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**Kuskokwim River Salmon Stock Status and  
Kuskokwim Area Fisheries, 2009; a Report to the  
Alaska Board of Fisheries**

by

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**Douglas B. Molyneaux,**

and

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December 2009

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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<b>Weights and measures (metric)</b>		<b>General</b>		<b>Measures (fisheries)</b>	
centimeter	cm	Alaska Administrative		fork length	FL
deciliter	dL	Code	AAC	mideye to fork	MEF
gram	g	all commonly accepted		mideye to tail fork	METF
hectare	ha	abbreviations	e.g., Mr., Mrs., AM, PM, etc.	standard length	SL
kilogram	kg			total length	TL
kilometer	km	all commonly accepted			
liter	L	professional titles	e.g., Dr., Ph.D., R.N., etc.	<b>Mathematics, statistics</b>	
meter	m	at	@	<i>all standard mathematical</i>	
milliliter	mL	compass directions:		<i>signs, symbols and</i>	
millimeter	mm	east	E	<i>abbreviations</i>	
		north	N	alternate hypothesis	H <sub>A</sub>
<b>Weights and measures (English)</b>		south	S	base of natural logarithm	<i>e</i>
cubic feet per second	ft <sup>3</sup> /s	west	W	catch per unit effort	CPUE
foot	ft	copyright	©	coefficient of variation	CV
gallon	gal	corporate suffixes:		common test statistics	(F, t, $\chi^2$ , etc.)
inch	in	Company	Co.	confidence interval	CI
mile	mi	Corporation	Corp.	correlation coefficient	
nautical mile	nmi	Incorporated	Inc.	(multiple)	R
ounce	oz	Limited	Ltd.	correlation coefficient	
pound	lb	District of Columbia	D.C.	(simple)	r
quart	qt	et alii (and others)	et al.	covariance	cov
yard	yd	et cetera (and so forth)	etc.	degree (angular)	°
		exempli gratia	e.g.	degrees of freedom	df
<b>Time and temperature</b>		(for example)		expected value	<i>E</i>
day	d	Federal Information	FIC	greater than	>
degrees Celsius	°C	Code		greater than or equal to	≥
degrees Fahrenheit	°F	id est (that is)	i.e.	harvest per unit effort	HPUE
degrees kelvin	K	latitude or longitude	lat. or long.	less than	<
hour	h	monetary symbols		less than or equal to	≤
minute	min	(U.S.)	\$, ¢	logarithm (natural)	ln
second	s	months (tables and		logarithm (base 10)	log
		figures): first three		logarithm (specify base)	log <sub>2</sub> , etc.
<b>Physics and chemistry</b>		letters	Jan, ..., Dec	minute (angular)	'
all atomic symbols		registered trademark	®	not significant	NS
alternating current	AC	trademark	™	null hypothesis	H <sub>0</sub>
ampere	A	United States		percent	%
calorie	cal	(adjective)	U.S.	probability	P
direct current	DC	United States of		probability of a type I error	
hertz	Hz	America (noun)	USA	(rejection of the null	
horsepower	hp	U.S.C.	United States	hypothesis when true)	α
hydrogen ion activity	pH		Code	probability of a type II error	
(negative log of)		U.S. state	use two-letter	(acceptance of the null	
parts per million	ppm		abbreviations	hypothesis when false)	β
parts per thousand	ppt, ‰		(e.g., AK, WA)	second (angular)	"
volts	V			standard deviation	SD
watts	W			standard error	SE
				variance	
				population	Var
				sample	var

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AREA FISHERIES, 2009; A REPORT TO THE ALASKA BOARD OF  
FISHERIES**

by

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## ABSTRACT

This report satisfies the requirement dictated in *Policy for the Management of Sustainable Salmon Fisheries* (SSFP; 5 AAC 39.222) that directs the Alaska Department of Fish and Game (ADF&G) to provide the Alaska Board of Fisheries (BOF) with reports on salmon stock status and identify any stocks that present a concern related to yield, management, or conservation. Presently, there are no stock of concern designations for the Kuskokwim Area. This report briefly covers 2 proposals concerning Kuskokwim Area commercial salmon fishing that the BOF will be considering in 2010. In addition, this report presents an overview of Kuskokwim Area abundance, escapement, and harvest/exploitation trends for Chinook, sockeye, chum, and coho salmon since 2005. A preliminary informal outlook for 2010 is also provided.

Key words: Kuskokwim Area, Chinook salmon, *Oncorhynchus tshawytscha*, chum salmon, *O. keta*, stock of concern, subsistence, commercial, fishing, ADF&G, sustainable salmon fisheries policy, Alaska Board of Fisheries.

## INTRODUCTION

The *Policy for the Management of Sustainable Salmon Fisheries* (SSFP; 5 AAC 39.222) directs the Alaska Department of Fish and Game (ADF&G) to provide the Alaska Board of Fisheries (BOF) with reports on salmon stocks status and identify any salmon stocks that present a concern related to yield, management, or conservation during regular BOF meetings. ADF&G presents an assessment of Kuskokwim Area salmon stocks and their use in this report.

The Kuskokwim Management Area is approximately 50,000 square miles in size, including the Kuskokwim River drainage and all waters of Alaska that flow into the Bering Sea between Cape Newenham and the Naskonat Peninsula, plus Nunivak and St. Matthew Islands. There are 4 commercial salmon fishing districts within the Kuskokwim Area (Figure 1). Districts 1 and 2 are within the Kuskokwim River; Districts 4 and 5 are in Kuskokwim Bay and target salmon bound for the Kanektok and Goodnews rivers, respectively.

Salmon escapements are evaluated by weirs and sonar on 9 tributary streams (McEwen 2009; Costello et al. 2008; Liller et al. 2008; Stewart et al. 2008; Thalhauser 2008). In addition, aerial surveys are flown during peak spawning abundances in up to 19 tributaries for Chinook salmon *Oncorhynchus tshawytscha* and 2 tributaries for sockeye salmon *O. nerka*.

## FISHERIES AND SALMON STOCK STATUS

### KUSKOKWIM RIVER

#### Run Reconstructions/Escapement Indices

Our understanding of historical annual salmon abundance in Kuskokwim River comes from a discontinuous time-series of subsistence harvest estimates, inriver commercial catch and effort data, a test-fishery project, tributary weir counts, index counts of spawning salmon derived from aerial surveys, and a few years of mark-recapture abundance estimates. None of these datasets, alone or in combination, provide total annual abundance estimates, but each does provide some insight into total annual abundance. Efforts are underway to use statistical modeling to integrate these various datasets to provide estimates of historical run abundance. We include drafts of these run reconstructions for Chinook, sockeye, chum *O. keta*, and coho salmon *O. kisutch* (Figures 2a, 3a, 4a, and 5a; respectively) in our discussions below. These graphs depict preliminary or exploratory information that will change as run reconstruction analysis proceeds; still, we feel even these preliminary analyses provide adequate depictions of historical salmon abundance in the Kuskokwim River. For comparison, each species also has a graph depicting a

composite index of historical escapements, similar to what has been presented to BOF in past years (Figures 2b, 3b, 4b, and 5b).

### **Chinook Salmon**

Kuskokwim River Chinook salmon were listed by BOF as a stock of yield concern in September 2000 (Linderman and Bergstrom 2006), but improved abundance led to the finding being discontinued in January 2007. Since then, run abundance has shifted to below average levels but is still sufficient for allowing subsistence harvests within amounts necessary for subsistence (ANS) guidelines and for modest commercial harvests. Of note is that the near record abundances of 2004, 2005, and 2006 are from some of the lowest parent year escapements on record (1999 and 2000).

#### *Escapement*

Chinook salmon escapement is monitored with weirs operated in 6 tributary streams (Figure 1), and peak aerial survey counts at up to 12 tributaries distributed throughout the drainage. Escapement goals have been established for 4 of the tributaries monitored with weirs, and 8 of the tributaries monitored with aerial surveys. These goals have generally been met since 2005 (Table 1 and Figure 2b).

Current escapement goals for Kuskokwim River Chinook salmon stocks are as follows:

Stock Unit	Enumeration Method	Current Escapement Goal		
		Goal	Type	Year Established
Chinook Salmon				
Aniak River	Aerial Survey	1,200–2,300	SEG	2005
Cheneetnuk River	Aerial Survey	340–1,300	SEG	2005
Gagaraya River	Aerial Survey	300–830	SEG	2005
George River	Weir	3,100–7,900	SEG	2007
Holitna River	Aerial Survey	970–2,100	SEG	2005
Kanektok River	Aerial Survey	3,500–8,000	SEG	2005
Kisaralik River	Aerial Survey	400–1,200	SEG	2005
Kogruklu River	Weir	5,300–14,000	SEG	2005
Kwethluk River	Weir	6,000–11,000	SEG	2007
Pitka Fork Salmon River	Aerial Survey	470–1,600	SEG	2005
Salmon River (Aniak Drainage)	Aerial Survey	330–1,200	SEG	2005
Tuluksak River	Weir	1,000–2,100	SEG	2007

The BOF will review the proposed establishment of a fisheries reserve within Holitna River subbasin (Figure 1). Of note is that approximately 20% to 30% of the total Kuskokwim River Chinook salmon escapement occurs within this one subbasin.

#### *Harvest/Exploitation*

Kuskokwim River Chinook salmon are harvested primarily for subsistence use (Table 2), and ANS has been met each year. Subsistence harvest information from 2008 and 2009 has not been finalized and preliminary numbers are not included in this report; instead, a 5-year average (2003–2007) harvest was used. Average annual subsistence harvests since 2005 have been approximately 72,000 fish (Table 2). Subsistence fishermen tend to prefer using gillnets with 8



inch or larger mesh when targeting Chinook salmon, resulting in subsistence harvest being weighted towards larger and older aged fish. In contrast, commercial harvest taken by gillnets of 6 inches or less targets smaller and younger fish, providing some potential to offset size selective subsistence harvest.

The directed Kuskokwim River Chinook salmon commercial fishery was discontinued in 1987 through a 6-inch mesh size restriction and later timing of the commercial fishery. Chinook salmon continued to be harvested incidentally in chum salmon directed commercial fisheries during late June and July under an incidental guideline harvest range of 0-50,000 fish. In response to increasing Chinook salmon run abundance since 2002, the BOF adopted regulations in 2007 allowing for up to 8-inch mesh gear in the commercial fishery and established a commercial guideline harvest range of 0-50,000 Chinook salmon. Functionally, Chinook salmon have continued to be harvested incidental to commercial fisheries directed at other species because of overlapping run timing of Chinook, sockeye, and chum salmon, and the use of 6-inch or smaller mesh gear to harvest all three species. A commercial harvest of 6,664 Chinook salmon was taken in 2009, down from the 2008 harvest of 8,865, but the second highest since 1998 (Table 2). Since 2005, Chinook salmon harvests have contributed nearly 5% of the exvessel value of the total District 1 commercial salmon fishery. Exvessel values of commercial Chinook salmon harvests in 2008 and 2009 were the highest since 1998 (Table 3).

Preliminary run reconstruction information indicates exploitation rate of Chinook salmon in 2009 was approximately 40%, compared to the recent 10-year average of 30%, with the majority of harvest attributed to the subsistence fishery (Figure 2a).

## **Chum Salmon**

Kuskokwim River chum salmon were listed by BOF as a stock of yield concern in September 2000 (Linderman and Bergstrom 2006), but improved abundance led to the finding being discontinued in January 2007. Near record runs occurred from 2005 through 2007; thereafter, abundance has been near average.

### ***Escapement***

Chum salmon escapement is monitored with weirs operated in 6 tributary streams and with sonar operated on one tributary (Figure 1). Escapement goals are established for one weir (Kogrukluk River) and the one sonar project (Aniak River). These goals have been annually achieved or exceeded in all but one of the last 10-years (Table 4 and Figure 3b).

Current escapement goals for Kuskokwim River chum salmon stocks are as follows:

Stock Unit	Enumeration Method	Current Escapement Goal		
		Goal	Type	Year Established
Chum Salmon				
Aniak River	Sonar	220,000–480,000	SEG	2007
Kogrukluk River	Weir	15,000–49,000	SEG	2005

Escapements in Kogrukluk River in 2005 and 2006 were records that nearly tripled the previous record escapement. Similar high escapements were observed in those years at Aniak River sonar and other escapement monitoring projects in Kuskokwim River drainage.

### ***Harvest/Exploitation***

Historically, Kuskokwim River chum salmon, though an important subsistence species, have been primarily targeted for commercial use. However, since the late 1990s, that fishery has been constrained by low market interest in chum salmon and limited processing capacity. In 2009, a modest commercial harvest of 76,790 fish was taken, which is the largest harvest since 1998 (Table 5) and is largely a result of improved processing capacity from a new fish processing plant in Platinum. Since 2005, commercial chum salmon harvests have contributed about 2% to the total exvessel value of the District 1 commercial salmon fishery. The exvessel value of commercial chum salmon harvest in 2009 was the highest since 1998 (Table 3).

Average annual subsistence harvest is approximately 50,000 chum salmon (Table 4), and harvest has been within or above ANS every year since 1990. Subsistence harvest information from 2008 and 2009 has not been finalized, but inseason reports indicate ANS was achieved in both years. Preliminary run reconstruction information indicates exploitation rate of chum salmon in 2009 was approximately 12%, compared to the recent 10-year average of 9% (Figure 3a; Bue et al. 2008)

### **Sockeye Salmon**

Sockeye salmon occur in relatively small numbers in the Kuskokwim River drainage, ranging from 60,000 to 500,000 fish based on preliminary run reconstruction information (Figure 4a). For comparison, an escapement index for sockeye salmon is illustrated in Figure 4b. Unlike more well known “lake-type” sockeye runs, Kuskokwim River runs are dominated by “river-type” populations that do not use lakes for rearing. River-type sockeye salmon tend to have more volatile productivity than lake-type populations (McPhee et al. *In press*), and that volatility is evident in Kuskokwim River populations where sockeye salmon have had up to a nine-fold difference in run size between years. Since 2005, annual abundance has been average to above average with record numbers of fish returning in 2005 and 2006, the parent years of which (2000 and 2001) notably had among the lowest abundance on record.

### ***Escapement***

Sockeye salmon escapements are monitored at each of the 6 tributary weir projects operated throughout the Kuskokwim River drainage (Figure 1) although they are only prominent in Kogruklu River (Table 6). Spawning distribution is mostly limited to tributaries in the lower two-thirds of the Kuskokwim River drainage, with occurrence dominated by Holitna, Stony, and Aniak rivers (Figure 1). Holitna River alone accounted for 56% and 50% of the estimated total escapement during radiotelemetry investigation in 2006 and 2007, and these are river-type fish (Gilk et al. *In prep*). Among these major producing streams, escapement monitoring is limited to Kogruklu River in the upper Holitna River subbasin, which has been recommended by ADF&G for an escapement goal.

### ***Harvest/Exploitation***

Kuskokwim River sockeye salmon are targeted in subsistence and commercial fisheries. Average subsistence harvest since 2004 is 33,627 fish and has annually been within ANS guidelines. Subsistence harvest information from 2008 and 2009 has not been finalized, but inseason reports indicate that harvests were within ANS guidelines.

In 2004, the BOF established a commercial guideline harvest level of 0 to 50,000 sockeye salmon. A total of 25,672 fish were commercially harvested in 2009, the largest harvest since

2005 (Table 7). Commercial sockeye salmon harvests make up about 8% of total District 1 commercial salmon exvessel value and their value in 2009 was the highest since 2005 (Table 3).

Based on preliminary run reconstruction information, overall sockeye salmon exploitation rate in 2009 was approximately 40%, slightly above the recent 10-year average of 35% (Figure 4a).

### **Coho Salmon**

Preliminary run reconstruction information indicates abundance of Kuskokwim River coho salmon declined after 1996 (Figure 5b). Average run abundance from years 1981–1996 was approximately 1.2 million coho salmon, with average abundance dropping to approximately 0.8 million fish for years 1997–present, a 32% decrease. Escapement remained relatively stable during these two time periods, as has subsistence harvest, but commercial harvest decreased from an average of 514,000 fish for years 1981–1996 to 179,000 fish for years 1997–2009, a 65% decrease. Average exploitation rate also decreased from approximately 50% to 25% during these same time periods. The cause of the shift in productivity is unknown, but generally thought to have been rooted in the anomalous ocean conditions of 1997 and 1998 that have been suggested as the cause of salmon declines at that time throughout western Alaska. Unlike most other salmon species, Kuskokwim River coho salmon do not appear to have recovered for reasons unknown. Still, coho salmon are the most valuable species to the commercial fishery, comprising well over half the 2009 total value and recent 5-year and 10-year averages (Table 3) for Kuskokwim River. In recent years, coho salmon harvests have also been affected by declining market conditions, lower prices paid, and limited processor capacity.

#### ***Escapement***

Coho salmon escapement is monitored with weirs operated in 6 tributary streams (Figure 1). Kogruklu River is the only tributary with an escapement goal and that goal has been annually achieved or exceeded in each of the last 10-years (Table 8).

Current escapement goals for Kuskokwim River coho salmon stocks are as follows:

Stock Unit	Enumeration Method	Current Escapement Goal		
		Goal	Type	Year Amended or Established
Coho Salmon				
Kogruklu River	Weir	13,000–28,000	SEG	2005

An additional escapement goal has been recommended by ADF&G for the Kwethluk River, which will be reviewed by the BOF in 2010.

#### ***Harvest/Exploitation***

Kuskokwim River coho salmon are harvested primarily in the commercial fishery, which has a most recent 10-year average harvest of 181,420 fish (Table 9). Average annual subsistence harvest is approximately 31,000 fish (Table 9) and has been consistently within ANS range since 1990. Based on preliminary run reconstruction information, overall coho salmon exploitation rate in 2009 was approximately 20%, below the recent 10-year average of 30% (Figure 4a).

## QUINHAGAK (DISTRICT 4)

### *Escapement*

A salmon enumeration weir is operated on Kanektok River at river mile 45 (Clark and Linderman 2009). Escapements past the weir for all species can be found in Table 10. No formal escapement goals for any species have been developed for this weir. Comparison of escapement among years is problematic because of variation in weir operational periods and a substantial number of Chinook, chum, and coho salmon spawn downstream of the weir. Also, starting in 2008, the weir project began ceasing operations in mid-August; thus, coho salmon counts are incomplete. Aerial survey escapement goals have been established for Chinook, sockeye, and chum salmon (Table 11). Chinook and sockeye salmon escapement goals have been achieved or exceeded in each of the last 10-years that aerial survey data are available.

Current escapement goals for Kanektok River salmon stocks are as follows:

Stock Unit	Enumeration Method	Current Escapement Goal		
		Goal	Type	Year Amended or Established
Chinook Salmon				
Kanektok River	Aerial Survey	3,500–8,000	SEG	2005
Chum Salmon				
Kanektok River	Aerial Survey	>5,200	SEG	2005
Sockeye Salmon				
Kanektok River	Aerial Survey	14,000–34,000	SEG	2005

Estimates of total Kanektok River drainage escapements of Chinook salmon have been made since 2004 using the proportion of aerial survey counts upstream and downstream of the weir, and applying them to weir escapement counts (Table 12; Clark and Linderman 2009).

### *Harvest/Exploitation*

Overall, District 4 commercial salmon harvests since 2005 have increased compared to harvests during the last 10 years (Table 13). This occurred despite catch limits being imposed by the one local buyer during periods of high salmon abundance within the district. A new processing plant opened in 2009 has substantially increased processing capacity and no limits were imposed in 2009. The district has seen 3 of the largest commercial sockeye salmon harvests on record since 2005, including a record harvest of 112,153 fish in 2009. These large harvests coincide with 3 years of high sockeye salmon abundance in Kanektok River drainage (Tables 10 and 11). The commercial chum salmon harvest of 91,158 fish in 2009 was the highest on record. The value of the commercial salmon fishery has increased by 35% relative to the most recent 10-year (1999–2008) average (Table 14).

Based on run reconstruction information for Chinook salmon, estimated exploitation rates have ranged from 35% to 56%, averaging 48% (Table 12).

## GOODNEWS BAY (DISTRICT 5)

### *Escapement*

Salmon escapement into the Goodnews River drainage is assessed by an enumeration weir on the Middle Fork Goodnews River (Clark and Linderman 2008) and by aerial survey. Weir-based escapement goals have been established for Chinook, sockeye, chum, and coho salmon (Table 10). These goals have been achieved or exceeded for all species in each of the last 10-years. Aerial survey escapement goals for Goodnews River Chinook and sockeye salmon have been met since 2005 (Table 11).

Current escapement goals for Goodnews River salmon stocks are as follows:

Stock Unit	Enumeration Method	Current Escapement Goal		
		Goal	Type	Year Amended or Established
<b>Chinook Salmon</b>				
Goodnews River (Main Fork)	Aerial Survey	640–3,300	SEG	2005
Middle Fork Goodnews River	Weir	1,500–2,900	BEG	2005
<b>Chum Salmon</b>				
Middle Fork Goodnews River	Weir	>12,000	SEG	2005
<b>Coho Salmon</b>				
Middle Fork Goodnews River	Weir	>12,000	SEG	2005
<b>Sockeye Salmon</b>				
Goodnews River (Main Fork)	Aerial Survey	5,500–19,500	SEG	2005
Middle Fork Goodnews River	Weir	18,000–40,000	BEG	2007

Total drainage escapements have been estimated for Chinook and sockeye salmon using weir and aerial survey information (Clark and Linderman 2008). Since 2000, Chinook salmon exploitation rates have averaged 26% (Figure 6a), while exploitation rates for sockeye salmon have averaged 22% (Figure 6b).

### *Harvest/Exploitation*

Like District 4, the single registered buyer in the district put fishermen on catch limits during periods that fell around the peak of the sockeye salmon run. However, the new processing plant has substantially increased processing capacity in the district and no limits were imposed in 2009. Generally, commercial harvests of Chinook and coho salmon have remained consistent when comparing most recent 5-year (2004–2008) and 10-year (1999–2008) averages (Table 13). Both sockeye and chum salmon have seen modest increases when comparing their most recent 5-year (2004–2008) commercial harvest average to their 10-year (1999–2008) average. The value of the commercial salmon fishery has increased 18% increase when compared the most recent 5-year (2005–2009) average (Table 14).

## 2010 ALASKA BOARD OF FISHERIES REGULATORY PROPOSALS AFFECTING KUSKOKWIM RIVER SALMON

- **Proposal 67: Rescind 8-inch mesh size gillnets in the District 1 commercial fishery.** In 2007, the BOF adopted regulations allowing for up to 8-inch mesh gear in the commercial fishery, but this has not yet been exercised. In 2010, the BOF will review a proposal to reduce the maximum allowable gillnet mesh size to 6-inch or smaller mesh in the Kuskokwim River District 1 commercial fishery.
- **The establishment of a fishery reserve within the Holitna River subbasin.** The BOF will review the proposed establishment of a fisheries reserve located within Holitna River subbasin. Holitna River subbasin (Figure 1) is a major salmon spawning area and important to Kuskokwim River salmon production.

### KUSKOKWIM AREA ESCAPEMENT GOAL RECOMMENDATIONS

ADF&G has undertaken a review of escapement goals for several Kuskokwim Area salmon stocks where sufficient long-term escapement, catch, and age composition data exist that enable the development of biological escapement goals (BEGs) or sustainable escapement goals (SEGs) based on analysis of production consistent with the escapement goal policy (5 AAC 39.223) (Volk et al. *In prep*). The escapement goal team evaluated the type, quality, and amount of data for each stock to determine the appropriate type of escapement goal as defined in these policies. Two new escapement goals are recommended for the Kuskokwim Area: Kwethluk River coho salmon and Kogrukluk River sockeye salmon (Figure 1). Details are in a separate report that reviews escapement goals for the entire AYK Region (Volk et al. *In prep*). Below is a summary of the 2 recommended Kuskokwim Area goals.

An SEG threshold of >19,000 coho salmon is recommended for Kwethluk River, a lower Kuskokwim River tributary. The goal corresponds to the minimum observed escapement based on weir and tower counts from years of light to moderate harvest. The Kuskokwim River has an active coho salmon fishery, but currently, only one escapement goal for coho salmon, which is for the Kogrukluk River, located in the upper Holitna River drainage. Addition of the Kwethluk River SEG will improve assessment of coho salmon escapement distribution.

An SEG of 4,400–17,000 sockeye salmon is recommended for Kogrukluk River, which is derived using the percentile approach (Bue and Hasbrouck<sup>1</sup>). An active sockeye salmon fishery exists in the Kuskokwim River with a guideline harvest level of 50,000 fish, yet there are no escapement goals for sockeye salmon in the Kuskokwim River drainage. Recent radiotelemetry studies have shown that up to 70% of Kuskokwim River drainage sockeye salmon spawn in the Holitna River drainage and 12–13% of these fish spawn in the Kogrukluk River. This makes the Kogrukluk River the best candidate for a sockeye salmon escapement goal among the monitored tributaries of the Kuskokwim River.

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<sup>1</sup> Bue, B. G. and J. J. Hasbrouck. *Unpublished*. Escapement goal review of salmon stocks of Upper Cook Inlet, report to the Alaska Board of Fisheries, 2001. Alaska Department of Fish and Game, Anchorage.

Proposed escapement goals for Kuskokwim area salmon stocks are as follows:

Stock Unit	Enumeration	Escapement Goal Recommendation		
	Method	Action	New or Revised Goal	Type
Coho Salmon				
Kwethluk	Weir	Establish	>19,000	SEG
Sockeye Salmon				
Kogruklu River	Weir	Establish	4,400–17,000	SEG

## 2010 KUSKOKWIM AREA OUTLOOK

The preliminary informal outlook for 2010 is for salmon abundance to be similar to levels observed in 2009 for all species, and for all Kuskokwim Area fishing districts. Age data collected in 2009 are still being processed, but as of yet, nothing extraordinary has been observed in age compositions to suggest large changes in abundance from what occurred in 2009, nor have there been any extraordinary environmental conditions that may have resulted in unusual ocean or freshwater survival. With that said, Chinook salmon abundance is again expected to be below the long-term average, but adequate for subsistence harvests within the range identified as ANS and adequate for limited commercial harvest, comparable to 2009. Sockeye salmon abundance is expected to be near average in Kuskokwim River (District 1) and Goodnews River (District 5), but above average in Kanektok River (District 4), with sufficient numbers of fish to provide for ANS and levels of commercial harvest comparable to 2009. Chum salmon abundance should be near average in Kuskokwim River (District 1) and above average in Kuskokwim Bay drainages (Districts 4 and 5), and sufficient to provide for ANS and above average levels of commercial harvest. The outlook for coho salmon is more speculative than other species because the vast majority of annual returns are from one age group, so no insight is available by considering younger age classes; still, given that ocean rearing conditions appear to have been relatively stable over the past few years, abundance in all Kuskokwim Area fishing districts is expected to be comparable to 2009 and adequate for ANS and commercial harvest similar to the past few years.

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## **TABLES AND FIGURES**

Table 1.–Chinook salmon aerial survey and weir escapement counts in Kuskokwim River spawning tributaries, 1980–2009.

Year	Kipchuk Salmon																	Salmon							
	Ek	Kwethluk		Kisaralik		Tuluksak		Aniak	(Aniak)	(Aniak)	Holokuk	Oskawalik	George	Holitna	Kogrukluk	Gagarayah	Cheeneetnuk	Tatlawiksuk	Takotna	(Pitka)					
	Aerial	Aerial	Weir	Aerial	Aerial	Weir	Aerial	Aerial	Aerial	Aerial	Aerial	Weir	Aerial	Weir	Aerial	Aerial	Weir	Weir	Weir	Aerial					
1980	2,378					1,035															1,450				
1981		2,034			672			9,074													16,655	1,439			
1982		471			81						42			521							10,993	413			
1983	188					202		1,909		231	33			1,069							3,009	572			
1984																					4,928	1,177	545		
1985	1,118	51			63	142					135										4,619	1,002	620		
1986								424		336	100			650							5,038	317			
1987	1,739								193	516	210	193									205				
1988	2,255				869	188		954		244											8,505		473		
1989	1,042	610			152			2,109	994	631											11,940		452		
1990					631	200		1,255	537	596	157	113									10,218				
1991	1,312				217	358	697	1,564	885	583											7,850				
1992			9,675				1,083	2,284	670	335	64	91		2,022	6,755	328	1,050						2,536		
1993							2,218	2,687	1,248	1,082	114	103		1,573	12,332	419	678						1,010		
1994					1,243		2,917		1,520	1,218					15,227	807	1,206						1,010		
1995					1,243			3,171	1,215	1,446	181	326		1,887	20,630	1,193	1,565						1,911		
1996			7,415							985	85		7,716		14,199								422		
1997			10,395					2,187	855	980	165	1,470	7,823	2,093	13,286		345						1,161		
1998	522	126			457			1,930	443	557					12,107										
1999											18	98	3,548		5,570								1,490		
2000			3,547					714	182	238	42		2,960	301	3,310								817	345	362
2001						997				598		186	3,309	1,130	9,298	143							2,010	721	1,033
2002		1,795	8,502	1,727		1,346		1,615	1,236	186	295	2,444	1,578	10,104	452								2,237	316	1,255
2003	1,236	2,628	14,474	654	94	1,064	3,514	1,493	1,242	528	844	4,693		11,771	1,095	810							1,683	378	1,391
2004	4,653	6,801	28,605	6,913	1,196	1,475	5,569	1,868	2,177	539	293	5,207	4,842	19,503	670	918							2,833	461	1,138
2005		5,059		4,112	672	2,653		1,944	4,097	510	582	3,845	2,795	21,993	788	1,155	2,918							499	1,809
2006			17,619	4,734		1,044	5,639	1,618		705	386	4,357	3,924	19,414	531	1,015	1,700							539	928
2007			13,267	1,373	173	374	3,984	2,147	1,458	146		4,883		13,029	1,035		2,061							418	1,014
2008		487	5,312	1,493		665	3,222	1,061	589	190	213	2,698	832	9,730	177	290	1,071							413	1,305
2009 <sup>a</sup>			5,710			404				565	378	3,663		9,517	303	323	1,071							306	632
SEG <sup>b</sup>		580- 6,000- 1,800 11,000		400- 1,200		1,000- 1,200- 2,100 2,300				330- 1,200			3,100- 970- 7,900 2,100		5,300- 14,000		300-830		340-1,300					470- 1,600	

<sup>a</sup> 2009 weir escapements are preliminary and subject to revision.

<sup>b</sup> Formally established SEG (ADF&G 2007).

Table 2.—Harvest of Chinook salmon in Kuskokwim River drainage, 1960–2009.

Year	Commercial Harvest <sup>a</sup>	Subsistence Harvest <sup>b</sup>	Test-Fish Harvest	Sport Fish Harvest	Total Harvest
1960	5,969	18,887			24,856
1961	18,918	28,934			47,852
1962	15,341	13,582			28,923
1963	12,016	34,482			46,498
1964	17,149	29,017			46,166
1965	21,989	24,697			46,686
1966	25,545	49,325	285		75,155
1967	29,986	59,913	766		90,665
1968	34,278	32,942	608		67,828
1969	43,997	40,617	833		85,447
1970	39,290	69,612	857		109,759
1971	40,274	43,242	756		84,272
1972	39,454	40,396	756		80,606
1973	32,838	39,093	577		72,508
1974	18,664	27,139	1,236		47,039
1975	22,135	48,448	704		71,287
1976	30,735	58,606	1,206		90,547
1977	35,830	56,580	1,264	33	93,707
1978	45,641	36,270	1,445	116	83,472
1979	38,966	56,283	979	74	96,302
1980	35,881	59,892	1,033	162	96,968
1981	47,663	61,329	1,218	189	110,399
1982	48,234	58,018	542	207	107,001
1983	33,174	47,412	1,139	420	82,145
1984	31,742	56,930	231	273	89,176
1985	37,889	43,874	79	85	81,927
1986	19,414	51,019	130	49	70,612
1987	36,179	67,325	384	355	104,243
1988	55,716	70,943 <sup>c</sup>	576	528	127,763
1989	43,217	81,175	543	1,218	126,153
1990	53,504	85,976	512	394	140,386
1991	37,778	85,556	117	401	123,852
1992	46,872	64,794	1,380	367	113,413
1993	8,735	87,513	2,483	587	99,318
1994	16,211	93,243	1,937	1,139	112,530
1995	30,846	96,435	1,421	541	129,243
1996	7,419	78,062	247	1,432	87,160
1997	10,441	81,577	332	1,227	93,577
1998	17,359	81,264	210	1,434	100,267
1999	4,705	73,194	98	252	78,249
2000	444	64,893	64	105	65,506
2001	90	73,610	86	290	74,076
2002	72	66,807	288	319	67,486
2003	158	67,788	409	734	69,089
2004	2,300	80,065	691	1,197	84,253

-continued-

Table 2.–Page 2 of 2.

Year	Commercial Harvest <sup>a</sup>	Subsistence Harvest <sup>b</sup>	Test-Fish Harvest	Sport Fish Harvest	Total Harvest
2005	4,784	68,213	608	1,092	74,697
2006	2,777	76,370	352	753	80,252
2007	179	68,645	305	1,478	70,607
2008	8,865	72,216 <sup>d</sup>	420	1,051 <sup>d</sup>	82,552
2009	6,664	72,216 <sup>d</sup>	470	1,051 <sup>d</sup>	80,401
5-yr avg ('05-'09)	4,654	71,532	431	1,085	77,702
10-yr avg ('00-'09)	2,633	71,082	369	807	74,892

<sup>a</sup> Districts 1 and 2; also includes harvests in District 3 from 1960–1965.

<sup>b</sup> Estimated subsistence harvest expanded from villages surveyed.

<sup>c</sup> Beginning in 1988, estimates based on a new formula. Data since 1988 is not comparable with previous years.

<sup>d</sup> 2008 and 2009 subsistence and sport harvests based on most recent 5-year average (2004–2007).

Table 3.–Commercial salmon harvest and exvessel value, District 1, Kuskokwim River, 1993–2009.

Year	Chinook		Sockeye		Pink		Chum		Coho		Total	
	Number	Value	Number	Value	Number	Value	Number	Value	Number	Value	Number	Value
1993	8,735	\$72,659	27,008	\$140,000	64	\$59	43,337	\$112,756	610,739	\$2,535,321	689,883	\$2,860,795
1994	16,211	\$126,892	49,365	\$188,691	30,930	\$8,967	271,115	\$381,639	724,689	\$2,875,803	1,092,310	\$3,581,992
1995	30,846	\$280,287	92,500	\$448,530	335	\$50	605,918	\$724,273	471,461	\$1,313,742	1,201,060	\$2,766,882
1996	7,419	\$23,665	33,878	\$97,176	1,621	\$744	207,877	\$170,977	937,299	\$1,824,683	1,188,094	\$2,117,245
1997	10,441	\$36,843	21,989	\$64,922	2	\$1	17,026	\$19,509	130,803	\$2,167,491	180,261	\$2,288,766
1998	17,359	\$74,387	60,906	\$209,860	92	\$55	207,809	\$183,307	210,481	\$516,024	496,647	\$983,633
1999	4,705	\$22,266	16,976	\$86,442	2	\$0	23,006	\$16,428	23,593	\$44,633	68,282	\$169,769
2000	444	\$3,044	4,130	\$14,272	7	\$3	11,570	\$7,967	261,379	\$489,644	277,530	\$514,930
2001	90	\$534	84	\$265	-	\$0	1,272	\$827	192,998	\$422,573	194,444	\$424,199
2002	72	\$212	84	\$196	-	\$0	1,900	\$1,190	83,463	\$124,763	85,519	\$126,361
2003	158	\$846	282	\$803	-	\$0	2,764	\$1,087	284,064	\$450,451	287,268	\$453,187
2004	2,300	\$9,815	9,748	\$19,549	-	\$0	20,429	\$6,611	433,807	\$907,791	466,284	\$943,766
2005	4,784	\$29,040	27,645	\$109,063	-	\$0	69,139	\$23,115	142,319	\$287,635	243,887	\$448,853
2006	2,777	\$16,192	12,618	\$41,891	1	\$1	44,070	\$14,988	185,598	\$378,318	245,064	\$451,390
2007	179	\$1,607	703	\$2,411	-	\$0	10,763	\$3,033	141,049	\$373,789	152,694	\$380,840
2008	8,865	\$70,988	15,601	\$59,777	15	\$4	30,156	\$11,212	142,877	\$396,329	197,859	\$538,310
2009	6,664	\$61,452	25,673	\$101,445	2	\$0	76,790	\$76,494	104,546	\$263,457	213,675	\$502,848
5-yr avg (’05-’09)	4,654	\$35,856	16,448	\$62,917	4	\$1	46,184	\$25,768	143,278	\$339,906	210,636	\$502,848
10-yr avg (’00-’09)	2,633	\$19,373	9,657	\$34,967	3	\$1	26,885	\$14,652	197,210	\$409,475	236,422	\$478,468

Table 4.–Kuskokwim River chum salmon escapement estimates, 1976–2009.

Year	Kwethluk Weir	Tuluksak Weir	Aniak Sonar <sup>a</sup>	KogrukluK Weir	George Weir	Tatlawiksuk Weir	Takotna Weir
1976				8,177			
1977				19,443			
1978				48,125			
1979				18,198			
1980			1,600,032	<sup>b</sup>			
1981			649,849	57,365			
1982			529,758	64,063			
1983			166,452	9,407			
1984			317,688	41,484			
1985			273,306	15,005			
1986			219,770	14,693			
1987			204,834	<sup>b</sup>			
1988			485,077	39,540			
1989			295,993	39,549			
1990			246,813	26,765			
1991		7,675	366,687	24,188			
1992	30,595	11,183	87,467	34,105			
1993		13,804	15,278	31,899			
1994		15,724	474,356	46,635			
1995			<sup>b</sup>	31,265			<sup>b</sup>
1996	26,049		402,195	48,495	19,393		2,872
1997	10,659		289,654	7,958	5,907		1,779
1998	<sup>b</sup>		351,792	36,442	<sup>b</sup>	<sup>b</sup>	<sup>b</sup>
1999	<sup>b</sup>		214,429	13,820	11,552	9,599	<sup>b</sup>
2000	11,691		177,384	11,491	3,492	7,044	1,254
2001	<sup>b</sup>	19,321	408,830	30,569	11,601	23,718	5,414
2002	35,854	9,958	472,346	51,570	6,543	24,542	4,377
2003	41,812	11,724	477,544	23,413	33,666	<sup>b</sup>	3,393
2004	38,646	11,796	672,931	24,201	14,409	21,245	1,630
2005	<sup>b</sup>	35,696	1,151,505	197,723	14,828	55,720	6,467
2006	47,490	25,648	1,108,626	180,594	41,467	32,301	12,598
2007	57,230	17,286	699,178	49,505	55,842	83,246	8,900
2008	20,048	12,518	427,911	44,978	29,978	30,896	5,691
2009 <sup>c</sup>	32,028	13,658	479,499	83,711	7,941	19,975	2,464
SEG			220,000-480,000	15,000-49,000			

<sup>a</sup> Sonar counts are unapportioned and considered to consist primarily of chum salmon.

<sup>b</sup> Field operations incomplete; annual escapement was not determined.

<sup>c</sup> 2009 weir escapement estimates and sonar counts are preliminary and subject to revisions.

Table 5.—Harvest of chum salmon in Kuskokwim River, 1960–2009.

Year	Commercial Harvest <sup>a</sup>	Subsistence Harvest <sup>b</sup>	Test-Fish Harvest	Sport Fish Harvest	Total Harvest
1960	0	301,753 <sup>c</sup>			301,753
1961	0	179,529 <sup>c</sup>			179,529
1962	0	161,849 <sup>c</sup>			161,849
1963	0	137,649 <sup>c</sup>			137,649
1964	0	190,191 <sup>c</sup>			190,191
1965	0	250,878 <sup>c</sup>			250,878
1966	0	175,735 <sup>c</sup>	502 <sup>d</sup>		176,237
1967	148	208,445 <sup>c</sup>	338		208,931
1968	187	275,008 <sup>c</sup>	562		275,757
1969	7,165	204,105 <sup>c</sup>	384		211,654
1970	1,664	246,810 <sup>c</sup>	1,139 <sup>d</sup>		249,613
1971	68,914	116,391 <sup>c</sup>	254		185,559
1972	78,619	120,316 <sup>c</sup>	486		199,421
1973	148,746	179,259 <sup>c</sup>	675		328,680
1974	171,887	277,170 <sup>c</sup>	2,021		451,078
1975	184,171	176,389 <sup>c</sup>	1,062		361,622
1976	177,864	223,792 <sup>c</sup>	2,101		403,757
1977	248,721	198,355 <sup>c</sup>	576	129	447,781
1978	248,656	118,809 <sup>c</sup>	2,153	555	370,173
1979	261,874	161,239 <sup>c</sup>	412	259	423,784
1980	483,751	165,172 <sup>c</sup>	2,058	324	651,305
1981	418,677	157,306 <sup>c</sup>	1,793	598	578,374
1982	278,306	190,011 <sup>c</sup>	504	1125	469,946
1983	276,698	146,876 <sup>c</sup>	1,069	922	425,565
1984	423,718	142,542 <sup>c</sup>	1,186	520	567,966
1985	199,478	94,750	616	150	294,994
1986	309,213	141,931 <sup>c</sup>	1,693	245	453,082
1987	574,336	70,709	2,302	566	647,913
1988	1,381,674	151,967 <sup>e</sup>	4,379	764	1,538,784
1989	749,182	139,672	2,082	2,023	892,959
1990	461,624	126,509	2,107	533	590,773
1991	431,802	93,077	931	378	526,188
1992	344,603	96,491	15,330	608	457,032
1993	43,337	59,394	8,451	359	111,541
1994	271,115	72,022	11,998	1,280	356,415
1995	605,918	67,861	17,473	226	691,478
1996	207,877	88,966	2,864	280	299,987
1997	17,026	39,987	790	86	57,889
1998	207,809	63,537	1,140	291	272,777
1999	23,006	43,601	562	180	67,349
2000	11,570	51,696	1,038	26	64,330
2001	1,272	49,874	1,743	112	53,001
2002	1,900	69,019	2,666	53	73,638
2003	2,764	43,320	1,713	67	47,864
2004	20,429	52,374	1,810	117	74,730

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Table 5.–Page 2 of 2.

Year	Commercial Harvest <sup>a</sup>	Subsistence Harvest <sup>b</sup>	Test-Fish Harvest	Sport Fish Harvest	Total Harvest
2005	69,139	46,036	4,459	608	120,242
2006 <sup>f</sup>	44,070	57,024	3,547	144	104,784
2007	10,783	51,308	3,237	424	65,752
2008	30,798	50,012 <sup>f</sup>	2,473	272 <sup>f</sup>	83,555
2009	76,790	50,012 <sup>f</sup>	2,741	272 <sup>f</sup>	129,815
5-yr avg ('05-'09)	46,316	50,878	3,291	344	100,830
10-yr avg ('00-'09)	26,952	52,067	2,543	209	81,771

<sup>a</sup> Districts 1 and 2 only; no chum harvests were reported in District 3.

<sup>b</sup> Estimated subsistence harvest expanded from villages surveyed.

<sup>c</sup> Includes small numbers of small Chinook, sockeye, and coho salmon.

<sup>d</sup> Includes small numbers of sockeye.

<sup>e</sup> Beginning in 1988, estimates based on a new formula. Data since 1988 is not comparable with previous years.

<sup>f</sup> 2008 and 2009 subsistence and sport harvest based on most recent 5-year average (2003–2007).



Table 6.–Kuskokwim River sockeye salmon escapement estimates, 1976–2009.

Year	Kwethluk Weir	Tuluksak Weir	George Weir	Kogrukluk Weir	Tatlawiksuk Weir	Takotna Weir
1976				2,326		
1977				1,637		
1978				1,670		
1979				2,628		
1980				<sup>a</sup>		
1981				18,066		
1982				17,297		
1983				1,176		
1984				4,133		
1985				4,359		
1986				4,244		
1987				<sup>a</sup>		
1988				4,397		
1989				5,811		
1990				8,406		
1991		697		16,455		
1992	1,316	1,083		7,540		
1993		2,218		29,358		
1994		2,917		14,192		
1995				10,996		<sup>a</sup>
1996	1,801		<sup>a</sup>	15,385		0
1997	1,374		445	13,078		0
1998	<sup>a</sup>		<sup>a</sup>	16,773	<sup>a</sup>	<sup>a</sup>
1999	<sup>a</sup>		<sup>a</sup>	5,864	6	
2000	358		22	2,867	0	4
2001	<sup>a</sup>	997	24	8,773	3	1
2002	272	1,346	17	4,050	1	1
2003	2,928	1,064	11	9,138	<sup>a</sup>	3
2004	3,302	1,479	174	6,671	10	18
2005	<sup>a</sup>	2,663	270	37,960	77	35
2006	6,732	985	164	60,807	41	60
2007	5,262	352	74	16,525	27	14
2008	2,451	185	94	19,675	39	13
2009 <sup>b</sup>	4,385	708	54	23,843	39	4

<sup>a</sup> Field operations incomplete; annual escapement was not determined.

<sup>b</sup> 2009 weir escapement estimates are preliminary and subject to revisions.

Table 7.—Harvest of sockeye salmon in Kuskokwim River, 1975–2009.

Year	Commercial Harvest	Subsistence Harvest	Sport Fish Harvest	Total Harvest
1975	23	a	a	23
1976	2,971	a	a	2,971
1977	9,379	a	a	9,379
1978	733	a	a	733
1979	1,054	a	a	1,054
1980	360	a	a	360
1981	48,375	a	a	48,375
1982	33,154	a	a	33,154
1983	68,855	a	a	68,855
1984	48,575	a	a	48,575
1985	106,647	33,632	a	140,279
1986	95,433	20,239	a	115,672
1987	136,602	25,180	a	161,782
1988	92,025	33,102 <sup>b</sup>	a	125,127
1989	42,747	37,088	a	79,835
1990	84,870	39,662	a	124,532
1991	108,946	56,404	a	165,350
1992	92,218	34,159	a	126,377
1993	27,008	51,363	a	78,371
1994	49,365	39,279	a	88,644
1995	92,500	28,622	95	121,217
1996	33,878	35,036	315	69,229
1997	21,989	41,270	423	63,682
1998	60,906	37,578	178	98,662
1999	16,976	49,388	54	66,418
2000	4,130	44,832	46	49,008
2001	84	51,965	231	52,280
2002	84	27,733	26	27,843
2003	282	36,894	289	37,465
2004	9,748	34,892	512	45,152
2005	27,645	32,891	792	61,328
2006	12,618	30,226	187	43,031
2007	703	33,234	382	34,319
2008	15,601	33,627 <sup>c</sup>	273	49,501
2009	25,673	33,627 <sup>c</sup>	429 <sup>d</sup>	59,729
5-yr avg ('05-'09)	16,448	32,721	413	49,582
10-yr avg ('00-'09)	9,657	35,992	317	45,966

<sup>a</sup> Harvest information not collected or unavailable.

<sup>b</sup> Beginning in 1988, estimates based on a new formula. Data since 1988 is not comparable with previous years.

<sup>c</sup> Harvest estimated using most recent 5-year average (2003–2007).

<sup>d</sup> Harvest estimated using most recent 5-year average (2004–2008).

Table 8.–Kuskokwim River coho salmon escapement estimates, 1981–2009.

Year	Kwethluk Weir	Tuluksak Weir	George Weir	KogrukluK Weir	Tatlawiksuk Weir	Takotna Weir
1981				11,455		
1982				37,796		
1983				8,538		
1984				27,595		
1985				16,441		
1986				22,506		
1987				22,821		
1988				13,512		
1989					<sup>a</sup>	
1990				6,132		
1991		4,651		9,964		
1992	45,605	7,501		26,057		
1993		8,328		20,517		
1994		7,952		34,695		
1995				27,861		<sup>a</sup>
1996	<sup>a</sup>		<sup>a</sup>	50,555		<sup>a</sup>
1997	<sup>a</sup>		9,210	12,237		<sup>a</sup>
1998	<sup>a</sup>		<sup>a</sup>	24,348	<sup>a</sup>	<sup>a</sup>
1999	<sup>a</sup>		8,914	12,609	3,455	<sup>a</sup>
2000	25,610		11,262	33,135	<sup>a</sup>	3,957
2001	22,904 <sup>a</sup>	23,768	14,398	19,387	10,539	2,606
2002	23,298	11,487	6,759	14,516	11,345	3,984
2003	107,789	39,627	31,925	74,754	<sup>a</sup>	7,171
2004	64,143	20,336	12,522	26,993	16,410	3,207
2005	<sup>a</sup>	11,324	8,187	24,113	7,495	2,216
2006	25,664 <sup>a</sup>	5,438 <sup>a</sup>	11,296	17,011	9,453 <sup>a</sup>	5,548
2007	19,473	2,807	29,317	27,033	8,685	2,853
2008	49,973	7,457	21,931	29,661	11,065	2,817
2009 <sup>b</sup>	21,911	8,137	12,464	23,009	10,148	2,701
SEG				13,000- 28,000		

<sup>a</sup> Field operations incomplete; annual escapement was not determined.

<sup>b</sup> 2009 weir escapement estimates are preliminary and subject to revisions.

Table 9.—Harvest of coho salmon in Kuskokwim River, 1975–2009.

Year	Commercial Harvest	Subsistence Harvest	Combined Harvest <sup>a</sup>
1975	81,945	b	81,945
1976	88,501	b	88,501
1977	241,364	b	241,364
1978	213,393	b	213,393
1979	219,060	b	219,060
1980	222,012	b	222,012
1981	211,251	b	211,251
1982	447,117	b	447,117
1983	196,287	b	196,287
1984	623,447	b	623,447
1985	335,606	b	335,606
1986	659,988	b	659,988
1987	399,467	b	399,467
1988	524,296	43,866	568,162
1989	479,856	57,847	537,703
1990	410,332	50,713	461,045
1991	500,935	55,581	556,516
1992	666,170	44,496	710,666
1993	610,739	35,295	646,034
1994	724,689	36,504	761,193
1995	471,461	39,165	510,626
1996	937,299	34,698	971,997
1997	130,803	30,714	161,517
1998	210,481	27,240	237,721
1999	23,593	27,754	51,347
2000	261,379	35,670	297,049
2001	192,998	31,686	224,684
2002	83,463	34,413	117,876
2003	284,064	38,791	322,855
2004	433,809	39,206	473,015
2005	142,319	25,706	168,025
2006	185,598	30,706	216,304
2007	141,049	25,107	166,156
2008	142,877	31,903 <sup>c</sup>	174,780
2009	104,546	31,903 <sup>c</sup>	136,449
5-yr avg ('05-'09)	143,278	29,065	172,343
10-yr avg ('00-'09)	197,210	32,509	229,719

<sup>a</sup> Does not include sport fish or Bethel test fish harvests.

<sup>b</sup> Information not collected or unavailable.

<sup>c</sup> Harvests estimated using the most recent 5-year average (2003–2007).

Table 10.—Historical salmon escapements, Middle Fork Goodnews and Kanektok River, 1981–2009.

Year	Operating Period <sup>a</sup>	Chinook	Sockeye	Chum	Pink	Coho
<u>Middle Fork Goodnews River</u>						
SEG:		BEG: 1,500-2,900	BEG: 18,000- 40,000	SEG >12,000		SEG >12,000
<i>Counting Tower</i>						
1981	06/13 to 08/15	3,688	49,108	21,827	1,327 <sup>b</sup>	356 <sup>b</sup>
1982	06/23 to 08/03	1,395	56,255	6,767	13,855 <sup>b</sup>	91 <sup>b</sup>
1983	06/11 to 07/28	6,022	25,813	15,548	34 <sup>b</sup>	0 <sup>b</sup>
1984	06/15 to 07/31	3,260	32,053	19,003	13,744 <sup>b</sup>	249 <sup>b</sup>
1985	06/27 to 07/31	2,831	24,131	10,367	144 <sup>b</sup>	282 <sup>b</sup>
1986	06/16 to 07/24	2,092	51,069	14,764	8,133 <sup>b</sup>	163 <sup>b</sup>
1987	06/22 to 07/30	2,272	28,871	17,517	62 <sup>b</sup>	62 <sup>b</sup>
1988	06/23 to 07/30	2,712	15,799	20,799	6,781 <sup>b</sup>	6 <sup>b</sup>
1989	06/29 to 07/31	1,915	21,186	10,380	24 <sup>b</sup> <sup>b</sup>	1,212 <sup>b</sup>
1990	06/19 to 07/24	3,636	31,679	6,410	3,378 <sup>b</sup>	0 <sup>b</sup>
<i>Weir</i>						
1991	06/29 to 08/24	1,952	47,397	31,644	1,428 <sup>b</sup>	1,978 <sup>b</sup>
1992	06/29 to 08/25	1,903	27,268	22,023	22,601 <sup>b</sup>	150 <sup>b</sup>
1993	06/22 to 08/18	2,317	26,452	14,952	318 <sup>b</sup>	1,451 <sup>b</sup>
1994	06/23 to 08/08	3,856	50,801	34,849	38,705 <sup>b</sup>	309 <sup>b</sup>
1995	06/19 to 08/28	4,836	39,009	33,699	330 <sup>b</sup>	5,415 <sup>b</sup>
1996	06/19 to 08/23	2,930	58,290	40,450	20,105 <sup>b</sup>	10,869 <sup>b</sup>
1997	06/11 to 09/17	2,937	35,530	17,369	940	13,413
1998	07/04 to 09/13	4,584	49,513	28,832	10,376	36,596
1999	06/26 to 09/26	3,221	48,205	19,513	914	11,545
2000	07/02 to 09/22	3,295	32,341	13,791	0	13,907
2001	06/26 to 09/30	5,398	21,024	26,820	5,405	19,626
2002	06/25 to 09/18	3,076	22,101	30,300	0	27,364
2003	06/18 to 09/18	2,389	44,387	21,637	1,921	52,810
2004	06/21 to 09/20	4,338	55,926	31,616	21,633	47,917
2005	06/26 to 09/12	4,633	113,809	26,690	5,926	15,683 <sup>c</sup>
2006	06/26 to 09/07	4,559	126,772	54,699	18,432	15,969
2007	06/25 to 09/10	3,852	72,282	49,285	4,819	20,767
2008	07/02 to 09/15	2,161	50,459	44,700	9,807	36,291
2009 <sup>d</sup>	06/28 to 09/20	1,630	25,460	19,713	890	19,333

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Table 10.–Page 2 of 2.

Year	Operating Period <sup>a</sup>	Chinook	Sockeye	Chum	Pink	Coho
<u>Kanektok River</u>						
<i>Counting Tower</i>						
1996	7/2-7/13; 7/20-7/25	6,827 <sup>b</sup>	71,637 <sup>b</sup>	70,617 <sup>b</sup>		
1997	6/11 to 08/21	16,731	96,348	51,180	7,872 <sup>b</sup>	23,172 <sup>b</sup>
1998	Not Operational					
1999	Not Operational					
<i>Weir</i>						
2000	Not Operational					
2001	8/10 to 10/03	132 <sup>b</sup>	733 <sup>b</sup>	1,058 <sup>b</sup>	21 <sup>b</sup>	36,440
2002	7/01 to 9/20	5,343 <sup>b</sup>	58,367 <sup>b</sup>	42,014 <sup>b</sup>	87,036	24,883
2003	6/24 to 9/18	8,231	127,471	40,066	2,443	72,448
2004	6/29 to 9/20	19,406	102,443	46,194	98,060	87,827
2005	7/08 to 9/08	12,721 <sup>c</sup>	160,702 <sup>c</sup>	50,881 <sup>c</sup>	3,530 <sup>c</sup>	13,690 <sup>c</sup>
2006	Not Operational					
2007	6/19 to 9/11	14,120	307,750	133,215	3,075	30,471
2008	7/21 to 8/21	6,578 <sup>e</sup>	141,388	54,024	142,430	24,490 <sup>b</sup>
2009 <sup>d</sup>	7/0/ to 8/11	6,841	272,483	51,647	1,246	2,336

<sup>a</sup> The operational period is inclusive of days when passage was estimated; unless noted otherwise, less than 10% of the total annual escapement is estimated.

<sup>b</sup> Field operations were incomplete and total annual escapement was not estimated.

<sup>c</sup> Total annual escapement is believed to be higher given the late project start date and/or premature project stop date.

<sup>d</sup> Escapement estimates are preliminary and subject to revisions.

<sup>e</sup> Passage from 7/2 through 7/16 estimated from percent passage at Middle Fork Goodnews River weir during same time period.

Table 11.—Peak aerial survey counts from Kuskokwim Bay spawning tributaries, 1961–2009.

Year	Kanektok River				Middle Fork Goodnews River				Goodnews River			
	Chinook	Sockeye	Chum	Coho	Chinook	Sockeye	Chum	Coho	Chinook	Sockeye	Chum	Coho
1962	935	43,108	a	a	a	a	a	a	a	a	a	a
1963	a	a	a	a	a	a	a	a	a	a	a	a
1964	a	a	a	a	a	a	a	a	a	a	a	a
1965	a	a	a	a	a	a	a	a	a	a	a	a
1966	3,718	a	a	28,800	a	a	a	a	a	a	a	a
1967	a	a	a	a	a	a	a	a	a	a	a	a
1968	4,170	8,000	a	14,000	a	a	a	a	a	a	a	a
1969	a	a	a	a	a	a	a	a	a	a	a	a
1970	3,112	1,128	a	11,100	a	a	a	a	a	a	a	a
1971	a	a	a	a	a	a	a	a	a	a	a	a
1972	a	a	a	a	a	a	a	a	a	a	a	a
1973	814	a	a	a	a	a	a	a	a	a	a	a
1974	197	532	a	424	a	a	a	a	a	a	a	a
1975	1,278	6,018	1,520	a	a	a	a	a	a	a	a	a
1976	3,079 <sup>d</sup>	2,936	a	2,500	a	a	a	a	a	a	a	a
1977	5,787	7,244	a	32,157	a	a	a	a	a	a	a	a
1978	9,999	44,215	a	229,290	a	a	a	a	a	a	a	a
1979	a	a	a	a	a	a	a	a	a	a	a	a
1980	6,172	113,931	a	25,950	1,164	18,926	3,782	a	1,228	75,739	1,975	a
1981	a	a	a	a	a	a	a	a	a	a	a	a
1982	7,740	55,940	9,700	5,720	1,546	2,327	6,300	a	1,990	19,160 <sup>c</sup>	9,700	a
1983	8,890 <sup>d</sup>	2,340	a	9,360	120	4,350	a	a	2,600	13,850 <sup>c</sup>	a	a
1984	11,282	30,840	4,400	48,360	1,930	12,897	9,172	a	2,002	12,807	28,124	a
1985	13,465	16,270	100	14,385	2,050	5,470	3,593	112	3,535	1,420	4,415	70
1986	3,643	12,090	a	16,790	1,249	16,990	7,645	4,400	1,068	8,960	11,850	6300

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Table 11.–Page 2 of 2.

Year	Kanektok River				Middle Fork Goodnews River				Goodnews River			
	Chinook	Sockeye	Chum	Coho	Chinook	Sockeye	Chum	Coho	Chinook	Sockeye	Chum	Coho
1987	1,647	20,798	a	6,010	2,207	34,532	9,696	2,420	2,234	19,786 <sup>c</sup>	12,103	3,715
1988	11,140	30,440	a	20,063	1,024	5,831	5,814	a	484	5,820	2,890	a
1989	7,914	14,735	1,755	6,270	1,277	8,044	2,922	300	651	3,605	1,440	650
1990	338	5,507	a	2,167	38	1,292	311	a	626	27,689	644	30
1991	a	a	a	a	a	a	a	a	a	a	a	a
1992	3,856	14,955	a	25,675	1,012	7,200	3,270	a	875	3,232 <sup>c</sup>	1,950	a
1993	4,670	23,128	a	1,285	a	a	a	10,376	a	a	a	a
1994	7,386	30,090	a	10,000	a	a	a	a	a	a	a	a
1995	a	2,250	2,900	250	a	a	a	a	3,314	a	a	a
1996	6,107	22,020	a	7,040	a	a	a	a	a	a	a	a
1997	7,990	27,100	a	3,270	1,425	17,843	1,465	a	3,611	12,610 <sup>c</sup>	a	a
1998	a	6,420	a	a	731	11,632	3,619	a	578	3,497 <sup>c</sup>	2,743	a
1999	202	6,054	a	10,325	a	a	a	a	a	a	a	a
2000	1,744 <sup>d</sup>	6,045	a	2,900	a	a	a	a	a	a	a	a
2001	6,483	38,610	a	11,440	2,799	12,383	6,945	a	3,561	29,340 <sup>c</sup>	7,330	a
2002	a	a	a	a	a	a	a	a	a	a	a	a
2003	5,430	18,010	a	2,700	1,210	21,760	2,310	a	2,015	27,380 <sup>c</sup>	3,370	a
2004	27,873	7,838	a	a	2,474	33,670	a	a	7,358	31,695	a	a
2005	13,926	110,730	a	a	a	a	a	a	a	a	a	a
2006	4,875	367,300	a	a	1,340	4,700	a	a	4,155	78,100	a	a
2007	a	a	a	a	a	a	a	a	a	a	a	a
2008	3,659	43,900	a	a	2,190	13,935	a	a	2,155	32,500	a	a
2009	a	a	a	a	a	a	a	a	a	a	a	a

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SEG<sup>b</sup> 3,500–8,000 14,000–34,000 >5,200 640–3,300 5,500–19,500

<sup>a</sup> Survey either not flown or did not meet acceptable survey criteria.



Table 12.—Historical escapement, Chinook salmon, Kanektok River escapement projects, 1996–2009.

Year	Method	Dates of Operation	Project	Drainage	Aerial Survey	Commercial	Subsistence	Sport	Exploitation
			Count	Estimate <sup>a</sup>	SEG (3,500–8,000)	Harvest	Harvest	Harvest	%
1996	Counting Tower <sup>b</sup>	2–13, 20–25 July	6,827 <sup>c</sup>		6,107				
1997	Counting Tower <sup>b</sup>	11 June–21 August	16,731		<sup>d</sup>	35,510	3,433	1,632	
1998	Counting Tower <sup>b</sup>	23 July–17 August	0 <sup>c</sup>		<sup>d</sup>	23,158	4,041	1,475	
1999	Tower/Weir <sup>b</sup>	Not Operational			202	18,426	3,167	854	
2000	Resistance Board Weir <sup>e</sup>	Not Operational			<sup>d</sup>	21,229	3,106	833	
2001	Resistance Board Weir <sup>f</sup>	10 August–3 October	132 <sup>c</sup>		6,483	12,775	2,923	947	
2002	Resistance Board Weir <sup>f</sup>	1 July–20 September	5,343		<sup>d</sup>	11,480	2,475	779	
2003	Resistance Board Weir <sup>f</sup>	24 June–18 September	8,221		5,430	14,444	3,898	323	
2004	Resistance Board Weir <sup>f</sup>	29 June–20 September	19,528	42,908	27,873	25,465	3,726	288	41
2005	Resistance Board Weir <sup>f</sup>	8 July–8 September	14,331	33,110	13,926	14,195	3,083	520	35
2006	Resistance Board Weir <sup>f</sup>	Not Operational		18,748	4,875	19,184	3,521	754	56
2007	Resistance Board Weir <sup>f</sup>	19 June–11 September	14,120	28,758	<sup>d</sup>	19,573	3,412	633	45
2008	Resistance Board Weir <sup>f</sup>	17 July–August 21	6,578	13,682	3,659	13,812	3,528 <sup>g</sup>	504 <sup>g</sup>	56
2009	Resistance Board Weir <sup>f</sup>	7 July–August 11	6,841 <sup>h</sup>	14,353 <sup>h</sup>	<sup>d</sup>	13,921	3,528 <sup>g</sup>	504 <sup>g</sup>	56

<sup>a</sup> Includes an estimate of the number of fish spawning below the weir. Drainage estimate calculated by expanding the weir count by the above and below count proportion observed during aerial surveys. Drainage estimate was not calculated prior to 2004.

<sup>b</sup> Project located approximately 15 river miles from the mouth of the Kanektok River.

<sup>c</sup> No counts or incomplete counts as the project was not operational during a large portion of species migration.

<sup>d</sup> Survey either not flown or rated as unacceptable.

<sup>e</sup> Project located approximately 20 river miles from the mouth of the Kanektok River.

<sup>f</sup> Project located approximately 42 river miles from the mouth of the Kanektok River.

<sup>g</sup> Estimated using most recent 5-year average (2003–2007).

<sup>h</sup> Preliminary estimate; subject to change.

Table 13.—Commercial salmon harvests, District 4 and 5, 1975–2009.

Year	District W-4 (Quinhagak)				District W-5 (Goodnews Bay)			
	Chinook	Sockeye	Coho	Chum	Chinook	Sockeye	Coho	Chum
1975	3,928	8,584	10,742	35,233	2,156	9,098	17,889	5,904
1976	14,110	6,090	13,777	43,659	4,417	5,575	9,852	10,354
1977	19,090	5,519	9,028	43,707	3,336	3,723	13,335	6,531
1978	12,335	7,589	20,114	24,798	5,218	5,412	13,764	8,590
1979	11,144	18,828	47,525	25,995	3,204	19,581	42,098	9,298
1980	10,387	13,221	62,610	65,984	2,331	28,632	43,256	11,748
1981	24,524	17,292	47,551	53,334	7,190	40,273	19,749	13,642
1982	22,106	25,685	73,652	34,346	9,476	38,877	46,683	13,829
1983	46,385	10,263	32,442	23,090	14,117	11,716	19,660	6,766
1984	33,633	17,255	132,151	50,422	8,612	15,474	71,176	14,340
1985	30,401	7,876	29,992	20,418	5,793	6,698	16,498	4,784
1986	22,835	21,484	57,544	29,700	2,723	25,112	19,378	10,355
1987	26,022	6,489	50,070	8,557	3,357	27,758	29,057	20,381
1988	13,883	21,556	68,605	29,220	4,964	36,368	30,832	33,059
1989	20,820	20,582	44,607	39,395	2,966	19,299	31,849	13,622
1990	27,644	83,681	26,926	47,717	3,303	35,823	7,804	13,194
1991	9,480	53,657	42,571	54,493	912	39,838	13,312	15,892
1992	17,197	60,929	86,404	73,383	3,528	39,194	19,875	18,520
1993	15,784	80,934	55,817	40,943	2,117	59,293	20,014	10,657
1994	8,564	72,314	83,912	61,301	2,570	69,490	47,499	28,477
1995	38,584	68,194	66,203	81,462	2,922	37,351	17,875	19,832
1996	14,165	57,665	118,718	83,005	1,375	30,717	43,836	11,093
1997	35,510	69,562	32,862	38,445	2,039	31,451	2,983	11,729
1998	23,158	41,382	80,183	45,095	3,675	27,161	21,246	14,155
1999	18,426	41,315	6,184	38,091	1,888	22,910	2,474	11,562
2000	21,229	68,557	30,529	30,553	4,442	37,252	15,531	7,450
2001	12,775	33,807	18,531	17,209	1,519	25,654	9,275	3,412
2002	11,480	17,802	26,695	29,252	979	6,304	3,041	3,799
2003	14,444	33,941	49,833	27,868	1,412	29,423	12,658	5,593
2004	25,465	34,627	82,398	25,820	2,565	20,922	23,690	6,014

-continued-

Table 13.–Page 2 of 2.

Year	District W-4 (Quinhagak)				District W-5 (Goodnews Bay)				
	Chinook	Sockeye	Coho	Chum	Chinook	Sockeye	Coho	Chum	
2005	24,195	68,801	51,708	13,529	2,035	23,933	11,735	2,568	
2006	19,004	106,424	26,831	39,191	2,899	29,858	12,561	11,678	
2007	19,575	109,517	34,710	62,232	3,126	43,766	13,697	7,853	
2008	13,812	69,776	95,073	57,663	1,278	27,237	22,547	10,408	
2009	13,920	112,153	48,115	91,158	1,509	32,544	8,406	16,985	
5-yr avg (’05-’09)	18,101	93,334	51,287	52,755	2,169	31,468	13,789	9,898	
10-yr avg (’00-’09)	17,590	65,541	46,442	39,448	2,176	27,689	13,314	7,576	

Table 14.–Commercial salmon fishing exvessel value, District 4 (Quinhagak) and District 5(Goodnews Bay), 1990–2009.

Year	District 4 (Quinhagak)						District 5 (Goodnews Bay)					
	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1990	\$253,562	\$542,485	\$123,936	\$4,146	\$89,343	\$1,013,472	\$32,135	\$263,598	\$38,910	\$254	\$25,767	\$360,664
1991	\$94,950	\$246,734	\$144,379	\$52	\$106,321	\$592,436	\$8,370	\$187,622	\$47,519	\$14	\$31,394	\$274,919
1992	\$166,471	\$368,310	\$303,740	\$15,875	\$139,268	\$993,664	\$30,688	\$257,457	\$75,278	\$2,913	\$39,111	\$405,447
1993	\$143,506	\$402,763	\$246,746	\$4	\$105,236	\$898,255	\$21,351	\$296,437	\$95,043	\$0	\$28,304	\$441,135
1994	\$67,584	\$253,922	\$420,802	\$10,454	\$84,395	\$837,157	\$21,732	\$309,577	\$271,687	\$5,442	\$41,309	\$649,747
1995	\$418,067	\$323,104	\$201,413	\$81	\$104,523	\$1,047,188	\$31,339	\$175,552	\$58,061	\$19	\$21,427	\$286,398
1996	\$61,004	\$165,100	\$246,930	\$6	\$61,686	\$534,726	\$5,952	\$87,427	\$120,191	\$4	\$9,015	\$222,589
1997	\$171,688	\$204,190	\$91,584	\$0	\$29,609	\$497,071	\$10,867	\$93,146	\$9,497	\$0	\$9,358	\$122,868
1998	\$82,168	\$150,631	\$197,676	\$871	\$36,497	\$467,843	\$13,685	\$100,171	\$59,102	\$174	\$11,133	\$184,265
1999	\$94,880	\$140,846	\$14,997	\$0	\$28,368	\$279,091	\$9,020	\$78,800	\$7,515	\$0	\$8,327	\$103,662
2000	\$131,351	\$249,382	\$31,898	\$1	\$23,929	\$436,561	\$25,614	\$146,708	\$34,689	\$2	\$6,001	\$213,014
2001	\$93,697	\$89,334	\$32,577	\$0	\$13,007	\$228,615	\$10,496	\$68,678	\$17,089	\$0	\$2,586	\$98,849
2002	\$56,356	\$40,368	\$47,651	\$0	\$23,374	\$167,749	\$343	\$15,846	\$5,634	\$0	\$2,979	\$24,802
2003	\$69,201	\$107,287	\$108,804	\$0	\$19,261	\$304,553	\$6,461	\$95,818	\$28,945	\$0	\$3,883	\$135,107
2004	\$107,700	\$77,394	\$201,879	\$0	\$18,372	\$405,345	\$10,857	\$49,741	\$70,404	\$0	\$4,244	\$135,246
2005	\$221,854	\$241,478	\$101,776	\$4	\$6,853	\$571,965	\$16,696	\$91,135	\$25,010	\$0	\$1,454	\$134,295
2006	\$147,802	\$327,917	\$61,433	\$0	\$14,030	\$551,182	\$21,314	\$87,996	\$27,587	\$0	\$4,368	\$141,265
2007	\$163,248	\$374,004	\$102,569	\$0	\$21,044	\$660,865	\$23,951	\$156,802	\$38,796	\$0	\$2,781	\$222,330
2008	\$140,580	\$272,427	\$317,143	\$0	\$20,581	\$750,731	\$13,181	\$104,296	\$76,683	\$0	\$3,910	\$198,070
2009	\$130,561	\$384,209	\$136,562	\$0	\$95,993	\$747,325	\$13,333	\$134,244	\$25,456	\$0	\$18,998	\$192,031
5-yr avg ('05-'09)	\$160,809	\$320,007	\$143,897	\$1	\$31,700	\$656,414	\$17,695	\$114,895	\$38,706	\$0	\$6,302	\$177,598
10-yr avg ('00-'09)	\$126,235	\$216,380	\$114,229	\$1	\$25,644	\$482,489	\$14,225	\$95,126	\$35,029	\$0	\$5,120	\$149,501

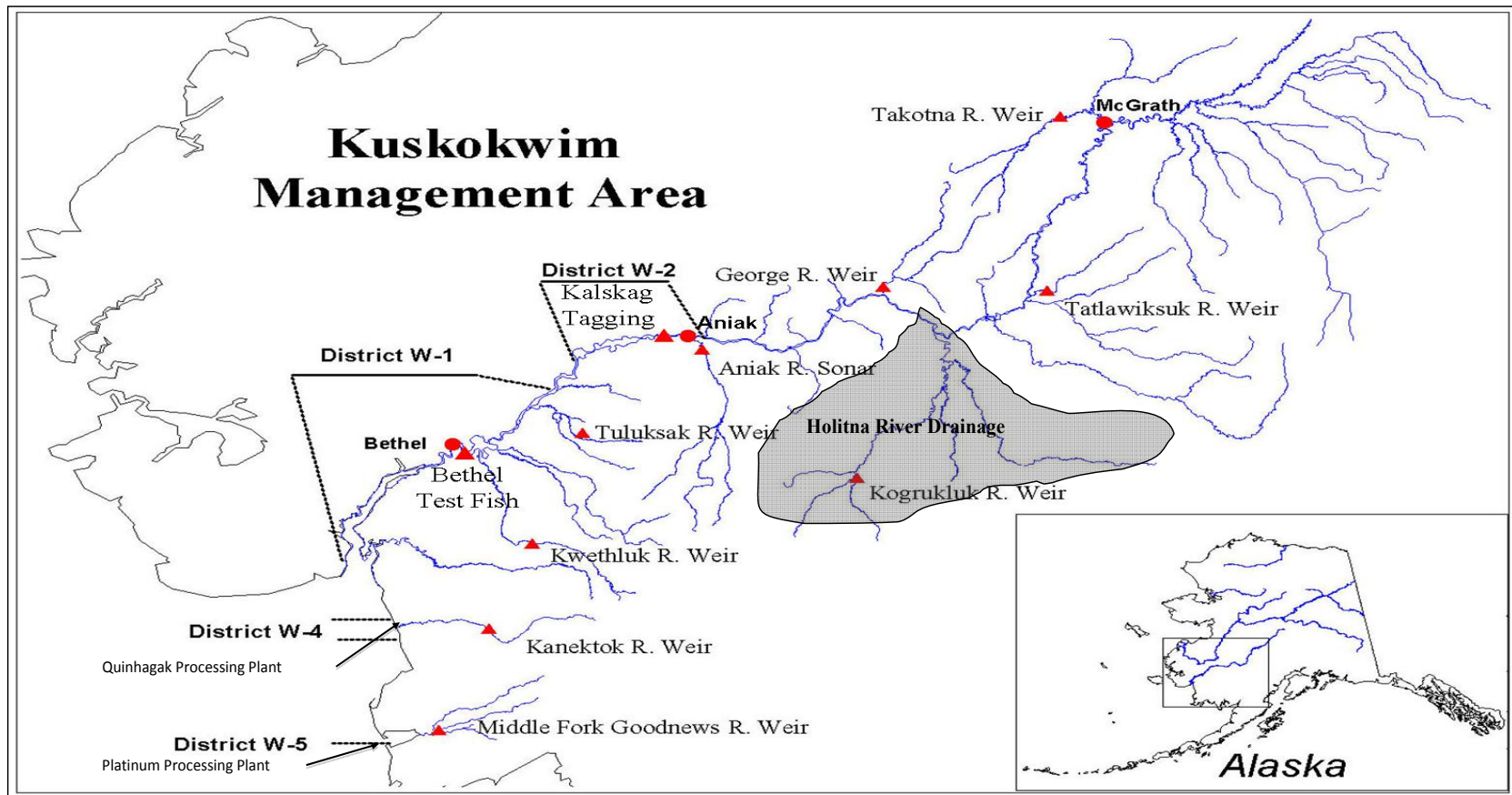
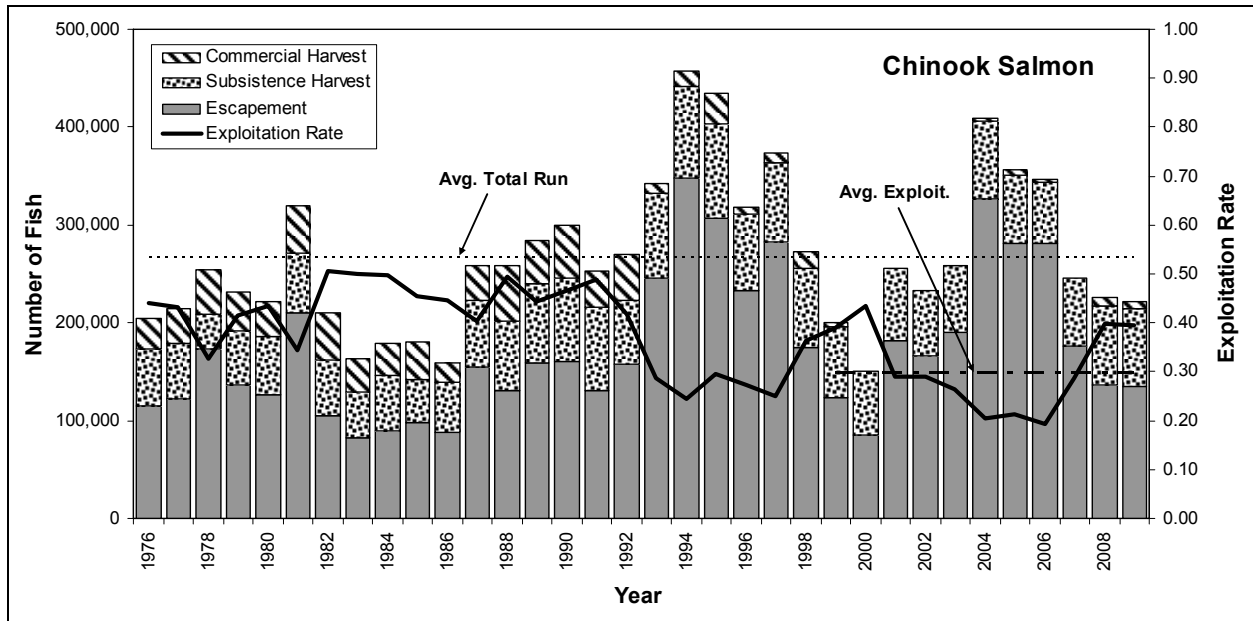


Figure 1.—Area map of the Kuskokwim Management area showing locations of fishing districts, escapement monitoring projects, and processing plants.

a:



b:

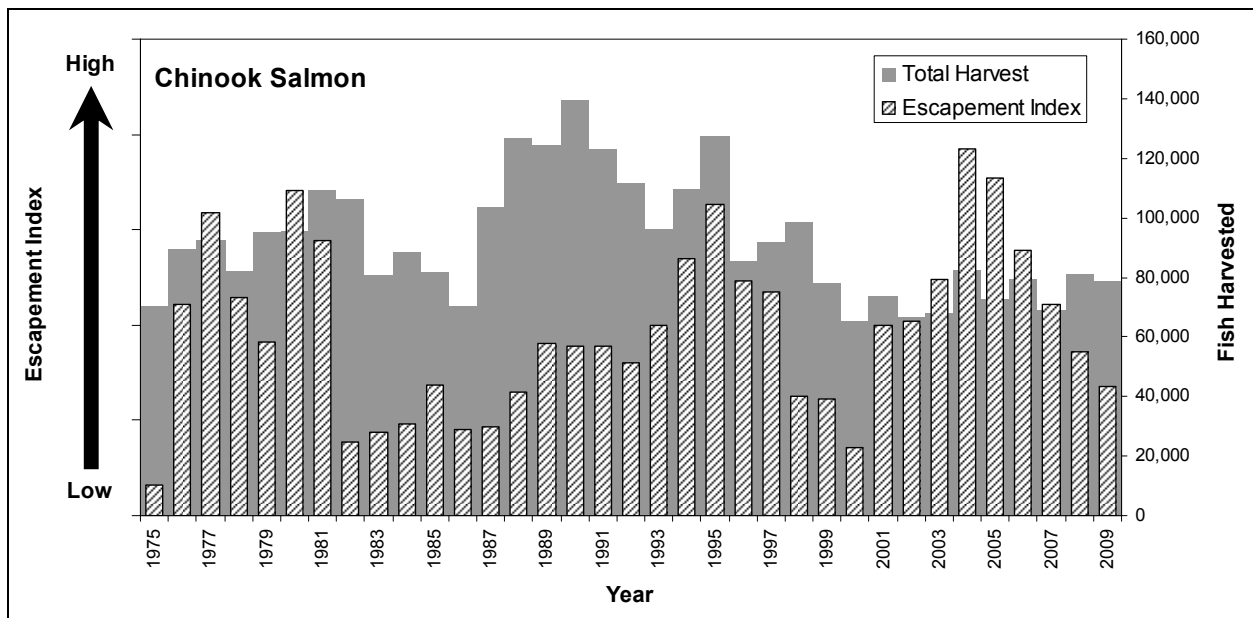
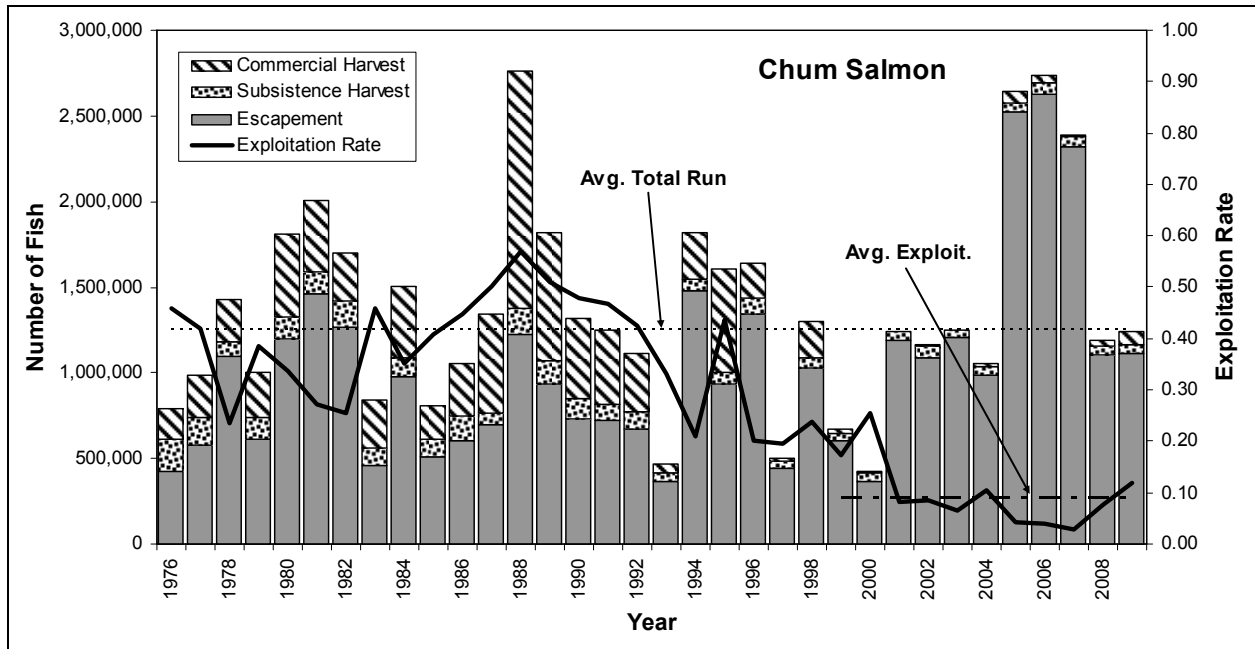


Figure 2.–a) Preliminary Chinook salmon run reconstruction showing escapement, commercial, and subsistence harvests, and estimated exploitation rate, 1976–2009. Subsistence harvests for 2008 and 2009 are estimated from most recent 5-year average (2003–2007); b) Kuskokwim River Chinook salmon escapement and total harvest trends, 1975–2009.

a:



b:

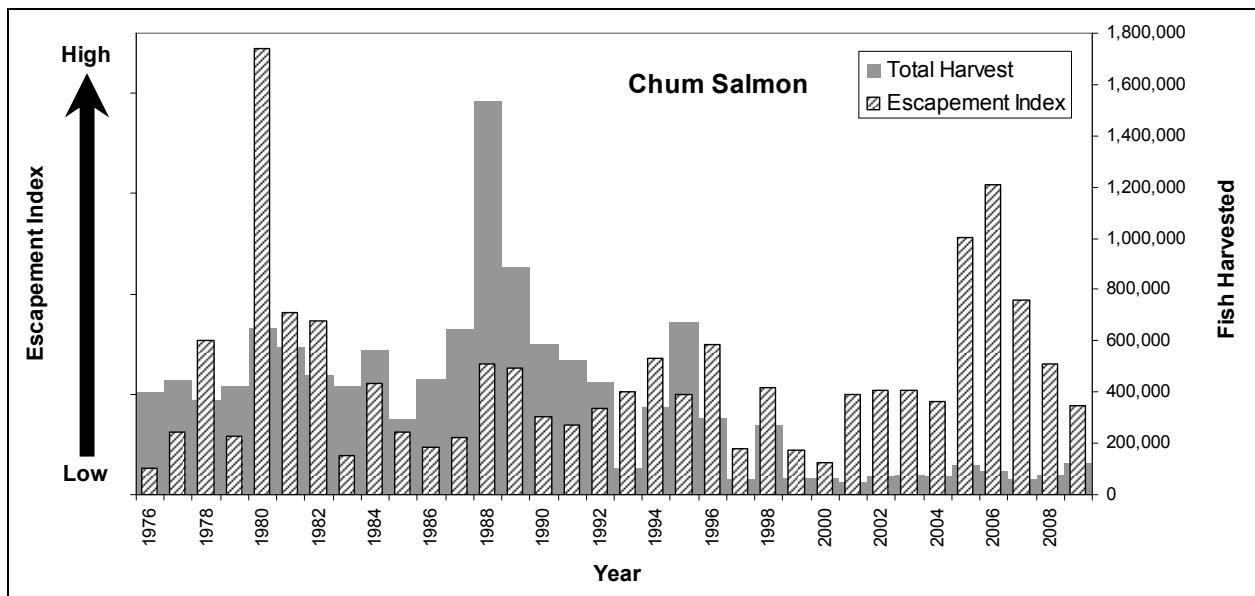
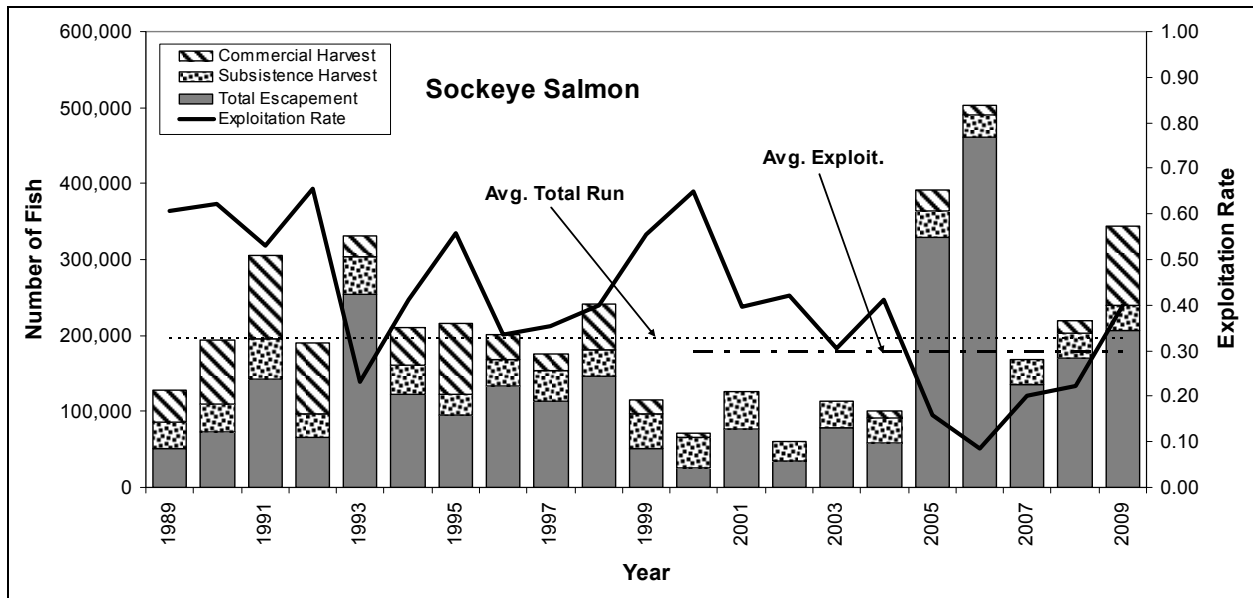


Figure 3.–a) Preliminary chum salmon run reconstruction showing escapement, commercial, and subsistence harvests, and estimated exploitation rate, 1976–2009, Subsistence harvests for 2008 and 2009 are estimated from most recent 5-year average (2003–2007); b) Kuskokwim River chum salmon escapement and total harvest trends, 1976–2009.

a:



b:

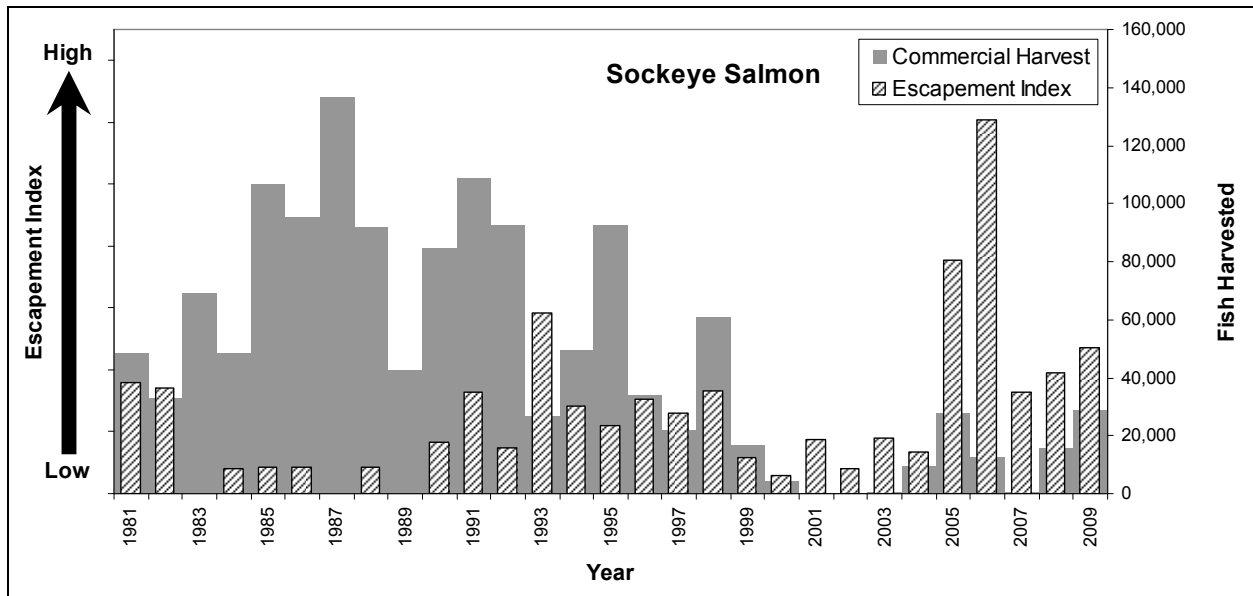
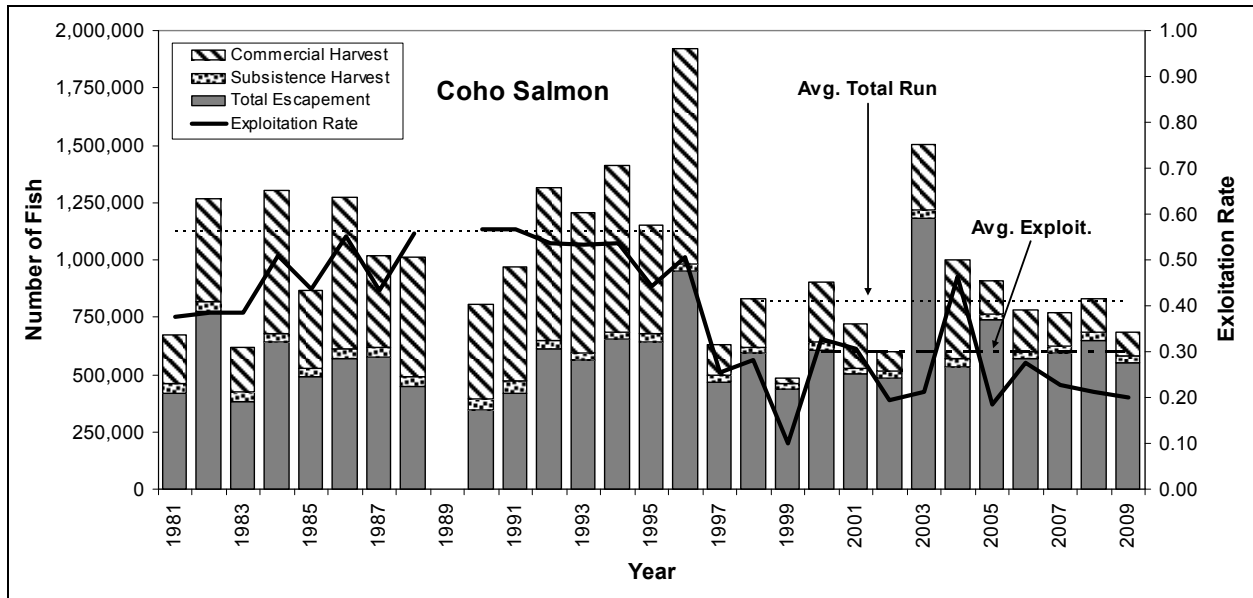


Figure 4.–a) Preliminary sockeye salmon run reconstruction showing escapement, commercial, and subsistence harvests, and estimated exploitation rate, 1989–2009. Subsistence harvests for 2008 and 2009 are estimated from most recent 5-year average (2003–2007); b) Kuskokwim River sockeye salmon escapement and total harvest trends, 1981–2009.



a:



b:

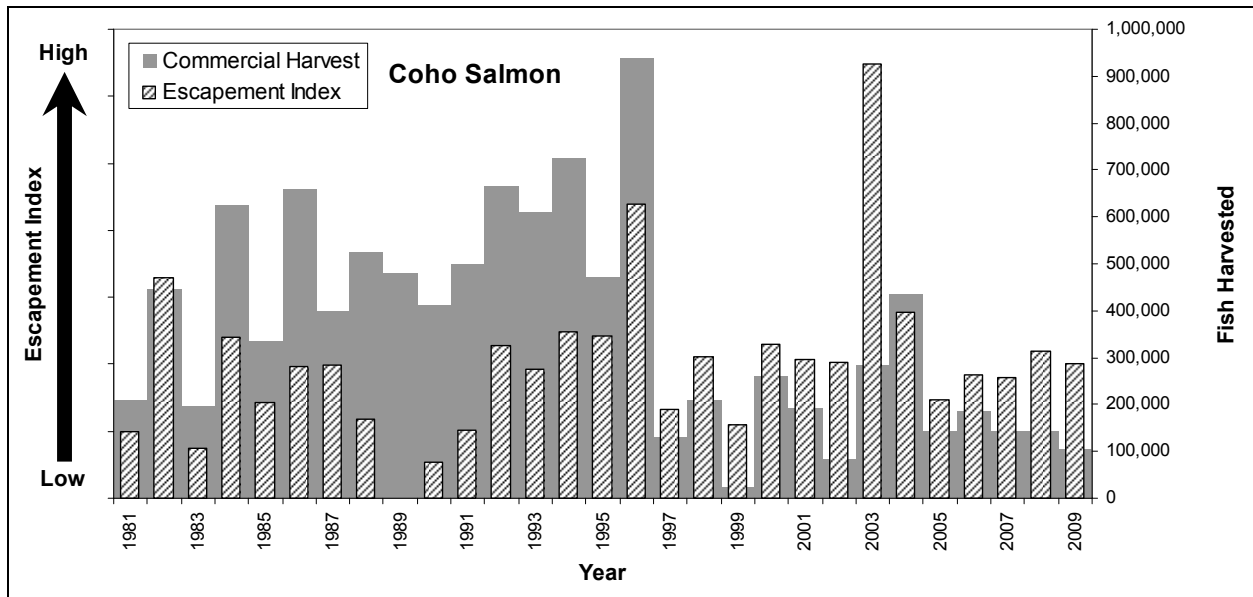
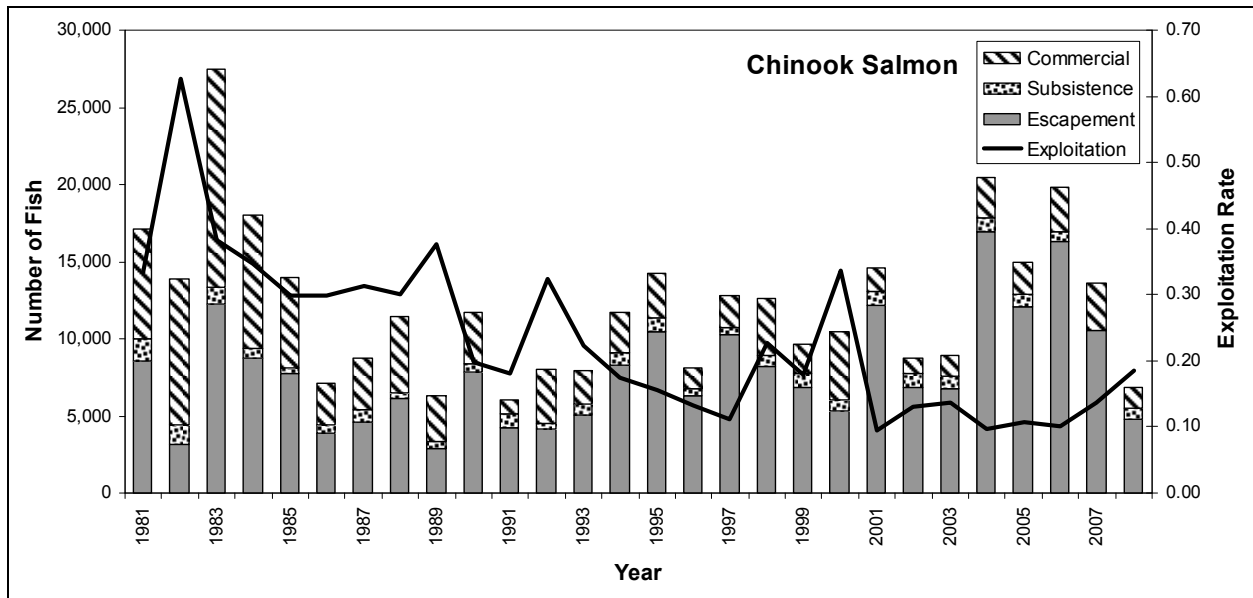


Figure 5.—Preliminary coho salmon run reconstruction showing escapement, commercial, and subsistence harvests, and estimated exploitation rate, 1981–2009. Subsistence harvests for 2008 and 2009 are estimated from most recent 5-year average (2003–2007); b) Kuskokwim River sockeye salmon escapement and total harvest trends, 1981–2009.

a:



b:

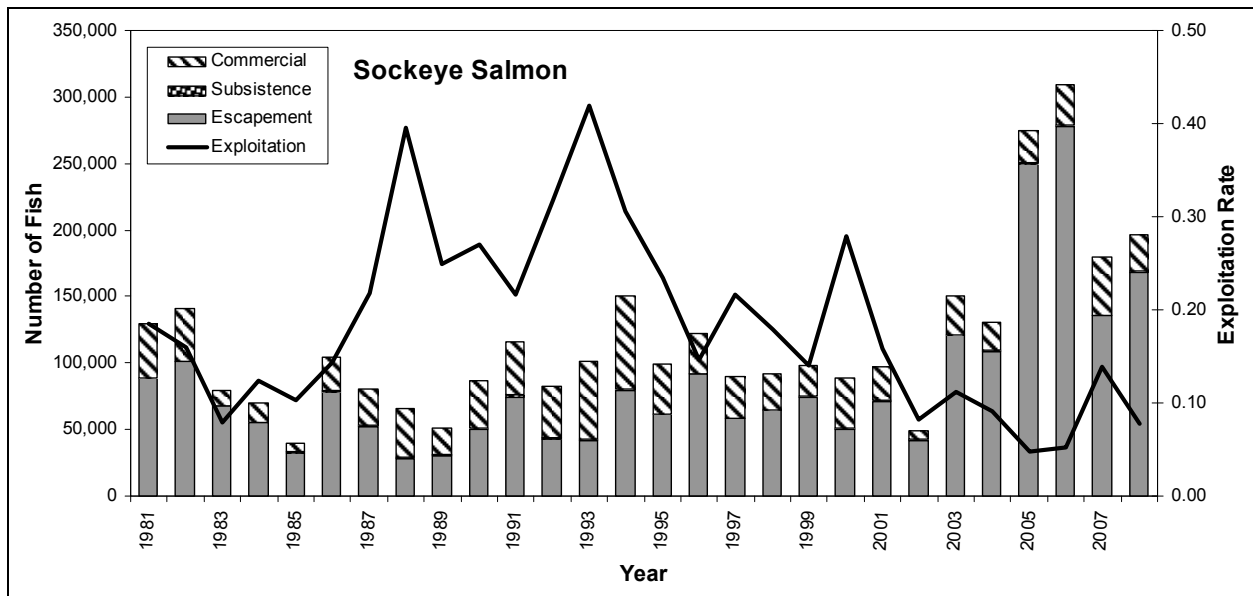


Figure 6.–a) Chinook salmon run reconstruction, Goodnews River drainage, showing escapement, commercial, and subsistence harvests, and estimated exploitation rate, 1981–2009; b) sockeye salmon Goodnews River drainage, showing escapement, commercial harvest, and estimated exploitation rate, 1981–2009.