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Coho Salmon Smolt Production, Adult Harvest, and Escapement from Jordan and Duck Creeks, Southeast Alaska, 2002–2003

by

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and

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May 2007

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

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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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ABSTRACT

The purpose of this study was to determine smolt production and estimate the marine survival, exploitation rates, and harvest of Jordan and Duck Creek coho salmon *Oncorhynchus kisutch*. The total number of Jordan Creek coho salmon smolts, all sizes, released alive below the weir (both tagged and untagged) in spring 2002 was 8,171. At Duck Creek, 332 coho salmon smolts ≥ 55 mm were similarly marked, tagged, and released. At Jordan Creek, age-1. smolts averaged 79 mm FL (SE = 0.68) and 5.3 g (SE = 0.19) and predominated the sample (83.5%). Age-2. smolts averaged 117 mm FL (SE = 3.18) and 15.5 g (SE = 1.27). At Duck Creek, captured age-2. smolts averaged 126.7 mm FL (SD = 12.96) and 18.8 g (SD = 5.8) and predominated the nonrandom sample (89.5%). Captured age-1. smolts averaged 107.4 mm FL (SD = 5.55) and 11.9 g (SD = 1.65).

In 2003, 106 coded wire tags (CWT) with Jordan Creek tag codes were randomly recovered in various sport and commercial fisheries. An estimated 348 (SE = 31) Jordan Creek coho salmon were harvested in the recreational and commercial fisheries for an exploitation rate of 54% (SE = 2.2%). The escapement into Jordan Creek was 302 (SE = 6) adult coho salmon. Total run size was estimated to be 650 (SE = 32) adult coho salmon and marine survival was 8% (SE = 0.39%) for smolts tagged in 2002. Ten CWTs with Duck Creek codes were also randomly recovered in various marine fisheries, but harvest, exploitation, and survival rates could not be estimated.

Key words: coded wire tag, production, abundance, harvest, contribution, survival, exploitation, recreational fishery, troll fishery, drift gillnet fishery, seine fishery, age composition, size composition, sex composition, length-at-age, coho salmon, *Oncorhynchus kisutch*, cutthroat trout, *Oncorhynchus clarki*, Dolly Varden, *Salvelinus malma*, Jordan Creek, Duck Creek, Juneau, Southeast Alaska.

INTRODUCTION

Duck and Jordan creeks are two anadromous fish streams that have been impacted by extensive urban development within Juneau's Mendenhall Valley. Of the two streams, Duck Creek has received greater impact because of its location within the center of Juneau's largest residential area. Anecdotal information suggests that historical counts of adult coho salmon *Oncorhynchus kisutch* in Duck Creek were substantially larger than recent escapements. Studies on spawning success in Duck Creek suggest minimal egg to fry survival because of low dissolved oxygen and heavy silt deposition (Gerke and Koski 1998; Lorenz and Beilharz 2000).

Although Jordan Creek is not a tributary of the Mendenhall River, it empties into an estuary that is adjacent to the Mendenhall River and other nearby coho salmon-producing drainages. Portions of upper Jordan Creek are somewhat less exposed to development, as it is located on the far eastern edge of the valley. However, stream gradients in this area are low and water velocities are insufficient to flush heavy silt deposits from construction activities and erosion. Much of the lower half of the creek has been channelized where it passes through the center of a small business district and through culverts beneath the Juneau International Airport. In 1998, Jordan Creek was listed as a "Tier 1" impaired water body under Section 303(d) of the Clean Water Act (State of Alaska Department of Environmental Conservation 2004), which indicates voluntary management measures. Jordan Creek remained on the 2003 list for sub-standard sediment, residue, and dissolved gas levels. Between 1995 and 2002, observer counts of spawning coho salmon in Jordan Creek averaged 59 fish compared to an average of 295 fish during the prior fourteen years (Brookover et al. *In prep*). In spite of these findings, recommendations opposing restoration of fish habitat in Jordan Creek and supporting relocation of the creek away from airport property have been suggested (Wilmoth et al. 2001). Also, additional rerouting of the creek on airport property could occur if a proposal to widen and extend the runway and taxiway is adopted.

A surprisingly large number of smolt (26,000 in the spring of 2001) were found emigrating from Jordan Creek despite very poor parent year escapements (peak foot survey counts of 47 and

30 for 1999 and 2000 escapement years, respectively).

This report summarizes counts and biological characteristics of coho salmon smolts emigrating from Jordan and Duck Creeks in 2002 and the estimated harvest in 2003. Project objectives were to:

1. Count all coho salmon smolt leaving Duck and Jordan Creeks in 2002.
2. Estimate the marine harvest of coho salmon from Jordan Creek in 2003.
3. Estimate the marine harvest of coho salmon from Duck Creek in 2003.
4. Estimate the age composition of coho salmon smolt ≥ 55 mm FL emigrating from Duck and Jordan Creeks in 2002.
5. Estimate the mean length at age of coho salmon smolt ≥ 55 mm FL emigrating from Duck and Jordan Creeks in 2002.
6. Estimate the mean weight at age of coho salmon smolt ≥ 55 mm FL emigrating from Duck and Jordan Creeks in 2002.
7. Count all coho salmon adults entering Jordan Creek in 2003 and estimate the age and sex composition.

STUDY SITE

Duck (anadromous stream no. 111-50-10500-2002) and Jordan creeks (anadromous stream no. 111-50-10620) are mainland watersheds located approximately 11 km north of Juneau, Alaska (58°21′30.510 N, 134°34′23.837 W) on the Juneau road system (Figure 1). Both creeks are located in the Mendenhall Valley and drain into Gastineau Channel via the Mendenhall Wetlands State Game Wildlife Refuge area.

Additional locations relative to the study on Duck and Jordan Creek are the Macaulay Salmon Hatchery and Auke Creek. Macaulay Salmon Hatchery is located within a few shoreline miles of the mouth of Jordan Creek and it is assumed that Jordan Creek smolts experience similar environmental conditions and exhibit the same emigration patterns as Macaulay Salmon Hatchery fish. Auke Creek (anadromous stream no. 111-50-10420) is part of a watershed located on the Juneau road system approximately 3 km north of Jordan Creek and 19 km north of downtown Juneau. The mouth of Auke Creek, which drains Auke Lake, is located 400 m downstream from the lake at Auke Bay. The lake shoreline is bordered by forested terrain, and the shoreline zone consists of areas dominated by *Equisetum spp.*, *Nuphar spp.*, and large woody debris. The lake and Auke Creek have very dark, tannic waters. Coho smolts originating from this system are fairly large in size and have high marine survivals and jacking rates. Because of its location and long history (27 years) of coho research, Auke Creek has been used as an index creek by the Alaska Department of Fish and Game (ADF&G) and for comparisons to other local streams such as Duck and Jordan creeks.

METHODS

SMOLT CAPTURE, CODED-WIRE-TAGGING, AND SAMPLING

A weir was operated at Jordan Creek from April 21 through June 28, 2002 to intercept all emigrant salmonids. An inclined trap, consisting of perforated metal panels and a live box for capturing emigrant fish, was constructed in Jordan Creek approximately 1.5 km upstream of the mouth above tidal influence. The weir was designed to spill water through a trough with vertical aluminum panels that had 3-mm perforations. Fish and water exited the trough through a flex hose and diverted to a holding box downstream from the weir. Fish were sorted by species, counted, sampled, tagged and released each day. During this time, fish could not move upstream through the weir. Immigrants caught in an upstream trap were processed and relocated above the weir.

In Duck Creek, upstream and downstream traps were installed side-by-side in an existing concrete structure located 0.7 km upstream from the mouth of the creek. However, the weir was non-operational for most of the emigration because of low water conditions, which prevented consistent flow past the weir structure. Consequently, fyke nets and minnow traps were deployed in watered areas upstream of the weir site.

All coho salmon smolts from Duck and Jordan creeks were injected in the snout with a full-length

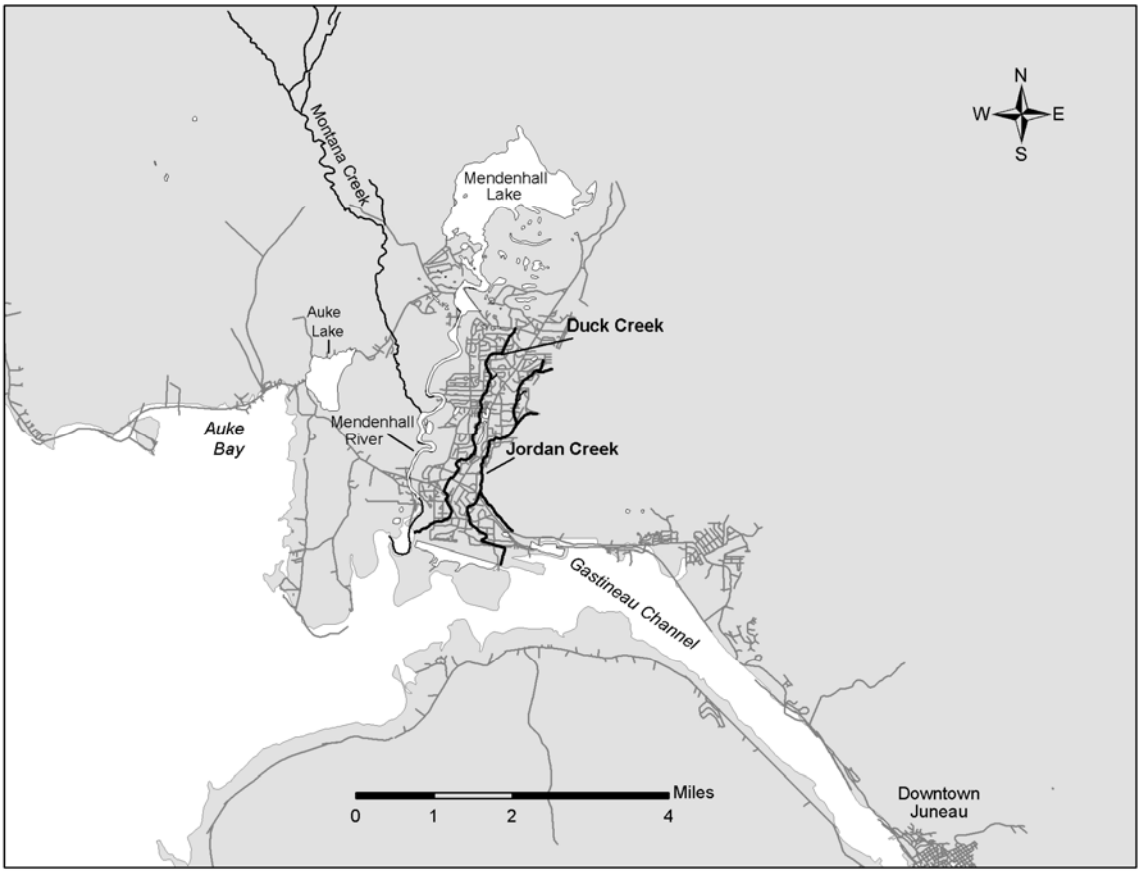

Figure 1.–Area map of Mendenhall Valley showing the location of Duck and Jordan Creeks.

(1 mm) coded wire tag (CWT) and marked with an adipose fin clip. After tagging, a systematic sample of coho salmon smolts was collected, anesthetized with MS-222, sampled for scales, weighed, and measured for length (AWL).

All tagged fish were placed in a holding pen and held for 24 hours to evaluate tag retention and tagging or handling mortality. A random sample of at least 50 fish from the previous day's catch was examined for tag retention. If less than 98% possessed a CWT, the entire sample was rechecked for the presence of a tag, and fish missing tags were retagged. Once tested for tag loss, fish were released downstream of the weir. A summary of the number of fish tagged, number of tagging-related mortalities, and the number of fish that shed their tag was submitted to the ADF&G, Division of Commercial Fisheries (CFD) Mark, Age and Tag Laboratory (Tag Lab) in Juneau at the completion of the field season.

AGE COMPOSITION, AND MEAN LENGTH AND WEIGHT AT AGE OF COHO SMOLT IN 2002

Proportions by age and their variances of the coho smolts that emigrated in 2002 were estimated by:

$$\hat{p}_a = \frac{n_a}{n} \tag{1}$$

$$\hat{\text{var}}\left[\hat{p}_a\right] = \frac{\hat{p}_a\left(1-\hat{p}_a\right)}{n-1} \tag{2}$$

where n is the number of smolts successfully aged and n_a is the subset of the total smolts determined to be age a.

Estimates of mean length and weight at age and their variances were calculated with standard sample summary statistics (Cochran 1977).

ESCAPEMENT

In 2003, an aluminum bipod weir was installed upstream of tidal influence in Jordan Creek to count the escapement of *adult* coho salmon. The weir was operated from August 18 through October 30, and it was fish tight to coho salmon >350 mm MEF throughout the season. In Jordan Creek, coho salmon jacks, or ocean age-0 fish (Groot and Margolis 1991), are typically <350 mm MEF. Therefore the population of inference for this study was the adult population, or ocean age-1 fish. However, jack coho salmon were occasionally captured.

All immigrant coho salmon captured at the weir were counted, classified as adults or jacks, inspected for missing adipose fins, and if not sampled for age, sex, and length (ASL), immediately released into the stream above the weir. Fish that were missing adipose fins were scanned for the absence or presence of a CWT, and all fish were examined for other tags or marks. All other salmon species captured at the weir were counted and released.

A systematic sample of the coho salmon immigrants were sampled for ASL and marked with red dye on the *left ventral fin*; placing dye marks on sampled fish allowed for a mark-recapture experiment in the event of a weir failure. Sampling for ASL included collecting scales, measuring MEF length, and visually determining sex (based on secondary maturation characteristics). Proportions by age and their variances were estimated with equations 1 and 2, as were proportions by sex by redefining variable *a*.

INSTREAM ADULT CARCASS SAMPLING

All adult coho salmon carcasses seen at the Jordan Creek weir or in the stream above the weir during foot surveys were sampled for CWTs (if missing an adipose fin) or otoliths (if not adipose-clipped) to determine if any were strays from other locations. Cinch straps were applied to each head sampled for CWTs and ASL data were recorded for each carcass. These samples were taken to the Tag Lab in Juneau at the completion of the field season. Otoliths collected from carcasses were stored in a labeled coin envelope and given to Macaulay Salmon Hatchery for thermal marking analysis at the end of the season. Adult carcasses sampled below the weir were reported separately. Planned escapement work (weir and stream survey) could not be completed for Duck Creek in 2003. Information that could be collected and the problems encountered are discussed in the Results section.

Carcass sampling, for either CWTs or otoliths, was used to estimate the amount of straying into Jordan Creek. The proportion of straying seen was determined in the marked and unmarked samples separately and used to estimate the amount of total straying into the system by applying those proportions to corresponding components of the total population.

HARVEST

The harvest of coho salmon in 2003 was estimated using samples collected in the creek and from Southeast Alaska commercial and recreational fisheries according to the methods in Bernard and Clark (1996). Commercial catch data were summarized and stratified differently for various fisheries. Statistics for the troll fishery were stratified by troll fishing period and by fishery quadrant, the seine and gillnet fisheries by statistical week and fishing district, and the recreational fisheries by port/fishery and fortnight (or biweek). In most cases, CWTs of interest were recovered in only a few of the sport fish sampling strata (e.g., low/high use harbors, morning/evening periods, derby strata, charter/lodge contributions), which defined the fishery-biweek. Assuming the harvests of fish with CWTs of interest were independent of sampling strata within fishery-biweeks, harvests and sampling information were totaled over the fishery-biweek to estimate contributions. This procedure allowed comparisons between published biweekly harvests (*H*) and the CWT data, and minimized biases that could have resulted if estimates were derived from data obtained in minor strata where sampling rates were unusual.

RUN SIZE, EXPLOITATION RATE, AND MARINE SURVIVAL

Estimated total run size $\hat{N}_R$ (harvest plus escapement of coho salmon returning to Jordan

Creek above the weir in 2003) was the sum of the estimated harvest $\hat{T}$ and escapement $\hat{N}_e$:

$$\hat{N}_R = \hat{T} + \hat{N}_e \quad (3)$$

$$var\left[\hat{N}_R\right] = var\left[\hat{T}\right] + var\left[\hat{N}_e\right] \quad (4)$$

Estimates of harvest $\hat{r}_i$ were calculated for each stratum, then summed across strata and across fisheries to obtain the estimate of the total harvest $\hat{T}$:

$$\hat{T} = \sum_i \hat{r}_i \quad (5)$$

$$var\left[\hat{T}\right] = \sum_i var\left[\hat{r}_i\right] \quad (6)$$

An estimate of escapement $\hat{N}_e$ was calculated using the carcass samples to determine and estimate the presence of hatchery fish, such that:

$$\hat{N}_e = \hat{N}_m + \hat{N}_u \quad (7)$$

where $\hat{N}_m$ is the estimated number of adipose-clipped fish that can be attributed to Jordan Creek, and $\hat{N}_u$ is the number of non-otolith marked fish that are attributed to Jordan Creek. Variance of $\hat{N}_e$ was estimated by:

$$var\left[\hat{N}_e\right] = var\left[\hat{N}_m\right] + var\left[\hat{N}_u\right] \quad (8)$$

where $var\left[\hat{N}_m\right]$ and $var\left[\hat{N}_u\right]$ are the binomial sampling variances obtained from carcass samples. Because the samples were non-random, it is assumed that the variance is a minimum variance. Likewise, there is no way to describe the possible bias from sampling carcasses.

The estimated fishery exploitation rate $\hat{E}$ was calculated:

$$\hat{E} = \frac{\hat{T}}{\hat{N}_R} \quad (9)$$

The delta method (Seber 1982) was used to approximate the variance of $\hat{E}$:

$$var[\hat{E}] \approx \frac{N_e^2}{\hat{N}_R^4} var[\hat{T}] \quad (10)$$

Smolt- to-adult survival was estimated by:

$$\hat{S} = \frac{\hat{N}_R}{N_S} \quad (11)$$

where N_S is the total smolt production: The variance of $\hat{S}$ is:

$$\text{var}\left[\hat{S}\right] = \frac{\text{var}\left[\hat{N}_R\right]}{N_S^2} \quad (12)$$

OTHER SPECIES

All migrant Dolly Varden *Salvelinus malma* and cutthroat trout *O. clarki* captured in Jordan Creek were examined for external marks. Untagged, emigrant cutthroat trout were injected with a passive integrated transponder (PIT) tag, adipose clipped, and released. All cutthroat trout mortalities were sampled for otoliths, length, scales, and sex; PIT tags, if present, were recovered. All emigrant Dolly Varden were measured to the nearest 5 mm FL, and cutthroat trout, to the nearest 1 mm FL.

RESULTS

SMOLT TAGGING, AGE, LENGTH, WEIGHT AND ABUNDANCE

Jordan Creek: A weir was installed on Jordan Creek mid-April 2002, and the first smolt was caught and sampled on April 21. Prior to May 3, fish ≥70 mm were tagged; from May 3 on, smolt ≥55 mm were tagged because of concerns about missing smaller smolts. All fish tagged during 2002 were used in the harvest analyses. The total number of fish captured prior to May 3 was 285 smolts. A total of 229 coho salmon smolts were tagged and released live, 20 fish were pre-tag mortalities, 1 fish was a post tag mortality, and 35 fish were released live untagged. A total of 8,027 coho salmon smolt ≥55 mm were captured from

May 3 through June 28. There were 65 pre-tag mortalities, 55 post tag mortalities, and 276 fish that were released without tags, leaving a tagged release of 7,631 smolts (Table 1). The total number of smolts, all sizes, released alive below the weir (both tagged and untagged) was 8,171. The midpoint of the emigration occurred on May 21, at which point 52% of the total smolts had been tagged (Figures 2 and 3). There was a bimodal emigration pattern with peaks around mid-May and early June. By June 7, approximately 95% of the cumulative total had been tagged (Figure 3). Smolt length distribution after May 3 was skewed to the right (Figure 4). The estimated average size for all smolts was 85 mm FL (SE = 1.15) and 6.9 g (SE = 0.34). Age-1. smolts averaged 79 mm FL (SE = 0.68) and 5.3 g (SE = 0.19) and predominated the sample (83.5% or 6,565). Age-2. coho salmon smolt averaged 117.4 mm FL (SE = 3.18) and 15.5 g (SE = 1.27). Unmarked smolts were tagged in 2002 and smolts captured with an adipose clip were killed at the weir to determine whether they were previously tagged.

Duck Creek: Low or no water precluded effective use of fyke nets, so minnow traps were used to capture smolts emigrating out of Duck Creek. Because of this nonrandom sampling method, it is inappropriate to extend any inferences to the population as a whole. Therefore, the following data are valid only for the captured smolts and standard deviations (not standard errors) are reported.

Coho salmon smolts were trapped from May 22 through June 10, 2002, and the majority was caught on June 5 (Figure 5). A total 489 coho salmon smolt ≥55 mm FL were captured. There were 145 pre-tag mortalities and 12 post tag mortalities, leaving a total of 332 smolts released with a tag (Table 2). Captured Duck Creek smolts were predominantly age-2. smolt (89.5% or 438 smolts), and there were no smolts <100 mm FL in the sample (Figure 6). Age-2. coho salmon smolt averaged 126.7 mm FL (SD = 12.96) and 18.8 g (SD = 5.8). Age-1. coho salmon smolt averaged 107.4 mm FL (SD = 5.55) and 11.9 g (SD = 1.65).

It was highly unlikely that the entire smolt emigration was tagged and impossible to determine the abundance of the actual smolt run from these partial counts. There was no carcass recovery or stream survey made on Duck Creek in 2003, therefore total smolt abundance for this system was not estimated. Because of problems obtaining escapement information, the ratio of marked to unmarked adult fish in the system and smolt abundance could not be estimated.

CODED WIRE TAG RECOVERY

Jordan Creek: In 2003, 106 CWTs were randomly recovered in sport and commercial fisheries from Jordan Creek coho salmon tagged in 2002 (Appendix A1). The largest number (57) of CWT recoveries was in the commercial troll fishery and the majority of these tags were recovered in the Northwest Quadrant inside Icy Strait; a small number were recovered in the Northeast Quadrant. Thirty-eight CWTs were recovered from the drift gillnet fishery, and all except one were recovered in District 115 (upper section of Lynn Canal). One tag was recovered in the purse seine fishery in District 112 (upper Chatham Strait near Hawk Inlet), and 10 tags were caught in the marine recreational fishery near Juneau (mostly District 111, Stephens Passage near Outer Point and the west side of Douglas Island). Jordan Creek tags were recovered in the commercial fishery as early as mid-July and as late as the beginning of October. Tag recovery data indicated that this cohort of coho salmon had one primary path of travel (Figure 7). Fish were caught along the outer coast as far south as Cape Ommaney at the lower end of Baranof Island early in the migration, and entered inside waters around the northern end of the Chichagof Island near Cross Sound. After entering inside waters, recoveries indicated movement through Icy Strait by the middle of the immigration, north into Lynn Canal, south into Stephens Passage, and finally Gastineau Channel (Tables 3 and 4).

Carcass sampling in Jordan Creek was conducted 2 to 3 days per week between September 3 and November 3. Three hundred adipose-clipped and 89 unmarked adult coho salmon were handled at the weir, and 85 fish were later sampled as carcasses in the stream for CWTs and otoliths. A total of 64 adipose-clipped carcasses were sampled for CWTs. Fifty-nine (92%) of the CWT samples were from Jordan Creek, one (2%) was

Table 1.–Daily counts of coho salmon smolts caught, tagged, and released with valid coded wire tags at the Jordan Creek smolt trap, 2002.

Date	Total smolts caught	Pre-tag mortalities	Total tagged [a]	Post-tag mortalities	Total released w/o tag	Tagged & released	Retention rate	Valid tags [b]
21-Apr	2	0	0	0	2	0	0	0
22-Apr	0	0	0	0	0	0	0	0
23-Apr	5	0	0	0	5	0	0	0
24-Apr	2	0	0	0	2	0	0	0
25-Apr	0	0	0	0	0	0	0	0
26-Apr	0	0	0	0	0	0	0	0
27-Apr	0	0	0	0	0	0	0	0
28-Apr	0	0	0	0	0	0	0	0
29-Apr	11	11	0	0	0	0	0	0
30-Apr	65	2	63	0	4	59	100%	59
1-May	120	0	120	0	0	120	100%	120
2-May	80	7	73	1	22	50	100%	50
3-May	100	0	100	0	0	100	100%	100
4-May	66	0	66	0	0	66	100%	66
5-May	90	3	87	0	0	87	100%	87
6-May	127	0	127	0	0	127	100%	127
7-May	119	0	119	0	0	119	100%	119
8-May	44	3	41	0	0	41	100%	41
9-May	196	0	196	0	1	195	100%	195
10-May	78	1	77	1	0	76	100%	76
11-May	268	2	266	0	0	266	100%	266
12-May	164	1	163	0	0	163	100%	163
13-May	220	1	219	1	0	218	100%	218
14-May	215	7	208	0	1	207	100%	207
15-May	260	1	259	0	0	259	100%	259
16-May	290	4	286	1	0	285	100%	285
17-May	364	1	363	1	1	361	100%	361
18-May	373	1	372	0	1	371	100%	371
19-May	226	1	225	1	0	224	100%	224
20-May	363	1	362	1	0	361	100%	361
21-May	470	7	463	3	1	459	100%	459
22-May	139	0	139	0	2	137	100%	137
23-May	157	0	157	1	1	155	100%	155
24-May	102	0	102	0	0	102	100%	102
25-May	186	0	186	0	0	186	100%	186
26-May	267	1	266	1	0	265	100%	265
27-May	185	1	184	0	0	184	100%	184
28-May	270	1	269	0	0	269	100%	269
29-May	198	1	197	0	0	197	100%	197
30-May	274	0	274	0	0	274	100%	274
31-May	124	0	124	0	0	124	100%	124
1-Jun	147	0	147	0	0	147	100%	147
2-Jun	306	0	306	0	0	306	100%	306
3-Jun	147	0	147	0	0	147	100%	147
4-Jun	241	1	240	13	0	227	100%	227
5-Jun	492	23	469	28	0	441	100%	441
6-Jun	34	0	34	0	0	34	100%	34

-continued-

Table 1.–Page 2 of 2.

Date	Total smolts caught	Pre-tag mortalities	Total tagged [a]	Post-tag mortalities	Total released w/o tag	Tagged & released	Retention rate	Valid tags [b]
7-Jun	37	0	37	0	0	37	100%	37
8-Jun	48	0	48	1	0	47	100%	47
9-Jun	54	1	53	1	0	52	100%	52
10-Jun	136	0	136	1	0	135	100%	135
11-Jun	97	0	97	0	0	97	100%	97
12-Jun	4	0	4	0	0	4	100%	4
13-Jun	9	0	9	0	0	9	100%	9
14-Jun	29	0	29	0	0	29	100%	29
15-Jun	12	2	10	0	0	10	100%	10
16-Jun	6	0	6	0	0	6	100%	6
17-Jun	11	0	11	0	0	11	100%	11
18-Jun	14	0	14	0	0	14	100%	14
19-Jun	25	0	25	0	25	0	0	0
20-Jun	17	0	17	0	17	0	0	0
21-Jun	42	0	42	0	42	0	0	0
22-Jun	43	0	43	0	43	0	0	0
23-Jun	8	0	8	0	8	0	0	0
24-Jun	8	0	8	0	8	0	0	0
25-Jun	1	0	1	0	1	0	0	0
26-Jun	34	0	34	0	34	0	0	0
27-Jun	61	0	61	0	61	0	0	0
28-Jun	29	0	29	0	29	0	0	0
Total	8,312	85	8,218	56	311	7,860	100%	7,860

[a] Prior to May 3, 2002, fish <70 mm were not CWT tagged. After May 3, fish ≥55 mm were tagged and released.

[b] Total valid tagged equals total tagged minus overnight mortalities times percent tag retention.

from Switzer Creek tagged by ADF&G in 2002, two (3%) were from Macaulay Salmon Hatchery, and two (3%) were from Sheep Creek experimental releases. The later releases were from a University of Alaska Fairbanks (UAF) experimental genetic study on outbreeding depression. Combining Macaulay Salmon Hatchery and the Sheep Creek experimental releases indicates that about 6% of the adipose-clipped fish in Jordan Creek were hatchery strays. Therefore, an estimated 23 of the 300 clipped fish were strays, having originated from a hatchery or location other than Jordan Creek, so that $\hat{N}_m$ = 276.6 (SE = 4.6). A total of 21 unclipped carcasses were sampled for otoliths. Fifteen (71%) of the otolith samples were from Macaulay Salmon Hatchery coho salmon smolt releases from brood year 2000, and 6 (29%) were unmarked otoliths, so $\hat{N}_u$ =25.4 (SE = 4.3). If it is assumed that 71% of all unclipped fish that were counted at the weir were Macaulay Salmon Hatchery strays, then 64 of these entered the system. Therefore, estimated total recovery of Macaulay Salmon Hatchery fish (both production and experimental, not including strays from other locations such as Switzer Creek) for adipose-clipped and unmarked fish was 82 (18 + 64 = 82) fish or 21.1% (82/389). One Jordan Creek tagged fish was also recovered in Haines in one of the tributaries of the Chilkat River system (Appendix A1).

Carcasses collected below the Jordan Creek weir: Forty-four coho salmon carcasses were sampled *below* the weir for CWTs and otoliths. These were kept separate from the other carcass collected *above* the weir because of the possibility that these fish may have gotten stranded on a high tide during their migration to other systems. Of

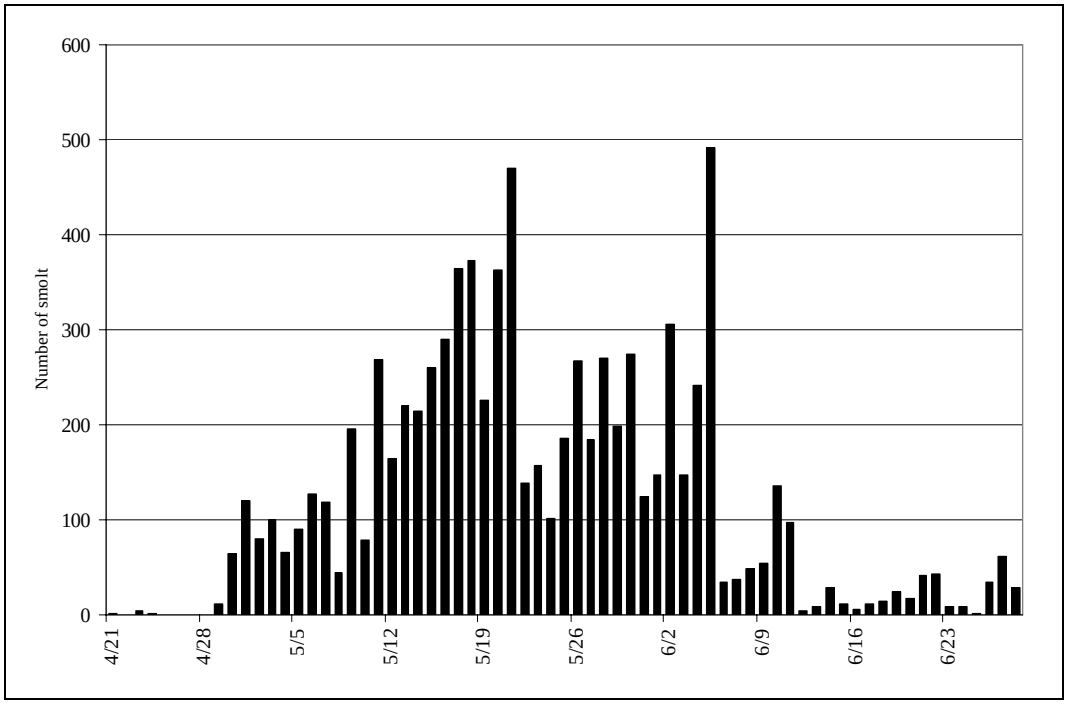

Figure 2.–Number of coho salmon smolts emigrating from Jordan Creek by emigration day, 2002.

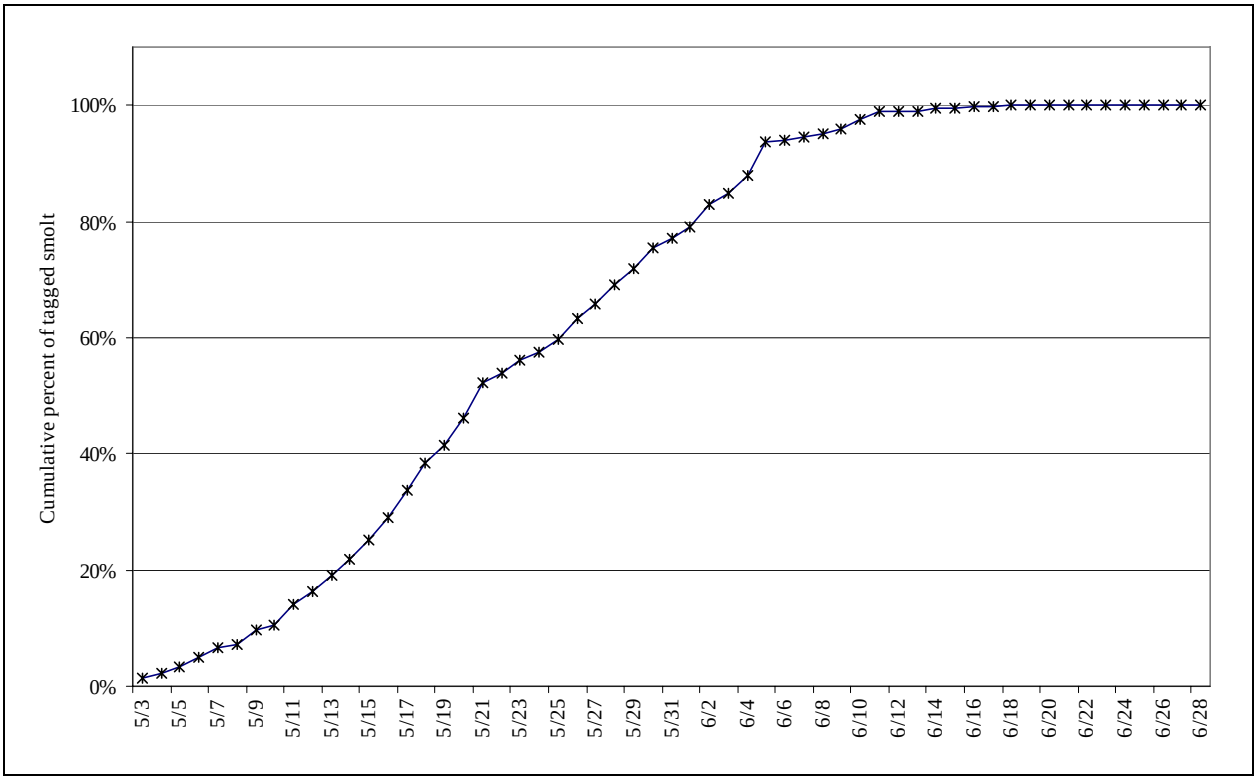

Figure 3.–Cumulative percent of coho salmon smolts tagged over the smolt emigration starting on May 3 at Jordan Creek, 2002.

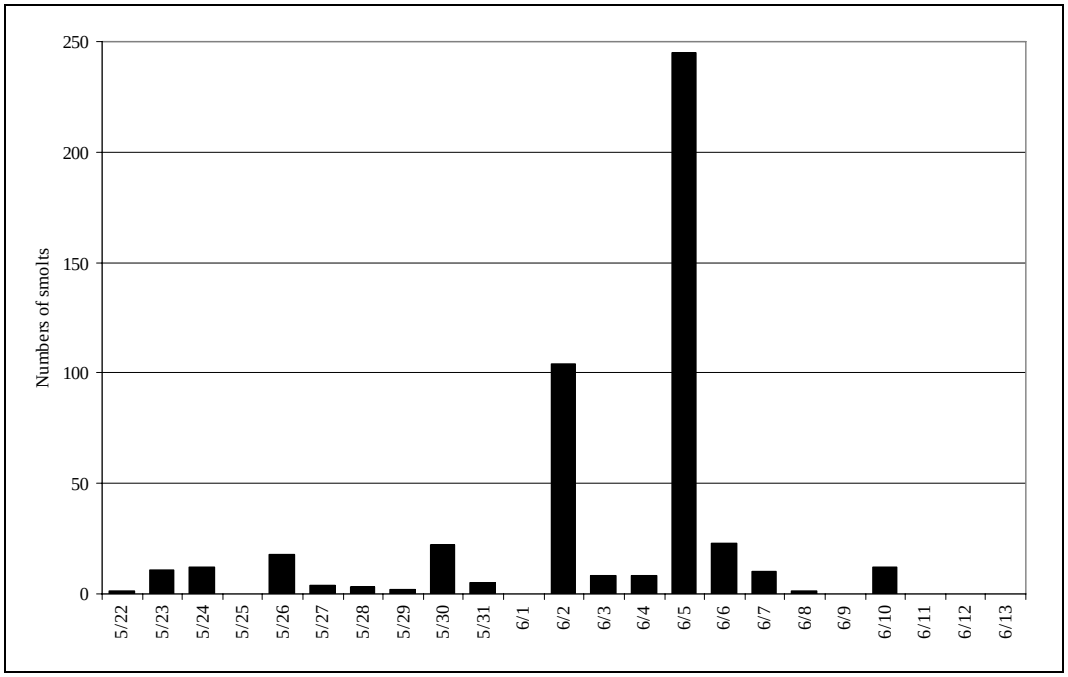

Figure 4.–Length frequency of coho salmon smolts ≥ 55 mm sampled at the Jordan Creek weir, 2002.

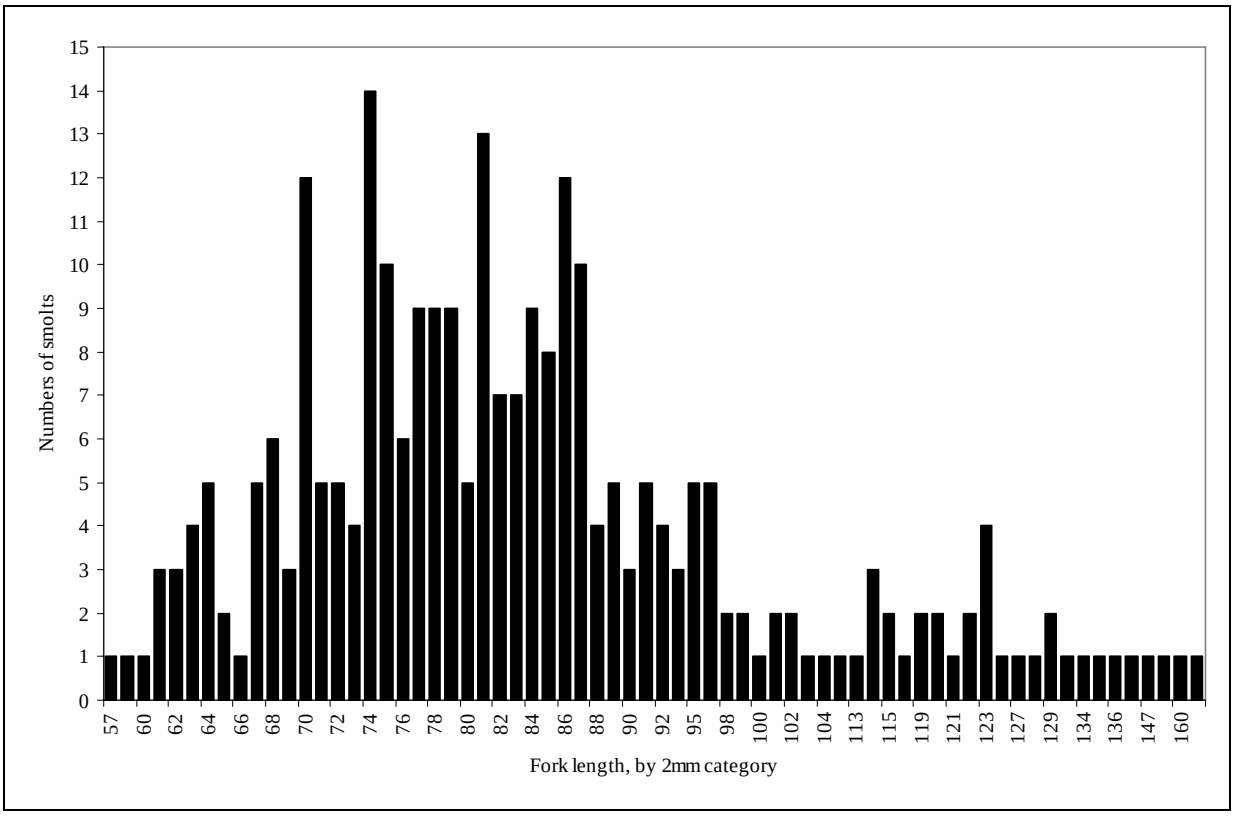

Figure 5.–Number of smolts trapped and tagged by day at Duck Creek, 2002.

Table 2.–Daily counts of coho salmon smolt caught, tagged, and released with valid coded wire tags at Duck Creek, 2002.

Date	Total smolts caught	Pre-tag mortalities	Total tagged	Post-tag mortalities	Total released w/o tag	Tagged & released	Retention rate	Valid tags [a]
22-May	1	0	1	0	0	1	100%	1
23-May	11	0	11	1	0	10	100%	10
24-May	12	0	12	0	0	12	100%	12
26-May	18	0	18	1	0	17	100%	17
27-May	4	0	4	0	0	4	100%	4
28-May	3	0	3	0	0	3	100%	3
29-May	2	0	2	0	0	2	100%	2
30-May	22	0	22	0	0	22	100%	22
31-May	5	0	5	0	0	5	100%	5
2-Jun	104	0	104	1	0	103	100%	103
3-Jun	8	0	8	0	0	8	100%	8
4-Jun	8	0	8	0	0	8	100%	8
5-Jun	245	145	100	9	0	91	100%	91
6-Jun	23	0	23	0	0	23	100%	23
7-Jun	10	0	10	0	0	10	100%	10
8-Jun	1	0	1	0	0	1	100%	1
9-Jun	0	0	0	0	0	0	100%	0
10-Jun	12	0	12	0	0	12	100%	12
11-Jun	0	0	0	0	0	0	100%	0
12-Jun	0	0	0	0	0	0	100%	0
13-Jun	0	0	0	0	0	0	100%	0
14-Jun	0	0	0	0	0	0	100%	0
15-Jun	0	0	0	0	0	0	100%	0
16-Jun	0	0	0	0	0	0	100%	0
17-Jun	0	0	0	0	0	0	100%	0
Total	489	145	344	12	0	332	100%	332

[a] Total valid tagged equals total tagged minus overnight mortalities time percent tag retention.

those sampled, 25 fish were adipose-clipped, seven were unmarked, and the remaining 12 were partial (heads only) carcasses. Twenty-five samples were taken for CWTs and seven were sampled for otoliths. Twenty-three (92%) of the CWT samples were from Jordan Creek, one (4%) was from Macaulay Salmon Hatchery, and one (4%) was from Sheep Creek experimental releases. All seven of the otolith samples collected below the weir were from Macaulay Salmon Hatchery.

Duck Creek: Ten tags bearing Duck Creek codes were randomly recovered in commercial and sport fisheries in 2003 (Appendix 2). Although there were only a few recoveries, some general comments can be made about the path these fish took through the fisheries. Most commercial CWT recoveries (5) were made in the commercial troll fishery in the Northwest Quadrant, mainly inside Icy Strait (Figure 7; Table 3). The rest of the commercial recoveries (4) occurred in District 115 troll fishery (upper Lynn Canal). No tags were recovered in the purse seine fishery, and one tag was caught in the marine recreational fishery. Duck Creek tags were recovered as early as the second week of August and as late as the end of September. Because low water conditions persisted in Duck Creek through late fall in 2003, fish did not move past the defunct smolt weir site in Duck Creek. Stream surveys later in the season found no fish in the creek as well. Because of low flow, incomplete emigration, and the inability to get a complete smolt count in spring 2002, it was important to estimate the ratio of marked to unmarked fish in the 2003 escapement for estimation of smolt abundance. Failing that, smolt abundance was not estimated.

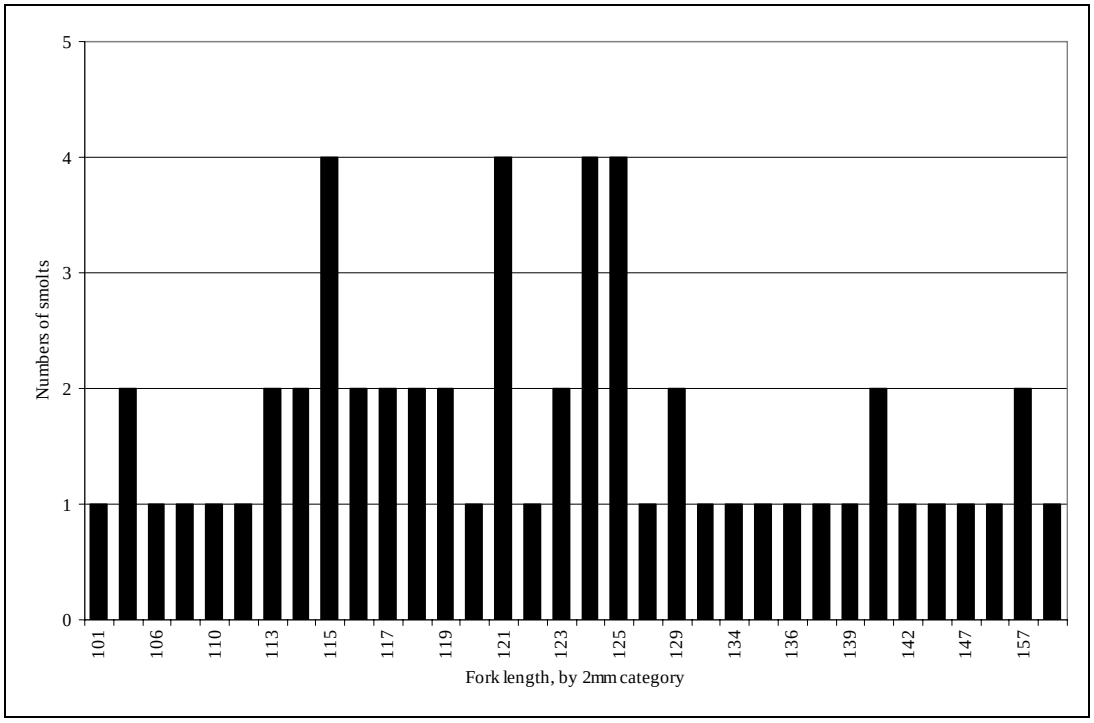

Figure 6.–Length frequency of coho salmon smolts captured in Duck Creek, 2002.

AGE COMPOSITION OF ADULT RETURNS

Jordan Creek: Adult returns were sampled for length, age, and sex at the Jordan Creek weir in 2003. A total of 180 scale samples were collected and successfully aged from marked adult coho salmon and two scale samples were collected from returning coho salmon jacks. Of the 180 adults sampled and successfully aged, 60% were males. Fifteen adults were age 2.1, five of which were males. Age 2.1 coho salmon adults averaged 595 mm MEF (SE = 12). The remaining 165 adults were age 1.1, predominantly male (62%), and averaged 583 mm MEF (SE = 4).

Duck Creek: An escapement weir was not installed in Duck Creek in 2003 and other means for sampling the escapement were not implemented, so age and size data were not collected.

HARVEST, EXPLOITATION, ESCAPEMENT, AND SURVIVAL IN 2003

Jordan Creek: An estimated 348 (SE = 31) coho salmon originating from Jordan Creek were harvested in the marine commercial and recreational fisheries in 2003 (Table 4 and 5). The commercial troll fishery harvested an estimated 205 (SE = 23) Jordan Creek coho salmon in the Northwest and Northeast quadrants, or 59% of the total harvest. Other contributions to the total harvest included 102 (SE = 15) fish (29%) to the gillnet fishery, 39 (SE = 14) fish (11%) to the marine recreational fishery, and 2 (SE = 2) fish (1%) to the purse seine fishery (Tables 4 and 5). The majority, 195 (56%), of the commercial troll fishery harvest was taken from the Northwest Quadrant. The District 115 gillnet fishery took 96 (28%) of the total drift gillnet harvest, and the entire seine fishery harvest occurred in District 112. The majority of the marine recreational fishery harvest occurred in the Juneau marine recreational fishery (Table 5).

A total of 389 coho salmon returned to Jordan Creek in 2003 (Appendix A3). Using CWT and otoliths samples from carcasses, 302 (SE = 6) of these are attributed to Jordan Creek (Table 5). Similarly, 82 fish of the total return were attributed to production or experimental releases made by Macaulay Salmon Hatchery, and five were from releases made in Switzer Creek. The estimated total run was 650 (SE = 32) adult coho salmon, excluding hatchery-contributed fish, the

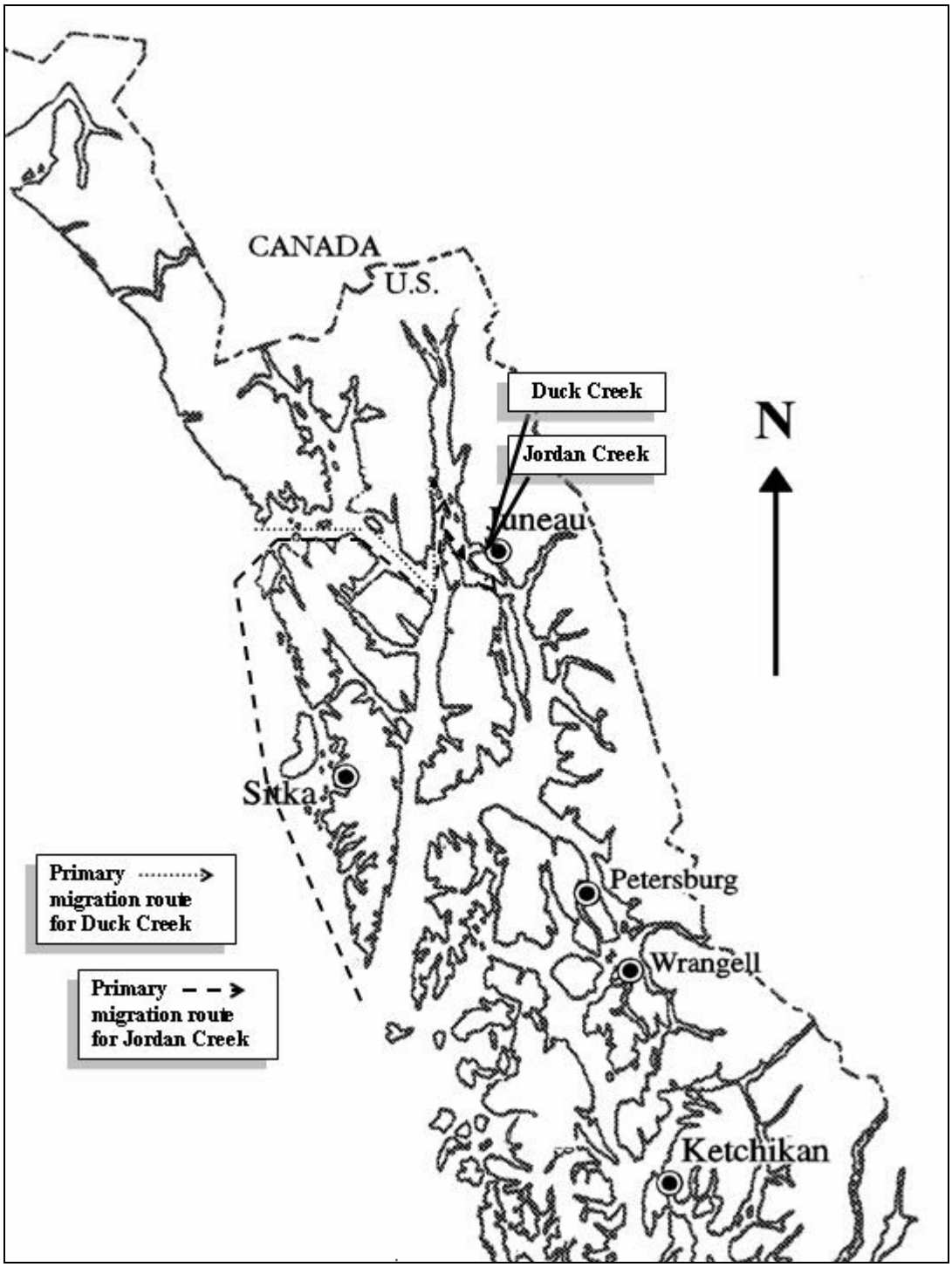

Figure 7.–Migration routes through Southeast Alaska of coho salmon bound for Jordan and Duck Creek, Juneau, Alaska.

estimated marine survival rate was 8% (SE = 0.39%), including unmarked adults, and the estimated marine fishery exploitation rate was 54% (SE = 2.2%).

Duck Creek: Escapement work (weir or stream survey) was not completed on Duck Creek in 2003, so the total return from the 2002 smolt emigration could not be estimated because

Table 3.–Statistical areas of Southeast Alaska within Pacific States Marine Fisheries Commission (PSMFC) areas and quadrants.

PSMFC Area	Abbreviation	Statistical Areas (Districts)
Northern Outside	NOUT	116, 156, 157, 181, 183, 189, 191
Central Outside	COUT	113, 154
Southern Outside	SOUT	103, 104, 152
Southern Inside	SIN	101, 102, 150
Southern Intermediate	SNTR	105, 109, 110
Central Inside	CIN	106, 107, 108
Stephens Passage	STEP	111
Central Intermediate	CNTR	112, 114
Lynn Canal	LYNN	115
Quadrant	Abbreviation	Statistical Areas (Districts)
Northwest	NW	113, 114, 116, 154, 157 ,181 ,183 ,186 ,189 ,191
Northeast	NE	109, 110, 111, 112, 115
Southwest	SW	103, 104, 150, 152
Southeast	SE	101, 102, 105, 106, 107, 108

information on the ratio of marked to unmarked adult fish was not obtained.

Eleven coho salmon retaining CWTs from Duck Creek were recovered in the marine commercial and recreational fisheries in 2003. The commercial troll fishery in the Northwest Quadrant recovered the majority of tags (four in District 114 and one in District 113). The gillnet fishery recovered four tags in District 115 in Lynn Canal. One tag was recovered in the Juneau marine boat fishery. Harvest could not be estimated because information on the marked fraction was not available.

MIGRANT TROUT AND DOLLY VARDEN

Jordan Creek: All inferences with regard to size and timing of trout and Dolly Varden are only valid for fish through the weir. If other trout and Dolly Varden emigrate at a different time, then this inference should only be extended with caution. In 2002, a total of 143 cutthroat trout emigrated from Jordan Creek during operation of the coho smolt weir. The first cutthroat trout was caught on April 22 and the last was caught on June 24 (Figure 8). The emigration was sporadic over this period and the midpoint of the run was June 4. Cutthroat trout emigrants averaged 241 mm FL (SD = 50 mm), and ranged from 157 to 362 mm. Size of emigrants did not show a change over time(Figure 9), but this could be a result of the small number of fish measured and the inconsistent migration over time. A total of 270 Dolly Varden emigrated from Jordan Creek in 2002. The emigration was not consistent but the first fish was caught April 21 and the last June 5 (Figure 10). Dolly Varden emigrants averaged 149 mm FL (SD = 38), and ranged from 60 to 250 mm. The size of emigrants changed over time with a slight decline in length by the end of the emigration (Figure 11).

One cutthroat trout was recovered with an adipose clip but no PIT tag. Another was recovered with a red dye mark on the anal fin, which is a mark used in the Auke Lake cutthroat trout study. The dye mark was an indicator that this fish was either too small to PIT tag while leaving Auke Creek, or came through the Auke Creek weir in the fall and was missed in the spring during emigration.

Twelve juvenile steelhead were caught at the weir. These were counted and measured for length from April 30 through June 5. Juvenile steelhead moving through the weir averaged 181 mm FL (SD = 15), and ranged from 145 to 206 mm.

DISCUSSION

Full stock assessments of small coho salmon populations along the Juneau roadside have generally not been conducted, although ADF&G, Division of Sport Fish has annually monitored a few local populations with foot surveys since 1980. The Auke Creek stock located near Juneau has been one of four main coho salmon stocks that have been closely monitored through long-term stock assessment programs. The other three systems are Berners River in Lynn Canal, Ford

Table 4.–Estimated marine harvest of adult coho salmon bound for Jordan Creek, 2003. N = total harvest in fishery stratum, n = number of fish inspected in the fishery stratum (the sample), a = number of fish which were missing an adipose fin, a′ = number of heads that arrived at the lab, t = number of heads with CWTs detected, t′ = number of CWTs that were dissected from heads and decoded, mc = number of CWTs with code(s) of interest, and $\hat{r}$ = estimated harvest.

TROLL FISHERY (stratified by quadrant and period)

Stat. Week [a]	Date	Period	Quadrant	*N*	V(*N*)	*n*	*a*	*a′*	*t*	*t′*	*mc*	$\hat{r}$	SE($\hat{r}$)	RP($\hat{r}$)	*Var*($\hat{r}$)
29-33	7/13-8/16	3	NW	259,598	0	73,397	1,389	1,377	1,142	1,142	8	30	9	59%	80
34-40	8/17-9/13	4	NW	440,235	0	128,461	3,480	3,452	2,961	2,959	46	165	21	25%	429
34-37	8/17-10/4	4	NE	63,455	0	20,412	469	469	408	408	3	10	5	94%	22
Subtotal troll fishery				763,288	0	222,270	5,338	5,298	4,511	4,509	57	205	23	22%	531

GILLNET FISHERY (stratified by week and fishing district)

Stat. Week [a]	Date	District	Quadrant	*N*	V(*N*)	*n*	*a*	*a′*	*t*	*t′*	*mc*	$\hat{r}$	SE($\hat{r}$)	RP($\hat{r}$)	*Var*($\hat{r}$)
35	8/24-8/30	111	NE	2,504	0	431	7	7	6	6	1	6	6	179%	30
35	8/24-8/30	115	NE	2,901	0	1,983	54	54	51	51	3	5	2	66%	2
36	8/31-9/6	115	NE	8,907	0	5,031	197	196	182	181	5	9	3	60%	8
37	9/7-9/13	115	NE	14,046	0	2,357	136	135	132	131	2	13	8	127%	67
38	9/14-9/20	115	NE	12,992	0	4,076	275	273	269	269	14	47	10	44%	109
39	9/21-9/27	115	NE	13,236	0	7,425	453	452	433	433	9	17	4	44%	14
40	9/28-10/4	115	NE	4,729	0	4,108	289	289	281	281	4	5	1	40%	1
Subtotal gillnet fishery				59,315	0	25,411	1,411	1,406	1,354	1,352	38	102	15	29%	231

SEINE FISHERY (stratified by week and fishing district)

Stat. Week [a]	Date	District	Quadrant	*N*	V(*N*)	*n*	*a*	*a′*	*t*	*t′*	*mc*	$\hat{r}$	SE($\hat{r}$)	RP($\hat{r}$)	*Var*($\hat{r}$)
34	8/17-8/23	112	NE	14,406	0	6,753	146	146	132	132	1	2	2	145%	3
Subtotal seine fishery				14,406	0	6,753	146	146	132	132	1	2	2	170%	3

RECREATIONAL FISHERY (stratified by biweek period)

Biweek [a]	Date	Area	Quadrant	*N*	V(*N*)	*n*	*a*	*a′*	*t*	*t′*	*mc*	$\hat{r}$	SE($\hat{r}$)	RP($\hat{r}$)	*Var*($\hat{r}$)
16	8/4-8/17	Juneau-Marine Boat	NE	3,486	366,473	1,053	16	15	13	13	2	7	5	121%	21
17	8/18-8/31	Juneau-Derby entry	NE	3,933	0	3,933	118	118	104	104	3	3	0	22%	0
17	8/18-8/31	Juneau-Derby Takehome	NE	932	42,829	258	6	6	6	6	1	4	3	169%	11
17	8/18-8/31	Juneau-Marine Boat	NE	2,922	425,441	533	19	17	17	17	1	6	6	181%	35
18	9/1-9/14	Juneau-Marine Boat	NE	4,235	2,047,474	758	53	50	45	44	3	19	11	118%	129
Subtotal recreational fishery				15,508	2,882,217	6,535	212	206	185	184	10	39	14	70%	196
TOTAL				852,517	2,882,217	260,969	7,107	7,056	6,182	6,177	106	348	31	17%	961

[a] Stratified by statistical week in all but the Juneau Marine Recreational Fishery, where biweek stratum was used.

Table 5.–Estimated marine harvest, exploitation rate, run size, and marine survival rate of the Jordan Creek stock of coho salmon, 2003.

Fishery	Area	Estimated harvest, $\hat{r}$	Var($\hat{r}$)	SE($\hat{r}$)	Percent of marine harvest	Exploitation Rate, $\hat{U}$	Var($\hat{U}$)	SE($\hat{U}$)
TROLL	NW Quadrant	195	509	23	56%	30%	0.03%	1.6%
	NE Quadrant	10	22	5	3%	2%	0.00%	0.3%
	Subtotal	205	531	23	59%	32%	0.03%	1.6%
GILLNET	District 111	6	30	5	2%	1%	0.00%	0.4%
	District 115	96	201	14	28%	15%	0.01%	1.0%
	Subtotal	102	231	15	29%	16%	0.01%	1.1%
SEINE	District 112	2	3	2	1%	0%	0.00%	0.1%
	Subtotal	2	3	2	1%	0%	0.00%	0.1%
RECREATIONAL	Juneau - MB	32	185	14	9%	5%	0.01%	1.0%
	Juneau - DE	3	0	0	1%	0%	0.00%	0.0%
	Juneau - DT	4	11	3	1%	1%	0.00%	0.2%
	Subtotal	39	196	14	11%	6%	0.01%	1.0%
	Total marine harvest	348	961	31	100%	54%	0.05%	2.2%
	Total escapement[a]	302	40	6.3		46%		
	Total run	650	1001	32		100%		
	Estimated marine survival	8.0%	0.001%	0.39%				
	Total number of smolts through weir in 2002	8,171	(Total number of smolts tagged in 2002 was 7,860 smolts.)					
	*Total number of adults in 2003	302	(277 adipose-clipped fish plus 25 unmarked adults)					

[a] Escapement counts are the total number of adults that could reasonably be attributed to Jordan Creek production from both CWT and otolith sampling. Total number of adults back to the weir was 300 adipose-clipped fish and 89 unmarked fish. A carcass sample was taken from both marked and unmarked fish to determine whether there were strays from other systems of from local hatchery production. Strays were removed from the total escapement to estimate the total production from Jordan Creek.

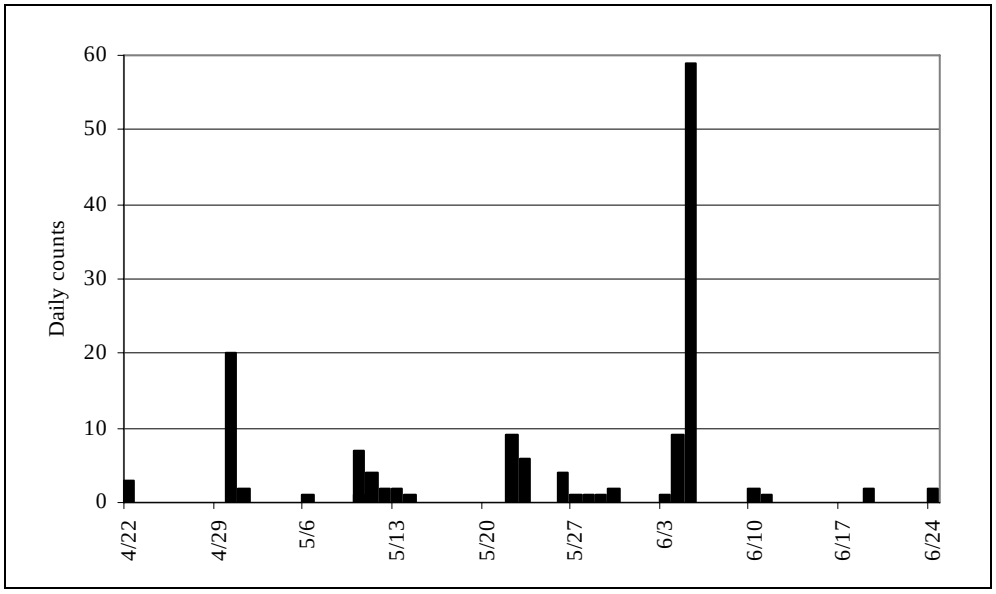

Figure 8.–Cutthroat trout emigration from Jordan Creek, 2002. The spring emigration started April 22 and ended June 24. Midpoint of the migration was June 4.

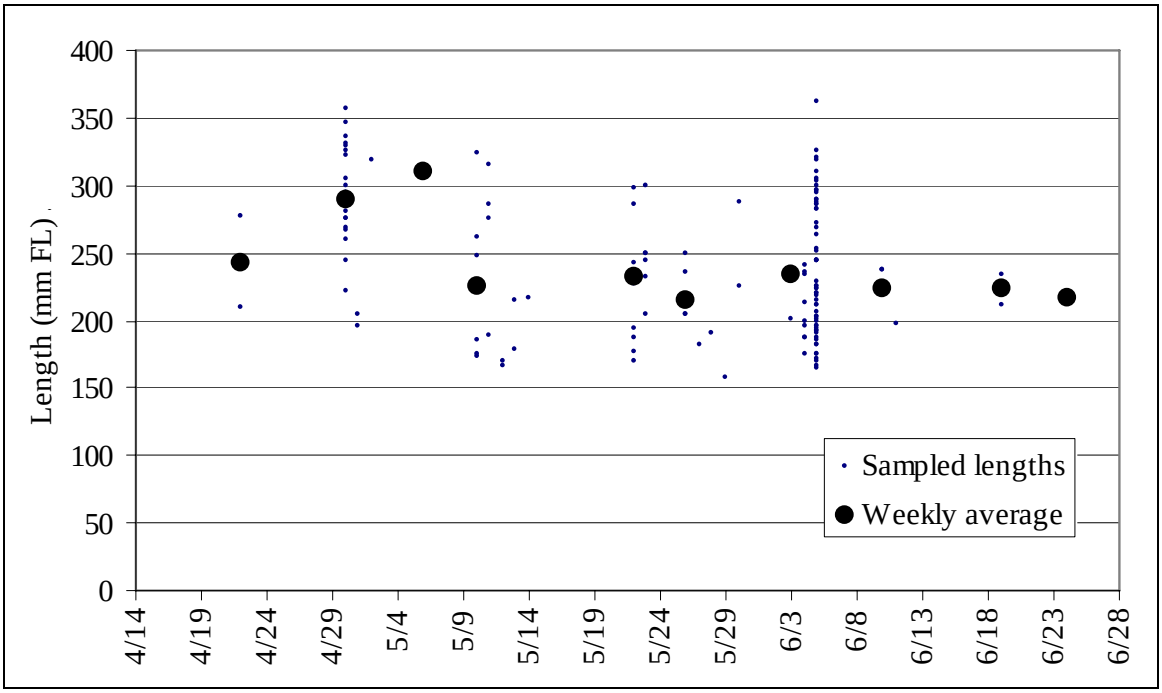

Figure 9.–Cutthroat trout lengths over time during the emigration from Jordan Creek, 2002. Average lengths for each migration week are overlaid upon sampled length data.

Arm Lake near Sitka, and Hugh Smith Lake near Ketchikan. Information from Auke Creek has been used to establish escapement goals for Juneau roadside systems (Clark 1995; Clark 2005).

Implementation of coded wire tagging in the spring 2002 and operation of an escapement weir in 2003 provided previously unavailable population parameter estimates for Jordan Creek coho salmon. Limited tagging and budget

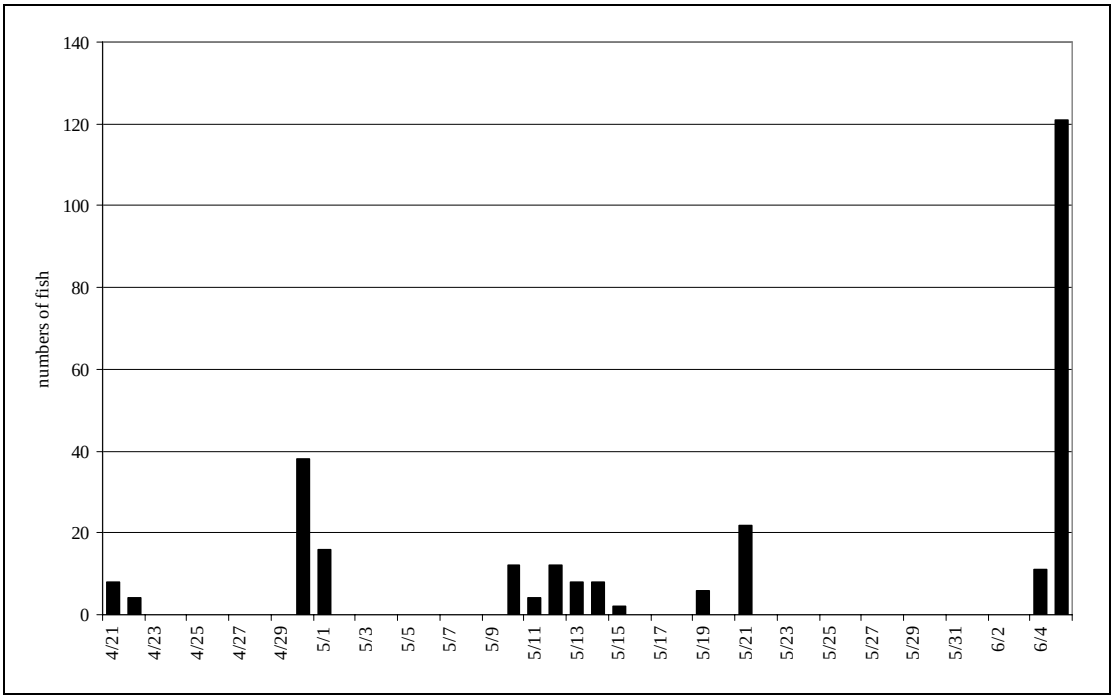

Figure 10.–Dolly Varden emigration from Jordan Creek, 2002. The first fish was captured on April 21 and the last on June 5.

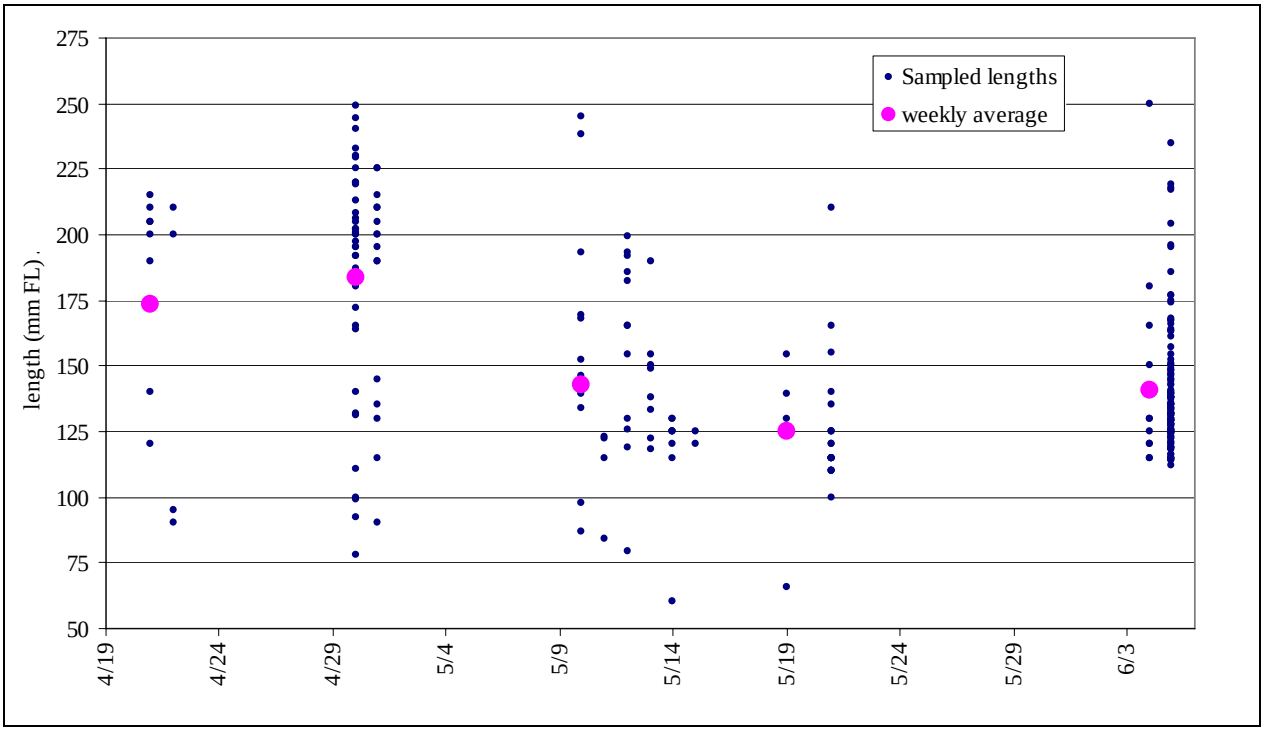

Figure 11.–Dolly Varden lengths over time during the emigration from Jordan Creek, 2002. Average lengths for each migration week are overlaid upon sampled length data.

constraints, which precluded operation of an escapement weir on Duck Creek, restricted the amount of information that could be reported for this system.

Estimated marine survival rate (8%, SE = 0.39%) for Jordan Creek coho salmon were somewhat similar to marine survival rates for coho salmon that returned to Macaulay Salmon Hatchery (10.1%, Rick Focht, Director of Research and Evaluation, DIPAC, Juneau; personal communication) and significantly less than those that returned to Auke Creek (27.9%, Taylor and Lum *Unpublished*) in 2003. There were considerable differences in emigration timing between smolts that emigrated from Jordan Creek and the releases at Macaulay Salmon Hatchery. While Jordan Creek smolts emigrated over a period of approximately 9 weeks, Macaulay Salmon Hatchery released its coho salmon smolts on June 17 and 18 (Rick Focht, Director of Research and Evaluation, DIPAC, Juneau; personal communication). Approximately 95% of the Jordan Creek emigration occurred by June 7 prior to these releases. Conversely, emigration timing for Jordan and Auke creek smolts was similar while having vastly different marine survivals.

Auke Creek coho smolts were larger and showed a marine survival advantage related to smolt size compared to those leaving Jordan Creek. Average sizes of the two release groups of age-1. smolts from Macaulay Salmon Hatchery were 18.8 g and 16.1 g, having a combined marine survival of 10.1% (Rick Focht, Director of Research and Evaluation, DIPAC, Juneau; personal communication). The average weight of age-1. smolts from Jordan Creek was 5.3 g (SE = 0.34), the smallest of the three locations, and had a marine survival of 8%. In comparison, age 1. smolts from Auke Creek were 10.9 g (SE = 0.28), larger than Jordan Creek smolts, but smaller than the hatchery releases. Overall marine survival for Auke Creek smolt was over twice as much as the survival for Macaulay Salmon Hatchery fish and over three times greater than that at Jordan Creek. In the later case, Auke Creek smolts were nearly double the size of Jordan Creek smolts, whereas in the case of Macaulay Salmon Hatchery, the smolts were 2 to 4 g larger than those leaving Auke Creek. Among the three locations it is suggestive that there is an influence of smolt size on marine survival. However, the relationship with respect to size did not conclusively result in higher survivals, the example being the survivals of Auke Creek in comparison to the releases at Macaulay Salmon Hatchery. Another variable that may have imposed some set of limiting factors or complicated the picture is location and how geographical location affects fish and nutrient transport, predator and prey complexes, and early marine protection and food availability. Late release timing from Macaulay Salmon Hatchery may have attributed to less than ideal conditions for early nearshore marine survival.

There was no information concerning predator abundance and food availability during this study for coho salmon in any of the three locations (Jordan Creek, Macaulay Salmon Hatchery, and Auke Creek). However, patterns of emigration timing, smolt size, and marine survival from Auke Creek show that the majority of the smolt emigration occurs around mid-May, survival is related to smolt size, and that survival rates are highest when smolts enter saltwater in May (Lum 2003). Similar results have been found for juvenile coho salmon by Bilton et al. (1982). Although we do not have extensive information for Jordan Creek coho salmon, emigration timing for Jordan Creek smolts is similar to that seen at Auke Creek and could suggest that survival patterns for Jordan Creek fish would also be similar, *assuming they encountered the same marine conditions*. Auke Creek and Jordan Creek survivals were different as noted above and size could have been the factor affecting marine survival for Jordan Creek.

There are differences in freshwater habitat and nearshore habitat that could possibly explain the survival differences between these stocks. Auke Creek coho salmon are lake-rearing, and except for some limited pond habitat, Jordan and Duck Creek fish are essentially stream-rearing. Lake rearing allows for some variation in smolt age composition and protection if conditions are not favorable for emigration into the nearshore marine environment.

In Jordan Creek, otolith samples were collected from unmarked coho salmon carcasses or from scavenged salmon heads to determine if they were of hatchery origin. Otolith analysis showed that

recoveries of Macaulay Salmon Hatchery coho salmon adults occurred as early as September 19 and as late as November 3, and the majority (77%) of the sample originated from the 2000 brood. These fish were collected either below or dead on the weir. Because of the weir's location, it can be argued that these were naturally occurring strays. However, because coho salmon tend to move in and out of systems to locate natal waters and osmoregulate, these adults could have been forced strays (i.e., the weir prevented them from leaving Jordan Creek or they were stranded in lower Jordan Creek after a high tide). Carcass collections of Sheep Creek Hatchery coho salmon suggest an imprinting problem at that release location. Coded wire tags were also recovered during carcass sampling; 3% of the carcasses had Macaulay Salmon Hatchery codes and 3% had Sheep Creek Hatchery codes. There was also one tag recovery indicating that it had been tagged at Switzer Creek in 2002.

Because of the high number of adult hatchery fish that strayed into Jordan Creek during this study, it was impossible to definitively back calculate the smolt tagging ratio. Since Jordan Creek is relatively small, and the weir maintained its integrity, we assumed a tagging ratio of 0.962 (theta = 0.962). Therefore, the estimated contribution to the fisheries should be considered a minimum contribution. Likewise, the survival estimate should be considered a maximum survival estimate. Escapement was also determined using a stratified method of samples taken from carcasses with an adipose clip or unmarked carcasses. The recovery of a CWT or an otolith mark provided an accounting of known Jordan Creek returns.

CONCLUSIONS AND RECOMMENDATIONS

Coded wire tag recoveries and otolith samples taken in Jordan Creek indicate that the coho salmon production of this stream is hatchery influenced. To what degree hatchery influence occurs and by what mechanism is not completely known. It is clear by the otolith and CWT recoveries that coho salmon adults bound for Macaulay Salmon Hatchery enter and possibly spawn in Jordan Creek.

Smolts have been recovered leaving Jordan Creek in the spring with CWT codes used the previous year in the Chilkat River, but none have been from Macaulay Salmon Hatchery. This suggests that wild smolts from a previous year's emigration possibly overwinter in Jordan Creek before ocean residence and that smolts can travel great distances before truly moving offshore to mature. The Macaulay Salmon Hatchery tags 10% of its coho salmon production and thermal marks 100%. This, however, did not allow for the clear separation of hatchery otolith marked smolts from wild smolts if they were present in the system because otolith marked smolts have no additional external mark. Because of this, it would impossible to completely discriminate between Jordan Creek and hatchery origin smolt during the emigration if they were indeed present. The timing and size of release would suggest that hatchery released smolt were more than likely predisposed to early maturity as jacks or to moving off shore for food. Sampling of both marked and unmarked adults for otoliths a year later would be the only means of determining whether there were indeed Macaulay Salmon Hatchery smolts that had been tagged and released after overwintering in Jordan Creek. At this point, all that can be truly said is that hatchery fish stray into Jordan Creek as adults and that fish from other systems may overwinter there. Without marking projects in the area, there is no way to show to what extent this occurs. In future years, it would be important to recover previously tagged smolts in the spring to determine whether these smolts were either 1) wild juvenile coho salmon from other systems that were tagged the previous year and overwintered in Jordan Creek, and 2) juveniles from Macaulay Salmon Hatchery production that did not move offshore.

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APPENDIX A

Appendix A1.–Random and select recoveries of coded-wire tagged coho salmon bound for Jordan Creek or recovered during the carcass survey at the stream location by date sample in 2003.

Head number	Tag code	Gear class	Recovery date	Stat. week	Quadrant	District	Length	Survey site	Sample number
RANDOM RECOVERIES									
180321	35605	TROLL	15-Jul-03	29	NW	113	688	SITKA	3030840
246309	35605	TROLL	18-Jul-03	29	NW	113		HOONAH	3110075
519032	35605	TROLL	22-Jul-03	30	NW		511	EXCURSION INLET	3100037
246471	35605	TROLL	25-Jul-03	30	NW	113	660	HOONAH	3110083
55473	35605	TROLL	30-Jul-03	31	NW	114	649	ELFIN COVE	3020069
223791	35605	TROLL	7-Aug-03	32	NW	113	657	PELICAN	3010205
246856	35605	TROLL	10-Aug-03	33	NW	113	555	HOONAH	3110115
55639	35605	TROLL	12-Aug-03	33	NW	114	740	ELFIN COVE	3020123
55667	35605	TROLL	18-Aug-03	34	NW	114	600	ELFIN COVE	3020144
55670	35605	TROLL	18-Aug-03	34	NW	114	635	ELFIN COVE	3020144
55666	35605	TROLL	18-Aug-03	34	NW	114	647	ELFIN COVE	3020144
246913	35605	TROLL	19-Aug-03	34	NE	112	685	HOONAH	3110119
247050	35605	TROLL	20-Aug-03	34	NW	113	655	HOONAH	3110138
55694	35605	TROLL	20-Aug-03	34	NW	114	670	ELFIN COVE	3020155
246962	35605	TROLL	20-Aug-03	34	NW	114	530	HOONAH	3110126
246968	35605	TROLL	20-Aug-03	34	NW	114	550	HOONAH	3110127
246972	35605	TROLL	20-Aug-03	34	NW	114	605	HOONAH	3110128
247120	35605	TROLL	25-Aug-03	35	NW	113	530	HOONAH	3110147
247073	35605	TROLL	25-Aug-03	35	NW	113	635	HOONAH	3110141
247094	35605	TROLL	25-Aug-03	35	NW	113	635	HOONAH	3110141
55727	35605	TROLL	25-Aug-03	35	NW	114	565	ELFIN COVE	3020167
55729	35605	TROLL	26-Aug-03	35	NW	114	687	ELFIN COVE	3020168
247148	35605	TROLL	27-Aug-03	35	NE	112	650	HOONAH	3110151
247144	35605	TROLL	27-Aug-03	35	NW	114	670	HOONAH	3110150
226151	35605	TROLL	28-Aug-03	35	NW		662	PELICAN	3010253
247284	35605	TROLL	1-Sep-03	36	NW	114	725	HOONAH	3110173
247265	35605	TROLL	2-Sep-03	36	NW	114	660	HOONAH	3110171
84727	35605	TROLL	2-Sep-03	36	NW		637	YAKUTAT	3140046
55805	35605	TROLL	5-Sep-03	36	NW	114	685	ELFIN COVE	3020196
247382	35605	TROLL	5-Sep-03	36	NW	114	600	HOONAH	3110186
247395	35605	TROLL	5-Sep-03	36	NW	114	625	HOONAH	3110186
235645	35605	TROLL	6-Sep-03	36	NW	113	675	SITKA	3031143

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Head number	Tag code	Gear class	Recovery date	Stat. week	Quadrant	District	Length	Survey site	Sample number
RANDOM RECOVERIES (Continued)									
235884	35605	TROLL	7-Sep-03	37	NW	113	664	SITKA	3031160
247468	35605	TROLL	7-Sep-03	37	NW	113	695	HOONAH	3110199
55839	35605	TROLL	8-Sep-03	37	NW	114	660	ELFIN COVE	3020204
84759	35605	TROLL	8-Sep-03	37	NW	189	671	YAKUTAT	3140049
226333	35605	TROLL	8-Sep-03	37	NW		591	PELICAN	3010277
226363	35605	TROLL	9-Sep-03	37	NW	113	565	PELICAN	3010278
55874	35605	TROLL	9-Sep-03	37	NW	114	695	ELFIN COVE	3020212
247550	35605	TROLL	11-Sep-03	37	NE	112	695	HOONAH	3110206
247572	35605	TROLL	11-Sep-03	37	NW	114	560	HOONAH	3110209
247577	35605	TROLL	11-Sep-03	37	NW	114	625	HOONAH	3110210
235755	35605	TROLL	12-Sep-03	37	NW	113	650	SITKA	3031187
226464	35605	TROLL	12-Sep-03	37	NW	114	615	PELICAN	3010290
247615	35605	TROLL	12-Sep-03	37	NW	114	640	HOONAH	3110214
247595	35605	TROLL	12-Sep-03	37	NW	114	605	HOONAH	3110213
247699	35605	TROLL	15-Sep-03	38	NW	114	599	HOONAH	3110222
247674	35605	TROLL	15-Sep-03	38	NW	114	660	HOONAH	3110222
247796	35605	TROLL	17-Sep-03	38	NW	114	635	HOONAH	3110227
247745	35605	TROLL	17-Sep-03	38	NW	114	605	HOONAH	3110223
27120	35605	TROLL	18-Sep-03	38	NW	114	625	ELFIN COVE	3020235
247825	35605	TROLL	18-Sep-03	38	NW	114	610	HOONAH	3110236
247847	35605	TROLL	18-Sep-03	38	NW	114	645	HOONAH	3110238
248274	35605	TROLL	20-Sep-03	38	NW	114	658	SITKA	3031231
27124	35605	TROLL	22-Sep-03	39	NW	114	660	ELFIN COVE	3020243
226533	35605	TROLL	22-Sep-03	39	NW	114	634	PELICAN	3010310
226599	35605	TROLL	1-Oct-03	40	NW	114	613	PELICAN	3010326
232158	35605	DRIFT	27-Aug-03	35	NE	111	678	JUNEAU	3040071
519167	35605	DRIFT	27-Aug-03	35	NE	115	620	EXCURSION INLET	3100084
519188	35605	DRIFT	28-Aug-03	35	NE	115	633	EXCURSION INLET	3100088
519194	35605	DRIFT	28-Aug-03	35	NE	115	642	EXCURSION INLET	3100088
232181	35605	DRIFT	2-Sep-03	36	NE	115	654	JUNEAU	3040075
520023	35605	DRIFT	4-Sep-03	36	NE	115	550	JUNEAU	3040081
520115	35605	DRIFT	4-Sep-03	36	NE	115	639	JUNEAU	3040081
520094	35605	DRIFT	5-Sep-03	36	NE	115	661	JUNEAU	3040082

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Head number	Tag code	Gear class	Recovery date	Stat. week	Quadrant	District	Length	Survey site	Sample number
RANDOM RECOVERIES (Continued)									
520093	35605	DRIFT	5-Sep-03	36	NE	115	712	JUNEAU	3040082
520284	35605	DRIFT	11-Sep-03	37	NE	115	611	JUNEAU	3040084
520280	35605	DRIFT	11-Sep-03	37	NE	115	683	JUNEAU	3040084
520589	35605	DRIFT	17-Sep-03	38	NE	115	550	JUNEAU	3040090
520576	35605	DRIFT	17-Sep-03	38	NE	115	563	JUNEAU	3040090
520601	35605	DRIFT	17-Sep-03	38	NE	115	568	JUNEAU	3040090
520463	35605	DRIFT	17-Sep-03	38	NE	115	581	JUNEAU	3040089
520634	35605	DRIFT	17-Sep-03	38	NE	115	606	JUNEAU	3040090
520582	35605	DRIFT	17-Sep-03	38	NE	115	608	JUNEAU	3040090
520597	35605	DRIFT	17-Sep-03	38	NE	115	627	JUNEAU	3040090
520598	35605	DRIFT	17-Sep-03	38	NE	115	630	JUNEAU	3040090
520509	35605	DRIFT	17-Sep-03	38	NE	115	657	JUNEAU	3040089
520527	35605	DRIFT	17-Sep-03	38	NE	115	664	JUNEAU	3040089
520410	35605	DRIFT	17-Sep-03	38	NE	115	702	JUNEAU	3040089
520604	35605	DRIFT	17-Sep-03	38	NE	115	704	JUNEAU	3040090
520554	35605	DRIFT	17-Sep-03	38	NE	115	708	JUNEAU	3040090
520411	35605	DRIFT	17-Sep-03	38	NE	115	718	JUNEAU	3040089
517111	35605	DRIFT	23-Sep-03	39	NE	115	635	JUNEAU	3040092
517287	35605	DRIFT	23-Sep-03	39	NE	115	647	JUNEAU	3040094
517239	35605	DRIFT	23-Sep-03	39	NE	115	670	JUNEAU	3040094
517153	35605	DRIFT	23-Sep-03	39	NE	115	674	JUNEAU	3040092
517191	35605	DRIFT	23-Sep-03	39	NE	115	722	JUNEAU	3040092
520905	35605	DRIFT	25-Sep-03	39	NE	115	644	JUNEAU	3040095
530031	35605	DRIFT	25-Sep-03	39	NE	115	703	JUNEAU	3040095
520988	35605	DRIFT	25-Sep-03	39	NE	115	712	JUNEAU	3040097
517312	35605	DRIFT	25-Sep-03	39	NE	115	739	JUNEAU	3040097
517392	35605	DRIFT	30-Sep-03	40	NE	115	676	JUNEAU	3040098
517446	35605	DRIFT	2-Oct-03	40	NE	115	595	JUNEAU	3040099
517518	35605	DRIFT	2-Oct-03	40	NE	115	671	JUNEAU	3040099
517439	35605	DRIFT	2-Oct-03	40	NE	115	702	JUNEAU	3040099
521737	35605	PURSE	18-Aug-03	34	NE	112	600	PETERSBURG	3050772
193966	35605	SPORT	16-Aug-03	33	NE	112	670	JUNEAU	3045300
193962	35605	SPORT	17-Aug-03	34	NE	111	590	JUNEAU	3045301

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Head number	Tag code	Gear class	Recovery date	Stat. week	Quadrant	District	Length	Survey site	Sample number
RANDOM RECOVERIES (Continued)									
193967	35605	SPORT	20-Aug-03	34	NE	111	470	JUNEAU	3045304
80820	35605	SPORT	22-Aug-03	34	NE	111	745	JUNEAU	3045311
253724	35605	SPORT	23-Aug-03	34	NE		690	JUNEAU	3045316
253772	35605	SPORT	25-Aug-03	35	NE		620	JUNEAU	3045321
234964	35605	SPORT	26-Aug-03	35	NE		645	JUNEAU	3045331
234721	35605	SPORT	1-Sep-03	36	NE	111	580	JUNEAU	3045379
234720	35605	SPORT	1-Sep-03	36	NE	111	590	JUNEAU	3045380
234736	35605	SPORT	6-Sep-03	36	NE	111	730	JUNEAU	3045367
222535	35605	ESCAPE	3-Sep-03	36	NE	111	610	JUNEAU MISC.	03AJ2001
222536	35605	ESCAPE	12-Sep-03	37	NE	111	610	JUNEAU MISC.	03AJ2002
222537	35605	ESCAPE	15-Sep-03	38	NE	111	495	JUNEAU MISC.	03AJ2003
222538	35605	ESCAPE	19-Sep-03	38	NE	111	510	JUNEAU MISC.	03AJ2004
222539	35605	ESCAPE	22-Sep-03	39	NE	111	600	JUNEAU MISC.	03AJ2005
222541	35605	ESCAPE	25-Sep-03	39	NE	111	570	JUNEAU MISC.	03AJ2006
222540	35605	ESCAPE	25-Sep-03	39	NE	111	590	JUNEAU MISC.	03AJ2006
222542	35605	ESCAPE	27-Sep-03	39	NE	111	600	JUNEAU MISC.	03AJ2007
222544	35605	ESCAPE	28-Sep-03	40	NE	111	560	JUNEAU MISC.	03AJ2008
222545	35605	ESCAPE	28-Sep-03	40	NE	111	665	JUNEAU MISC.	03AJ2008
55956	35605	ESCAPE	28-Sep-03	40	NE	115	665	CHILKAT & TRIBUTARIES	3900056
222546	35605	ESCAPE	1-Oct-03	40	NE	111		JUNEAU MISC.	03AJ2009
222547	35605	ESCAPE	1-Oct-03	40	NE	111		JUNEAU MISC.	03AJ2009
222548	35605	ESCAPE	1-Oct-03	40	NE	111		JUNEAU MISC.	03AJ2009
222549	35605	ESCAPE	1-Oct-03	40	NE	111		JUNEAU MISC.	03AJ2009
222550	35605	ESCAPE	8-Oct-03	41	NE	111		JUNEAU MISC.	03AJ2013
222551	35605	ESCAPE	8-Oct-03	41	NE	111		JUNEAU MISC.	03AJ2013
222552	35605	ESCAPE	8-Oct-03	41	NE	111		JUNEAU MISC.	03AJ2013
222553	35605	ESCAPE	9-Oct-03	41	NE	111	570	JUNEAU MISC.	03AJ2014
222554	35605	ESCAPE	10-Oct-03	41	NE	111	560	JUNEAU MISC.	03AJ2015
222555	35605	ESCAPE	10-Oct-03	41	NE	111	630	JUNEAU MISC.	03AJ2015
222556	35605	ESCAPE	11-Oct-03	41	NE	111	560	JUNEAU MISC.	03AJ2016
222558	35605	ESCAPE	13-Oct-03	42	NE	111	495	JUNEAU MISC.	03AJ2017
222557	35605	ESCAPE	13-Oct-03	42	NE	111	640	JUNEAU MISC.	03AJ2017

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Head number	Tag code	Gear class	Recovery date	Stat. week	Quadrant	District	Length	Survey site	Sample number
RANDOM RECOVERIES (Continued)									
222559	35605	ESCAPE	15-Oct-03	42	NE	111	540	JUNEAU MISC.	03AJ2018
222560	35605	ESCAPE	15-Oct-03	42	NE	111	620	JUNEAU MISC.	03AJ2018
222562	35605	ESCAPE	16-Oct-03	42	NE	111	560	JUNEAU MISC.	03AJ2019
222561	35605	ESCAPE	16-Oct-03	42	NE	111	650	JUNEAU MISC.	03AJ2019
222564	35605	ESCAPE	22-Oct-03	43	NE	111	460	JUNEAU MISC.	03AJ2020
222563	35605	ESCAPE	22-Oct-03	43	NE	111	520	JUNEAU MISC.	03AJ2020
222565	35605	ESCAPE	23-Oct-03	43	NE	111	560	JUNEAU MISC.	03AJ2021
222580	35605	ESCAPE	23-Oct-03	43	NE	111	560	JUNEAU MISC.	03AJ2021
222569	35605	ESCAPE	23-Oct-03	43	NE	111	570	JUNEAU MISC.	03AJ2021
222579	35605	ESCAPE	23-Oct-03	43	NE	111	580	JUNEAU MISC.	03AJ2021
222570	35605	ESCAPE	23-Oct-03	43	NE	111	590	JUNEAU MISC.	03AJ2021
222568	35605	ESCAPE	23-Oct-03	43	NE	111	600	JUNEAU MISC.	03AJ2021
222577	35605	ESCAPE	23-Oct-03	43	NE	111	600	JUNEAU MISC.	03AJ2021
222578	35605	ESCAPE	23-Oct-03	43	NE	111	600	JUNEAU MISC.	03AJ2021
222566	35605	ESCAPE	23-Oct-03	43	NE	111	610	JUNEAU MISC.	03AJ2021
222567	35605	ESCAPE	23-Oct-03	43	NE	111	610	JUNEAU MISC.	03AJ2021
222571	35605	ESCAPE	23-Oct-03	43	NE	111	610	JUNEAU MISC.	03AJ2021
222582	35605	ESCAPE	23-Oct-03	43	NE	111	620	JUNEAU MISC.	03AJ2021
222583	35605	ESCAPE	23-Oct-03	43	NE	111	620	JUNEAU MISC.	03AJ2021
222576	35605	ESCAPE	23-Oct-03	43	NE	111	660	JUNEAU MISC.	03AJ2021
222572	35605	ESCAPE	23-Oct-03	43	NE	111		JUNEAU MISC.	03AJ2021
222573	35605	ESCAPE	23-Oct-03	43	NE	111		JUNEAU MISC.	03AJ2021
222574	35605	ESCAPE	23-Oct-03	43	NE	111		JUNEAU MISC.	03AJ2021
222586	35605	ESCAPE	24-Oct-03	43	NE	111	585	JUNEAU MISC.	03AJ2022
222585	35605	ESCAPE	24-Oct-03	43	NE	111	615	JUNEAU MISC.	03AJ2022
222584	35605	ESCAPE	24-Oct-03	43	NE	111	650	JUNEAU MISC.	03AJ2022
222591	35605	ESCAPE	26-Oct-03	44	NE	111	530	JUNEAU MISC.	03AJ2024
222590	35605	ESCAPE	26-Oct-03	44	NE	111	540	JUNEAU MISC.	03AJ2024
222592	35605	ESCAPE	26-Oct-03	44	NE	111	540	JUNEAU MISC.	03AJ2024
222593	35605	ESCAPE	26-Oct-03	44	NE	111	590	JUNEAU MISC.	03AJ2024
222588	35605	ESCAPE	26-Oct-03	44	NE	111	610	JUNEAU MISC.	03AJ2024
222589	35605	ESCAPE	26-Oct-03	44	NE	111	610	JUNEAU MISC.	03AJ2024
222594	35605	ESCAPE	26-Oct-03	44	NE	111	610	JUNEAU MISC.	03AJ2024
222595	35605	ESCAPE	26-Oct-03	44	NE	111	610	JUNEAU MISC.	03AJ2024

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Head number	Tag code	Gear class	Recovery date	Stat. week	Quadrant	District	Length	Survey site	Sample number
RANDOM RECOVERIES (Continued)									
222596	35605	ESCAPE	27-Oct-03	44	NE	111	605	JUNEAU MISC.	03AJ2025
222598	35605	ESCAPE	28-Oct-03	44	NE	111	535	JUNEAU MISC.	03AJ2026
255505	35605	ESCAPE	28-Oct-03	44	NE	111	540	JUNEAU MISC.	03AJ2026
222600	35605	ESCAPE	28-Oct-03	44	NE	111	550	JUNEAU MISC.	03AJ2026
255522	35605	ESCAPE	28-Oct-03	44	NE	111	550	JUNEAU MISC.	03AJ2026
255519	35605	ESCAPE	28-Oct-03	44	NE	111	580	JUNEAU MISC.	03AJ2026
255517	35605	ESCAPE	28-Oct-03	44	NE	111	600	JUNEAU MISC.	03AJ2026
255523	35605	ESCAPE	28-Oct-03	44	NE	111	600	JUNEAU MISC.	03AJ2026
255521	35605	ESCAPE	28-Oct-03	44	NE	111	605	JUNEAU MISC.	03AJ2026
255524	35605	ESCAPE	28-Oct-03	44	NE	111	610	JUNEAU MISC.	03AJ2026
255525	35605	ESCAPE	28-Oct-03	44	NE	111	610	JUNEAU MISC.	03AJ2026
255520	35605	ESCAPE	28-Oct-03	44	NE	111	630	JUNEAU MISC.	03AJ2026
255527	35605	ESCAPE	28-Oct-03	44	NE	111	630	JUNEAU MISC.	03AJ2026
255503	35605	ESCAPE	28-Oct-03	44	NE	111	635	JUNEAU MISC.	03AJ2026
255508	35605	ESCAPE	28-Oct-03	44	NE	111	635	JUNEAU MISC.	03AJ2026
255506	35605	ESCAPE	28-Oct-03	44	NE	111	650	JUNEAU MISC.	03AJ2026
222599	35605	ESCAPE	28-Oct-03	44	NE	111	660	JUNEAU MISC.	03AJ2026
255507	35605	ESCAPE	28-Oct-03	44	NE	111	660	JUNEAU MISC.	03AJ2026
222597	35605	ESCAPE	28-Oct-03	44	NE	111	670	JUNEAU MISC.	03AJ2026
255502	35605	ESCAPE	28-Oct-03	44	NE	111		JUNEAU MISC.	03AJ2026
255504	35605	ESCAPE	28-Oct-03	44	NE	111		JUNEAU MISC.	03AJ2026
255510	35605	ESCAPE	28-Oct-03	44	NE	111		JUNEAU MISC.	03AJ2026
255511	35605	ESCAPE	28-Oct-03	44	NE	111		JUNEAU MISC.	03AJ2026
255512	35605	ESCAPE	28-Oct-03	44	NE	111		JUNEAU MISC.	03AJ2026
255513	35605	ESCAPE	28-Oct-03	44	NE	111		JUNEAU MISC.	03AJ2026
255514	35605	ESCAPE	28-Oct-03	44	NE	111		JUNEAU MISC.	03AJ2026
255515	35605	ESCAPE	28-Oct-03	44	NE	111		JUNEAU MISC.	03AJ2026
255516	35605	ESCAPE	28-Oct-03	44	NE	111		JUNEAU MISC.	03AJ2026
255518	35605	ESCAPE	28-Oct-03	44	NE	111		JUNEAU MISC.	03AJ2026
255528	35605	ESCAPE	31-Oct-03	44	NE	111	570	JUNEAU MISC.	03AJ2028
255530	35605	ESCAPE	31-Oct-03	44	NE	111	570	JUNEAU MISC.	03AJ2028
255529	35605	ESCAPE	31-Oct-03	44	NE	111	620	JUNEAU MISC.	03AJ2028
255528	35605	ESCAPE	31-Oct-03	44	NE	111	570	JUNEAU MISC.	03AJ2028

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Head number	Tag code	Gear class	Recovery date	Stat. week	Quadrant	District	Length	Survey site	Sample number
RANDOM RECOVERIES (Continued)									
255530	35605	ESCAPE	31-Oct-03	44	NE	111	570	JUNEAU MISC.	03AJ2028
255529	35605	ESCAPE	31-Oct-03	44	NE	111	620	JUNEAU MISC.	03AJ2028
255535	35605	ESCAPE	3-Nov-03	45	NE	111	550	JUNEAU MISC.	03AJ2029
255531	35605	ESCAPE	3-Nov-03	45	NE	111	600	JUNEAU MISC.	03AJ2029
255532	35605	ESCAPE	3-Nov-03	45	NE	111	620	JUNEAU MISC.	03AJ2029
255533	35605	ESCAPE	3-Nov-03	45	NE	111	670	JUNEAU MISC.	03AJ2029
255534	35605	ESCAPE	3-Nov-03	45	NE	111		JUNEAU MISC.	03AJ2029
SELECT RECOVERIES									
80832	35605	SPORT	5-Sep-03	36	NE	111		JUNEAU	3045359

Appendix A2.–Random and select recoveries of coded-wire tagged coho salmon bound for Duck Creek by date sampled in 2003.

Head Number	Tag Code	Gear Class	Recovery Date	Stat. Week	Quad.	District	Length	Survey Site	Sample Number
RANDOM RECOVERIES									
234957	35606		8/25/2003	35	NE		585	JUNEAU	3045329
519165	35606	DRIFT	8/27/2003	35	NE	115	736	EXCURSION INLET	3100084
520038	35606	DRIFT	9/4/2003	36	NE	115	667	JUNEAU	3040081
226281	35606	TROLL	9/5/2003	36	NW	114	608	PELICAN	3010270
247504	35606	TROLL	9/7/2003	37	NW	113	700	HOONAH	3110199
226323	35606	TROLL	9/8/2003	37	NW	114	740	PELICAN	3010276
55870	35606	TROLL	9/9/2003	37	NW	114	720	ELFIN COVE	3020212
247585	35606	TROLL	9/11/2003	37	NW	114	650	HOONAH	3110212
517322	35606	DRIFT	9/25/2003	39	NE	115	675	JUNEAU	3040097
530045	35606	DRIFT	9/25/2003	39	NE	115	690	JUNEAU	3040095
SELECT RECOVERIES									
246819	35606	TROLL	8/11/2003	33	NW	114	665	HOONAH	3110112

Appendix A3.–Daily adult coho salmon returns to Jordan Creek, 2003.

Date	Coho Adults	Adipose-clipped Coho Adults	Coho Jacks	Adipose-clipped Coho jacks	Pinks	Chums	Comments
8/22/03	0	0	0	0	6	0	
8/23/03	0	0	0	0	4	0	
8/24/03	0	0	0	0	3	2	
8/25/03	0	0	0	0	7	1	
8/26/03	0	0	0	0	6	0	
8/27/03	0	0	0	0	3	0	
8/28/03	0	0	0	0	1	1	
8/29/03	0	0	0	0	0	0	
8/30/03	0	0	0	0	0	0	
8/31/03	0	0	0	0	5	0	
9/1/03	0	0	0	0	0	0	
9/2/03	6	3	0	0	25	1	
9/3/03	1	1	0	0	10	0	
9/4/03	0	0	0	0	0	0	
9/5/03	0	0	0	0	1	0	
9/6/03	0	0	0	0	3	0	
9/7/03	0	0	0	0	1	0	
9/8/03	5	5	0	0	2	2	
9/9/03	39	29	0	0	6	0	
9/10/03	11	7	0	0	1	1	
9/11/03	6	6	0	0	0	0	
9/12/03	5	5	0	0	1	0	
9/13/03	44	36	2	0	2	1	
9/14/03	17	11	0	0	0	1	
9/15/03	0	0	0	0	0	0	
9/16/03	0	0	0	0	0	0	
9/17/03	0	0	0	0	0	0	
9/18/03	0	0	0	0	0	0	
9/19/03	0	0	0	0	0	0	
9/20/03	0	0	0	0	0	0	
9/21/03	1	1	0	0	0	0	
9/22/03	0	0	0	0	0	0	
9/23/03	0	0	0	0	0	0	
9/24/03	56	44	0	0	0	0	
9/25/03	41	27	0	0	0	0	
9/26/03	5	3	0	0	0	0	
9/27/03	18	13	0	0	0	0	
9/28/03	64	52	0	0	0	0	
9/29/03	11	10	0	0	0	0	
9/30/03	4	3	0	0	0	1	
10/1/03	0	0	0	0	0	0	
10/2/03	0	0	0	0	0	0	
10/3/03	0	0	0	0	0	0	
10/4/03	0	0	0	0	0	0	
10/5/03	1	0	0	0	0	0	

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Date	Coho Adults	Adipose-clipped Coho Adults	Coho Jacks	Adipose-clipped Coho jacks	Pinks	Chums	Comments
10/6/03	1	1	0	0	0	0	
10/7/03	1	0	0	0	0	0	
10/8/03	0	0	0	0	0	0	
10/9/03	0	0	0	0	0	0	
10/10/03	6	5	0	0	0	0	
10/11/03	0	0	0	0	0	0	
10/12/03	0	0	0	0	0	0	
10/13/03	0	0	0	0	0	0	
10/14/03	0	0	0	0	0	0	
10/15/03	0	0	0	0	0	0	
10/16/03	0	0	0	0	0	0	
10/17/03	0	0	0	0	0	0	
10/18/03	1	0	0	0	0	0	
10/19/03	0	0	0	0	0	0	
10/20/03	1	1	0	0	0	0	
10/21/03	0	0	0	0	0	0	
10/22/03	0	0	0	0	0	0	
10/23/03	0	0	0	0	0	0	
10/24/03	0	0	0	0	0	0	
10/25/03	20	17	0	0	0	0	
10/26/03	20	17	0	0	0	0	
10/27/03	0	0	0	0	0	0	
10/28/03	4	3	0	0	0	0	
10/29/03	0	0	0	0	0	0	Weir pulled
Total	389	300	2	0	87	11	

Appendix A4.–List of computer data files archived from this study.

DATA FILE	DESCRIPTION
02DuckCoho.xls	Number of smolts trapped and tagged by day at Duck Creek, 2002.
02JordanCoho.xls	Number of smolts trapped and tagged by day at Jordan Creek, 2002.
02Duck_AWL.xls	Age, weight, and length sample for Duck Creek smolts, 2002.
02Jordan_AWL.xls	Age, weight, and length sample for Jordan Creek smolts, 2002.
02Jordan_SHCT.xls	Steelhead and cutthroat trout counts and lengths for Jordan Creek, 2002.
02Jordan_DV.xls	Dolly Varden counts and lengths for Jordan Creek, 2002.
Strayest02-03.xls	Worksheet for estimating hatchery strays in the escapement for Jordan Creek, 2002.
Harv_Exp_Rep_Duck_03.xls	Worksheets for marine harvest, exploitation rate, run size, and marine survival for Duck Creek coho salmon adults, 2003.
Harv_Exp_Rep_Jordan_03.xls	Worksheets for marine harvest, exploitation rate, run size, and marine survival for Jordan Creek coho salmon adults, 2003.
Jordan_Morts 03.xls	Carcass sampling data for 2003 Jordan Creek escapement.
Jordan_otoliths 03.xls	Analysis of otolith samples taken from carcasses from Jordan Creek, 2003.
Jordan_Adults_ASL 03.xls	Age, sex, length sampling from Jordan Creek adult coho, 2003.