky River	>1,400 (EO[a]) 1992	640–1,600 (SEG)
Anvik River	>1,300 (EO[a]) 1992	1,100–1,700 (SEG)
Gisasa River	>600 (EO[a]) 1992	420–1,100 (SEG)
Nulato N. and S. combined	None	940–1,900 (SEG)
Chena River	2,800–5,700 (BEG) 2001	No Change
Salcha River	3,300–6,500 (BEG) 2001	No Change

[a] Goals were called escapement objectives (EO) because they were inconsistent with definitions BEG and SEG within the policy.

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 information for Yukon River Chinook salmon is presented in Appendix A8 and Figure 10.

9.1.1.2 Objective

Cooperative Canada/U.S. management of Canadian origin Yukon River Chinook salmon has utilized an agreed 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 rebuild 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 has 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 taking into account the 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.

9.1.1.3 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

In 2005, aerial survey goals for summer chum salmon were discontinued for the East and West Forks of the Andreafsky River in favor of using the East Fork Andreafsky River weir escapement goal as an index of escapement into the system. No change was recommended for the East Fork Andreafsky River weir goal. The biological escapement goal for Anvik River summer chum salmon was revised from the 400,000 to 800,000 fish to a range of 350,000 to 700,000 as measured by the Anvik River sonar (Table 20). The escapement goal team recommended no changes to these escapement goals for 2007 and none were adopted by the Board of Fisheries. The East Fork Andreafsky and Anvik River BEGs are currently under review by the Escapement Goal Review Team.

Table 20.–Yukon River escapement goals set for summer chum salmon in 2005 were continued from 2006 through 2008.

Summer Chum Salmon Stock	Previous Goal and Year Established	Goal Adopted in 2005 (Type)
E. Fork Andreafsky R.	65,000–130,000 (BEG) 2001	No Change (weir)
E. Fork Andreafsky R.	35,000–70,000 (BEG) 2001	Discontinued (aerial)[a]
W. Fork Andreafsky R.	65,000–130,000 (BEG) 2001	Discontinued (aerial)[a]
W. Fork Andreafsky R.	35,000–70,000 (BEG) 2001	Discontinued (aerial)[a]
Anvik R.	400,000–800,000 (BEG) 2001	350,000–700,000 (sonar)

[a] Discontinued because of difficulty conducting aerial surveys of summer chum salmon.

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 (BEGs) established in 2001 for Alaskan fall chum salmon stocks (Table 21). There are no fall chum salmon BEGs for Canadian-origin stocks within the Upper Yukon River (mainstem) and Porcupine River drainages. The BEGs 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 21.–Yukon River escapement goals set for fall chum salmon in 2008 and recommendations for 2009.

Fall Chum Salmon Stock	Previous Goal (Type) Established in 2001	2008 Goals	Goal Recommended in 2009
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	No Change
Fishing Branch River	50,000–120,000 (Yukon Salmon Agreement)	22,000-49,000	22,000–49,000

However, as is outlined in Section 8.5.3, the JTC has recommended an interim management escapement goal (IMEG) range of 22,000 to 49,000 to be used for the Fishing Branch River 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. It is anticipated that a BEG for Fishing Branch River fall chum salmon will be developed by 2011. The JTC recommends that the current goal for rebuilt Upper Yukon River (mainstem) fall chum salmon of >80,000, as per the Yukon River Salmon Agreement, be maintained in 2009.

9.4 COHO SALMON

For coho salmon in 2005, 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. No changes were made to the escapement goal by the Alaska Board of Fisheries in 2007 and therefore the existing goal will remain in effect for 2009.

10.0 MARINE FISHERIES INFORMATION

10.1 INTRODUCTION

Yukon River salmon migrate into the Bering Sea during the spring and summer after typically spending 1 winter rearing in fresh water. Information on stock origin from tagging, scale pattern, parasites, and genetic analyses indicate that Yukon River salmon are likely to be found throughout the Bering Sea and in regions of the North Pacific Ocean south of the Aleutian chain and Gulf of Alaska (Healey, 1991; Salo, 1991). Yukon River salmon have the potential to be captured by fisheries which harvest mixed stocks of salmon, by fisheries targeting 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 include the salmon fisheries in the South Alaska Peninsula area, and the U.S. groundfish trawl fishery in the Gulf of Alaska and in the Bering Sea-Aleutian Islands management area (BSAI). Updated information on the South Alaska Peninsula fisheries harvests and salmon bycatch in the Bering Sea and Gulf of Alaska groundfish fisheries is included along with information on High Seas Driftnet enforcement activities by the United States Coast Guard and National Marine Fisheries Service (Figure 12).

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 1 period.

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

Prior to the 2004 fishing season, many of the restrictions in place from 2001 to 2003 were replaced by a set fishing schedule, which is currently still in effect. Sockeye salmon harvests from 2004 through 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; Figure 12).

10.3 Salmon Bycatch in the Bering Sea and Gulf of Alaska Groundfish Fisheries

The U.S. groundfish fisheries in the BSAI and in the Gulf of Alaska (GOA) are managed under the Magnuson-Stevens Fisheries Conservation and Management Act by the North Pacific Fishery Management Council (NPFMC), and are regulated by NMFS. Annual summaries of Pacific salmon bycatch in the Bering Sea and Gulf of Alaska groundfish fisheries are provided by the North Pacific Groundfish Observer Program (Berger, 2008), and information on Chinook salmon bycatch in the BSAI groundfish fishery is currently available inseason from the NMFS catch reporting website, (http://www.fakr.noaa.gov/sustainablefisheries/catchstats.htm).

Bycatch of both Chinook and non-Chinook salmon (principally chum salmon) dropped to historic low levels in the BSAI and GOA groundfish fisheries in 2008 (Chinook: 18,768 in BSAI, 13,344 in GOA) (non-Chinook: 9,031 in BSAI, 2,035 in GOA) (Appendix A21; Berger, 2008). Through a series of workshops and the development of an Environmental Impact Statement (EIS) on Chinook salmon bycatch, the NPFMC has provided a comprehensive overview of the various components of bycatch, including the distribution and abundance patterns of salmon and pollock, effectiveness of avoidance strategies used to manage bycatch in groundfish fisheries, and bycatch impacts to western Alaska salmon populations (http://www.fakr.noaa.gov/npfmc/current_issues/bycatch/bycatch.htm).

10.4 Enforcement of High Seas Driftnet Fishing Moratorium

Monitoring compliance with the North Pacific Anadromous Fisheries Commission (NPAFC) Convention and the moratorium on high seas driftnet (HSDN) fishing continues to be an important mission for the U. S. Coast Guard (USCG) and the National Oceanic & Atmospheric Administration/National Marine Fisheries Service (NOAA/NMFS). In recent years, the threat of illegal HSDN fishing in the North Pacific has largely shifted from targeting salmon to squid, with tuna as bycatch.

Operation North Pacific Watch, the U.S. Coast Guard HSDN Enforcement Plan, started in July with the commencement of the USCG cutter MUNRO patrol. The cutter patrols were augmented with several USCG HC-130 deployments punctuated throughout the summer and fall to Shemya Island, Alaska and Midway Island in July, September, and October. The Canadian Air Force also made an extended CP-140 deployment to Shemya in September. Japan Coast Guard Gulfstream-V aircraft also patrolled the Convention Area and coordinated surveillance efforts with the USCG cutter MUNRO in September and October. Air Station Kodiak aircraft flew a total of 115 surveillance hours this year, and the USCG cutter JARVIS and USCG cutter MUNRO patrolled a combined total of 97 days (61 days in the Convention Area) (Appendix A22). There were 16 potential HSDN vessels sighted (by both USCG and Canadian flights), resulting in the seizure of 2 vessels due to the presence of HSDN gear on board within the NPAFC convention area and approximately 140 tons of squid were seized.

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FIGURES

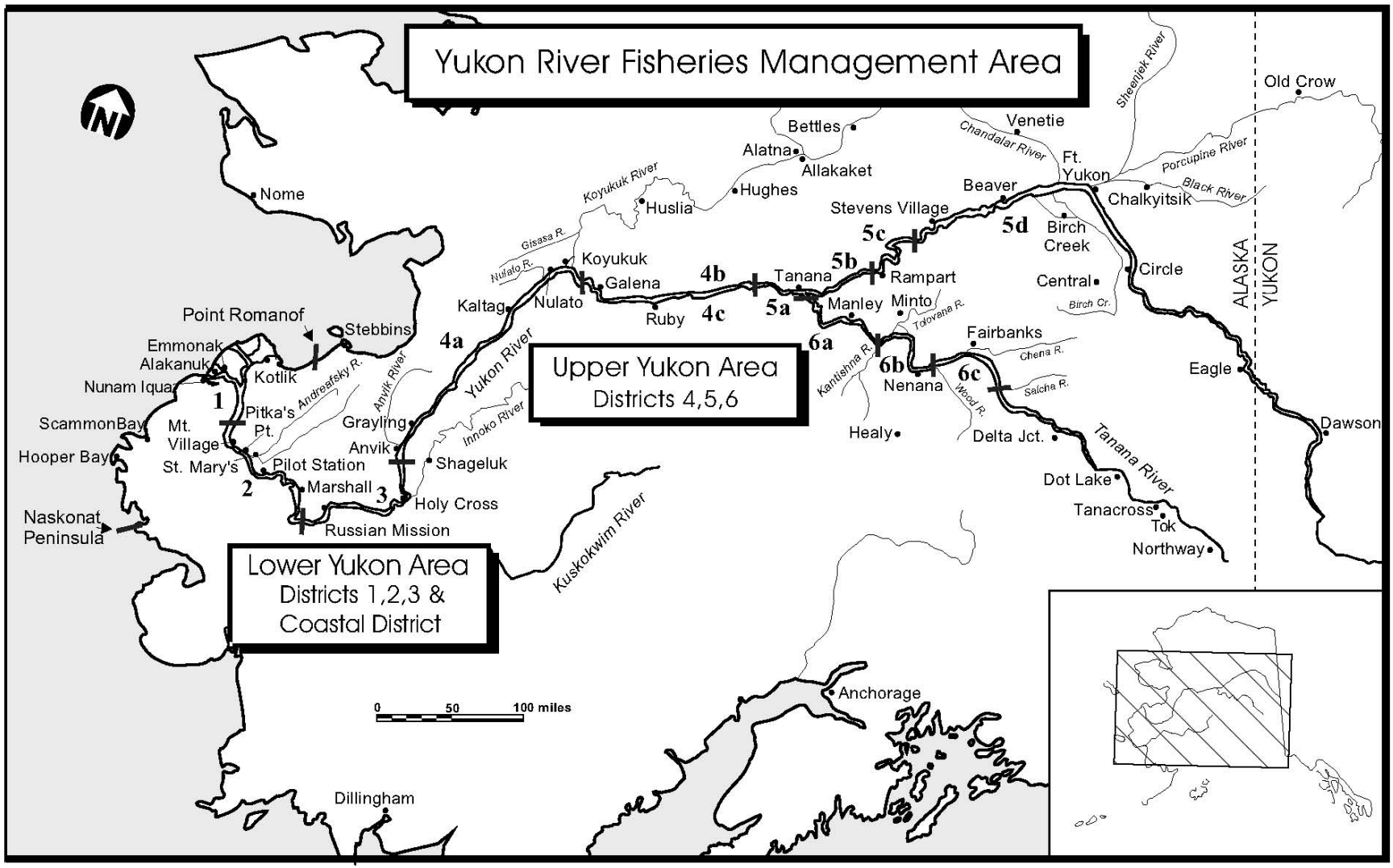
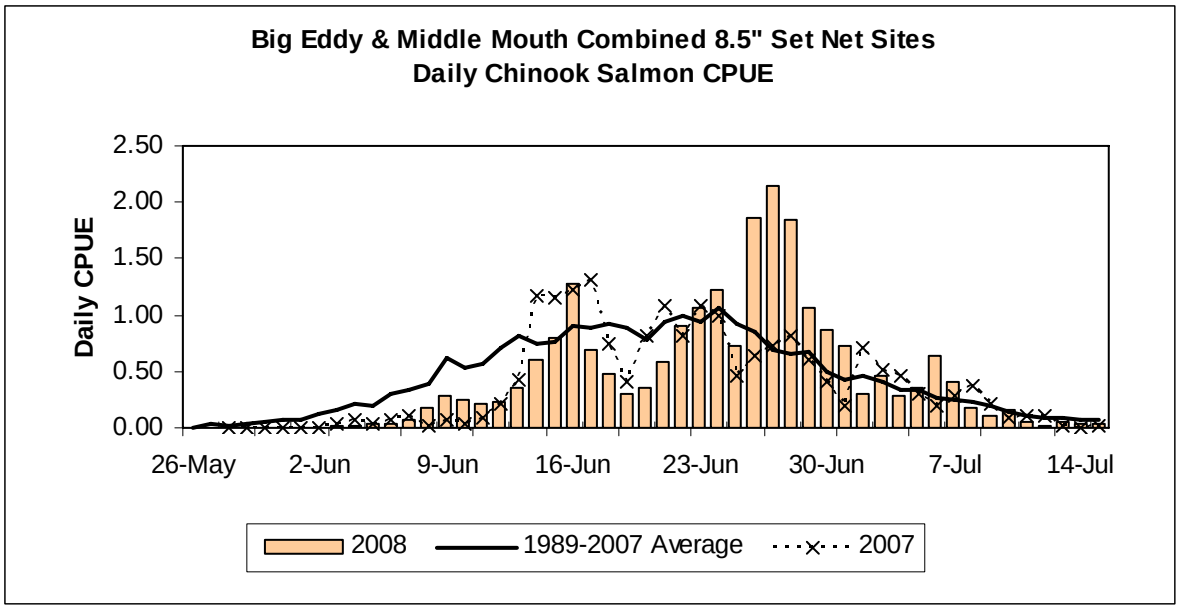
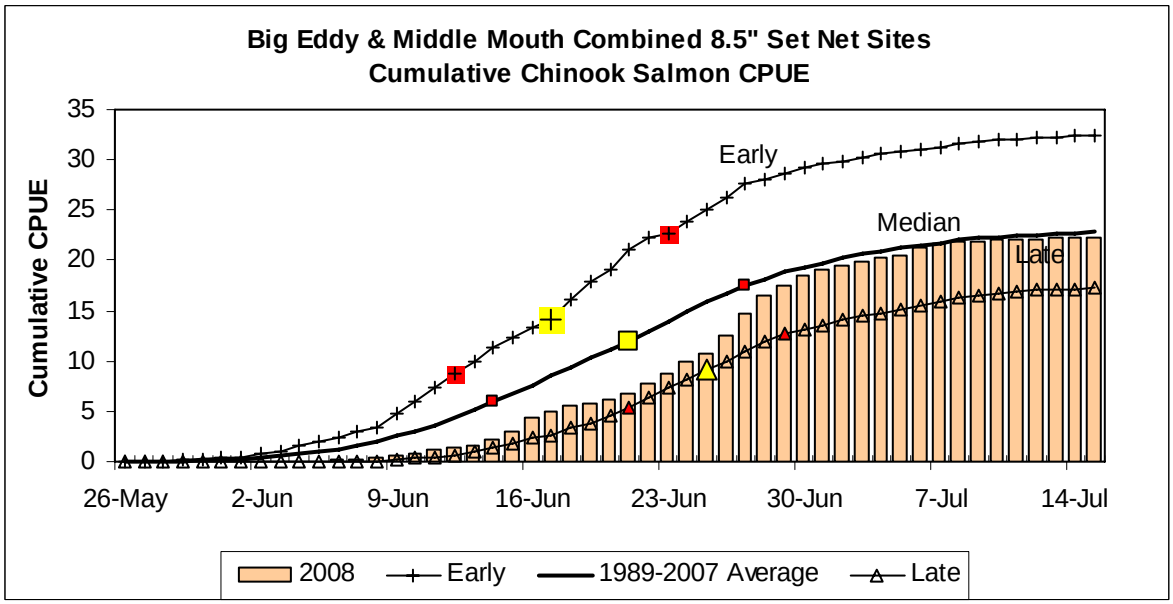


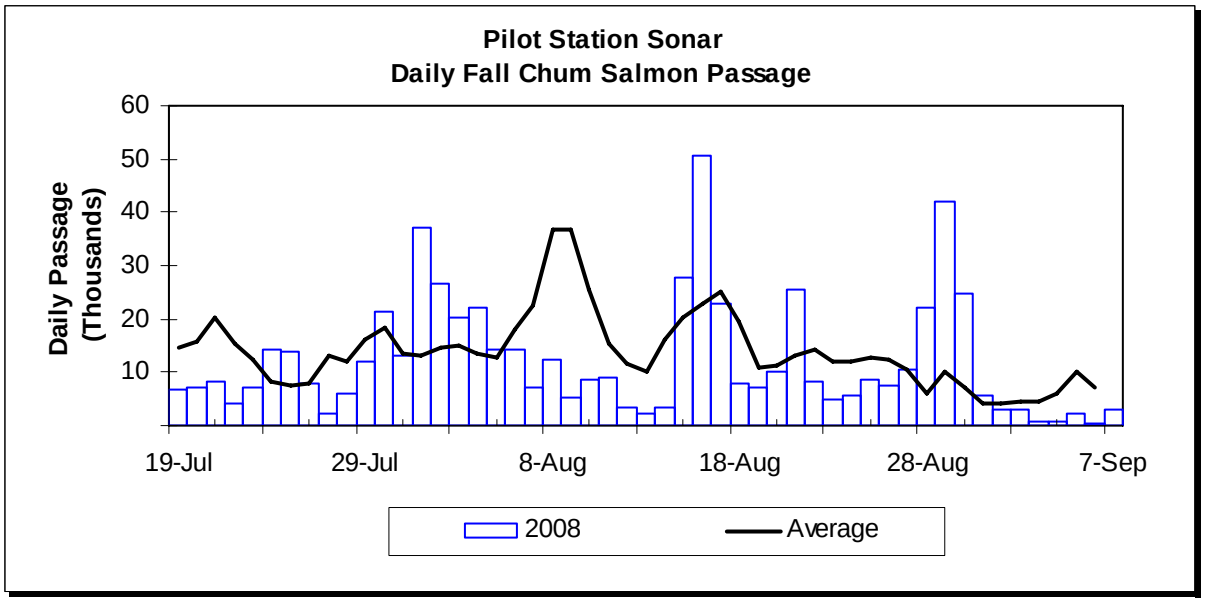
Figure 1.–Map of the Alaskan portion of the Yukon River drainage showing communities and fishing districts.





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 2008 compared to the 1989 to 2007 average (above). The 2008 cumulative CPUE compared to the 1989 to 2007 average early, and late run timing (below).



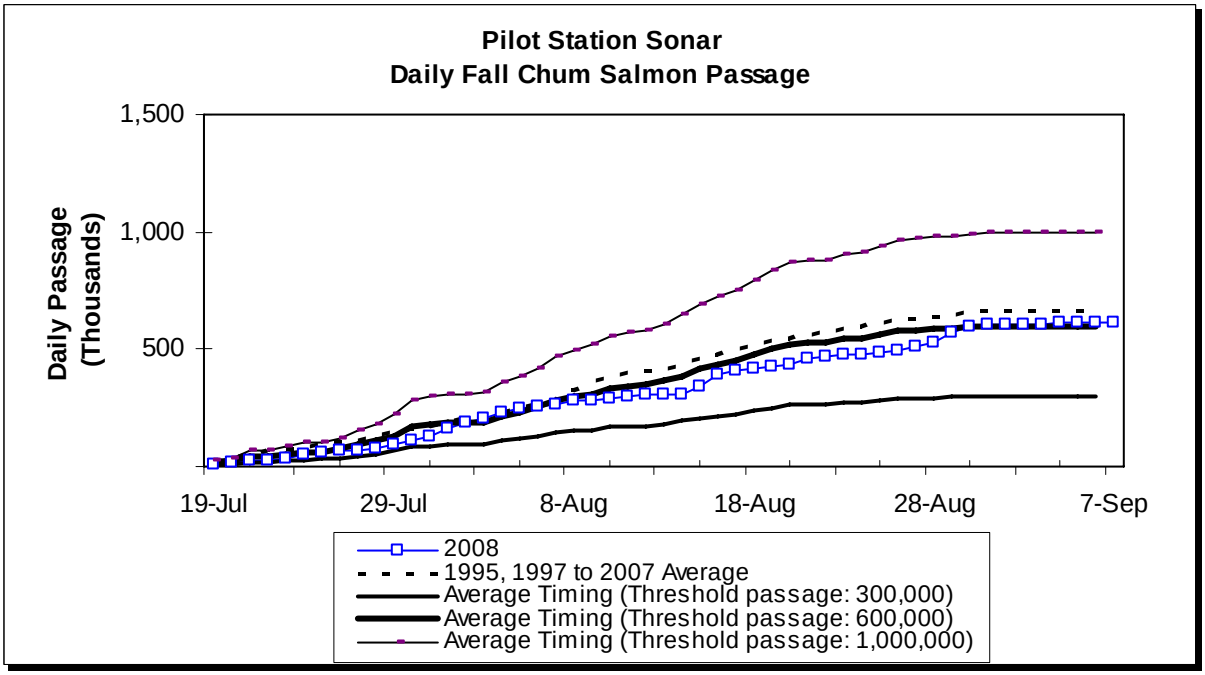


Figure 3.–Daily Pilot Station sonar passage counts attributed to fall chum salmon in 2008 (top), compared to 1995 and 1997 through 2007 average. Cumulative Pilot Station sonar passage counts attributed to fall chum salmon in 2008 (bottom), compared to 1995 and 1997 though 2007 average.

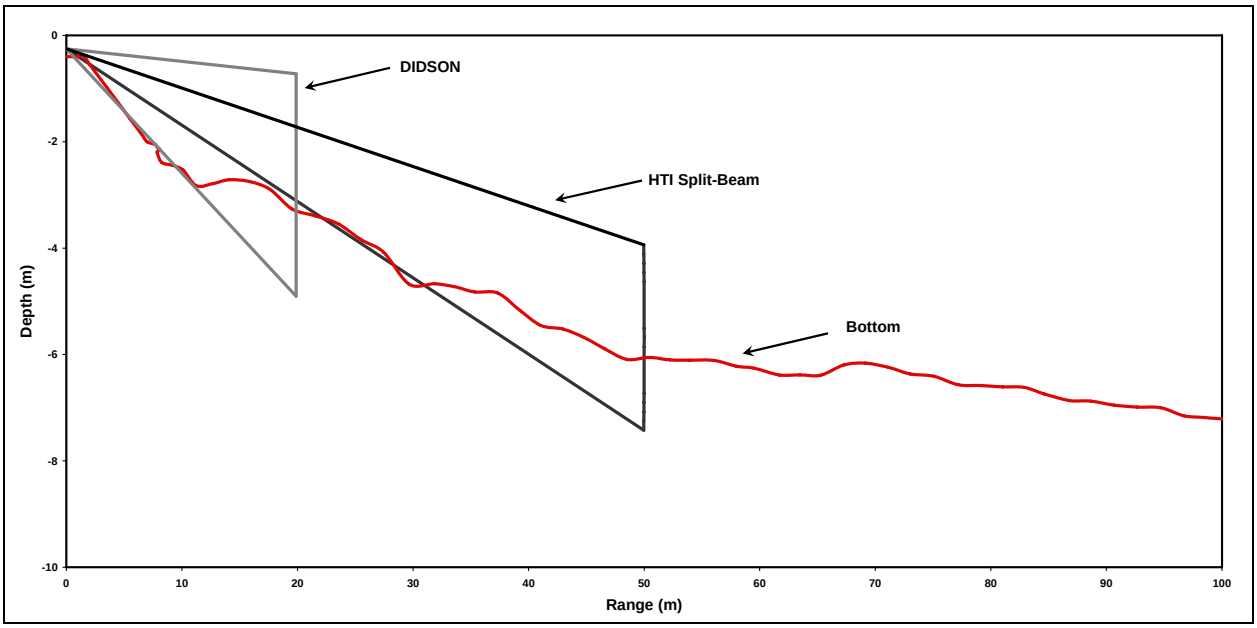


Figure 4.–Schematic representation of the approximate river profile in 2005 and associated nominal beam-width of the DIDSON and split-beam sonar of the first sampling stratum on the left bank used from 2005 through 2008.

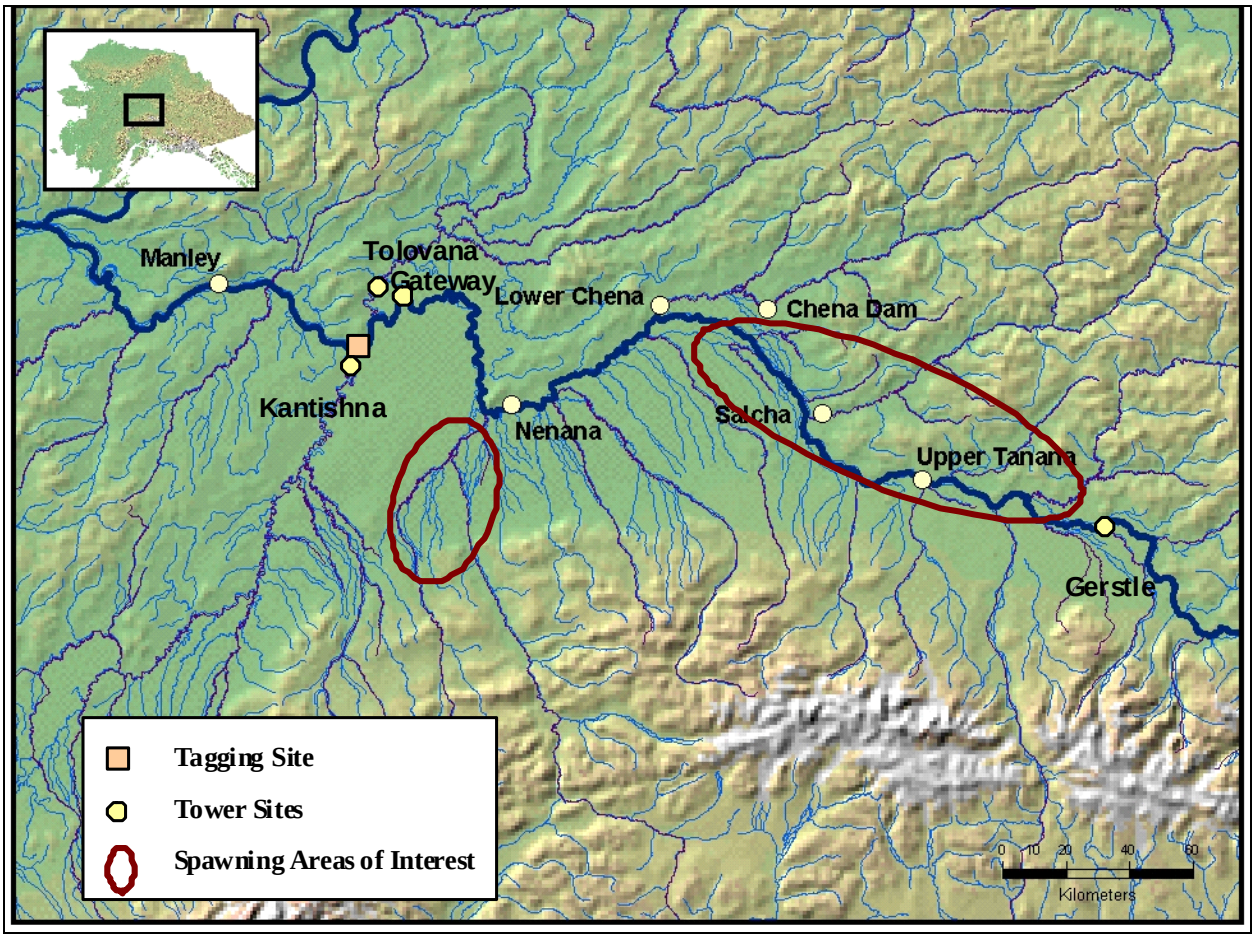


Figure 5.–Map of the Tanana River drainage indicating tagging site, names and locations of remote tracking stations, and particular locations of interest, 2008.

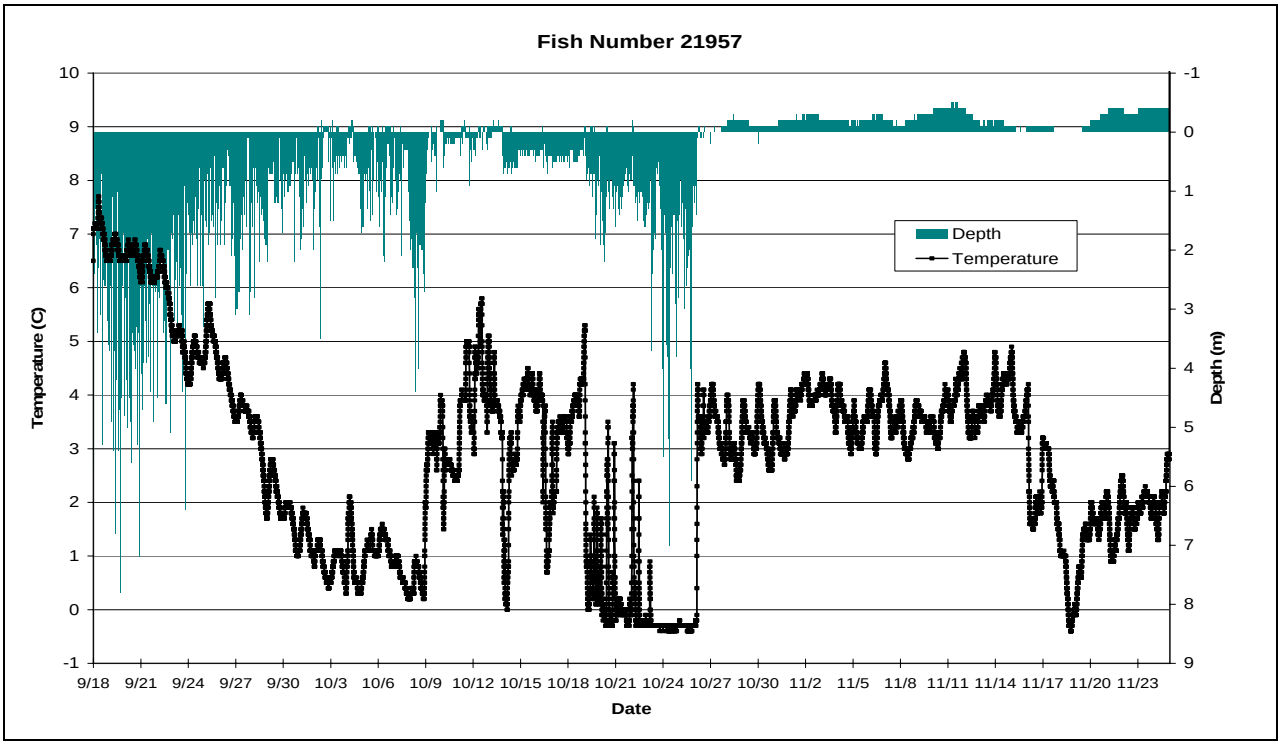


Figure 6.–Archival tagged fall chum salmon released near the mouth of the Kantishna River on 9-18-08, and then recovered on 11-25-08 at the Delta River. The fish was located at Rika's Roadhouse from approximately 10-9 to 10-20, and then moved to the Delta River from 10-27 to 11-25 (note the rise in temperature during these times and drop in depth).

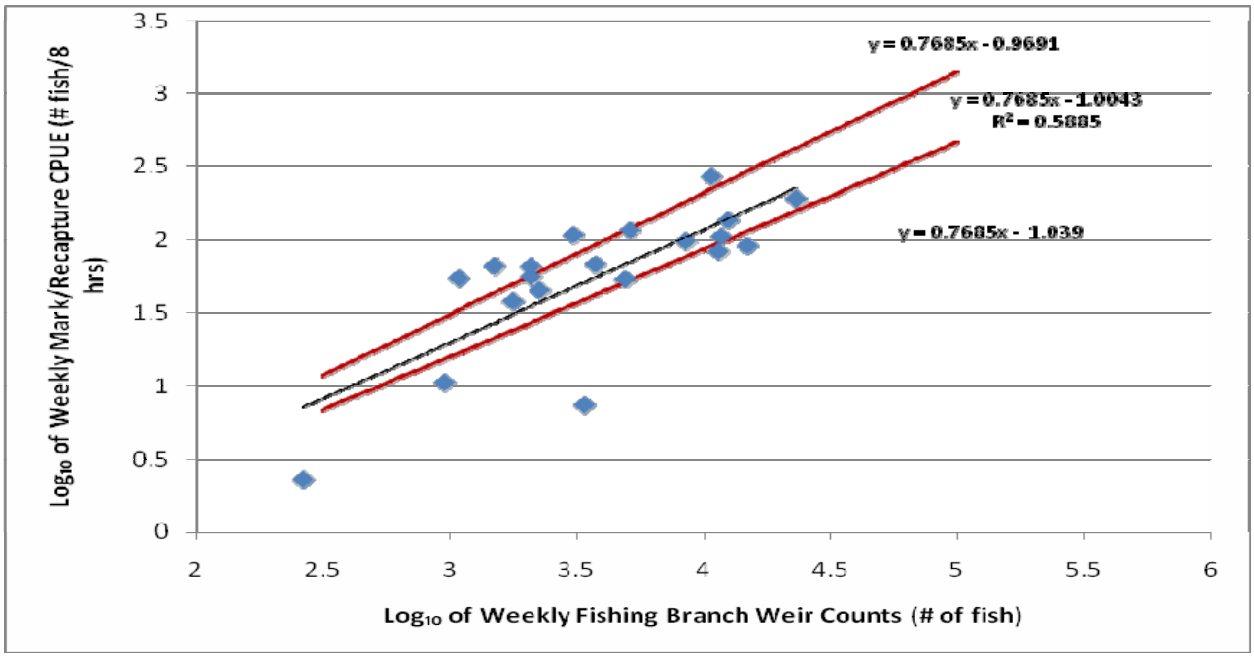


Figure 7.–Scatter plot showing the relationship between weekly test fishery CPUE and adjusted Fishing Branch Weir counts. (red lines indicate 75% confidence interval).

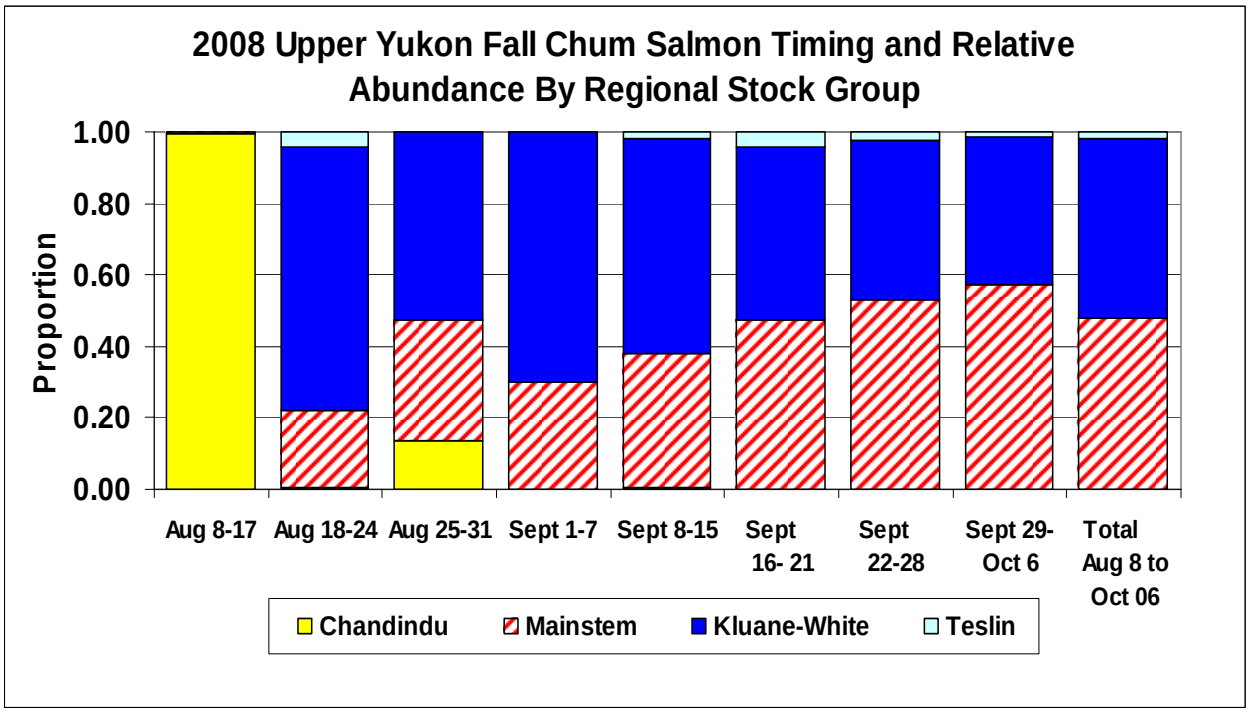


Figure 8.–Weekly proportions and relative abundance of Upper Yukon Chinook salmon stocks in 2008 determined by Genetic Stock Identification analyses. This figure shows all 4 of the regional stock aggregates. The first 3 weeks of the early season data involves small samples sizes.

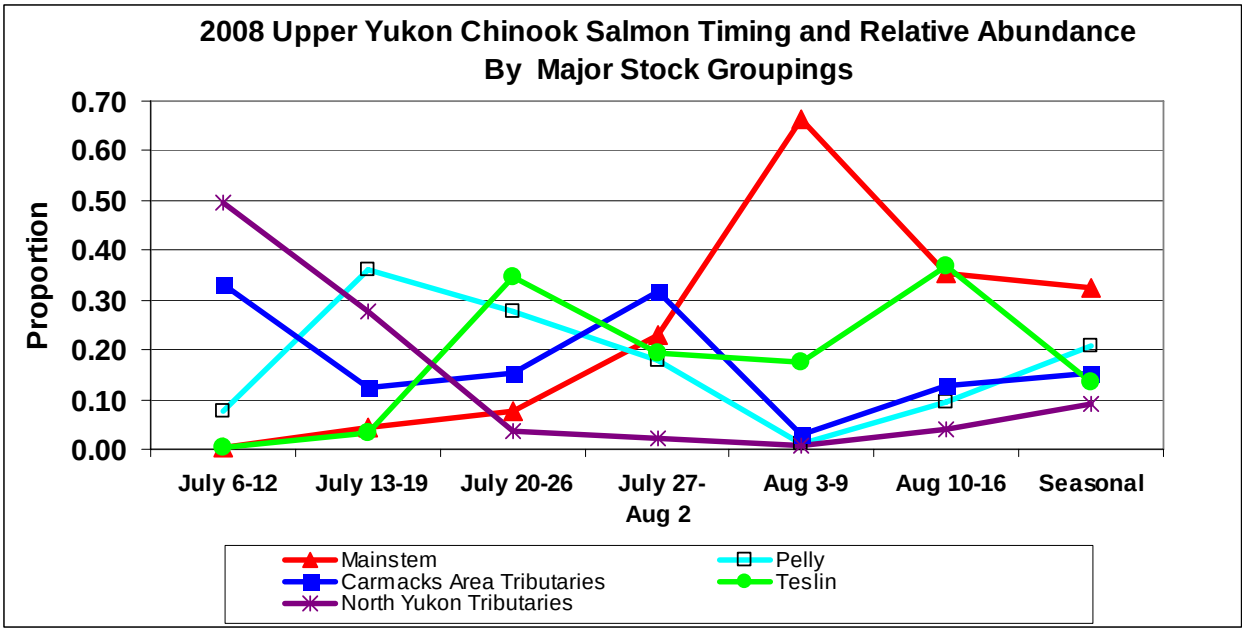


Figure 9.–Timing and relative abundance of Upper Yukon Chinook salmon stocks in 2008 determined by Genetic Stock Identification analyses. This figure shows the 5 dominate stock aggregates (within the 8 aggregate stocks) observed in 2008.

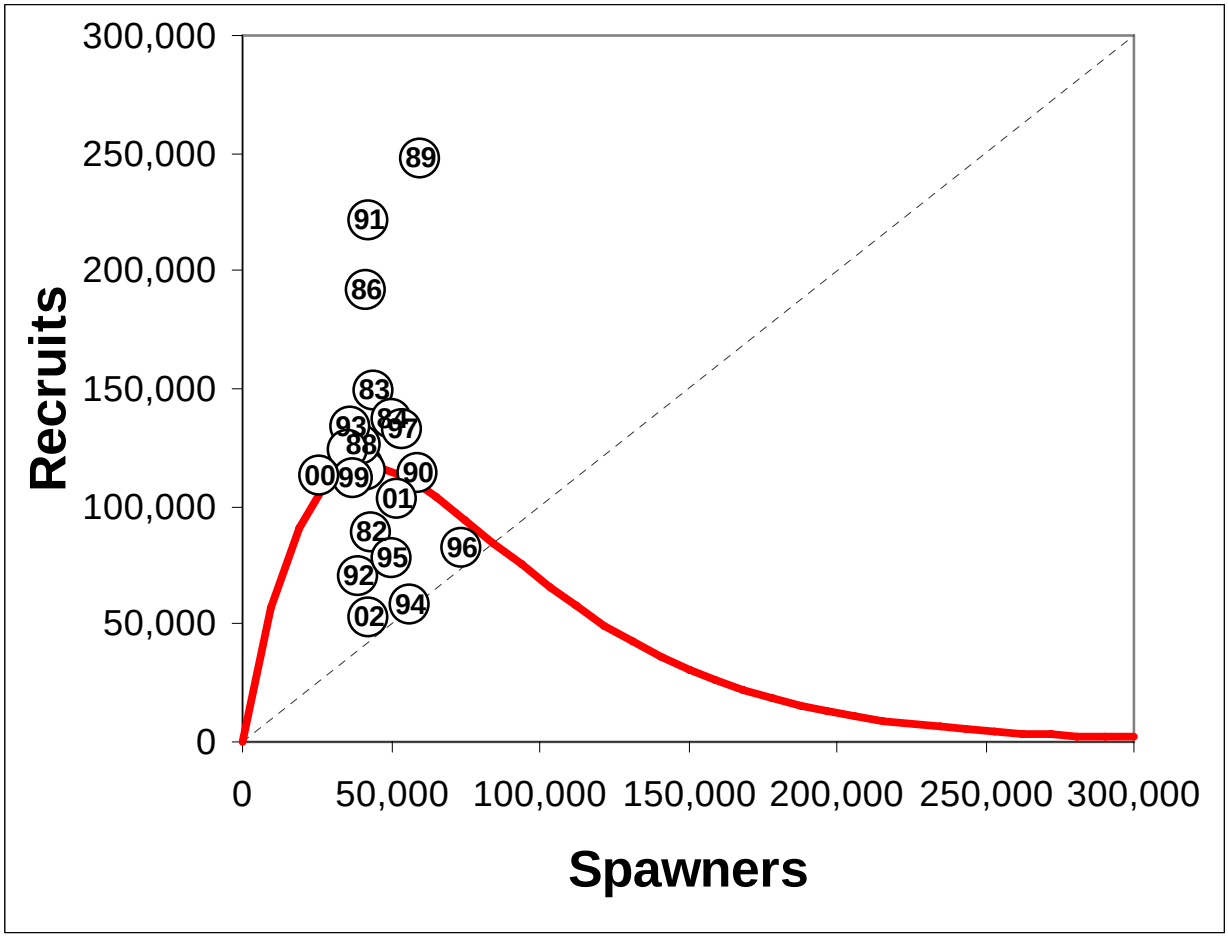


Figure 10.–Yukon River Canadian-origin Chinook salmon recruits versus spawners, Ricker curve, and 1:1 replacement line.

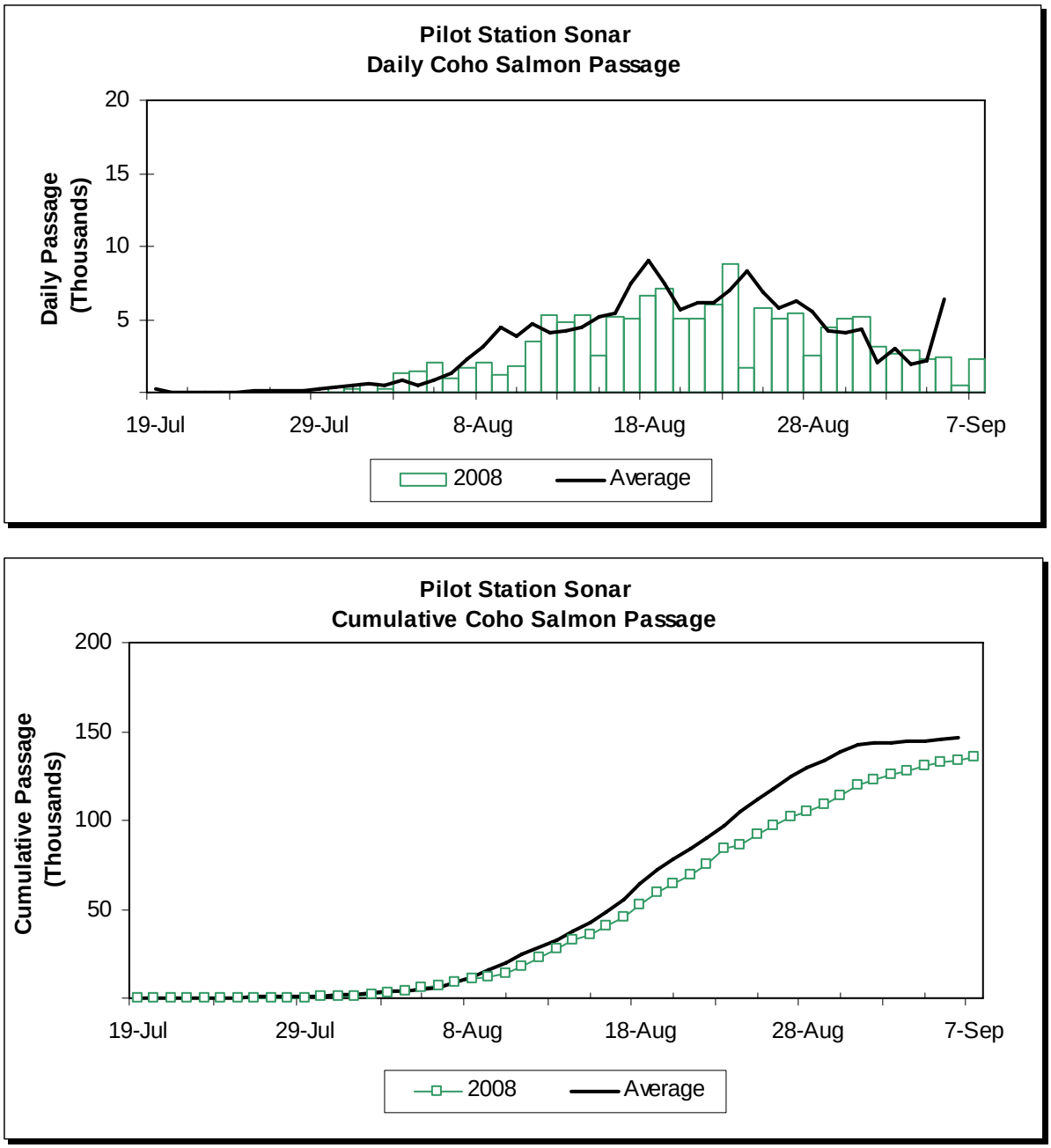


Figure 11.–Daily Pilot Station sonar passage counts attributed to coho salmon in 2008 (top), compared to 1995 and 1997 through 2007 average. Cumulative Pilot Station sonar passage counts attributed to coho salmon in 2008 (bottom), compared to 1995 and 1997 though 2007 average.

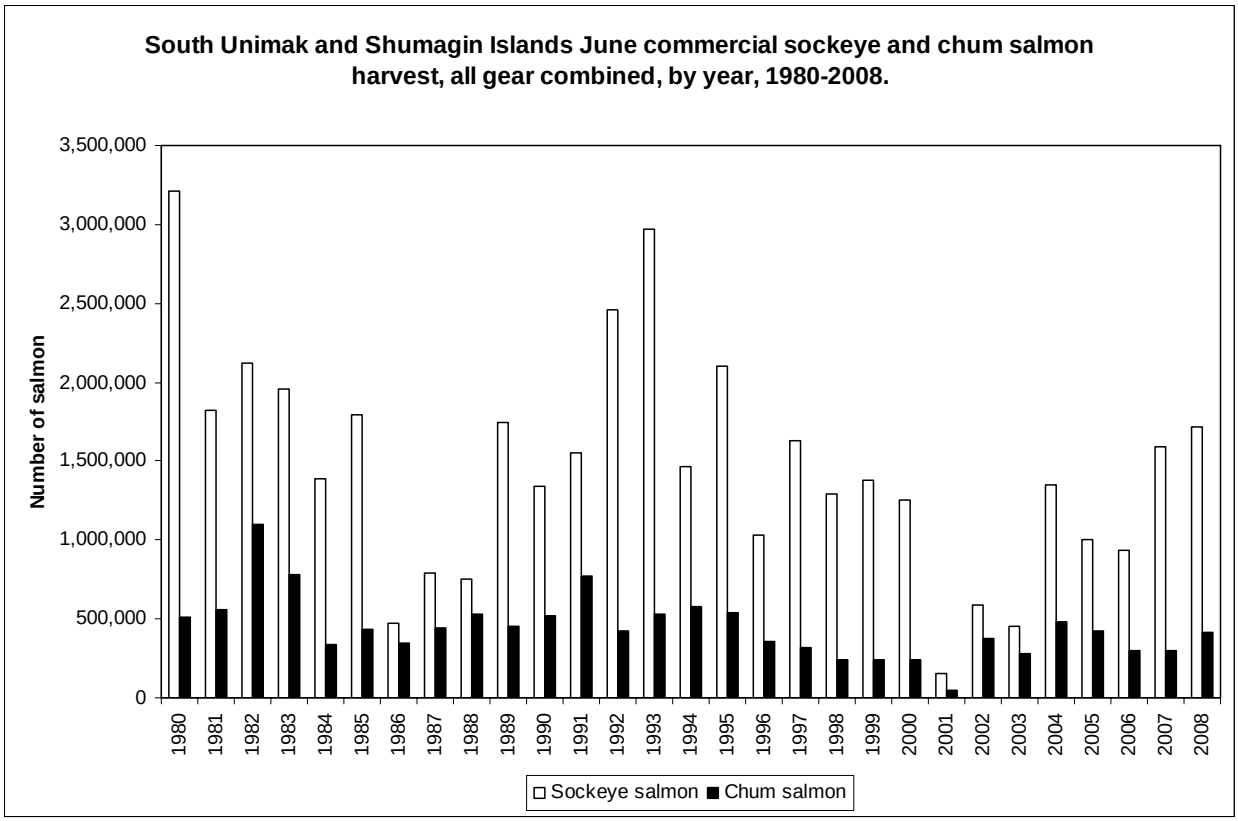


Figure 12.–South Unimak and Shumagin Islands, June commercial sockeye and chum salmon harvest, all gear combined, by year, 1980-2008.

APPENDIX A: TABLES

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

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 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, 1997-2008 [a].

Species	2008 Final		2007	2006	2005 [b]	2004	2003	2002	2001 [c]	2000	1999	1998	1997 [d]
	Passage Estimate	Standard Error	Passage Estimates										
Large Chinook [e]	106,708	8,843	90,184	145,553	142,007	110,236	245,037	92,584	85,511	39,233	127,809	71,177	118,121
Small Chinook	23,935	3,617	35,369	23,850	17,434	46,370	23,500	30,629	13,892	5,195	16,914	16,675	77,526
Chinook Total	130,643		125,553	169,403	159,441	156,606	268,537	123,213	99,403	44,428	144,723	87,852	195,647
Summer Chum	1,665,667	83,030	1,726,885	3,767,044	2,439,616	1,357,826	1,168,518	1,088,463	441,450	456,271	973,708	826,385	1,415,641
Fall Chum [f]	615,127	20,164	684,011	790,563	1,813,589	594,060	889,778	326,858	376,182	247,935	379,493	372,927	506,621
Chum Total	2,280,794		2,410,896	4,557,607	4,253,205	1,951,886	2,058,296	1,415,321	817,632	704,206	1,353,201	1,199,312	1,922,262
Coho [f]	135,570	9,042	173,289	131,919	184,718	188,350	269,081	122,566	137,769	175,421	62,521	136,906	104,343
Pink	558,050	65,890	71,699	115,624	37,932	243,375	4,656	64,891	665	35,501	1,801	66,751	2,379
Other Species [g]	585,303	55,521	1,085,316	875,899	593,248	637,257	502,878	557,779	353,431	361,222	465,515	277,566	621,857
Season Total	3,690,360		3,866,753	5,850,452	5,228,544	3,177,474	3,103,448	2,283,770	1,408,900	1,320,778	2,027,761	1,768,387	2,846,488

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

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

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

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

[e] Chinook salmon >655 mm.

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

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

Appendix A3.–Alaskan commercial salmon sales and estimated harvest by district 2008[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	297	2,530	67,459	0	67,704	0	13,946	0
2	208	2,111	58,139	0	41,270	0	19,246	0
Subtotal	474	4,641	125,598	0	108,974	0	33,192	0
3	0	0	0	0	0	0	0	0
Total Lower Yukon	474	4,641	125,598	0	108,974	0	33,192	0
Anvik River	0	0	0	0	0	0	0	0
4-A	8	0	23,746	21,624	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	8	0	23,746	21,624	0	0	0	0
5-ABC	3	0	0	0	4,556	2,429	91	68
5-D	0	0	0	0	0	0	0	0
Subtotal District 5	3	0	0	0	4,556	2,429	91	68
6	11	0	1,857	4	5,735	2,708	2,408	2,262
Total Upper Yukon	22	0	25,603	21,628	10,291	5,137	2,499	2,330
Total Alaska	496	4,641	151,201	21,628	119,265	5,137	35,691	2,330

Note: See Appendix Tables B1-B5 and B8. See Appendix Figures 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.

[e] A total of 3 sockeye and 14,100 pinks were harvested in Districts 1 and 2 in 2008.

Appendix A4.–Number of commercial salmon fishing gear permit holders by district and season, Yukon Area, 1971–2008[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
1998-2007 Average [d]	372	220	2	577	1	15	7	23	599

-continued-

Year	Fall Chum and Coho Salmon Season								
	Lower Yukon Area				Upper Yukon Area				Yukon Area Total
	District 1	District 2	District 3	Subtotal [b]	District 4	District 5	District 6	Subtotal	
1971	352	-	-	352	-	-	-	-	352
1972	353	75	3	431	-	-	-	-	431
1973	445	183		628	-	-	-	-	628
1974	322	121	6	449	17	23	22	62	511
1975	428	185	12	625	44	33	33	110	735
1976	422	194	28	644	18	36	44	98	742
1977	337	172	37	546	28	34	32	94	640
1978	429	204	28	661	24	43	30	97	758
1979	458	220	32	710	31	44	37	112	822
1980	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
1998-2007 Average [e]	118	43	0	160	1	1	5	7	167

-continued-

	COMBINED 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	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
1998-2007 Average [d]	382	225	2	579	2	15	8	25	604

-continued-

[a] Number of permit holders which made at least 1 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, 1977–2008.

	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]
2003-2007 **Average**	2,423,292	32,697	2,455,988	53,210	21,482	74,692	2,530,681

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Appendix A5.–Page 2 of 2.

	Fall Season							
	Fall Chum			Coho				
Year	Lower Yukon Value	Upper Yukon Value	Subtotal	Lower Yukon Value	Upper Yukon Value	Subtotal	Total Season	Total 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
2003-2007 **Average**	134,142	20,624	154,766	56,581	8,631	65,211	219,977	2,750,658

[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.

Run Size Estimate [b] (Point Estimate)	Recommended Management Action [a] Fall Chum Salmon Directed Fisheries				Targeted Drainagewide Escapement
	Commercial	Personal Use	Sport	Subsistence	
300,000 or Less	Closure	Closure	Closure	Closure [c]	
300,001 to 500,000	Closure	Closure [c]	Closure [c]	Possible Restrictions [c, d]	300,000 to 600000
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.

[e] Drainage-wide commercial fisheries may be open and the harvestable surplus above 600,000 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 2008.

Statistical Week	Week Ending	Start Date	Finish Date	Days Fished	Number Fishing	Boat Days	Chinook Salmon	Chum Salmon	Coho Salmon
27	7/5			closed					
28	7/12			closed					
29	7/19			closed					
30	7/26			closed					
31	8/2			closed					
32	8/9			closed					
33	8/16			closed					
34	8/23			closed					
35	8/30			closed					
36	9/6	8/31	9/4	4	1	4	1	4	0
37	9/13	9/5	9/9	4	3	12	0	448	0
38	9/20	9/12	9/16	4	3.0	12	0	1,031	0
39	9/27	9/19	10/3	14	4.0	56	0	2,134	0
40	10/4								
41	10/11								
42	10/18	10/3	10/17	14	3.0	42	0	445	0
	00-Jan								
Dawson Area Subtotal				40	11.0	126	1	4,062	0
Upriver Commercial Subtotal				40	0	0	0	0	0
Total Commercial Harvest							1	4,062	0
Chinook & Chum Test Fisheries (Chum is live release)							513		
Domestic Harvest							0	0	0
Estimated Recreational Harvest								0	0
Aboriginal Fishery Catch							2,885	2,068	0
Total Upper Yukon Harvest							3,399	6,130	0
Old Crow Aboriginal Fishery							27	3,436	200
Old Crow Test Fishery								(1,269) *	

* These fish were released.

Appendix A8.–Salmon fishery projects conducted in the Alaskan portion of the Yukon River drainage in 2008.

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Commercial Catch and Effort Assessment	Alaskan portion of the Yukon River drainage	-document and estimate the catch and associated effort of the Alaskan Yukon River -commercial salmon fishery via receipts (fish tickets) of commercial sales of salmon	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; -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.	post season	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. -sample captured salmon for age, sex, size composition information.	June - Aug.	ADF&G	all aspects

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Appendix A8.–Page 2 of 5.

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Lower Yukon River Drift Test Fishing	South, Middle, and North mouths of the Yukon River delta, RM 20	-index Chinook, summer and fall chum, and coho salmon run timing and abundance using drift gillnets. -sample captured salmon for age, sex, size composition information.	June - Aug.	ADF&G	all aspects OSM funded (07-09)
Mountain Village Drift Gillnet Test Fishing	Mainstem Yukon River, RM 87	-index fall chum and coho salmon run timing and relative abundance using drift gillnets. -sample captured salmon for age, sex, size composition information.	July - Sept.	Asa'carsar miut Trad. Council	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 AVCP	all aspects TI Funding R&M Funding - extended operations
Anvik River Sonar	Mile 40 Anvik River, RM 358	-estimate daily escapement of summer chum salmon to the Anvik River; -estimate age, sex, and size composition of the summer chum salmon escapement.	June - July	ADF&G	all aspects
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. -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; -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; -estimate age, sex, and size composition of the Chinook and summer chum salmon escapements (OSM 2005-2007)	June - Aug.	TCC USFWS-OSM	all aspects oversite & funding report write-up
Y5A Test Fish Wheel	Mainstem Yukon River RM 695	-index the timing of Chinook, summer and fall chum, and coho salmon on the south bank of the Yukon River bound for the Tanana River drainage, using test fish wheel equipped with video monitoring system.	Aug–Oct.	ADF&G USFWS	all aspects R&M funding

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Appendix A8.–Page 3 of 5.

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. -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. -estimate age, sex, and size composition of salmon captured in the test nets.	Jul. - Oct.	ADF&G DFO	all aspects, technical support, TI Funding, R&E Funding
Kaltag Village Drift Gillnet Test Fishing	Mainstem Yukon River Kaltag, RM 451	-index fall chum and coho salmon run timing and relative abundance using drift gillnets. -sample captured salmon for age, sex, size composition information.	July - Sept.	City of Kaltag	all aspects R&E funding
Middle Yukon RiverChinook 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 Fish Wheel Test Fishing	Mainstem Yukon River RM 730	-index run timing of Chinook and fall chum salmon runs as well as non-salmon species using video monitoring techniques.	June-Sept.	Zuray USFWS	all aspects R&E funding
Nenana Test Fish Wheel Test Fishing	mainstem Tanana River Nenana, RM 860	-index the timing of Chinook, summer chum, fall chum, and coho salmon runs using a test fish wheel.	June – Sept.	ADF&G USFWS	all aspects R&M Funded, fall season contract, tech support R&M funding
Tanana Radio Tagging	mainstem Tanana River between RM 793 and 1,059.	-determine relative contributions of mainstem spawners to overall Upper Tanana fall chum salmon population. -identify and characterize mainstem spawning habitats used by fall chum salmon. -construct a mainstem spawning habitat prediction model for upper Tanana fall chum salmon populations. -estimate the stock specific run timing, migration rates, and movement patterns.	Aug. - Dec.	ADF&G TCC UAF USGS	all aspects AYKSSI funding
Tozitna River Weir	Mile 50 Tozitna River Yukon River, RM 681	-estimate daily escapement of Chinook and summer chum salmon into the Tozitna River, -estimate age, sex and size comp of the Chinook and summer chum escapement	June-Aug.	BLM TTC	all aspects

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Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
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. -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
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	ADF&G	all aspects, TI funding, R&E funding
Marshall Test Fish	Mainstem Yukon River RM 161	-index Chinook, summer and fall chum, and coho salmon run timing and abundance using drift gillnets. -sample captured salmon for age, sex, size composition information.	June - July	AVCP	all aspects 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 downstream 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 -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. -evaluate the marketability of the catch from the various mesh sizes,	June - July	ADF&G YDFDA	all aspects

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Appendix A8.–Page 5 of 5.

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Gillnet catch composition in lower and middle Yukon River fisheries	Yukon District Y-1	-determine the weight and girth of individual Chinook salmon caught in the Lower Yukon River Test Fishery at Big Eddy and Middle Mouth and Rampart Rapids fish wheels. -characterize the weight and girth composition of Chinook salmon caught in the Lower Yukon Test Fishery and Rampart Rapids fish wheels by run timing.	3 years	YRDFA ADF&G	all aspects R&E funding

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 2008.

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Upper Yukon Tagging Program (mark-recapture)	Yukon River downstream of Dawson City	to obtain population, and escapement estimates of Chinook and chum salmon in the Canadian section of the mainstem Yukon River to collect stock ID, age, size, sex composition data to participate in the Eagle sonar program	June - Oct	DFO	all aspects
Chinook and Chum Test Fishery	Yukon River near Dawson City	to provide catch and tag recovery information for the mark recapture program as required (Chinook required in 2008) to provide ASL information the Chinook test fishery uses nets while the chum test fishery uses live release fish wheels	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 (CM and CK), and recovery of tags 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 recover tags 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, landed and retained, of salmon caught in the Yukon through a catch card program	July-Oct	DFO	all aspects
DFO Escapement Index Surveys	Chinook and chum aerial index streams	to obtain counts in index areas including: Big Salmon, L. Salmon Wolf, Nisutlin, Mainstem Yukon, Kluane & Teslin rivers	Aug - Nov	DFO	all aspects
Escapement Surveys and DNA Collection	Throughout upper Yukon R. drainage	to conduct surveys of spawning fish by foot, boat, air etc. to enumerate and recover tags in terminal areas to collect DNA samples from spawning population and aggregate samples from fisheries and large migration corridors	July - Oct	R&E Projects DFO YFN's AFS	all aspects
Fishing Branch Chum Salmon Weir	Fishing Branch R.	to enumerate 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 returns to the Whitehorse fishway area and obtain age, size, sex and tag data	July - Aug	YF&GA	all aspects

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Appendix A9.–Page 2 of 2.

Project Name	Location	Primary Objective(s)	Duration	Agency	Responsibility
Blind Creek Weir	Pelly River	enumerate Chinook escapement and recover tags 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 carcass survey for tags, ASL, and DNA	July-Aug	JW&A	all aspects
Klondike River Sonar Feasibility	Klondike River	Examine lower river for suitable sonar sites	July -Oct	BM&A	all aspects
Escapement Sampling	Various tributaries	collect ASL data and DNA samples	Aug -Oct	DFO	all aspects
Porcupine Mark-Recapture Program	Porcupine River	conduct chum marking and test fishery program establish method of conducting inseason local management	Aug -Oct	EDI & VGG	all aspects
Whitehorse Rapids Fish Hatchery and Coded-Wire Tagging Project	Whitehorse	to rear and release ~150K Chinook fry produced from Whitehorse Rapids Fishway broodstock to mark fry with a CWT, adipose clip, and release upstream of the Whitehorse hydroelectric facility	ongoing	RR, YEC YF&GA	all aspects coded-wire tagging
MacIntyre Incubation Box and Coded-Wire Tagging Project	Whitehorse	to rear up to 120K Chinook fry from broodstock collected from the Takhini River and/or Tatchun Creek 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:
AFS = Aboriginal Fisheries Strategy
BM&A = B. Mercer and Associates
DFO = Department of Fisheries and Oceans Canada
EDI = Environmental Dynamics Incorporated
JW&A = Jane Wilson & Associates
NRI = Northern Research Institute
R&E = Yukon Panel Restoration and Enhancement Program
RR = Government of Yukon- Renewable Resources
TKC = Ta'an Kwach'an Council
THFN = Tr'ondek Hwech'in First Nation
VGG = Vuntut Gwitchin Government
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
YSC = Yukon Salmon Committee

Appendix A10.–Yukon River Canadian Chinook salmon total run by brood year, and escapement by year, 1982–2002 based on 3-Area Index, Eagle Sonar (2005–2007), 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	6,175	0	57,521	56,449	1.02
1995	34	1,784	15,989	52,717	7,026	10	77,559	50,673	1.53
1996	20	276	23,199	44,463	14,609	2	82,569	74,060	1.11
1997	14	3,567	26,386	94,407	7,811	14	132,200	53,821	2.46
1998	0	3,478	39,259	76,446	4,376	0	123,559	35,497	3.48
1999	133	1,692	29,791	77,011	2,880	5	111,514	37,184	3.00
2000	0	5,693	40,882	63,607	2,348	0	112,531	25,870	4.35
2001	0	1,818	50,973	48,127	2,566	0	103,483	52,564	1.97
2002	76	2,265	26,711	20,527	3,996	0	53,576	42,359	1.26
2003	63	5,677	31,998					80,594	
2004	0	1,510						48,469	
2005	0							68,551	
2006								62,933	
2007								34,903	
2008								34,008	
Average	**1982-2002**						**122,124**	**46,048**	**2.78**

Contrast	**2.86**

Note: Data highlighted in grey are preliminary.

Appendix A11.–Chinook salmon age and sex percentages from selected Yukon River escapement projects, 2008.

Location	Sample Size		Age 3	4	5	6	7	8	Total
Anvik River [a]	223	Males	0.0	7.6	65.5	8.1	0.0	0.0	81.2
		Females	0.0	0.0	4.0	13.9	0.9	0.0	18.8
		Total	0.0	7.6	69.5	22.0	0.9	0.0	100.0
Chena River [a]	36	Males	0.0	8.3	41.7	5.6	0.0	0.0	55.6
		Females	0.0	0.0	19.4	19.4	5.6	0.0	44.4
		Total	0.0	8.3	61.1	25.0	5.6	0.0	100.0
East Fork Andreafsky River [b]	466	Males	0.0	3.7	56.6	4.4	0.5	0.0	65.2
		Females	0.0	0.1	17.9	15.7	1.0	0.0	34.8
		Total	0.0	3.8	74.5	20.1	1.5	0.0	100.0
Gisasa River [b]	466	Males	0.3	19.0	58.1	6.5	0.0	0.0	83.8
		Females	0.0	0.1	5.6	7.3	3.1	0.0	16.2
		Total	0.3	19.1	63.9	13.7	3.1	0.0	100.0
Salcha River [a]	303	Males	0.7	9.9	39.9	10.2	0.0	0.0	60.7
		Females	0.0	0.0	11.9	25.7	1.7	0.0	39.3
		Total	0.7	9.9	51.8	36.0	1.7	0.0	100.0
Tozitna River [b]	239	Males	1.5	19.9	64.7	2.7	0.0	0.0	88.9
		Females	0.0	0.5	5.3	4.9	0.5	0.0	11.1
		Total	1.5	20.4	70.0	7.6	0.5	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, 2008.

			Age					
Location	Sample Size		3	4	5	6	7	Total
Anvik River [a]	533	Males	0.1	18.3	24.5	2.1	0.0	45.1
		Females	1.5	25.3	26.1	2.1	0.0	54.9
		Total	1.6	43.6	50.6	4.2	0.0	100.0
East Fork Andreafsky River [b]	746	Males	0.0	5.6	44.9	1.6	0.0	52.1
		Females	0.0	9.7	37.2	1.0	0.0	47.9
		Total	0.0	15.3	82.1	2.6	0.0	100.0
Gisasa River [b]	659	Males	0.2	13.3	33.8	3.5	0.0	50.8
		Females	0.1	15.4	30.5	3.2	0.0	49.2
		Total	0.3	28.7	64.3	6.7	0.0	100.0
Tozitna River [b]	624	Males	1.7	27.5	23.6	2.6	0.0	55.4
		Females	3.6	23.5	15.3	2.3	0.0	44.6
		Total	5.3	51.0	38.9	4.9	0.0	100.0

[a] Samples were collected by beach seine.

[b] Samples were collected from a weir trap.

Appendix A13.–Total (U.S. and Canada) Yukon River Chinook salmon harvest proportion by stock group, 1981–2008.

Year [a]	Lower	Middle	Upper
1981	0.054	0.545	0.401
1982	0.139	0.247	0.614
1983	0.129	0.337	0.533
1984	0.253	0.402	0.345
1985	0.276	0.223	0.501
1986	0.195	0.096	0.709
1987	0.159	0.196	0.645
1988	0.218	0.158	0.625
1989	0.244	0.159	0.597
1990	0.202	0.252	0.547
1991	0.280	0.253	0.467
1992	0.163	0.218	0.619
1993	0.215	0.254	0.531
1994	0.182	0.214	0.604
1995	0.179	0.224	0.597
1996	0.210	0.104	0.686
1997	0.264	0.168	0.569
1998	0.327	0.174	0.498
1999	0.401	0.063	0.536
2000	0.339	0.123	0.538
2001	0.316	0.160	0.524
2002	0.194	0.292	0.514
2003	0.068	0.289	0.643
2004	0.153	0.288	0.559
2005	0.207	0.214	0.579
2006	0.176	0.276	0.549
2007[b]	0.124	0.313	0.563
2008[c]			
Average (1981–2006)	0.205	0.236	0.559

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

[b] 2007 estimates are preliminary.

[c] 2008 estimates are not available until the following year.

Appendix A14.–Yukon River Chinook salmon harvest proportion by stock group in Alaska, 1981–2008.

Year [a]	Stock Group		
	Lower	Middle	Upper
1981	0.059	0.598	0.343
1982	0.154	0.275	0.571
1983	0.142	0.370	0.489
1984	0.280	0.443	0.277
1985	0.304	0.246	0.451
1986	0.223	0.109	0.668
1987	0.174	0.214	0.612
1988	0.249	0.181	0.570
1989	0.272	0.177	0.551
1990	0.228	0.284	0.488
1991	0.318	0.287	0.396
1992	0.180	0.241	0.578
1993	0.237	0.280	0.483
1994	0.204	0.241	0.555
1995	0.200	0.250	0.550
1996	0.240	0.118	0.642
1997	0.289	0.183	0.528
1998	0.347	0.185	0.468
1999	0.441	0.069	0.490
2000	0.375	0.136	0.489
2001	0.375	0.190	0.434
2002	0.221	0.332	0.447
2003	0.075	0.317	0.608
2004	0.169	0.316	0.515
2005	0.234	0.242	0.524
2006	0.192	0.302	0.505
2007[b]	0.131	0.331	0.538
2008[c]			
Average (1981–2006)	0.228	0.262	0.510

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

[b] 2007 estimates are preliminary.

[c] 2008 estimates are not available until the following year.

Appendix A15.–Upper stock group proportion, by country, from the Yukon River Chinook salmon harvest, 1981–2008.

	Upper Stock Group	
Year [a]	Alaska	Canada
1981	0.781	0.219
1982	0.835	0.165
1983	0.837	0.163
1984	0.727	0.273
1985	0.816	0.184
1986	0.827	0.173
1987	0.867	0.133
1988	0.798	0.202
1989	0.829	0.171
1990	0.792	0.208
1991	0.748	0.252
1992	0.845	0.155
1993	0.826	0.174
1994	0.818	0.182
1995	0.824	0.176
1996	0.819	0.181
1997	0.848	0.152
1998	0.888	0.112
1999	0.830	0.170
2000	0.819	0.181
2001	0.698	0.303
2002	0.763	0.235
2003	0.862	0.138
2004	0.837	0.163
2005	0.801	0.199
2006	0.841	0.159
2007[b]	0.904	0.096
2008[c]		
Average (1981–2006)	0.820	0.180

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

[b] 2007 estimates are preliminary.

[c] 2008 estimates are not available until the following year.

Appendix A16.–Summary of releases for coded wire tagged Chinook salmon from Whitehorse Hatchery, 1985–2008.

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	Days [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	Days [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 6.

Release Location	Release Date*	Code	# Tagged & Clipped [c]	Adipose Clipped Only	%Tag-Loss	Days [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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Appendix A16.–Page 5 of 6.

Release Location	Release Date*	Code	# Tagged & Clipped [c]	Adipose Clipped Only	%Tag-Loss	Days [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		10,939
Wolf	26-Jun-08			2,618			2,618			2,618
Mainstem	5-Jun-08	Agency Tags 08	20,498	418	2.000		20,916	2.84		20,916
Michie	5-Jun-08	Agency Tags 08	24,615	502	2.000		25,117	2.71		25,117
McClintock	5-Jun-08	Agency Tags 08	24,687	1,029	4.000		25,716	2.89		25,716
SUM	2008		80,739	4,567			85,306		0	85,306
TOTAL			3,868,752	298,342			4,167,094		1,180,189	5,347,283

[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 1989-94.
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 1991–2008.

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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Appendix A17.–Page 3 of 7.

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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Appendix A17.–Page 4 of 7.

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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Appendix A17.–Page 5 of 7.

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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Appendix A17.–Page 6 of 7.

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)	Project
McIntyre Cr	Chinook	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	Chinook	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	Chinook	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	Chinook	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	Chinook	2006	Tatchun	02-01-02-04-02	Spring Fry	Tatchun Ck.	07/21/07	07/26/07	9775	182	185	10142	>2.4**
McIntyre Cr	Chinook	2006	Tatchun	02-01-02-04-03	Spring Fry	Tatchun Ck.	07/21/07	07/26/07	9450	476	113	10039	>2.4**
McIntyre Cr	Chinook	2006	Tatchun	02-01-02-03-05	Spring Fry	Tatchun Ck.	07/21/07	07/26/07	8972	955	196	10123	>2.4**
McIntyre Cr	Chinook	2006	Tatchun	02-01-02-03-06	Spring Fry	Tatchun Ck.	07/21/07	07/26/07	6261	261	101	6623	>2.4**
McIntyre Cr	Chinook	2007	Tatchun	Tatchun	Spring Fry	Tatchun Creek	06/27/08	06/27/08	10170	103	145	10418	1.6
McIntyre Cr	Chinook	2007	Tatchun	Tatchun	Spring Fry	Tatchun Creek	06/27/08	06/27/08	10056	311	228	10595	1.6
McIntyre Cr	Chinook	2007	Tatchun	Tatchun	Spring Fry	Tatchun Creek	06/27/08	06/27/08	4345	44	328	4717	1.6
McIntyre Cr	Chinook	2007	Takhini	Takhini	Spring Fry	Takhini River	07/02/08	07/02/08	6756	209	197	7162	1.4
McIntyre Cr	Chinook	2007	Takhini	Takhini	Spring Fry	Takhini River	07/02/08	07/02/08	9490	293	119	9902	1.4

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 1974–2008.

				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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Appendix A18.–Page 2 of 3.

				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
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	922,394	3.19
2000	210,756	28,543	239,299	8,446	297,012	115,488	0	0.020	0.706	0.274	0.000	420,946	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	3,003,001	8.89
2002	397,977	27,411	425,388	0	444,507	232,656	12,831	0.000	0.651	0.346	0.019	683,312	>1.72
2003	695,363	79,529	774,892	24,263	849,743	426,811	16,982	0.018	0.645	0.324		1,317,798 [d]	>1.90
2004	537,873	76,296	614,169	0	326,466	180,928						507,394 [e]	>0.94
2005	1,996,700	290,183	2,286,883	2,228									
2006	873,987	270,471	1,144,458										
2007	916,606	203,393	1,119,999										
2008	559,541	208,795	768,336										
Average-07	563,320	315,442	878,762										
	487,323	All Brood Years (1974-2002)		31,089	598,462	210,628	7,335	0.0324	0.6889	0.2698	0.0094	847,145	2.09
	371,738	Even Brood Years (1974-2002)		20,343	388,548	178,612	6,377	0.0340	0.6540	0.3022	0.0109	593,168	1.88
	611,164	Odd Brood Years (1974-2002)		42,603	823,369	244,931	8,361	0.0307	0.7264	0.2351	0.0077	1,119,264	2.30
	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
	473,912	All Brood Years (1984-2002)		16,484	540,747	232,786	9,747	0.0173	0.6620	0.3087	0.0129	799,201	2.03
	410,726	Even Brood Years (1984-2002)		6,940	364,823	200,715	8,754	0.0163	0.6287	0.3414	0.0152	580,164	1.68
	544,119	Odd Brood Years (1984-2002)		27,088	736,217	268,420	10,849	0.0183	0.6990	0.2723	0.0103	1,042,574	2.41

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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 (see footnote "b" Table 5).

[d] Brood year return for 3, 4, and 5 year fish, indicate that production (R/P) from brood year 2003 was at least 1.90. Recruits estimated for incomplete brood year.

[e] Brood year return for 3 and 4 year fish, indicate that production (R/P) from brood year 2004 was at least 0.94. Recruits estimated for incomplete brood year.

Appendix A19.–Escapement, rebuilding and interim goals for Canadian origin Chinook and fall chum salmon stocks, 1985–2008.

Year	Canadian Origin Stock Targets					
	Chinook Salmon		Fall Chum Salmon			
	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	55,000	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	33,667
2008	>45,000[b]	>45,000[b]	80,000	80,000	22,000-49,000[c]	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 2008-2010.

Appendix A20.–South Unimak and Shumagin Islands June commercial sockeye and chum salmon harvest, all gear combined, by year, 1980–2008.

	Sockeye [a]			Chum [a]		
Year	South Unimak	Shumagin Island	Total	South Unimak	Shumagin Island	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

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Year	Sockeye [a] South Unimak	Sockeye [a] Shumagin Island	Sockeye [a] Total	Chum [a] South Unimak	Chum [a] Shumagin Island	Chum [a] Total
1988-2007 Average	936,408	415,333	1,351,741	258,974	140,061	399,035
1998-2007 Average	598,455	400,028	998,484	143,348	151,391	294,739

Source: Poetter 2006.

[a] Does not include test fish harvest.

Appendix A21.–Total groundfish catch (mt) and estimated bycatch (numbers) of Pacific salmon in U.S. groundfish fisheries in the Bering Sea-Aleutian Islands (BSAI) and Gulf of Alaska (GOA) management areas, 1990–2008 (from Berger 2008). After 1997, chum, coho, sockeye, and pink salmon were aggregated into a single species group.

Region	Year	Groundfish	Chinook	Chum	Coho	Sockeye	Pink	Total Non-Chinook
BSAI	1990	1,706,379	14,085	16,202	153	30	31	16,416
	1991	2,154,903	48,880	28,270	656	1,310	26	30,262
	1992	2,057,849	41,955	40,090	1,266	14	80	41,450
	1993	1,854,216	46,014	242,916	324	22	8	243,270
	1994	1,958,788	43,821	94,107	228	20	193	94,548
	1995	1,928,073	23,436	20,983	871	0	21	21,875
	1996	1,847,631	63,205	77,819	234	5	2	78,060
	1997	1,824,188	50,530	66,816	109	3	66	66,994
	1998	1,615,685	55,431	…	…	…	…	65,697
	1999	1,424,752	14,599	…	…	…	…	47,234
	2000	1,607,549	8,223	…	…	…	…	59,327
	2001	1,813,924	40,547	…	…	…	…	60,731
	2002	1,934,957	39,684	…	…	…	…	82,483
	2003	1,970,817	54,763	…	…	…	…	193,981
	2004	1,978,721	63,130	…	…	…	…	457,286
	2005	1,981,072	74,975	…	…	…	…	711,939
	2006	1,975,216	87,798	…	…	…	…	326,457
	2007	1,853,877	129,530	…	…	…	…	97,219
	2008	1,221,795	18,768	…	…	…	…	9,031
GOA	1990	244,397	16,913	2,541	1,482	85	64	4,172
	1991	269,616	38,894	13,711	1,133	46	64	14,954
	1992	269,797	16,794	11,140	55	21	0	11,216
	1993	255,434	24,465	55,268	306	15	799	56,388
	1994	239,503	13,613	36,782	42	96	306	37,226
	1995	216,585	14,647	64,067	668	41	16	64,792
	1996	202,054	15,761	3,969	194	2	11	4,176
	1997	230,448	15,119	3,349	41	7	23	3,420
	1998	245,516	16,984	…	…	…	…	13,544
	1999	227,614	30,600	…	…	…	…	7,529
	2000	204,398	26,705	…	…	…	…	10,995
	2001	182,011	15,104	…	…	…	…	6,063
	2002	165,664	12,920	…	…	…	…	3,219
	2003	176,433	15,860	…	…	…	…	10,548
	2004	168,475	18,087	…	…	…	…	5,878
	2005	185,138	31,598	…	…	…	…	7,094
	2006	195,593	19,158	…	…	…	…	4,499
	2007	163,433	39,757	…	…	…	…	3,705
	2008	117,193	13,344	…	…	…	…	2,035

Appendix A22.–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

Appendix A23.–Fall chum salmon age and sex percentages from selected Yukon River escapement projects, 2008.

Location	Sample Size		Age 3	4	5	6	7	Total
Chandalar River [a]	178	Males	1.1	15.7	23.6	3.4	0.0	43.8
		Females	2.2	25.3	23.0	3.9	1.7	56.2
		Total	3.4	41.0	46.6	7.3	1.7	100
Delta River [b]	179	Males	0.0	18.4	31.3	5.0	0.0	54.7
		Females	1.7	16.8	21.8	4.5	0.6	45.3
		Total	1.7	35.2	53.1	9.5	0.6	100
Sheenjek River [c]		Males	0.0	23.3	30.2	2.6	0.9	56.9
		Females	0.9	19.8	21.6	0.9	0.0	43.1
		Total	0.9	43.1	51.7	3.4	0.9	100

[a] Samples were handpicked by USFWS.
[b] Samples were handpicked from the main channels as they peaked.
[c] Samples were collected by beach seine throughout the run.

APPENDIX B: TABLES

Appendix B1.–Alaskan and Canadian total utilization of Yukon River Chinook, chum and coho salmon, 1903–2008.

	Alaska [a,b]			Canada [c]			Total		
Year	Chinook Salmon	Other Salmon	Total	Chinook Salmon	Other Salmon	Total	Chinook Salmon	Other Salmon	Total
1903				4,666		4,666	4,666		4,666
1904									
1905									
1906									
1907									
1908				7,000		7,000	7,000		7,000
1909				9,238		9,238	9,238		9,238
1910									
1911									
1912									
1913				12,133		12,133	12,133		12,133
1914				12,573		12,573	12,573		12,573
1915				10,466		10,466	10,466		10,466
1916				9,566		9,566	9,566		9,566
1917									
1918	12,239	1,500,065	1,512,304	7,066		7,066	19,305	1,500,065	1,519,370
1919	104,822	738,790	843,612	1,800		1,800	106,622	738,790	845,412
1920	78,467	1,015,655	1,094,122	12,000		12,000	90,467	1,015,655	1,106,122
1921	69,646	112,098	181,744	10,840		10,840	80,486	112,098	192,584
1922	31,825	330,000	361,825	2,420		2,420	34,245	330,000	364,245
1923	30,893	435,000	465,893	1,833		1,833	32,726	435,000	467,726
1924	27,375	1,130,000	1,157,375	4,560		4,560	31,935	1,130,000	1,161,935
1925	15,000	259,000	274,000	3,900		3,900	18,900	259,000	277,900
1926	20,500	555,000	575,500	4,373		4,373	24,873	555,000	579,873
1927		520,000	520,000	5,366		5,366	5,366	520,000	525,366
1928		670,000	670,000	5,733		5,733	5,733	670,000	675,733
1929		537,000	537,000	5,226		5,226	5,226	537,000	542,226
1930		633,000	633,000	3,660		3,660	3,660	633,000	636,660
1931	26,693	565,000	591,693	3,473		3,473	30,166	565,000	595,166
1932	27,899	1,092,000	1,119,899	4,200		4,200	32,099	1,092,000	1,124,099
1933	28,779	603,000	631,779	3,333		3,333	32,112	603,000	635,112
1934	23,365	474,000	497,365	2,000		2,000	25,365	474,000	499,365
1935	27,665	537,000	564,665	3,466		3,466	31,131	537,000	568,131
1936	43,713	560,000	603,713	3,400		3,400	47,113	560,000	607,113
1937	12,154	346,000	358,154	3,746		3,746	15,900	346,000	361,900
1938	32,971	340,450	373,421	860		860	33,831	340,450	374,281
1939		327,650	355,687	720		720	28,757	327,650	356,407
1940	32,453	1,029,000	1,061,453	1,153		1,153	33,606	1,029,000	1,062,606
1941	47,608	438,000	485,608	2,806		2,806	50,414	438,000	488,414
1942	22,487	197,000	219,487	713		713	23,200	197,000	220,200
1943	27,650	200,000	227,650	609		609	28,259	200,000	228,259

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	Alaska [a,b]			Canada [c]			Total		
Year	Chinook Salmon	Other Salmon	Total	Chinook Salmon	Other Salmon	Total	Chinook Salmon	Other Salmon	Total
1944	14,232		14,232	986		986	15,218		15,218
1945	19,727		19,727	1,333		1,333	21,060		21,060
1946	22,782		22,782	353		353	23,135		23,135
1947	54,026		54,026	120		120	54,146		54,146
1948	33,842		33,842				33,842		33,842
1949	36,379		36,379				36,379		36,379
1950	41,808		41,808				41,808		41,808
1951	56,278		56,278				56,278		56,278
1952	38,637	10,868	49,505				38,637	10,868	49,505
1953	58,859	385,977	444,836				58,859	385,977	444,836
1954	64,545	14,375	78,920				64,545	14,375	78,920
1955	55,925		55,925				55,925		55,925
1956	62,208	10,743	72,951				62,208	10,743	72,951
1957	63,623		63,623				63,623		63,623
1958	75,625	337,500	413,125	11,000	1,500	12,500	86,625	339,000	425,625
1959	78,370		78,370	8,434	3,098	11,532	86,804	3,098	89,902
1960	67,597		67,597	9,653	15,608	25,261	77,250	15,608	92,858
1961	141,152	461,597	602,749	13,246	9,076	22,322	154,398	470,673	625,071
1962	105,844	434,663	540,507	13,937	9,436	23,373	119,781	444,099	563,880
1963	141,910	429,396	571,306	10,077	27,696	37,773	151,987	457,092	609,079
1964	109,818	504,420	614,238	7,408	12,187	19,595	117,226	516,607	633,833
1965	134,706	484,587	619,293	5,380	11,789	17,169	140,086	496,376	636,462
1966	104,887	309,502	414,389	4,452	13,192	17,644	109,339	322,694	432,033
1967	146,104	352,397	498,501	5,150	16,961	22,111	151,254	369,358	520,612
1968	118,632	270,818	389,450	5,042	11,633	16,675	123,674	282,451	406,125
1969	105,027	424,399	529,426	2,624	7,776	10,400	107,651	432,175	539,826
1970	93,019	585,760	678,779	4,663	3,711	8,374	97,682	589,471	687,153
1971	136,191	547,448	683,639	6,447	16,911	23,358	142,638	564,359	706,997
1972	113,098	461,617	574,715	5,729	7,532	13,261	118,827	469,149	587,976
1973	99,670	779,158	878,828	4,522	10,135	14,657	104,192	789,293	893,485
1974	118,053	1,229,678	1,347,731	5,631	11,646	17,277	123,684	1,241,324	1,365,008
1975	76,883	1,307,037	1,383,920	6,000	20,600	26,600	82,883	1,327,637	1,410,520
1976	105,582	1,026,908	1,132,490	5,025	5,200	10,225	110,607	1,032,108	1,142,715
1977	114,494	1,090,758	1,205,252	7,527	12,479	20,006	122,021	1,103,237	1,225,258
1978	129,988	1,615,312	1,745,300	5,881	9,566	15,447	135,869	1,624,878	1,760,747
1979	159,232	1,596,133	1,755,365	10,375	22,084	32,459	169,607	1,618,217	1,787,824
1980	197,665	1,730,960	1,928,625	22,846	23,718 [d]	46,564	220,511	1,754,678	1,975,189
1981	188,477	2,097,871	2,286,348	18,109	22,781 [d]	40,890	206,586	2,120,652	2,327,238

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Appendix B1.–Page 3 of 4.

	Alaska [a,b]			Canada [c]			Total		
Year	Chinook Salmon	Other Salmon	Total	Chinook Salmon	Other Salmon	Total	Chinook Salmon	Other Salmon	Total
1982	152,808	1,265,457	1,418,265	17,208	16,091 [d]	33,299	170,016	1,281,548	1,451,564
1983	198,436	1,678,597	1,877,033	18,952	29,490 [d]	48,442	217,388	1,708,087	1,925,475
1984	162,683	1,548,101	1,710,784	16,795	29,767 [d]	46,562	179,478	1,577,868	1,757,346
1985	187,327	1,657,984	1,845,311	19,301	41,515 [d]	60,816	206,628	1,699,499	1,906,127
1986	146,004	1,758,825	1,904,829	20,364	14,843 [d]	35,207	166,368	1,773,668	1,940,036
1987	188,386	1,246,176	1,434,562	17,614	44,786 [d]	62,400	206,000	1,290,962	1,496,962
1988	148,421	2,311,214	2,459,635	21,427	33,915 [d]	55,342	169,848	2,345,129	2,514,977
1989	157,606	2,281,566	2,439,172	17,944	23,490 [d]	41,434	175,550	2,305,056	2,480,606
1990	149,433	1,053,351	1,202,784	19,227	34,302 [d]	53,529	168,660	1,087,653	1,256,313
1991	154,651	1,335,111	1,489,762	20,607	35,653 [d]	56,260	175,258	1,370,764	1,546,022
1992	168,191	863,575	1,031,766	17,903	21,310 [d]	39,213	186,094	884,885	1,070,979
1993	163,078	341,953	505,031	16,611	14,150 [d]	30,761	179,689	356,103	535,792
1994	172,315	554,643	726,958	21,198	38,342	59,540	193,513	592,985	786,498
1995	177,663	1,437,837	1,615,500	20,884	46,109	66,993	198,547	1,483,946	1,682,493
1996	138,562	1,121,181	1,259,743	19,612	24,395	44,007	158,174	1,145,576	1,303,750
1997	174,625	544,879	719,504	16,528	15,880	32,408	191,153	560,759	751,912
1998	99,369	199,735	299,104	5,937 [e]	8,165	14,102	105,306	207,900	313,206
1999	124,315	234,221	358,536	12,468	19,736	32,204	136,783	253,957	390,740
2000	45,308	106,936	152,244	4,879 [f]	9,273	14,152	50,187	116,209	166,396
2001	53,738	116,477	170,215	10,139	10,192	20,331	63,877	126,669	190,546
2002	67,888	122,360	190,248	9,257	8,495	17,752	77,145	130,855	208,000
2003	101,000	199,917	300,917	9,616	11,885	21,501	110,619	211,802	322,418
2004	114,370	206,099	320,469	11,238	9,930	21,168	125,608	216,029	341,637
2005	86,355	478,749	565,104	11,371	18,348	29,719	97,726	497,097	594,823
2006 [g]	96,067	552,211	648,278	9,072	11,908	20,980	105,139	564,119	669,258
2007 [g]	90,735	548,420	639,155	5,094	14,332	19,426	95,829	562,752	658,581
2008 [g, j,i]	48,978	502,037	551,015	3,426	9,566	13,192	52,404	511,603	564,207
Average									
1903-2007	91,158	736,028	724,296	8,723	17,844	18,979	87,994	728,780	689,049
1998-2007	87,915	276,513	364,427	8,990	12,187	21,177	96,904	288,699	385,604
2003-2007	97,705	397,079	494,785	9,278	13,281	22,559	106,984	410,360	517,343

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[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. Totals do not include 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] Subsistence, Personal Use and Sport Fish harvest data are unavailable at this time.

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

j Includes the previous 5 year average of Sport Fish harvest data.

Appendix B2.–Alaskan catch of Yukon River Chinook salmon, 1961–2008.

Year	Commercial	Commercial Related [a]	Total	Subsistence	Personal Use [b]	Test Fish Sales [c]	Sport Fish [d]	Total
1961	119,664	0	119,664	21,488				141,152
1962	94,734	0	94,734	11,110				105,844
1963	117,048	0	117,048	24,862				141,910
1964	93,587	0	93,587	16,231				109,818
1965	118,098	0	118,098	16,608				134,706
1966	93,315	0	93,315	11,572				104,887
1967	129,656	0	129,656	16,448				146,104
1968	106,526	0	106,526	12,106				118,632
1969	91,027	0	91,027	14,000				105,027
1970	79,145	0	79,145	13,874				93,019
1971	110,507	0	110,507	25,684				136,191
1972	92,840	0	92,840	20,258				113,098
1973	75,353	0	75,353	24,317				99,670
1974	98,089	0	98,089	19,964				118,053
1975	63,838	0	63,838	13,045				76,883
1976	87,776	0	87,776	17,806				105,582
1977	96,757	0	96,757	17,581			156	114,494
1978	99,168	0	99,168	30,785			523	130,476
1979	127,673	0	127,673	31,005			554	159,232
1980	153,985	0	153,985	42,724			956	197,665
1981	158,018	0	158,018	29,690			769	188,477
1982	123,644	0	123,644	28,158			1,006	152,808
1983	147,910	0	147,910	49,478			1,048	198,436
1984	119,904	0	119,904	42,428			351	162,683
1985	146,188	0	146,188	39,771			1,368	187,327
1986	99,970	0	99,970	45,238			796	146,004
1987	134,760	0	134,760 [e]	55,039	1,706		502	192,007
1988	100,364	0	100,364	45,495	2,125	1,081	944	150,009
1989	104,198	0	104,198	48,462	2,616	1,293	1,053	157,622
1990	95,247	413	95,660	48,587	2,594	2,048	544	149,433
1991	104,878	1,538	106,416	46,773		689	773	154,651
1992	120,245	927	121,172	47,077		962	431	169,642
1993	93,550	560	94,110	63,915	426	1,572	1,695	161,718
1994	113,137	703	113,840	53,902		1,631	2,281	171,654
1995	122,728	1,324	124,052	50,620	399	2,152	2,525	179,748
1996	89,671	521	90,192	45,671	215	1,698	3,151	140,927
1997	112,841	769	113,610	57,117	313	2,811	1,913	175,764
1998	43,618	81	43,699	54,124	357	926	654	99,760
1999	69,275	288	69,563	53,305	331	1,205	1,023	125,427
2000	8,518		8,518	36,404	75	597	276	45,870
2001 [h]				55,819	122		679	56,620
2002	24,128		24,128	43,742	126	528	486	69,010
2003	40,438		40,438	56,959	204	680	2,719	101,000
2004	56,151		56,151	55,713	201	792	1,513	114,370

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Appendix B2.–Page 2 of 2.

Year	Commercial	Commercial Related [a]	Total	Subsistence	Personal Use [b]	Test Fish Sales [c]	Sport Fish [d]	Total
2005	32,029		32,029	53,409	138	296	483	86,355
2006 [f]	45,829		45,829	48,593	89	817	739	96,067
2007 [f]	33,634		33,634	55,156 [h]	136 [h]	849	960	90,735
2008 [f]	4,641		4,641	45,311	121	0	1,283 [g]	51,356
Average								
1989-1998	100,011	684	100,695	51,625	989	1,578	1,502	156,092
2002-2007	41,616		41,616	51,966	154	687	1,283	97,705
1997-2007	39,291[i]		39,332	51,322	178	743	1,016	88,521

[a] 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, includes harvest from the Coastal District and test fish harvest that were utilized for subsistence.

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

[c] Includes only test fish that were sold commercially.

[d] Sport fish harvest for the Alaskan portion of the Yukon River drainage. Most of this harvest is believed to have been taken within the Tanana River drainage (see Schultz et al. 1993: 1992 Yukon Area Annual Management Report).

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

[f] Subsistence and personal use data are preliminary.

[g] Data are unavailable at this time, estimated based on the previous 5-year average.

[h] No commercial fishery was conducted.

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

Appendix B3.–Alaska catch of Yukon River summer chum salmon, 1970–2008.

Year	Subsistence [a]	Commercial	Commercial Related [b]	Personal Use	Test Fish Sales [c]	Sport Fish [d]	Total
1970	166,504	137,006	0				303,510
1971	171,487	100,090	0				271,577
1972	108,006	135,668	0				243,674
1973	161,012	285,509	0				446,521
1974	227,811	589,892	0				817,703
1975	211,888	710,295	0				922,183
1976	186,872	600,894	0				787,766
1977	159,502	534,875	0			316	694,693
1978	171,383	1,052,226	25,761			451	1,249,821
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	170,678	442,238	180,303	4,262		846	798,327
1988	196,599	1,148,650	468,032	2,225	3,587	1,037	1,820,130
1989	167,155	955,806	496,934	1,891	10,605	2,132	1,634,523
1990	115,609	302,625	214,552	1,827	8,263	472	643,348
1991	118,540	349,113	308,989		3,934	1,037	781,613
1992	125,497	332,313	211,264		1,967	1,308	672,349
1993	104,776	96,522	43,594	674	1,869	564	247,999
1994	109,904	80,284	178,457		3,212	350	372,207
1995	118,723	259,774	558,640	780	6,073	1,174	945,164
1996	102,503	147,127	535,106	905	7,309	1,854	794,804
1997	97,109	95,242	133,010	391	2,590	475	328,817
1998	86,004	28,611	187	84	3,019	421	118,326
1999	70,323	29,389	24	382	836	555	101,509
2000	64,895	6,624	0	30	648	161	72,358
2001	58,385	0	0	146	0	82	58,613
2002	72,260	13,558	19	175	218	384	86,614
2003	68,304	10,685	0	148	119	1,638	80,894
2004	69,672	26,410	0	231	217	203	96,733
2005	93,259	41,264	0	152	134	435	135,244
2006 [e]	115,093	92,116	0	262	502	583	208,556
2007	92,891	198,201	0	184	10	245	291,531
2008 [e]	85,693	151,201	0	138	80	621 [f]	237,733
Average							
2003-2007	92,290	73,735	0	195	196	621	167,038
1998-2007	86,988	49,651[h]	77 [h]	179	634 [h]	471	132,917

-continued-

[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 salmon harvested for subsistence and an estimate of the number of salmon harvested for the commercial production of salmon roe and the carcasses used for subsistence. These data are only available since 1990.

[c] Includes only test fish that were sold commercially.

[d] The majority of the sport-fish harvest is believed to be taken in the Tanana drainage. Sport fish division does not differentiate between the 2 races of chum salmon. Sport fish harvest is assumed to be primarily summer chum salmon caught incidental to directed Chinook fishing.

[e] Subsistence and personal use data are preliminary.

[f] Data are unavailable at this time, estimated based on the previous 5-year average.

[g] No commercial fishery was conducted.

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

Appendix B4.–Alaskan harvest of Yukon River fall chum salmon, 1961–2008.

Year	Estimated Subsistence Use [a]	Harvest		
		Subsistence [b]	Commercial [c]	Total [d]
1961	101,772 [e, f]	101,772	42,461	144,233
1962	87,285 [e, f]	87,285	53,116	140,401
1963	99,031 [e, f]	99,031		99,031
1964	120,360 [e, f]	120,360	8,347	128,707
1965	112,283 [e, f]	112,283	23,317	135,600
1966	51,503 [e, f]	51,503	71,045	122,548
1967	68,744 [e, f]	68,744	38,274	107,018
1968	44,627 [e, f]	44,627	52,925	97,552
1969	52,063 [e, f]	52,063	131,310	183,373
1970	55,501 [e, f]	55,501	209,595	265,096
1971	57,162 [e, f]	57,162	189,594	246,756
1972	36,002 [e, f]	36,002	152,176	188,178
1973	53,670 [e, f]	53,670	232,090	285,760
1974	93,776 [e, f]	93,776	289,776	383,552
1975	86,591 [e, f]	86,591	275,009	361,600
1976	72,327 [e, f]	72,327	156,390	228,717
1977	82,771 [f]	82,771 [f]	257,986	340,757
1978	94,867 [f]	84,904 [f]	247,011	331,915
1979	233,347	214,881	378,412	593,293
1980	172,657	167,637	298,450	466,087
1981	188,525	177,240	477,736	654,976
1982	132,897	132,092	224,992	357,084
1983	192,928	187,864	307,662	495,526
1984	174,823	172,495	210,560	383,055
1985	206,472	203,947	270,269	474,216
1986	164,043	163,466	140,019	303,485
1987 [k]	361,663	342,597 [g]		361,663
1988	158,694	157,075	164,210	325,609
1989	230,978	211,303	301,928	522,302
1990	185,244	167,900	143,402	318,642
1991	168,890	145,524	258,154	403,678
1992	110,903	107,808	20,429 [h]	128,237
1993 [k]	76,925	76,882		77,045
1994	127,586	123,565	7,999	131,564
1995	163,693	130,860	284,178	415,901
1996	146,154	129,258	107,347	236,961
1997	96,899	95,141	59,054	154,479
1998	62,869	62,901	0	62,903
1999	89,999	89,940	20,371	111,743

-continued-

Appendix B4.–Page 2 of 2.

Year		Estimated Subsistence Use [a]	Harvest			
			Subsistence [b]	Commercial [c]		Total [d]
2000	[k]	19,307	19,395			19,396
2001	[k]	35,154	35,703			35,713
2002	[k]	19,393	19,674			19,677
2003		57,178	56,930	10,996		68,320
2004		62,436	62,526	4,110		66,866
2005		91,597	91,534	180,249		271,916
2006	[i]	84,133	83,987	174,542		258,862
2007	[i]	98,886	98,947	90,677		189,797
2008	[i]	80,200	80,368	119,265		199,814
Average						
1961-07		112,438	108,286	160,150		248,932
1998-07		62,095	62,154	68,706	[l]	110,519
2003-07		78,846	78,785	92,115		171,152

[a] Includes salmon harvested for subsistence and personal use purposes, and an estimate of number of salmon harvested for the commercial production of salmon roe and the carcasses used for subsistence. These data are only available since 1990. Does not include harvest from the Coastal District.

[b] Includes harvest from the Coastal District communities of Scammon Bay and Hooper Bay (1978, 1987-89 and 1992-2008), and from test fish harvest and commercial retained fish (not sold) that were utilized for subsistence.

[c] Includes ADF&G test fish sales, fish sold in the round, and estimated numbers of female salmon commercially harvested for production of salmon roe (see Bergstrom et al. 1992: 1990 Yukon Area AMR).

[d] Does not include sport-fish harvest. The majority of the sport-fish harvest is believed to be taken in the Tanana River drainage. Sport fish division does not differentiate between the 2 races of chum salmon. However, most of this harvest is believed to be summer chum salmon.

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

[f] Minimum estimates because surveys were conducted prior to the end of the fishing season.

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

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

[i] Subsistence and personal use data are preliminary.

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

[k] Commercial fishery was not conducted.

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

Appendix B5.–Alaskan harvest of Yukon River coho salmon, 1961–2008.

Year	Estimated Subsistence Use		Harvest						Total
			Subsistence		Commercial		Sport		
1961	9,192	e, f	9,192	e, f	2,855				12,047
1962	9,480	e, f	9,480	e, f	22,926				32,406
1963	27,699	e, f	27,699	e, f	5,572				33,271
1964	12,187	e, f	12,187	e, f	2,446				14,633
1965	11,789	e, f	11,789	e, f	350				12,139
1966	13,192	e, f	13,192	e, f	19,254				32,446
1967	17,164	e, f	17,164	e, f	11,047				28,211
1968	11,613	e, f	11,613	e, f	13,303				24,916
1969	7,776	e, f	7,776	e, f	15,093				22,869
1970	3,966	e, f	3,966	e, f	13,188				17,154
1971	16,912	e, f	16,912	e, f	12,203				29,115
1972	7,532	e, f	7,532	e, f	22,233				29,765
1973	10,236	e, f	10,236	e, f	36,641				46,877
1974	11,646	e, f	11,646	e, f	16,777				28,423
1975	20,708	e, f	20,708	e, f	2,546				23,254
1976	5,241	e, f	5,241	e, f	5,184				10,425
1977	16,333	f	16,333	f	38,863		112		55,321
1978	7,787	f	7,876	f	26,152		302		34,330
1979	9,794		9,794		17,165		50		27,009
1980	20,158		20,158		8,745		67		28,970
1981	21,228		21,228		23,680		45		44,953
1982	35,894		35,894		37,176		97		73,167
1983	23,905		23,905		13,320		199		37,424
1984	49,020		49,020		81,940		831		131,791
1985	32,264		32,264		57,672		808		90,744
1986	34,468		34,468		47,255		1,535		83,258
1987	84,894	n	82,562	g			1,292		86,319
1988	69,080		69,782		99,907		2,420		173,256
1989	41,583		41,065		85,493		1,811		129,100
1990	47,896		43,460		46,937		1,947		93,525
1991	40,894		37,388		109,657		2,775		149,820
1992	53,344		51,980		9,608	h	1,666		63,254
1993	15,772	n	15,812				897		16,709
1994	48,926		41,775		4,451		2,174		48,400
1995	29,716		28,377		47,206		1,278		77,278
1996	33,651		30,404		57,710		1,588		89,900
1997	24,579		23,945		35,818		1,470		61,583

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Appendix B5.–Page 2 of 2.

Year		Estimated Subsistence Use [a]	Harvest					
			Subsistence [b]		Commercial [c]		Sport [d]	Total
1998		17,781	18,121		1		758	18,889
1999		20,970	20,891		1,601		609	23,248
2000	[n]	14,717	14,939				554	15,493
2001	[n]	21,654	22,122				1,248	23,404
2002	[n]	15,261	15,489				1,092	16,601
2003		24,129	23,872		25,243		1,477	51,141
2004		20,965	20,795		20,232		1,623	42,883
2005		27,078	27,250		58,311		627	86,295
2006	[k]	19,650	19,706		64,942		1,000	85,927
2007	[k]	22,462	21,878		44,575		597	67,185
2008	[k]	15,225	15,486		35,691		1,065 [m]	51,931
Average								
1961-07		24,302	23,806		30,126		1,063	51,598
1998-07		20,467	20,506		30,701	o	959	43,107
2003-07		22,857	22,700		42,661		1,065	66,686

[a] Includes salmon harvested for subsistence and personal use purposes, and an estimate of the number of salmon harvested for the commercial production of salmon roe and the carcasses used for subsistence. These data are only available since 1990. Does not include harvest from the Coastal District.

[b] Includes harvest from the Coastal District communities of Scammon Bay and Hooper Bay (1978, 1987-89 and 1992-2008), and from test fish harvest and commercial retained fish (not sold) that were utilized for subsistence.

[c] Includes ADF&G test fish sales, fish sold in the round, and estimated numbers of female salmon commercially harvested for the production of salmon roe (see Bergstrom et al. 1992: 1990 Yukon Area AMR).

[d] Sport fish harvest for the Alaskan portion of the Yukon River drainage. The majority of this harvest is believed to have been taken within the Tanana River drainage (see Schultz et al. 1993: 1992 Yukon Area AMR).

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

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

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

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

[k] Subsistence and personal use data are preliminary.

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

[n] Commercial fishery was not conducted.

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

Appendix B6.–Alaskan and Canadian total utilization of Yukon River Chinook and fall chum salmon, 1961–2008.

	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	15,580	154,479	170,059
1998	5,937	99,369	105,306	7,951	62,869	70,820
1999	12,468	124,315	136,783	19,636	110,369	130,005
2000	4,879	45,308	50,187	9,236	19,307	28,543
2001	10,139	53,738 [g]	63,877	9,822	35,154 [d]	44,976
2002	9,257	67,888	77,145	8,018	19,393	27,411
2003	9,619	101,000	110,619	11,355	68,174	79,529
2004	11,238	114,370	125,608	9,750	66,546	76,296
2005	11,371	86,355	97,726	18,337	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 [f]	3,426	48,978	52,404	9,566	199,284	208,850

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	Chinook			Fall Chum		
Year	Canada	Alaska	Total	Canada	Alaska	Total
Average						
1961-07	11,960	131,180	143,141	18,369	248,546	266,915
1998-07	8,990	87,915	96,904	12,001	110,139	122,140
2003-07	9,279	97,705	106,984	13,014	170,860	183,873

Note: Canadian managers do not refer to chum as fall chum.

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

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

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

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

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

[f] Data are preliminary.

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

Appendix B7.–Canadian catch of Yukon River Chinook salmon, 1961–2008.

	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
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[c]	1		2,885		513	3,398	3,399	27	3,426
Average									
1961-2007	5,836	405	5,543	376	621	6,119	11,707	252	11,943
1998-2007	2,308	94	6,103	274	621	6,832	8,678	229	8,907
2003-2007	3,214	91	5,782	348	349	6,413	8,984	295	9,278

[a] Sport fish 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, 1961–2008.

	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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Appendix B8.–Page 2 of 2.

	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	15,580
1998[a]				1,792	1,792	1,792	6,159	7,951
1999	10,402	0		3,234	3,234	13,636	6,000	19,636
2000	1,319	0		2,917	2,917	4,236	5,000	9,236
2001	2,198	3	1 [b]	3,027	3,030	5,228	4,594	9,822
2002	3,065	0	2,756 [b]	3,093	3,093	6,158	1,860	8,018
2003	9,030	0	990 [b]	1,943	1,943	10,973	382	11,355
2004	7,365	0	995 [b]	2,180	2,180	9,545	205	9,750
2005	11,931	13		1,800	1,813	13,744	4,593	18,337
2006	4,096	0		2,521	2,521	6,617	5,179	11,796
2007[c]	7,109	0	3,765	2,221	2,221	9,330	4,500	13,830
2008[c]	4,062	0		2,068	2,068	6,130	3,436	9,566
Average								
1961-2007	11,104	561	1,701	2,525	2,865	13,733	4,731	18,363
1998-2007	6,279	2	1,701	2,473	2,474	8,126	3,847	11,973
2003-2007	7,906	3	1,917	2,133	2,136	10,042	2,972	13,014

[a] A test fishery and aboriginal fisheries took place, but all other fisheries were closed.
[b] The chum 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, 1961–2008. [a]

Year	Andreafsky River		Anvik River		Nulato River			Gisasa River	
	East Fork	West Fork	Drainage Wide Total	Index Area	North Fork	South Fork	Both Forks		
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]
1999	[b]	870 [b]	[b]	950 [b]	[b]	[b]			[b]
2000	1,018	427	1,721	1,394	[b]	[b]			[b]

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Appendix B9.–Page 2 of 2.

	Andreafsky River			Anvik River		Nulato River			
Year	East Fork	West Fork	Drainage Wide Total	Index area	North Fork	South Fork	Both Forks		Gisasa River	
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]
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.

Appendix B10.–Chinook salmon escapement counts for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1986–2008.

	Andreafsky River		Nulato River Tower	Gisasa River Weir		Chena River w/corrected percent females		Salcha River w/corrected 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	20.0 [d]		35.8
1987	2,011	56.1 [a]				6,404	43.8 [d]	4,771	47.0 [d]
1988	1,339	38.7 [a]				3,346	46.0 [d]	4,562	36.6 [d]
1989		13.6				2,666	38.0 [d]	3,294	46.8 [d]
1990		41.6				5,603	35.0 [d]	10,728	35.4 [d]
1991		33.9				3,025	31.5 [d]	5,608	34.0 [d]
1992		21.2				5,230	27.8 [d]	7,862	27.3 [d]
1993		29.9				12,241	11.9 [a]	10,007	24.2 [a]
1994	7,801	35.5 [b, c]	1,795 [c]	2,888	[c]	11,877	34.9 [a]	18,399	35.2 [a]
1995	5,841	43.7 [b]	1,412	4,023	46.0	9,680	50.3	13,643	42.2 [a]
1996	2,955	41.9 [b]	756	1,991	19.5	7,153	27.0	7,570	26.3
1997	3,186	36.8 [b]	4,766	3,764	26.0	13,390	17.0 [a]	18,514	36.3 [a]
1998	4,034	29.0 [b]	1,536	2,414	16.2	4,745	30.5 [a]	5,027	22.4 [a]
1999	3,444	28.6 [b]	1,932	2,644	26.4	6,485	47.0 [a]	9,198	38.8 [a]
2000	1,609	54.3 [b]	908	2,089	34.4	4,694	20.0 [d]	4,595	29.9 [a]
2001		[c]	[c]	3,052	49.2 [c]	9,696	32.4 [a]	13,328	27.9 [a]
2002	4,123	21.1 [b]	2,696	2,025	20.7	6,967	27.0 [d]	4,644	34.8 [c]
2003	4,336	45.3 [b]	1,716 [c]	1,901	38.1	8,739	34.0 [c]	15,500	31.8 [c,f]
2004	8,045	37.3	[g]	1,774	30.1	9,645	47.0	15,761	47.0
2005	2,239	50.2	[g]	3,111	34.0		[c]	5,988	54.3
2006	6,463	42.6	[g]	3,030	28.2	2,936	34.0 [c]	10,679	33.0
2007	4,504	44.7	[g]	1,425	39.0	3,564	[k]	5,639	[k]
2008	4,242	[k]	[g]	1,735	[k]	3,212 [d]	41.0 [h]	2,731 [d]	39.0 [h]
BEG [j]						2,800-5,700		3,300-6,500	

-continued-

[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, Jan. 2001.
[k] Data not available.

Appendix B11.–Chinook salmon escapement counts for selected spawning areas in the Canadian portion of the Yukon River drainage, 1961–2008. 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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										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]
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	12,354	37,184
2000	19 [t]	277 [e]	46	113	20		32		4 [u]	677	69	30,699	4,829	25,870
2001	39 [t]		1,035	1,020	481		154		129 [m]	988	36	62,333	9,769	52,564
2002			526	1,149	280		84		[l]	605	39	51,428	9,069	42,359
2003			1,658	3,075	687		292	1115	185 [i]	1,443	70	90,037	9,443	80,594
2004			1,140	762	330		226	792		1,989	76	59,415	10,946	48,469
2005			1519	952	807	363	260	525		2,632	57	79,528	10,977	68,551
2006			1381	1140	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	37,407	3,399	34,008
Escapement Objective														>45,000 [q]
Averages														
1961-07	120	235	550	903	437	284	192	704	138	942	19	63,324	14,768	48,556
1998-07	37	311	861	969	382	363	141	668	138	1,238	62	57,570	8,678	48,893
2003-07	39		1,230	1,306	512	363	189	683	185	1,642	56	68,074	8,984	59,090

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

b All foot surveys prior to 1997 except 1978 (boat survey) and 1986 (aerial survey).

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

d One Hundred Mile Creek to Sidney Creek.

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; 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.

Appendix B12.–Summer chum salmon ground based escapement counts for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1973–2008.

	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	%	No. Fish		No. Fish	%		No. Fish	%		No. Fish	%		No. Fish		No. Fish	
1980				492,676	60.7															
1981	147,312		[a]	1,486,182	54.7															
1982	181,352	64.6	[a]	444,581	69.4															
1983	110,608	57.4	[a]	362,912	56.5															
1984	70,125	50.7	[a]	891,028	60.9															
1985		58.1	[d]	1,080,243	55.8															
1986	167,614	55.4	[b]	1,189,602	57.8															
1987	45,221	58.6	[b]	455,876	65.1				44.9											
1988	68,937	49.3	[b]	1,125,449	66.1				60.9											
1989				636,906	65.6															
1990				403,627	51.3															
1991				847,772	57.9															
1992				775,626	56.6															
1993		48.6		517,409	52.0												5,400		5,809	
1994	200,981	65.2	[c] [d]	1,124,689	59.1	47,295		148,762	47.7	[d]	51,116		[d]				9,984		39,450	
1995	172,148	48.9	[c]	1,339,418	40.1	77,193		236,890	55.6		136,886	45.7		116,735	62.1		3,519	[d]	30,784	
1996	108,450	51.4	[c]	933,240	47.3	51,269		129,694	51.9		157,589	49.3		100,912	59.0		12,810	[d]	74,827	
1997	51,139		[c]	609,118	53.6	48,018		157,975	51.9		31,800			76,454			9,439	[d]	35,741	
1998	67,591	57.3	[c]	471,865	55.9	8,113		49,140	64.2		18,228	50.8		212		[d]	5,901	[d]	17,289	
1999	32,229	56.4	[c]	437,631	58.1	5,300		30,076	63.0		9,920	53.1		11,283		[d]	9,165	[d]	23,221	
2000	22,918	48.2	[c]	196,349	61.6	6,727		24,308	62.6		14,410	49.9		19,376	43.6		3,515		20,516	
2001		52.0	[d]	224,058	55.3		[d]			[d]	17,936	50.3	[d]	3,674	32.4		4,773	[d]	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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Appendix B12.-Page 2 of 2.

	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	%	No. Fish	No. Fish	%	No. Fish	%	No. Fish	%	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	[j]	374,929	[j]	[e]	[e]		36,758	[j]		[e]	1,333 [d]	1,251 [d]
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, Jan. 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, 1971–2008.

	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	

-continued-

Appendix B13.–Page 2 of 6.

	Alaska													
		Yukon River Mainstem Sonar	Tanana River Drainage								Upper Yukon River Drainage			
				Kantishna River			Bluff Cabin		Upper Tanana River					
Year		Estimate	Toklat River	[a]	Abundance Estimate	[b]	Delta River	[c]	Slough	[d]	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	[al]	615,127					23,055	[r]	1,198	[i]			178,278	[am]	50,353	[y, aj, am]
BEG	[an]	300,000-600,000	15,000-33,000				6,000-13,000				46,000-103,000	[ao]	74,000-152,000		50,000-104,000	
Average																
1971-07		669,605	31,243		61,398		14,002		5,963		158,040		151,896		95,386	
1997-07		634,729	16,984		61,398		14,872		6,183		150,163		177,438		101,161	
2003-07		954,400	24,917		84,844		21,690		10,945		235,706		264,150		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	35,125	o					198	p, d								
1973	15,989		383				2,500									
1974	31,525						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	56,016		10,760		1,195		7,538		356		99,775		37,765	62,010		
1986	31,723		825		14		16,686		213		101,826		13,886	87,940		
1987	48,956		6,115		50		12,000				125,121		44,345	80,776		
1988	23,597		1,550		0		6,950		140		69,280		32,494	36,786		
1989	43,834		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	37,733		2,426		53		11,675		468		112,303		33,842	78,461		
1992	22,517		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	77,278		4,977				14,431		315		143,758		21,329	122,429		
1997	26,959		2,189				3,350		207		94,725		9,286	85,439		
1998	13,564		7,292				7,337		235		48,047		1,742	46,305		
1999	12,904						5,136		19		72,188	ae	13,506	58,682		
2000	5,053		933				1,442		204		57,978	ae	4,236	53,742		
2001	21,669		2,453				4,884		5		38,769	ae	4,918	33,851		
2002	13,563		973				7,147		64		104,853	ae	6,158	98,695		
2003	29,519		7,982				39,347		390		153,656	ae	10,973	142,683		
2004	20,274		3,440				18,982		167		163,625	ae	9,545	154,080		
2005	121,413		16,425				34,600		585		451,477		13,744	437,733		
2006	30,849		6,553				18,208		620		217,810	aq,ar	6,617	211,193	aq,ar	
2007	33,750										235,956	aq,ar	9,330	226,626	aq,ar	
2008	20,055	al									132,048	aq,ar	6,130	125,918	aq,ar	
EO	22,000-49,000	ap												>80,000		
Average																
1971-07	55,606		4,480		223		8,982		317		115,171		19,113	96,058		
1997-07	29,956		5,360		--		14,043		250		149,008		8,187	140,821		
2003-07	47,161		8,600		--		27,784		441		244,505		10,042	234,463		

-continued-

[a] Expanded total abundance estimates for upper Toklat River index area using stream life curve (SLC) developed with 1987-1993 data. Index area includes Geiger Creek, Sushana River, and mainstem floodplain sloughs from approximately 0.25 mile upstream of roadhouse.

[b] Fall chum salmon abundance estimate for the Kantishna and Toklat River drainages is based on a mark-recapture program. Tag deployment occurs at a fish wheel located near the mouth of the Kantishna River and recaptures are collected at 4 fish wheels; 2 located 8 miles upstream of the mouth of the Toklat River (1999-2005) and 1 fish wheel on the Kantishna River (2000-2002) and 2 fish wheels in 2003-2005.

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

[d] Foot survey, unless otherwise indicated.

[e] Fall chum salmon abundance estimate for the upper Tanana River drainage is based on a mark-recapture program. Tag deployment occurs from a fish wheel (2 fish wheels in 1995) located just upstream of the Kantishna River and recaptures are collected from 1 fish wheel (2 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 since 2007.

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

[h] Weir count, unless otherwise indicated.

[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 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 2004 border passage 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] Data are preliminary.

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

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

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

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

[aq] An independent border passage estimate and spawning escapement is available from the Eagle sonar program.

[ar] There was unusual late run strength which has not been incorporated into the border passage and spawning escapement estimates.

Appendix B14.–Coho salmon passage estimates or escapement estimates for selected spawning areas in the Alaskan portion of the Yukon River Drainage, 1972–2008.

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

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Appendix B14.–Page 2 of 3.

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]
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]	[q]	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

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		Yukon	Kantishna					Upper Tanana River Drainage			
	East	River	River	Nenana River Drainage					Delta		
	Fork	Mainstem	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]
2005	5,303	184,071	625	430	325 [h]	1,030	3,890	34,293	8,766	2,100	2,024
2006		131,919		194	160 [h]	634	1,916	16,748	4,281	4,375	271
2007 [y]		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
SEG [s]								5,200-17,000 [z]			
Average 1972-2007	8,288	147,537	278	857	973	1,558	1,621	17,483	8,077	2,187	1,442

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.

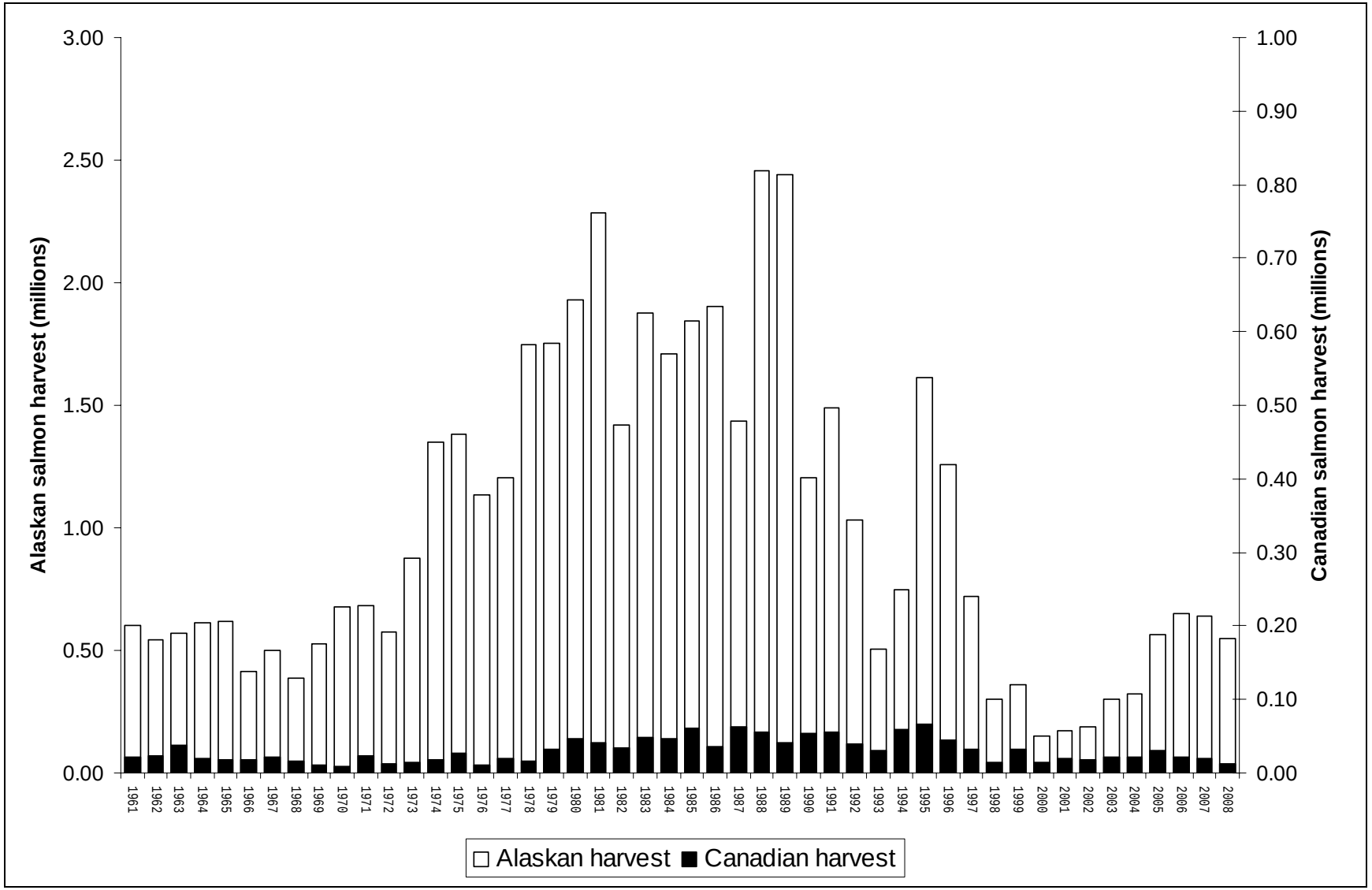
[p] No survey of Wood Creek due to obstructions in creek.

[q] Combination foot and boat survey.

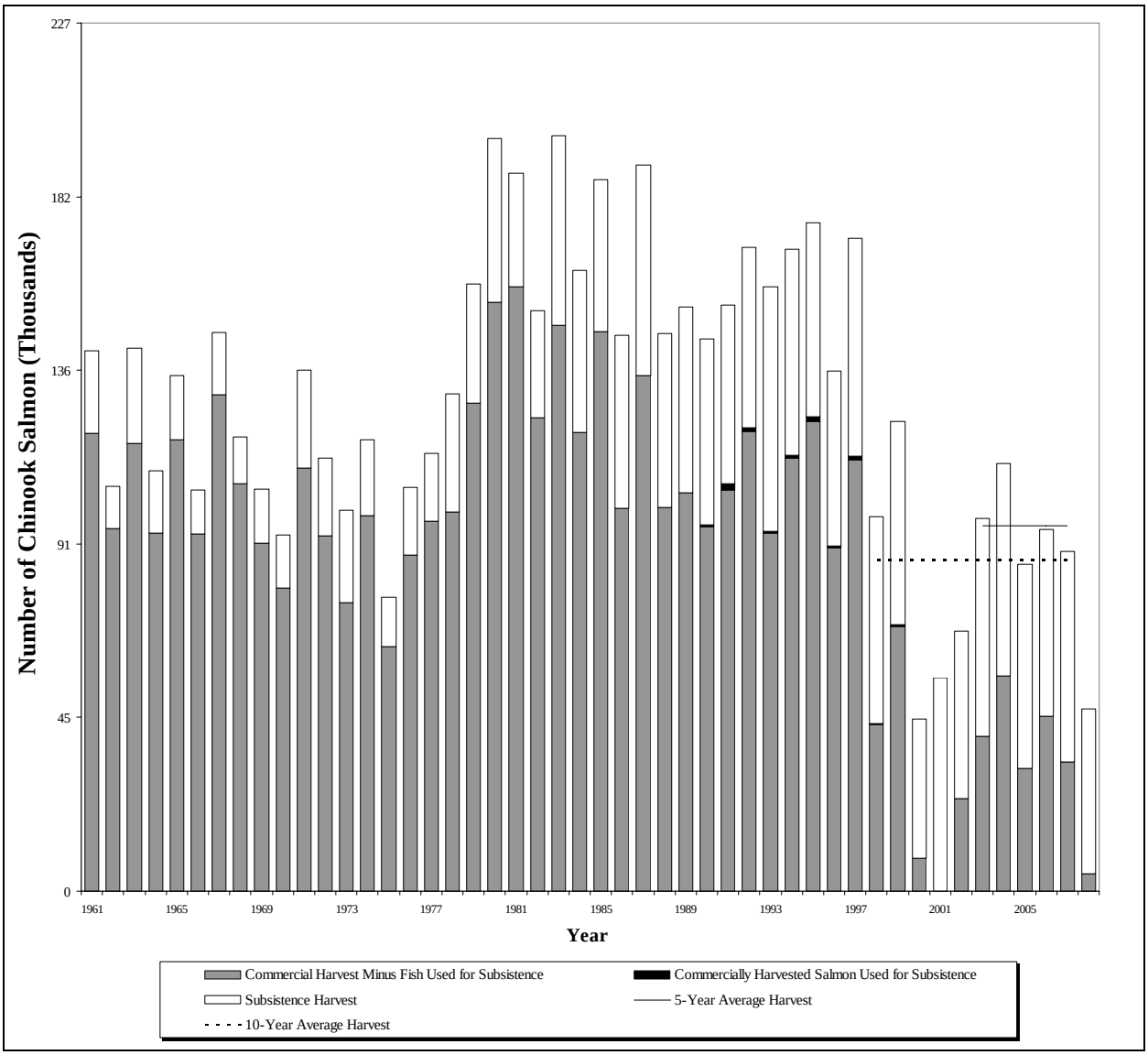
[r] Data preliminary.

[s] 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.

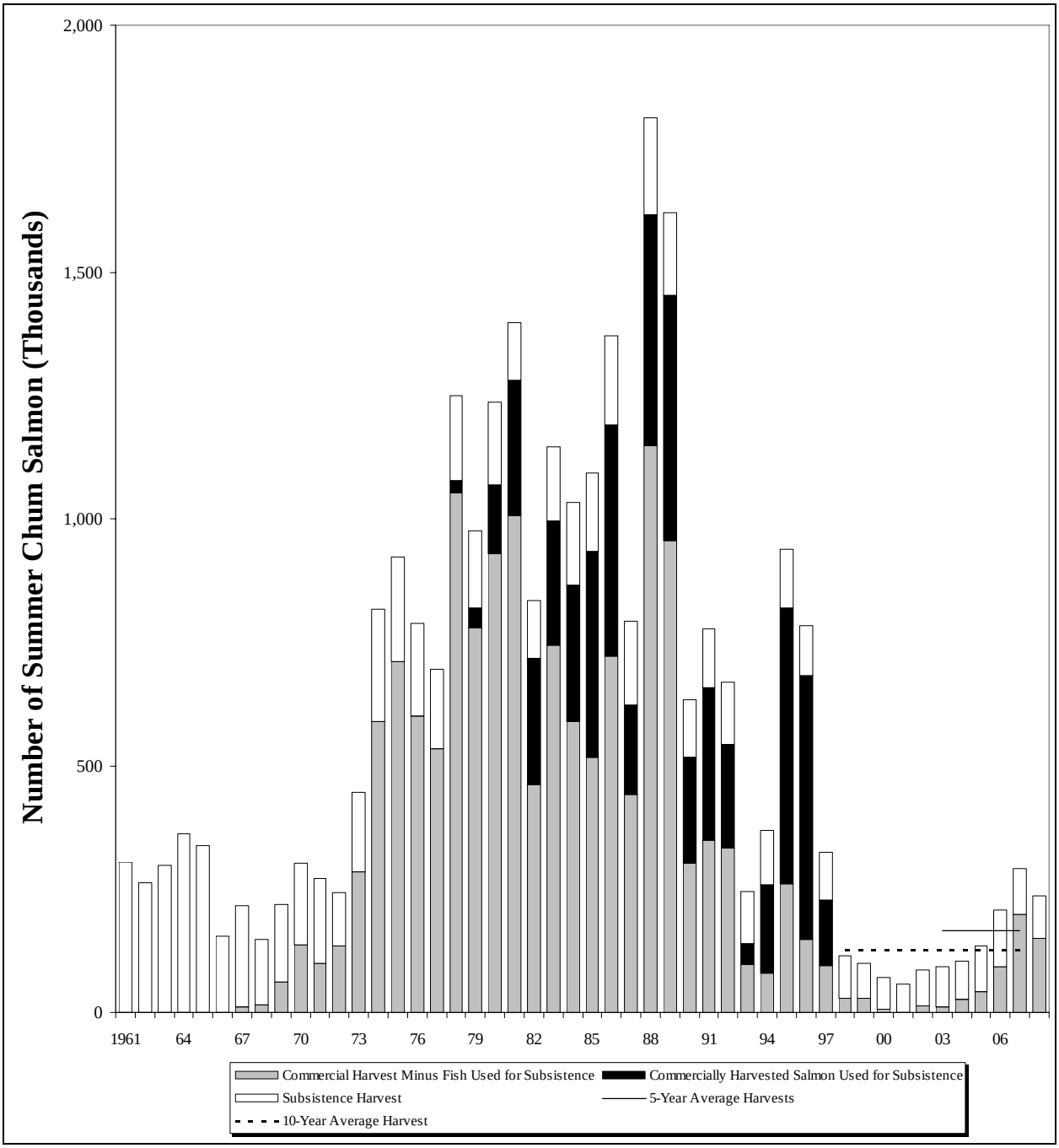
APPENDIX C: FIGURES



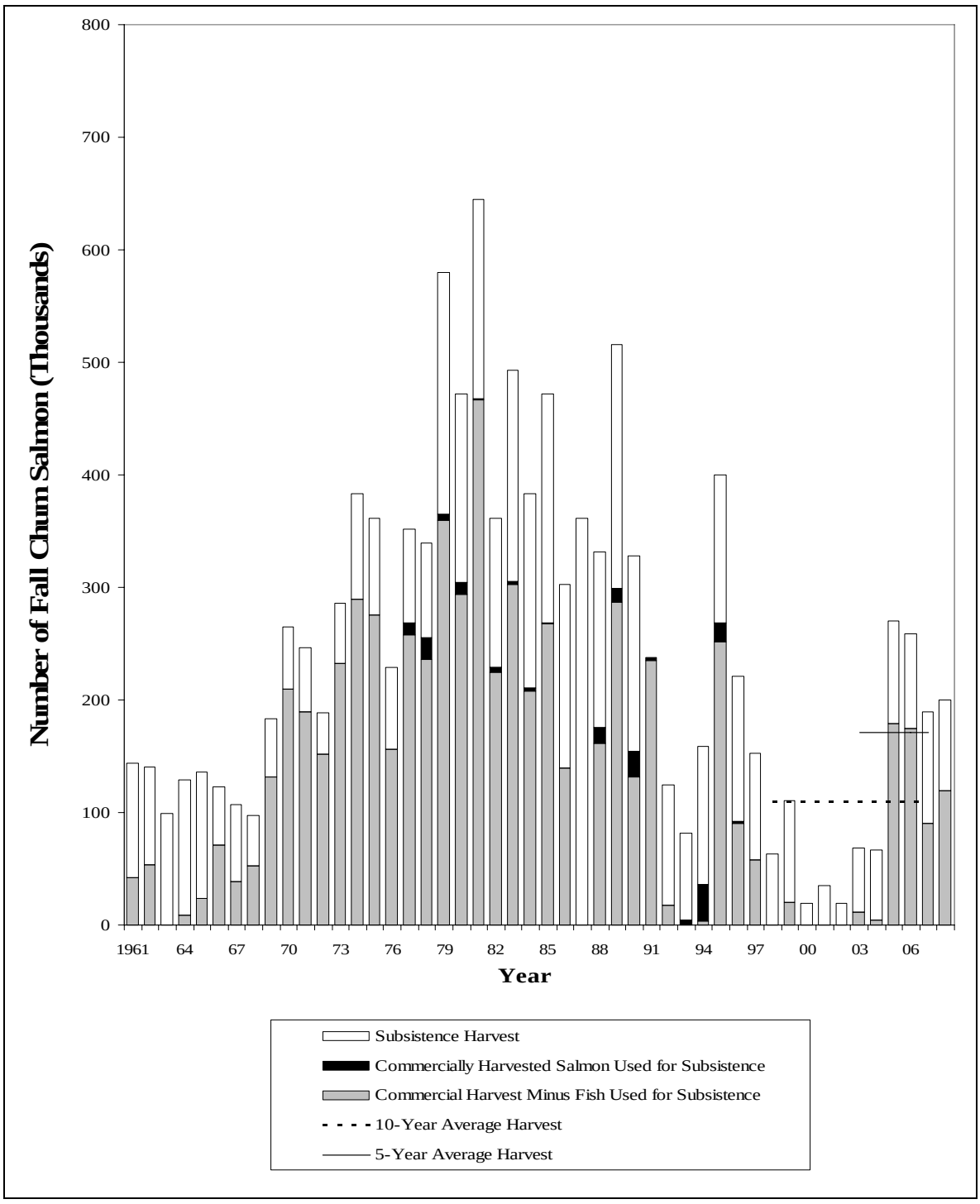
Appendix C1.–Total utilization of salmon, Yukon River, 1961–2008. 2008 Alaskan harvest estimates other than commercial are preliminary.



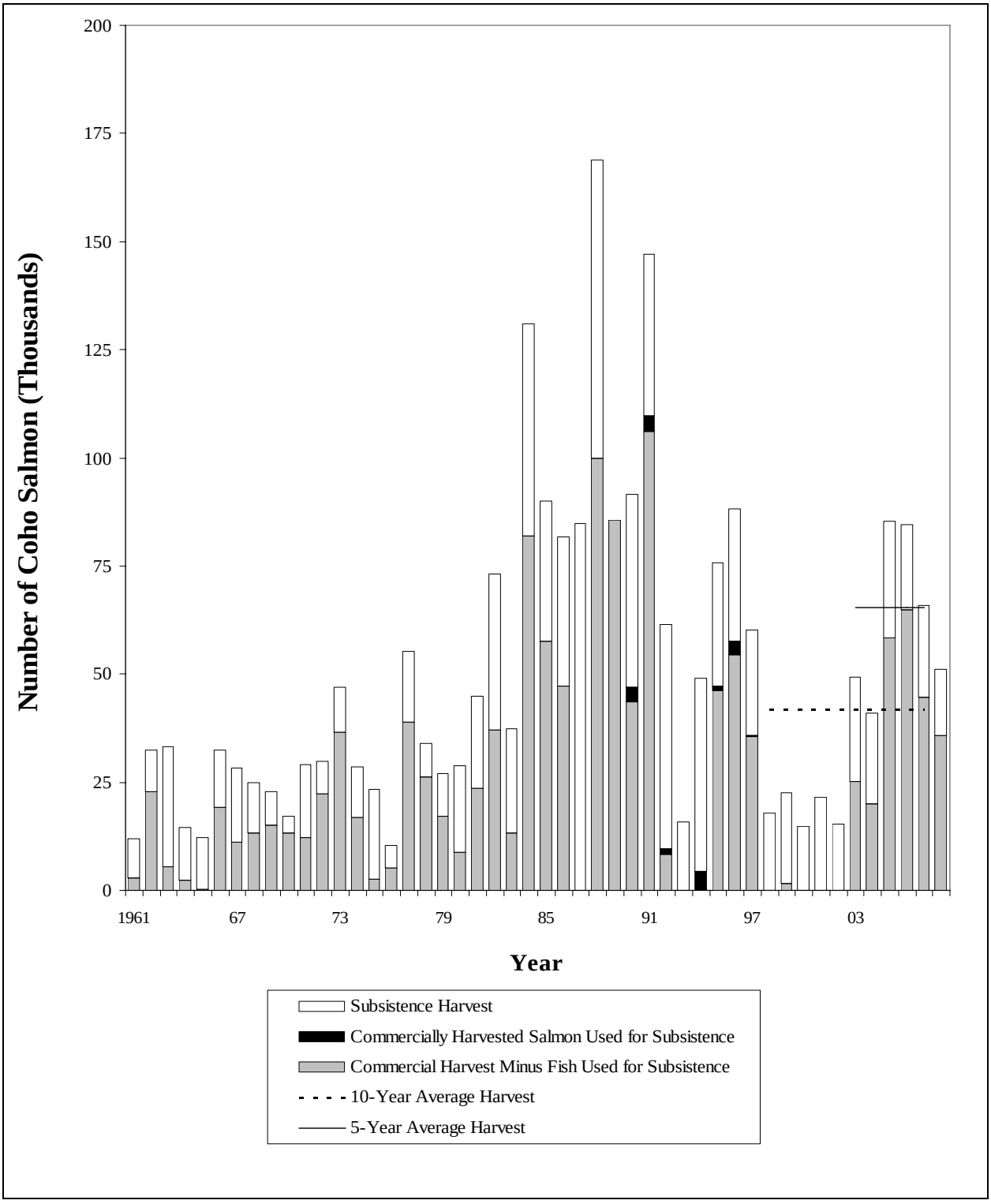
Appendix C2.–Alaskan harvest of Chinook salmon, Yukon River, 1961–2008. No commercial fishery occurred in 2001. 2008 harvest estimates are preliminary.



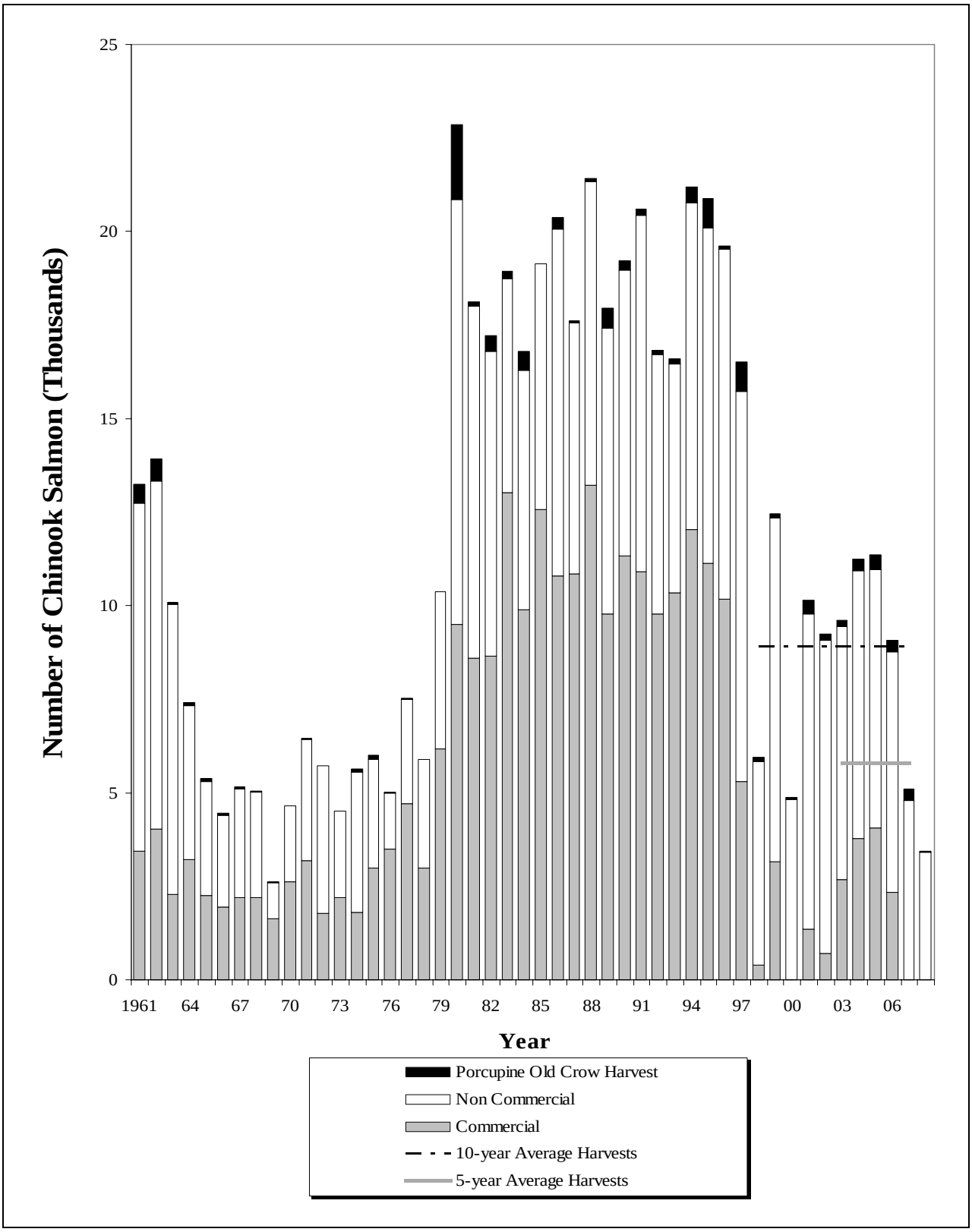
Appendix C3.–Alaskan harvest of summer chum salmon 1961–2008. The 2008 harvest estimates other than commercial are preliminary.



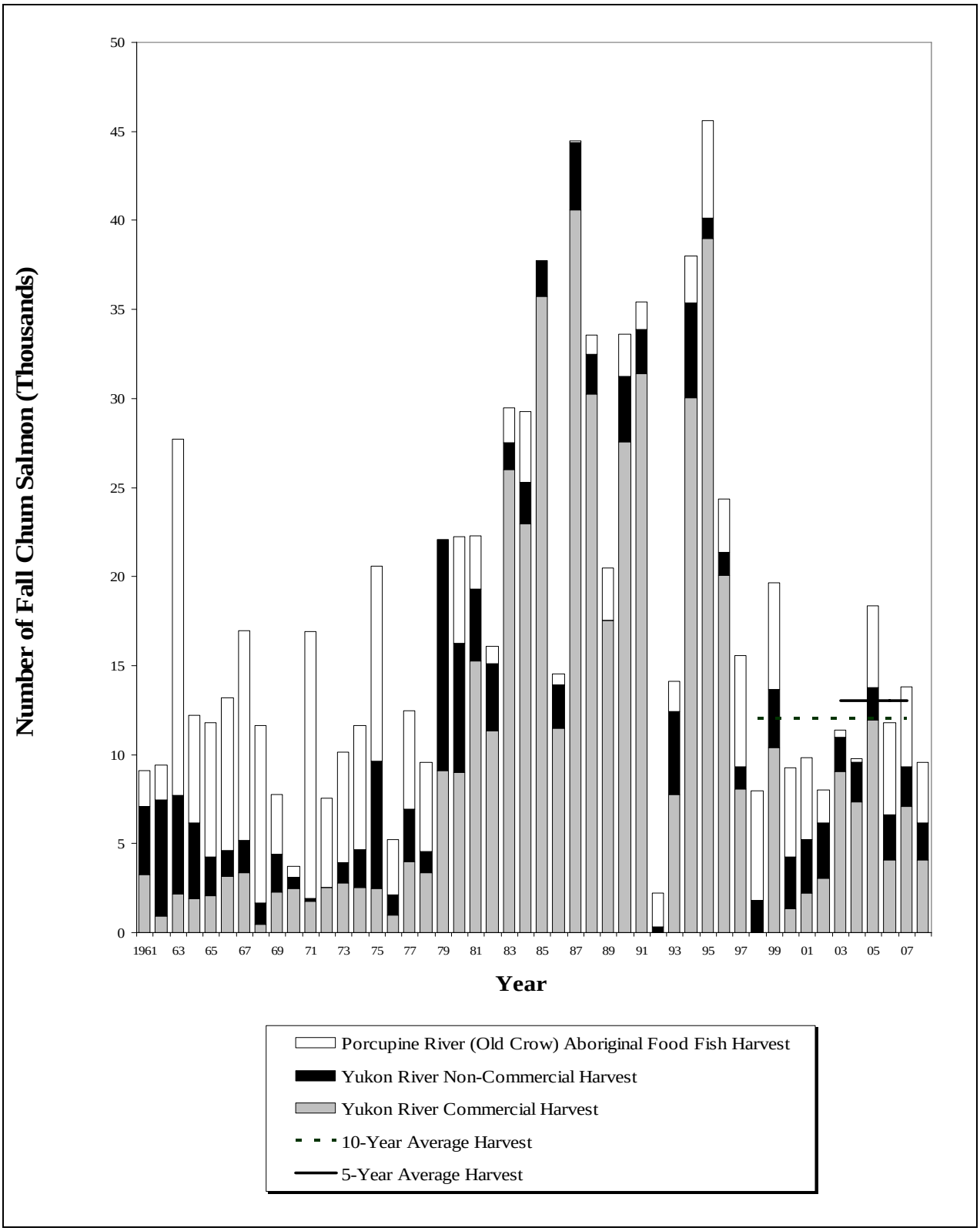
Appendix C4.–Alaskan harvest of fall chum salmon, Yukon River, 1961–2008. The commercial fishery was closed 2000–2002. The 2007 and 2008 subsistence harvest estimates are preliminary.



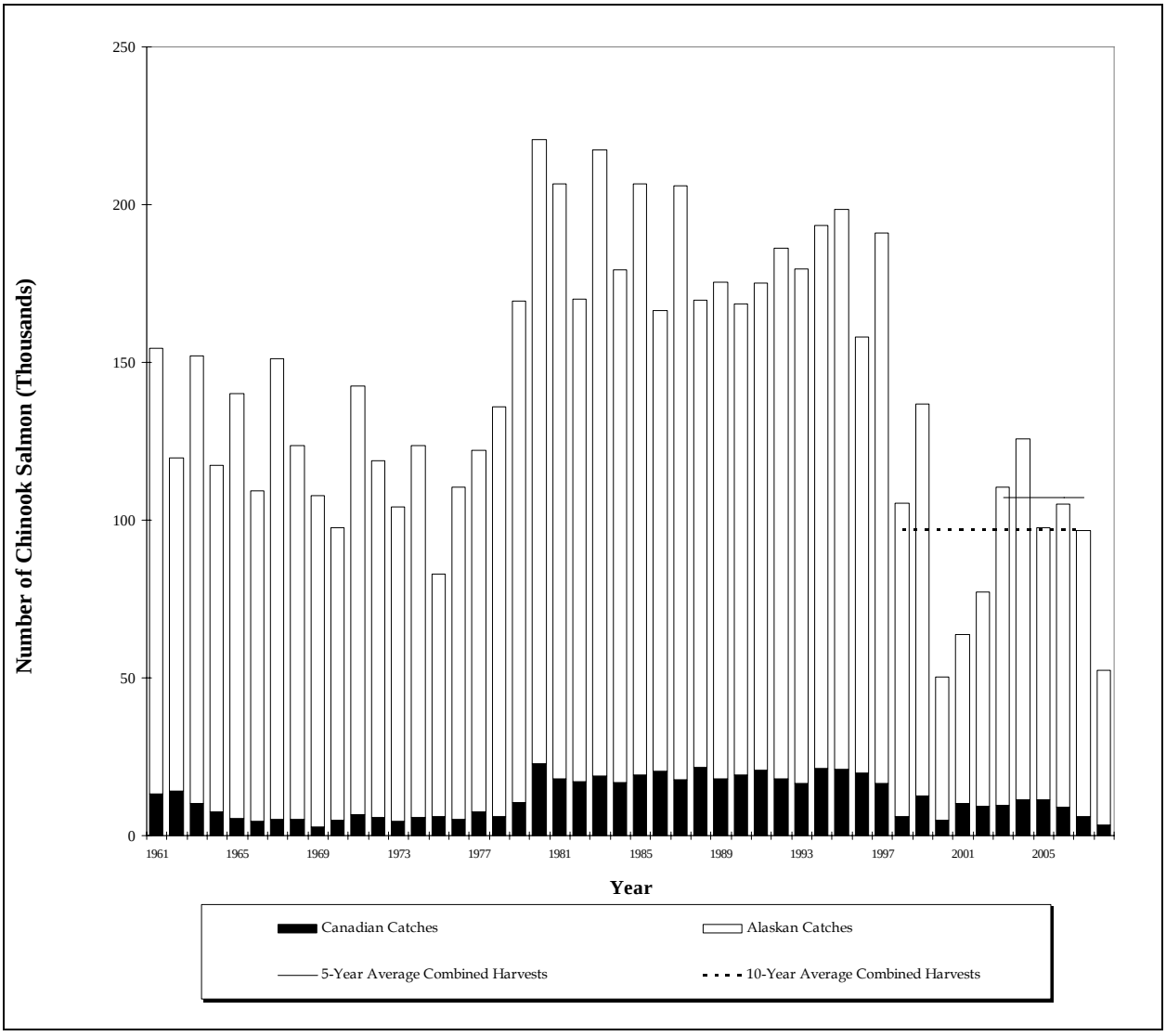
Appendix C5.–Alaskan harvest of coho salmon, Yukon River, 1961–2008. The commercial fishery was closed 2000-2002. The 2007 and 2008 subsistence harvest estimates are preliminary. Commercial harvest is not adjusted for subsistence use of commercially caught fish.



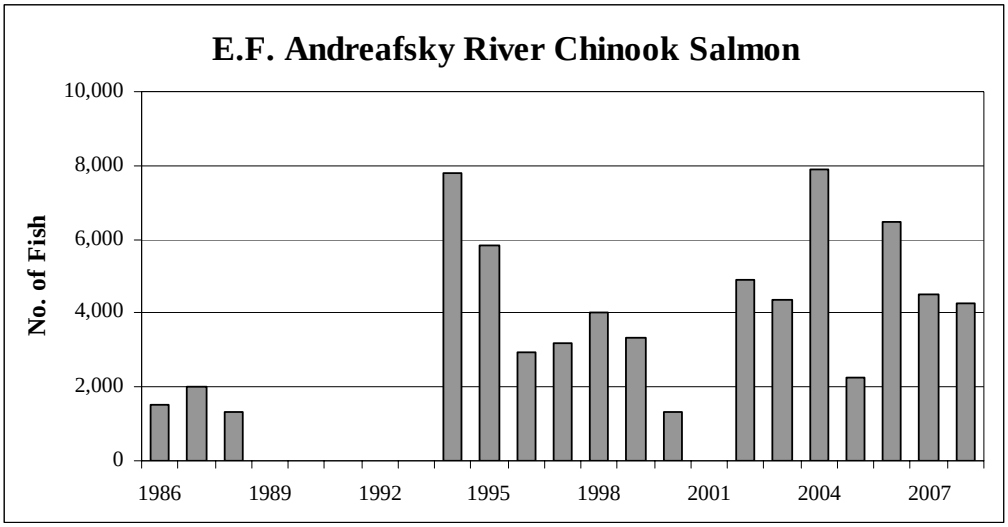
Appendix C6.–Canadian harvest of Chinook salmon, Yukon River, 1961–2008. Catch data for 2008 are preliminary.

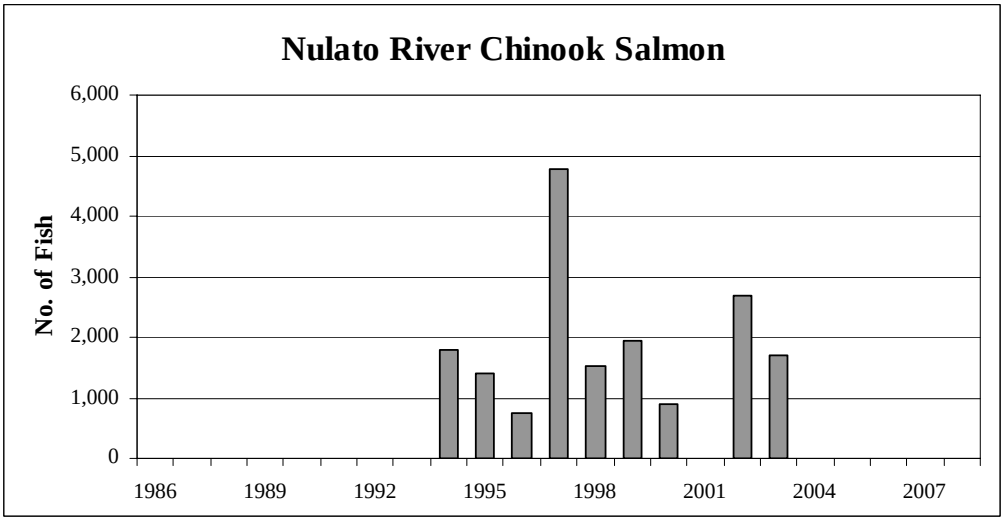


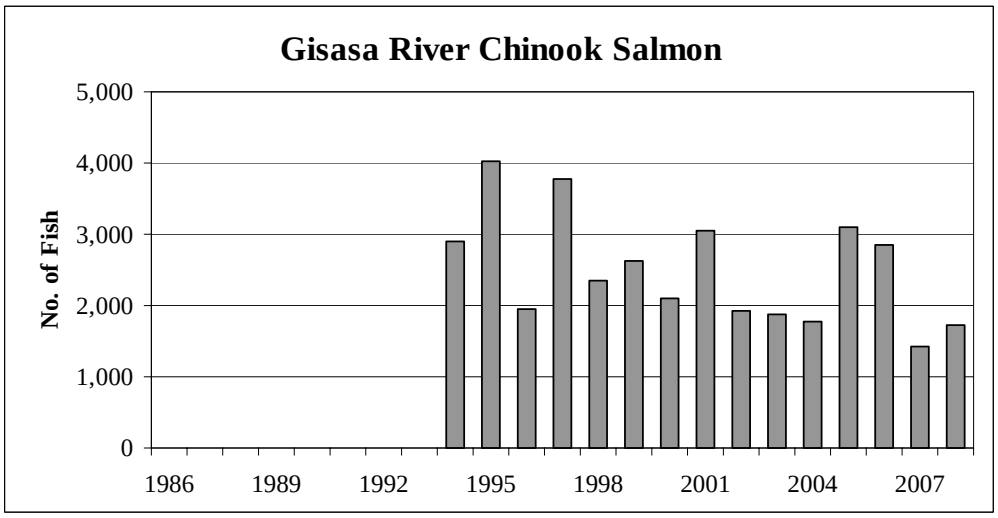
Appendix C7.–Canadian harvest of fall chum salmon, Yukon River, 1961–2008. Catch data for 2008 are preliminary.



Appendix C8.–Total utilization of Chinook salmon, Yukon River, 1961–2008. Catch data for 2008 are incomplete and preliminary.







Appendix C9.–Chinook salmon ground based escapement estimates for selected tributaries in the Alaska portion of the Yukon River drainage, 1986–2008.

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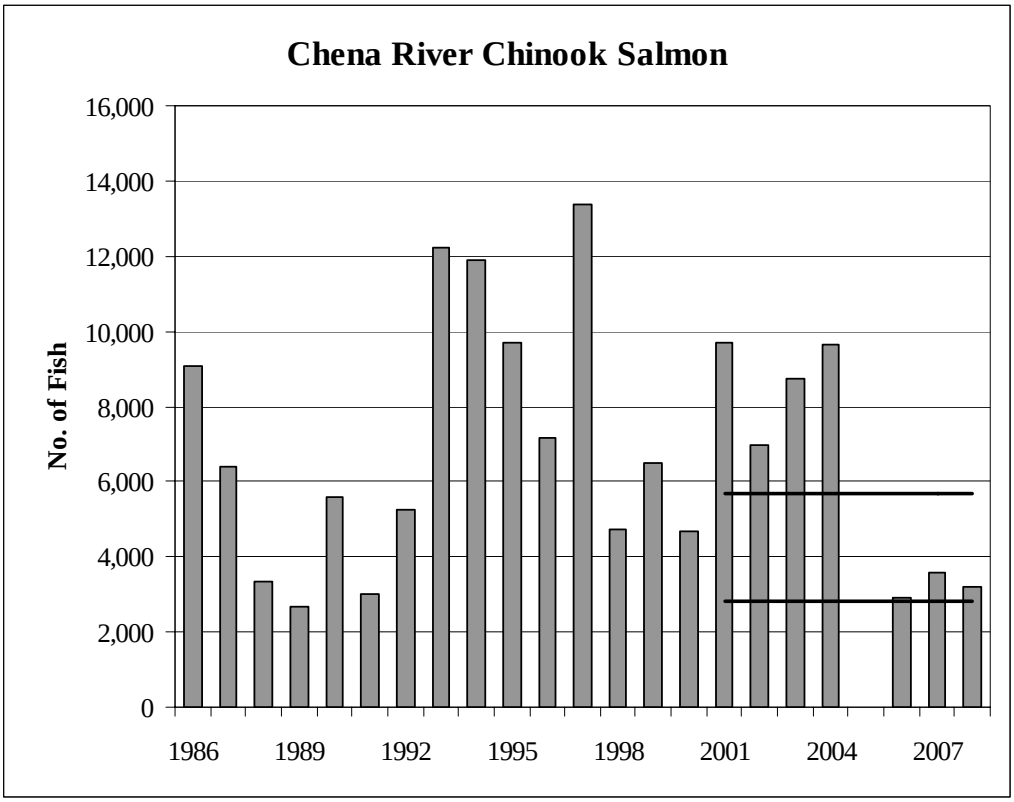
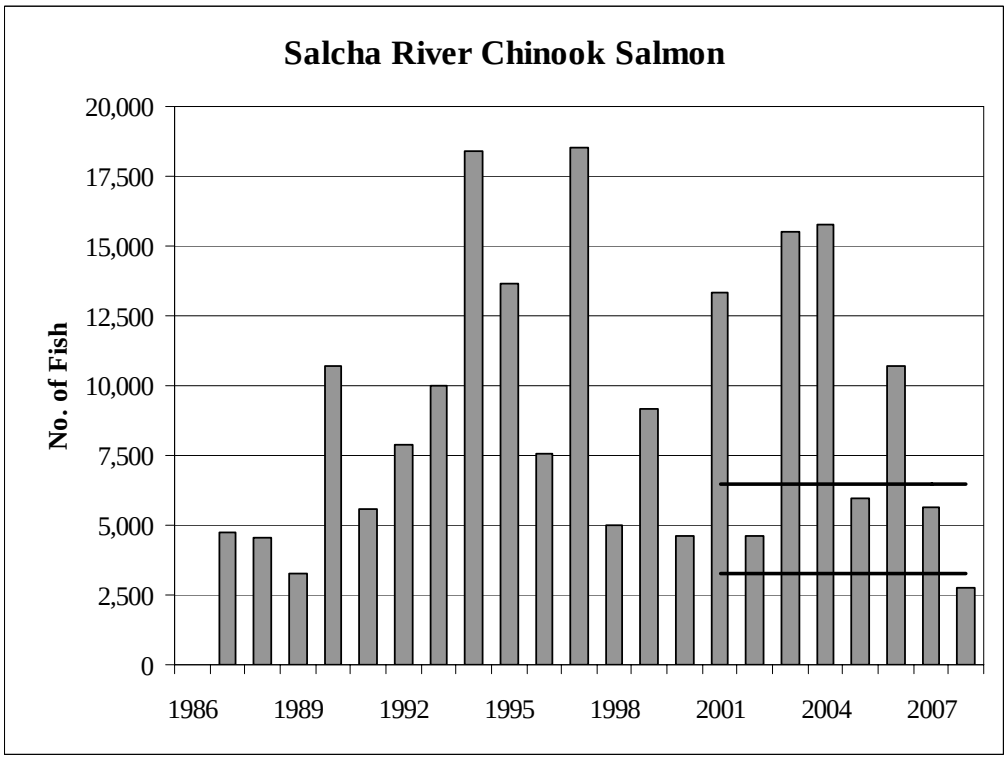
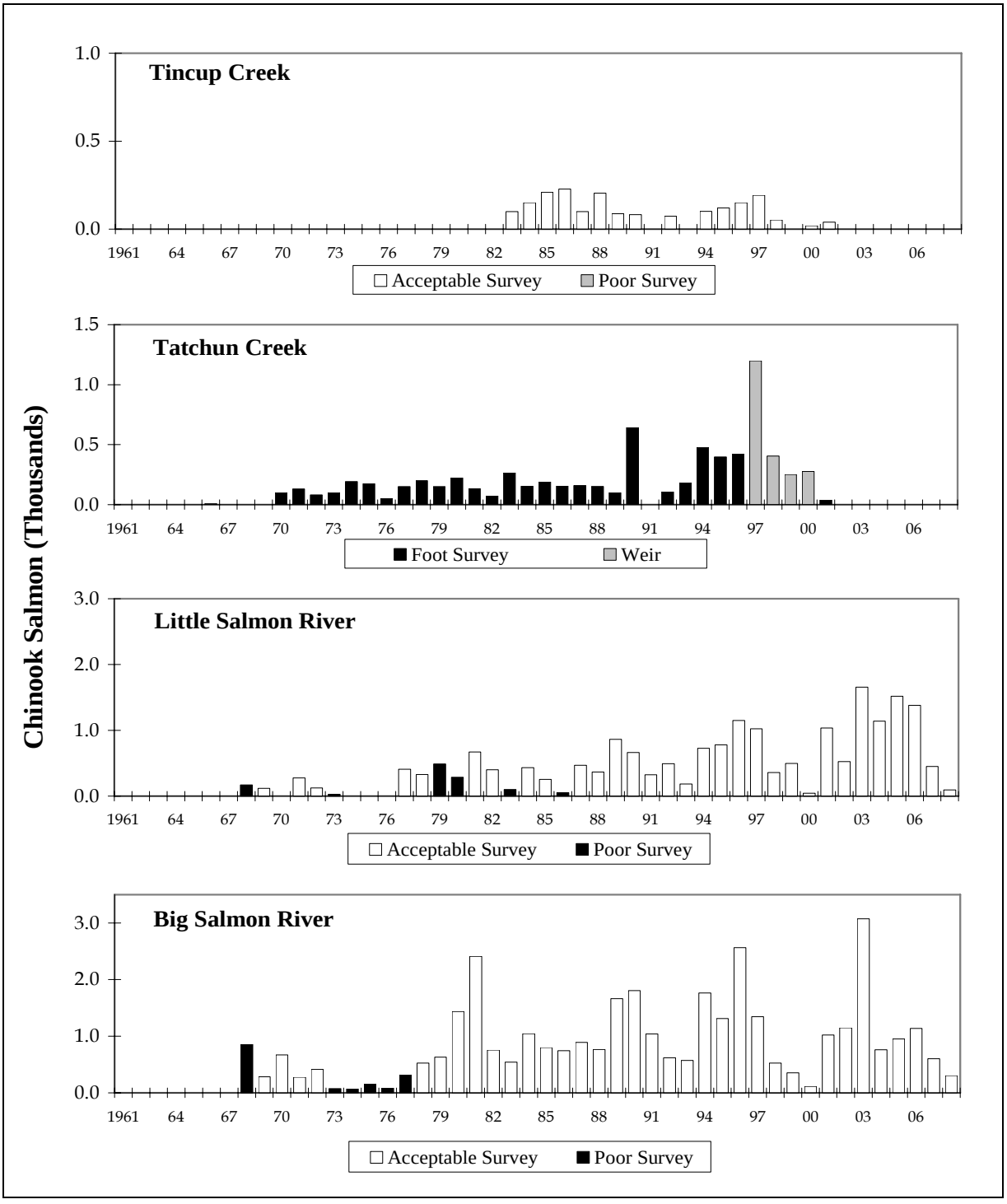


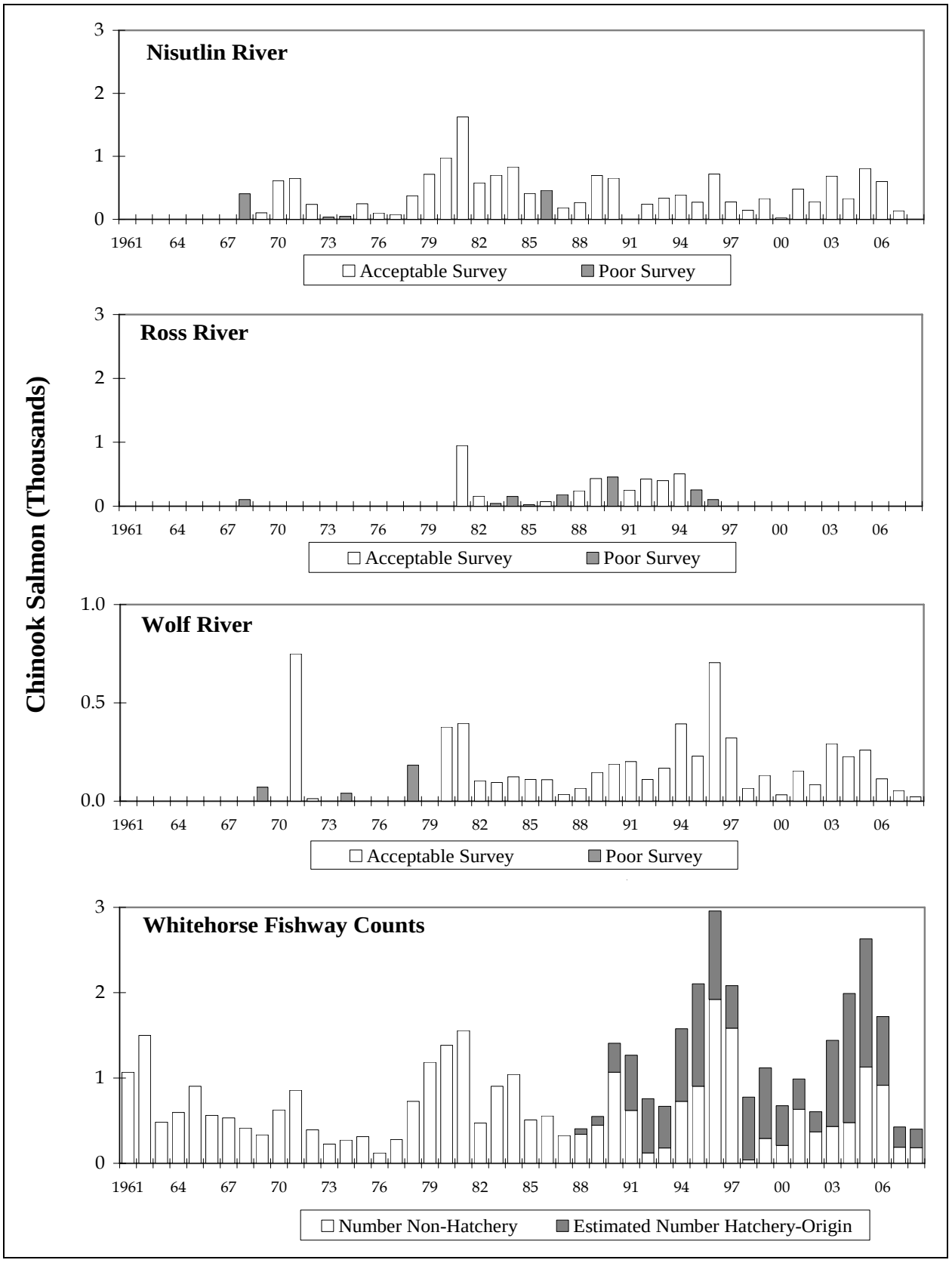


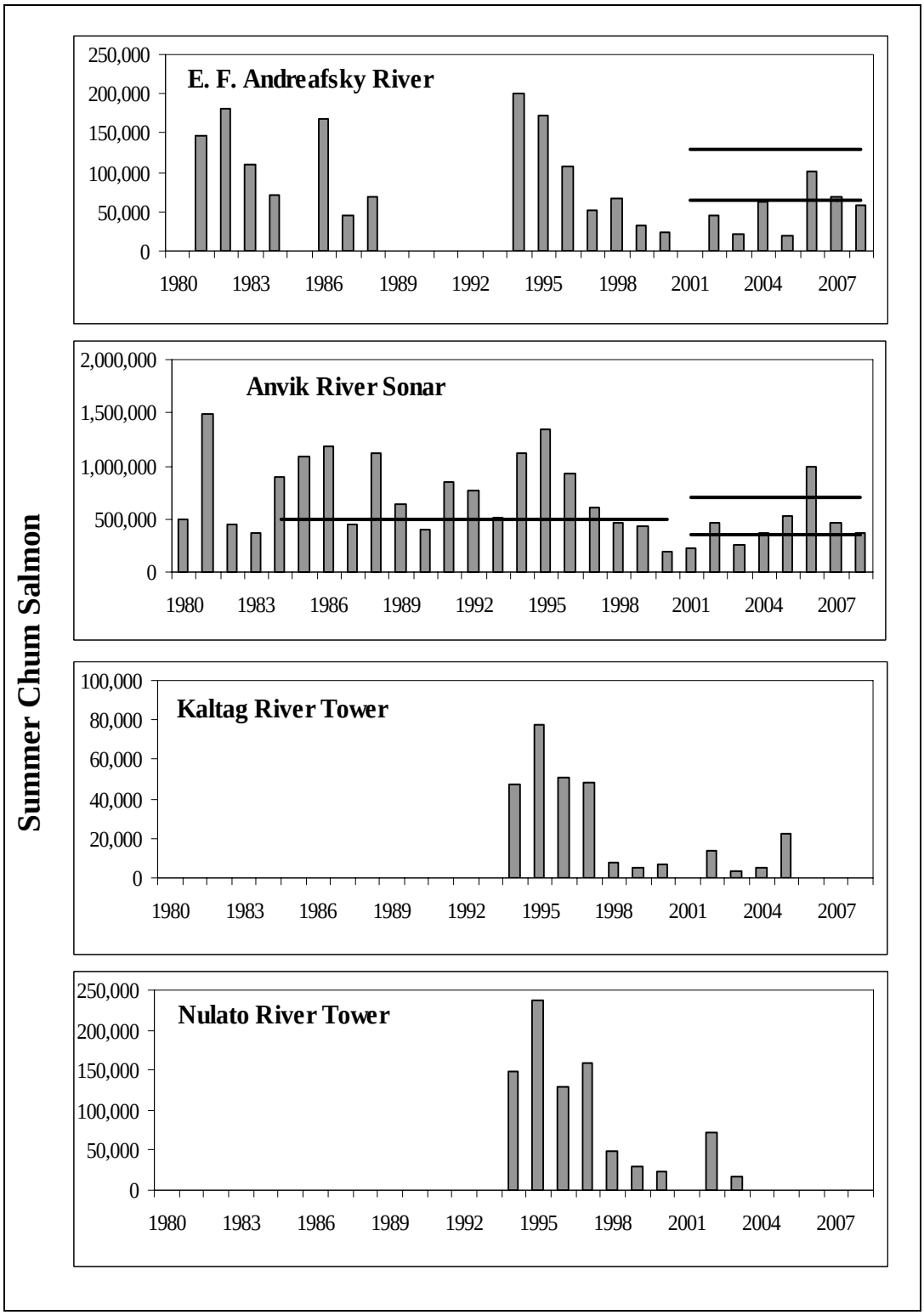
Note: The BEG range is indicated by the horizontal lines for tributaries with BEGs. The vertical scale is variable.



Appendix C10.–Chinook salmon escapement data for selected spawning areas in the Canadian portion of the Yukon River drainage, 1961–2008. Data are aerial survey observations unless noted otherwise. Note vertical scale is variable.

-continued-


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



Appendix C11.–Summer chum salmon ground based escapement estimates for selected tributaries in the Alaskan Yukon River drainage, 1980–2008. The BEG range is indicated by the horizontal lines for tributaries with BEGs. The vertical scale is variable.

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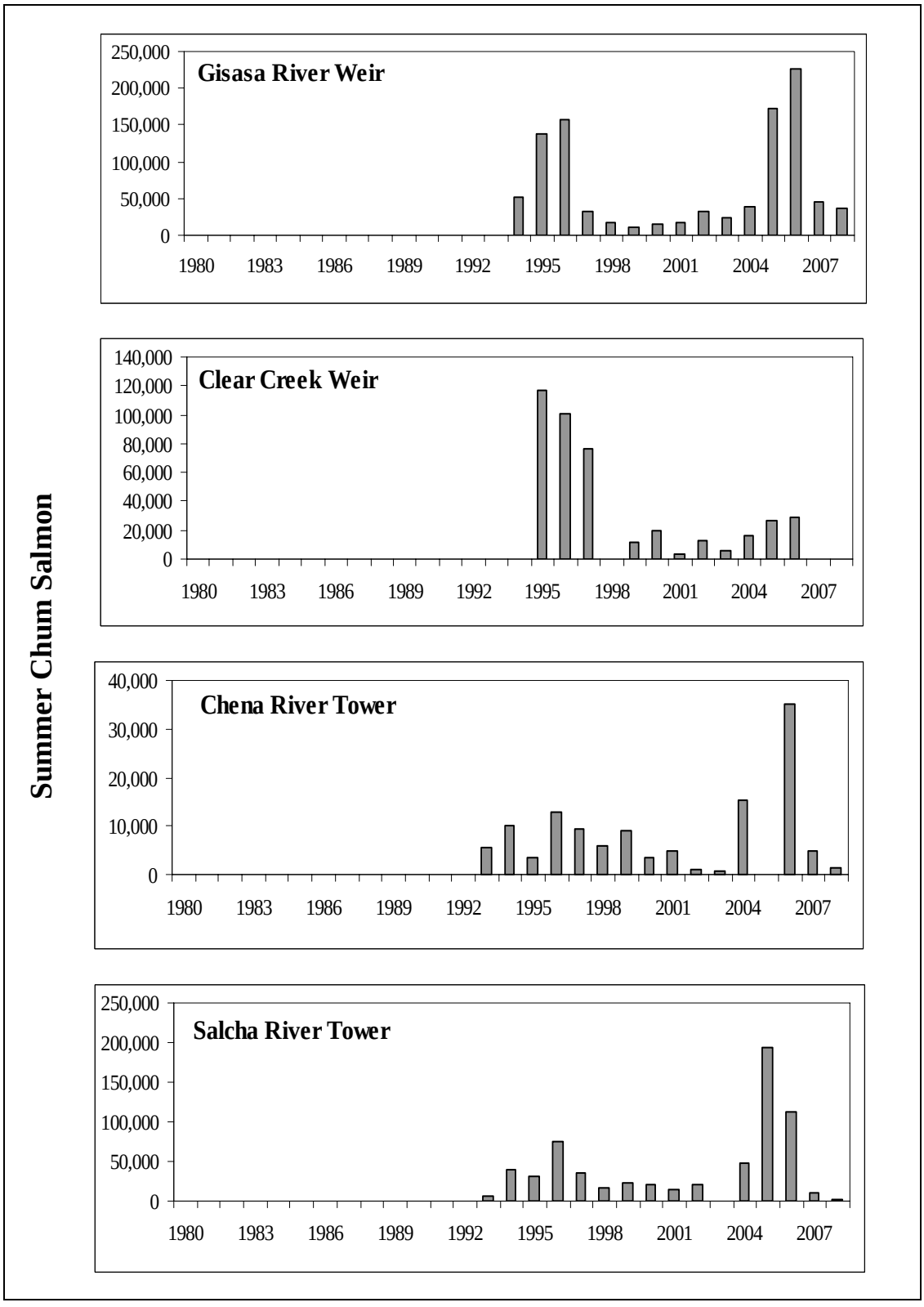
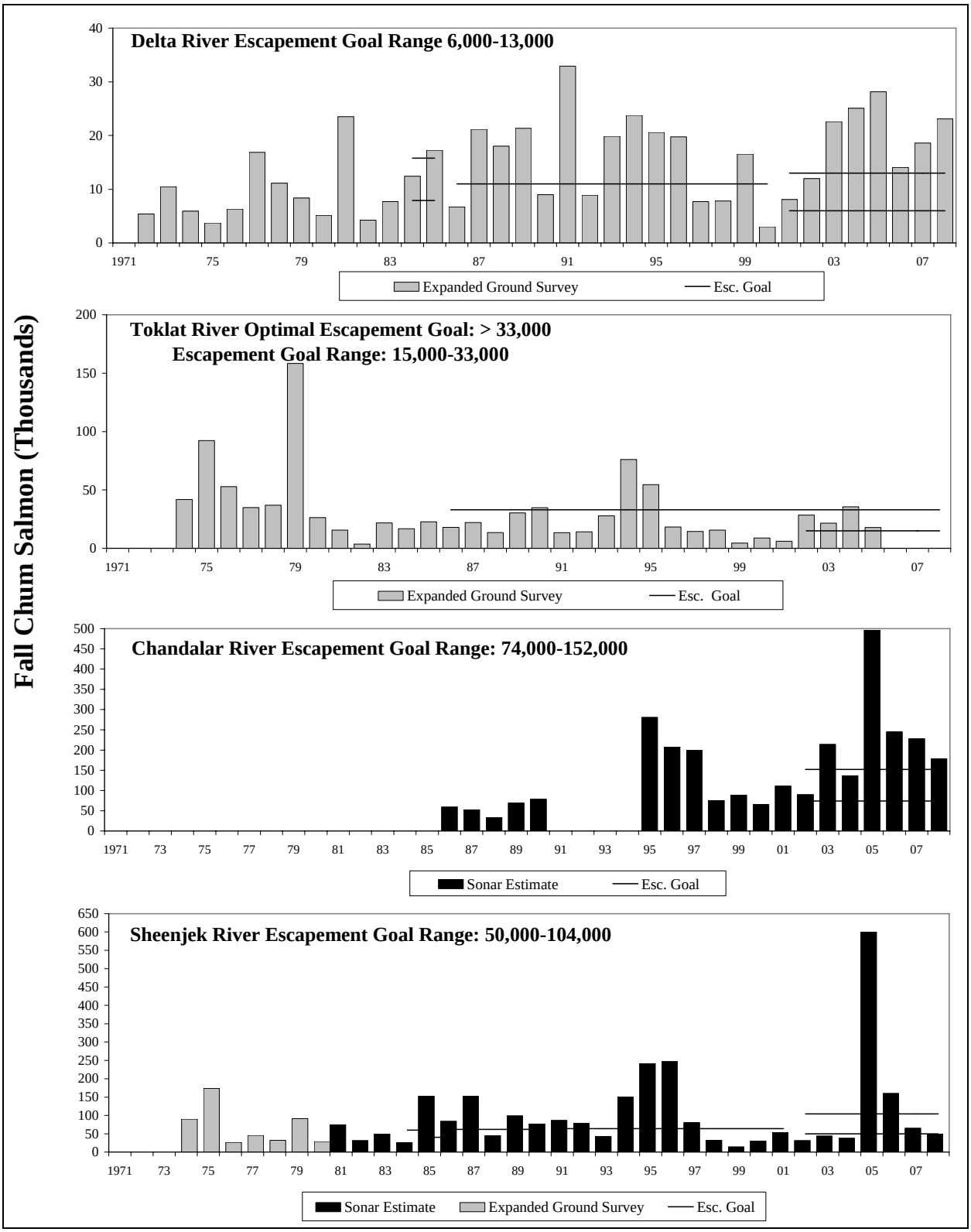
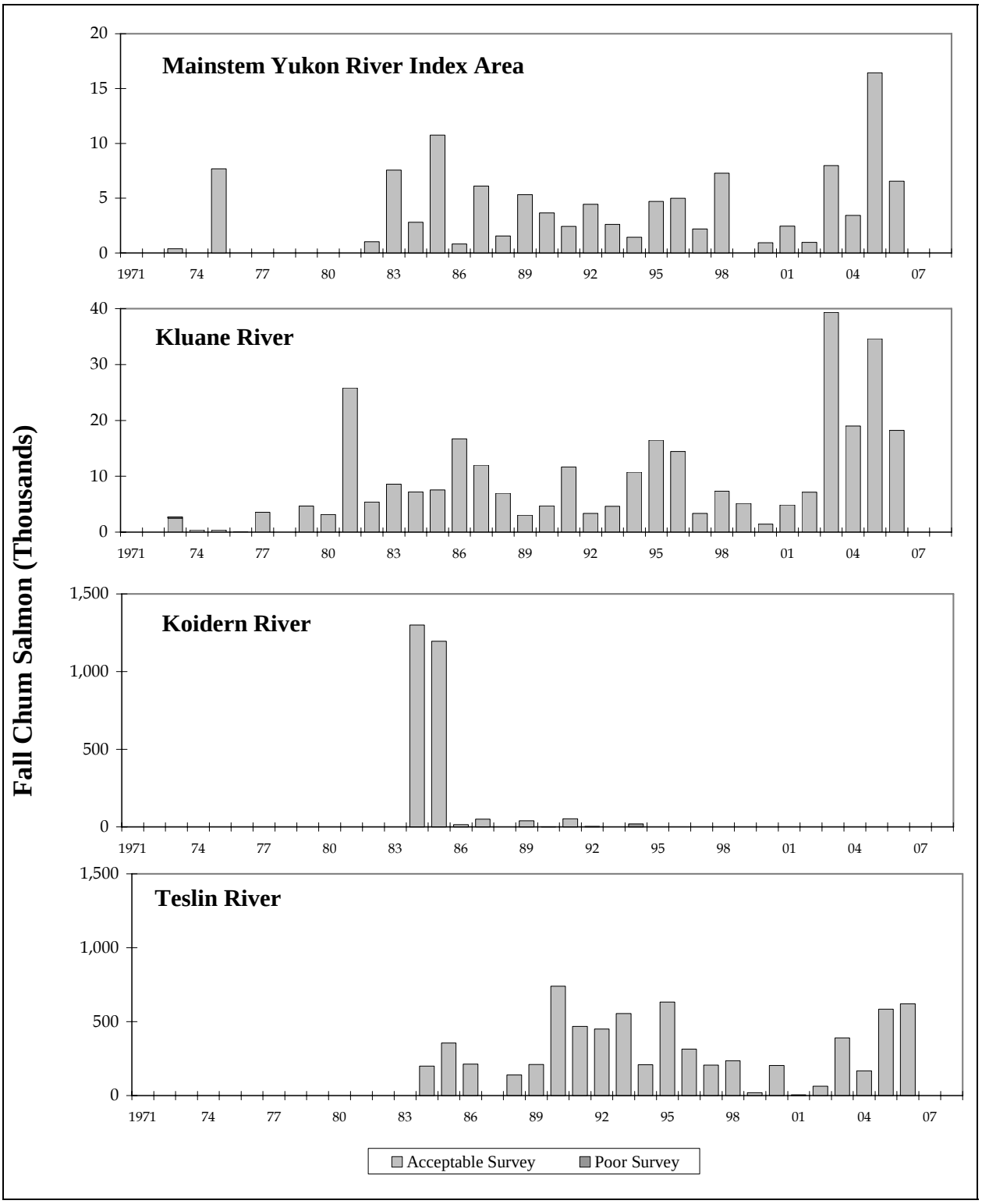
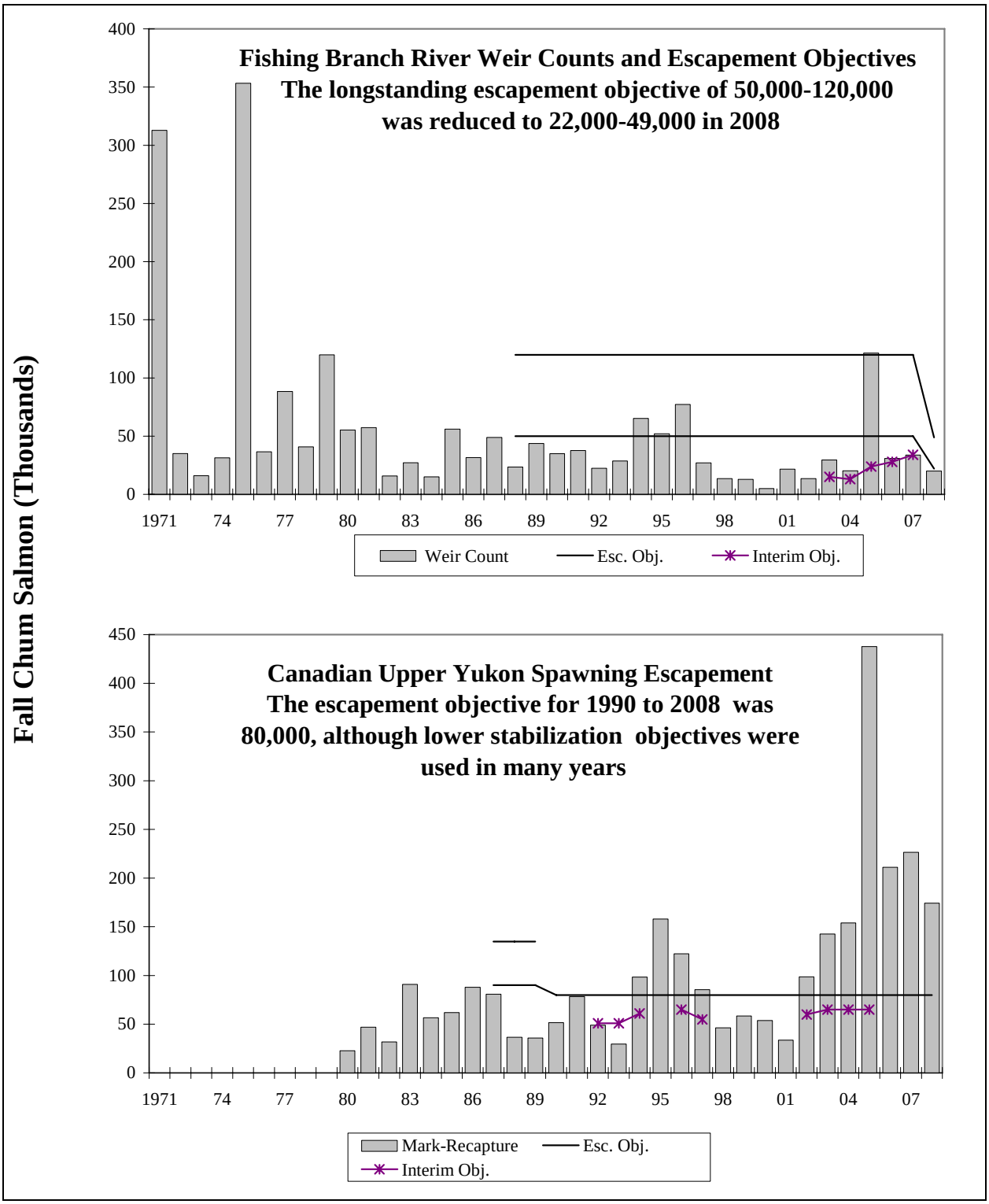

Summer Chum Salmon
Gisasa River Weir
250,000
200,000
150,000
100,000
50,000
0
1980 1983 1986 1989 1992 1995 1998 2001 2004 2007
Clear Creek Weir
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
1980 1983 1986 1989 1992 1995 1998 2001 2004 2007
Chena River Tower
40,000
30,000
20,000
10,000
0
1980 1983 1986 1989 1992 1995 1998 2001 2004 2007
Salcha River Tower
250,000
200,000
150,000
100,000
50,000
0
1980 1983 1986 1989 1992 1995 1998 2001 2004 2007



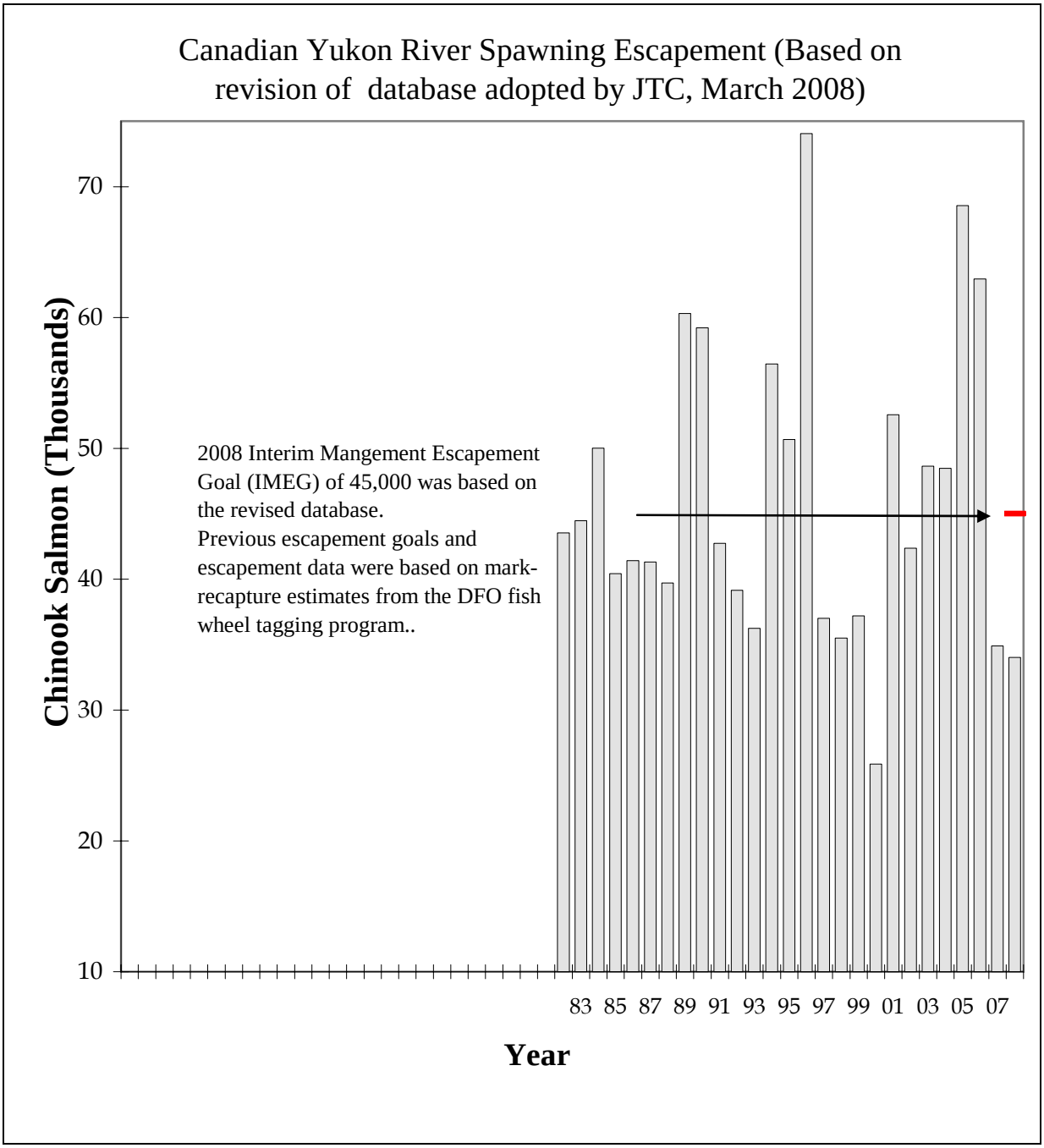
Appendix C12.–Fall chum salmon escapement estimates for selected spawning areas in the Alaskan portion of the Yukon River drainage, 1971–2008. Horizontal lines represent biological escapement goals or ranges. Note vertical scale is variable.



Appendix C13.–Chum aerial survey data for selected spawning areas in the Canadian portion of the Yukon River drainage, 1971–2008.Note, vertical scale of Mainstem and Kluane in thousands, wile the Koidern and Teslin are in hundreds. Genetic stock identification was used to determine relative tributary spawning abundance in 2007 and 2008.



Appendix C14.–Chum salmon escapement estimates for spawning areas in the Canadian portion of the Yukon River drainage, 1971–2008. 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 using analyses undertaken by Gene Sandone. The 2008 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, 1982–2008.