

**Fishery Data Series No. 07-41**

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**Ninilchik River Chinook Salmon Assessment,  
2002 and 2003**

by

**Robert N. Begich**

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August 2007

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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

***FISHERY DATA SERIES NO. 07-41***

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by

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## ABSTRACT

During 2002 and 2003, wild (naturally-produced) and stocked Chinook salmon *Oncorhynchus tshawytscha* runs to the Ninilchik River were assessed with a weir to determine the stock composition of total escapements and to determine if Chinook salmon stray to the Ninilchik River from three stocking locations in Kachemak Bay. The stock composition of the Chinook salmon harvest was estimated for the third weekend open for sport fishing in the Ninilchik River below the Sterling Highway.

The total escapement of wild Chinook salmon was 1,340 fish in 2002 and 1,127 fish in 2003. The 2-year average wild stock contribution to the escapement was 77%. Wild stock escapement corresponding to the sustained escapement goal (SEG) monitoring period was 655 fish during 2002 and 393 fish during 2003. Stocked escapements were 395 fish in 2002 and 336 fish in 2003. The average contribution of stocked fish to the escapements was 23%. The majority of the wild Chinook salmon escapement consisted of 3-ocean fish, 59% (SE = 3%) and 57% (SE = 3%) in 2002 and 2003, respectively. For the stocked Chinook salmon escapements, 3-ocean fish accounted for an estimated 48% (SE = 3%) of the 2002 and 41% (SE = 4%) of the 2003 escapements.

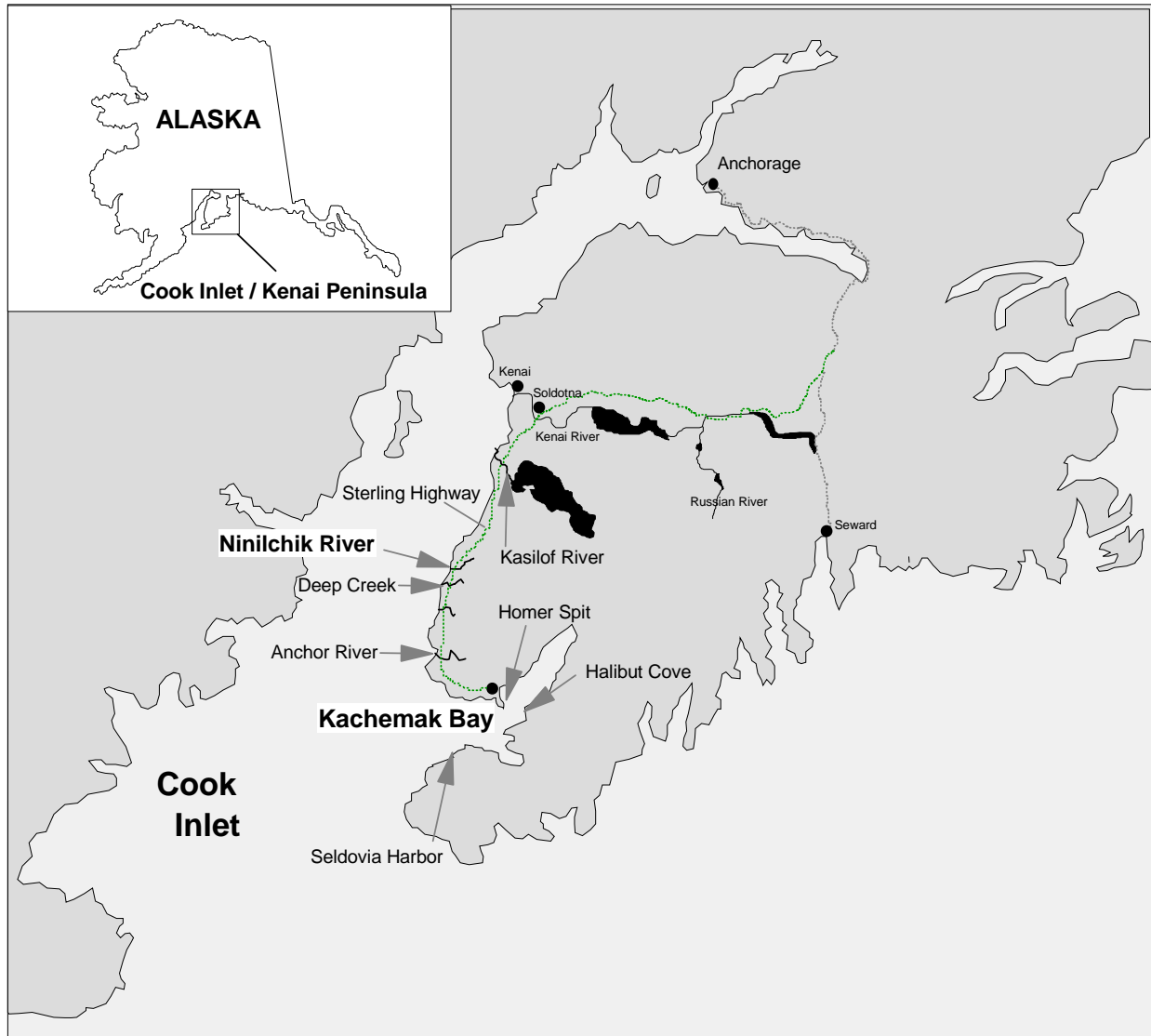
Stock composition of the immigration varied significantly over the duration of the runs to the weir. Median date of weir immigration for wild fish was July 17, 2002 and July 4, 2003; the median date for stocked fish was July 24, 2002 and July 17, 2003. Two hundred seventeen coded wire tags were decoded from 226 Chinook salmon that were sacrificed at the weir. No strays from Kachemak Bay stocking programs were detected, 212 tags were from fish stocked at the Ninilchik River, and 5 were from the Alaska Department of Fish and Game, Crooked Creek stocking program (tag expansion of 1.0), a tributary of the Kasilof River. The contribution of stocked Chinook salmon to the third weekend sport harvest sampled in the lower river was 22% (SE = 9%) during 2002 and 32% (SE = 12%) during 2003. Continuing the Chinook salmon assessment at Ninilchik River weir is recommended to fully understand the relation between inseason management actions designed to increase exploitation of hatchery stock surpluses while maintaining wild stock escapements.

Keywords: Chinook salmon *Oncorhynchus tshawytscha*, Ninilchik River, wild stock, hatchery stock, run, escapement, weir, contribution, adipose finclip, and coded wire tag.

## INTRODUCTION

Chinook salmon *Oncorhynchus tshawytscha* returning to the Ninilchik River support a weekend (Saturday, Sunday, and Monday) sport fishery on the lower Kenai Peninsula beginning with the Memorial Day weekend (Figure 1). The fishery is open from salt water to approximately 2 miles upstream. Harvest averaged approximately 1,727 Chinook salmon from 1977-2003 (Howe et al. 1995, 1996, 2001 a-d; Jennings et al. 2004; 2006a; 2006b; Mills 1979-1980, 1981a-b, 1982-1994; Walker et al. 2003; Table 1).

Historical escapement information for Ninilchik River obtained by aerial survey indicated that the Ninilchik River contained a relatively small population of spawning Chinook salmon, with the annual average run being approximately 1,500 fish (Nelson 1995). In recognition of the adverse impact increasing harvest could have on the Ninilchik River Chinook salmon stock, the Alaska Department of Fish and Game (ADF&G), Division of Sport Fish began a stocking program with installation of a weir in 1987 to collect eggs. In addition, due to concerns about overexploitation of wild Chinook salmon stocks throughout the Kenai Peninsula, three saltwater locations within Kachemak Bay were identified as stocking sites for smolt raised from eggs collected at the Ninilchik River weir. The Kachemak Bay stocking sites include the Homer Spit Fishing Lagoon, Halibut Cove Lagoon and Seldovia Harbor (Figure 1). The first smolt releases into Kachemak Bay and at Ninilchik River (Table 1) occurred in 1988. Hatchery runs boosted Chinook salmon harvests at Ninilchik River from a prestocking yearly average of 990 fish to harvests that averaged over 3,000 Chinook salmon annually from 1991 through 1998 (the period reflecting earlier higher stocking rates; Table 1, Figure 2).



**Figure 1.**-Kenai Peninsula highway system, Ninilchik River and Kachemak Bay Chinook salmon stocking locations.

At the Ninilchik River, fish stocked as smolt return 1-4 years later to spawn and are available to the sport fishery and other various fisheries along their migration route. Stocked fish that escape the fisheries to Ninilchik River spawning areas may spawn with wild fish or other stocked fish. For purposes of this report, all fish that are progeny of fish that spawned in the river are considered “wild,” while those that were released into the river as juveniles through the stocking program are termed “stocked” or “hatchery.” It is recognized that some fish thus termed “wild” may actually be the progeny of stocked fish.

Prior to 1994 the Chinook salmon run was managed for a spawning escapement goal of 500 to 900 fish, monitored using a combination of ground and aerial surveys. From 1996-1998 aerial surveys were used to monitor escapement, while foot survey counts of Chinook salmon above the fishery were used as an inseason indicator of run-strength (Szarzi 1999). From 1987 through 1998 the weir operated from approximately early July until August and therefore only a partial



**Table 1.**-Estimated angler effort, harvest, escapement, and stocking summary of Chinook salmon, Ninilchik River, 1962 through 2003.

Year	Angler Effort <sup>a</sup>	Harvest <sup>a</sup>	% Hatchery in Harvest <sup>b</sup>	Foot Survey <sup>c</sup>	Aerial Survey <sup>d</sup>	Estimated Escapement <sup>e</sup>	Weir Count <sup>f</sup>	Number Smolt Released <sup>g</sup>	Number Smolt Marked with Finclip and Tag <sup>h</sup>	Percent Smolt Marked
1962				193	179	530				
1963				143	47	450				
1964				347	200	910				
1965				219	224	1,030				
1966				231	No survey	670				
1967				213	100	360				
1968				126	31	450				
1969				191	87	760				
1973				203	No survey					
1976				470	956	1,180				
1977	11,350	1,168		719	1169	1,400				
1978	14,173	1,445		457	724	990				
1979	18,282	1,493		183	854	1,390				
1980	19,706	723			No data	720				
1981	14,184	1,523		232	552	830				
1982	11,806	1,240		568	947	1,430				
1983	9,458	871		313	445	710				
1984	10,122	648		208	346	600				
1985	10,213	983		243	582	650				
1986	9,250	420		277	307	790				
1987	13,329	1,112		239	523	600				
1988	12,533	795		444	569	1,080		247,327	30,809	12%
1989	9,997	744		241	280	400	254	199,831	18,772	9%
1990	8,323	693		414	288	840	315	215,804	40,319	19%
1991	19,640	3,123	77%	362	594	830	338	87,992	21,074	24%
1992	27,816	5,316	57%		No survey		539	132,387	41,335	31%
1993	20,466	4,235	50%		688	2,400		184,585	42,960	23%
1994	21,827	3,108	45%	261	0		539	201,513	45,535	23%
1995	16,160	2,451	50%		No survey		1,150	54,662	54,115	99%

-continued-

**Table 1.**—Page 2 of 2.

Year	Angler Effort <sup>a</sup>	Harvest <sup>a</sup>	% Hatchery in Harvest <sup>b</sup>	Foot Survey <sup>c</sup>	Aerial Survey <sup>d</sup>	Estimated Escapement <sup>e</sup>	Weir Count <sup>f</sup>	Number Smolt Released <sup>g</sup>	Number Smolt Marked with Finclip and Tag <sup>h</sup>	Percent Smolt Marked
1996	11,445	2,401	50%		0		944	51,688	50,866	98%
1997	11,064	3,263			393		1,096	50,698	50,292	99%
1998	10,994	1,453			316		1,002	48,798	47,480	97%
1999	15,344	1,945			357		2,285	49,853	48,906	98%
2000	12,432	1,782	49%		578		2,487	51,298	50,272	98%
2001	10,602	1,399	51%		268		2,087	54,770	54,441	99%
2002	9,572	830					2,075	54,631	54,139	99%
2003	9,843	1,452					1,683	47,997	44,349	92%
Average 1977-2003	13,701	1,727	54%		420		2,123	108,365		

<sup>a</sup> Estimates of total number of angler days and harvest (Howe et al. 1995, 1996, 2001 a-d; Jennings et al. 2004; 2006a; 2006b; Mills 1979-1980, 1981a-b, 1982-1994; Walker et al. 2003).

<sup>b</sup> Estimated by creel survey 1991-1993, estimated by catch sampling 1994-1996, 2000 and 2001.

<sup>c</sup> No raw data for 1970-1972, 1974-1975, 1980, 1992 and 1993; survey was discontinued after 1994.

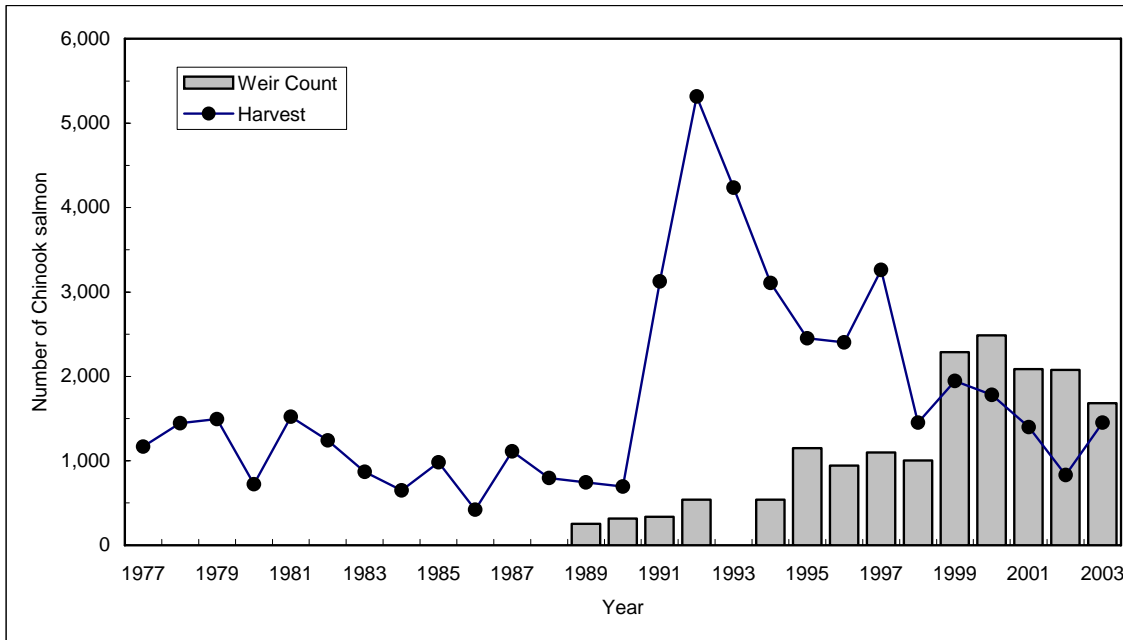
<sup>d</sup> Aerial survey not conducted in 1970 and 1971; no data available for 1972, 1974, and 1975. Surveys conducted from fixed-wing aircraft 1966-1973, fixed-wing aircraft and helicopter 1974, and helicopter 1975-2000.

<sup>e</sup> Annual expanded estimates of escapement from foot and aerial surveys; not estimated in 1992.

<sup>f</sup> Complete counts began in 1999; 1989-1998 are partial counts from broodstock weir; no data available for 1993; average is for 1999 and 2000 counts only.

<sup>g</sup> Smolt held in Ninilchik Harbor intertidal-saltwater area prior to release there in 1995 and 1996; 1997-2003 smolt held/released in fresh water.

<sup>h</sup> Number with adipose finclip and coded wire tag; accounts for fish which will shed the coded wire tag beginning in 1995.



**Figure 2.**-Sport harvest and total weir counts of Chinook salmon, Ninilchik River 1977-2003.

count of the Chinook salmon escapement was obtained because the Chinook salmon immigration begins during late May (Table 2). Due to the infusion of hatchery fish on spawning grounds that were subsequently counted during the aerial survey, as well as variation between aerial counts and partial counts of the escapement obtained at the weir, concern regarding the uncertainty in the number of wild fish in the escapement arose. Accordingly, the Department began complete enumeration of the Chinook salmon escapement in 1999 by installing the weir beginning in May. This provided the means to enumerate wild and hatchery escapement, timing of wild and hatchery runs, sex composition and to estimate age composition and length-at-age. Additionally, hatchery contribution to harvests was estimated from sampling the sport fishery (Balland and Begich *In prep*, Begich 2006).

In 2001 the Department set a new escapement goal for wild Ninilchik River Chinook salmon that was based on weir counts from 1994 through 2000 for the period July 8 through July 24. Weir counts were selected because they were considered more reliable than aerial survey counts. The dates selected corresponded to operation of the broodstock weir, which allowed use of partial weir data (prior to 1999) for establishing the goal (Bue and Hasbrouck 2001). The aerial survey was discontinued in 2002. The new escapement goal defines a range of escapement levels desired as a sustainable escapement goal (SEG) at 400 to 950 wild Chinook salmon. Weir counts and hatchery stock run-timing information has provided the basis for inseason management of this fishery. The sport fishery was liberalized in each year from 2001 through 2003 with the concurrent objectives of attaining a wild fish escapement within the desired escapement goal range and to harvest surpluses of stocked fish. This report is part of a continuing series on Ninilchik River Chinook salmon that provides information on the status of wild Chinook salmon and the hatchery program there.

**Table 2.-**Summary of counts for Chinook salmon at the Ninilchik River weir, 1989 through 2003.

Year	Run Component	Total Return <sup>a</sup>	Proportion of Return <sup>b</sup>	CWT Recovery <sup>c</sup>	Egg-Take Kill <sup>d</sup>	CWT Non-Ninilchik Origin <sup>e</sup>	Escapement <sup>f</sup>	Proportion of Escapement <sup>g</sup>	Weir Dates <sup>h</sup>
1989		254							7/04 - 7/25
1990		315							7/06 - 7/ 27
1991		338							7/01 - 7/17
1992		539							6/30 - 7/14
1994	Wild	446	0.812						
	Hatchery	103	0.188						
	Total	549			125		411	0.749	7/07 - 7/26
1995	Wild	725	0.630						
	Hatchery	425	0.370						
	Total	1,150			194		792	0.689	7/04 - 8/01
1996	Wild	654	0.693						
	Hatchery	290	0.307						
	Total	944			190		692	0.733	7/02 - 7/24
1997	Wild	579	0.528						
	Hatchery	517	0.472						
	Total	1,096			132		675	0.616	7/01 - 8/11
1998	Wild	536	0.535						
	Hatchery	466	0.465						
	Total	1,002			196		619	0.618	7/03 - 8/01
1999	Wild	1,644	0.719	0	68		1,576	0.733	
	Hatchery	641	0.281	42	26		573	0.267	
	Total	2,285		42	94		2,149	0.940	5/18 - 8/13
2000	Wild	1,634	0.657	0	81		1,553	0.694	
	Hatchery	853	0.343	108	60	1	685	0.306	
	Total	2,487		108	141	1	2,238	0.900	5/17 - 8/08
2001	Wild	1,414	0.678	0	175		1,239	0.695	5/30 -8/05
	Hatchery	673	0.322	130	0		543	0.305	
	Total	2,087		130	175		1,782		
2002	Wild	1,516	0.731		176		1,340	0.772	5/23 -8/11
	Hatchery	559	0.269	109	55		395	0.228	
	Total	2,075		109	231		1,735		
2003	Wild	1,258	0.747		131		1,127	0.770	5/16 -8/05
	Hatchery	425	0.253	37	52	5	336	0.230	
	Total	1,683		37	183	5	1,463		

<sup>a</sup> Total number of Chinook salmon counted at the weir. No data for 1987, 1988 or 1993; 1999 returns and escapements include 56 fish captured by netting below the weir of which 37 were wild and 19 were hatchery fish.

<sup>b</sup> Estimated proportion of the total number of Chinook salmon in the return that were wild or hatchery fish.

<sup>c</sup> Total number of Chinook salmon sacrificed for coded weir tag recovery information.

<sup>d</sup> Total number of Chinook salmon sacrificed for hatchery broodstock during egg takes at the weir.

<sup>e</sup> Coded wire tagged Chinook salmon of non-Ninilchik River origin, included in egg-take kill total.

<sup>f</sup> Escapement is return less those sacrificed for CWT recovery and egg take.

<sup>g</sup> Proportion of the total number of Chinook salmon in the escapement that are wild or hatchery fish.

<sup>h</sup> Inclusive dates for each year that the weir was fully operational.

## **OBJECTIVES**

During 2002 and 2003 the study objectives were to:

1. Census the wild and hatchery production of Chinook salmon escapement into the Ninilchik River during 2002 and 2003;
2. Estimate the age and sex composition and mean length-at-age of the wild and hatchery Chinook salmon escapement into Ninilchik River during 2002 and 2003;
3. Estimate the proportion of hatchery-produced Chinook salmon in the inriver sport harvest downstream of the Sterling Highway Bridge prior to periods of extended fishing during 2002 and 2003; and
4. Estimate the contribution of hatchery-produced Chinook salmon stocked into the Homer Spit Fishing Lagoon, Halibut Cove Lagoon, and Seldovia to the run of Chinook salmon enumerated at Ninilchik River Weir during 2002.

## **METHODS**

### **BIOLOGICAL SAMPLING AND ESCAPEMENT**

From May 23 through August 11, 2002 and May 16 through August 5, 2003 a weir was operated on the Ninilchik River approximately 4.5 km upstream of its mouth. Chinook salmon entered a trap to pass through the weir where they were counted and sampled. All Chinook salmon captured were examined for an adipose finclip. Practically all stocked Chinook salmon released into the Ninilchik River since 1995 were marked with an adipose finclip (Loopstra et al. 2000a; 2000b; 2002; Loopstra and Hansen 2005; Starkey et al. 1996; 1997; 1999; Table 1). Consequently, examining all Chinook salmon captured at the weir for an adipose finclip allowed for the daily and cumulative count of both the wild and stocked components of the escapement.

Age compositions and length-at-age of both run components were estimated from fish systematically subsampled at the weir. Sex was recorded for each fish enumerated and was determined based on head shape, and presence of ovipositor, eggs, or milt. During each year we attempted to sample every fifth fish for age and length. Length was measured from mid-eye-to-fork of tail (METF). Three scales were collected for age determination from the left side of the body, at a point on a diagonal from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin, two rows above the lateral line (Welanders 1940). Later scales were pressed and age was determined using procedures described by Mosher (1969).

The total escapement of wild or stocked Chinook salmon was the total number of unique fish counted through the weir of each run component minus those sacrificed for broodstock and for coded wire tag information.

Biological data were categorized by run component (wild or hatchery), sex, and ocean age. Chinook salmon sampled at the weir were used to estimate mean length-at-age and ocean age composition of the escapement. Sex was determined for all Chinook salmon when they were examined for an adipose fin and counted at the weir. Thus, the number in the escapement, as well as the number by sex of each component in the escapement, was known. Because fish were sampled for age and length systematically throughout the immigration, the samples collected at the weir were pooled and used to estimate age composition for the escapement. Age and sex composition of the wild and hatchery escapements was adjusted for fish sacrificed at the weir.

No statistical tests are required to examine temporal differences in the hatchery versus wild component or in sex composition of the escapement because all fish were examined at the weir for sex and the presence of an adipose fin. Contingency table analysis (Conover 1980) was used, however, to test for temporal differences in age composition, as only a sample of the escapement was assessed for age. The proportion of sex  $k$  in each group (wild versus hatchery) in the escapement was calculated as:

$$p_k = \frac{N_k}{N}, \quad (1)$$

where:

$N_k$  is the number of Chinook salmon of sex  $k$  in  $N$ , and

$N$  is the number of Chinook salmon examined at the weir from the group.

There is no variance associated with this quantity (all fish were examined for sex).

The proportion of Chinook salmon of age  $j$  and sex  $k$  in each group (wild versus hatchery) in the escapement was estimated by:

$$\hat{p}_{jk} = \hat{p}_{j|k} p_k, \quad (2)$$

where:

$$\hat{p}_{j|k} = \frac{n_{jk}}{n_k}, \quad (3)$$

with variance estimated as

$$\hat{V}ar(\hat{p}_{jk}) = p_k^2 \left[ \frac{N_k - n_k}{N_k} \right] \frac{\hat{p}_{j|k}(1 - \hat{p}_{j|k})}{n_k - 1}, \quad (4)$$

where:

$n_{jk}$  = the number of fish of age  $j$  in  $n$ ,

$n_k$  = the number of fish of sex  $k$  sampled from the group.

The number of fish by age  $j$  and sex  $k$  in the escapement of each group was estimated by:

$$\hat{N}_{jk} = N \hat{p}_{jk}, \quad (5)$$

and its variance estimated by:

$$\hat{V}ar(\hat{N}_{jk}) = N^2 \hat{V}ar(\hat{p}_{jk}). \quad (6)$$

## SPORT HARVEST

In the lower 1-mile section of the Ninilchik River downstream of the Sterling Highway bridge, during the third regular sport fishing weekend on June 8-10, 2002 and June 7-9, 2003, prior to extended fishing periods, a random sample of Chinook salmon harvested was examined for adipose finclips. This sample was used to estimate the proportion of hatchery and wild Chinook

salmon harvested. The proportion of hatchery fish  $H$  in the sampled harvest for a given day was estimated as:

$$\hat{p}_H = \frac{n_H}{n}, \quad (7)$$

with variance estimated as:

$$\hat{Var}(\hat{p}_H) = \frac{\hat{p}_H (1 - \hat{p}_H)}{n - 1}, \quad (8)$$

where:

$n_H$  is the number of Chinook salmon of hatchery origin found in  $n$ , and

$n$  is the number of sport-harvested Chinook salmon sampled during the day.

No finite population correction was used because the total number of Chinook salmon harvested in a given weekend is unknown. A chi-square test was used to test the null hypothesis that the proportion of hatchery-produced fish did not change among days of the final regular weekend opening.

## **STRAYING**

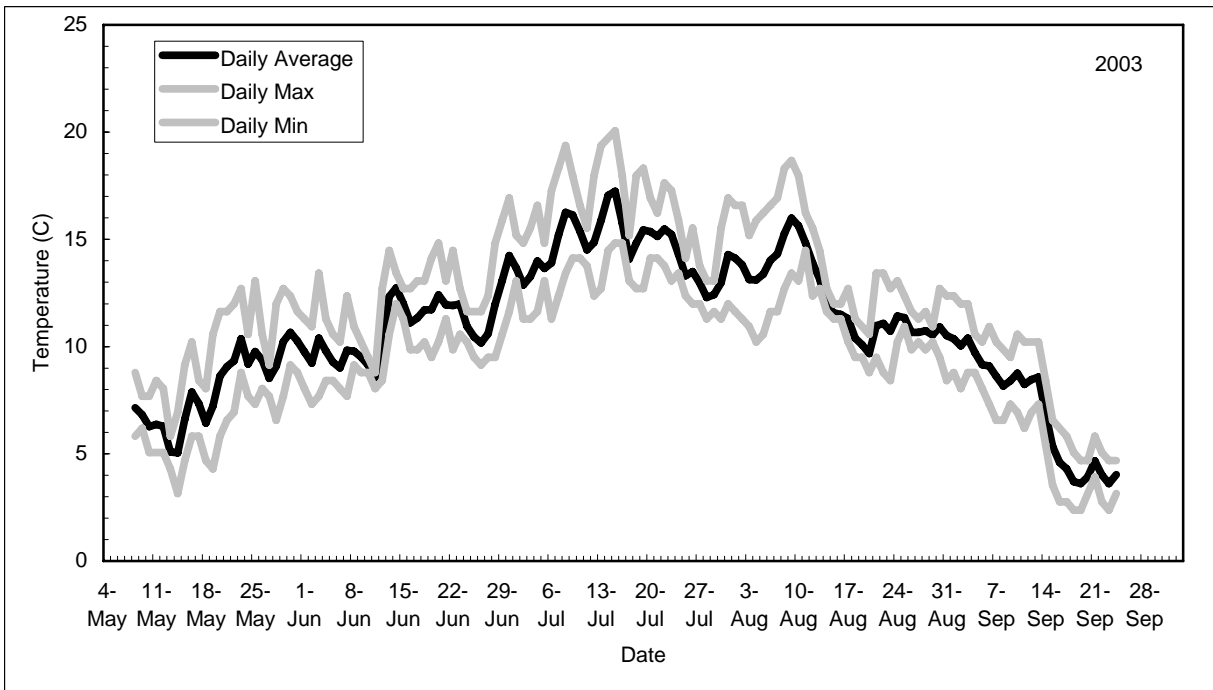
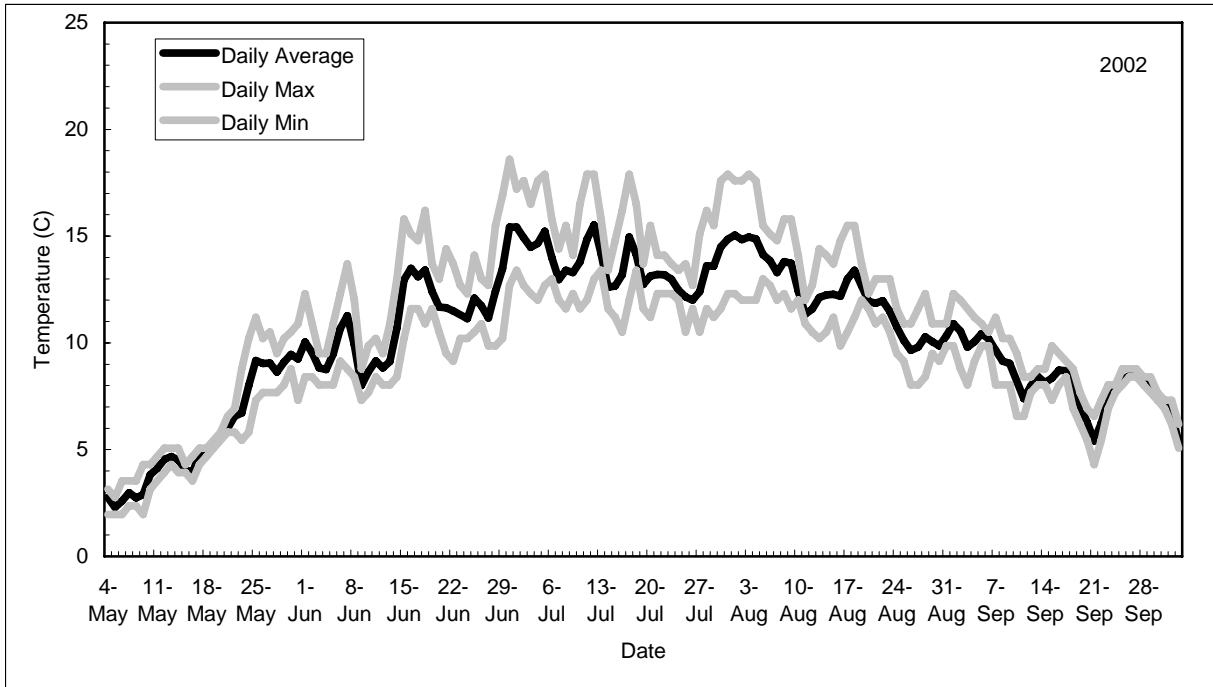
Chinook salmon counted at the weir with an adipose finclip were sampled systematically throughout the immigrations. Attempts were made to sacrifice every fifth fish examined at the weir that had an adipose finclip during 2002. During 2003, every tenth Chinook salmon with an adipose finclip was sacrificed. Fish were sampled for age, sex, and length as described above. In addition, Chinook salmon with adipose finclips sacrificed during egg takes were sampled. Heads of all fish sacrificed were removed, labeled with a numbered cinch strap, frozen, and later sent to the Mark, Tag and Age Laboratory (Tag Lab) in Juneau to detect and remove the coded wire tag. Decoding the tag number identified the time and location of release, and the presence of stray Chinook salmon from Kachemak Bay stocking programs.

Final data are archived with the Alaska Department of Fish and Game (Appendix C1).

## **RESULTS**

### **RUN AND ESCAPEMENT**

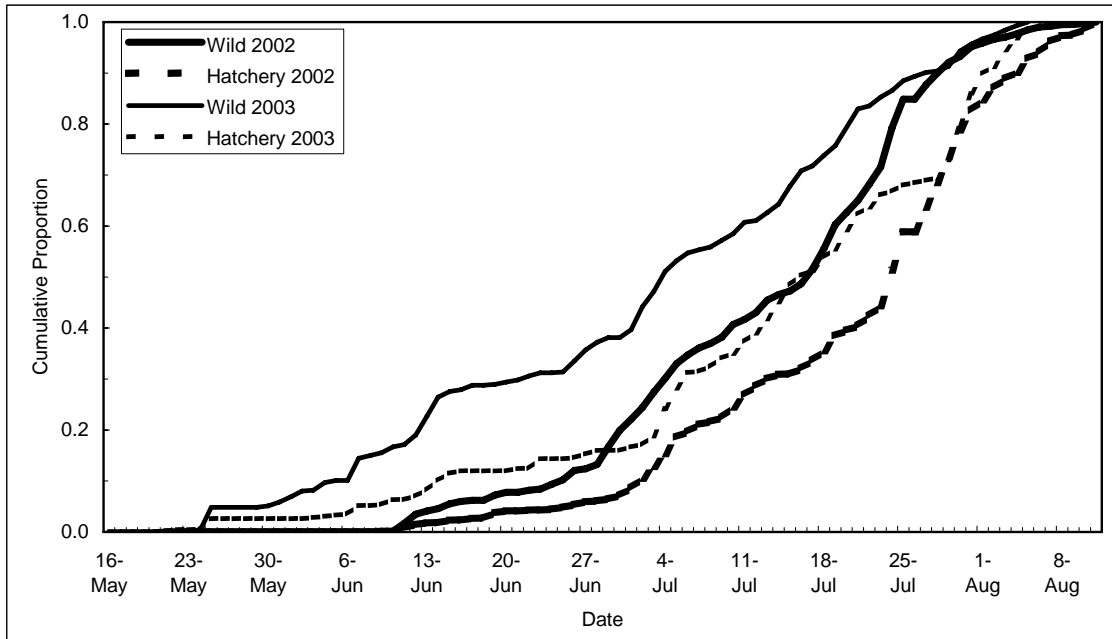
Average daily temperature at the weir ranged from 2.3° C to 15.52° C in 2002, and from 3.6° C to 17.3° C in 2003 (Figure 3, Appendices B1 and B2). The Chinook salmon runs to the Ninilchik River weir were 2,075 in 2002 and 1,683 in 2003 (Table 2). After subtraction of those sacrificed during egg takes and for CWTs, the total escapement of wild and stocked Chinook salmon combined was 1,735 fish during 2002 and 1,463 fish in 2003 (Table 2). The escapement of wild Chinook salmon was 1,340 fish in 2002 and 1,127 fish in 2003. The stocked escapement was 395 fish in 2002 and 336 fish in 2003. Stock composition of the escapements was the same for both years: wild fish accounted for 77% and hatchery fish for 23% (Table 2).



**Figure 3.**-Daily average, maximum, and minimum water temperatures recorded by a remote data logger, Ninilchik River weir site, 2002 (top panel) and 2003 (bottom panel).



Run timing differed between wild and hatchery fish each year. The mid-point of immigration to the weir for the wild Chinook salmon run was July 17, 2002 and July 4, 2003; the mid-points for stocked Chinook salmon were July 24, 2002 and July 17, 2003 (Figure 4, Appendices A1 and A2).



**Figure 4.** Time of immigration of wild and hatchery Chinook salmon at Ninilchik River weir, 2002 and 2003.

### AGE, SEX AND LENGTH COMPOSITIONS, 2002

The escapement of wild Chinook salmon was composed of 32% female and 68% male (Table 3). The majority of wild female Chinook salmon was estimated to be 3-ocean fish (82%, SE = 3%), while 3-ocean fish made up about half (49%, SE = 4%) of the wild male escapement. Overall, the escapement of wild Chinook salmon was comprised of 59% (SE = 3%) 3-ocean, followed by 35% (SE = 3%) 2-ocean, 4% (SE = 1%) 4-ocean fish, and 3% (SE = 1%) 1-ocean fish (Table 3).

Sixty-three percent of the stocked Chinook salmon escapement was comprised of males (Table 3). The majority of males were 2-ocean fish (48%, SE = 5%), followed by 1-ocean (30%, SE = 5%) and 3-ocean (22%, SE = 4%) fish. No 4-ocean males were detected in our systematic sample of the hatchery escapement. Three-ocean fish comprised 92% (SE = 4%) of the female hatchery escapement (Table 3). Altogether the age composition of the hatchery escapement was 48% (SE = 3%) 3-ocean, 32%, (SE = 4%) 2-ocean, 19% (SE = 3%) 1-ocean, and 1% (SE = 1%) 4-ocean fish (Table 3).

**Table 3.**-Estimated ocean age composition and length-at-age of the wild and hatchery Chinook salmon escapements, Ninilchik River, 2002.

	Wild					Hatchery				
	Ocean Age				Total	Ocean Age				Total
	1	2	3	4		1	2	3	4	
<b><u>Females</u></b>										
Number sampled	1	12	94	8	115	0	2	33	1	36
Estimated Proportion by Sex	0.009	0.104	0.817	0.070	1.000	0.000	0.056	0.917	0.028	1.000
SE Proportion	0.007	0.024	0.031	0.020						
Estimated Proportion	0.003	0.033	0.258	0.022	0.316	0	0.021	0.343	0.01	0.375
SE Proportion	0.002	0.008	0.010	0.006		0.000	0.013	0.015	0.009	
Estimated abundance	4	44	346	29	423	0	8	136	4	148
SE Abundance	3	10	13	9		0	5	6	4	
Mean Length	377	665	767	829	757		690	741	830	741
SE Mean Length		17	4	20	6		42	7		7
<b><u>Males</u></b>										
Number sampled	5	65	69	3	142	20	32	15	0	67
Estimated Proportion by Sex	0.035	0.458	0.486	0.021	1.000	0.299	0.478	0.224	0.000	1.000
SE Proportion	0.014	0.039	0.039	0.011						
Estimated Proportion	0.024	0.313	0.333	0.014	0.684	0.187	0.299	0.140	0.000	0.625
SE Proportion	0.010	0.026	0.026	0.008		0.030	0.033	0.027	0.000	
Estimated abundance	32	420	446	19	917	74	118	55	0	247
SE Abundance	13	35	35	10		12	13	11	0	
Mean Length	397	625	765	887	715	377	510	709		557
SE Mean Length	23	7	6	23	11	10	9	30		17
<b><u>All</u></b>										
Estimated Proportion	0.03	0.35	0.59	0.04	1.00	0.19	0.32	0.48	0.01	1.00
SE Proportion	0.01	0.03	0.03	0.01		0.03	0.04	0.03	0.01	
Estimated abundance	36	464	791	49	1,340	74	126	191	4	395
SE Abundance	13	37	38	13		12	14	12	4	
Mean Length	394	631	766	845	720	377	605	731	830	621
SE Mean Length	19	7	3	18	6	10	9	11		15

### AGE, SEX AND LENGTH COMPOSITIONS, 2003

The escapement of wild Chinook salmon was comprised of 62% male and 38% female (Table 4). Among females the majority were 3-ocean (80%, SE = 4%), followed by 4-ocean (15%, SE = 4%) and 2-ocean (5%, SE = 2%) fish. Two-ocean fish accounted for 45% (SE = 5%) and 3-ocean 44% (SE = 5%) of the escapement males. Overall, the majority of the wild fish escapement was 3-ocean fish (57%, SE = 3%) (Table 4).

The escapement of hatchery Chinook salmon was 66% male. The male ocean age composition was 66% (SE = 7%) 2-ocean, 20% (SE = 6%) 3-ocean and 15% (SE = 6%) 1-ocean (Table 4). Similar to 2002 no 4-ocean males were detected in the systematic sample of the male hatchery escapement at the weir (Table 4). Three-ocean and 2-ocean fish accounted for the majority of the female hatchery escapement, 84% (SE = 5%) and 10% (SE = 5%), respectively. In total 2-ocean fish comprised 47% (SE = 5%), 3-ocean 41% (SE = 4%), 1-ocean 11% (SE = 4%), 4-ocean 1% (SE = 1%) of the escapement of hatchery Chinook salmon (Table 4).

**Table 4.**-Estimated ocean age composition and length-at-age of the wild and hatchery Chinook salmon escapements, Ninilchik River, 2003.

	Wild					Hatchery				
	Ocean Age				Total	Ocean Age				Total
	1	2	3	4		1	2	3	4	
<b><u>Females</u></b>										
Number sampled	0	4	63	12	79	1	3	26	1	31
Estimated Proportion by Sex	0.000	0.051	0.797	0.152	1.000	0.032	0.097	0.839	0.032	1.000
SE Proportion	0.000	0.022	0.041	0.037						
Estimated Proportion	0.000	0.019	0.301	0.057	0.377	0.011	0.033	0.282	0.011	0.336
SE Proportion	0.000	0.008	0.015	0.014		0.009	0.015	0.019	0.009	
Estimated abundance	0	22	339	65	425	4	11	95	4	113
SE Abundance	0	10	17	16		3	5	6	3	
Mean Length		623	795	855	796	500	634	758	802	738
SE Mean Length		32	6	14	7		42	8		13
<b><u>Males</u></b>										
Number sampled	2	43	42	9	96	6	27	8	0	41
Estimated Proportion by Sex	0.021	0.448	0.438	0.094	1.000	0.146	0.659	0.195	0.000	1.000
SE Proportion	0.014	0.047	0.047	0.028						
Estimated Proportion	0.013	0.279	0.273	0.058	0.623	0.097	0.437	0.130	0.000	0.664
SE Proportion	0.008	0.030	0.029	0.017		0.034	0.045	0.038	0.000	
Estimated abundance	15	314	307	66	702	33	147	44	0	223
SE Abundance	10	33	33	20		11	15	13	0	
Mean Length	529	622	780	894	715	400	613	777		614
SE Mean Length	56	6	7	18	11	19	9	23		19
<b><u>All</u></b>										
Estimated Proportion	0.01	0.30	0.57	0.12	1.00	0.11	0.47	0.41	0.01	1.00
SE Proportion	0.01	0.03	0.03	0.02		0.03	0.05	0.04	0.01	
Estimated abundance	15	336	646	130	1,127	36	158	138	4	336
SE Abundance	10	35	38	25		12	16	14	3	
Mean Length	529	622	789	871	751	414	615	762	802	668
SE Mean Length	56	6	4	12	8	19	9	8		14

## SPORT HARVEST

During the third regulatory weekend fishing period of 2002 a total of 99 Chinook salmon harvested in the lower river were sampled for adipose finclips. Twenty-two (22%, SE = 9%) were stocked fish (Table 5). The daily proportion of stocked fish in the sampled harvest ranged from 26% (SE = 12%) on the first weekend day (Saturday) to 15% (SE = 36%) on the last weekend day (Monday). We found no significant differences in the stocked versus wild fraction over days within the third weekend. ( $\chi^2 = 0.832$ ,  $df = 2$ ,  $P = 0.659$ ).

In 2003 a total of 54 Chinook salmon from the harvest were sampled. Stocked Chinook salmon comprised 32% (SE = 12%) of the sampled harvest (Table 5). Stock composition of the sampled harvest was not significantly different among days of the final third weekend ( $\chi^2 = 1.222$ ,  $df = 2$ ,  $P = 0.543$ ) (Table 5).

**Table 5.**-Stock composition estimates of the Chinook salmon sport harvest by weekend sampled in the lower Ninilchik River below the Sterling Highway bridge during the third regulatory fishing period, 2002 and 2003.

Date	Wild Chinook salmon			Hatchery Chinook salmon			Total Sampled
	Sampled	Proportion	SE	Sampled	Proportion	SE	
<b>2002</b>							
8-Jun	41	0.745	0.069	14	0.255	0.121	55
9-Jun	25	0.806	0.081	6	0.194	0.177	31
10-Jun	11	0.846	0.114	2	0.154	0.361	13
Total	77	0.778	0.048	22	0.222	0.091	99
<b>2003</b>							
7-Jun	27	0.692	0.091	12	0.308	0.139	39
8-Jun	8	0.615	0.184	5	0.385	0.243	13
9-Jun	2	1.000	0.000	0	0.000	0.000	2
Total	37	0.685	0.077	17	0.315	0.116	54

## STRAYING

One hundred sixty-four Chinook salmon were sacrificed during sampling of the immigration at the weir (109) and the egg takes (55) during 2002, of which 138 were used to detect strays from Kachemak Bay locations (Tables 2 and 6, Appendix A3). CWTs were successfully decoded from 130 samples. All were of Ninilchik River origin (Table 6, Appendix A3).

During 2003 a total of 37 Chinook salmon were sacrificed during sampling of the immigration at the weir, 20 were collected for egg takes, and 32 were mortalities during egg takes (Appendix A4). All those sampled during the immigration were of Ninilchik River origin (Appendix A4). Among those from fish used for the egg takes 17 were of Ninilchik River origin, 2 were from the ADF&G stocking program at Crooked Creek, a tributary of the Kasilof River, and 1 fish was not sampled (Appendix A4). Among the 32 holding-pen mortalities, 29 were of Ninilchik River origin and 3 were from the Crooked Creek stocking program (Appendix A4). No strays were detected from Homer Spit Fishing Lagoon, Halibut Cove Lagoon, or Seldovia Harbor (Table 6, Appendix A4).

A summary of the age and length composition by sex of Chinook salmon sampled during egg takes and for CWT information appears in Appendix A5.

## DISCUSSION

Desired escapements have been attained during 2 of the 3 years since the 2001 revision of the escapement goal range for wild Chinook salmon. The 2003 escapement of wild fish during July 8-24, 2003 was 393 fish (Table 7), 7 fish below the lower end of the desired range of 400 to 950. Failure to attain the desired escapement can be attributed to the earlier run of wild fish to the weir (Figure 4), such that fewer fish migrated during the escapement goal window of July 8-24. For instance, the mid-point of the wild Chinook salmon immigration at the weir was July 4 in 2003 (Figure 4, Appendix A2), whereas from 1999 through 2002 mid-points have occurred between July 12 and July 17 (Balland and Begich *In prep*, Begich 2006). Overall, the 2003 total run of wild Chinook salmon was the lowest since 1998; however, it compared closely to the 2001 and 2002 runs (Table 2). Furthermore, the 2003 escapement corresponding to the July 8-24

**Table 6.**-Coded wire tag recovery information by tag code, brood year, and release location for Chinook salmon sacrificed at the Ninilchik River, 2002 and 2003.

Year	Tag Code <sup>a</sup>	Brood Year	Rearing Code and location <sup>b</sup>	Release Date	Release Site	Actual Age <sup>c</sup>		Female	Male	Sample Total
						Fresh	Ocean			
2002										
	310260	2000	(H) Fort Richardson	06/13/2001	Ninilchik R 244-20	0	1	0	23	23
	310248	1999	(H) Fort Richardson	06/02/2000	Ninilchik R 244-20	0	2	2	34	36
	310147	1998	(H) Fort Richardson	06/15/1999	Ninilchik R 244-20	0	3	53	13	66
	312635	1997	(H) Fort Richardson	06/15/1998	Ninilchik R 244-20	0	4	5	0	5
	No tag							3	5	8
	Not sampled							0	0	26
						Total		63	75	164
2003										
	310282	2001	(H) Fort Richardson	06/14/2002	Ninilchik R 244-20	0	1	0	2	2
	310260	2000	(H) Fort Richardson	06/13/2001	Ninilchik R 244-20	0	2	3	17	20
	310248	1999	(H) Fort Richardson	6/2/2000	Ninilchik R 244-20	0	3	39	7	46
	310147	1998	(H) Fort Richardson	6/15/1999	Ninilchik R 244-20	0	4	12	2	14
	310135	1999	(H) Elmendorf	6/5/2000	Crooked Cr 244-30	0	3	2	0	2
	310134	1999	(H) Elmendorf	6/5/2000	Crooked Cr 244-30	0	3	3	0	3
	No tag							0	1	1
	Not sampled							1		1
						Total		60	29	89

<sup>a</sup> No tag is a Chinook with an adipose finclip but no tag, not sampled is an adipose finclipped fish that was counted but head was not recovered.

<sup>b</sup> Rearing code H is for hatchery facility.

<sup>c</sup> Actual age fresh and ocean was determined by comparing brood year, release year, and recovery year.

**Table 7.**-Number of wild and hatchery Chinook salmon counted at the Ninilchik River weir, July 8 through July 24, 1994 through 2003.

Year	Wild Chinook <sup>a</sup>	Hatchery Chinook	Total	Proportion
				Hatchery
1994	423	40	463	0.086
1995	503	342	845	0.405
1996	591	264	855	0.309
1997	235	358	593	0.604
1998	422	268	690	0.388
1999	799	277	1,076	0.257
2000	834	426	1,260	0.338
2001	716	363	1,079	0.336
2002	655	169	824	0.205
2003	393	150	543	0.276
Average	557	266	823	0.321
Avg 1994-1998	435	254	689	0.358
Avg 1999-2003	679	277	956	0.283
Avg 2001-2003	588	227	815	0.273

<sup>a</sup> SEG 400-950.

monitoring period was within the range of escapements recorded between 1994 and 2002. Given the restrictive nature of regulations in place to control harvest and our ability to monitor runs of wild Chinook salmon at the weir it is unlikely that the 2003 escapement that was slightly below our desired goal range will negatively impact future wild stock returns.

Findings from the 1999 and 2000 Ninilchik Chinook salmon assessments illuminated run-timing differences between the wild and stocked components (Begich 2006). Findings also pointed out that numbers of stocked fish harvested over the duration of the lower river fishery were approximately equal to the numbers of wild fish harvested even though numbers of stocked fish counted at the weir prior to July are small relative to the numbers of wild fish counted. These results led to the conclusions that stocked Chinook salmon remained in the area open to fishing making them more prone to harvest, while wild fish passed through the area open to fishing making them less susceptible to harvest. These conclusions led to various inseason regulatory changes that attempted to increase exploitation of stocked fish and so curb escapement of stocked fish through the weir while maintaining desired escapement of wild fish.

During 2001 the fishery was opened to harvest both wild and hatchery fish for an additional (fourth) 3-day weekend. Together, harvest data collected during the extension and weir counts indicated that the fishery could be extended to harvest the surplus of stocked fish without significantly impacting the wild population; the majority of fish harvested during the 2001 extension were stocked fish (67%) and escapement of wild fish was maintained within the desired goal range (716 fish) (Table 7). Accordingly, during 2002 the third regulatory opening was sampled to estimate contribution of stocked fish. However, nearly 80% of the harvest during the third weekend was of wild fish (Table 8), much greater than in 2001 (about 50%).

**Table 8.**-Summary of stock composition estimates of the Chinook salmon sport harvest sampled below the Sterling Highway Bridge, Ninilchik River, 2000 through 2003.

Weekend	Wild Chinook salmon			Hatchery Chinook salmon			Total Sampled
	Sampled	Proportion	SE	Sampled	Proportion	SE	
2000							
1	37	0.468	0.057	42	0.532	0.057	79
2	53	0.510	0.049	51	0.490	0.049	104
3	55	0.550	0.050	45	0.450	0.050	100
Total	145	0.512	0.030	138	0.488	0.043	283
2001							
1	57	0.576	0.050	42	0.424	0.050	99
2	34	0.420	0.055	47	0.580	0.055	81
3	43	0.524	0.055	39	0.476	0.055	82
4	20	0.328	0.061	41	0.672	0.061	61
Total	154	0.477	0.028	169	0.523	0.039	323
2002							
3	77	0.778	0.042	22	0.222	0.042	99
2003							
3	37	0.685	0.064	17	0.315	0.064	54
2000-2003 avg							
Weekend 3	53	0.634	0.034	31	0.367	0.088	84

Therefore, the 2002 fishery was extended for an additional 3-day weekend with the condition that only stocked fish, identified by an adipose finclip, be harvested. Escapement of wild Chinook salmon within the desired goal range was attained and the count of stocked fish at the weir was lower than any of the previous 3 years (Tables 2 and 7). In 2003 wild fish again made up a significant majority of the sampled harvest during the third weekend (nearly 70%). Consequently, the fishery was again extended for the harvest of stocked fish only, beginning with the Tuesday immediately following the third weekend opening (June 9) through June 30. Again the count of stocked fish at the weir declined below recent counts. Since 2000, wild Chinook salmon composed the majority of the sampled harvests during the third weekend period, with the proportions of wild fish in the harvests in 2002-2003 being much greater (Table 8). Hence, future sport fishery extensions should continue to target stocked fish to protect the wild component. Taking into account the various inseason regulatory changes it appears that the three-weekend harvest strategy for the Ninilchik River Chinook salmon fishery can be expanded to provide increased harvest opportunity on surpluses of stocked fish, while maintaining escapement of wild fish within the desired escapement goal range. It is recommended that selective fisheries targeting stocked Chinook salmon continue to be executed, and that monitoring of escapements of wild Chinook salmon continues.

During this 2-year study no tagged Chinook salmon from the Homer Spit Fishing Lagoon, Halibut Cove Lagoon, or Seldovia Harbor were found (Table 6). During 2003 the only marked hatchery group returning to Kachemak Bay was 4-ocean fish from the 1999 Homer Spit release. Seldovia and Halibut Cove releases were last marked in 1998 and marked fish were not expected to return from these releases. Given the small number of 4-ocean hatchery fish normally seen at

the weir, and that no 2 or 3-ocean Homer Spit tags have been detected at the Ninilchik River weir from the 1999 release (Balland and Begich *In prep*), detection of stray 4-ocean fish from the Homer Spit release at the weir was considered unlikely. Overall, our results indicate that the Kachemak Bay Chinook salmon enhancement program poses a low risk of introgression to the wild Chinook salmon stock at Ninilchik River.

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**APPENDIX A. SUPPORTING WEIR COUNT AND CODED  
WIRE TAGGING DATA.**

**Appendix A1.**-Daily and cumulative counts of wild and hatchery Chinook salmon at the Ninilchik River weir, 2002.

Date	Wild			Hatchery			Total		
	Daily Count	Cumulative Count	Cumulative Proportion	Daily Count	Cumulative Count	Cumulative Proportion	Daily Count	Cumulative Count	Cumulative Proportion
23-May-02	0	0	0.000	0	0	0.000	0	0	0.000
24-May-02	0	0	0.000	0	0	0.000	0	0	0.000
25-May-02	0	0	0.000	0	0	0.000	0	0	0.000
26-May-02	0	0	0.000	0	0	0.000	0	0	0.000
27-May-02	0	0	0.000	0	0	0.000	0	0	0.000
28-May-02	0	0	0.000	0	0	0.000	0	0	0.000
29-May-02	0	0	0.000	0	0	0.000	0	0	0.000
30-May-02	0	0	0.000	0	0	0.000	0	0	0.000
31-May-02	0	0	0.000	0	0	0.000	0	0	0.000
1-Jun-02	0	0	0.000	0	0	0.000	0	0	0.000
2-Jun-02	0	0	0.000	0	0	0.000	0	0	0.000
3-Jun-02	0	0	0.000	0	0	0.000	0	0	0.000
4-Jun-02	0	0	0.000	0	0	0.000	0	0	0.000
5-Jun-02	0	0	0.000	0	0	0.000	0	0	0.000
6-Jun-02	0	0	0.000	0	0	0.000	0	0	0.000
7-Jun-02	0	0	0.000	0	0	0.000	0	0	0.000
8-Jun-02	0	0	0.000	0	0	0.000	0	0	0.000
9-Jun-02	3	3	0.002	0	0	0.000	3	3	0.001
10-Jun-02	0	3	0.002	0	0	0.000	0	3	0.001
11-Jun-02	23	26	0.017	5	5	0.009	28	31	0.015
12-Jun-02	27	53	0.035	3	8	0.014	30	61	0.029
13-Jun-02	10	63	0.042	2	10	0.018	12	73	0.035
14-Jun-02	7	70	0.046	0	10	0.018	7	80	0.039
15-Jun-02	14	84	0.055	3	13	0.023	17	97	0.047
16-Jun-02	7	91	0.060	0	13	0.023	7	104	0.050
17-Jun-02	3	94	0.062	2	15	0.027	5	109	0.053
18-Jun-02	0	94	0.062	0	15	0.027	0	109	0.053
19-Jun-02	16	110	0.073	6	21	0.038	22	131	0.063
20-Jun-02	8	118	0.078	2	23	0.041	10	141	0.068
21-Jun-02	0	118	0.078	0	23	0.041	0	141	0.068
22-Jun-02	6	124	0.082	1	24	0.043	7	148	0.071
23-Jun-02	4	128	0.084	0	24	0.043	4	152	0.073
24-Jun-02	14	142	0.094	1	25	0.045	15	167	0.080
25-Jun-02	13	155	0.102	2	27	0.048	15	182	0.088
26-Jun-02	28	183	0.121	3	30	0.054	31	213	0.103
27-Jun-02	5	188	0.124	3	33	0.059	8	221	0.107
28-Jun-02	13	201	0.133	1	34	0.061	14	235	0.113
29-Jun-02	52	253	0.167	2	36	0.064	54	289	0.139
30-Jun-02	49	302	0.199	4	40	0.072	53	342	0.165

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Appendix A1.-Page 2 of 2.

Date	Wild			Hatchery			Total		
	Daily Count	Cumulative Count	Cumulative Proportion	Daily Count	Cumulative Count	Cumulative Proportion	Daily Count	Cumulative Count	Cumulative Proportion
1-Jul-02	33	335	0.221	8	48	0.086	41	383	0.185
2-Jul-02	35	370	0.244	11	59	0.106	46	429	0.207
3-Jul-02	46	416	0.274	13	72	0.129	59	488	0.235
4-Jul-02	41	457	0.301	14	86	0.154	55	543	0.262
5-Jul-02	44	501	0.330	18	104	0.186	62	605	0.292
6-Jul-02	25	526	0.347	6	110	0.197	31	636	0.307
7-Jul-02	21	547	0.361	8	118	0.211	29	665	0.320
8-Jul-02	14	561	0.370	3	121	0.216	17	682	0.329
9-Jul-02	18	579	0.382	4	125	0.224	22	704	0.339
10-Jul-02	38	617	0.407	12	137	0.245	50	754	0.363
11-Jul-02	15	632	0.417	13	150	0.268	28	782	0.377
12-Jul-02	20	652	0.430	10	160	0.286	30	812	0.391
13-Jul-02	37	689	0.454	8	168	0.301	45	857	0.413
14-Jul-02	17	706	0.466	5	173	0.309	22	879	0.424
15-Jul-02	11	717	0.473	0	173	0.309	11	890	0.429
16-Jul-02	21	738	0.487	6	179	0.320	27	917	0.442
17-Jul-02	44	782	0.516	9	188	0.336	53	970	0.467
18-Jul-02	60	842	0.555	11	199	0.356	71	1,041	0.502
19-Jul-02	72	914	0.603	16	215	0.385	88	1,129	0.544
20-Jul-02	36	950	0.627	6	221	0.395	42	1,171	0.564
21-Jul-02	35	985	0.650	5	226	0.404	40	1,211	0.584
22-Jul-02	49	1,034	0.682	11	237	0.424	60	1,271	0.613
23-Jul-02	51	1,085	0.716	11	248	0.444	62	1,333	0.642
24-Jul-02	117	1,202	0.793	39	287	0.513	156	1,489	0.718
25-Jul-02	85	1,287	0.849	42	329	0.589	127	1,616	0.779
26-Jul-02	0	1,287	0.849	0	329	0.589	0	1,616	0.779
27-Jul-02	42	1,329	0.877	27	356	0.637	69	1,685	0.812
28-Jul-02	35	1,364	0.900	27	383	0.685	62	1,747	0.842
29-Jul-02	32	1,396	0.921	28	411	0.735	60	1,807	0.871
30-Jul-02	18	1,414	0.933	30	441	0.789	48	1,855	0.894
31-Jul-02	29	1,443	0.952	21	462	0.826	50	1,905	0.918
1-Aug-02	10	1,453	0.958	12	474	0.848	22	1,927	0.929
2-Aug-02	12	1,465	0.966	13	487	0.871	25	1,952	0.941
3-Aug-02	6	1,471	0.970	10	497	0.889	16	1,968	0.948
4-Aug-02	10	1,481	0.977	7	504	0.902	17	1,985	0.957
5-Aug-02	12	1,493	0.985	15	519	0.928	27	2,012	0.970
6-Aug-02	8	1,501	0.990	7	526	0.941	15	2,027	0.977
7-Aug-02	3	1,504	0.992	12	538	0.962	15	2,042	0.984
8-Aug-02	4	1,508	0.995	6	544	0.973	10	2,052	0.989
9-Aug-02	1	1,509	0.995	1	545	0.975	2	2,054	0.990
10-Aug-02	3	1,512	0.997	6	551	0.986	9	2,063	0.994
11-Aug-02	4	1,516	1.000	8	559	1.000	12	2,075	1.000
Total	1,516			559			2,075		

Weir pulled 8/12/02

**Appendix A2.**-Daily and cumulative counts of wild and hatchery Chinook salmon at the Ninilchik River weir, 2003.

Date	Wild			Hatchery			Total		
	Daily Count	Cumulative Count	Cumulative Proportion	Daily Count	Cumulative Count	Cumulative Proportion	Daily Count	Cumulative Count	Cumulative Proportion
16-May-03	1	1	0.001	0	0	0.000	1	1	0.001
17-May-03	0	1	0.001	0	0	0.000	0	1	0.001
18-May-03	0	1	0.001	0	0	0.000	0	1	0.001
19-May-03	0	1	0.001	0	0	0.000	0	1	0.001
20-May-03	0	1	0.001	0	0	0.000	0	1	0.001
21-May-03	2	3	0.002	1	1	0.002	3	4	0.002
22-May-03	1	4	0.003	1	2	0.005	2	6	0.004
23-May-03	0	4	0.003	0	2	0.005	0	6	0.004
24-May-03	0	4	0.003	0	2	0.005	0	6	0.004
25-May-03	57	61	0.048	9	11	0.026	66	72	0.043
26-May-03	0	61	0.048	0	11	0.026	0	72	0.043
27-May-03	0	61	0.048	0	11	0.026	0	72	0.043
28-May-03	0	61	0.048	0	11	0.026	0	72	0.043
29-May-03	0	61	0.048	0	11	0.026	0	72	0.043
30-May-03	3	64	0.051	0	11	0.026	3	75	0.045
31-May-03	10	74	0.059	0	11	0.026	10	85	0.051
1-Jun-03	13	87	0.069	0	11	0.026	13	98	0.058
2-Jun-03	14	101	0.080	0	11	0.026	14	112	0.067
3-Jun-03	2	103	0.082	1	12	0.028	3	115	0.068
4-Jun-03	19	122	0.097	1	13	0.031	20	135	0.080
5-Jun-03	5	127	0.101	1	14	0.033	6	141	0.084
6-Jun-03	0	127	0.101	1	15	0.035	1	142	0.084
7-Jun-03	55	182	0.145	7	22	0.052	62	204	0.121
8-Jun-03	7	189	0.150	0	22	0.052	7	211	0.125
9-Jun-03	6	195	0.155	1	23	0.054	7	218	0.130
10-Jun-03	15	210	0.167	4	27	0.064	19	237	0.141
11-Jun-03	6	216	0.172	0	27	0.064	6	243	0.144
12-Jun-03	23	239	0.190	3	30	0.071	26	269	0.160
13-Jun-03	46	285	0.227	5	35	0.082	51	320	0.190
14-Jun-03	48	333	0.265	8	43	0.101	56	376	0.223
15-Jun-03	14	347	0.276	6	49	0.115	20	396	0.235
16-Jun-03	4	351	0.279	2	51	0.120	6	402	0.239
17-Jun-03	11	362	0.288	0	51	0.120	11	413	0.245
18-Jun-03	0	362	0.288	0	51	0.120	0	413	0.245
19-Jun-03	2	364	0.289	0	51	0.120	2	415	0.247
20-Jun-03	6	370	0.294	0	51	0.120	6	421	0.250
21-Jun-03	5	375	0.298	2	53	0.125	7	428	0.254
22-Jun-03	10	385	0.306	0	53	0.125	10	438	0.260
23-Jun-03	8	393	0.312	8	61	0.144	16	454	0.270
24-Jun-03	0	393	0.312	0	61	0.144	0	454	0.270
25-Jun-03	2	395	0.314	0	61	0.144	2	456	0.271
26-Jun-03	27	422	0.335	1	62	0.146	28	484	0.288
27-Jun-03	27	449	0.357	3	65	0.153	30	514	0.305
28-Jun-03	19	468	0.372	3	68	0.160	22	536	0.318
29-Jun-03	12	480	0.382	0	68	0.160	12	548	0.326
30-Jun-03	0	480	0.382	0	68	0.160	0	548	0.326

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**Appendix A2.**-Page 2 of 2.

Date	Wild			Hatchery			Total		
	Daily Count	Cumulative Count	Cumulative Proportion	Daily Count	Cumulative Count	Cumulative Proportion	Daily Count	Cumulative Count	Cumulative Proportion
1-Jul-03	19	499	0.397	3	71	0.167	22	570	0.339
2-Jul-03	57	556	0.442	2	73	0.172	59	629	0.374
3-Jul-03	37	593	0.471	7	80	0.188	44	673	0.400
4-Jul-03	50	643	0.511	23	103	0.242	73	746	0.443
5-Jul-03	26	669	0.532	17	120	0.282	43	789	0.469
6-Jul-03	19	688	0.547	13	133	0.313	32	821	0.488
7-Jul-03	8	696	0.553	1	134	0.315	9	830	0.493
8-Jul-03	7	703	0.559	4	138	0.325	11	841	0.500
9-Jul-03	17	720	0.572	7	145	0.341	24	865	0.514
10-Jul-03	16	736	0.585	4	149	0.351	20	885	0.526
11-Jul-03	28	764	0.607	10	159	0.374	38	923	0.548
12-Jul-03	4	768	0.610	7	166	0.391	11	934	0.555
13-Jul-03	20	788	0.626	12	178	0.419	32	966	0.574
14-Jul-03	21	809	0.643	14	192	0.452	35	1,001	0.595
15-Jul-03	44	853	0.678	14	206	0.485	58	1,059	0.629
16-Jul-03	38	891	0.708	8	214	0.504	46	1,105	0.657
17-Jul-03	12	903	0.718	4	218	0.513	16	1,121	0.666
18-Jul-03	26	929	0.738	11	229	0.539	37	1,158	0.688
19-Jul-03	24	953	0.758	7	236	0.555	31	1,189	0.706
20-Jul-03	45	998	0.793	16	252	0.593	61	1,250	0.743
21-Jul-03	46	1,044	0.830	13	265	0.624	59	1,309	0.778
22-Jul-03	7	1,051	0.835	6	271	0.638	13	1,322	0.786
23-Jul-03	22	1,073	0.853	10	281	0.661	32	1,354	0.805
24-Jul-03	16	1,089	0.866	3	284	0.668	19	1,373	0.816
25-Jul-03	24	1,113	0.885	5	289	0.680	29	1,402	0.833
26-Jul-03	11	1,124	0.893	2	291	0.685	13	1,415	0.841
27-Jul-03	10	1,134	0.901	2	293	0.689	12	1,427	0.848
28-Jul-03	3	1,137	0.904	2	295	0.694	5	1,432	0.851
29-Jul-03	12	1,149	0.913	15	310	0.729	27	1,459	0.867
30-Jul-03	37	1,186	0.943	29	339	0.798	66	1,525	0.906
31-Jul-03	18	1,204	0.957	27	366	0.861	45	1,570	0.933
1-Aug-03	12	1,216	0.967	16	382	0.899	28	1,598	0.949
2-Aug-03	10	1,226	0.975	6	388	0.913	16	1,614	0.959
3-Aug-03	12	1,238	0.984	14	402	0.946	26	1,640	0.974
4-Aug-03	11	1,249	0.993	10	412	0.969	21	1,661	0.987
5-Aug-03	9	1,258	1.000	13	425	1.000	22	1,683	1.000
Total	1,258			425			1,683		

Weir pulled 8/5/2003

**Appendix A3.-Summary of Chinook salmon coded wire tag recoveries from return sampled at weir and during egg take, Ninilchik River, 2002.**

Sample #	Date	Head	Tag Code	Brood Year	Actual Age <sup>a</sup>		Scale Age <sup>b</sup>		Sex	Length	Rearing Code and Location	Release Date	Release Site
	Recovered	Number			Fresh	Ocean	Fresh	Ocean					
Return sampled at weir during immigration													
02DE2002	06/11/02	86486	No Tag				R	3	F	750			
02DE2004	06/13/02	86487	310147	1998	0	3	R	3	F	810	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2008	06/17/02	86488	310260	2000	0	1			M	350	Fort Richardson	06/13/01	Ninilchik R 244-20
02DE2009	06/19/02	86489	310260	2000	0	1	R	1	M	300	Fort Richardson	06/13/01	Ninilchik R 244-20
02DE2013	06/24/02	86490	310248	1999	0	2			M	600	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2015	06/26/02	86491	310147	1998	0	3	1	3	M	810	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2018	06/29/02	86492	310147	1998	0	3	2	3	F	663	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2019	06/30/02	86493	310248	1999	0	2	R	2	M	623	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2020	07/01/02	86494	310147	1998					F	770	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2021	07/02/02	86495	310147	1998	0	3	1	3	F	710	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2021	07/02/02	86496	310248	1999	0	2	1	2	M	510	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2022	07/03/02	86497	310147	1998	0	3	R	3	M	620	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2022	07/03/02	86498	310260	2000	0	1	1	3	M	340	Fort Richardson	06/13/01	Ninilchik R 244-20
02DE2022	07/03/02	86499	310248	1999	0	2			M	615	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2023	07/04/02	86500	No Tag					1	2	M	580		
02DE2023	07/04/02	86501	310260	2000	0	1	R	1	M	421	Fort Richardson	06/13/01	Ninilchik R 244-20
02DE2023	07/04/02	86502	310248	1999	0	2	1	2	M	571	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2024	07/05/02	86503	310248	1999	0	2	R	2	M	675	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2024	07/05/02	86504	310248	1999	0	2	1	2	F	648	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2024	07/05/02	86505	310147	1998	0	3	2	3	M	704	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2025	07/06/02	86506	310147	1998	0	3	R	3	F	737	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2025	07/06/02	86507	310147	1998	0	3	R	3	F	692	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2026	07/07/02	86508	310248	1999	0	2			M	626	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2027	07/08/02	86509	310248	1999	0	2			M	565	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2028	07/09/02	86510	310260	2000	0	1			M	385	Fort Richardson	06/13/01	Ninilchik R 244-20
02DE2029	07/10/02	86511	310248	1999	0	2			M	609	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2029	07/10/02	86512	310248	1999	0	2			M	554	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2030	07/11/02	86513	310248	1999	0	2			M	568	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2030	07/11/02	86514	310248	1999	0	2			M	530	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2030	07/11/02	86515	310248	1999	0	2			M	581	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2031	07/12/02	86516	310260	2000	0	1			M	425	Fort Richardson	06/13/01	Ninilchik R 244-20
02DE2031	07/12/02	86517	310248	1999	0	2			M	557	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2032	07/13/02	86518	310147	1998	0	3			F	670	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2035	07/16/02	86519	312635	1997	0	4					Fort Richardson	06/15/98	Ninilchik R 244-20

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Appendix A3.—Page 2 of 4.

Sample #	Date	Head	Tag Code	Brood Year	Actual Age <sup>a</sup>		Scale Age <sup>b</sup>		Sex	Length	Rearing Code and Location	Release	Release
	Recovered	Number			Fresh	Ocean	Fresh	Ocean				Sample #	Recovered
Return sampled at weir during immigration													
02DE2036	07/16/02	86520	310147	1998	0	3			F	707	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2037	07/17/02	86521	310260	2000	0	1			M	378	Fort Richardson	06/13/01	Ninilchik R 244-20
02DE2037	07/17/02	86522	310260	2000	0	1			M	360	Fort Richardson	06/13/01	Ninilchik R 244-20
02DE2038	07/18/02	86523	310248	1999	0	2			M	684	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2038	07/18/02	86524	310147	1998	0	3			F	740	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2039	07/19/02	86525	310147	1998	0	3			M	730	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2039	07/19/02	86526	310147	1998	0	3			M	760	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2039	07/19/02	86527	No Tag						M	630			
02DE2039	07/19/02	86528	312635	1997	0	4			F	830	Fort Richardson	06/15/98	Ninilchik R 244-20
02DE2040	07/20/02	86529	310147	1998	0	3			M	760	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2041	07/21/02	86530	310147	1998	0	3			M	720	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2042	07/22/02	86531	310248	1999	0	2			M	631	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2042	07/22/02	86532	310260	2000	0	1			M	365	Fort Richardson	06/13/01	Ninilchik R 244-20
02DE2043	07/23/02	86533	310260	2000	0	1			M	380	Fort Richardson	06/13/01	Ninilchik R 244-20
02DE2043	07/23/02	86534	310248	1999	0	2			M	584	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2044	07/24/02	86535	310248	1999	0	2			M	638	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2044	07/24/02	86536	310147	1998	0	3			M	758	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2044	07/24/02	86537	310248	1999	0	2			M	592	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2044	07/24/02	86538	310248	1999	0	2			M	654	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2044	07/24/02	86539	310147	1998	0	3			F	732	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2044	07/24/02	86540	310248	1999	0	2			M	642	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2044	07/24/02	86541	310248	1999	0	2			M	543	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2044	07/24/02	86542	310248	1999	0	2	R	2	M	620	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2045	07/25/02	86543	310248	1999	0	2	R	2	M	565	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2045	07/25/02	86544	310248	1999	0	2	R	3	M	590	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2045	07/25/02	86545	310147	1998	0	3	R	3	M	750	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2045	07/25/02	86546	310248	1999	0	2	R	3	M	655	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2045	07/25/02	86547	310147	1998	0	3	1	3	M	780	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2045	07/25/02	86548	310147	1998	0	3	R		F	700	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2045	07/25/02	86549	No Tag				R	3	F	700			
02DE2045	07/25/02	86550	312635	1997	0	4	R	2	F	780	Fort Richardson	06/15/98	Ninilchik R 244-20
02DE2046	07/27/02	166704	310248	1999	0	2	R	2	M	590	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2046	07/27/02	166705	310248	1999	0	2	R	2	M	560	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2046	07/27/02	166706	310248	1999	0	2	R	3	M	525	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2046	07/27/02	166707	310147	1998	0	3	1	3	M	770	Fort Richardson	06/15/99	Ninilchik R 244-20

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Sample #	Date Recovered	Head		Brood	Actual Age <sup>a</sup>		Scale Age <sup>b</sup>		Sex	Length	Rearing Code and Location	Release Sample #	Release Recovered
		Number	Tag Code	Year	Fresh	Ocean	Fresh	Ocean					
Return sampled at weir during immigration													
02DE2046	07/27/02	166708	No Tag				1	3	M	660			
02DE2046	07/27/02	166709	310147	1998	0	3	R	3	F	720	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2047	07/28/02	166710	310147	1998	0	3	R		M	790	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2047	07/28/02	166711	310248	1999	0	2	R	3	M	625	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2047	07/28/02	166712	No Tag				R	3	F	715			
02DE2047	07/28/02	166713	310147	1998	0	3	1	1	F	780	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2047	07/28/02	166714	310260	2000	0	1	R	1	M	430	Fort Richardson	06/13/01	Ninilchik R 244-20
02DE2048	07/29/02	166715	310260	2000	0	1	1	3	M	378	Fort Richardson	06/13/01	Ninilchik R 244-20
02DE2048	07/29/02	166716	310147	1998	0	3	1	2	M	736	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2048	07/29/02	166717	310248	1999	0	2	1	2	M	572	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2048	07/29/02	166718	310248	1999	0	2	R	1	M	638	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2048	07/29/02	166719	310248	1999	0	2	1	1	M	503	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2048	07/29/02	166720	310260	2000	0	1	R	3	M	339	Fort Richardson	06/13/01	Ninilchik R 244-20
02DE2051	07/30/02	166729	310147	1998	0	3	R	3	F	805	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2049	07/30/02	166730	310147	1998	0	3	R	3	F	778	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2049	07/30/02	166731	310147	1998	0	3	1	3	F	704	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2049	07/30/02	166732	310147	1998	0	3	R	3	F	735	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2049	07/30/02	166733	310147	1998	0	3	1	3	F	732	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2049	07/30/02	166734	310147	1998	0	3	R	3	F	757	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2050	07/31/02	166735	310147	1998	0	3	R	3	F	796	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2050	07/31/02	166736	310147	1998	0	3	1	3	F	778	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2050	07/31/02	166737	310147	1998	0	3	1	3	F	720	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2050	07/31/02	166738	310147	1998	0	3	1	3	F	738	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2052	08/01/02	166739	310147	1998	0	3	1	1	F	727	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2056	08/02/02	166759	310260	2000	0	1	R	3	M	380	Fort Richardson	06/13/01	Ninilchik R 244-20
02DE2053	08/02/02	166760	310147	1998	0	3	R	3	F	750	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2053	08/02/02	166761	310147	1998	0	3	1	1	F	725	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2053	08/02/02	166762	310260	2000	0	1	R	1	M	375	Fort Richardson	06/13/01	Ninilchik R 244-20
02DE2054	08/03/02	166763	310260	2000	0	1	R	3	M	360	Fort Richardson	06/13/01	Ninilchik R 244-20
02DE2054	08/03/02	166764	310147	1998	0	3	1	3	F	705	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2055	08/04/02	166765	No Tag				1	3	F	675			
02DE2058	08/05/02	166766	310147	1998	0	3	R	3	F	781	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2058	08/05/02	166767	310147	1998	0	3	1	3	F	748	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2058	08/05/02	166768	312635	1997	0	4	1	3	F	836	Fort Richardson	06/15/98	Ninilchik R 244-20
02DE2059	08/06/02	166769	310147	1998	0	3	1	1	F	776	Fort Richardson	06/15/99	Ninilchik R 244-20
2DE2059	08/06/02	166770	310260	2000	0	1	R	3	M	332	Fort Richardson	06/13/01	Ninilchik R 244-20

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Sample #	Date	Head	Tag Code	Brood Year	Actual Age <sup>a</sup>		Scale Age <sup>b</sup>		Sex	Length	Rearing Code and Location	Release	Release
	Recovered	Number			Fresh	Ocean	Fresh	Ocean				Sample #	Recovered
Return sampled at weir during immigration													
02DE2060	08/07/02	166771	310147	1998	0	3	R	1	F	796	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2060	08/07/02	166772	310260	2000	0	1	R	1	M	368	Fort Richardson	06/13/01	Ninilchik R 244-20
02DE2061	08/08/02	166773	310260	2000	0	1	1	2	M	360	Fort Richardson	06/13/01	Ninilchik R 244-20
02DE2062	08/09/02	166774	310248	1999	0	2	R	1	M	630	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2063	08/10/02	166775	No Tag				R	1	M	365			
02DE2064	08/11/02	166776	310260	2000	0	1			M	330	Fort Richardson	06/13/01	Ninilchik R 244-20
Egg-take samples													
02DE2049	07/30/02	166721	310147	1998	0	3			F	695	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2051	07/30/02	166722	310147	1998	0	3			F	750	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2051	07/30/02	166723	310147	1998	0	3			F	720	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2051	07/30/02	166724	312635	1997	0	4			F	800	Fort Richardson	06/15/98	Ninilchik R 244-20
02DE2051	07/30/02	166725	310147	1998	0	3			F	740	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2051	07/30/02	166726	310147	1998	0	3			F	760	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2051	07/30/02	166727	310147	1998	0	3			F	770	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2051	07/30/02	166728	310147	1998	0	3			F	745	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2052	08/01/02	166740	310260	2000	0	1	1	3	M	384	Fort Richardson	06/13/01	Ninilchik R 244-20
02DE2056	08/02/02	166741	310147	1998	0	3	R	3	F	705	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2056	08/02/02	166742	310147	1998	0	3	R		F	735	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2056	08/02/02	166743	310147	1998	0	3	R	2	F	695	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2056	08/02/02	166744	310248	1999	0	2	R		F	640	Fort Richardson	06/02/00	Ninilchik R 244-20
02DE2056	08/02/02	166745	310147	1998	0	3	R	3	F	745	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2056	08/02/02	166746	310147	1998	0	3	R		F	790	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2056	08/02/02	166747	310147	1998	0	3	R	3	F	715	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2056	08/02/02	166748	310147	1998	0	3	1	3	F	700	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2056	08/02/02	166749	310147	1998	0	3	R	3	F	765	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2056	08/02/02	166750	310147	1998	0	3	R	3	F	755	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2056	08/02/02	166751	310147	1998	0	3	1	3	F	710	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2056	08/02/02	166752	310147	1998	0	3	R		F	740	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2056	08/02/02	166753	310260	2000	0	1	R	3	M	355	Fort Richardson	06/13/01	Ninilchik R 244-20
02DE2056	08/02/02	166754	310147	1998	0	3	R	3	F	780	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2056	08/02/02	166755	310147	1998	0	3	R	3	F	720	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2056	08/02/02	166756	310147	1998	0	3	R		F	720	Fort Richardson	06/15/99	Ninilchik R 244-20
02DE2056	08/02/02	166757	310260	2000	0	1	R	3	M	330	Fort Richardson	06/13/01	Ninilchik R 244-20
02DE2056	08/02/02	166758	310147	1998	0	3	0	1	F	775	Fort Richardson	06/15/99	Ninilchik R 244-20

<sup>a</sup> Actual fresh and ocean age was determined by comparing brood year, year of release, and year of recovery.

<sup>b</sup> Scale age is the estimated fresh and ocean age determined from scale samples. R = regenerated, denotes fish that could not be aged. Not all fish were sampled for age.

**Appendix A4.-Summary of Chinook salmon coded wire tag recoveries, 2003.**

Sample #	Date Recovered	Head Number	Tag Code	Brood Year	Actual Age <sup>a</sup>		Scale Age <sup>b</sup>		Sex	Length	Rearing Code and Location	Release Date	Release Site
					Fresh	Ocean	Fresh	Ocean					
Return sampled at weir during immigration													
03DE2060	7/22/2003	166787	310248	1999	0	3	1	2	F	725	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2061	7/23/2003	166790	310248	1999	0	3			M	654	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2009	6/3/2003	184771	310248	1999	0	3		3	M	718	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2013	6/7/2003	184772	310248	1999	0	3			F	734	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2019	6/13/2003	184773	310248	1999	0	3			F	766	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2020	6/14/2003	184774	310248	1999	0	3			F	724	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2026	6/21/2003	184775	No Tag					3	M	788			
03DE2030	6/26/2003	184776	310248	1999	0	3		2	M	708	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2036	7/3/2003	184777	310248	1999	0	3		3	F	735	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2037	7/4/2003	184778	310248	1999	0	3	3		F	755	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2037	7/4/2003	184779	310248	1999	0	3		2	F	734	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2038	7/5/2003	184780	310260	2000	0	2		1	F	500	Fort Richardson	6/13/2001	Ninilchik R 244-20
03DE2038	7/5/2003	184781	310260	2000	0	2		1	F	635	Fort Richardson	6/13/2001	Ninilchik R 244-20
03DE2039	7/6/2003	184782	310260	2000	0	2		2	M	626	Fort Richardson	6/13/2001	Ninilchik R 244-20
03DE2041	7/8/2003	184783	310260	2000	0	2		2	M	634	Fort Richardson	6/13/2001	Ninilchik R 244-20
03DE2043	7/10/2003	184784	310248	1999	0	3	1	3	F	764	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2044	7/11/2003	184785	310248	1999	0	3			M	745	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2046	7/13/2003	184786	310248	1999	0	3	1	3	F	752	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2046	7/13/2003	184787	310248	1999	0	3		3	M	821	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2047	7/14/2003	184789	310260	2000	0	2	1		M	804	Fort Richardson	6/13/2001	Ninilchik R 244-20
03DE2049	7/15/2003	184790	310248	1999	0	3		3	M	810	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2050	7/16/2003	184791	310248	1999	0	3	1	2	F	705	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2051	7/17/2003	184792	310248	1999	0	3	1	3	F	792	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2052	7/18/2003	184793	310248	1999	0	3	1	3	F	702	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2055	7/20/2003	184795	310248	1999	0	3		3	F	802	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2072	7/29/2003	188068	310260	2000	0	2		1	M	608	Fort Richardson	6/13/2001	Ninilchik R 244-20
03DE2075	7/30/2003	188084	310260	2000	0	2	1	1	M	589	Fort Richardson	6/13/2001	Ninilchik R 244-20
03DE2075	7/30/2003	188085	310260	2000	0	2		2	M	609	Fort Richardson	6/13/2001	Ninilchik R 244-20
03DE2075	7/30/2003	188086	310260	2000	0	2		1	M	579	Fort Richardson	6/13/2001	Ninilchik R 244-20
03DE2076	7/31/2003	188088	310248	1999	0	2		3	F	703	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2076	7/31/2003	188089	310260	2000	0	2		2	M	603	Fort Richardson	6/13/2001	Ninilchik R 244-20
03DE2079	8/1/2003	188099	310260	2000	0	2	1	2	M	581	Fort Richardson	6/13/2001	Ninilchik R 244-20

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Sample #	Date Recovered	Head Number	Tag Code	Brood Year	Actual Age <sup>a</sup>		Scale Age <sup>b</sup>		Sex	Length	Rearing Code and Location	Release Date	Release Site
					Fresh	Ocean	Fresh	Ocean					
Return sampled at weir during immigration													
03DE2079	8/1/2003	188100	310147	1998	0	4	1	4	F	802	Fort Richardson	6/15/1999	Ninilchik R 244-20
03DE2080	8/2/2003	221961	310282	2001	0	1	1	1	M	378	Fort Richardson	6/14/2002	Ninilchik R 244-20
03DE2081	8/3/2003	221962	310260	2000	0	2		1	M	563	Fort Richardson	6/13/2001	Ninilchik R 244-20
03DE2082	8/4/2003	221963	310248	1999	0	3		3	F	756	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2083	8/5/2003	221964	310260	2000	0	2		2	F	561	Fort Richardson	6/13/2001	Ninilchik R 244-20
Egg-take samples <sup>c</sup>													
03DE2058	7/22/2003	166777	310248	1999	0	3	1	3	F	726	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2058	7/22/2003	166778	310248	1999	0	3		3	F	776	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2058	7/22/2003	166779	310147	1998	0	4			F	817	Fort Richardson	6/15/1999	Ninilchik R 244-20
03DE2058	7/22/2003	184800	310147	1998	0	4	1	3	F	821	Fort Richardson	6/15/1999	Ninilchik R 244-20
03DE2073	7/29/2003	188069	310134	1999	0	3		3	F	768	Elmendorf	6/5/2000	Crooked Cr 244-30
03DE2073	7/29/2003	188070	310248	1999	0	3			F	780	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2073	7/29/2003	188071	310248	1999	0	3		3	F	823	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2073	7/29/2003	188072	310147	1998	0	4	1	3	F	788	Fort Richardson	6/15/1999	Ninilchik R 244-20
03DE2073	7/29/2003	188073	310248	1999	0	3	1	3	F	747	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2073	7/29/2003	188074	310248	1999	0	3	1	3	F	782	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2073	7/29/2003	188075	310248	1999	0	3		3	F	737	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2073	7/29/2003	188076	310134	1999	0	3		3	F	755	Elmendorf	6/5/2000	Crooked Cr 244-30
03DE2073	7/29/2003	188077	310248	1999	0	3			F	745	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2073	7/29/2003	188078	310147	1998	0	4		3	F	799	Fort Richardson	6/15/1999	Ninilchik R 244-20
03DE2078	8/1/2003	188091	310248	1999	0	3	1	3	F	772	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2078	8/1/2003	188092	310248	1999	0	3		3	F	703	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2078	8/1/2003	188093	310248	1999	0	3	1	3	F	794	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2078	8/1/2003	188094	310248	1999	0	3		3	F	758	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2078	8/1/2003	188095	310248	1999	0	3		3	F	803	Fort Richardson	6/2/2000	Ninilchik R 244-20
Holding pen mortalities													
03DE2048	7/14/2003	184788	310282	2001	0	1			M	415	Fort Richardson	6/14/2002	Ninilchik R 244-20
03DE2054	7/19/2003	184794	310147	1998	0	4			F	711	Fort Richardson	6/15/1999	Ninilchik R 244-20
03DE2057	7/21/2003	184797	310147	1998	0	4			F	777	Fort Richardson	6/15/1999	Ninilchik R 244-20
03DE2057	7/21/2003	184798	310147	1998	0	4			M	781	Fort Richardson	6/15/1999	Ninilchik R 244-20

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Sample #	Date Recovered	Head Number	Tag Code	Brood Year	Actual Age <sup>a</sup>		Scale Age <sup>b</sup>		Sex	Length	Rearing Code and Location	Release Date	Release Site
					Fresh	Ocean	Fresh	Ocean					
Holding pen mortalities													
03DE2059	7/22/2003	166780	310135	1999	0	3			F	770	Elmendorf	6/5/2000	Crooked Cr 244-30
03DE2059	7/22/2003	166781	310248	1999	0	3			F	800	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2059	7/22/2003	166782	310248	1999	0	3			F	740	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2059	7/22/2003	166783	310248	1999	0	3			F	752	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2059	7/22/2003	166784	310135	1999	0	3			F	760	Elmendorf	6/5/2000	Crooked Cr 244-30
03DE2059	7/22/2003	166785	310248	1999	0	3			F	734	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2059	7/22/2003	166786	310260	2000	0	2			M	573	Fort Richardson	6/13/2001	Ninilchik R 244-20
03DE2062	7/23/2003	166788	310260	2000	0	2			M	703	Fort Richardson	6/13/2001	Ninilchik R 244-20
03DE2062	7/23/2003	166789	310248	1999	0	3			F	783	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2063	7/24/2003	166791	310260	2000	0	2			M	566	Fort Richardson	6/13/2001	Ninilchik R 244-20
03DE2063	7/24/2003	166792	310248	1999	0	3			F	769	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2063	7/24/2003	166793	310248	1999	0	3			F	745	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2063	7/24/2003	166794	310248	1999	0	3			F	781	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2066	7/25/2003	166796	310248	1999	0	3			F	760	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2066	7/25/2003	166797	310248	1999	0	3			F	767	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2067	7/26/2003	166798	310134	1999	0	3			F	762	Elmendorf	6/5/2000	Crooked Cr 244-30
03DE2067	7/26/2003	166799	310147	1998	0	4			M	849	Fort Richardson	6/15/1999	Ninilchik R 244-20
03DE2071	7/28/2003	166800	310248	1999	0	3			M	772	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2071	7/28/2003	188067	310260	2000	0	2			M	557	Fort Richardson	6/13/2001	Ninilchik R 244-20
03DE2074	7/29/2003	188079	310147	1998	0	4			F	745	Fort Richardson	6/15/1999	Ninilchik R 244-20
03DE2074	7/29/2003	188080	310147	1998	0	4			F	742	Fort Richardson	6/15/1999	Ninilchik R 244-20
03DE2074	7/29/2003	188081	310147	1998	0	4			F	769	Fort Richardson	6/15/1999	Ninilchik R 244-20
03DE2074	7/29/2003	188082	310260	2000	0	2			M	613	Fort Richardson	6/13/2001	Ninilchik R 244-20
03DE2074	7/29/2003	188083	310260	2000	0	2			M	575	Fort Richardson	6/13/2001	Ninilchik R 244-20
03DE2078	8/1/2003	188090	310147	1998	0	4			F	742	Fort Richardson	6/15/1999	Ninilchik R 244-20
03DE2078	8/1/2003	188096	310248	1999	0	3			F	788	Fort Richardson	6/2/2000	Ninilchik R 244-20
03DE2078	8/1/2003	188097	310147	1998	0	4			F	784	Fort Richardson	6/15/1999	Ninilchik R 244-20
03DE2078	8/1/2003	188098	310260	2000	0	2			M	665	Fort Richardson	6/13/2001	Ninilchik R 244-20

<sup>a</sup> Actual fresh and ocean age was determined by comparing brood year, year of release, and year of recovery.

<sup>b</sup> Scale age is the estimated fresh and ocean age determined from scale samples. R = regenerated, denotes fish that could not be aged. Not all fish were sampled for age.

<sup>c</sup> Does not include one adipose finclipped fish that was sacrificed at egg take and counted but not sampled.

**Appendix A5.-Summary of samples from Chinook salmon sacrificed at Ninilchik River, 2002 and 2003.**

	Wild Fish					Hatchery Fish				
	Ocean Age				Total	Ocean Age				Total
	1	2	3	4		1	2	3	4	
<b>2002</b>										
Females										
Number sampled	0	6	111	15	132	0	2	22	1	25
Mean Length		772	777	820	778		704	757	691	751
SE Mean Length		21	4	12	4		64	9		10
Males										
Number sampled	0	0	1	0	1	1	0	0	0	1
Mean Length			839		839	380				380
SE Mean Length										
All										
Number sampled	0	6	112	15	133	1	2	22	1	26
Mean Length		772	773	820	778	380	704	757	691	736
SE Mean Length		21	4	12	4		64	9	17	17
<b>2003</b>										
Females										
Number sampled	0	7	98	12	117	0	0	16	0	16
Mean Length		714	801	859	802			772		772
SE Mean Length		29	4	13	4			8		8
Males										
Number sampled	0	0	0	0	0	0	0	0	0	0
Mean Length										
SE Mean Length										
All										
Number sampled	0	7	98	12	117	0	0	16	0	16
Mean Length		714	801	859	802			772		772
SE Mean Length		29	4	13	4			8		8





**APPENDIX B. WATER TEMPERATURE DATA RECORDED  
AT THE NINILCHIK RIVER WEIR, 2002 AND 2003.**

**Appendix B1.**-Daily average, maximum, and minimum water temperatures recorded by a remote temperature data logger, Ninilchik River weir site, May 4 through October 3, 2002.

Date	Celcius			Fahrenheit		
	Daily Average	Daily Maximum	Daily Minimum	Daily Average	Daily Maximum	Daily Minimum
4-May	2.75	3.14	1.97	36.97	37.67	35.56
5-May	2.30	2.76	1.97	36.15	36.97	35.56
6-May	2.59	3.53	1.97	36.67	38.37	35.56
7-May	2.98	3.53	2.37	37.38	38.37	36.27
8-May	2.74	3.53	2.37	36.94	38.37	36.27
9-May	2.90	4.30	1.97	37.23	39.75	35.56
10-May	3.82	4.30	3.14	38.89	39.75	37.67
11-May	4.12	4.68	3.53	39.43	40.44	38.37
12-May	4.54	5.06	3.92	40.18	41.12	39.06
13-May	4.68	5.06	4.30	40.44	41.12	39.75
14-May	4.51	5.06	3.92	40.12	41.12	39.06
15-May	4.08	4.30	3.92	39.35	39.75	39.06
16-May	3.92	4.68	3.53	39.06	40.44	38.37
17-May	4.79	5.06	4.30	40.64	41.12	39.75
18-May	4.97	5.06	4.68	40.95	41.12	40.44
19-May	5.33	5.44	5.06	41.60	41.80	41.12
20-May	5.74	5.82	5.44	42.34	42.48	41.80
21-May	5.99	6.56	5.82	42.79	43.82	42.48
22-May	6.56	6.93	5.82	43.82	44.49	42.48
23-May	6.71	8.78	5.44	44.09	47.81	41.80
24-May	8.00	10.20	5.82	46.40	50.36	42.48
25-May	9.17	11.20	7.31	48.51	52.16	45.16
26-May	9.04	10.20	7.68	48.27	50.36	45.82
27-May	9.05	10.50	7.68	48.29	50.90	45.82
28-May	8.64	9.50	7.68	47.55	49.10	45.82
29-May	9.10	10.20	8.04	48.38	50.36	46.47
30-May	9.46	10.50	8.78	49.02	50.90	47.80
31-May	9.25	10.90	7.31	48.66	51.62	45.16
1-Jun	10.04	12.30	8.41	50.08	54.14	47.14
2-Jun	9.55	10.90	8.41	49.18	51.62	47.14
3-Jun	8.84	9.50	8.04	47.90	49.10	46.47
4-Jun	8.76	9.50	8.04	47.77	49.10	46.47
5-Jun	9.49	10.90	8.04	49.08	51.62	46.47
6-Jun	10.67	12.30	9.14	51.21	54.14	48.45
7-Jun	11.27	13.70	8.78	52.28	56.66	47.80
8-Jun	9.90	12.00	8.41	49.83	53.60	47.14
9-Jun	8.00	8.78	7.31	46.40	47.80	45.16
10-Jun	8.65	9.86	7.68	47.57	49.75	45.82
11-Jun	9.16	10.20	8.41	48.50	50.36	47.14
12-Jun	8.84	9.50	8.04	47.90	49.10	46.47
13-Jun	9.13	10.90	8.04	48.44	51.62	46.47
14-Jun	10.71	13.00	8.41	51.27	55.40	47.14
15-Jun	12.95	15.80	10.20	55.30	60.44	50.36
16-Jun	13.49	15.10	11.60	56.29	59.18	52.88
17-Jun	13.10	14.80	11.60	55.58	58.64	52.88
18-Jun	13.42	16.20	10.90	56.15	61.16	51.62

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Date	Celcius		Celcius	Fahrenheit		Fahrenheit
	Daily Average	Daily Maximum	Daily Minimum	Daily Average	Daily Maximum	Daily Minimum
19-Jun	12.42	13.70	11.60	54.35	56.66	52.88
20-Jun	11.68	13.00	10.50	53.02	55.40	50.90
21-Jun	11.65	14.40	9.50	52.97	57.92	49.10
22-Jun	11.50	13.70	9.14	52.70	56.66	48.45
23-Jun	11.32	12.70	10.20	52.38	54.86	50.36
24-Jun	11.14	12.30	10.20	52.06	54.14	50.36
25-Jun	12.10	14.10	10.50	53.77	57.38	50.90
26-Jun	11.74	13.00	10.90	53.13	55.40	51.62
27-Jun	11.17	12.70	9.86	52.10	54.86	49.75
28-Jun	12.42	15.50	9.86	54.36	59.90	49.75
29-Jun	13.48	16.90	10.20	56.26	62.42	50.36
30-Jun	15.42	18.60	12.70	59.75	65.48	54.86
1-Jul	15.43	17.20	13.40	59.77	62.96	56.12
2-Jul	14.93	17.60	12.70	58.88	63.68	54.86
3-Jul	14.48	16.50	12.30	58.07	61.70	54.14
4-Jul	14.66	17.60	12.00	58.39	63.68	53.60
5-Jul	15.23	17.90	12.70	59.41	64.22	54.86
6-Jul	14.00	15.80	13.00	57.19	60.44	55.40
7-Jul	12.96	14.40	12.00	55.33	57.92	53.60
8-Jul	13.40	15.50	11.60	56.13	59.90	52.88
9-Jul	13.29	14.10	12.30	55.92	57.38	54.14
10-Jul	13.79	16.50	11.60	56.83	61.70	52.88
11-Jul	14.85	17.90	12.00	58.72	64.22	53.60
12-Jul	15.52	17.90	13.00	59.94	64.22	55.40
13-Jul	14.18	15.80	13.40	57.52	60.44	56.12
14-Jul	12.61	13.40	11.60	54.70	56.12	52.88
15-Jul	12.66	14.80	11.20	54.79	58.64	52.16
16-Jul	13.19	16.20	10.50	55.74	61.16	50.90
17-Jul	14.96	17.90	12.00	58.93	64.22	53.60
18-Jul	14.14	16.50	13.40	57.45	61.70	56.12
19-Jul	12.73	13.70	11.60	54.92	56.66	52.88
20-Jul	13.13	15.50	11.20	55.64	59.90	52.16
21-Jul	13.20	14.10	12.30	55.76	57.38	54.14
22-Jul	13.19	14.10	12.30	55.74	57.38	54.14
23-Jul	12.98	13.70	12.30	55.36	56.66	54.14
24-Jul	12.47	13.40	12.00	54.45	56.12	53.60
25-Jul	12.16	13.70	10.50	53.89	56.66	50.90
26-Jul	12.01	12.70	11.60	53.62	54.86	52.88
27-Jul	12.40	15.10	10.50	54.32	59.18	50.90
28-Jul	13.61	16.20	11.60	56.50	61.16	52.88
29-Jul	13.59	15.50	11.20	56.46	59.90	52.16
30-Jul	14.49	17.60	11.60	58.08	63.68	52.88
31-Jul	14.86	17.90	12.30	58.75	64.22	54.14
1-Aug	15.04	17.60	12.30	59.08	63.68	54.14
2-Aug	14.84	17.60	12.00	58.72	63.68	53.60
3-Aug	14.96	17.90	12.00	58.93	64.22	53.60
4-Aug	14.86	17.60	12.00	58.75	63.68	53.60

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**Appendix B1.-Page 3 of 4.**

Date	Celcius Daily Average	Celcius Daily Maximum	Celcius Daily Minimum	Fahrenheit Daily Average	Fahrenheit Daily Maximum	Fahrenheit Daily Minimum
5-Aug	14.13	15.50	13.00	57.44	59.90	55.40
6-Aug	13.84	15.10	12.70	56.92	59.18	54.86
7-Aug	13.29	14.80	12.00	55.92	58.64	53.60
8-Aug	13.80	15.80	12.30	56.84	60.44	54.14
9-Aug	13.73	15.80	11.60	56.71	60.44	52.88
10-Aug	12.44	14.10	12.00	54.39	57.38	53.60
11-Aug	11.35	12.00	10.90	52.42	53.60	51.62
12-Aug	11.59	12.70	10.50	52.86	54.86	50.90
13-Aug	12.13	14.40	10.20	53.83	57.92	50.36
14-Aug	12.24	14.10	10.50	54.04	57.38	50.90
15-Aug	12.28	13.70	11.20	54.10	56.66	52.16
16-Aug	12.19	14.80	9.86	53.93	58.64	49.75
17-Aug	12.99	15.50	10.50	55.39	59.90	50.90
18-Aug	13.40	15.50	11.20	56.12	59.90	52.16
19-Aug	12.68	13.70	12.00	54.82	56.66	53.60
20-Aug	11.95	12.30	11.60	53.51	54.14	52.88
21-Aug	11.86	13.00	10.90	53.35	55.40	51.62
22-Aug	11.98	13.00	11.20	53.56	55.40	52.16
23-Aug	11.48	13.00	10.50	52.66	55.40	50.90
24-Aug	10.74	11.60	9.50	51.34	52.88	49.10
25-Aug	10.11	10.90	9.14	50.20	51.62	48.45
26-Aug	9.66	10.90	8.04	49.38	51.62	46.47
27-Aug	9.80	11.60	8.04	49.64	52.88	46.47
28-Aug	10.28	12.30	8.41	50.50	54.14	47.14
29-Aug	10.06	10.90	9.50	50.10	51.62	49.10
30-Aug	9.87	10.90	9.14	49.76	51.62	48.45
31-Aug	10.33	10.90	9.86	50.59	51.62	49.75
1-Sep	10.89	12.30	9.86	51.60	54.14	49.75
2-Sep	10.55	12.00	8.78	50.98	53.60	47.80
3-Sep	9.80	11.60	8.04	49.63	52.88	46.47
4-Sep	10.06	11.20	9.14	50.10	52.16	48.45
5-Sep	10.43	10.90	9.86	50.77	51.62	49.75
6-Sep	10.20	10.50	9.86	50.36	50.90	49.75
7-Sep	9.65	11.20	8.04	49.37	52.16	46.47
8-Sep	9.15	10.20	8.04	48.47	50.36	46.47
9-Sep	9.04	10.20	8.04	47.99	49.76	46.49
10-Sep	8.21	9.50	6.56	46.78	49.11	43.82
11-Sep	7.40	8.41	6.56	45.32	47.15	43.82
12-Sep	7.98	8.41	7.68	46.38	47.15	45.83
13-Sep	8.43	8.78	8.04	47.18	47.81	46.49
14-Sep	8.13	8.78	8.04	46.66	47.81	46.49
15-Sep	8.35	9.86	7.31	47.03	49.76	45.16
16-Sep	8.73	9.50	8.04	47.72	49.11	46.49
17-Sep	8.69	9.14	8.41	47.64	48.46	47.15
18-Sep	7.74	8.78	6.93	45.93	47.81	44.49
19-Sep	7.06	7.68	6.19	44.71	45.83	43.15
20-Sep	6.28	6.93	5.44	43.32	44.49	41.80

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**Appendix B1.-Page 4 of 4.**

Date	Celcius		Celcius	Fahrenheit		Fahrenheit
	Daily Average	Daily Maximum	Daily Minimum	Daily Average	Daily Maximum	Daily Minimum
21-Sep	5.40	6.56	4.30	41.74	43.82	39.75
22-Sep	6.24	7.31	5.44	43.23	45.16	41.80
23-Sep	7.38	8.04	6.93	45.30	46.49	44.49
24-Sep	7.82	8.04	7.68	46.08	46.49	45.83
25-Sep	8.29	8.78	8.04	46.93	47.81	46.49
26-Sep	8.46	8.78	8.41	47.23	47.81	47.15
27-Sep	8.43	8.78	8.41	47.18	47.81	47.15
28-Sep	8.32	8.41	8.04	46.99	47.15	46.49
29-Sep	8.00	8.41	7.68	46.41	47.15	45.83
30-Sep	7.43	7.68	7.31	45.38	45.83	45.16
1-Oct	7.25	7.31	6.93	45.05	45.16	44.49
2-Oct	6.70	7.31	6.19	44.07	45.16	43.15
3-Oct	5.34	6.19	5.06	41.63	43.15	41.12
Average	10.24	11.64	8.99	50.43	52.94	48.19

**Appendix B2.**-Daily average, maximum, and minimum water temperatures recorded by a remote temperature data logger, Ninilchik River weir site, May 8 through September 24, 2003.

Date	Celcius			Fahrenheit		
	Daily Average	Daily Maximum	Daily Minimum	Daily Average	Daily Maximum	Daily Minimum
8-May	7.15	8.78	5.82	44.87	47.81	42.48
9-May	6.81	7.68	6.19	44.27	45.83	43.15
10-May	6.26	7.68	5.06	43.28	45.83	41.12
11-May	6.37	8.41	5.06	43.48	47.15	41.12
12-May	6.28	8.04	5.06	43.31	46.49	41.12
13-May	5.09	5.82	4.30	41.18	42.48	39.75
14-May	5.05	6.93	3.14	41.10	44.49	37.67
15-May	6.61	9.14	4.68	43.91	48.46	40.44
16-May	7.88	10.22	5.82	46.19	50.40	42.48
17-May	7.33	8.41	5.82	45.21	47.15	42.48
18-May	6.43	8.04	4.68	43.59	46.49	40.44
19-May	7.22	10.58	4.30	45.00	51.05	39.75
20-May	8.61	11.64	5.82	47.52	52.97	42.48
21-May	9.08	11.64	6.56	48.35	52.97	43.82
22-May	9.33	12.00	6.93	48.81	53.61	44.49
23-May	10.36	12.71	8.78	50.66	54.89	47.81
24-May	9.20	10.58	7.68	48.56	51.05	45.83
25-May	9.77	13.07	7.31	49.59	55.53	45.16
26-May	9.38	10.58	8.04	48.89	51.05	46.49
27-May	8.52	9.14	7.68	47.34	48.46	45.83
28-May	9.10	12.00	6.56	48.39	53.61	43.82
29-May	10.24	12.71	7.68	50.44	54.89	45.83
30-May	10.66	12.36	9.14	51.20	54.25	48.46
31-May	10.26	11.64	8.78	50.48	52.97	47.81
1-Jun	9.75	11.29	8.04	49.56	52.33	46.49
2-Jun	9.24	10.93	7.31	48.63	51.69	45.16
3-Jun	10.40	13.42	7.68	50.73	56.16	45.83
4-Jun	9.80	11.29	8.41	49.64	52.33	47.15
5-Jun	9.27	10.58	8.41	48.70	51.05	47.15
6-Jun	9.01	10.22	8.04	48.24	50.40	46.49
7-Jun	9.83	12.36	7.68	49.71	54.25	45.83
8-Jun	9.78	10.93	9.14	49.62	51.69	48.46
9-Jun	9.52	10.22	8.78	49.13	50.40	47.81
10-Jun	9.14	9.50	8.78	48.46	49.11	47.81
11-Jun	8.56	8.78	8.04	47.43	47.81	46.49
12-Jun	10.06	12.71	8.41	50.12	54.89	47.15
13-Jun	12.34	14.48	10.58	54.22	58.07	51.05
14-Jun	12.74	13.42	12.00	54.94	56.16	53.61
15-Jun	12.01	12.71	11.29	53.64	54.89	52.33
16-Jun	11.11	12.71	9.86	52.01	54.89	49.76
17-Jun	11.33	13.07	9.86	52.41	55.53	49.76
18-Jun	11.70	13.07	10.22	53.08	55.53	50.40
19-Jun	11.73	14.12	9.50	53.12	57.43	49.11
20-Jun	12.41	14.83	10.22	54.35	58.70	50.40
21-Jun	11.94	13.07	11.29	53.50	55.53	52.33
22-Jun	11.92	14.48	9.86	53.47	58.07	49.76

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**Appendix B2.-Page 2 of 3.**

Date	Celcius Daily Average	Celcius Daily Maximum	Celcius Daily Minimum	Fahrenheit Daily Average	Fahrenheit Daily Maximum	Fahrenheit Daily Minimum
23-Jun	12.00	12.71	10.58	53.61	54.89	51.05
24-Jun	10.95	11.64	10.22	51.72	52.97	50.40
25-Jun	10.46	11.64	9.50	50.83	52.97	49.11
26-Jun	10.17	11.64	9.14	50.32	52.97	48.46
27-Jun	10.60	12.36	9.50	51.10	54.25	49.11
28-Jun	11.98	14.83	9.50	53.57	58.70	49.11
29-Jun	13.09	15.88	10.58	55.57	60.59	51.05
30-Jun	14.25	16.93	11.64	57.66	62.48	52.97
1-Jul	13.67	15.18	13.07	56.61	59.33	55.53
2-Jul	12.87	14.83	11.29	55.18	58.70	52.33
3-Jul	13.27	15.53	11.29	55.89	59.96	52.33
4-Jul	13.99	16.58	11.64	57.18	61.85	52.97
5-Jul	13.65	14.83	13.07	56.59	58.70	55.53
6-Jul	13.90	17.28	11.29	57.02	63.11	52.33
7-Jul	15.20	18.32	12.36	59.37	64.99	54.25
8-Jul	16.25	19.37	13.42	61.27	66.88	56.16
9-Jul	16.14	17.97	14.12	61.06	64.36	57.43
10-Jul	15.38	16.58	14.12	59.70	61.85	57.43
11-Jul	14.52	15.53	13.77	58.15	59.96	56.80
12-Jul	14.85	17.97	12.36	58.74	64.36	54.25
13-Jul	15.89	19.37	12.71	60.61	66.88	54.89
14-Jul	17.04	19.72	14.48	62.69	67.51	58.07
15-Jul	17.25	20.07	14.83	63.05	68.14	58.70
16-Jul	15.76	17.97	14.83	60.38	64.36	58.70
17-Jul	14.08	15.18	13.07	57.35	59.33	55.53
18-Jul	14.82	17.97	12.71	58.69	64.36	54.89
19-Jul	15.44	18.32	12.71	59.79	64.99	54.89
20-Jul	15.37	16.93	14.12	59.67	62.48	57.43
21-Jul	15.13	16.23	14.12	59.25	61.22	57.43
22-Jul	15.48	17.63	13.77	59.88	63.74	56.80
23-Jul	15.24	17.28	13.07	59.43	63.11	55.53
24-Jul	14.30	15.88	13.42	57.75	60.59	56.16
25-Jul	13.30	14.12	12.36	55.95	57.43	54.25
26-Jul	13.50	15.53	12.00	56.32	59.96	53.61
27-Jul	12.98	13.77	12.00	55.37	56.80	53.61
28-Jul	12.30	13.07	11.29	54.14	55.53	52.33
29-Jul	12.43	13.07	11.64	54.38	55.53	52.97
30-Jul	12.97	15.53	11.29	55.36	59.96	52.33
31-Jul	14.30	16.93	12.00	57.74	62.48	53.61
1-Aug	14.12	16.58	11.64	57.42	61.85	52.97
2-Aug	13.81	16.58	11.29	56.87	61.85	52.33
3-Aug	13.12	15.18	10.93	55.63	59.33	51.69
4-Aug	13.12	15.88	10.22	55.62	60.59	50.40
5-Aug	13.38	16.23	10.58	56.10	61.22	51.05
6-Aug	14.02	16.58	11.64	57.24	61.85	52.97
7-Aug	14.32	16.93	11.64	57.79	62.48	52.97
8-Aug	15.27	18.32	12.71	59.50	64.99	54.89

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**Appendix B2.-** Page 3 of 3.

Date	Celcius		Celcius	Fahrenheit		Fahrenheit
	Daily Average	Daily Maximum	Daily Minimum	Daily Average	Daily Maximum	Daily Minimum
9-Aug	15.99	18.67	13.42	60.79	65.62	56.16
10-Aug	15.63	17.97	13.07	60.14	64.36	55.53
11-Aug	14.83	16.23	14.48	58.70	61.22	58.07
12-Aug	13.90	15.53	12.36	57.03	59.96	54.25
13-Aug	13.16	14.48	12.71	55.69	58.07	54.89
14-Aug	11.94	12.71	11.64	53.50	54.89	52.97
15-Aug	11.57	12.00	11.29	52.84	53.61	52.33
16-Aug	11.50	12.00	11.29	52.70	53.61	52.33
17-Aug	11.30	12.71	10.22	52.35	54.89	50.40
18-Aug	10.40	11.29	9.50	50.72	52.33	49.11
19-Aug	10.08	10.93	9.50	50.16	51.69	49.11
20-Aug	9.68	10.58	8.78	49.43	51.05	47.81
21-Aug	10.97	13.42	9.50	51.76	56.16	49.11
22-Aug	11.08	13.42	8.78	51.95	56.16	47.81
23-Aug	10.72	12.71	8.41	51.30	54.89	47.15
24-Aug	11.42	13.07	10.22	52.57	55.53	50.40
25-Aug	11.35	12.36	10.93	52.44	54.25	51.69
26-Aug	10.66	11.64	9.86	51.21	52.97	49.76
27-Aug	10.67	11.29	10.22	51.21	52.33	50.40
28-Aug	10.74	11.64	9.86	51.34	52.97	49.76
29-Aug	10.55	10.93	10.22	50.99	51.69	50.40
30-Aug	10.92	12.71	9.50	51.66	54.89	49.11
31-Aug	10.51	12.36	8.41	50.93	54.25	47.15
1-Sep	10.36	12.36	8.78	50.66	54.25	47.81
2-Sep	10.05	12.00	8.04	50.09	53.61	46.49
3-Sep	10.39	12.00	8.78	50.72	53.61	47.81
4-Sep	9.73	10.58	8.78	49.51	51.05	47.81
5-Sep	9.17	10.22	8.04	48.51	50.40	46.49
6-Sep	9.10	10.93	7.31	48.39	51.69	45.16
7-Sep	8.61	10.22	6.56	47.51	50.40	43.82
8-Sep	8.16	9.86	6.56	46.70	49.76	43.82
9-Sep	8.39	9.50	7.31	47.12	49.11	45.16
10-Sep	8.75	10.58	6.93	47.76	51.05	44.49
11-Sep	8.23	10.22	6.19	46.83	50.40	43.15
12-Sep	8.46	10.22	6.93	47.24	50.40	44.49
13-Sep	8.57	10.22	7.31	47.44	50.40	45.16
14-Sep	6.89	8.41	5.44	44.40	47.15	41.80
15-Sep	5.34	6.56	3.53	41.62	43.82	38.37
16-Sep	4.59	6.19	2.76	40.28	43.15	36.97
17-Sep	4.29	5.82	2.76	39.74	42.48	36.97
18-Sep	3.70	5.06	2.37	38.68	41.12	36.27
19-Sep	3.61	4.68	2.37	38.51	40.44	36.27
20-Sep	3.93	4.68	3.14	39.09	40.44	37.67
21-Sep	4.66	5.82	3.92	40.40	42.48	39.06
22-Sep	4.01	5.06	2.76	39.23	41.12	36.97
23-Sep	3.61	4.68	2.37	38.51	40.44	36.27
24-Sep	4.03	4.68	3.14	39.26	40.44	37.67
Average	10.85	12.60	9.29	51.54	54.68	48.72



## **APPENDIX C. DATA FILES**

**Appendix C1.-Computer data files and analysis programs developed for the 2002 and 2003 Ninilchik River Chinook salmon assessment project.**

File	Description	Location
<b>2002</b>		
P001600B012002.DTA	Weir data ASCII (DTA) file format, Mark sense form AWL version 1.1. All chinook salmon sampled at the Ninilchik River weir 2002.	RTS Anchorage
P001600B022002.DTA	Weir data ASCII (DTA) file format, Mark sense form AWL version 1.1. All chinook salmon sampled during egg-takes at the Ninilchik River weir 2002.	RTS Anchorage
P001600B031999.DTA		RTS Anchorage
<b>NinilchikRB2002.Zip</b>	<b>Zip File containing the five files listed below for 1999.</b>	Homer Office of the Alaska Department of Fish and Game.
Ninspt02.SAS	SAS program to analyze Sport02.CSV.	
Ninkng02.SAS	SAS program created to analyze AWL ASCII (DTA) files.	
Ninwngcomp02.XLS	Excel spreadsheet created to calculate age composition of wild and hatchery chinook salmon escapements at the Ninilchik River 2002.	
NRW AFC2002.XLS	Excel spreadsheet created from tag-lab query to produce listing report of coded wire tagged chinook salmon sacrificed at Ninilchik River, 2002.	
Ninweircount.XLS	Excel spreadsheet created to produce daily count summary of chinook salmon passage at Ninilchik River weir, 2002.	
<b>2003</b>		
P0000600B012003.DTA	Weir data ASCII (DTA) file format. Mark sense form AWL version 1.1. All chinook salmon sampled at the Ninilchik River weir, 2003.	RTS Anchorage
Sport03.CSV	Sport harvest data tab delimited file format. Chinook salmon sampled by data and stock during the 2003 Ninilchik River chinook salmon fishery sample.	RTS Anchorage
<b>NinilchikRB2003.Zip</b>	<b>Zip File containing the five files listed below for 2003.</b>	Homer Office of the Alaska Department of Fish and Game.
Ninkng03.SAS	SAS program to analyze P0000600B012003.DTA,	
Ninspt03.SAS	SAS program to analyze Sport03.CSV.	
Ninwngcomp03	Excel spreadsheet created to calculate age composition of wild and hatchery chinook salmon escapements at the Ninilchik River 2003.	
NRW AFC2003.XLS	Excel spreadsheet created from tag-lab query to produce listing report of coded wire tagged chinook salmon sacrificed at Ninilchik River, 2003.	
Ninweircount.XLS	Excel spreadsheet created to produce daily count summary of chinook salmon passage at Ninilchik River weir, 2003.	