

Fishery Data Series No. 09-07

**Age Composition and Spawning Escapement of
Chinook Salmon in Karluk, Ayakulik, and Chignik
Rivers, Alaska, 1999–2003**

by

Donn A. Tracy,

Julia S. Schmidt,

and

Steve J. Fleischman

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Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



Symbols and Abbreviations

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

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

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1999-2003**

by
Donn A. Tracy, Julia S. Schmidt
Division of Sport Fish, Kodiak
and
Steve J. Fleischman
Division of Sport Fish, Research and Technical Services, Anchorage

Alaska Department of Fish and Game
Division of Sport Fish, Research and Technical Services
333 Raspberry Road, Anchorage, Alaska, 99518-1565

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Donn A. Tracy and Julia S. Schmidt
Alaska Department of Fish and Game, Division of Sport Fish
211 Mission Road, Kodiak, Alaska 99615-6399, USA
and
Steve J. Fleischman
Alaska Department of Fish and Game, Division of Sport Fish
333 Raspberry Road, Anchorage, Alaska 99518-1899, USA

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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 the Chinook salmon *Oncorhynchus tshawytscha* stocks of the Karluk, Ayakulik and Chignik rivers. This report presents data collected between 1999 and 2003. During this time period the inriver returns of Chinook salmon to the Karluk and Ayakulik rivers were censused by counting fish passing through weirs on the rivers, while inriver returns to the Chignik River were estimated from sample weir counts taken at hourly intervals. Age and sex compositions of the Karluk and Ayakulik inriver returns were estimated by sampling Chinook salmon at the weirs. Age and sex composition of the Chignik inriver return was estimated by opportunistic sampling of the commercial harvests in Chignik Lagoon and sport harvests in the Chignik River. Total sport fishing effort, and catch and harvest of Chinook salmon, for the Karluk and Ayakulik rivers were annually estimated through the Statewide Harvest Survey. Spawning escapements to the Karluk and Ayakulik rivers were estimated by subtracting sport harvest from inriver return because most harvest at these rivers occurs above the weirs.

At the Karluk River from 1999-2003, the inriver return ranged from 4,453 to 13,063 Chinook salmon. Sport harvest ranged from 587 to 2,581 Chinook salmon, and anglers released from 1,872 to 8,165 Chinook salmon. Estimated sport fishing effort for the entire year in the Karluk system ranged from 1,858 to 8,301 angler-days. Estimated spawning escapement ranged from 3,149 to 11,297 Chinook salmon.

At the Ayakulik River from 1999-2002, the inriver return ranged from 12,552 to 20,527 Chinook salmon. Estimated sport harvest ranged from 362 to 803 Chinook salmon, and estimates of release ranged from 2,825 to 8,135 Chinook salmon. Estimated sport fishing effort for the entire season ranged from 1,715 to 3,173 angler-days. Estimated spawning escapement ranged from 12,190 to 19,724 Chinook salmon.

In 2003, the inriver return to the Ayakulik River was 17,557 Chinook salmon. Census statistics of sport fishery catch, harvest and total effort were 451 Chinook harvested, 4,768 released and 1,725 days of directed Chinook salmon angler effort. Estimated spawning escapement was 17,106 Chinook salmon.

From 1999-2003, the estimated inriver return to the Chignik River ranged from 2,992 to 6,412 Chinook salmon. Harvest in the commercial purse seine fishery in Chignik Lagoon ranged from 595 to 2,834 Chinook salmon. The estimated average annual harvest of Chignik River Chinook salmon was 112 fish.

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 Cape Mensikof on the Bering side, and the Aleutian Islands) occur in the Karluk, Ayakulik, and Chignik rivers. All three populations support sport fisheries and are also harvested incidentally by commercial fisheries targeting sockeye salmon *Oncorhynchus nerka*. Chinook salmon from each of these drainages are also harvested by subsistence fisheries. In order to improve Chinook salmon management for the benefit of users it is essential to establish escapement goals which accurately reflect the production capacities of each stock. The purpose of this study is to estimate the age, sex, and length compositions of Chinook salmon returns, estimate total spawning escapements, and document estimated sport harvests and total incidental commercial catch. These data can 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.

THE KARLUK RIVER

The Karluk River, located on the southwest end of Kodiak Island (Figure 1), contains one of only two indigenous 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. A large portion 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.

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 probably include stocks from the Karluk and Ayakulik rivers, but also include stocks of unknown origin. This fishery annually opens by regulation as early as 9 June. Because over 97% of the escapement to Karluk River typically occurs by 15 July, mature Karluk Chinook salmon are considered to be commercially exploited from around 9 June through 15 July. The Alaska Department of Fish and Game, Commercial Fisheries Division (CFD) documents commercial harvests of Chinook salmon through fish ticket reports received from fish processors.

The subsistence harvest of Karluk River Chinook salmon is principally conducted by residents of Karluk Village. Harvest in this fishery is documented through subsistence permits issued by the CFD. Between 1994 and 2002 reported harvests ranged from 4 to 165 Chinook salmon (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 through air service into the village of Karluk or by float plane into Karluk Lake, Karluk Lagoon, or an area in mid-river known as the Portage. 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 harvests of Karluk River Chinook salmon as well as overall fishing effort are estimated by the Statewide Harvest Survey (SWHS; Howe et al. 1995, 1996, 2001 a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b). In addition, sport fishery catch and effort information is available from creel surveys conducted at the Karluk River in 1993 and 1994 (Schwarz et al. 2002), a census conducted in 2002 (Schwarz et al. 2003), and again during 2003 (Schwarz et al. *In prep*)¹. Between the late 1980s to the early 1990s the total estimated Karluk River sport fishing effort doubled while the estimated annual harvests of Chinook salmon also increased during this period. During the mid-1990s both effort and harvest remained relatively stable, although between 1999 and 2000 the estimated Chinook salmon harvest increased by more than 40% (Howe et al. 1995, 1996, 2001 a-d; Walker et al. 2003) (Table 1, Figure 2).

The CFD operates a weir on the Karluk River located approximately one-quarter mile upriver of Karluk Lagoon. Between 1994 and 2003, the inriver return of Chinook salmon migrating through the weir ranged from 4,453 to 13,443 and averaged 10,085 fish (Table 1, Figure 2, Appendix B1). Weir counts prior to 1994 (dating to 1976) averaged 9,003 fish.

¹ Schwartz, L. J., D. Tracy, and J. Schmidt. *In prep*. Karluk River visitor census, 2003. Alaska Department of Fish and Game, Fishery Management report, Anchorage.

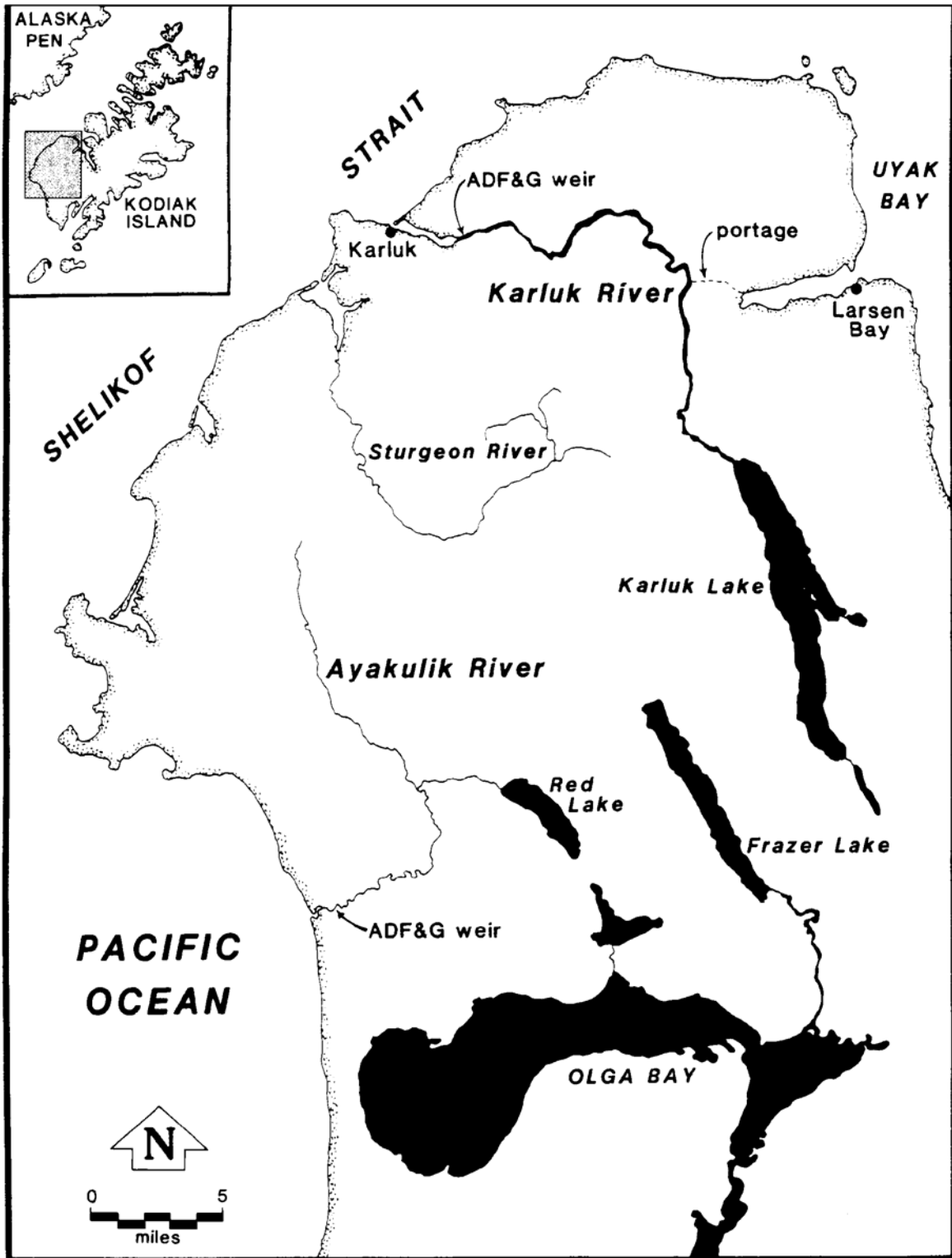


Figure 1.-Karluk and Ayakulik rivers on Kodiak Island with the general locations of ADF&G weirs.

Table 1.—Total commercial harvest of Chinook salmon from the Inner and Outer Karluk Section statistical areas, Karluk River inriver Chinook salmon return, and estimated sport harvests, 1994-2003; and reported subsistence harvests, 1994-2003.

Year	Inner and Outer Karluk Section Statistical Area Harvest ^a	Karluk River					
		Subsistence Harvest ^b	Inriver Return ^c	Sport Fishery ^d			
				Harvest (SE)	Release	Effort ^e	
1994	5,114	13	12,049	1,483	208	2,174	10,948
1995	1,794	31	12,657	1,284	230	2,613	6,928
1996	1,662	4	10,051	1,695	353	8,641	4,665
1997	1,445	17	13,443	1,574	285	9,119	5,043
1998	252	4	10,239	1,173	224	6,150	4,223
1999	1,067	7	13,063	1,766	317	5,957	6,239
2000	693	22	10,460	2,581	427	8,165	8,301
2001	2,588	24	4,453	1,304	257	3,676	5,589
2002 ^f	1,262	165	7,175	1,086	307	3,715	3,119
2003 ^g	1,336	6	7,256	587	n/a	1,872	1,858
Mean	1,721	29	10,085	1,453		5,208	5,691

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

^b Based on subsistence harvest records maintained by the Westward Region of CFD; includes all reported harvest in Karluk Section.

^c Census of Chinook salmon passing Karluk River weir (K. R. Brennan, Fisheries Biologist, ADF&G, Commercial Fisheries, Kodiak; personal communication)

^d Statewide Harvest Survey (Howe et al. 1995, 1996, 2001 a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b).

^e Units are angler-days. Includes effort directed toward all species.

^f 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, 234 released, and 1,374 angler days below the weir (Jennings et al. 2006a).

^g Sport fishery estimates include census above weir of 294 fish harvested, 1,513 released, and 831 angler days (Schwarz et al. *In prep*)¹ and SWHS estimates of 293 fish harvested, 359 released, and 1,027 angler-days below the weir (Jennings et al. 2006b).

¹ Schwartz. L. J., D. Tracy, and J. Schmidt. *In prep*. Karluk River visitor census, 2003. Alaska Department of Fish and Game, Fishery Management report, Anchorage.

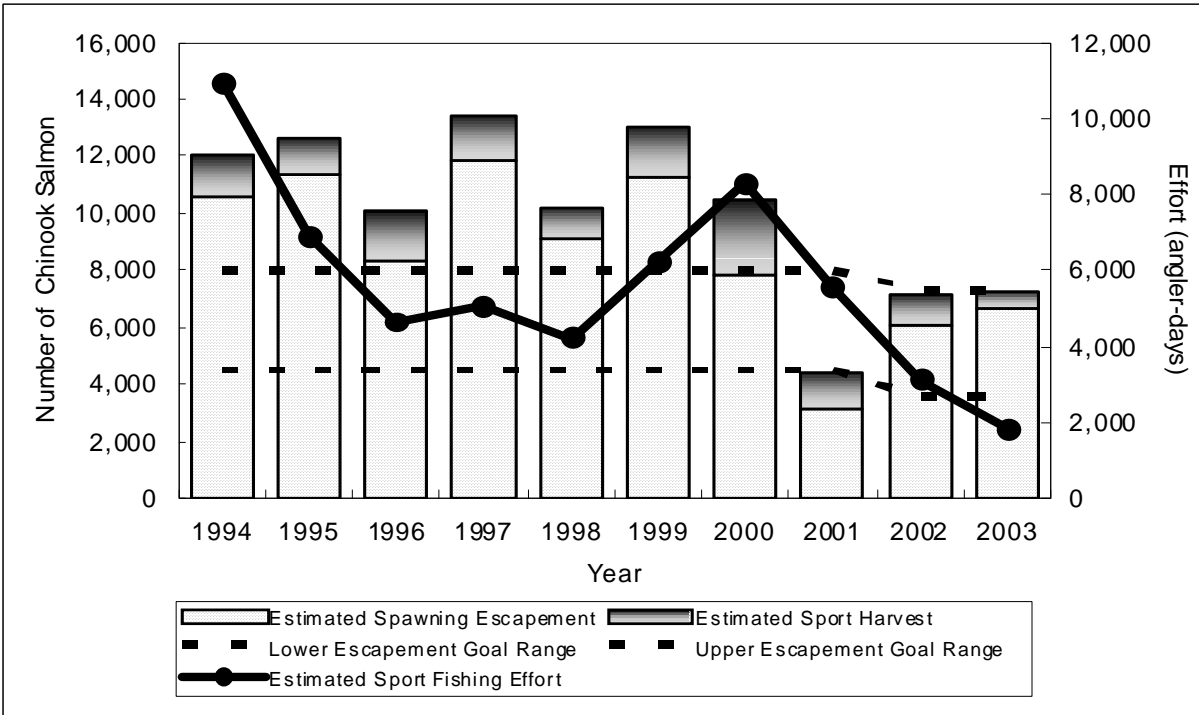


Figure 2.—Chinook salmon inriver return, estimated Chinook salmon sport harvest, and spawning escapement 1994-2003, and sport fishing effort (angler-days) for all species at Karluk River, 1994-2003.

The current Karluk River Chinook salmon minimum biological escapement goal (BEG) has been set at 3,600 spawning fish, based on an analysis of age composition and escapement data available through 2001 (Hasbrouck and Clark *In prep*)². The sport fishery is allowed to proceed without inseason restrictions if interim escapement levels projecting a total spawning escapement at or above the minimum goal are achieved. The current management approach assumes a Chinook salmon sport fishing mortality above the weir within the range of 1,000 to 1,500 fish.

THE AYAKULIK RIVER

The Ayakulik River, located about 25 miles south of the Karluk River (Figure 1), contains the only other indigenous population of Chinook salmon occurring 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 from 1994-2003 were negligible, averaging approximately 14 fish annually.

² Hasbrouck, J. J., and R. Clark. *In prep*. Escapement goal review of Chinook salmon in the Ayakulik, Chignik, and Karluk rivers. Alaska Department of Fish and Game, Fishery Manuscript, Anchorage.

Table 2.—Total commercial harvest of Chinook salmon from the Inner and Outer Ayakulik Section statistical areas, Ayakulik River inriver Chinook salmon return and estimated sport harvest, 1994-2003; and reported subsistence harvests, 1994-2002.

Year	Inner and Outer Ayakulik Section Statistical Area Harvest ^a	Ayakulik River					
		Subsistence Harvest ^b	Inriver Return ^c	Sport Fishery ^d			
				Harvest	(SE)	Release	Effort ^e
1994	0	3	9,138	948	n/a	1,020	5,473
1995	2,412	4	17,701	200	89	883	1,299
1996	3,723	0	10,344	419	168	1,972	1,524
1997	812	0	14,357	1,190	451	5,989	3,374
1998	3,795	0	14,038	259	93	3,245	1,314
1999	3,564	26	13,503	609	207	2,825	2,165
2000	3,416	38	20,527	803	209	7,578	1,808
2001	6,727	16	13,929	568	182	8,135	3,173
2002	85	37	12,552	362	135	5,282	1,715
2003	0	n/a	17,557	451	0	4,768	1,725
Mean	2,453	14	14,365	581		4,170	2,357

^a Source: ADF&G, Commercial Fish Division Statewide Harvest Receipt (fish ticket) database. Includes all Chinook harvested annually between Cape Ikolik and approximately N57.05.00' through 15 July. See Appendix A1 for harvest by inclusive statistical areas.

^b Based on subsistence harvest records maintained by the Westward Region of ADF&G's Commercial Fish Division; includes all reported harvest in Red (Ayakulik) River Section.

^c Census of Chinook salmon passing Karluk River weir (K. R. Brennan, Fisheries Biologist, ADF&G, Commercial Fisheries, Kodiak; personal communication).

^d 1994-2002 numbers are from Statewide Harvest Survey (Howe et al. 1995, 1996, 2001 a-d; Walker et al. 2003; Jennings et al. 2004, 2006a). 2003 sport fishery figures are from census data (Tracy and Schmidt *In prep*).

^e Units are angler-days; includes effort directed toward all species.

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 sea plane, 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. Two commercial sport fishing lodges near the lagoon provide opportunity for 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 down river from Bare Creek to exit at the lagoon. Estimated annual sport harvest of Ayakulik River Chinook salmon varied considerably from 1994-2003, ranging between 200 and 1,190 fish (Table 2, Figure 3). Between 1994 and 2003 estimates of overall sport fishing effort for all species averaged 2,357 angler-days.

Annual Chinook salmon inriver escapements are enumerated through a weir operated by the CFD just upstream of the Ayakulik Lagoon. From 1994 through 2003, inriver return of Chinook

salmon averaged 14,365 fish, with a peak inriver return of 20,527 occurring in 2000. Other relatively large inriver returns exceeding 17,000 fish occurred in 1995 and 2003 (Table 2, Figure 3, Appendix B2).

The current Ayakulik River Chinook salmon minimum biological escapement goal has been set at 4,800-9,600 spawning fish, based on an analysis of age composition and escapement data available through 2001 (Hasbrouck and Clark *In prep*)². 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 10,426 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 a total inriver count (minus an average estimated upriver sport harvest) meeting or exceeding the minimum goal are achieved. The current management approach assumes an annual Chinook salmon sport fishing mortality above the weir of less than 1,000 fish.

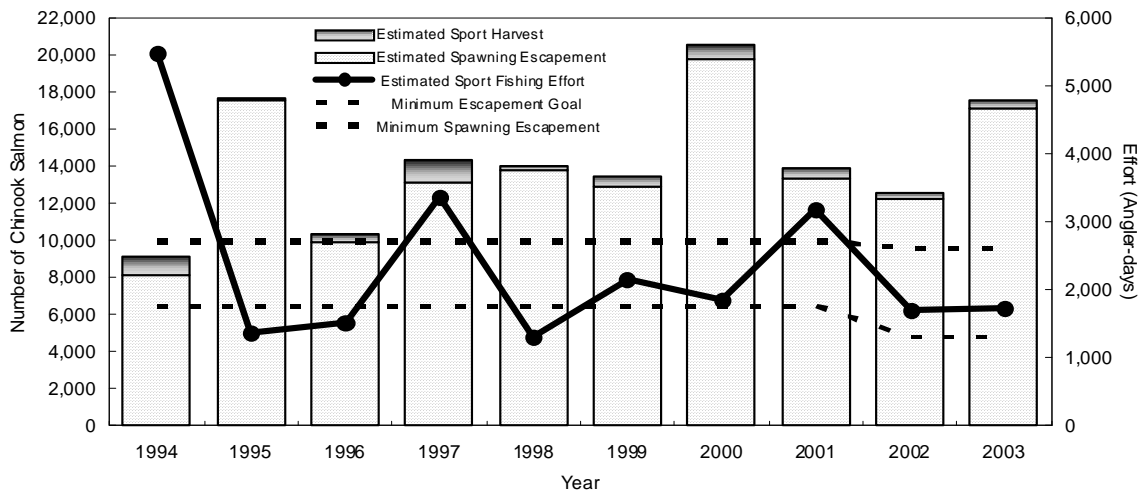


Figure 3.—Ayakulik River Chinook salmon inriver return, estimated Chinook salmon sport harvest, and spawning escapement, 1994-2003, and sport fishing effort (angler-days) for all species, 1994-2003.

THE 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 1994 and 2003, reported commercial harvests of Chinook salmon from Chignik Lagoon ranged from 595 to

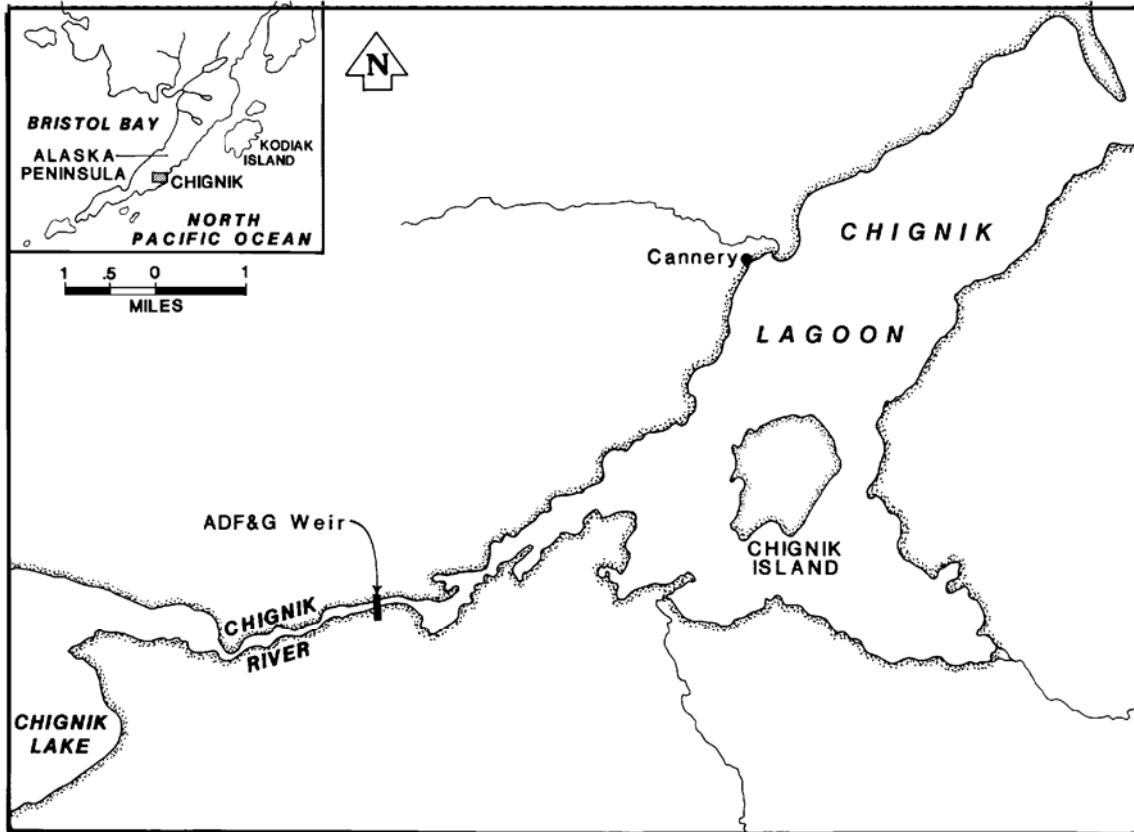


Figure 4.—Chignik River on Alaska Peninsula with the general location of the ADF&G weir.

3,008 fish and averaged 1,697 (Table 3). Reported subsistence harvests of Chignik River Chinook salmon during the same period ranged between 28 and 243 fish.

The sport fishery occurs primarily in the 2-mile river section between an Alaska Department of Fish and Game (ADF&G) weir and the outlet of Chignik Lake. Annual estimates of total sport harvests of Chignik River Chinook salmon have not been published by the SWHS (annual sample sizes have been too small to estimate effort, harvest, and catch). However, a creel survey conducted by ADF&G in 1998 estimated a harvest of approximately 200 fish (Schwarz et al. 2002), and the (unpublished) mean annual harvest estimated by the SWHS from 1999 through 2003 was 112 (SE = 36) Chinook salmon (Figure 5).

The CFD operates the ADF&G weir on Chignik River located approximately midway between Chignik Lagoon and Chignik Lake. Prior to 1993, Chinook salmon were visually counted through the weir on a daily basis during the first 10-minute interval of each hour between 7:00 a.m. and 10:00 p.m. Total daily passage was then estimated by expanding the hourly counts and summing the results. In 1993 Chinook salmon were counted for the first 30 minutes of daily weir operation and during the first 10 minutes of each hour of operation thereafter (Owen 1993; Owen and Quimby 1997). Additionally, until 1994, weir-based estimates of Chinook salmon escapement did not account for fish less than approximately 650 mm mid-eye to fork length, counts of which were instead included in estimates of sockeye salmon escapement due to a

Table 3.–Commercial and subsistence harvests, and estimated sport harvest of Chignik River Chinook salmon, along with inriver returns, 1994-2003.

Year	Total Chignik Area Commercial Harvest ^a	Chignik Lagoon Commercial Harvest ^b	Inriver Return ^c	Subsistence Harvest ^d	Sport Harvest ^e
1994	3,919	1,804	3,016	165	n/a
1995	5,493	3,008	4,288	98	n/a
1996	3,105	1,579	3,485	48	n/a
1997	3,032	1,289	3,824	28	n/a
1998	4,395	1,700	3,075	91	168
1999	3,296	2,101	3,728	243	n/a
2000	2,592	595	4,285	163	n/a
2001	2,849	1,142	2,992	171	n/a
2002	1,521	920	3,028	74	n/a
2003	3,059	2,834	6,412	n/a	n/a
Mean ^f	3,326	1,697	3,813	120	n/a

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

^c Inriver returns based on tallies from replayed video counts recorded daily during all hours of weir operation (Pappas et al. 2003).

^d Based on subsistence harvest records maintained by CFD and Subsistence Division; figures given are the sum of expanded community harvest estimates for the Chignik Management Area (Pappas et al. 2003).

^e Sport harvest estimates available for 1998 only (Schwarz et al. 2002).

^f 1994-2003.

similarity in size. Estimated total Chinook salmon counts incorporated the smaller fish escapement component by using age composition estimates for the run. Beginning in 1994 an underwater video camera was installed at the weir to identify and enumerate inriver return by species. Currently, daily video recordings during all hours of weir operation are replayed to produce an enumeration of the number of all Chinook salmon passing through the weir. Between 1994 and 2003, estimates of total Chinook salmon inriver return ranged from 2,992 to 6,412 fish and averaged 3,813 (Table 3).

In 1993 a Ricker stock-recruit model (Ricker 1975) was constructed using limited available 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 return while allowing fisheries to proceed during lower escapement years. Because of an 18% overestimation error of inriver return discovered in 1993, the BEG range of 1,750-3,000 fish was subsequently lowered by 18%. The current Chignik River Chinook salmon biological escapement goal range has been set at 1,300-2,700 spawning fish based on an

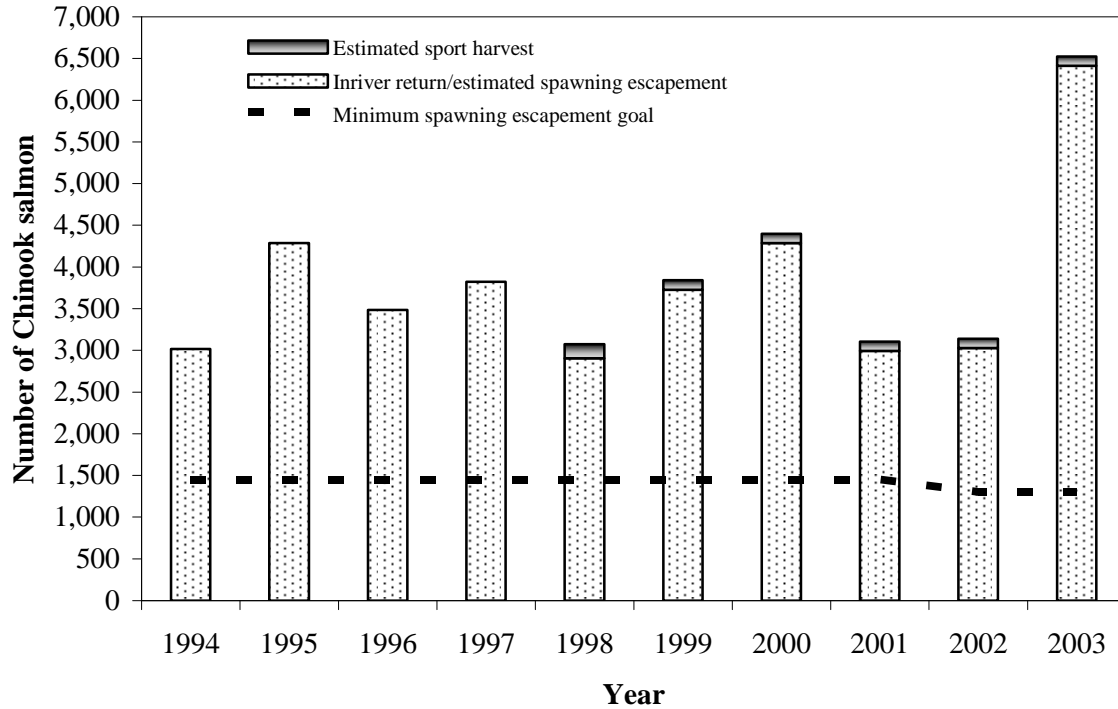


Figure 5.—Inriver return of Chinook salmon to Chignik River, 1994-1997, and estimated sport harvest and spawning escapement, 1998-2003.

analysis of age composition and escapement data available through 2001 (Hasbrouck and Clark *In prep*)². The sport fishery is allowed to proceed without inseason restrictions if interim escapement levels projecting to an inriver estimate meeting or exceeding the minimum goal are achieved. The current management approach assumes a Chinook salmon sport fishing mortality above the weir of approximately 200 fish.

STUDY OBJECTIVES

Due to practical constraints on the means available for gathering data to study the Chignik Chinook salmon population, study objectives established for this stock differ from those for Karluk and Ayakulik river stocks. The current method of enumerating the Chignik River salmon escapement using an underwater video camera has precluded sampling of Chinook salmon to estimate length, age and sex composition of the inriver return. Conversely, the visual escapement enumeration method employed at Karluk and Ayakulik river weirs facilitates capture for sampling of a portion of the inriver Chinook salmon return. Study objectives for Karluk and Ayakulik river Chinook salmon were:

1. Enumerate the inriver return of Chinook salmon through the Karluk and Ayakulik weirs;
2. Census the fishing effort, harvest and catch of Chinook salmon of anglers traveling downstream past the Karluk and Ayakulik weirs from 1 June to 15 July;

3. Estimate the length, age and sex composition of the inriver return of Chinook salmon through the weir on the Karluk and Ayakulik rivers; and
4. Estimate the length and sex composition of Chinook salmon harvested by anglers traveling by raft downstream past the weir on the Karluk and Ayakulik rivers from 1 June to 15 July.

Study objectives for Chignik River Chinook salmon were:

1. Enumerate the inriver return of Chinook salmon through the Chignik weir; and
2. Estimate the age and sex composition of the commercial harvest of Chinook salmon in the Chignik River Lagoon.

METHODS

DATA COLLECTION

Inriver Return

During the 1999-2003 seasons all species of immigrant and outmigrant anadromous fish passing through weirs on the Karluk, Ayakulik, and Chignik rivers were enumerated during the respective dates of operation according to CFD operational plans for each project. Census counts of Chinook salmon inriver returns were obtained each year for the Karluk and Ayakulik river stocks, while inriver returns to Chignik River were estimated. In 2000 high water conditions on the Chignik River precluded operation of the weir between the dates of 8 June and 11 July. Consequently, Chinook escapement was estimated from historic run data for this period (Pappas et al. 2003).

Age and Sex Composition of Inriver Return

On the Karluk and Ayakulik rivers, returns of Chinook salmon were sampled from weir traps at each location. Sampling strategies for each system consisted of stratification by seven weekly intervals (see below) with sample goals of 15-60 fish each, proportional to historic abundance by time period. Cumulative Chinook salmon sampling goals for each location totaled 300 fish annually.

On the Chignik River, the commercial purse seine harvest was sampled for age, sex, and length. During 1999-2001, the season was divided in two 2-week strata (1 July-15 July and 16 July-31 July) with sample goals of 150 fish for each interval. In 2002 and 2003 the commercial harvest sampling strategy was revised to consist of stratification by six weekly intervals (see below) proportional to historic abundance by time period. The total sample size goal was 150 fish annually.

In 2002 and 2003, beach seining was conducted below the weir to sample the escapement of sockeye salmon. This allowed for age-sex-length sampling of Chinook salmon incidentally captured during these operations. Ultimately, Chignik commercial harvest samples were deemed unreliable (see Results), and the escapement sample sizes too small. Sport-caught samples (see below) were used to estimate age and sex composition.

Length from mid-eye to fork of tail (MEF) was recorded to the nearest millimeter for each fish sampled. Sex was determined on the basis of external characteristics. Whenever possible, three 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, two rows above the lateral line (Welander 1940). Sample scales were placed on a gummed card for subsequent analysis. Scales not available from the preferred area 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. Scales not available in the preferred area on the left side of the fish 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, and catch and harvest of Chinook salmon at the Karluk River were estimated by the SWHS for 1999-2003 and at the Ayakulik River for 1999-2002. The SWHS total estimate for the Karluk was split into separate components – upstream and downstream of the ADF&G weir – beginning in 2002. The Karluk River sport fishery upriver of the weir was censused in 2002 and 2003. SWHS estimates were not available for the Chignik River sport fishery due to small sample size. The Chignik sport fishery was censused once, in 1998.

In addition, anglers traveling downstream past or through the Karluk and Ayakulik weirs were individually interviewed to provide inseason indices of fishery performance. The following information was recorded for each interview:

1. Number of days fished;
2. Number of Chinook and sockeye salmon, steelhead, and Dolly Varden harvested;
3. Number of Chinook and sockeye salmon, steelhead, and Dolly Varden released;
4. Residency: (a) non-Alaska resident, (b) non-Kodiak Island Alaska resident, (c) Kodiak Island resident, and (d) non-citizen;
5. Guided or unguided.

On the Ayakulik River, clients from a lodge located on the lagoon walked and boated upriver daily to fish. In order to avoid multiple interviews of the same angler, the lodge manager provided ADF&G with daily summaries of client fishing activities between 1999 and 2002. The daily summary included the following information:

1. Number of anglers;
2. Number of Chinook and sockeye salmon, steelhead, and Dolly Varden collectively harvested;
3. Number of Chinook and sockeye salmon, steelhead, and Dolly Varden collectively released;
4. Residency.

Age, Sex, and Length Sampling of Sport Harvest

At the Karluk and Ayakulik weirs, sport-harvested Chinook salmon were sampled for sex and length up to a goal of 12 fish per week between 24 May and 10 July. Filleted or headed fish were not sampled. Length and sex data were collected as described for escapement sampling. Difficulty in achieving sport harvest sample goals at either location is due to a common practice of anglers processing fish shortly after being landed for cooler storage during the remainder of their trip. On the Ayakulik River the sample goal has historically been achievable as a result of

predominantly sampling fish harvested by anglers based from the lower river lodge, which are assumed to be representative of the entire sport fish harvest.

At the Chignik River weir, Chinook salmon harvested by anglers traveling downriver past the weir were sampled for age, sex, and length.

DATA ANALYSIS

Inriver Return at Karluk and Ayakulik Rivers

The proportion of Chinook salmon in age/sex class j sampled from the inriver return at the Karluk and Ayakulik rivers during temporal stratum i and its variance was estimated as a binomial proportion (Cochran 1977) by:

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

and

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

where:

- n_{ij} = the number of Chinook salmon in age/sex class j during stratum i ,
- n_i = the total number of Chinook salmon sampled during stratum i , and
- N_i = the inriver return of Chinook salmon counted during stratum i .

The abundance of Chinook salmon by age/sex class was estimated as the product of the inriver return and the proportion:

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

and its variance estimated by:

$$Var(\hat{N}_{ij}) = N_i^2 Var(\hat{p}_{ij}). \quad (4)$$

Chi-square statistics were calculated to test the null hypothesis that the age/sex composition of the inriver return did not differ among temporal strata shown below.

River and Year	Stratum						
	1	2	3	4	5	6	7
<u>Karluk and Ayakulik Rivers</u>							
1999-2002	Before 31 May	31 May – 5 June	6-12 June	13-19 June	20-26 June	27 June – 3 July	After 3 July
2003	Before 31 May	31 May – 6 June	7-13 June	14-20 June	21-27 June	28 June – 4 July	After 4 July
<u>Chignik River:</u>							
1999-2001	1-15 July	16-31 July					
2002	Before 30 June	30 June – 6 July	7-13 July	14-20 July	21-27 July	After 27 July	
2003	Before 29 June	29 June – 5 July	6-12 July	13-19 July	20-26 July	After 26 July	

Data were pooled across adjacent strata when differences were not detected at $\alpha = 0.05$, or when sampling fractions were approximately equal between strata. If either of these conditions were true, then the pooled and stratified estimates were essentially equivalent, so the adjacent strata were pooled. If neither condition was true (i.e., if either age proportions or sampling fractions differed), then age composition, and return by age, was estimated separately for each stratum. The total number of Chinook salmon of each age/sex class, and their variances, was the sum of the stratum estimates.

Spawning Escapement at Karluk and Ayakulik Rivers

During 1999-2001, we believe that nearly all of sport harvest occurred upstream of the Karluk and Ayakulik river weirs, therefore spawning escapement was estimated by subtracting total estimated sport fish harvest. The variance of the estimated spawning escapement was the same as the variance of the estimated sport harvest; the inriver return was a complete census and thus without sampling error.

The proportion of Chinook salmon harvested by anglers who moved downstream past the Karluk or Ayakulik weir that was of sex j , and its variance, was estimated using equations (1) and (2). The total number of Chinook salmon of sex j harvested above the weir was estimated by:

$$\hat{H}_j = \hat{H}\hat{p}_j, \quad (5)$$

and its variance estimated by (Goodman 1960):

$$Var(\hat{H}_j) = \hat{H}^2Var(\hat{p}_j) + \hat{p}_j^2Var(\hat{H}) - Var(\hat{p}_j)Var(\hat{H}), \quad (6)$$

where:

\hat{H} and $Var(\hat{H})$ = harvest and variance of harvest estimated from the SWHS, and

\hat{p}_j and $Var(\hat{p}_j)$ = proportion and variance of the proportion of Chinook salmon of class j .

Chignik River

Chignik River Lagoon commercial harvest data based on fish ticket receipts and daily counts of Chinook salmon through the Chignik River weir were considered census data. Total returns of Chinook salmon to the Chignik River were calculated by summing commercial harvests and inriver returns. Since we had no yearly estimates of Chignik sport harvest, Chignik River Chinook salmon spawning escapement was estimated by subtracting 200 fish from the estimated inriver returns (based on a 1998 creel census estimate of 168 fish harvested (Clapsadl 2002). Uncertainty in the Chignik spawning escapement due to the imputed sport harvest estimate has not been addressed in this report. Age and sex proportions, and returns by age and sex, were estimated from samples of sport-harvested fish using equations (1)-(4). Age and sex composition estimates were not stratified by time.

Age and sex composition of total returns was estimated using equations (1)-(4), based on fish sampled in the commercial harvest.

RESULTS

KARLUK RIVER

1999

The Karluk weir was installed in 1999 on 26 May and remained operational continuously through 23 September.

The inriver return of Chinook salmon through the weir was 13,063 fish. Age was determined for 324 of 355 Chinook salmon sampled at the weir. Estimates of abundance by age were stratified by time period: through 12 June and after 12 June (Appendix D1). Age composition changed between periods (ages 1.1-1.5, $\chi^2 = 24.0$, $df = 4$, $P = 0.0001$), with older fish arriving early and younger fish late. Most fish were aged 1.3 or 1.4 (Table 4). There were 1.1 males for every female.

In 1999, anglers fishing the Karluk system caught an estimated 7,723 Chinook salmon and harvested 1,766 (SE = 317) fish, expending 6,239 (SE = 945) angler-days of effort for all species during the entire year (Table 1; Howe et al. 2001d). The 1999 Karluk River spawning escapement was estimated at 11,297 (SE = 317) Chinook salmon (Figure 2), of which 5,310 (SE = 350) were females and 5,987 (SE = 358) were males.

Angler interviews conducted at the weir during 1999 accounted for 1,944 angler days of effort during which 350 Chinook salmon were harvested and 1,540 released (Appendix G1). Of the 323 anglers interviewed, 78% were nonresident and 66% were unguided. Sport caught Chinook salmon were not sampled for age, sex and length during the 1999 fishery.

2000

The Karluk weir was installed in 2000 on 25 May and operated through 24 September. Daily Chinook salmon escapement was enumerated during this period, except on 15, 22, 23, 29 June and 11 July when counts were unobtainable due to displacement of the weir structure by bears. An estimated total of 220 Chinook salmon were added to the cumulative overall escapement to account for the passage of fish during these periods.

The inriver return of Chinook salmon through the weir was 10,460 fish. Age was determined for 280 of 305 Chinook salmon sampled at the weir. Estimates of abundance by age were stratified by time period: through 12 June and after 12 June (Appendix D2). Age composition changed between periods (ages 1.1-1.5, $\chi^2 = 14.9$, $df = 4$, $P = 0.005$), with older fish arriving early and younger fish late. Over 60% of the fish were age 1.4 (Table 5). There were 1.8 females for every male.

In 2000, anglers fishing the Karluk system caught an estimated 10,746 Chinook salmon and harvested 2,581 (SE = 427) fish, expending 8,301 (SE = 1,203) angler-days of effort for all species during the entire year (Table 1; Walker et al. 2003). The 2000 Karluk River spawning escapement was estimated at 7,879 (SE = 427) Chinook salmon, of which 5,066 (SE = 352) were females and 2,813 (SE = 268) were males.

Angler interviews conducted at the weir during 2000 accounted for 1,903 angler days of effort during which 511 Chinook salmon were harvested and 1,958 released (Appendix G1).

Table 4.—Estimated age and sex composition of inriver return, and mideye to fork length by age and sex for Karluk River Chinook salmon, 1999.

	Age								Total
	0.2	0.4	1.1	1.2	1.3	1.4	1.5	2.4	
Females									
Percent	0.0	0.3	0.0	0.8	15.9	25.5	4.3	0.3	47.0
SE	0.0	0.3	0.0	0.5	2.0	2.4	1.2	0.3	2.8
Inriver Return	0	36	0	107	2,074	3,335	558	36	6,146
SE	0	35	0	61	259	318	156	35	363
Number Sampled		1		3	54	83	12	1	175
Mean Length		805		658	728	789	837	796	768
Std Dev Length				6	48	41	35		59
Minimum Length		805		654	540	700	779	796	540
Maximum Length		805		665	875	870	890	796	890
Males									
Percent	0.5	0.0	0.5	7.8	26.0	16.8	1.2	0.0	53.0
SE	0.4	0.0	0.4	1.5	2.4	2.1	0.7	0.0	2.8
Inriver Return	71	0	71	1,025	3,398	2,196	156	0	6,917
SE	50	0	50	194	315	276	88	0	363
Number Sampled			2	26	87	52	3		180
Mean Length			324	582	739	796	802		728
Std Dev Length			1	41	47	51	118		94
Minimum Length			323	490	610	620	680		323
Maximum Length			325	652	830	910	915		915
Total									
Percent	0.5	0.3	0.5	8.7	41.9	42.3	5.5	0.3	100.0
SE	0.4	0.3	0.4	1.5	2.7	2.7	1.3	0.3	0.0
Inriver Return	71	36	71	1,133	5,472	5,531	713	36	13,063
SE	50	35	50	202	352	359	175	35	0
Number Sampled		1	2	29	141	135	15	1	355
Mean Length		805	324	589	734	791	830	796	747
Std Dev Length			1	46	47	45	56		81
Minimum Length		805	323	490	540	620	680	796	323
Maximum Length		805	325	665	875	910	915	796	915

Note: Age and sex compositions were stratified by time period (see Appendix D1) based on samples obtained 28 May–9 July 1999. Female, male, and total statistics include 21, 10, and 31 fish for which age was not determined, respectively.

Table 5.—Estimated age and sex composition of inriver return, and mideye to fork length by age and sex for Karluk River Chinook salmon, 2000.

	Age					Total
	1.1	1.2	1.3	1.4	1.5	
Females						
Percent	0.0	0.6	19.0	43.8	0.8	64.3
SE	0.0	0.4	2.4	3.0	0.6	2.8
Inriver Return	0	66	1,992	4,583	83	6,724
SE	0	46	247	311	59	298
Number Sampled		2	54	119	2	192
Mean Length		590	758	821	831	800
Std Dev Length		45	56	37	41	56
Minimum Length		558	497	641	802	497
Maximum Length		621	878	920	860	920
Males						
Percent	1.6	3.0	13.3	17.3	0.5	35.7
SE	0.7	1.0	1.9	2.3	0.5	2.8
Inriver Return	164	312	1,396	1,814	50	3,736
SE	72	102	199	242	49	298
Number Sampled	5	9	41	47	1	113
Mean Length	386	535	768	838	827	766
Std Dev Length	36	41	51	47		124
Minimum Length	359	470	637	717	827	359
Maximum Length	448	616	870	955	827	955
Total						
Percent	1.6	3.6	32.4	61.2	1.3	100.0
SE	0.7	1.1	2.7	2.8	0.7	0.0
Inriver Return	164	378	3,389	6,397	132	10,460
SE	72	111	286	297	76	0
Number Sampled	5	11	95	166	3	305
Mean Length	386	545	762	826	830	787
Std Dev Length	36	45	54	41	29	89
Minimum Length	359	470	497	641	802	359
Maximum Length	448	621	878	955	860	955

Note: Age and sex compositions were stratified by time period (see Appendix D2) based on samples obtained 25 May–5 July 2000. Female, male, and total statistics include 15, 10, and 25 fish for which age was not determined, respectively.

2001

The Karluk weir was installed in 2001 on 24 May and operated through 18 September.

The inriver return of Chinook salmon through the weir was 4,453 fish. Age was determined for 71 of 81 Chinook salmon sampled at the weir. Estimates of abundance by age were not stratified by time period, since age composition did not change between periods (before and after 12 June, ages 1.3-1.5, $\chi^2 = 1.6$, $df = 2$, $P = 0.45$). Most (67.6%) fish were age 1.4 (Table 6). There were 1.5 females for every male.

In 2001, anglers fishing the Karluk system caught an estimated 4,980 (SE = 1,221) Chinook salmon and harvested 1,304 (SE = 257) fish, expending 5,589 (SE = 784) angler-days of effort for all species during the entire year (Table 1; Jennings et al. 2004). The 2001 Karluk River spawning escapement was estimated at 3,149 (SE = 257) Chinook salmon, of which 1,864 (SE = 240) were females and 1,285 (SE = 213) were males.

Angler interviews conducted at the weir and at Karluk Portage during 2001 accounted for 1,976 angler-days of effort during which 333 Chinook salmon were harvested and 1,230 released (Appendix G1). Of the 526 anglers interviewed, 90% were nonresident and 70% were guided. Eight harvested Chinook salmon were measured at the weir, four of which were females. Sampled females averaged 849 mm (SE = 17), and males 725 mm (SE = 46) in length (Appendix C1).

2002

The Karluk weir was installed in 2002 on 21 May and operated through 20 September.

The inriver return of Chinook salmon through the weir was 7,174 fish. Age was determined for 303 of 347 Chinook salmon sampled at the weir. Estimates of abundance by age were stratified by time period: through 12 June, 13-26 June, 27 June-3 July, and after 3 July (Appendix D3). Age composition changed between periods (ages 1.1-1.5, $\chi^2 = 114$, $df = 12$, $P < 0.0001$), with older fish arriving early and younger fish late. Most fish were ages 1.2, 1.3, or 1.4 (Table 7). There were 1.4 males for every female.

In 2002, anglers fishing the Karluk system caught an estimated 4,801 (SE = 505) Chinook salmon and harvested 1,086 (SE = 307) fish, expending 3,119 (SE = 592) angler-days of effort for all species during the entire year (Table 1; Jennings et al. 2006a). The 2002 Karluk River spawning escapement was 6,573 Chinook salmon, of which 2,721 (SE = 184) were females and 3,852 (SE = 184) were males.

Angler interviews conducted at the weir and at Karluk Portage during 2002 accounted for 1,745 angler-days of effort during which 601 Chinook salmon were harvested and 2,268 were released (Appendix G1). Of the 831 anglers interviewed, 90% were nonresident and 77% were guided. Sport caught Chinook salmon were not sampled for age, sex and length during the 2002 fishery.

2003

The Karluk weir was installed in 2003 on 17 May and operated through 27 September. In late August high water conditions interrupted operations for a 3-day period, during which an estimate of the daily Chinook salmon escapement was made based on historic run timing scaled to the magnitude of the 2003 return prior to the high water period.

Table 6.—Estimated age and sex composition of inriver return, and mideye to fork length by age and sex for Karluk River Chinook salmon, 2001.

	Age				Total
	1.3	1.4	1.5	2.5	
Females					
Percent	9.9	46.5	2.8	0.0	59.2
SE	3.5	5.9	2.0	0.0	5.8
Inriver Return	439	2,070	125	0	2,634
SE	157	263	87	0	260
Number Sampled	7	33	2		48
Mean Length	779	827	847		821
Std Dev Length	67	57	6		57
Minimum Length	686	601	843		601
Maximum Length	852	906	851		906
Males					
Percent	12.7	21.1	5.6	1.4	40.8
SE	3.9	4.8	2.7	1.4	5.8
Inriver Return	564	941	251	63	1,819
SE	176	216	122	62	260
Number Sampled	9	15	4	1	33
Mean Length	741	821	857	820	803
Std Dev Length	51	51	37		62
Minimum Length	672	694	817	820	672
Maximum Length	834	902	905	820	905
Total					
Percent	22.5	67.6	8.5	1.4	100.0
SE	5.0	5.5	3.3	1.4	0.0
Inriver Return	1,003	3,010	376	63	4,453
SE	221	247	147	62	0
Number Sampled	16	48	6	1	81
Mean Length	758	826	854	820	813
Std Dev Length	59	55	29		60
Minimum Length	672	601	817	820	601
Maximum Length	852	906	905	820	906

Note: Based on samples obtained 28 May–9 July 2001. Female, male, and total statistics include 6, 4, and 10 fish for which age was not determined, respectively.

Table 7.—Estimated age and sex composition of inriver return, and mideye to fork length by age and sex for Karluk River Chinook salmon, 2002.

	Age					Total
	1.1	1.2	1.3	1.4	1.5	
Females						
Percent	0.0	0.3	15.1	23.8	2.2	41.4
SE	0.0	0.3	2.3	2.1	0.8	2.8
Inriver Return	0	20	1,085	1,704	160	2,969
SE	0	20	163	152	54	201
Number Sampled		1	46	83	8	164
Mean Length		750	781	805	858	799
Std Dev Length			39	40	32	44
Minimum Length		750	687	676	810	627
Maximum Length		750	898	925	915	925
Males						
Percent	2.5	25.0	16.8	12.2	2.1	58.6
SE	1.5	2.7	2.2	1.7	0.8	2.8
Inriver Return	180	1,794	1,205	878	148	4,205
SE	106	193	157	120	54	201
Number Sampled	3	58	54	43	7	183
Mean Length	372	620	764	797	849	722
Std Dev Length	31	44	59	53	33	105
Minimum Length	349	508	612	692	818	349
Maximum Length	408	718	884	911	909	911
Total						
Percent	2.5	25.3	31.9	36.0	4.3	100.0
SE	1.5	2.7	2.9	2.3	1.1	0.0
Inriver Return	180	1,815	2,289	2,582	308	7,174
SE	106	194	205	162	76	0
Number Sampled	3	59	100	126	15	347
Mean Length	372	623	772	802	854	758
Std Dev Length	31	46	51	45	32	91
Minimum Length	349	508	612	676	810	349
Maximum Length	408	750	898	925	915	925

Note: Age and sex compositions were stratified by time period (see Appendix D3) based on samples obtained 26 May–5 July 2002. Female, male, and total statistics include 26, 16, and 42 fish for which age was not determined, respectively.

The inriver return of Chinook salmon through the weir was 7,256 fish. Age was determined for 373 of 416 Chinook salmon sampled at the weir. Estimates of abundance by age were stratified by time period: through 30 May, 31 May–13 June, 14–27 June, and after 27 June (Appendix D4). Age composition changed between periods (ages 1.1–1.5, $\chi^2 = 31.7$, $df = 12$, $P = 0.002$), with older fish generally arriving early and younger fish late. Most fish were age 1.3 (Table 8). There were 0.8 males for every female.

In 2003, anglers fishing the Karluk system caught an estimated 2,459 Chinook salmon and harvested 587 fish, expending 1,858 angler-days of effort directed at all species during the entire year (Table 1; Jennings et al. 2006b). The 2003 Karluk River spawning escapement was 6,986 Chinook salmon, of which 3,884 (SE = 238) were females and 3,102 (SE = 238) were males.

Angler interviews conducted at the weir and at Karluk Portage during 2003 accounted for 758 angler-days of effort during which 291 Chinook salmon were harvested and 1,513 released (Appendix G1). Of the 389 anglers interviewed at Karluk weir in 2003, 71% were non Alaska residents from other parts of the United States (U.S.) and 63% were guided. Of the 54 harvested Chinook salmon measured at the weir, 21 were females and 33 were males. Sampled females averaged 797 mm (SE = 10), and males 765 mm (SE = 19) in length (Appendix C2).

AYAKULIK RIVER

1999

The Ayakulik weir was installed in 1999 on 25 May and operated through 22 August.

The inriver return of Chinook salmon through the weir was 13,503 fish. Age was determined for 254 of 300 Chinook salmon sampled at the weir. Estimates of abundance by age were stratified by time period: through 19 June, and after 19 June (Appendix E1). Age composition changed between periods (ages 1.1–1.5, $\chi^2 = 29.5$, $df = 4$, $P < 0.0001$), with older fish generally arriving early and younger fish late. Most fish were age 1.3 or 1.4 (Table 9). There were 2.2 males for every female.

In 1999, anglers fishing the Ayakulik system caught an estimated 3,434 Chinook salmon and harvested 609 (SE = 207) fish, expending 2,165 (SE = 491) angler-days of effort for all species during the entire year (Table 2; Howe et al. 2001d). The 1999 Ayakulik River spawning escapement was estimated at 12,894 (SE = 207) Chinook salmon (Figure 3), of which 3,971 (SE = 405) were females and 8,923 (SE = 425) were males.

Angler interviews conducted at the weir during 1999 accounted for 343 angler-days of effort during which 237 Chinook salmon were harvested and 971 released (Appendix G2). Of the 63 anglers interviewed, 65% were non Alaska residents from other parts of the U.S. and 64% were guided. Sport caught Chinook salmon were not sampled for age, sex and length during the 1999 fishery.

2000

The Ayakulik weir was installed in 2000 on 21 May and operated through 26 August. On 2–3 August the weir was removed due to high water and was re-installed on 4 August. During this period an estimated Chinook salmon escapement of 0 fish was based on historic run timing scaled to the magnitude of the 2000 return prior to the high water period.

Table 8.—Estimated age and sex composition of inriver return, and mideye to fork length by age and sex for Karluk River Chinook salmon, 2003.

	Age						Total
	1.1	1.2	1.3	1.4	1.5	2.4	
Females							
Percent	0.0	6.0	35.0	14.4	0.3	0.0	55.6
SE	0.0	1.1	4.4	3.8	0.3	0.0	3.4
Inriver Return	0	435	2,537	1,042	22	0	4,036
SE	0	79	317	275	22	0	247
Number Sampled		28	107	46	1		197
Mean Length		650	764	816	811		756
Std Dev Length		75	50	46			76
Minimum Length		528	618	692	811		528
Maximum Length		834	874	903	811		903
Males							
Percent	1.4	12.6	23.9	5.9	0.5	0.1	44.4
SE	0.6	1.5	3.3	1.1	0.3	0.0	3.4
Inriver Return	102	915	1,733	429	36	4	3,220
SE	45	112	237	81	25	3	247
Number Sampled	5	55	101	28	1	1	219
Mean Length	443	605	775	811	1,009	881	726
Std Dev Length	99	67	64	65			118
Minimum Length	356	477	596	626	1,009	881	356
Maximum Length	595	826	906	965	1,009	881	1,009
Total							
Percent	1.4	18.6	58.8	20.3	0.8	0.1	100.0
SE	0.6	1.8	4.1	3.9	0.5	0.0	0.0
Inriver Return	102	1,351	4,270	1,471	58	4	7,256
SE	45	129	297	284	33	3	0
Number Sampled	5	83	208	74	2	1	416
Mean Length	443	620	769	814	910	881	740
Std Dev Length	99	73	57	54	140		101
Minimum Length	356	477	596	626	811	881	356
Maximum Length	595	834	906	965	1,009	881	1,009

Note: Age and sex compositions were stratified by time period (see Appendix D4) based on samples obtained 22 May–11 July 2003. Female, male, and total statistics include 15, 28, and 43 fish for which age was not determined, respectively.

Table 9.—Estimated age and sex composition of inriver return, and mideye to fork length by age and sex for Ayakulik River Chinook salmon, 1999.

	Age											Total
	0.2	0.3	0.4	1.1	1.2	1.3	1.4	1.5	2.3	2.4	2.5 unkn.	
Females												
Percent	0.0	0.0	0.0	0.0	1.5	16.8	12.2	0.2	0.0	0.0	0.0	30.8
SE	0.0	0.0	0.0	0.0	0.8	2.5	2.1	0.2	0.0	0.0	0.0	3.1
Inriver Return	0	0	0	0	203	2,269	1,652	32	0	0	0	4,155
SE	0	0	0	0	107	343	283	31	0	0	0	414
Number Sampled					4	38	34	1				23
Mean Length					540	755	818	847				780
Std Dev Length					66	48	48					78
Minimum Length					476	638	689	847				582
Maximum Length					603	898	897	847				982
Males												
Percent	0.5	0.0	0.0	2.0	17.5	32.6	15.6	1.0	0.0	0.0	0.0	69.2
SE	0.5	0.0	0.0	0.9	2.3	3.1	2.4	0.6	0.0	0.0	0.0	3.1
Inriver Return	70	0	0	267	2,367	4,398	2,113	134	0	0	0	9,348
SE	69	0	0	115	311	422	326	82	0	0	0	414
Number Sampled	1			6	54	74	39	3				23
Mean Length	562			431	577	745	812	800				694
Std Dev Length				184	43	76	70	167				117
Minimum Length	562			314	469	458	672	609				486
Maximum Length	562			782	697	924	917	920				876
Total												
Percent	0.5	0.0	0.0	2.0	19.0	49.4	27.9	1.2	0.0	0.0	0.0	100.0
SE	0.5	0.0	0.0	0.9	2.4	3.2	2.9	0.6	0.0	0.0	0.0	0.0
Inriver Return	70	0	0	267	2,570	6,667	3,764	166	0	0	0	13,503
SE	69	0	0	115	323	436	398	88	0	0	0	0
Number Sampled	1			6	58	112	73	4				46
Mean Length	562			431	574	749	815	812				737
Std Dev Length				184	45	68	60	139				107
Minimum Length	562			314	469	458	672	609				486
Maximum Length	562			782	697	924	917	920				982

Note: Age and sex compositions were stratified by time period (see Appendix E1) based on samples obtained 27 May–4 July 1999. Female, male, and total statistics include 23, 23, and 46 fish for which age was not determined, respectively.

The inriver return of Chinook salmon through the weir was 20,527 fish (Table 2). Age was determined for 339 of 392 Chinook salmon sampled at the weir. Estimates of abundance by age were stratified by time period: through 30 May, 31 May-12 June, 13-19 June, and after 19 June (Appendix E2). Age composition changed between periods (ages 1.2-1.4, $\chi^2 = 30.7$, $df = 6$, $P < 0.0001$), with older fish arriving early and younger fish late. Most fish were age 1.3 or 1.4 (Table 10). There were 1.4 males for every female.

In 2000, anglers fishing the Ayakulik system caught an estimated 8,381 Chinook salmon and harvested 803 (SE = 209) fish, expending 1,808 (SE = 395) angler-days of effort for all species during the entire year (Table 2; Walker et al. 2003). The 2000 Ayakulik River spawning escapement was estimated at 19,724 (SE = 209) Chinook salmon, of which 8,304 (SE = 657) were females and 11,420 (SE = 662) were males.

Angler interviews conducted at the weir during 2000 accounted for 403 angler-days of effort during which 315 Chinook salmon were harvested and 1,567 released (Appendix G2). Of the 60 anglers interviewed, 83% were non Alaskan residents from other parts of the U.S. and 95% were guided. Sport caught Chinook salmon were not sampled for age, sex and length during the 2000 fishery.

2001

The Ayakulik weir was installed in 2001 on 20 May and operated through 29 August. On 2 June, 19-20 July, and 20-21 August the weir was removed due to high water and on each occasion subsequently re-installed. During this period an estimated cumulative total Chinook salmon escapement of 100 fish was based on historic run timing scaled to the magnitude of the 2001 return prior to the high water periods.

The inriver return of Chinook salmon through the weir was 13,929 fish (Table 2). Age was determined for 232 of 300 Chinook salmon sampled at the weir. Estimates of abundance by age were stratified by time period: through 5 June, 6-19 June, and after 19 June (Appendix E3). Age composition changed between periods (ages 1.1-1.5, $\chi^2 = 22.4$, $df = 8$, $P = 0.004$). In general, older fish arrived earlier than younger fish, although the proportion of age-1.1 fish peaked during the second time period. Most fish were age 1.4 (Table 11). There were 0.7 males for every female.

In 2001, anglers fishing the Ayakulik system caught an estimated 8,703 (SE = 2,418) Chinook salmon and harvested 568 (SE = 182) fish, expending 3,173 (SE = 1,006) angler-days of effort for all species during the entire year (Table 2; Jennings et al. 2004). The 2001 Ayakulik River spawning escapement was estimated at 13,361 (SE = 182) Chinook salmon, of which 7,830 (SE = 467) were females and 5,531 (SE = 460) were males.

Angler interviews conducted during 2001 accounted for 981 angler-days of effort during which 298 Chinook salmon were harvested and 4,097 released (Appendix G2). Of the 157 anglers interviewed at the Ayakulik weir in 2001, 58% were non Alaskan resident from other parts of the U.S. and 34% were guided. A total of 13 Chinook salmon were measured from the weir census harvest, including 7 females and 6 males. Sampled sport harvested females averaged 856 mm (SE = 9), and males averaged 880 mm (SE = 17) in length.

Table 10.—Estimated age and sex composition of inriver return, and mideye to fork length by age and sex for Ayakulik River Chinook salmon, 2000.

	Age											Total	
	0.2	0.3	0.4	1.1	1.2	1.3	1.4	1.5	2.3	2.4	2.5		unkn.
Females													
Percent	0.0	0.0	0.0	0.0	0.0	17.4	24.5	0.1	0.0	0.0	0.0		42.1
SE	0.0	0.0	0.0	0.0	0.0	2.6	2.6	0.1	0.0	0.0	0.0		3.3
Inriver Return	0	0	0	0	0	3,581	5,032	25	0	0	0		8,638
SE	0	0	0	0	0	528	544	24	0	0	0		668
Number Sampled						64	82	1				21	168
Mean Length						755	820	854				801	793
Std Dev Length						50	36					57	54
Minimum Length						533	734	854				702	533
Maximum Length						878	891	854				903	903
Males													
Percent	0.0	0.0	0.0	0.1	3.1	33.9	20.7	0.1	0.0	0.0	0.0		57.9
SE	0.0	0.0	0.0	0.1	1.1	3.2	2.7	0.1	0.0	0.0	0.0		3.3
Inriver Return	0	0	0	25	627	6,961	4,251	25	0	0	0		11,889
SE	0	0	0	24	233	654	553	24	0	0	0		668
Number Sampled				1	13	105	72	1				31	224
Mean Length				425	570	747	844	927				752	768
Std Dev Length					41	53	50					95	92
Minimum Length				425	518	565	722	927				503	425
Maximum Length				425	663	836	985	927				888	985
Total													
Percent	0.0	0.0	0.0	0.1	3.1	51.4	45.2	0.2	0.0	0.0	0.0		100.0
SE	0.0	0.0	0.0	0.1	1.1	3.2	3.1	0.2	0.0	0.0	0.0		0.0
Inriver Return	0	0	0	25	627	10,542	9,283	50	0	0	0		20,527
SE	0	0	0	24	233	655	642	35	0	0	0		0
Number Sampled				1	13	169	154	2				52	392
Mean Length				425	570	750	832	891				772	779
Std Dev Length					41	52	45	52				85	79
Minimum Length				425	518	533	722	854				503	425
Maximum Length				425	663	878	985	927				903	985

Note: Age and sex compositions were stratified by time period (see Appendix E2) based on samples obtained 25 May–5 July 2000. Female, male, and total statistics include 21, 31, and 52 fish for which age was not determined, respectively.

Table 11.—Estimated age and sex composition of inriver return, and mideye to fork length by age and sex for Ayakulik River Chinook salmon, 2001.

	Age											Total
	0.2	0.3	0.4	1.1	1.2	1.3	1.4	1.5	2.2	2.3	2.4 unkn.	
Females												
Percent	0.0	0.0	0.0	0.0	0.9	10.6	45.3	1.8	0.0	0.0	0.0	58.6
SE	0.0	0.0	0.0	0.0	0.7	2.3	3.5	1.1	0.0	0.0	0.0	3.4
Inriver Return	0	0	0	0	126	1,480	6,306	256	0	0	0	8,168
SE	0	0	0	0	99	318	493	148	0	0	0	475
Number Sampled					2	21	99	3				37
Mean Length					825	817	830	846				816
Std Dev Length					76	40	30	32				45
Minimum Length					771	699	743	817				672
Maximum Length					878	859	899	880				891
Males												
Percent	0.0	0.0	0.0	8.2	6.7	7.8	17.6	0.7	0.2	0.0	0.2	41.4
SE	0.0	0.0	0.0	1.7	1.6	1.9	2.7	0.7	0.2	0.0	0.2	3.4
Inriver Return	0	0	0	1,142	928	1,083	2,451	95	31	0	31	5,761
SE	0	0	0	240	216	264	371	95	30	0	30	475
Number Sampled				21	20	19	44	1	1		1	31
Mean Length				355	562	733	857	920	580		895	719
Std Dev Length				40	74	142	54					148
Minimum Length				282	326	299	697	920	580		895	346
Maximum Length				423	688	932	980	920	580		895	935
Total												
Percent	0.0	0.0	0.0	8.2	7.6	18.4	62.9	2.5	0.2	0.0	0.2	100.0
SE	0.0	0.0	0.0	1.7	1.7	2.8	3.4	1.2	0.2	0.0	0.2	0.0
Inriver Return	0	0	0	1,142	1,054	2,563	8,757	351	31	0	31	13,929
SE	0	0	0	240	237	391	474	174	30	0	30	0
Number Sampled				21	22	40	143	4	1		1	68
Mean Length				355	586	777	838	865	580		895	772
Std Dev Length				40	106	109	41	45				115
Minimum Length				282	326	299	697	817	580		895	346
Maximum Length				423	878	932	980	920	580		895	935

Note: Age and sex compositions were stratified by time period (see Appendix E3) based on samples obtained 24 May–8 July 2001. Female, male, and total statistics include 37, 31, and 68 fish for which age was not determined, respectively.

2002

The Ayakulik weir was installed in 2002 on 20 May and operated through 24 August.

The inriver return of Chinook salmon through the weir was 12,552 fish (Table 2). Age was determined for 252 of 308 Chinook salmon sampled at the weir. Estimates of abundance by age were stratified by time period: through 30 May, 31 May-12 June, 13-19 June, and after 19 June (Appendix E4). Age composition changed between periods (ages 1.1-1.5, $\chi^2 = 39.2$, $df = 12$, $P = 0.0001$).

In general, older fish arrived earlier and younger fish later. Most fish were age 1.2, 1.3 or 1.4 (Table 12). There were 1.3 males for every female.

In 2002, anglers fishing the Ayakulik system caught an estimated 5,644 (SE = 2,079) Chinook salmon and harvested 362 (SE = 135) fish, expending 1,715 (SE = 491) angler-days of effort for all species during the entire year (Table 2; Jennings et al. 2006a). The 2002 Ayakulik River spawning escapement was 12,189 (SE = 135) Chinook salmon, of which 5,302 (SE = 382) were females and 6,887 (SE = 385) were males.

Angler interviews conducted at the weir in 2002 accounted for 1,199 angler-days of effort during which 272 Chinook salmon were harvested and 2,343 were released (Appendix G2). Of the 460 anglers interviewed at the Ayakulik weir in 2002, 86% were non Alaskan residents from other parts of the U.S. and 76% were guided. Sport caught Chinook salmon were not sampled for age, sex and length during the 2002 fishery.

2003

The Ayakulik weir was installed in 2003 on 21 May and operated until 11 August, when high water conditions resulted in its removal for the year.

The inriver return of Chinook salmon through the weir was 17,557 fish (Table 2). Age was determined for 281 of 327 Chinook salmon sampled at the weir. Estimates of abundance by age were stratified by time period: through 30 May, 31 May-13 June, 14-27 June, and after 27 June (Appendix E5). Age composition changed between periods (ages 1.2-1.4, $\chi^2 = 23.8$, $df = 6$, $P = 0.0006$). In general, older fish arrived earlier and younger fish later. See Table 13 for estimates of abundance and length by age and sex. There were 1.4 males for every female.

In 2003, anglers fishing the Ayakulik system caught 5,219 Chinook salmon and harvested 451 fish, expending 1,725 angler-days of effort for all species during the entire year (Table 2; Tracy and Schmidt *In prep*). The 2003 Ayakulik River spawning escapement was 17,106 Chinook salmon, of which 7,185 (SE = 513) were females and 9,921 (SE = 513) were males.

Of the 188 anglers interviewed at the Ayakulik weir in 2003, 48% were non Alaskan residents from other parts of the U.S. and 44% were guided (Appendix G2). Sport caught Chinook salmon were not sampled for age, sex and length during the 2003 fishery.

CHIGNIK RIVER

Fish sampled from the commercial purse seine fishery in 2002 and 2003 had extremely high proportions of fish aged 1.1 and 1.2 (Appendices C6-C7). This is inconsistent with sport harvest (Tables 14-18) and escapement (Appendix F1) samples, as well as historical age composition for the Chignik (Schwarz 1996; Motis 1997; Clapsadl 2002). We suspect that the Chignik Lagoon

Table 12.—Estimated age and sex composition of inriver return, and mideye to fork length by age and sex for Ayakulik River Chinook salmon, 2002.

	Age											Total	
	0.2	0.3	1.0	1.1	1.2	1.3	1.4	1.5	2.3	2.4	2.5 unkn.		
Females													
Percent	0.0	0.0	0.0	0.0	3.8	15.3	20.9	2.3	0.1	0.8	0.2	43.5	
SE	0.0	0.0	0.0	0.0	1.3	2.7	2.9	0.9	0.1	0.8	0.2	3.1	
Inriver Return	0	0	0	0	477	1,921	2,627	288	16	103	30	5,463	
SE	0	0	0	0	167	336	363	112	16	103	29	394	
Number Sampled					10	33	44	7	1	1	1	24	123
Mean Length					628	775	821	854	762	814	915	756.1	782.66
Std Dev Length					36	81	43	51				107.4	89.894
Minimum Length					552	571	679	770	762	814	915	517	517
Maximum Length					678	913	906	907	762	814	915	891	938
Males													
Percent	0.0	0.0	0.2	5.4	22.8	18.0	6.7	2.4	0.0	0.0	0.8	56.5	
SE	0.0	0.0	0.2	1.4	2.8	2.5	1.6	1.1	0.0	0.0	0.8	3.1	
Inriver Return	0	0	30	680	2,865	2,265	841	305	0	0	103	7,088	
SE	0	0	29	182	346	310	195	139	0	0	103	394	
Number Sampled			1	13	54	55	18	6			1	32	185
Mean Length			348	369	593	669	839	904			913	687	656
Std Dev Length				78	48	124	99	73				159	158
Minimum Length			348	306	492	319	545	814			913	327	306
Maximum Length			348	591	697	904	952	978			913	986	986
Total													
Percent	0.0	0.0	0.2	5.4	26.6	33.4	27.6	4.7	0.1	0.8	1.1	100.0	
SE	0.0	0.0	0.2	1.4	2.9	3.3	3.2	1.4	0.1	0.8	0.9	0.0	
Inriver Return	0	0	30	680	3,342	4,186	3,469	592	16	103	133	12,552	
SE	0	0	29	182	366	415	401	176	16	103	107	0	
Number Sampled			1	13	64	88	62	13	1	1	2	56	308
Mean Length			348	368.9	598	709	826	877	762	814	914	717	707
Std Dev Length				77.67	48	120	64	64			1	142	148
Minimum Length			348	306	492	319	545	770	762	814	913	327	306
Maximum Length			348	591	697	913	952	978	762	814	915	986	986

Note: Age and sex compositions were stratified by time period (see Appendix E4) based on samples obtained 28 May–8 July 2002. Female, male, and total statistics include 24, 32, and 56 fish for which age was not determined, respectively.

Table 13.—Estimated age and sex composition of inriver return, and mideye to fork length by age and sex for Ayakulik River Chinook salmon, 2003.

	Age												Total
	0.2	0.3	0.4	1.1	1.2	1.3	1.4	1.5	2.3	2.4	2.5	unkn.	
Females													
Percent	0.0	0.0	0.0	0.0	1.0	26.6	14.3	0.0	0.0	0.0	0.0		42.0
SE	0.0	0.0	0.0	0.0	0.6	2.7	2.1	0.0	0.0	0.0	0.0		3.0
Inriver Return	0	0	0	0	181	4,672	2,519	0	0	0	0		7,371
SE	0	0	0	0	104	472	374	0	0	0	0		524
Number Sampled					3	75	44						21
Mean Length					668	778	813						797
Std Dev Length					6	50	65						73
Minimum Length					661	665	692						668
Maximum Length					671	956	935						948
Males													
Percent	0.0	0.0	0.0	0.4	18.9	32.0	6.3	0.4	0.0	0.0	0.0		58.0
SE	0.0	0.0	0.0	0.4	2.3	2.8	1.5	0.4	0.0	0.0	0.0		3.0
Inriver Return	0	0	0	67	3,320	5,620	1,107	72	0	0	0		10,186
SE	0	0	0	67	407	500	263	71	0	0	0		524
Number Sampled				1	53	87	17	1					25
Mean Length				321	580	760	801	909					733
Std Dev Length					52	66	63						117
Minimum Length				321	476	549	694	909					519
Maximum Length				321	714	948	896	909					948
Total													
Percent	0.0	0.0	0.0	0.4	19.9	58.6	20.7	0.4	0.0	0.0	0.0		100.0
SE	0.0	0.0	0.0	0.4	2.4	3.0	2.4	0.4	0.0	0.0	0.0		0.0
Inriver Return	0	0	0	67	3,501	10,292	3,626	72	0	0	0		17,557
SE	0	0	0	67	413	527	430	71	0	0	0		0
Number Sampled				1	56	162	61	1					46
Mean Length				321	585	768	810	909					762
Std Dev Length					54	60	64						103
Minimum Length				321	476	549	692	909					519
Maximum Length				321	714	956	935	909					948

Note: Age and sex compositions were stratified by time period (see Appendix E5) based on samples obtained 28 May–6 July 2003. Female, male, and total statistics include 21, 25, and 46 fish for which age was not determined, respectively.

Table 14.—Estimated age and sex composition of total return, and mideye to fork length by age and sex for Chignik River Chinook salmon, 1999.

	Age											Total	
	0.2	0.3	0.4	1.1	1.2	1.3	1.4	1.5	1.6	2.3	2.4		unkn.
Females													
Percent	0.0	0.0	0.0	0.0	3.7	16.7	31.5	3.7	0.0	0.0	0.0		55.6
SE	0.0	0.0	0.0	0.0	2.6	5.1	6.4	2.6	0.0	0.0	0.0		6.8
Total Return	0	0	0	0	225	1,012	1,912	225	0	0	0		3,373
SE	0	0	0	0	157	309	386	157	0	0	0		413
Number Sampled					2	9	17	2				2	32
Mean Length					633	818	896	860				837	852
Std Dev Length					84	95	53	21				68	93
Minimum Length					573	680	802	845				789	573
Maximum Length					692	944	983	875				885	983
Males													
Percent	0.0	0.0	0.0	0.0	7.4	18.5	16.7	1.9	0.0	0.0	0.0		44.4
SE	0.0	0.0	0.0	0.0	3.6	5.3	5.1	1.8	0.0	0.0	0.0		6.8
Total Return	0	0	0	0	450	1,124	1,012	112	0	0	0		2,699
SE	0	0	0	0	217	323	309	112	0	0	0		413
Number Sampled					4	10	9	1					24
Mean Length					656	788	912	1,019					822
Std Dev Length					30	104	63						126
Minimum Length					629	615	800	1,019					615
Maximum Length					690	940	982	1,019					1019
Total													
Percent	0.0	0.0	0.0	0.0	11.1	35.2	48.1	5.6	0.0	0.0	0.0		100.0
SE	0.0	0.0	0.0	0.0	4.3	6.5	6.8	3.1	0.0	0.0	0.0		0.0
Total Return	0	0	0	0	675	2,136	2,924	337	0	0	0		6,072
SE	0	0	0	0	261	397	415	190	0	0	0		0
Number Sampled					6	19	26	3				2	56
Mean Length					648	802	902	913				837	839
Std Dev Length					46	98	56	93				68	108
Minimum Length					573	615	800	845				789	573
Maximum Length					692	944	983	1,019				885	1,019

Note: Estimates are based on fish sampled from the sport fishery harvest from 30 June–6 August, 1999. Female, male, and total statistics include 2, 0, and 2 fish for which age was not determined, respectively.

Table 15.—Estimated age and sex composition of total return, and mideye to fork length by age and sex for Chignik River Chinook salmon, 2000.

	Age											Total	
	0.2	0.3	0.4	1.1	1.2	1.3	1.4	1.5	2.2	2.3	2.4		unkn.
Females													
Percent	0.0	0.0	0.0	0.0	0.0	24.3	22.9	2.9	0.0	0.0	0.0		50.0
SE	0.0	0.0	0.0	0.0	0.0	5.1	5.0	2.0	0.0	0.0	0.0		6.0
Total Return	0	0	0	0	0	1,225	1,153	144	0	0	0		2,522
SE	0	0	0	0	0	259	253	100	0	0	0		301
Number Sampled						17	16	2				5	40
Mean Length						859	871	980				784	860
Std Dev Length						58	39	78				80	66
Minimum Length						767	812	925				675	675
Maximum Length						990	965	1,035				876	1,035
Males													
Percent	0.0	0.0	0.0	2.9	11.4	17.1	15.7	2.9	0.0	0.0	0.0		50.0
SE	0.0	0.0	0.0	2.0	3.8	4.5	4.4	2.0	0.0	0.0	0.0		6.0
Total Return	0	0	0	144	576	865	792	144	0	0	0		2,522
SE	0	0	0	100	192	227	219	100	0	0	0		301
Number Sampled				2	8	12	11	2					35
Mean Length				405	639	816	864	988					777
Std Dev Length				7	79	95	73	18					155
Minimum Length				400	580	635	775	975					400
Maximum Length				410	812	980	1,005	1,000					1,005
Total													
Percent	0.0	0.0	0.0	2.9	11.4	41.4	38.6	5.7	0.0	0.0	0.0		100.0
SE	0.0	0.0	0.0	2.0	3.8	5.9	5.8	2.8	0.0	0.0	0.0		0.0
Total Return	0	0	0	144	576	2,089	1,945	288	0	0	0		5,043
SE	0	0	0	100	192	297	293	140	0	0	0		0
Number Sampled				2	8	29	27	4				5	75
Mean Length				405	639	841	868	984				784	821
Std Dev Length				7	79	77	55	46				80	123
Minimum Length				400	580	635	775	925				675	400
Maximum Length				410	812	990	1,005	1,035				876	1,035

Note: Estimates are based on fish sampled from the sport fishery harvest from 13-23 June 2000. Female, male, and total statistics include 5, 0, and 5 fish for which age was not determined, respectively.

Table 16.—Estimated age and sex composition of total return, and mideye to fork length by age and sex for Chignik River Chinook salmon, 2001.

	Age												Total
	0.2	0.3	0.4	1.1	1.2	1.3	1.4	1.5	2.2	2.3	2.4	unkn.	
Females													
Percent	0.0	0.0	0.0	0.0	3.6	14.5	24.5	0.0	0.0	0.0	0.0		42.7
SE	0.0	0.0	0.0	0.0	1.8	3.3	4.1	0.0	0.0	0.0	0.0		4.7
Total Return	0	0	0	0	157	626	1,057	0	0	0	0		1,840
SE	0	0	0	0	76	144	175	0	0	0	0		201
Number Sampled					4	16	27					1	48
Mean Length					684	854	901					843	866
Std Dev Length					29	50	43						74
Minimum Length					644	776	826					843	644
Maximum Length					706	940	1,020					843	1,020
Males													
Percent	0.0	0.0	0.0	20.0	3.6	17.3	14.5	1.8	0.0	0.0	0.0		57.3
SE	0.0	0.0	0.0	3.8	1.8	3.6	3.3	1.3	0.0	0.0	0.0		4.7
Total Return	0	0	0	861	157	744	626	78	0	0	0		2,466
SE	0	0	0	163	76	154	144	54	0	0	0		201
Number Sampled				22	4	19	16	2				4	67
Mean Length				428	599	878	901	991				551	703
Std Dev Length				95	89	79	80	98				250	240
Minimum Length				305	510	715	705	921				335	305
Maximum Length				695	690	1,000	1,050	1,060				890	1,060
Total													
Percent	0.0	0.0	0.0	20.0	7.3	31.8	39.1	1.8	0.0	0.0	0.0		100.0
SE	0.0	0.0	0.0	3.8	2.5	4.4	4.6	1.3	0.0	0.0	0.0		0.0
Total Return	0	0	0	861	313	1,370	1,683	78	0	0	0		4,305
SE	0	0	0	163	106	190	199	54	0	0	0		0
Number Sampled				22	8	35	43	2				5	115
Mean Length				428	641	867	901	991				609	771
Std Dev Length				95	76	67	59	98				253	205
Minimum Length				305	510	715	705	921				335	305
Maximum Length				695	706	1,000	1,050	1,060				890	1,060

Note: Estimates are based on fish sampled from the sport fishery harvest from 26 June–31 July 2001. Female, male, and total statistics include 1, 4, and 5 fish for which age was not determined, respectively.

commercial harvest samples included fish harvested outside the Lagoon, where immature fish from multiple stocks are often present. For this reason, samples from sport-harvested fish were used to estimate age and sex composition of the Chignik River Chinook salmon return for all years covered in this report (1999-2003).

1999

The Chignik weir was installed in 1999 on 31 May and operated through 3 September.

The inriver return of Chinook salmon through the weir was 3,728 fish (Table 3). With the commercial harvest of 2,101 fish in Chignik Lagoon and the reported subsistence harvest of 243 fish, the total Chinook salmon return was 6,072 fish.

Table 17.—Estimated age and sex composition of total return, and mideye to fork length by age and sex for Chignik River Chinook salmon, 2002.

	Age												Total
	0.2	0.3	0.4	1.1	1.2	1.3	1.4	1.5	1.6	2.3	2.4	unkn.	
Females													
Percent	0.0	0.0	0.0	0.0	12.5	2.1	25.0	0.0	0.0	0.0	0.0		39.6
SE	0.0	0.0	0.0	0.0	4.8	2.1	6.3	0.0	0.0	0.0	0.0		7.1
Total Return	0	0	0	0	567	94	1,134	0	0	0	0		1,795
SE	0	0	0	0	218	94	285	0	0	0	0		322
Number Sampled					6	1	2						19
Mean Length					695	825	897						829
Std Dev Length					56		83						118
Minimum Length					631	825	695						631
Maximum Length					783	825	980						980
Males													
Percent	0.0	0.0	0.0	4.2	29.2	10.4	14.6	2.1	0.0	0.0	0.0		60.4
SE	0.0	0.0	0.0	2.9	6.6	4.4	5.1	2.1	0.0	0.0	0.0		7.1
Total Return	0	0	0	189	1,323	472	661	94	0	0	0		2,740
SE	0	0	0	131	299	201	232	94	0	0	0		322
Number Sampled				2	14	5	7	1				2	31
Mean Length				384	704	824	931	1,045				892	777
Std Dev Length				20	55	92	74					33	160
Minimum Length				370	625	735	835	1,045				868	370
Maximum Length				398	829	966	1,045	1,045				915	1,045
Total													
Percent	0.0	0.0	0.0	4.2	41.7	12.5	39.6	2.1	0.0	0.0	0.0		100.0
SE	0.0	0.0	0.0	2.9	7.2	4.8	7.1	2.1	0.0	0.0	0.0		0.0
Total Return	0	0	0	189	1,890	567	1,795	94	0	0	0		4,535
SE	0	0	0	131	324	218	322	94	0	0	0		0
Number Sampled				2	20	6	19	1				2	50
Mean Length				384	702	825	909	1,045				892	797
Std Dev Length				20	54	82	79					33	146
Minimum Length				370	625	735	695	1,045				868	370
Maximum Length				398	829	966	1,045	1,045				915	1,045

Note: Estimates are based on fish sampled from the sport fishery harvest from 26 June–30 July 2002. Female, male, and total statistics include 0, 2, and 2 fish for which age was not determined, respectively.

Age was determined for 54 of 56 Chinook salmon sampled from the Chignik River sport fishery. Ages 1.3 and 1.4 were dominant (Table 14). There were 0.8 males for every female. Age composition and length of Chinook salmon sampled from the commercial harvest are shown in Appendix C4.

2000

The Chignik weir was installed in 2000 on 28 May and operated through 4 September. Due to high water conditions the weir was washed out from 20 June through 12 July. During this period an estimate of the Chinook salmon passing through the weir during this time period was derived using the data available before and after the wash out and a recent 10-year average time of entry curve was applied to the Chinook salmon escapement (Pappas et al. 2003).

Table 18.—Estimated age and sex composition of total return, and mideye to fork length by age and sex for Chignik River Chinook salmon, 2003.

	Age											Total	
	0.2	0.3	0.4	1.1	1.2	1.3	1.4	1.5	2.1	2.3	2.4		unkn.
Females													
Percent	0.0	0.0	0.0	2.6	10.3	33.3	5.1	2.6	0.0	0.0	0.0		53.8
SE	0.0	0.0	0.0	2.6	4.9	7.6	3.6	2.6	0.0	0.0	0.0		8.1
Total Return	0	0	0	237	948	3,082	474	237	0	0	0		4,979
SE	0	0	0	237	454	706	330	237	0	0	0		746
Number Sampled				1	4	13	2	1	0	0	0	1	22
Mean Length				627	693	893	1002	887				368	828
Std Dev Length					117	50							154
Minimum Length				627	623	797	1002	887				368	368
Maximum Length				627	828	970	1002	887				368	1002
Males													
Percent	0.0	0.0	0.0	5.1	2.6	30.8	7.7	0.0	0.0	0.0	0.0		46.2
SE	0.0	0.0	0.0	3.6	2.6	7.5	4.3	0.0	0.0	0.0	0.0		8.1
Total Return	0	0	0	474	237	2,845	711	0	0	0	0		4,267
SE	0	0	0	330	237	691	399	0	0	0	0		746
Number Sampled				2	1	12	3	0	0	0	0	2	20
Mean Length				329	774	845	1,073					755	815
Std Dev Length				151		101	34					240	216
Minimum Length				222	774	708	1,040					585	222
Maximum Length				435	774	1,042	1,108					925	1,108
Total													
Percent	0.0	0.0	0.0	7.7	12.8	64.1	12.8	2.6	0.0	0.0	0.0		100.0
SE	0.0	0.0	0.0	4.3	5.4	7.8	5.4	2.6	0.0	0.0	0.0		0.0
Total Return	0	0	0	711	1,185	5,927	1,185	237	0	0	0		9,246
SE	0	0	0	399	500	718	500	237	0	0	0		0
Number Sampled				3	5	25	5	1	0	0	0	3	42
Mean Length				428	714	870	1,055	887				626	822
Std Dev Length				203	103	81	45					281	185
Minimum Length				222	623	708	1,002	887				368	222
Maximum Length				627	828	1,042	1,108	887				925	1,108

Note: Estimates are based on fish sampled from the sport fishery harvest from 6-31 July 2003. Female, male, and total statistics include 1, 2, and 3 fish for which age was not determined, respectively.

The inriver return of Chinook salmon through the weir was 4,285 fish. With the commercial harvest of 595 fish in Chignik Lagoon and the reported subsistence catch of 163 fish, the total Chinook salmon return was 5,043 fish.

Age was determined for 70 of 75 Chinook salmon sampled from the Chignik River sport fishery. Ages 1.3 and 1.4 were dominant (Table 15). There were 1.0 males for every female.

2001

The Chignik weir was installed in 2001 on 25 May and operated through 19 August (Pappas et al. 2005).

The inriver return of Chinook salmon through the weir was 2,992 fish (Table 3). With the commercial harvest of 1,142 fish in Chignik Lagoon and the reported subsistence catch of 171 fish, the total Chinook salmon return was 4,305 fish.

Age was determined for 110 of 115 Chinook salmon sampled from the Chignik River sport fishery. Ages 1.3 and 1.4 were dominant, followed by age 1.1 (Table 16). There were 1.3 males for every female. Age composition and length of Chinook salmon sampled from the commercial harvest are shown in Appendix C5.

2002

The Chignik weir was installed in 2002 on 2 June and operated through 4 September.

The inriver return of Chinook salmon through the weir was 3,028 fish (Table 3). With the commercial harvest of 920 fish in Chignik Lagoon and the reported subsistence catch of 74 fish, the total Chinook salmon return was 4,022 fish.

Age was determined for 48 of 50 Chinook salmon sampled from the Chignik River sport fishery. Ages 1.2 and 1.4 were dominant (Table 17). There were 1.5 males for every female. Age composition and length of Chinook salmon sampled from the commercial harvest are shown in Appendix C6.

2003

The Chignik weir was installed in 2003 on 28 May and operated through 4 September.

The inriver return of Chinook salmon through the weir was 6,412 fish (Table 3). With the commercial harvest of 2,834 fish in Chignik Lagoon, and using the previous 9-year average of 120 fish as a substitute for the 2003 subsistence harvest, the estimated total Chinook salmon return was 9,366 fish.

Age was determined for 39 of 42 Chinook salmon sampled from the Chignik River sport fishery. Age 1.3 was dominant (Table 18). There were 0.9 males for every female. Age composition and length of Chinook salmon sampled from the commercial harvest are shown in Appendix C7.

DISCUSSION

The intent of this report series is to document assessment of sport fishing effort, harvest and catch along with age and sex compositions of Chinook salmon stocks of the Karluk, Ayakulik and Chignik rivers. These assessments are necessary to generate brood tables useful for projecting future returns from brood year escapements, which in turn can be used to evaluate and refine escapement goals. Management of fisheries toward appropriate escapement goals will ensure maximum sustained yields are achieved for each of the three Chinook salmon stocks.

KARLUK AND AYAKULIK 1999

Inriver returns to the Karluk and Ayakulik rivers of 13,063 and 13,503 Chinook salmon, respectively, were within the ranges of returns observed between 1994 and 2003. The total 1999 Inner and Outer Karluk and Ayakulik sections commercial harvest of 4,631 Chinook salmon on the west side of Kodiak Island (Tables 1 and 2) was nearly equal to the average commercial harvest during the same time period.

The prevalent age component of the Karluk and Ayakulik inriver returns between 1994 and 1998, comprised of age-1.3 and -1.4 fish, also dominated inriver returns in 1999. Approximately 76% of the Ayakulik inriver return and 85% of the Karluk inriver return consisted of fish belonging to one of these two age groups.

The male to female ratios in the Karluk and Ayakulik during 1999, at approximately 1:1 and 2:1 respectively, are not anomalous as compared to those documented since the stock assessment project was initiated in 1993.

CHIGNIK 1999

The inriver return to the Chignik River of 3,728 Chinook salmon was very comparable to the average return of 3,813 observed between 1994 and 2003. The commercial harvest in Chignik lagoon of 2,101 fish was slightly higher than the average harvest of 1,697 during the same time period (Table 3).

The combined commercial and subsistence harvests and inriver return produced an estimate for the total return of 6,072 fish. It is possible that this estimate is conservative due to exclusion of any Chignik-bound Chinook salmon caught in commercial fisheries prosecuted outside of Chignik Lagoon.

KARLUK AND AYAKULIK 2000

While the inriver return of 10,460 Chinook salmon to the Karluk River was very similar to the average return of 10,085 fish observed between 1994 and 2003, the Ayakulik River return of 20,527 Chinook salmon was the highest on record during the same time period. The total 2000 Inner and Outer Karluk and Ayakulik sections commercial harvest of 4,109 Chinook salmon on the west side of Kodiak Island was somewhat below the average commercial harvest between 1994 and 2003.

Similar to preceding years, in 2000 the prevalent age component of the Karluk and Ayakulik inriver returns was again primarily comprised of age-1.3 and -1.4 fish. Approximately 97% of the Ayakulik inriver return and 94% of the Karluk inriver return consisted of fish belonging to one of these two age groups.

The male to female ratios in the Karluk and Ayakulik during 1999, at approximately 1.8:1 and 1.4:1 respectively, are not unusual as compared to those documented since the stock assessment project was initiated in 1993.

CHIGNIK 2000

The inriver return of Chinook salmon to the Chignik River in 2000 was approximately 15% larger than the 1999 total return with an extrapolated total of 4,285 fish migrating through the weir. Conversely, the commercial harvest in the lagoon was far less than in 1999 with just 595 fish harvested (Table 3). The estimated total return of 5,043 fish from combined harvest and inriver return was comparable to the average estimated return of 5,631 between 1994 and 2003.

KARLUK AND AYAKULIK 2001

The 2001 inriver return of 4,453 Chinook salmon to the Karluk River was the lowest on record since 1994. The Ayakulik return of 13,929 Chinook salmon was slightly below the 1994-2003

average. The total 2001 commercial harvest of 9,315 Chinook salmon from the Inner and Outer Karluk and Ayakulik sections was more than 100% over the average harvest during the same period. Since nearly 75% of this harvest came from the Inner and Outer Ayakulik sections, it is unlikely that the overall increase was significantly responsible for the poor Chinook salmon return to the Karluk River.

In 2001 age-1.3 and -1.4 fish again dominated returns to the Karluk and Ayakulik rivers (Tables 6 and 11). Approximately 90% of the Karluk inriver return and 81% of the Ayakulik inriver return consisted of fish belonging to one of these two age groups.

CHIGNIK 2001

The inriver return of 2,992 Chinook salmon to Chignik River in 2001 was approximately 25% smaller than the 2000 return of 4,285 fish migrating through the weir (Table 3). The commercial harvest in the lagoon was nearly twice that of 2000 but still the second smallest harvest since 1994. The estimated total return of 4,305 fish from combined harvest and inriver return was somewhat smaller than the average total return fish during the most recent 10-year period.

KARLUK AND AYAKULIK 2002

The 2002 inriver return of 7,175 Chinook salmon to the Karluk River was the second lowest on record since 1994 (Table 1). The Ayakulik return of 12,552 Chinook salmon was the lowest since 1996 and the third lowest since 1994 (Table 2). The total 2002 commercial harvest of 1,347 Chinook salmon from the Inner and Outer Karluk and Ayakulik sections was also the second lowest since 1994, and possibly illustrative of relatively weak returns to both the Karluk and Ayakulik rivers.

In 2002 age-1.3 and -1.4 fish again dominated returns to the Karluk and Ayakulik rivers, although age-1.2 fish were also prevalent, comprising between 25 to 26% of the returns (Tables 7 and 12). Approximately 68% of the Karluk inriver return and 61% of the Ayakulik inriver return consisted of fish aged 1.3 or 1.4.

CHIGNIK 2002

The inriver return of 3,028 Chinook salmon to the Chignik River in 2002 is reflective of the average return since 1994 (Table 3). In contrast, the commercial harvest in the lagoon was second lowest on record during the same period. The estimated total return of 4,022 fish from combined harvest and inriver return was 29% below the estimated average annual return since 1994.

KARLUK AND AYAKULIK 2003

The 2003 inriver return of 7,256 Chinook salmon to the Karluk was slightly higher than 2002 return and the third lowest on record since 1994 (Table 1). Conversely, the Ayakulik river return of 17,557 fish was the third highest on record during the same time period and substantially larger than the 2002 return (Table 2). The total 2003 Karluk commercial harvest of 1,336 fish was slightly higher than the 2002 harvest but less than the 1994-2003 mean of 1,721 fish.

As in previous years, age-1.3 and -1.4 fish were most prevalent in both Karluk and Ayakulik inriver returns, although similar only to 2002, age-1.2 fish comprised nearly 20% of returns to

each drainage (Tables 8 and 13). About 80% of the Ayakulik and Karluk inriver returns consisted of fish aged 1.3 or 1.4.

CHIGNIK 2003

The extrapolated 2003 inriver return of 6,412 Chinook salmon to the Chignik River was the highest on record (Table 3). Similarly, the commercial harvest in the lagoon of 2,834 fish was more than triple the 2002 harvest and substantially larger than the most recent 10-year average. The estimated total return of 9,366 fish from combined harvest and inriver return was also the highest on record.

KARLUK AND AYAKULIK SPORT FISHING

Between 1999 and 2003 sport fishing effort in the Kodiak Management Area was generally higher than average levels of effort during the preceding 5 years (Walker et al. 2003; Jennings et al. 2004, 2006a-b). In contrast, SWHS estimates of angler effort in the Ayakulik River sport fishery have fluctuated significantly since 1994 with no apparent trend, illustrated by the fact that the highest and lowest effort during this period occurred on consecutive years. Levels of estimated annual angler effort at the Karluk River have also fluctuated substantially since 1994, even though the lowest estimates of total effort occurred consecutively in 2002 and 2003.

Ayakulik River Chinook salmon sport harvests have also been highly variable since 1994, ranging between 200 and 1,190 fish (Table 2), and indicating no apparent trend even though the third lowest estimated harvest on record occurred in 2002. Estimated sport harvests for the Karluk River during the same period have generally been higher than those for the Ayakulik River, averaging 1,453 fish, but also fluctuating significantly between years and ranging as high as 2,581 fish. Annual restrictions on public access to the Karluk River implemented during the 2003 Chinook salmon sport fishery were possibly an important factor affecting angler effort and harvest, the latter of which at 587 fish was not only the lowest on record, but substantially so, totaling less than 50% of estimated harvests between 1994 and 2002.

CHIGNIK SPORT FISHING

The SWHS has not produced published estimates of sport fishing effort and harvest for any species in the Chignik River during the most recent 10-year period due to an insufficient number of survey respondents. However the *unpublished* mean annual harvest between 1999-2003 is only 112 Chinook salmon, indicating current levels of activity are low by comparison to the Karluk and Ayakulik river fisheries. Due to recent dynamics in the local commercial salmon fishing-based economy, future interest in Chignik River Chinook salmon by the sport fish guiding industry may increase. Consequently, it is possible that although the upper end of the current Chignik River escapement goal of 2,700 fish has been surpassed every year since 1994, it may be difficult to achieve desired escapements in the future if significant increases in sport fishing effort coincide with below average inriver returns.

Brood tables constructed from Chinook salmon returns 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 river stocks as necessary (Hasbrouck and Clark *In prep*)². 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 has further constrained precise evaluation of productivity parameters. With the exception of relatively weak Chinook salmon returns during 2001-2003, consistently high escapements to the Karluk River during the previous 10-year period have also constrained more precise analysis of stock productivity factors. A continuation of the data collections initiated in 1993 may provide the basis for better understanding the role of these variables across a greater spectrum of adult returns.

Although Ayakulik River Chinook salmon returns since 1994 have been somewhat less variable than those of the Karluk River, inclusion of inriver returns dating back to the late 1970s suggests that the Chinook salmon population has likely also experienced relatively high levels of production in the years during which stock assessment data have been available.

Current levels of sport fishing activity at the Karluk and Ayakulik rivers probably have minimal impacts upon the magnitude of returns generated by a specific brood year. However, development of a trend of increasing harvest and effort at the Karluk River could increase the significance of the sport fishery to achievement of escapement goals, particularly in conjunction with below average inriver returns such as those in 2001-2003. Hooking and release mortality and sex-based harvest selectivity does not appear to be a significant problem of sport fisheries occurring at either location. Assumption of a hooking mortality rate of approximately 7% (Bendock and Alexandersdottir 1992) suggests the effect from this aspect of the sport fisheries on escapement has been minimal. Likewise, the sex composition of sport caught fish sampled at the Karluk and the Ayakulik weirs has been generally similar to the sex composition of the sampled escapement.

During the most recent 10-year period both Karluk and Ayakulik rivers have maintained sustained populations of Chinook salmon. During most years these two systems have produced escapement counts that are equal to or greater than the combined incidental commercial, subsistence, and sport harvests of Chinook salmon around Kodiak Island. It appears unlikely that any near term changes in prosecution of these three fisheries will substantially increase current harvest levels.

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 Chinook salmon escapement goal. However, due to past problems with attainment of data collection goals, including ensuring an accurate accounting of the harvest location of samples taken from the commercial catch, the Chignik River component of the Chinook salmon assessment project should be discontinued until such time as direct random systematic sampling of the inriver escapement through the weir can be accomplished. This measure will aid in more precise assessment of the variables influencing stock productivity and, correspondingly, the potential impact of increased fishery removal rates and other sources of adult mortality.

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REFERENCES CITED

- Bendock, T. N., and M. Alexandersdottir. 1992. Mortality and movement behavior of hooked-and-released Chinook salmon in the Kenai River recreational fishery, 1989-1991. Alaska Department of Fish and Game, Fishery Manuscript No. 92-2, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidPDFs/fms92-02.pdf>
- Clapsadl, M. 2002. Age composition and spawning escapement of Chinook salmon in the Karluk, Ayakulik, and Chignik rivers, Alaska, 1997 and 1998. Alaska Department of Fish and Game, Fishery Data Series No. 02-02, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidPDFs/fds02-02.pdf>
- Cochran, W. G. 1977. Sampling techniques, *third edition*. John Wiley and Sons, New York.
- Goodman, L. A. 1960. On the exact variance of products. *Journal of the American Statistical Association* 55:708-713.
- Handler, R., and T. Chatto. 1989. A habitat analysis to determine the optimum number of Ayakulik River Chinook spawners needed for escapement. United States Fish and Wildlife Service, Kodiak National Wildlife Refuge, Kodiak.
- Howe, A. L., G. Fidler, A. E. Bingham, and M. J. Mills. 1996. Harvest, catch, and participation in Alaska sport fisheries during 1995. Alaska Department of Fish and Game, Fishery Data Series No. 96-32, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidPDFs/fds96-32.pdf>
- Howe, A. L., G. Fidler, and M. J. Mills. 1995. Harvest, catch, and participation in Alaska sport fisheries during 1994. Alaska Department of Fish and Game, Fishery Data Series No. 95-24, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidPDFs/fds95-24.pdf>
- Howe, A. L., R. J. Walker, C. Olnes, K. Sundet, and A. E. Bingham. 2001a. Revised Edition. Harvest, catch, and participation in Alaska sport fisheries during 1996. Alaska Department of Fish and Game, Fishery Data Series No. 97-29 (revised), Anchorage. [http://www.sf.adfg.state.ak.us/FedAidPDFs/fds97-29\(revised\).pdf](http://www.sf.adfg.state.ak.us/FedAidPDFs/fds97-29(revised).pdf)
- Howe, A. L., R. J. Walker, C. Olnes, K. Sundet, and A. E. Bingham. 2001b. Revised Edition. Harvest, catch, and participation in Alaska sport fisheries during 1997. Alaska Department of Fish and Game, Fishery Data Series No. 98-25 (revised), Anchorage. [http://www.sf.adfg.state.ak.us/FedAidPDFs/fds98-25\(revised\).pdf](http://www.sf.adfg.state.ak.us/FedAidPDFs/fds98-25(revised).pdf)
- Howe, A. L., R. J. Walker, C. Olnes, K. Sundet, and A. E. Bingham. 2001c. Revised Edition. Participation, catch, and harvest in Alaska sport fisheries during 1998. Alaska Department of Fish and Game, Fishery Data Series No. 99-41 (revised), Anchorage. [http://www.sf.adfg.state.ak.us/FedAidPDFs/fds99-41\(revised\).pdf](http://www.sf.adfg.state.ak.us/FedAidPDFs/fds99-41(revised).pdf)
- Howe, A. L., R. J. Walker, C. Olnes, K. Sundet, and A. E. Bingham. 2001d. Participation, catch, and harvest in Alaska sport fisheries during 1999. Alaska Department of Fish and Game, Fishery Data Series No. 01-8, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidPDFs/fds01-08.pdf>
- Jennings, G. B., K. Sundet, A. E. Bingham, and D. Sigurdsson. 2004. Participation, catch, and harvest in Alaska sport fisheries during 2001. Alaska Department of Fish and Game, Fishery Data Series No. 04-11, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidPDFs/fds04-11.pdf>
- Jennings, G. B., K. Sundet, A. E. Bingham, and D. Sigurdsson. 2006a. Participation, catch, and harvest in Alaska sport fisheries during 2002. Alaska Department of Fish and Game, Fishery Data Series No. 06-34, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidpdfs/fds06-34.pdf>

REFERENCES CITED (Continued)

- Jennings, G. B., K. Sundet, A. E. Bingham, and D. Sigurdsson. 2006b. Participation, catch, and harvest in Alaska sport fisheries during 2003. Alaska Department of Fish and Game, Fishery Data Series No. 06-44, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidpdfs/fds06-44.pdf>
- Mosher, K. H. 1969. Identification of Pacific salmon and steelhead trout by scale characteristics. U. S. Fish and Wildlife Service, Bureau of Commercial Fisheries, Circular 317.
- Motis, T. 1997. Age composition and spawning escapement of Chinook salmon in the Karluk, Ayakulik, and Chignik rivers, Alaska, 1995 and 1996. Alaska Department of Fish and Game, Fishery Data Series No. 97-40, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidPDFs/fds97-40.pdf>
- Owen, D. L. 1993. An analysis of two counting methods used for estimates during the first hour for chinook and sockeye escapements through the Chignik Weir, 1992. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K93-22, Kodiak. <http://www.sf.adfg.state.ak.us/FedAidPDFs/rir.4k.1993.22.pdf>
- Owen, D. L., and A. Quimby. 1997. Chignik management area annual finfish management report, 1994. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report 4K97-18, Kodiak.
- Pappas, G. E., M. J. Daigneault, and M. LaCroix. 2003. Chignik management area annual finfish management report, 2000. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K03-62, Kodiak. <http://www.sf.adfg.state.ak.us/FedAidPDFs/rir.4k.2003.62.pdf>
- Pappas, G. E., P. Tschersich, and K. J. Clark. 2005. Chignik Management Area annual finfish management report, 2001. Alaska Department of Fish and Game, Fishery Management Report No. 05-30, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidPDFs/fmr05-30.pdf>
- Ricker, W. E. 1975. Computation and interpretation of biological statistics of fish populations. Bulletin of the Fisheries Research Board of Canada 191:382.
- Schwarz, L., D. Tracy, and S. Schmidt. 2002. Area management report for the recreational fisheries of the Kodiak and Alaska Peninsula/Aleutian Islands regulatory areas, 1999 and 2000. Alaska Department of Fish and Game, Fishery Management Report No. 02-02, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidPDFs/fmr02-02.pdf>
- Schwarz, L., D. Tracy, and S. Schmidt. 2003. Karluk River visitor use census, 2002. Alaska Department of Fish and Game, Fishery Data Series No. 03-17, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidPDFs/fds03-17.pdf>
- Schwarz, L. J. 1996. Age composition and spawning escapement of Chinook salmon in the Karluk, Ayakulik, and Chignik rivers, Alaska, 1993 and 1994. Alaska Department of Fish and Game, Fishery Data Series No. 96-6, Anchorage <http://www.sf.adfg.state.ak.us/FedAidPDFs/fds96-06.pdf>
- Tracy, D. A., and J. S. Schmidt. *In prep.* Summary of the 2003 and 2004 Ayakulik River visitor use census. Department of Fish and Game, Fishery Data Series, Anchorage.
- Walker, R. J., C. Olnes, K. Sundet, A. L. Howe, and A. E. Bingham. 2003. Participation, catch, and harvest in Alaska sport fisheries during 2000. Alaska Department of Fish and Game, Fishery Data Series No. 03-05, Anchorage. <http://www.sf.adfg.state.ak.us/FedAidPDFs/fds03-05.pdf>
- Welander, A. D. 1940. A study of the development of the scale of Chinook salmon *Oncorhynchus tshawytscha*. Masters Thesis. University of Washington, Seattle.

**APPENDIX A. COMMERCIAL HARVEST OF CHINOOK
SALMON FROM THE WEST SIDE OF KODIAK ISLAND,
BY STATISTICAL AREA, 1994-2003**

Appendix A1.-Numbers of Chinook salmon harvested commercially from the west side of Kodiak Island by statistical area, 1 June through 15 July 1994-2003.

Statistical Area	Commercial harvest (no. of Chinook salmon)									
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
253-11 (Uganik)	565	267	122	84	84	28	47	103	220	277
254-10 (Rocky Point)	1,767	405	633	326	659	484	296	887	349	1,086
254-20 (Inner Uyak)	177	292	76	109	128	132	94	93	264	339
254-30 (Zachar)	143	701	48	2	27	21	92	56	44	32
254-40 (Spiridon)	902	415	441	177	478	161	143	34	292	203
254-50 (Spiridon Term. area)	0	0	0	0	72	112	10	1	388	43
255-10 (Inner Karluk)	3,632	482	487	790	0	380	231	1,051	543	634
255-20 (Outer Karluk)	1,482	1,312	1,175	655	252	687	462	1,537	719	702
256-10 (S. Ayakulik)	0	45	1	0	73	198	210	12	14	0
256-15 (Inner Ayakulik)	0	0	107	4	73	444	824	3,414	32	0
256-20 (N. Ayakulik)	0	2,367	3,615	808	3,649	2,922	2,382	3,301	39	0
256-25 (Gurney Bay)	0	65	20	75	323	151	22	20	0	0
256-30 (Halibut Bay)	0	196	20	364	231	475	168	423	0	0
256-40 (Sturgeon)	0	153	0	0	0	0	18	0	0	0
257-10 (Sukhoi)	43	3	0	0	2	27	8	0	0	0
257-20 (Tannerhead)	1,433	612	279	152	1,047	73	291	401	0	127
Total	10,144	7,315	7,024	3,546	7,098	6,295	5,298	11,333	2,904	3,443
Average weight (lb.)	15	15	15	14	15	15	17	13	10	11

Source: ADF&G, Division of Commercial Fisheries, statewide electronic fish ticket database.

**APPENDIX B. KARLUK, AYAKULIK, AND CHIGNIK
RIVERS CHINOOK SALMON WEIR COUNTS, 1994-2003**

Appendix B1.-Daily cumulative weir counts of Karluk River Chinook salmon, 25 May through 1 August 1994-2003.

Date	1994		1995		1996		1997		1998		1999		2000		2001		2002		2003		1994-2003
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	Avg %
25-May	223	2	166	1	14	0	298	2	116	1	0	0	8	0	3	0	14	0	17	0	1
26-May	267	2	238	2	29	0	461	3	230	2	0	0	23	0	9	0	60	1	24	0	1
27-May	331	3	260	2	49	0	609	5	396	4	27	0	48	0	18	0	105	1	33	0	2
28-May	405	3	318	3	179	2	848	6	562	5	49	0	118	1	43	1	145	2	41	1	3
29-May	489	4	328	3	274	3	964	7	595	6	82	1	138	1	141	3	149	2	45	1	3
30-May	540	4	366	3	399	4	1,105	8	728	7	122	1	179	2	211	5	149	2	61	1	4
31-May	635	5	405	3	502	5	1,178	9	813	8	189	1	308	3	340	8	181	3	63	1	5
1-Jun	743	6	529	4	679	7	1,421	11	936	9	218	2	464	4	352	8	291	4	67	1	6
2-Jun	855	7	754	6	779	8	1,831	14	1,112	11	377	3	733	7	666	15	359	5	67	1	8
3-Jun	1,204	10	907	7	1,006	10	1,993	15	1,301	13	460	4	886	8	917	21	632	9	360	5	11
4-Jun	1,459	12	1,094	9	1,180	12	2,208	16	1,458	14	651	5	934	9	1,010	23	816	11	586	8	12
5-Jun	1,835	15	1,290	10	1,457	14	2,480	18	1,687	16	840	6	977	9	1,056	24	967	13	739	10	14
6-Jun	2,000	17	1,491	12	1,713	17	2,730	20	1,903	19	1,161	9	1,035	10	1,268	28	1,149	16	803	11	16
7-Jun	2,206	18	1,587	13	1,994	20	3,265	24	2,138	21	1,800	14	1,111	11	1,436	32	1,354	19	909	13	19
8-Jun	2,614	22	1,966	16	2,174	22	3,711	28	2,395	23	2,268	17	2,259	22	1,573	35	1,497	21	1,050	14	23
9-Jun	2,869	24	2,305	18	2,402	24	3,866	29	2,705	26	3,125	24	2,914	28	1,709	38	1,561	22	1,147	16	26
10-Jun	3,114	26	2,785	22	2,612	26	4,155	31	2,997	29	4,037	31	3,394	32	1,848	42	1,774	25	1,447	20	29
11-Jun	3,467	29	3,091	24	2,755	27	4,265	32	3,265	32	4,447	34	3,606	34	2,156	48	2,140	30	1,466	20	32
12-Jun	4,198	35	3,534	28	2,985	30	4,469	33	3,620	35	4,562	35	3,734	36	2,277	51	2,417	34	1,564	22	35
13-Jun	4,709	39	4,058	32	3,242	32	5,030	37	4,000	39	5,130	39	4,517	43	2,525	57	2,686	37	1,640	23	40
14-Jun	5,245	44	4,339	34	4,189	42	5,740	43	4,468	44	5,318	41	4,752	45	2,690	60	3,092	43	1,767	24	44
15-Jun	5,774	48	4,885	39	4,419	44	6,366	47	4,811	47	5,509	42	5,216	50	2,867	64	3,250	45	1,826	25	47
16-Jun	6,304	52	5,174	41	4,854	48	6,861	51	5,190	51	5,787	44	5,528	53	3,062	69	3,350	47	1,832	25	51
17-Jun	6,645	55	5,662	45	5,036	50	7,270	54	5,432	53	6,354	49	6,152	59	3,243	73	3,694	51	1,835	25	54
18-Jun	6,971	58	6,049	48	5,191	52	7,892	59	5,826	57	6,952	53	6,636	63	3,391	76	3,839	54	1,845	25	58
19-Jun	7,143	59	6,495	51	5,465	54	8,510	63	6,030	59	7,388	57	6,813	65	3,434	77	3,934	55	1,971	27	60
20-Jun	7,464	62	6,970	55	5,580	56	9,353	70	6,828	67	7,715	59	7,133	68	3,528	79	4,201	59	2,030	28	64
21-Jun	7,816	65	7,589	60	6,024	60	9,715	72	6,911	67	7,876	60	7,340	70	3,641	82	4,464	62	2,269	31	67
22-Jun	8,194	68	7,859	62	6,565	65	10,027	75	7,275	71	8,508	65	7,429	71	3,725	84	4,786	67	2,774	38	70
23-Jun	8,373	69	8,303	66	7,048	70	10,287	77	7,380	72	8,940	68	7,518	72	3,861	87	4,931	69	2,825	39	72

-continued-

Appendix B1.-Page 2 of 3.

Date	1994		1995		1996		1997		1998		1999		2000		2001		2002		2003		1994-2003
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	Avg %
24-Jun	8,645	72	8,776	69	7,374	73	10,856	81	7,431	73	9,145	70	7,845	75	3,980	89	5,013	70	2,859	39	75
25-Jun	9,014	75	9,105	72	7,651	76	11,309	84	7,838	77	9,498	73	8,220	79	4,060	91	5,100	71	3,074	42	77
26-Jun	9,205	76	9,432	75	7,766	77	11,404	85	8,117	79	9,817	75	8,784	84	4,067	91	5,121	71	3,519	48	79
27-Jun	9,648	80	9,710	77	8,031	80	11,429	85	8,449	83	10,149	78	8,806	84	4,086	92	5,183	72	3,767	52	81
28-Jun	9,835	82	9,875	78	8,160	81	11,505	86	8,795	86	10,491	80	9,069	87	4,086	92	5,352	75	3,795	52	83
29-Jun	10,107	84	10,092	80	8,397	84	11,547	86	8,856	86	10,792	83	9,199	88	4,104	92	5,391	75	3,852	53	84
30-Jun	10,344	86	10,251	81	8,671	86	11,752	87	8,961	88	10,984	84	9,281	89	4,119	92	5,436	76	3,909	54	85
1-Jul	10,427	87	10,672	84	8,696	87	12,189	91	9,094	89	11,169	86	9,435	90	4,124	93	5,944	83	4,008	55	88
2-Jul	10,533	87	10,920	86	8,713	87	12,409	92	9,239	90	11,283	86	9,503	91	4,133	93	6,079	85	4,086	56	89
3-Jul	10,631	88	11,082	88	8,735	87	12,469	93	9,275	91	11,452	88	9,616	92	4,138	93	6,109	85	4,093	56	89
4-Jul	10,767	89	11,265	89	8,791	87	12,531	93	9,337	91	11,602	89	9,673	92	4,142	93	6,153	86	4,108	57	90
5-Jul	10,829	90	11,350	90	8,809	88	12,565	93	9,438	92	11,716	90	9,756	93	4,175	94	6,184	86	4,178	58	91
6-Jul	10,876	90	11,419	90	8,817	88	12,609	94	9,469	92	11,758	90	9,790	94	4,180	94	6,216	87	4,286	59	91
7-Jul	10,923	91	11,509	91	8,818	88	12,844	96	9,490	93	12,101	93	9,862	94	4,211	95	6,262	87	4,310	59	92
8-Jul	11,046	92	11,643	92	8,828	88	12,905	96	9,588	94	12,197	93	9,897	95	4,220	95	6,305	88	4,746	65	92
9-Jul	11,078	92	11,686	92	8,836	88	12,934	96	9,729	95	12,283	94	9,941	95	4,222	95	6,333	88	5,872	81	93
10-Jul	11,138	92	11,839	94	8,842	88	12,962	96	9,853	96	12,341	94	9,957	95	4,231	95	6,367	89	6,407	88	93
11-Jul	11,189	93	11,915	94	8,844	88	13,041	97	9,901	97	12,442	95	9,974	95	4,235	95	6,401	89	6,455	89	94
12-Jul	11,230	93	11,955	94	8,859	88	13,054	97	9,921	97	12,459	95	9,987	95	4,252	95	6,502	91	6,673	92	94
13-Jul	11,276	94	12,006	95	8,860	88	13,058	97	9,933	97	12,471	95	10,008	96	4,262	96	6,505	91	6,703	92	94
14-Jul	11,301	94	12,072	95	8,862	88	13,065	97	9,942	97	12,597	96	10,015	96	4,279	96	6,533	91	6,719	93	95
15-Jul	11,327	94	12,111	96	8,864	88	13,078	97	9,945	97	12,637	97	10,020	96	4,293	96	6,591	92	6,802	94	95
16-Jul	11,347	94	12,144	96	8,880	88	13,108	98	9,951	97	12,657	97	10,061	96	4,296	96	6,636	92	6,811	94	95
17-Jul	11,355	94	12,183	96	8,904	89	13,116	98	9,953	97	12,672	97	10,070	96	4,296	96	6,659	93	6,832	94	95
18-Jul	11,357	94	12,204	96	8,930	89	13,123	98	9,955	97	12,700	97	10,074	96	4,297	96	6,704	93	6,836	94	95
19-Jul	11,365	94	12,211	96	8,944	89	13,137	98	9,955	97	12,737	98	10,099	97	4,309	97	6,745	94	6,840	94	96
20-Jul	11,367	94	12,239	97	9,357	93	13,137	98	9,956	97	12,764	98	10,101	97	4,320	97	6,758	94	6,852	94	96
21-Jul	11,420	95	12,266	97	9,383	93	13,151	98	9,984	98	12,786	98	10,107	97	4,321	97	6,784	95	6,866	95	96
22-Jul	11,472	95	12,285	97	9,515	95	13,152	98	10,000	98	12,796	98	10,123	97	4,334	97	6,803	95	6,869	95	97
23-Jul	11,538	96	12,298	97	9,602	96	13,156	98	10,014	98	12,811	98	10,128	97	4,339	97	6,821	95	6,893	95	97
24-Jul	11,623	96	12,314	97	9,608	96	13,233	98	10,044	98	12,835	98	10,136	97	4,361	98	6,897	96	6,906	95	97

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Date	<u>1994</u>		<u>1995</u>		<u>1996</u>		<u>1997</u>		<u>1998</u>		<u>1999</u>		<u>2000</u>		<u>2001</u>		<u>2002</u>		<u>2003</u>		<u>1994-2003</u>
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	Avg %
25-Jul	11,687	97	12,345	98	9,638	96	13,233	98	10,052	98	12,841	98	10,168	97	4,365	98	6,912	96	6,907	95	97
26-Jul	11,697	97	12,375	98	9,650	96	13,233	98	10,056	98	12,862	98	10,170	97	4,370	98	6,925	97	6,913	95	98
27-Jul	11,728	97	12,393	98	9,656	96	13,234	98	10,059	98	12,892	99	10,172	97	4,372	98	6,928	97	6,929	95	98
28-Jul	11,770	98	12,418	98	9,755	97	13,239	98	10,078	98	12,894	99	10,191	97	4,373	98	6,944	97	6,949	96	98
29-Jul	11,777	98	12,472	99	9,796	97	13,242	99	10,083	98	12,918	99	10,220	98	4,379	98	6,966	97	6,952	96	98
30-Jul	11,797	98	12,481	99	9,801	98	13,243	99	10,094	99	12,929	99	10,226	98	4,385	98	6,987	97	6,980	96	98
31-Jul	11,814	98	12,485	99	9,850	98	13,269	99	10,122	99	12,930	99	10,288	98	4,394	99	7,006	98	7,021	97	98
1-Aug	11,823	98	12,489	99	9,886	98	13,295	99	10,132	99	13,057	100	10,458	100	4,453	100	7,016	98	7,035	97	99
Total count	12,049		12,657		10,051		13,443		10,239		13,063		10,460		4,453		7,175		7,256		

Note: N = daily cumulative weir count (number of Chinook salmon).

Appendix B2.-Daily cumulative weir counts of Ayakulik River Chinook salmon, 25 May through 1 August 1994-2003.

Date	1994		1995		1996		1997		1998		1999		2000		2001		2002		2003		1994-2003
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	Avg %
25-May	100	1	0	0	65	1	24	0	177	1	0	155	1	101	1	72	1	2	0	1	
26-May	129	1	0	0	73	1	34	0	236	2	0	197	1	152	1	92	1	4	0	1	
27-May	158	2	2	0	75	1	56	0	422	3	46	0	210	1	177	1	100	1	5	0	1
28-May	204	2	11	0	91	1	68	0	604	4	48	0	215	1	399	3	173	1	6	0	2
29-May	210	2	22	0	111	1	70	0	732	5	55	0	216	1	797	6	179	1	13	0	2
30-May	265	3	29	0	123	1	123	1	848	6	55	0	262	1	1,079	8	230	2	53	0	2
31-May	294	3	41	0	318	3	132	1	1,049	7	55	0	282	1	1,227	9	295	2	147	1	3
1-Jun	328	4	127	1	622	6	151	1	1,413	10	55	0	437	2	1,476	11	607	5	275	2	4
2-Jun	568	6	349	2	961	9	215	1	1,858	13	71	1	464	2	1,760	13	786	6	541	3	6
3-Jun	694	8	532	3	1642	16	316	2	2,170	15	405	3	581	3	3,277	24	825	7	947	5	9
4-Jun	1304	14	2818	16	1822	18	483	3	2,536	18	537	4	2,047	10	3,657	26	1,242	10	1,742	10	13
5-Jun	1,565	17	3,602	20	2,020	20	706	5	2,941	21	610	5	3,434	17	5,325	38	1,280	10	2,183	12	17
6-Jun	1,636	18	4,111	23	2,988	29	920	6	3,477	25	634	5	4,810	23	6,952	50	1,511	12	2,596	15	21
7-Jun	1,860	20	4,397	25	3,317	32	1,344	9	3,940	28	1,089	8	5,050	25	8,179	59	1,749	14	3,865	22	24
8-Jun	2,731	30	5,167	29	3,404	33	1,429	10	4,347	31	1,298	10	5,129	25	9,115	65	2,011	16	4,128	24	28
9-Jun	3,257	36	5,466	31	3,413	33	1,741	12	4,825	34	1,857	14	5,312	26	9,605	69	2,316	18	4,334	25	30
10-Jun	3,641	40	5,671	32	3,473	34	3,019	21	5,328	38	2,447	18	6,561	32	9,889	71	2,483	20	5,095	29	34
11-Jun	3,797	42	5,936	34	3,511	34	3,978	28	5,799	41	3,405	25	6,981	34	10,204	73	2,651	21	6,689	38	37
12-Jun	4,293	47	6,245	35	3,585	35	4,553	32	6,147	44	6,148	46	8,204	40	10,450	75	2,713	22	6,889	39	42
13-Jun	4,321	47	7,213	41	3,740	36	4,782	33	6,612	47	8,135	60	9,545	46	10,592	76	2,848	23	6,999	40	46
14-Jun	4,544	50	7,470	42	4,080	39	4,905	34	6,840	49	8,863	66	10,379	51	10,669	77	3,229	26	7,831	45	48
15-Jun	4,825	53	7,800	44	4,773	46	5,547	39	7,150	51	9,190	68	10,994	54	10,721	77	3,338	27	8,563	49	51
16-Jun	4,933	54	8,160	46	5,579	54	6,038	42	7,575	54	9,256	69	13,324	65	10,818	78	3,728	30	9,151	52	55
17-Jun	5,155	56	8,633	49	6,015	58	6,723	47	7,972	57	9,329	69	15,467	75	10,948	79	4,869	39	9,874	56	59
18-Jun	5,347	59	9,021	51	6,113	59	7,095	49	8,225	59	9,586	71	15,913	78	11,003	79	5,533	44	10,046	57	61
19-Jun	5,461	60	9,368	53	6,161	60	7,428	52	8,585	61	9,953	74	16,077	78	11,283	81	6,119	49	10,760	61	63
20-Jun	5,536	61	9,781	55	6,428	62	7,814	54	8,779	63	10,050	74	16,425	80	11,421	82	7,490	60	10,864	62	66
21-Jun	5,771	63	11,126	63	7,144	69	8,213	57	9,327	66	10,113	75	16,663	81	11,504	83	7,693	61	10,984	63	69
22-Jun	5,931	65	11,797	67	7,583	73	8,530	59	9,717	69	10,257	76	17,347	85	11,963	86	7,855	63	11,343	65	71
23-Jun	6,190	68	12,269	69	8,746	85	10,077	70	10,360	74	10,414	77	17,389	85	12,147	87	8,672	69	11,515	66	76

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Date	1994		1995		1996		1997		1998		1999		2000		2001		2002		2003		1994-2003	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	Avg %	
24-Jun	6,789	74	13,292	75	8,819	85	12,048	84	10,938	78	10,460	77	18,189	89	12,335	89	9,353	75	11,608	66	81	
25-Jun	7,229	79	14,207	80	8,915	86	12,560	87	11,380	81	10,559	78	18,582	91	12,376	89	10,249	82	11,845	67	84	
26-Jun	7,724	85	14,618	83	9,010	87	12,626	88	11,645	83	10,926	81	18,724	91	12,436	89	10,484	84	11,868	68	86	
27-Jun	7,906	87	15,177	86	9,083	88	12,778	89	11,984	85	11,438	85	19,087	93	12,553	90	10,668	85	12,127	69	87	
28-Jun	7,990	87	15,557	88	9,269	90	12,839	89	12,247	87	11,631	86	19,195	94	12,671	91	10,884	87	12,962	74	89	
29-Jun	8,093	89	15,702	89	9,434	91	12,881	90	12,453	89	11,862	88	19,462	95	12,899	93	11,088	88	13,693	78	90	
30-Jun	8,261	90	16,291	92	9,557	92	12,964	90	12,664	90	12,000	89	19,583	95	12,971	93	11,172	89	13,897	79	91	
1-Jul	8,443	92	16,446	93	9,582	93	13,177	92	12,816	91	12,116	90	19,620	96	13,128	94	11,259	90	14,222	81	92	
2-Jul	8,522	93	16,676	94	9,642	93	13,418	93	13,035	93	12,226	91	19,722	96	13,286	95	11,495	92	14,623	83	93	
3-Jul	8,619	94	16,771	95	9,750	94	13,577	95	13,212	94	12,230	91	19,772	96	13,325	96	11,546	92	14,783	84	94	
4-Jul	8,661	95	16,810	95	9,809	95	13,701	95	13,348	95	12,266	91	19,795	96	13,397	96	11,728	93	15,122	86	95	
5-Jul	8,691	95	16,850	95	9,858	95	13,766	96	13,408	96	12,366	92	19,888	97	13,397	96	11,917	95	15,317	87	95	
6-Jul	8,740	96	16,914	96	9,988	97	13,852	96	13,511	96	12,392	92	19,990	97	13,496	97	11,942	95	15,547	89	96	
7-Jul	8,806	96	17,155	97	10,087	98	13,928	97	13,601	97	12,465	92	19,992	97	13,541	97	11,978	95	15,719	90	96	
8-Jul	8,832	97	17,182	97	10,132	98	13,980	97	13,690	98	12,522	93	19,992	97	13,549	97	12,012	96	15,882	90	97	
9-Jul	8,873	97	17,220	97	10,153	98	14,035	98	13,731	98	12,757	94	20,046	98	13,598	98	12,036	96	16,021	91	97	
10-Jul	8,942	98	17,315	98	10,153	98	14,094	98	13,779	98	12,884	95	20,116	98	13,650	98	12,174	97	16,301	93	98	
11-Jul	8,973	98	17,359	98	10,172	98	14,120	98	13,825	98	12,965	96	20,140	98	13,678	98	12,189	97	16,724	95	98	
12-Jul	8,990	98	17,376	98	10,194	99	14,153	99	13,862	99	13,089	97	20,200	98	13,700	98	12,208	97	16,754	95	98	
13-Jul	9,008	99	17,414	98	10,194	99	14,165	99	13,872	99	13,129	97	20,253	99	13,755	99	12,252	98	16,762	95	98	
14-Jul	9,025	99	17,420	98	10,202	99	14,177	99	13,904	99	13,165	97	20,287	99	13,765	99	12,306	98	16,823	96	99	
15-Jul	9,036	99	17,459	99	10,211	99	14,181	99	13,916	99	13,188	98	20,292	99	13,791	99	12,307	98	16,840	96	99	
16-Jul	9,054	99	17,490	99	10,227	99	14,191	99	13,924	99	13,188	98	20,325	99	13,803	99	12,335	98	16,929	96	99	
17-Jul	9,069	99	17,512	99	10,234	99	14,212	99	13,933	99	13,195	98	20,329	99	13,825	99	12,367	99	16,934	96	99	
18-Jul	9,082	99	17,516	99	10,249	99	14,216	99	13,946	99	13,203	98	20,334	99	13,836	99	12,373	99	16,980	97	99	
19-Jul	9,088	99	17,549	99	10,256	99	14,248	99	13,969	99	13,203	98	20,365	99	13,843	99	12,386	99	17,078	97	99	
20-Jul	9,094	99	17,577	99	10,260	99	14,274	99	13,973	99	13,287	98	20,378	99	13,843	99	12,397	99	17,368	99	99	
21-Jul	9,099	99	17,581	99	10,266	99	14,280	99	13,977	99	13,297	98	20,396	99	13,844	99	12,401	99	17,384	99	99	
22-Jul	9,104	99	17,585	99	10,289	99	14,293	99	13,978	99	13,347	99	20,407	99	13,846	99	12,406	99	17,485	100	99	
23-Jul	9,105	99	17,599	99	10,291	99	14,299	99	13,981	99	13,371	99	20,421	99	13,849	99	12,415	99	17,488	100	99	
24-Jul	9,108	99	17,610	99	10,293	99	14,302	99	13,984	99	13,376	99	20,437	100	13,856	99	12,416	99	17,492	100	99	

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Date	1994		1995		1996		1997		1998		1999		2000		2001		2002		2003		1994-2003
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	Avg %
25-Jul	9,111	99	17,618	99	10,298	99	14,303	99	13,986	99	13,386	99	20,445	100	13,877	100	12,416	99	17,527	100	99
26-Jul	9,111	99	17,620	99	10,301	99	14,308	99	13,992	99	13,404	99	20,452	100	13,885	100	12,416	99	17,528	100	99
27-Jul	9,113	99	17,628	99	10,305	99	14,314	99	13,993	99	13,435	99	20,463	100	13,891	100	12,416	99	17,530	100	99
28-Jul	9,115	99	17,637	99	10,307	99	14,322	99	14,004	99	13,446	100	20,477	100	13,892	100	12,416	99	17,537	100	99
29-Jul	9,116	99	17,649	99	10,308	99	14,323	99	14,005	99	13,449	100	20,479	100	13,893	100	12,429	99	17,537	100	99
30-Jul	9,118	99	17,651	99	10,314	99	14,325	99	14,009	99	13,467	100	20,479	100	13,900	100	12,429	99	17,544	100	99
31-Jul	9,118	99	17,659	99	10,316	99	14,325	99	14,013	99	13,474	100	20,483	100	13,901	100	12,429	99	17,544	100	99
1-Aug	9,120	99	17,664	99	10,321	99	14,326	99	14,017	99	13,475	100	20,487	100	13,902	100	12,429	99	17,545	100	99
Total																					
count	9,138		17,701		10,344		14,357		14,038		13,503		20,527		13,929		12,552		17,557		

Note: N = daily cumulative weir count (number of Chinook salmon).

Appendix B3.-Daily cumulative weir counts of Chignik River Chinook salmon 16 June through 15 August 1994-2003.

Date	1994		1995		1996		1997		1998		1999		2000		2001		2002		2003		1994-2003	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	Avg %	
16-Jun	4	0			7	0	6	0			2	0					6	0	26	0		
17-Jun	5	0	7	0	7	0	19	0	12	0	8	0					12	0	27	0		
18-Jun	5	0	15	0	7	0	19	0	24	1	8	0					12	0	33	1		
19-Jun	6	0	36	1	14	0	19	0	25	1	14	0					36	1	69	1		
20-Jun	24	1	36	1	62	2	55	1	58	2	14	0	39	1			42	1	69	1		
21-Jun	30	1	36	1	74	2	73	2	95	3	14	0	47	1			42	1	105	2		
22-Jun	50	2	36	1	80	2	106	3	108	4	20	1	60	1	18	1	67	2	135	2		2
23-Jun	56	2	38	1	94	3	124	3	114	4	38	1	73	2	18	1	79	2	159	2		2
24-Jun	74	2	45	1	124	4	130	3	150	5	63	2	94	2	18	1	85	2	183	3		2
25-Jun	88	3	49	1	136	4	160	4	198	6	85	2	124	3	18	1	122	3	219	3		3
26-Jun	88	3	53	1	142	4	218	6	222	7	97	3	163	4	18	1	226	6	279	4		4
27-Jun	94	3	53	1	250	7	280	7	276	9	109	3	219	5	18	1	256	7	388	6		5
28-Jun	108	4	74	2	394	11	358	9	369	12	111	3	300	7	54	2	305	9	448	7		6
29-Jun	140	5	77	2	532	15	382	10	441	14	135	4	399	9	85	3	389	11	485	8		8
30-Jun	147	5	77	2	574	16	462	12	495	16	184	5	467	11	128	4	551	16	534	8		10
1-Jul	167	6	77	2	691	20	528	14	525	17	214	6	557	13	257	9	599	17	552	9		11
2-Jul	167	6	85	2	725	21	582	15	561	18	280	8	643	15	485	16	659	19	612	10		13
3-Jul	205	7	104	2	798	23	624	16	621	20	354	9	763	18	647	22	678	19	668	10		15
4-Jul	318	11	140	3	822	24	693	18	665	22	390	10	887	21	731	24	843	24	848	13		17
5-Jul	444	15	212	5	912	26	778	20	755	25	459	12	1,033	24	779	26	891	25	1,071	17		20
6-Jul	514	17	266	6	946	27	848	22	794	26	495	13	1,234	29	857	29	958	27	1,254	20		22
7-Jul	583	19	284	7	946	27	990	26	942	31	647	17	1,384	32	965	32	1,060	30	1,296	20		25
8-Jul	752	25	383	9	964	28	1,137	30	1,092	36	695	19	1,581	37	1,088	36	1,144	32	1,602	25		28
9-Jul	863	29	503	12	976	28	1,398	37	1,110	36	761	20	1,753	41	1,158	39	1,228	35	1,932	30		31
10-Jul	1,025	34	603	14	1,246	36	1,533	40	1,221	40	828	22	1,954	46	1,218	41	1,324	37	2,161	34		34
11-Jul	1,096	36	633	15	1,288	37	1,664	44	1,305	42	967	26	2,103	49	1,280	43	1,408	40	2,564	40		37
12-Jul	1,212	40	982	23	1,402	40	1,793	47	1,383	45	1,111	30	2,343	55	1,304	44	1,579	45	3,081	48		41
13-Jul	1,315	44	1,625	38	1,527	44	1,890	49	1,440	47	1,292	35	2,512	59	1,328	44	1,675	47	3,408	53		45
14-Jul	1,330	44	2,030	47	1,599	46	1,921	50	1,521	49	1,463	39	2,608	61	1,436	48	1,729	49	3,649	57		48
15-Jul	1,435	48	2,358	55	1,709	49	1,975	52	1,635	53	1,702	46	2,728	64	1,496	50	1,867	53	3,921	61		52
16-Jul	1,703	56	2,413	56	1,819	52	2,131	56	1,659	54	1,790	48	2,836	66	1,656	55	1,935	55	4,085	64		55

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Date	1994		1995		1996		1997		1998		1999		2000		2001		2002		2003		1994-2003	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	Avg %	
17-Jul	1,846	61	2,443	57	2,094	60	2,263	59	1,798	58	1,938	52	2,938	69	1,818	61	2,121	60	4,281	67	60	
18-Jul	2,069	69	2,587	60	2,270	65	2,451	64	1,879	61	1,992	53	3,016	70	2,016	67	2,271	64	4,369	68	64	
19-Jul	2,151	71	2,861	67	2,384	68	2,543	67	2,138	70	2,214	59	3,159	74	2,152	72	2,362	67	4,460	70	68	
20-Jul	2,340	78	2,948	69	2,535	73	2,587	68	2,222	72	2,281	61	3,244	76	2,237	75	2,464	70	4,600	72	71	
21-Jul	2,378	79	3,104	72	2,577	74	2,621	69	2,312	75	2,378	64	3,352	78	2,325	78	2,526	71	4,752	74	73	
22-Jul	2,432	81	3,281	77	2,626	75	2,729	71	2,365	77	2,458	66	3,442	80	2,452	82	2,640	75	4,896	76	76	
23-Jul	2,494	83	3,317	77	2,663	76	2,858	75	2,431	79	2,573	69	3,650	85	2,513	84	2,772	78	5,005	78	79	
24-Jul	2,570	85	3,360	78	2,740	79	2,972	78	2,505	81	2,729	73	3,766	88	2,609	87	2,904	82	5,011	78	81	
25-Jul	2,610	87	3,545	83	2,855	82	3,045	80	2,555	83	2,777	74	3,786	88	2,663	89	2,982	84	5,149	80	83	
26-Jul	2,663	88	3,691	86	2,905	83	3,057	80	2,585	84	2,897	78	3,788	88	2,702	90	3,054	86	5,203	81	85	
27-Jul	2,679	89	3,775	88	3,030	87	3,073	80	2,603	85	3,001	80	3,806	89	2,714	91	3,084	87	5,371	84	86	
28-Jul	2,700	90	3,838	90	3,078	88	3,131	82	2,625	85	3,031	81	3,848	90	2,726	91	3,108	88	5,495	86	87	
29-Jul	2,707	90	3,859	90	3,131	90	3,215	84	2,680	87	3,290	88	3,885	91	2,744	92	3,144	89	5,610	87	89	
30-Jul	2,720	90	3,895	91	3,163	91	3,257	85	2,696	88	3,348	90	3,923	92	2,756	92	3,156	89	5,694	89	90	
31-Jul	2,735	91	3,914	91	3,171	91	3,349	88	2,708	88	3,384	91	3,953	92	2,816	94	3,180	90	5,766	90	91	
1-Aug	2,747	91	3,974	93	3,196	92	3,387	89	2,732	89	3,402	91	3,973	93	2,822	94	3,192	90	5,808	91	91	
2-Aug	2,768	92	4,008	93	3,214	92	3,407	89	2,753	90	3,432	92	4,063	95	2,858	96	3,198	90	5,820	91	92	
3-Aug	2,780	92	4,021	94	3,227	93	3,414	89	2,765	90	3,462	93	4,111	96	2,876	96	3,234	91	5,874	92	93	
4-Aug	2,792	93	4,043	94	3,233	93	3,420	89	2,789	91	3,501	94	4,135	96	2,906	97	3,258	92	5,880	92	93	
5-Aug	2,828	94	4,050	94	3,264	94	3,434	90	2,825	92	3,522	94	4,147	97	2,924	98	3,270	92	5,928	92	94	
6-Aug	2,869	95	4,062	95	3,300	95	3,465	91	2,825	92	3,528	95	4,189	98	2,930	98	3,294	93	5,928	92	94	
7-Aug	2,879	95	4,094	95	3,306	95	3,564	93	2,855	93	3,564	96	4,189	98	2,930	98	3,312	94	5,934	93	95	
8-Aug	2,903	96	4,110	96	3,313	95	3,627	95	2,882	94	3,584	96	4,189	98	2,943	98	3,337	94	5,988	93	96	
9-Aug	2,915	97	4,183	98	3,331	96	3,651	95	2,915	95	3,602	97	4,213	98	2,955	99	3,373	95	6,024	94	97	
10-Aug	2,915	97	4,192	98	3,345	96	3,696	97	2,933	95	3,626	97	4,219	98	2,961	99	3,391	96	6,102	95	97	
11-Aug	2,921	97	4,229	99	3,388	97	3,716	97	2,933	95	3,650	98	4,249	99	2,967	99	3,415	96	6,144	96	98	
12-Aug	2,939	97	4,235	99	3,412	98	3,728	97	2,945	96	3,662	98	4,249	99	2,967	99	3,421	97	6,192	97	98	
13-Aug	2,957	98	4,247	99	3,418	98	3,729	98	2,975	97	3,692	99	4,255	99	2,979	100	3,433	97	6,207	97	98	
14-Aug	2,963	98	4,253	99	3,418	98	3,729	98	2,981	97	3,704	99	4,267	100	2,979	100	3,439	97	6,243	97	98	
15-Aug	2,963	98	4,253	99	3,438	99	3,761	98	2,999	98	3,704	99	4,267	100	2,986	100	3,445	97	6,261	98	99	
Total	count		3,016		4,288		3,485		3,824		3,075		3,728		4,285		2,992		3,541		6,412	

Note: N = daily cumulative weir count (number of Chinook salmon).

**APPENDIX C. AGE COMPOSITIONS FROM KARLUK,
AND AYAKULIK RIVER CHINOOK SALMON SPORT
HARVEST, AND CHIGNIK RIVER COMMERCIAL
HARVEST, 1999-2003**

Appendix C1.-Age composition and mean length-at-age for Karluk River Chinook salmon sport harvest, 2001.

Year ^a	Age				Total ^b
	1.1	1.2	1.3	1.4	
Females					
Number sampled	0	0	3	1	4
Percent	0.0	0.0	37.5	12.5	50.0
SE Percent	0.0	0.0	18.3	12.5	18.9
Mean Length (mm)			839	819	849
SE Mean Length			15		17
Minimum Length (mm)			816	819	816
Maximum Length (mm)			868	819	906
Males					
Number sampled	0	2	0	2	4
Percent	0.0	25.0	0.0	25.0	50.0
SE Percent	0.0	16.4	0.0	16.4	18.9
Mean Length (mm)		617		813	725
SE Mean Length		13		29	46
Minimum Length (mm)		604		784	604
Maximum Length (mm)		629		841	841
All					
Number sampled	0	2	3	3	8
Percent	0.0	25.0	37.5	37.5	100.0
SE Percent	0.0	16.4	18.3	18.3	0.0
Mean Length (mm)		617	839	815	787
SE Mean Length		13	15	17	31
Minimum Length (mm)		604	816	784	604
Maximum Length (mm)		629	868	841	906

Note: Length from mid-eye to fork of tail recorded to the nearest millimeter.

^a Estimated from sport fish catch sampled on 11 June 2001.

^b Female total mean length includes 1 fish for which age was not determined, male total mean length includes 1 fish for which age was not determined, total mean length was not determined for all Chinook salmon includes 1 fish for which age was not determined.

Appendix C2.-Age composition and mean length-at-age of Karluk River Chinook salmon sport harvest, 2003.

Year ^a	Age				Total ^b
	1.1	1.2	1.3	1.4	
Females					
Number sampled	0	0	14	7	21
Percent	0.0	0.0	25.9	13.0	38.9
SE Percent	0.0	0.0	6.0	4.6	6.7
Mean Length (mm)			776	830	797
SE Mean Length			14	14	10
Minimum Length (mm)			627	782	627
Maximum Length (mm)			843	880	903
Males					
Number sampled	2	3	14	14	33
Percent	3.7	5.6	25.9	25.9	61.1
SE Percent	2.6	3.1	6.0	6.0	6.7
Mean Length (mm)	371	679	787	828	765
SE Mean Length	2	62	9	14	19
Minimum Length (mm)	369	58	741	724	369
Maximum Length (mm)	372	798	862	905	905
All					
Number sampled	2	3	28	21	54
Percent	3.7	5.6	51.9	38.9	100.0
SE Percent	2.6	3.1	6.9	6.7	0.0
Mean Length (mm)	371	679	781	829	778
SE Mean Length	2	62	8	10	2
Minimum Length (mm)	369	58	327	724	369
Maximum Length (mm)	372	798	862	905	905

Note: Length from mid-eye to fork of tail recorded to the nearest millimeter.

^a Estimated from sport fish catch sampled between 8 June and 6 July 2003.

^b Female total mean length includes 5 fish for which age was not determined, male total mean length includes 5 fish for which age was not determined, total mean length for all Chinook salmon includes 10 fish for which age was not determined.

Appendix C3.-Age composition and mean length-at-age of
Ayakulik River Chinook salmon sport harvest, 2001.

Year ^a	Age		Total ^b
	1.3	1.4	
Females			
Number sampled	1	6	7
Percent	7.7	46.2	53.8
SE Percent	7.7	14.4	14.4
Mean Length (mm)	883	844	856
SE Mean Length		12	9
Minimum Length (mm)	883	802	802
Maximum Length (mm)	883	885	896
Males			
Number sampled	1	5	6
Percent	7.7	38.5	46.2
SE Percent	7.7	14.0	14.4
Mean Length (mm)	862	893	880
SE Mean Length		24	17
Minimum Length (mm)	862	820	820
Maximum Length (mm)	862	970	970
All			
Number sampled	2	11	13
Percent	15.4	84.6	100.0
SE Percent	10.4	10.4	0.0
Mean Length (mm)	873	866	867
SE Mean Length	11	14	9
Minimum Length (mm)	862	802	802
Maximum Length (mm)	883	970	970

Note: Length from mideye to fork of tail recorded to the nearest millimeter.

^a Estimated from sport catch sampled from 12-26 June 2001.

^b Female total mean length includes 3 fish for which age was not determined, male total mean length includes 2 fish for which age was not determined, total mean length for all Chinook salmon includes 5 fish for which age was not determined.

Appendix C4.-Age composition and mideye to fork length of commercial-harvested Chinook salmon, Chignik River, 1999.

	Age							Total
	1.1	1.2	1.3	1.4	1.5	1.6	2.4	
Females								
Number sampled	10	80	82	61	7	0	1	241
Percent	2.4	19.2	19.7	14.6	1.7	0.0	0.2	57.8
SE Percent	0.8	1.9	1.9	1.7	0.6		0.2	2.4
Mean Length (mm)	431	604	783	871	865		910	737
Std Dev Length	115	66	84	71	58			147
Minimum Length (mm)	282	463	408	712	749		910	282
Maximum Length (mm)	727	724	902	1045	934		910	1045
Males								
Number sampled	4	45	58	62	6	1	0	176
Percent	1.0	10.8	13.9	14.9	1.4	0.2	0.0	42.2
SE Percent	0.5	1.5	1.7	1.7	0.6	0.2		2.4
Mean Length (mm)	417	626	790	913	904	881		791
Std Dev Length	17	92	91	64	82			149
Minimum Length (mm)	401	491	605	755	757	881		401
Maximum Length (mm)	440	964	1,043	1,075	973	881		1,075
All								
Number sampled	14	125	140	123	13	1	1	417
Percent	3.4	30.0	33.6	29.5	3.1	0.2	0.2	100.0
SE Percent	0.9	2.2	2.3	2.2	0.9	0.2	0.2	0.0
Mean Length (mm)	427	612	786	893	883	881	910	760
Std Dev Length	96	77	87	71	70			150
Minimum Length (mm)	282	463	408	712	749	881	910	282
Maximum Length (mm)	727	964	1,043	1,075	973	881	910	1,075

Note: Length from mideye to fork of tail recorded to the nearest millimeter.

^a Based on samples obtained 25 June-8 August 1999.

^b Female, male, and total statistics include 8, 8, and 16 fish for which age was not determined, respectively.

Appendix C5.-Age composition and mideye to fork length of commercial-harvested Chinook salmon, Chignik River, 2001.

	Age					Total
	1.1	1.2	1.3	1.4	1.5	
Females						
Number sampled	2	10	14	19	4	49
Percent	1.7	8.3	11.6	15.7	3.3	40.5
SE Percent	1.2	2.5	2.9	3.3	1.6	4.5
Mean Length (mm)	392	618	815	884	937	785
Std Dev Length	4	60	76	60	46	166
Minimum Length (mm)	389	532	601	765	885	184
Maximum Length (mm)	394	738	885	1040	995	1040
Males						
Number sampled	23	12	15	21	1	72
Percent	19.0	9.9	12.4	17.4	0.8	59.5
SE Percent	3.6	2.7	3.0	3.5	0.8	4.5
Mean Length (mm)	408	650	780	913	826	674
Std Dev Length	26	135	106	68		222
Minimum Length (mm)	344	520	475	773	826	332
Maximum Length (mm)	448	954	950	1,076	826	1,076
All						
Number sampled	25	22	29	40	5	121
Percent	20.7	18.2	24.0	33.1	4.1	100.0
SE Percent	3.7	3.5	3.9	4.3	1.8	0.0
Mean Length (mm)	407	636	797	899	915	719
Std Dev Length	25	107	93	65	64	208
Minimum Length (mm)	344	520	475	765	826	184
Maximum Length (mm)	448	954	950	1,076	995	1,076

Note: Length from mideye to fork of tail recorded to the nearest millimeter.

^a Based on samples obtained 16 June-31 July 2001.

^b Female, male, and total statistics include 4, 5, and 9 fish for which age was not determined, respectively.

Appendix C6.-Age composition and mid-eye to fork length of commercial-harvested Chinook salmon, Chignik River, 2002.

	Age					Total
	1.1	1.2	1.3	1.4	1.5	
Females						
Number sampled	10	10	0	2	0	22
Percent	26.3	26.3	0.0	5.3	0.0	57.9
SE Percent	7.2	7.2		3.7		8.1
Mean Length	371	604		872		526
Std Dev Length	28	46		64		158
Minimum Length	312	512		826		312
Maximum Length	406	657		917		917
Males						
Number sampled	6	8	1	1	0	16
Percent	15.8	21.1	2.6	2.6	0.0	42.1
SE Percent	6.0	6.7	2.6	2.6		8.1
Mean Length	404	662	646	989		595
Std Dev Length	17	45				157
Minimum Length	383	581	646	989		383
Maximum Length	432	721	646	989		989
All						
Number sampled	16	18	1	3	0	38
Percent	42.1	47.4	2.6	7.9	0.0	100.0
SE Percent	8.1	8.2	2.6	4.4		0.0
Mean Length	383	630	646	911		556
Std Dev Length	29	53		82		160
Minimum Length	312	512	646	826		312
Maximum Length	432	721	646	989		989

Note: Length from mid-eye to fork of tail recorded to the nearest millimeter.

^a Based on samples obtained 26 June-31 July 2002.

^b Female, male, and total statistics include 3, 3, and 6 fish for which age was not determined, respectively.

Appendix C7.-Age composition and mideye to fork length of commercial-harvested Chinook salmon, Chignik River, 2003.

	Age				Total
	1.1	1.2	1.3	2.1	
Females					
Number sampled	28	6	1	1	36
Percent	46.7	10.0	1.7	1.7	60.0
SE Percent	6.5	3.9	1.7	1.7	6.4
Mean Length	427	528	797	341	453
Std Dev Length	66	137			104
Minimum Length	302	357	797	341	302
Maximum Length	682	666	797	341	797
Males					
Number sampled	8	12	4		24
Percent	13.3	20.0	6.7	0.0	40.0
SE Percent	4.4	5.2	3.2		6.4
Mean Length	412	627	743		579
Std Dev Length	33	84	65		138
Minimum Length	372	400	662		372
Maximum Length	449	720	807		807
All					
Number sampled	36	18	5	1	60
Percent	60.0	30.0	8.3	1.7	100.0
SE Percent	6.4	6.0	3.6	1.7	0.0
Mean Length	424	594	753	341	505
Std Dev Length	60	111	61		133
Minimum Length	302	357	662	341	302
Maximum Length	682	720	807	341	807

Note: Length from mideye to fork of tail recorded to the nearest millimeter.

^a Based on samples obtained 26 June-1 August 2003.

^b Female, male, and total statistics include 3, 3, and 6 fish for which age was not determined, respectively.

**APPENDIX D. ESTIMATED INRIVER RETURN OF
CHINOOK SALMON BY TIME STRATUM AND AGE,
KARLUK RIVER, 1999-2003**

Appendix D1.-Estimated inriver return of Chinook salmon by time stratum and age, Karluk River, 1999.

	Age								Total
	0.2	0.4	1.1	1.2	1.3	1.4	1.5	2.4	
<u>Through 12 June</u>									
Females									
Number sampled	0	0	0	0	9	23	8	0	40
Percent	0.0	0.0	0.0	0.0	10.2	26.1	9.1	0.0	45.5
SE percent					3.2	4.7	3.1		5.3
Inriver return at weir	0	0	0	0	467	1,192	415	0	2,074
SE return	0	0	0	0	147	213	139	0	241
Males									
Number sampled	0	0	0	6	18	21	3	0	48
Percent	0.0	0.0	0.0	6.8	20.5	23.9	3.4	0.0	54.5
SE percent				2.7	4.3	4.5	1.9		5.3
Inriver return at weir	0	0	0	311	933	1,089	156	0	2,488
SE return	0	0	0	122	195	206	88	0	241
All									
Number sampled	0	0	0	6	27	44	11	0	88
Percent	0.0	0.0	0.0	6.8	30.7	50.0	12.5	0.0	100.0
SE percent				2.7	4.9	5.3	3.5		0.0
Inriver return at weir	0	0	0	311	1,400	2,281	570	0	4,562
SE return	0	0	0	122	223	242	160	0	0
<u>After 12 June</u>									
Females									
Number sampled	0	1	0	3	45	60	4	1	114
Percent	0.0	0.4	0.0	1.3	19.1	25.4	1.7	0.4	48.3
SE percent		0.4		0.7	2.5	2.8	0.8	0.4	3.2
Inriver return at weir	0	36	0	108	1,621	2,161	144	36	4,106
SE return	0	36	0	61	215	238	71	36	273
Males									
Number sampled	0	0	2	20	69	31	0	0	122
Percent	0.0	0.0	0.8	8.5	29.2	13.1	0.0	0.0	51.7
SE percent			0.6	1.8	2.9	2.2			3.2
Inriver return at weir	0	0	72	720	2,485	1,117	0	0	4,395
SE return	0	0	50	152	249	185	0	0	273
All									
Number sampled	0	1	2	23	114	91	4	1	236
Percent	0.0	0.4	0.8	9.7	48.3	38.6	1.7	0.4	100.0
SE percent		0.4	0.6	1.9	3.2	3.1	0.8	0.4	0.0
Inriver return at weir	0	36	72	828	4,106	3,278	144	36	8,501
SE return	0	36	50	162	273	266	71	36	0

Appendix D2.-Estimated inriver return of Chinook salmon by time stratum and age, Karluk River, 2000.

	Age					Total
	1.1	1.2	1.3	1.4	1.5	
<u>Through 12 June</u>						
Females						
Number sampled	0	0	13	40	1	54
Percent	0.0	0.0	17.3	53.3	1.3	72.0
SE percent			4.4	5.7	1.3	5.2
Inriver return at weir	0	0	647	1,991	50	2,688
SE Return	0	0	163	214	49	193
Males						
Number sampled	0	1	3	16	1	21
Percent	0.0	1.3	4.0	21.3	1.3	28.0
SE percent		1.3	2.3	4.7	1.3	5.2
Inriver return at weir	0	50	149	797	50	1,046
SE Return	0	49	84	176	49	193
All						
Number sampled	0	1	16	56	2	75
Percent	0.0	1.3	21.3	74.7	2.7	100.0
SE percent		1.3	4.7	5.0	1.9	0.0
Inriver return at weir	0	50	797	2,788	100	3,734
SE Return	0	49	176	187	69	0
<u>After 12 June</u>						
Females						
Number sampled	0	2	41	79	1	123
Percent	0.0	1.0	20.0	38.5	0.5	60.0
SE percent		0.7	2.8	3.4	0.5	3.4
Inriver return at weir	0	66	1,345	2,592	33	4,036
SE Return	0	46	185	226	32	227
Males						
Number sampled	5	8	38	31	0	82
Percent	2.4	3.9	18.5	15.1	0.0	40.0
SE percent	1.1	1.3	2.7	2.5		3.4
Inriver return at weir	164	262	1,247	1,017	0	2,690
SE Return	72	90	180	166	0	227
All						
Number sampled	5	10	79	110	1	205
Percent	2.4	4.9	38.5	53.7	0.5	100.0
SE percent	1.1	1.5	3.4	3.4	0.5	0.0
Inriver return at weir	164	328	2,592	3,609	33	6,726
SE Return	72	100	226	231	32	0

Appendix D3.-Estimated inriver return of Chinook salmon by time stratum and age, Karluk River, 2002.

	Age				Total
	1.2	1.3	1.4	1.5	
<u>Through 12 June</u>					
Females					
Number sampled	0	11	52	6	69
Percent	0.0	9.0	42.6	4.9	56.6
SE percent		2.5	4.4	1.9	4.4
Inriver return at weir	0	218	1,030	119	1,367
SE Return	0	61	106	46	106
Males					
Number sampled	4	17	27	5	53
Percent	3.3	13.9	22.1	4.1	43.4
SE percent	1.6	3.1	3.7	1.8	4.4
Inriver return at weir	79	337	535	99	1,050
SE Return	38	74	89	42	106
All					
Number sampled	4	28	79	11	122
Percent	3.3	23.0	64.8	9.0	100.0
SE percent	1.6	3.7	4.2	2.5	0.0
Inriver return at weir	79	555	1,565	218	2,417
SE Return	38	90	102	61	0
<u>13-26 June</u>					
Females					
Number sampled	1	28	26	2	57
Percent	0.8	21.2	19.7	1.5	43.2
SE percent	0.7	3.5	3.4	1.0	4.2
Inriver return at weir	20	574	533	41	1,168
SE Return	20	94	92	28	114
Males					
Number sampled	31	29	14	1	75
Percent	23.5	22.0	10.6	0.8	56.8
SE percent	3.6	3.5	2.6	0.7	4.2
Inriver return at weir	635	594	287	20	1,536
SE Return	98	95	71	20	114
All					
Number sampled	32	57	40	3	132
Percent	24.2	43.2	30.3	2.3	100.0
SE percent	3.7	4.2	3.9	1.3	0.0
Inriver return at weir	656	1,168	819	61	2,704
SE Return	99	114	106	34	0

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	Age					Total
	1.1	1.2	1.3	1.4	1.5	
<u>27 June - 3 July</u>						
Females						
Number sampled	0	0	5	5	0	10
Percent	0.0	0.0	14.3	14.3	0.0	28.6
SE percent			5.9	5.9		7.6
Inriver return at weir	0	0	141	141	0	282
SE Return	0	0	58	58	0	75
Males						
Number sampled	1	14	7	2	1	25
Percent	2.9	40.0	20.0	5.7	2.9	71.4
SE percent	2.8	8.3	6.7	3.9	2.8	7.6
Inriver return at weir	28	395	198	56	28	706
SE Return	28	82	67	39	28	75
All						
Number sampled	1	14	12	7	1	35
Percent	2.9	40.0	34.3	20.0	2.9	100.0
SE percent	2.8	8.3	8.0	6.7	2.8	0.0
Inriver return at weir	28	395	339	198	28	988
SE Return	28	82	79	67	28	0
<u>After 3 July</u>						
Females						
Number sampled	0	0	2	0	0	2
Percent	0.0	0.0	14.3	0.0	0.0	14.3
SE percent			9.6			9.6
Inriver return at weir	0	0	152	0	0	152
SE Return	0	0	103	0	0	103
Males						
Number sampled	2	9	1	0	0	12
Percent	14.3	64.3	7.1	0.0	0.0	85.7
SE percent	9.6	13.2	7.1			9.6
Inriver return at weir	152	685	76	0	0	913
SE Return	103	141	76	0	0	103
All						
Number sampled	2	9	3	0	0	14
Percent	14.3	64.3	21.4	0.0	0.0	100.0
SE percent	9.6	13.2	11.3			0.0
Inriver return at weir	152	685	228	0	0	1,065
SE Return	103	141	120	0	0	0

Appendix D4.-Estimated inriver return of Chinook salmon by time stratum and age, Karluk River, 2003.

	Age			Total
	1.3	1.4	2.4	
<u>Through 30 May</u>				
Females				
Number sampled	2	5	0	7
Percent	12.5	31.3	0.0	43.8
SE percent	7.3	10.3		11.0
Inriver return at weir	8	19	0	27
SE Return	4	6	0	7
Males				
Number sampled	4	4	1	9
Percent	25.0	25.0	6.3	56.3
SE percent	9.6	9.6	5.4	11.0
Inriver return at weir	15	15	4	34
SE Return	6	6	3	7
All				
Number sampled	6	9	1	16
Percent	37.5	56.3	6.3	100.0
SE percent	10.7	11.0	5.4	0.0
Inriver return at weir	23	34	4	61
SE Return	7	7	3	0
<u>31 May - 13 June</u>				
Females				
Number sampled	5	2	0	7
Percent	62.5	25.0	0.0	87.5
SE percent	18.3	16.3		12.5
Inriver return at weir	987	395	0	1,382
SE Return	288	258	0	197
Males				
Number sampled	1	0	0	1
Percent	12.5	0.0	0.0	12.5
SE percent	12.5			12.5
Inriver return at weir	197	0	0	197
SE Return	197	0	0	197
All				
Number sampled	6	2	0	8
Percent	75.0	25.0	0.0	100.0
SE percent	16.3	16.3		0.0
Inriver return at weir	1,184	395	0	1,579
SE Return	258	258	0	0

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	Age					Total
	1.1	1.2	1.3	1.4	1.5	
<u>14 - 27 June</u>						
Females						
Number sampled	0	6	20	11	1	38
Percent	0.0	6.3	20.8	11.5	1.0	39.6
SE percent		2.4	4.1	3.2	1.0	4.9
Inriver return at weir	0	133	443	244	22	842
SE Return	0	52	87	68	22	104
Males						
Number sampled	4	19	24	10	1	58
Percent	4.2	19.8	25.0	10.4	1.0	60.4
SE percent	2.0	4.0	4.3	3.1	1.0	4.9
Inriver return at weir	89	421	532	222	22	1,285
SE Return	43	85	92	65	22	104
All						
Number sampled	4	25	44	21	2	96
Percent	4.2	26.0	45.8	21.9	2.1	100.0
SE percent	2.0	4.4	5.0	4.1	1.4	0.0
Inriver return at weir	89	554	975	465	44	2,127
SE Return	43	94	106	88	30	0
<u>After 27 June</u>						
Females						
Number sampled	0	22	80	28	0	130
Percent	0.0	8.7	31.5	11.0	0.0	51.2
SE percent		1.7	2.8	1.9		3.0
Inriver return at weir	0	302	1,099	385	0	1,786
SE Return	0	59	98	66	0	106
Males						
Number sampled	1	36	72	14	1	124
Percent	0.4	14.2	28.3	5.5	0.4	48.8
SE percent	0.4	2.1	2.7	1.4	0.4	3.0
Inriver return at weir	14	495	989	192	14	1,703
SE Return	13	74	95	48	13	106
All						
Number sampled	1	58	152	42	1	254
Percent	0.4	22.8	59.8	16.5	0.4	100.0
SE percent	0.4	2.5	3.0	2.2	0.4	0.0
Inriver return at weir	14	797	2,088	577	14	3,489
SE Return	13	89	104	78	13	0

**APPENDIX E. ESTIMATED INRIVER RETURN OF
CHINOOK SALMON BY TIME STRATUM AND AGE,
AYAKULIK RIVER, 1999-2003**

Appendix E1.-Estimated inriver return of Chinook salmon by time stratum and age, Ayakulik River, 1999.

	Age						Total
	0.2	1.1	1.2	1.3	1.4	1.5	
<u>Through 19 June</u>							
Females							
Number sampled	0	0	2	28	15	0	45
Percent	0.0	0.0	1.4	19.6	10.5	0.0	31.5
SE percent			1.0	3.3	2.6		3.9
Inriver return at weir	0	0	139	1,949	1,044	0	3,132
SE return	0	0	97	329	254	0	385
Males							
Number sampled	1	2	17	54	23	1	98
Percent	0.7	1.4	11.9	37.8	16.1	0.7	68.5
SE percent	0.7	1.0	2.7	4.0	3.1	0.7	3.9
Inriver return at weir	70	139	1,183	3,758	1,601	70	6,821
SE return	69	97	268	402	305	69	385
All							
Number sampled	1	2	19	82	38	1	143
Percent	0.7	1.4	13.3	57.3	26.6	0.7	100.0
SE percent	0.7	1.0	2.8	4.1	3.7	0.7	0.0
Inriver return at weir	70	139	1,322	5,707	2,645	70	9,953
SE return	69	97	281	410	366	69	0
<u>After 19 June</u>							
Females							
Number sampled	0	0	2	10	19	1	32
Percent	0.0	0.0	1.8	9.0	17.1	0.9	28.8
SE percent			1.2	2.7	3.5	0.9	4.3
Inriver return at weir	0	0	64	320	608	32	1,023
SE return	0	0	44	95	125	31	151
Males							
Number sampled	0	4	37	20	16	2	79
Percent	0.0	3.6	33.3	18.0	14.4	1.8	71.2
SE percent		1.7	4.4	3.6	3.3	1.2	4.3
Inriver return at weir	0	128	1,183	640	512	64	2,527
SE return	0	62	157	128	117	44	151
All							
Number sampled	0	4	39	30	35	3	111
Percent	0.0	3.6	35.1	27.0	31.5	2.7	100.0
SE percent		1.7	4.5	4.2	4.4	1.5	0.0
Inriver return at weir	0	128	1,247	959	1,119	96	3,550
SE return	0	62	159	148	155	54	0

Appendix E2.-Estimated inriver return of Chinook salmon by time stratum and age, Ayakulik River, 2000.

	Age				Total
	1.2	1.3	1.4	1.5	
<u>Through 30 May</u>					
Females					
Number sampled	0	2	6	0	8
Percent	0.0	14.3	42.9	0.0	57.1
SE percent		9.4	13.4		13.4
Inriver return at weir	0	37	112	0	150
SE return	0	25	35	0	35
Males					
Number sampled	0	2	4	0	6
Percent	0.0	14.3	28.6	0.0	42.9
SE percent		9.4	12.2		13.4
Inriver return at weir	0	37	75	0	112
SE return	0	25	32	0	35
All					
Number sampled	0	4	10	0	14
Percent	0.0	28.6	71.4	0.0	100.0
SE percent		12.2	12.2		0.0
Inriver return at weir	0	75	187	0	262
SE return	0	32	32	0	0
<u>31 May - 12 June</u>					
Females					
Number sampled	0	11	38	0	49
Percent	0.0	11.8	40.9	0.0	52.7
SE percent		3.3	5.1		5.2
Inriver return at weir	0	939	3,245	0	4,184
SE return	0	266	405	0	411
Males					
Number sampled	1	20	23	0	44
Percent	1.1	21.5	24.7	0.0	47.3
SE percent	1.1	4.3	4.5		5.2
Inriver return at weir	85	1,708	1,964	0	3,758
SE return	85	338	355	0	411
All					
Number sampled	1	31	61	0	93
Percent	1.1	33.3	65.6	0.0	100.0
SE percent	1.1	4.9	4.9		0.0
Inriver return at weir	85	2,647	5,209	0	7,942
SE return	85	388	391	0	0

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	Age					Total
	1.1	1.2	1.3	1.4	1.5	
<u>13-19 June</u>						
Females						
Number sampled	0	0	11	6	0	17
Percent	0.0	0.0	20.4	11.1	0.0	31.5
SE percent			5.5	4.3		6.4
Inriver return at weir	0	0	1,604	875	0	2,479
SE return	0	0	434	339	0	501
Males						
Number sampled	0	2	26	9	0	37
Percent	0.0	3.7	48.1	16.7	0.0	68.5
SE percent		2.6	6.8	5.1		6.4
Inriver return at weir	0	292	3,791	1,312	0	5,394
SE return	0	204	538	402	0	501
All						
Number sampled	0	2	37	15	0	54
Percent	0.0	3.7	68.5	27.8	0.0	100.0
SE percent		2.6	6.4	6.1		0.0
Inriver return at weir	0	292	5,394	2,187	0	7,873
SE return	0	204	501	483	0	0
<u>after 19 June</u>						
Females						
Number sampled	0	0	40	32	1	73
Percent	0.0	0.0	22.5	18.0	0.6	41.0
SE percent			3.1	2.8	0.6	3.6
Inriver return at weir	0	0	1,000	800	25	1,825
SE return	0	0	137	126	24	161
Males						
Number sampled	1	10	57	36	1	105
Percent	0.6	5.6	32.0	20.2	0.6	59.0
SE percent	0.6	1.7	3.4	3.0	0.6	3.6
Inriver return at weir	25	250	1,425	900	25	2,625
SE return	24	75	153	132	24	161
All						
Number sampled	1	10	97	68	2	178
Percent	0.6	5.6	54.5	38.2	1.1	100.0
SE percent	0.6	1.7	3.7	3.6	0.8	0.0
Inriver return at weir	25	250	2,425	1,700	50	4,450
SE return	24	75	163	159	35	0

Appendix E3.-Estimated inriver return of Chinook salmon by time stratum and age, Ayakulik River, 2001.

	Age					Total
	1.1	1.2	1.3	1.4	1.5	
<u>Through 5 June</u>						
Females						
Number sampled	0	1	8	27	2	38
Percent	0.0	1.8	14.3	48.2	3.6	67.9
SE percent		1.8	4.7	6.7	2.5	6.3
Inriver return at weir	0	95	761	2,567	190	3,613
SE return	0	95	250	357	133	334
Males						
Number sampled	0	1	5	11	1	18
Percent	0.0	1.8	8.9	19.6	1.8	32.1
SE percent		1.8	3.8	5.3	1.8	6.3
Inriver return at weir	0	95	475	1,046	95	1,712
SE return	0	95	204	284	95	334
All						
Number sampled	0	2	13	38	3	56
Percent	0.0	3.6	23.2	67.9	5.4	100.0
SE percent		2.5	5.7	6.3	3.0	0.0
Inriver return at weir	0	190	1,236	3,613	285	5,325
SE return	0	133	302	334	161	0
<u>6-19 June</u>						
Females						
Number sampled	0	0	9	43	1	53
Percent	0.0	0.0	10.0	47.8	1.1	58.9
SE percent			3.2	5.3	1.1	5.2
Inriver return at weir	0	0	596	2,847	66	3,509
SE return	0	0	188	313	66	308
Males						
Number sampled	14	7	5	11	0	37
Percent	15.6	7.8	5.6	12.2	0.0	41.1
SE percent	3.8	2.8	2.4	3.4		5.2
Inriver return at weir	927	463	331	728	0	2,449
SE return	227	168	144	205	0	308
All						
Number sampled	14	7	14	54	1	90
Percent	15.6	7.8	15.6	60.0	1.1	100.0
SE percent	3.8	2.8	3.8	5.2	1.1	0.0
Inriver return at weir	927	463	927	3,575	66	5,958
SE return	227	168	227	307	66	0

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	Age						Total
	1.1	1.2	1.3	1.4	2.2	2.4	
after 19 June							
Females							
Number sampled	0	1	4	29	0	0	34
Percent	0.0	1.2	4.7	33.7	0.0	0.0	39.5
SE percent		1.1	2.2	5.0			5.2
Inriver return at weir	0	31	123	892	0	0	1,046
SE return	0	30	59	133	0	0	138
Males							
Number sampled	7	12	9	22	1	1	52
Percent	8.1	14.0	10.5	25.6	1.2	1.2	60.5
SE percent	2.9	3.7	3.3	4.7	1.1	1.1	5.2
Inriver return at weir	215	369	277	677	31	31	1,600
SE return	77	98	86	123	30	30	138
All							
Number sampled	7	13	13	51	1	1	86
Percent	8.1	15.1	15.1	59.3	1.2	1.2	100.0
SE percent	2.9	3.8	3.8	5.2	1.1	1.1	0.0
Inriver return at weir	215	400	400	1,569	31	31	2,646
SE return	77	101	101	139	30	30	0

Appendix E4.-Estimated inriver return of Chinook salmon by time stratum and age, Ayakulik River, 2002.

	Age								Total
	1.0	1.1	1.2	1.3	1.4	1.5	2.3	2.5	
<u>Through 30 May</u>									
Females									
Number sampled	0	0	2	3	0	0	1	0	6
Percent	0.0	0.0	14.3	21.4	0.0	0.0	7.1	0.0	42.9
SE percent			9.4	11.0			6.9		13.3
Inriver return at weir	0	0	33	49	0	0	16	0	99
SE return	0	0	22	25	0	0	16	0	31
Males									
Number sampled	0	0	0	7	1	0	0	0	8
Percent	0.0	0.0	0.0	50.0	7.1	0.0	0.0	0.0	57.1
SE percent				13.4	6.9				13.3
Inriver return at weir	0	0	0	115	16	0	0	0	131
SE return	0	0	0	31	16	0	0	0	31
All									
Number sampled	0	0	2	10	1	0	1	0	14
Percent	0.0	0.0	14.3	71.4	7.1	0.0	7.1	0.0	100.0
SE percent			9.4	12.1	6.9		6.9		0.0
Inriver return at weir	0	0	33	164	16	0	16	0	230
SE return	0	0	22	28	16	0	16	0	0
<u>31 May - 12 June</u>									
Females									
Number sampled	0	0	2	9	19	4	0	1	35
Percent	0.0	0.0	2.4	10.7	22.6	4.8	0.0	1.2	41.7
SE percent			1.6	3.3	4.5	2.3		1.2	5.3
Inriver return at weir	0	0	59	266	562	118	0	30	1,035
SE return	0	0	41	83	112	57	0	29	132
Males									
Number sampled	1	2	12	26	5	3	0	0	49
Percent	1.2	2.4	14.3	31.0	6.0	3.6	0.0	0.0	58.3
SE percent	1.2	1.6	3.8	5.0	2.6	2.0			5.3
Inriver return at weir	30	59	355	769	148	89	0	0	1,448
SE return	29	41	94	124	63	50	0	0	132
All									
Number sampled	1	2	14	35	24	7	0	1	84
Percent	1.2	2.4	16.7	41.7	28.6	8.3	0.0	1.2	100.0
SE percent	1.2	1.6	4.0	5.3	4.9	3.0		1.2	0.0
Inriver return at weir	30	59	414	1,035	709	207	0	30	2,483
SE return	29	41	100	132	121	74	0	29	0

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	Age							Total
	1.1	1.2	1.3	1.4	1.5	2.4	2.5	
<u>13-19 June</u>								
Females								
Number sampled	0	1	9	14	0	1	0	25
Percent	0.0	3.0	27.3	42.4	0.0	3.0	0.0	75.8
SE percent		3.0	7.8	8.7		3.0		7.5
Inriver return at weir	0	103	929	1,445	0	103	0	2,580
SE return	0	103	267	296	0	103	0	257
Males								
Number sampled	0	3	3	0	1	0	1	8
Percent	0.0	9.1	9.1	0.0	3.0	0.0	3.0	24.2
SE percent		5.1	5.1		3.0		3.0	7.5
Inriver return at weir	0	310	310	0	103	0	103	826
SE return	0	172	172	0	103	0	103	257
All								
Number sampled	0	4	12	14	1	1	1	33
Percent	0.0	12.1	36.4	42.4	3.0	3.0	3.0	100.0
SE percent		5.7	8.5	8.7	3.0	3.0	3.0	0.0
Inriver return at weir	0	413	1,239	1,445	103	103	103	3,406
SE return	0	196	288	296	103	103	103	0
<u>After 19 June</u>								
Females								
Number sampled	0	5	12	11	3	0	0	31
Percent	0.0	4.4	10.5	9.6	2.6	0.0	0.0	27.2
SE percent		1.9	2.9	2.8	1.5			4.1
Inriver return at weir	0	282	677	621	169	0	0	1,749
SE return	0	123	184	177	96	0	0	267
Males								
Number sampled	11	39	19	12	2	0	0	83
Percent	9.6	34.2	16.7	10.5	1.8	0.0	0.0	72.8
SE percent	2.8	4.4	3.5	2.9	1.2			4.1
Inriver return at weir	621	2,200	1,072	677	113	0	0	4,683
SE return	177	284	223	184	79	0	0	267
All								
Number sampled	11	44	31	23	5	0	0	114
Percent	9.6	38.6	27.2	20.2	4.4	0.0	0.0	100.0
SE percent	2.8	4.5	4.1	3.7	1.9			0.0
Inriver return at weir	621	2,483	1,749	1,298	282	0	0	6,432
SE return	177	292	267	241	123	0	0	0

Appendix E5.-Estimated inriver return of Chinook salmon by time stratum and age, Ayakulik River, 2003.

	Age				Total
	1.2	1.3	1.4	1.5	
<u>Through 30 May</u>					
Females					
Number sampled	0	4	6	0	10
Percent	0.0	30.8	46.2	0.0	76.9
SE percent		11.6	12.5		10.6
Inriver return at weir	0	16	24	0	41
SE return	0	6	7	0	6
Males					
Number sampled	1	1	1	0	3
Percent	7.7	7.7	7.7	0.0	23.1
SE percent	6.7	6.7	6.7		10.6
Inriver return at weir	4	4	4	0	12
SE return	4	4	4	0	6
All					
Number sampled	1	5	7	0	13
Percent	7.7	38.5	53.8	0.0	100.0
SE percent	6.7	12.2	12.5		0.0
Inriver return at weir	4	20	29	0	53
SE return	4	6	7	0	0
<u>31 May - 13 June</u>					
Females					
Number sampled	0	30	17	0	47
Percent	0.0	30.9	17.5	0.0	48.5
SE percent		4.7	3.9		5.1
Inriver return at weir	0	2,148	1,217	0	3,366
SE return	0	325	268	0	352
Males					
Number sampled	9	29	11	1	50
Percent	9.3	29.9	11.3	1.0	51.5
SE percent	2.9	4.6	3.2	1.0	5.1
Inriver return at weir	644	2,077	788	72	3,580
SE return	204	322	223	71	352
All					
Number sampled	9	59	28	1	97
Percent	9.3	60.8	28.9	1.0	100.0
SE percent	2.9	4.9	4.6	1.0	0.0
Inriver return at weir	644	4,225	2,005	72	6,946
SE return	204	344	319	71	0

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	Age				Total
	1.1	1.2	1.3	1.4	
<u>14 - 27 June</u>					
Females					
Number sampled	0	2	24	13	39
Percent	0.0	2.2	26.7	14.4	43.3
SE percent		1.5	4.6	3.7	5.2
Inriver return at weir	0	114	1,367	741	2,222
SE return	0	79	238	189	267
Males					
Number sampled	0	21	28	2	51
Percent	0.0	23.3	31.1	2.2	56.7
SE percent		4.4	4.9	1.5	5.2
Inriver return at weir	0	1,197	1,595	114	2,906
SE return	0	228	249	79	267
All					
Number sampled	0	23	52	15	90
Percent	0.0	25.6	57.8	16.7	100.0
SE percent		4.6	5.2	3.9	0.0
Inriver return at weir	0	1,310	2,963	855	5,128
SE return	0	235	266	201	0
<u>After 27 June</u>					
Females					
Number sampled	0	1	17	8	26
Percent	0.0	1.2	21.0	9.9	32.1
SE percent		1.2	4.5	3.3	5.2
Inriver return at weir	0	67	1,140	536	1,743
SE return	0	67	245	180	281
Males					
Number sampled	1	22	29	3	55
Percent	1.2	27.2	35.8	3.7	67.9
SE percent	1.2	4.9	5.3	2.1	5.2
Inriver return at weir	67	1,475	1,944	201	3,687
SE return	67	268	289	114	281
All					
Number sampled	1	23	46	11	81
Percent	1.2	28.4	56.8	13.6	100.0
SE percent	1.2	5.0	5.5	3.8	0.0
Inriver return at weir	67	1,542	3,084	737	5,430
SE return	67	272	298	206	0

**APPENDIX F. AGE COMPOSITION AND MEAN LENGTH
AT AGE OF THE CHIGNIK RIVER CHINOOK SALMON
ESCAPEMENT, 2003**

Appendix F1.-Estimates of Chinook salmon escapement by age and mean length at age, Chignik River, 2003.

	Age			Total
	1.1	1.2	1.3	
Females				
Number sampled	3	5	5	13
Percent	13.6	22.7	22.7	59.1
SE Percent	7.5	9.1	9.1	10.7
Mean Length (mm)	317	630	766	624
SE Mean Length	134	26	37	56
Minimum Length (mm)	51	543	627	51
Maximum Length (mm)	484	694	827	827
Males				
Number sampled	2	6	1	9
Percent	9.1	27.3	4.5	40.9
SE Percent	6.3	9.7	4.5	10.7
Mean Length (mm)	542	646	802	640
SE Mean Length	94	22		33
Minimum Length (mm)	448	550	802	448
Maximum Length (mm)	636	697	802	802
All				
Number sampled	5	11	6	22
Percent	22.7	50.0	27.3	100.0
SE Percent	9.1	10.9	9.7	0.0
Mean Length (mm)	407	639	772	630
SE Mean Length	97	16	31	36
Minimum Length (mm)	51	543	627	51
Maximum Length (mm)	636	697	827	827

Note: Length from mideye to fork of tail recorded to the nearest millimeter.

**APPENDIX G. CHINOOK SALMON ANGLER CENSUS
DATA FROM KARLUK AND AYAKULIK RIVER WEIRS,
1999-2003**

Appendix G1.-Chinook salmon angler census data from Karluk River weir, 1999-2003.

Year		Angler type		Residency ^a				Total
		Guided	Unguided	Alaska resident		Non Alaska resident		
				Local	Nonlocal	U.S.	Foreign	
1999	Anglers	109	214	31	39	110	143	323
	Effort ^b	451	1,493	110	141	457	1,236	1,944
	Harvest	110	240	21	33	86	210	350
	Release	223	1,317	147	115	430	848	1,540
2000	Anglers	173	214	6	61	150	170	387
	Effort ^b	530	1,373	13	227	441	1,222	1,903
	Harvest	224	287	2	58	192	259	511
	Release	383	1,575	3	154	853	948	1,958
2001	Anglers	366	160	2	49	323	152	526
	Effort ^b	934	1,042	2	150	670	1,154	1,976
	Harvest	261	72	0	30	228	75	333
	Release	743	487	0	176	760	294	1,230
2002	Anglers	637	194	41	46	598	146	831
	Effort ^b	1,019	726	88	58	882	717	1,745
	Harvest	513	88	16	32	463	90	601
	Release	1,622	646	51	107	1,369	741	2,268
2003	Anglers	244	145	36	28	277	48	389
	Effort ^b	418	340	51	53	333	321	758
	Harvest	221	70	17	14	202	58	291
	Release	1,111	402	96	39	977	401	1,513

^a Local = Alaska resident who lives on Kodiak Island; Nonlocal = Alaska resident who lives outside of Kodiak Island; U.S. = lives in the U.S. outside of the State of Alaska; Foreign = lives outside the United States. Residency undetermined for some anglers.

^b Units of effort = angler days.

Appendix G2.-Chinook salmon angler census data from Ayakulik River weir, 1999-2003.

Year		Angler type		Residency ^a				Total
		Guided	Unguided	Alaska resident		Non Alaska resident		
				Local	Nonlocal	U.S.	Foreign	
1999	Anglers	41	22	ND	23	40	ND	63
	Effort ^b	240	103	ND	93	250	ND	343
	Harvest	212	25	ND	22	215	ND	237
	Release	796	175	ND	109	862	ND	971
2000	Anglers	57	3	ND	10	50	ND	60
	Effort	391	12	ND	39	364	ND	403
	Harvest	309	6	ND	18	297	ND	315
	Release	1,472	95	ND	36	1,531	ND	1,567
2001	Anglers	54	103	27	16	91	23	157
	Effort	288	693	158	95	510	218	981
	Harvest	134	164	41	16	231	10	298
	Release	1,306	2,791	601	327	2,402	767	4,097
2002	Anglers	348	112	24	13	395	28	460
	Effort	474	725	104	85	752	258	1,199
	Harvest	145	127	25	19	209	19	272
	Release	1,332	1,011	243	69	1,695	336	2,343
2003	Anglers	83	105	21	20	90	57	188
	Effort	420	756	123	120	468	465	1,176
	Harvest	149	100	14	29	146	60	249
	Release	902	1,725	298	340	1,303	686	2,627

Note: ND = no data because no attempts were made to collect it.

^a Local = Alaska resident who lives on Kodiak Island; Nonlocal = Alaska resident who lives outside of Kodiak Island; U.S. = lives in the U.S. outside of the State of Alaska; Foreign = lives outside the United States. Residency undetermined for some anglers.

^b Units of effort = angler days.

Appendix G3.-Comparison of harvest and release of Chinook salmon estimates from the Statewide Harvest Survey, creel surveys, and censuses at Karluk and Ayakulik rivers, 1994-2003.

River	Year	SWHS ^a		Creel survey ^b		Angler census at weir ^c			
		Harvest	Release	Harvest	Release	Anglers	Effort ^d	Harvest	Release
Karluk	1994	1,483	2,174	896 ^e	4,339 ^e	506	1,650	493	3,385
	1995	1,284	2,613			380	1,677	492	2,411
	1996	769	1,613			329	1,727	406	2,996
	1997	1,562	9,051			322	1,632	399	2,246
	1998	1,173	6,150			289	1,738	376	1,453
	1999	1,766	6,150			323	1,944	350	1,540
	2000	2,581	8,165			385	1,903	512	1,958
	2001	1,304	3,676			526	1,976	333	1,230
	2002	716	753	601 ^e	2,268 ^e	562	2,060	425	1,811
	2003	563	1,832	291 ^e	1,513 ^e	265	858	247	1,193
1994-2003 Mean	1,320	4,218	-	-	389	1,717	403	2,022	
Ayakulik	1994	948	1,020	739 ^f	2,752 ^f	203	926	477	1,898
	1995	200	883			126	606	296	2,445
	1996	203	591			135	446	292	1,299
	1997	1,182	5,951			75	537	251	1,799
	1998	259	3,245			64	440	195	2,060
	1999	609	2,825			64	349	237	971
	2000	803	7,578			152	966	404	3,114
	2001	568	8,135			157	981	303	4,148
	2002	362	5,302			458	1,179	255	2,276
	2003	344	3,738	434 ^g	4,746 ^g	188	1,176	249	2,627
1994-2003 Mean	568	3,927	-	-	162	761	296	2,264	

Note: "-" = value can't be computed due to limitations of the data.

^a SWHS = Statewide Harvest Survey (Howe et al. 1995 1996, 2001a-d; Walker et al. 2003; Jennings et al 2004, 2006 a, b).

^b Schwartz et al. 2002.

^c Does not include anglers who fished Karluk Lagoon or anglers who exited at Karluk Portage.

^d Units of effort = angler days.

^e Does not include anglers who fished downstream of the weir.

^f Creel census conducted by U.S. Fish and Wildlife Service.

^g Creel census conducted by ADF&G and U.S. Fish and Wildlife Service.