

**Fishery Data Series No. 12-21**

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**Age Composition and Escapement of Chinook Salmon  
in the Karluk, Ayakulik, and Chignik Rivers, Alaska,  
2006–2007**

by

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and

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May 2012

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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>Mathematics, statistics</b>	
centimeter	cm	Alaska Administrative Code	AAC	<i>all standard mathematical signs, symbols and abbreviations</i>	
deciliter	dL	all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.	alternate hypothesis	$H_A$
gram	g	all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.	base of natural logarithm	$e$
hectare	ha	at	@	catch per unit effort	CPUE
kilogram	kg	compass directions:		coefficient of variation	CV
kilometer	km	east	E	common test statistics	(F, t, $\chi^2$ , etc.)
liter	L	north	N	confidence interval	CI
meter	m	south	S	correlation coefficient	
milliliter	mL	west	W	(multiple)	R
millimeter	mm	copyright	©	correlation coefficient (simple)	r
		corporate suffixes:		covariance	cov
<b>Weights and measures (English)</b>		Company	Co.	degree (angular)	$^\circ$
cubic feet per second	ft <sup>3</sup> /s	Corporation	Corp.	degrees of freedom	df
foot	ft	Incorporated	Inc.	expected value	$E$
gallon	gal	Limited	Ltd.	greater than	>
inch	in	District of Columbia	D.C.	greater than or equal to	$\geq$
mile	mi	et alii (and others)	et al.	harvest per unit effort	HPUE
nautical mile	nmi	et cetera (and so forth)	etc.	less than	<
ounce	oz	exempli gratia	e.g.	less than or equal to	$\leq$
pound	lb	(for example)		logarithm (natural)	ln
quart	qt	Federal Information Code	FIC	logarithm (base 10)	log
yard	yd	id est (that is)	i.e.	logarithm (specify base)	log <sub>2</sub> , etc.
		latitude or longitude	lat. or long.	minute (angular)	'
<b>Time and temperature</b>		monetary symbols (U.S.)	\$, ¢	not significant	NS
day	d	months (tables and figures): first three letters	Jan, ..., Dec	null hypothesis	$H_0$
degrees Celsius	°C	registered trademark	®	percent	%
degrees Fahrenheit	°F	trademark	™	probability	P
degrees kelvin	K	United States (adjective)	U.S.	probability of a type I error (rejection of the null hypothesis when true)	$\alpha$
hour	h	United States of America (noun)	USA	probability of a type II error (acceptance of the null hypothesis when false)	$\beta$
minute	min	U.S.C.	United States Code	second (angular)	"
second	s	U.S. state	use two-letter abbreviations (e.g., AK, WA)	standard deviation	SD
<b>Physics and chemistry</b>				standard error	SE
all atomic symbols				variance	
alternating current	AC			population sample	Var
ampere	A			sample	var
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				

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## ABSTRACT

In 1993, the Alaska Department of Fish and Game, Division of Sport Fish, initiated a project to monitor the status of Chinook salmon (*Oncorhynchus tshawytscha*) stocks of the Karluk, Ayakulik, and Chignik rivers in the Kodiak Management Area. This report presents data collected in 2006 and 2007. During this time, the inriver runs were estimated by counting fish passing through weirs on the Karluk and Ayakulik rivers, and were estimated from sample weir counts taken at hourly intervals on the Chignik River. In 2006, the inriver runs to the Karluk, Ayakulik, and Chignik rivers were 4,112; 3,106; and 3,535 Chinook salmon, respectively. In 2007, the inriver runs were 1,765; 6,535; and 2,000 Chinook salmon, respectively. Age and sex compositions of inriver runs were estimated by sampling Chinook salmon at the Karluk and Ayakulik rivers weirs. Total sport fishing effort, and catch and harvest of Chinook salmon for the Karluk and Ayakulik rivers, were estimated annually through the Statewide Harvest Survey. Sport fisheries occurring upriver of the weirs at both drainages were partially censused during each year. According to Statewide Harvest Survey estimates, anglers harvested 670 (SE = 388) and released 2,337 Chinook salmon from the Karluk River during 2006. Due to restrictions on the sport fishery in 2007, anglers harvested only an estimated 205 (SE = 142) Chinook salmon and released 528. At the Ayakulik River, anglers harvested an estimated 169 (SE = 79) Chinook salmon and released 2,914 in 2006, and harvested an estimated 303 (SE = 155) and released 3,779 in 2007. During the 2006 commercial purse seine fishery in Chignik Lagoon, a total of 2,009 Chinook salmon were harvested, compared to 667 in 2007. In 2006, estimated escapement was 3,673 and 2,937 Chinook salmon from the Karluk and Ayakulik rivers, respectively. In 2007, estimated escapement was 1,697 and 6,232 Chinook salmon, respectively.

Key words: Chinook salmon, *Oncorhynchus tshawytscha*, escapement, Karluk River, Ayakulik River, Chignik River, age, length, sex composition, sport harvest, sport effort.

## INTRODUCTION

The largest Chinook salmon (*Oncorhynchus tshawytscha*) populations in the Kodiak Management Area (the Kodiak Island Archipelago, Alaska Peninsula waters west of Cape Douglas on the Pacific side and west of Cape Menshikof on the Bering side, and the Aleutian Islands) occur in the Karluk, Ayakulik, and Chignik rivers. All 3 populations support sport fisheries and are also harvested incidentally by commercial fisheries targeting sockeye salmon (*Oncorhynchus nerka*). Subsistence fisheries also harvest relatively small numbers of Chinook salmon from each of these drainages. In order to improve Chinook salmon management for the benefit of users, it is essential to establish escapement goals that accurately reflect the production capacities of each stock. The purpose of this study is to annually estimate the age, sex, and length compositions of Chinook salmon runs, estimate total escapements, and document estimated or censused sport harvests and total incidental commercial catch within these drainages. These data can then be used to construct brood tables and refine escapement goals. Adjusting escapement goals to the most effective level will allow for maximum production and harvest opportunity.

## KARLUK RIVER

The Karluk River, located on the southwest end of Kodiak Island (Figure 1), contains 1 of only 2 native populations of Chinook salmon found on the Kodiak Archipelago. From its source at the outlet of Karluk Lake, the Karluk River flows 35.2 km (22 mi) to its terminus at Karluk Lagoon. Large portions of the uplands surrounding the Karluk River are currently held in private ownership. Chinook salmon of Karluk River origin are harvested in sport, commercial, and subsistence fisheries.

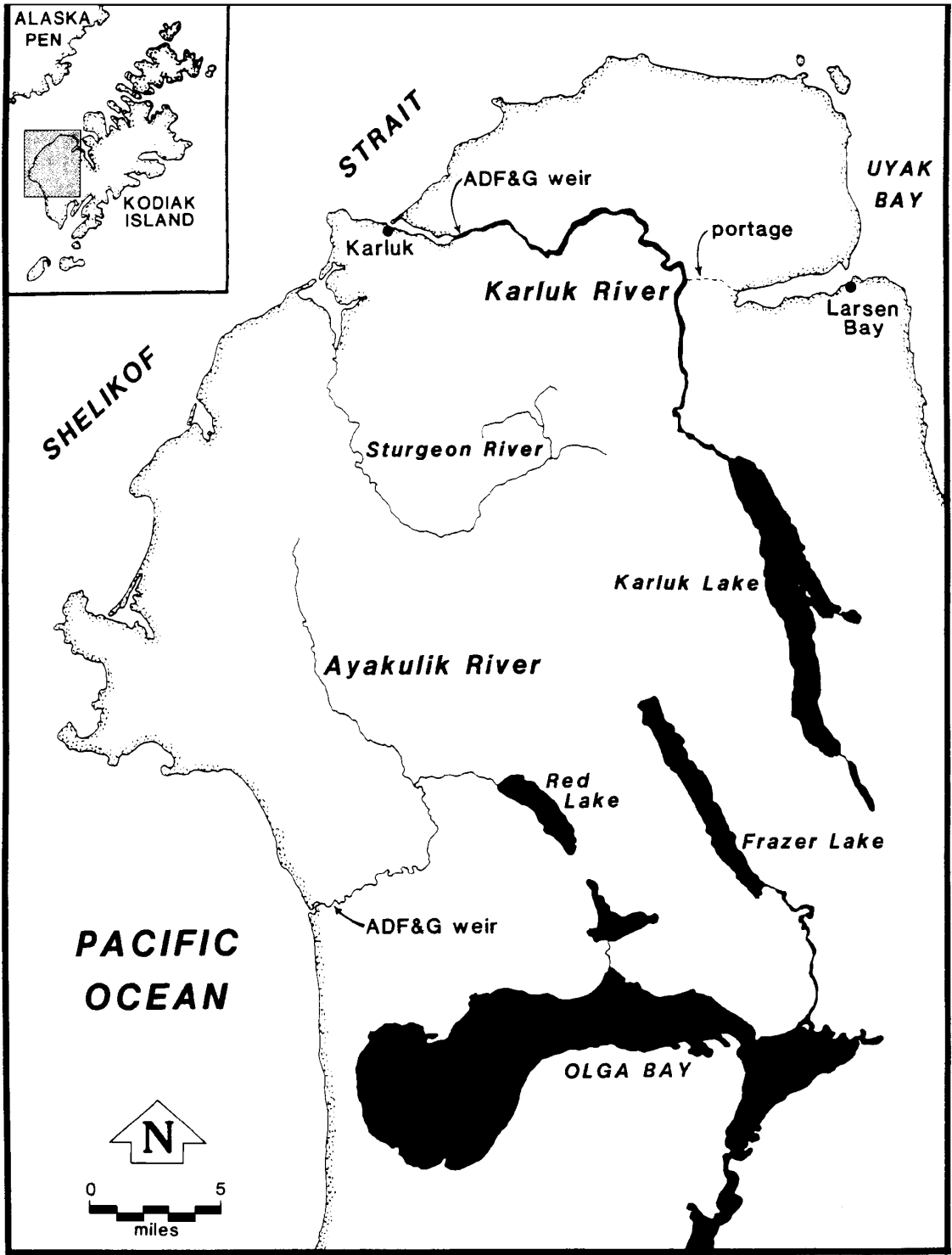


Figure 1.—Map of Karluk and Ayakulik rivers showing location of ADF&G weirs.



The primary commercial harvest of Karluk River Chinook salmon likely occurs in a mixed stock fishery along the west side of Kodiak Island (Appendix A1). Chinook salmon incidentally harvested in this area include stocks from the Karluk and Ayakulik rivers, and also stocks of unknown origin. This fishery opens annually by regulation as early as 1 June. Because more than 90% of the escapement to the Karluk River typically occurs by 15 July, mature Karluk River Chinook salmon are considered commercially exploited from 1 June through 15 July. The Alaska Department of Fish and Game (ADF&G), Division of Commercial Fisheries (CF), documents commercial harvests of Chinook salmon through fish ticket reports from fish processors.

Most of the Karluk River Chinook salmon subsistence harvest is attributed to the residents of Karluk Village. Harvest in this fishery is documented through subsistence permits issued by CF. Between 1998 and 2007, reported Chinook salmon harvests ranged from 1 to 165 fish (Table 1).

Chinook salmon are harvested in the sport fishery throughout the Karluk River and in Karluk Lagoon. Anglers typically gain access to the fishery by floatplane into Karluk Lake, Karluk Lagoon, or an area in midriver known as “the Portage.”(Figure 1) Guided anglers also access the Portage area by an overland trail from the community of Larsen Bay. Fly-in parties accessing the fishery upstream often float the river to its terminus.

Sport fish harvests of Karluk River Chinook salmon as well as overall fishing effort and catch are estimated by the Statewide Harvest Survey (SWHS) (Howe et al. 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010). In addition, sport fish effort, catch, and harvest information is also available through creel surveys of the sport fishery above the lagoon conducted from 2002 through 2004 for all anglers fishing the Karluk River and from a partial census in 2005 through 2007 of anglers who exited the fishery below the weir (Schwarz et al. 2003, Tracy et al. 2010). Between the late 1980s and early 1990s estimated total sport fishing effort on Karluk River Chinook salmon doubled (Mills 1988-1994; Howe et al. 1995), while the estimated annual harvests of Chinook salmon also increased during this period. Creel censuses from SWHS data indicate that during the mid-1990s, both effort and harvest remained relatively stable (Howe et al. 1996, 2001a-c), although between 1999 and 2000, the estimated Chinook salmon harvest increased by more than 60% (Howe et al. 2001d; Walker et al. 2003). In 2001, 2002, and 2004, the estimated sport fish harvest remained relatively stable although the effort decreased (Jennings et al. 2004, 2006a, 2007). During 2006 and 2007, the estimated sport fish harvests were below the most recent 10-year average (1998–2007) (Table 1, Figure 2; Jennings et al. 2009b, 2010).

There is a weir on the Karluk River, operated by CF, located approximately one-quarter mile upriver of Karluk Lagoon. Between 1998 and 2007, counts of Chinook salmon migrating through the weir have ranged from 1,765 to 13,063 and averaged 7,085 (Table 1, Figure 2, Appendix B1). Weir counts prior to 1998 (dating to 1976) averaged approximately 9,000 fish (Schwarz et al. 2002).

The current (2006–2007) Karluk River Chinook salmon minimum biological escapement goal (BEG) has been set at 3,600 fish based on an analysis of age composition and escapement data available through 2007 (Honnold et al. 2007). The sport fishery is allowed to proceed without inseason restrictions if the interim total escapement (inriver count minus average estimated upriver sport fish harvest) is achieved at or above the minimum goal. The current pre-season management approach assumes a Chinook salmon sport fishing mortality above the weir within the range of 1,000 to 1,500 fish.

Table 1.—Total commercial harvest of Chinook salmon from Inner and Outer Karluk Section statistical areas, Karluk River inriver Chinook salmon run, estimated sport harvests and reported subsistence harvests, 1998–2007.

Year	Inner and Outer Karluk Section statistical area harvest <sup>a</sup>	Subsistence harvest <sup>b</sup>	Inriver run <sup>c</sup>	Karluk River			
				Harvest	(SE)	Release	Effort <sup>e</sup>
1998	252	4	10,239	1,173	(224)	6,150	NA
1999	1,067	7	13,063	1,766	(317)	5,957	NA
2000	693	22	10,460	2,581	(427)	8,165	NA
2001	2,588	24	4,453	1,304	(257)	3,676	NA
2002 <sup>f</sup>	1,262	165	7,175	1,086	(307)	2,533	1,745
2003 <sup>g</sup>	1,336	6	7,256	584	(139)	1,872	758
2004 <sup>h</sup>	2,249	16	7,525	1,113	(144)	1,974	605
2005 <sup>i</sup>	339	5	4,798	368	(165)	815	NA
2006 <sup>j</sup>	900	17	4,112	670	(388)	2,337	NA
2007 <sup>k</sup>	313	1	1,765	205	(142)	528	NA
Average 1998–2007	1,100	27	7,085	1,085		3,401	

Note: “NA” = data not available.

<sup>a</sup> Source: ADF&G, Division of Commercial Fisheries (CF) Statewide Harvest Receipt (fish ticket) database. Includes all Chinook salmon harvested annually between Rocky Point and Cape Karluk through 15 July. See Appendix A1 for harvest by inclusive statistical areas.

<sup>b</sup> Based on subsistence harvest records maintained by CF Westward Region; includes all reported harvest in Karluk Sections.

<sup>c</sup> Census of Chinook salmon passing Karluk River weir (Spalinger 2006).

<sup>d</sup> Statewide mail survey (Howe et al. 2001c-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a).

<sup>e</sup> Source: creel census data for effort directed at Chinook salmon only (Tracy et al. 2010); units are angler-days.

<sup>f</sup> Sport fishery estimates include census above weir of 601 fish harvested, 2,268 released, and 1,745 angler days (numbers corrected from original reported by Schwarz et al. (2003)) and SWHS estimates of 485 fish harvested, 265 released, and 1,374 angler days below the weir (Jennings et al. 2006a).

<sup>g</sup> Sport fishery estimates include census above weir of 291 fish harvested, 1,513 released, and 758 angler days (Tracy et al. 2010) and SWHS estimates of 293 fish harvested, 652 released, and 1,027 angler days below the weir (Jennings et al. 2006b).

<sup>h</sup> Sport fishery estimates include census above weir of 720 fish harvested, 1,359 released, and 605 angler days (Tracy et al. 2010) and SWHS estimates of 393 fish harvested, 615 released, and 1,644 angler days below the weir (Jennings et al. 2007).

<sup>i</sup> Sport fishery estimates include SWHS estimates of 114 fish harvested and 605 released above the weir and 254 fish harvested and 210 released below the weir (Jennings et al. 2009a).

<sup>j</sup> Sport fishery estimates include SWHS estimates of 439 fish harvested and 2,180 released above the weir and 231 fish harvested and 157 released below the weir (Jennings et al. 2009b).

<sup>k</sup> Sport fishery estimates include SWHS estimates of 68 fish harvested and 428 released above the weir and 137 fish harvested and 100 released below the weir (Jennings et al. 2010).

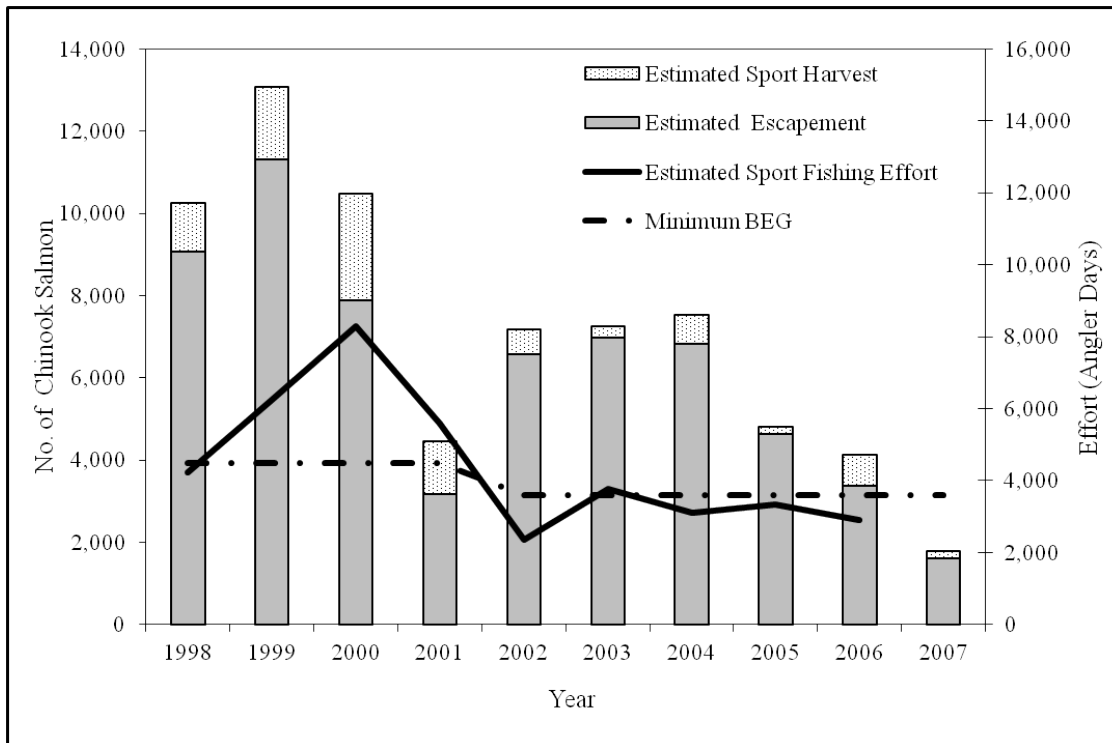


Figure 2.—Estimated Chinook salmon sport harvest, escapement, and sport fishing effort (angler days) for all species in relation to minimum biological escapement goals, Karluk River, 1998–2007.

## AYAKULIK RIVER

The Ayakulik River, located about 25 miles south of the Karluk River (Figure 1), contains the only other native population of Chinook salmon on Kodiak Island. With the exception of approximately 1 square mile surrounding the stream terminus, all uplands surrounding the Ayakulik River are currently held in public land ownership as part of the Kodiak National Wildlife Refuge. Chinook salmon of Ayakulik River origin are harvested in the mixed stock commercial fishery along the west side of Kodiak Island (Table 2). Reported subsistence harvests from the Ayakulik River (1998–2007) have been negligible, averaging 19 fish annually.

Chinook salmon are also harvested in the sport fishery, which generally occurs between the confluence of the Ayakulik and Red rivers and Ayakulik Lagoon. Anglers typically gain access to the fishery via seaplane, either at the lagoon or upriver near the confluence of the Ayakulik River and Bare Creek. Upriver anglers often travel by raft to exit the fishery from the lagoon. One commercial sport fishing lodge near the lagoon and a seasonal camp just below the Red River confluence provide opportunity for guided anglers seeking this type of accommodation. During some years, when aircraft cannot access the lagoon due to low water levels, nearly all visitors exit the fishery from the upriver location. In other years, as many as 50 angler parties have floated downriver from Bare Creek to exit at the lagoon. Estimated sport fish harvests of Ayakulik River Chinook salmon have varied considerably since 1998, ranging between 169 and 803 fish annually (Table 2, Figure 3). Between 1998 and 2007, estimates of overall sport fishing effort have averaged around 2,050 angler days.

Table 2.—Total commercial harvest of Chinook salmon from Inner and Outer Ayakulik Section statistical areas, Ayakulik River inriver Chinook salmon run, estimated sport harvests and reported subsistence harvests, 1998–2007.

Year	Inner and Outer Ayakulik	Ayakulik River				
	Section statistical area harvest <sup>a</sup>	Subsistence harvest <sup>b</sup>	Inriver run <sup>c</sup>	Harvest	(SE)	Release
1998	3,795	0	14,038	259	(93)	3,245
1999	3,564	26	13,503	609	(207)	2,825
2000	3,416	38	20,527	803	(209)	7,578
2001	6,727	16	13,929	568	(182)	8,135
2002	85	37	12,552	362	(135)	5,282
2003	0	14	17,557	461	(0)	4,768
2004	158	15	24,830	407	(0)	7,417
2005	0	8	8,340	489	(176)	7,545
2006	0	37	3,106	169	(79)	2,914
2007	13	0	6,535	303	(155)	3,779
Average 1998–2007	1,776	19	13,492	443		5,349

<sup>a</sup> Source: ADF&G, Division of Commercial Fisheries (CF) Statewide Harvest Receipt (fish ticket) database. Includes all Chinook harvested annually through 15 July between Cape Ikolik and approximately 57° 05'N. See Appendix A1 for harvest by inclusive statistical areas.

<sup>b</sup> Based on subsistence harvest records maintained by CF Westward Region; includes all reported harvest in Red (Ayakulik) River Section; 2007 data preliminary.

<sup>c</sup> Census of Chinook salmon passing Ayakulik River weir (Caldentey 2007).

<sup>d</sup> Statewide harvest survey 1994–2007 (Howe et al. 1995-1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a); 2003–2005 figures are from census data (Tracy et al. 2010).

Annual Chinook salmon inriver runs are enumerated through a weir operated by CF just upstream of the Ayakulik Lagoon. From 1998 through 2007, Chinook salmon escapements averaged 13,492, with the peak escapement during this period of 24,830, occurring in 2004 (Table 2). Other relatively large escapements exceeding 17,000 fish occurred in 2000 and 2003 (Table 2, Figure 3, Appendix B2).

The current (2006–2007) Ayakulik River Chinook salmon minimum BEG has been set at 4,800 spawning fish based on an analysis of age composition and escapement data available through 2007 (Honnold et al. 2007). Additional assessment of the Chinook salmon stock, conducted in 1989 by the U.S. Fish and Wildlife Service (USFWS), estimated a maximum available spawning habitat capable of accommodating approximately 10,400 adult fish (Handler and Chatto 1989).

Similar to management of the Karluk River, the sport fishery is allowed to proceed without inseason restrictions if interim escapement levels projecting total escapement (inriver count minus average estimated upriver sport harvest) at or above the minimum goal are achieved. The current preseason management approach assumes an annual Chinook salmon sport fishing mortality above the weir of less than 1,000 fish.

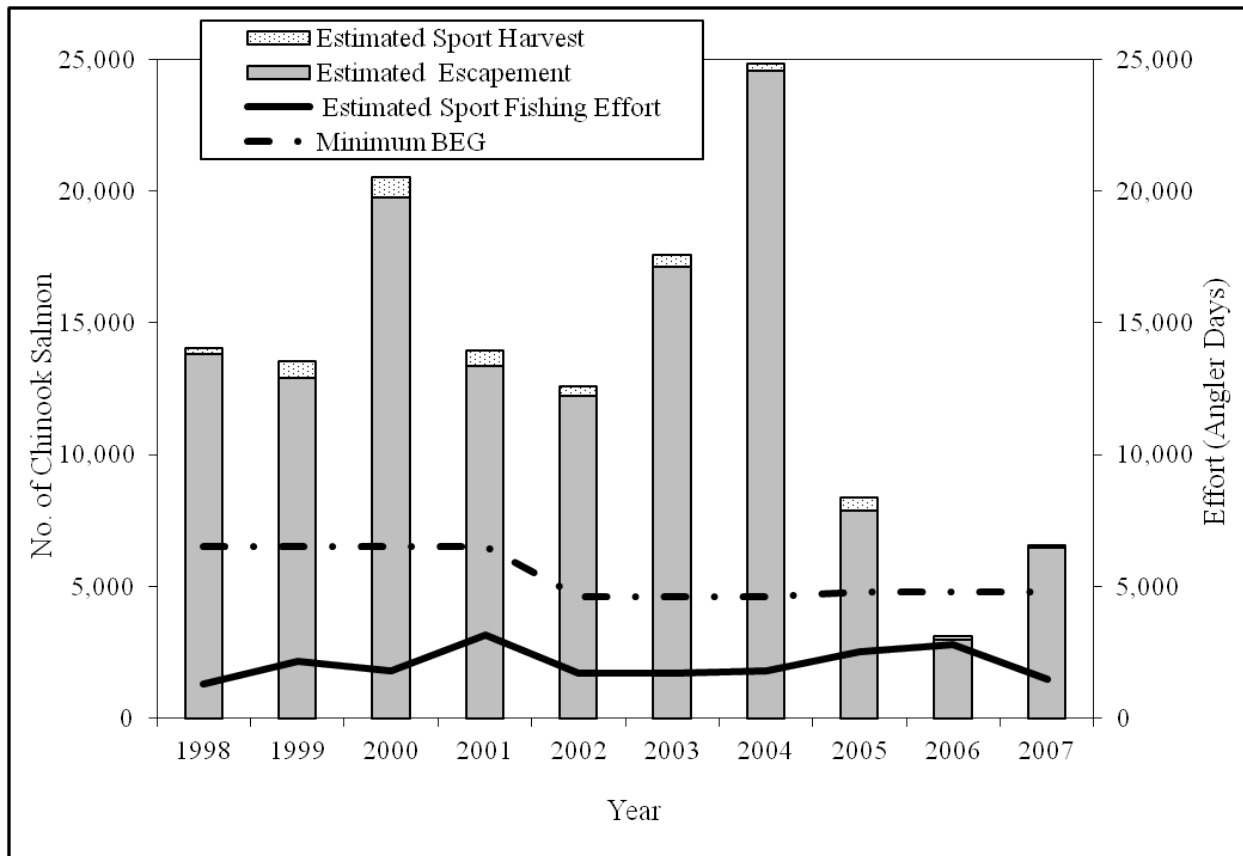


Figure 3.—Estimated Chinook salmon sport harvest, escapement, and sport fishing effort (angler days) for all species in relation to minimum biological escapement goals, Ayakulik River, 1998–2007.

## CHIGNIK RIVER

The Chignik River, located on the Alaska Peninsula near the village of Chignik (Figure 4), is the largest Chinook salmon–producing system on the southern edge of the Alaska Peninsula. Sport, commercial, and subsistence fisheries harvest Chinook salmon of Chignik River origin.

Commercial harvests of Chignik River–bound Chinook salmon occur incidentally in the Chignik commercial sockeye salmon fishery, which takes place both in Chignik Lagoon and in outside waters. Peak Chinook salmon harvests typically occur during July. Between 1998 and 2007, commercial harvests of Chinook salmon from Chignik Lagoon ranged from 595 to 2,834 fish and averaged 1,720 (Table 3). Reported subsistence harvests of Chignik River Chinook salmon during the same period ranged between 74 and 267 fish.

The sport fishery occurs primarily in the 2-mile river section between the ADF&G weir and the outlet of Chignik Lake (Figure 4). Annual estimates of total sport harvests of Chignik River Chinook salmon have not been published by the SWHS (annual sample sizes too small to precisely estimate effort, harvest, and catch). However, a creel survey conducted by ADF&G in 1998 estimated a harvest of 168 Chinook salmon (Schwarz et al. 2002), and the unpublished harvest estimates from the SWHS (Table 3) were similarly low.

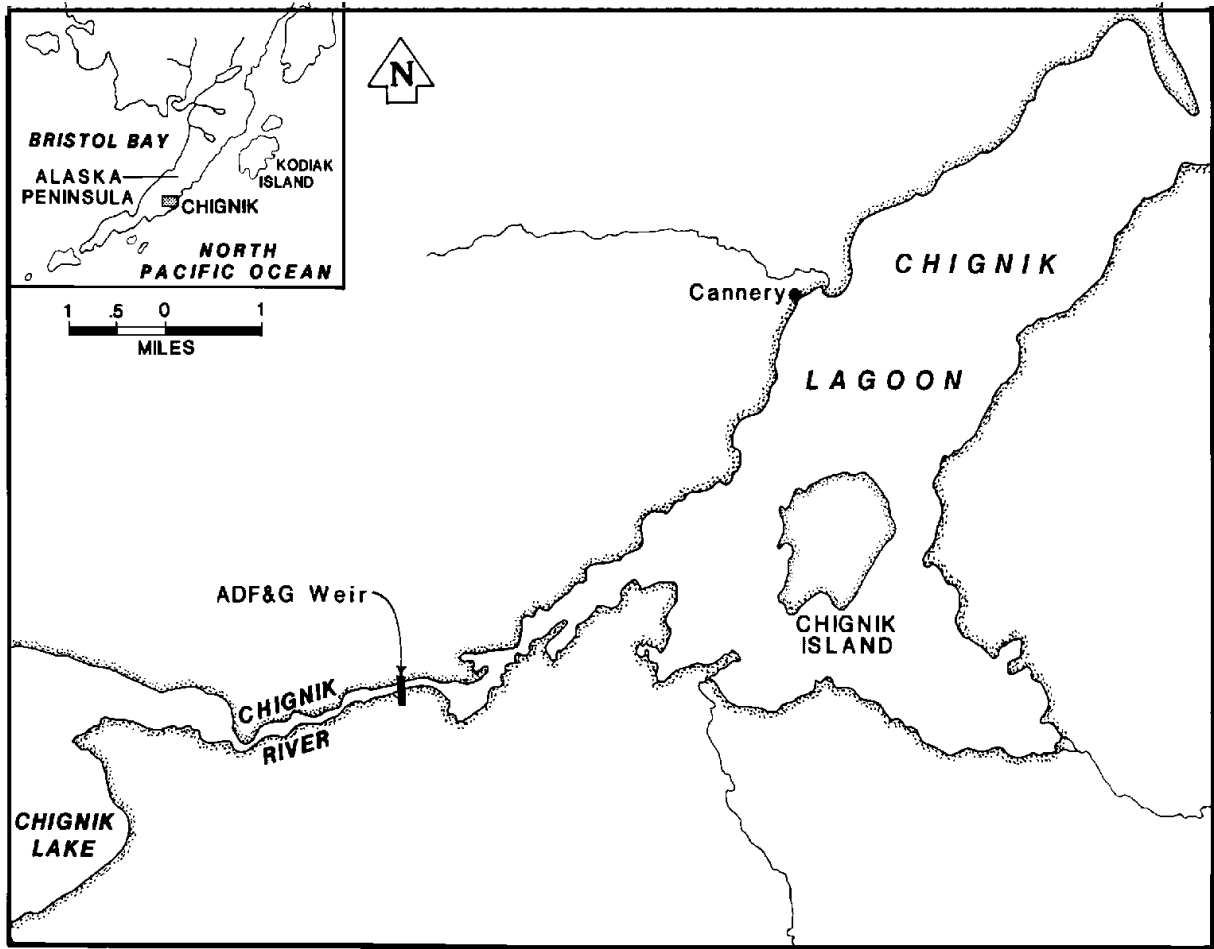


Figure 4.—Map of Chignik River on the Alaska Peninsula showing the location of the ADF&G weir.

The weir on Chignik River, operated by CF, is located approximately midway between Chignik Lagoon and Chignik Lake (Figure 4). Between 1998 and 2007, estimates of the total Chinook salmon inriver run ranged from approximately 2,000 to 7,800 and have averaged around 4,300 (Table 3).

In 1993, a Ricker stock-recruit model (Ricker 1975) was constructed using limited data to develop a Chinook salmon BEG (Len Schwarz, ADF&G Kodiak, personal communication). The model output estimated maximum sustained yield at an escapement level of 3,000 fish, although a minimum escapement goal of 1,750 fish was selected in order provide escapement sufficient to sustain the run while allowing fisheries to proceed during lower escapement years. Because of an apparent 18% overestimation error of inriver run discovered in 1993, the BEG range of 1,750–3,000 fish was subsequently lowered by 18% (Figure 5). The current Chignik River Chinook salmon minimum BEG has been set at 1,300 spawning fish based on an analysis of age composition and escapement data available through 2007 (Honnold et al. 2007). The sport fishery is allowed to proceed without inseason restrictions if interim escapement levels project an inriver estimate that will meet or exceed the minimum goal. The current pre-season management approach assumes a Chinook salmon sport fishing mortality above the weir of approximately 200 fish.

Table 3.—Commercial and subsistence harvests, estimated sport harvests, and inriver runs of Chignik River Chinook salmon, 1998–2007.

Year	Commercial harvest		Inriver run <sup>b</sup>	Subsistence harvest <sup>c</sup>	Sport fish harvest <sup>d</sup>	(SE)
	Total Chignik area <sup>a</sup>	Chignik Lagoon <sup>a</sup>				
1998	4,395	1,700	3,075	91	168	(0)
1999	3,296	2,101	3,728	243	22	(23)
2000	2,592	595	4,285	163	87	(46)
2001	2,849	1,142	2,992	171	190	(127)
2002	1,521	920	3,028	74	99	(70)
2003	3,059	2,834	6,412	267	164	(93)
2004	2,520	2,520	7,840	88	349	(n/a)
2005	3,408	2,714	6,486	224	364	(n/a)
2006	2,256	2,009	3,535	258	391	(n/a)
2007	1,773	667	2,000	84	399	(n/a)
Average 1998–2007	2,767	1,720	4,338	166	223	

<sup>a</sup> Source: ADF&G, Division of Commercial Fisheries (CF) Statewide Harvest Receipt (fish ticket) database. Total Chignik area includes all Chinook salmon harvested during the entire fishing season within statistical areas between Kilokak Rocks and Kupreanof Point on the Alaska Peninsula; Chignik Lagoon includes all Chinook salmon harvested during the entire fishing season within statistical area 271-10.

<sup>b</sup> Inriver runs based on tallies from replayed video counts recorded daily during all hours of weir operation (Stichert 2008).

<sup>c</sup> Based on subsistence harvest records maintained by CF; figures given are the sum of all communities reporting harvest estimates for the Chignik Management Area (Stichert 2008).

<sup>d</sup> Sport fish harvest estimate for 1998 is from a creel survey (Schwarz et al. 2002). Others are unpublished Statewide Harvest Survey estimates (see Methods; standard errors in parentheses where available).

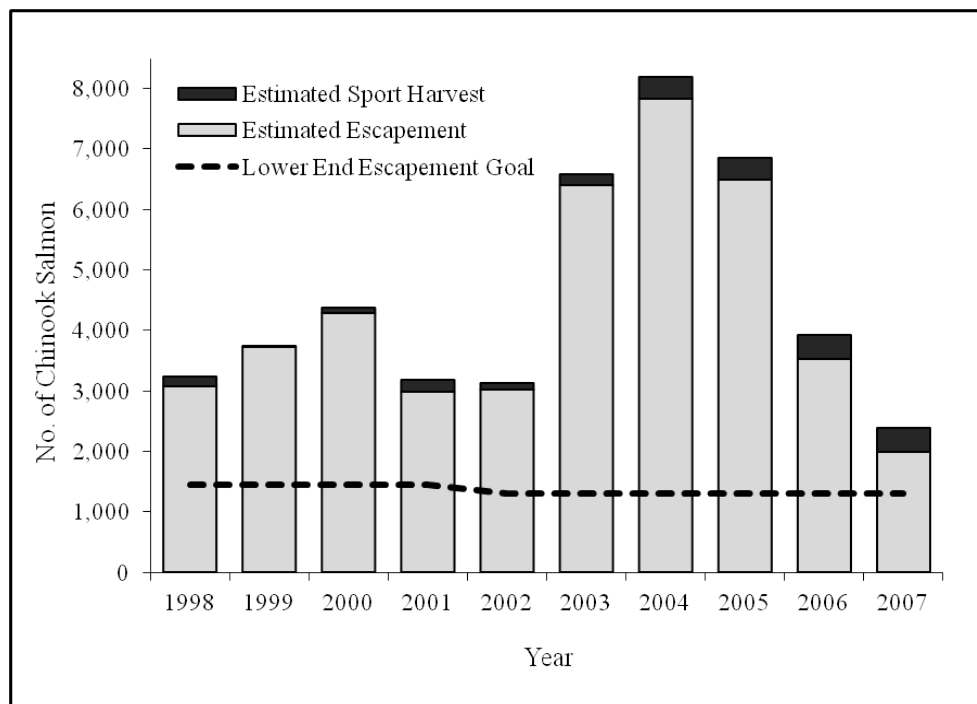


Figure 5.—Estimated Chinook salmon sport harvest and escapement, Chignik River, 1998–2007.

## OBJECTIVES

Specific study objectives in both years consisted of the following:

1. Estimate escapement of Chinook salmon in the Karluk and Ayakulik rivers such that the estimates were within 20% of the true values 95% of the time. This was accomplished by
  - a. censusing the number of Chinook salmon migrating upstream through the weirs on the Karluk and Ayakulik rivers, and
  - b. censusing the sport harvest of Chinook salmon above the weirs *or* estimating the sport harvest of Chinook salmon above the weirs such that the estimates were within 65% of the true values 80% of the time.
2. Estimate total run, by brood year, such that the estimates were within 20% of the true values 95% of the time. This entailed estimating the inriver run at the weirs (Objective 1a, above) plus
  - a. censusing the commercial harvest of Chinook salmon in statistical areas Inner Karluk, Outer Karluk, Inner Ayakulik, and Outer Ayakulik,
  - b. estimating the sport harvest of Chinook salmon below the Karluk River weir<sup>1</sup> such that the estimate was within 65% of the true value 80% of the time, and
  - c. estimating the age composition of Chinook salmon at each weir by sampling fixed proportions of the inriver run (2.0% sampled at the Karluk weir, 1.5% at the Ayakulik weir).
3. Census the sport harvest of Chinook salmon by anglers floating past the Karluk and Ayakulik weirs in such a way that the numbers are available to the manager of the sport fishery during the season.<sup>2</sup>

## METHODS

### DATA COLLECTION

#### Inriver Run

During the 2006 and 2007 seasons, all species of immigrant and out-migrating anadromous fish passing through weirs on the Karluk, Ayakulik, and Chignik rivers were enumerated during the respective dates of operation according to CF operational plans for each project. Nearly complete census counts of Chinook salmon inriver runs were obtained each year for the Karluk and Ayakulik rivers stocks.

Inriver runs to the Chignik River were estimated. During the years 2006–2007, underwater video equipment was also used to count fish passing through 2 open gates in the weir. Total numbers passing the weir during the first 10 minutes of each hour were enumerated and the resulting counts multiplied by 6 to obtain hourly estimates of fish passage. These hourly estimates were summed to provide an estimate of total daily fish passage.

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<sup>1</sup> Sport harvest below the Ayakulik weir is usually negligible, and therefore was not estimated.

<sup>2</sup> This is only a partial census of harvest upstream of the weir.



## Age and Sex Composition of Inriver Run

The inriver runs of Chinook salmon to the Karluk and Ayakulik rivers were sampled from weir traps at each location. In 2006 and 2007, the number of Chinook salmon sampled was a fixed proportion of the number of fish counted passing the weir since the last sampling event. For the Karluk and Ayakulik rivers this proportion was set at 2.0% and 1.5%, respectively.

Sampling was scheduled on 3 days per week to coordinate with concurrent sampling by CF of sockeye salmon. On each sampling day, the sample size goal was calculated based on 2.0% (Karluk River) or 1.5% (Ayakulik River) of the number of Chinook salmon passing the weir since the last sampling day. One exception to this rule was when more Chinook salmon were observed in the trap box than were needed to satisfy the sample goal. In this case, to avoid bias, all Chinook salmon in the trap box were sampled.

Length from mideye to tail fork (METF) was recorded to the nearest millimeter for each fish sampled. Sex was determined on the basis of external characteristics. Whenever possible, 4 scales were removed from the left side of the body, at a point on a diagonal line from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin, 2 rows above the lateral line (Welander 1940). Sample scales were placed on a gum card for subsequent analysis. Whenever scales were not available from the preferred area, they were taken from the area bounded dorsally by the fourth row of scales above the lateral line, ventrally by the lateral line, and between lines drawn vertically from the posterior insertion of the dorsal fin and the anterior insertion of the anal fin. When scales were not available in the preferred area on the left side of the fish, they were collected from the preferred area on the opposite side. Ages of sampled Chinook salmon were determined from scales using criteria described in Mosher (1969).

## Sport Harvest and Effort

Total sport fishing effort, catch, and harvest of Chinook salmon at the Karluk and Ayakulik rivers were estimated by the SWHS for 2006 and 2007 (Jennings et al. 2009b, 2010). Estimates for the Karluk River were split above and below the weir beginning in 2002. Although SWHS estimates for the Chignik River sport fishery were not published prior to the 2004–2005 fishery data series report due to imprecise estimates resulting from small numbers of respondents to the mail-out survey, the most recent 10-year estimates are reported here to indicate long-term trends in the fishery.

In addition to SWHS estimates, sport fishing effort was recorded in 2006 and 2007 from verbal interviews of anglers fishing upstream of the Karluk and Ayakulik rivers weirs prior to 16 July. On both rivers, only anglers exiting the fishery from the lagoon were interviewed. Because no anglers who may have departed upriver of the weirs were interviewed, the recorded sport fishing effort was considered a partial census. The following information was recorded for each interview:

1. number of days fished
2. number of Chinook and sockeye salmon, steelhead (*O. mykiss*), and Dolly Varden (*Salvelinus malma*) harvested
3. number of Chinook and sockeye salmon, steelhead, and Dolly Varden released

4. residency of anglers: a) non-Alaska resident (nonresident), b) non-Kodiak Island Alaska resident (AK resident), c) Kodiak Island resident (local), and d) non-citizen (nonresident alien)
5. guided or unguided

## DATA ANALYSIS

### Abundance by Age and Sex

The proportion of Chinook salmon in age or sex class  $j$  during temporal stratum  $i$  and its variance were estimated (Cochran 1977) as

$$\hat{p}_{ij} = \frac{n_{ij}}{n_i}, \text{ and} \quad (1)$$

$$\hat{\text{var}}(\hat{p}_{ij}) = \left[ \frac{N_i - n_i}{N_i} \right] \frac{\hat{p}_{ij}(1 - \hat{p}_{ij})}{n_i - 1}, \quad (2)$$

where

- $n_{ij}$  = the number of Chinook salmon in age or sex class  $j$  during stratum  $i$ ,
- $n_i$  = the total number of Chinook salmon sampled during stratum  $i$ , and
- $N_i$  = the inriver run, total run, or escapement of Chinook salmon during stratum  $i$ .

The abundance of Chinook salmon by age or sex class  $j$  was estimated as

$$\hat{N}_{ij} = N_i \hat{p}_{ij}, \quad (3)$$

with estimated variance (Goodman 1960)

$$\hat{\text{var}}(\hat{N}_{ij}) = \hat{N}_i^2 \hat{\text{var}}(\hat{p}_{ij}) + \hat{p}_{ij}^2 \hat{\text{var}}(\hat{N}_i) - \hat{\text{var}}(\hat{p}_j) \hat{\text{var}}(\hat{N}_i). \quad (4)$$

For the Karluk and Ayakulik rivers, age or sex composition data were initially summarized by week, then pooled across some pairs of adjacent weeks with small sample sizes (<10). The final number of strata ranged from 3 to 4 per year. For the Karluk and Ayakulik rivers, estimates of age or sex composition were stratified even when statistical tests did not show significant differences among strata. Historically, there has been a consistent tendency for age composition to shift toward younger fish late in the season, though the differences have not always been statistically significant. In this context, stratification was clearly desirable.

Inriver run was counted with zero variance on the Karluk and Ayakulik rivers. Sampling error was small for the Chignik inriver run; however, variance estimates were not available, so they were also assumed to be zero for this report. Escapement was estimated by subtracting sport harvest above the weir from inriver runs. On the Ayakulik and Chignik rivers, almost all of the sport harvest occurs above the weir, so the entire sport harvest, as estimated by mail survey<sup>3</sup>, was

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<sup>3</sup> For the Chignik River, unpublished estimates of sport harvest were obtained from the Alaska Department of Fish and Game Statewide Harvest Survey 1998–2007 databases.. Project leader G. B. Jennings, Sport Fish Division, Research and Technical Services, Anchorage. Accessed Feb 2008.

subtracted. For the Karluk River, only the harvest above the weir, as estimated by mail survey, was subtracted.

Total runs were calculated by summing inriver runs (weir counts), and sport harvest below the weir (Karluk River only, from mail survey), and commercial harvest. Commercial harvest was tallied from fish ticket receipts and was considered to be known without error.

## RESULTS

### KARLUK RIVER

#### 2006

The Karluk weir was installed in 2006 on 21 May and operated through 20 September.

The inriver run of Chinook salmon through the weir was 4,112 fish (Table 1). Age was determined for 57 of 82 Chinook salmon sampled at the weir. Estimates of abundance by age were stratified by time period: through 12 June, 13–19 June, 20 June–3 July, and after 3 July (Appendix C1). Estimates of abundance and length by age and sex are given in Table 4. The inriver run was 25% female (Table 4). Effective 1 July, the daily Chinook salmon bag limit was reduced to 1 fish by emergency order. Based on the SWHS, anglers fishing the Karluk River above the weir harvested an estimated 439 (SE = 272) Chinook salmon and released 2,180 fish in 2006 (Jennings et al. 2009b). Anglers fishing the Karluk river below the weir harvested an estimated 231 (SE = 116) Chinook salmon and released 157 (Jennings et al. 2009b). In all, anglers harvested an estimated 670 (SE = 388) Chinook salmon and released 2,337 (Table 1).

The 2006 partial creel census at the Karluk River weir and Karluk Portage recorded 1,066 angler days of effort above the weir, during which 764 Chinook salmon were harvested and 1,780 were released (Appendix D1). Of the 679 anglers interviewed, approximately 93% were nonresident and 79% guided. Angler residency and guided-unguided status was unknown for a small percentage of interview respondents.

The 2006 Karluk River estimated escapement was 3,673 Chinook salmon (inriver run minus SWHS estimated harvest above the weir), of which 904 (SE = 258) were females and 2,769 (SE = 323) were males (based on results in Table 4).

#### 2007

The Karluk weir was installed in 2007 on 20 May and operated through 26 September.

The inriver run of Chinook salmon through the weir was 1,765 fish (Table 1). Age was determined for 44 of 53 Chinook salmon sampled from the inriver run (Table 5). Estimates of abundance by age were stratified by time period: through 12 June, 13–19 June, and after 26 June (Appendix C2). Estimates of abundance and length by age and sex are given in Table 5. The inriver run was 60% female.

In 2007, the Chinook salmon daily bag limit was reduced to 1 fish preseason due to low abundance. The SWHS estimated that anglers fishing the Karluk river above the weir harvested an estimated 68 (SE = 34) Chinook salmon and released 428 (Jennings et al. 2010). Anglers fishing the Karluk river below the weir harvested an estimated 137 (SE = 108) Chinook salmon and released 100 (Jennings et al. 2010). In all, anglers harvested an estimated 205 (SE = 142) Chinook salmon and released 528 (Table 1).

Angler interviews conducted at the weir during 2007 accounted for 598 angler days of effort above the weir, during which 156 Chinook salmon were harvested and 257 were released (Appendix D1). Of the 270 anglers interviewed at the Karluk weir in 2007, 95% were nonresident and 86% guided.

The 2007 Karluk River estimated escapement was 1,697 Chinook salmon (inriver run minus SWHS estimate of harvest above the weir), of which 1,018 (SE = 134) were females and 679 (SE = 133) were males (based on results in Table 5).

Table 4.—Estimated age and sex composition of inriver run, and lengths from mid eye to tail fork by age and sex for Karluk River Chinook salmon, 2006.

	Age class									Total
	1.1	1.2	1.3	1.4	1.5	2.2	2.3	2.4	unknown	
Females										
Percent	0.0	3.0	2.0	9.9	0.0	0.0	5.8	3.9		24.6
SE	0.0	3.0	1.3	4.5	0.0	0.0	4.1	3.0		6.8
Inriver run	0	125	81	406	0	0	240	160		1,013
SE	0	124	55	187	0	0	169	123		278
Number sampled		1	2	6			2	2	5	18
Mean length		695	749	772			741	802	775	766
Std Dev length			21	17			25	48	38	35
Minimum length		695	734	746			723	768	726	695
Maximum length		695	764	794			759	836	814	836
Males										
Percent	0.0	2.0	16.3	24.9	1.0	0.0	13.3	17.9		75.4
SE	0.0	1.3	4.9	6.3	1.0	0.0	5.2	5.2		6.8
Inriver run	0	81	672	1,024	40	0	545	738		3,099
SE	0	55	202	258	40	0	216	213		278
Number sampled		2	12	17	1		5	7	20	64
Mean length		595	736	788	830		776	800	715	750
Std Dev length		51	45	56			54	57	93	79
Minimum length		559	634	641	830		693	715	467	467
Maximum length		631	821	891	830		825	858	809	891
Total										
Percent	0.0	5.0	18.3	34.8	1.0	0.0	19.1	21.8		100.0
SE	0.0	3.3	5.0	7.0	1.0	0.0	6.2	5.2		0.0
Inriver run	0	205	752	1,430	40	0	786	898		4,112
SE	0	136	205	290	40	0	255	214		0
Number sampled		3	14	23	1		7	9	25	82
Mean length		628	737	784	830		766	800	727	754
Std Dev length		68	42	49			49	52	88	72
Minimum length		559	634	641	830		693	715	467	467
Maximum length		695	821	891	830		825	858	814	891

Note: Age and sex compositions were stratified by time period (see Appendix C1). Length statistics were not. Results based on samples obtained 1 June–12 July.

Table 5.—Estimated age and sex composition of inriver run, and lengths from mid eye to tail fork by age and sex for Karluk River Chinook salmon, 2007.

	Age class									Total
	1.0	1.2	1.3	1.4	1.5	2.2	2.4	2.5	unknown	
Females										
Percent	1.9	0.0	8.1	39.8	3.2	0.0	5.1	1.9		60.0
SE	1.9	0.0	4.5	8.1	2.2	0.0	2.9	1.9		7.8
Inriver run	34	0	143	703	57	0	90	34		1,060
SE	33	0	80	143	38	0	50	33		138
Number sampled	1		3	16	2		3	1	4	30
Mean length	374		764	777	785		781	769	786	764
Std Dev length			20	32	35		27		39	79
Minimum length	374		747	722	760		750	769	752	374
Maximum length	374		786	824	809		798	769	826	826
Males										
Percent	0.0	3.8	3.2	13.7	6.7	1.9	9.0	1.6		40.0
SE	0.0	2.5	2.2	5.8	4.0	1.9	4.8	1.6		7.8
Inriver run	0	67	57	241	119	34	159	28		705
SE	0	45	38	103	71	33	84	28		138
Number sampled		2	2	6	3	1	3	1	5	23
Mean length		486	673	711	845	591	834	780	758	730
Std Dev length		122	24	84	59		64		32	116
Minimum length		400	656	549	793	591	763	780	717	400
Maximum length		572	690	790	909	591	886	780	798	909
Total										
Percent	1.9	3.8	11.3	53.5	10.0	1.9	14.1	3.5		100.0
SE	1.9	2.5	4.9	8.2	4.5	1.9	5.5	2.5		0.0
Inriver run	34	67	199	944	176	34	249	62		1,765
SE	33	45	87	144	79	33	97	43		0
Number sampled	1	2	5	22	5	1	6	2	9	53
Mean length	374	486	728	759	821	591	808	775	770	749
Std Dev length		122	53	58	56		53	8	36	97
Minimum length	374	400	656	549	760	591	750	769	717	374
Maximum length	374	572	786	824	909	591	886	780	826	909

Note: Age and sex composition estimates were stratified by time period (see Appendix C2). Length statistics were not. Results based on samples obtained 10 June–16 July.

## **AYAKULIK RIVER**

### **2006**

The Ayakulik weir was installed in 2006 on 1 June and operated through 21 August.

The inriver run of Chinook salmon through the weir was 3,106 fish (Table 2). Age was determined for 39 of 54 Chinook salmon sampled at the weir (Table 6). Estimates of abundance by age were stratified by time period: through 19 June, 20–26 June, 27 June–3 July, and after 3 July (Appendix C3). Estimates of abundance and length by age and sex are given in Table 6. The inriver run was 74% female.

The 2006 SWHS estimated that anglers fishing the Ayakulik river harvested an estimated 169 (SE = 79) Chinook salmon and released 2,914 (Table 2; Jennings et al. 2009b). Angler interviews conducted at the weir during 2006, accounted for 605 angler-days of effort during which 50 Chinook salmon were harvested and 541 released (Appendix D2). Of the 97 anglers interviewed in 2006, 74% were nonresident and 67% were guided (Appendix D2).

The 2006 Ayakulik River estimated escapement was 2,937 Chinook salmon (inriver run minus sport fish harvest; Table 2), of which 2,170 (SE = 228) were female and 767 (SE = 220) were male (based on results in Table 6).

### **2007**

The Ayakulik weir was installed in 2007 on 27 May and operated until 14 September.

The inriver run of Chinook salmon through the weir was 6,535 (Table 2). Age was determined for 79 of 113 Chinook salmon sampled from the inriver run (Table 7). Estimates of abundance by age were stratified by time period: through 12 June, 13–19 June, 20–26 June, and after 26 June (Appendix C4). Estimates of abundance and length by age and sex are given in Table 7. The inriver run was 60% female.

Inseason management actions were taken during the 2007 Chinook salmon sport fishery. Effective 1 June, the daily limit was reduced to 1 fish; the Chinook salmon sport fishery was closed on 27 June; and on 2 July the fishery re-opened with a daily limit of 3 Chinook salmon, of which 2 could be over 28 inches. The SWHS estimated that anglers fishing the Ayakulik river in 2007 harvested 303 (SE = 155) Chinook salmon and released 3,779 (Table 2; Jennings et al. 2010).

In 2007, a creel survey, where 75 anglers were interviewed at the Ayakulik weir, recorded 59 Chinook salmon harvested and 1,005 released, during 412 angler days (Appendix D2). Of the anglers interviewed at the weir, 72% were non-resident and 80% were guided (Appendix D2).

The 2007 Ayakulik River estimated escapement was 6,232 Chinook salmon (inriver run minus sport fish harvest; Table 2), of which 3,703 (SE = 451) were females and 2,520 (SE = 446) were males (based on results in Table 7).

Table 6.—Estimated age and sex composition of inriver run, and lengths from mid eye to tail fork by age and sex for Ayakulik River Chinook salmon, 2006.

	Age class									Total
	1.0	1.2	1.3	1.4	1.5	2.2	2.3	2.4	unkn.	
<b>Females</b>										
Percent	0.0	6.9	39.1	15.2	0.0	4.0	4.6	4.2		73.9
SE	0.0	3.8	8.0	5.1	0.0	4.0	3.2	2.9		7.5
Inriver run	0	213	1,205	470	0	123	142	128		2,281
SE	0	117	246	156	0	122	100	90		233
Number sampled		3	14	7		1	2	2	11	40
Mean length		641	736	801		535	796	840	727	741
Std Dev length		79	41	38			148	24	45	74
Minimum length		568	668	746		535	691	823	650	535
Maximum length		725	811	864		535	900	857	784	900
<b>Males</b>										
Percent	2.5	6.0	9.5	4.2	0.0	0.0	4.0	0.0		26.1
SE	2.4	4.4	4.2	2.9	0.0	0.0	4.0	0.0		7.5
Inriver run	76	184	294	128	0	0	123	0		804
SE	75	136	131	90	0	0	122	0		233
Number sampled	1	2	4	2			1		4	14
Mean length	360	571	765	830			753		763	716
Std Dev length		2.8284	36	96					22	133
Minimum length	360	569	712	762			753		740	360
Maximum length	360	573	791	898			753		787	898
<b>Total</b>										
Percent	2.5	12.9	48.6	19.4	0.0	4.0	8.6	4.2		100.0
SE	2.4	5.7	8.6	5.4	0.0	4.0	5.1	2.9		0.0
Inriver run	76	397	1,499	598	0	123	265	128		3,085
SE	75	177	265	168	0	122	158	90		0
Number sampled	1	5	18	9		1	3	2	15	54
Mean length	360	613	742	807		535	781	840	737	735
Std Dev length		68	41	49			107	24	43	92
Minimum length	360	568	668	746		535	691	823	650	360
Maximum length	360	725	811	898		535	900	857	787	900

Note: Age and sex composition estimates were stratified by time period (see Appendix C3) Length statistics were not. Results based on samples obtained 18 June–15 July.

Table 7.—Estimated age and sex composition of inriver run, and lengths from mid eye to tail fork by age and sex for Ayakulik River Chinook salmon, 2007.

	Age class									Total
	1.0	1.2	1.3	1.4	1.5	2.2	2.3	2.4	unkn.	
<b>Females</b>										
Percent	0.0	3.8	14.3	31.7	0.4	0.0	0.4	9.0		59.5
SE	0.0	3.0	5.1	6.9	0.3	0.0	0.3	4.3		7.1
Inriver run	0	248	936	2,073	23	0	23	588		3,890
SE	0	196	334	448	22	0	22	279		462
Number sampled		2	12	24	1		1	6	23	69
Mean length		600	728	792	877		688	784	783	771
Std Dev length		37	42	41				61	46	59
Minimum length		573	647	711	877		688	704	676	573
Maximum length		626	787	863	877		688	862	852	877
<b>Males</b>										
Percent	0.0	0.7	6.7	18.4	0.9	0.0	1.1	12.7		40.5
SE	0.0	0.5	3.3	5.7	0.9	0.0	1.0	5.1		7.1
Inriver run	0	46	440	1,200	61	0	69	829		2,645
SE	0	31	214	373	60	0	69	331		462
Number sampled		2	8	14	1		1	7	11	44
Mean length		476	712	778	884		731	801.86	771	756
Std Dev length		69.296	52	90				43.556	108	105
Minimum length		427	627	523	884		731	737	595	427
Maximum length		525	779	907	884		731	850	932	932
<b>Total</b>										
Percent	0.0	4.5	21.1	50.1	1.3	0.0	1.4	21.7		100.0
SE	0.0	3.0	5.8	7.3	1.0	0.0	1.1	6.2		0.0
Inriver run	0	294	1,376	3,273	84	0	92	1,417		6,535
SE	0	198	379	478	65	0	72	405		0
Number sampled		4	20	38	2		2	13	34	113
Mean length		538	722	787	881		710	794	779	765
Std Dev length		85	46	63	5		30	51	71	80
Minimum length		427	627	523	877		688	704	595	427
Maximum length		626	787	907	884		731	862	932	932

Note: Age and sex composition estimates were stratified by time period (see Appendix C4). Length statistics were not. Results based on samples obtained 29 May–12 July.

## CHIGNIK RIVER

### 2006

The Chignik weir was installed on 30 May and operated through 4 September.

The estimated inriver run of Chinook salmon through the weir was 3,535 fish (Table 3). The total estimated Chinook salmon run was 5,802 fish (sum of the inriver run plus the reported commercial harvest of 2,009 fish in Chignik Lagoon and the reported subsistence catch of 258 fish).



Chinook salmon sport harvest in the Chignik River during 2006 was estimated at 391 (SE not available; unpublished data from statewide mail survey) (Table 3).

The 2006 Chignik River estimated escapement was 3,144 (inriver run minus sport fish harvest; SE not available).

## **2007**

The Chignik weir was installed on 1 June and operated through 3 September.

The estimated inriver run of Chinook salmon through the weir was 2,000. The total estimated Chinook salmon run was 2,751 fish (sum of inriver run plus the reported commercial harvest of 667 fish in Chignik Lagoon and the total reported subsistence catch of 84 fish).

Chinook salmon sport harvest in the Chignik River during 2007 was estimated at 399 (SE not available; unpublished data from statewide mail survey) (Table 3).

The 2007 Chignik River estimated escapement was 1,601 fish (inriver run minus sport harvest; SE not available).

## **DISCUSSION**

### **Karluk**

From 1998 through 2000, the inriver run of Chinook salmon in the Karluk River was above 10,000 fish. After that period, the inriver run was much lower and in 2006, a total of 4,112 fish were counted, nearly 3,000 below the recent (1998–2007) 10-year average. In 2007, the inriver run of 1,765 fish was the lowest on record since 1976.

The 2006 commercial harvest of 900 Chinook salmon from the Inner and Outer Karluk sections was 82% of the 1998–2007 average annual harvest. In 2007, a total of 313 fish were commercially harvested in the Inner and Outer Karluk sections; inseason restrictions on retention of large Chinook salmon ( $\geq 28$  in) likely contributed to the low harvest.

Consistently high escapements of Chinook salmon to the Karluk River have constrained analysis of stock productivity factors because the lack of contrast between annual escapements poorly fits a stock-recruitment model. As runs from years of lower productivity (2001–2007) are assessed, a better understanding of the role that productivity factors play across a greater spectrum of adult runs may be obtained.

### **Ayakulik**

The 2006 inriver run of 3,106 Chinook salmon to the Ayakulik River was the lowest since 1983 (Table 2). In 2007, the inriver run increased to 6,535 fish, which was the second lowest during the same time period (Tracy et al. 2010).

The commercial harvests from the Inner and Outer Ayakulik Sections for 2006 and 2007 were 0 and 13 fish, respectively. These harvests were among the lowest in recent history; an absence of commercial fishery openings in the Ayakulik sections during June through mid-July 2007 and inseason restrictions on retention of large Chinook salmon ( $\geq 28$  in) in the Karluk sections likely contributed to the unusually low harvest magnitude.

## **Chignik**

The inriver run of 3,535 Chinook salmon to the Chignik River in 2006 was below the 1998–2007 10-year average (Table 3). The estimated total run of 5,802 fish from the combined inriver run, subsistence, and commercial harvests was also below the 1998–2007 10-year average of 6,225 fish. In contrast, the reported commercial harvest from Chignik Lagoon was above average.

The 2007 inriver run of 2,000 Chinook salmon to the Chignik River was the lowest in 10 years. Similarly, the commercial harvest in the lagoon of 667 was also the second lowest during the same period. Accordingly, an estimated total run of 2,751 fish from the combined inriver run, subsistence, and commercial harvests was also well below the recent average.

## **Karluk and Ayakulik Sport Fishing**

Between 1998 and 2007, the Ayakulik River Chinook salmon sport fish harvests estimated by the SWHS have ranged from about 170 to 800 fish and have showed no annual trend or correlation to effort levels. Estimated harvests for the Karluk River during the same period have generally been higher than those for the Ayakulik River, averaging around 1,100 Chinook salmon, but have also fluctuated significantly between years, ranging as high as approximately 2,600 and as low as 205 fish. Restrictions on public access to the Karluk River implemented in 2003 combined with below average inriver runs are likely important factors affecting recent angler interest in the Chinook salmon fishery.

Until recently, escapements have been consistently high, which have limited the ability to assess productivity under different levels of escapement. As runs from years of lower productivity (2001–2007) are assessed, it will be possible to obtain better estimates of the stock-recruitment relationship.

Although Ayakulik River Chinook salmon runs have been somewhat less variable than those of the Karluk River since 1998, CF records of inriver runs dating back to the late 1970s (Tiernan 2011) suggest that the Chinook salmon population may have recently experienced relatively high levels of productivity. The most recent 3-year escapements may also reflect the onset of a trend of decreasing productivity, similar to that recorded in the late 1970s.

Current levels of sport fishing activities at the Karluk and Ayakulik rivers probably have minimal impact on Chinook salmon stocks. However, increasing harvest and effort at the Karluk River could increase the impact of the sport fishery, particularly in conjunction with below-average inriver runs such as those from 2001 through 2007. Hook-and-release mortality and sex-biased harvest selectivity does not appear to be a significant problem of sport fisheries occurring at either location. If hooking mortality rate is similar to other fisheries (e.g., Bendock and Alexandersdottir [1992] estimated 7% mortality for Kenai River Chinook salmon) the effect of hooking mortality has probably been minimal.

During 1998 through 2007, both the Karluk and Ayakulik rivers appeared to have sustainable populations of Chinook salmon. During most years, the sum of escapement counts for these 2 systems have been comparable to the combined incidental commercial, subsistence, and sport harvests of Chinook salmon around Kodiak Island. It appears unlikely that any near-term changes in the prosecution of these 3 fisheries will substantially increase current harvest levels.

## **Chignik Sport Fishing**

Prior to this report, due to an insufficient number of survey respondents, SWHS estimates of sport fishing effort and harvest for any species in the Chignik River had not been published. These estimates, though imprecise, indicate that current levels of angling activity are low by comparison to the Karluk and Ayakulik rivers fisheries. However, future interest in Chignik River Chinook salmon by the sport fish guiding industry may increase, due in part to recent dynamics in the local commercial salmon fishing-based economy. Consequently, it's possible that even though the upper end of the current Chignik River escapement goal (2,700 fish) has been exceeded during all but 1 year since 1998, difficulties achieving desired future escapements may be encountered if measurable increases in sport fishing harvest and effort coincide with periods of below-average inriver runs.

Brood tables constructed from Chinook salmon runs since initiation of the stock assessment project in 1993 have provided the basis for evaluating existing escapement goals and re-estimating the optimum magnitude of escapements for the Karluk, Ayakulik, and Chignik rivers stocks to produce maximum yields (Nelson et al. 2005). However, because the historic range of Chinook salmon escapement to the Chignik River prior to 2003 has generally been narrow and the relative magnitude of those escapements has been high, factors affecting stock productivity in addition to escapement remain poorly understood. Moreover, poor success in attainment of Chignik Chinook salmon annual sampling objectives during recent years (and the consequent elimination of this objective for the last 2 years) has further constrained precise evaluation of productivity parameters.

Although currently stable and abundant, the Chignik River Chinook salmon stock may be more vulnerable to expanding sport, commercial, or subsistence harvests because of its relatively small size. Harvest increases in local fisheries of lesser relative magnitude than those potentially affecting the Karluk and Ayakulik River fisheries could have greater impacts on achievement of the Chignik Chinook salmon escapement goal.

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**APPENDIX A: COMMERCIAL HARVEST OF CHINOOK  
SALMON FROM THE WEST SIDE OF KODIAK ISLAND  
BY STATISTICAL AREA, 1998–2007**

Appendix A1.—Numbers of Chinook salmon harvested commercially from the west side of Kodiak Island by statistical area, 1 June through 15 July, 1998–2007.

Statistical Area	Year									
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
253-11 (Uganik)	84	28	47	103	220	277	1064	242	583	39
254-10 (Rocky Point)	659	484	296	887	349	1,086	1267	509	2,029	269
254-20 (Inner Uyak)	128	132	94	93	264	339	175	76	187	88
254-30 (Zachar)	27	21	92	56	44	32	74	60	256	194
254-40 (Spiridon)	478	161	143	34	292	203	1,076	356	259	37
254-50 Spiridon Term. area)	72	112	10	1	388	43	115	1	0	0
255-10 (Inner Karluk)	0	380	231	1,051	543	634	1,517	104	230	72
255-20 (Outer Karluk)	252	687	462	1,537	719	702	732	235	680	246
256-10 (S. Ayakulik)	73	198	210	12	14	0	0	0	0	0
256-15 (Inner Ayakulik)	73	444	824	3,414	32	0	0	0	0	0
256-20 (N. Ayakulik)	3,649	2,922	2,382	3,301	39	0	158	0	0	0
256-25 (Gurney Bay)	323	151	22	20	0	0	41	0	0	0
256-30 (Halibut Bay)	231	475	168	423	0	0	194	0	0	0
256-40 (Sturgeon)	0	0	18	0	0	0	0	0	0	0
257-10 (Sukhoi)	2	27	8	0	0	0	3	0	0	0
257-20 (Tannerhead)	1,047	73	291	401	0	127	866	369	0	2
Total number	7,098	6,295	5,298	11,333	2,904	3,443	7,282	1,952	4,224	947
Avg. weight per fish (lb)	15	15	17	13	10	11	13	13	10	10

Source: ADF&G, Division of Commercial Fisheries Statewide Harvest Receipt (fish ticket) database.



**APPENDIX B: KARLUK, AYAKULIK, AND CHIGNIK  
RIVERS CHINOOK SALMON WEIR COUNTS, 1998–2007**

Appendix B1.—Daily cumulative weir counts of Karluk River Chinook salmon, 25 May–1 August, 1998–2007.

Date	1998		1999		2000		2001		2002		2003		2004		2005		2006		2007		1998–2007
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	Avg %
25 May	116	1	0	0	8	0	3	0	14	0	17	0	85	1	0	0	28	1	3	0	0
26 May	230	2	0	0	23	0	9	0	60	1	24	0	118	2	0	0	54	1	5	0	1
27 May	396	4	27	0	48	0	18	0	105	1	33	0	159	2	0	0	73	2	8	0	1
28 May	562	5	49	0	118	1	43	1	145	2	41	1	186	2	2	0	82	2	18	1	2
29 May	595	6	82	1	138	1	141	3	149	2	45	1	308	4	2	0	113	3	32	2	2
30 May	728	7	122	1	179	2	211	5	149	2	61	1	398	5	3	0	113	3	37	2	3
31 May	813	8	189	1	308	3	340	8	181	3	63	1	433	6	18	0	113	3	38	2	3
1 Jun	936	9	218	2	464	4	352	8	291	4	67	1	660	9	33	1	197	5	42	2	4
2 Jun	1,112	11	377	3	733	7	666	15	359	5	67	1	849	11	52	1	222	5	64	4	6
3 Jun	1,301	13	460	4	886	8	917	21	632	9	360	5	1,065	14	57	1	277	7	75	4	9
4 Jun	1,458	14	651	5	934	9	1,010	23	816	11	586	8	1,411	19	89	2	344	8	112	6	11
5 Jun	1,687	16	840	6	977	9	1,056	24	967	13	739	10	1,608	21	168	4	382	9	118	7	12
6 Jun	1,903	19	1,161	9	1,035	10	1,268	28	1,149	16	803	11	2,037	27	183	4	436	11	132	7	14
7 Jun	2,138	21	1,800	14	1,111	11	1,436	32	1,354	19	909	13	2,221	30	199	4	516	13	145	8	16
8 Jun	2,395	23	2,268	17	2,259	22	1,573	35	1,497	21	1,050	14	2,406	32	215	4	521	13	156	9	19
9 Jun	2,705	26	3,125	24	2,914	28	1,709	38	1,561	22	1,147	16	2,442	32	217	5	849	21	300	17	23
10 Jun	2,997	29	4,037	31	3,394	32	1,848	42	1,774	25	1,447	20	2,495	33	260	5	984	24	427	24	27
11 Jun	3,265	32	4,447	34	3,606	34	2,156	48	2,140	30	1,466	20	2,969	39	270	6	1,202	29	493	28	30
12 Jun	3,620	35	4,562	35	3,734	36	2,277	51	2,417	34	1,564	22	3,171	42	292	6	1,385	34	514	29	32
13 Jun	4,000	39	5,130	39	4,517	43	2,525	57	2,686	37	1,640	23	3,363	45	347	7	1,522	37	576	33	36
14 Jun	4,468	44	5,318	41	4,752	45	2,690	60	3,092	43	1,767	24	3,500	47	449	9	1,540	37	643	36	39
15 Jun	4,811	47	5,509	42	5,216	50	2,867	64	3,250	45	1,826	25	3,548	47	581	12	1,584	39	668	38	41
16 Jun	5,190	51	5,787	44	5,528	53	3,062	69	3,350	47	1,832	25	3,947	52	891	19	1,815	44	775	44	45
17 Jun	5,432	53	6,354	49	6,152	59	3,243	73	3,694	51	1,835	25	4,258	57	1,117	23	1,872	46	778	44	48
18 Jun	5,826	57	6,952	53	6,636	63	3,391	76	3,839	54	1,845	25	4,379	58	1,505	31	1,951	47	780	44	51
19 Jun	6,030	59	7,388	57	6,813	65	3,434	77	3,934	55	1,971	27	4,563	61	1,663	35	2,061	50	841	48	53
20 Jun	6,828	67	7,715	59	7,133	68	3,528	79	4,201	59	2,030	28	4,921	65	1,677	35	2,376	58	865	49	57
21 Jun	6,911	67	7,876	60	7,340	70	3,641	82	4,464	62	2,269	31	5,043	67	1,916	40	2,615	64	1,100	62	61
22 Jun	7,275	71	8,508	65	7,429	71	3,725	84	4,786	67	2,774	38	5,109	68	2,009	42	2,732	66	1,140	65	64
23 Jun	7,380	72	8,940	68	7,518	72	3,861	87	4,931	69	2,825	39	5,282	70	2,106	44	2,864	70	1,145	65	66

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Date	1998		1999		2000		2001		2002		2003		2004		2005		2006		2007		1998–2007
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	Avg %
24 Jun	7,431	73	9,145	70	7,845	75	3,980	89	5,013	70	2,859	39	5,308	71	2,240	47	2,886	70	1,245	71	67
25 Jun	7,838	77	9,498	73	8,220	79	4,060	91	5,100	71	3,074	42	5,411	72	2,323	48	2,906	71	1,264	72	70
26 Jun	8,117	79	9,817	75	8,784	84	4,067	91	5,121	71	3,519	48	5,512	73	2,329	49	2,928	71	1,295	73	72
27 Jun	8,449	83	10,149	78	8,806	84	4,086	92	5,183	72	3,767	52	5,590	74	2,568	54	3,002	73	1,343	76	74
28 Jun	8,795	86	10,491	80	9,069	87	4,086	92	5,352	75	3,795	52	5,681	75	2,822	59	3,037	74	1,344	76	76
29 Jun	8,856	86	10,792	83	9,199	88	4,104	92	5,391	75	3,852	53	5,892	78	3,069	64	3,049	74	1,360	77	77
30 Jun	8,961	88	10,984	84	9,281	89	4,119	92	5,436	76	3,909	54	5,899	78	3,187	66	3,050	74	1,363	77	78
1 Jul	9,094	89	11,169	86	9,435	90	4,124	93	5,944	83	4,008	55	5,945	79	3209	67	3,088	75	1,367	77	79
2 Jul	9,239	90	11,283	86	9,503	91	4,133	93	6,079	85	4,086	56	5,979	79	3262	68	3,120	76	1,389	79	80
3 Jul	9,275	91	11,452	88	9,616	92	4,138	93	6,109	85	4,093	56	5,992	80	3387	71	3,185	77	1,399	79	81
4 Jul	9,337	91	11,602	89	9,673	92	4,142	93	6,153	86	4,108	57	5,998	80	3431	72	3,242	79	1,399	79	82
5 Jul	9,438	92	11,716	90	9,756	93	4,175	94	6,184	86	4,178	58	6,010	80	3431	72	3,367	82	1,404	80	83
6 Jul	9,469	92	11,758	90	9,790	94	4,180	94	6,216	87	4,286	59	6,014	80	3461	72	3,492	85	1,409	80	83
7 Jul	9,490	93	12,101	93	9,862	94	4,211	95	6,262	87	4,310	59	6,016	80	3463	72	3,630	88	1,415	80	84
8 Jul	9,588	94	12,197	93	9,897	95	4,220	95	6,305	88	4,746	65	6,035	80	3,497	73	3,647	89	1,417	80	85
9 Jul	9,729	95	12,283	94	9,941	95	4,222	95	6,333	88	5,872	81	6,714	89	3,541	74	3,650	89	1,423	81	88
10 Jul	9,853	96	12,341	94	9,957	95	4,231	95	6,367	89	6,407	88	6,807	90	3,859	80	3,668	89	1,425	81	90
11 Jul	9,901	97	12,442	95	9,974	95	4,235	95	6,401	89	6,455	89	6,904	92	3,878	81	3,755	91	1,432	81	91
12 Jul	9,921	97	12,459	95	9,987	95	4,252	95	6,502	91	6,673	92	6,931	92	4,051	84	3,792	92	1,432	81	92
13 Jul	9,933	97	12,471	95	10,008	96	4,262	96	6,505	91	6,703	92	7,001	93	4,137	86	3,797	92	1,460	83	92
14 Jul	9,942	97	12,597	96	10,015	96	4,279	96	6,533	91	6,719	93	7,007	93	4,147	86	3,799	92	1,460	83	92
15 Jul	9,945	97	12,637	97	10,020	96	4,293	96	6,591	92	6,802	94	7,017	93	4,151	87	3,808	93	1,461	83	93
16 Jul	9,951	97	12,657	97	10,061	96	4,296	96	6,636	93	6,811	94	7,039	94	4,156	87	3,830	93	1,470	83	93
17 Jul	9,953	97	12,672	97	10,070	96	4,296	96	6,659	93	6,832	94	7,039	94	4,183	87	3,830	93	1,558	88	94
18 Jul	9,955	97	12,700	97	10,074	96	4,297	96	6,704	93	6,836	94	7,042	94	4,196	87	3,830	93	1,558	88	94
19 Jul	9,955	97	12,737	98	10,099	97	4,309	97	6,745	94	6,840	94	7,043	94	4,224	88	3,830	93	1,560	88	94
20 Jul	9,956	97	12,764	98	10,101	97	4,320	97	6,758	94	6,852	94	7,057	94	4,241	88	3,831	93	1,565	89	94
21 Jul	9,984	98	12,786	98	10,107	97	4,321	97	6,784	95	6,866	95	7,069	94	4,475	93	3,831	93	1,568	89	95
22 Jul	10,000	98	12,796	98	10,123	97	4,334	97	6,803	95	6,869	95	7,077	94	4,478	93	3,831	93	1,569	89	95
23 Jul	10,014	98	12,811	98	10,128	97	4,339	97	6,821	95	6,893	95	7,096	94	4,538	95	3,831	93	1,570	89	95
24 Jul	10,044	98	12,835	98	10,136	97	4,361	98	6,897	96	6,906	95	7,115	95	4,550	95	3,832	93	1,570	89	95

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Date	<u>1998</u>		<u>1999</u>		<u>2000</u>		<u>2001</u>		<u>2002</u>		<u>2003</u>		<u>2004</u>		<u>2005</u>		<u>2006</u>		<u>2007</u>		<u>1998–2007</u>
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	Avg %
25 Jul	10,052	98	12,841	98	10,168	97	4,365	98	6,912	96	6,907	95	7,122	95	4,555	95	3,833	93	1,576	89	96
26 Jul	10,056	98	12,862	98	10,170	97	4,370	98	6,925	97	6,913	95	7,154	95	4,616	96	3,835	93	1,605	91	96
27 Jul	10,059	98	12,892	99	10,172	97	4,372	98	6,928	97	6,929	95	7,154	95	4,625	96	3,835	93	1,605	91	96
28 Jul	10,078	98	12,894	99	10,191	97	4,373	98	6,944	97	6,949	96	7,162	95	4,626	96	3,837	93	1,612	91	96
29 Jul	10,083	98	12,918	99	10,220	98	4,379	98	6,966	97	6,952	96	7,162	95	4,630	96	3,837	93	1,613	91	96
30 Jul	10,094	99	12,929	99	10,226	98	4,385	98	6,987	97	6,980	96	7,166	95	4,642	97	3,837	93	1,618	92	96
31 Jul	10,122	99	12,930	99	10,288	98	4,394	99	7,006	98	7,021	97	7,185	95	4,645	97	3,837	93	1,631	92	97
1 Aug	10,132	99	13,057	100	10,458	100	4,453	100	7,016	98	7,035	97	7,188	96	4,661	97	3,838	93	1,632	92	97
Total count	10,239		13,063		10,460		4,453		7,174		7,256		7,525		4,798		4,112		1,765		

Appendix B2.–Daily cumulative weir counts of Ayakulik River Chinook salmon, 25 May–1 August, 1998–2007.

Date	1998		1999		2000		2001		2002		2003		2004		2005		2006		2007		'98-'07
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	Avg %
25 May	177	1		0	155	1	101	1	72	1	2	0		0	5	0	0	0	14	0	0
26 May	236	2		0	197	1	152	1	92	1	4	0		0	5	0	0	0	14	0	0
27 May	422	3	46	0	210	1	177	1	100	1	5	0		0	11	0	0	0	14	0	1
28 May	604	4	48	0	215	1	399	3	173	1	6	0		2	11	0	0	0	14	0	1
29 May	732	5	55	0	216	1	797	6	179	1	13	0		5	19	0	0	0	18	0	1
30 May	848	6	55	0	262	1	1,079	8	230	2	53	0	200	1	28	0	0	0	18	0	2
31 May	1,049	7	55	0	282	1	1,227	9	295	2	147	1	1,210	5	49	1	0	0	25	0	3
1 Jun	1,413	10	55	0	437	2	1,476	11	607	5	275	2	2,496	10	49	1	32	1	27	0	4
2 Jun	1,858	13	71	1	464	2	1,760	13	786	6	541	3	3,843	15	53	1	74	2	31	0	6
3 Jun	2,170	15	405	3	581	3	3,277	24	825	7	947	5	4,327	17	159	2	94	3	52	1	8
4 Jun	2,536	18	537	4	2,047	10	3,657	26	1,242	10	1,742	10	9,521	38	267	3	101	3	61	1	12
5 Jun	2,941	21	610	5	3,434	17	5,325	38	1,280	10	2,183	12	10,037	40	357	4	104	3	71	1	15
6 Jun	3,477	25	634	5	4,810	23	6,952	50	1,511	12	2,596	15	10,504	42	540	6	128	4	192	3	19
7 Jun	3,940	28	1,089	8	5,050	25	8,179	59	1,749	14	3,865	22	11,712	47	555	7	136	4	222	3	22
8 Jun	4,347	31	1,298	10	5,129	25	9,115	65	2,011	16	4,128	24	11,866	48	764	9	192	6	365	6	24
9 Jun	4,825	34	1,857	14	5,312	26	9,605	69	2,316	18	4,334	25	11,934	48	955	11	206	7	438	7	26
10 Jun	5,328	38	2,447	18	6,561	32	9,889	71	2,483	20	5,095	29	12,081	49	958	11	238	8	438	7	28
11 Jun	5,799	41	3,405	25	6,981	34	10,204	73	2,651	21	6,689	38	12,399	50	1,101	13	272	9	477	7	31
12 Jun	6,147	44	6,148	46	8,204	40	10,450	75	2,713	22	6,889	39	12,457	50	1,112	13	319	10	644	10	35
13 Jun	6,612	47	8,135	60	9,545	46	10,592	76	2,848	23	6,999	40	12,915	52	1,248	15	360	12	734	11	38
14 Jun	6,840	49	8,863	66	10,379	51	10,669	77	3,229	26	7,831	45	16,445	66	1,812	22	637	21	988	15	44
15 Jun	7,150	51	9,190	68	10,994	54	10,721	77	3,338	27	8,563	49	16,980	68	2,321	28	668	22	1,346	21	46
16 Jun	7,575	54	9,256	69	13,324	65	10,818	78	3,728	30	9,151	52	17,735	71	3,028	36	668	22	1,637	25	50
17 Jun	7,972	57	9,329	69	15,467	75	10,948	79	4,869	39	9,874	56	18,574	75	3,226	39	748	24	1,702	26	54
18 Jun	8,225	59	9,586	71	15,913	78	11,003	79	5,533	44	10,046	57	18,611	75	3,538	42	750	24	1,707	26	56
19 Jun	8,585	61	9,953	74	16,077	78	11,283	81	6,119	49	10,760	61	18,722	75	3,588	43	951	31	1,819	28	58
20 Jun	8,779	63	10,050	74	16,425	80	11,421	82	7,490	60	10,864	62	19,406	78	3,609	43	1,574	51	1,944	30	62
21 Jun	9,327	66	10,113	75	16,663	81	11,504	83	7,693	61	10,984	63	20,045	81	3,809	46	1,583	51	2,009	31	64
22 Jun	9,717	69	10,257	76	17,347	85	11,963	86	7,855	63	11,343	65	20,653	83	4,045	49	1,740	56	2,103	32	66
23 Jun	10,360	74	10,414	77	17,389	85	12,147	87	8,672	69	11,515	66	20,809	84	4,234	51	1,762	57	2,400	37	69

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Date	1998		1999		2000		2001		2002		2003		2004		2005		2006		2007		'98-'07
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	Avg %
24 Jun	10,938	78	10,460	77	18,189	89	12,335	89	9,353	75	11,608	66	20,936	84	4,271	51	1,898	61	2,482	38	71
25 Jun	11,380	81	10,559	78	18,582	91	12,376	89	10,249	82	11,845	67	21,087	85	5,378	64	1,925	62	2,576	39	74
26 Jun	11,645	83	10,926	81	18,724	91	12,436	89	10,484	84	11,868	68	21,265	86	5,646	68	1,931	62	2,612	40	75
27 Jun	11,984	85	11,438	85	19,087	93	12,553	90	10,668	85	12,127	69	21,307	86	6,207	74	1,932	62	3,081	47	78
28 Jun	12,247	87	11,631	86	19,195	94	12,671	91	10,884	87	12,962	74	22,179	89	6,231	75	1,935	62	3,813	58	80
29 Jun	12,453	89	11,862	88	19,462	95	12,899	93	11,088	88	13,693	78	22,792	92	6,325	76	1,951	63	4,175	64	82
30 Jun	12,664	90	12,000	89	19,583	95	12,971	93	11,172	89	13,897	79	22,831	92	6,623	79	1,961	63	4,475	68	84
1 Jul	12,816	91	12,116	90	19,620	96	13,128	94	11,259	90	14,222	81	23,291	94	6,758	81	2,234	72	5,057	77	87
2 Jul	13,035	93	12,226	91	19,722	96	13,286	95	11,495	92	14,623	83	23,519	95	6,761	81	2,291	74	5,128	78	88
3 Jul	13,212	94	12,230	91	19,772	96	13,325	96	11,546	92	14,783	84	23,631	95	6,878	82	2,424	78	5,448	83	89
4 Jul	13,348	95	12,266	91	19,795	96	13,397	96	11,728	93	15,122	86	23,825	96	7,621	91	2,531	81	5,602	86	91
5 Jul	13,408	96	12,366	92	19,888	97	13,397	96	11,917	95	15,317	87	23,857	96	7,646	92	2,549	82	5,801	89	92
6 Jul	13,511	96	12,392	92	19,990	97	13,496	97	11,942	95	15,547	89	23,945	96	7,686	92	2,568	83	5,936	91	93
7 Jul	13,601	97	12,465	92	19,992	97	13,541	97	11,978	95	15,719	90	23,958	96	7,798	94	2,568	83	6,051	93	93
8 Jul	13,690	98	12,522	93	19,992	97	13,549	97	12,012	96	15,882	90	23,977	97	7,802	94	2,568	83	6,164	94	94
9 Jul	13,731	98	12,757	94	20,046	98	13,598	98	12,036	96	16,021	91	24,080	97	7,855	94	2,576	83	6,197	95	94
10 Jul	13,779	98	12,884	95	20,116	98	13,650	98	12,174	97	16,301	93	24,223	98	7,855	94	2,581	83	6,211	95	95
11 Jul	13,825	98	12,965	96	20,140	98	13,678	98	12,189	97	16,724	95	24,247	98	7,867	94	2,723	88	6,291	96	96
12 Jul	13,862	99	13,089	97	20,200	98	13,700	98	12,208	97	16,754	95	24,282	98	7,867	94	2,831	91	6,385	98	97
13 Jul	13,872	99	13,129	97	20,253	99	13,755	99	12,252	98	16,762	95	24,378	98	7,867	94	2,845	92	6,420	98	97
14 Jul	13,904	99	13,165	97	20,287	99	13,765	99	12,306	98	16,823	96	24,410	98	8,007	96	2,845	92	6,451	99	97
15 Jul	13,916	99	13,188	98	20,292	99	13,791	99	12,307	98	16,840	96	24,481	99	8,021	96	2,847	92	6,457	99	97
16 Jul	13,924	99	13,188	98	20,325	99	13,803	99	12,335	98	16,929	96	24,530	99	8,041	96	2,848	92	6,471	99	98
17 Jul	13,933	99	13,195	98	20,329	99	13,825	99	12,367	99	16,934	96	24,539	99	8,073	97	2,856	92	6,472	99	98
18 Jul	13,946	99	13,203	98	20,334	99	13,836	99	12,373	99	16,980	97	24,563	99	8,075	97	2,866	92	6,475	99	98
19 Jul	13,969	99	13,203	98	20,365	99	13,843	99	12,386	99	17,078	97	24,637	99	8,079	97	2,922	94	6,485	99	98
20 Jul	13,973	99	13,287	98	20,378	99	13,843	99	12,397	99	17,368	99	24,719	100	8,134	98	2,924	94	6,492	99	98
21 Jul	13,977	99	13,297	98	20,396	99	13,844	99	12,401	99	17,384	99	24,723	100	8,143	98	3,007	97	6,493	99	99
22 Jul	13,978	99	13,347	99	20,407	99	13,846	99	12,406	99	17,485	100	24,727	100	8,198	98	3,007	97	6,495	99	99
23 Jul	13,981	99	13,371	99	20,421	99	13,849	99	12,415	99	17,488	100	24,741	100	8,201	98	3,007	97	6,497	99	99
24 Jul	13,984	99	13,376	99	20,437	100	13,856	99	12,416	99	17,492	100	24,764	100	8,201	98	3,056	98	6,499	99	99

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Date	<u>1998</u>		<u>1999</u>		<u>2000</u>		<u>2001</u>		<u>2002</u>		<u>2003</u>		<u>2004</u>		<u>2005</u>		<u>2006</u>		<u>2007</u>		<u>'98-'07</u>
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	Avg %
25 Jul	13,986	99	13,386	99	20,445	100	13,877	100	12,416	99	17,527	100	24,790	100	8,201	98	3,062	99	6,501	99	99
26 Jul	13,992	99	13,404	99	20,452	100	13,885	100	12,416	99	17,528	100	24,794	100	8,221	99	3,066	99	6,508	100	99
27 Jul	13,993	99	13,435	99	20,463	100	13,891	100	12,416	99	17,530	100	24,794	100	8,289	99	3,066	99	6,514	100	99
28 Jul	14,004	99	13,446	100	20,477	100	13,892	100	12,416	99	17,537	100	24,794	100	8,292	99	3,066	99	6,515	100	99
29 Jul	14,005	99	13,449	100	20,479	100	13,893	100	12,429	99	17,537	100	24,794	100	8,295	99	3,067	99	6,515	100	99
30 Jul	14,009	99	13,467	100	20,479	100	13,900	100	12,429	99	17,544	100	24,794	100	8,297	99	3,067	99	6,515	100	100
31 Jul	14,013	99	13,474	100	20,483	100	13,901	100	12,429	99	17,544	100	24,802	100	8,301	100	3,069	99	6,515	100	100
1 Aug	14,017	99	13,475	100	20,487	100	13,902	100	12,429	99	17,545	100	24,806	100	8,302	100	3,069	99	6,515	100	100
Total count	14,038		13,503		20,527		13,929		12,551		17,557		24,830		8,340		3,106		6,535		

Appendix B3.–Daily cumulative weir counts of Chignik River Chinook salmon 15 June–15 August, 1998–2007.

Date	1998		1999		2000		2001		2002		2003		2004		2005		2006		2007		1998-2007
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	Avg %
16 Jun			2	0					6	0	26	0	0	0	0	0	0	0	0	0	
17 Jun	12	0	8	0					12	0	27	0	6	0	0	0	18	1	6	0	
18 Jun	24	1	8	0					12	0	33	1	18	0	0	0	18	1	6	0	
19 Jun	25	1	14	0					36	1	69	1	18	0	0	0	24	1	6	0	
20 Jun	58	2	14	0	39	1			42	1	69	1	24	0	6	0	24	1	6	0	
21 Jun	95	3	14	0	47	1			42	1	105	2	48	1	84	1	24	1	12	1	
22 Jun	108	4	20	1	60	1	18	1	67	2	135	2	48	1	117	2	24	1	12	1	
23 Jun	114	4	38	1	73	2	18	1	79	2	159	2	66	1	196	3	30	1	12	1	2
24 Jun	150	5	63	2	94	2	18	1	85	2	183	3	114	1	262	4	42	1	24	1	2
25 Jun	198	6	85	2	124	3	18	1	122	3	219	3	210	3	292	5	72	2	30	2	3
26 Jun	222	7	97	3	163	4	18	1	226	6	279	4	312	4	460	7	84	2	42	2	4
27 Jun	276	9	109	3	219	5	18	1	256	7	388	6	348	4	605	9	138	4	48	2	5
28 Jun	369	12	111	3	300	7	54	2	305	9	448	7	486	6	719	11	150	4	48	2	6
29 Jun	441	14	135	4	399	9	85	3	389	11	485	8	654	8	909	14	162	5	54	3	8
30 Jun	495	16	184	5	467	11	128	4	551	16	534	8	780	10	1,065	16	162	5	54	3	9
1 Jul	525	17	214	6	557	13	257	8	599	17	552	9	926	12	1,223	19	180	5	54	3	11
2 Jul	561	18	280	8	643	15	485	16	659	19	612	10	1,064	14	1,345	21	222	6	66	3	13
3 Jul	621	20	354	9	763	18	647	21	678	19	668	10	1,154	15	1,579	24	246	7	84	4	15
4 Jul	665	22	390	10	887	21	731	24	843	24	848	13	1,295	17	1,982	31	288	8	114	6	17
5 Jul	755	25	459	12	1,033	24	779	26	891	25	1,071	17	1,626	21	2,144	33	324	9	120	6	20
6 Jul	794	26	495	13	1,234	29	857	28	958	27	1,254	20	1,782	23	2,338	36	396	11	138	7	22
7 Jul	942	31	647	17	1,384	32	965	32	1,060	30	1,296	20	1,873	24	2,569	40	574	16	156	8	25
8 Jul	1,092	36	695	19	1,581	37	1,088	36	1,144	32	1,602	25	2,072	26	2,894	45	745	21	228	11	29
9 Jul	1,110	36	761	20	1,753	41	1,158	38	1,228	35	1,932	30	2,253	29	3,452	53	864	24	258	13	32
10 Jul	1,221	40	828	22	1,954	46	1,218	40	1,324	37	2,161	34	2,398	31	3,742	58	921	26	372	19	35
11 Jul	1,305	42	967	26	2,103	49	1,280	42	1,408	40	2,564	40	2,698	34	3,875	60	980	28	440	22	38
12 Jul	1,383	45	1,111	30	2,343	55	1,304	43	1,579	45	3,081	48	2,944	38	4,055	63	1,034	29	626	31	43
13 Jul	1,440	47	1,292	35	2,512	59	1,328	44	1,675	47	3,408	53	3,323	42	4,211	65	1,200	34	668	33	46
14 Jul	1,521	49	1,463	39	2,608	61	1,436	47	1,729	49	3,649	57	3,732	48	4,358	67	1,388	39	718	36	49
15 Jul	1,635	53	1,702	46	2,728	64	1,496	49	1,867	53	3,921	61	4,020	51	4,461	69	1,448	41	782	39	53
16 Jul	1,659	54	1,790	48	2,836	66	1,656	55	1,935	55	4,085	64	4,243	54	4,609	71	1,540	44	839	42	55

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Date	1998		1999		2000		2001		2002		2003		2004		2005		2006		2007		1998–2007
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	Avg %
17 Jul	1,798	58	1,938	52	2,938	69	1,818	60	2,121	60	4,281	67	4,552	58	4,794	74	1,668	47	876	44	59
18 Jul	1,879	61	1,992	53	3,016	70	2,016	67	2,271	64	4,369	68	4,985	64	4,932	76	1,720	49	1,037	52	62
19 Jul	2,138	70	2,214	59	3,159	74	2,152	71	2,362	67	4,460	70	5,256	67	5,106	79	2,044	58	1,199	60	67
20 Jul	2,222	72	2,281	61	3,244	76	2,237	74	2,464	70	4,600	72	5,478	70	5,204	80	2,226	63	1,321	66	70
21 Jul	2,312	75	2,378	64	3,352	78	2,325	77	2,526	71	4,752	74	5,721	73	5,337	82	2,310	65	1,327	66	73
22 Jul	2,365	77	2,458	66	3,442	80	2,452	81	2,640	75	4,896	76	5,843	75	5,513	85	2,424	69	1,375	69	75
23 Jul	2,431	79	2,573	69	3,650	85	2,513	83	2,772	78	5,005	78	5,987	76	5,622	87	2,508	71	1,400	70	78
24 Jul	2,505	81	2,729	73	3,766	88	2,609	86	2,904	82	5,011	78	6,131	78	5,904	91	2,694	76	1,462	73	81
25 Jul	2,555	83	2,777	74	3,786	88	2,663	88	2,982	84	5,149	80	6,311	80	5,976	92	2,795	79	1,511	76	83
26 Jul	2,585	84	2,897	78	3,788	88	2,702	89	3,054	86	5,203	81	6,488	83	6,000	93	2,871	81	1,541	77	84
27 Jul	2,603	85	3,001	80	3,806	89	2,714	90	3,084	87	5,371	84	6,632	85	6,099	94	2,917	83	1,545	77	85
28 Jul	2,625	85	3,031	81	3,848	90	2,726	90	3,108	88	5,495	86	6,728	86	6,147	95	2,991	85	1,559	78	86
29 Jul	2,680	87	3,290	88	3,885	91	2,744	91	3,144	89	5,610	87	6,824	87	6,196	96	3,058	87	1,589	79	88
30 Jul	2,696	88	3,348	90	3,923	92	2,756	91	3,156	89	5,694	89	6,956	89	6,202	96	3,105	88	1,610	81	89
31 Jul	2,708	88	3,384	91	3,953	92	2,816	93	3,180	90	5,766	90	7,076	90	6,214	96	3,159	89	1,622	81	90
1 Aug	2,732	89	3,402	91	3,973	93	2,822	93	3,192	90	5,808	91	7,100	91	6,226	96	3,202	91	1,651	83	91
2 Aug	2,753	90	3,432	92	4,063	95	2,858	94	3,198	90	5,820	91	7,173	91	6,232	96	3,208	91	1,677	84	91
3 Aug	2,765	90	3,462	93	4,111	96	2,876	95	3,234	91	5,874	92	7,252	93	6,253	96	3,280	93	1,684	84	92
4 Aug	2,789	91	3,501	94	4,135	96	2,906	96	3,258	92	5,880	92	7,324	93	6,273	97	3,305	93	1,720	86	93
5 Aug	2,825	92	3,522	94	4,147	97	2,924	97	3,270	92	5,928	92	7,324	93	6,273	97	3,329	94	1,732	87	94
6 Aug	2,825	92	3,528	95	4,189	98	2,930	97	3,294	93	5,928	92	7,324	93	6,291	97	3,353	95	1,732	87	94
7 Aug	2,855	93	3,564	96	4,189	98	2,930	97	3,312	94	5,934	93	7,324	93	6,321	97	3,365	95	1,732	87	94
8 Aug	2,882	94	3,584	96	4,189	98	2,943	97	3,337	94	5,988	93	7,324	93	6,351	98	3,390	96	1,750	88	95
9 Aug	2,915	95	3,602	97	4,213	98	2,955	98	3,373	95	6,024	94	7,324	93	6,351	98	3,408	96	1,768	88	95
10 Aug	2,933	95	3,626	97	4,219	98	2,961	98	3,391	96	6,102	95	7,324	93	6,352	98	3,414	97	1,808	90	96
11 Aug	2,933	95	3,650	98	4,249	99	2,967	98	3,415	96	6,144	96	7,324	93	6,354	98	3,450	98	1,808	90	96
12 Aug	2,945	96	3,662	98	4,249	99	2,967	98	3,421	97	6,192	97	7,324	93	6,366	98	3,468	98	1,809	90	96
13 Aug	2,975	97	3,692	99	4,255	99	2,979	98	3,433	97	6,207	97	7,324	93	6,374	98	3,474	98	1,827	91	97
14 Aug	2,981	97	3,704	99	4,267	100	2,979	98	3,439	97	6,243	97	7,324	93	6,398	99	3,493	99	1,830	92	97
15 Aug	2,999	98	3,704	99	4,267	100	2,986	99	3,445	97	6,261	98	7,324	93	6,428	99	3,505	99	1,831	92	97
Total count	3,075		3,728		4,285		3,028		3,541		6,412		7,840		6,486		3,535		2,000		



**APPENDIX C: SAMPLE AGE COMPOSITION AND  
ESTIMATED INRIVER RUN FROM KARLUK AND  
AYAKULIK RIVERS CHINOOK SALMON ESCAPEMENT  
BY TIME STRATUM, 2006–2007**

Appendix C1.–Chinook salmon sample age composition and estimates of inriver run by time stratum, Karluk River, 2006

Time stratum	Age class								Total
	1.1	1.2	1.3	1.4	1.5	2.2	2.3	2.4	
Through 12 June									
	<u>Females</u>								
Number sampled	0	0	0	1	0	0	1	1	3
Percent	0.0	0.0	0.0	8.3	0.0	0.0	8.3	8.3	25.0
SE percent				8.3			8.3	8.3	13.0
Inriver run	0	0	0	115	0	0	115	115	346
SE return	0	0	0	115	0	0	115	115	180
	<u>Males</u>								
Number sampled	0	0	0	2	0	0	1	6	9
Percent	0.0	0.0	0.0	16.7	0.0	0.0	8.3	50.0	75.0
SE percent				11.2			8.3	15.0	13.0
Inriver run	0	0	0	231	0	0	115	693	1,039
SE return	0	0	0	155	0	0	115	208	180
	<u>All</u>								
Number sampled	0	0	0	3	0	0	2	7	12
Percent	0.0	0.0	0.0	25.0	0.0	0.0	16.7	58.3	100.0
SE Percent				13.0			11.2	14.8	0.0
Inriver run	0	0	0	346	0	0	231	808	1,385
SE Return	0	0	0	180	0	0	155	205	0
13–19 June									
	<u>Females</u>								
Number sampled	0	0	0	1	0	0	0	1	2
Percent	0.0	0.0	0.0	6.7	0.0	0.0	0.0	6.7	13.3
SE Percent				6.6				6.6	9.0
Inriver run	0	0	0	45	0	0	0	45	90
SE Return	0	0	0	45	0	0	0	45	61
	<u>Males</u>								
Number sampled	0	0	4	4	0	0	4	1	13
Percent	0.0	0.0	26.7	26.7	0.0	0.0	26.7	6.7	86.7
SE Percent			11.7	11.7			11.7	6.6	9.0
Inriver run	0	0	180	180	0	0	180	45	586
SE Return	0	0	79	79	0	0	79	45	61
	<u>All</u>								
Number sampled	0	0	4	5	0	0	4	2	15
Percent	0.0	0.0	26.7	33.3	0.0	0.0	26.7	13.3	100.0
SE Percent			11.7	12.5			11.7	9.0	0.0
Inriver run	0	0	180	225	0	0	180	90	676
SE Return	0	0	79	84	0	0	79	61	0

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Time stratum	Age class								Total
	1.1	1.2	1.3	1.4	1.5	2.2	2.3	2.4	
20 June–3 July									
	<u>Females</u>								
Number sampled	0	1	0	1	0	0	1	0	3
Percent	0.0	11.1	0.0	11.1	0.0	0.0	11.1	0.0	33.3
SE Percent		11.1		11.1			11.1		16.6
Inriver run	0	125	0	125	0	0	125	0	375
SE Return	0	124	0	124	0	0	124	0	187
	<u>Males</u>								
Number sampled	0	0	2	2	0	0	2	0	6
Percent	0.0	0.0	22.2	22.2	0.0	0.0	22.2	0.0	66.7
SE Percent			14.6	14.6			14.6		16.6
Inriver run	0	0	250	250	0	0	250	0	749
SE Return	0	0	165	165	0	0	165	0	187
	<u>All</u>								
Number sampled	0	1	2	3	0	0	3	0	9
Percent	0.0	11.1	22.2	33.3	0.0	0.0	33.3	0.0	100.0
SE Percent		11.1	14.6	16.6			16.6		0.0
Inriver run	0	125	250	375	0	0	375	0	1124
SE Return	0	124	165	187	0	0	187	0	0
After 3 July									
	<u>Females</u>								
Number sampled	0	0	2	3	0	0	0	0	5
Percent	0.0	0.0	8.7	13.0	0.0	0.0	0.0	0.0	21.7
SE Percent			5.9	7.1					8.7
Inriver run	0	0	81	121	0	0	0	0	202
SE Return	0	0	55	66	0	0	0	0	81
	<u>Males</u>								
Number sampled	0	2	6	9	1	0	0	0	18
Percent	0.0	8.7	26.1	39.1	4.3	0.0	0.0	0.0	78.3
SE Percent		5.9	9.2	10.3	4.3				8.7
Inriver run	0	81	242	363	40	0	0	0	725
SE Return	0	55	86	95	40	0	0	0	81
	<u>All</u>								
Number sampled	0	2	8	12	1	0	0	0	23
Percent	0.0	8.7	34.8	52.2	4.3	0.0	0.0	0.0	100.0
SE Percent		5.9	10.0	10.5	4.3				0.0
Inriver run	0	81	322	484	40	0	0	0	927
SE Return	0	55	93	97	40	0	0	0	0

Appendix C2.–Chinook salmon sample age composition and estimates of inriver run by time stratum, Karluk River, 2007.

Time stratum	Age class								Total
	1.0	1.2	1.3	1.4	1.5	2.2	2.4	2.5	
Through 12 June									
	<u>Females</u>								
Number sampled	0	0	2	5	0	0	0	0	7
Percent	0.0	0.0	22.2	55.6	0.0	0.0	0.0	0.0	77.8
SE percent			14.6	17.4					14.6
Inriver run	0	0	114	286	0	0	0	0	400
SE return	0	0	75	90	0	0	0	0	75
	<u>Males</u>								
Number sampled	0	0	0	1	1	0	0	0	2
Percent	0.0	0.0	0.0	11.1	11.1	0.0	0.0	0.0	22.2
SE percent				11.0	11.0				14.6
Inriver run	0	0	0	57	57	0	0	0	114
SE return	0	0	0	57	57	0	0	0	75
	<u>All</u>								
Number sampled	0	0	2	6	1	0	0	0	9
Percent	0.0	0.0	22.2	66.7	11.1	0.0	0.0	0.0	100.0
SE percent			14.6	16.5	11.0				0.0
Inriver run	0	0	114	343	57	0	0	0	514
SE return	0	0	75	85	57	0	0	0	0
13–19 June									
	<u>Females</u>								
Number sampled	0	0	0	2	0	0	0	0	2
Percent	0.0	0.0	0.0	40.0	0.0	0.0	0.0	0.0	40.0
SE percent				24.3					24.3
Inriver run	0	0	0	131	0	0	0	0	131
SE return	0	0	0	79	0	0	0	0	79
	<u>Males</u>								
Number sampled	0	0	0	1	0	0	2	0	3
Percent	0.0	0.0	0.0	20.0	0.0	0.0	40.0	0.0	60.0
SE percent				19.8			24.3		24.3
Inriver run	0	0	0	65	0	0	131	0	196
SE return	0	0	0	65	0	0	79	0	79
	<u>All</u>								
Number sampled	0	0	0	3	0	0	2	0	5
Percent	0.0	0.0	0.0	60.0	0.0	0.0	40.0	0.0	100.0
SE percent				24.3			24.3		0.0
Inriver run	0	0	0	196	0	0	131	0	327
SE return	0	0	0	79	0	0	79	0	0

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Time stratum	Age class								Total
	1.0	1.2	1.3	1.4	1.5	2.2	2.4	2.5	
20–26 June									
	<u>Females</u>								
Number sampled	0	0	1	3	2	0	2	0	8
Percent	0.0	0.0	6.3	18.8	12.5	0.0	12.5	0.0	50.0
SE percent			6.1	9.9	8.4		8.4		12.7
Inriver run	0	0	28	85	57	0	57	0	227
SE return	0	0	28	45	38	0	38	0	58
	<u>Males</u>								
Number sampled	0	0	2	3	1	0	1	1	8
Percent	0.0	0.0	12.5	18.8	6.3	0.0	6.3	6.3	50.0
SE percent			8.4	9.9	6.1		6.1	6.1	12.7
Inriver run	0	0	57	85	28	0	28	28	227
SE return	0	0	38	45	28	0	28	28	58
	<u>All</u>								
Number sampled	0	0	3	6	3	0	3	1	16
Percent	0.0	0.0	18.8	37.5	18.8	0.0	18.8	6.3	100.0
SE percent			9.9	12.3	9.9		9.9	6.1	0.0
Inriver run	0	0	85	170	85	0	85	28	454
SE return	0	0	45	56	45	0	45	28	0
after 26 June									
	<u>Females</u>								
Number sampled	1	0	0	6	0	0	1	1	9
Percent	7.1	0.0	0.0	42.9	0.0	0.0	7.1	7.1	64.3
SE Percent	7.0			13.5			7.0	7.0	13.1
Inriver run	34	0	0	201	0	0	34	34	302
SE Return	33	0	0	64	0	0	33	33	62
	<u>Males</u>								
Number sampled	0	2	0	1	1	1	0	0	5
Percent	0.0	14.3	0.0	7.1	7.1	7.1	0.0	0.0	35.7
SE Percent		9.6		7.0	7.0	7.0			13.1
Inriver run	0	67	0	34	34	34	0	0	168
SE Return	0	45	0	33	33	33	0	0	62
	<u>All</u>								
Number sampled	1	2	0	7	1	1	1	1	14
Percent	7.1	14.3	0.0	50.0	7.1	7.1	7.1	7.1	100.0
SE Percent	7.0	9.6		13.7	7.0	7.0	7.0	7.0	0.0
Inriver run	34	67	0	235	34	34	34	34	470
SE Return	33	45	0	64	33	33	33	33	0

Appendix C3.–Chinook salmon sample age composition and estimates of inriver run by time stratum, Ayakulik River, 2006.

Time stratum	Age class								Total
	1.0	1.2	1.3	1.4	1.5	2.2	2.3	2.4	
Through 19 June									
	<u>Females</u>								
Number sampled	0	0	5	5	0	0	1	1	12
Percent	0.0	0.0	35.7	35.7	0.0	0.0	7.1	7.1	85.7
SE percent			13.2	13.2			7.1	7.1	9.6
Inriver run	0	0	332	332	0	0	66	66	797
SE return	0	0	123	123	0	0	66	66	90
	<u>Males</u>								
Number sampled	0	0	1	1	0	0	0	0	2
Percent	0.0	0.0	7.1	7.1	0.0	0.0	0.0	0.0	14.3
SE percent			7.1	7.1					9.6
Inriver run	0	0	66	66	0	0	0	0	133
SE return	0	0	66	66	0	0	0	0	90
	<u>All</u>								
Number sampled	0	0	6	6	0	0	1	1	14
Percent	0.0	0.0	42.9	42.9	0.0	0.0	7.1	7.1	100.0
SE percent			13.6	13.6			7.1	7.1	0.0
Inriver run	0	0	399	399	0	0	66	66	930
SE return	0	0	127	127	0	0	66	66	0
20–26 June									
	<u>Females</u>								
Number sampled	0	0	5	0	0	1	0	0	6
Percent	0.0	0.0	62.5	0.0	0.0	12.5	0.0	0.0	75.0
SE percent			18.2			12.4			16.3
Inriver run	0	0	613	0	0	123	0	0	735
SE return	0	0	179	0	0	122	0	0	160
	<u>Males</u>								
Number sampled	0	1	0	0	0	0	1	0	2
Percent	0.0	12.5	0.0	0.0	0.0	0.0	12.5	0.0	25.0
SE percent		12.4					12.4		16.3
Inriver run	0	123	0	0	0	0	123	0	245
SE return	0	122	0	0	0	0	122	0	160
	<u>All</u>								
Number sampled	0	1	5	0	0	1	1	0	8
Percent	0.0	12.5	62.5	0.0	0.0	12.5	12.5	0.0	100.0
SE percent		12.4	18.2			12.4	12.4		0.0
Inriver run	0	123	613	0	0	123	123	0	980
SE return	0	122	179	0	0	122	122	0	0

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Time stratum	Age class								Total
	1.0	1.2	1.3	1.4	1.5	2.2	2.4	2.5	
27 June– 3 July									
<u>Females</u>									
Number sampled	0	1	3	1	0	0	0	1	6
Percent	0.0	12.5	37.5	12.5	0.0	0.0	0.0	12.5	75.0
SE percent		12.4	18.1	12.4				12.4	16.2
Inriver run	0	62	185	62	0	0	0	62	370
SE return	0	61	89	61	0	0	0	61	80
<u>Males</u>									
Number sampled	0	1	0	1	0	0	0	0	2
Percent	0.0	12.5	0.0	12.5	0.0	0.0	0.0	0.0	25.0
SE percent		12.4		12.4					16.2
Inriver run	0	62	0	62	0	0	0	0	123
SE return	0	61	0	61	0	0	0	0	80
<u>All</u>									
Number sampled	0	2	3	2	0	0	0	1	8
Percent	0.0	25.0	37.5	25.0	0.0	0.0	0.0	12.5	100.0
SE percent		16.2	18.1	16.2				12.4	0.0
Inriver run	0	123	185	123	0	0	0	62	493
SE return	0	80	89	80	0	0	0	61	0
After 3 July									
<u>Females</u>									
Number sampled	0	2	1	1	0	0	1	0	5
Percent	0.0	22.2	11.1	11.1	0.0	0.0	11.1	0.0	55.6
SE percent		14.6	11.0	11.0			11.0		17.5
Inriver run	0	152	76	76	0	0	76	0	379
SE return	0	100	75	75	0	0	75	0	119
<u>Males</u>									
Number sampled	1	0	3	0	0	0	0	0	4
Percent	11.1	0.0	33.3	0.0	0.0	0.0	0.0	0.0	44.4
SE percent	11.0		16.6						17.5
Inriver run	76	0	227	0	0	0	0	0	303
SE return	75	0	113	0	0	0	0	0	119
<u>All</u>									
Number sampled	1	2	4	1	0	0	1	0	9
Percent	11.1	22.2	44.4	11.1	0.0	0.0	11.1	0.0	100.0
SE percent	11.0	14.6	17.5	11.0			11.0		0.0
Inriver run	76	152	303	76	0	0	76	0	682
SE return	75	100	119	75	0	0	75	0	0

Appendix C4.–Chinook salmon sample age composition and estimates of inriver run by time stratum, Ayakulik River, 2007.

Time stratum	Age class								Total
	1.0	1.2	1.3	1.4	1.5	2.2	2.3	2.4	
Through 12 June									
	<u>Females</u>								
Number sampled	0	0	5	8	1	0	1	1	16
Percent	0.0	0.0	17.9	28.6	3.6	0.0	3.6	3.6	57.1
SE percent			7.2	8.5	3.5		3.5	3.5	9.3
Inriver run	0	0	115	184	23	0	23	23	368
SE return	0	0	46	55	22	0	22	22	60
	<u>Males</u>								
Number sampled	0	2	5	5	0	0	0	0	12
Percent	0.0	7.1	17.9	17.9	0.0	0.0	0.0	0.0	42.9
SE percent		4.8	7.2	7.2					9.3
Inriver run	0	46	115	115	0	0	0	0	276
SE return	0	31	46	46	0	0	0	0	60
	<u>All</u>								
Number sampled	0	2	10	13	1	0	1	1	28
Percent	0.0	7.1	35.7	46.4	3.6	0.0	3.6	3.6	100.0
SE percent		4.8	9.0	9.4	3.5		3.5	3.5	0.0
Inriver run	0	46	230	299	23	0	23	23	644
SE return	0	31	58	60	22	0	22	22	0
13–19 June									
	<u>Females</u>								
Number sampled	0	0	2	4	0	0	0	1	7
Percent	0.0	0.0	11.8	23.5	0.0	0.0	0.0	5.9	41.2
SE percent			8.0	10.5				5.8	12.2
Inriver run	0	0	138	276	0	0	0	69	484
SE return	0	0	94	124	0	0	0	69	144
	<u>Males</u>								
Number sampled	0	0	2	4	0	0	1	3	10
Percent	0.0	0.0	11.8	23.5	0.0	0.0	5.9	17.6	58.8
SE percent			8.0	10.5			5.8	9.5	12.2
Inriver run	0	0	138	276	0	0	69	207	691
SE return	0	0	94	124	0	0	69	111	144
	<u>All</u>								
Number sampled	0	0	4	8	0	0	1	4	17
Percent	0.0	0.0	23.5	47.1	0.0	0.0	5.9	23.5	100.0
SE percent			10.5	12.4			5.8	10.5	0.0
Inriver run	0	0	276	553	0	0	69	276	1,175
SE return	0	0	124	146	0	0	69	124	0

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Time stratum	Age class								Total
	1.0	1.2	1.3	1.4	1.5	2.2	2.4	2.5	
20–26 June									
<u>Females</u>									
Number sampled	0	1	2	5	0	0	0	2	10
Percent	0.0	7.7	15.4	38.5	0.0	0.0	0.0	15.4	76.9
SE percent		7.6	10.3	13.9				10.3	12.1
Inriver run	0	61	122	305	0	0	0	122	610
SE return	0	60	82	110	0	0	0	82	96
<u>Males</u>									
Number sampled	0	0	0	1	1	0	0	1	3
Percent	0.0	0.0	0.0	7.7	7.7	0.0	0.0	7.7	23.1
SE percent				7.6	7.6			7.6	12.1
Inriver run	0	0	0	61	61	0	0	61	183
SE return	0	0	0	60	60	0	0	60	96
<u>All</u>									
Number sampled	0	1	2	6	1	0	0	3	13
Percent	0.0	7.7	15.4	46.2	7.7	0.0	0.0	23.1	100.0
SE percent		7.6	10.3	14.3	7.6			12.1	0.0
Inriver run	0	61	122	366	61	0	0	183	793
SE return	0	60	82	113	60	0	0	96	0
After 26 June									
<u>Females</u>									
Number sampled	0	1	3	7	0	0	0	2	13
Percent	0.0	4.8	14.3	33.3	0.0	0.0	0.0	9.5	61.9
SE percent		4.7	7.8	10.5				6.5	10.8
Inriver run	0	187	560	1308	0	0	0	374	2429
SE return	0	186	306	412	0	0	0	257	425
<u>Males</u>									
Number sampled	0	0	1	4	0	0	0	3	8
Percent	0.0	0.0	4.8	19.0	0.0	0.0	0.0	14.3	38.1
SE percent			4.7	8.8				7.8	10.8
Inriver run	0	0	187	747	0	0	0	560	1494
SE return	0	0	186	344	0	0	0	306	425
<u>All</u>									
Number sampled	0	1	4	11	0	0	0	5	21
Percent	0.0	4.8	19.0	52.4	0.0	0.0	0.0	23.8	100.0
SE percent		4.7	8.8	11.1				9.5	0.0
Inriver run	0	187	747	2055	0	0	0	934	3923
SE return	0	186	344	437	0	0	0	373	0



**APPENDIX D: EFFORT, CHINOOK SALMON CATCH AND  
HARVEST, AND ANGLER RESIDENCY AND GUIDE  
STATUS SUMMARIZED FROM INTERVIEWS  
CONDUCTED AT THE KARLUK AND AYAKULIK  
RIVERS, 2006–2007**

Appendix D1.—Angler effort, Chinook salmon catch and harvest, and angler residency and guide status summarized from interviews conducted at the Karluk River weir and Portage, 2006–2007.

	Angler type		Residency				Total
	Guided	Unguided	Local	AK resident	Nonresident	Nonresident alien	
2006							
Anglers	537	142	24	23	584	48	679
Effort <sup>a</sup>	819	249	52	31	656	327	1,066
Harvest	695	66	17	18	695	34	764
Release	1,577	205	29	56	1,435	260	1,780
2007							
Anglers	231	38	8	6	215	41	270
Effort <sup>a</sup>	441	161	11	20	270	297	598
Harvest	147	9	2	3	141	10	156
Release	241	21	3	4	192	58	257

*Note:* Angler type and residency, as well as effort, catch, and harvest by angler type and residency were undetermined for some anglers.

<sup>a</sup> Defined as angler days.

Appendix D2.—Angler effort, Chinook salmon catch and harvest, and angler residency and guide status summarized from interviews conducted at the Ayakulik River weir and Bare Creek, 2006–2007.

	Angler type		Residency				Total
	Guided	Unguided	Local	AK resident	Nonresident	Nonresident alien	
2006							
Anglers	65	33	0	25	65	7	97
Effort <sup>a</sup>	343	277	-	150	385	70	605
Harvest	31	19	-	16	30	4	50
Release	420	130	-	81	453	7	541
2007							
Anglers	60	15	1	20	35	19	75
Effort <sup>a</sup>	318	101	6	95	192	119	412
Harvest	51	8	0	7	26	26	59
Release	860	129	15	22	529	439	1,005

*Note:* Angler type and residency, as well as effort, catch, and harvest by angler type and residency were undetermined for some anglers.

<sup>a</sup> Defined as angler days.