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Ninilchik River Chinook Salmon Assessment, 2001

by

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and

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November 2007

Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

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Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Measures (fisheries)

fork length	FL
mideye-to-fork	MEF
mideye-to-tail-fork	METF
standard length	SL
total length	TL

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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ABSTRACT

During 2001, wild (naturally-produced) and stocked Chinook salmon *Oncorhynchus tshawytscha* runs to the Ninilchik River were passed through a weir and censused to determine the stock composition of total escapements and if Chinook salmon stray to the Ninilchik River from three Chinook salmon stocking locations in Kachemak Bay. A random sample of sport harvested Chinook salmon was also examined for an adipose finclip to estimate the stock composition of the harvest sampled each weekend in the lower Ninilchik River, below the Sterling Highway. The escapement of wild Chinook salmon was 1,239 fish in 2001, or 70% of the escapement. Escapement of stocked fish was 543. Stock composition of the immigration varied significantly over the duration of the run to the weir. The mid-point date of immigration to the weir for wild fish was July 13, and July 21 for stocked fish. The age class composition of the wild Chinook salmon escapement was comprised of 45% (SE = 3%) 2-ocean, followed by 3-ocean (39%, SE = 3%), and 4-ocean (15%, SE = 2%). The stocked Chinook salmon escapement consisted of 40% (SE = 5%) 3-ocean, 39% (SE = 4%) 2-ocean and 14% (SE = 4%) 4-ocean. From the 130 Chinook salmon that were sacrificed at the weir, 125 coded wire tags were decoded. No strays of stocked Chinook salmon from Kachemak Bay were detected.

The overall contribution of stocked Chinook salmon to the sport harvest sampled in the lower river was 51% (SE = 4%), ranging from 42% to 62% of the harvested fish. Continuing the Chinook salmon assessment at the Ninilchik River weir is recommended to fully understand run-timing characteristics and contribution to the sport harvest of hatchery runs so that any annual surpluses of stocked Chinook salmon can be more fully utilized by anglers.

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

INTRODUCTION

The major Chinook salmon *Oncorhynchus tshawytscha* producing streams of the Kenai Peninsula are accessible from the highway system. Anchor River, Deep Creek, and Ninilchik River support road accessible recreational fisheries for Chinook salmon on the lower Kenai Peninsula (Figure 1). Ninilchik River and Deep Creek from salt water to approximately 2 miles upstream are open to Chinook salmon fishing during three 3-day weekends (Saturday, Sunday, and Monday) beginning with the Memorial Day weekend. In 2001 the Ninilchik River fishery was opened by Emergency Order for an additional weekend. Anchor River is more liberally managed with five 3-day weekend openings. The combined annual Chinook salmon harvest from these three streams has averaged approximately 4,055 fish since 1977 (Howe et al. 1995, 1996, 2001 a-d; Jennings et al. 2004; Mills 1979-1980, 1981a-b, 1982-1994; Walker et al. 2003). About 44% (1,795) of the average annual Chinook salmon harvest from these streams is supported by the fishery at the Ninilchik River (Table 1) (Howe et al. 1995, 1996, 2001 a-d; Jennings et al. 2004; Mills 1979-1980, 1981a-b, 1982-1994; Walker et al. 2003).

Aerial counts of Chinook salmon escapements in Ninilchik River have historically been lower than those of Anchor River or Deep Creek. The average annual run of wild Chinook salmon to Ninilchik River was thought to number approximately 1,500 fish. In recognition of the adverse impact increasing harvest could have on the Ninilchik River Chinook salmon stock, Alaska Department of Fish and Game (ADF&G), Division of Sport Fish began a hatchery stocking program there. In addition, due to concerns about overexploitation of wild Chinook salmon stocks throughout the Kenai Peninsula, several saltwater locations within Kachemak Bay were stocked including the Nick Dudiak Fishing Lagoon on Homer Spit, Halibut Cove Lagoon, and Seldovia Harbor.

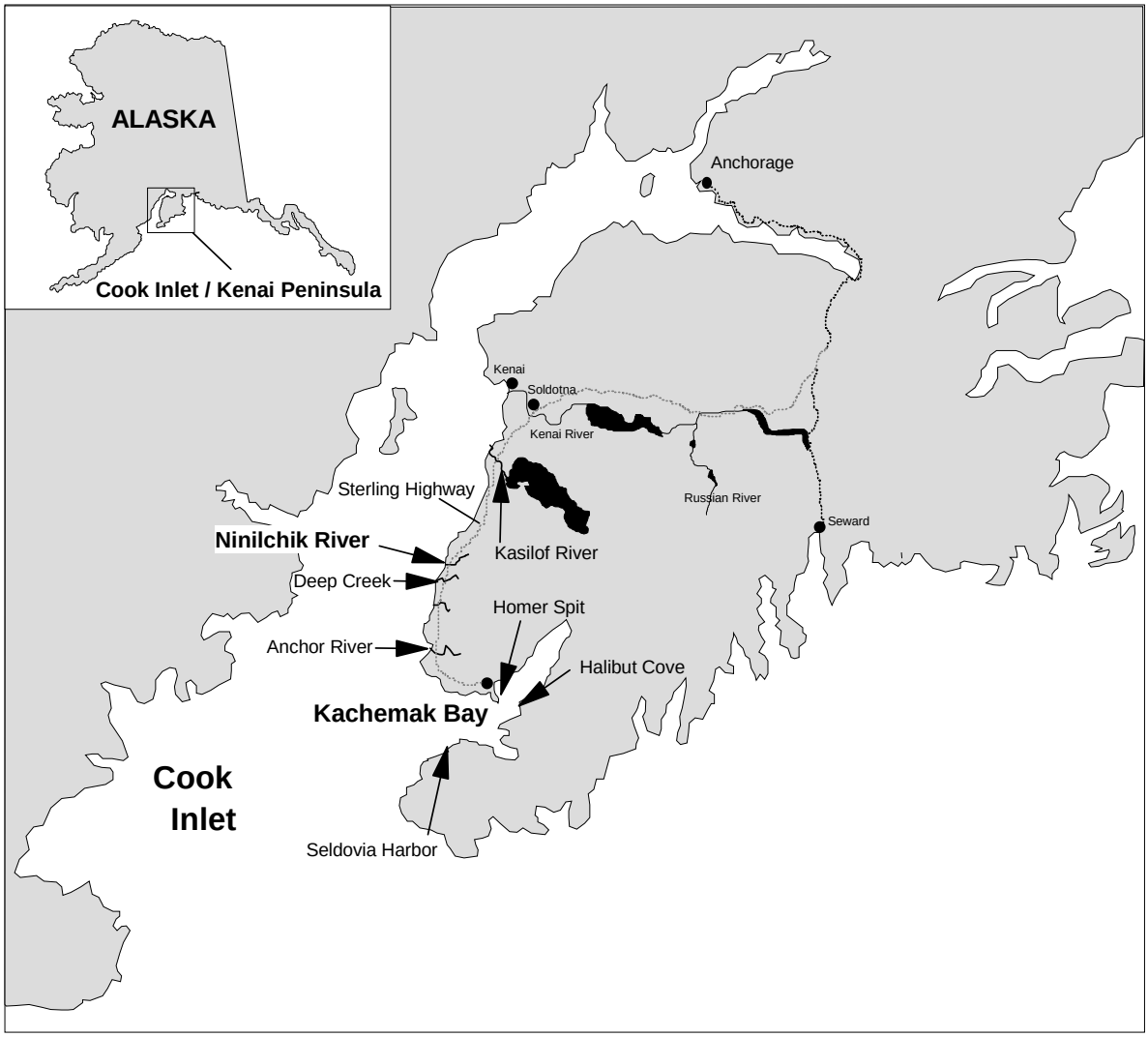

Figure 1.-Kenai Peninsula highway system, Ninilchik River and Kachemak Bay Chinook salmon stocking locations, 2001.

The purpose of the stocking program at Ninilchik River is to increase Chinook salmon sport fishing opportunities on a sustainable basis by supplementing the stream's natural run with hatchery fish without significantly altering historical Chinook salmon age and sex compositions (ADF&G 1999). Furthermore, the Ninilchik River stocking program supplies the broodstock and is the sole egg source for all Kachemak Bay stocking locations. The stocking program was initiated in 1987 with installation of a weir on the Ninilchik River that was used to collect Chinook salmon for broodstock and eggs. The first smolt release at Ninilchik River occurred in 1988.

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

Table 1.-Estimated angler effort, harvest, escapement, and stocking summary of Chinook salmon, Ninilchik River, 1962 through 2001.

Year	Angler Effort[a]	Harvest[a]	% Hatchery in Harvest[b]	Foot Survey[c]	Aerial Survey[d]	Estimated Escapement[e]	Weir Count[f]	Number Smolt Released[g]	Number smolt Marked with Fin Clip and Tag[h]	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	252		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[a]	Harvest[a]	% Hatchery in Harvest[b]	Foot Survey[c]	Aerial Survey[d]	Estimated Escapement[e]	Weir Count[f]	Number Smolt Released[g]	Number smolt Marked with Fin Clip and Tag[h]	Percent Smolt Marked
1996	11,445	2,401	50%		158		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	50,016	98%
2001	10,602	1,945	51%		268		2,087	54,770	54,441	99%
Avg. 1977 - 2001	14,021	1,795	54%		509		2,286	(1999-2001 avg)		

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

[b] Estimated by creel survey 1991-93, estimated by catch sampling 1994-1996 and 2000-2001.

[c] No raw data for 1970-72, 1974-75, 1980, 1992 and 1993, survey discontinued after 1994.

[d] Aerial survey not conducted in 1970 and 1971, no data available for 1972, 1974, and 1975. Conducted from fixed-wing aircraft 1966-1973, fixed-wing aircraft and helicopter 1974, and helicopter 1975-2001.

[e] Annual expanded estimates of escapement from foot and aerial surveys, not estimated in 1992.

[f] Complete counts began in 1999, 1989-1998 are partial counts from broodstock weir, no data available for 1993, average is for 1999-2001 counts only.

[g] Smolt held in Ninilchik Harbor intertidal-saltwater area prior to release there in 1995 and 1996, 1997-2001 smolt held/released in fresh water.

[h] Number with adipose finclip and coded wire tag; beginning in 1995, nearly 100% adipose finclipping accounts for fish which will shed the coded wire tag.

considered "wild," while those that were released into the river as juveniles through the stocking program are termed "stocked" or "hatchery." We recognize that some fish thus termed "wild" may actually be the progeny of stocked fish.

From 1962–1994 spawning escapements of Chinook salmon at Ninilchik River were monitored by an index that was a combination of ground and aerial surveys (Table 1). 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. From 1987 through 1998 a partial escapement count was obtained from the weir that was operated to collect broodstock and eggs from early July to early August.

During the period of partial escapement counts at the weir, characteristics of the stocking program, Chinook salmon harvests, and ratio of wild to stocked fish in the escapement changed. First, smolt stocking levels decreased from an initial stocking level of 200,000 to just 50,000 in 1995 (Table 1). Second, harvest increased due to extensions of the Chinook salmon sport fishing season, because surplus fish from the stocking program were available. Finally, the fraction of hatchery fish in the escapement counted at the weir increased from 19% in 1994 to 47% in 1998. This information created concern that wild Ninilchik Chinook salmon were being adversely affected by the stocking program and that their abundance might be declining.

Given the fact that prior to 1997 evaluations of Ninilchik Chinook salmon were directed at collecting information to estimate: (1) angler effort and harvest; (2) contribution of stocked fish to harvests; and (3) age composition of the harvests (Balland et al. 1994; Boyle and Alexandersdottir 1992; Boyle et al. 1993; Marsh 1995; Marsh *Unpublished)*, it was of interest to address uncertainties regarding the numbers of wild and hatchery fish in the escapement and sport harvest as well as the sex and age structure of both components of the run. Consequently, in 1999 an assessment project began to evaluate the contributions of wild and hatchery fish to the escapement and sport harvests so that stock status of wild Chinook salmon and benefits of the Ninilchik River stocking program could be determined (Begich 2006). This report is part of the continuing study to assess Chinook salmon production and harvests at the Ninilchik River.

OBJECTIVES

The 2001 study objectives were to:

1. Census the escapement of wild and stocked Chinook salmon into the Ninilchik River.
2. Estimate the age and sex composition and mean length-at-age of the stocked and wild Chinook salmon escapements into the Ninilchik River.
3. Estimate the proportion of stocked Chinook salmon in the inriver sport harvest sampled downstream of the Sterling Highway.
4. Estimate the contribution of Chinook salmon stocked at the Homer Spit Fishing Lagoon, Halibut Cove Lagoon, and Seldovia to the Ninilchik River escapement.

METHODS

BIOLOGICAL SAMPLING AND ESCAPEMENT

A weir was operated on the Ninilchik River from May 30 through August 5, 2001 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. Since 1995, practically all hatchery-produced Chinook salmon released into the Ninilchik River have been marked by having the adipose fin clipped (Table 1; Loopstra and Hansen 2005; Loopstra et al. 2000; Loopstra et al. 2002). Consequently, examination of all Chinook salmon captured at the weir for an adipose finclip has allowed for daily and cumulative counts of both the wild and hatchery components of the Chinook salmon escapement.

Age and length compositions of both run components were estimated from fish systematically sub-sampled at the weir. During 2001 we attempted to sample every fifth fish. Length was measured to the nearest millimeter 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 (Welander 1940). Later, scales were pressed and age was determined using procedures described by Mosher (1969). Sex was recorded for all fish enumerated and was determined based on head shape, and presence of ovipositor, eggs, or milt.

The total escapement of wild or hatchery Chinook salmon was the total number of unique fish counted through the weir of each run component, minus the numbers sacrificed for broodstock during the egg take and for coded wire tag (CWT) information.

Biological data were summarized by run component (wild or stocked), sex, and ocean age. Chinook salmon sampled at the weir were used to estimate ocean age and mean length-at-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 were adjusted for fish sacrificed at the weir.

No statistical tests were required to examine temporal differences in the hatchery versus wild component or in sex composition of the escapement for purposes of making estimates because all fish were examined at the weir for sex and the presence of an adipose fin. However, contingency table analysis (Conover 1980) was used to test for temporal differences in age composition because of interest in biological characteristics of the run; only a sample of the escapement was assessed for age.

The proportion of sex k in each group (wild versus stocked) in the escapement was calculated as:

$$p_k = \frac{N_k}{N}, \tag{1}$$

where:

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

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 stocked) in the escapement was estimated by:

$$\hat{p}_{jk} = \hat{p}_{j\,|\,k}\, p_k\,, \tag{2}$$

where:

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

with variance estimated as

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

where:

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

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:

$$\hat{N}_{jk} = N\hat{p}_{jk}, \tag{5}$$

and its variance by:

$$\hat{\text{var}}(\hat{N}_{jk}) = N^2\hat{Var}(\hat{p}_{jk}). \tag{6}$$

SPORT HARVEST

During 2001, Chinook salmon were sampled in the harvest from the lower 1-mile section of the Ninilchik River downstream of the Sterling Highway bridge during the weekend sport fishing periods of May 26-28, June 2-4, June 9-11, and June 16-18. Each sampled fish was examined for an adipose fin. The proportion of stocked fish in the sampled harvest for a given weekend was estimated:

$$\hat{p}_H = \frac{n_H}{n}, \tag{7}$$

with variance estimated as:

$$\hat{\text{var}}(\hat{p}_H) = \frac{\hat{p}_H(1-\hat{p}_H)}{n-1}, \tag{8}$$

where:

n_H is the number of stocked Chinook salmon found in n,

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

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 weekend fishing periods.

STRAYING

Chinook salmon counted at the weir with a missing adipose fin were sampled systematically throughout the immigration. Every fifth fish without an adipose fin was sacrificed. Additionally, the fish were sampled for age, sex, and length as described above. Heads of all

fish sacrificed were removed, labeled with a numbered cinch strap, frozen, and later sent to the ADF&G Mark, Tag and Age Laboratory (Tag Lab) in Juneau to detect and remove the CWT. Decoding the tag number identified the time and location of release, and the presence of stray Chinook salmon from Kachemak Bay stocking programs.

RESULTS

ESCAPEMENT

Average daily temperature at the Ninilchik River weir ranged from -0.02° C to 19.4° C (Figure 2, Appendix A4).

From May 31 through August 5, 2001, 2,087 Chinook salmon were counted through the Ninilchik River weir (Table 2). After subtraction of those sacrificed during egg takes and for CWTs, the total escapement of wild and stocked Chinook salmon combined was 1,782. The escapement of wild Chinook salmon was 1,239 (70%) while the stocked escapement was 543 fish (Table 2).

There was a difference between the numbers of wild versus stocked Chinook salmon counted among weeks at the weir. The midpoint date for immigration of wild Chinook salmon to the weir was July 12, and the midpoint date for stocked Chinook salmon was July 20 (Figure 3; Appendix A1.)

AGE, SEX AND LENGTH COMPOSITIONS

The escapement of wild Chinook salmon was composed of 26% female and 74% male (Table 3). The sex composition differed among weekly strata due to an increase in the number of males relative to the number of females in July. Of the stocked escapement, 60% were males (Table 3). The sex composition of the stocked run also differed among weeks due to an increase in the number of males relative to females during the second through fifth weeks of the immigration.

Age was determined for 217 wild Chinook salmon sampled at the weir (Table 3). There was no significant difference in the ocean age composition of wild Chinook salmon among weeks (χ^2 = 16.27, df = 18, P = 0.574). The ocean age composition of females was 19% (SE = 4%) 2-ocean fish, 54% (SE = 5%) 3-ocean, and 27% (SE = 4%) 4-ocean (Table 3). Age of most males was 2-ocean (55%, SE = 4%) or 3-ocean (33%, SE = 4%). Summed over sex, 2-ocean fish accounted for 45% (SE = 3%) and 3-ocean fish accounted for 39% (SE = 3%) of the escapement of wild Chinook salmon (Table 3).

Ocean age was estimated for 87 of the hatchery-produced component of the escapement of the Chinook salmon sampled at the weir (Table 3). Ocean age composition of hatchery fish varied significantly over the duration of the immigration (χ^2 = 33.09, df = 21, P = 0.045). The majority of males was 2-ocean fish (55%, SE = 6%), while the majority of females was 3-ocean fish (59%, SE = 9%) (Table 3). Four-ocean fish accounted for just 5% (SE = 3%) of the male escapement, whereas 28% (SE = 8%) of females were 4-ocean fish. Altogether the age composition of the hatchery escapement was mostly 2-ocean (39%, SE = 4%) and 3-ocean (40%, SE = 5%) fish (Table 3).

SPORT HARVEST

During the four weekend sport fishing periods in 2001, 323 harvested Chinook salmon were examined for adipose finclips. Of those, 166 (51%, SE = 3%) were stocked fish (Table 4). The proportion of stocked fish in the harvest ranged from 42% (SE = 5%) to 62% (SE = 6%). There

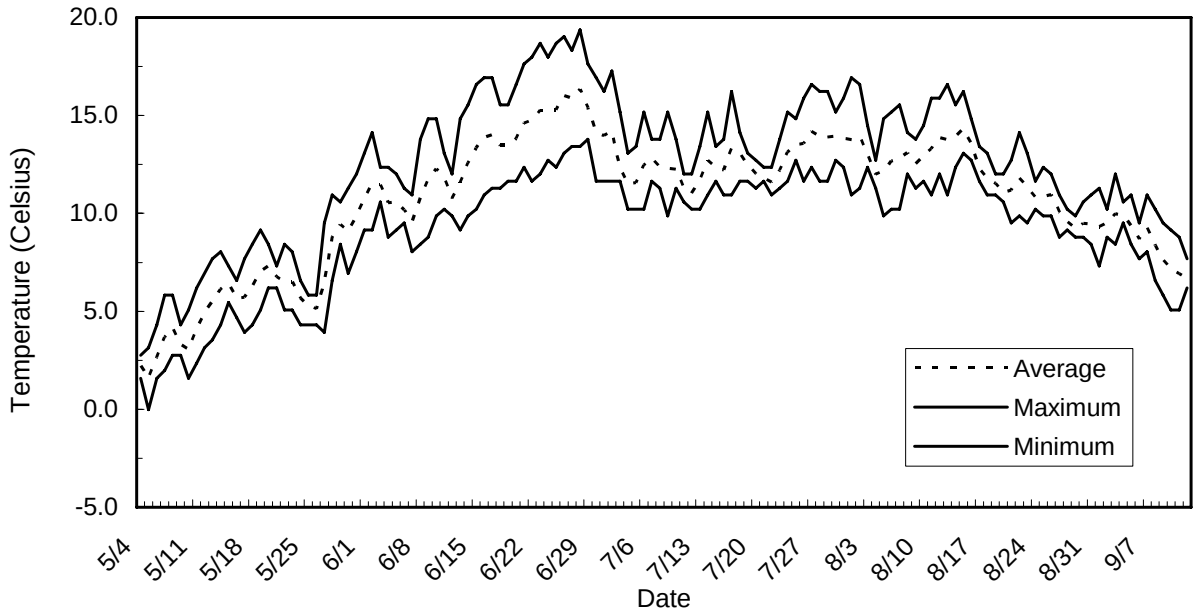

Figure 2.-Water temperature at Ninilchik River weir, 2001.

was a significant change in stocked versus wild fish over the fishing periods (χ^2 = 8, df =3, P = 0.046). However, when the sample from the fourth weekend was excluded from the test, there was no significant difference (χ^2 = 4.419, df =2, P = 0.11).

STRAYING

In 2001, 130 Chinook salmon were sacrificed for CWTs (Table 2). CWTs were successfully decoded from 125 of those fish (four fish had no tags and the head of one fish was lost). All were of Ninilchik River origin (Table 5, Appendix A2).

DISCUSSION

This study was the third year the escapement of wild and stocked Chinook salmon at the Ninilchik River was completely enumerated. Our findings indicate that the 2001 wild and hatchery escapements were lower than, but of similar magnitude to, the 1999 and 2000 escapements. Importantly, if the average escapement of wild Chinook salmon during July 8 through July 24, 1994-1998 (full counts only began in 1999) are compared to the 2001 escapement over the same dates, the 2001 escapement of wild fish is almost double that of the past (1994-1998 average = 435 fish, 2001 = 716 fish, Table 6). These results indicate that the Chinook salmon run has been stable since 1999 and that the escapement of wild Chinook salmon has increased since the mid-1990s. Another finding is the difference among years of the proportion of the escapement seen by the aerial surveys. From 1999-2001, the number of Chinook salmon counted during the aerial survey ranged from 268 to 578 fish, 13%–23% of the weir counts of 2,087 to 2,487 Chinook salmon (Tables 1 and 2); this difference indicates the low management value of aerial surveys for this water. Therefore it is recommended that wild and stocked Chinook salmon escapements continue to be completely enumerated at the weir and aerial surveys at Ninilchik River be discontinued.

Table 2.-Summary of counts for Chinook salmon at the Ninilchik River weir, 1989 through 2001.

Year	Run Component	Total Return[a]	Proportion of Return[b]	CWT Recovery[c]	Egg-Take Kill[d]	CWT Non-Ninilchik Origin[e]	Escapement[f]	Proportion of Escapement[g]	Weir Dates[h]
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	0.81						
	Hatchery	103	0.19						
	Total	549			125		411	0.75	7/07 - 7/26
1995	Wild	725	0.63						
	Hatchery	425	0.37						
	Total	1,150			194		792	0.69	7/04 - 8/01
1996	Wild	654	0.69						
	Hatchery	290	0.31						
	Total	944			190		692	0.73	7/02 - 7/24
1997	Wild	579	0.53						
	Hatchery	517	0.47						
	Total	1,096			132		675	0.62	7/01 - 8/11
1998	Wild	536	0.53						
	Hatchery	466	0.47						
	Total	1,002			196		619	0.62	7/03 - 8/01
1999	Wild	1,644	0.72	0	68		1,576	0.73	
	Hatchery	641	0.28	42	26	0	573	0.27	
	Total	2,285		42	94	0	2,149		5/18 - 8/13
2000	Wild	1,634	0.66	0	81		1,553	0.69	
	Hatchery	853	0.34	108	60	1	685	0.31	
	Total	2,487		108	141	1	2,238		5/17 - 8/08
2001	Wild	1,414	0.68	0	175		1,239	0.70	5/30 - 8/05
	Hatchery	673	0.32	130	0	0	543	0.30	
	Total	2,087		130	175	0	1,782		

[a] 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.

[b] Estimated proportion of the total number of Chinook salmon in the return that were wild or hatchery fish. Proportions were estimated from 1994–1998; beginning in 1999 all hatchery fish were marked with an adipose finclip.

[c] Total number of Chinook salmon sacrificed for coded weir tag recovery information.

[d] Total number of Chinook salmon sacrificed for hatchery broodstock during egg takes at the weir.

[e] Coded wire tagged Chinook salmon of non-Ninilchik River origin.

[f] Escapement is return less those sacrificed for CWT recovery and egg take.

[g] Proportion of the total number of Chinook salmon in the escapement that are wild or hatchery fish.

[h] Inclusive dates for each year that the weir was fully operational.

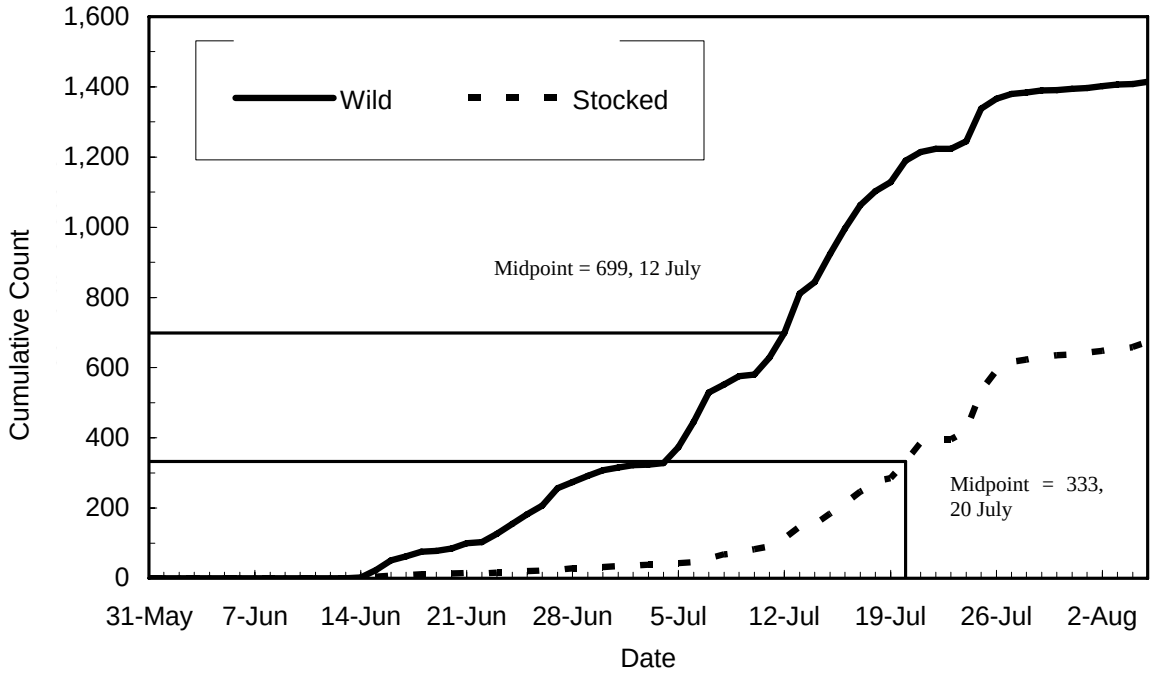

Figure 3.-Time of immigration for wild and hatchery Chinook salmon, Ninilchik River, 2001.

The lower river fishery was sampled to assess hatchery stock contribution to the harvest to address the concern regarding a potentially high wild stock exploitation rate. In 2001, a foot survey upstream of the harvest area indicated sufficient numbers of fish would reach the weir to achieve the sustainable escapement goal range of 400 to 850 wild Chinook salmon. An Emergency Order extending the sport fishery by one additional weekend (72 hours) was issued to further investigate the exploitation rate of wild Chinook salmon. Harvest sampling results mitigated the concern that hatchery stock contribution to the harvest was low; 51% (SE = 4%) of the total weekend harvest sampled over 4 weekends was hatchery in origin (Table 4). Monitoring escapement again illuminated the difference in run-timing between wild and hatchery fish. The 2001 results suggested that the immigration of hatchery fish through the fishery to upstream spawning areas was protracted. During the additional 72-hour opening, 62% of the harvested fish were comprised of hatchery fish.

Similar characteristics in run-timing at the weir site and stock separation over time in the lower river fishery have endured since 1999, so we support future management actions that provide sport fishing opportunity to use hatchery stock surpluses, thereby increasing the benefit of the stocking program to the public. Using surplus hatchery stock could be accomplished by additional fishery openings that selectively target hatchery (adipose finclipped) fish in the lower river. Therefore, run timing characteristics of the wild and hatchery components of the escapement, as well as their contributions to the fishery, should continue to be evaluated through enumerating fish at the weir over the duration of the immigration; estimation of stock composition of harvests in the lower river fishery should also be continued. In addition, it is recommended that hatchery-selective fisheries be executed while escapement is being monitored so that risks to wild stock escapement associated with selective hatchery stock fisheries can be evaluated.

Table 3.-Estimated ocean age composition and length-at-age of the wild and hatchery Chinook salmon escapements, Ninilchik River, 2001.

	Ocean Age of Wild Fish					Ocean Age of Hatchery Fish				
Statistic	1	2	3	4	Total	1	2	3	4	Total
Females										
Number sampled	0	16	46	23	85	0	4	17	8	29
Estimated Proportion by Sex	0.00	0.19	0.54	0.27	1.00	0.00	0.14	0.59	0.28	1.00
SE Proportion	0.00	0.04	0.05	0.04		0.00	0.06	0.09	0.08	
Estimated Proportion	0.00	0.05	0.14	0.07	0.26	0.00	0.06	0.24	0.11	0.40
SE Proportion	0.00	0.01	0.01	0.01		0.00	0.02	0.03	0.03	
Estimated Abundance	0	61	174	87	322	0	30	128	60	218
SE Abundance	0	12	15	13		0	13	19	17	
Mean Length		655	793	845			718	764	801	
SE Mean Length		8	2	3			18	2	8	
Males										
Number sampled	2	72	44	14	132	7	32	16	3	58
Estimated Proportion By Sex	0.02	0.55	0.33	0.11	1.00	0.12	0.55	0.28	0.05	1.00
SE Proportion	0.01	0.04	0.04	0.02		0.04	0.06	0.05	0.03	
Estimated Proportion	0.01	0.40	0.25	0.08	0.74	0.07	0.33	0.17	0.03	0.60
SE Proportion	0.01	0.03	0.03	0.02		0.02	0.04	0.03	0.02	
Estimated Abundance	14	500	306	97	917	39	179	90	17	325
SE Abundance	9	37	35	23		13	19	17	9	
Mean Length	600	627	774	869		422	595	763	759	
SE Mean Length	14	1	2	8		15	2	5	44	
All										
Number sampled	2	88	90	37	217	7	36	33	11	87
Estimated Proportion	0.01	0.45	0.39	0.15	1.00	0.07	0.39	0.40	0.14	1.00
SE Proportion	0.01	0.03	0.03	0.02		0.02	0.04	0.05	0.04	
Estimated Abundance	14	561	480	184	1,239	39	209	217	77	543
SE Abundance	9	39	38	26		13	23	26	19	
Mean Length	600	632	784	854		422	609	763	790	
SE Mean Length	14	1	1	2		15	2	2	7	

One hundred and thirty Chinook salmon were sacrificed for CWT recovery information. No Chinook salmon from which CWTs were decoded were identified as originating from the Homer Spit Fishing Lagoon, Halibut Cove Lagoon, or Seldovia Harbor Chinook salmon stocking locations (Table 5; Appendix A2). This confirms findings from 1999 and 2000 that the Kachemak Bay Chinook salmon stocking program poses a low risk of introgression to the native Chinook salmon stock at Ninilchik River.

The estimated age composition of Chinook salmon utilized for egg takes was 52% (SE = 3%) 3-ocean fish, followed by 23% (SE = 3%) 2-ocean fish, and 18% (SE = 3%) 4-ocean fish (Appendix A3).

Table 4.-Estimates of the proportions of wild and hatchery Chinook salmon in the sport harvest, by sport fishing period, 2001.

Weekend	Number Wild Sampled	Proportion	SE	Number Hatchery Sampled	Proportion	SE	Total Number Sampled
5/26-5/28	57	0.576	0.050	42	0.424	0.050	99
6/02-6/04	34	0.420	0.055	47	0.580	0.055	81
6/09-6/11	43	0.524	0.055	39	0.476	0.055	82
6/16-6/18	23	0.377	0.063	38	0.623	0.063	61
Total	157	0.486	0.028	166	0.514	0.028	323

Table 5.-Coded wire tag recovery information by tag code, brood year and release location for Chinook salmon sacrificed at the Ninilchik River, 2001.

Tag Code[a]	Brood Year	Rearing Code and Location[b]	Release Date	Release Site	Actual Age[c]		Number in Sample		
					Fresh	Ocean	Female	Male	Total
310248	1999	(H)Fort Richardson	2-Jun-00	Ninilchik R 244-20	0	1	0	16	16
310147	1998	(H)Fort Richardson	15-Jun-99	Ninilchik R 244-20	0	2	3	52	55
312635	1997	(H)Fort Richardson	15-Jun-98	Ninilchik R 244-20	0	3	29	17	46
312608	1996	(H)Fort Richardson	17-Jun-97	Ninilchik R 244-20	0	4	5	3	8
Head Lost							0	1	1
No Tag							0	4	4
						Total	37	93	130

[a] "Head lost" is a Chinook salmon with a missing adipose fin that was recovered but the head was lost prior to processing; "No tag" is a Chinook salmon with an adipose finclip but no tag.

[b] Rearing code H is for hatchery facility.

[c] Actual age fresh and ocean was determined by comparing brood year, release year, and recovery year.

Table 6.-Number of wild and hatchery Chinook salmon counted at the Ninilchik River weir, July 8 through July 24, 1994 through 2001.

Year	Wild	Hatchery	Total
1994	423	40	463
1995	503	342	845
1996	591	264	855
1997	235	358	593
1998	422	268	690
1999	799	277	1,076
2000	834	426	1,260
2001	716	363	1,079
Average	565	292	858
Avg. 1994-1998	435	254	689
Avg. 1999-2001	783	355	1,138

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APPENDIX A. SUMMARY OF NINILCHIK RIVER CHINOOK SALMON ASSESSMENT STATISTICS FOR 2001

Appendix A1.-Daily and cumulative counts of wild and hatchery Chinook salmon at the Ninilchik River, 2001.

	Wild			Hatchery			Total		
Date	Daily Count	Cumulative Count	Cumulative Proportion	Daily Count	Cumulative Count	Cumulative Proportion	Daily Count	Cumulative Count	Cumulative Proportion
30-May-01	**Weir fish tight at 1500 hours**								
31-May-01	0	0	0.000	0	0	0.000	0	0	0.000
1-Jun-01	0	0	0.000	0	0	0.000	0	0	0.000
2-Jun-01	0	0	0.000	0	0	0.000	0	0	0.000
3-Jun-01	0	0	0.000	0	0	0.000	0	0	0.000
4-Jun-01	0	0	0.000	0	0	0.000	0	0	0.000
5-Jun-01	0	0	0.000	0	0	0.000	0	0	0.000
6-Jun-01	0	0	0.000	0	0	0.000	0	0	0.000
7-Jun-01	0	0	0.000	0	0	0.000	0	0	0.000
8-Jun-01	0	0	0.000	0	0	0.000	0	0	0.000
9-Jun-01	0	0	0.000	0	0	0.000	0	0	0.000
10-Jun-01	0	0	0.000	0	0	0.000	0	0	0.000
11-Jun-01	0	0	0.000	0	0	0.000	0	0	0.000
12-Jun-01	0	0	0.000	0	0	0.000	0	0	0.000
13-Jun-01	0	0	0.000	0	0	0.000	0	0	0.000
14-Jun-01	2	2	0.001	0	0	0.000	2	2	0.001
15-Jun-01	22	24	0.017	4	4	0.006	26	28	0.013
16-Jun-01	27	51	0.036	3	7	0.010	30	58	0.028
17-Jun-01	11	62	0.044	3	10	0.015	14	72	0.034
18-Jun-01	14	76	0.054	1	11	0.016	15	87	0.042
19-Jun-01	2	78	0.055	1	12	0.018	3	90	0.043
20-Jun-01	7	85	0.060	2	14	0.021	9	99	0.047
21-Jun-01	14	99	0.070	1	15	0.022	15	114	0.055
22-Jun-01	4	103	0.073	0	15	0.022	4	118	0.057
23-Jun-01	24	127	0.090	1	16	0.024	25	143	0.069
24-Jun-01	28	155	0.110	1	17	0.025	29	172	0.082
25-Jun-01	27	182	0.129	3	20	0.030	30	202	0.097
26-Jun-01	25	207	0.146	1	21	0.031	26	228	0.109
27-Jun-01	50	257	0.182	4	25	0.037	54	282	0.135
28-Jun-01	17	274	0.194	3	28	0.042	20	302	0.145
29-Jun-01	18	292	0.207	1	29	0.043	19	321	0.154
30-Jun-01	15	307	0.217	3	32	0.048	18	339	0.162
1-Jul-01	9	316	0.223	3	35	0.052	12	351	0.168
2-Jul-01	6	322	0.228	2	37	0.055	8	359	0.172
3-Jul-01	1	323	0.228	1	38	0.056	2	361	0.173
4-Jul-01	5	328	0.232	1	39	0.058	6	367	0.176
5-Jul-01	45	373	0.264	4	43	0.064	49	416	0.199
6-Jul-01	73	446	0.315	2	45	0.067	75	491	0.235
7-Jul-01	83	529	0.374	12	57	0.085	95	586	0.281
8-Jul-01	23	552	0.390	11	68	0.101	34	620	0.297
9-Jul-01	24	576	0.407	3	71	0.105	27	647	0.310
10-Jul-01	4	580	0.410	12	83	0.123	16	663	0.318
11-Jul-01	49	629	0.445	7	90	0.134	56	719	0.345

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Appendix A1.-Page 2 of 2.

	Wild			Hatchery			Total		
Date	Daily Count	Cumulative Count	Cumulative Proportion	Daily Count	Cumulative Count	Cumulative Proportion	Daily Count	Cumulative Count	Cumulative Proportion
12-Jul-01	70	69	0.494	23	113	0.168	93	812	0.389
13-Jul-01	112	811	0.574	34	147	0.218	146	958	0.459
14-Jul-01	33	844	0.597	4	151	0.224	37	995	0.477
15-Jul-01	80	924	0.653	32	183	0.272	112	1,107	0.530
16-Jul-01	72	996	0.704	31	214	0.318	103	1,210	0.580
17-Jul-01	67	1,063	0.752	33	247	0.367	100	1,310	0.628
18-Jul-01	40	1,103	0.780	28	275	0.409	68	1,378	0.660
19-Jul-01	25	1,128	0.798	10	285	0.423	35	1,413	0.677
20-Jul-01	62	1,190	0.842	48	333	0.495	110	1,523	0.730
21-Jul-01	24	1,214	0.859	53	386	0.574	77	1,600	0.767
22-Jul-01	9	1,223	0.865	10	396	0.588	19	1,619	0.776
23-Jul-01	0	1,223	0.865	0	396	0.588	0	1,619	0.776
24-Jul-01	22	1,245	0.880	24	420	0.624	46	1,665	0.798
25-Jul-01	93	1,338	0.946	115	535	0.795	208	1,873	0.897
26-Jul-01	28	1,366	0.966	58	593	0.881	86	1,959	0.939
27-Jul-01	13	1,379	0.975	23	616	0.915	36	1,995	0.956
28-Jul-01	5	1,384	0.979	7	623	0.926	12	2,007	0.962
29-Jul-01	6	1,390	0.983	8	631	0.938	14	2,021	0.968
30-Jul-01	1	1,391	0.984	4	635	0.944	5	2,026	0.971
31-Jul-01	3	1,394	0.986	3	638	0.948	6	2,032	0.974
1-Aug-01	3	1,397	0.988	4	642	0.954	7	2,039	0.977
2-Aug-01	5	1,402	0.992	6	648	0.963	11	2,050	0.982
3-Aug-01	5	1,407	0.995	6	654	0.972	11	2,061	0.988
4-Aug-01	1	1,408	0.996	4	658	0.978	5	2,066	0.990
5-Aug-01	6	1,414	1.000	15	673	1.000	21	2,087	1.000

Weir pulled 8-Aug-01.

Appendix A2.-Summary of Chinook salmon coded wire tag recoveries from return sampled at the weir, Ninilchik River, 2001.

Sample #	Date Recovered	Head Number	Tag Code	Brood Year	Actual Age[a]		Scale Age[b]		Sex	Length	Rearing Site	Release Date	Release Site
					Fresh	Ocean	Fresh	Ocean					
01DE2004	6/17/2001	85378	310248	1999	0	1	1	1	M	370	Fort Richardson	6/2/2000	Ninilchik
01DE2007	6/20/2001	85379	310248	1999	0	1	1	1	M	348	Fort Richardson	6/2/2000	Ninilchik
01DE2012	6/25/2001	85380	310147	1998	0	2	No	Scale	M	615	Fort Richardson	6/15/1999	Ninilchik
01DE2014	6/27/2001	85381	310147	1998	0	2	R		M	591	Fort Richardson	6/15/1999	Ninilchik
01DE2016	6/29/2001	85382	NO TAG				1	3	M	605			
01DE2018	7/1/2001	85383	310147	1998	0	2	R		M	545	Fort Richardson	6/15/1999	Ninilchik
01DE2021	7/4/2001	85384	310147	1998	0	2	R	2	M	600	Fort Richardson	6/15/1999	Ninilchik
01DE2023	7/6/2001	85385	312635	1997	0	3	No	Scale	F	750	Fort Richardson	6/15/1998	Ninilchik
01DE2024	7/7/2001	85386	312635	1997	0	3	R		F	740	Fort Richardson	6/15/1998	Ninilchik
01DE2024	7/7/2001	85387	312635	1997	0	3	R	2	F	720	Fort Richardson	6/15/1998	Ninilchik
01DE2025	7/8/2001	85388	312635	1997	0	3	R		M	760	Fort Richardson	6/15/1998	Ninilchik
01DE2025	7/8/2001	85389	310147	1998	0	2	1	2	M	575	Fort Richardson	6/15/1999	Ninilchik
01DE2026	7/9/2001	85390	310248	1999	0	1	1	1	M	375	Fort Richardson	6/2/2000	Ninilchik
01DE2028	7/11/2001	85391	312635	1997	0	3	1	4	F	765	Fort Richardson	6/15/1998	Ninilchik
01DE2028	7/11/2001	85392	310147	1998	0	2	R		M	502	Fort Richardson	6/15/1999	Ninilchik
01DE2029	7/12/2001	85393	312608	1996	0	4	1	4	M	831	Fort Richardson	6/17/1997	Ninilchik
01DE2029	7/12/2001	85394	312635	1997	0	3	1	3	M	789	Fort Richardson	6/15/1998	Ninilchik
01DE2029	7/12/2001	85395	310147	1998	0	2	R	2	F	650	Fort Richardson	6/15/1999	Ninilchik
01DE2029	7/12/2001	85396	312635	1997	0	3	R	4	F	731	Fort Richardson	6/15/1998	Ninilchik
01DE2030	7/13/2001	85397	312635	1997	0	3	R	3	M	820	Fort Richardson	6/15/1998	Ninilchik
01DE2030	7/13/2001	85398	310147	1998	0	2	R	2	M	579	Fort Richardson	6/15/1999	Ninilchik
01DE2030	7/13/2001	85399	312635	1997	0	3	R	3	M	868	Fort Richardson	6/15/1998	Ninilchik
01DE2031	7/14/2001	85400	Head lost										
01DE2030	7/13/2001	85511	310147	1998	0	2	1	2	M	546	Fort Richardson	6/15/1999	Ninilchik
01DE2030	7/13/2001	85512	312608	1996	0	4	R	4	M	840	Fort Richardson	6/17/1997	Ninilchik
01DE2030	7/13/2001	85513	310147	1998	0	2	R	2	M	615	Fort Richardson	6/15/1999	Ninilchik
01DE2031	7/14/2001	85514	312635	1997	0	3	R	2	M	781	Fort Richardson	6/15/1998	Ninilchik
01DE2032	7/15/2001	85515	312635	1997	0	3	1	3	M	823	Fort Richardson	6/15/1998	Ninilchik
01DE2032	7/15/2001	85516	310147	1998	0	2	1	2	M	561	Fort Richardson	6/15/1999	Ninilchik
01DE2032	7/15/2001	85517	312635	1997	0	3	1	3	M	691	Fort Richardson	6/15/1998	Ninilchik
01DE2032	7/15/2001	85518	310147	1998	0	2	1	2	M	641	Fort Richardson	6/15/1999	Ninilchik
01DE2032	7/15/2001	85519	310248	1999	0	1	1	2	M	371	Fort Richardson	6/2/2000	Ninilchik
01DE2032	7/15/2001	85520	310248	1999	0	1	1	2	M	367	Fort Richardson	6/2/2000	Ninilchik

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Sample #	Date Recovered	Head Number	Tag Code	Brood Year	Actual Age[a]		Scale Age[b]		Sex	Length	Rearing Site	Release Date	Release Site
					Fresh	Ocean	Fresh	Ocean					
01DE2033	7/16/2001	85521	312635	1997	0	3	1	3	F	750	Fort Richardson	6/15/1998	Ninilchik
01DE2033	7/16/2001	85522	312635	1997	0	3	1	3	F	765	Fort Richardson	6/15/1998	Ninilchik
01DE2033	7/16/2001	85523	310147	1998	0	2	1	2	M	585	Fort Richardson	6/15/1999	Ninilchik
01DE2033	7/16/2001	85524	312635	1997	0	3	1	3	F	700	Fort Richardson	6/15/1998	Ninilchik
01DE2033	7/16/2001	85525	310147	1998	0	2	1	2	M	650	Fort Richardson	6/15/1999	Ninilchik
01DE2033	7/16/2001	85526	310147	1998	0	2	R		M	680	Fort Richardson	6/15/1999	Ninilchik
01DE2033	7/16/2001	85527	NO TAG				1	1	M	520			
01DE2034	7/17/2001	85528	312635	1997	0	3	R		F	785	Fort Richardson	6/15/1998	Ninilchik
01DE2034	7/17/2001	85529	310147	1998	0	2	R	2	M	690	Fort Richardson	6/15/1999	Ninilchik
01DE2034	7/17/2001	85530	310147	1998	0	2	1	2	M	660	Fort Richardson	6/15/1999	Ninilchik
01DE2034	7/17/2001	85531	310147	1998	0	2	1	4	M	605	Fort Richardson	6/15/1999	Ninilchik
01DE2034	7/17/2001	85532	312608	1996	0	4	1	1	F	870	Fort Richardson	6/17/1997	Ninilchik
01DE2034	7/17/2001	85533	310147	1998	0	2			M	560	Fort Richardson	6/15/1999	Ninilchik
01DE2035	7/18/2001	85534	312635	1997	0	3	1	3	M	820	Fort Richardson	6/15/1998	Ninilchik
01DE2035	7/18/2001	85535	310147	1998	0	2	R		M	660	Fort Richardson	6/15/1999	Ninilchik
01DE2035	7/18/2001	85536	310147	1998	0	2	1	2	M	620	Fort Richardson	6/15/1999	Ninilchik
01DE2035	7/18/2001	85537	310147	1998	0	2	R		M	660	Fort Richardson	6/15/1999	Ninilchik
01DE2035	7/18/2001	85538	310147	1998	0	2	1	2	M	530	Fort Richardson	6/15/1999	Ninilchik
01DE2035	7/18/2001	85539	310147	1998	0	2	1	2	M	600	Fort Richardson	6/15/1999	Ninilchik
01DE2036	7/19/2001	85540	310147	1998	0	2			M	620	Fort Richardson	6/15/1999	Ninilchik
01DE2036	7/19/2001	85541	312608	1996	0	4	R	3	M	810	Fort Richardson	6/17/1997	Ninilchik
01DE2037	7/20/2001	85542	310248	1999	0	1	R		M	371	Fort Richardson	6/2/2000	Ninilchik
01DE2037	7/20/2001	85543	310147	1998	0	2	R		M	530	Fort Richardson	6/15/1999	Ninilchik
01DE2037	7/20/2001	85544	310147	1998	0	2	R		M	623	Fort Richardson	6/15/1999	Ninilchik
01DE2037	7/20/2001	85545	312635	1997	0	3	R		F	741	Fort Richardson	6/15/1998	Ninilchik
01DE2037	7/20/2001	85546	310248	1999	0	1	R		M	400	Fort Richardson	6/2/2000	Ninilchik
01DE2037	7/20/2001	85547	310147	1998	0	2	R		M	648	Fort Richardson	6/15/1999	Ninilchik
01DE2037	7/20/2001	85548	310248	1999	0	1	R		M	360	Fort Richardson	6/2/2000	Ninilchik
01DE2037	7/20/2001	85549	310248	1999	0	1	R		M	362	Fort Richardson	6/2/2000	Ninilchik
01DE2037	7/20/2001	85550	312608	1996	0	4	R		F	843	Fort Richardson	6/17/1997	Ninilchik
01DE2038	7/21/2001	85719	NO TAG				R		M	603			
01DE2038	7/21/2001	85720	310147	1998	0	2	R		M	649	Fort Richardson	6/15/1999	Ninilchik
01DE2038	7/21/2001	85721	310147	1998	0	2	R		M	647	Fort Richardson	6/15/1999	Ninilchik
01DE2038	7/21/2001	85722	310248	1999	0	1	R		M	556	Fort Richardson	6/2/2000	Ninilchik

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Sample #	Date Recovered	Head Number	Tag Code	Brood Year	Actual Age[a] Fresh	Actual Age[a] Ocean	Scale Age[b] Fresh	Scale Age[b] Ocean	Sex	Length	Rearing Site	Release Date	Release Site
01DE2038	7/21/2001	85723	310147	1998	0	2	R		M	372	Fort Richardson	6/15/1999	Ninilchik
01DE2038	7/21/2001	85724	310248	1999	0	1	R		M	414	Fort Richardson	6/2/2000	Ninilchik
01DE2038	7/21/2001	85725	312635	1997	0	3	R		F	787	Fort Richardson	6/15/1998	Ninilchik
01DE2038	7/21/2001	85726	312635	1997	0	3	R		F	735	Fort Richardson	6/15/1998	Ninilchik
01DE2038	7/21/2001	85727	312635	1997	0	3	R		M	767	Fort Richardson	6/15/1998	Ninilchik
01DE2038	7/21/2001	85728	310248	1999	0	1	R		M	350	Fort Richardson	6/2/2000	Ninilchik
01DE2039	7/22/2001	85729	312635	1997	0	3	1	3	M	805	Fort Richardson	6/15/1998	Ninilchik
01DE2039	7/22/2001	85730	310147	1998	0	2	1	3	M	594	Fort Richardson	6/15/1999	Ninilchik
01DE2040	7/24/2001	85731	310147	1998	0	2	1	3	M	640	Fort Richardson	6/15/1999	Ninilchik
01DE2040	7/24/2001	85732	310248	1999	0	1	1	1	M	330	Fort Richardson	6/2/2000	Ninilchik
01DE2040	7/24/2001	85733	312635	1997	0	3	R		M	765	Fort Richardson	6/15/1998	Ninilchik
01DE2040	7/24/2001	85734	310147	1998	0	2	1	2	M	595	Fort Richardson	6/15/1999	Ninilchik
01DE2040	7/24/2001	85735	310248	1999	0	1	R		M	320	Fort Richardson	6/2/2000	Ninilchik
01DE2041	7/25/2001	85736	312635	1997	0	3	1	3	M	745	Fort Richardson	6/15/1998	Ninilchik
01DE2041	7/25/2001	85737	312635	1997	0	3	1	3	F	800	Fort Richardson	6/15/1998	Ninilchik
01DE2041	7/25/2001	85738	310147	1998	0	2	R	2	M	680	Fort Richardson	6/15/1999	Ninilchik
01DE2041	7/25/2001	85739	312608	1996	0	4	1	4	F	855	Fort Richardson	6/17/1997	Ninilchik
01DE2041	7/25/2001	85740	310147	1998	0	2	1	2	M	573	Fort Richardson	6/15/1999	Ninilchik
01DE2041	7/25/2001	85741	312635	1997	0	3	1	3	F	750	Fort Richardson	6/15/1998	Ninilchik
01DE2041	7/25/2001	85742	312608	1996	0	4	1	4	F	890	Fort Richardson	6/17/1997	Ninilchik
01DE2041	7/25/2001	85743	312635	1997	0	3	1	3	F	770	Fort Richardson	6/15/1998	Ninilchik
01DE2041	7/25/2001	85744	312635	1997	0	3	1	3	M	840	Fort Richardson	6/15/1998	Ninilchik
01DE2041	7/25/2001	85745	312635	1997	0	3	1	3	F	825	Fort Richardson	6/15/1998	Ninilchik
01DE2041	7/25/2001	85746	310147	1998	0	2	1	2	M	645	Fort Richardson	6/15/1999	Ninilchik
01DE2041	7/25/2001	85747	312635	1997	0	3	1	3	F	805	Fort Richardson	6/15/1998	Ninilchik
01DE2041	7/25/2001	85748	312635	1997	0	3	1	3	M	760	Fort Richardson	6/15/1998	Ninilchik
01DE2041	7/25/2001	85749	310147	1998	0	2	1	2	M	630	Fort Richardson	6/15/1999	Ninilchik
01DE2041	7/25/2001	85750	310147	1998	0	2	1	2	M	563	Fort Richardson	6/15/1999	Ninilchik
01DE2041	7/25/2001	86451	312635	1997	0	3	R	3	M	780	Fort Richardson	6/15/1998	Ninilchik
01DE2041	7/25/2001	86452	312635	1997	0	3	1	3	F	750	Fort Richardson	6/15/1998	Ninilchik
01DE2041	7/25/2001	86453	312635	1997	0	3	1	3	F	750	Fort Richardson	6/15/1998	Ninilchik
01DE2041	7/25/2001	86454	310147	1998	0	2	1	2	M	635	Fort Richardson	6/15/1999	Ninilchik
01DE2041	7/25/2001	86455	312608	1996	0	4	1	4	F	800	Fort Richardson	6/17/1997	Ninilchik

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Sample #	Date Recovered	Head Number	Tag Code	Brood Year	Actual Age[a] Fresh	Actual Age[a] Ocean	Scale Age[b] Fresh	Scale Age[b] Ocean	Sex	Length	Rearing Site	Release Date	Release Site
01DE2041	7/25/2001	86456	312635	1997	0	3	1	2	M	700	Fort Richardson	6/15/1998	Ninilchik
01DE2041	7/25/2001	86457	310147	1998	0	2	R		M	565	Fort Richardson	6/15/1999	Ninilchik
01DE2041	7/25/2001	86458	310147	1998	0	2	1	2	M	630	Fort Richardson	6/15/1999	Ninilchik
01DE2042	7/26/2001	86459	312635	1997	0	3	1	2	F	770	Fort Richardson	6/15/1998	Ninilchik
01DE2042	7/26/2001	86460	310147	1998	0	2	1	2	M	630	Fort Richardson	6/15/1999	Ninilchik
01DE2042	7/26/2001	86461	312635	1997	0	3	1	2	F	790	Fort Richardson	6/15/1998	Ninilchik
01DE2042	7/26/2001	86462	312635	1997	0	3	1	3	F	770	Fort Richardson	6/15/1998	Ninilchik
01DE2042	7/26/2001	86463	312635	1997	0	3	1	3	F	745	Fort Richardson	6/15/1998	Ninilchik
01DE2042	7/26/2001	86464	310147	1998	0	2	R	2	M	595	Fort Richardson	6/15/1999	Ninilchik
01DE2042	7/26/2001	86465	310147	1998	0	2	1	1	M	620	Fort Richardson	6/15/1999	Ninilchik
01DE2042	7/26/2001	86466	312635	1997	0	3	1	3	M	790	Fort Richardson	6/15/1998	Ninilchik
01DE2042	7/26/2001	86467	310147	1998	0	2	1	2	M	565	Fort Richardson	6/15/1999	Ninilchik
01DE2042	7/26/2001	86468	310147	1998	0	2	1	2	M	574	Fort Richardson	6/15/1999	Ninilchik
01DE2042	7/26/2001	86469	310248	1999	0	1	R		M	370	Fort Richardson	6/2/2000	Ninilchik
01DE2043	7/27/2001	86470	310147	1998	0	2	R		M	645	Fort Richardson	6/15/1999	Ninilchik
01DE2043	7/27/2001	86471	310147	1998	0	2	R		F	710	Fort Richardson	6/15/1999	Ninilchik
01DE2043	7/27/2001	86472	310147	1998	0	2	R		M	675	Fort Richardson	6/15/1999	Ninilchik
01DE2043	7/27/2001	86473	NO TAG				R		M	510			
01DE2043	7/27/2001	86474	310147	1998	0	2	R		M	570	Fort Richardson	6/15/1999	Ninilchik
01DE2044	7/28/2001	86475	310147	1998	0	2	R		M	597	Fort Richardson	6/15/1999	Ninilchik
01DE2045	7/29/2001	86476	312635	1997	0	3	R	3	M	765	Fort Richardson	6/15/1998	Ninilchik
01DE2045	7/29/2001	86477	310147	1998	0	2	R	2	F	661	Fort Richardson	6/15/1999	Ninilchik
01DE2046	7/30/2001	86478	310248	1999	0	1	1	1	M	391	Fort Richardson	6/2/2000	Ninilchik
01DE2048	8/1/2001	86479	312635	1997	0	3	R	3	F	820	Fort Richardson	6/15/1998	Ninilchik
01DE2049	8/2/2001	86480	312635	1997	0	3	1	3	F	750	Fort Richardson	6/15/1998	Ninilchik
01DE2050	8/3/2001	86481	312635	1997	0	3	1	3	F	765	Fort Richardson	6/15/1998	Ninilchik
01DE2050	8/3/2001	86482	310147	1998	0	2	1	2	M	650	Fort Richardson	6/15/1999	Ninilchik
01DE2052	8/5/2001	86483	312635	1997	0	3	1	3	F	735	Fort Richardson	6/15/1998	Ninilchik
01DE2052	8/5/2001	86484	312635	1997	0	3	1	3	F	767	Fort Richardson	6/15/1998	Ninilchik
01DE2052	8/5/2001	86485	310147	1998	0	2	1	2	M	589	Fort Richardson	6/15/1999	Ninilchik

[a] Actual fresh and ocean age were determined by comparing brood year, year of release, and year of recovery.

[b] 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 A3.-Estimated ocean age composition of wild fish utilized during egg takes at Ninilchik River weir, 2001.

	Ocean Age				
	1	2	3	4	Total
Females					
Number Sampled	0	2	61	21	84
Estimated Proportion		0.024	0.726	0.250	0.5
SE Proportion		0.017	0.032	0.043	
Estimated Composition	0	3	76	26	105
SE Abundance		2	3	4	
Males					
Number Sampled	8	24	18	6	56
Estimated Proportion	0.143	0.429	0.321	0.107	0.5
SE Proportion	0.045	0.059	0.057	0.040	
Estimated Composition	15	45	34	11	105
SE Abundance	5	6	6	4	
All	8	26	79	27	140
Estimated Proportion	0.071	0.226	0.524	0.179	1
SE Proportion	0.023	0.030	0.033	0.029	
Estimated Composition	15	48	110	38	210
SE Abundance	5	6	7	6	

Note: No length data available.

Appendix A4.-Summary of water temperature (ºCelsius) at Chinook salmon weir, Ninilchik River, 2001.

Date	Average °C	Maximum °C	Minimum °C
5/4/2001	2.2	2.8	1.6
5/5/2001	1.6	3.2	-0.02
5/6/2001	2.6	4.3	1.6
5/7/2001	3.7	5.8	2.0
5/8/2001	4.2	5.8	2.8
5/9/2001	3.3	4.3	2.8
5/10/2001	3.0	5.1	1.6
5/11/2001	4.1	6.2	2.4
5/12/2001	4.9	6.9	3.2
5/13/2001	5.5	7.7	3.5
5/14/2001	6.1	8.1	4.3
5/15/2001	6.4	7.3	5.5
5/16/2001	5.7	6.6	4.7
5/17/2001	5.7	7.7	3.9
5/18/2001	6.3	8.4	4.3
5/19/2001	7.0	9.1	5.1
5/20/2001	7.3	8.4	6.2
5/21/2001	6.8	7.3	6.2
5/22/2001	6.5	8.4	5.1
5/23/2001	6.5	8.1	5.1
5/24/2001	5.7	6.6	4.3
5/25/2001	5.3	5.8	4.3
5/26/2001	5.1	5.8	4.3
5/27/2001	6.5	9.5	3.9
5/28/2001	8.8	10.9	6.6
5/29/2001	9.4	10.6	8.4
5/30/2001	9.1	11.3	6.9
5/31/2001	9.9	12.0	8.1
6/1/2001	10.8	13.1	9.1
6/2/2001	11.5	14.1	9.1
6/3/2001	11.5	12.4	10.6
6/4/2001	10.5	12.4	8.8
6/5/2001	10.6	12.0	9.1
6/6/2001	10.2	11.3	9.5
6/7/2001	9.6	10.9	8.1
6/8/2001	10.8	13.8	8.4
6/9/2001	11.7	14.8	8.8
6/10/2001	12.3	14.8	9.9
6/11/2001	11.8	13.1	10.2
6/12/2001	10.8	12.0	9.9
6/13/2001	11.6	14.8	9.1
6/14/2001	12.6	15.5	9.9
6/15/2001	13.4	16.6	10.2
6/16/2001	13.9	16.9	10.9
6/17/2001	14.0	16.9	11.3
6/18/2001	13.5	15.5	11.3
6/19/2001	13.5	15.5	11.7
6/20/2001	13.8	16.6	11.7

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Appendix A4.-Page 2 of 3.

Date	Average °C	Maximum °C	Minimum °C
6/21/2001	14.6	17.6	12.4
6/22/2001	14.8	18.0	11.7
6/23/2001	15.3	18.7	12.0
6/24/2001	15.3	18.0	12.7
6/25/2001	15.3	18.7	12.4
6/26/2001	16.0	19.0	13.1
6/27/2001	15.9	18.3	13.4
6/28/2001	16.3	19.4	13.4
6/29/2001	15.4	17.6	13.8
6/30/2001	14.1	16.9	11.7
7/1/2001	14.0	16.2	11.7
7/2/2001	14.2	17.3	11.7
7/3/2001	12.3	15.2	11.7
7/4/2001	11.5	13.1	10.2
7/5/2001	11.6	13.4	10.2
7/6/2001	12.5	15.2	10.2
7/7/2001	12.8	13.8	11.7
7/8/2001	12.4	13.8	11.3
7/9/2001	12.3	15.2	9.9
7/10/2001	12.3	13.8	11.3
7/11/2001	11.3	12.0	10.6
7/12/2001	11.0	12.0	10.2
7/13/2001	11.7	13.4	10.2
7/14/2001	12.7	15.2	10.9
7/15/2001	12.4	13.4	11.7
7/16/2001	12.2	13.8	10.9
7/17/2001	13.3	16.2	10.9
7/18/2001	13.1	14.1	11.7
7/19/2001	12.5	13.1	11.7
7/20/2001	12.0	12.7	11.3
7/21/2001	11.8	12.4	11.7
7/22/2001	11.6	12.4	10.9
7/23/2001	12.2	13.8	11.3
7/24/2001	13.1	15.2	11.7
7/25/2001	13.5	14.8	12.7
7/26/2001	13.6	15.9	11.7
7/27/2001	14.2	16.6	12.4
7/28/2001	13.9	16.2	11.7
7/29/2001	13.9	16.2	11.7
7/30/2001	14.0	15.2	12.7
7/31/2001	13.8	15.9	12.4
8/1/2001	13.8	16.9	10.9
8/2/2001	13.9	16.6	11.3
8/3/2001	13.0	14.5	12.4
8/4/2001	12.0	12.7	11.3
8/5/2001	12.2	14.8	9.9
8/6/2001	12.7	15.2	10.2
8/7/2001	12.8	15.5	10.2
8/8/2001	13.1	14.1	12.0

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Appendix A4.-Page 3 of 3.

Date	Average °C	Maximum °C	Minimum °C
8/9/2001	12.6	13.8	11.3
8/10/2001	13.0	14.5	11.7
8/11/2001	13.3	15.9	10.9
8/12/2001	13.9	15.9	12.0
8/13/2001	13.8	16.6	10.9
8/14/2001	13.9	15.5	12.4
8/15/2001	14.3	16.2	13.1
8/16/2001	13.5	14.8	12.7
8/17/2001	12.3	13.4	11.7
8/18/2001	11.8	13.1	10.9
8/19/2001	11.5	12.0	10.9
8/20/2001	11.1	12.0	10.6
8/21/2001	11.2	12.7	9.5
8/22/2001	11.8	14.1	9.9
8/23/2001	11.3	13.1	9.5
8/24/2001	10.8	11.7	10.2
8/25/2001	10.8	12.4	9.9
8/26/2001	11.0	12.0	9.9
8/27/2001	10.1	10.9	8.8
8/28/2001	9.6	10.2	9.1
8/29/2001	9.2	9.9	8.8
8/30/2001	9.5	10.6	8.8
8/31/2001	9.5	10.9	8.4
9/1/2001	9.3	11.3	7.3
9/2/2001	9.5	10.2	8.8
9/3/2001	10.0	12.0	8.4
9/4/2001	9.9	10.6	9.5
9/5/2001	9.4	10.9	8.4
9/6/2001	8.7	9.5	7.7
9/7/2001	9.3	10.9	8.1
9/8/2001	8.4	10.2	6.6
9/9/2001	7.6	9.5	5.8
9/10/2001	7.2	9.1	5.1
9/11/2001	6.9	8.8	5.1
9/12/2001	6.7	7.7	6.2
Temperature Range		2.8 - 19.4	-0.02 - 13.8
Average Daily Temperature	10.8	12.6	9.2

Note: Daily data based on hourly readings of a remote data logger.

APPENDIX B. DATA FILES

Appendix B1.-Data files.

File	Description	Location
P0000600B012001.DTA	Weir data ASCII (DTA) file format. Mark sense form AWL version 1.1. All Chinook salmon sampled at the Ninilchik River weir, 2001.	RTS Anchorage
P0000600B052001.DTA	Sport harvest data ASCII (DTA) file format. Mark sense form AWL version 1.1. All Chinook salmon sampled for the presence of an adipose fin during the 2001 Ninilchik River Chinook salmon fishery.	RTS Anchorage
NinilchikRB2001.Zip	Zip File containing the eight files listed below for 2001.	Homer Office of the Alaska Dept. of Fish and Game
P0000600b012001.txt	Text file containing the above listed ASCII file.	
P0000600B052001.txt	Text file containing the above listed ASCII file.	
NINWKGcomp01	Excel spreadsheet created to calculate age composition of wild and hatchery Chinook salmon escapements at the Ninilchik River, 2001.	
TagQuery2001.txt	Tag Lab query of Adcwt tags returning to the Ninilchik weir in 2001.	
Return20001.prz	Free Lance graphics file with figures for Ninilchik River, 2001.	
Ninweir_count99-03.XLS	Excel spreadsheet created to produce daily count summary of Chinook salmon passage at Ninilchik River weir, 2001.	
FDStabs01	Excel spreadsheet created to produce Tables and Appendices used in Ninilchik River report for 2001.	
NRWmrksns.xls	Excel spreadsheet created to coalesce Marksense and Tag Lab Query data.	