Fishery Data Series No. 03-28

Production of Coho Salmon from the Chilkat River, 2001–2002

by

Randolph P. Ericksen

December 2003

Alaska Department of Fish and Game Division of Sport Fish

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
metric ton	mt
milliliter	ml
millimeter	mm

Weights and measures (English)

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

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
hour (spell out for 24-hour clock)	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	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

all commonly accepted abbreviations.	e.g., Mr., Mrs., a.m., p.m., etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
and	&
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
et alii (and other people)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.,
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
number (before a number)	# (e.g., #10)
pounds (after a number)	# (e.g., 10#)
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S. state and District of Columbia abbreviations	use two-letter abbreviations (e.g., AK, DC)

Mathematics, statistics, fisheries

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	C.I.
correlation coefficient	R (multiple)
correlation coefficient	r (simple)
covariance	cov
degree (angular or temperature)	°
degrees of freedom	df
divided by	÷ or / (in equations)
equals	=
expected value	E
fork length	FL
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.
mideye-to-fork	MEF
minute (angular)	'
multiplied by	x
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
standard length	SL
total length	TL
variance	var

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TABLE OF CONTENTS

	Page
LIST OF TABLES	ii
LIST OF FIGURES	ii
LIST OF APPENDICES	ii
ABSTRACT	1
INTRODUCTION	1
METHODS	2
Smolt Capture, Sampling, and Marking	2
Lower River Adult Sampling and Marking	4
Spawning Ground Recovery	4
Abundance Estimates	4
Age, Sex, and Size Compositions	5
Harvest	6
Run Size, Exploitation Rate, and Marine Survival	7
RESULTS	7
2001 Smolt Tagging, Age and Size	7
2002 Lower River Adult Sampling	8
Smolt Abundance	10
Coded Wire Tag Recovery	10
Harvest	10
Inriver Abundance	13
Age and Sex Composition of the Inriver Run	15
Marine Exploitation and Survival	16
Data Files	20
DISCUSSION	20
ACKNOWLEDGMENTS	24
LITERATURE CITED	24
APPENDIX A	27

LIST OF TABLES

Table **Page**

1. Number of traps checked and smolt caught and tagged in the Chilkat River drainage by time period, April 17 through May 28, 2001 7
2. Summary of coded wire tagging data in the Chilkat River drainage during the spring of 2001 8
3. Estimated age and size composition of coho salmon smolt ≥75 mm FL marked in the Chilkat River, 2001 8
4. Number of adult coho salmon sampled in the lower Chilkat River for missing adipose fins and coded wire tags, 2002 9
5. Estimated age, sex, and size composition of coho salmon captured in Chilkat River fish wheels, 2002 10
6. Random marine recoveries of CWTs from Chilkat River coho salmon by tag code, fishery, and statistical week, 2002 11
7. Estimated marine harvest of adult coho salmon bound for the Chilkat River by fishery and temporal stratum, 2002 13
8. Total coho salmon harvest and estimated Chilkat River coho salmon harvest in Alaska fisheries, by fishery and area, 2002 14
9. Number of coho salmon captured in the lower Chilkat River and marked by temporal strata and size class, July 30 through October 25, 2002 15
10. Number of coho salmon inspected for marks and number of marked fish recaptured during mark recovery surveys in the Chilkat River by site, size class, and sex, 2002 16
11. Number of marked coho salmon released into the lower Chilkat River and number recaptured by marking period and recovery site, and examined for marks at each recovery site by size class, 2002 19
12. Pooled number of coho salmon marked by stratum, recovered by marking stratum and recovery area, and examined for marks by recovery area and size class in the Chilkat River drainage, 2002 20
13. Estimated abundance of coho salmon in the Chilkat River by size class, 2002 20
14. Estimated age composition of coho salmon captured in Chilkat River fish wheels by size class, 2002 21
15. Estimated abundance of coho salmon in the Chilkat River by age, sex, and size class, 2002 21
16. Estimated stock assessment parameters for coho salmon that emigrated from the Chilkat River in 2001 22
17. Peak number of coho salmon counted in spawning index tributaries of the Chilkat River, 1987–2002, mark-recapture estimates of large coho for the entire drainage in 1990, 1998 and 2002, and the fraction counted in peak surveys 22

LIST OF FIGURES

Figure **Page**

1. Map of the Chilkat River drainage showing location of sampling sites 3
2. Daily water depth (cm), temperature (°C × 8), and catches of coho salmon smolt ≥75 mm in the Chilkat River, April 17 through May 29, 2001 8
3. Daily water depth (cm/23), temperature (^{o}C), and fish wheel catch of adult coho salmon in the lower Chilkat River by size, July 30 through October 19, 2002 9
4. Commercial troll quadrants and migration routes of Chilkat River coho salmon through northern Southeast Alaska 12
5. Estimated marine harvest of coho salmon bound for the Chilkat River by fishery and statistical week, 2002 14
6. Cumulative distribution function of MEF lengths of coho salmon marked in the lower Chilkat River versus lengths of marked fish recaptured on the spawning grounds and versus lengths of fish examined for marks on the spawning grounds, 2002 17
7. Cumulative distribution function of MEF lengths of small and large coho salmon marked in the lower Chilkat River versus lengths of marked fish recaptured on the spawning grounds, 2002 18
8. Cumulative proportion of adult coho salmon captured in Chilkat River fish wheels during 2002 compared to the mean cumulative proportion of 1990 and 1997–2001 23

LIST OF APPENDICES

Appendix **Page**

A1. Random, select, and voluntary recoveries in 2002 of coho salmon CWT'd in the Chilkat River 28
A2. Computer files used in the analysis of data for this report 38

ABSTRACT

The purpose of this study was to conduct a full stock assessment of Chilkat River coho salmon *Oncorhynchus kisutch*. Coho salmon smolt were captured in the Chilkat River during spring 2001, 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 recreational and commercial fisheries harvests throughout Southeast Alaska during 2002. Adult coho salmon were sampled in the Chilkat River to determine the marked fraction to enable us to estimate the 2001 coho smolt emigration and the 2002 harvest of adult coho salmon in sampled marine fisheries. In addition, the inriver abundance of coho salmon to the Chilkat River in 2002 was estimated by using a mark-recapture experiment. Fish were marked in the lower Chilkat River with individually numbered solid-core spaghetti tags and batch marks, and later sampled upriver near spawning grounds to recover tags and estimate marking fractions.

We marked and released 36,114 coho salmon smolt ≥75 mm (FL) during spring 2001 with an adipose finclip and a CWT. Most (86.7%, SE = 1.6%) of the smolt emigrating were age-1. We captured a total of 4,934 adult coho salmon aged-1.1 or -2.1 in fish wheels operating in the lower Chilkat River during 2002 and sampled them for marks; 59 of these were marked as smolt in 2001. On the basis of these data, we estimated that 2,970,458 (SE = 377,695) coho salmon smolt emigrated from the Chilkat River in 2001.

In 2002, 352 CWTs with Chilkat River tag codes were recovered from coho salmon during the random sampling of various recreational and commercial harvests. An estimated 113,993 (SE = 10,3823) coho salmon bound for the Chilkat River were harvested in commercial, recreational, and subsistence fisheries in 2002. Most (55.3%) of the harvest occurred in the commercial troll fishery (63,056, SE = 8,452), followed (38.0%) by the Lynn Canal drift gillnet fishery (43,296, SE = 5,848). The remainder of the harvests occurred in the recreational (5.5%), commercial seine (0.7%), and subsistence (0.5%) fisheries.

Between July 30 and October 25, 2002, we marked 4,589 coho salmon in the lower Chilkat River. We examined 7,512 coho salmon in upriver locations of the Chilkat River drainage, and 221 of these were marked. A Darroch estimator, stratified by fish size, was used to estimate that 209,311 (SE = 31,174) coho salmon immigrated into the Chilkat River during 2002. The majority of these fish (170,550, SE = 26,587) were classified as large (≥ 500 mm MEF) fish. We estimated that 166,321 of these fish were age-1.1 (1999 brood year), and 42,354 were age-2.1 (1998 brood year). Most (120,715, SE = 19,743) were males.

The marine survival rate (smolt-to-adult) was estimated at 10.7% (SE = 1.8%) and marine exploitation rate at 34.6% (SE = 1.4%) for this stock.

Key words: abundance, escapement, mark-recapture, coded wire tag, harvest, contribution, subsistence fishery, recreational fishery, troll fishery, drift gillnet fishery, seine fishery, age composition, size composition, sex composition, length-at-age, marine survival, exploitation rate, coho salmon, *Oncorhynchus kisutch*, Chilkat River, Haines, Southeast Alaska

INTRODUCTION

The purpose of this study was to conduct a full stock assessment 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 principles.

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 equally popular with local and non-local anglers—52% of anglers who fished in fresh water during 2000 were nonresidents (Walker et al. 2003). The Chilkat River produces most of the coho salmon harvested in Haines area recreational 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 (Howe et al. 1995–1996, 2001a-d, Mills 1979–1994, Walker et al. 2003). This stock also contributes a significant number (more than 40,000 per year) of fish to the commercial troll, gillnet, and seine fisheries in northern Southeast Alaska (Elliott and Kuntz 1988, Shaul et al. 1991, Ericksen 2001–2002a).

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 km² (Bugliosi 1988).

The Chilkat River is the third or fourth largest producer of coho salmon in Southeast Alaska (Scott McPherson, Alaska Department of Fish and Game, Douglas, personal communication). Research conducted during the 1980s on coho salmon stocks in Lynn Canal (including the Chilkat River), concluded that these stocks have, at times, been subjected to very high (over 85%) exploitation rates (Elliott and Kuntz 1988, Shaul et al. 1991).

The current management program for Chilkat River coho salmon relies on monitoring of spawning escapements on four index streams: Clear Creek, Spring Creek, Tahini River, and Kelsall River (Figure 1). Alaska Department of Fish and Game (ADF&G) personnel survey the index streams by foot or boat on a weekly basis during peak spawning and count the number of adult coho salmon. 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 2 years. The estimated escapement was 80,700 (SE = 9,984, Dangel et al. *Unpublished*) in 1980 and 37,132 (SE = 7,432, Ericksen 1999) in 1998.

This was the third consecutive study designed to monitor the cycle of smolt production and subsequent adult harvest of Chilkat River coho salmon. During each of the first two cycles, approximately 1.2 million smolt emigrated from the Chilkat River and contributed about 40,000 adults to commercial, sport, and subsistence fisheries (Ericksen 2001–2002a). Research objectives for this study were to:

1. estimate the number of coho salmon smolt leaving the Chilkat River in 2001;
2. estimate the age composition of coho salmon smolt leaving the Chilkat River in 2001;
3. estimate the escapement of coho salmon to the Chilkat River in 2002;
4. estimate the age, sex and length composition of large adult coho salmon entering the Chilkat River in 2002; and
5. estimate the marine harvest of Chilkat River coho salmon in sampled fisheries in 2002.

METHODS

Coho salmon smolt were captured in the mainstem of the Chilkat River during spring 2001 and marked with an adipose finclip and a coded wire tag (CWT). Adult coho salmon were sampled for CWTs in recreational and commercial fisheries harvests throughout Southeast Alaska in 2002. In addition, returning adult coho salmon were sampled in the Chilkat River in 2002 to determine the marked fraction for estimating the 2001 coho smolt emigration and the harvest of adult coho salmon in sampled fisheries in 2002.

We used a mark-recapture experiment to estimate the number of adult coho salmon returning to the Chilkat River in 2002. Marks were applied to coho salmon captured in the lower Chilkat River from July 30 through October 25, between the area adjacent to Haines Highway miles 8 and 9 (Figure 1). Coho salmon were marked with a uniquely numbered solid-core spaghetti tag and a hole punch in the upper left operculum prior to release. Fish were examined for marks on spawning tributaries of the Chilkat River between September 20 and November 21. The marked to unmarked ratio obtained from tributaries sampled was used to estimate abundance.

SMOLT CAPTURE, SAMPLING, AND MARKING

Smolt were captured in the mainstem of the Chilkat River from the airport upstream to approximately Haines Highway milepost (MP) 21 during spring 2001 (Figure 1). Two crews of two people fished an average of 98 G-40 minnow traps per day between April 17 and May 28. 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 capture site. Remaining fish were transported to holding boxes for

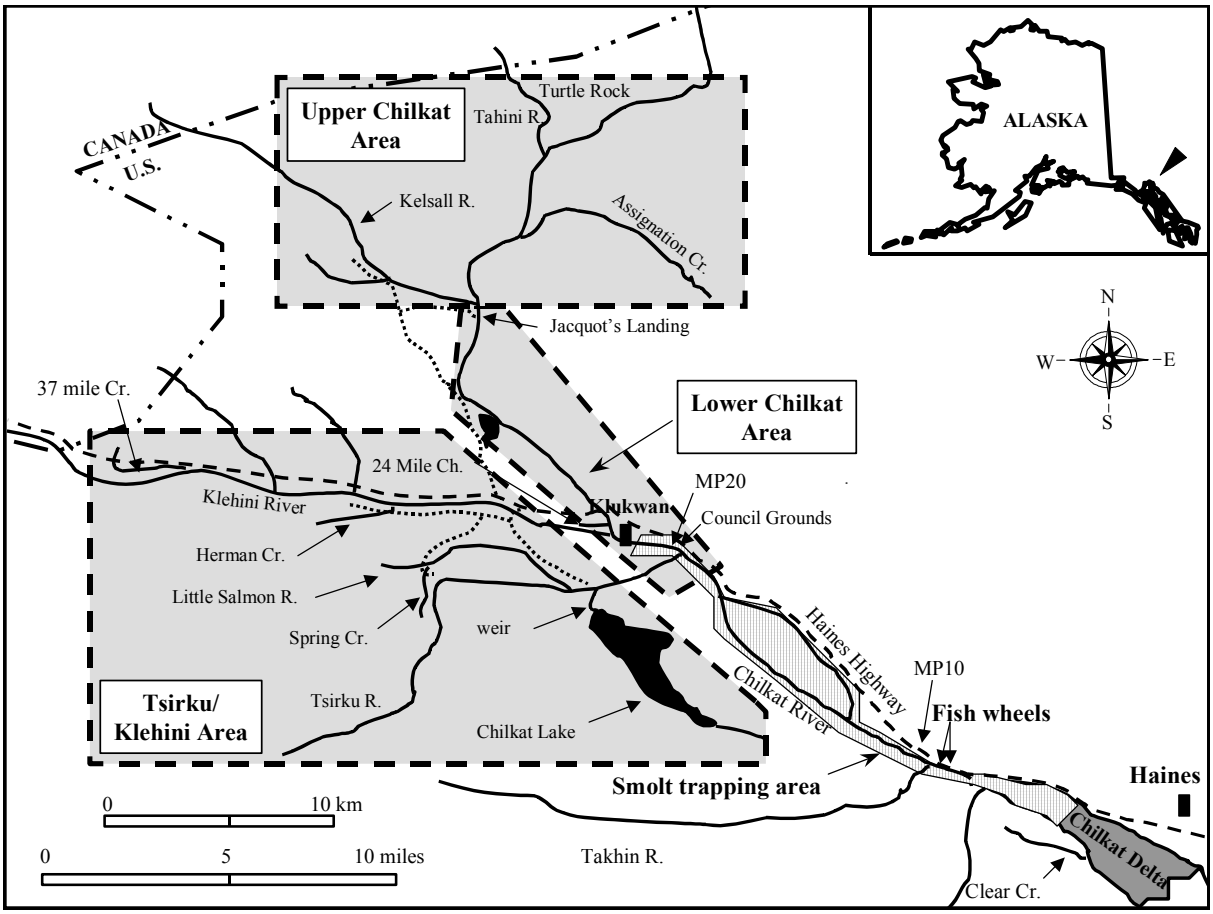

Figure 1.–The Chilkat River drainage, showing location of sampling sites.

processing at the tagging site located on the bank of the Chilkat River adjacent to the Haines Highway mile 19. Water depth (cm), and temperature (°C) were recorded each morning near the tagging site.

All healthy juvenile coho ≥75 mm fork length (FL) were marked with an adipose finclip and given a CWT following the methods in Koerner (1977). Fish were first tranquilized in a solution of tricain-methane sulfanate (MS 222) buffered with sodium bicarbonate.

Every 80th coho salmon smolt tagged was measured to the nearest mm FL, weighed to the nearest g, and scale sampled (for age). Twelve 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 × 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 100 fish in the previous day's catch were checked for the retention of CWTs and mortality. If tag retention was 98/100 or greater, mortalities were counted and all live fish from that batch were released. If tag retention was less than 98/100, 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 (CFD) Tag Lab in Juneau at the completion of the field season.

LOWER RIVER ADULT SAMPLING AND MARKING

Returning coho salmon were captured in fish wheels operating adjacent to the Haines Highway MP 9 (Figure 1) during 2002. CFD personnel installed two 3-basket aluminum fish wheels in early June to estimate escapement of coho, sockeye *O. nerka*, chinook *O. tshawytscha*, and chum salmon *O. keta*, to the Chilkat River. One fish wheel operated adjacent to the Haines Highway near highway MP 9, and the other about 300 m downstream of the first. The fish wheels were operated continuously from June 5 through October 19, 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. In addition, a set gill net was fished adjacent to MP 7.5 on October 24 and 25 after fish wheel operations were discontinued. Water depth (cm), and temperature (°C) were recorded each morning near highway MP 8.

Captured coho salmon were visually examined to estimate sex, measured to the nearest mm mideye-to-fork (MEF), and inspected for missing adipose fins. A scale sample was systematically collected from every third coho salmon captured through September 11, and from every sixth coho salmon from September 12 to October 25. 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 that were not assigned an age were classified as 1-ocean-age fish (emigrated as smolt in 2001) if they were 350 mm or greater MEF.

Coho salmon captured in good condition (not directly injured during capture) were marked with a uniquely numbered solid-core spaghetti tag sewn at the posterior end of the dorsal fin through the pterygiophores and had a ¼-inch hole punched in the upper edge of the left operculum prior to release. Beginning August 25, coho salmon were also given a temporal mark (alternating clips to the left and right pectoral fin or axillary appendage or a partial dorsal finclip) to allow the abundance estimate to be stratified over time in the event of significant tag loss. During the peak of the immigration (September 8-21) only every third marked coho salmon was given a tag to speed sampling; the untagged fish were given a left axillary appendage clip (in addition to the opercule punch and temporal marks) to differentiate them from fish which might lose their numbered tags.

Fish wheel personnel retained heads from all 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 lab database.

SPAWNING GROUND RECOVERY

Coho salmon in thirteen (13) spawning tributaries were sampled for marks by two teams of two people from October 2 to November 21. In addition, coho salmon caught incidental to chum salmon recovery efforts were sampled by CFD personnel, and by Northern Southeast Regional Aquaculture Association (NSRAA) personnel sampling sockeye salmon at the Chilkat Lake weir from September 20 through October 18. The sampling sites were initally classified into three distinct areas based upon a similar study conducted in 1998 (Figure 1, Ericksen 1999). The Upper Chilkat area was sampled October 2 to November 13. The Tsirku/Klehini area was sampled September 20 to November 19. The Lower Chilkat area was sampled September 26 to November 21. Coho salmon were captured with gillnets, seine nets, dip nets, snagging gear, and bare hands. All coho salmon were examined for marks and missing adipose fins, measured for length (MEF in mm), and sexed. Double sampling was prevented by punching a hole in the lower edge of the left operculum of all fish sampled during recovery efforts.

ABUNDANCE ESTIMATES

A two-event mark-recapture experiment was used to estimate the abundance of coho salmon smolt (N_s) emigrating from Chilkat River in 2001. The number of smolt marked during spring 2001

defined the first sampling event. Sampling returning adults for missing adipose fins during fall 2002 defined the second sampling event.

Smolt abundance (number emigrating) of coho salmon smolt was estimated using the Chapman's modified Petersen estimator for a closed population (Seber 1982):

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

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

where n_1 is the number of smolt marked in the spring of 2001, n_2 is the number of age-1.1 and -2.1 coho salmon captured in the Chilkat River fish wheels in 2002, and m_2 is the subset of n_2 which had been marked as coho smolt in 2001.

The escapement of coho salmon to the Chilkat River in 2002 (N_e) was also estimated using the Petersen model, if assumptions of the model were met (i.e., stratification by time of marking and/or recapture area was not required). A Darroch model (Seber 1982) was used otherwise.

The validity of the Petersen mark-recapture experiment rests on several assumptions: (a) that every fish has an equal probability of being marked during event 1, 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).

The validity of assumption (a) was tested through a series of hypothesis tests ($\alpha = 0.10$). First, the possibility of selective sampling was investigated because assumption (a) could be violated if the sampling rate varied by size of the fish. The hypothesis that fish of different sizes were captured with equal probability was tested with a Kolmogorov-Smirnov (K-S) 2-sample test comparing the size distribution of marked fish with those recaptured. If selective sampling was apparent the abundance estimate could be stratified by size and/or by sex. Next, an R×2 contingency table (chi-square statistic) was used to test the hypothesis that fish marked during R marking periods were recaptured at the same rate. Finally, a 2×C contingency table was used to test the hypothesis that fish sampled at C spawning tributaries were marked at the same rate. If either of these last two hypotheses was accepted, a simple Petersen model was appropriate to estimate abundance; otherwise a Darroch estimator was considered appropriate. If a Darroch model was needed, temporal and/or geographical strata were pooled to find admissible (non-negative) estimates, reduce the number of parameters, and increase precision while finding no evidence of lack of fit (Arnason et al. 1996). Two main points were considered when pooling strata: the similarity of the fractions of fish marked (for recovery strata) and the similarity of recovery fractions (for marking strata). Pooling of neighboring strata (temporal periods, or adjoining or adjacent stream reaches) was also considered to remove redundancy and to develop an intuitive basis for pooling. Other assumptions are considered in the Discussion section.

AGE, SEX, AND SIZE COMPOSITIONS

Age composition of coho salmon smolt in 2001 and age and sex compositions of adults in 2002 were estimated from systematically drawn samples as described above. Sex and length compositions were tabulated separately for adult fish in the lower river and in each escapement sampling area. Standard sample summary statistics were used to calculate estimates of mean length- and mean weight-at-age and their variances (Cochran 1977).

Size and sex selectivity was investigated by comparing the numbers of coho salmon by size and sex captured in the lower river and spawning ground samples with contingency table analysis ($\alpha = 0.10$). Age (or sex) composition of the escapement was obtained from pooled samples when no selectivity was found or from separate unbiased samples as appropriate. Proportions in the age [or sex] compositions and their variances were estimated as

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

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

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.

The abundance of sex s coho salmon by size class c in the escapement was estimated as:

$$\hat{N}_{c,s} = \hat{N}_c \hat{p}_{c,s} \tag{3a}$$

$$\begin{aligned} &\mathrm{var}[\hat{N}_{c,s}] = \\ &\mathrm{var}[\hat{p}_{c,s}]\hat{N}_c^2 + \mathrm{var}[\hat{N}_c]\hat{p}_{c,s}^2 - \mathrm{var}[\hat{p}_{c,s}]\mathrm{var}[\hat{N}_c] \end{aligned} \tag{3b}$$

where $\hat{N}_c$ is the estimated inriver abundance of size class c coho salmon. The abundance of age a coho salmon by sex in the escapement $\hat{N}_{c,s,a}$ was estimated by substituting $\hat{N}_{c,s}$ and $\hat{p}_{c,s,a}$ for $\hat{N}_c$ and $\hat{p}_{c,s}$ in equations 3a and 3b.

HARVEST

Harvest in 2002 of coho salmon originating from the Chilkat River was estimated from fish sampled for CWTs from catches in marine commercial and recreational fisheries and in the Chilkat River escapement for determining the tagged fraction θ_h.

The Southeast Alaska Commercial Fisheries Division Port Sampling program sampled landings from commercial drift gillnet, set gillnet, purse seine, and troll fisheries throughout Southeast Alaska and Yakutat. During summer and early fall, samplers were stationed at processors in Ketchikan, Craig, Wrangell, Petersburg, Sitka, Pelican, Port Alexander, Elfin Cove, Excursion Inlet, and Juneau. The sample goal was to inspect at least 20% of the total catch of chinook and coho salmon for missing adipose fins. Heads from fish missing their adipose fin were sent to the Coded Wire Tag laboratory in Juneau on a weekly basis where CWTs were removed and decoded, and the resulting information compiled.

The annual Commercial Fisheries Port Sampling manual (ADF&G, unpublished) provides a detailed explanation of commercial catch sampling procedures and logistics.

Because several fisheries exploited coho salmon over several months in 2002, 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. Hubartt et al. (1997) describe methods of sampling recreational fisheries in Southeast Alaska. Since there was no on-site sampling in the Haines area, the estimated harvest of Chilkat River coho salmon in the Haines marine and Chilkat River sport fisheries came from the Sport Fish Division's postal Statewide Harvest Study (SWHS). Harvests within the Chilkat River drainage were identified in the SWHS and summed to estimate the total inriver coho salmon harvest. The marine sport fishery estimates were restricted to locations in the SWHS near the terminus of the Chilkat River and all coho salmon harvested within these locations were assumed to be of Chilkat River origin.

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 carried a coded wire tag implanted at the Chilkat River.

Data from the catch and field sampling programs were used to estimate the harvest of coho salmon bound for the Chilkat River $\hat{r}_i$ and its variance (by stratum) using the procedures in Bernard and Clark (1996). Estimates of harvest were summed across strata and across fisheries to obtain an estimate of the total $\hat{T}$:

$$\hat{T} = \sum_i \hat{r}_i \tag{4a}$$

$$\mathrm{var}[\hat{T}] = \sum_i \mathrm{var}[\hat{r}_i] \tag{4b}$$

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 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 of which m_{ci} were identified as Chilkat River releases.

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:

$$\hat{P}_d = \frac{\hat{H}_d}{\sum_i H_i} \tag{5}$$

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:

$$\hat{\bar{d}} = \sum_{d=1}^{n} d\hat{P}_d \tag{6}$$

RUN SIZE, EXPLOITATION RATE, AND MARINE SURVIVAL

Run size (harvest plus escapement) of coho salmon returning to the Chilkat River in 2002 was estimated as:

$$\hat{N}_R = \hat{T} + \hat{N}_e \tag{7a}$$

$$\mathrm{var}[\hat{N}_R] = \mathrm{var}[\hat{T}] + \mathrm{var}[\hat{N}_e] \tag{7b}$$

The fraction of the run harvested (the exploitation rate) was calculated as:

$$\hat{E} = \frac{\hat{T}}{\hat{N}_R} \tag{8a}$$

$$\mathrm{var}[\hat{E}] \approx \frac{\mathrm{var}[\hat{T}]\hat{N}_e^2}{\hat{N}_R^4} + \frac{\mathrm{var}[\hat{N}_e]\hat{T}^2}{\hat{N}_R^4} \tag{8b}$$

where the variance is an approximation from the delta method (Seber 1982).

The estimated marine survival rate (smolt to adult) and the delta method approximation of its variance was calculated as:

$$\hat{S} = \frac{\hat{N}_R}{\hat{N}_s} \tag{9a}$$

$$\mathrm{var}[\hat{S}] \approx \hat{S}^2\left[\frac{\mathrm{var}[\hat{N}_R]}{\hat{N}_R^2} + \frac{\mathrm{var}[\hat{N}_s]}{\hat{N}_s^2}\right] \tag{9b}$$

RESULTS

2001 SMOLT TAGGING, AGE AND SIZE

We marked 36,204 coho salmon smolt ≥75 mm FL during the spring of 2001 with an adipose finclip and a CWT (Table 1). Ninety (90) of these died within 24h of tagging, leaving a total marked population of 36,114 (Table 2). An estimated 137 coho smolt shed their tags within 24h. In addition, we tagged 4,509 chinook salmon ≥50 mm, 3 of which died within 24h (Tables 1 and 2, Ericksen 2002b).

The catch of coho salmon peaked on May 20 (Figure 2). The average catch of coho smolt per minnow trap (CPUE) peaked between May 22 and May 26 (Table 1).

Four hundred forty-six (446) coho salmon smolt ≥75 mm were sampled for age (scales), weight and length during spring 2001 (Table 3). Those sampled averaged 87 mm FL (SE = 0.5 mm) and 6.9 g (SE = 0.1 g) in weight. Age-1 dominated the emigration (86.7%) of smolt from the Chilkat River (Table 3).

Table 1.–Number of traps checked and smolt caught and tagged in the Chilkat River by time period, April 17 through May 28, 2001.

Dates	Traps checked	Number tagged		CPUE[a]	
		Coho	Chinook	Coho	Chinook
4/17–21	499	3,552	851	7.1	1.7
4/22–28	686	4,048	1,004	5.9	1.5
4/29–5/5	698	5,146	1,201	7.4	1.7
5/6–12	667	7,377	625	11.1	0.9
5/13–19	632	7,080	464	11.2	0.7
5/22–26	633	7,974	336	12.6	0.5
5/27–28	165	1,027	28	6.2	0.2
Total	3,980	36,204	4,509	9.1	1.1

[a] Catch of smolt per trap day.

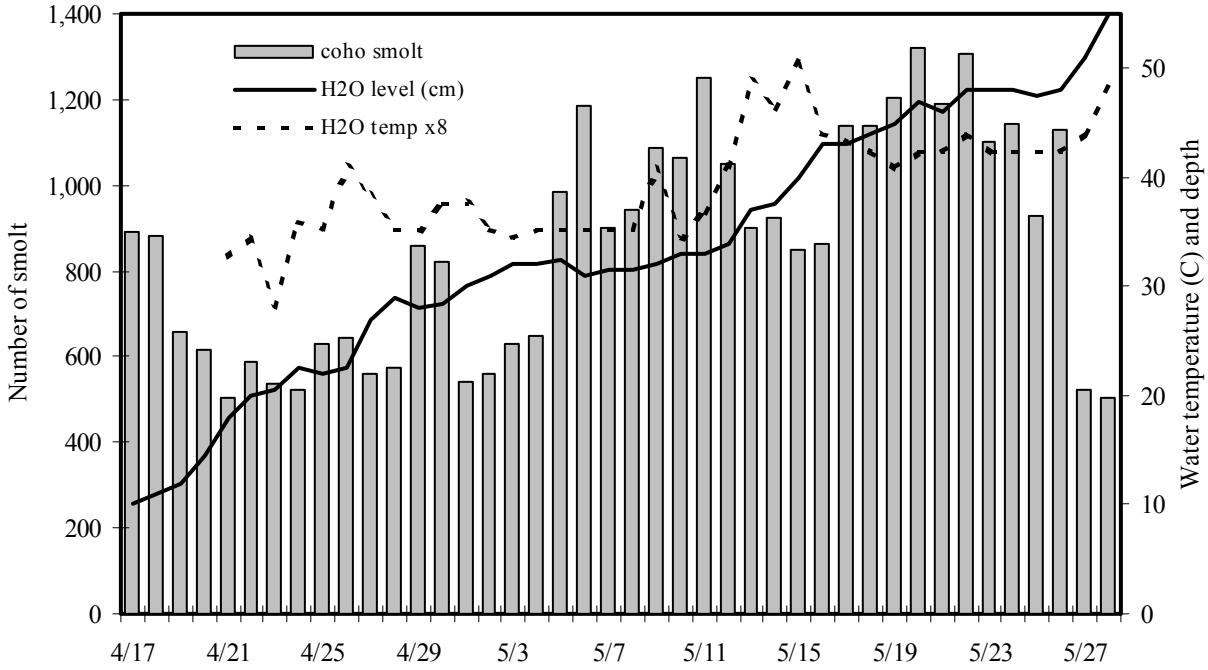

Figure 2.–Daily water depth (cm)**, temperature** (^{o}C × 8)**, and catches of coho salmon smolt ≥ 75 mm in Chilkat River, April 17 through May 29, 2001.**

Table 2.–Summary of coded wire tagging data in the Chilkat River drainage during spring 2001.

Tag code	Species	Last date	Tagged	24h morts	Marked	Shed tags	Valid CWTs
04-03-96	coho	5/3/01	10,384	47	10,337	0	10,337
04-03-97	coho	5/13/01	9,739	25	9,714	19	9,695
04-03-98	coho	5/23/01	10,748	11	10,737	75	10,662
04-02-98	coho	5/29/01	5,333	7	5,326	43	5,283
		Coho subtotal	36,204	90	36,114	137	35,977
04-01-67	chinook	5/29/01	4,509	3	4,506	0	4,506
		Chinook subtotal	4,509	3	4,506	0	4,506

Table 3.–Estimated age and size composition of coho salmon smolt ≥75 mm FL marked in the Chilkat River, 2001.

	Age-1	Age-2	Total aged	Total sampled
Sample size	379	58	437	446
Percent (SE)	86.7 (1.6)	13.3 (1.6)		
Mean length (SE)	85 (0.4)	101 (1.3)		87 (0.5)
Mean weight (SE)	6.4 (0.1)	7.1 (0.2)		6.9 (0.1)

2002 LOWER RIVER ADULT SAMPLING

The 2002 coho salmon catch in the Chilkat River fish wheels was the highest on record. Between July 30 and October 19, 2002, we captured a total of 5,079 adult coho salmon in fish wheels (Figure 3). In addition, seven (7) were captured using a set gillnet between October 24 and 25. Of those caught, we examined 4,956 for missing adipose fins (Table 4). Sixty (60) fish were missing an adipose fin and their heads were examined for CWTs. All 60 contained decodable

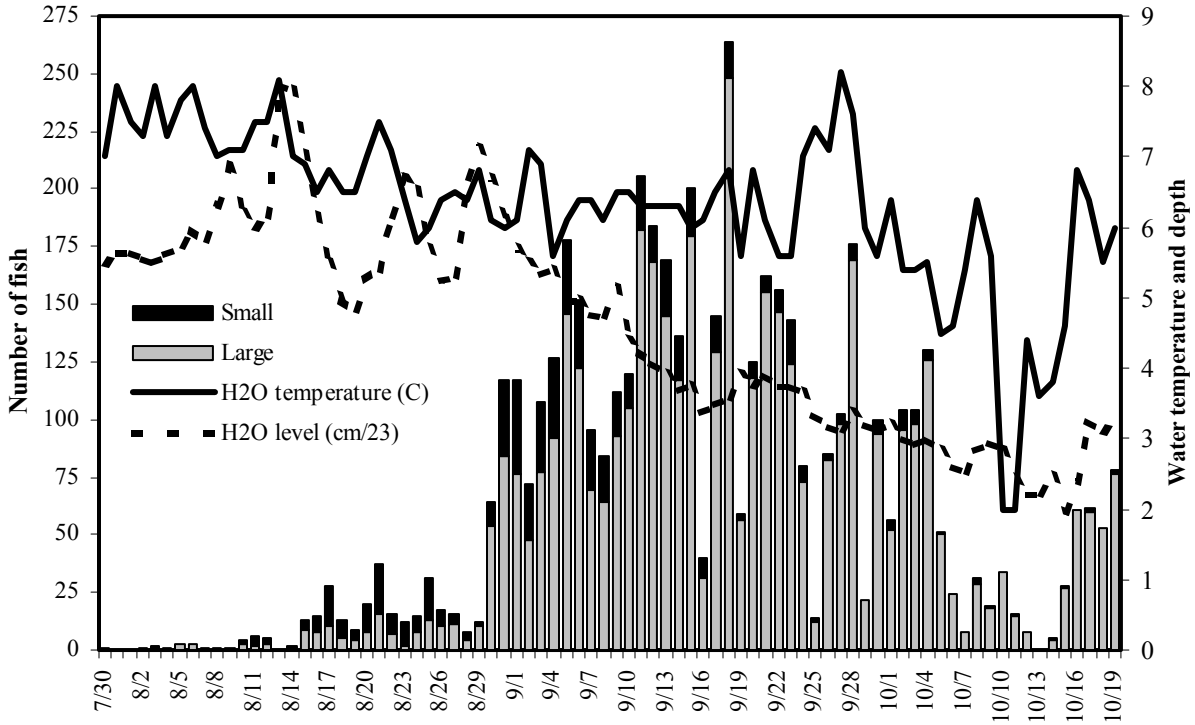

Figure 3.–Daily water depth (cm/23)**, temperature** (^{o}C)**, and fish wheel catch of adult coho salmon in the lower Chilkat River, by size, July 30 through October 19, 2002.**

Table 4.–Number of adult coho salmon sampled in the lower Chilkat River for missing adipose fins and coded wire tags, 2002.

Statistical week	Coho salmon [a]			Tag code					Total ad clips	Percent marked
	0-ocean	1-ocean	Total	04-03-61[b]	04-02-98	04-03-96	04-03-97	04-03-98		
31	0	4	4						0	0.0
32	0	13	13						0	0.0
33	0	69	69			1			1	1.4
34	2	120	122			1		1	2	1.7
35	4	260	264		1	1	1	1	4	1.5
36	0	845	845		1	2	2	3	8	0.9
37	3	997	1000			3	1	2	6	0.6
38	0	893	893	1			2	3	6	0.7
39	6	745	751		1	5	2	4	12	1.6
40	7	557	564		2	7	2	3	14	2.5
41	0	140	140		1		1	1	3	2.1
42	0	284	284			1		3	4	1.4
43[c]	0	7	7						0	0.0
Total	22	4,934	4,956	1	6	21	11	21	60	1.2

[a] Number at ocean age based on age composition (see Table 5).

[b] This tag code was used to tag coho salmon smolt in 2000.

[c] Adult coho salmon were captured with a set gillnet during week 43. All others were caught using fish wheels.

tags; one was tagged in 2000 and the rest were tagged in 2001.

We sampled 1,052 coho salmon for scales and 905 were successfully aged (Table 5); 902 of these were age-1.1 or -2.1 (1-ocean-age fish). Based on this information, we estimate that 4,934 adults sampled for missing adipose fins in 2002 emigrated as smolt during 2001 (Table 4).

SMOLT ABUNDANCE

To estimate smolt abundance, the 59 1-ocean-age fish missing adipose fins with 2001 tag codes were considered marked. Thus, the marked fraction θ_s germane to estimating smolt abundance was 0.0120 (SE = 0.0015).

The number of coho salmon smolt emigrating from the Chilkat River in 2001 is thus 2,907,458 (SE = 377,695) under the Petersen model (n_1 = 36,114, n_2 = 4,934, m_2 = 59).

CODED WIRE TAG RECOVERY

In 2002, 352 CWTs with codes from Chilkat River drainage were recovered from coho salmon during the random sampling of various sport and commercial marine harvests (Table 6, Appendix A1). This included five with 2000 codes (04-02-60, 04-02-61, and 04-03-61). Most tags (212) were recovered in the NW quadrant commercial troll fishery (Figure 4), followed by 130 recoveries in the commercial drift gillnet fishery (Table 6). Twenty-three (23) gillnet caught fish were recovered in a mixed district batch during statistical week 37 and were discarded from further analysis. CWTs were also recovered in the inside purse seine fisheries (2), and the Sitka, Gustavus, and Juneau marine sport fisheries (8).

Coho salmon bearing the different Chilkat River tag codes were recovered with similar relative frequencies in the District 115 (Lynn Canal) drift gillnet fishery from July 28 to September 28, and in the Northwest Quadrant troll fishery from July 14 to October 5 (Table 6). 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 37% recovered in gillnet and 60% in the troll fisheries.

There were 18 select recoveries (returned from a location with no sampling program) and 5 voluntary recoveries (returned from an area with a sampling program) of coho salmon bearing 2001 Chilkat River tag codes in 2002 (Appendix A1). One juvenile fish was recovered from Jordan Creek, near Juneau by Division of Sport Fish personnel on May 13, 2002. Four adult coho salmon were voluntarily turned in from the troll fishery, one from the Gustavus marine sport fishery, and five from the Chilkat River sport fishery in 2002. Twelve (12) were recovered during coho salmon recovery efforts in the Chilkat River drainage.

Table 5.–Estimated age, sex, and size composition of coho salmon captured in the Chilkat River fish wheels, 2002.

	Brood year and age class				
	1999 2.0	1999 1.1	1998 2.1	Total aged	Total sampled
Females					
Sample size	0	280	93	373	437
Percent		75.1	24.9		41.5
SE		2.2	2.2		1.5
Mean length		630	662		
SE		4	7		
Males					
Sample size	3	440	89	532	615
Percent	0.6	82.7	16.7		58.5
SE	0.3	1.6	1.6		1.5
Mean length	340	568	597		
SE	5	5	12		
All fish					
Sample size	3	720	182	905	1,052
Percent	0.3	79.6	20.1		
SE	0.2	1.3	1.3		
Mean length	340	592	630		
SE	5	4	7		

HARVEST

The tagged fraction θ_h germane to estimating harvest contributions was 0.0122 (SE = 0.0016). This estimate is based on the 60 fish with decoded tags in the 4,934 1-ocean adult coho salmon inspected for marks in 2002.

An estimated 109,407 (SE = 10,353) coho salmon bound for the Chilkat River were harvested in sampled marine commercial and sport fisheries in 2002 (Table 7). An additional 574 coho salmon

Table 6.–Random marine recoveries of CWTs from Chilkat River coho salmon by tag code, fishery, and statistical week, 2002.

Statistical week	Dates	Tag code							Total
		04-02-60[a]	04-02-61[a]	04-02-98	04-03-61[a]	04-03-96	04-03-97	04-03-98	
DISTRICT 115 GILLNET FISHERY									
31	07/28-08/03	0	0	0	0	0	0	1	1
32	08/04-08/10	0	0	0	0	2	1	2	5
34	08/18-08/24	0	0	1	0	1	0	0	2
35	08/25-08/31	0	0	1	0	0	0	0	1
36	09/01-09/07	1	0	0	0	2	1	0	4
37	09/08-09/14	0	1	7	0	13	10	11	42
38	09/15-09/21	1	0	7	0	12	7	12	39
39	09/22-09/28	0	0	4	1	4	3	1	13
MIXED DISTRICT GILLNET FISHERY									
37	09/08-09/14	0	0	5	0	8	4	6	23
	Gillnet subtotal	2	1	25	1	42	26	33	130
NORTHWEST QUADRANT TROLL									
29	07/14-07/20	0	0	1	0	0	0	1	2
30	07/21-07/27	0	0	1	0	1	0	0	2
31	07/28-08/03	0	0	0	0	3	2	2	7
32	08/04-08/10	0	0	2	0	5	3	6	16
34	08/18-08/24	0	0	1	0	3	1	3	8
35	08/25-08/31	0	0	3	0	8	8	6	25
36	09/01-09/07	0	0	9	0	6	7	5	27
37	09/08-09/14	1	0	11	0	20	10	20	62
38	09/15-09/21	0	0	5	0	15	10	12	42
39	09/22-09/28	0	0	2	0	7	5	4	18
40	09/29-10/05	0	0	0	0	1	2	0	3
	NW troll subtotal	1	0	35	0	69	48	59	212
SITKA MARINE SPORT FISHERY									
29	07/14-07/20	0	0	1	0	0	0	0	1
GUSTAVUS MARINE SPORT FISHERY									
32	08/04-08/10	0	0	0	0	0	1	0	1
JUNEAU MARINE SPORT FISHERY									
34	08/18-08/24	0	0	0	0	1	0	0	1
35	08/25-08/31	0	0	3	0	0	1	0	4
38	09/15-09/21	0	0	1	0	0	0	0	1
	Marine sport subtotal	0	0	5	0	1	2	0	8
DISTRICT 109 PURSE SEINE FISHERY									
31	07/28-08/03	0	0	0	0	0	0	1	1
DISTRICT 114 PURSE SEINE FISHERY									
31	07/28-08/03	0	0	1	0	0	0	0	1
	Purse seine subtotal	0	0	1	0	0	0	1	2
Total recoveries		3	1	66	1	112	76	93	352
Valid tags released		9,960	10,756	5,283	4,276	10,337	4,276	10,662	
Percent gillnet		66.7	100.0	37.9	100.0	37.5	34.2	35.5	36.9
Percent troll		33.3	0.0	53.0	0.0	61.6	63.2	63.4	60.2
Percent gillnet & troll		100.0	100.0	90.9	100.0	99.1	97.4	98.9	97.2

[a] These tag codes were used to tag coho salmon in 2000.

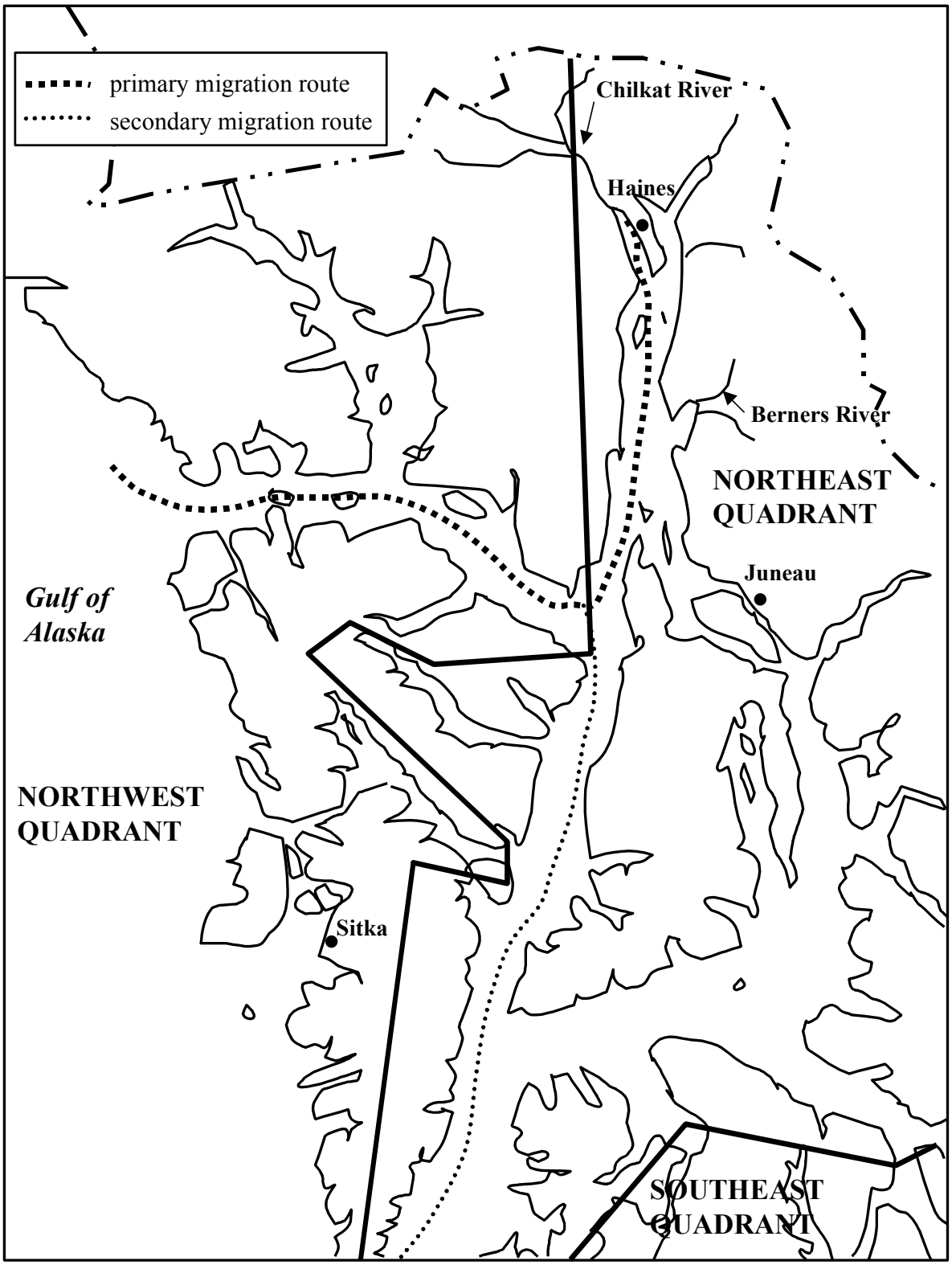

Figure 4.–Commercial troll quadrants and migration routes of Chilkat River coho salmon through northern Southeast Alaska.

Table 7.–Estimated marine harvest in 2002 of adult coho salmon bound for the Chilkat River, by fishery and temporal stratum (= statistical week, except biweek in the marine recreational fisheries)**.**

	Dis-	Stat.			Estimated marine harvest [a]							
Fishery	**trict**	**week**	**Harvest**	**Var[H]**	**n**	**a**	**a'**	**t**	**t'**	**m**	**r**	**SE[r]**
Lynn Canal gillnet	115	31	226	0	151	3	3	3	3	1	123	123
Lynn Canal gillnet	115	32-37	47,990	0	7,896	267	260	240	240	54	27,716	5,159
Lynn Canal gillnet	115	38	21,682	0	5,426	234	231	220	220	39	12,982	2,648
Lynn Canal gillnet	115	39-41	6,884	0	3,038	187	183	175	175	13	2,475	750
Lynn Canal gillnet subtotal			76,782	0	16,511	691	677	638	638	107	43,296	5,848
NW troll period 3		27-32	341,306	0	113,254	2,224	2,210	1,845	1,844	27	6,737	1,547
NW troll period 4		33-40	461,263	0	125,974	3,234	3,201	2,819	2,817	185	56,318	8,309
NW troll subtotal			802,569	0	239,228	5,458	5,411	4,664	4,661	212	63,056	8,452
Purse seine	109	31	44,672	0	5,731	62	62	52	51	1	654	653
Purse seine	114	31	6,377	0	3,366	65	65	53	52	1	159	158
Purse seine subtotal			51,049	0	9,097	127	127	105	103	2	812	672
Sitka marine sport	113	14	9,614	11,525,161	2,327	36	36	33	33	1	340	339
Sitka marine sport subtotal			9,614	11,525,161	2,327	36	36	33	33	1	340	339
Gustavus marine sport	114	12-18	29,636	7,447,441	2,884	48	48	37	37	1	845	845
Gustavus marine sport subtotal			29,636	7,447,441	2,884	48	48	37	37	1	845	845
Juneau marine sport	111,112	17	9,405	3,506,253	6,118	201	197	171	171	5	645	318
Juneau marine sport	111,112	18-19	2,700	817,779	553	34	33	31	31	1	414	413
Juneau marine sport subtotal			12,105	4,324,032	6,671	235	230	202	202	6	1,059	521
		Total	981,755	23,296,634	276,718	6,595	6,529	5,679	5,674	329	109,407	10,353

[a] n = subset of the catch inspected for missing adipose fins; a = subset of n missing adipose fins; a′ = subset of heads arriving in Juneau; t = subset of heads with detected CWTs; t′ = subset of heads with decoded CWTs; m = number of CWTs from the Chilkat River cohort of interest.

were harvested in the Chilkat Inlet and Chilkat River subsistence fisheries, and 4,012 (SE = 772) in Haines area recreational fisheries for a total harvest of 113,993 (SE = 10,382, Table 8). Most of the harvest (55.3%; 63,056, SE = 8,452) occurred in the commercial troll fisheries followed by the Lynn Canal drift gillnet fishery (38.0%; 43,296, SE = 5,848). The remainder of the harvest occurred in the recreational (5.5%), commercial seine (0.7%), and subsistence (0.5%) fisheries. 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 first week of October (Figure 5). In contrast, the harvest in the drift gillnet fishery occurred from early August through the last week of September, and in the purse seine and Juneau sport fisheries from early August to early September. The estimated mean date of harvest in the Northwest quadrant troll fishery was September 9 compared to September 11 for the Lynn Canal gillnet fishery.

INRIVER ABUNDANCE

Of the 5,086 fish captured in the lower river, 4,589 were marked and released (Table 9). Forty-one (41) coho salmon escaped prior to being marked, 22 were found dead, and 60 were missing their adipose fin and were sacrificed to obtain the CWT. In addition, 374 were intentionally released without marks (primarily September 15 and 28) when large fish wheel catches of both chum and coho salmon

Table 8.–Total coho salmon harvest and estimated Chilkat River coho salmon harvest in Alaska fisheries, by fishery and area, 2002.

		Coho salmon harvest			Percent of harvest	
Fishery	**Area**	Total	Chilkat	SE	Fishery[a]	Chilkat[b]
Drift gillnet	District 115	77,521	43,296	5,848	55.9	38.0
U.S. troll fishery	NW Quadrant	802,569	63,056	8,452	7.9	55.3
Seine fishery	District 109	104,609	654	653	0.6	0.6
	District 114	19,739	159	158	0.8	0.1
	Subtotal	124,348	812	672	0.7	0.7
Recreational	Sitka marine	46,154	340	339	0.7	0.3
	Gustavus marine	29,636[c]	845	845	2.9	0.7
	Juneau marine	26,273	1,059	521	4.0	0.9
	Haines marine	642[c]	532	213	82.9	0.5
	Chilkat River	3,480[c]	3,480	742	100.0	3.1
	Subtotal	106,185	6,255	1,302	5.9	5.5
Subsistence[d]	Chilkat Inlet	166	166	0	100.0	0.1
	Chilkat River	408	408	0	100.0	0.4
	Subtotal	574	574	0	100.0	0.5
Total		1,111,197	113,993	10,382	10.3	100.0

[a] Percent of Chilkat River coho salmon in the fishery harvest.

[b] Percent of the Chilkat River coho salmon harvest by the fishery.

[c] Bingham et al. (*In prep.*)

[d] Data taken from subsistence harvest reports (Division of Commercial Fisheries).

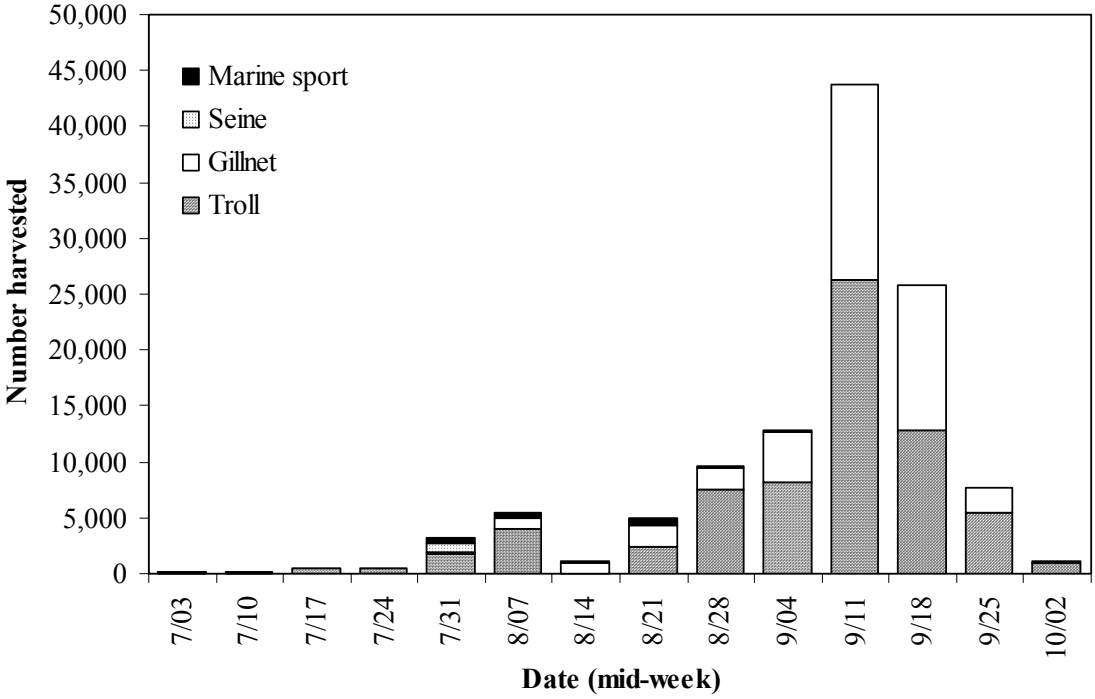

Figure 5.–Estimated marine harvests of coho salmon bound for the Chilkat River, by fishery and statistical week, 2002. Weekly estimates of harvest in the troll (period) and marine sport fisheries (biweek) are approximated.

Table 9.–Number of coho salmon captured in the lower Chilkat River, and marked by temporal strata and size class[a], July 30 through October 25, 2002

Date	Finclip	Number captured	Number marked			Proportion marked
			Small	Large	Total	
07/30-08/24	None	209	110	95	205	0.98
08/25-09/07	Right pectoral	1,114	293	799	1,092	0.98
09/08-09/21 [b]	Left pectoral	2,006	210	1,564	1,774	0.88
09/22-10/05	Right axillary app.	1,323	77	1,077	1,154	0.87
10/06-10/19	Left axillary app.	427	10	347	357	0.84
10/24-10/25 [c]	Dorsal	7	0	7	7	1.00
	Total	5,086	700	3,889	4,589	0.90

[a] Fish were classified by length (MEF): small, < 500 mm MEF; large, ≥500 mm.
[b] Only 75 small and 633 large fish in this strata (708 total) given numbered tags.
[c] Adults captured with a set gillnet; all others caught using fish wheels.

resulted in severe overcrowding in the holding boxes. None of the 7 fish marked in the set gillnet were later recaptured so those marks were removed from further analysis.

We examined 7,512 coho salmon on the spawning grounds for marks (Table 10) and recovered 221 marked fish. Of these, 158 had tags and were recaptured 5 to 65 days (mean = 44 days, SE = 1 day) after being marked in the lower river, 50 were not tagged during the marking event (as identified by secondary clips), 9 were incomplete carcasses that were missing the dorsal region (where the tag would have been), and 4 had lost their tags.

The cumulative distribution function (CDF) of lengths of coho salmon marked in the lower Chilkat River was significantly different from the CDF of marked coho salmon recaptured on the spawning grounds (K-S test, d_{max} = 0.133, P = 0.002, Figure 6, top). In addition, coho salmon marked in the lower Chilkat River were significantly smaller than those sampled on the spawning grounds (K-S test, d_{max} = 0.085, P < 0.001, Figure 6, bottom). These results suggest the second sampling event was size-selective but the status of the first event was unknown. Thus, the estimate was stratified into two size classes: small fish (less than 500 mm MEF); and large fish (500 mm and larger), to reduce bias. The resultant CDFs of lengths of marked fish were not significantly different from the CDFs of those recaptured on the spawning grounds for small fish (K-S test, d_{max} = 0.190, P = 0.661, Figure 7, top), and large fish (K-S test, d_{max} = 0.071, P = 0.308, Figure 7, bottom.

Spawning ground sampling was not uniform over time, as recovery rates were greater for large fish marked early in the immigration (Table 11). Large fish marked during three marking periods (7/30–9/7, 9/8–21, and 9/22–10/19) were recaptured at significantly different rates (χ^2 = 92.6, df = 2, P < 0.001). In addition, the probability of capturing a large marked coho salmon differed significantly among the three large spawning areas (χ^2 = 17.8, df = 2, P < 0.001). Therefore, a Darroch estimator was used to estimate abundance.

Partial pooling of the strata was necessary because inadmissible estimates (at least one estimated probability of capture and stratum abundance <0) were obtained when we applied the Darroch model to the original 5 marking strata and 13 recovery strata. The data for small coho salmon were pooled into two temporal marking periods and two spawning areas. Similarly, data for large coho salmon was pooled into three temporal marking periods and two spawning areas (Table 12). An estimated 209,311 (SE = 31,174) coho salmon immigrated to the Chilkat River drainage in 2002 (Table 13). Of those, 38,806 (SE =16,277) were small, and 170,550 (SE = 26,587) were large fish. The estimates are germane to the time of tagging in the lower river, because an unquantified removal occurs (due to predation and unreported inriver subsistence fishery harvests) between the two sampling events.

Age and Sex Composition of the Inriver Run

We sampled 206 small and 846 large coho salmon for age (scales) and sex in the lower Chilkat River during 2002. A total of 905 of these were

Table 10.–Number of coho salmon inspected for marks and number of marked fish recaptured during mark recovery surveys in the Chilkat River by site, size class[a] and sex, 2002.

			Number inspected					Number marked				
		No. days	Small		Large			Small		Large		
Site	Dates	sampled	M	F	M	F	Total	M	F	M	F	Total
UPPER CHILKAT AREA												
Assignation Cr.	10/04-11/07	7	75	12	499	652	1,238	1	2	26	25	54
Tahini River	10/02-11/06	15	155	18	655	618	1,446	6	0	28	17	51
Chilkat – Turtle Rk.	10/18-10/18	1	0	0	11	6	17	0	0	0	1	1
Kelsall River	10/09-11/13	7	19	1	264	238	522	1	0	10	10	21
Subtotal		30	249	31	1,429	1,514	3,223	8	2	64	53	127
TSIRKU/KLEHINI AREA												
24 Mile Sp. Chan.	10/22-10/22	1	1	0	9	2	12	0	0	0	0	0
Chilkat Lake Weir	09/20-10/18	20	18	12	297	178	505	1	0	4	3	8
Spring Cr.	10/07-11/12	9	36	13	417	556	1,022	2	0	14	14	30
Little Salmon River	10/10-11/13	6	35	3	299	259	596	1	0	4	8	13
Klehini River	10/23-10/24	2	3	0	16	18	37	0	0	0	0	0
Herman Cr.	10/22-11/19	6	93	3	176	246	518	1	0	4	5	10
37 Mile Cr.	10/08-11/14	5	23	6	119	185	333	0	0	2	8	10
Subtotal		49	209	37	1,333	1,444	3,023	5	0	28	38	71
LOWER CHILKAT AREA												
Council Grounds	09/26-11/04	9	55	1	306	177	539	0	0	4	2	6
Jacquot's Landing	10/18-11/21	6	31	1	428	267	727	0	0	13	4	17
Subtotal		15	86	2	734	444	1,266	0	0	17	6	23
Total		94	544	70	3,496	3,402	7,512	13	2	109	97	221

[a] Fish were classified by length (MEF): small, <500 mm; and large, ≥500 mm.

successfully aged, representing three age classes (Table 14). In addition, 614 small and 6,898 large fish were sampled for sex determination during recovery surveys (Table 10).

The proportion of small fish sampled for age in the lower river (0.18) was significantly greater than the proportion examined on the spawning grounds (0.08, $\chi^2 = 138.7$, df = 1, P < 0.001). The proportion of small fish sampled in the lower river (0.18) was nearly identical to the proportion of small fish in the abundance estimate (0.19). These results, in conjunction with prior tests showing the second sampling event was size selective, suggest that the first sampling event was not size selective. Therefore, samples from the first event (Table 14) were used to estimate the age composition of the escapement.

Spawning ground samples were used to estimate sex composition for each size class. Sex ratios of fish sampled in the lower river and those sampled on the spawning grounds were not significantly different for large fish ($\chi^2 = 1.24$, df = 1, P = 0.265), but were for small fish ($\chi^2 = 8.15$, df = 1, P = 0.004). In addition, sex determination was less accurate during the marking event (see Discussion). Therefore, only the spawning ground samples were used to estimate sex composition (by size and age) in the escapement (Table 15). The majority of the escapement (166,356, SE = 19,287) was age-1.1 fish and males (120,738, SE = 19,743).

MARINE EXPLOITATION AND SURVIVAL

Based on a total 2002 run of 318,825 (1-ocean-age, SE = 32,847) adult coho salmon bound for the Chilkat River, we estimate the marine survival rate at 10.7% (Table 16, SE = 1.8%). The marine exploitation of this stock was estimated at 34.5% (Table 16, SE = 4.0%).

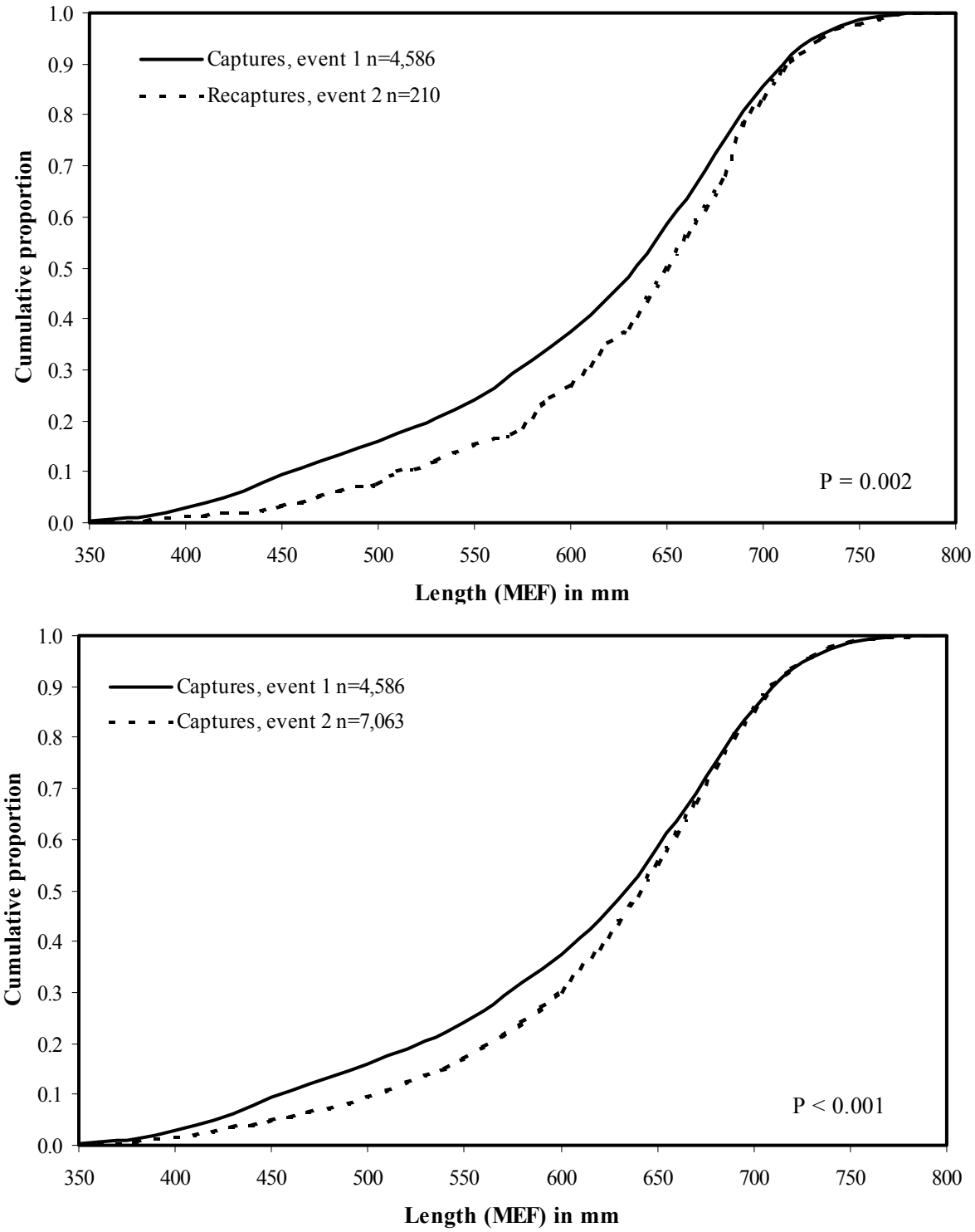

Figure 6.–Cumulative distribution function (CDF) **of MEF lengths of coho salmon marked in the lower Chilkat River versus lengths of marked fish recaptured on the spawning grounds** (top) **and versus lengths of fish examined for marks on the spawning grounds** (bottom)**, 2002.**

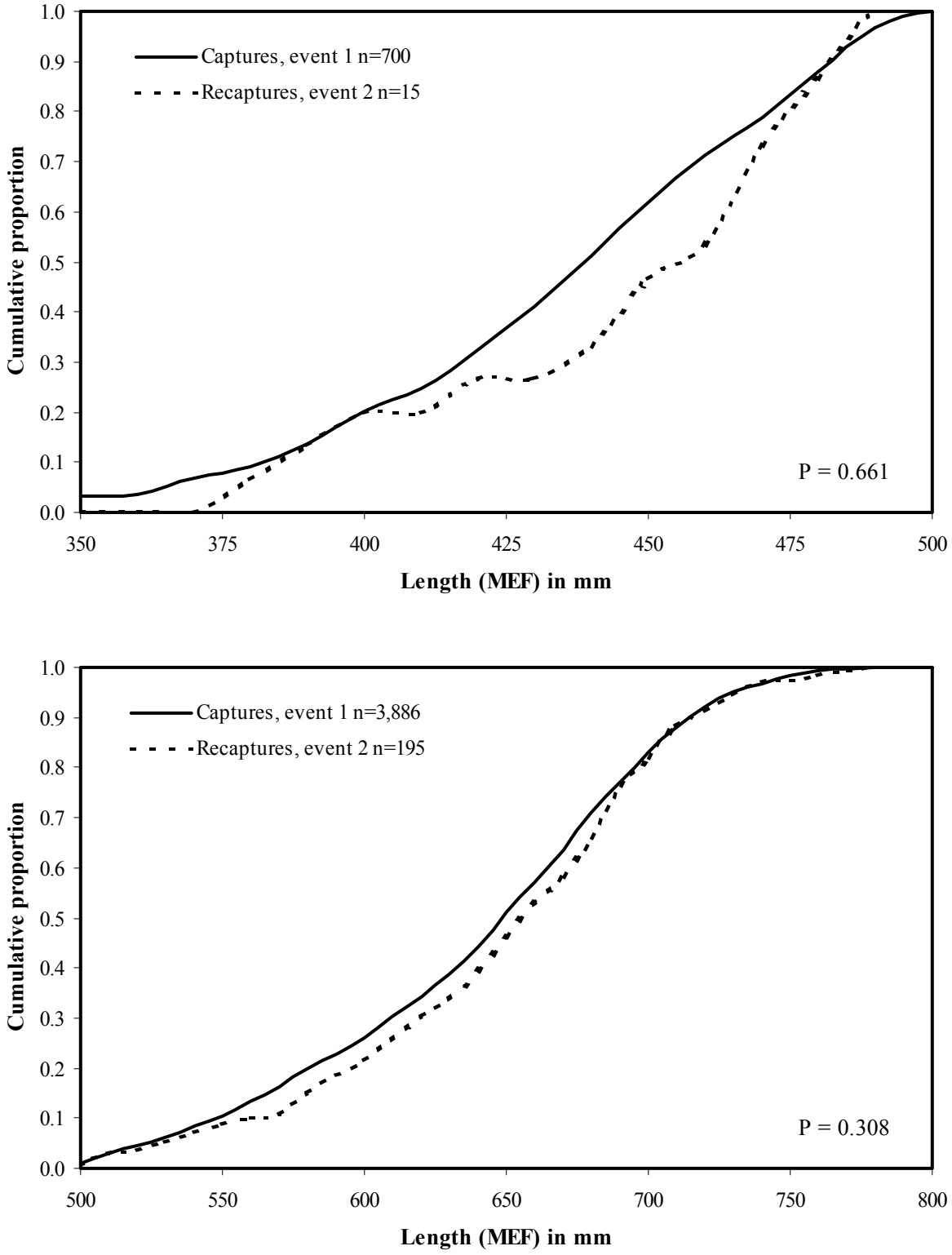

Figure 7.–Cumulative distribution function (CDF) **of MEF lengths of small (top) and large** (bottom) **coho salmon marked in the lower Chilkat River versus lengths of marked fish recaptured on the spawning grounds, 2002.**

Table 11.–Number of marked coho salmon released into the lower Chilkat River and recaptured by marking period and recovery site, and number examined for marks at each recovery site by size class, 2002.

			UPPER CHILKAT				TSIRKU/KLEHINI							LOWER CHILKAT	
Marking stratum	No. marked	Fraction recovered	Assignation Creek	Tahini River	Turtle Rock	Kelsall River	24 mile Channel	Chilkat weir	Spring Creek	Little Salmon River	Klehini River	Herman Creek	37 mile Creek	20-22 Mile	Jacquot's Landing
							SMALL FISH								
07/30-08/24	110	0.018	1	1	0	0	0	0	0	0	0	0	0	0	0
08/25-09/07	293	0.034	2	5	0	1	0	0	2	0	0	0	0	0	0
09/08-09/21	210	0.010	0	0	0	0	0	1	0	0	0	1	0	0	0
09/22-10/05	77	0.013	0	0	0	0	0	0	0	1	0	0	0	0	0
10/06-10/19	10	0.000	0	0	0	0	0	0	0	0	0	0	0	0	0
Examined for marks			87	173	0	20	1	30	49	38	3	96	29	56	32
Fraction marked			0.034	0.035	0.000	0.050	0.000	0.033	0.041	0.026	0.000	0.010	0.000	0.000	0.000
							LARGE FISH								
07/30-08/24	95	0.053	2	3	0	0	0	0	0	0	0	0	0	0	0
08/25-09/07	799	0.116	40	27	1	7	0	1	6	5	0	0	5	1	0
09/08-09/21	1,564	0.053	9	14	0	10	0	4	19	4	0	5	5	3	10
09/22-10/05	1,077	0.021	0	1	0	3	0	2	3	3	0	3	0	2	6
10/06-10/19	347	0.006	0	0	0	0	0	0	0	0	0	1	0	0	1
Examined for marks			1,151	1,273	17	502	11	475	973	558	34	422	304	483	695
Fraction marked			0.044	0.035	0.059	0.040	0.000	0.015	0.029	0.022	0.000	0.021	0.033	0.012	0.024

Table 12.–Pooled number of coho salmon marked by stratum, recovered by marking stratum and recovery area, and examined for marks by recovery area and size class in the Chilkat River drainage, 2002.

Marking stratum	No. marked	Fraction recovered	Upper Chilkat area	Tsirku/Klehini Lower Chilkat areas
		Small fish		
07/30-09/07	403	0.030	10	2
09/08-10/19	297	0.010	0	3
Examined for marks			280	334
Fraction marked			0.036	0.015

Marking stratum	No. marked	Fraction recovered	Upper Chilkat Tsirku/Klehini areas	Lower Chilkat area
		Large fish		
07/30-09/07	894	0.110	97	1
09/08-09/21	1,564	0.053	70	13
09/22-10/19	1,424	0.018	16	9
Examined for marks			5,720	1,178
Fraction marked			0.032	0.020

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 estimates of abundance. We attempted to make sure that every smolt had an equal chance of being marked. Although smolt were still being captured when we ceased trapping on May 28, catch rates were declining rapidly (Table 1). Therefore, we believe that we sampled the bulk of the emigration. In addition, sampling effort for adults in the fish wheels (to estimate the marked fraction) was relatively constant over time, tending to equalize probability of capture during the second sampling event. Also, the estimated marked fraction varied very little between the first (prior to statistical week 37) and second half of the run (Table 4; $\chi^2 = 0.077$, df = 1, P = 0.781). This suggests that marked and unmarked fish mixed completely between sampling events, thus acting to satisfy assumption a. While 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 adults (assumption c). Other studies have shown that marked coho smolt do not suffer significantly higher mortality than unmarked fish (Elliott and Sterritt 1990; Vincent-Lang 1993). Because all fish had secondary marks (adipose finclips) that were not lost, assumption (d) was satisfied. Personnel sampling the fish wheels carefully examined each fish for missing adipose fins; therefore failure of assumption (e) was unlikely.

The assumptions for a Petersen mark-recapture experiment are generalized for the Darroch estimate (Arnason et al. 1996, Seber 1982) of adult salmon abundance: (a) every fish present during the marking event has a non-zero probability of recovery in one of the final strata and all fish in the final strata were also present in one of the initial strata [in salmon runs, closure is achieved by ensuring that sampling starts at the beginning of the run and that sampling continues until all animals have completed spawning]; (b) fish retain their marks and are correctly identified as marked or unmarked and, if marked,

Table 13.–Estimated abundance of coho salmon in the Chilkat River by size class, 2002.

Size category	Abundance	SE
Small	38,806	16,277
Large	170,550	26,587
Combined	209,356	31,174

Table 14.–Estimated age composition of coho salmon captured in the Chilkat River fish wheels by size class, 2002.

	Brood year and age class				
	1999 2.0	1999 1.1	1998 2.1	Total aged	Total sampled
		Small			
Sample size	3	154	26	183	206
Percent	1.6	84.2	14.2		19.6
SE	0.9	2.7	2.6		1.2
		Large			
Sample size	0	566	156	722	846
Percent		78.4	21.6		80.4
SE		1.5	1.5		1.2
		Combined			
Sample size	3	720	182	905	1,052
Percent	0.3	79.6	20.1		
SE	0.2	1.3	1.3		

Table 15.–Estimated abundance of coho salmon in the Chilkat River by age, sex, and size class, 2002.

	Brood year and age class			
	1999 2.0	1999 1.1	1998 2.1	Total
		Small fish		
Male	562	28,865	4,873	34,301
SE	376	12,143	2,198	14,395
Female	74	3,791	640	4,505
SE	50	1,640	296	1,945
All small	636	32,656	5,513	38,806
SE	380	12,253	2,218	16,277
		Large fish		
Male		67,743	18,671	86,414
SE		10,674	3,199	13,513
Female		65,922	18,169	84,091
SE		10,388	3,114	13,151
All large		133,665	36,840	170,550
SE		14,894	4,464	26,587
		Combined		
Male	562	96,608	23,545	120,715
SE	376	16,167	3,882	19,743
Female	74	69,713	18,809	88,596
SE	50	10,517	3,128	13,294
All fish	636	166,321	42,354	209,311
SE	380	19,287	4,985	31,174

by initial stratum; (c) all fish in a given final stratum, whether marked or unmarked, have the same probability of being sampled; and (d) all marked and unmarked fish within a given marking stratum have the same probability of moving between strata.

Fish wheels were operational in early June, long before the first coho salmon was captured on July 31, and continued through October 19. However, 50–75 coho salmon per day were still being caught during the last days of fish wheel operations. Fewer than 1% of the coho salmon were captured after October 19 in 1990 (when the wheels were operated through October 25) and we captured only 7 coho salmon with a set gillnet on October 24 and 25 (Table 9). Thus, we believe that we tagged essentially throughout the entire emigration.

Coho salmon have been known to back out of some rivers after being tagged (Jones et al. 2001, Wellar et al. 2002). This can lead to a failure of assumption (a) if these fish are caught in fisheries downstream or ultimately spawn in another drainage. Other studies have shown that backing out does not occur if the marking site is far enough upstream (Vincent-Lang et al. 1993). Our marking site is located several miles above the intertidal zone. Although we have accumulated no evidence (e.g., recoveries in the commercial drift gillnet fishery operating in Chilkat Inlet, etc.) of coho salmon backing out of the Chilkat River after being marked. We intend to add radiotagging to this study if it is repeated to quantify the extent of this phenomenon.

Our results suggest that fish wheels were not size selective for coho salmon. This contradicts earlier results (Ericksen 1999) that indicated fish wheels were selective for smaller coho in 1998. These divergent results suggest interannual differences in fishwheel catchability, perhaps related to gear placement and stream morphology and discharge rates. However, the number of marked fish recaptured in 1998 (28) was much lower than in 2002 (221). Therefore, the power of the first KS test (comparing lengths of marked and recaptured fish, Figure 6 top) was greater in this study. As a result, we may have falsely concluded that the second sampling event in 1998 was size selective and the first was not.

Table 16.–Estimated stock assessment parameters for coho salmon that emigrated from the Chilkat River in 2001.

Parameter	Estimate	SE
2001 smolt emigration	2,970,458	377,695
2002 marine harvest	110,105	10,355
2002 1-ocean age inriver run[a]	208,720	31,172
Total 2002 run	318,825	32,847
Marine exploitation rate	34.5%	4.0%
Marine survival	10.7%	1.8%

[a] Total inriver run, excluding age-2.0 fish.

We could not continue recovery sampling until all salmon had completed spawning. We sampled 157 coho salmon at Jacquot's Landing on November 21 (the last day of sampling). Only 54 of these fish were classified as spawned out or carcasses (34%) and the rest (66%) were in spawning or pre-spawning condition. However, we did recover a fish that had been marked on the last day the fish wheels were operated (October 19) and therefore assume that any bias due to this failure of assumption (a) was inconsequential.

A total of 63 of 221 marked fish (29%) were missing a tag (as determined from the secondary marks) during the recovery event. Most (55) of these 63 fish could be assigned to marking strata based on their secondary marks. As the remaining 8 fish represent a low percentage of the marked sample (4%), tag loss was a not a significant problem in this experiment and assumption (d) was essentially met.

Darroch estimates of coho salmon escapement varied greatly depending on how the data was pooled. For example, estimates for large fish ranged from 141,337 (SE = 14,126) to 240,309 (SE = 96,068). However, the final estimate (170,550) had the best goodness of fit test result (P = 0.15) and is very close to the mean of all the estimates considered (173,178). Therefore, the estimate is considered reasonable.

Sex was estimated with uncertainty in the lower river (marking event). Twenty (20) out of 159

Table 17.–Peak number of coho salmon counted in spawning index tributaries of the Chilkat River, 1987–2002, mark-recapture estimates of large (≥500 mm MEF) **coho for the entire drainage in 1990, 1998 and 2002, and the fraction counted in peak surveys** (ratio)**.**

	PEAK SURVEYS					M-R		
	Spring Creek	Kelsall River	Tahini River	Clear Creek	Combined	estimate	SE	Ratio
1987	84	184	696	23	987			
1988	83	152	539	35	809			
1989	48	182	981	134	1,345			
1990	79	328	2,448	150	3,005	80,700	9,984	0.0372
1991	176	392	1,707	135	2,410			
1992	174	266	1,077	700	2,217			
1993	95	115	947	460	1,617			
1994	398	440	4,419	381	5,638			
1995	253	178	1,029	177	1,637			
1996	180	157	381	290	1,008			
1997	204	129	643	250	1,226			
1998	264	262	638	275	1,439	37,132	7,432	0.0388
1999	324	202	930	195	1,651			
2000	302	551	1,302	420	2,575			
2001	441	221	1,252	1,285	3,199			
2002	1,274	423	2,536	1,310	5,543	170,550	26,587	0.0325
Average	274	261	1,345	389	2,269	96,127		0.0362

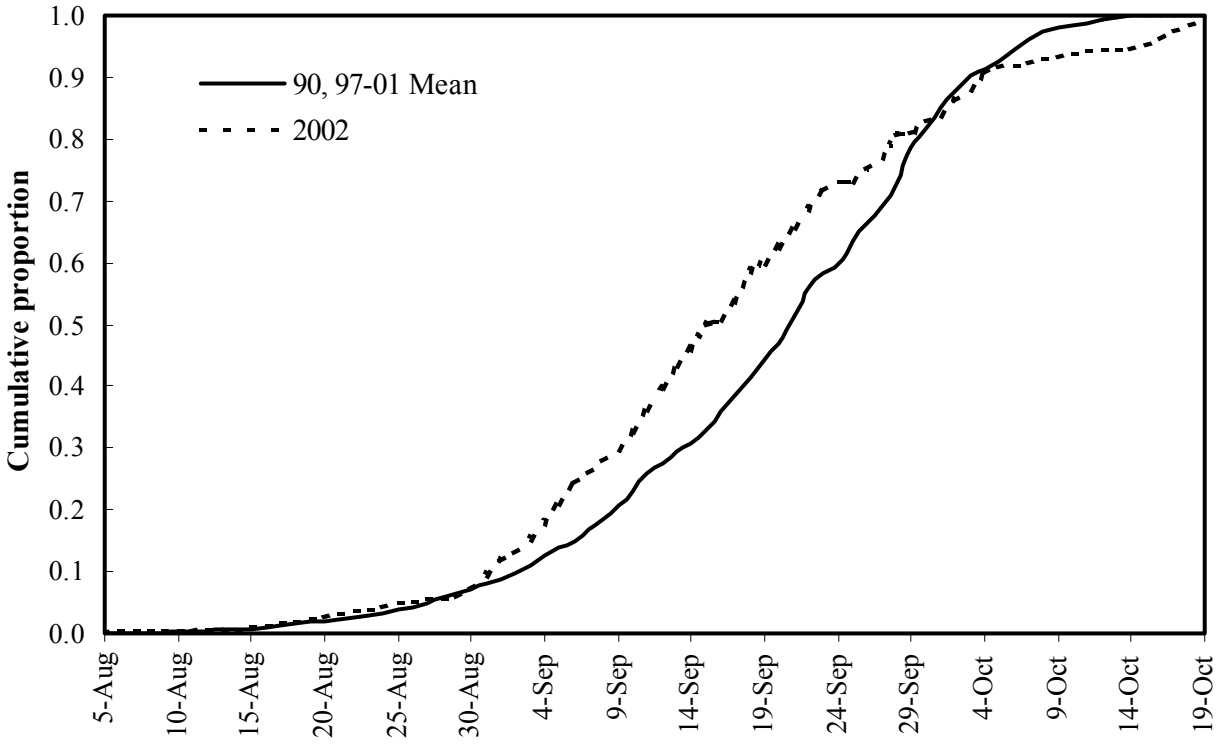

Figure 8.–Cumulative proportion of adult coho salmon captured in Chilkat River fish wheels during 2002 compared to the mean cumulative proportion of 1990, and 1997–2001.

tagged fish that were recaptured on the spawning grounds were sexed incorrectly during the marking event, as judged by sex determination on the spawning ground (where sexual dimorphism is more evident). The majority (14) of these were sexed as female when tagged and as males on the spawning grounds during 2002. Therefore using lower river samples to estimate sex composition would have overestimated the proportion of females in the escapement. We avoided this bias by using spawning ground samples to estimate sex composition by size category.

The timing of the coho salmon escapement into the Chilkat River was early relative to years when the fish wheels were operated into October (1990 and 1997–2001). The mean date of migratory timing in 2002 was September 16. In contrast, the mean date for past years was September 21 (Figure 8).

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 (63,056) of Chilkat River fish, they represented only 7.9% of this harvest (Table 8). The second largest harvest occurred in the Lynn Canal drift gillnet fishery (43,296) where Chilkat River fish represented 55.9% of the total harvest. As one might expect, Chilkat River fish contributed a greater percentage to the harvest in fisheries closer to the Chilkat River because the number of stocks present likely decreases with proximity.

One coho salmon smolt with a 2001 Chilkat River tag code was sampled as it emigrated from Jordan Creek near Juneau in 2002 (Appendix A1). This is not the first time smolt have been recovered from another drainage with Chilkat River codes. Two smolt were recaptured in the Berners River in 2000 with 1999 codes (Ericksen 2001). In addition, an adult coho salmon was recovered in a Chilkat River fish wheel in 1998 with a Berners River tag code (Ericksen 1999).

This fish may have also migrated from the Chilkat River to the Berners River where it was captured and tagged. There is increasing evidence that smolt occasionally migrate through salt water to another freshwater drainage to rear for a period of time.

The estimates of the total harvest of Chilkat River coho salmon in 2002 should be considered minimum because not all fisheries were sampled and some were not sampled at rates sufficient to detect small harvests. For example, many smaller marine sport fisheries (including those in Pelican and Icy Strait) were not sampled for coded wire tags. Thus, the contribution of various stocks to these fisheries cannot be estimated.

The exploitation of coho salmon in the Lynn Canal commercial drift gillnet fishery was lower than normal. The price paid for a gillnet-caught coho salmon averaged $0.30/lb over the season. This was the lowest average price paid for coho salmon in over 20 years. Many fishers stopped fishing earlier in the season rather than accept such a low price.

Our results indicate that coho salmon entering the river early in the season were headed toward the Upper Chilkat area. In addition, we found that later fish were headed for the Lower Chilkat area. This phenomenon is consistent with work done in 1990 (Dangel et al. *Unpublished*) and 1998 (Ericksen 1999).

The 2002 immigration of large fish 170,550 (SE = 26,587) is more than double the estimate in 1990 (80,700, SE = 9,984), and over four times greater than 1998 (37,132, SE = 7,432). These results are consistent with peak counts of coho salmon on the index spawning tributaries for those years (Table 17). The proportion of fish counted during these three years was extremely consistent (range = 0.0325 to 0.0388). This limited sampling suggests that our counts may be of value for indexing escapement. Additional studies will provide the basis to evaluate the accuracy of the counts as escapement indices.

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APPENDIX A

Appendix A1.–Random, select, and voluntary recoveries in 2002 of coho salmon that were coded wire tagged in the Chilkat River.

Head number	Tag code	Gear	Port	Recovery date	Stat. week	Quad-rant	Dist.	Sub-dist.	Length
				RANDOM RECOVERIES					
31213	40398	Gillnet	Excursion Inlet	8/1/2002	31	NE	115		787
31366	40397	Gillnet	Excursion Inlet	8/6/2002	32	NE	115		603
31367	40398	Gillnet	Excursion Inlet	8/7/2002	32	NE	115		579
31286	40398	Gillnet	Excursion Inlet	8/9/2002	32	NE	115		744
31287	40396	Gillnet	Excursion Inlet	8/9/2002	32	NE	115		636
31289	40396	Gillnet	Excursion Inlet	8/9/2002	32	NE	115		629
31581	40298	Gillnet	Excursion Inlet	8/21/2002	34	NE	115		630
31582	40396	Gillnet	Excursion Inlet	8/21/2002	34	NE	115		639
31801	40298	Gillnet	Excursion Inlet	8/29/2002	35	NE	115		755
31797	40396	Gillnet	Excursion Inlet	9/4/2002	36	NE	115		729
31798	40260	Gillnet	Excursion Inlet	9/4/2002	36	NE	115		772
31799	40397	Gillnet	Excursion Inlet	9/4/2002	36	NE	115		621
31800	40396	Gillnet	Excursion Inlet	9/4/2002	36	NE	115		830
11302	40398	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		675
11313	40298	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		656
11314	40397	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		716
11323	40398	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		
11330	40397	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		
11337	40398	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		
11338	40397	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		
11342	40298	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		
11347	40298	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		
11478	40398	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		770
11481	40396	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		664
11483	40398	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		737
11487	40397	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		706
11488	40261	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		752
11490	40396	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		691
11496	40397	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		672
11498	40396	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		627
11665	40396	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		800
11667	40398	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		654
11671	40397	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		724
11687	40398	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		707
11697	40396	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		719
11709	40397	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		661
11720	40398	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		754
11725	40396	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		686
11735	40298	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		815
11742	40398	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		796
11753	40396	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		759
11754	40396	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		689
11756	40398	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		719
11759	40298	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		708
11765	40397	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		696
11772	40298	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		760

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Appendix A1.–Page 2 of 10.

Head number	Tag code	Gear	Port	Recovery date	Stat. week	Quad-rant	Dist.	Sub-dist.	Length
11773	40396	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		736
11780	40396	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		690
11797	40298	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		761
11922	40397	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		698
11923	40398	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		738
11932	40397	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		709
11947	40396	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		811
31876	40396	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		
31877	40396	Gillnet	Excursion Inlet	9/12/2002	37	NE	115		
46653	40298	Gillnet	Excursion Inlet	9/12/2002	37	NE			
46672	40396	Gillnet	Excursion Inlet	9/12/2002	37	NE			
46686	40396	Gillnet	Excursion Inlet	9/12/2002	37	NE			
46703	40396	Gillnet	Excursion Inlet	9/12/2002	37	NE			
46714	40398	Gillnet	Excursion Inlet	9/12/2002	37	NE			
46718	40397	Gillnet	Excursion Inlet	9/12/2002	37	NE			
46727	40396	Gillnet	Excursion Inlet	9/12/2002	37	NE			
46729	40396	Gillnet	Excursion Inlet	9/12/2002	37	NE			
46739	40398	Gillnet	Excursion Inlet	9/12/2002	37	NE			
46750	40397	Gillnet	Excursion Inlet	9/12/2002	37	NE			
46754	40398	Gillnet	Excursion Inlet	9/12/2002	37	NE			
46762	40396	Gillnet	Excursion Inlet	9/12/2002	37	NE			
46769	40298	Gillnet	Excursion Inlet	9/12/2002	37	NE			
46773	40396	Gillnet	Excursion Inlet	9/12/2002	37	NE			
46776	40298	Gillnet	Excursion Inlet	9/12/2002	37	NE			
46779	40398	Gillnet	Excursion Inlet	9/12/2002	37	NE			
46781	40298	Gillnet	Excursion Inlet	9/12/2002	37	NE			
46791	40398	Gillnet	Excursion Inlet	9/12/2002	37	NE			
46792	40398	Gillnet	Excursion Inlet	9/12/2002	37	NE			
46801	40397	Gillnet	Excursion Inlet	9/12/2002	37	NE			
46821	40397	Gillnet	Excursion Inlet	9/12/2002	37	NE			
46823	40298	Gillnet	Excursion Inlet	9/12/2002	37	NE			
46826	40396	Gillnet	Excursion Inlet	9/12/2002	37	NE			
65959	40396	Gillnet	Juneau	9/16/2002	38	NE	115		720
65968	40397	Gillnet	Juneau	9/16/2002	38	NE	115		670
65991	40398	Gillnet	Juneau	9/16/2002	38	NE	115		650
65995	40396	Gillnet	Juneau	9/16/2002	38	NE	115		675
65996	40396	Gillnet	Juneau	9/16/2002	38	NE	115		660
66641	40396	Gillnet	Juneau	9/16/2002	38	NE	115		625
66645	40398	Gillnet	Juneau	9/16/2002	38	NE	115		720
88013	40396	Gillnet	Juneau	9/16/2002	38	NE	115		680
88015	40396	Gillnet	Juneau	9/16/2002	38	NE	115		710
88037	40260	Gillnet	Juneau	9/16/2002	38	NE	115		800
88046	40298	Gillnet	Juneau	9/16/2002	38	NE	115		765
11019	40396	Gillnet	Juneau	9/18/2002	38	NE	115		754
11025	40298	Gillnet	Juneau	9/18/2002	38	NE	115		706
11031	40397	Gillnet	Juneau	9/18/2002	38	NE	115		722
11036	40398	Gillnet	Juneau	9/18/2002	38	NE	115		730
11039	40397	Gillnet	Juneau	9/18/2002	38	NE	115		770

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Appendix A1.–Page 3 of 10.

Head number	Tag code	Gear	Port	Recovery date	Stat. week	Quad-rant	Dist.	Sub-dist.	Length
11040	40396	Gillnet	Juneau	9/18/2002	38	NE	115		738
11043	40398	Gillnet	Juneau	9/18/2002	38	NE	115		774
11045	40298	Gillnet	Juneau	9/18/2002	38	NE	115		603
66650	40398	Gillnet	Juneau	9/18/2002	38	NE	115		622
93980	40398	Gillnet	Juneau	9/18/2002	38	NE	115		730
93984	40398	Gillnet	Juneau	9/18/2002	38	NE	115		669
94147	40298	Gillnet	Juneau	9/18/2002	38	NE	115		615
94150	40398	Gillnet	Juneau	9/18/2002	38	NE	115		645
94285	40298	Gillnet	Juneau	9/18/2002	38	NE	115		660
94287	40397	Gillnet	Juneau	9/18/2002	38	NE	115		691
94292	40396	Gillnet	Juneau	9/18/2002	38	NE	115		664
94297	40396	Gillnet	Juneau	9/18/2002	38	NE	115		696
94376	40397	Gillnet	Juneau	9/18/2002	38	NE	115		664
94377	40298	Gillnet	Juneau	9/18/2002	38	NE	115		642
94381	40398	Gillnet	Juneau	9/18/2002	38	NE	115		702
94382	40298	Gillnet	Juneau	9/18/2002	38	NE	115		631
94386	40396	Gillnet	Juneau	9/18/2002	38	NE	115		715
94388	40398	Gillnet	Juneau	9/18/2002	38	NE	115		614
94389	40397	Gillnet	Juneau	9/18/2002	38	NE	115		758
94390	40396	Gillnet	Juneau	9/18/2002	38	NE	115		773
94393	40397	Gillnet	Juneau	9/18/2002	38	NE	115		755
94396	40398	Gillnet	Juneau	9/18/2002	38	NE	115		647
94400	40398	Gillnet	Juneau	9/18/2002	38	NE	115		682
88241	40396	Gillnet	Juneau	9/23/2002	39	NE	115		664
88251	40298	Gillnet	Juneau	9/23/2002	39	NE	115		685
88254	40397	Gillnet	Juneau	9/23/2002	39	NE	115		750
88279	40396	Gillnet	Juneau	9/23/2002	39	NE	115		633
92703	40298	Gillnet	Juneau	9/23/2002	39	NE	115		686
93999	40396	Gillnet	Juneau	9/23/2002	39	NE	115		784
92709	40397	Gillnet	Juneau	9/25/2002	39	NE	115		649
92714	40361	Gillnet	Juneau	9/25/2002	39	NE	115		780
92715	40298	Gillnet	Juneau	9/25/2002	39	NE	115		760
92721	40397	Gillnet	Juneau	9/25/2002	39	NE	115		728
92734	40298	Gillnet	Juneau	9/25/2002	39	NE	115		742
92736	40398	Gillnet	Juneau	9/25/2002	39	NE	115		810
92910	40396	Gillnet	Juneau	9/25/2002	39	NE	115		687
31238	40398	Seine	Excursion Inlet	8/2/2002	31	NW	114		752
506540	40398	Seine	Petersburg	8/3/2002	31	NE	109	51	790
228360	40298	Sport	Sitka	7/18/2002	29	NW	113	41	630
234602	40397	Sport	Gustavus	8/10/2002	32	NW	114	23	650
207834	40396	Sport	Juneau	8/24/2002	34	NE			660
98283	40298	Sport	Juneau	8/26/2002	35	NE			465
98290	40397	Sport	Juneau	8/26/2002	35	NE			690
98295	40298	Sport	Juneau	8/26/2002	35	NE			690
189244	40298	Sport	Juneau	8/31/2002	35	NE	111	50	670
189095	40298	Sport	Juneau	9/16/2002	38	NE	112	15	700
31179	40298	Troll	Excursion Inlet	7/18/2002	29	NW			673
218536	40398	Troll	Hoonah	7/19/2002	29	NW	113	91	630

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Appendix A1.–Page 4 of 10.

Head number	Tag code	Gear	Port	Recovery date	Stat. week	Quad-rant	Dist.	Sub-dist.	Length
212014	40298	Troll	Sitka	7/24/2002	30	NW	113	41	664
218600	40396	Troll	Hoonah	7/24/2002	30	NW	113		665
213471	40396	Troll	Sitka	7/28/2002	31	NW	113	22	723
218643	40396	Troll	Hoonah	7/29/2002	31	NW	113		600
25916	40397	Troll	Excursion Inlet	7/30/2002	31	NW			641
218671	40396	Troll	Hoonah	7/31/2002	31	NW	113		605
195054	40398	Troll	Yakutat	8/1/2002	31	NW			588
209918	40398	Troll	Pelican	8/1/2002	31	NW	116		583
209919	40397	Troll	Pelican	8/1/2002	31	NW	116		663
31334	40397	Troll	Excursion Inlet	8/5/2002	32	NW			620
31364	40396	Troll	Excursion Inlet	8/5/2002	32	NW			748
209941	40298	Troll	Pelican	8/5/2002	32	NW	113	91	622
195063	40298	Troll	Yakutat	8/6/2002	32	NW	183	10	643
209994	40398	Troll	Pelican	8/6/2002	32	NW			662
218712	40397	Troll	Hoonah	8/6/2002	32	NW	113		630
218737	40398	Troll	Hoonah	8/6/2002	32	NW	113		615
210032	40398	Troll	Pelican	8/7/2002	32	NW	114	21	802
210042	40396	Troll	Pelican	8/7/2002	32	NW			635
222411	40397	Troll	Elfin Cove	8/7/2002	32	NW	114	21	835
210061	40398	Troll	Pelican	8/8/2002	32	NW	113	91	548
214157	40398	Troll	Sitka	8/8/2002	32	NW	154		578
218777	40396	Troll	Hoonah	8/9/2002	32	NW	114		680
218788	40398	Troll	Hoonah	8/9/2002	32	NW	114	23	755
218789	40396	Troll	Hoonah	8/9/2002	32	NW	114	23	720
31441	40396	Troll	Excursion Inlet	8/10/2002	32	NW			674
214474	40398	Troll	Sitka	8/18/2002	34	NW			681
218800	40396	Troll	Hoonah	8/18/2002	34	NW	113	95	495
218803	40398	Troll	Hoonah	8/18/2002	34	NW	113	95	665
218879	40398	Troll	Hoonah	8/18/2002	34	NW	113	95	690
218826	40396	Troll	Hoonah	8/19/2002	34	NW	114	23	600
218831	40397	Troll	Hoonah	8/19/2002	34	NW	114	23	545
218858	40298	Troll	Hoonah	8/20/2002	34	NW	116	11	680
195224	40396	Troll	Yakutat	8/22/2002	34	NW	181	60	709
218994	40398	Troll	Hoonah	8/25/2002	35	NW	113	95	500
218970	40397	Troll	Hoonah	8/26/2002	35	NW	114	23	605
210380	40397	Troll	Pelican	8/27/2002	35	NW	113	91	525
218974	40298	Troll	Hoonah	8/27/2002	35	NW	114	23	630
218975	40398	Troll	Hoonah	8/27/2002	35	NW	114	23	615
219009	40396	Troll	Hoonah	8/27/2002	35	NW	114	23	730
219033	40298	Troll	Hoonah	8/27/2002	35	NW			765
219042	40398	Troll	Hoonah	8/27/2002	35	NW			685
219022	40298	Troll	Hoonah	8/28/2002	35	NW	114	25	660
219026	40396	Troll	Hoonah	8/28/2002	35	NW	114	25	750
222927	40397	Troll	Yakutat	8/28/2002	35	NW	189	30	693
222947	40396	Troll	Yakutat	8/28/2002	35	NW	189	30	728
219085	40397	Troll	Hoonah	8/29/2002	35	NW	114	23	665
219087	40396	Troll	Hoonah	8/29/2002	35	NW	114	25	630
31754	40397	Troll	Excursion Inlet	8/30/2002	35	NW			689

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Appendix A1.–Page 5 of 10.

Head number	Tag code	Gear	Port	Recovery date	Stat. week	Quad-rant	Dist.	Sub-dist.	Length
31806	40396	Troll	Excursion Inlet	8/30/2002	35	NW			614
31813	40396	Troll	Excursion Inlet	8/30/2002	35	NW			707
31815	40398	Troll	Excursion Inlet	8/30/2002	35	NW			644
31817	40398	Troll	Excursion Inlet	8/30/2002	35	NW			767
31842	40398	Troll	Excursion Inlet	8/30/2002	35	NW			651
215633	40397	Troll	Sitka	8/30/2002	35	NW	113	45	683
219094	40396	Troll	Hoonah	8/30/2002	35	NW	114	25	625
219130	40397	Troll	Hoonah	8/30/2002	35	NW	114	25	595
222471	40397	Troll	Elfin Cove	8/30/2002	35	NW	114	21	710
222474	40396	Troll	Elfin Cove	8/30/2002	35	NW	114	21	777
219175	40396	Troll	Hoonah	9/1/2002	36	NW	113	95	835
219194	40298	Troll	Hoonah	9/2/2002	36	NW	113	95	640
219196	40397	Troll	Hoonah	9/2/2002	36	NW	113	95	675
31762	40396	Troll	Excursion Inlet	9/3/2002	36	NW			714
31763	40298	Troll	Excursion Inlet	9/3/2002	36	NW			663
31767	40396	Troll	Excursion Inlet	9/3/2002	36	NW			685
31768	40298	Troll	Excursion Inlet	9/3/2002	36	NW			710
31770	40298	Troll	Excursion Inlet	9/3/2002	36	NW			602
31776	40396	Troll	Excursion Inlet	9/3/2002	36	NW			684
31787	40397	Troll	Excursion Inlet	9/3/2002	36	NW			720
219135	40398	Troll	Hoonah	9/3/2002	36	NW	114	25	670
219137	40397	Troll	Hoonah	9/3/2002	36	NW	114	25	700
219146	40298	Troll	Hoonah	9/3/2002	36	NW	114	25	600
222998	40298	Troll	Yakutat	9/3/2002	36	NW	189	30	725
223003	40398	Troll	Yakutat	9/3/2002	36	NW	189	30	682
223011	40396	Troll	Yakutat	9/3/2002	36	NW	189	30	775
223018	40398	Troll	Yakutat	9/3/2002	36	NW	189	30	588
223020	40397	Troll	Yakutat	9/3/2002	36	NW	189	30	581
219155	40298	Troll	Hoonah	9/4/2002	36	NW	114	25	745
222477	40397	Troll	Elfin Cove	9/4/2002	36	NW	114	21	665
236049	40397	Troll	Sitka	9/4/2002	36	NW	113		674
31863	40396	Troll	Excursion Inlet	9/6/2002	36	NW			753
210797	40398	Troll	Pelican	9/6/2002	36	NW	113	91	685
219239	40397	Troll	Hoonah	9/6/2002	36	NW	114	25	765
219249	40298	Troll	Hoonah	9/6/2002	36	NW	114	25	640
219253	40298	Troll	Hoonah	9/6/2002	36	NW	114	25	705
219255	40398	Troll	Hoonah	9/6/2002	36	NW	114	25	655
219281	40298	Troll	Hoonah	9/8/2002	37	NW	113	95	665
219287	40298	Troll	Hoonah	9/8/2002	37	NW	113	95	665
210644	40396	Troll	Pelican	9/9/2002	37	NW	113	91	660
219256	40396	Troll	Hoonah	9/9/2002	37	NW	114	25	700
219257	40397	Troll	Hoonah	9/9/2002	37	NW	114	25	690
219258	40397	Troll	Hoonah	9/9/2002	37	NW	114	25	705
222486	40398	Troll	Elfin Cove	9/9/2002	37	NW	114	21	669
222499	40397	Troll	Elfin Cove	9/9/2002	37	NW	114	21	720
222502	40398	Troll	Elfin Cove	9/9/2002	37	NW	114	21	690
223030	40398	Troll	Yakutat	9/9/2002	37	NW	189	30	686
223035	40397	Troll	Yakutat	9/9/2002	37	NW	189	30	749

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Appendix A1.–Page 6 of 10.

Head number	Tag code	Gear	Port	Recovery date	Stat. week	Quad-rant	Dist.	Sub-dist.	Length
223037	40398	Troll	Yakutat	9/9/2002	37	NW	189	30	750
236742	40396	Troll	Sitka	9/9/2002	37	NW			602
236758	40298	Troll	Sitka	9/9/2002	37	NW			736
236764	40398	Troll	Sitka	9/9/2002	37	NW			675
236769	40397	Troll	Sitka	9/9/2002	37	NW			670
236792	40396	Troll	Sitka	9/9/2002	37	NW			780
236795	40298	Troll	Sitka	9/9/2002	37	NW			734
236798	40398	Troll	Sitka	9/9/2002	37	NW			742
210699	40396	Troll	Pelican	9/10/2002	37	NW	113	91	635
219305	40396	Troll	Hoonah	9/10/2002	37	NW	114	25	730
219312	40396	Troll	Hoonah	9/10/2002	37	NW	114	25	705
219365	40396	Troll	Hoonah	9/10/2002	37	NW	113	95	710
222514	40396	Troll	Elfin Cove	9/10/2002	37	NW	114	21	580
223040	40396	Troll	Yakutat	9/10/2002	37	NW	189	30	694
223041	40298	Troll	Yakutat	9/10/2002	37	NW	189	30	615
223042	40396	Troll	Yakutat	9/10/2002	37	NW	189	30	700
223052	40398	Troll	Yakutat	9/10/2002	37	NW	189	30	599
236184	40298	Troll	Sitka	9/10/2002	37	NW	113	45	673
210822	40398	Troll	Pelican	9/11/2002	37	NW	114	21	597
210830	40398	Troll	Pelican	9/11/2002	37	NW			690
210837	40398	Troll	Pelican	9/11/2002	37	NW			650
210839	40398	Troll	Pelican	9/11/2002	37	NW			658
210840	40396	Troll	Pelican	9/11/2002	37	NW			714
219314	40396	Troll	Hoonah	9/11/2002	37				685
219316	40298	Troll	Hoonah	9/11/2002	37				690
219318	40397	Troll	Hoonah	9/11/2002	37				690
219320	40298	Troll	Hoonah	9/11/2002	37				660
219333	40398	Troll	Hoonah	9/11/2002	37	NW	114	25	645
219334	40397	Troll	Hoonah	9/11/2002	37	NW	114	25	720
219342	40396	Troll	Hoonah	9/11/2002	37	NW	114	25	740
11382	40398	Troll	Excursion Inlet	9/12/2002	37	NW			715
11384	40298	Troll	Excursion Inlet	9/12/2002	37	NW			650
31887	40398	Troll	Excursion Inlet	9/12/2002	37	NW			656
31889	40397	Troll	Excursion Inlet	9/12/2002	37	NW			745
31891	40398	Troll	Excursion Inlet	9/12/2002	37	NW			660
31894	40398	Troll	Excursion Inlet	9/12/2002	37	NW			642
31896	40398	Troll	Excursion Inlet	9/12/2002	37	NW			596
31897	40260	Troll	Excursion Inlet	9/12/2002	37	NW			726
31900	40298	Troll	Excursion Inlet	9/12/2002	37	NW			732
219350	40396	Troll	Hoonah	9/12/2002	37	NW	114	25	680
222516	40397	Troll	Elfin Cove	9/12/2002	37	NW	114	21	655
222518	40298	Troll	Elfin Cove	9/12/2002	37	NW	114	21	720
222519	40396	Troll	Elfin Cove	9/12/2002	37	NW	114	21	630
222522	40396	Troll	Elfin Cove	9/12/2002	37	NW	114	21	705
219390	40398	Troll	Hoonah	9/13/2002	37	NW	114	25	755
219407	40396	Troll	Hoonah	9/13/2002	37	NW	114	25	715
219408	40397	Troll	Hoonah	9/13/2002	37	NW	114	25	720
222526	40396	Troll	Elfin Cove	9/13/2002	37	NW	114	21	824

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Appendix A1.–Page 7 of 10.

Head number	Tag code	Gear	Port	Recovery date	Stat. week	Quad-rant	Dist.	Sub-dist.	Length
222527	40398	Troll	Elfin Cove	9/13/2002	37	NW	114	21	732
223061	40398	Troll	Yakutat	9/13/2002	37	NW	189	30	748
223066	40396	Troll	Yakutat	9/13/2002	37	NW	189	30	676
46558	40398	Troll	Excursion Inlet	9/15/2002	38	NW			780
46561	40396	Troll	Excursion Inlet	9/15/2002	38	NW			590
46566	40396	Troll	Excursion Inlet	9/15/2002	38	NW			690
46568	40398	Troll	Excursion Inlet	9/15/2002	38	NW			705
237142	40298	Troll	Sitka	9/15/2002	38	NW			701
237143	40398	Troll	Sitka	9/15/2002	38	NW			680
237147	40398	Troll	Sitka	9/15/2002	38	NW			702
237150	40397	Troll	Sitka	9/15/2002	38	NW			785
237155	40398	Troll	Sitka	9/15/2002	38	NW			702
237157	40396	Troll	Sitka	9/15/2002	38	NW			706
237159	40396	Troll	Sitka	9/15/2002	38	NW			720
237180	40396	Troll	Sitka	9/15/2002	38	NW			689
237182	40396	Troll	Sitka	9/15/2002	38	NW			685
237184	40398	Troll	Sitka	9/15/2002	38	NW			605
89955	40397	Troll	Petersburg	9/16/2002	38	NW	189	30	679
89962	40397	Troll	Petersburg	9/16/2002	38	NW	189	30	657
219414	40397	Troll	Hoonah	9/16/2002	38	NW	114	25	695
219440	40396	Troll	Hoonah	9/16/2002	38	NW	114		660
219441	40398	Troll	Hoonah	9/16/2002	38	NW	114		750
219442	40298	Troll	Hoonah	9/16/2002	38	NW	114		695
219443	40396	Troll	Hoonah	9/16/2002	38	NW	114		640
210886	40396	Troll	Pelican	9/17/2002	38	NW	114	21	655
210889	40396	Troll	Pelican	9/17/2002	38	NW	114	21	728
210890	40396	Troll	Pelican	9/17/2002	38	NW	114	21	694
219418	40398	Troll	Hoonah	9/17/2002	38	NW	114	25	810
219425	40397	Troll	Hoonah	9/17/2002	38	NW	114	25	710
219493	40396	Troll	Hoonah	9/17/2002	38	NW	114		815
210898	40397	Troll	Pelican	9/18/2002	38	NW			580
219448	40298	Troll	Hoonah	9/18/2002	38	NW	114	25	730
219451	40298	Troll	Hoonah	9/18/2002	38	NW	114	25	615
219462	40398	Troll	Hoonah	9/18/2002	38	NW	114	25	680
219472	40398	Troll	Hoonah	9/18/2002	38	NW	114	25	730
210932	40396	Troll	Pelican	9/19/2002	38	NW	114	21	688
210933	40398	Troll	Pelican	9/19/2002	38	NW	114	21	610
210936	40298	Troll	Pelican	9/19/2002	38	NW	114	21	642
219480	40397	Troll	Hoonah	9/19/2002	38	NW	114	25	775
219512	40397	Troll	Hoonah	9/20/2002	38	NW	114	21	680
236881	40396	Troll	Sitka	9/20/2002	38	NW	113	45	726
237227	40397	Troll	Sitka	9/20/2002	38	NW	114	21	694
237240	40398	Troll	Sitka	9/20/2002	38	NW	114	21	668
237247	40396	Troll	Sitka	9/20/2002	38	NW	114	21	648
237271	40397	Troll	Sitka	9/20/2002	38	NW	114	21	762
210962	40397	Troll	Pelican	9/23/2002	39	NW	114	21	702
210985	40396	Troll	Pelican	9/24/2002	39	NW	114	21	771
210986	40396	Troll	Pelican	9/24/2002	39	NW	114	21	690

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Appendix A1.–Page 8 of 10.

Head number	Tag code	Gear	Port	Recovery date	Stat. week	Quad-rant	Dist.	Sub-dist.	Length
210992	40298	Troll	Pelican	9/24/2002	39	NW	114	21	718
210993	40397	Troll	Pelican	9/24/2002	39	NW	114	21	547
239004	40396	Troll	Pelican	9/25/2002	39	NW	113	91	752
239007	40398	Troll	Pelican	9/25/2002	39	NW	113	91	691
239021	40397	Troll	Pelican	9/26/2002	39	NW			710
236198	40398	Troll	Sitka	9/27/2002	39	NW			668
236937	40396	Troll	Sitka	9/27/2002	39	NW	113	45	740
237352	40396	Troll	Sitka	9/27/2002	39	NW			707
237359	40298	Troll	Sitka	9/27/2002	39	NW			711
237373	40396	Troll	Sitka	9/27/2002	39	NW			625
237381	40397	Troll	Sitka	9/27/2002	39	NW			726
237383	40397	Troll	Sitka	9/27/2002	39	NW			728
237392	40396	Troll	Sitka	9/27/2002	39	NW			616
239033	40398	Troll	Pelican	9/27/2002	39	NW	114	21	634
239042	40398	Troll	Pelican	9/28/2002	39	NW	113	91	730
223081	40397	Troll	Yakutat	9/30/2002	40	NW	189	30	701
223085	40397	Troll	Yakutat	9/30/2002	40	NW	189	30	685
239045	40396	Troll	Pelican	9/30/2002	40	NW	114	21	690
189480	40396	Fish wheels	Chilkat River	8/17/2002	33	NE	115	32	425
189481	40396	Fish wheels	Chilkat River	8/21/2002	34	NE	115	32	420
189482	40398	Fish wheels	Chilkat River	8/21/2002	34	NE	115	32	510
189483	40398	Fish wheels	Chilkat River	8/30/2002	35	NE	115	32	670
189485	40298	Fish wheels	Chilkat River	8/30/2002	35	NE	115	32	620
149934	40396	Fish wheels	Chilkat River	8/31/2002	35	NE	115	32	520
189484	40397	Fish wheels	Chilkat River	8/31/2002	35	NE	115	32	480
149935	40397	Fish wheels	Chilkat River	9/1/2002	36	NE	115	32	455
149936	40396	Fish wheels	Chilkat River	9/1/2002	36	NE	115	32	550
149937	40298	Fish wheels	Chilkat River	9/1/2002	36	NE	115	32	580
149938	40398	Fish wheels	Chilkat River	9/2/2002	36	NE	115	32	440
149939	40398	Fish wheels	Chilkat River	9/4/2002	36	NE	115	32	440
149940	40397	Fish wheels	Chilkat River	9/4/2002	36	NE	115	32	715
149941	40396	Fish wheels	Chilkat River	9/6/2002	36	NE	115	32	415
149942	40398	Fish wheels	Chilkat River	9/7/2002	36	NE	115	32	625
149943	40396	Fish wheels	Chilkat River	9/10/2002	37	NE	115	32	565
149944	40397	Fish wheels	Chilkat River	9/11/2002	37	NE	115	32	620
149945	40396	Fish wheels	Chilkat River	9/11/2002	37	NE	115	32	635
149946	40398	Fish wheels	Chilkat River	9/12/2002	37	NE	115	32	670
149950	40396	Fish wheels	Chilkat River	9/12/2002	37	NE	115	32	730
149947	40398	Fish wheels	Chilkat River	9/14/2002	37	NE	115	32	675
149948	40361	Fish wheels	Chilkat River	9/17/2002	38	NE	115	32	745
149949	40397	Fish wheels	Chilkat River	9/18/2002	38	NE	115	32	555
189486	40398	Fish wheels	Chilkat River	9/19/2002	38	NE	115	32	540
189487	40398	Fish wheels	Chilkat River	9/19/2002	38	NE	115	32	665
189488	40398	Fish wheels	Chilkat River	9/20/2002	38	NE	115	32	640
189489	40397	Fish wheels	Chilkat River	9/20/2002	38	NE	115	32	705
189490	40396	Fish wheels	Chilkat River	9/22/2002	39	NE	115	32	635
189436	40398	Fish wheels	Chilkat River	9/23/2002	39	NE	115	32	645
189437	40396	Fish wheels	Chilkat River	9/23/2002	39	NE	115	32	640

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Appendix A1.–Page 9 of 10.

Head number	Tag code	Gear	Port	Recovery date	Stat. week	Quad-rant	Dist.	Sub-dist.	Length
189438	40398	Fish wheels	Chilkat River	9/23/2002	39	NE	115	32	630
189439	40398	Fish wheels	Chilkat River	9/23/2002	39	NE	115	32	715
189440	40396	Fish wheels	Chilkat River	9/26/2002	39	NE	115	32	735
189441	40397	Fish wheels	Chilkat River	9/27/2002	39	NE	115	32	585
189442	40396	Fish wheels	Chilkat River	9/27/2002	39	NE	115	32	600
189443	40397	Fish wheels	Chilkat River	9/27/2002	39	NE	115	32	605
189453	40398	Fish wheels	Chilkat River	9/27/2002	39	NE	115	32	685
189468	40298	Fish wheels	Chilkat River	9/28/2002	39	NE	115	32	715
189469	40397	Fish wheels	Chilkat River	9/30/2002	40	NE	115	32	665
189471	40397	Fish wheels	Chilkat River	9/30/2002	40	NE	115	32	600
189472	40396	Fish wheels	Chilkat River	9/30/2002	40	NE	115	32	700
189473	40398	Fish wheels	Chilkat River	9/30/2002	40	NE	115	32	710
189491	40396	Fish wheels	Chilkat River	10/2/2002	40	NE	115	32	435
189492	40398	Fish wheels	Chilkat River	10/2/2002	40	NE	115	32	655
189493	40396	Fish wheels	Chilkat River	10/3/2002	40	NE	115	32	700
149951	40396	Fish wheels	Chilkat River	10/4/2002	40	NE	115	32	630
149952	40397	Fish wheels	Chilkat River	10/4/2002	40	NE	115	32	650
149953	40396	Fish wheels	Chilkat River	10/4/2002	40	NE	115	32	715
149954	40398	Fish wheels	Chilkat River	10/4/2002	40	NE	115	32	655
149955	40396	Fish wheels	Chilkat River	10/4/2002	40	NE	115	32	600
149956	40298	Fish wheels	Chilkat River	10/4/2002	40	NE	115	32	655
149957	40396	Fish wheels	Chilkat River	10/5/2002	40	NE	115	32	750
149958	40298	Fish wheels	Chilkat River	10/5/2002	40	NE	115	32	650
149961	40398	Fish wheels	Chilkat River	10/8/2002	41	NE	115	32	670
149962	40397	Fish wheels	Chilkat River	10/8/2002	41	NE	115	32	520
149963	40298	Fish wheels	Chilkat River	10/8/2002	41	NE	115	32	650
149964	40398	Fish wheels	Chilkat River	10/15/2002	42	NE	115	32	695
149965	40398	Fish wheels	Chilkat River	10/16/2002	42	NE	115	32	575
149971	40396	Fish wheels	Chilkat River	10/16/2002	42	NE	115	32	670
149972	40398	Fish wheels	Chilkat River	10/16/2002	42	NE	115	32	660
			SELECT RECOVERIES						
222913	40298	Troll	Yakutat	8/10/2002	32	NW	157		
236131	40398	Troll	Sitka	8/29/2002	35	NW	113	45	
236202	40398	Troll	Sitka	8/31/2002	35	NW	189	30	
236402	40396	Troll	Sitka	9/1/2002	36	NW	113	91	
234630	40396	Sport	Gustavus	9/13/2002	37	NW	114	25	
900001	40398	Juvenile recovery	Juneau (Jordan Cr.)	5/13/2002	20	NE	111	50	
189452	40396	Chilkat recovery	Chilkat R.	9/26/2002	39	NE	115	32	465
149901	40398	Chilkat recovery	Tahini R.	10/8/2002	41	NE	115	32	575
149982	40398	Chilkat recovery	Spring Cr.	10/17/2002	42	NE	115	32	620
149983	40398	Chilkat recovery	Spring Cr.	10/17/2002	42	NE	115	32	625
149984	40398	Chilkat recovery	Little Salmon R.	10/18/2002	42	NE	115	32	540
149985	40298	Chilkat recovery	Little Salmon R.	10/18/2002	42	NE	115	32	620
149990	40398	Chilkat recovery	Little Salmon R.	10/29/2002	44	NE	115	32	620
149991	40298	Chilkat recovery	Little Salmon R.	10/29/2002	44	NE	115	32	620
189494	40298	Chilkat recovery	Assignation Cr.	10/31/2002	44	NE	115	32	685
149988	40398	Chilkat recovery	Assignation Cr.	11/1/2002	44	NE	115	32	575
189495	40396	Chilkat recovery	Herman Cr.	11/7/2002	45	NE	115	32	620

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Appendix A1.–Page 10 of 10.

Head number	Tag code	Gear	Port	Recovery date	Stat. week	Quad-rant	Dist.	Sub-dist.	Length
189496	40397	Chilkat recovery	Herman Cr.	11/14/2002	46	NE	115	32	570
VOLUNTARY RECOVERIES									
149969	40397	Sport	Chilkat River	10/5/2002	40	NE	115	32	640
149970	40397	Sport	Chilkat River	10/5/2002	40	NE	115	32	630
149967	40396	Sport	Chilkat River	10/13/2002	42	NE	115	32	700
149968	40396	Sport	Chilkat River	10/13/2002	42	NE	115	32	710
149987	40396	Sport	Chilkat River	10/20/2002	43	NE	115	32	600

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

FILE NAME	DESCRIPTION
01trapsum.xls	Excel workbook containing 2001 Chilkat River coho salmon smolt trapping and coded wire tagging data.
01trapsum.prn	Space delimited text file with raw 2001 Chilkat River coho salmon smolt trapping and coded wire tagging data.
01trapsum.txt	Text file describing heading and column layout in 01trapsum.prn
Smoltawl2001.xls	Excel workbook containing 2001 Chilkat River coho salmon smolt age-weight-length data.
Smoltawl2001.prn	Space delimited text file with raw 2001 Chilkat River coho salmon smolt age-weight-length data.
Smoltawl2001.txt	Text file describing heading and column layout in Smoltawl2001.prn
02FWCohoAges.xls	Excel workbook containing 2002 Chilkat River fish wheel coho salmon catch, marking, and age-length sample data.
02FWCohoAges.prn	Space delimited text file with raw 2002 Chilkat River fish wheel coho salmon catch, marking, and age-length sample data.
02FWCohoAges.txt	Text file describing heading and column layout in 02FWCohoAges.prn
Allcwtrecoveries2002.xls	Excel workbook containing recovery data and harvest estimates of Chilkat River coho salmon tagged as smolt during 2001.
Allcwtrecoveries2002.prn	Space delimited text file with raw recovery data of Chilkat River coho salmon tagged as smolt during 2001.
Allcwtrecoveries2002.txt	Text file describing heading and column layout in Allcwtrecoveries2002.prn