

**Fishery Data Series No. 01-17**

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**Smolt Production and Harvest of Coho Salmon from  
the Chilkat River, 1999-2000**

by

**Randolph P. Ericksen**

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November 2001

Alaska Department of Fish and Game

Division of Sport Fish



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<b>Weights and measures (metric)</b>		<b>General</b>		<b>Mathematics, statistics, fisheries</b>	
centimeter	cm	All commonly accepted abbreviations.	e.g., Mr., Mrs., a.m., p.m., etc.	alternate hypothesis	$H_A$
deciliter	dL	All commonly accepted professional titles.	e.g., Dr., Ph.D., R.N., etc.	base of natural logarithm	e
gram	g	And	&	catch per unit effort	CPUE
hectare	ha	At	@	coefficient of variation	CV
kilogram	kg	Compass directions:		common test statistics	F, t, $\chi^2$ , etc.
kilometer	km			confidence interval	C.I.
liter	L			correlation coefficient	R (multiple)
meter	m			correlation coefficient	r (simple)
metric ton	mt			covariance	cov
milliliter	ml			degree (angular or temperature)	$^\circ$
millimeter	mm	Copyright	©	degrees of freedom	df
<b>Weights and measures (English)</b>		Corporate suffixes:		divided by	÷ or / (in equations)
cubic feet per second	ft <sup>3</sup> /s			equals	=
foot	ft	Company	Co.	expected value	E
gallon	gal	Corporation	Corp.	fork length	FL
Inch	in	Incorporated	Inc.	greater than	>
mile	mi	Limited	Ltd.	greater than or equal to	≥
ounce	oz	et alii (and other people)	et al.	harvest per unit effort	HPUE
pound	lb	et cetera (and so forth)	etc.	less than	<
quart	qt	exempli gratia (for example)	e.g.,	less than or equal to	≤
yard	yd	id est (that is)	i.e.,	logarithm (natural)	ln
Spell out acre and ton.		latitude or longitude	lat. or long.	logarithm (base 10)	log
<b>Time and temperature</b>		monetary symbols (U.S.)	\$, ¢	logarithm (specify base)	log <sub>2</sub> , etc.
day	d	months (tables and figures): first three letters	Jan,...,Dec	mid-eye-to-fork	MEF
degrees Celsius	°C	number (before a number)	# (e.g., #10)	minute (angular)	'
degrees Fahrenheit	°F	pounds (after a number)	# (e.g., 10#)	multiplied by	x
hour (spell out for 24-hour clock)	h	registered trademark	®	not significant	NS
minute	min	trademark	™	null hypothesis	$H_0$
second	s	United States (adjective)	U.S.	percent	%
Spell out year, month, and week.		United States of America (noun)	USA	probability	P
<b>Physics and chemistry</b>		U.S. state and District of Columbia abbreviations	use two-letter abbreviations (e.g., AK, DC)	probability of a type I error (rejection of the null hypothesis when true)	$\alpha$
all atomic symbols				probability of a type II error (acceptance of the null hypothesis when false)	$\beta$
alternating current	AC			second (angular)	"
ampere	A			standard deviation	SD
calorie	cal			standard error	SE
direct current	DC			standard length	SL
hertz	Hz			total length	TL
horsepower	hp			variance	Var
hydrogen ion activity	pH				
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

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## ABSTRACT

The purpose of this study was to estimate smolt production and adult harvest of Chilkat River coho salmon *Oncorhynchus kisutch*. Coho salmon smolt were captured in three locations of the Chilkat River drainage during the spring of 1999, marked with an adipose finclip and a coded wire tag (CWT), and sampled for age, weight, and length. Adult coho salmon were sampled for CWTs in sport and commercial fisheries harvests throughout Southeast Alaska during 2000. In addition, coho salmon were sampled in the Chilkat River to determine the marked fraction to permit estimates of the 1999 coho smolt emigration and the 2000 harvest of adult coho salmon in sampled fisheries.

We marked and released 25,915 coho salmon smolt  $\geq 70$  mm during the spring of 1999 with an adipose fin clip and a CWT. Most (82.9%, SE = 1.8%) of the smolt caught in the lower river areas were age 1. In contrast, most (51.3%, SE = 5.8%) of those caught at the Chilkat Lake outlet were age 2. Those sampled at the Chilkat Lake outlet were also much larger on average (116mm, 15.1g) than those sampled at the lower river sites (83mm, 6.1g). We captured a total of 1,431 adult coho salmon aged 1.1 or 2.1 in fish wheels operating in the lower Chilkat River during 2000 and sampled them for marks. Twenty-nine (29) of these were missing their adipose fin (marked). On the basis of these data, we estimated that 1,237,056 (SE = 219,715) coho salmon smolt emigrated from the Chilkat River in 1999.

In 2000, 265 CWTs with Chilkat River tag codes were recovered from coho salmon during the random sampling of various sport and commercial harvests. An estimated 40,569 (SE = 3,752) coho salmon bound for the Chilkat River were harvested in commercial, sport, and subsistence fisheries in 2000. Most (54.3%) of the harvest occurred in the commercial troll fishery (22,030, SE = 2,891), followed (38.8%) by the Lynn Canal drift gillnet fishery (15,744, SE = 2,238). The remainder of the harvests occurred in the recreational (4.3%), commercial seine (2.1%), and subsistence (0.5%) fisheries.

Key words: Mark-recapture, coded wire tag, harvest, contribution, recreational fishery, troll fishery, drift gillnet fishery, seine fishery, age composition, size composition, sex composition, length-at-age, weight-length model, coho salmon, *Oncorhynchus kisutch*, Chilkat River, Chilkat Lake, Haines, Southeast Alaska

## INTRODUCTION

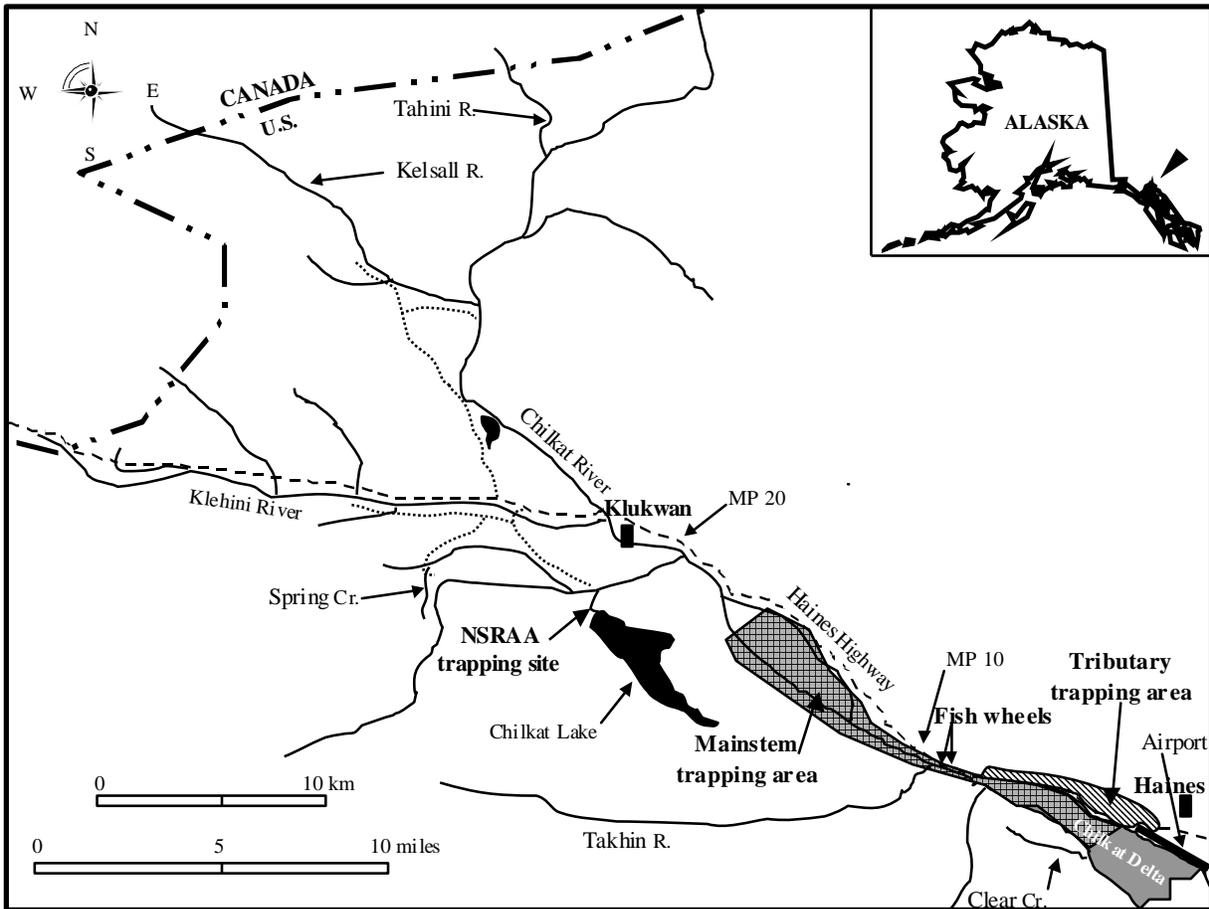
The purpose of this study was to monitor smolt production and adult harvest of Chilkat River coho salmon *Oncorhynchus kisutch*. The long-term goal of this study is to gather information needed to manage harvests in accordance with sustained yield management.

The freshwater coho salmon fishery in Haines provides a small but important component of the local economy. In 1988, anglers fishing in Haines and Skagway for coho salmon spent an estimated \$181,000 (Jones and Stokes 1991). This fishery operates late in the year when other fisheries have finished and is popular both with local and non-local anglers. Ninety percent (90%) of the anglers fishing in freshwater during 1985 were from out of town (Bethers 1986). The Chilkat River produces most of the coho salmon harvested in Haines area sport fisheries and supports one of the largest freshwater coho fisheries in the Southeast region, with an average

annual harvest of about 1,000 coho salmon (Mills 1979–1994, Howe et al. 1995–2001). This stock also contributes a significant number of fish to the commercial troll, gillnet and seine fisheries in northern Southeast Alaska (Elliott and Kuntz 1988, Shaul et al. 1991).

The Chilkat River is a large glacial system that originates in British Columbia, Canada, flows through rugged dissected mountainous terrain, and terminates in Chilkat Inlet near Haines, Alaska (Figure 1). The mainstem and major tributaries comprise approximately 350 km of river channel in a watershed covering about 1,600 km<sup>2</sup> (Bugliosi 1988).

The Chilkat River is the third or fourth largest producer of coho salmon in Southeast Alaska (Scott McPherson, Division of Sport Fish, Douglas, personal communication). Research conducted during the 1980s on coho salmon stocks in Lynn Canal (including the Chilkat River), suggest that these stocks have, at times, been subjected to very high (over 85%)



**Figure 1.– Location of sampling sites in the Chilkat River drainage.**

exploitation rates (Elliott and Kuntz 1988, Shaul et al. 1991).

The current management program for Chilkat River coho salmon relies on postseason monitoring of escapements by an “index system,” where survey counts are conducted on four streams: Clear Creek, Spring Creek, Tahini River, and Kelsall River (Figure 1). The number of adult coho is counted on a weekly basis during peak spawning. The peak number counted for each stream is used as the index count for that year. The escapement of coho salmon to the Chilkat River drainage has been estimated for two years. The estimated escapement was 80,700 (90% CI = 70,000 – 95,600, Dangel et al. *Unpublished*) in 1980 and 37,132 (SE = 7,432, Ericksen 1999) in 1998.

Coho salmon coded wire tag (CWT) studies have been conducted in the Chilkat River drainage sporadically between 1977 and 1984 (Table 1). This study was initiated to monitor smolt production and adult harvest of Chilkat River coho salmon. Research objectives were:

1. to estimate the number of coho salmon smolt leaving the Chilkat River in 1999;
2. to estimate the age composition of salmon smolt leaving the Chilkat River in 1999;
3. to estimate the age and sex composition of adult coho salmon entering the Chilkat River in 2000; and,
4. to estimate the marine harvest of Chilkat River coho salmon in sampled fisheries in 2000.

**Table 1.—Number of coho salmon coded wire tagged in the Chilkat River drainage, by year and area, through 1998.**

Release year	Capture site	Stage	Total marked	Shed tags	Valid tags
<b>1976 total</b>	Chilkat River <sup>a</sup>	fingerling	<b>9,074</b>	<b>0</b>	<b>9,074</b>
1977	Chilkat Lake	fingerling	6,344	0	6,344
1977	Chilkat ponds <sup>b</sup>	fingerling	2,729	0	2,729
<b>1977 total</b>			<b>9,073</b>	<b>0</b>	<b>9,073</b>
<b>1981 total</b>	Chilkat Lake	fingerling	<b>2,603</b>	<b>0</b>	<b>2,603</b>
<b>1982 total</b>	Chilkat ponds	fingerling	<b>8,608</b>	<b>93</b>	<b>8,515</b>
<b>1984 total</b>	Chilkat ponds	fingerling	<b>14,644</b>	<b>102</b>	<b>14,542</b>

<sup>a</sup> In 1976 various areas were trapped in the drainage, including the airport tributaries.

<sup>b</sup> Access was improved into several ponds along the Chilkat River; rearing coho were coded-wire-tagged to evaluate production of coho from these ponds.

## METHODS

Coho salmon smolt were captured in the Chilkat River during the spring of 1999 and marked with an adipose finclip and a CWT. Adult coho salmon were sampled for CWTs in sport and commercial fisheries harvests throughout Southeast Alaska in 2000. In addition, coho salmon were sampled in the Chilkat River to determine the marked fraction to permit estimates of the 1999 coho smolt emigration and the harvest of adult coho salmon in sampled fisheries in 2000.

### SMOLT CAPTURE, CODED-WIRE-TAGGING, AND SAMPLING

Smolt were captured at three locations in the Chilkat River drainage (Chilkat mainstem, Chilkat tributaries, and Chilkat Lake outlet) during the spring of 1999 (Figure 1). Two crews captured smolt using baited minnow traps in the Chilkat River mainstem from the airport upstream to approximately Haines Highway mile 16 on April 6 and April 18 through June 6, and in tributaries along the highway from Yindastuki Creek to Haines Highway mile 8, between April 25 and May 23. They also tagged a portion of the coho smolt captured in a smolt trap operated on the outlet of Chilkat Lake by Northern Southeast Regional Aquaculture Association (NSRAA), between May 17 and June 30.

Two crews of two people fished an average of 70 G-40 minnow traps per day in the Chilkat River mainstem, and 58 per day in the tributaries. Traps were baited with disinfected salmon roe and checked at least once per day. Crew members immediately released obviously undersized or non-target species at the tagging site. Remaining fish were transported to holding boxes for processing at the tagging site located on the bank of the Chilkat River adjacent to the Haines Highway mile 7.5. Water depth (cm), and temperature (°C) were recorded each morning near highway mile 8.

All healthy juvenile coho  $\geq 70$  mm fork length (FL) were marked with an adipose fin clip and a CWT. Fish were first tranquilized in a solution of tricain-methane sulfanate (MS 222) buffered with sodium bicarbonate. The MS 222 solution was maintained at a constant water temperature by pumping it through a continuous loop containing a coil of aluminum tubing submerged in the river. Smolt were tagged with a CWT and marked by excision of the adipose fin, following the methods in Koerner (1977). Every 50<sup>th</sup> coho salmon smolt tagged was measured to the nearest mm fork length, weighed to the nearest g, and scale sampled (for age). Twelve (12) to 15 scales were taken two rows above the lateral line on the left side of each sampled smolt just ahead of the adipose fin (Scarnecchia 1979). Scales were mounted individually between two 25-mm by 75-mm glass slides and viewed through a

microfiche reader at 70× magnification. Age was determined once for each fish and reported in European notation. All chinook salmon smolt ≥50 mm were also marked as above using a separate tag code.

All marked smolt were held overnight to check for 24 hour tag retention and handling induced mortality. The following morning 50 fish in the previous day’s catch were randomly selected and checked for the retention of CWTs and mortality. If tag retention was 49/50 or greater, mortalities were counted and all live fish from that batch were released. If tag retention was less than 49/50, the entire batch of smolt was checked for tag retention and those that tested negative were re-tagged. The number of fish tagged, number of tagging-related mortalities, and number of fish that had shed their tags were compiled and submitted to the Commercial Fisheries Division (CF) Tag Lab in Juneau at the completion of the field season.

#### INRIVER ADULT CAPTURE AND SAMPLING

Returning coho salmon were captured in fish wheels operating adjacent to the Haines Highway mile 9 (Figure 1) during 2000. CF personnel installed two 3-basket aluminum fish wheels in early June to monitor escapement of sockeye salmon *O. nerka* to the Chilkat River. The Division of Sport Fish provided funding for the fish wheels, beginning September 16, to sample coho salmon. One fish wheel operated adjacent to the Haines Highway near highway mile 9, and another about 300 m downstream of the first. The fish wheels were operated continuously from June 10 through October 7, except for maintenance. The wheels were located along the east bank of the river where the main flow was constrained primarily to one side of the floodplain. Water depth (cm), and temperature (°C) were recorded each morning near highway mile 8.

Captured coho salmon were visually examined to estimate sex, measured to the nearest mm (MEF), and inspected for missing adipose fins. In addition, a scale sample was collected from every other coho salmon captured. Four scales were removed from the left side of the fish, along a line 2 to 4 scale rows above the lateral line between the posterior insertion of the dorsal fin

and anterior insertion of the anal fin. Ages were determined from patterns of circuli according to protocols in Mosher (1968).

Fish wheel personnel retained heads from coho salmon missing adipose fins, and a plastic cinch strap with a unique number was inserted through the jaw of the head. Heads and CWT recovery data were sent to the ADF&G CWT Processing Laboratory in Juneau, where any tags present were removed, decoded, and corresponding information entered into the tag lab database.

#### SMOLT ABUNDANCE

A two event mark-recapture experiment was used to estimate the abundance of coho salmon smolt emigrating from Chilkat River in 1999. The number of smolt marked during the spring of 1999 defined the first sampling event. Sampling returning adults for missing adipose fins during the fall of 2000 defined the second sampling event.

Abundance (numbers emigrating) of coho salmon smolt was estimated using the Chapman’s modified Petersen estimator for a closed population (Seber 1982):

$$\hat{N} = \frac{(n_1 + 1)(n_2 + 1)}{(m_2 + 1)} - 1 \quad (1a)$$

$$\text{var}[\hat{N}] = \frac{(n_1 + 1)(n_2 + 1)(n_1 - m_2)(n_2 - m_2)}{(m_2 + 1)^2(m_2 + 2)} \quad (1b)$$

where  $n_1$  is the number of smolt marked in the spring of 1999,  $n_2$  is the number of age 1.1 and 2.1 coho salmon captured in the Chilkat River fish wheels in 2000, and  $m_2$  is the subset of  $n_2$  which had been marked as smolt in 1999.

The validity of the mark-recapture experiment rests on several assumptions: (a) that every fish has an equal probability of being marked during event 1, or that every fish has an equal probability of being captured in event 2, or that marked fish mix completely with unmarked fish; (b) that recruitment and “death” (emigration) do not both occur between sampling events; (c) that marking does not affect catchability (or mortality) of the fish; (d) that fish do not lose

marks between sample events; (e) that all recovered marks are reported; and (f) that double sampling does not occur (Seber 1982).

### AGE, SEX, AND SIZE COMPOSITIONS

The age composition of coho salmon smolt in 1999 and age and sex compositions of adults in 2000 were estimated from systematically drawn samples.

Age compositions for smolt were tabulated separately for each sampling location. Differences in age composition between areas were investigated by contingency table analysis and data were pooled when no differences were found.

Proportions in the age or sex compositions and their variances were estimated as

$$\hat{p}_a = \frac{n_a}{n} \quad (2a)$$

$$var[\hat{p}_a] = \frac{\hat{p}_a (1 - \hat{p}_a)}{n - 1} \quad (2b)$$

where  $n$  is the number of successfully aged (or sexed) fish and  $n_a$  is the subset of  $n$  determined to be age (or sex)  $a$ .

I also fit an allometric growth model (Quinn and Deriso 1999, pp. 129-131) to estimate the weight to length relationship of coho smolt. A multiplicative error structure was used because the variation in weight increased with length. Mean length-at-age, weight-at-age, and variances were calculated using standard normal statistics.

### HARVEST

Harvest in 2000 of coho salmon originating from the Chilkat River was estimated from fish sampled from catches in commercial and recreational fisheries and in the Chilkat River escapement. Because several fisheries exploited coho salmon over several months in 2000, harvest was estimated over several strata, each a combination of time, area, and type of fishery. Statistics from the commercial troll fishery were stratified by fishing period and by fishing quadrant. Statistics from drift gillnet fisheries

were stratified by week and by fishing district. Statistics from the recreational fishery were stratified by fortnight. Estimates of harvest  $\hat{r}_i$  were calculated for each stratum, then summed across strata and across fisheries to obtain an estimate of the total  $\hat{T}$ :

$$\hat{T} = \sum_i \hat{r}_i \quad (3a)$$

$$var[\hat{T}] = \sum_i var[\hat{r}_i] \quad (3b)$$

Variance of the sum of estimates was estimated as the sum of variances across strata, because sampling was independent across strata and across fisheries.

A subset  $n_i$  of the catch in each stratum was counted and inspected to find recaptured fish. Of those inspected,  $a_i$  salmon were missing their adipose fin, and had their heads marked and sent to Juneau for dissection. Of the  $a'_i$  heads that arrived in Juneau, all were passed through a magnetometer to detect a CWT. Of the  $t_i$  tags detected,  $t'_i$  were successfully decoded under a microscope, after dissection of which  $m_{ci}$  had come from the Chilkat River. Oliver (1990) and Hubartt et al. (1997) present details of sampling commercial and recreational fisheries, respectively. The fraction of the return to the Chilkat River with tags was estimated as the fraction of the adults sampled in the fish wheels that had valid, decoded CWTs. Information from catch and field sampling programs was expanded to estimate harvest and the associated variance of coho salmon bound for the Chilkat River for each stratum, using methods and equations from Bernard and Clark (1996: Table 2).

### MEAN DATE OF HARVEST

Estimates of the mean dates of harvest for commercial fisheries were calculated from the time series of estimated proportions of catches by strata within a fishery (Mundy 1982). The fraction of Chilkat River coho salmon in a fishery on day  $d$  was estimated as

$$\hat{P}_d = \frac{\hat{H}_d}{\sum_i H_i} \quad (4)$$

where  $\hat{H}_d$  is the estimated number of Chilkat River coho salmon harvested in a fishery on day d. The mean date of harvest in each fishery over a time interval of n strata was calculated as

$$\hat{d} = \sum_{d=1}^n d\hat{P}_d \quad (5)$$

## RESULTS

### 1999 SMOLT TAGGING, AGE AND SIZE

We marked 26,075 coho salmon smolt  $\geq 70$  mm during the spring of 1999 with an adipose finclip and a CWT (Table 2). One-hundred sixty (160) of these died within 24 h of tagging, leaving a total marked population of 25,915 (Table 3). An estimated 29 coho smolt shed their tags within 24h. In addition, we tagged 780 chinook salmon  $\geq 50$  mm, 9 of which died within 24h (Tables 2 and 3).

The timing of coho salmon smolt catch varied considerably by area. The catch of coho salmon peaked in the tributaries on April 25 (Figure 2). In contrast, the catch in the Chilkat River was the greatest on May 23 (Figure 2). However, trapping effort varied over time for both of these areas. The average catch of coho smolt per trap (CPUE) in the tributaries was much higher early in the season peaking on April 25 (Figure 3). The CPUE in the Chilkat River was relatively constant throughout the season, with a small peak occurring on May 23 (Figure 3). This compares with the catch of coho smolt at the outlet of Chilkat Lake which peaked on May 25 (Figure 4).

Five hundred sixty-four (564) coho salmon smolt  $\geq 70$  mm were sampled for age (scales), weight and length during the spring of 1999 (Table 4). The age composition of smolt sampled at the Chilkat Lake outlet was significantly different ( $\chi^2 = 44.62$ ,  $df = 1$ ,  $P < 0.001$ ) from those sampled at the other sites. Thus, those samples were analyzed separately. Age compositions of smolt sampled from the tributaries and the

**Table 2.**—Number of traps checked and smolt caught and tagged in the Chilkat River drainage by time period and area, April 6 through July 3, 1999. (Note that tagging did not occur every day; therefore, fish caught during one time period may be tagged in the next time period.)

Dates	Chilkat mainstem			Chilkat tributaries		Chilkat Lake <sup>a</sup>		Total tagged	
	Traps checked	Number tagged		Traps checked	Coho tagged	Coho salmon		Coho	Chinook
		Coho	Chinook			Caught	Tagged		
04/06	5	102	2					102	2
04/18-04/24	602	2,095	61	48				2,095	61
04/25-05/01	338	1,111	149	377	3,366			4,477	149
05/02-05/08	280	859	99	431	1,948			2,807	99
05/09-05/15	285	989	136	423	2,093			3,082	136
05/16-05/22	379	1,217	67	405	2,201	1,071		3,418	67
05/23-05/29	724	3,077	116		208	3,155	3,103	6,388	116
05/30-06/05	786	1,923	94			1,240	508	2,431	94
06/06-06/12	113	711	56			2,145	564	1,275	56
06/13-06/19						1,012			
06/20-06/26						101			
06/27-07/03						16			
<b>Total</b>	<b>3,512</b>	<b>12,084</b>	<b>780</b>	<b>1,684</b>	<b>9,816</b>	<b>8,740</b>	<b>4,175</b>	<b>26,075</b>	<b>780</b>

<sup>a</sup> Northern Southeast Regional Aquaculture Association (NSRAA) personnel operated a smolt trap on the outlet of Chilkat Lake to monitor emigration of sockeye salmon. They counted and held coho salmon smolt for us to tag.

**Table 3.—Summary of coded wire tagging data in the Chilkat River drainage during the spring of 1999.**

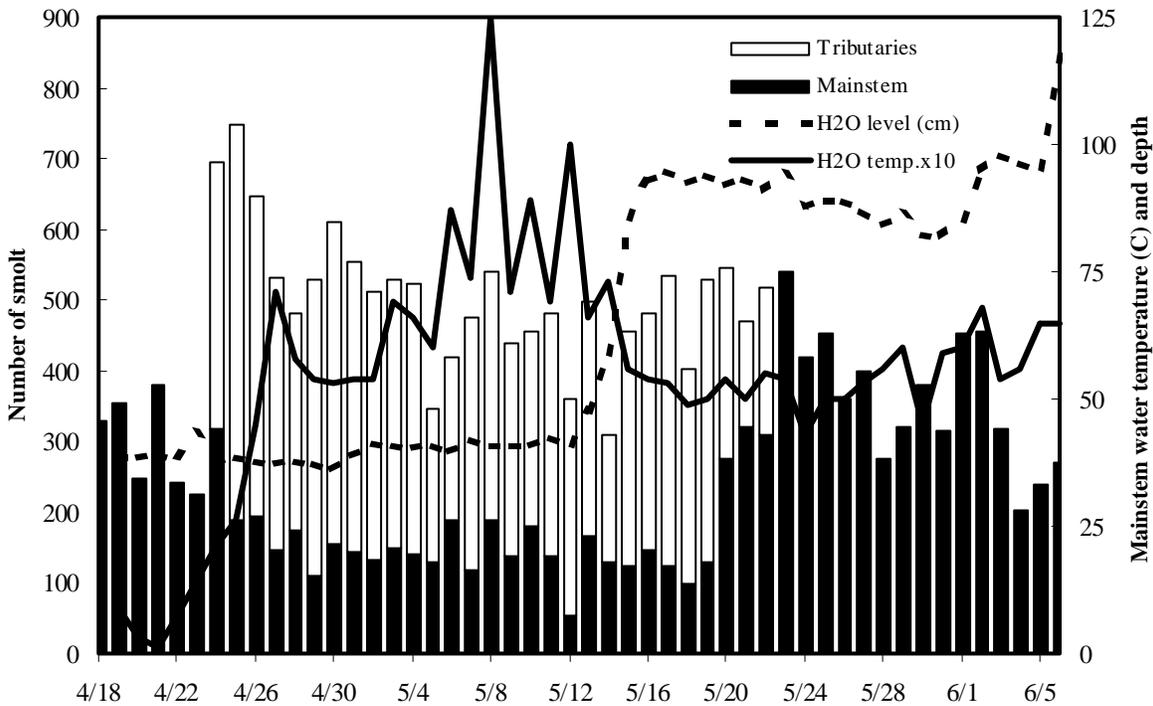
Tag code	Location	Species	Last date	Tagged	24h morts	Marked	Shed tags	Valid CWTs
04-01-23	Chilkat River	coho	06/02/99	10,076	37	10,039	10	10,029
04-01-34	Chilkat River	coho	06/07/99	2,008	10	1,998	0	1,998
04-01-24	Chilkat tributaries	coho	05/24/99	9,816	16	9,800	29	9,771
04-01-28	Chilkat Lake	coho	06/07/99	4,175	97	4,078	0	4,078
<b>Coho subtotal</b>				26,075	160	25,915	39	25,876
04-01-25	Chilkat River	chinook	06/07/99	780	9	771	0	771

Chilkat River mainstem were similar ( $\chi^2 = 0.317$ ,  $df = 1$ ,  $P = 0.574$ ). Therefore, those samples were pooled to estimate age composition for emigrant smolt in 1999 (Table 4). Age 1 dominated the catch (82.9%) of smolt in the lower river. In contrast, most (51.3%) of those caught at the Chilkat Lake outlet were age 2. Those sampled at the Chilkat Lake outlet were also larger on average (116 mm FL, 15.1g) than those sampled at the lower river sites (83mm, 6.1g, Table 4, Figure 5).

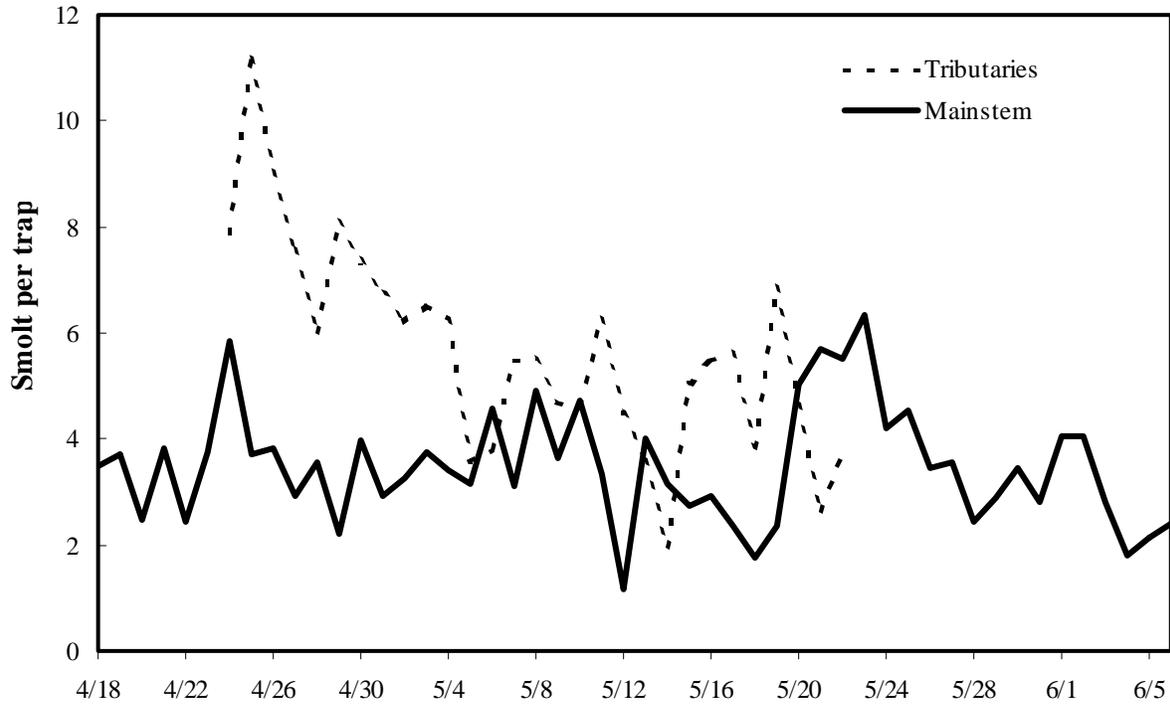
I fit the smolt weight-length model to 564 pairs of weight length data (Figure 6). Parameter estimates for this model were  $\alpha = -10.8$  (SE = 0.104) and  $\beta = 2.84$  (SE = 0.024).

**ESTIMATE OF  $\Theta$  AND SMOLT ABUNDANCE**

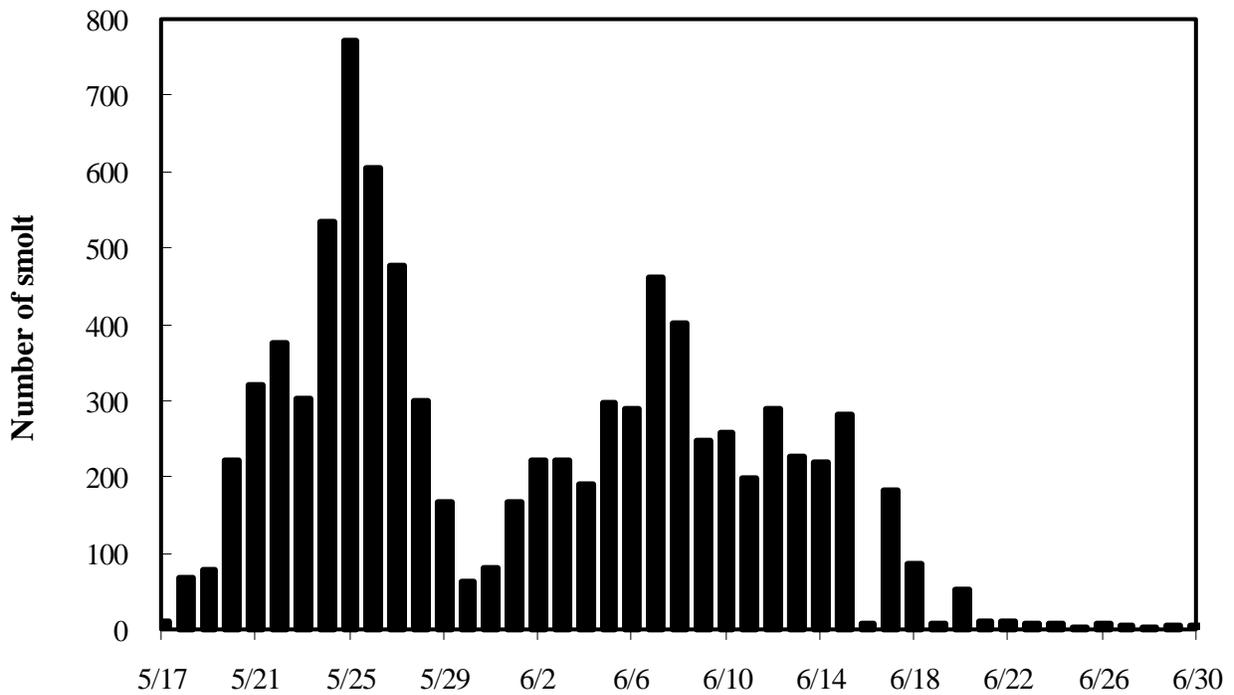
We captured a total of 1,495 adult coho salmon during 2000 in fish wheels operating in the lower Chilkat River and examined them for missing



**Figure 2.—Daily water depth (cm), temperature (°C) x 10, and catches of coho salmon smolt  $\geq 70$  mm by area in the lower Chilkat River, April 18 through June 6, 1999.**



**Figure 3.**—Average daily catch of coho salmon smolt  $\geq 70$  mm per trap, by trapping area in the lower Chilkat River, April 18 through June 6, 1999.



**Figure 4.**—Daily catch of coho salmon smolt  $\geq 70$  mm at the outlet to Chilkat Lake, May 17 through June 30, 1999. Data provided by Northern Southeast Aquaculture Association.

**Table 4.—Estimated age and size composition of juvenile coho salmon  $\geq 70$  mm FL marked in the Chilkat River drainage, by capture site, 1999.**

		Age 1		Age 2		Total aged	Total sampled <sup>a</sup>
<b>Chilkat mainstem</b>	Sample size	236		46		282	290
	Percent (SE)	83.7	(2.2)	16.3	(2.2)		
	Mean length (SE)	80	(0.6)	101	(2.6)		84 (0.8)
	Mean weight (SE)	5.4	(0.1)	10.3	(0.9)		6.2 (0.2)
<b>Chilkat tributaries</b>	Sample size	147		33		180	189
	Percent (SE)	81.7	(2.9)	18.3	(2.9)		
	Mean length (SE)	79	(0.7)	99	(2.2)		83 (0.9)
	Mean weight (SE)	5.0	(0.1)	10.1	(0.7)		5.9 (0.2)
<b>Lower sites combined</b>	<b>Sample size</b>	<b>383</b>		<b>79</b>		<b>462</b>	<b>479</b>
	<b>Percent (SE)</b>	<b>82.9</b>	(1.8)	<b>17.1</b>	(1.8)		
	<b>Mean length (SE)</b>	<b>80</b>	(0.4)	<b>100</b>	(1.8)		<b>83</b> (0.6)
	<b>Mean weight (SE)</b>	<b>5.2</b>	(0.1)	<b>10.2</b>	(0.6)		<b>6.1</b> (0.2)
<b>Chilkat Lake</b>	Sample size	37		39		76	85
	Percent (SE)	48.7	(5.8)	51.3	(5.8)		
	Mean length (SE)	101	(1.3)	128	(2.0)		116 (1.9)
	Mean weight (SE)	9.8	(1.6)	19.5	(0.9)		15.1 (0.7)

<sup>a</sup> Includes fish that were not assigned an age.

adipose fins (Figure 7, Table 5). Twenty-nine (29) were missing their adipose fin and were sacrificed to search for CWTs (Table 5). Twenty-six (26) contained tags implanted during 1999: 13 contained tags from the Chilkat River mainstem, 6 from the lower river tributaries, and 7 from Chilkat Lake. In addition, one head was lost prior to shipment to the tag lab, and two had no tags (Table 5).

Seven hundred sixty (760) coho salmon caught at the fish wheels were sampled for scales, and 657 were successfully aged (Table 6): 629 (95.7%) of these were aged as age 1.1 or 2.1 (1-ocean). On the basis of these data, I estimate that 1,431 of those captured in the fish wheels had emigrated as smolt during 1999.

Because marked fish were recovered with no tags, separate estimates of the marked fraction ( $\theta$ ) were used for estimating smolt abundance and harvest. For smolt abundance, all 1-ocean fish missing adipose fins (29) were considered marked. To estimate harvest, only fish with decoded tags and the lost fish were considered

marked (27). Both estimates of  $\theta$  were based on 1,431 1-ocean adult coho salmon inspected for marks in 2000. Thus,  $\theta_s = 0.0203$  (SE = 0.0037) for the smolt estimate, and  $\theta_h = 0.0189$  (SE = 0.0036) for the harvest estimate. I estimate that 1,237,056 (SE = 219,715) coho salmon smolt emigrated from the Chilkat River in 1999 ( $n_1 = 25,915$ ,  $n_2 = 1,431$ ,  $m_2 = 29$ ).

#### **CODED WIRE TAG RECOVERY**

In 2000, 265 CWTs with codes from Chilkat River were recovered from coho salmon during the random sampling of various sport and commercial harvests (Table 7, Appendix A1). This includes one coho salmon that was recovered with tag code 04-01-25 used for chinook salmon (Table 7). Most (148) tags were recovered in the NW quadrant commercial troll fishery (Figure 8), followed by recoveries in the Lynn Canal (District 115) commercial drift net fishery (107, Table 7). CWTs were also recovered in the NE quadrant troll fishery (3), the Inside purse seine fisheries (3), and the Juneau marine sport fishery (4).

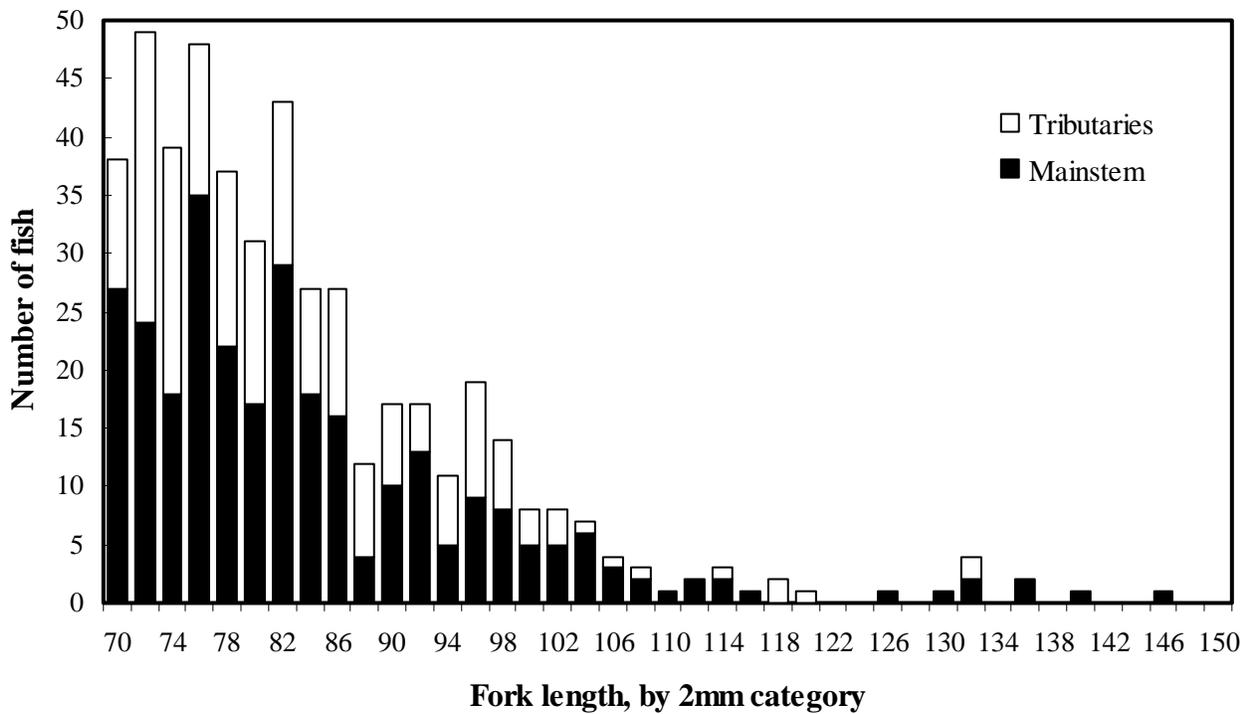
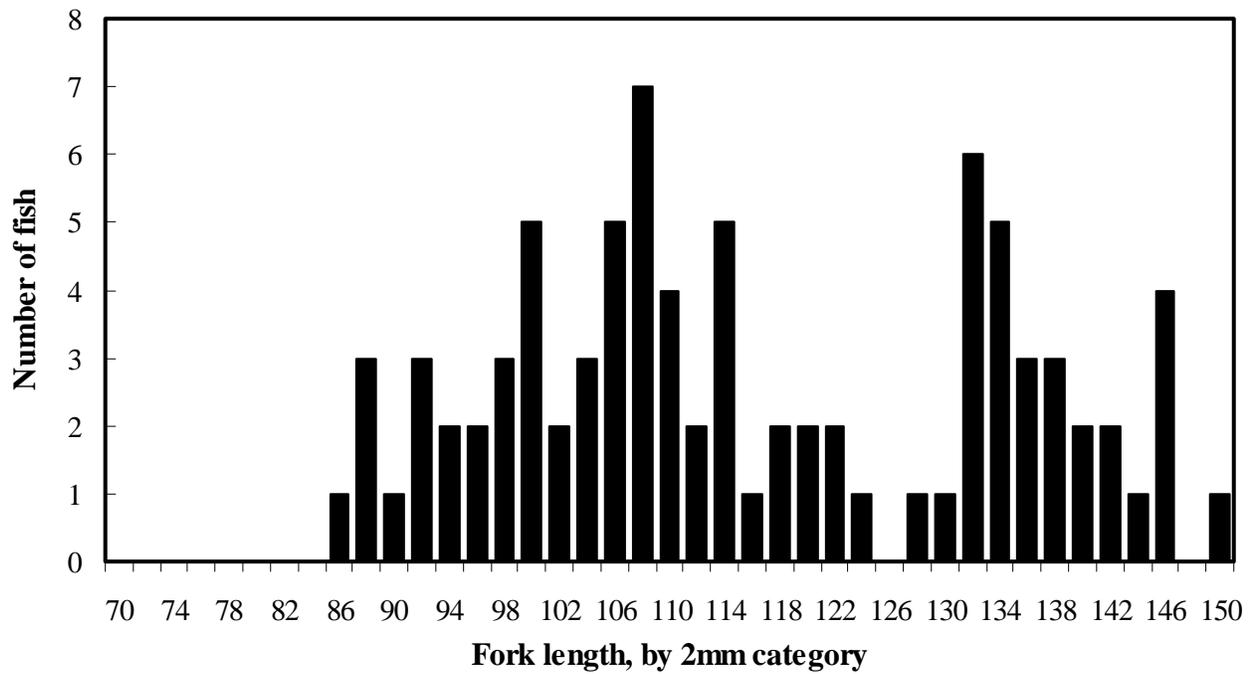


Figure 5.—Length frequency of coho salmon smolt  $\geq 70$  mm sampled from the lower Chilkat River sites (top) and the Chilkat Lake outlet (bottom), 1999.

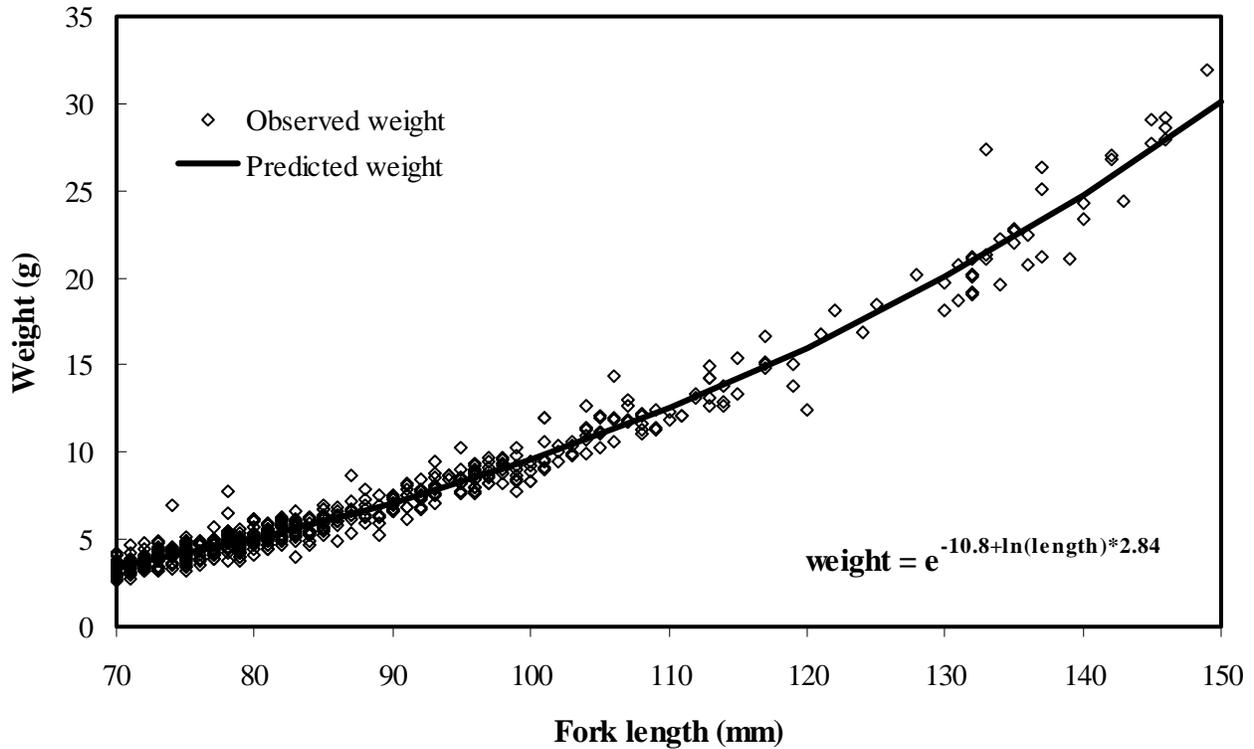


Figure 6.—Sampled weight and length and predicted weight from the weight-length model of Chilkat River coho salmon smolt in 1999.

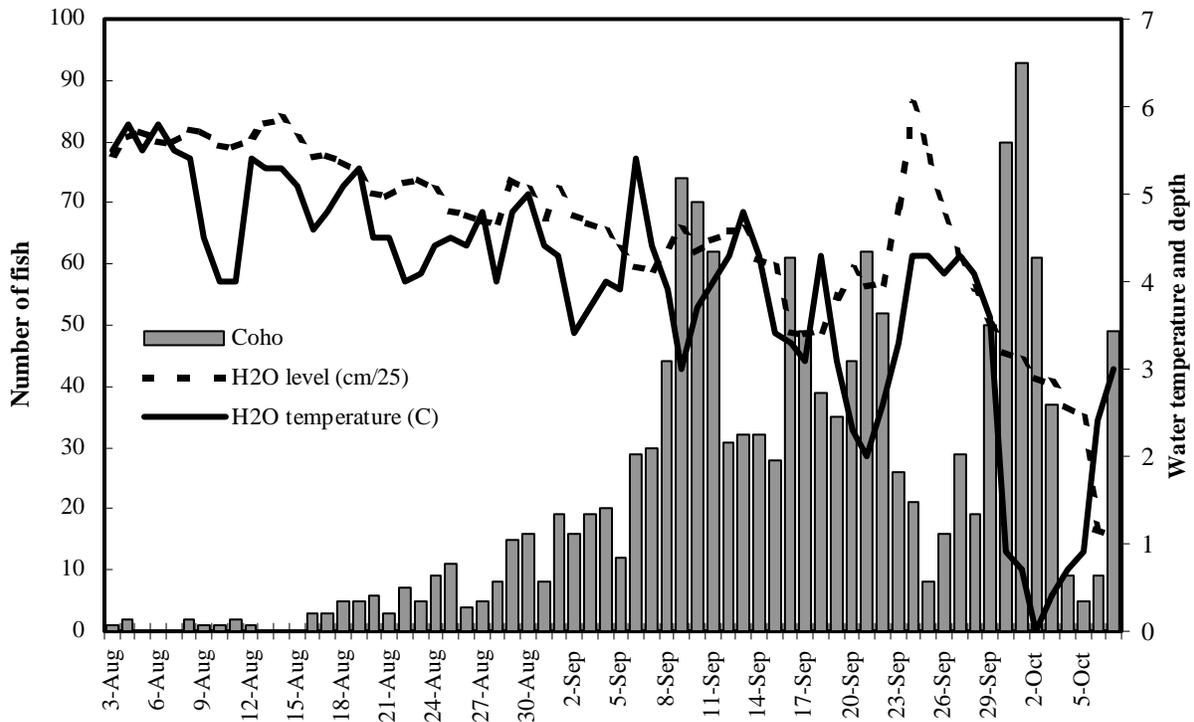


Figure 7.—Daily water depth (cm/25), temperature (°C), and fish wheel catch of adult coho salmon in the lower Chilkat River, August 3 through October 7, 2000.

**Table 5.—Number of adult coho salmon sampled in the Chilkat River fish wheels for missing adipose fins and coded wire tags, 2000.**

Statistical week	Coho salmon			Tag location and code				Total ad clips	Percent marked	
	0-ocean	1-ocean	Total	Mainstem 04-01-23, 04-01-34	Tributaries 04-01-24	Chilkat Lake 04-01-28	No tag			Head lost
32	3	0	3						0	
33	1	6	7						0	0.0
34	1	15	16						0	0.0
35	0	45	45	1	1				2	4.4
36	4	83	87						0	0.0
37	9	219	228	4	1	1			6	2.7
38	27	289	316	2	3	1			6	2.1
39	7	300	307	5		2			7	2.3
40	7	216	223					1	1	0.5
41	5	258	263	1	1	3	2		7	2.7
Total	64	1,431	1,495	13	6	7	2	1	29	2.0

**Table 6.—Estimated age and size composition of coho salmon captured in the Chilkat River fish wheels, 2000.**

	Brood year and age class				Total aged	Total sampled
	1998	1997	1997	1996		
	1.0	2.0	1.1	2.1		
<b>Females</b>						
Sample size	0	0	194	93	287	333
Percent			67.6	32.4		43.8
SE			2.8	2.8		1.8
Mean length			635	658		
SE			3	5		
<b>Males</b>						
Sample size	5	23	249	93	370	427
Percent	1.4	6.2	67.3	25.1		56.2
SE	0.6	1.3	2.4	2.3		1.8
Mean length	332	320	605	640		
SE	14	5	6	8		
<b>All fish</b>						
Sample size	5	23	443	186	657	760
Percent	0.8	3.5	67.4	28.3		
SE	0.3	0.7	1.8	1.8		
Mean length	332	320	618	649		
SE	14	5	4	5		

Coho salmon bearing the different Chilkat River tag codes were recovered with similar relative frequencies in the Lynn Canal drift gillnet fishery

from August 13 to September 30, and in the Northwest Quadrant troll fishery from July 2 to September 23 (Table 7). This indicates that tagged fish mixed well in the ocean environment. The percent of tags recovered in these two fisheries was 97% for all tag codes, with 40% recovered in gillnet and 57% in the troll fisheries.

There were 19 select and voluntary recoveries of coho salmon bearing 1999 Chilkat River tag codes in 1999 and 2000 (Appendix A1). One juvenile fish was recovered by National Marine Fisheries Service on July 1, 1999 in a research trawl operating in Chatham Strait near the mouth of Icy Strait, and two 0-ocean fish were recovered in the Chilkat River escapement. Four adult coho salmon were voluntarily turned in from the troll fishery, and one from the Chilkat River sport fishery in 2000.

Eleven (11) juvenile coho salmon bearing 1999 Chilkat River tag codes were recovered in freshwater in 2000. Nine (9) were recovered in the Chilkat River tributaries, and two from the Berners River (a distance nearly 60 km by saltwater from the Chilkat River, Figure 8) during 2000. These results indicate that some coho salmon CWTd in 1999 held over a second year in fresh water before smolting in 2000.

**Table 7.–Random recoveries of CWTs from Chilkat River coho salmon by tag code, fishery, and statistical week, 2000.**

Statistical week	Dates	Tag code					Total
		04-01-23	04-01-34	04-01-24	04-01-28	04-01-25 <sup>a</sup>	
<b>District 115 Gillnet Fishery</b>							
34	08/13-08/19			1			1
35	08/20-08/26	8	1	7			16
36	08/27-09/02	13	1	13	12		39
37	09/03-09/09	4		2	3		9
38	09/10-09/16	4		0	1		5
39	09/17-09/23	7		7	5		19
40	09/24-09/30	4		5	8	1	18
Gillnet subtotal		40	2	35	29	1	107
<b>Northwest Quadrant Troll</b>							
28	07/02-07/08	1					1
29	07/09-07/15	1					1
30	07/16-07/22	3	1	2			6
31	07/23-07/29	3		2	1		6
32	07/30-08/05	2		2	2		6
33	08/06-08/12	5	1	6	2		14
34	08/13-08/19	3		2	2		7
35	08/20-08/26	2	1	2	2		7
36	08/27-09/02	16	2	11	8		37
37	09/03-09/09	13		8	4		25
38	09/10-09/16	6		9	4		19
39	09/17-09/23	6		7	6		19
NW troll subtotal		61	5	51	31	0	148
<b>Northeast Quadrant Troll</b>							
36	08/27-09/02	1					1
38	09/10-09/16	2					2
NE troll subtotal		3	0	0	0	0	3
<b>Juneau Sport Fishery</b>							
34	08/13-08/19	2					2
36	08/27-09/02	1					1
38	09/10-09/16				1		1
Juneau sport subtotal		3	0	0	1	0	4
<b>District 112 Purse Seine Fishery</b>							
34	08/13-08/19	2					2
<b>District 114 Purse Seine Fishery</b>							
38	09/10-09/16				1		1
Purse seine subtotal		2			1		3
<b>Total recoveries</b>		109	7	86	62	1	265
<b>Valid tags released</b>		10,029	1,998	9,771	4,078		25,876
<b>Percent gillnet</b>		36.7	28.6	40.7	46.8		40.4
<b>Percent troll</b>		58.7	71.4	59.3	50.0		57.0
<b>Percent gillnet &amp; troll</b>		95.4	100.0	100.0	96.8		97.4

<sup>a</sup> This tag code was used to tag chinook salmon smolt.

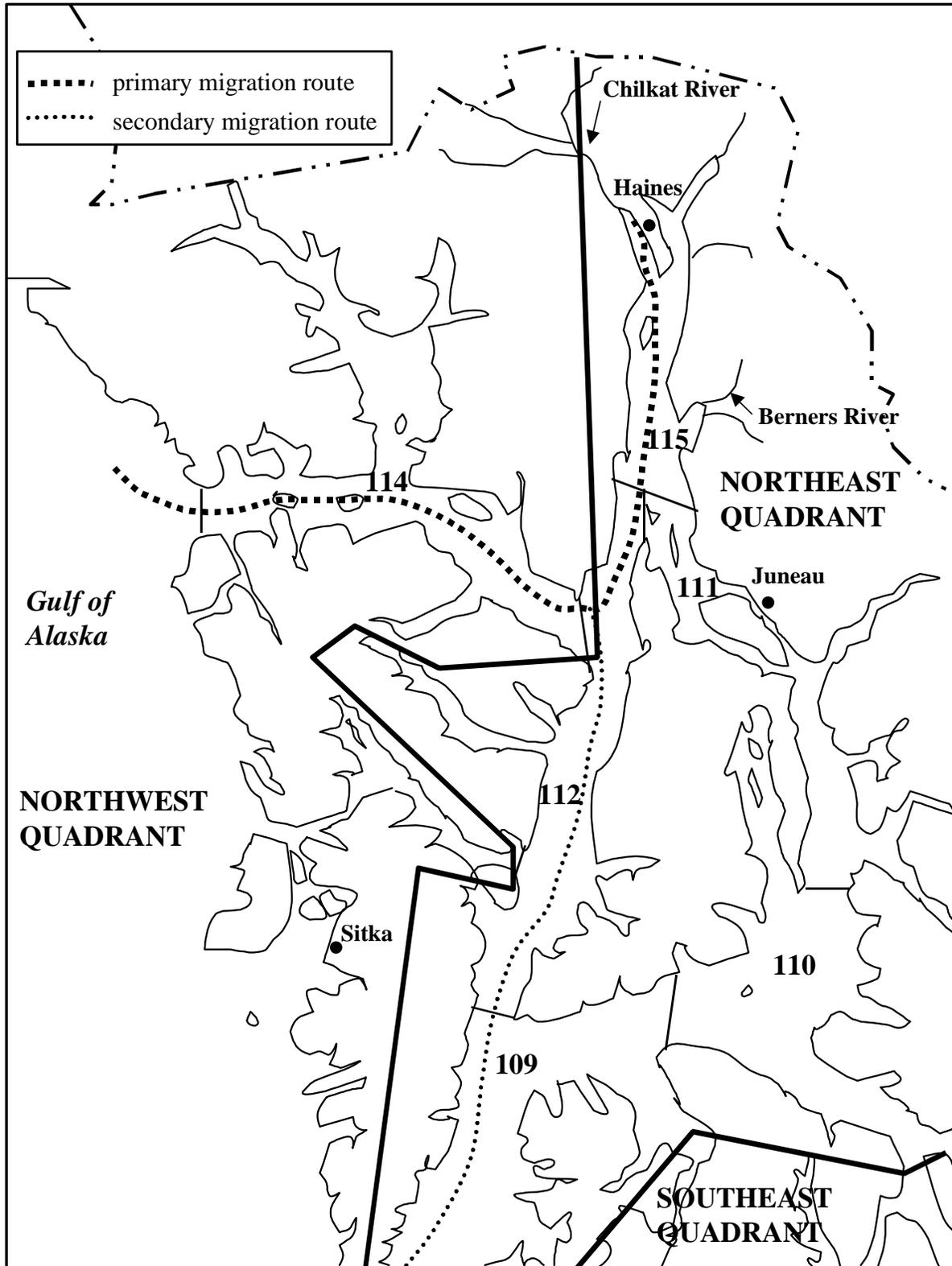


Figure 8.—Commercial troll quadrants and inside fishing districts in, and migration routes of Chilkat River coho salmon through northern Southeast Alaska.

## HARVEST

An estimated 39,546 (SE = 3,745) coho salmon bound for the Chilkat River were harvested in sampled marine commercial and sport fisheries in 2000 (Table 8). An additional 199 coho salmon were harvested in the Chilkat Inlet and Chilkat River subsistence fisheries, and 824 (SE = 232) in Haines area recreational fisheries, for a total harvest of 40,569 (SE = 3,752, Table 9). Most (54.3%) of the harvest (22,030, SE = 2,891) occurred in commercial troll fisheries (Table 9), followed (38.8%) by the Lynn Canal drift gillnet fishery (15,744, SE = 2,238). The remainder of

the harvests occurred in the recreational (4.3%), commercial seine (2.1%), and subsistence (0.5%) fisheries (Table 9). Harvests in the troll fisheries occurred earlier and over a longer period than in the other fisheries. Harvests in the troll fisheries occurred from early July through the third week of September (Figure 9). In contrast, harvest in the drift gillnet fishery occurred from mid-August through the end of September, and in the purse seine and Juneau sport fisheries from mid-August to mid-September (Figure 9). The estimated mean date of harvest in the Northwest quadrant troll fishery was August 30, compared to September 8 for the Lynn Canal gillnet fishery.

**Table 8.—Estimated marine harvest of adult coho salmon bound for the Chilkat River by fishery and temporal stratum, 2000.**

Fishery	Dist- rict	Stat. week <sup>a</sup>	Harvest	Var[H]	n	a	a'	t	t'	m <sub>c</sub>	Contribution			
											$\hat{r}$	SE[ $\hat{r}$ ]		
Lynn Canal gillnet	115	34	487	0	237	4	4	3	3	1	109	108		
Lynn Canal gillnet	115	35	2,276	0	2,631	36	26	24	24	16	1,016	314		
Lynn Canal gillnet	115	36	5,024	0	2,601	84	84	78	78	39	3,993	985		
Lynn Canal gillnet	115	37	7,217	0	1,001	39	39	36	36	9	3,439	1,301		
Lynn Canal gillnet	115	38	9,181	0	1,119	61	60	53	52	5	2,253	1,077		
Lynn Canal gillnet	115	39	5,631	0	2,409	168	160	156	155	19	2,487	732		
Lynn Canal gillnet	115	40	5,057	0	1,971	158	158	155	155	18 <sup>b</sup>	2,448	732		
<b>Lynn Canal gillnet subtotal</b>			34,873	0	11,969	550	531	505	503	107	15,744	2,238		
NW troll period 3			28-32	516,263	0	146,026	3,164	3,127	2,576	2,573	20	3,796	1,102	
NW troll period 4			33-34	128,318	0	45,686	1,147	1,138	945	944	21	3,154	903	
NW troll period 5			35-37	135,705	0	52,283	1,735	1,720	1,501	1,497	69	9,600	2,152	
NW troll period 6			38-39	33,409	0	13,063	504	499	442	441	38	5,214	1,293	
<b>NW troll subtotal</b>			813,695	0	257,058	6,550	6,484	5,464	5,455	148	21,765	2,887		
NE troll period 5			35-37	11,681	0	6,248	95	92	77	77	1	102	102	
NE troll period 6			38-39	998	0	650	23	23	19	19	2	163	116	
<b>NE troll subtotal</b>			12,679	0	6,898	118	115	96	96	3	265	155		
Purse seine			112	34	11,030	0	4,663	102	100	83	83	2	256	183
Purse seine			114	38	2,092	0	192	5	5	5	5	1	577	577
<b>Purse seine subtotal</b>			13,122	0	4,855	107	105	88	88	3	833	605		
Juneau marine sport			111	17	6,056	3,210,960	2,008	112	109	97	97	2	328	245
Juneau marine sport			112	18	3,073	755,275	1,212	58	54	51	51	1	144	144
Juneau marine sport			112	19	509	44,148	58	2	2	2	2	1	465	465
<b>Juneau marine sport subtotal</b>			9,638	4,010,383	3,278	172	165	150	150	4	938	545		
<b>Total</b>			884,007	4,010,383	284,058	7,497	7,400	6,303	6,292	265	39,546	3,745		

<sup>a</sup> Stratified by statistical week in all but the Juneau marine sport fishery, where a biweek stratum was used.

<sup>b</sup> Includes one coho salmon recovered with a code used for chinook salmon.

**Table 9.—Total coho salmon harvest and estimated Chilkat River coho salmon harvest in Alaska fisheries, by fishery and area, 2000.**

Fishery	Area	Coho salmon harvest			Percent of harvest	
		Total	Chilkat	SE	Fishery <sup>a</sup>	Chilkat <sup>b</sup>
<b>Drift gillnet</b>	District 115	34,940	15,744	2,238	45.1	38.8
<b>U.S. troll fishery</b>	NW Quadrant	813,695	21,765	2,887	2.7	53.6
	NE Quadrant	95,421	265	155	0.3	0.7
	Subtotal	909,116	22,030	2,891	2.4	54.3
<b>Seine fishery</b>	District 112	28,992	256	183	0.9	0.7
	District 114	4,038	577	577	14.3	1.4
	Subtotal	33,030	833	605	2.5	2.1
<b>Recreational</b>	Juneau marine	11,960	938	545	7.8	2.3
	Haines marine <sup>c</sup>	233	136	69	58.4	0.3
	Chilkat River <sup>c</sup>	688	688	221	100.0	1.7
	Subtotal	12,881	1,762	592	13.7	4.3
<b>Subsistence<sup>d</sup></b>	Chilkat Inlet	34	34	0	100.0	0.1
	Chilkat River	165	165	0	100.0	0.4
	Subtotal	199	199	0	100.0	0.5
<b>Total</b>		990,166	40,569	3,752	4.1	100.0

<sup>a</sup> Percent of Chilkat River coho salmon in the fishery harvest.

<sup>b</sup> Percent of the Chilkat River coho salmon harvest by the fishery.

<sup>c</sup> Walker et al. (*In prep*).

<sup>d</sup> Data taken from subsistence harvest reports (Division of Commercial Fisheries).

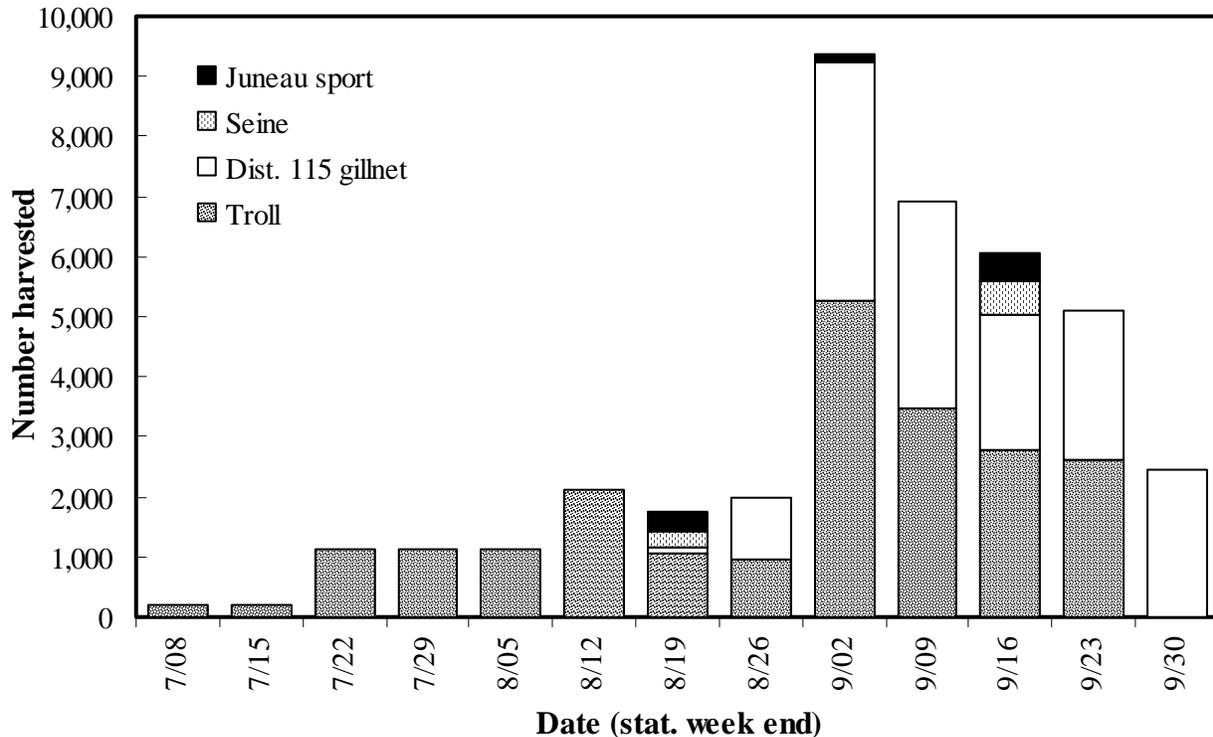
## DATA FILES

Data collected during this study (Appendix A2) have been archived in ADF&G offices in Haines, Douglas, and Anchorage.

## DISCUSSION

Several assumptions, as noted above, underlie our estimate of smolt abundance. It is unlikely that every smolt had an equal chance of being marked because trapping effort varied by area over the emigration (Table 2). In addition, coho smolt captured and marked from the Chilkat Lake outlet were clearly different in size from those marked in the lower river. However, sampling effort for adults in the fish wheels was relatively constant over time, tending to equalize probability of capture during the second sampling event. Also, the marked fraction of fish captured in the fish wheels varied very little

between the first (prior to statistical week 39) and second half of the run (Table 5,  $\chi^2 = 0.067$ ,  $df = 1$ ,  $P = 0.796$ ). This suggests that marked and unmarked fish mixed completely between sampling events. Thus, we believe that assumption a was satisfied. Although the population in this experiment was not closed to losses from mortality, it was closed to recruitment (assumption b), because salmon return to their natal stream to spawn. Because different capture gear was used during the first and second sampling events, it is unlikely that marking affected the catchability of fish (assumption c). Other studies have shown that marked coho smolt do not have significantly higher mortality than unmarked fish (Elliott and Sterritt 1990; Vincent-Lang 1993). Because all fish had secondary marks that were not lost, assumption (d) was satisfied. Personnel sampling the fish wheels carefully examined each fish for marks; therefore failure of assumption (e) is unlikely.



**Figure 9.—Estimated marine harvests of coho salmon bound for the Chilkat River, by fishery and statistical week, 2000.** Weekly estimates of harvest in the troll (period) and Juneau sport fisheries (biweek) are approximated.

One experimental difficulty experienced during this study was that some marked fish held over another year in fresh water. During our first day of tagging in 2000, we examined 648 smolt from the lower Chilkat River and 1,465 from the tributaries. None of those sampled from the river and 9 (0.6%) from the tributaries had previously been tagged in 1999 (Appendix A1). If a significant number of marked fish held over, our smolt estimate is biased high. We will have a better idea on the magnitude of this problem after the 2001 adult return. In 2000, we raised the minimum tagging length from 70 to 75 mm. In 1999, 22% of the coho we marked were less than 75 mm (Figure 5). Raising the minimum length will reduce or eliminate the number of holdovers in the future.

Two coho salmon smolt with 1999 Chilkat River tag codes were also recovered in 2000 from the Berners River (Appendix A1). These fish were both captured while exiting over a beaver dam

about 7 miles from salt water (Leon Shaul, Alaska Department of Fish and Game Commercial Fisheries Division, Douglas, personal communication). They were sacrificed as part of an age validation study. It is unknown whether these fish migrated to the Berners River (a distance of nearly 60 km in saltwater) during 1999 or in the spring of 2000. An adult coho salmon was recovered in the Chilkat River fish wheels in 1998 with a Berners River tag code (Erickson 1999). This fish may have also migrated from the Chilkat River to the Berners River where it was captured and tagged.

Different estimates of the marked fraction were necessary to estimate smolt abundance and harvest because 7% of the marked fish were recovered in the escapement without CWTs. While the marked fractions differ, they should be unbiased for their particular use. The secondary mark (adipose fin clip) was used for the smolt abundance estimate to avoid bias due to tag loss.

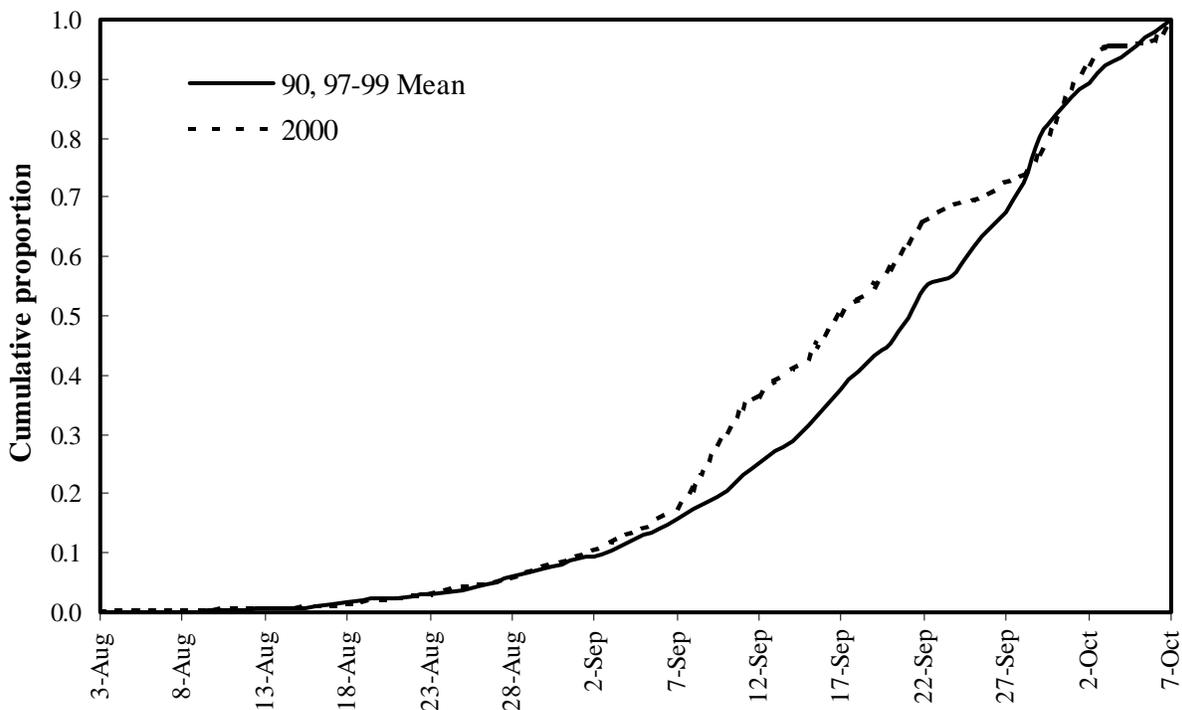
Only valid tags (and the lost head) were used to estimate harvest, because fisheries comprise mixed stocks that also have missing adipose fins. The lost head was included because we assumed that it had a high probability of holding a valid tag. The reason for the 7% loss of CWTs during the smolt to adult period is not obvious. However, some of the Chilkat Lake fish were so large that their heads would not fit the tagging molds and had to be manually injected. Although the 24 hour tag retention was 100% for this tag group, there may have been a higher long-term tag loss.

One coho salmon recovered in the Lynn Canal gillnet fishery was mistakenly tagged with a chinook salmon code (Table 7, Appendix A1). Chinook and coho salmon smolt are relatively similar in appearance. However, this does not appear to be a significant problem because so few fish were tagged with the chinook tag code and only one fish was recovered with the wrong code despite extensive sampling efforts.

A ‘white’ coho salmon was recovered in the Juneau marine sport fishery on September 10, 2000 with a Chilkat Lake tag code (head number 75100, Appendix A1). White fleshed chinook salmon are common in many drainages in Southeast Alaska, including the Chilkat River, but white coho salmon are relatively rare.

The timing of the coho salmon escapement into the Chilkat River was similar to, but somewhat earlier, than the mean of other years when the fish wheels were operated into October (1990 and 1997–1999). The mean date of migratory timing in 2000 (Mundy 1984) was September 17. In contrast, the mean date for past years was September 21 (Figure 10).

The percent of Chilkat River coho salmon in the harvest varied greatly, depending on the proximity of the fishery to the Chilkat River. Although we estimated that the NW troll fishery harvested the greatest number (22,030) of Chilkat River fish, they represented only 2.7% of



**Figure 10.**—Cumulative proportion of adult coho salmon captured in the Chilkat River during 2000 compared to the mean cumulative proportion of 1990, 1997, 1998, and 1999.

**Table 10.—Peak number of coho salmon counted in spawning index tributaries of the Chilkat River, 1987–2000, compared to mark-recapture estimates for the entire drainage in 1990 and 1998.**

	Peak survey counts					M-R estimate	SE	Ratio
	Spring Creek	Kelsall River	Tahini River	Clear Creek	Combined			
<b>1987</b>	84	84	696	23	987			
<b>1988</b>	83	152	539	35	809			
<b>1989</b>	48	182	981	134	1,345			
<b>1990</b>	79	328	2,448	150	3,005	80,700	9,984	0.0372
<b>1991</b>	176	392	1,707	135	2,410			
<b>1992</b>	174	266	1,077	700	2,217			
<b>1993</b>	95	115	947	460	1,617			
<b>1994</b>	398	440	4,419	381	5,638			
<b>1995</b>	253	178	1,029	177	1,637			
<b>1996</b>	180	157	381	290	1,008			
<b>1997</b>	204	129	643	250	1,226			
<b>1998</b>	264	262	638	275	1,439	37,132	7,432	0.0388
<b>1999</b>	324	202	930	195	1,651			
<b>2000</b>	302	551	1,302	420	2,575			
<b>Average</b>	190	253	1,267	259	1,969	58,916		0.0380

this harvest (Table 9). The second largest harvest occurred in the Lynn Canal drift gillnet fishery (15,744) where Chilkat River fish represented 45.1% of the total harvest. As one might expect, fisheries closer to the Chilkat River had a higher percent of Chilkat River fish in the harvest because the mixture of stocks become less.

Estimates of the total harvest of Chilkat River coho salmon in 2000 should be considered minimum, because not all fisheries were sampled or were sampled at rates low enough to prevent detection of small harvests. For example, many smaller marine sport fisheries (including those in Icy Straits) were not sampled for coded wire tags. Thus, the contribution of various stocks to these fisheries can not be estimated.

I recommend that we estimate escapement of coho salmon to the Chilkat River during two or more years when CWTd fish are returning. This would allow us to estimate average marine survival and exploitation rates for this stock. At the present time, escapement is monitored through the peak counts of spawning coho salmon in four index tributaries to the Chilkat River (Table 10). Two years of mark-recapture experiments suggest that the proportion of coho salmon counted in the peak index counts (0.0372–0.0388) is similar over time (Table 10). If this

proportion held in 2000, about 68,000 coho salmon escaped into the Chilkat River and exploitation rate was about 37%. However, additional studies are needed to better validate these escapement indices. Estimating escapement during years when CWTs are coming back will present a complete stock assessment program and provide added validation of the escapement indices.

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in Juneau dissected heads from adipose finclipped coho salmon to remove and read coded wire tags. Bob Marshall with RTS in Douglas provided biometric support in the study design, and analysis. Bob Marshall and Scott McPherson provided critical review of this report. Alma Seward prepared the final layout and typesetting of this report for publication.

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## **APPENDIX A**



**Appendix A1.–Random, select, and voluntary recoveries of coho salmon that were coded-wire-tagged during the spring of 1999.** See text for explanation of notation.

Head number	Tag code	Gear	Recovery date	Stat. week	Quad-rant	Sub-Dist.	Sub-dist.	Length	H	n	a	a'	t	t'
<b>RANDOM RECOVERIES</b>														
501511	40124	Gillnet	08/17/00	34	NE	115		528	487	237	4	4	3	3
501751	40123	Gillnet	08/24/00	35	NE	115		593	2,276	2,631	36	26	24	24
500882	40123	Gillnet	08/24/00	35	NE	115		612	2,276	2,631	36	26	24	24
500888	40123	Gillnet	08/24/00	35	NE	115		615	2,276	2,631	36	26	24	24
500891	40123	Gillnet	08/24/00	35	NE	115		634	2,276	2,631	36	26	24	24
500885	40123	Gillnet	08/24/00	35	NE	115		639	2,276	2,631	36	26	24	24
500897	40123	Gillnet	08/24/00	35	NE	115		642	2,276	2,631	36	26	24	24
500899	40123	Gillnet	08/24/00	35	NE	115		751	2,276	2,631	36	26	24	24
501755	40123	Gillnet	08/24/00	35	NE	115		796	2,276	2,631	36	26	24	24
500890	40124	Gillnet	08/24/00	35	NE	115		517	2,276	2,631	36	26	24	24
500900	40124	Gillnet	08/24/00	35	NE	115		524	2,276	2,631	36	26	24	24
501754	40124	Gillnet	08/24/00	35	NE	115		599	2,276	2,631	36	26	24	24
500892	40124	Gillnet	08/24/00	35	NE	115		643	2,276	2,631	36	26	24	24
501752	40124	Gillnet	08/24/00	35	NE	115		645	2,276	2,631	36	26	24	24
500884	40124	Gillnet	08/24/00	35	NE	115		654	2,276	2,631	36	26	24	24
500886	40124	Gillnet	08/24/00	35	NE	115		785	2,276	2,631	36	26	24	24
500893	40134	Gillnet	08/24/00	35	NE	115		649	2,276	2,631	36	26	24	24
501720	40128	Gillnet	08/29/00	36	NE	115		517	5,024	2,601	84	84	78	78
501723	40128	Gillnet	08/29/00	36	NE	115		518	5,024	2,601	84	84	78	78
501713	40128	Gillnet	08/29/00	36	NE	115		730	5,024	2,601	84	84	78	78
501721	40128	Gillnet	08/29/00	36	NE	115		758	5,024	2,601	84	84	78	78
501718	40123	Gillnet	08/29/00	36	NE	115		534	5,024	2,601	84	84	78	78
501719	40123	Gillnet	08/29/00	36	NE	115		564	5,024	2,601	84	84	78	78
501717	40123	Gillnet	08/29/00	36	NE	115		626	5,024	2,601	84	84	78	78
501712	40123	Gillnet	08/29/00	36	NE	115		645	5,024	2,601	84	84	78	78
501711	40123	Gillnet	08/29/00	36	NE	115		790	5,024	2,601	84	84	78	78
501715	40124	Gillnet	08/29/00	36	NE	115		554	5,024	2,601	84	84	78	78
501716	40124	Gillnet	08/29/00	36	NE	115		616	5,024	2,601	84	84	78	78
501722	40124	Gillnet	08/29/00	36	NE	115		686	5,024	2,601	84	84	78	78
501724	40134	Gillnet	08/29/00	36	NE	115		567	5,024	2,601	84	84	78	78
144136	40124	Gillnet	08/29/00	36	NE	115		735	5,024	2,601	84	84	78	78
501934	40128	Gillnet	08/30/00	36	NE	115		555	5,024	2,601	84	84	78	78
501939	40128	Gillnet	08/30/00	36	NE	115		641	5,024	2,601	84	84	78	78
501941	40128	Gillnet	08/30/00	36	NE	115		653	5,024	2,601	84	84	78	78
501917	40128	Gillnet	08/30/00	36	NE	115		657	5,024	2,601	84	84	78	78
501904	40128	Gillnet	08/30/00	36	NE	115		690	5,024	2,601	84	84	78	78
501942	40128	Gillnet	08/30/00	36	NE	115		729	5,024	2,601	84	84	78	78
501981	40128	Gillnet	08/30/00	36	NE	115		746	5,024	2,601	84	84	78	78
501909	40128	Gillnet	08/30/00	36	NE	115		796	5,024	2,601	84	84	78	78
501911	40123	Gillnet	08/30/00	36	NE	115		550	5,024	2,601	84	84	78	78
501935	40123	Gillnet	08/30/00	36	NE	115		555	5,024	2,601	84	84	78	78
501948	40123	Gillnet	08/30/00	36	NE	115		599	5,024	2,601	84	84	78	78
501980	40123	Gillnet	08/30/00	36	NE	115		607	5,024	2,601	84	84	78	78
501924	40123	Gillnet	08/30/00	36	NE	115		645	5,024	2,601	84	84	78	78
501979	40123	Gillnet	08/30/00	36	NE	115		646	5,024	2,601	84	84	78	78
501921	40123	Gillnet	08/30/00	36	NE	115		652	5,024	2,601	84	84	78	78

-continued-

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Head number	Tag code	Gear	Recovery date	Stat. week	Quad-rant	Sub-Dist.	dist.	Length	H	n	a	a'	t	t'
501945	40123	Gillnet	08/30/00	36	NE	115		688	5,024	2,601	84	84	78	78
501905	40124	Gillnet	08/30/00	36	NE	115		485	5,024	2,601	84	84	78	78
501914	40124	Gillnet	08/30/00	36	NE	115		516	5,024	2,601	84	84	78	78
501903	40124	Gillnet	08/30/00	36	NE	115		544	5,024	2,601	84	84	78	78
501976	40124	Gillnet	08/30/00	36	NE	115		554	5,024	2,601	84	84	78	78
501907	40124	Gillnet	08/30/00	36	NE	115		580	5,024	2,601	84	84	78	78
501989	40124	Gillnet	08/30/00	36	NE	115		621	5,024	2,601	84	84	78	78
501978	40124	Gillnet	08/30/00	36	NE	115		708	5,024	2,601	84	84	78	78
501937	40124	Gillnet	08/30/00	36	NE	115		732	5,024	2,601	84	84	78	78
501938	40124	Gillnet	08/30/00	36	NE	115		784	5,024	2,601	84	84	78	78
501253	40128	Gillnet	09/06/00	37	NE	115		634	7,217	1,001	39	39	36	36
501277	40128	Gillnet	09/06/00	37	NE	115		705	7,217	1,001	39	39	36	36
501263	40128	Gillnet	09/06/00	37	NE	115		777	7,217	1,001	39	39	36	36
501260	40123	Gillnet	09/06/00	37	NE	115		681	7,217	1,001	39	39	36	36
501257	40123	Gillnet	09/06/00	37	NE	115		689	7,217	1,001	39	39	36	36
501284	40123	Gillnet	09/06/00	37	NE	115		773	7,217	1,001	39	39	36	36
501270	40123	Gillnet	09/06/00	37	NE	115		792	7,217	1,001	39	39	36	36
501262	40124	Gillnet	09/06/00	37	NE	115		721	7,217	1,001	39	39	36	36
501259	40124	Gillnet	09/06/00	37	NE	115		729	7,217	1,001	39	39	36	36
512517	40128	Gillnet	09/13/00	38	NE	115		573	9,181	1,119	61	60	53	52
512536	40123	Gillnet	09/13/00	38	NE	115		620	9,181	1,119	61	60	53	52
512531	40123	Gillnet	09/13/00	38	NE	115		639	9,181	1,119	61	60	53	52
512519	40123	Gillnet	09/13/00	38	NE	115		666	9,181	1,119	61	60	53	52
512504	40123	Gillnet	09/13/00	38	NE	115		683	9,181	1,119	61	60	53	52
500418	40128	Gillnet	09/19/00	39	NE	115		640	5,631	2,409	168	160	156	155
512363	40128	Gillnet	09/19/00	39	NE	115		675	5,631	2,409	168	160	156	155
512274	40128	Gillnet	09/19/00	39	NE	115		715	5,631	2,409	168	160	156	155
500398	40128	Gillnet	09/19/00	39	NE	115		772	5,631	2,409	168	160	156	155
512365	40128	Gillnet	09/19/00	39	NE	115		812	5,631	2,409	168	160	156	155
500419	40123	Gillnet	09/19/00	39	NE	115		676	5,631	2,409	168	160	156	155
500396	40123	Gillnet	09/19/00	39	NE	115		714	5,631	2,409	168	160	156	155
500385	40123	Gillnet	09/19/00	39	NE	115		716	5,631	2,409	168	160	156	155
500355	40123	Gillnet	09/19/00	39	NE	115		719	5,631	2,409	168	160	156	155
500372	40123	Gillnet	09/19/00	39	NE	115		739	5,631	2,409	168	160	156	155
500432	40123	Gillnet	09/19/00	39	NE	115		747	5,631	2,409	168	160	156	155
500415	40123	Gillnet	09/19/00	39	NE	115		780	5,631	2,409	168	160	156	155
500406	40124	Gillnet	09/19/00	39	NE	115		547	5,631	2,409	168	160	156	155
500371	40124	Gillnet	09/19/00	39	NE	115		656	5,631	2,409	168	160	156	155
500394	40124	Gillnet	09/19/00	39	NE	115		687	5,631	2,409	168	160	156	155
512291	40124	Gillnet	09/19/00	39	NE	115		690	5,631	2,409	168	160	156	155
512384	40124	Gillnet	09/19/00	39	NE	115		723	5,631	2,409	168	160	156	155
512381	40124	Gillnet	09/19/00	39	NE	115		775	5,631	2,409	168	160	156	155
500412	40124	Gillnet	09/19/00	39	NE	115		835	5,631	2,409	168	160	156	155
512442	40128	Gillnet	09/26/00	40	NE	115	10	641	5,057	1,971	158	158	155	155
512496	40128	Gillnet	09/26/00	40	NE	115	10	643	5,057	1,971	158	158	155	155
512457	40128	Gillnet	09/26/00	40	NE	115	10	652	5,057	1,971	158	158	155	155
512435	40128	Gillnet	09/26/00	40	NE	115	10	671	5,057	1,971	158	158	155	155
512709	40128	Gillnet	09/26/00	40	NE	115	10	679	5,057	1,971	158	158	155	155

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Head number	Tag code	Gear	Recovery date	Stat. week	Quad-rant	Dist.	Sub-dist.	Length	H	n	a	a'	t	t'
512447	40128	Gillnet	09/26/00	40	NE	115	10	691	5.057	1,971	158	158	155	155
512721	40128	Gillnet	09/26/00	40	NE	115	10	696	5.057	1,971	158	158	155	155
512475	40125	Gillnet	09/26/00	40	NE	115	10	678	5.057	1,971	158	158	155	155
512448	40123	Gillnet	09/26/00	40	NE	115	10	671	5.057	1,971	158	158	155	155
512410	40123	Gillnet	09/26/00	40	NE	115	10	696	5.057	1,971	158	158	155	155
512416	40123	Gillnet	09/26/00	40	NE	115	10	700	5.057	1,971	158	158	155	155
512413	40123	Gillnet	09/26/00	40	NE	115	10	728	5.057	1,971	158	158	155	155
512471	40124	Gillnet	09/26/00	40	NE	115	10	676	5.057	1,971	158	158	155	155
512492	40124	Gillnet	09/26/00	40	NE	115	10	699	5.057	1,971	158	158	155	155
512495	40124	Gillnet	09/26/00	40	NE	115	10	742	5.057	1,971	158	158	155	155
512701	40124	Gillnet	09/26/00	40	NE	115	10	744	5.057	1,971	158	158	155	155
512436	40124	Gillnet	09/26/00	40	NE	115	10	777	5.057	1,971	158	158	155	155
503514	40128	Gillnet	09/27/00	40	NE	115	10	736	5.057	1,971	158	158	155	155
501502	40123	Seine	08/16/00	34	NE	112	17	591	11.030	4,663	102	100	83	83
500971	40123	Seine	08/16/00	34	NE	112		591	11.030	4,663	102	100	83	83
512362	40128	Seine	09/14/00	38	NW	114	80	663	2.092	192	5	5	5	5
84312	40123	Sport	08/19/00	34	NE	111		600	6.056	2,008	112	109	97	97
84310	40123	Sport	08/19/00	34	NE	111		745	6.056	2,008	112	109	97	97
56830	40123	Sport	08/27/00	36	NE	112	15	750	3.073	1,212	58	54	51	51
75100	40128	Sport	09/10/00	38	NE	112	15	720	509	58	2	2	2	2
157425	40123	Troll	07/04/00	28	NW	113	21	529	516,263	146,026	3,164	3,127	2,576	2,573
157026	40123	Troll	07/14/00	29	NW	113	45	638	516,263	146,026	3,164	3,127	2,576	2,573
158518	40134	Troll	07/16/00	30	NW	113	95	530	516,263	146,026	3,164	3,127	2,576	2,573
135408	40124	Troll	07/18/00	30	NW	113	31	553	516,263	146,026	3,164	3,127	2,576	2,573
164379	40124	Troll	07/20/00	30	NW	156		643	516,263	146,026	3,164	3,127	2,576	2,573
135902	40123	Troll	07/21/00	30	NW	113	22	660	516,263	146,026	3,164	3,127	2,576	2,573
158597	40123	Troll	07/22/00	30	NW	116	11	585	516,263	146,026	3,164	3,127	2,576	2,573
158580	40123	Troll	07/22/00	30	NW	116	11	610	516,263	146,026	3,164	3,127	2,576	2,573
163525	40124	Troll	07/25/00	31	NW	116	11	715	516,263	146,026	3,164	3,127	2,576	2,573
164481	40123	Troll	07/25/00	31	NW	116	11	560	516,263	146,026	3,164	3,127	2,576	2,573
164461	40123	Troll	07/25/00	31	NW			690	516,263	146,026	3,164	3,127	2,576	2,573
135767	40128	Troll	07/26/00	31	NW	154		570	516,263	146,026	3,164	3,127	2,576	2,573
135988	40124	Troll	07/27/00	31	NW	154		539	516,263	146,026	3,164	3,127	2,576	2,573
157294	40123	Troll	07/28/00	31	NW	113		656	516,263	146,026	3,164	3,127	2,576	2,573
501021	40128	Troll	08/01/00	32	NW			656	516,263	146,026	3,164	3,127	2,576	2,573
158787	40128	Troll	08/02/00	32	NW	113	95	530	516,263	146,026	3,164	3,127	2,576	2,573
158765	40123	Troll	08/02/00	32	NW	113	95	705	516,263	146,026	3,164	3,127	2,576	2,573
55587	40124	Troll	08/02/00	32	NW	113	91	696	516,263	146,026	3,164	3,127	2,576	2,573
164674	40124	Troll	08/02/00	32	NW			646	516,263	146,026	3,164	3,127	2,576	2,573
500693	40123	Troll	08/04/00	32	NW			685	516,263	146,026	3,164	3,127	2,576	2,573
158857	40128	Troll	08/06/00	33	NW	113	95	700	128,318	45,686	1,147	1,138	945	944
158892	40128	Troll	08/07/00	33	NW	113	95	650	128,318	45,686	1,147	1,138	945	944
164767	40124	Troll	08/07/00	33	NW	113	91	627	128,318	45,686	1,147	1,138	945	944
158890	40124	Troll	08/08/00	33	NW	113	91	665	128,318	45,686	1,147	1,138	945	944
158889	40124	Troll	08/08/00	33	NW	113	91	670	128,318	45,686	1,147	1,138	945	944
501069	40123	Troll	08/09/00	33	NW			699	128,318	45,686	1,147	1,138	945	944
158985	40134	Troll	08/09/00	33	NW	113	95	590	128,318	45,686	1,147	1,138	945	944
163589	40123	Troll	08/10/00	33	NW	114	21	615	128,318	45,686	1,147	1,138	945	944

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Head number	Tag code	Gear	Recovery date	Stat. week	Quad-rant	Sub-Dist.	Sub-dist.	Length	H	n	a	a'	t	t'
158970	40123	Troll	08/10/00	33	NW	114	21	535	128,318	45,686	1,147	1,138	945	944
163596	40123	Troll	08/11/00	33	NW	113	91	675	128,318	45,686	1,147	1,138	945	944
163603	40123	Troll	08/11/00	33	NW	114	21	615	128,318	45,686	1,147	1,138	945	944
501155	40124	Troll	08/11/00	33	NW			744	128,318	45,686	1,147	1,138	945	944
155239	40124	Troll	08/12/00	33	NW			583	128,318	45,686	1,147	1,138	945	944
155246	40124	Troll	08/12/00	33	NW			741	128,318	45,686	1,147	1,138	945	944
164888	40123	Troll	08/13/00	34	NW	116	11	619	128,318	45,686	1,147	1,138	945	944
164885	40124	Troll	08/13/00	34	NW	116	11	802	128,318	45,686	1,147	1,138	945	944
142702	40128	Troll	08/13/00	34	NW			626	128,318	45,686	1,147	1,138	945	944
501048	40128	Troll	08/14/00	34	NW			664	128,318	45,686	1,147	1,138	945	944
500918	40123	Troll	08/14/00	34	NW			513	128,318	45,686	1,147	1,138	945	944
500944	40124	Troll	08/14/00	34	NW			648	128,318	45,686	1,147	1,138	945	944
500089	40123	Troll	08/14/00	34	NW	113	91	617	128,318	45,686	1,147	1,138	945	944
178112	40128	Troll	08/24/00	35	NW	113	95	745	135,705	52,283	1,735	1,720	1,501	1,497
178117	40123	Troll	08/24/00	35	NW	113	95	680	135,705	52,283	1,735	1,720	1,501	1,497
178081	40123	Troll	08/24/00	35	NW	114	25	600	135,705	52,283	1,735	1,720	1,501	1,497
178142	40124	Troll	08/25/00	35	NW	114	25	820	135,705	52,283	1,735	1,720	1,501	1,497
501952	40124	Troll	08/26/00	35	NW			577	135,705	52,283	1,735	1,720	1,501	1,497
178149	40134	Troll	08/26/00	35	NW	114	21	640	135,705	52,283	1,735	1,720	1,501	1,497
165054	40128	Troll	08/26/00	35	NW	113	91	757	135,705	52,283	1,735	1,720	1,501	1,497
165099	40123	Troll	08/27/00	36	NW	113	91	598	135,705	52,283	1,735	1,720	1,501	1,497
155651	40128	Troll	08/27/00	36	NW			686	135,705	52,283	1,735	1,720	1,501	1,497
155676	40123	Troll	08/27/00	36	NW			545	135,705	52,283	1,735	1,720	1,501	1,497
155660	40123	Troll	08/27/00	36	NW			663	135,705	52,283	1,735	1,720	1,501	1,497
155671	40124	Troll	08/27/00	36	NW			640	135,705	52,283	1,735	1,720	1,501	1,497
155702	40124	Troll	08/27/00	36	NW			737	135,705	52,283	1,735	1,720	1,501	1,497
163629	40123	Troll	08/28/00	36	NW	114	21	710	135,705	52,283	1,735	1,720	1,501	1,497
163633	40124	Troll	08/28/00	36	NW	114	21	760	135,705	52,283	1,735	1,720	1,501	1,497
501827	40128	Troll	08/28/00	36	NW			661	135,705	52,283	1,735	1,720	1,501	1,497
501624	40128	Troll	08/28/00	36	NW			706	135,705	52,283	1,735	1,720	1,501	1,497
501623	40123	Troll	08/28/00	36	NW			661	135,705	52,283	1,735	1,720	1,501	1,497
501636	40123	Troll	08/28/00	36	NW			772	135,705	52,283	1,735	1,720	1,501	1,497
501840	40124	Troll	08/28/00	36	NW			630	135,705	52,283	1,735	1,720	1,501	1,497
501833	40124	Troll	08/28/00	36	NW			741	135,705	52,283	1,735	1,720	1,501	1,497
178193	40123	Troll	08/28/00	36	NW	113	91	710	135,705	52,283	1,735	1,720	1,501	1,497
178276	40124	Troll	08/28/00	36	NW	113	91	585	135,705	52,283	1,735	1,720	1,501	1,497
165158	40123	Troll	08/28/00	36	NW	113	71	642	135,705	52,283	1,735	1,720	1,501	1,497
165131	40123	Troll	08/28/00	36	NW	113	91	622	135,705	52,283	1,735	1,720	1,501	1,497
503360	40123	Troll	08/29/00	36	NE	109	51	597	11,681	6,248	95	92	77	77
178328	40128	Troll	08/29/00	36	NW	113	95	680	135,705	52,283	1,735	1,720	1,501	1,497
178340	40123	Troll	08/29/00	36	NW	113	95	690	135,705	52,283	1,735	1,720	1,501	1,497
178267	40123	Troll	08/29/00	36	NW	116	11	775	135,705	52,283	1,735	1,720	1,501	1,497
165286	40124	Troll	08/29/00	36	NW	113	91	640	135,705	52,283	1,735	1,720	1,501	1,497
501227	40123	Troll	08/30/00	36	NW			784	135,705	52,283	1,735	1,720	1,501	1,497
178306	40123	Troll	08/30/00	36	NW	113	91	660	135,705	52,283	1,735	1,720	1,501	1,497
165415	40124	Troll	08/30/00	36	NW	156		657	135,705	52,283	1,735	1,720	1,501	1,497
165372	40124	Troll	08/30/00	36	NW	156		742	135,705	52,283	1,735	1,720	1,501	1,497
178351	40128	Troll	08/31/00	36	NW	114	25	670	135,705	52,283	1,735	1,720	1,501	1,497

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Head number	Tag code	Gear	Recovery date	Stat. week	Quad-rant	Sub-Dist.	Sub-dist.	Length	H	n	a	a'	t	t'
178347	40123	Troll	08/31/00	36	NW	114	25	795	135,705	52,283	1,735	1,720	1,501	1,497
165430	40124	Troll	08/31/00	36	NW	156		733	135,705	52,283	1,735	1,720	1,501	1,497
501356	40128	Troll	09/01/00	36	NW			721	135,705	52,283	1,735	1,720	1,501	1,497
501479	40128	Troll	09/01/00	36	NW			812	135,705	52,283	1,735	1,720	1,501	1,497
501481	40123	Troll	09/01/00	36	NW			677	135,705	52,283	1,735	1,720	1,501	1,497
501495	40123	Troll	09/01/00	36	NW			692	135,705	52,283	1,735	1,720	1,501	1,497
501476	40124	Troll	09/01/00	36	NW			655	135,705	52,283	1,735	1,720	1,501	1,497
501498	40134	Troll	09/01/00	36	NW			604	135,705	52,283	1,735	1,720	1,501	1,497
501472	40134	Troll	09/01/00	36	NW			725	135,705	52,283	1,735	1,720	1,501	1,497
162206	40128	Troll	09/01/00	36	NW			765	135,705	52,283	1,735	1,720	1,501	1,497
178418	40123	Troll	09/04/00	37	NW	114	21	720	135,705	52,283	1,735	1,720	1,501	1,497
178394	40123	Troll	09/04/00	37	NW	114	25	620	135,705	52,283	1,735	1,720	1,501	1,497
178409	40123	Troll	09/04/00	37	NW	114	25	735	135,705	52,283	1,735	1,720	1,501	1,497
178417	40124	Troll	09/04/00	37	NW	114	21	605	135,705	52,283	1,735	1,720	1,501	1,497
178411	40124	Troll	09/04/00	37	NW	114	25	660	135,705	52,283	1,735	1,720	1,501	1,497
501893	40128	Troll	09/05/00	37	NW			707	135,705	52,283	1,735	1,720	1,501	1,497
512342	40128	Troll	09/05/00	37	NW			795	135,705	52,283	1,735	1,720	1,501	1,497
501884	40124	Troll	09/05/00	37	NW			775	135,705	52,283	1,735	1,720	1,501	1,497
178435	40123	Troll	09/05/00	37	NW	113	95	700	135,705	52,283	1,735	1,720	1,501	1,497
178458	40123	Troll	09/05/00	37	NW	113	95	785	135,705	52,283	1,735	1,720	1,501	1,497
178427	40123	Troll	09/05/00	37	NW	114	25	715	135,705	52,283	1,735	1,720	1,501	1,497
178422	40124	Troll	09/05/00	37	NW	114	25	685	135,705	52,283	1,735	1,720	1,501	1,497
156680	40123	Troll	09/05/00	37	NW	113	91	668	135,705	52,283	1,735	1,720	1,501	1,497
156798	40124	Troll	09/05/00	37	NW			701	135,705	52,283	1,735	1,720	1,501	1,497
501350	40128	Troll	09/07/00	37	NW			652	135,705	52,283	1,735	1,720	1,501	1,497
501330	40123	Troll	09/07/00	37	NW			629	135,705	52,283	1,735	1,720	1,501	1,497
500803	40123	Troll	09/07/00	37	NW			688	135,705	52,283	1,735	1,720	1,501	1,497
501345	40123	Troll	09/07/00	37	NW			745	135,705	52,283	1,735	1,720	1,501	1,497
500822	40124	Troll	09/07/00	37	NW			702	135,705	52,283	1,735	1,720	1,501	1,497
501344	40124	Troll	09/07/00	37	NW			723	135,705	52,283	1,735	1,720	1,501	1,497
500824	40124	Troll	09/07/00	37	NW			753	135,705	52,283	1,735	1,720	1,501	1,497
178463	40123	Troll	09/07/00	37	NW	114	25	590	135,705	52,283	1,735	1,720	1,501	1,497
165537	40128	Troll	09/07/00	37	NW	113	91	648	135,705	52,283	1,735	1,720	1,501	1,497
178479	40123	Troll	09/08/00	37	NW	114	25	660	135,705	52,283	1,735	1,720	1,501	1,497
500826	40123	Troll	09/09/00	37	NW			589	135,705	52,283	1,735	1,720	1,501	1,497
500262	40123	Troll	09/11/00	38	NE	112	63	767	998	650	23	23	19	19
178524	40123	Troll	09/11/00	38	NW	114	25	770	33,409	13,063	504	499	442	441
178521	40124	Troll	09/11/00	38	NW	114	25	655	33,409	13,043	504	499	442	441
500258	40123	Troll	09/11/00	38	NW	113	91	645	33,409	13,043	504	499	442	441
165589	40123	Troll	09/11/00	38	NW			660	33,409	13,043	504	499	442	441
165568	40124	Troll	09/11/00	38	NW	113	91	700	33,409	13,043	504	499	442	441
165570	40124	Troll	09/11/00	38	NW	113	91	785	33,409	13,043	504	499	442	441
165561	40124	Troll	09/11/00	38	NW	114	21	680	33,409	13,043	504	499	442	441
178557	40128	Troll	09/12/00	38	NW			640	33,409	13,043	504	499	442	441
156212	40124	Troll	09/12/00	38	NW	114		578	33,409	13,043	504	499	442	441
178572	40123	Troll	09/13/00	38	NE	112	63	600	998	650	23	23	19	19
163732	40128	Troll	09/13/00	38	NW	114	21	742	33,409	13,043	504	499	442	441
163735	40123	Troll	09/13/00	38	NW	114	21	750	33,409	13,043	504	499	442	441

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Head number	Tag code	Gear	Recovery date	Stat. week	Quad-rant	Sub-Dist.	Sub-dist.	Length	H	n	a	a'	t	t'
512354	40123	Troll	09/13/00	38	NW			746	33,409	13,043	504	499	442	441
512357	40123	Troll	09/13/00	38	NW			752	33,409	13,043	504	499	442	441
178578	40128	Troll	09/13/00	38	NW	114	21	610	33,409	13,043	504	499	442	441
165605	40124	Troll	09/13/00	38	NW	114	21	652	33,409	13,043	504	499	442	441
178579	40128	Troll	09/14/00	38	NW	114	25	650	33,409	13,043	504	499	442	441
165649	40124	Troll	09/14/00	38	NW	114	21	652	33,409	13,043	504	499	442	441
165627	40124	Troll	09/14/00	38	NW			648	33,409	13,043	504	499	442	441
165625	40124	Troll	09/14/00	38	NW			735	33,409	13,043	504	499	442	441
165728	40124	Troll	09/17/00	39	NW	113	91	730	33,409	13,043	504	499	442	441
178600	40128	Troll	09/18/00	39	NW	114	25	635	33,409	13,043	504	499	442	441
178635	40123	Troll	09/18/00	39	NW	114	25	725	33,409	13,043	504	499	442	441
178641	40123	Troll	09/18/00	39	NW	114	25	725	33,409	13,043	504	499	442	441
178601	40124	Troll	09/18/00	39	NW	114	25	625	33,409	13,043	504	499	442	441
178627	40124	Troll	09/18/00	39	NW	114	25	705	33,409	13,043	504	499	442	441
165674	40128	Troll	09/18/00	39	NW			642	33,409	13,043	504	499	442	441
165666	40128	Troll	09/18/00	39	NW			742	33,409	13,043	504	499	442	441
165668	40123	Troll	09/18/00	39	NW			674	33,409	13,043	504	499	442	441
165691	40124	Troll	09/18/00	39	NW			548	33,409	13,043	504	499	442	441
178657	40124	Troll	09/20/00	39	NW	114	25	645	33,409	13,043	504	499	442	441
178665	40124	Troll	09/20/00	39	NW	114	25	690	33,409	13,043	504	499	442	441
165821	40128	Troll	09/21/00	39	NW			722	33,409	13,043	504	499	442	441
165810	40128	Troll	09/21/00	39	NW			740	33,409	13,043	504	499	442	441
165838	40123	Troll	09/21/00	39	NW			641	33,409	13,043	504	499	442	441
165847	40123	Troll	09/21/00	39	NW			677	33,409	13,043	504	499	442	441
165834	40123	Troll	09/21/00	39	NW			766	33,409	13,043	504	499	442	441
151984	40128	Troll	09/21/00	39	NW	116	12	662	33,409	13,043	504	499	442	441
503506	40124	Troll	09/22/00	39	NW	114	25	606	33,409	13,043	504	499	442	441
90668	40124	Esc. Surv.	08/22/00	35	NE	115	32	480						
90669	40123	Esc. Surv.	08/24/00	35	NE	115	32	660						
90670	40123	Esc. Surv.	09/04/00	37	NE	115	32	630						
90664	40128	Esc. Surv.	09/08/00	37	NE	115	32	495						
182209	40123	Esc. Surv.	09/09/00	37	NE	115	32	565						
90700	40123	Esc. Surv.	09/09/00	37	NE	115	32	605						
182208	40123	Esc. Surv.	09/09/00	37	NE	115	32	620						
182210	40124	Esc. Surv.	09/09/00	37	NE	115	32	450						
182211	40123	Esc. Surv.	09/10/00	38	NE	115	32	670						
182212	40123	Esc. Surv.	09/11/00	38	NE	115	32	392						
182213	40124	Esc. Surv.	09/11/00	38	NE	115	32	550						
182214	40124	Esc. Surv.	09/11/00	38	NE	115	32	680						
182215	40124	Esc. Surv.	09/12/00	38	NE	115	32	655						
90676	40128	Esc. Surv.	09/15/00	38	NE	115	32	565						
90677	40123	Esc. Surv.	09/17/00	39	NE	115	32	583						
90685	40128	Esc. Surv.	09/18/00	39	NE	115	32	630						
90684	40123	Esc. Surv.	09/18/00	39	NE	115	32	690						
90686	40123	Esc. Surv.	09/20/00	39	NE	115	32	640						
90687	40128	Esc. Surv.	09/21/00	39	NE	115	32	567						
90688	40123	Esc. Surv.	09/21/00	39	NE	115	32	600						
90689	40123	Esc. Surv.	09/23/00	39	NE	115	32	505						

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Head number	Tag code	Gear	Recovery date	Stat. week	Quad-rant	Dist.	Sub-dist.	Length
182217	40128	Esc. Surv.	10/01/00	41	NE	115	32	650
182218	40123	Esc. Surv.	10/01/00	41	NE	115	32	530
182219	No tag	Esc. Surv.	10/01/00	41	NE	115	32	598
182216	Lost	Esc. Surv.	10/02/00	41	NE	115	32	600
182221	40128	Esc. Surv.	10/02/00	41	NE	115	32	630
182220	40128	Esc. Surv.	10/02/00	41	NE	115	32	645
182222	40124	Esc. Surv.	10/03/00	41	NE	115	32	680
182223	No tag	Esc. Surv.	10/07/00	41	NE	115	32	605
<b>SELECT RECOVERIES</b>								
164950	40128	Troll	08/13/00	34	NW			
148693	40123	Troll	08/30/00	36	NW	116	11	
148695	40124	Troll	08/30/00	36	NW	116	11	
154486	40123	Troll						
90653	40128	Esc. Surv.	09/13/99	38	NE	115	32	322
90654	40128	Esc. Surv.	10/06/99	41	NE	115	32	290
<b>VOLUNTARY RECOVERIES</b>								
	40123	Berners Smolt	05/17/00	21	NE	115	20	126
	40134	Berners Smolt	05/26/00	22	NE	115	20	127
182233	40123	Chilkat Smolt	04/19/00	17	NE	115	32	90
182229	40123	Chilkat Smolt	04/19/00	17	NE	115	32	95
182226	40123	Chilkat Smolt	04/19/00	17	NE	115	32	98
182232	40124	Chilkat Smolt	04/19/00	17	NE	115	32	90
182228	40124	Chilkat Smolt	04/19/00	17	NE	115	32	97
182227	40124	Chilkat Smolt	04/19/00	17	NE	115	32	100
182225	40124	Chilkat Smolt	04/19/00	17	NE	115	32	123
182231	40134	Chilkat Smolt	04/19/00	17	NE	115	32	84
182230	40134	Chilkat Smolt	04/19/00	17	NE	115	32	93
182224	40128	Inriver Sport	10/22/00	44	NE	115	32	
99050009	40128	NMFS Survey	07/01/99	27	NE	114	25	203

**Appendix A2.–Computer files used in the analysis of data for this report.**

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<b>FILE NAME</b>	<b>DESCRIPTION</b>
99SmoltCWT.xls	Excel workbook containing 1999 Chilkat River coho salmon smolt trapping and coded wire tagging data.
99smoltawl.xls	Excel workbook containing 1999 Chilkat River coho salmon smolt age-weight-length data.
99smoltest.xls	Excel workbook used to estimate 1999 Chilkat River coho salmon smolt emigration.
00FWCohoAWL.xls	Excel workbook containing Chilkat River fish wheel coho salmon catch and age-length sample data.
Allcwtrecoveries.xls	Excel workbook containing recovery data and harvest estimates of Chilkat River coho salmon tagged as smolt during 1999.

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