Fishery Data Series No. 06-02

Production of Coho Salmon from the Taku River, 1999–2003

by

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February 2006

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

Symbols and Abbreviations

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Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Measures (fisheries)

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

Mathematics, statistics

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

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TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF APPENDICES (Continued)

ABSTRACT

Smolt abundance in 1999, 2000, 2001, and 2002 and adult production in 2000, 2001, 2002, and 2003 were estimated for coho salmon *Oncorhynchus kisutch* from the Taku River, near Juneau, Alaska using coded wire tags implanted in smolts, harvest sampling, and an inriver mark-recapture experiment on adults. A modified Petersen estimate was used to estimate that 1,728,240 (SE = 255,147), 1,846,629 (SE = 276,385), 2,718,816 (SE = 363,071), and 2,988,349 (SE = 1,008,886) smolt emigrated from the Taku River in 1999, 2000, 2001, and 2002; these smolt survived to adulthood at estimated rates of 6.3% (SE = 1.0%), 8.8% (SE = 1.4%), 11.2% (SE = 1.8%), and 8.9% (SE = 3.1%), accordingly. From the return of coded wire tags in 2000, 2001, 2002, and 2003, harvests of adults were estimated at 38,971 (SE = 3,326), 55,264 (SE = 4,828), 80,046 (SE = 6,389), and 78,277 (SE = 10,271), respectively in U. S. marine waters. Over these four years, the troll fishery took an estimated 54%; drift gillnet fisheries took 32%; recreational fisheries, 9%; and seine fisheries, 5% of marine harvests. An estimated 70,147 (SE = 5,667) in 2000, 107,493 (SE = 9,495) in 2001, 223,162 (SE = 28,648) in 2002, and 186,755 (SE = 17,727) in 2003 adults passed by Canyon Island (located about 30 km up the Taku River), estimated from tagging and recapture of adults in those years. Estimates of escapement past all fisheries in the Taku River were 64,700 (SE = 5,667) in 2000, 104,394 (SE = 9,495) in 2001, 219,360 (SE = 28,648) in 2002, and 183,038 (SE = 17,727) in 2003. Exploitation including all marine and inriver harvests was estimated at 41% in 2000, 36% in 2001, 28% in 2002, and 31% in 2003. The Taku River stock of coho salmon comprised an estimated 44%, 20%, 30%, and 37% of the coho salmon harvest in the Juneau recreational fishery in 2000, 2001, 2002, and 2003, respectively. The estimated run (escapement plus harvest) for coho salmon originating above Canyon Island was 109,149 (SE = 6,571) in 2000, 162,778 (SE = 10,652) in 2001, 303,276 (SE = 29,352) in 2002, and 265,089 (SE = 20,485) in 2003. Age composition of adult coho salmon was 80%, 81%, 85%, and 90% age-1.1 fish in 2000, 2001, 2002, and 2003.

Key words: adult production, coded wire tag, coho salmon, drift gillnet fishery, escapement, exploitation rate, harvest, inriver fishery, marine survival, mark-recapture experiment, migratory timing, *Oncorhynchus kisutch*, recreational fishery, seine fishery, smolt abundance, Taku River, troll fishery

INTRODUCTION

The Taku River annually produces an estimated 100,000–450,000 adult coho salmon *Oncorhynchus kisutch*, many of which are caught in commercial and recreational fisheries in northern Southeast Alaska (Elliott and Bernard 1994; McPherson and Bernard 1995, 1996; McPherson et al. 1997, 1998; PSC 1996; Yanusz et al. 1999). Coho salmon returning to the Taku River pass through an offshore troll fishery before entering inside waters (Figure 1), then through a seine fishery in Icy and Chatham straits and a drift gillnet fishery in lower Lynn Canal. They next transit the recreational fishery near Juneau and the drift gillnet fishery in Taku Inlet/Stephens Passage before ascending the Taku River (Figure 2). After entering the river, the remaining coho salmon are exposed to a drift/set gillnet fishery just inside Canada (Figure 2). Because of the large production of coho salmon from the Taku River, and because of the many fisheries that utilize this production, the Alaska Department of Fish and Game (ADF&G), Fisheries and Oceans Canada (DFO), and the Taku River Tlingit First Nation (TRTFN) operate a cooperative program of stock assessment and management in regards to this stock (Appendix A1 contains references for past studies). Coho salmon spawning in the Taku River are managed as a single stock, and the stock assessment program has mirrored that emphasis since 1991 (McPherson and Bernard 1996; PSC 1996).

Objectives of this study were to estimate (1) abundance of coho salmon smolt leaving the Taku River in 1999–2002, (2) harvests of adults returning to the Taku River in 2000–2003, and (3) escapement and age composition of returning adults in 2000–2003. These objectives were accomplished by tagging and sampling smolt each spring from 1999 through 2002 in the lower Taku River and operating cooperative, inriver mark-recapture experiments to estimate abundance of adult coho salmon in 2000 through 2003.

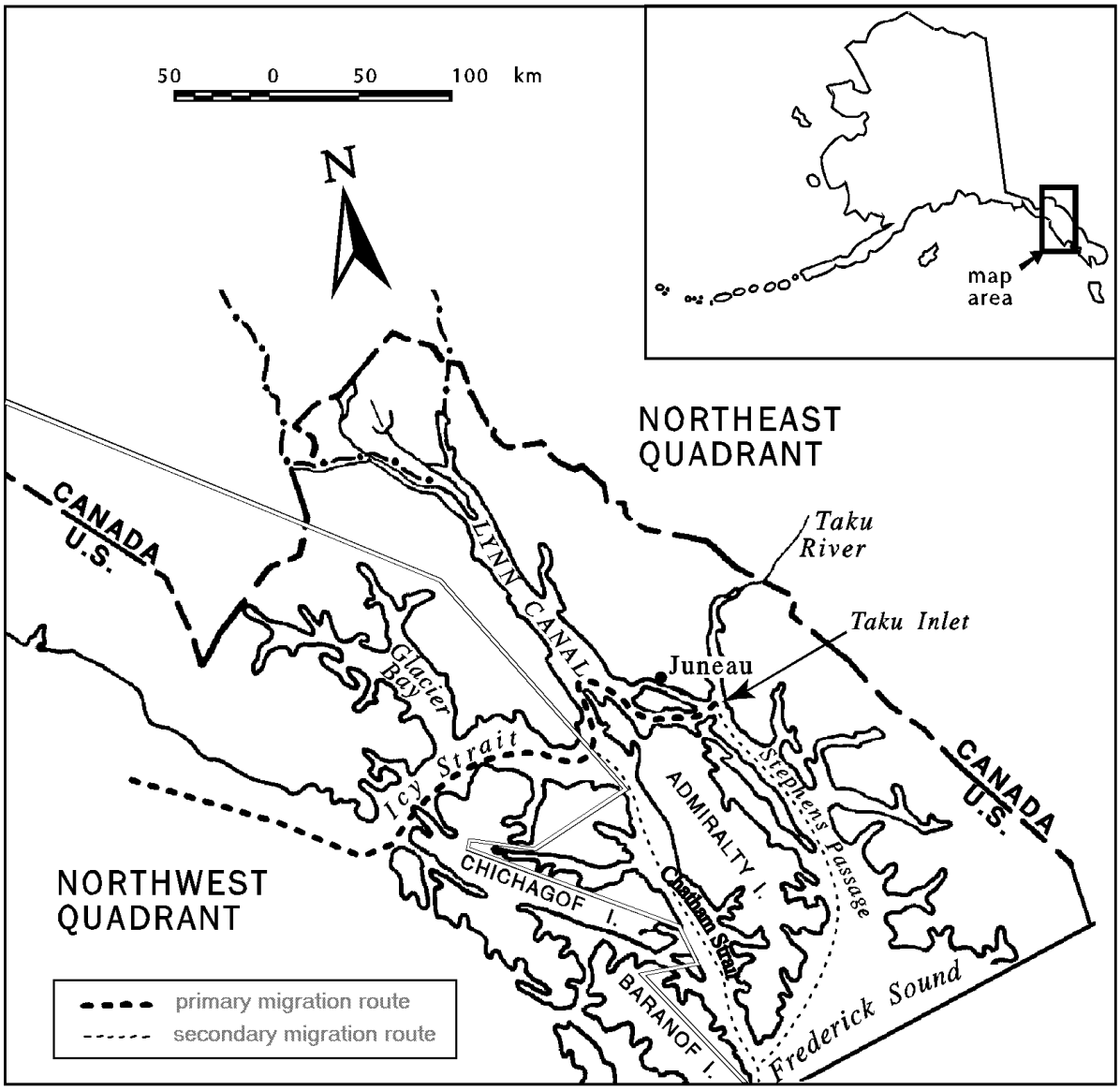

Figure 1.–Migration routes through northern Southeast Alaska of coho salmon bound for the Taku River.

METHODS

SMOLT CAPTURE, CODED WIRE TAGGING, AND SAMPLING

Minnow traps (style G-40) baited with salmon roe were fished daily for 24 h/d each spring, 1999-2002. Traps were distributed along mainstem banks and in some backwater areas along both sides of the Taku River stretching from about 6 km above to 6 km below Canyon Island (Figure 2). Traps were checked daily when the river stage was stable, and more frequently when the stage was rising or falling. Captured salmonid smolt and fry were transported to holding boxes at camp, and processed each afternoon. Coho and Chinook salmon *O. tshawytscha* smolt were separated by inspection from other species of salmon and Dolly Varden *Salvelinus malma*. Coho and Chinook salmon smolt were carefully examined to distinguish species. A clear 'window' in the pigmentation of the adipose fin (Meehan and Vania 1961; Pollard et al. 1997) and a more 'silver' sheen from a side view indicated a Chinook salmon smolt. Coho salmon smolt had more narrow parr marks, showed a greater number of small, darkly pigmented spots from a dorsal view,

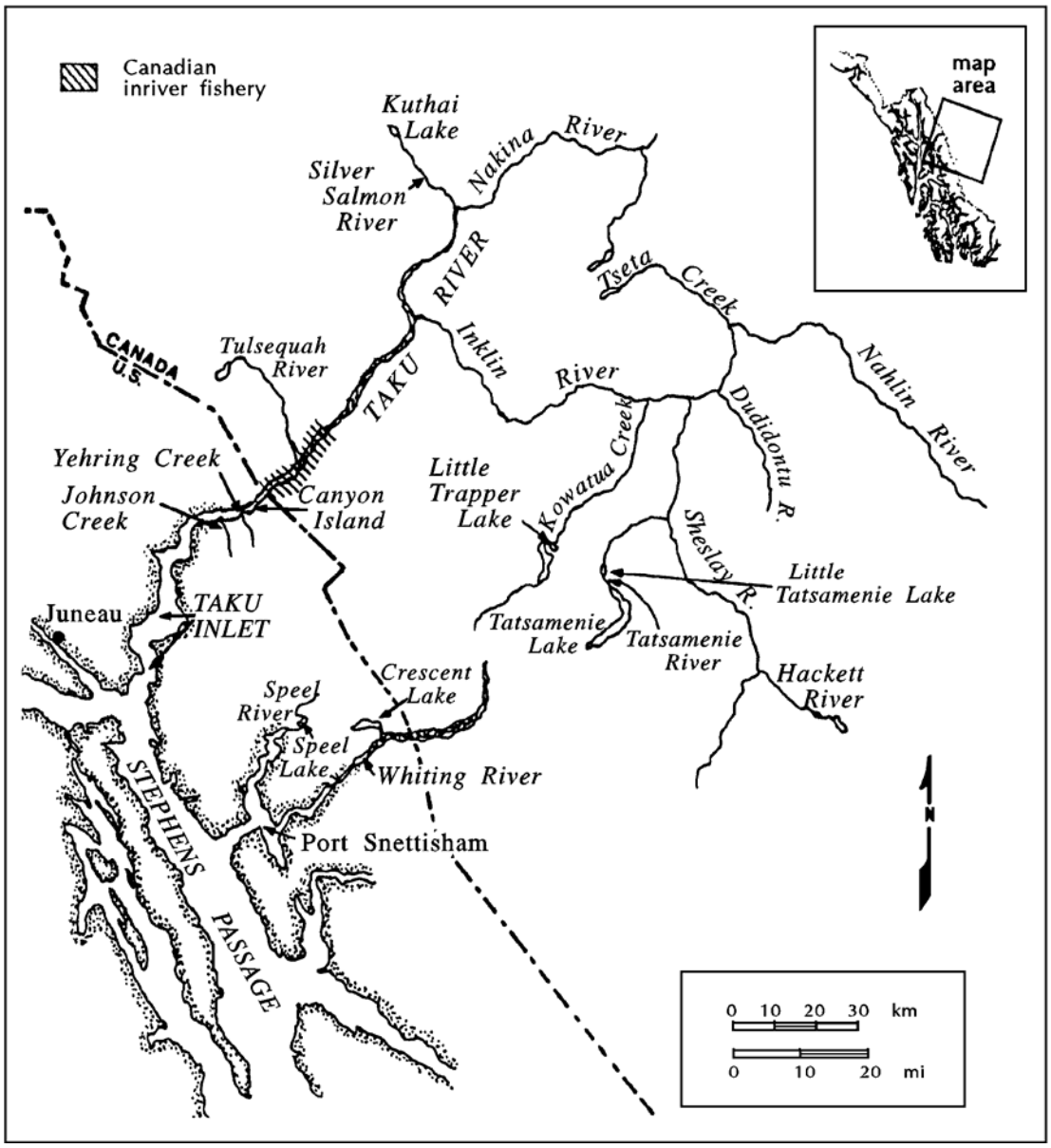

Figure 2.–Taku River drainage, northwestern British Columbia, and Southeast Alaska.

had pigmentation throughout the adipose fin, and had longer anterior rays on the anal fin.

All live coho salmon smolt ≥70 mm fork length (FL) in 1999 and 2000 and ≥75 mm FL in 2001 and 2002 were tranquilized in a solution of tricain-methane sulfonate (MS 222). The solution was buffered with sodium bicarbonate until the pH was neutral, as measured with a Hach kit. The MS 222 solution was maintained at river temperature by circulating it through a coil of aluminum tubing submerged in the river. All fish were tagged with a coded wire tag (CWT) and marked by excision of the adipose fin, following methods in Koerner (1977). Small coho salmon (70-85 mm FL in 1999 and 2000; 75-85 mm FL in 2001 and 2002) were tagged with a different set of codes than were larger smolt (>85 mm FL). All Chinook salmon smolt ≥50 mm FL were also tagged, but with different codes than those used for tagging coho salmon. All tagged fish were held for 24 hours and inspected for mortalities prior to release; 100 fish were checked daily to determine if their tag had been retained. When

fewer than 100 fish of a species were caught in a day, half the catch was checked. The number of fish tagged, number of tagging-related mortalities, and number of fish that had shed their tags were compiled and recorded on *ADF&G CWT Tagging Summary and Release Information Forms* which were submitted to the ADF&G Mark, Tag, and Age Lab in Juneau when field work ended.

One day per week, 1 out of 40 smolt was measured to the nearest 1 mm FL and weighed to the nearest 0.1 g. In addition, 1 out of 80 smolt had 12-15 scales removed from the preferred area for later determination of age (Scarnecchia 1979). Every coho salmon smolt that was recaptured in a minnow trap, i.e. already missing its adipose fin, was tested for the presence of a CWT, and its FL was recorded.

SMOLT ABUNDANCE

Abundance of coho salmon smolt (N_S) in 1999, 2000, 2001, and 2002 was estimated using a modified Petersen's estimator for closed populations. A sample of smolts was marked and tagged in one of the above years, and a sample of adults was inspected for marks in the following year. During the year at sea the population was open to mortality, but because of their life history, was closed to recruitment. Because smaller smolts demonstrably had a lower probability of being caught in minnow traps and of surviving to adulthood, Chapman's modification of Petersen's estimator (Seber 1982) was altered to produce relatively unbiased estimates of smolt abundance. From Appendix A2, the corrected estimator is:

$$\hat{N}_S = \frac{(\hat{\lambda}M_1 + M_2 + 1)(C+1)}{\hat{\lambda}(R_1 + \hat{\pi}R_3) + R_2 + (1-\hat{\pi})R_3 + 1} - 1 \qquad (1)$$

where M_1 is the number of smaller smolts (70–85 or 75–85 mm FL) marked and released in a year, M_2 is the number of larger smolts (>85 mm FL) marked in the same year, C the number of adults inspected for marks a year later, R_1 the subset of C with marks representing adults tagged as smaller smolt, R_2 the subset of C representing adults tagged as larger smolt, and R_3 the subset of C comprised of marked fish that had lost their tag (size at tagging unknown). The adjustment λ is the ratio of the catchability coefficients for larger to smaller smolt; π is the fraction of adults that were tagged as smaller smolts. Note that if there is no difference in catchability by smolt group (λ = 1), equation (1) becomes Chapman's modification regardless of size of marked smolt. Estimates of π and λ were obtained as (Appendices A2 and A3)

$$\hat{\pi} = \frac{\hat{T}_1}{\hat{T}_1 + \hat{T}_2} \qquad (2)$$

$$\hat{\lambda} = \frac{\hat{T}_2(\hat{\phi}_2 - \hat{p})}{\hat{T}_1(\hat{p} - \hat{\phi}_1)} \qquad (3)$$

where $\hat{T}_{1(2)}$ is the number of all tags representing smaller (or larger) smolt recovered or recaptured fromadult salmon regardless of how or where recovered or recaptured, $\phi_{1(2)}$ is the fraction of smaller (or larger) smolts that were age 1-freshwater (age-1.) when tagged, and p is the fraction of all adults that are age-1. a year later.

Variance and relative statistical bias in the estimator (equation 1) were estimated with bootstrap procedures described in general by Buckland and Garthwaite (1991). Each bootstrap sample was drawn randomly with replacement from the capture histories of the $\hat{N}_S$ smolt in the "virtual" population (Figure 3). From the bootstrap sample a new estimate of smolt abundance $\hat{N}'_S$ was calculated. Then the process was repeated 200 times to create the frequency distribution $\hat{F}'(\hat{N}'_S)$. At the end of the iterations, the following statistics were calculated:

$$\overline{N}'_S = \frac{\sum_{b=1}^{200} \hat{N}'_{S(b)}}{200} \qquad (4a)$$

$$\mathrm{var}(\hat{N}_S) = \frac{\sum_{b=1}^{200} (\hat{N}'_{S(b)} - \overline{N}'_S)^2}{200 - 1} \qquad (4b)$$

$$\text{Estimated Relative Bias} = \frac{\overline{N}'_S - \hat{N}_S}{\hat{N}_S}(100) \qquad (4c)$$

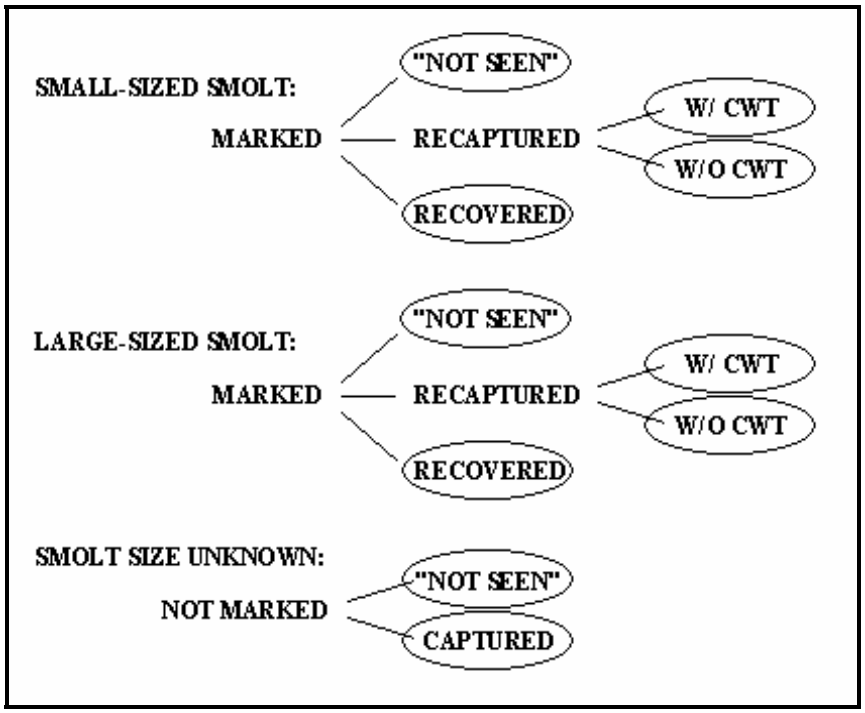

Figure 3.–Capture histories (in ovals) concerning smolts in the population emigrating from the Taku River.

The relationships between statistics and the 10 capture histories used in each year's simulation are provided in Tables 1 and 2. Bootstrap estimates $\hat{\phi}_1'$, $\hat{\phi}_2'$, and $\hat{p}'$ were obtained from binomial distributions based plug-in estima`tes $\hat{\phi}_1$, $\hat{\phi}_2$, and $\hat{p}$. A QuickBASIC program SMLTTAKU.BAS (Appendix A4) was used to conduct the simulations.

HARVESTS

Methods described in Bernard and Clark (1996, Table 2) were used to estimate the marine harvests of salmon from the Taku River using information from stratified catch sampling of marine commercial and recreational fisheries. Commercial catch data for the analysis were summarized by ADF&G statistical week (SW) and district (for gillnet and seine fisheries), or by troll period and quadrant for troll fisheries. Data on recovery of tags from recreational fisheries was obtained from reports provided by the ADF&G Mark, Tag, and Age Lab located in Juneau and summarized by biweek and fishery (e.g., biweek 16 during the Sitka Marine Creel Survey). Harvest estimates were obtained from ADF&G reports (e.g., Hubartt et al. 2001) and ADF&G computer summaries. In most cases, CWTs were recovered in only a few strata in sport fisheries. Assuming that the harvests of fish with CWTs of interest were independent of sampling strata within fishery-biweeks, harvests and sampling information was totaled over the fishery-biweek to estimate contributions. This procedure allowed comparisons between published biweekly harvests and the CWT data, and minimized bias that could have resulted if estimates had been derived from data obtained in minor strata where sampling rates were unusual.

The harvest estimates are based on the:

1) Number of coho salmon harvested;
2) Fraction of the harvest inspected;
3) Number of coho salmon in the sample without adipose fins;
4) Number of fish whose heads reached the tag lab;
5) Number of these heads that contained a CWT;
6) Number of CWTs that were decoded; and
7) Number of decoded CWTs with the appropriate code (i.e., originally released in the Taku River).

Table 1.–Relationships among program variables, capture histories, and model variables in bootstrap simulations to estimate the variance of smolt abundance estimates.

Program Variable	Capture History	Model Variables
(1)	Not marked, not seen	$\hat{\mathrm{N}} - M_1 - M_2 - C + R_1 + R_2 + R_3$
(2)	Marked, not seen – Smaller Smolt	$M_1 - \hat{T}_1$
(3)	" " – Larger Smolt	$M_2 - \hat{T}_2$
(4)	Marked, recaptured – Smaller Smolt w/ CWT	R_1
(5)	" " – Larger Smolt w/ CWT	R_2
(6)	" " – Smaller Smolt w/o CWT	$\hat{\pi} R_3$
(7)	" " – Larger Smolt w/o CWT	$(1-\hat{\pi}) R_3$
(8)	Marked, recovered – Smaller Smolt	$\hat{T}_1 - R_1 - \hat{\pi} R_3$
(9)	" " – Larger Smolt	$\hat{T}_2 - R_2 - (1-\hat{\pi}) R_3$
(10)	Not marked, captured	$C - R_1 - R_2 - R_3$

Table 2.–Model variables and their values for capture histories used to estimate abundance of coho salmon smolt emigrating from the Taku River in 1999, 2000, 2001, and 2002. Note the each row in this table corresponds to the same row in Table 1.

Model Variables	1999	2000	2001	2002
$\hat{\mathrm{N}} - M_1 - M_2 - C + R_1 + R_2 + R_3$	= 1,691,411	= 1,811,038	= 2,718,816	= 2,737,851
$M_1 - \hat{T}_1$	18,712 – 98 = 18,614	24,074 – 175 = 23,899	23,285 – 163 = 23,122	9,710 – 74 = 9,636
$M_2 - \hat{T}_2$	11,972 – 158 = 11,814	20,733 – 205 = 20,528	27,250 – 294 = 26,956	13,548 – 145 = 13,403
R_1	19	20	16	8
R_2	14	20	26	14
$\hat{\pi} R_3$	0.383(2) = 0.77	0.461(21) = 9.68	0.357(40) = 14.3	0.338(8) = 2.704
$(1-\hat{\pi}) R_3$	(1 – 0.383) 2 = 1.23	(1 – 0.461) 21 = 11.32	(1 – 0.357) 40 = 25.7	(1 – 0.338) 8 = 5.296
$\hat{T}_1 - R_1 - \hat{\pi} R_3$	98 – 19 – 0.77 = 78.23	175 – 20- 9.68 = 145.32	163 – 16 – 14.3 = 132.7	74 – 8 – 2.704 = 63.296
$\hat{T}_2 - R_2 - (1-\hat{\pi}) R_3$	158 – 14 – 1.23 = 142.77	205 – 20 – 11.32 = 172.68	294 – 26 – 25.7 = 242.3	145 – 14 – 5.296 = 125.704
$C - R_1 - R_2 - R_3$	1,877 – 19 – 14 – 2 = 1,842	2,380 – 20 – 20 – 21 = 2,319	3,765 – 16 – 26 – 40 = 3,683	3,003 – 8 – 14 – 8 = 2,973

Harvest over all marine and freshwater fisheries (H) was estimated as the sum of harvests estimated for each fishery. Because harvest was estimated for each fishery independently, estimated variance for harvest over all fisheries is the sum of all variances estimated for each fishery.

ESCAPEMENTS

Estimates of the number N_E of adult coho salmon passing by Canyon Island in 2000, 2001, 2002, and 2003 were based on two-event, closed-population, mark-recapture experiments conducted by ADF&G Divisions of Sport Fish

and Commercial Fisheries , TRTFN, and DFO. In the first sampling event, coho salmon were captured using fish wheels operated at Canyon Island, tagged with a uniquely numbered solid-core spaghetti tag sewn through the back of the fish just posterior and below the dorsal fin, measured to the nearest 5 mm from mid-eye to tail fork (MEF), sampled for scales, and released. A set gillnet (127 mm stretch mesh) was also used at Canyon Island to capture coho salmon when low water impaired operation of the fish wheels.

Scale samples consisted of four scales from the "preferred area" from each sampled fish - i.e. the left side of the fish two scales above the lateral line and on an imaginary line from the posterior dorsal fin to the anterior anal fin (Scarnecchia 1979). The scales were applied to a gum card in the field and later pressed into acetate cards. Ages were determined by examining the impressions under 70× magnification. Criteria used to assign ages were similar to those of Moser (1968) and were supplemented with results from recent studies on validating age as determined from scales (C. Farrington, CFD, Douglas, AK, unpublished data). Ages are reported in European notation (Koo 1962).

Coho salmon caught in two fisheries, the Canadian commercial gillnet and in test fisheries 3–20 km upstream of Canyon Island were sampled as part of the second event of the mark-recapture experiment. See Kelley and Milligan (1999) for a detailed description of the field methods. Mark-recapture data were grouped into statistical weeks (SW) for analysis to avoid the variability associated with day-to-day statistics and to reflect the weekly periods used to manage U.S. and Canadian fisheries. Because the commercial fishery ended before all adults had reached Canyon Island, a test fishery was used each year to extend sampling during the second event.

Adult abundance N_E past Canyon Island during the mark-recapture experiment was estimated each year according to stratified models first developed by Darroch (Seber 1982) for circumstances where temporal or spatial distributions of fish affect their probabilities of capture. One condition for getting a consistent abundance estimate for passing salmon from an unstratified estimator is that there is no temporal changes in the probabilities of capture. Experience has shown that probabilities of capture of coho salmon during the first event often change as their annual migration progresses. Fluctuation in water levels at Canyon Island has affected the efficiency of fish wheels and gillnets (Yanusz et al. 1999). Also, the change from the commercial fishery to a test fishery halfway through the migration has affected probabilities of capture upstream during the second sampling event. In each annual experiment statistics were pooled across statistical weeks into strata based upon estimated fish catchability and fishing methods. To allow for travel time from Canyon Island upstream to the fisheries, recovery strata were lagged one SW from the release strata. A matrix of fish released and recovered in each stratum was input into the computer program SPAS (Arnason et al. 1996) to perform the abundance and variance calculations and diagnostic tests. Other conditions for obtaining a consistent estimate from a two-event mark-recapture experiment are:

1. All adults have an equal probability of being marked regardless of their size; or
2. All adults have an equal probability of being inspected for marks regardless of their size; and
3. There is no recruitment to the population between Canyon Island and the fisheries upstream; and
4. There is no trap-induced behavior; and
5. Fish do not lose their marks and all marks are recognizable.

Size distributions and recapture rates by size groups were compared to detect heterogeneity in probabilities of capture. Considering the short distance between Canyon Island and the inriver fisheries just upstream, and considering the life history of the species, no recruitment could have occurred between sampling events. Different sampling gears in different sampling events prevented trap-induced behavior. The short duration between sampling events should have left a scar as a secondary mark for any fish that had lost its tag in transit. Evidence from a radio telemetry study (Eiler et al. 1993) is that coho salmon caught as in this study can be expected to survive handling to move upstream to fishing

grounds in Canada. Escapement (spawning abundance) was estimated as $\hat{E} = \hat{N}_E - H_{FW}$ where the latter statistic is the inriver harvest in Canada (note that $\text{var}(\hat{E}) = \text{var}(\hat{N}_E)$).

RUN SIZE, EXPLOITATION, AND MARINE SURVIVAL

Estimates of run size (N_A) of coho salmon returning to the Taku River above Canyon Island in 2000, 2001, 2002, and 2003 and the associated exploitation rates (U) in commercial and sport fisheries are based on the sum of estimates of harvest (H) and escapement (E):

$$\hat{N}_A = \hat{H} + \hat{E} \tag{5a}$$

$$\text{var}(\hat{N}_A) = \text{var}(\hat{H}) + \text{var}(\hat{E}) \tag{5b}$$

$$\hat{U} = \frac{\hat{H}}{\hat{H} + \hat{E}} \tag{6a}$$

Variance for equation (6a) was approximated with the delta method (Seber 1982) to be:

$$\text{var}(\hat{U}) \cong \frac{\text{var}(\hat{H})\hat{E}^2}{\hat{N}_A^4} + \frac{\text{var}(\hat{E})\hat{H}^2}{\hat{N}_A^4} \tag{6b}$$

Survival rate of smolts to adults (S) was estimated as:

$$\hat{S} = \frac{\hat{N}_A}{\hat{N}_S} \tag{7a}$$

Variance for equation (7a) was approximated with the delta method to be:

$$\text{var}(\hat{S}) \cong \hat{S}^2 \left[\frac{\text{var}(\hat{N}_A)}{\hat{N}_A^2} + \frac{\text{var}(\hat{N}_S)}{\hat{N}_S^2} \right] \tag{7b}$$

RESULTS

PRODUCTION OF COHO SALMON 1999-2000

From 15 April through 6 June, 1999, 30,684 coho salmon smolt were captured, tagged, and released with the following codes:

Tag code	Size[a]	Number tagged	Overnight mortality	Tag retention	Final release
040126	small	11,099	7	0.999	11,079
040131	small	7,680	18	0.996	7,633
040127	large	10,083	4	0.998	10,057
040132	large	1,926	0	0.994	1,915
Sub total	small	18,779	25	0.996	18,712
Sub total	large	12,009	4	0.997	11,972
Grand total		30,788	29	0.997	30,684

[a] Small coho salmon smolt were fish measured between 70-85 mm FL; large fish > 85 mm FL.

Ninety percent (90%) of coho salmon smolt were captured between 15 April and 25 May. Peak catches occurred on 21 April and 7 May, and 50% of the catch occurred by 5 May (Figure 4; Appendix B1). The average FL of coho salmon smolt was 82 mm (SD = 11.13; Figure 5) and average weight was 5.4 g (SD = 2.54) in 1999. Length frequencies of coho salmon smolt captured the first time and those recaptured were not comparable ($P < 0.001$; Figure 6) as recaptured fish were significantly larger than captured fish. An additional 19,622 Chinook salmon smolt were captured and tagged with code 04-01-41; 65 died within 24 h of tagging and tag retention was nearly 100% leaving a release of 19,531 marked smolts. Analyses of data on tagged Chinook salmon will be published after returns from that brood (1997) are completed in calendar year 2004.

Based on the recovery of tags (CWTs) and sampling a year later in 2000, an estimated 1,728,240 coho salmon smolt (SE = 255,147) had emigrated to sea in 1999 (capture histories and associated statistics are in Table 2 for this year and for 2000, 2001, and 2002). Coded wire tags were recovered from approximately 0.52% (98 of 18,712) smaller smolt and 1.32% (158 of 11,972) from larger smolt. These rates indicate significantly better odds (2.52) for recovery and implied survival of larger smolt ($\chi^2 = 55.91$, df = 1, $P < 0.0001$). From sampling smolts in 1999, estimated fractions of smaller and larger smolt comprised of age-1.0 fish ($\hat{\phi}_1$ and $\hat{\phi}_2$) were 0.97 (SE = 0.013) and 0.48 (SE = 0.064), respectively.

From sampling adults at Canyon Island in 2000, estimated fraction $\hat{p}$ of age-1.1 adults was 0.80 (SE = 0.016). From simulation the estimated ratio of catchability $\hat{\lambda}$ was 3.06 (SE = 0.82), confirming evidence presented in Figure 6 that larger smolt were more likely to be captured in minnow traps. Simulated estimates had a low of 1.483, indicating that $\hat{\lambda}$ was significantly greater than one. Estimated relative bias in $\hat{\lambda}$ was low at 5.2% and even lower in the abundance estimate (2.1%). In contrast to results from equation (1), abundance as estimated with Chapman's modification of Petersen's estimator was 1,600,733, about 5% less.

In 2000, during random sampling of marine catches, 229 adult coho salmon were found possessing CWTs germane to the Taku River (Appendix B2). The greatest number of CWTs (126) was recovered from the commercial troll fishery, nearly all of which were from the Northwest Quadrant (94%) on the outside coast, followed by the marine gillnet fisheries (61), most (74%) of them from District 111 (Taku Inlet/Stephens Passage). Twenty-nine (29) CWTs were recovered in the marine recreational fishery near Juneau from July through early September. Thirteen (13) CWTs were recovered in the seine fishery in Chatham Strait and Frederick Sound.

An estimated 38,971 (SE = 3,326) coho salmon originating upriver from Canyon Island were harvested in various marine and inriver fisheries in 2000 (Table 3; Appendix B2). Harvests in marine fisheries were estimated based on 1.76% of returning adults carrying a CWT. Thirty-five of 1,877 adults sampled at Canyon Island were missing their adipose fin, 33 of which had tags. Marked fractions of these sampled adults varied through the season (Table 4), but not significantly

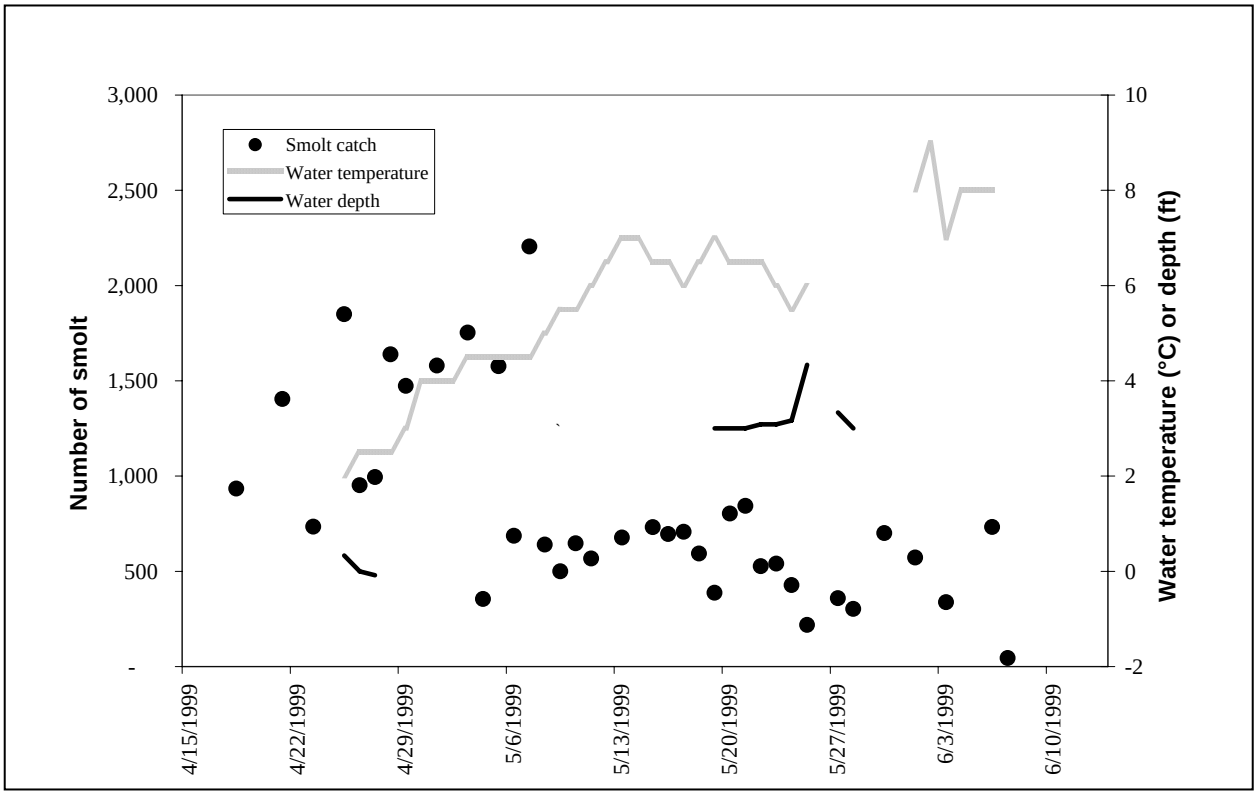

Figure 4.–Daily catch of coho salmon smolt ≥70 mm FL and daily water temperature and depth near Canyon Island, Taku River, during 1999.

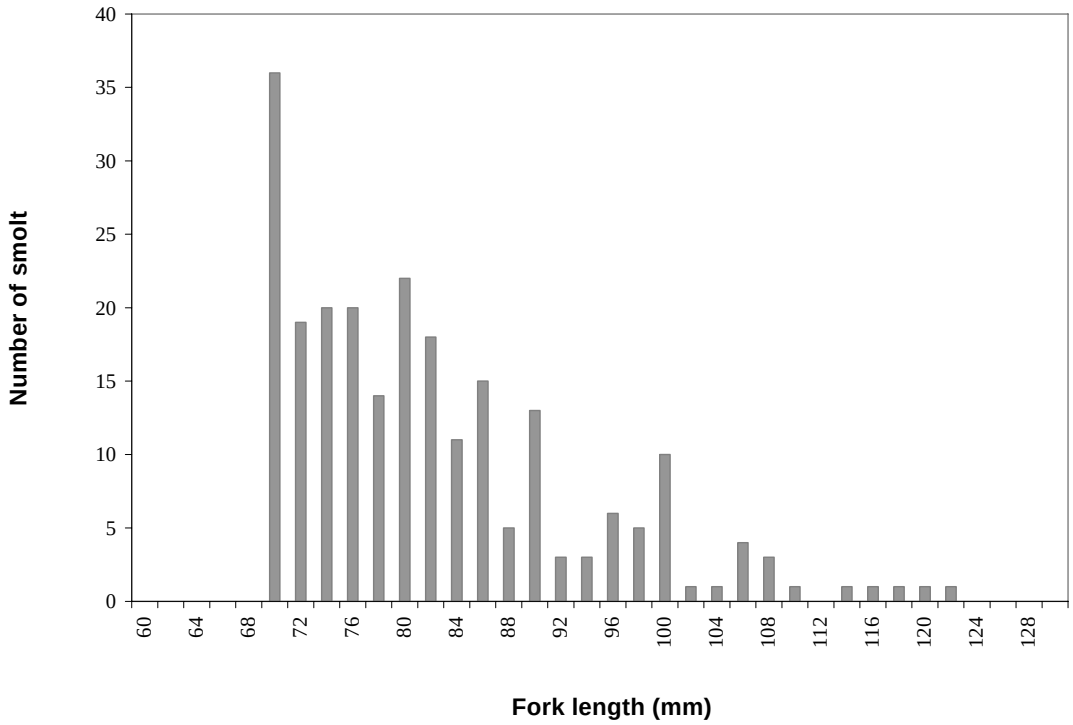

Figure 5.–Length frequency of 251 coho salmon smolt ≥70 mm FL captured and measured at Canyon Island, Taku River, during 1999.

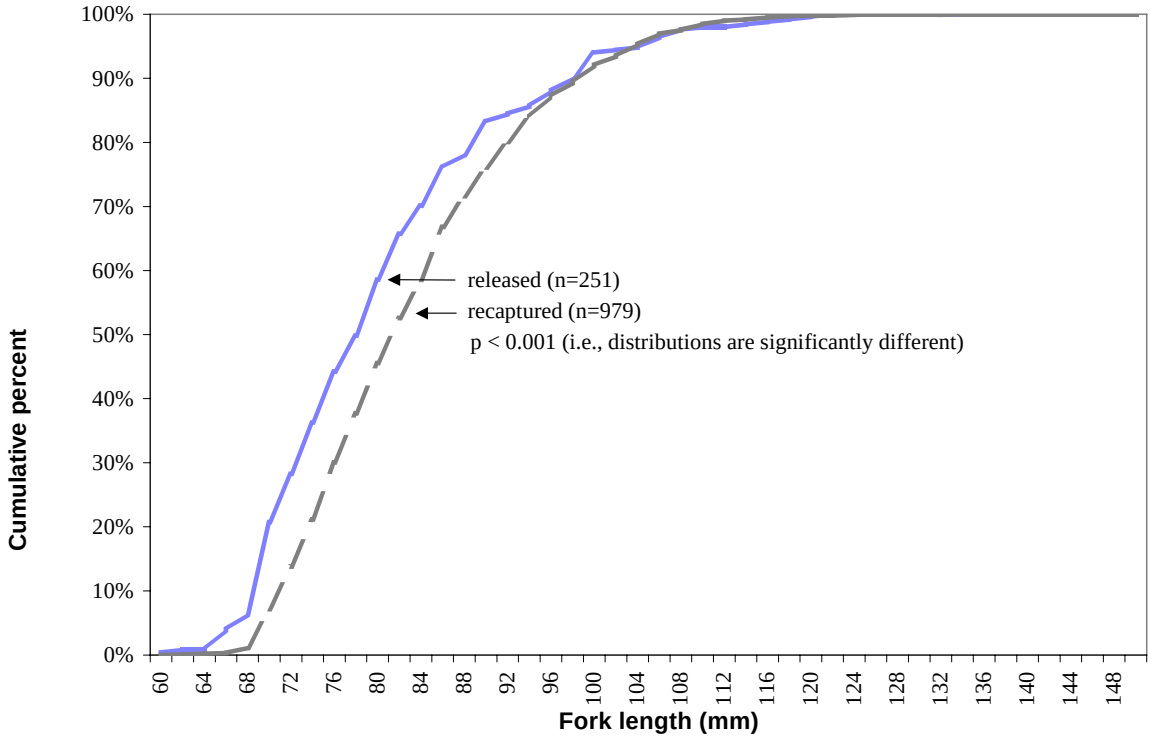

Figure 6.–Length frequency distributions of coho salmon smolt at the time of first capture and again during recapture at Canyon Island on the Taku River during 1999. Probability corresponds to a two-sample Kolmogorov-Smirnov test.

Table 3.–Estimates of smolt abundance in 1999, of adult harvest in 2000, escapement and run size in 2000 for the Taku River stock of coho salmon.

	Estimate	SE	Exploitation rate	SE	Removal rate	SE
Smolt abundance (1999)	1,728,240	255,147				
Marine survival	0.063	0.010				
Adult run (2000)	109,149	6,571				
Total harvest (2000)	44,449	3,326	39.7%	2.8%		
Total marine harvest (2000)	38,971	3,326	35.7%	2.6%	35.7%	2.6%
Troll fishery subtotal	21,236	2,480	19.5%	1.7%	19.5%	1.7%
NW Quadrant	20,292	2,454	18.6%	1.6%		
SW Quadrant	80	79	0.1%	0.0%		
NE Quadrant	864	349	0.8%	0.2%		
Seine fishery subtotal	2,132	630	2.0%	0.4%	2.4%	0.4%
District 112	1,869	602	1.7%	0.3%		
District 113	263	87	0.2%	0.1%		
Recreational fishery subtotal	4,137	1,148	3.8%	0.7%	4.8%	0.7%
Juneau	4,137	1,148	3.8%	0.7%		
Drift gillnet subtotal	11,466	1,789	10.5%	1.1%	14.0%	1.1%
District 111	7,352	1,355	6.7%	0.8%		
District 115	4,114	1,168	3.8%	0.7%		
U.S. personal use harvest (2000)[a]	31					
Total Canadian harvest (2000)[b]	5,447		5.0%	0.3%	7.8%	0.6%
Passage past Canyon Island (2000)[c]	70,146	5,667				
Escapement past all fisheries (2000)[d]	64,700	5,667				

[a] U.S. personal use harvest mostly occurs downriver of the mark and recapture locations.

[b] Total Canadian harvest includes the inriver commercial, test, and aboriginal fisheries.

[c] Inriver run is the estimated number of coho salmon above Canyon Island.

[d] Escapement past all fisheries is the inriver run minus the total Canadian harvest.

Table 4.–Numbers of adult coho salmon sampled for coded wire tags at Canyon Island and in the Canadian test fishery along with the numbers of fish with clipped adipose fins and valid coded wire tags recovered in each by time strata in 2000.

	Canyon Island				Test Fishery			
	Number				Number			
Date	Examined	Ad clips	Valid	Marked % Ad Clips	Examined	Ad clips	Valid	Marked % Ad Clips
July 9–Aug 12	199	1	1	0.50%				
Aug 13–Aug 26	345	4	3	1.16%				
Aug 27–Sept 9	532	8	7	1.50%				
Sept 10–Sept 23	519	17	17	3.28%	394	15	8	3.81%
Sept 24–Oct 7	282	5	5	1.77%	209	4	2	1.91%
Total	1,877	35	33	1.86%	603	19	10	3.15%

so (χ^2 = 8.62, df = 4, P = 0.07). Details on the numbers examined by day at Canyon Island and in the test fishery along with the numbers of fish missing adipose fins, valid CWTs, and their respective codes are detailed in Appendix B3. Table 3 contains estimated fractions of harvest by fishery and estimated exploitation rates, and Figure 7 the weekly harvests by fishery. Estimated mean date of harvest, using techniques detailed in Mundy (1984), was 9 August for the troll fishery compared to 31 August for the gillnet fishery (Appendix B4). Mean date of estimated harvest in all marine fisheries occurred on 17 August, about average compared with previous years (McPherson and Bernard 1995, 1996; McPherson et al. 1997, 1998; Yanusz et al. 1999). Estimated harvest of coho salmon bound for the Taku River above Canyon Island in the Juneau marine recreational fishery was 4,137 fish or 9.3% of all estimated marine and inriver harvests (44,418). Expanding for the estimated 22% of the Taku River coho salmon run that spawns below Canyon Island, the recreational harvest was 5,304 (4,137/0.78) representing 44% of the estimated 11,960 coho salmon caught in the Juneau area marine fishery (Hubartt et al. 2001). The inriver harvest of coho salmon in the Taku River was 4,395 in 2000.

An estimated 70,146 (SE = 5,667) adults passed upstream of Canyon Island in 2000. Between 9 July and 3 October, 1,877 coho salmon were captured at Canyon Island of which 1,763 were marked and released. From 9 July through 9 September 4,395 coho salmon, 108 with spaghetti tags, were examined in the upstream commercial fishery. From 10 September through 7 October, 1,052 fish were caught (710 were harvested) in the inriver test fishery of which 28 carried tags; another 342 fish were harvested in the aboriginal fishery. The mark-recapture data were stratified

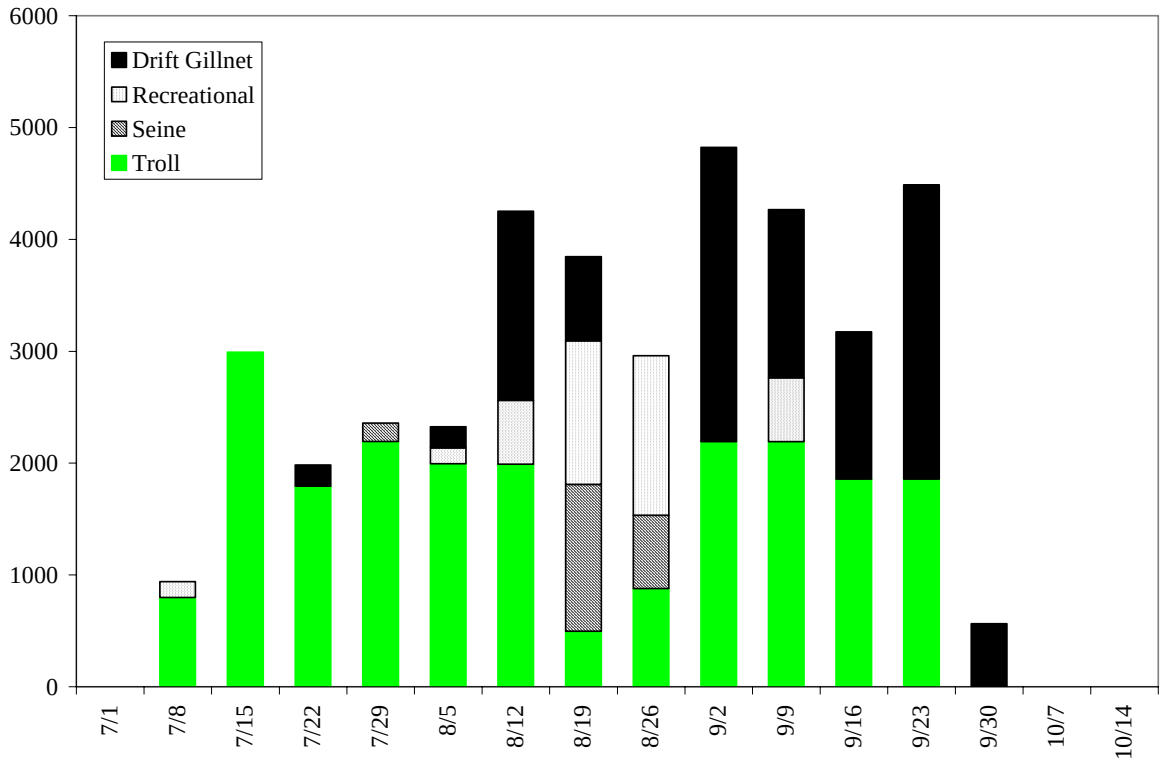

Figure 7.–Estimated harvests of coho salmon bound for Taku River in 2000, assigned to marine commercial and recreational fishery by statistical week (weekly estimates of harvest in the troll fishery approximated).

by week (Appendix B5) and tests for consistency in SPAS (Arnason et al. 1996) indicated near equal proportions of tags were recovered in the commercial and test fisheries (χ^2 = 16.63, df = 12, P = 0.16). Comparisons of marked fractions in both fisheries were also similar (χ^2 = 0.15, df = 1, P = 0.70). Since commercial and test fisheries were consecutive, results of these tests are evidence for having only a single stratum in the mark-recapture experiment, that is Chapman's modification of Petersen's estimator (Seber 1982) could be (and was) used to estimate abundance. Similar length distributions of all fish released with spaghetti tags and of fish recaptured upstream (Figure 8) indicated that no stratification was needed based on size. Given that 5,447 coho salmon were harvested above Canyon Island, estimated spawning escapement of coho salmon past all fisheries in 2000 was 64,700 (SE = 5,667) (Table 3).

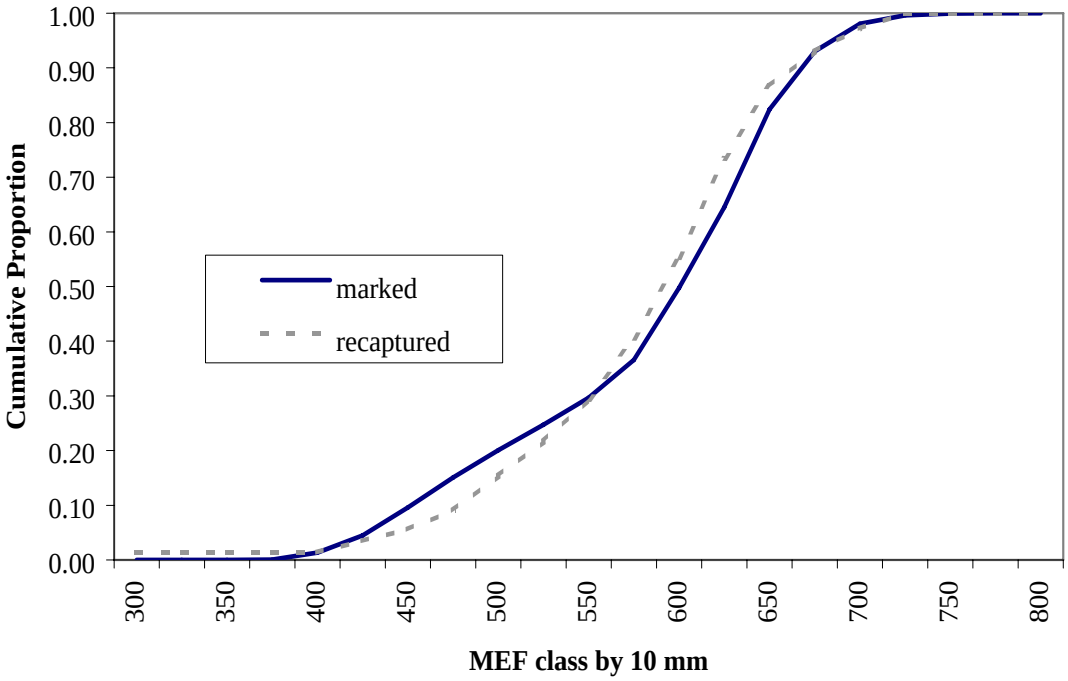

Figure 8.–Length distributions of adult coho salmon marked at Canyon Island compared with those of recaptures from the inriver fisheries as part of the mark-recapture experiment in 2000. Length distributions were not significantly different (P = 0.16).

PRODUCTION OF COHO SALMON 2000-2001

From 9 April through 14 June 2000, 24,136 coho salmon smolt were captured, tagged, and released with the following codes:

Tag code	Size[a]	Number tagged	Overnight mortality	Tag retention	Final release
040253	small	10,720	15	0.999	10,705
040252	small	10,529	5	0.996	10,482
040360	small	2,887	0	1.000	2,887
040254	large	10,680	14	0.996	10,634
040255	large	10,014	19	0.998	9,995
040133	large	104	0	1.000	104
Sub total	small	24,136	20	0.997	24,074
Sub total	large	20,798	33	0.997	20,733
Grand total		44,934	53	0.997	44,807

[a] Small coho salmon smolt were fish measured between 75-85 mm FL; large fish were > 85 mm FL.

Ninety percent (90%) of coho smolt were captured between 15 April and 25 May. Peak catches occurred from 19 April through 3 May, and 50% of the catch occurred by 3 May (Figure 9; Appendix C1). The average FL of coho salmon smolt was 88 mm (SD = 10.53; Figure 10) andaverage weight was 7.0 g (SD = 2.62) in 2000. Length frequencies of coho salmon smolt captured the first time and those recaptured were not significantly different (P = 0.39; Figure 11). An additional 17,396 Chinook salmon smolt were captured and tagged with code 04-03-53; 59 died within 24 h of tagging and tag retention was nearly 100% leaving a release of 17,298 marked smolts. Analyses of data on tagged Chinook salmon will be published after returns from that

brood (1998) are completed in calendar year 2005.

Based the recovery of CWTs and sampling a year later in 2001, an estimated 1,846,629 coho salmon smolt (SE = 276,385) had emigrated to sea in 2000 (values for capture histories are in Table 2). Coded wire tags were recovered from approximately 0.73% (175 of 24,074) smaller smolt and 0.99% (205 of 20,733) from larger smolt. These rates indicate slightly better odds (1.36) for recovery and implied survival of larger smolt (χ^2 = 9.08, df = 1, P = 0.0025). From sampling smolts in 2000, estimated fractions of smaller and larger smolt comprised of age-1.0 fish($\hat{\phi}_1$ and $\hat{\phi}_2$) were 0.968 (SE = 0.012) and 0.475 (SE = 0.032), respectively. From sampling adults at Canyon Island in 2001, estimated fraction $\hat{p}$ of age-1.1 adults was 0.81 (SE = 0.014). From simulation the estimated ratio of catchability $\hat{\lambda}$ was 2.66 (SE = 0.571), indicating that larger smolt were more likely to be captured in minnow traps (in contrast to information in Figure 11). Simulated estimateshad a low of 1.675, indicating that $\hat{\lambda}$ was significantly greater than one. Estimated relative bias in $\hat{\lambda}$ was low at 3.4% as is estimated bias in the abundance estimate (1.9%). Consistent with the indication of a small difference in survival rates between large and small smolt reported above, abundance as estimated with Chapman's modification of Petersen's estimator (1,720,771) was about 5% less than the estimate from equation (1).

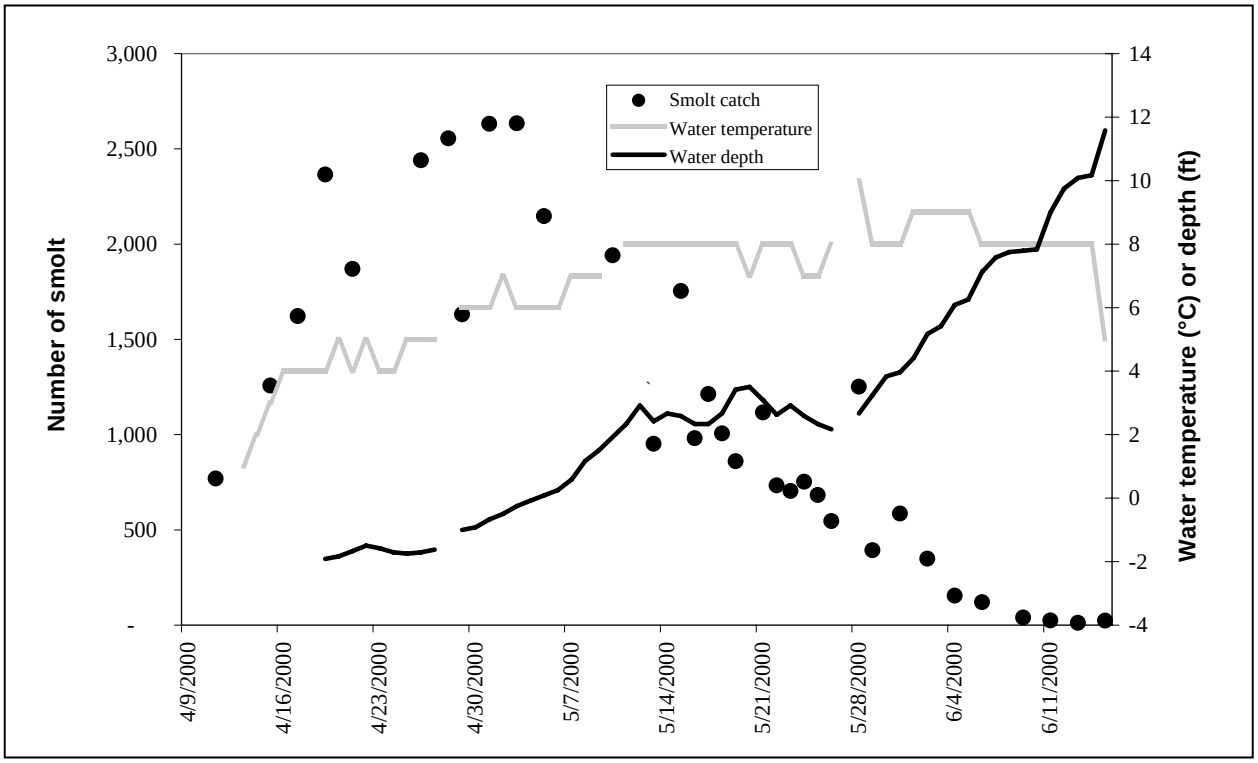

Figure 9.–Daily catch of coho salmon smolt ≥75 mm FL and daily water temperature and depth near Canyon Island, Taku River, during 2000.

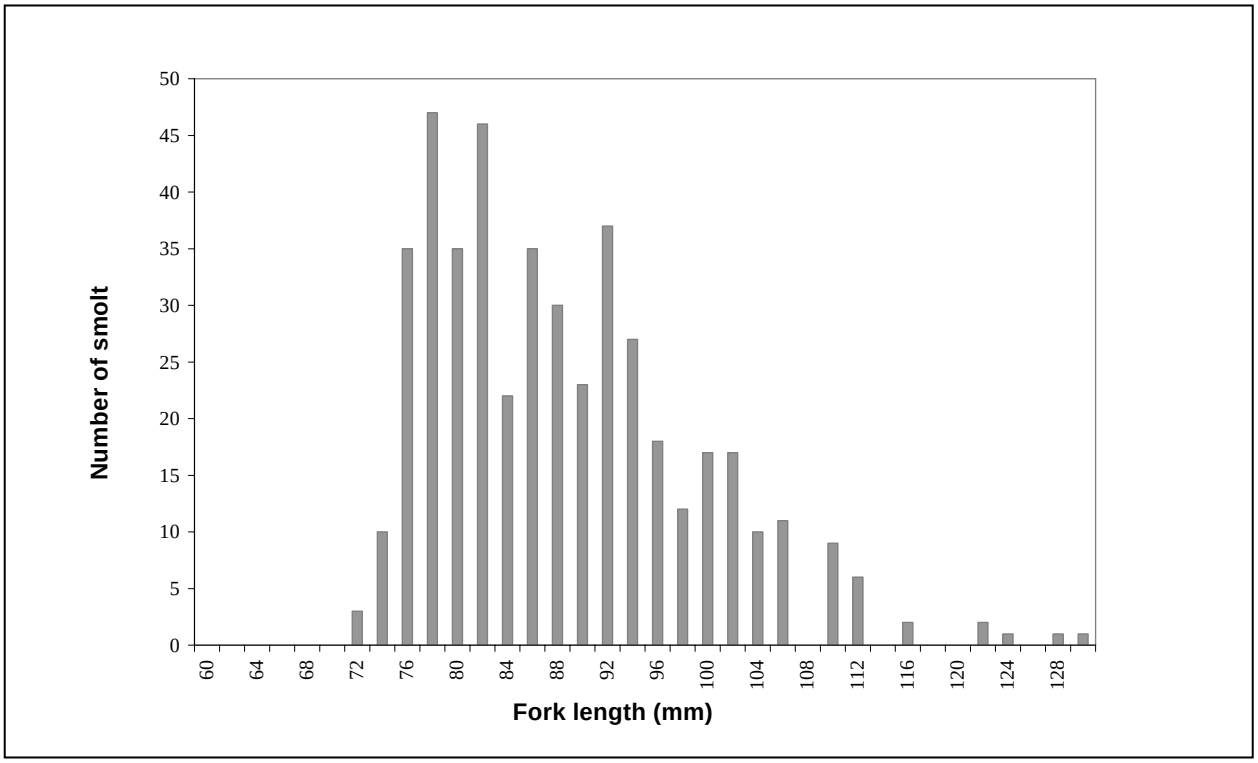

Figure 10.–Length frequency of 458 coho salmon smolt ≥75 mm FL captured and measured at Canyon Island, Taku River, during 2000.

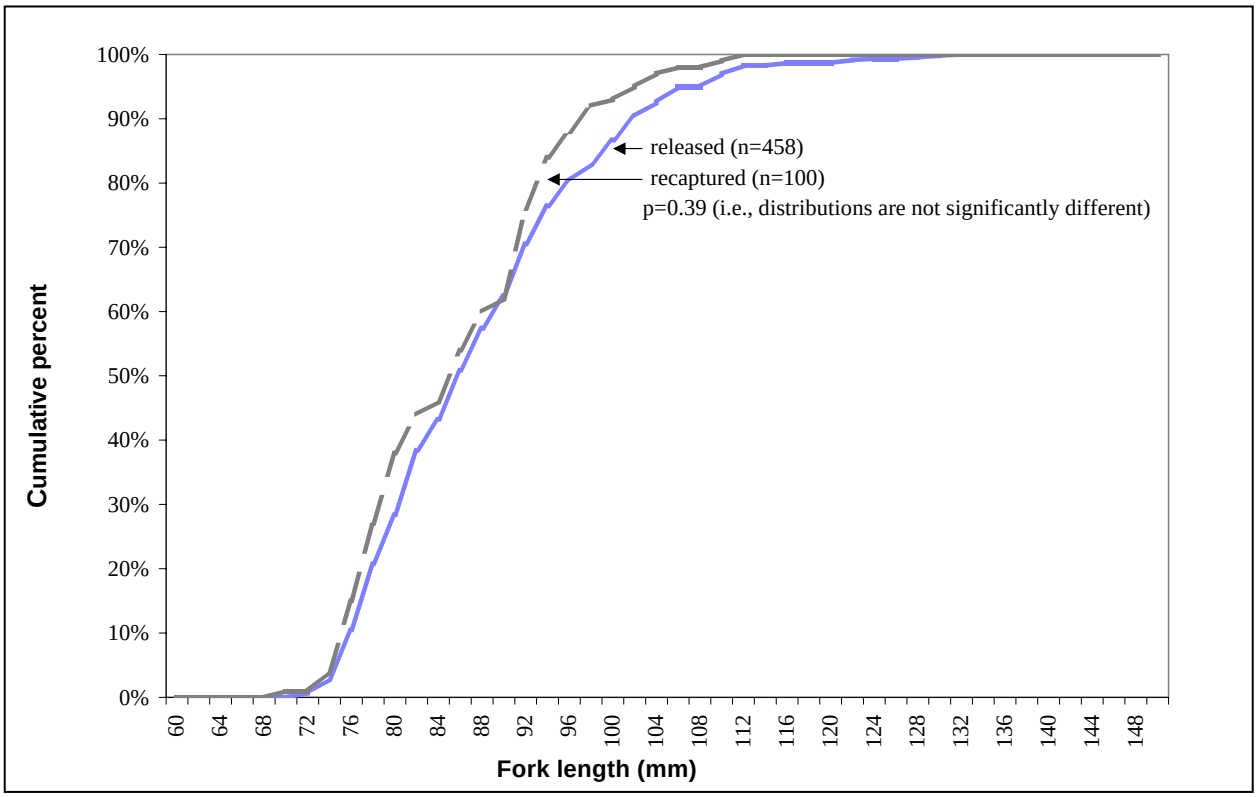

Figure 11.–Length frequency distributions of coho salmon smolt at the time of first capture and again during recapture at Canyon Island on the Taku River during 2000. Probability corresponds to a two-sample Kolmogorov-Smirnov test.

In 2001, during random sampling of marine catches, 351 adult coho salmon were found possessing CWTs germane to the Taku River (Appendix C2). The greatest number of CWTs (220) was recovered from the commercial troll fishery, most of which were split between the Northeast Quadrant (50%) and the Northwest Quadrant (49%). Other CWTs were recovered in marine gillnet fisheries (87), most (87%) of them from District 111 (Taku Inlet/Stephens Passage), and twenty-six (26) CWTs were recovered in the marine recreational fishery near Juneau from July through early September. Eighteen (18) CWTs were recovered in the seine fishery in Chatham Strait and Frederick Sound.

An estimated 58,385 (SE = 4,828) coho salmon originating upriver from Canyon Island were harvested in various marine and inriver fisheries in 2001 (Table 5; Appendix C2). Harvests in marine fisheries were estimated based on 2.39% of returning adults carrying a CWT. Sixty-one of 2,380 adults sampled at Canyon Island were missing their adipose fin, 57 of which had tags. Marked fractions of these sampled adults varied through the season (Table 6), but not significantly so (χ^2 = 3.36, df = 5, P = 0.64). Details on the numbers examined by day at Canyon Island and in the test fishery along with the numbers of ad clips, valid CWTs, and their respective codes can be found in Appendix C3. Table 5 contains estimated fractions of harvest by fishery and estimated exploitation rates, and Figure 12 the weekly harvests by fishery. Estimated mean date of harvest, using techniques detailed in Mundy (1984), was 8 August for the troll fishery compared to 11 September for the gillnet fishery (Appendix C4). Mean date of estimated harvest in all marine fisheries occurred on 16 August, about average compared with previous years (McPherson and Bernard 1995, 1996; McPherson et al. 1997, 1998; Yanusz et al. 1999). Estimated harvest of coho salmon bound for the Taku River above Canyon Island in the Juneau marine recreational fishery was 2,505 fish or 4.5% of all estimated marine and inriver harvests (55,710). Expanded to 3,212 (2,505/0.78) for the entire Taku River drainage, this was 20% of the estimated 16,036 coho salmon caught in the Juneau area marine fishery (Hubartt et al. 2002). The inriver harvest of coho salmon in the Taku River was 3,099 in 2001.

An estimated 107,493 (SE = 9,495) adults passed upstream of Canyon Island in 2001. Between 3 July and 5 October, 2,380 coho salmon were captured at Canyon Island of which 2,230 were marked and released. From 8 July through 31 August, 2,320 coho salmon, 50 with spaghetti tags, were examined in the upstream commercial fishery. After 1 September through 10 October, 3,509 fish were caught (31 of these were harvested) in the test fishery and of the total 70 carried tags; another 500 fish were harvested in the aboriginal fishery. The mark-recapture data were stratified by week (Appendix C5) and tests for consistency in SPAS (Arnason et al. 1996) indicated near equal proportions of tags were recovered in the commercial and test fisheries (χ^2 = 20.18, df = 13, P = 0.09). Comparisons of marked fractions in both fisheries were also similar (χ^2 = 0.17, df = 1, P = 0.68). Since commercial and test fisheries were consecutive, results of these tests are evidence for having only a single stratum in the mark-recapture experiment, that is Chapman's modification of Petersen's estimator (Seber 1982) could be (and was) used to estimate abundance. Given that 3,099 coho salmon were harvested above Canyon Island, estimated spawning escapement of coho salmon past all fisheries in 2001 was 104,394 (SE = 9,495) (Table 5).

PRODUCTION OF COHO SALMON 2001-2002

From 12 April through 9 June 2001, 50,535 coho salmon smolt were captured, tagged, and released with the following codes:

Tag code	Size[a]	Number tagged	Overnight mortality	Tag retention	Final release
040293	small	11,028	2	0.999	11,019
040294	small	11,028	6	0.999	11,022
040295	small	1,244	0	1.000	1,244
040454	large	11,139	5	0.999	11,126
040455	large	10,942	3	1.000	10,939
040456	large	5,187	2	1.000	5,185
Sub total	small	23,300	8	0.999	23,285
Sub total	large	27,268	10	0.999	27,250
Grand total		50,568	18	0.999	50,535

[a] Small coho salmon smolt were fish measured between 75-85 mm FL; large fish > 85 mm FL.

Table 5.–Estimates of smolt abundance in 2000, of adult harvest, escapement and run size in 2001 for the Taku River stock of coho salmon.

	Estimate	SE	Exploitation rate	SE	Removal rate	SE
Smolt abundance (2000)	1,846,629	276,385				
Marine survival	0.088	0.014				
Adult run (2001)	162,778	10,652				
Total harvest (2001)	58,385	4,828	35.9%	2.8%		
Total marine harvest (2001)	55,264	4,828	34.0%	2.7%	34.0%	2.7%
Troll fishery subtotal	38,326	4,370	23.5%	2.2%	23.5%	2.2%
NW Quadrant	23,865	3,711	14.7%	1.7%		
SW Quadrant	83	83	0.1%	0.0%		
NE Quadrant	14,293	2,304	8.8%	1.0%		
SE Quadrant	85	84	0.1%	0.0%		
Seine fishery subtotal	2,066	604	1.3%	0.2%	1.7%	0.2%
District 109	304	216	0.2%	0.1%		
District 112	1,366	403	0.8%	0.2%		
District 114	395	395	0.2%	0.2%		
Recreational fishery subtotal	3,094	865	1.9%	0.4%	2.5%	0.4%
Sitka	589	294	0.4%	0.1%		
Juneau	2,505	813	1.5%	0.3%		
Drift gillnet subtotal	11,777	1,760	7.2%	0.8%	9.9%	0.8%
District 106	500	288	0.3%	0.1%		
District 115	2,065	835	1.3%	0.3%		
District 111	9,212	1,523	5.7%	0.7%		
U.S. personal use harvest (2001)[a]	22					
Total Canadian harvest (2001)[b]	3,099		1.9%	0.1%	2.9%	0.3%
Inriver run (2001)[c]	107,493	9,495				
Escapement past all fisheries (2001)[d]	104,394	9,495				

[a] U.S. personal use harvest mostly occurs downriver of the mark and recapture locations.
[b] Total Canadian harvest includes the inriver commercial, test, and aboriginal fisheries.
[c] Inriver run is the estimated number of coho salmon above Canyon Island.
[d] Escapement past all fisheries is the inriver run minus the total Canadian harvest.

Table 6.–Numbers of adult coho salmon sampled and adipose fin-clips recovered at Canyon Island and in the Canadian test fishery in 2001. Also shown is the number of valid coded wire tags recovered at Canyon Island along with the spaghetti tag marked percent as seen in the Canadian commercial and test fisheries, the program used to estimate inriver abundance.

	Canyon Island				Test Fishery			
	Number				Number			
Date	Examined	Ad clips	Valid	Marked % Ad clips	Examined	Ad clips	Marked % Ad clips	Marked % Spag tags
July 3–Aug 4	100	1	0	1.00%				2.33%
Aug 5–Aug 18	125	3	3	2.40%				1.40%
Aug 19–Sept 1	305	8	8	2.62%	92	2	2.17%	3.37%
Sept 2–Sept 15	595	15	13	2.52%	1,142	21	1.84%	1.74%
Sept 16–Sept 29	930	29	29	3.12%	926	14	1.51%	1.95%
Sept 30–Oct 13	325	5	4	1.54%	832	14	1.68%	2.40%
Total	2,380	61	57	2.56%	2,992	51	1.70%	2.06%

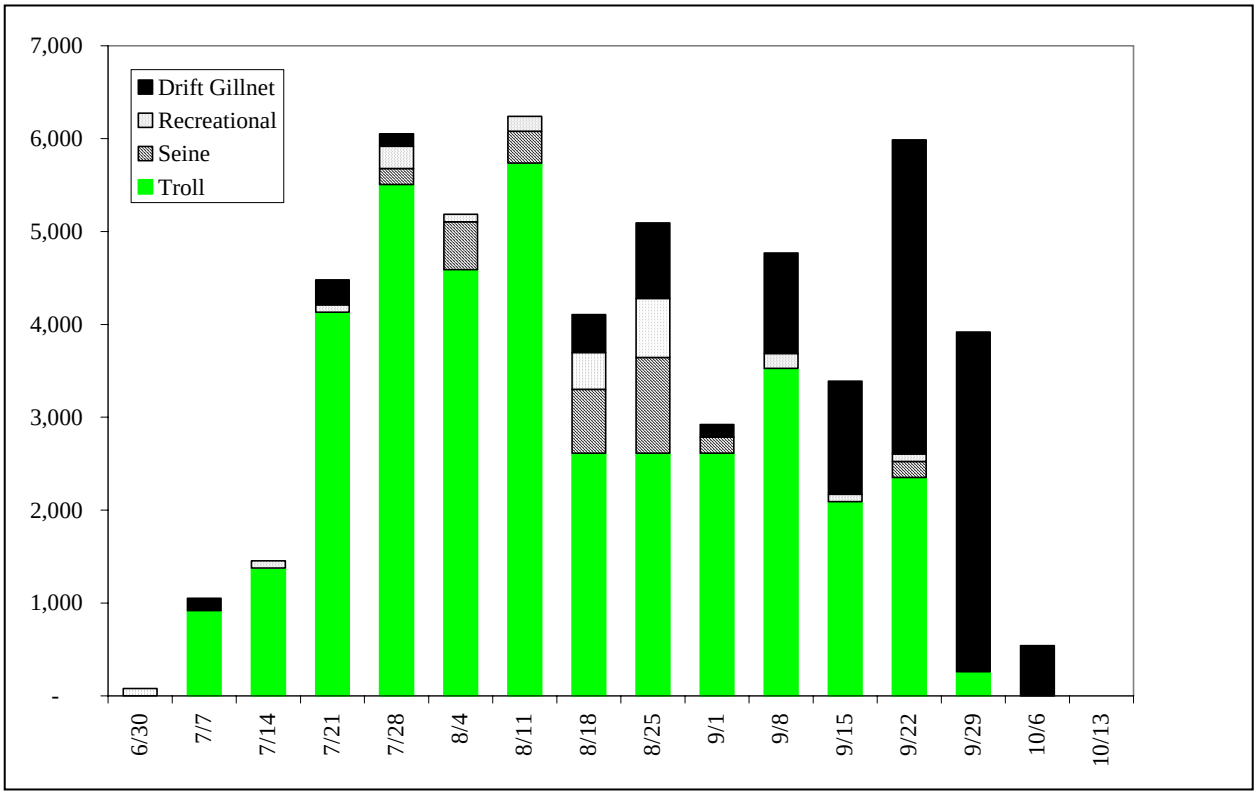

Figure 11.–Estimated harvests of coho salmon bound for Taku River in 2001, assigned to marine commercial and recreational fishery by statistical week (weekly estimates of harvest in the troll fishery approximated).

Ninety percent (90%) of coho smolt were captured between 16 April and 24 May. Peak catches occurred during this same period, and 50% of the catch occurred by 5 May (Figure 13; Appendix D1). The average FL of coho salmon smolt was 88 mm (SD = 9.8; Figure 14) and average weight was 6.9 g (SD = 2.37) in 2001. Length frequencies of coho salmon smolt captured the first time and those recaptured were marginally significant (P = 0.05; Figure 15) with

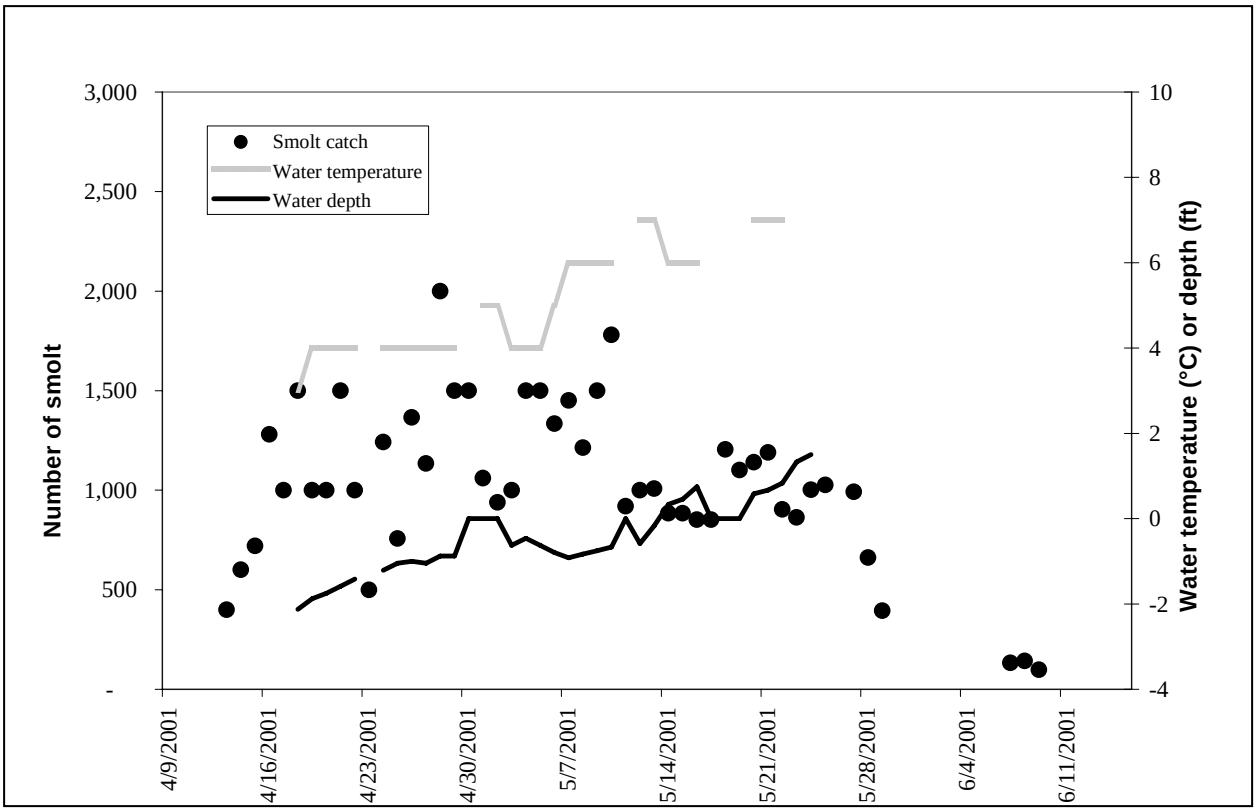

Figure 12.–Daily catch of coho salmon smolt ≥75mm FL and daily water temperature and depth near Canyon Island, Taku River, during 2001.

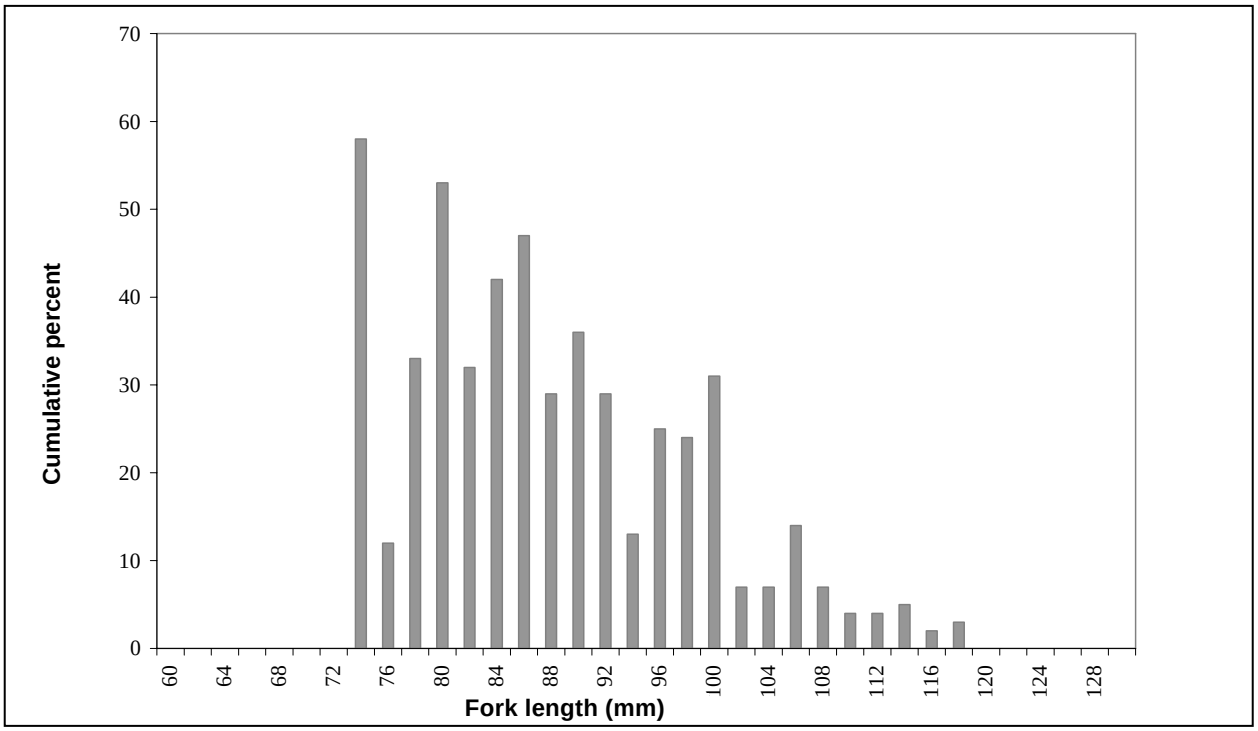

Figure 13.–Length frequency of 530 coho salmon smolt ≥75 mm FL captured and measured at Canyon Island, Taku River, during 2001.

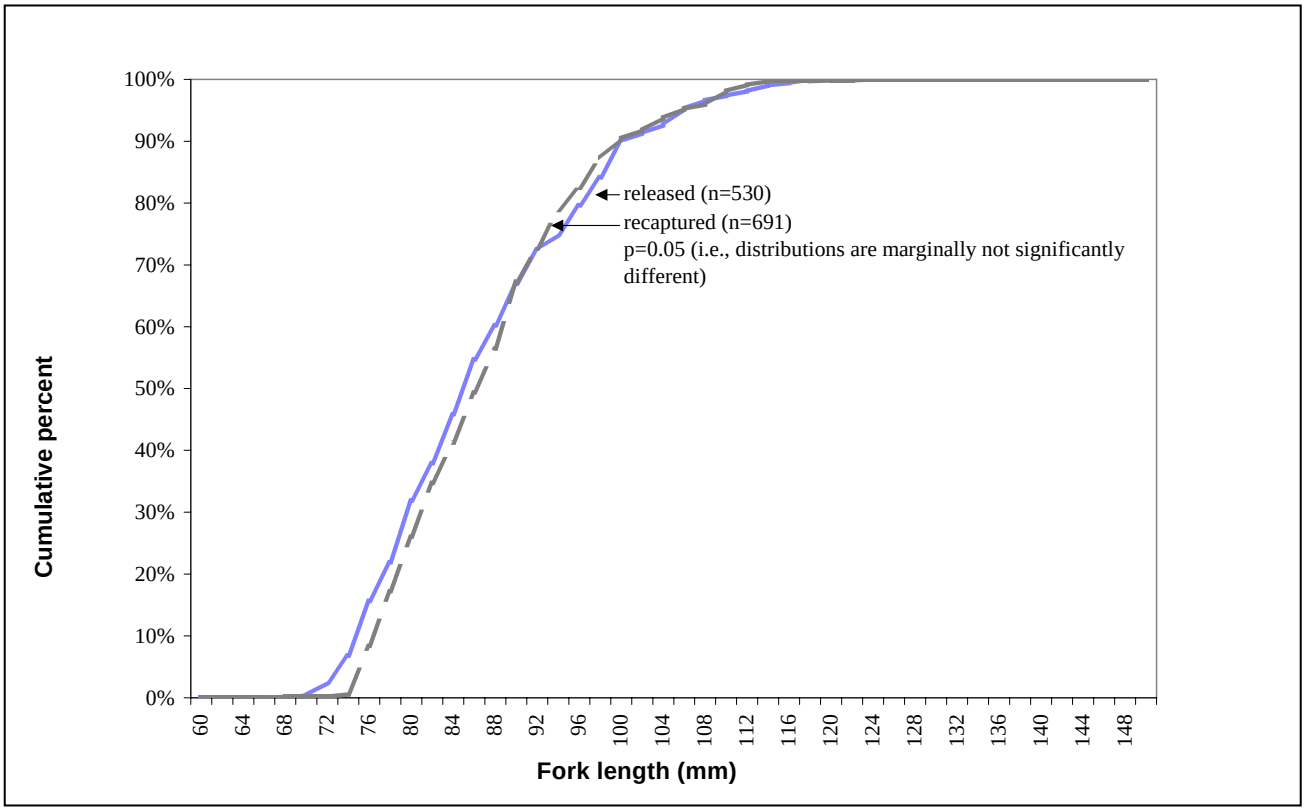

Figure 14.–Length frequency distributions of coho salmon smolt at the time of first capture and again during recapture at Canyon Island on the Taku River during 2001. Probability corresponds to a two-sample Kolmogorov-Smirnov test.

recaptured fish slightly larger than captured fish. An additional 41,945 Chinook salmon smolt were captured and tagged with codes 04-03-53 and 04-03-54; 89 died within 24 h of tagging and tag retention was nearly 100% leaving a release of 41,836 marked smolts. Analyses of data on tagged Chinook salmon will be published after returns from that brood (1999) are completed in calendar year 2006.

Based the recovery of CWTs and sampling a year later in 2002, an estimated 2,718,816 coho salmon smolt (SE = 363,071) had emigrated to sea in 2001 (values for capture histories are in Table 2). Coded wire tags were recovered from approximately 0.70% (163 of 23,285) smaller smolt and 1.08% (294 of 27,250) from larger smolt. These rates indicate better odds (1.54) for recovery and implied survival of larger smolt ($\chi^2 = 20.11$, df = 1, $P < 0.0001$). From sampling smolts in 2001, estimated fractions of smaller and larger smolt comprised of age-1.0 fish ($\hat{\phi}_1$ and $\hat{\phi}_2$) were 0.942 (SE = 0.015) and 0.454 (SE = 0.031), respectively. From sampling adults at Canyon Island in 2002, estimated fraction $\hat{p}$ of age-1.1 adults was 0.85 (SE = 0.011). From simulation the estimated ratio of catchability $\hat{\lambda}$ was 7.850 (SE = 2.219), confirming evidence that larger smolt were more likely to be captured in minnow traps. Simulated estimates of λ had a low of 4.700, indicating that $\hat{\lambda}$ was significantly greater than one. Estimated relative bias in $\hat{\lambda}$ is low at 4.0% as is estimated bias for the abundance estimate (1.6%). Abundance as estimated with Chapman's modification of Petersen's estimator (2,292,994) was about 16% less than the estimate from equation (1).In 2002, during random sampling of marine catches, 398 adult coho salmon were found possessing CWTs germane to the Taku River (Appendix D2). The greatest number of CWTs (227) was recovered from the commercial troll fishery, nearly all which were from the Northwest Quadrant (95%) on the outer coast. Other CWTs

were recovered in the marine gillnet fisheries (95), most (76%) of them fromDistrict 111 (Taku Inlet/Stephens Passage), and twenty-nine (58) CWTs were recovered in the marine recreational fishery near Juneau from July through early September. Eighteen (18) CWTs were recovered in the seine fishery in Chatham Strait and Frederick Sound.

An estimated 83,916 (SE = 6,389) coho salmon originating upriver from Canyon Island were harvested in various marine and inriver fisheries in 2002 (Table 7; Appendix D2). Harvests in marine fisheries were estimated based on 2.02% of returning adults carrying a CWT. Eighty-two (82) of 3,765 adults sampled at Canyon Island were missing their adipose fin, 76 of which were considered valid tags (two of the valid tags were assumed as valid; one was lost during shipping and another was lost on the lab floor). Marked fractions of these sampled adults varied through the season (Table 8), but not significantly so (χ^2 = 5.03, df = 5, P = 0.41). Details on the numbers examined by day at Canyon Island and in the test fishery along with the numbers of fish missing adipose fins, and numbers of valid CWTs and their respective codes are detailed in Appendix D3. Table 7 contains estimated fractions of harvest by fishery and estimated exploitation rates, and Figure 16 the weekly harvests by fishery. Estimated mean date of harvest, using techniques detailed in Mundy (1984), was 25 August for the troll fishery compared to 3 September for the gillnet fishery (Appendix D4). Mean date of estimated harvest in all marine fisheries occurred on 27 August, about two weeks later than the average seen in prior years (McPherson and Bernard 1995, 1996; McPherson et al. 1997, 1998; Yanusz et al. 1999).

Estimated harvest in the Juneau marine recreational fishery was 6,189 fish for coho salmon germane to areas of the Taku River near or above Canyon Island or 7.4% of all estimated marine and inriver harvests (83,916 fish). Expanded for the entire drainage to an estimate of 7,935 (6,189/0.78), this represents 30% of the estimated 26,273 coho salmon caught in the Juneau marine fishery, according to harvest and sampling data from Hubartt and Jaenicke (2004).

Between 2 July and 10 October, 3,765 coho salmon were captured at Canyon Island of which 3,518 were marked and released. From 7 July through 17 August, 3,082 fish were harvested in the upstream commercial fishery; 3,076 of these were sampled and 76 had spaghetti tags. After 18 August through 11 October, 4,069 fish were caught (32 of these were harvested) in the test fishery and of the total 69 carried tags; another 688 fish were harvested in the aboriginal fishery. The mark-recapture data were stratified by week (Appendix D5) and tests for consistency in SPAS (Arnason et al. 1996) indicated that equal proportions of tags were not recovered in the commercial and test fisheries (χ^2 = 31.99, df = 13, P < 0.001). Comparisons of marked fractions in both fisheries were also not similar χ^2 = 7.97, df = 1, P = 0.004). Results of these tests were evidence for stratifying the mark-recapture experiment by time and using Darroch's method (Seber 1982) to estimate the escapement of coho salmon in 2002. The mark-recapture data were stratified by two time and recovery periods as follows:

Time	Number released w/ marks	Commercial fishery	Test fishery
Stratum 1	687	76	6
Stratum 2	2,831	0	56
Number inspected for marks		3,076	4,069

where Stratum 1 refer to fish released at Canyon Island between 2 July and 24 August, Stratum 2 referred to fish released between 25 August and 10 October. Using SPAS (Arnason et al. 1996), the estimated number of adult coho salmon past Canyon Island in 2002 was 223,162 (SE = 28,648). Given that 3,802 coho salmon were harvested above Canyon Island, the estimated spawning escapement of coho salmon past all fisheries in 2002 was 219,360 (SE = 28,648) (Table 7).

Table 7.–Estimates of smolt abundance in 2001, of adult harvest, escapement and run size in 2002 for the Taku River stock of coho salmon.

	Estimate	SE	Exploitation rate	SE	Removal rate	SE
Smolt abundance (2001)	2,718,816	363,071				
Marine survival	0.112	0.018				
Adult run (2002)	303,270	29,352				
Total harvest (2002)	83,916	6,389	27.7%	3.0%		
Total marine harvest (2002)	80,046	6,389	26.4%	2.9%	26.4%	2.9%
Troll fishery subtotal	39,054	4,345	12.9%	1.6%	12.9%	1.6%
NW Quadrant	37,461	4,316	12.4%	1.6%		
SW Quadrant	71	71	0.0%	0.0%		
NE Quadrant	1,388	482	0.5%	0.1%		
SE Quadrant	133	133	0.0%	0.0%		
Seine fishery subtotal	3,457	1,062	1.1%	0.3%	1.3%	0.3%
District 110	154	154	0.1%	0.0%		
District 112	2,602	1,021	0.9%	0.3%		
District 114	700	251	0.2%	0.1%		
Recreational fishery subtotal	6,641	1,366	2.2%	0.4%	2.5%	0.4%
Sitka	205	204	0.1%	0.0%		
Elfin Cove	50	49	0.0%	0.0%		
Gustavus	198	100	0.1%	0.0%		
Juneau	6,189	1,346	2.0%	0.4%		
Drift gillnet subtotal	30,894	4,352	10.2%	1.4%	12.2%	1.4%
District 111	26,981	4,257	8.9%	1.3%		
District 115	3,913	906	1.3%	0.2%		
U.S. personal use harvest (2002)[a]	68					
Total Canadian harvest (2002)[b]	3,802		1.3%	0.1%	1.7%	0.2%
Inriver run (2002)[c]	223,162	28,648				
Escapement past all fisheries (2002)[d]	219,360	28,648				

[a] U.S. personal use harvest mostly occurs downriver of the mark and recapture locations.

[b] Total Canadian harvest includes the inriver commercial, test, and aboriginal fisheries.

[c] Inriver run is the estimated number of coho salmon above Canyon Island.

[d] Escapement past all fisheries is the inriver run minus the total Canadian harvest.

Table 8.–Numbers of adult coho salmon sampled and adipose fin-clips recovered at Canyon Island and in the Canadian test fishery in 2002. Also shown is the number of valid coded wire tags recovered at Canyon Island along with the spaghetti tag marked percent as seen in the Canadian commercial and test fisheries, the program used to estimate inriver abundance.

	Canyon Island				Test Fishery			
	Number				Number			
Date	Examined	Ad clips	Valid	Marked % Ad clips	Examined[a]	Ad clips	Marked % Ad clips	Marked % Spag tags
July 7–Aug 3	277	4	4	1.44%				2.74%
Aug 4–Aug 17	229	5	3	2.18%				2.21%
Aug 18–Aug 31	1,037	17	15	1.64%	417	1	0.24%	2.22%
Sept 1–Sept 14	1,070	30	29	2.80%	1,353	14	1.03%	1.80%
Sept 15–Sept 28	816	16	15	1.96%	1,009	13	1.29%	1.05%
Sept 29–Oct 11	336	10	10	2.98%	1,020	29	2.84%	1.30%
Total	3,765	82	76	2.18%	3,799	57	1.50%	1.93%

[a] In the test fishery, of the total examined for spaghetti tags, 270 fish were not examined for adipose fin-clips.

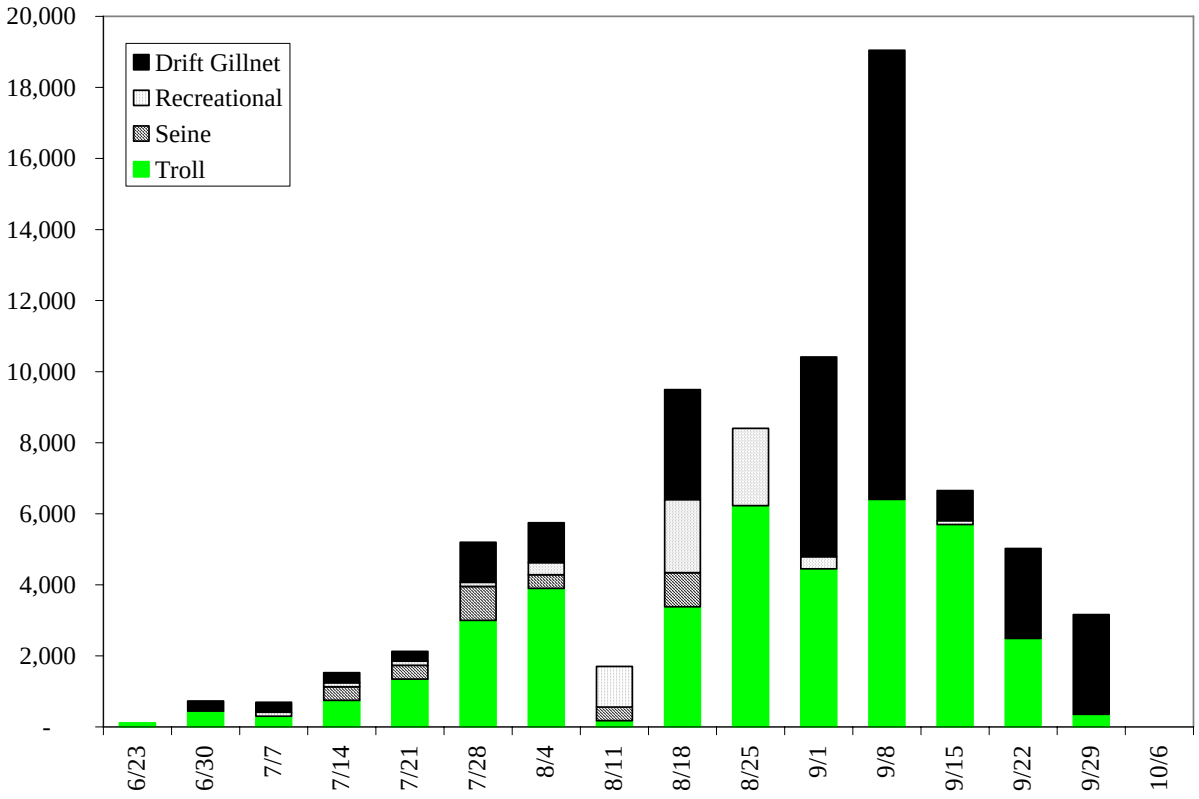

Figure 15.–Estimated harvests of coho salmon bound for Taku River in 2002, assigned to marine commercial and recreational fishery by statistical week (weekly estimates of harvest in the troll fishery approximated).

PRODUCTION OF COHO SALMON 2002–2003

From 18 April through 8 June 2002, 23,258 coho salmon smolt were captured, tagged, and released with the following codes:

Tag code	Size[a]	Number tagged	Overnight mortality	Tag retention	Final release
040551	small	9,718	4	0.999	9,710
040544	large	10,806	10	1.000	10,796
040550	large	2,752	0	1.000	2,752
Sub total	small	9,718	4	0.999	9,710
Sub total	large	13,558	10	1.000	13,548
Grand total		23,276	14	0.999	23,258

[a] Small coho salmon smolt were fish measured between 70-85 mm FL; large fish were > 85 mm FL.

Ninety percent (90%) of coho smolt were captured between 19 April and 21 May. Peak catches occurred from 28 April through 14 May, and 50% of the catch occurred by 7 May (Figure 17; Appendix E1). The average FL of coho salmon smolt was 88 mm (SD = 10.26; Figure 18) and average weight was 6.7 g (SD = 2.39) in 2002. Length frequencies of coho salmon smolt captured the first time and those recaptured were not significantly different (P = 0.65; Figure 19). An additional 37,834 Chinook salmon smolt were captured and tagged with codes 04-05-41, 04-05-42, 04-05-43, and 04-05-49; 39 died within 24 h of tagging and tag retention was nearly 100% leaving a release of 37,776 marked smolts. Analyses of data on tagged Chinook salmon will be published after returns from that brood (2000) are completed in calendar year 2007.

Based on the recovery of CWTs and sampling a year later in 2003, an estimated 2,988,349 coho salmon smolt (SE = 1,008,886) had emigrated to sea in 2002 (values for capture histories are in Table 2). Coded wire tags were recovered from approximately 0.76% (74 of 9,710) smaller smolt and 1.07% (145 of 13,548) from larger smolt. These rates indicate slightly better odds (1.40) for recovery and implied survival of larger smolt (χ^2 = 5.75, df = 1, P = 0.0164). From sampling smolts in 2002, estimated fractions of smaller and larger smolt comprised of age-1.0 fish ($\hat{\phi}_1$ and $\hat{\phi}_2$) were 0.892 (SE = 0.030) and 0.352 (SE = 0.043), respectively. From sampling adults at Canyon Island in 2003, estimated fraction $\hat{p}$ of age-1.1 adults was 0.90 (SE = 0.010). From simulation the estimated ratio of catchability $\hat{\lambda}$ was 38.51 (SE = 686.21), indicating that larger smolt were more likely to be captured in minnow traps (in contrast to information in Figure 19). Simulated estimates had a low of 3116 and a high of 8248, indicating that $\hat{\lambda}$ was far ranging and the estimated relative bias was high at 386% as is estimated bias in the abundance estimate (8.38%). Consistent with the indication of a small difference in survival rates between large and small smolt reported above, abundance as estimated with Chapman's modification of Petersen's estimator (2,085,056) was about 18% less than the estimate from equation (1).

In 2003, during random sampling of marine catches, 197 adult coho salmon were found possessing CWTs germane to the Taku River (Appendix E2). The greatest number of CWTs (93) was recovered from the commercial troll fishery, nearly all which were from the Northwest Quadrant (95%) on the outer coast with the remaining from the Northeast Quadrant. Other CWTs were recovered in marine gillnet fisheries (65), with District 111 (Taku Inlet/Stephens Passage) providing 53% and the remainder being from District 115. Twenty-seven (27) CWTs were recovered in the marine recreational fishery near Juneau from late July through early September and 12 CWTs were recovered in the seine fisheries of Districts 112 and 114.

An estimated 82,051 (SE = 10,271) coho salmon originating upriver from Canyon Island were harvested in various marine and inriver fisheries in 2003 (Table 9; Appendix E2). Harvests in marine fisheries were estimated based on 0.97% of returning adults carrying a CWT. Thirty (30) of 2,778 adults sampled at Canyon Island were missing their adipose fin, 27 of which had tags. Marked fractions of these sampled adults varied through the season (Table 10), but not significantly (χ^2 = 4.30, df = 4, P = 0.36). Details on the numbers examined by day at Canyon Island and in the test fishery along with the numbers of adipose fin clips, valid CWTs, and their respective codes can be found in Appendix E3. Table 9 contains estimated fractions of harvest by fishery and estimated exploitation rates, and Figure 20 the

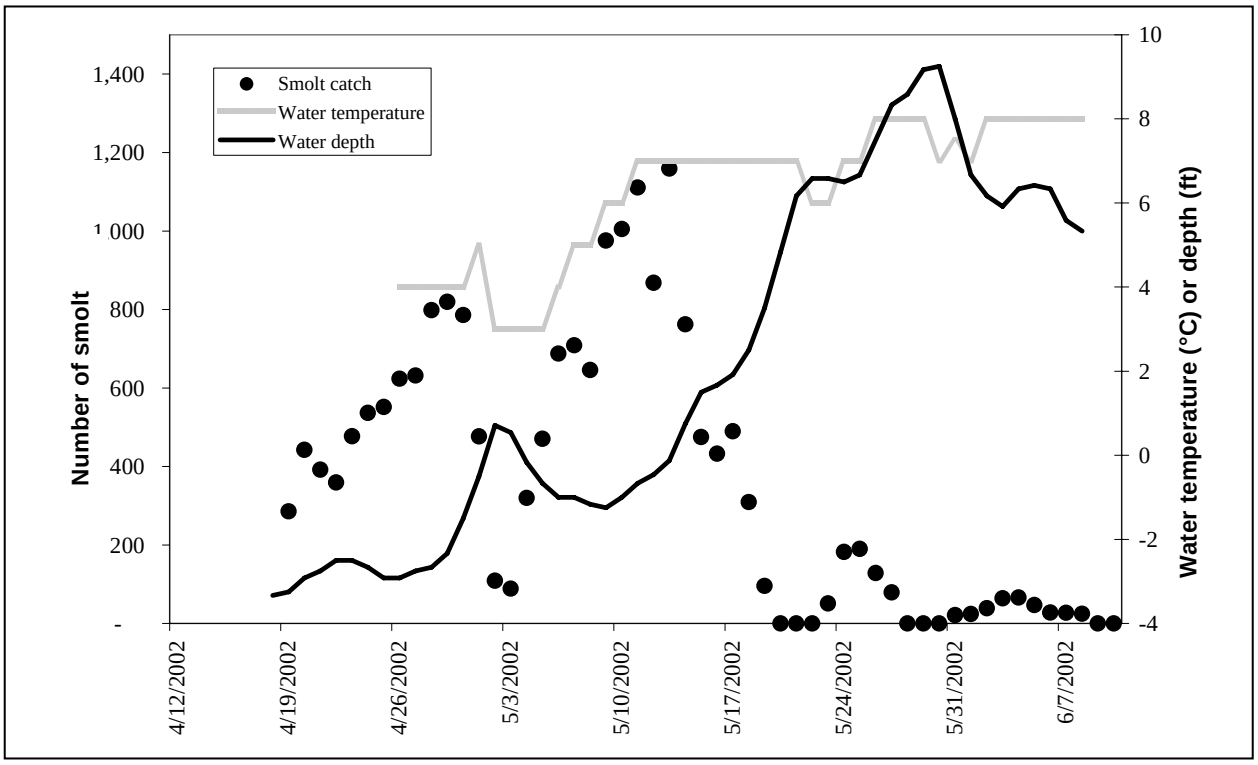

Figure 16.–Daily catch of coho salmon smolt ≥75mm FL and daily water temperature and depth near Canyon Island, Taku River, during 2002.

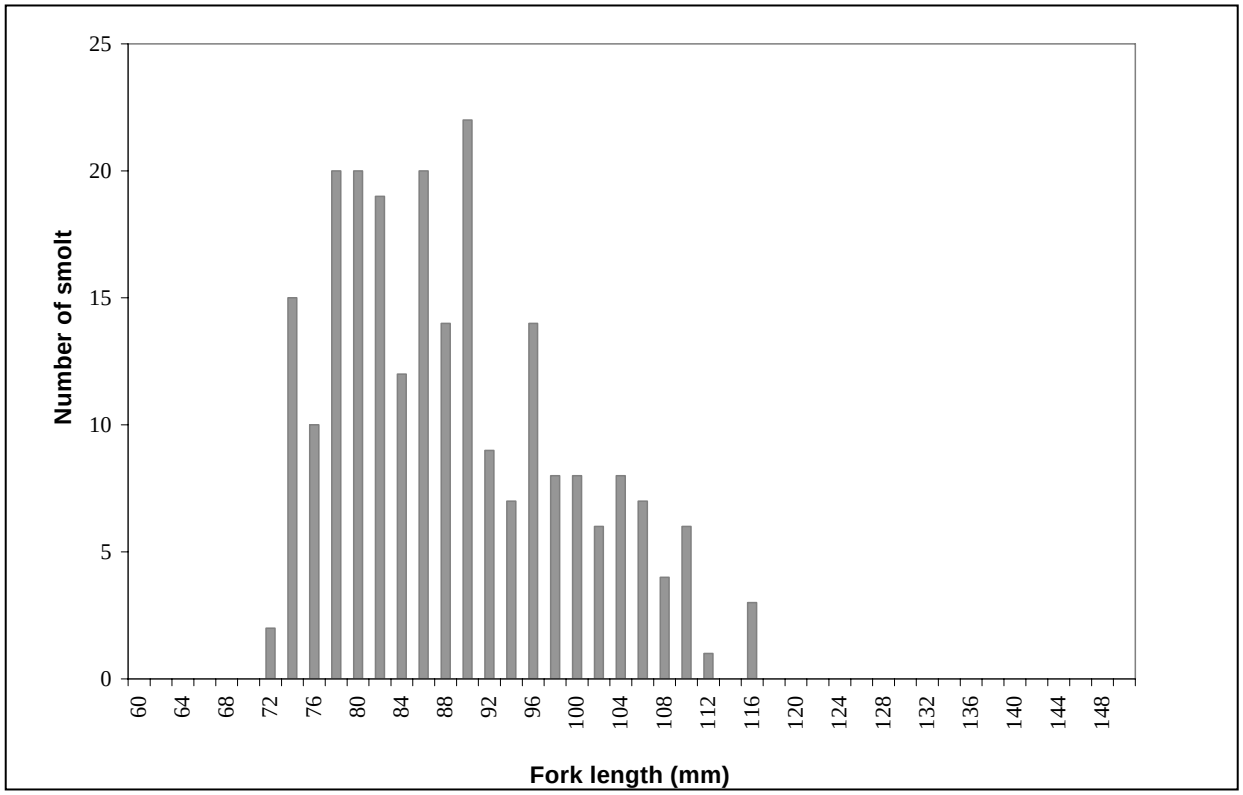

Figure 17.–Length frequency of 235 coho salmon smolt ≥75 mm FL captured and measured at Canyon Island, Taku River, during 2002.

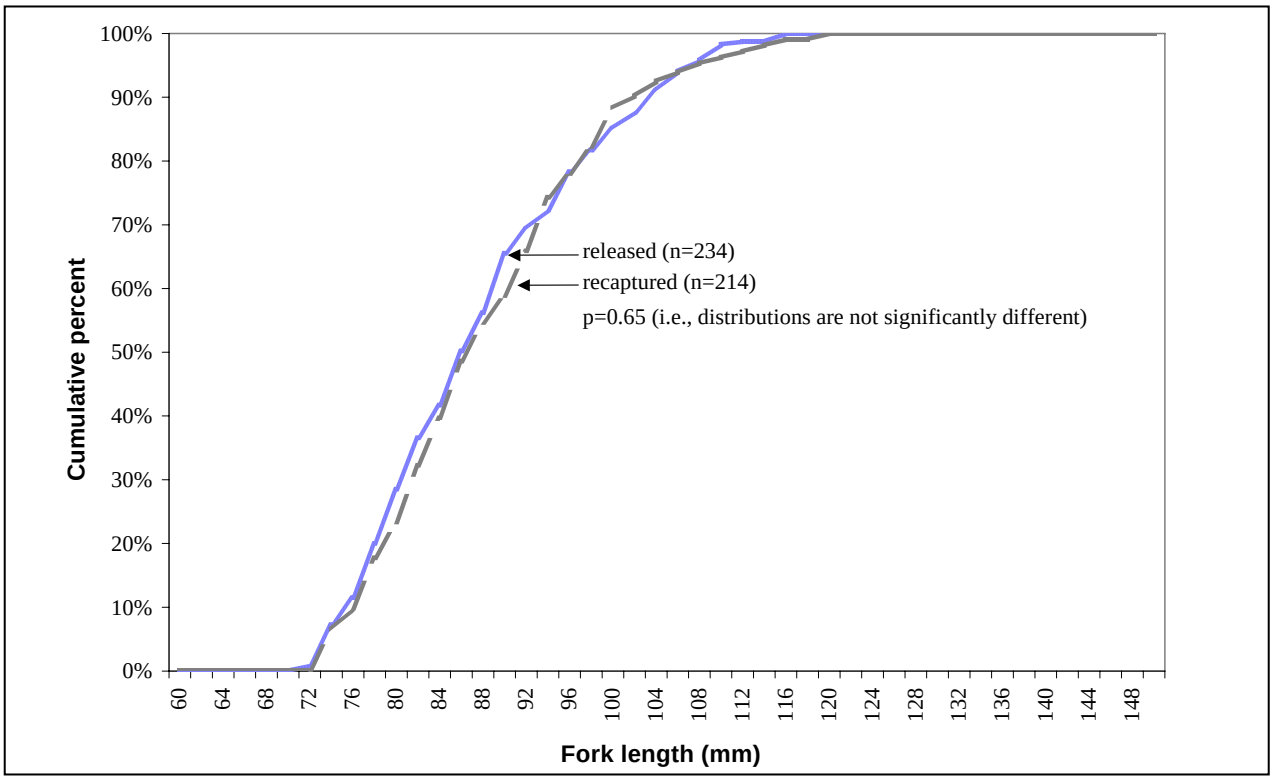

Figure 18.–Length frequency distributions of coho salmon smolt at the time of first capture and again during recapture at Canyon Island on the Taku River during 2002. Probability corresponds to a two-sample Kolmogorov-Smirnov test.

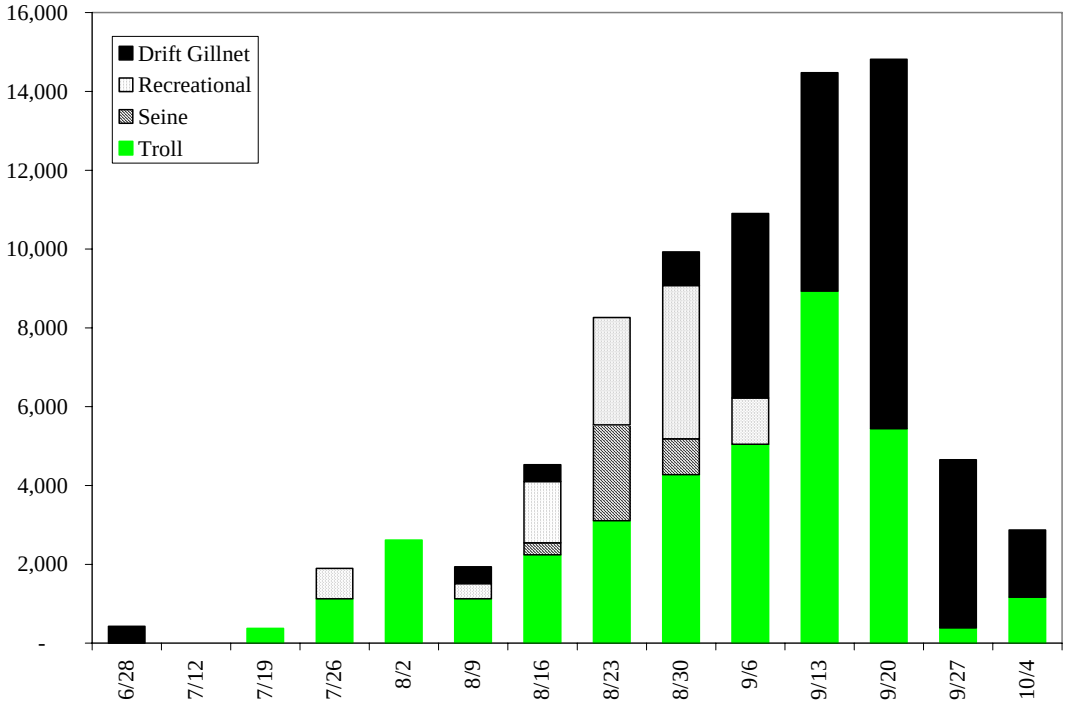

Figure 19.–Estimated harvests of coho salmon bound for Taku River in 2003, assigned to marine commercial and recreational fishery by statistical week (weekly estimates of harvest in the troll fishery approximated).

Table 9.–Estimates of smolt abundance in 2002, of adult harvest, escapement and run size in 2003 for the Taku River stock of coho salmon.

	Estimate	SE	Exploitation rate	SE	Removal rate	SE
Smolt abundance (2002)	2,988,349	1,008,886				
Marine survival	0.089	0.031				
Adult run (2003)	265,089	20,485				
Total harvest (2003)	82,051	20,485	31.0%	5.7%		
Total marine harvest (2003)	78,277	10,271	29.5%	3.3%	29.5%	3.3%
Troll fishery subtotal	36,433	6,649	13.7%	2.0%	13.7%	2.0%
NW Quadrant	34,674	6,595	13.1%	1.9%		
NE Quadrant	1,759	845	0.7%	0.2%		
Seine fishery subtotal	3,646	1,249	1.4%	0.3%	1.6%	0.3%
District 112	3,535	1,244	1.3%	0.3%		
District 114	111	110	0.0%	0.0%		
Recreational fishery subtotal	10,504	2,862	4.0%	0.8%	4.7%	0.8%
Sitka	412	412	0.2%	0.1%		
Gustavus	4,200	2,220	1.6%	0.6%		
Yakutat	470	338	0.2%	0.1%		
Juneau	5,421	1,727	2.0%	0.5%		
Drift gillnet subtotal	27,694	7,178	10.4%	2.0%	12.9%	2.0%
District 111	19,659	6,937	7.4%	1.9%		
District 115	8,035	1,844	3.0%	0.5%		
U.S. personal use harvest (2003)[a]	57					
Total Canadian harvest (2003)[b]	3,717		1.4%	0.1%	2.0%	0.2%
Inriver run (2003)[c]	186,755	17,724				
Escapement past all fisheries (2003)[d]	183,038	17,724				

[a] U.S. personal use harvest mostly occurs downriver of the mark and recapture locations.

[b] Total Canadian harvest includes the inriver commercial, test, and aboriginal fisheries.

[c] Inriver run is the estimated number of coho salmon above Canyon Island.

[d] Escapement past all fisheries is the inriver run minus the total Canadian harvest.

Table 10.–Numbers of adult coho salmon sampled and adipose fin-clips recovered at Canyon Island and in the Canadian test fishery in 2003. Also shown are the numbers sampled in the Canadian inriver commercial fishery and the spaghetti tag marked percents encountered at both inriver fisheries, the program used to estimate inriver abundance.

	Canyon Island				Test Fishery				Commercial Fishery	
	Number				Number		Marked %			
Date	Examined	Ad clips	Valid	Marked % Ad clips	Examined	Ad clips	Ad clips	Spag tags	Number Examined	Marked % Spag tags
June 22–Aug 16	312	1	1	0.32%					2,130	1.64%
Aug 17–Aug 30	354	2	2	0.56%	570	7	1.23%	0.18%	497	0.60%
Aug 31–Sept 13	1,143	13	10	1.14%	1,507	12	0.80%	2.06%	615	0.49%
Sept 14–Sept 27	778	7	7	0.90%	1,185	16	1.35%	1.35%		
Sept 28–Oct 11	416	7	7	1.68%	828	23	2.78%	2.29%		
Total	3,003	30	27	1.00%	4,090	58	1.42%	1.64%	3,242	1.26%

weekly harvests by fishery. Estimated mean date of harvest, using techniques detailed in Mundy (1984), was 27 August for the troll fishery compared to 9 September for the gillnet fishery (Appendix E4). Mean date of estimated harvest in all marine fisheries occurred on 30 August, similar to 2002 but about two weeks late compared with previous years (McPherson and Bernard 1995, 1996; McPherson et al. 1997, 1998; Yanusz et al. 1999). Estimated harvest of coho salmon bound for the Taku River above Canyon Island in the Juneau marine recreational fishery was 5,421 fish or 6.6% of all estimated marine and inriver harvests (82,051). Expanded to 6,950 (5,421/0.78) for the entire Taku River drainage, this was 37% of the estimated 18,682 coho salmon caught in the Juneau area marine fishery (Wendt and Jaenicke *In prep*).

An estimated 186,755 (SE = 17,724) adults passed upstream of Canyon Island in 2003. Between 2 July and 8 October, 3,003 coho salmon were captured at Canyon Island of which 2,775 were marked and released. From 22 June through 13 September, 3,242 coho salmon, 41 with

spaghetti tags, were harvested and examined in the upstream commercial fishery. From 17 August through 11 October, 4,090 fish were caught (59 of these were harvested) in the test fishery and of the total 67 carried spaghetti tags; another 416 fish were harvested in the aboriginal fishery. The mark-recapture data were stratified by week (Appendix E5) and tests for consistency in SPAS (Arnason et al. 1996) indicated near equal proportions of tags were recovered in the commercial and test fisheries (χ^2 = 21.57, df = 15, P = 0.12). Comparisons of marked fractions in both fisheries were also similar (χ^2 = 1.74, df = 1, P = 0.19). Since commercial and test fisheries were consecutive, results of these tests are evidence for having only a single stratum in the mark-recapture experiment, that is Chapman's modification of Petersen's estimator (Seber 1982) could be (and was) used to estimate abundance. Given that 3,717 coho salmon were harvested above Canyon Island, estimated spawning escapement of coho salmon past all fisheries in 2003 was 183,038 (SE = 17,724) (Table 9).

DISCUSSION

High quality stock assessment for the Taku River stock of coho salmon is essential in order to develop and implement abundance-based management and to develop a revised MSY escapement goal as mandated in the Pacific Salmon Treaty 1999 Revised Annexes (p. 17, paragraph 2(b)(2)(i)). Results from this project are contributing to development of a long-term database. Smolt production was estimated in 1999 through 2002 and adult production 2000 through 2003, representing eleven consecutive years these parameters have been estimated for this population (Appendix F1). Escapements and inriver run sizes have been estimated by ADF&G and DFO since 1987 (Appendices F1 and F2). Methods have been developed to forecast smolt abundance and run strength since 1999. This information, along with inseason assessment of catch, escapement, and

total run (McPherson et al. 1998), have provided the tools necessary for abundance-based management, and in the near future will allow us to analyze the production relationship between parent year adults and subsequent production of adults and smolt to refine escapement goal(s) for this stock.

From 1991 to 1996, rotary screw traps were used to capture smolt. In 1997, the screw traps were decommissioned and smolt were captured using baited minnow traps. Capture with minnow traps has been shown to be size selective, catching less smaller smolt and more larger smolt. This introduced bias into the smolt abundance estimates, using a simple two-event Petersen-type estimator, and necessitated the need to generate stratified abundance estimates that began in 1999. This required tagging smolt in two size groups (small fish 70/75mm to 85mm; large fish greater than 85mm) and taking scales to estimate age structure of each size group. In 1999, the minnow trapping effort was increased to boost the numbers of smolt released with coded wire tags thereby increasing the numbers of adults recovered with CWTs for each of these four size and age categories (i.e., small age-1.1 and age-2.1 and large age-1.1 and age-2.1 fish). The results from 1999 to 2002 indicated that the simple pooled Petersen estimate underestimated the true smolt abundance by an average of 10%. The smolt abundance estimates generated 1991 to 1996 (unstratified) and 1999 to 2002 (stratified) are likely unbiased, but estimates generated in 1997 and 1998 were likely biased low by about 10%. Results from this study suggest that marine survival varies substantially by age as well as size. Smaller, younger fish had lower marine survivals than larger, older fish; moreover, larger fish survived at higher rates than younger fish even within a given size group. In general, if smolt are captured using size-selective gear, then stratified estimates are required to produce an asymptotically unbiased estimate of smolt abundance.

Coho salmon smolt captured and tagged in 1999 were smaller than those seen in prior years, 1991-1997 (Elliott and Bernard 1994; McPherson et al. 1994; McPherson and Bernard 1995, 1996; McPherson et al. 1998; Yanusz et al. 1999), and in subsequent years, 2000–2001. Not surprising, estimated rate of marine survival for the 1999 smolt was the lowest seen to date. Sizes of adults in 2000 were typical of other years. Some evidence for larger smolt having a higher probability of being captured in minnow traps was perhaps an artifact of growth in body size. Smolt recaptured in minnow traps soon after release were significantly larger than those captured only once in 1999 and 2001, but not 2000. One obvious explanation for this circumstance was that fish might grow between release and recapture, yet this was not the case for fish in 2000.

Generally during smolt trapping, water temperatures increase dramatically over the first few weeks of work (Figures 4, 10, 15), and accelerated growth typically results. Average smolt size was larger in May than April for all years of this study. However, growth from April to May in a year does not affect the estimate of λ (catchability); that indicated larger smolts were more likely to be captured. Estimated rates of marine survival of smolts in 1999 and 2000 were 5.4% and 6.4%, respectively, which were well below the average rates observed for earlier years (1993–1998 12.7% average over 1993–1998 from Yanusz et al. 2000; Appendix F1). For smolt in 2001, the estimated rate of marine survival increased dramatically (11.2%) to near average levels.

From 1987 to 2000, fish wheels were used to capture adult coho salmon at Canyon Island. During most of these years, budget restrictions and/or water levels resulted in ADF&G operating the fish wheels for only part of September and as a result inriver run estimates were expanded, by using information on fishery performance, to estimate the remainder of the escapement through the first week of October. Beginning in 2001, to ameliorate these budget shortfalls and improve stock assessment, additional funding from the Southeast Sustainable Salmon Fund was granted to extend the project through the first week of October. When fish wheels were not operable, set gillnets were used to capture adult coho salmon for tagging requirements. These efforts enabled estimation of the inriver run size and escapement

through the duration of the run, which is vital to improving management and the pending escapement goal analyses.

During periods of low water, fish wheels will spin at less than optimal rates and gillnets are then used to capture fish. The specific gauge levels vary from year to year but low water levels can be generalized as 4 ft or less and fish wheel revolutions of 2 per minute. At higher water levels, fish wheels spin at greater than optimal rates decreasing efficiency. The use of gillnets was avoided if there was too much drag on the net (due to high flow rates) which caused significant mortality rates on fish. Equal probability of recapture was also attempted during event 2 by having weekly openings of the Canadian commercial fishery. However, this fishery ceased by early September in all three years and sampling was then dependent on the test fishery.

The estimates of escapement generated by this study were minimum estimates for the entire Taku River as many fish spawn downstream of Canyon Island. As much as 22% of the spawning occurs below the Canadian border (Eiler et al. 1993), and only a small portion of the U.S. population is believed to spawn above Canyon Island. Using that expansion, we estimated coho salmon escapement in the entire Taku River in 2000 at 85,536 ([65,751 + 4,395]/0.78 – 4,395), marine harvest at 49,963 (38,971/0.78), and total run at 139,894; in 2001 at 135,492 ([105,173 + 2,320]/0.78 – 2,320), marine harvest at 70,851 (55,264/0.78), and total run at 208,662; and in 2002 at 282,303 ([219,360 + 3,802]/0.78 – 3,802), marine harvest at 102,702 (80,108/0.78), and total run at 388,808 (Appendix F1). Exploitation rates and marine survival rates for populations spawning downstream of Canyon Island were assumed to be the same as rates for fish spawning above Canyon Island. Studies on downstream tributaries such as Yehring Creek indicated fish that spawn in these tributaries rear in these tributaries (Elliott and Sterritt 1990), making estimates of smolt abundance at Canyon Island germane to populations spawning upstream.

Continued efforts to maximize the numbers of smolt tagged with CWTs are recommended to increase precision of smolt and adult parameter estimates. Tagging smolt early each spring helps to cover a greater proportion of smolt emigration and adding a third trap line during the peak of outmigration substantially increases smolt catches. Minnow traps have proven to be size-selective so future studies should continue to tag smolt stratified by size thereby emphasizing the need to continue sampling scales from smolt for age composition analyses. Just as important, increasing the numbers tagged for each size and age category is mandatory in order to increase our precision by boosting our adult recovery rates inriver the following year. Sampling of adults at Canyon Island using gillnets and fish wheels should also be maximized with catchability rates held nearly consistent throughout the run to increase the precision in estimates of marked fractions. The inriver capture-recapture program should continue to be funded to produce escapement estimates through the first week in October. Set gillnetting has worked well as a means to capture and mark fish when river levels late in the season became too low to operate the fish wheels adequately.

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APPENDIX A

Appendix A1.–Bibliography of historical stock assessment studies conducted on the Taku River.

Citation	Location	Objective(s)
Eiler et al. 1993	Taku River	Spawning distribution
Elliott and Kuntz 1988	Yehring Creek	1986 escapement
Elliott and Kuntz 1988	Yehring Creek	1987 smolt samples
		1987 escapement
Elliott et al. 1989	Yehring Creek	1988 harvest and escapement
		1987 smolt abundance and survival
		1988 smolt abundance
	Nahlin River	1988 harvest and escapement
		1988 juvenile tagging
Elliott and Sterritt 1990	Yehring Creek	1989 harvest and escapement
		1988 smolt abundance and survival
		1989 smolt abundance
Elliott and Sterritt 1991	Yehring Creek	1990 harvest and escapement
		1989 smolt abundance and survival
	Nahlin River	1990 smolt tagging
Elliott 1992	Yehring Creek	Smolt capture methods
Elliott and Bernard 1994	Taku River	1991 smolt abundance and 1992 adult harvest and escapement
Gray et al. 1978	Moose Creek	Harvest estimate
	Johnson Creek	Harvest estimate
	Yehring Creek	Harvest estimate
	Other tribs.	Harvest estimate
McPherson et al. 1998	Taku River	1995 escapement
McPherson et al. 1998	Taku River	1996 escapement
Kelley and Milligan 1999	Taku River	1997 escapement
McGregor and Clark. 1988	Taku River	1987 escapement
McGregor and Clark 1989	Taku River	1988 escapement
McGregor et al. 1991	Taku River	1989 escapement
McPherson et al. 1994	Taku River	1992 smolt abundance and survival
		1993 harvest and escapement
McPherson and Bernard 1995	Taku River	1993 smolt abundance and survival
		1994 harvest and escapement
McPherson and Bernard 1996	Taku River	1994 smolt abundance and survival
		1995 harvest and escapement
McPherson et al. 1997	Taku River	1995 smolt abundance and survival
		1996 harvest and escapement
McPherson et al. 1998	Taku River	1996 smolt abundance and survival
		1997 harvest and escapement
Murphy et al. 1988	Taku River	1987 smolt tagging
PSC 1993	Taku River	1992 escapement
Shaul 1987	Nahlin River	1986 escapement
		1986 juvenile tagging
	Tatsamenie L.	1986 escapement
Shaul 1987	Tatsamenie L.	1986 juvenile tagging
	Dudidontu R.	1986 escapement
Shaul 1988	Tatsamenie L.	1987 juvenile tagging
Shaul 1989	Nahlin River	1988 harvest
	Mainstem	1988 harvest
	Tatsamenie L.	1988 harvest
	Sheslay R.	1988 harvest
	Yehring Creek	1988 harvest
	U.S. tribs.	1988 escapement

-continued-

Appendix A1.–Page 2 of 2.

Citation	Location	Objective(s)
Shaul 1990	Nahlin River	1989 harvest
	Mainstem	1989 harvest
	Tatsamenie L.	1989 harvest
	Yehring Creek	1989 harvest
	U.S. tribs.	1989 escapement
Shaul et al. 2003	Nahlin River	1990 harvest
	Mainstem	1990 harvest
	Tatsamenie L.	1990 harvest
	Yehring Creek	1990 harvest
	U.S. tribs.	1990 escapement
Yanusz et al. 1999	Taku River	1997 smolt abundance and survival
		1998 harvest and escapement
Yanusz et al. 2000	Taku River	1998 smolt abundance and survival
		1999 harvest and escapement

Appendix A2.–Estimating abundance with group-specific rates of being marked and of surviving.

When a population is divided into two groups labeled (1) and (2), Petersen's model of a mark-recapture experiment can be expressed as:

$$N_1 + N_2 = (N_1\alpha_1 + N_2\alpha_2)\frac{N_1\alpha_1 S_1\beta_1 + N_2\alpha_2 S_2\beta_2 + N_1(1-\alpha_1)S_1\beta_1 + N_2(1-\alpha_2)S_2\beta_2}{N_1\alpha_1 S_1\beta_1 + N_2\alpha_2 S_2\beta_2}$$

where N is abundance, α is the rate at which members of the group are marked (tagged), S the rate at which members survive to return as adults, and β the rate at which surviving members are captured. If all adults have an equal probability of being captured in the experiment regardless of group membership, and of their having or not having a mark, then $\beta_1 = \beta_2 = \beta$, and the equation above reduces to:

$$N_1 + N_2 = (N_1\alpha_1 + N_2\alpha_2)\frac{N_1\alpha_1 S_1 + N_2\alpha_2 S_2 + N_1(1-\alpha_1)S_1 + N_2(1-\alpha_2)S_2}{N_1\alpha_1 S_1 + N_2\alpha_2 S_2}$$

Relationships between capture rates and between survival rates by group can be expressed as $\alpha_2 = \alpha_1\lambda$ and $S_2 = S_1\delta$, respectively. Plugging these relationships into the equation immediately above and simplifying produces:

$$N_1 + N_2 = \frac{(N_1 + \lambda N_2)(N_1 + \delta N_2)}{N_1 + \lambda\delta N_2}$$

Note that this result is false only when $\lambda \neq 1$ (i.e., $\alpha_1 \neq \alpha_2$) and $\delta \neq 1$ (i.e., $S_1 \neq S_2$), that is, when groups of smolts are tagged at different rates and survive at different rates.

Note that for an estimate using Chapman's modification of Petersen's model, $\hat{N} = (M_1 + M_2 + 1)(C + 1)/(R_1 + R_2 + 1)$ where M is the number marked by group, C the number inspected for marks, and R the number of marks recovered by group. Since $\lambda > 1$ and $\delta > 1$, $N > \hat{N}$. However, if group (1) had had the same marking rate as group (2), λM_1 smolt would have been marked and λR_1 would have been recaptured as adults. Plugging an estimate for λ into the model produces a rescaled estimate of abundance:

$$\hat{N} = \frac{(\hat{\lambda}M_1 + M_2 + 1)(C+1)}{\hat{\lambda}R_1 + R_2 + 1} - 1$$

The expected value of $\hat{N}$ is N because in the rescaled situation the two groups have the same effective marking rate. Unfortunately, values for R must often be estimated because not all recaptured adults can be assigned to a smolt group; tags are shed or heads are lost before tags can be retrieved and decoded. If there are R_3 of such recaptured fish of unknown origin, a naïve adjustment to the estimator would be:

$$\hat{N} = \frac{(\hat{\lambda}M_1 + M_2 + 1)(C+1)}{\hat{\lambda}(R_1 + \pi R_3) + R_2 + (1-\pi)R_3 + 1} - 1$$

where π is the fraction of recaptured fish from group (1) recaptured as adults. Tags summed by group no matter how recovered from adults can be used to estimate π.

Appendix A3.–Estimation of the ratio of catchabilities between large and small smolt.

The fraction p of adults with 1-freshwater age (age-1.) can be expressed as:

$$p = \frac{N_1\phi_1 S_1 + N_2\phi_2 S_2}{N_1 S_1 + N_2 S_2} = \frac{N_1\phi_1 S_1 + N_2\phi_2\delta S_1}{N_1 S_1 + N_2\delta S_1} = \frac{N_1\phi_1 + N_2\phi_2\delta}{N_1 + N_2\delta}$$

where N is smolt number by smolt size group, S their survival rate, ϕ the fraction of the smolt group comprised of age-1. smolt, and δ is the ratio of survival rates S_2/S_1. This relationship simplifies to:

$$\frac{N_1}{N_2} = \frac{\delta(\phi_2 - p)}{(p - \phi_1)}$$

If α is the capture rate of smolts, then $M_1 = \alpha_1 N_1$ and $M_2 = \alpha_2 N_2$, and:

$$\frac{N_1}{N_2} = \frac{M_1}{M_2}\frac{\alpha_2}{\alpha_1} = \frac{\delta(\phi_2 - p)}{(p - \phi_1)}$$

If λ is the ratio of catchability for the two groups of smolts, then $\lambda = \alpha_2/\alpha_1$ since fishing effort by definition is equal for both groups. Substitution creates:

$$\lambda = \frac{M_2\delta(\phi_2 - p)}{M_1(p - \phi_1)}$$

A naïve estimate of $\hat{\lambda}$ is therefore:

$$\hat{\lambda} = \frac{M_2\hat{\delta}(\hat{\phi}_2 - \hat{p})}{M_1(\hat{p} - \hat{\phi}_1)}$$

Noting that the estimate for the ratio of survival rates is:

$$\hat{\delta} = \frac{\hat{T}_2}{M_2}\frac{M_1}{\hat{T}_1}$$

A simpler estimate for λ is:

$$\hat{\lambda} = \frac{\hat{T}_2(\hat{\phi}_2 - \hat{p})}{\hat{T}_1(\hat{p} - \hat{\phi}_1)}$$

Appendix A4.–Listing of QuickBASIC program SMLTTAKU.BAS.

Program is initialized to bootstrap the estimate of abundance for the stock of Taku River coho salmon smolt outmigrating in 1999.

```
10 CLS
50 OPEN "TakCoh99.TXT" FOR OUTPUT AS #1
100 DIM CDF(10), N(10), PHI(2), PHIP(2)
150 RANDOMIZE
190 REM ----------------------------------------------Inputs
195 NITER = 200
196 PI = 98 / (98 + 158)
197 N(2) = 18712 - 98
200 N(3) = 11972 - 158
210 N(4) = 19
220 N(5) = 14
230 N(6) = 2 * PI
251 N(7) = 2 * (1 - PI)
261 N(8) = 98 - 19 - PI * 2
265 N(9) = 158 - 14 - (1 - PI) * 2
266 N(10) = 1877 - 19 - 14 - 2
275 PHI(1) = 178 / 184
280 PHI(2) = 30 / 62
282 SSRATE = 125
283 P = 515 / 648
284 ASMPLS = 648
285 REM ---------------------------------------Notation
286 REM N(1-10), phi, pi, R, M, T, C, LAMBDA as defined in report
287 REM SSRATE is the rate at which smolts were sampled to determine age (one out of every SSRATE smolt tagged)
288 REM ASMPLS is the number of adults sampled to determine age composition
290 REM ---------------------------------------Estimate Abundance
292 R1 = N(4): R2 = N(5): R3 = N(6) + N(7)
297 T1 = N(8) + R1 + N(6): T2 = N(9) + R2 + N(7)
303 C = N(10) + R1 + R2 + R3
305 M1 = N(2) + T1: M2 = N(3) + T2
307 PI = T1 / (T1 + T2)
312 A = (PHI(2) - P) * T2 / (P - PHI(1)) / T1
320 NS = (A * M1 + M2 + 1) * (C + 1) / (A * (R1 + PI * R3) + R2 + (1 - PI) * R3 + 1)
325 PRINT X; R1; R2; R3; T1; T2; M1; M2; C; PI; PHI(1); PHI(2); P; A; NS
326 PRINT #1, X; R1; R2; R3; T1; T2; M1; M2; C; PI; PHI(1); PHI(2); P; A; NS
330 REM ---------------------------------------Set up CDF
332 N(1) = NS - M1 - M2 - C + R1 + R2 + R3
335 CDF(1) = N(1) / NS
340 FOR I = 2 TO 10
350 CDF(I) = N(I) / NS + CDF(I - 1)
352 NEXT I
460 REM ---------------------------------------Iterate ===== START HERE
465 NPSQ = NPSUM = 0
470 FOR I = 1 TO NITER
480 FOR J = 1 TO 10: N(J) = 0: NEXT J
490 FOR J = 1 TO NS
500 X = RND
510 FOR K = 1 TO 9
```

-continued-

Appendix A4.–Page 2 of 2

```
520 IF X < CDF(K) THEN N(K) = N(K) + 1: GOTO 540
530 NEXT K
535 N(10) = N(10) + 1
540 NEXT J
550 REM ----------Recalculate statistics
555 R1 = N(4): R2 = N(5): R3 = N(6) + N(7)
560 T1 = N(8) + R1 + N(6): T2 = N(9) + R2 + N(7)
565 C = N(10) + R1 + R2 + R3
570 M1 = N(2) + T1: M2 = N(3) + T2
575 PI = T1 / (T1 + T2)
576 REM ----------Simulate phi's and p
577 SN = INT(M1 / SSRATE + .5): SS = 0
579 FOR J = 1 TO SN: IF RND < PHI(1) THEN SS = SS + 1
580 NEXT J: PHIP(1) = SS / SN
581 SN = INT(M2 / SSRATE + .5): SS = 0
582 FOR J = 1 TO SN: IF RND < PHI(2) THEN SS = SS + 1
583 NEXT J: PHIP(2) = SS / SN
588 SS = 0
590 FOR J = 1 TO ASMPLS: IF RND < P THEN SS = SS + 1
592 NEXT J: PP = SS / ASMPLS
605 LAMBDA = (PHIP(2) - PP) * T2 / (PP - PHIP(1)) / T1
610 NP = (LAMBDA * M1 + M2 + 1) * (C + 1) / (LAMBDA * (R1 + PI * R3) + R2 + (1 - PI) * R3 + 1)
710 REM ----------Tally statistics
720 NPSQ = NP * NP + NPSQ: NPSUM = NP + NPSUM
725 PRINT #1, I; R1; R2; R3; T1; T2; M1; M2; C; PI; PHIP(1); PHIP(2); PP; LAMBDA; NP
726 PRINT I; R1; R2; R3; T1; T2; M1; M2; C; PI; PHIP(1); PHIP(2); PP; LAMBDA; NP
730 NEXT I
740 REM ----------Output statistics
750 NB = NPSUM / NITER: SEN = SQR((NPSQ - NPSUM * NPSUM / NITER) / (NITER - 1))
760 PRINT NB; SEN
770 END
```

APPENDIX B

Appendix B1.–Number of salmon smolt caught in minnow traps near Canyon Island on the Taku River during 1999. Days with trap sets but no catches indicate that fish caught were held one, two, or three days until enough were accumulated for tagging.

		Daily catch		Catch per trap		Air temperature (°C)			Water	
Date	Trap sets	Coho	Chinook	Coho	Chinook	Min.	Max.	Precipitation (inches)	Temp. (°C)	Stage (ft.)
15-Apr	13									
16-Apr	52									
17-Apr	84									
18-Apr	98	934	688	4	3				2.0	
19-Apr	100									
20-Apr	81									
21-Apr	92	1,404	438	5	2				2.0	0.3
22-Apr	114									
23-Apr	115	734	187	3	1				2.0	0.3
24-Apr	120									
25-Apr	110	1,850	451	8	2	-1	9		2.0	0.3
26-Apr	130	952	349	7	3	-1	10		2.5	0.0
27-Apr	139	994	339	8	3	-6	11		2.5	-0.1
28-Apr	139	1,639	481	12	4	-2	16	0.02	2.5	
29-Apr	133	1,473	559	11	4	-1	11	0.01	3.0	
30-Apr	128					-1	12		4.0	
1-May	137	1,580	836	6	3	2	14	0.03	4.0	
2-May	140					-2	8	0.61	4.0	
3-May	144	1,753	1,315	6	5	-3	7		4.5	
4-May	127	354	264	3	2	-5	12		4.5	
5-May	136	1,577	1,066	11	7	-1	16		4.5	-0.8
6-May	141	686	1,413	5	10	5	17		4.5	
7-May	139	2,205	430	19	4	1	12	0.12	4.5	
8-May	142	639	342	6	3				5.0	
9-May	140	499	351	4	3	-4	19		5.5	
10-May	141	646	656	10	11	-2	18		5.5	
11-May	137	567	378	12	8	-5	17		6.0	
12-May	146					4	19	0.15	6.5	
13-May	139	677	428	2	2	2	17		7.0	0.2
14-May	116						22	0.01	7.0	
15-May	115	732	153	3	1				6.5	
16-May	118	695	68	6	1	-2	19		6.5	
17-May	62	707	125	11	2	4	19		6.0	
18-May	47	593	190	13	4	5	15	0.03	6.5	
19-May	71	387	127	5	2	3	18	0.04	7.0	3.0
20-May	68	803	571	12	8	5	18	0.12	6.5	3.0
21-May	70	843	733	12	10	4	14	0.17	6.5	3.0
22-May	65	527	593	8	9	9	18	0.15	6.5	3.1
23-May	66	540	888	8	13	4	17	0.01	6.0	3.1
24-May	63	427	994	7	16	4	9	0.86	5.5	3.2
25-May	45	218	694	5	15	4	7	0.25	6.0	4.3
26-May	62					3	10	0.23		
27-May	57	358	552	3	5	4	16	0.04		3.3
28-May	68	303	437	4	6	3	17	0.29		3.0
29-May	149									
30-May	143	700	973	2	3	4	16	0.06	9.0	2.4

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Appendix B1.–Page 2 of 2.

Date	Trap sets	Daily catch		Catch per trap		Air temperature (°C)		Precipitation (inches)	Water	
		Coho	Chinook	Coho	Chinook	Min.	Max.		Temp. (°C)	Stage (ft)
31-May	142					3	13	0.35		
1-Jun	133	572	531	2	2		18	0.01	8.0	
2-Jun	100					8	23		9.0	
3-Jun	29	732	305	3	4	5	17	0.14	7.0	
4-Jun	29	44	109			4	14	0.03	8.0	
5-Jun	89		5			9	18	0.02	8.0	
6-Jun	62		7	4	2	4	18	0.03	8.0	
7-Jun		732	305	3	4					
8-Jun		44	109							
13-Jun			5							
Total	5,426	30,684	19,531					3.78		
Mean				7 .0	5 .0					

Appendix B2.–Estimated marine harvest of adult coho salmon bound for the Taku River above Canyon Island in 2000. Calculations follow equations in Table 2 of Bernard and Clark (1996) with 0.0176 used as an estimate of θ and 0.0190 for G(θ -1). Definitions of notation used to label these and other statistics are immediately below. In fishing periods and fishing quadrants for which no CWT was recovered with the appropriate code, harvest was assumed to be zero.

a_i	=	number of adults missing adipose fins in a sample from catch in a stratum
a_i'	=	number of heads that arrive at Juneau for dissection (subset of a_i) in a stratum
r_i	=	number of adults from the stock harvested in a stratum in year *j*
m_{ci}	=	number of CWTs with the appropriate code(s) (subset of t_i') in a stratum
n_i	=	number of adults caught in a stratum inspected for missing adipose fins
t_i	=	number of heads with tags detected magnetically (subset of a_i') in a stratum
t_i'	=	number of CWTs found through dissection and decoded (subset of t_i) in a stratum
θ	=	fraction of the stock with CWTs
$G(\theta^{-1})$	=	squared coefficient of variation for the estimate of $1/\theta$

TROLL FISHERY

Stat. weeks	Dates	Per.	Quad.	H	v(H)	n	a	a'	t	t'	m_c	$\hat{r}$	SE($\hat{r}$)	RP($\hat{r}$)
28-32	7/5–8/11	3	NW	516,094		146,026	3,164	3,127	2,576	2,573	47	9,571	1,909	39%
28	7/7	3	NE	11,916		5,758	109	106	86	86	1	121	121	195%
29	7/13	3	SW	25,198		18,133	294	291	227	227	1	80	79	195%
33-34	8/7–8/14	4	NW	128,318		45,686	1,147	1,138	945	944	14	2,257	672	58%
33	8/8	4	NE	18,021		4,589	66	64	51	51	1	230	230	196%
35-37	8/24–9/8	5	NW	135,765		52,283	1,735	1,720	1,501	1,497	33	4,930	1,086	43%
35-36	8/26–8/29	5	NE	10,494		5,617	78	75	67	67	3	332	194	115%
38-39	9/11–9/21	6	NW	33,409		13,063	504	499	442	441	24	3,534	863	48%
38	9/11–9/13	6	NE	978		614	23	23	19	19	2	181	129	139%
Subtotal troll fishery				880,193		291,769	7,120	7,043	5,914	5,905	126	21,236	2,480	22.9%

SEINE FISHERY

Stat. week	Dates	District	H	v(H)	n	a	a'	t	t'	m_c	$\hat{r}$	SE($\hat{r}$)	RP($\hat{r}$)
31	7/27	112	2,124		699	5	5	4	4	1	173	172	195%
34	8/16–8/19	112	1,605		5,501	114	112	93	93	8	1,482	557	74%
35	8/24	113	2,388		1,034	31	31	27	27	2	263	187	139%
35	8/23–8/24	112	7,096		3,773	74	74	62	62	2	214	152	139%
Subtotal seine fishery			29,213		11,007	224	222	186	186	13	2,132	630	58.0%

SPORT FISHERY

Biweek	Dates	Derby	Area	H	v(H)	n	a	a'	t	t'	m_c	$\hat{r}$	SE($\hat{r}$)	RP($\hat{r}$)
14	7/3–7/16	No	Juneau	41	326	21	1	1	1	1	1	111	111	195%
16	7/31–8/13	No	Juneau	2,005	247,310	493	16	16	14	14	5	1,157	593	100%
17	8/14–8/27	Yes	Juneau	1,046		1,046	74	74	66	66	15	853	246	57%
17	8/14–8/27	No	Juneau	4,200	3,150,318	755	32	29	25	25	4	1,397	878	123%
18	8/28–9/10	No	Juneau	3,073	755,275	1,212	58	54	51	51	4	620	351	111%
Subtotal sport fishery				10,365	4,153,229	3,527	181	174	157	157	29	4,137	1,148	54.4%

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Appendix B2.–Page 2 of 2.

GILLNET FISHERY													
Stat. week	**Dates**	**District**	***H***	**v(** H **)**	***n***	***a***	***a'***	***t***	***t'***	m_c	$\hat{r}$	**SE(** $\hat{r}$ **)**	**RP(** $\hat{r}$ **)**
30	7/16–7/22	111	204		41	2	2	1	1	1	283	283	196%
32	7/30–8/5	111	148		75	1	1	1	1	1	112	112	195%
33	8/6–8/12	111	1,336		879	16	16	16	16	9	778	277	70%
34	8/13–8/19	111	844		565	8	8	6	6	4	340	174	100%
36	8/27–9/2	111	1,945		834	27	27	25	25	14	1,857	553	58%
37	9/3–9/9	115	7,217		1,001	39	39	36	36	2	820	585	140%
37	9/3–9/9	111	965		304	30	30	26	26	6	1,083	462	84%
38	9/10–9/16	115	9,181		1,119	61	60	53	52	3	1,451	853	115%
38	9/10–9/16	111	800		149	15	14	10	10	4	1,309	672	101%
39	9/17–9/23	115	5,631		2,409	168	160	156	155	10	1,405	479	67%
39	9/17–9/23	111	845		133	11	10	10	10	4	1,590	816	101%
40	9/24–9/30	115	5,057		1,971	158	158	155	155	3	438	257	115%
Subtotal gillnet fishery			34,173		9,480	536	525	495	493	61	11,466	1,789	30.6%
TOTAL			**953,944**	**4,153,229**	**315,783**	**8,061**	**7,964**	**6,752**	**6,741**	**229**	**38,971**	**3,326**	**16.7%**

Appendix B3.–Numbers of coded wire tagged and untagged coho salmon sampled in Canyon Island fish wheels and gillnets in 2000. Numbers of coded wire tagged and untagged coho salmon in samples of immigrating salmon at Canyon Island fish wheels and the Canadian set/drift gill net fishery in 1993.

		Canyon Island[a]				Test Fishery[b]			
Date	Stat week	Number examined	Number ad clips	Number valid	Tag codes	Number examined	Number ad clips	Number valid	Tag codes
7/9	29	2							
7/10	29	1							
7/11	29	0							
7/12	29	1							
7/13	29	3							
7/14	29	0							
7/15	29	1							
7/16	30	0							
7/17	30	0							
7/18	30	4							
7/19	30	3							
7/20	30	2							
7/21	30	5							
7/22	30	4							
7/23	31	6							
7/24	31	0							
7/25	31								
7/26	31								
7/27	31	1							
7/28	31	4							
7/29	31	2							
7/30	32	8							
7/31	32	2							
8/1	32	11							
8/2	32	5							
8/3	32	6							
8/4	32	7							
8/5	32	14							
8/6	33	22							
8/7	33	18							
8/8	33	9							
8/9	33	7							
8/10	33	16	1	1	40132				
8/11	33	20							
8/12	33	15							
8/13	34	26	1	1	40132				
8/14	34	42							
8/15	34	24	1		No tag				
8/16	34	27							
8/17	34	44							
8/18	34	29							

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Appendix B3.–Page 2 of 3.

		Canyon Island[a]				Test Fishery[b]			
Date	Stat week	Number examined	Number ad clips	Number valid	Tag codes	Number examined	Number ad clips	Number valid	Tag codes
8/19	34	23							
8/20	35	18							
8/21	35	24							
8/22	35	14	1	1	40126				
8/23	35	10							
8/24	35	14							
8/25	35	23	1	1	40131				
8/26	35	27							
8/27	36	24							
8/28	36	45	1	1	40127				
8/29	36	25	2	1	40127				
					No tag				
8/30	36	30	1	1	40126				
8/31	36	35							
9/1	36	31	1	1	40131				
9/2	36	11							
9/3	37	46							
9/4	37	5							
9/5	37	81	2	2	40126				
					40131				
9/6	37	66							
9/7	37	28							
9/8	37	59							
9/9	37	46	1	1	40127				
9/10	38	33	1	1	40126				
9/11	38	18	1	1	40127				
9/12	38	38	2	2	40127				
					40132				
9/13	38	41							
9/14	38	29							
9/15	38	40	2	2	40126				
					40126				
9/16	38	32	1	1	40127	194	8	4	40126
									40126
									40127
									40131
9/17	39	10							
9/18	39	34							
9/19	39	56	2	2	40126				
					40127				
9/20	39	57	2	2	40126				
					40132				

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Appendix B3.–Page 3 of 3.

		Canyon Island[a]				Test Fishery[b]			
Date	Stat week	Number examined	Number ad clips	Number valid	Tag codes	Number examined	Number ad clips	Number valid	Tag codes
9/21	39	48	2	2	40126				
					40131				
9/22	39	42	3	3	40126	200	7	4	40126
					40127				40127
					40127				40127
									40132
9/23	39	20							
9/24	40	21	1	1	40131				
9/25	40	26							
9/26	40	22							
9/27	40	59	1	1	40126				
9/28	40	70	2	2	40127	177	2	1	40127
					40131				
9/29	40	26							
9/30	40	53	1	1	40126				
10/1	41	10	1	1	40126				
10/2	41	11							
10/3	41	5							
10/4	41								
10/5	41								
10/6	41								
10/7	41					32	2	1	40131
Total		1,877	35	33		603	19	10	

[a] At Canyon, all adipose fin-clipped coho salmon were sacrificed for coded wire tag sampling.

[b] In the test fishery, all adipose fin-clipped coho salmon were sacrificed for coded wire tag sampling. Five heads were lost during shipping and four did not possess valid coded wire.

Appendix B4.–Estimated harvests of coho salmon bound for the Taku River above Canyon Island in 2000 in the marine commercial troll and gillnet fisheries by statistical week. Harvest in the troll fishery was approximated by weighting period catches by the number of coded wire tags recovered in a statistical week

		Troll		Gillnet		Total		Weekly prop of harvest			Weekly prop of harvest times Statistical week		
Statistical week	Ending date	Tags	Harvest	Tags	Harvest	Tags	Harvest	Troll	Gillnet	Total	Troll	Gillnet	Total
27	07/01	4	798			4	798	0.04		0.02	1.05		0.68
28	07/08	15	2,991			15	2,991	0.14		0.09	4.09		2.65
29	07/15	9	1,795	1	188	10	1,983	0.08	0.02	0.06	2.54	0.49	1.82
30	07/22	11	2,194			11	2,194	0.1		0.07	3.2		2.08
31	07/29	10	1,994	1	188	11	2,182	0.09	0.02	0.07	3.01	0.52	2.14
32	08/05	12	1,990	9	1,692	21	3,681	0.09	0.15	0.11	3.09	4.87	3.71
33	08/12	3	497	4	752	7	1,249	0.02	0.07	0.04	0.8	2.23	1.3
34	08/19	6	877			6	877	0.04		0.03	1.45		0.94
35	08/26	15	2,192	14	2,632	29	4,824	0.1	0.23	0.15	3.72	8.26	5.31
36	09/02	15	2,192	8	1,504	23	3,696	0.1	0.13	0.11	3.82	4.85	4.18
37	09/09	13	1,858	7	1,316	20	3,174	0.09	0.11	0.1	3.32	4.36	3.69
38	09/16	13	1,858	14	2,632	27	4,489	0.09	0.23	0.14	3.41	8.95	5.35
39	09/23			3	564	3	564		0.05	0.02		1.97	0.69
40	09/30												
41	10/07												
42	10/14												
	Total	126	21,236	61	11,466	187	32,702	1.00	1.00	1.00	33.49	36.51	34.55
							Estimated mean date of harvest				8/9/00	8/31/00	8/17/00

Appendix B5.–Number of marked coho salmon released at Canyon Island and recaptured and examined for marks in the inriver test and Canadian commercial fisheries by statistical week in 2000.

Release stat week	Date	Number of fish released	Recovery stat week												
			29	30	31	32	33	34	35	36	37	38	39	40	41
29	7/9–7/15	5	0	2	0	0	0	0	0	0	0	0	0	0	0
30	7/16–7/	6	0	1	0	0	0	0	0	0	0	0	0	0	0
31	7/23–7/29	16	0	0	0	1	0	0	0	0	0	0	0	0	0
32	7/30–8/5	37	0	0	0	7	2	0	0	0	0	0	0	0	0
33	8/6–8/12	89	0	0	0	0	18	7	1	1	0	0	0	0	0
34	8/13–8/19	189	0	0	0	0	0	15	11	4	0	0	0	0	0
35	8/20–8/26	123	0	0	0	0	0	0	11	7	0	0	0	0	0
36	8/27–9/2	199	0	0	0	0	0	0	0	16	1	0	0	0	0
37	9/3–9/9	253	0	0	0	0	0	0	0	0	3	1	0	0	0
38	9/10–9/16	247	0	0	0	0	0	0	0	0	0	4	3	1	0
39	9/17–9/23	254	0	0	0	0	0	0	0	0	0	2	9	2	0
40	9/24–9/30	245	0	0	0	0	0	0	0	0	0	0	1	3	2
41	10/1–10/7	100	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	1,763	0	3	0	8	20	22	23	28	4	7	13	6	2
		Marked percent	0.0	5.1	0.0	2.1	3.4	2.5	3.5	2.3	0.7	2.8	3.3	2.1	1.7
		Number of fish examined	12	59	37	375	586	874	667	1,234	551	248	395	288	121

APPENDIX C

Appendix C1.–Number of salmon smolt caught in minnow traps near Canyon Island on the Taku River during 2000. Days with trap sets but no catches indicate that fish caught were held one, two, or three days until enough were accumulated for tagging.

		Daily catch		Catch per trap		Air temperature (°C)			Water	
Date	Trap sets	Coho	Chinook	Coho	Chinook	Min.	Max.	Precipitation(inches)	Temp. (°C)	Stage (ft.)
9-Apr	26									
10-Apr	70									
11-Apr	120	770	525	4	2					
12-Apr	114									
13-Apr	130								1	
14-Apr	109					-2	13		2	
15-Apr	114	1,257	559	3	1	-6	13		3	
16-Apr	138					-5	14		4	-2.3
17-Apr	140	1,621	462	6	2	2	12		4	
18-Apr	137						10	0.45	4	
19-Apr	126	2,365	618	9	2	0	5	0.47	4	-1.9
20-Apr	115					0	12	0.07	5	-1.8
21-Apr	127	1,870	375	8	2	0	13	0.61	4	-1.7
22-Apr	118					0	13	0.15	5	-1.5
23-Apr	119					-6	10	0.01	4	-1.6
24-Apr	118	3,141	521	9	1	-4	13		4	-1.7
25-Apr	173					-4	14		5	-1.8
26-Apr	199	2,440	357	7	1	-4	15		5	-1.7
27-Apr	210					-3	17		5	-1.6
28-Apr	211	2,555	448	6	1					
29-Apr	201	1,631	218	8	1	2	17	0.25	6	-1.0
30-Apr	212					3	13	0.21	6	-0.9
1-May	206	2,632	372	6	1	3	12	0.26	6	-0.7
2-May	199					0	14	0.06	7	-0.5
3-May	199	2,635	219	7	1				6	-0.3
4-May	192					1	19	0.04	6	-0.1
5-May	184	2,147	203	6	1	0	17		6	0.1
6-May	199					1	20		6	0.3
7-May	182	3,549	374	9	1	4	20		7	0.6
8-May	170					-4	17		7	1.2
9-May	203					0	20		7	1.5
10-May	199	1,941	207	3	0	0	21			1.9
11-May	189					6	24		8	2.3
12-May	132					0	23		8	2.9
13-May	99	952	107	2	0	5	22	0.05	8	2.4
14-May	125					5	20	0.02	8	2.7
15-May	118	1,754	455	7	2	4	16	0.01	8	2.6
16-May	170	981	387	6	2	5	21	0.07	8	2.3
17-May	230	1,213	646	5	3	5	17	0.05	8	2.3
18-May	217	1,006	836	5	4	5	17	0.10	8	2.7
19-May	222	861	806	4	4	4	18	0.10	8	3.4
20-May	222					4	14	0.05	7	3.5
21-May	217	1,116	1,109	3	3	3	17	0.02	8	3.1
22-May	214	733	625	3	3	5	17	0.17	8	2.6
23-May	205	704	776	3	4	3	15	0.05	8	2.9
24-May	226	753	712	3	3	2	15	0.02	7	2.6

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Appendix C1.–Page 2 of 2.

Date	Trap Sets	Daily catch		Catch per trap		Air temperature (°C)		Precipitation (inches)	Water	
		Coho	Chinook	Coho	Chinook	Min.	Max.		Temp. (°C)	Stage (ft)
25-May	222	683	686	3	3	0	18		7	2.3
26-May	212	546	652	3	3	-2	17	0.01	8	2.2
27-May	207									
28-May	206	393	510	3	3	4	24		10	2.7
29-May	207			2	2	6	19	0.25	8	3.3
30-May	215	585	824			-1	19	0.05	8	3.8
31-May	193			1	2	0			8	4.0
1-Jun	188	349	478			3	24		9	4.4
2-Jun	106			1	2				9	5.2
3-Jun	96	155	194						9	5.4
4-Jun	55			1	1	1	25		9	6.1
5-Jun	56	120	255			4	21		9	6.3
6-Jun	62			1	2	6	22		8	7.1
7-Jun	43					6	14	0.36	8	7.6
8-Jun	36	39	151			5	14	0.07	8	7.8
9-Jun	50			0	1	3	29		8	7.8
10-Jun	56	24	198			7	21	0.03	8	7.8
11-Jun	62			0	2	4	24	0.02	8	9.0
12-Jun	48	12	78			5	21		8	9.8
13-Jun	37			0	1	5	25		8	10.1
14-Jun	44	23	28			4	19	0.12	8	10.2
15-Jun	29	393	510	0	0	7	17	0.07	5	11.6
Total	9,976	44,807	17,298					4.27		
Mean				4 .1	1 .9					

Appendix C2.–Estimated marine harvest of adult coho salmon bound for the Taku River above Canyon Island in 2001. Calculations follow equations in Table 2 of Bernard and Clark (1996) with 0.0239 used as an estimate of θ and 0.0172 for G(θ -1). Definitions of notation used to label these and other statistics are immediately below. In fishing periods and fishing quadrants for which no CWT was recovered with the appropriate code, harvest was assumed to be zero.

a_i	=	number of adults missing adipose fins in a sample from catch in a stratum
a_i'	=	number of heads that arrive at Juneau for dissection (subset of a_i) in a stratum
r_i	=	number of adults from the stock harvested in a stratum in year *j*
m_{ci}	=	number of CWTs with the appropriate code(s) (subset of t_i') in a stratum
n_i	=	number of adults caught in a stratum inspected for missing adipose fins
t_i	=	number of heads with tags detected magnetically (subset of a_i') in a stratum
t_i'	=	number of CWTs found through dissection and decoded (subset of t_i) in a stratum
θ	=	fraction of the stock with CWTs
$G(\theta^{-1})$	=	squared coefficient of variation for the estimate of $1/\theta$

TROLL FISHERY

Stat. weeks	Dates	Per.	Quad.	*H*	v(*H*)	*n*	*A*	*a'*	*t*	*t'*	m_c	$\hat{r}$	SE($\hat{r}$)	RP($\hat{r}$)
27-32	7/5-8/11	3	NW	796,959		144,935	2,673	2,662	2,221	2,217	96	22,172	3,670	32%
27-32	7/5-8/11	3	SW	95,191		49,926	640	615	478	476	1	83	83	195%
33-39	8/12-9/29	4	NW	383,090		104,643	2,277	2,264	1,971	1,969	11	1,693	551	64%
33-39	8/12-9/29	4	NE	73,122		23,819	440	438	375	375	111	14,293	2,304	32%
33-39	8/12-9/29	4	SE	6,640		3,679	45	40	28	28	1	85	84	195%
Subtotal troll fishery				1,355,002		327,002	6,075	6,019	5,073	5,065	220	38,326	4,370	22.3%

SEINE FISHERY

Stat.week	Dates	District	*H*	v(*H*)	n	a	a'	t	t'	m_c	$\hat{r}$	SE($\hat{r}$)	RP($\hat{r}$)
30	7/22-7/28	112	2,926		1,146	24	24	20	20	1	107	106	195%
31	7/29-8/4	109	15,901		4,428	67	66	60	60	2	304	216	139%
31	7/29-8/4	112	6,555		2,124	51	45	38	38	1	146	146	195%
32	8/5-8/11	112	5,579		3,864	87	87	80	80	1	60	60	194%
32	8/5-8/11	114	1,780		188	3	3	3	3	1	395	395	196%
33	8/12-8/18	112	2,284		1,817	68	68	63	63	4	210	107	100%
34	8/19-8/25	112	10,297		3,263	89	89	73	73	6	791	335	83%
35	8/26-9/1	112	5,913		4,709	104	104	92	91	1	53	53	194%
38	9/16-9/22	109[a]								1			
Subtotal seine fishery			51,235		21,539	493	486	429	428	18	2,066	604	57.3%

SPORT FISHERY

Biweek	Dates	Derby	Area	*H*	v(*H*)	n	A	a'	t	t'	m_c	$\hat{r}$	SE($\hat{r}$)	RP($\hat{r}$)
13	6/18-7/1	No	Sitka	6,291	1,974,332	1,766	16	16	15	15	1	149	148	195%
14	7/2-7/15	No	Sitka	10,816	11,969,993	2,947	43	41	38	37	1	165	165	195%
15	7/16-7/29	No	Sitka	21,656	22,447,237	6,344	76	75	66	66	1	144	144	195%
15	7/16-7/29	No	Juneau	1,118	72,714	459	4	4	4	4	3	305	188	121%
16	7/30-8/12	No	Juneau	2,665	227,276	1,048	25	23	20		4	462	246	105%
17	8/13-8/26	No	Yakutat [b]								1			
17	8/13-8/26	No	Sitka	16,680	12,759,327	5,340	90	90	81	81	1	130	130	195%
17	8/13-8/26	Yes	Juneau	2,339		2,339	106	106	100	100	9	376	132	69%
17	8/13-8/26	No	Juneau	3,322	624,844	785	17	16	14	14	1	188	187	196%
18	8/27-9/9	No	Juneau	3,276	333,278	1,240	62	55	53	53	2	249	179	141%
19	9/10-9/23	No	Juneau	1,452	225,566	144	11	10	9	9	2	926	693	147%
Subtotal sport fishery				69,615	50,634,567	22,412	450	436	400	399	26	3,094	865	54.8%

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Appendix C2.–Page 2 of 2.

GILLNET FISHERY													
Stat. week	**Dates**	**District**	***H***	**v(*H*)**	**n**	**A**	**a'**	**t**	**t'**	m_c	$\hat{r}$	**SE($\hat{r}$)**	**RP($\hat{r}$)**
27	7/1-7/7	106	4,227		1,035	59	59	57	55	1	177	176	195%
29	7/15-7/21	106	18,515		4,767	202	195	179	178	1	169	168	195%
29	7/15-7/21	115	95		115	1	1	1	1	1	34	34	193%
30	7/22-7/28	111	187		104	1	1	1	1	1	75	75	195%
33	8/12-8/18	106	5,588		1,509	17	17	17	17	1	155	154	195%
33	8/12-8/18	111	3,470		474	5	5	4	3	2	815	581	140%
34	8/19-8/25	111	1,501		485	10	10	10	10	6	775	329	83%
35	8/26-9/1	111	1,581		173	5	5	5	5	1	382	381	196%
36	9/2-9/8	111	1,174		810	47	47	45	45	8	484	180	73%
37	9/9-9/15	111	1,129		645	31	28	23	22	6	508	215	83%
37	9/9-9/15	115	6,124		629	35	34	32	32	3	1,255	736	115%
38	9/16-9/22	111	2,003		1,092	67	65	61	59	23	1,877	458	48%
38	9/16-9/22	115	5,448		1,381	36	34	34	33	2	359	256	139%
39	9/23-9/29	111	1,995		910	55	52	50	50	26	2,517	588	46%
39	9/23-9/29	115	6,960		1,712	71	70	70	69	1	175	174	195%
40	9/30-10/6	111	1,136		96	6	5	5	5	3	1,779	1,044	115%
40	9/30-10/6	115	5,327		989	76	71	68	68	1	241	240	196%
Subtotal gillnet fishery			66,460		16,926	724	699	662	653	87	11,777	1,760	29.3%
TOTAL			1,542,312	50,634,567	387,879	7,742	7,640	6,564	6,545	351	55,264	4,828	17.1%

[a] No harvest reported; PNP Cost Rec fish.

[b] Harvest not estimated in Yakutat, only catch composition.

Appendix C3.–Numbers of coded wire tagged and untagged coho salmon sampled in Canyon Island fish wheels and gillnets in 2001. Numbers of coded wire tagged and untagged coho salmon in samples of immigrating salmon at Canyon Island fish wheels and the Canadian set/drift gill net fishery in 1993.

		Canyon Island[a]				Test Fishery[b]	
Date	Stat Week	Number Examined	Number ad clips	Number valid	Tag codes	Number examined	Number ad clips
7/3	27	1					
7/4	27	0					
7/5	27	1					
7/6	27	0					
7/7	27	1					
7/8	28	1					
7/9	28	0					
7/10	28	0					
7/11	28	2					
7/12	28	2					
7/13	28	3					
7/14	28	2					
7/15	29	1					
7/16	29	4					
7/17	29	2					
7/18	29	3					
7/19	29	2					
7/20	29	2					
7/21	29	6					
7/22	30	2					
7/23	30	1					
7/24	30	7					
7/25	30	4					
7/26	30	3					
7/27	30	7					
7/28	30	2					
7/29	31	4					
7/30	31	10	1		No tag		
7/31	31	5					
8/1	31	8					
8/2	31	11					
8/3	31	1					
8/4	31	2					
8/5	32	6					
8/6	32	8					
8/7	32	14					
8/8	32	4					
8/9	32	3					
8/10	32	0					
8/11	32	4					
8/12	33	15					

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Appendix C3.–Page 2 of 4.

		Canyon Island[a]				Test Fishery[b]	
Date	Stat week	Number examined	Number ad clips	Number valid	Tag codes	Number examined	Number ad clips
8/13	33	6					
8/14	33	8					
8/15	33	9					
8/16	33	12	2	2	40252		
					40360		
8/17	33	20					
8/18	33	16	1	1	40360		
8/19	34	16	1	1	40254		
8/20	34	22					
8/21	34	8					
8/22	34	7					
8/23	34	8					
8/24	34	16					
8/25	34	17					
8/26	35	21	3	3	40254		
					40255		
					40255		
8/27	35	16					
8/28	35	29	2	2	40252		
					40254		
8/29	35	18					
8/30	35	34	1	1	40255		
8/31	35	54					
9/1	35	39	1	1	40254	92	2
9/2	36	36				81	0
9/3	36	35				76	1
9/4	36	19				98	2
9/5	36	22				106	3
9/6	36	30	2	2	40253	122	0
					40254		
9/7	36	35				138	5
9/8	36	69	3	2	40252	101	3
					40255		
					No tag		
9/9	37	46	3	3	40252		
					40254		
					40254		
9/10	37	66	3	3	40253	88	2
					40253		
					40254		
9/11	37	50	1	1	40360	147	1
9/12	37	49	1	1	40255	117	4

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Appendix C3.–Page 3 of 4.

		Canyon Island[a]				Test Fishery[b]	
Date	Stat week	Number examined	Number ad clips	Number valid	Tag codes	Number examined	Number ad clips
9/13	37	9				68	0
9/14	37	52					
9/15	37	77	2	1	Released		
					No tag		
9/16	38	95	3	3	Released	84	2
					Released		
					Released		
9/17	38	71	3	3	40131	81	0
					40253		
					40254		
9/18	38	55	3	3	40253	138	3
					40254		
					40254		
9/19	38	63	1	1	Released	109	3
9/20	38	55					
9/21	38	50	2	2	40252		
					40255		
9/22	38	71	3	3	40252		
					40252		
					40360		
9/23	39	35	1	1	40253	108	1
9/24	39	84	4	4	40252	134	1
					40254		
					40255		
					Nonsense[c]		
9/25	39	97	1	1	Released	170	2
9/26	39	20	1	1	Released		
9/27	39	82	3	3	Released	102	2
					Released		
					Released		
9/28	39	75	1	1	40255		
9/29	39	77	3	3	40252		
					Released		
					Released		
9/30	40	0				191	1
10/1	40	34				184	2
10/2	40	68	1	1	Released	66	3
10/3	40	101	3	2	Released	66	1
					Released		
					No tag		
10/4	40	87	1	1	Released		
10/5	40	35					

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Appendix C3.–Page 4 of 4.

Date	Stat week	Canyon Island[a] Number examined	Number ad clips	Number valid	Tag codes	Test Fishery[b] Number examined	Number ad clips
10/6	40						
10/7	41					102	2
10/8	41					92	2
10/9	41					19	1
10/10	41					112	2
Total		2,380	61	57		2,992	51

[a] At Canyon Island, adipose fin-clipped coho salmon that tested positive for the presence of valid coded wire using a handheld magnetic wand detector were subsequently released. One fish tagged as a Chinook salmon smolt in the spring of 2000 was recaptured as an adult coho salmon sampled on 9/24.

[b] In the test fishery, all adipose fin-clipped coho salmon were released and not sacrificed.

[C] ADF&G Coded Wire Tag Laboratory tag status for a mismatched species.

Appendix C4.–Estimated harvests of coho salmon bound for Taku River above Canyon Island in 2001 in marine commercial troll and gillnet fisheries by statistical week. Harvest in the troll fishery was approximated by weighting period catches by the number of coded wire tags recovered in a statistical week

Statistical week	Ending date	Troll		Gillnet		Total		Weekly prop of harvest			Weekly prop of harvest times Statistical week		
		Tags	Harvest	Tags	Harvest	Tags	Harvest	Troll	Gillnet	Total	Troll	Gillnet	Total
26	6/30												
27	7/7	4	887	1	131	5	1,017	0.02	0.01	0.02	0.65	0.31	27
28	7/14	6	1,330			6	1,330	0.04		0.03	1.01		28
29	7/21	18	3,990	2	262	20	4,251	0.11	0.02	0.09	3.12	0.67	29
30	7/28	24	5,320	1	131	25	5,451	0.14	0.01	0.11	4.31	0.34	30
31	8/4	20	4,433			20	4,433	0.12		0.09	3.71		31
32	8/11	25	5,542			25	5,542	0.15		0.12	4.79		32
33	8/18	20	2,525	3	392	23	2,917	0.07	0.03	0.06	2.25	1.14	33
34	8/25	20	2,525	6	785	26	3,309	0.07	0.07	0.07	2.32	2.34	34
35	9/1	20	2,525	1	131	21	2,655	0.07	0.01	0.06	2.39	0.40	35
36	9/8	27	3,408	8	1,046	35	4,454	0.09	0.09	0.09	3.31	3.31	36
37	9/15	16	2,020	9	1,177	25	3,197	0.05	0.10	0.07	2.02	3.83	37
38	9/22	18	2,272	25	3,270	43	5,542	0.06	0.29	0.12	2.33	10.92	38
39	9/29	2	252	27	3,531	29	3,784	0.01	0.31	0.08	0.27	12.10	39
40	10/6			4	523				0.05			1.84	40
41	10/13												41
42	10/20												
	Total	220	37,027	87	11,378	303	47,882	1.00	1.00	1.00	32.47	37.21	33 .52
								Estimated mean date of harvest			8/8/01	9/11/01	8/16/01

Appendix C5.–Number of marked coho salmon released at Canyon Island and recaptured and examined for marks in the inriver test and Canadian commercial fisheries by statistical week in 2001.

Release stat week	Date	Number of fish released	Recovery stat week													
			28	29	30	31	32	33	34	35	36	37	38	39	40	41
27	7/1–7/7	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	7/8–7/14	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	7/15–7/21	19	0	2	2	0	0	0	0	0	0	0	0	0	0	0
30	7/22–7/29	23	0	0	2	3	0	0	0	0	0	0	0	0	0	0
31	7/29–8/4	37	0	0	0	3	1	0	0	0	0	0	0	0	0	0
32	8/5–8/11	39	0	0	0	0	3	11	0	0	0	0	0	0	0	0
33	8/12–8/18	82	0	0	0	0	0	2	16	0	0	0	0	0	0	0
34	8/19–8/25	89	0	0	0	0	0	0	5	0	3	0	0	0	0	0
35	8/26–9/1	193	0	0	0	0	0	0	0	2	6	0	0	0	0	0
36	9/2–9/8	237	0	0	0	0	0	0	0	0	7	0	0	0	0	0
37	9/9–9/15	334	0	0	0	0	0	0	0	0	0	6	7	1	1	0
38	9/16–9/22	422	0	0	0	0	0	0	0	0	0	0	7	6	2	0
39	9/23–9/29	442	0	0	0	0	0	0	0	0	0	0	0	4	12	0
40	9/30–10/6	303	0	0	0	0	0	0	0	0	0	0	0	0	1	5
	Total	2,230	0	2	4	6	4	13	21	2	16	6	14	11	16	5
	Marked percent		0.0	4.2	4.0	1.7	0	.94	1.6	3.6	2.2	2.2	1.1	2.6	1.5	2.9	1.5
	Number of fish examined		20	47	99	348	427	789	590	92	735	529	544	735	549	325

APPENDIX D

Appendix D1.–Number of salmon smolt caught in minnow traps near Canyon Island on the Taku River during 2001. Days with trap sets but no catches indicate that fish caught were held one, two, or three days until enough were accumulated for tagging.

		Daily catch		Catch per trap		Air		Water	
Date	Trap sets	Coho	Chinook	Coho	Chinook	temperature[a] (°C)	Precipitation (inches)	Temp. (°C)	Stage (ft.)
9-Apr									
10-Apr									
11-Apr									
12-Apr	61								
13-Apr	118	400	187	2	1				
14-Apr	148	600	280	4	2				
15-Apr	178	720	478	4	3			3	-2.4
16-Apr	174	1,280	456	7	3				
17-Apr	174	1,000	560	6	3				
18-Apr	196	1,500	560	8	3			3	-2.1
19-Apr	200	1,000	560	5	3			4	-1.9
20-Apr	212	1,000	654	5	3			4	-1.8
21-Apr	190	1,500	467	8	2			4	-1.6
22-Apr	217	1,000	654	5	3			4	-1.4
23-Apr	220	500	654	2	3				
24-Apr	234	1,242	683	5	3			4	-1.2
25-Apr	227	758	345	3	2		0.1	4	-1.0
26-Apr	190	1,366	445	7	2		0.1	4	-1.0
27-Apr	184	1,134	955	6	5		0.2	4	-1.0
28-Apr	243	2,000	934	8	4		0.1	4	-0.9
29-Apr	249	1,500	467	6	2		0.0	4	-0.9
30-Apr	212	1,500	934	7	4		0.1		0.0
1-May	216	1,061	956	5	4			5	0.0
2-May	220	939	911	4	4		0.1	5	0.0
3-May	211	1,000	934	5	4		0.7	4	-0.6
4-May	218	1,500	934	7	4		0.6	4	-0.5
5-May	229	1,500	934	7	4		0.1	4	-0.6
6-May	225	1,335	1,138	6	5		0.0	5	-0.8
7-May	266	1,451	1,437	5	5			6	-0.9
8-May	267	1,214	2,094	5	8		0.4	6	-0.8
9-May	269	1,500	1,868	6	7		0.2	6	-0.8
10-May	272	1,780	2,366	7	9		0.0	6	-0.7
11-May	218	920	996	4	5				0.0
12-May	213	1,000	1,074	5	5			7	-0.6
13-May	207	1,008	1,081	5	5		0.3	7	-0.2
14-May	186	884	568	5	3		0.0	6	0.3
15-May	194	884	568	5	3		0.0	6	0.5
16-May	173	853	627	5	4		0.1	6	0.8
17-May	159	853	627	5	4				0.0
18-May	244	1,204	1,381	5	6				0.0
19-May	223	1,101	1,262	5	6				0.0
20-May	231	1,140	1,308	5	6			7	0.6
21-May	241	1,190	1,364	5	6		0.2	7	0.7

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Appendix D1.–Page 2 of 2.

Date	Trap Sets	Daily catch		Catch per trap		Air temperature[a] (°C)	Precipitation (inches)	Water	
		Coho	Chinook	Coho	Chinook			Temp. (°C)	Stage (ft)
22-May	183	903	1,036	5	6		0.1	7	0.8
23-May	175	864	991	5	6		0.1		1.3
24-May	203	1,002	1,149	5	6		0.2		1.5
25-May	208	1,027	1,178	5	6				
26-May									
27-May	201	992	1,138	5	6				
28-May	134	661	759	5	6				
29-May	80	395	453	5	6				
30-May									
31-May									
1-Jun									
2-Jun									
3-Jun									
4-Jun									
5-Jun									
6-Jun									
7-Jun	27	133	153	5	6				
8-Jun	29	143	164	5	6				
9-Jun	20	99	113	5	6				
Total	9,569	50,535	41,836				3.54		
Mean				5.2	4.4				

[a] Air temperature was not recorded during smolt operations in 2001 due to a malfunctioning thermometer.

Appendix D1.–Estimated marine harvest of adult coho salmon bound for the Taku River above Canyon Island in 2002. Calculations follow equations in Table 2 of Bernard and Clark (1996) with 0.0202 used as an estimate of θ and 0.0141 for G(θ -1). Definitions of notation used to label these and other statistics are immediately below. In fishing periods and fishing quadrants for which no CWT was recovered with the appropriate code, harvest was assumed to be zero.

a_i	=	number of adults missing adipose fins in a sample from catch in a stratum
a_i'	=	number of heads that arrive at Juneau for dissection (subset of a_i) in a stratum
r_i	=	number of adults from the stock harvested in a stratum in year *j*
m_{ci}	=	number of CWTs with the appropriate code(s) (subset of t_i') in a stratum
n_i	=	number of adults caught in a stratum inspected for missing adipose fins
t_i	=	number of heads with tags detected magnetically (subset of a_i') in a stratum
t_i'	=	number of CWTs found through dissection and decoded (subset of t_i) in a stratum
θ	=	fraction of the stock with CWTs
$G(\theta^{-1})$	=	squared coefficient of variation for the estimate of $1/\theta$

TROLL FISHERY

Stat. weeks	Dates	Per.	Quad.	H	v(H)	n	a	a'	t	t'	m_c	$\hat{r}$	SE($\hat{r}$)	RP($\hat{r}$)
26	6/23–6/29	2	NW[a]	667		286	2	2	2	2	1	116	115	195 %
27–32	6/30–8/10	3	NW	341,306		113,254	2,224	2,210	1,845	1,844	63	9,470	1,630	34 %
26	6/30–8/11	3	NE	102,015		35,428	1,363	1,351	1,200	1,197	1	144	144	195 %
26	6/30–8/12	3	SE	65,133		24,561	475	469	372	372	1	133	133	195 %
33-40	8/11–10/5	4	NW	461,263		125,974	3,234	3,201	2,819	2,817	152	27,876	3,994	28 %
33-40	8/11–10/5	4	NE	82,886		26,757	866	857	739	737	8	1,244	460	72 %
33-40	8/11–10/5	4	SW	50,368		35,540	518	511	407	407	1	71	71	195 %
Subtotal troll fishery				1,103,638		361,800	8,682	8,601	7,384	7,376	227	39,054	4,345	21.8%

SEINE FISHERY

Stat. week	Dates	District	H	v(H)	n	a	a'	t	t'	m_c	$\hat{r}$	SE($\hat{r}$)	RP($\hat{r}$)
29	7/14–7/20	112	751		493	6	6	6	6	2	151	107	139 %
30	7/21–7/27	110	6,946		2,230	12	12	11	11	1	154	154	195 %
30	7/21-7/27	112	4,661		560	9	9	7	7	1	412	412	196 %
31	7/28–8/3	112	9,442		1,314	23	23	17	17	3	1,068	624	115 %
31	7/28–8/3	114	6,377		3,366	65	65	53	52	2	191	136	139 %
32	8/4–8/10	112	11,402		1,133	20	20	17	17	1	499	498	196 %
32	8/4–8/10	114	2,478		941	18	18	16	16	1	130	130	195 %
33	8/11–8/17	112	6,536		685	14	14	14	14	1	473	472	196 %
33	8/11–8/17	114	6,172		2,571	69	69	59	59	1	119	118	195 %
34	8/18–8/24	114	1,505		1,438	52	52	47	47	5	259	118	89 %
Subtotal seine fishery			56,270		14,731	288	288	247	246	18	3,457	1,062	60.2%

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Appendix D2.–Page 2 of 2.

SPORT FISHERY

Bi-week	Dates	Derby	Area	H	v(H)	n	a	a'	t	t'	m_c	$\hat{r}$	SE($\hat{r}$)	RP($\hat{r}$)
14	7/8–7/21	No	Sitka	9,614	11,525,161	2,327	36	36	33	33	1	205	204	195 %
14	7/8–7/21	No	Elfin Cove[a]	324		324	10	10	7	7	1	50	49	195 %
11-14	7/8–7/21	No	Juneau	2,271	445,161	275	3	3	3	3	1	409	409	195 %
15	7/22–8/4	No	Juneau	3,417	617,744	613	6	4	4	4	1	414	414	121 %
16	8/5–8/18	No	Juneau	8,480	5,104,552	2,165	42	37	33	33	11	2,423	990	105 %
16-17	8/5–9/1	No	Yakutat[b]				6	6	5	5	2			
17	8/19–9/1	Yes	Juneau-DE	4,824		4,824	170	170	147	147	31	1,536	327	195 %
17	8/19–9/1	Yes	Juneau-DT	1,818	156,514	476	14	11	10	10	2	482	350	69 %
17	8/19–9/1	No	Juneau-MB	2,763	3,349,739	818	17	16	14	14	1	178	178	195 %
18-19	9/2–9/15	No	Juneau	2,700	817,779	553	34	33	31	31	3	748	482	141 %
15-18	7/22–9/15	No	Gustavus[a]	2,884		2,884	48	48	37	37	4	198	100	147 %
Subtotal sport fishery				39,095	22,016,650	15,259	386	374	324	324	58	6,641	1,366	40.3%

GILLNET FISHERY

Stat. week	Dates	District	H	v(H)	n	a	a'	t	t'	m_c	$\hat{r}$	SE($\hat{r}$)	RP($\hat{r}$)
25-27	6/16–7/6	111	43		25	1	1	1	1	1	85	85	195 %
28-29	7/7–7/20	115	418		339	4	4	3	3	2	122	86	138 %
30	7/21–7/27	111	3,098		741	3	3	3	3	1	207	207	196 %
31	7/28–8/3	111	2,840		488	5	5	5	5	3	865	505	115 %
30-31	7/21–8/3	115	481		277	5	5	3	3	1	86	86	195 %
32-33	8/4–8/17	111	5,357		1,710	15	15	11	10	4	683	348	100 %
34-35	8/18–8/31	111	4,731		1,105	20	20	20	20	9	1,909	670	69 %
36	9/1–9/7	111	6,720		2,324	36	35	30	30	20	2,947	740	49 %
37	9/8–9/14	111	8,967		1,099	28	28	27	27	20	8,084	2,033	49 %
37	9/8–9/14	115	30,323		7,329	252	245	225	225	12	2,530	783	61 %
38	9/15–9/21	115	21,682		5,426	234	231	220	220	3	602	351	114 %
38-41	9/15–10/12	111	6,808		387	14	14	14	14	14	12,201	3,545	57 %
39-41	9/22–9/28	115	6,884		3,038	187	183	175	175	5	574	263	90 %
Subtotal gillnet fishery			98,352		24,288	804	789	737	736	95	30,894	4,352	27.6%
TOTAL			1,297,355	22,016,650	416,078	10,160	10,052	8,692	8,682	398	80,046	6,389	15.6%

[a] Catch sampling program, variance of harvest not available.

[b] Harvest not estimated in Yakutat, only catch composition

Appendix D2.–Numbers of coded wire tagged and untagged coho salmon sampled in Canyon Island fish wheels and gillnets in 2002. Numbers of coded wire tagged and untagged coho salmon in samples of immigrating salmon at Canyon Island fish wheels and the Canadian set/drift gill net fishery in 1993.

		Canyon Island[a]				Test Fishery[b]	
Date	Stat week	Number examined	Number ad clips	Number valid	Tag codes	Number examined	Number ad clips
7/2	27	1					
7/3	27	0					
7/4	27	1					
7/5	27	0					
7/6	27	0					
7/7	28	0					
7/8	28	1					
7/9	28	2					
7/10	28	2					
7/11	28	2					
7/12	28	4					
7/13	28	2					
7/14	29	5					
7/15	29	11					
7/16	29	5					
7/17	29	7	1	1	40294		
7/18	29	5					
7/19	29	13					
7/20	29	11	1	1	40454		
7/21	30	12					
7/22	30	12					
7/23	30	18					
7/24	30	17					
7/25	30	12					
7/26	30	18					
7/27	30	15					
7/28	31	6					
7/29	31	8					
7/30	31	11					
7/31	31	13					
8/1	31	15	1	1	40294		
8/2	31	23	1	1	40454		
8/3	31	25					
8/4	32	33	2	1	40456		
					No tag		
8/5	32	33	1	1	40294		
8/6	32	28	1		No tag		
8/7	32	14					
8/8	32	19					
8/9	32	12					
8/10	32	12					
8/11	33	26					

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Appendix D3.–Page 2 of 4.

		Canyon Island[a]				Test Fishery[b]	
Date	Stat week	Number examined	Number ad clips	Number valid	Tag codes	Number examined	Number ad clips
8/12	33	11					
8/13	33	5					
8/14	33	2	1		Tag lost		
8/15	33	25					
8/16	33	9					
8/17	33						
8/18	34	0					
8/19	34	36					
8/20	34	34					
8/21	34	18				9	
8/22	34	66	3	2	40294	14	1
					40294		
					No tag		
8/23	34	49	2	1	40294	2	
					No tag		
8/24	34	40				1	
8/25	35	184	4	4	40454		
					40454		
					40455		
					40455		
8/26	35	109				14	
8/27	35	96				55	
8/28	35	59					
8/29	35	80	3	3	40454	34	
					40454		
					40455		
8/30	35	128	3	3	40454	41	
					40455		
					40455		
8/31	35	138	2	2	40293	247	
					40454		
9/1	36	68				168	
9/2	36	98	3	3	40454	137	4
					40455		
					Released		
9/3	36	52	1	1	Released	244	7
9/4	36	66				36	
9/5	36	64				168	1
9/6	36	98				145	1
9/7	36	79	1		No tag		
9/8	37	51	4	4	40454	102	
					Released		

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Appendix D3.–Page 3 of 4.

		Canyon Island[a]				Test Fishery[b]	
Date	Stat week	Number examined	Number ad clips	Number valid	Tag codes	Number Examined	Number ad clips
					Released		
					Released		
9/9	37	43	1	1	40455	96	
9/10	37	29	1	1	Released	102	1
9/11	37	85	3	3	40294	92	
					40454		
					Released		
9/12	37	148	8	8	40293		
					40454		
					Released		
					Released		
					Released		
					Released		
					Released		
					Released		
9/13	37	87	7	6	40294	47	
					40455		
					Released		
					Released		
					Released		
					Released		
					Head Lost		
9/14	37	102	1	1	Released	16	
9/15	38						
9/16	38	81	1	1	Released		
9/17	38	64	2	1	Released	70	
					No tag		
9/18	38	68	3	3	40293	65	
					40455		
					Released		
9/19	38	70	3	3	Released	201	5
					Released		
					Released		
9/20	38	97				137	
9/21	38						
9/22	39					78	4
9/23	39	81	1	1	Released	72	
9/24	39	157	1	1	Released	174	2
9/25	39	45	1	1	Released	97	2
9/26	39	40	4	4	40293	57	
					40456		
					40456		

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Appendix D3.–Page 4 of 4.

		Canyon Island[a]				Test Fishery[b]	
Date	Stat week	Number examined	Number ad clips	Number valid	Tag codes	Number examined	Number ad clips
					Released		
9/27	39	64				58	
9/28	39	49					
9/29	40					50	2
9/30	40	69	1	1	40294	161	2
10/1	40	18				121	3
10/2	40	76	3	3	40293	162	5
					40293		
					40454		
10/3	40	46	1	1	Released	163	6
10/4	40	41	1	1	Released	45	
10/5	40	36	3	3	40295		
					40456		
					Released		
10/6	41					33	2
10/7	41	50	1	1	Released	55	4
10/8	41					73	1
10/9						56	1
10/10						71	3
10/11						30	
Total		3,765	82	74		3,799	57

[a] At Canyon Island, adipose fin-clipped coho salmon that tested positive for the presence of valid coded wire using a handheld magnetic wand detector were subsequently released. One head was lost on the floor at the lab for a fish sacrificed on 8/14 and another was lost during shipping for a fish sacrificed on 9/13.

[b] In the test fishery, all adipose fin-clipped coho salmon were released and not sacrificed.

Appendix D3.–Estimated harvests of coho salmon bound for Taku River above Canyon Island in 2002 in marine commercial troll and gillnet fisheries by statistical week. Harvest in the troll fishery was approximated by weighting period catches by the number of coded wire tags recovered in a statistical week.

Statistical week	Ending date	Troll		Gillnet		Total		Weekly prop of harvest			Weekly prop of harvest times Statistical week		
		Tags	Harvest	Tags	Harvest	Tags	Harvest	Troll	Gillnet	Total	Troll	Gillnet	Total
26	6/30	2	116			2	116	0.00		0.00	0.08	0.04	0.08
27	6/30	3	450	1	281	4	731	0.01	0.01	0.01	0.31	0.25	0.28
28	7/7	2	300	1	281	3	581	0.01	0.01	0.01	0.22	0.25	0.23
29	7/14	5	750	1	281	6	1,031	0.02	0.01	0.01	0.56	0.26	0.43
30	7/21	9	1,350	1	281	10	1,631	0.03	0.01	0.02	1.04	0.27	0.70
31	7/28	20	2,999	4	1,123	24	4,123	0.08	0.04	0.06	2.38	1.13	1.83
32	8/4	26	3,899	4	1,123	30	5,022	0.10	0.04	0.07	3.19	1.16	2.30
33	8/11	1	178			1	178	0.00	-	0.00	0.15	-	0.08
34	8/18	19	3,382	11	3,089	30	6,471	0.09	0.10	0.09	2.94	3.40	3.15
35	8/25	35	6,230			35	6,230	0.16	-	0.09	5.58	-	3.12
36	9/1	25	4,450	20	5,617	45	10,067	0.11	0.18	0.14	4.10	6.55	5.18
37	9/8	36	6,408	45	12,638	81	19,046	0.16	0.41	0.27	6.07	15.14	10.07
38	9/15	32	5,696	3	843	35	6,538	0.15	0.03	0.09	5.54	1.04	3.55
39	9/22	14	2,492	9	2,528	23	5,020	0.06	0.08	0.07	2.49	3.19	2.80
40	9/29	2	356	10	2,809	12	3,165	0.01	0.09	0.05	0.36	3.64	1.81
41	10/6												
42	10/13												
Total		231	39,054	110	30,894	341	69,948	1.00	1.00	1.00	35.02	36.27	35.57
								Estimated mean date of harvest			8/25/02	9/03/02	8/27/02

Appendix D4. Number of marked coho salmon released at Canyon Island and recaptured and examined for marks in the inriver test and Canadian commercial fisheries by statistical week in 2002.

Release stat week	Date	Number of fish released	RECOVERY STAT WEEK													
			28	29	30	31	32	33	34	35	36	37	38	39	40	41
27	6/30–7/6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	7/7–/13	11	0	3	0	0	0	0	0	0	0	0	0	0	0	0
29	7/14–7/20	51	0	2	6	0	0	0	0	0	0	0	0	0	0	0
30	7/21–7/27	98	0	0	4	24	6	0	0	0	0	0	0	0	0	0
31	7/28–8/3	93	0	0	0	2	14	1	0	0	0	0	0	0	0	0
32	8/4–8/10	136	0	0	0	0	5	9	0	0	0	0	0	0	0	0
33	8/11–8/17	70	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	8/18–8/24	226	0	0	0	0	0	0	0	4	1	0	0	1	0	0
35	8/25–8/31	750	0	0	0	0	0	0	0	9	10	0	0	0	0	0
36	9/1–9/7	507	0	0	0	0	0	0	0	0	9	3	0	0	0	0
37	9/8–9/14	503	0	0	0	0	0	0	0	0	0	1	6	0	0	2
38	9/15–9/21	359	0	0	0	0	0	0	0	0	0	0	2	3	1	0
39	9/22–9/28	403	0	0	0	0	0	0	0	0	0	0	0	0	2	2
40	9/29–10/5	263	0	0	0	0	0	0	0	0	0	0	0	0	3	3
41	10/6–10/11	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		3,518	0	5	10	26	25	10	0	13	20	4	8	4	6	7
	Marked percent		0.0%	1.7%	2.3%	3.6%	1.9%	4.1%	0.0%	2.3%	2.3%	0.9%	1.3%	0.8%	0.9%	2.2%
	Number of fish examined		53	294	431	717	1,337	244	26	559	878	459	612	536	681	318

APPENDIX E

Appendix E1.–Number of salmon smolt caught in minnow traps near Canyon Island on the Taku River during 2002. Days with trap sets but no catches indicate that fish caught were held one, two, or three days until enough were accumulated for tagging.

		Daily catch		Catch per trap				Water[a]	
Date	Trap sets	Coho	Chinook	Coho	Chinook	Air temperature[a] (°C)	Precipitation[a] (inches)	Temp. (°C)	Stage (ft.)
12-Apr									
13-Apr									
14-Apr									
15-Apr									
16-Apr									
17-Apr									
18-Apr									-3.3
19-Apr	69	352	572	5	8				-3.3
20-Apr	115	545	885	5	8				-2.9
21-Apr	117	483	785	4	7				-2.8
22-Apr	116	443	720	4	6				-2.5
23-Apr	134	588	955	4	7		0.2		-2.5
24-Apr	144	662	1,074	5	7				-2.7
25-Apr	154	680	1,105	4	7				-2.9
26-Apr	149	769	1,249	5	8			4	-2.9
27-Apr	153	779	1,265	5	8			4	-2.8
28-Apr	153	984	1,599	6	10			4	-2.7
29-Apr	157	1,011	1,642	6	10			4	-2.3
30-Apr	157	969	1,574	6	10	-3		4	-1.5
01-May	145	587	954	4	7	3		5	-0.5
02-May	114	134	218	1	2	1	0.0	3	0.7
03-May	85	109	178	1	2	-4		3	0.5
04-May	120	395	641	3	5	-2		3	-0.2
05-May	131	580	942	4	7	-1		3	-0.7
06-May	134	848	1,377	6	10	1		4	-1.0
07-May	144	874	1,419	6	10	-2		5	-1.0
08-May	153	796	1,294	5	8	-3		5	-1.2
09-May	150	1,203	1,954	8	13	1		6	-1.3
10-May	150	1,239	2,012	8	13	4	0.1	6	-1.0
11-May	145	1,369	2,224	9	15	4	0.0	7	-0.7
12-May	147	1,070	1,738	7	12	4	0.3	7	-0.5
13-May	155	1,429	2,321	9	15	4	0.1	7	-0.1
14-May	151	940	1,526	6	10	4	0.2	7	0.8
15-May	150	585	951	4	6	4		7	1.5
16-May	138	533	866	4	6	5		7	1.7
17-May	145	604	981	4	7	3		7	1.9
18-May	138	381	619	3	4	3	0.0	7	2.5
19-May	124	118	192	1	2	7	0.2	7	3.5
20-May						9		7	4.8
21-May						15		7	6.2
22-May						8	0.1	6	6.6
23-May	44	62	101	1	2	8	0.1	6	6.6
24-May	82	225	366	3	4	8		7	6.5
25-May	110	234	380	2	3	3		7	6.7
26-May	108	158	257	1	2	3		8	7.5
27-May	76	98	159	1	2	9	0.0	8	8.3
28-May						8	0.1	8	8.6
29-May						8	0.2	8	9.2
30-May						7	0.2	7	9.3
31-May	66	26	43	0	1	2	0.0	8	8.0

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Appendix E1.–Page 2 of 2.

Date	Trap sets	Daily catch		Catch per trap		Air temperature[a] (°C)	Precipitation[a] (inches)	Water[a] Temp. (°C)	Water[a] Stage (ft)
		Coho	Chinook	Coho	Chinook				
01-Jun	72	30	49	0	1	7	0 .1	7	6.7
02-Jun	95	48	78	1	1	7	0 .0	8	6.2
03-Jun	93	79	128	1	1	8	0 .1	8	5.9
04-Jun	99	81	132	1	1	8	0 .1	8	6.3
05-Jun	97	58	94	1	1	8	0 .2	8	6.4
06-Jun	90	34	56	0	1	8	0 .0	8	6.3
07-Jun	89	34	55	0	1	7		8	5.6
08-Jun	89	31	50	0	1	7		8	5.3
09-Jun									
10-Jun		30	49			7	0 .1		
Total	5,447	23,258	37,776				2 .24		
Mean				3 .8	6 .1				

[a] Air temperature, precipitation, and water temperature and stage were recorded daily around 8 a.m.

Appendix E2.–Estimated marine harvest of adult coho salmon bound for the Taku River above Canyon Island in 2003. Calculations follow equations in Table 2 of Bernard and Clark (1996) with 0.0095 used as an estimate of θ and 0.0460 for G(θ -1). Definitions of notation used to label these and other statistics are immediately below. In fishing periods and fishing quadrants for which no CWT was recovered with the appropriate code, harvest was assumed to be zero.

a_i = number of adults missing adipose fins in a sample from catch in a stratum

a_i' = number of heads that arrive at Juneau for dissection (subset of a_i) in a stratum

r_i = number of adults from the stock harvested in a stratum in year *j*

m_{ci} = number of CWTs with the appropriate code(s) (subset of t_i') in a stratum

n_i = number of adults caught in a stratum inspected for missing adipose fins

t_i = number of heads with tags detected magnetically (subset of a_i') in a stratum

t_i' = number of CWTs found through dissection and decoded (subset of t_i) in a stratum

θ = fraction of the stock with CWTs

$G(\theta^{-1})$ = squared coefficient of variation for the estimate of $1/\theta$

TROLL FISHERY

Stat. weeks	Dates	Per.	Quad.	*H*	v(*H*)	*n*	*a*	*a'*	*t*	*t'*	m_c	$\hat{r}$	SE($\hat{r}$)	RP($\hat{r}$)
29-33	7/16-8/16	3	NW	259,598		73,397	1,389	1,377	1,142	1,142	20	8,074	2,385	58 %
34-40	8/18-10/1	4	NW	440,210		128,461	3,480	3,452	2,961	2,959	68	26,600	6,149	45 %
34-40	8/18-10/1	4	NE	63,455		20,412	469	469	408	408	5	1,759	845	94 %
Subtotal troll fishery				763,263		222,270	5,338	5,298	4,511	4,509	93	6,433	6,649	35.8%

SEINE FISHERY

Stat. week	Dates	District	*H*	v(*H*)	*n*	*a*	*a'*	*t*	*t'*	m_c	$\hat{r}$	SE($\hat{r}$)	RP($\hat{r}$)
33	8/10-8/16	112	3,541		1,230	18	18	16	16	1	326	325	196 %
34	8/17-8/23	112	14,406		6,753	146	146	132	132	8	1,931	770	78 %
35	8/24-8/30	112	5,683		1,006	53	53	48	48	2	1,278	921	141 %
35	8/24-8/30	114	43		44	2	2	1	1	1	111	110	195 %
Subtotal seine fishery			23,673		9,033	219	219	197	197	12	3,646	1,249	67.1%

SPORT FISHERY

Bi-week	Dates	Derby	Area	*H*	v(*H*)	*n*	*a*	*a'*	*t*	*t'*	m_c	$\hat{r}$	SE($\hat{r}$)	RP($\hat{r}$)
15	7/21–8/3	No	Sitka	15,148	9,760,054	4,196	121	121	105	104	1	412	412	196 %
15	7/21–8/3	No	Gustavus/ Elfin cove[a]	29,019		3,191	50	49	46	46	4	4,200	2,220	104 %
16-17	8/4–8/31	No	Yakutat[b]	8,093		3,894	27	27	21	21	2	470	338	141 %
16	8/4–8/17	No	Juneau	3,486	366,473	1,053	16	15	13	13	4	1,598	876	107 %
17	8/18–8/31	Yes	Juneau-DE[c]	3,933		3,933	118	118	104	104	12	1,358	468	68 %
17	8/18–8/31	Yes	Juneau-DT[c]	932	42,829	258	6	6	6	6	1	409	408	196 %
18	9/1–9/14	No	Juneau	4,235	2,047,474	758	53	50	45	44	3	2,056	1,352	129 %
Subtotal sport fishery				64,846	12,216,830	17,283	391	386	340	338	27	10,504	2,862	53.4%

-continued-

Appendix E2.–Page 2 of 2.

GILLNET FISHERY														
Stat. week	**Dates**	**District**	***H***	**v(*H*)**	**n**	**a**	**a'**	**t**	**t'**	m_c	$\hat{r}$	**SE($\hat{r}$)**	**RP($\hat{r}$)**	
27	6/29–7/5	111	106		18	1	1	1	1	1	665	665	196	%
32	8/3–8/9	115	65		63	3	3	3	3	1	117	116	195	%
33	8/10–8/16	111	1,000		463	1	1	1	1	1	244	244	196	%
35	8/24–8/30	115	2,901		1,983	54	54	51	51	2	331	238	141	%
36	8/31–9/6	111	1,738		653	21	21	18	18	10	3,012	1,107	72	%
36	8/31–9/6	115	8,907		5,031	197	196	182	181	1	202	202	196	%
37	9/7–9/13	111	7,391		1,833	49	49	46	46	12	5,475	1,891	68	%
37	9/7–9/13	115	14,046		2,357	136	135	132	131	1	685	684	196	%
38	9/14–9/20	111	3,887		1,143	163	163	150	149	10	3,874	1,424	72	%
38	9/14–9/20	115	12,992		4,076	275	273	269	269	12	4,360	1,505	68	%
39	9/21–9/27	111	3,161		56	3	3	3	3	1	6,387	6,387	196	%
39	9/21–9/27	115	13,236		7,425	453	452	433	433	9	1,819	694	75	%
40	9/28–10/4	115	4,729		4,108	289	289	281	281	4	521	275	103	%
Subtotal gillnet fishery			74,159		29,209	1,645	1,640	1,570	1,567	65	27,694	7,178	50.8%	
TOTAL			925,941	12,216,830	277,795	7,593	7,543	6,618	6,611	197	78,277	10,271	25.7%	

[a] Catch sampling program, variance of harvest not available.

[b] Harvest not estimated in Yakutat, only catch composition.

[c] DE or Derby Entered are fish turned in at the docks for derby prizes; DT or Derby Take Home are fish not turned in at the docks and are taken home for personal consumption.

Appendix E3.–Numbers of coded wire tagged and untagged coho salmon sampled in Canyon Island fish wheels and gillnets in 2003. Numbers of coded wire tagged and untagged coho salmon in samples of immigrating salmon at Canyon Island fish wheels and the Canadian set/drift gill net fishery in 1993.

		Canyon Island[a]				Test Fishery[b]	
Date	Stat week	Number examined	Number ad clips	Number valid	Tag codes	Number examined	Number ad clips
7/2	27	1					
7/3	27	0					
7/4	27	1					
7/5	27	0					
7/6	28	2					
7/7	28	3					
7/8	28	2					
7/9	28	1					
7/10	28	3					
7/11	28	0					
7/12	28	10					
7/13	29	8					
7/14	29	8					
7/15	29	10					
7/16	29	8					
7/17	29	4					
7/18	29	5					
7/19	29	3					
7/20	30	6					
7/21	30	6					
7/22	30	17					
7/23	30	12					
7/24	30	12					
7/25	30	11					
7/26	30	4					
7/27	31	5					
7/28	31	13					
7/29	31	4					
7/30	31	5	1	1	40544		
7/31	31	7					
8/1	31	10					
8/2	31	11					
8/3	32	5					
8/4	32	9					
8/5	32	12					
8/6	32	12					
8/7	32	5					
8/8	32	16					
8/9	32	17					
8/10	33						
8/11	33	0					

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Appendix E3.–Page 2 of 3.

		Canyon Island[a]				Test Fishery[b]	
Date	Stat week	Number examined	Number ad clips	Number valid	Tag codes	Number examined	Number ad clips
8/13	33	6					
8/14	33	10					
8/15	33	14					
8/16	33	8					
8/17	34	21					
8/18	34	44					
8/19	34	34					
8/20	34	18					
8/21	34	14					
8/22	34	19					
8/23	34	27					
8/24	35	9					
8/25	35	7				836	7
8/26	35	15					
8/27	35	13					
8/28	35	41					
8/29	35	44	1	1	35607		
8/30	35	48	1	1	40544		
8/31	36	58	3	2	40550		
					Released		
					No tag		
9/1	36	83	2	1	40544		
					No tag		
9/2	36	70					
9/3	36	163					
9/4	36	130				931	12
9/5	36	35					
9/6	36	37	2	2	40551		
					Released		
9/7	37	72					
9/8	37	66					
9/9	37	89	1	1			
9/10	37	63	3	3	40544		
					40544		
					Released		
9/11	37	107	1	1	Released		
9/12	37	72					
9/13	37	98	1	1	40544		
9/14	38	93	1	1	40551	814	5
9/15	38	64	1	1	40544		
9/16	38	28					
9/17	38	40					

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Appendix E3.–Page 3 of 3.

		Canyon Island[a]				Test Fishery[b]	
Date	Stat week	Number examined	Number ad clips	Number valid	Tag codes	Number Examined	Number ad clips
9/18	38	45	1	1	40544		
9/19	38	54	1	1	40551		
9/20	38	45					
9/21	39					570	8
9/22	39	49	1	1	40551		
9/23	39	47					
9/24	39	54					
9/25	39	34	1	1	40544		
9/26	39	91					
9/27	39	134	1	1	40544	559	15
9/28	40						
9/29	40	144					
9/30	40	97	1	1	40544		
10/1	40	43	2	2	40550		
					40551		
10/2	40	46	1	1	40551		
10/3	40	34	1	1	40551		
10/4	40	18					
10/5	41						
10/6	41	21	2	2	40544	380	11
					40551		
10/7	41	0					
10/8	41	13					
Total		3,003	30	28		4,090	58

[a] At Canyon Island, adipose fin-clipped coho salmon that tested positive for the presence of valid coded wire using a handheld magnetic wand detector were subsequently released. One fish sacrificed on 8/29 was tagged at Switzer Creek in the spring of 2002; all other valid recoveries were germane to the Taku River.

[b] In the test fishery, no information was available regarding presence or absence of coded-wire for sampled adipose fin-clipped coho salmon.

Appendix E4.–Estimated harvests of coho salmon bound for Taku River above Canyon Island in 2003 in marine commercial troll and gillnet fisheries by statistical week. Harvest in the troll fishery was approximated by weighting period catches by the number of coded wire tags recovered in a statistical week.

Statistical	Ending	Troll		Gillnet		Total		Weekly prop of harvest			Weekly prop of harvest times Statistical week		
week	date	Tags	Harvest	Tags	Harvest	Tags	Harvest	Troll	Gillnet	Total	Troll	Gillnet	Total
27	6/28			1	394	1	394			0.01		0.42	0.18
28	7/12												
29	7/19	1	373			1	373	0.01		0.01	0.32		0.18
30	7/26	3	1,120			3	1,120	0.03		0.02	1.00		0.57
31	8/2	7	2,614			7	2,614	0.08		0.04	2.40		1.37
32	8/9	3	1,120	1	394	4	1,515	0.03	0.02	0.03	1.06	0.49	0.82
33	8/16	6	2,241	1	394	7	2,635	0.07	0.02	0.04	2.19	0.51	1.47
34	8/23	8	2,875			8	2,875	0.09		0.05	2.90		1.65
35	8/30	11	3,953	2	788	13	4,741	0.12	0.03	0.08	4.11	1.08	2.80
36	9/6	13	4,672	11	4,336	24	9,007	0.14	0.17	0.15	4.99	6.09	5.47
37	9/13	23	8,265	13	5,124	36	13,389	0.25	0.20	0.23	9.07	7.40	8.35
38	9/20	14	5,031	22	8,671	36	13,702	0.15	0.34	0.23	5.67	12.86	8.78
39	9/27	1	359	10	3,941	11	4,301	0.01	0.15	0.07	0.42	6.00	2.83
40	10/4	3	1,078	4	1,577	7	2,655	0.03	0.06	0.04	1.28	2.46	1.79
41	10/18												
Total		93	33,703	65	25,619	158	59,322	1.00	1.00	1.00	35.42	37.31	36.23
								Estimated mean date of harvest			8/27/03	9/09/03	9/02/03

Appendix E5.–Number of marked coho salmon released at Canyon Island and recaptured and examined for marks in the inriver test and Canadian commercial fisheries by statistical week in 2003.

			Recovery stat week														
Release stat week	**Date**	**Number of fish released**	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
27	6/29–7/5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	7/6–7/12	19	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
29	7/13–7/19	42	0	0	0	1	4	0	0	0	0	0	0	0	0	0	0
30	7/20–7/26	61	0	0	0	0	2	6	1	0	0	0	0	0	0	0	0
31	7/27–8/2	51	0	0	0	0	0	0	10	1	0	0	0	0	0	0	0
32	8/3–8/9	65	0	0	0	0	0	0	1	7	2	0	0	0	0	0	0
33	8/10–8/16	37	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
34	8/17–8/23	159	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
35	8/24–8/30	159	0	0	0	0	0	0	0	0	0	0	4	1	0	0	0
36	8/31–9/6	535	0	0	0	0	0	0	0	0	0	0	13	9	0	0	0
37	9/7–9/13	533	0	0	0	0	0	0	0	0	0	0	0	7	6	0	0
38	9/14–9/20	349	0	0	0	0	0	0	0	0	0	0	0	0	5	4	0
39	9/21–9/27	378	0	0	0	0	0	0	0	0	0	0	0	0	0	1	11
40	9/28–10/4	354	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	10/5–10/10	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		2,775	0	0	3	6	6	12	8	3	1	17	17	11	5	11	8
	Marked percent		0.0%	0.0%	1.9%	1.8%	2.7%	1.8%	1.1%	1.3%	0.1%	1.6%	1.6%	1.9%	0 .8%	2.3%	2.3%
	Number of fish examined		9	41	155	335	224	659	707	232	835	1,034	1,088	589	596	485	343

APPENDIX F

Appendix F 1.–Summary of population parameters for the Taku River coho salmon run, 1987–2003.

Calendar year	Escapement	Canadian harvest	Inriver run	Est. U.S. marine harv.	Est. total run	Total harv. rate (%)	U.S. marine harv. rate (%)	Smolt in year (t-1)	Marine survival (%)
COHO SALMON ABOVE CANYON ISLAND									
1987	55,457	6,519	61,976						
1988	39,450	3,643	43,093						
1989	56,808	4,033	60,841						
1990	72,196	3,685	75,881						
1991	127,484	5,439	132,923						
1992	84,853	5,541	90,394	96,283	186,677	54.5	51.6	743,000	
1993	109,457	4,634	114,091	97,758	211,849	48.3	46.1	1,510,000	14.0
1994	96,343	14,693	111,036	228,607	339,643	71.6	67.3	1,476,000	23.0
1995	55,710	13,738	69,448	111,571	181,019	69.2	61.6	1,525,000	11.9
1996	44,635	5,052	49,687	44,529	94,216	52.6	47.3	986,489	9.6
1997	32,345	2,690	35,035	15,825	50,860	36.4	31.1	759,763	6.7
1998	61,382	5,090	66,472	53,368	119,840	48.8	44.5	853,662	14.0
1999	60,768	5,575	66,343	50,789	117,132	48.1	43.4	1,184,195	9.9
2000	64,700	5,447	70,147	38,971	109,118	40.7	35.7	1,728,240	6.3
2001	104,394	3,099	107,493	55,264	162,756	35.9	34.0	1,846,629	8.8
2002	219,360	3,802	223,162	80,046	303,208	27.7	26.4	2,718,816	11.2
2003	183,038	3,717	186,755	78,277	265,032	30.9	29.5	2,988,349	8.9
Standard errors									
1992			19,033	24,005	30,635		8.20	247,000	
1993			17,503	19,256	26,022		6.20	418,051	4.2
1994			6,529	36,734	37,310		3.80	368,411	6.3
1995			3,242	12,186	12,610		2.80	339,822	2.8
1996			3,650	6,494	7,449		4.10	214,152	2.2
1997			4,120	2,691	4,921		4.40	154,051	1.5
1998			5,394	7,435	9,186		4.00	147,260	2.6
1999			7,049	6,097	9,320		3.90	207,576	1.9
2000			5,667	3,326	6,571		2.59	255,147	1.0
2001			9,495	4,828	10,652		2.75	276,385	1.4
2002			28,648	6,389	29,352		2.92	363,071	1.8
2003			17,724	10,271	20,485		3.32	1,008,886	3.1
COHO SALMON FROM ENTIRE TAKU RIVER DRAINAGE									
1987	72,937	6,519	79,456						
1988	51,604	3,643	55,247						
1989	73,968	4,033	78,001						
1990	93,598	3,685	97,283						
1991	164,975	5,439	170,414						
1992	110,349	5,541	115,890	123,440	239,330	53.9	51.6	952,774	
1993	141,637	4,634	146,271	125,331	271,601	47.9	46.1	1,935,938	140
1994	127,661	14,693	142,354	293,086	435,440	70.7	67.3	1,892,147	230
1995	75,298	13,738	89,036	143,040	232,076	67.6	61.6	1,955,551	11.9
1996	58,649	5,052	63,701	57,088	120,790	51.4	47.3	1,264,729	9.6
1997	42,227	2,690	44,917	20,288	65,205	35.2	31.1	974,055	6.7
1998	80,131	5,090	85,221	68,421	153,641	47.8	44.5	1,094,438	14.0
1999	79,480	5,575	85,055	65,114	150,169	47.1	43.4	1,518,199	9.9
2000	84,485	5,447	89,932	49,962	139,894	39.6	35.7	2,215,692	6.3
2001	134,712	3,099	137,811	70,851	208,662	35.4	34.0	2,367,473	8.8
2002	282,303	3,802	286,105	102,623	388,728	27.4	26.4	3,485,662	11.2
2003	235,713	3,717	239,430	100,355	339,785	30.6	29.5	3,831,217	8.9
Standard errors									
1992			24,401	30,776	39,276			374,000	
1993			22,440	24,687	33,362			535,963	
1994			8,371	47,095	47,833			472,321	
1995			4,156	15,623	16,167			435,669	
1996			4,679	8,326	9,550			274,554	
1997			5,282	3,450	6,309			197,501	
1998			6,915	9,532	11,777			188,795	
1999			9,037	7,817	11,949			266,123	
2000			7,265	4,265	8,424			327,112	
2001			12,173	6,189	13,656			354,340	
2002			36,728	8,191	37,631			465,476	
2003			22,723	13,167	26,263			1,293,444	

Appendix F2.–Weekly and season estimates of inriver run, harvest and escapement of coho salmon above Canyon Island in the Taku River, 1987–2003.

Recovery week	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
27										45		11	7	19	29	60	50
28										464	5	55	44	128	197	409	339
29									1,460	853	106	337	83	514	787	1,634	1,354
30		548	1,425	1,479	2,517	3,298	641	3,348	2,628	1,525	134	1,968	275	1,492	2,286	4,746	3,931
31	3,841	1,060	878	2,186	2,209	1,741	2,386	5,026	4,582	2,159	843	2,932	1,127	2,155	3,303	6,857	5,680
32	2,529	1,526	2,693	1,051	4,157	10,040	3,186	3,988	2,100	6,216	738	5,226	1,221	3,109	4,764	9,890	8,193
33	3,623	1,257	300	1,910	4,867	4,875	4,550	4,308	5,299	5,337	1,265	4,116	2,327	3,064	4,696	9,749	8,076
34	4,721	7,412	9,598	11,095	1,740	500	12,759	9,827	8,764	6,589	1,542	4,428	3,148	5,715	8,758	18,182	15,062
35	3,503	8,366	8,385	17,739	27,296	2,170	3,424	15,029	10,565	7,861	2,589	6,007	1,984	7,997	12,255	25,443	21,077
36	4,061	5,583	14,038	17,855	5,924	13,332	19,703	7,904	10,951	7,362	3,028	5,508	4,725	8,349	12,795	26,563	22,005
37	3,843	11,371	10,181	12,563	17,411	14,601	15,427	34,400	7,118	2,900	10,211	5,758	10,403	10,870	16,657	34,580	28,647
38	6,009	1,446	3,351	9,596	4,708			13,583	5,889	1,312	10,236	3,265	8,225	5,561	8,523	17,693	14,657
39	11,440	4,524	8,031	407	9,100			787	2,109	1,549	1,462	4,384	3,582	3,896	5,971	12,396	10,269
40			1,960		33,009			443	273		2,875	5,293	10,654	7,045	10,795	22,412	18,566
41					11,371								11,245	10,230	15,677	32,547	26,962
42					4,410												
43					4,204												
Inriver run	43,570	43,093	60,841	75,881	132,923	50,557	62,076	98,643	61,738	44,172	35,035	49,290	59,052	70,146	107,493	223,162	186,755
SE	3,096	7,162	11,174	21,813	19,051	10,645	9,523	5,800	2,882	3,405	4,160	4,485	6,650	5,667	9,495	28,648	17,724
Inriver harvest	6,519	3,643	4,033	3,685	5,439	5,541	4,634	14,693	13,738	5,052	2,690	5,090	5,575	5,447	3,099	3,802	3,717
Expanded inriver run[a]	61,976	43,093	60,841	75,881	132,923	90,394	114,091	111,036	69,448	49,687	35,035	66,472	66,343	70,146	107,493	223,162	186,755
Final escapement	55,457	39,450	56,808	72,196	127,484	84,901	109,457	96,343	55,710	44,635	32,345	61,382	60,768	64,699	104,394	219,360	183,038
SE	4,053	7,162	11,174	21,813	19,051	19,033	17,503	6,529	3,242	3,650	4,120	5,394	7,049	5,667	9,495	28,648	17,724
Estimated U.S. harvest						96,283	97,758	228,607	111,571	44,529	15,825	53,368	50,789	39,002	55,286	80,114	78,334
SE						24,005	19,256	36,734	12,186	6,494	2,691	7,435	6,097	3,326	4,828	6,389	10,271
Estimated total run						186,677	211,849	339,643	181,019	94,216	50,860	119,840	117,132	109,148	162,779	303,276	265,089
SE						30,635	26,022	37,310	12,610	7,449	4,921	9,186	9,320	6,571	10,652	29,352	20,485

[a] Inriver run expansions may be revised pending further studies.

Appendix F3.–Estimated age compositions of coho salmon sampled in Canyon Island fishwheels and gillnets, 1983–2003.

		Percent by age class					
Year	**Sample size**	**1.0**	**1.1**	**2.0**	**2.1**	**3.1**	**4.0**
1983	477		56.0		44.2		
1984	630	0.3	43.2	0.5	56.2	6.0	
1985	825		44.5	0.2	51.4	4.0	
1986	475	0.6	44.0	0.4	52.8	2.7	
1987	1,700	0.1	32.4	0.3	65.1	2.4	0.1
1988	1,338	1.1	32.3	0.8	59.0	6.8	
1989	1,826		49.3	0.1	48.5	2.1	
1990	1,463		29.3		67.9	2.9	0.1
1991	523	0.4	31.4		67.7	1.3	
1992	534	0.4	51.5		48.1		
1993	498		39.4	0.6	60.0	0.8	
1994	539		44.8	0.6	55.0	0.4	
1995	582		52.6		47.8		
1996	599		56.3		43.2	0.5	
1997	481		64.7		35.3		
1998	610		67.7		32.3		
1999	617		79.3		20.7		
2000	648		79.5		20.5		
2001	771		81.3		18.7		
2002	1,112		84.8		15.2		
2003	905		90.2		9.8		
Average (83–03)	639	0.05	61.2	0.07	38.54	0.14	0.01
SD (83–03)		0.12	14.71	0.14	14.47	0.20	0.04
CV (83–03)		262%	24%	194%	38%	144%	458%

		Average length by age class in MEF (mm)					
Year	**Sample size**	**1.0**	**1.1**	**2.0**	**2.1**	**3.1**	**Total**
1983	476		589		610		596
1984	620		566	320	608	565	582
1985	765		584		616	625	599
1986	455	320	577		598	645	587
1987	633	330	568	310	592	596	582
1988	607		595		612	655	604
1989	621		581		601	623	589
1990	639		569		623		600
1991	592		607		623		614
1992	524	303	574	325	606		587
1993	567		578	270	592	680	584
1994	553		592	333	611		599
1995	597		584		588		586
1996	592		575		602	588	588
1997	478		575		603		585
1998	609		601		616		606
1999	617		569		594		574
2000	648		575		603		622
2001	771		601		616		595
2002	1,112		569		594		596

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Appendix F3.–Page 2 of 2.

		Average length by age class in MEF (mm)					
Year	**Sample size**	**1.0**	**1.1**	**2.0**	**2.1**	**3.1**	**Total**
2003	905		614		635		616
Average (83–03)	637	318	583	312	607	622	595
SD (83–03)		14	14	25	12	38	12
CV (83–03)		4%	2%	8%	2%	6%	2%

APPENDIX G

Appendix G1.–Computer data files on Taku River coho salmon, 1999-2003.

File name	Description
SPAS.exe	SPAS program for estimating adult abundance
BootVar.bas	Quickbasic program for bootstrapping variance of adult abundance estimate
KS2.exe	Program for running Kolmogorov-Smirnov Two Sample Test for similarity in smolt length distributions
1OVERTC.exe	Program for estimating Var (1/θ)
99_Smolt Data.xls	Excel file containing 1999 smolt data
99_Smolt_KS.prn	KS2.exe input file using 1999 smolt length data
00_Taku_43.xls	Excel file containing 2000 adult data
00_Taku BOOT_43.dat	BootVar.bas input file for variance of 2000 adult abundance
00_Taku BOOT_43.out	BootVar.bas output file for variance of 2000 adult abundance
00_Smolt Data.xls	Excel file containing 2000 smolt data
00_Smolt_KS.prn	KS2.exe input file using 2000 smolt length data
00_Taku SPAS_43.dat	SPAS.exe input file using 2000 adult data
01_Taku_43.xls	Excel file containing 2001 adult data
01_Taku BOOT_43.dat	BootVar.bas input file for variance of 2001 adult abundance
01_Taku BOOT_43.out	BootVar.bas output file for variance of 2001 adult abundance
01_Smolt Data.xls	Excel file containing 2001 smolt data
01_Smolt_KS.prn	KS2.exe input file using 2001 smolt length data
01_Taku SPAS_43.dat	SPAS.exe input file using 2001 adult data
02_Taku_43.xls	Excel file containing 2002 adult data
02_Smolt Data.xls	Excel file containing 2002 smolt data
02_Smolt_KS.prn	KS2.exe input file using 2002 smolt length data
02_Taku SPAS_43.dat	SPAS.exe input file using 2002 adult data
02_Taku SPAS 2x2_43.dat	SPAS.exe input file using 2002 adult data and a 2x2 matrix
03_Taku_43.xls	Excel file containing 2003 adult data
03_Taku BOOT_43.dat	BootVar.bas input file for variance of 2003 adult abundance
03_Taku BOOT_43.out	BootVar.bas output file for variance of 2003 adult abundance
03_Taku SPAS_43.dat	SPAS.exe input file using 2003 adult data