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FINAL REPORT

SOUTHEAST ALASKA CHINOOK SALMON AGE, SEX, LENGTH PROJECT

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Alaska Department of Fish and Game **Division of Sport Fish**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used in Division of Sport Fish Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications without definition. All others must be defined in the text at first mention, as well as in the titles or footnotes of tables and in figures or figure captions.

Weights and measures (metric)

Centimeter	cm
Deciliter	dL
Gram	g
Hectare	ha
Kilogram	kg
Kilometer	km
liter	L
meter	m
metric ton	mt
milliliter	ml
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
ounce	oz
pound	lb
quart	qt
yard	yd
Spell out acre and ton.	

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
hour (spell out for 24-hour clock)	h
minute	min
second	s
Spell out year, month, and week.	

Physics and chemistry

all atomic symbols	
alternating current	AC
Ampere	A
Calorie	cal
direct current	DC
Hertz	Hz
Horsepower	hp
hydrogen ion activity	pH
parts per million	ppm
parts per thousand	ppt, ‰
Volts	V
Watts	W

General

All commonly accepted abbreviations.	e.g., Mr., Mrs., a.m., p.m., etc.
All commonly accepted professional titles.	e.g., Dr., Ph.D., R.N., etc.
And	&
At	@
Compass directions:	
east	E
north	N
south	S
west	W
Copyright	©
Corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
et alii (and other people)	et al.
et cetera (and so forth)	Etc.
exempli gratia (for example)	e.g.,
id est (that is)	i.e.,
latitude or longitude	Lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
number (before a number)	# (e.g., #10)
pounds (after a number)	# (e.g., 10#)
registered trademark	®
Trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S. state and District of Columbia abbreviations	use two-letter abbreviations (e.g., AK, DC)

Mathematics, statistics, fisheries

alternate hypothesis	H_A
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	F, t, χ^2, etc.
confidence interval	C.I.
correlation coefficient	R (multiple)
correlation coefficient	r (simple)
covariance	cov
degree (angular or temperature)	°
degrees of freedom	df
divided by	÷ or / (in equations)
equals	=
expected value	E
fork length	FL
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$log_{2,}$ etc.
mideye-to-fork	MEF
minute (angular)	'
multiplied by	x
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
standard length	SL
total length	TL
variance	vzr

TABLE OF CONTENTS

LIST OF TABLES

Table **Page**

LIST OF FIGURES

Figure **Page**

LIST OF APPENDICES

Appendix **Page**

ABSTRACT

As part of a continuing stock assessment program in Southeast Alaska, the Division of Sport Fish obtained age, sex, and length samples from Chinook salmon *Oncorhynchus tshawytscha* on Andrew Creek and the Blossom, Keta, and King Salmon rivers in 2007. These samples were used to estimate the age, sex, and length composition of the escapement, estimated, by a separate project, as the product of system specific standardized peak survey counts and predictive expansion factors. Poor weather and extended periods of flooding resulted in smaller than desired sample sizes, with precision levels for estimated age fractions ranging from 66% to 94% of goal. The percentage of females in the escapement ranged from 38.5% (SE = 7.4%) in the Blossom River to 59.4% (SE = 6.7%) in the King Salmon River. Age-1.4 fish comprised 11.3% (SE = 4.8%) of the escapement to the Blossom River compared to 27.9% (SE = 5.4%) in the Keta River, 34.3% (SE = 3.7%) in Andrew Creek, and 51.1% (SE = 6.7%) in the King Salmon River. As a percentage of escapement, age-1.2 "jacks" ranged from 33.3% (SE = 7.1%) of the Blossom River escapement to 4.7% (SE = 1.9%) in Andrew Creek. Freshwater age 0 fish were not found in the King Salmon River or Andrew Creek but were found to contribute approximately 8% and 11% respectively to the Keta River and Blossom River escapements. On average, by sex and major age class, Andrew Creek fish were shorter than were fish from the other three systems, while fish from the Blossom River were consistently the largest.

Key words: Chinook salmon, *Oncorhynchus tshawytscha*, escapement, Blossom River, Keta River, Andrew Creek, King Salmon River, peak survey count, expansion factor, age, sex, length composition, Southeast Alaska

INTRODUCTION

The King Salmon River is located on Admiralty Island, southeast of Juneau, and it supports a small run of Chinook salmon (Figure 1). Andrew Creek is a tributary of the lower Stikine River and it supports a moderate run of Chinook salmon, averaging about 1,500 large Chinook spawners (Figure 2). The Keta and Blossom rivers are located in Behm Canal near Ketchikan and also support small runs of Chinook salmon, with annual escapements of approximately 500 to 2,000 fish (Figure 3). These four stocks of Chinook salmon are all harvested in SEAK fisheries, and the Behm Canal stocks are also harvested to a minor extent in northern British Columbia fisheries. All four of these Chinook salmon populations are used as escapement indicator stocks by the CTC of the Pacific Salmon Commission (PSC). Escapement indicator stocks are used by the CTC to judge stock status of naturally spawning Chinook salmon stocks coast-wide, from SEAK through Oregon. The United States Section of the CTC (USCTC) developed data standards desirable for stock specific assessments of escapement, terminal runs, and forecasts of abundance against which existing stock assessment programs could be evaluated (USCTC 1997).

The USCTC (1997) report made specific findings relative to the current stock assessment program for all U. S. escapement indicator stocks relative to these data standards. The King Salmon River Chinook salmon stock assessment program failed to meet minimum data standards because age and sex composition of the annual escapements were not annually sampled. The Keta and Blossom Chinook salmon stock assessment programs failed to meet minimum data standards developed by the USCTC because of two reasons: (1) age and sex composition were not sampled on an annual basis, and (2) numerical index expansion factors specific to these rivers had not been verified. The USCTC (1997) recommendations for SEAK included:

"Develop permanent annual age and sex composition sampling of escapements for several river systems that are currently not sampled."

Since 1998, the Alaska Department of Fish and Game (ADF&G) has addressed these concerns with several programs, including mark-recapture studies on the Blossom and Keta rivers to estimate the escapement by age and to calculate a predictive survey expansion factor, and age, sex and length (ASL) sampling programs to estimate the composition of the Chinook salmon escapement to all four systems. Funding was provided by the CTC for implementation of the U.S. Chinook Letter of Agreement (LOA) and the Southeast Sustainable Salmon Fund.

This project supported sampling of the Andrew Creek and King Salmon, Blossom, and Keta river escapements in 2007 for age, length, and sex (ASL) composition in order to maintain the minimum USCTC standards relative to age and sex sampling for assessment programs on theses stocks.

Bringing the stock assessment program for SEAK Chinook salmon up to minimum USCTC standards is important to abundance-based management of PSC Chinook salmon fisheries for two reasons. First, the stock assessment data obtained through these programs is used by the CTC and in the CTC Chinook salmon model, which in turn is used to evaluate potential coast-wide fishery management options being considered or planned by the PSC and/or other fishery management agencies, as well as to assist in evaluating fishery management decisions already made. Data quality has limited the CTC and PSC in the past and as the PSC and coast-wide fishery management agencies shift to abundance-based management regimes, higher quality stock assessment data will be needed to ensure that both conservation and allocative fishery management objectives are realized. As the USCTC (1997) report states:

"The accuracy of the CTC evaluations depends to a considerable extent on the quality of the data provided by the management agencies. A previous review of monitoring and research needs by the CTC (1992) concluded that "the lack of reliable data in some areas and the complete lack of data in other areas…restrict the quality of CTC stock and fishery assessments""

and

"The USCTC anticipates that meeting these data standards will enable the CTC to provide additional rigor in CTC analyses. For example, the USCTC envisions: (1) including a measure of uncertainty in the preseason predictions of fishery abundance; (2) explicitly incorporating variance estimates in the escapement assessment; and (3) conducting biennial reviews of agency forecast performance relative to the data standards."

The CTC currently uses escapement data from six stocks, aggregated into a single stock group, in the Chinook Model for producing the annual preseason and postseason abundance indices and other parameters. These six stocks include the four targeted in this project and data from the Unuk and Chickamin rivers. Calendar year estimates of total escapement by age are required to model this data with any degree of precision. This project provides the age and sex composition for four of these stocks. A separate project provides total escapement and age/sex composition estimates for the Chickamin River. A third project, funded by ADF&G, provides total escapement and age/sex composition estimates for the Unuk River, the largest stock amongst these six.

A second reason this work is important is for stock specific, rather than coast-wide, implementation of abundance-based management regimes. Inadequate data currently prevent fine-tuned terminal management. An improved database could lead to a terminal fishery management approach in Behm Canal whereby U. S. fishermen annually target surplus production of Chinook from the Behm Canal stocks described here as well as other Behm Canal stocks of Chinook (e.g., the Unuk River stock). In the Pacific Salmon Treaty 1999 Revised Annexes, it states "SEAK fisheries will be managed to achieve escapement objectives for Southeast Alaska and Transboundary River Chinook stocks." (Chapter 3, footnote 1 to Attachment I).

Additionally, data from this and other projects are essential to evaluate escapement goals, based on new information. For example, at present the survey index counts in the Unuk, Chickamin, Keta and Blossom Rivers are used the CTC for evaluation of stock status because of the lack of accepted expansion factors for these stocks. In CTC Technical Note 9404, the CTC accepted survey count (index) escapement goals for the four Behm Canal stocks as developed by ADF&G. The CTC also agreed to recommendations, including the following:

1. *Expansion factors for total escapement should be verified for these systems. River-specific expansions need to be validated.*
2. *Age composition for each river system would improve the analysis (spawner-recruit). Whenever possible, annual samples should be obtained from each population.*

The objective of this project was to estimate the age, sex, and length composition of Chinook salmon spawning in the King Salmon, Blossom, and Keta rivers, and Andrew Creek in 2007 such that all estimated fractions would be within ± 10 percentage points of their true values 90% of the time for King Salmon and Blossom rivers; within ± 10 percentage points of their true values 95% of the time for Keta River; and within ± 8 percentage points of their true values 95% of the time for Andrew Creek.

STUDY AREA

The Blossom River is tributary to the Wilson Arm of Smeaton Bay, off Behm Canal (Figure 3), draining an area of 176 km^2. The river is confined within a narrow, steep-sided, glacier-carved valley, and has an overall mainstem gradient of about 1%. The system is defined by short glides, moderate riffles with small cobble and gravel sediments, and long, deep pools. There are two large logjams upstream from salt water at about river km (RK) 2 and RK10, and all gear and personnel are flown in by helicopter during low to normal water levels (Figure 4). Areas above the logjam at river RK10 can be accessed on foot up to about km 15 during low river levels, but a helicopter is needed to get to the upper spawning areas when water levels are above normal. A velocity block at RK17 denies spawners access to the upper 53% of the drainage (Pahlke and Magnus 2006). The Blossom River supports an annual spawning population of approximately 500-2,000 fish annually.

The Keta River is tributary to Boca de Quadra Inlet, off Behm Canal draining an area of approximately 193 km^2 (Figure 3). The system is characterized by large cobble riverbed sediments, exposed bars, steep rivers, and very large, bedrock controlled pools (Brownlee et al 1999). An estimated 52% of spawning habitat is between the mouth and km 4.0, 22% between km 4.0 and the confluence of Hill Creek at km 7.0, and the remaining spawning habitat is upstream of Hill Creek (Hafele 1983; Figure 4). The Keta River supports an annual spawning population of approximately 500-2,000 fish annually.

The King Salmon River is located on Admiralty Island, flowing into King Salmon Bay in the eastern part of Stephens Passage about 25 km southeast of Juneau Alaska, and drains an area of approximately 100 km^2 (Pahlke 1993; Figure 1). This is the only island system in Southeast Alaska that supports an annual spawning population of more than 100 Chinook salmon.

Andrew Creek is a tributary of the Stikine River located in the U.S. portion of the watershed near the limit of tidal influence (Figure 2). Historically spawning populations of Chinook salmon in Andrews Creek have been treated as a separate stock from Chinook salmon spawning upriver in Canada (Richards et al In press). Andrew Creek supports a moderate run of Chinook salmon, averaging about 1,500 large Chinook spawners annually.

METHODS

Sampling goals were established to estimate the age and sex composition of Chinook salmon spawning in the King Salmon, Blossom, and Keta rivers, and Andrew Creek such that all estimated fractions would be within ± 10 percentage points of their true values 90% of the time for King Salmon and Blossom rivers; within ± 10 percentage points of their true values 95% of the time for Keta River; and within ± 8 percentage points of their true values 95% of the time for Andrew Creek. Sample sizes needed to estimate age composition would be sufficient to estimate the mean length of major age classes (comprising > 5% of the runs) such that all estimates would be within ± 10 mm (mid-eye to fork-of-tail measurement) of their true values 90% of the time. Sampling goals were consequently established as 100 for both the Blossom and King Salmon rivers, 127 for the Keta River, and 200 for Andrew Creek.

Estimation of Spawning Abundance

Standardized, low altitude helicopter surveys have been used to count large Chinook salmon in the Blossom and Keta rivers since 1975 (Pahlke 1998). Annual helicopter and/or foot surveys have been conducted since 1971 to count spawning abundance in the King Salmon River, and helicopter, fixed-wing, and/or foot surveys have been used to count large Chinook salmon in Andrew Creek in 1975, 1979, 1981, 1982, and annually since 1984 (McPherson and Clark 2001, McPherson et al 2005). In most cases, multiple surveys are conducted on each system annually, and the largest or “peak” survey count is used as an index of the spawning abundance of large Chinook salmon.

Peak survey counts were multiplied by system specific long-term (predictive) expansion factors ($\bar{\pi}$) to provide estimates of the spawning abundance of large Chinook salmon in 2007. The expansion factors were estimated for each system by ADF&G using data from years with peak survey counts and either mark-recapture or weir estimates of spawning abundance. Mark-recapture (M-R) studies were conducted in the Blossom River in 1998 and 2004-2006 (Brownlee et al 1999; Pahlke and Magnus 2005, 2006; Weller et al 2007), and in the Keta River from 1998-2000 (Brownlee et al 1999; Freeman et al 2000, 2001). Weirs were used to estimate spawning abundance of large Chinook salmon in Andrew Creek (1976-1984 and 1997; Clark et al 1998) and the King Salmon River (1983-1992; McPherson and Clark 2001). Currently established expansion factors for Andrew Creek and the Keta, Blossom, and King Salmon rivers are 1.95 (SE = 0.45), 3.0 (SE = 0.52), 3.01 (SE = 1.03), and 1.52 (SE = 0.26) respectively (detailed methodology provided in McPherson and Clark 2001; Freeman et al 2001;Weller et al 2007; McPherson et al 2005).

The abundance of medium-sized fish (405-655 mm MEF) was estimated indirectly by expanding the estimate for large fish by the estimated size composition of the spawning escapement:

$$\hat{\mathrm{N}}_{\mathrm{M}} = \hat{\mathrm{N}}_{\mathrm{L}}\left(\frac{1}{\hat{\phi}} - 1\right), \qquad (1)$$

$$\mathrm{var}(\hat{N}_M) = \mathrm{var}(\hat{N}_L)\left[\frac{1}{\phi} - 1\right]^2 + \hat{N}_L^{\,2}\left[\frac{1}{\phi^4}\frac{\phi(1-\phi)}{n-1}\right] - \mathrm{var}(\hat{N}_L)\left[\frac{1}{\phi^4}\frac{\phi(1-\phi}{n-1}\right] \qquad (2)$$

where $\hat{N}_M$ is the estimated spawning escapement of medium-sized fish, $\hat{N}_L$ is the estimated spawning escapement of large fish, and $\hat{\phi}$ is the estimated fraction of large sized fish in the spawning population Chinook salmon as determined from age, sex, and length (ASL) samples collected on the spawning grounds (McPherson et al. 1996). Testing of the spawning grounds samples collected on these systems has consistently found no evidence of size or gender selectivity.

Historically, negligible numbers of small-sized fish (<405 mm MEF) have been captured in these systems, and consequently spawning abundance for small-sized fish is not estimated.

Age, Sex, and Length Composition

The King Salmon River is sampled by flying a crew from Juneau via helicopter to the upper end of the spawning area. The crew then works their way downstream to the mouth of the river and is picked up and returned to Juneau by helicopter. To sample Andrew Creek a crew flies to Wrangell and then travels by skiff or float plane to a base camp on the lower mainstem of the Stikine River. The crew then travels daily from the base camp by boat to Andrew Creek and samples the system on foot. To sample the Blossom and Keta rivers, crews fly by helicopter from ADF&G field camps on the Unuk and/or Chickamin rivers and/or from Ketchikan, sample each system, and return to their original location at the end of the day. Because these rivers are large and the spawning areas too widely dispersed to sample effectively by foot, helicopter assistance is required. All four systems require crews be available to fly on short notice when the river conditions are favorable for sampling. Each system generally requires multiple sampling trips to achieve the desired sampling goals.

Chinook salmon were captured by hand, by gigs fitted on a spear, by rod and reel, and/or by net depending on which method was most efficient. Five scales were taken from each captured fish (Welander 1940). Scales were mounted onto gum cards; each gum card had the capacity to hold scales from up to 10 fish. The age of each fish was determined later from annual growth patterns of circuli (Olsen 1992) on images of scales impressed onto acetate magnified 70× (Clutter and Whitesel 1956). Each fish was measured from mid-eye to fork (MEF) of tail and sex was determined by external morphological characteristics. Data was recorded on standard ADF&G biological-sampling forms. All sampled Chinook salmon carcasses were slashed along their left side and all live fish sampled were marked with a hole punched in their left operculum to ensure double sampling did not occur. All fish were examined for the absence of the adipose fin, indicating the possible presence of a coded wire tag. Heads from all fish without adipose fins were collected and forwarded to the ADF&G Mark, Tag, and Age Laboratory for decoding, along with all pertinent data and forms

Due to sampling error or regeneration, age cannot be determined from all scale samples. Regenerated scales lack circuli prior to the age of their formation, providing an incomplete record from which to determine age. Consequently, regenerated scales were not used in the estimation of the age composition of the Keta River, Blossom River, or Andrew Creek spawning populations. In the historical data set of the King Salmon River however, only a negligible proportion of sampled Chinook salmon have had a fresh water age other than 1. Regenerated scales from this system lacking circuli formed during fresh water residence, but with circuli formed during marine residence, were assumed to have a fresh water age of 1 and were therefore used in age composition estimates.

The proportion of the spawning population composed of a given age within a size class was estimated as a binomial variable:

$$\hat{p}_{ij} = \frac{n_{ij}}{n_i} \tag{3}$$

$$\text{var}(\hat{p}_{ij}) = \frac{\hat{p}_{ij}(1-\hat{p}_{ij})}{n_i - 1} \tag{4}$$

Where $\hat{p}_{ij}$ is the estimated proportion of the population of age j in size group i, n_{ij} is the number of Chinook salmon of age j of size group i, and n_i is the number of Chinook salmon in the sample n of size group i. Numbers of spawning fish by age were estimated as the sum of the products of estimated age composition and estimated abundance within a size category:

$$\hat{N}_j = \sum_i (\hat{p}_{ij}\hat{N}_i) \tag{5}$$

and with variance calculated according to procedures in Goodman (1960):

$$\text{var}(\hat{N}_j) = \sum_i \left(\text{var}(\hat{p}_{ij}) \hat{N}_i^2 + \text{var}(\hat{N}_i) \hat{p}_{ij}^2 - \text{var}(\hat{p}_{ij}) \text{var}(\hat{N}_i) \right) \tag{6}$$

The proportion of the spawning population composed of a given age was estimated as the summed totals across size categories:

$$\hat{p}_j = \frac{\hat{N}_j}{\hat{N}} \tag{7}$$

and:

$$\text{var}(\hat{p}_j) = \frac{\sum_i (\text{var}(\hat{p}_{ij}) \hat{N}_i^2 + \text{var}(\hat{N}_i)(\hat{p}_{ij} - \hat{p}_j)^2)}{\hat{N}^2} \tag{8}$$

where $\hat{N}$ is the sum of fish of all sizes, and variance is approximated according to procedures in Seber (1982, p. 8–9).

Sex composition and age-sex composition for the entire spawning population and its associated variances were also estimated using the above equations by first redefining the binomial variables in samples to produce estimated proportions by sex $\hat{p}_k$, where k denotes gender (male or female), such that $\sum_k \hat{p}_k = 1$, and by age-sex $\hat{p}_{jk}$, such that $\sum_{jk} \hat{p}_{jk} = 1$.

Standard sample summary statistics were used to calculate estimates of mean length at age and its variance (Cochran 1977).

Sampling goals were established to estimate the age and sex composition of Chinook salmon spawning in the King Salmon, Blossom, and Keta rivers, and Andrew Creek such that estimated fractions of major age classes (comprising > 5% of the runs) would be within ± 10 percentage points of their true values 90% of the time for King Salmon and Blossom rivers; within ± 10 percentage points of their true values 95% of the time for Keta River; and within ± 8 percentage points of their true values 95% of the time for Andrew Creek. Sample sizes needed to estimate age composition would be sufficient to estimate the mean length of major age classes (comprising > 5% of the runs) because there are more age categories than sex categories, such that all estimates would be within ± 10 mm (mid-eye to fork-of-tail measurement) of their true values 90% of the time. Sampling goals were consequently established as 100 for both the Blossom and King Salmon rivers, 127 for the Keta River, and 200 for Andrew Creek.

RESULTS

King Salmon River

A peak survey count of 119 large Chinook salmon in the King Salmon River (Pahlke In prep) resulted in an estimated spawning abundance of 181 (SE = 31) large and 34 (SE = 13) medium-sized fish in 2007. A total of 63 fish were captured on the spawning grounds and sampled for ASL between 30 July and 3 August 2007. Scales from two of the samples were not used in the age composition analysis due to regeneration.

An estimated 59.4% (SE = 6.7%) of the escapement was determined to be female, of which 66.7% were age-1.4 and the remainder were age-1.3 fish (Table 1). The escapement of males was approximately equally divided between age-1.2, -1.3, and -1.4 fish. An estimated 51.1% (SE = 6.7%) of the escapement was comprised of age-1.4 fish, 34.6% (SE = 6.2%) were age-1.3, and 14.3% (SE = 5.3%) were age-1.2 fish. We were 75% confident that the age classes were estimated to be within ± 10 percentage points of their true values.

The average length of age-1.2 males was 611 mm MEF (SD = 25; Table 2). On average, age-1.3 males were smaller than age-1.3 females, 762 mm MEF (SD = 68) compared to 805 mm MEF (SD = 35). The reverse was true for age-1.4 fish where males averaged 883 mm MEF (SD = 47) compared to 854 mm MEF (SD = 40) for female fish (Table 2).

Andrew Creek

A peak survey count of 890 large Chinook salmon in Andrew Creek (Pahlke In prep) resulted in an estimated spawning abundance of 1,736 (SE = 401) large and 121 (SE = 44) medium-sized fish in 2007. A total of 200 fish were captured on the spawning grounds and sampled for ASL between 6 August and 8 August, 2007. Scales from 27 of the samples were not used in the age composition analysis due to regeneration and one sample was not used for lack of associated gender data.

The escapement was comprised of an estimated 56.8% (SE = 3.8%) age-1.3 fish, 34.8% age-1.4 fish, and 4.7% (SE = 1.9%) and 4.1% (SE = 1.5%) of age-1.2 and age-1.5 fish, respectively (Table 3). We were 94% confident that the age classes were estimated to be within ± 10 percentage points of their true values. An estimated 51.4% (SE = 3.9%) of the escapement was determined to be female.

The average length of age-1.2 males was 537 mm MEF (SD = 83; Table 4). On average, age-1.3 males were smaller than age-1.3 females, 739 mm MEF (SD = 78) compared to 774 mm MEF (SD = 54). Age-1.4 males averaged 829 mm MEF (SD = 54) as compared to 808 mm MEF (SD = 45) for female age-1.4 fish (Table 4). By sex and major age class, average fish length was smaller on Andrew Creek than at the Blossom, King Salmon, or Keta rivers.

Blossom River

A peak survey count of 130 large Chinook salmon in the Blossom River (Pahlke In prep) resulted in an estimated spawning abundance of 503 (SE = 81) large and 97 (SE = 36) medium-sized fish in 2007. A total of 62 fish were captured on the spawning grounds and sampled for ASL between 24 August and 10 September, 2007. Scales from 15 of the samples were not used in the age composition analysis due to regeneration.

Fish with freshwater ages of 0 and 1 comprised approximately 10.1% and 89.9% of the escapement, respectively (Table 5). Age-0.2 fish, all male, comprised 20% (SE = 13.3%) of medium-sized fish and 5.5% (SE = 3.3%) of the total escapement. Age-1.2 fish, all males, comprised an estimated 80.0% (SE = 13.3%) of medium-sized fish, 24.3% (SE = 7.2%) of large fish, and 33.3% (SE = 7.1%) of the total escapement. Age-0.3 and age-0.4 fish comprised 4.5% (SE = 3.2%) and 6.8% (SE = 3.8%) of the escapement. Females, all large, accounted for 38.5% (SE = 7.4%) of the escapement. Age-1.3 and age-1.4 fish accounted for an estimated 38.5% (SE = 7.4%) and 11.3% (SE = 4.8%) of the total escapement (Table 5). We were 66% confident that the age classes were estimated to be within ± 10 percentage points of their true values.

The average length of age-0.2 and age-1.2 males was 667 mm MEF (SD = 55) and 674 mm MEF (SD = 48), respectively (Table 6). On average, age-1.3 males were smaller than their female counterparts, 779 mm MEF (SD = 80) compared to 824 mm MEF (SD = 42). By sex and major age class, average fish length was larger on the Blossom River than at Andrew Creek, the King Salmon River, or the Keta River.

Keta River

A peak survey count of 310 large Chinook salmon in the Blossom River (Pahlke In prep) resulted in an estimated spawning abundance of 930 (SE = 161) large and 144 (SE = 49) medium-sized fish in 2007. A total of 97 fish were captured on the spawning grounds and sampled for ASL between 23 August and 10 September, 2007. Scales from 27 of the samples were not used in the age composition analysis due to regeneration.

Fish with freshwater ages of 0 and 1 comprised approximately 8.4% and 91.6% of the escapement, respectively (Table 7). Age-1.1 fish, all male, comprised 25% (SE = 16.4%) of medium-sized fish and 3.4% (SE = 0.5%) of the total escapement. Age-1.2 fish, all males, comprised an estimated 75.0% (SE = 16.4%) of medium-sized fish, 9.7% (SE = 3.8%) of large fish, and 18.4% (SE = 4.9%) of the total escapement. Age-0.2, -0.3 and -0.4 fish comprised 1.4% (SE = 1.4%), 4.2% (SE = 2.4%), and 2.8% (SE = 2.0%) of the escapement. Females, all large, accounted for 41.9% (SE = 5.9%) of the escapement. Age-1.3 and age-1.4 fish accounted for an estimated 41.9% (SE = 5.9%) and 27.9% (SE = 5.4%) of the total escapement (Table 7). We were 82% confident that the age classes were estimated to be within ± 10 percentage points of their true values.

The average length of age-1.1 and age-1.2 males was 468 mm MEF (SD = 25) and 655 mm MEF (SD = 61), respectively (Table 8). On average, age-1.3 and age-1.4 males were smaller than their female counterparts, 806 mm MEF (SD = 76) compared to 847 mm MEF (SD = 54) and 867 (SD = 98) compared to 884 (SD = 32), respectively (Table 8).

DISCUSSION

Sampling goals were not attained in either the Blossom or Keta rivers due primarily to extremely poor weather conditions, even by SE Alaska standards, and persistent flooding. ADF&G crews from the Unuk River and Chickamin River camps repeatedly attempted to reach these systems throughout the duration of spawning, but were rebuffed by unacceptable flying conditions on all but two trips of two-days each. River levels on the successful trips were higher than desired for maximum sampling effectiveness. In addition, it is believed we were unable to sample during the peak period of spawning on these systems, further decreasing effectiveness.

In addition to the biological objectives of this project, an additional objective of performing necessary maintenance to our logistical bases on the Chickamin and Stikine River camps was approved by the PSC in mid-season. On the Chickamin River, two leased cabins which are used as a staging area to access the ADFG field camp on that river, over-winter gear storage, and short-term personnel accommodations, were raised and the foundation supports and foundation stringers were replaced. In addition, pilings were replaced on the Chickamin River camp's tent platforms, bunks were replaced, and other necessary maintenance performed. Similar maintenance was planned for the Stikine River field camp but logistical and personnel limitations forced deferral to fall 2008.

A detailed list of expenditures for this project is provided in Appendix-A1. Actual versus anticipated expenditures differed in two major areas; costs of helicopter/float plane charters and personnel. Charter costs were absorbed by other projects, and were less than anticipated in any case due to our inability to fly during much of the sampling season due to unacceptable conditions. Personnel costs were greater than expected due to unanticipated costs associated with cabin and tent platform maintenance on the Chickamin River and the need to keep crews on both the Unuk and Chickamin River on hand to fly to the Blossom and Keta Rivers over extended periods of time. We were also unable to schedule a Swift water Rescue training class as anticipated due to scheduling conflicts between instructors and crew. Materials travel, and contract costs (other than charters) were similar to anticipated costs.

CONCLUSIONS AND RECOMMENDATIONS

Andrew Creek sampling goals were attained but the desired level of precision in our estimates was not met due to the necessity of excluding 13.5% of the samples due to scale regeneration. Regenerated scales also comprised 24% of the samples from the Blossom River and 27% of scales from the Keta River. In order to achieve the desired levels of precision in future estimates, we recommend that sampling goals for the Blossom River, Keta River, and Andrew Creek be increased to 125, 165, and 225, respectively.

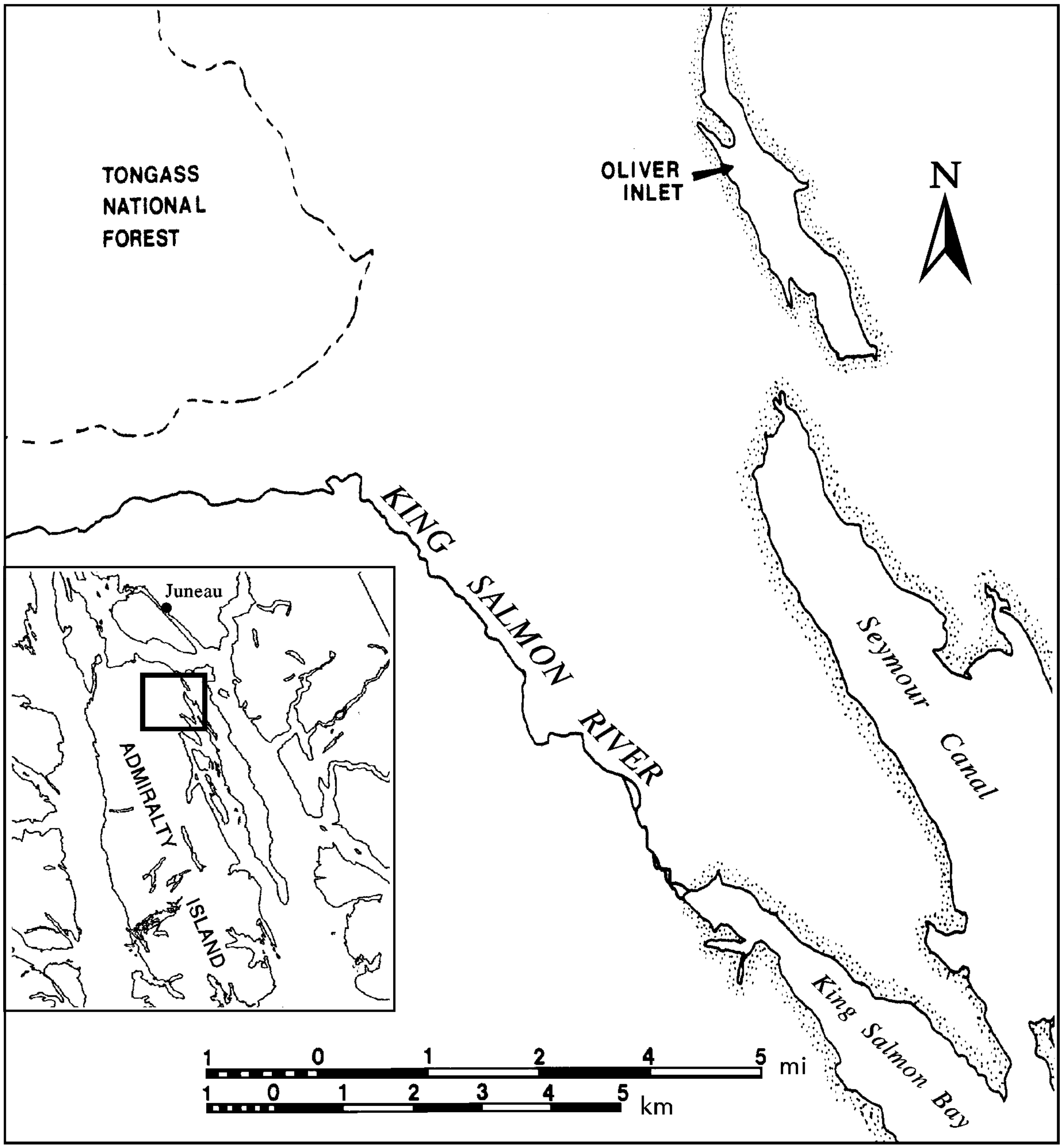

Figure 1.-The King Salmon River on Admiralty Island in Southeast Alaska.

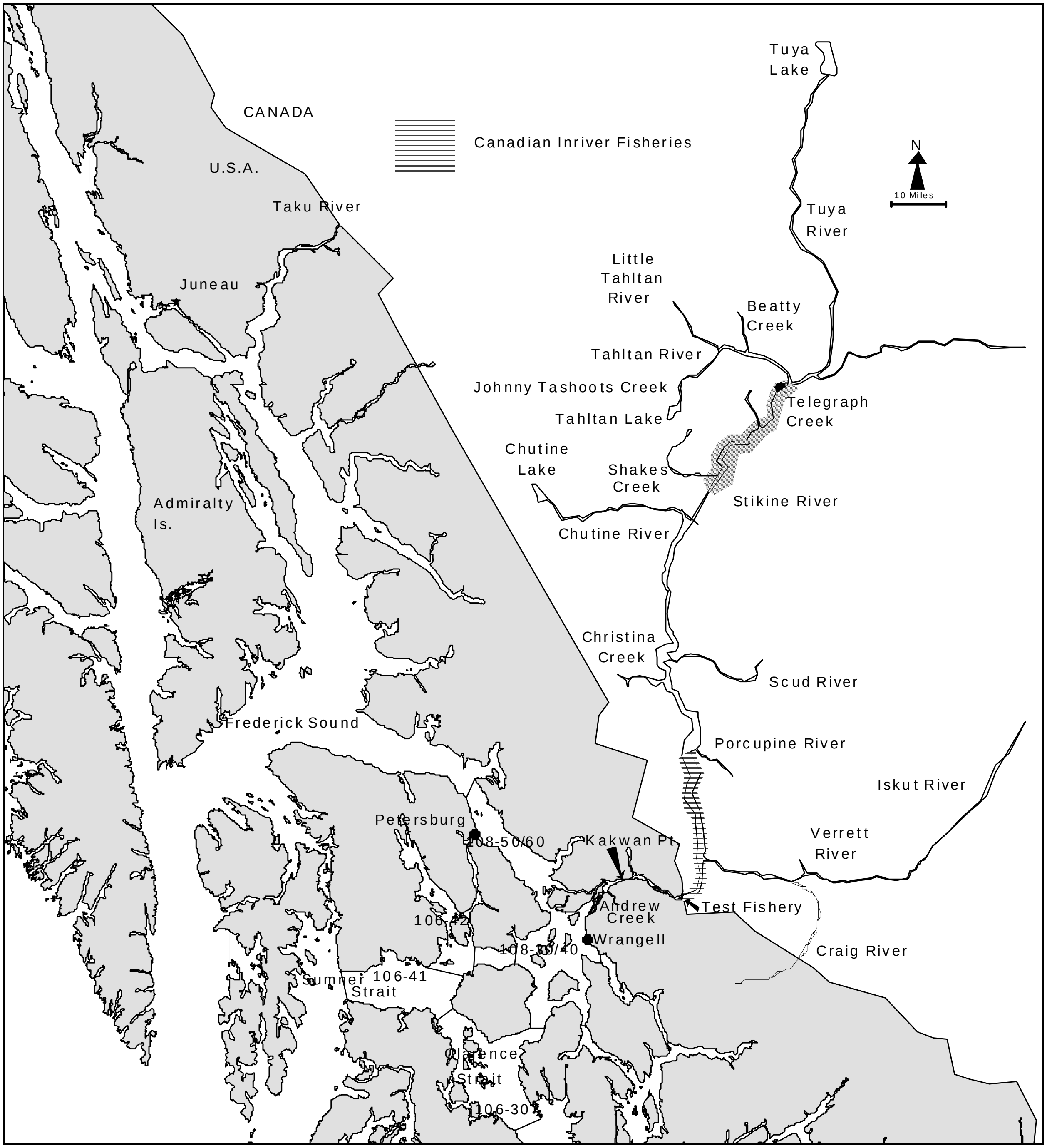

Figure 2.-The Stikine River and tributaries.

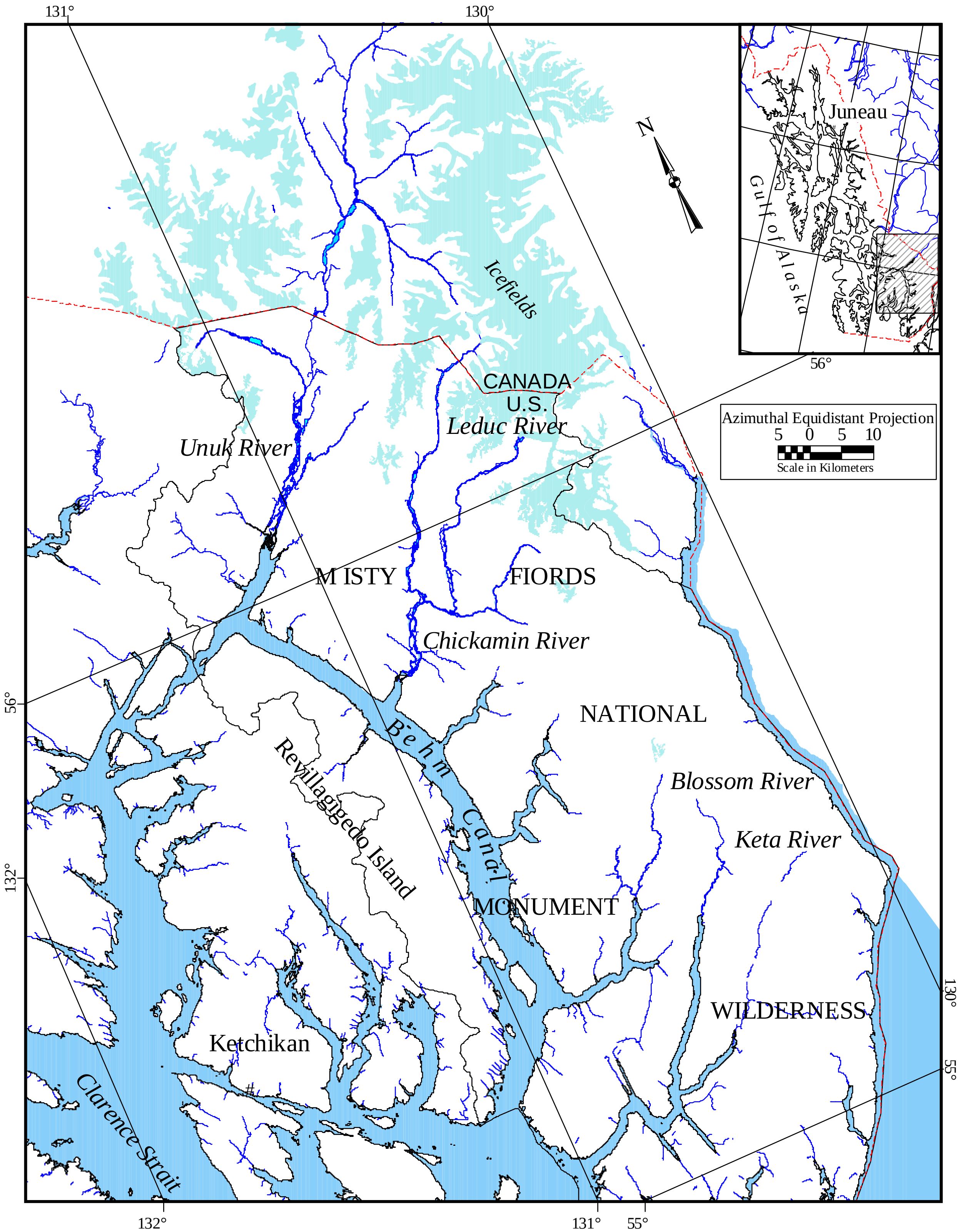

Figure 3.-Behm Canal in Southeast Alaska and the location of the Blossom and Keta rivers.

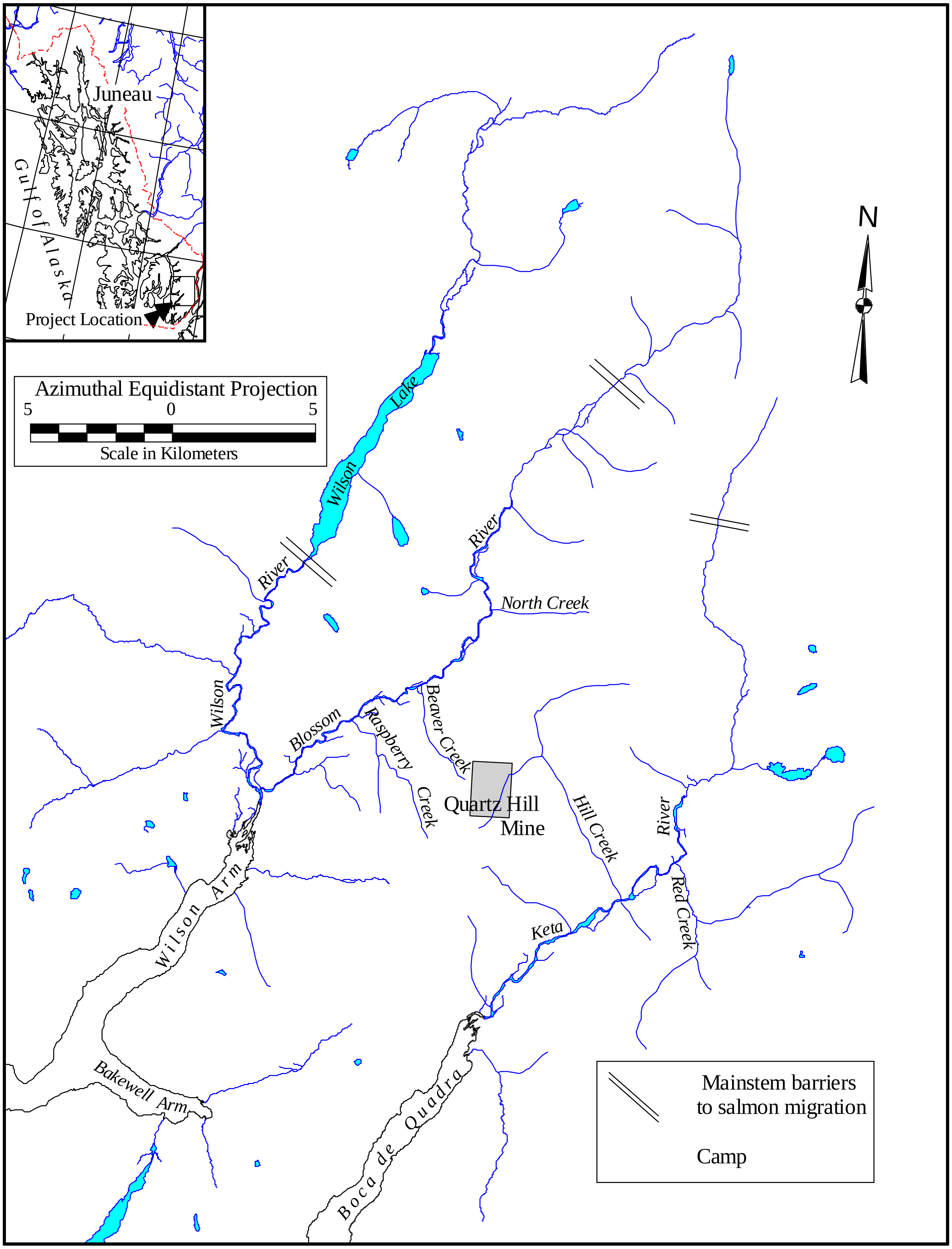

Figure 4.–The Blossom and Keta river drainages in Southeast Alaska, showing location of major tributaries and barriers to fish migration.

Table 1.-Estimated age and sex composition and escapement of large (≥660 mm MEF) and medium (401-659 mm MEF) Chinook salmon in the King Salmon River, 2007. Estimates are from Chinook salmon sampled on the spawning grounds.

		BROOD YEAR AND AGE CLASS			
		2003	2002	2001	
		1.2	1.3	1.4	Total
PANEL A: AGE COMPOSITION OF MEDIUM CHINOOK SALMON					
Males[a]	Sample size	9	1		10
	p_{ijk} x100	90.0%	10.0%		100.0%
	$SE(p_{ijk})$x100	10.0%	10.0%		
	N_{ijk}	31	3		34
	$SE(N_{ijk})$	12	3		13
PANEL B: AGE COMPOSITION OF LARGE CHINOOK SALMON					
Males	Sample size		8	7	15
	p_{ijk} x100		15.7%	13.7%	29.4%
	$SE(p_{ijk})$x100		5.1%	4.9%	6.4%
	N_{ijk}		28	25	53
	$SE(N_{ijk})$		10	10	15
Females	Sample size		12	24	36
	p_{ijk} x100		23.5%	47.1%	70.6%
	$SE(p_{ijk})$x100		6.0%	7.1%	6.4%
	N_{ijk}		43	85	128
	$SE(N_{ijk})$		13	19	25
Sexes	Sample size		20	31	51
combined	p_{ij} x100		39.2%	60.8%	100.0%
	$SE(p_{ij})$x100		6.9%	6.9%	
	N_{ij}		71	110	181
	$SE(N_{ij})$		17	22	31
PANEL C: AGE COMPOSITION OF MEDIUM AND LARGE CHINOOK SALMON					
Males	Sample size	9	9	7	25
	p_{ik} x100	14.3%	14.8%	11.5%	40.6%
	$SE(p_{ik})$x100	5.3%	4.6%	4.2%	6.7%
	N_{jk}	31	32	25	87
	$SE(N_{jk})$	12	11	10	20
Females	Sample size		12	24	36
	p_{ik} x100		19.8%	39.6%	59.4%
	$SE(p_{ik})$x100		5.2%	6.5%	6.7%
	N_{jk}		43	85	128
	$SE(N_{jk})$		13	19	25
Sexes	Sample size	9	21	31	61
combined	p_j x100	14.3%	34.6%	51.1%	100.0%
	$SE(p_j)$x100	5.3%	6.2%	6.7%	
	N_j	31	74	110	215
	$SE(N_j)$	12	18	22	34

a No medium-sized females were captured.

Table 2.-Estimated average length (mm MEF) by sex and age of the escapement of Chinook salmon in the King Salmon River, 2007. Estimates are from Chinook salmon sampled on the spawning grounds.

		BROOD YEAR AND AGE CLASS			
		2003	2002	2001	
		1.2	1.3	1.4	Total
Males	Sample size	9	9	7	25
	Avg. length	611	762	883	742
	SD	23	68	47	121
	SE	8	23	18	24
Females	Sample size[a]		12	24	38
	Avg. length		805	854	841
	SD		35	40	46
	SE		10	8	7
Sexes combined	Sample size[a]	9	21	31	63
	Avg. length	611	787	860	801
	SD	23	55	43	96
	SE	8	12	8	12

a Sample sizes for total females and total sexes combined each include two females of unknown age

Table 3.-Estimated age and sex composition and escapement of large (≥660 mm MEF) and medium (401-659 mm MEF) Chinook salmon in Andrew Creek, 2007. Estimates are from Chinook salmon sampled on the spawning grounds.

		BROOD YEAR AND AGE CLASS				
		2003	2002	2001	2000	
		1.2	1.3	1.4	1.5	Total
PANEL A: AGE COMPOSITION OF MEDIUM CHINOOK SALMON						
Males	Sample size	7	5			12
	p_{ijk} x100	53.8%	38.5%			92.3%
	$SE(p_{ijk})$x100	14.4%	14.0%			7.7%
	N_{ijk}	65	47			112
	$SE(N_{ijk})$	29	23			41
Females	Sample size		1			1
	p_{ijk} x100		7.7%			7.7%
	$SE(p_{ijk})$x100		7.7%			7.7%
	N_{ijk}		9			9
	$SE(N_{ijk})$		9			9
Sexes	Sample size	7	6			13
combined	p_{ij} x100	53.8%	46.2%			100.0%
	$SE(p_{ij})$x100	14.4%	14.4%			
	N_{ij}	65	56			121
	$SE(N_{ij})$	29	26			44
PANEL B: AGE COMPOSITION OF LARGE CHINOOK SALMON						
Males	Sample size	1	48	18	5	72
	p_{ijk} x100	0.6%	30.4%	11.4%	3.2%	45.6%
	$SE(p_{ijk})$x100	0.6%	3.7%	2.5%	1.4%	4.0%
	N_{ijk}	11	527	198	55	791
	$SE(N_{ijk})$	11	137	63	27	194
Females	Sample size	1	43	40	2	86
	p_{ijk} x100	0.6%	27.2%	25.3%	1.3%	54.4%
	$SE(p_{ijk})$x100	0.6%	3.6%	3.5%	0.9%	4.0%
	N_{ijk}	11	472	439	22	945
	$SE(N_{ijk})$	11	124	117	16	228
Sexes	Sample size	2	91	58	7	158
combined	p_{ij} x100	1.3%	57.6%	36.7%	4.4%	100.0%
	$SE(p_{ij})$x100	0.9%	3.9%	3.8%	1.6%	
	N_{ij}	22	1,000	637	77	1,736
	$SE(N_{ij})$	16	240	161	33	401

-continued-

Table 3.-Page 2 of 2.

		BROOD YEAR AND AGE CLASS				
		2003	2002	2001	2000	
		1.2	1.3	1.4	1.5	Total
PANEL C: AGE COMPOSITION OF MEDIUM AND LARGE CHINOOK SALMON						
Males	Sample size	8	53	18	5	84
	p_{ik} x100	4.1%	30.9%	10.6%	3.0%	48.6%
	$SE(p_{ik})$x100	1.8%	3.6%	2.4%	1.3%	3.9%
	N_{jk}	76	574	198	55	903
	$SE(N_{jk})$	31	139	63	27	199
Females	Sample size	1	44	40	2	87
	p_{ik} x100	0.6%	25.9%	23.7%	1.2%	51.4%
	$SE(p_{ik})$x100	0.6%	3.4%	3.3%	0.8%	3.9%
	N_{jk}	11	482	439	22	954
	$SE(N_{jk})$	11	125	117	16	228
Sexes	Sample size	9	97	58	7	171
combined	p_j x100	4.7%	56.8%	34.3%	4.1%	100.0%
	$SE(p_j)$x100	1.9%	3.8%	3.7%	1.5%	
	N_j	87	1,056	637	77	1,857
	$SE(N_j)$	33	241	161	33	403

Table 4.-Estimated average length (mm MEF) by sex and age of the escapement of Chinook salmon in Andrew Creek, 2007. Estimates are from Chinook salmon sampled on the spawning grounds.

		BROOD YEAR AND AGE CLASS					
		2004	2003	2002	2001	2000	
		1.1	1.2	1.3	1.4	1.5	Total
Males	Sample size[a]	1	8	54	18	5	96
	Avg. length	335	537	739	829	799	741
	SD		83	78	54	61	110
	SE		29	11	13	27	11
Females	Sample size[b]		1	43	40	2	103
	Avg. length		795	774	808	833	792
	SD			54	45	95	52
	SE			8	7	68	5
Sexes	Sample size[cd]	1	9	98	58	7	200
combined	Avg. length	335	566	755	814	809	767
	SD		116	70	49	65	89
	SE		39	7	6	25	6

a Total includes 10 male Chinook salmon of unknown age.

b Total includes 17 female Chinook salmon of unknown age.

c Sample size for age-1.3 includes one fish of unknown gender.

d Total includes 27 Chinook salmon of unknown age and one age-1.3 fish of unknown gender.

Table 5.-Estimated age and sex composition and escapement of large (≥660 mm MEF) and medium (401-659 mm MEF) Chinook salmon in the Blossom River, 2007. Estimates are from Chinook salmon sampled on the spawning grounds.

		BROOD YEAR AND AGE CLASS						
		2004	2003	2003	2002	2002	2001	
		0.2	0.3	1.2	0.4	1.3	1.4	Total
PANEL A: AGE COMPOSITION OF MEDIUM CHINOOK SALMON								
Males[a]	Sample size	2		8				10
	p_{ijk} x100	20.0%		80.0%				100.0%
	$SE(p_{ijk})$x100	13.3%		13.3%				
	N_{ijk}	19		77				97
	$SE(N_{ijk})$	14		32				36
PANEL B: AGE COMPOSITION OF LARGE CHINOOK SALMON								
Males	Sample size	1	1	9	1	7	1	20
	p_{ijk} x100	2.7%	2.7%	24.3%	2.7%	18.9%	2.7%	54.1%
	$SE(p_{ijk})$x100	2.7%	2.7%	7.2%	2.7%	6.5%	2.7%	8.3%
	N_{ijk}	14	14	122	14	95	14	272
	$SE(N_{ijk})$	14	14	41	14	36	14	60
Females	Sample size		1		2	10	4	17
	p_{ijk} x100		2.7%		5.4%	27.0%	10.8%	45.9%
	$SE(p_{ijk})$x100		2.7%		3.8%	7.4%	5.2%	8.3%
	N_{ijk}		14		27	136	54	231
	$SE(N_{ijk})$		14		19	43	27	55
Sexes	Sample size	1	2	9	3	17	5	37
combined	p_{ij} x100	2.7%	5.4%	24.3%	8.1%	45.9%	13.5%	100.0%
	$SE(p_{ij})$x100	2.7%	3.8%	7.2%	4.5%	8.3%	5.7%	
	N_{ij}	14	27	122	41	231	68	503
	$SE(N_{ij})$	14	19	41	24	55	30	81
PANEL C: AGE COMPOSITION OF MEDIUM AND LARGE CHINOOK SALMON								
Males	Sample size	3	1	17	1	7	1	30
	p_{ik} x100	5.5%	2.3%	33.3%	2.3%	15.9%	2.3%	61.5%
	$SE(p_{ik})$x100	3.3%	2.3%	7.1%	2.3%	5.6%	2.3%	7.4%
	N_{jk}	33	14	200	14	95	14	369
	$SE(N_{jk})$	20	14	51	14	36	14	70
Females	Sample size		1		2	10	4	17
	p_{ik} x100		2.3%		4.5%	22.7%	9.1%	38.5%
	$SE(p_{ik})$x100		2.3%		3.2%	6.4%	4.4%	7.4%
	N_{jk}		14		27	136	54	231
	$SE(N_{jk})$		14		19	43	27	55
Sexes	Sample size	3	2	17	3	17	5	47
combined	p_j x100	5.5%	4.5%	33.3%	6.8%	38.5%	11.3%	100.0%
	$SE(p_j)$x100	3.3%	3.2%	7.1%	3.8%	7.4%	4.8%	
	N_j	33	27	200	41	231	68	600
	$SE(N_j)$	20	19	51	24	55	30	88

a No medium-sized females were sampled.

Table 6.-Estimated average length (mm MEF) by sex and age of the escapement of Chinook salmon in the Blossom River, 2007. Estimates are from Chinook salmon sampled on the spawning grounds.

		BROOD YEAR AND AGE CLASS						
		2004	2003	2003	2002	2002	2001	
		0.2	0.3	1.2	0.4	1.3	1.4	Total
Males	Sample size[a]	3	1	17	1	7	1	37
	Avg. length	667	760	674	915	779	915	728
	SD	55		48		80		96
	SE	32		12		30		16
Females	Sample size[b]		1		2	10	4	25
	Avg. length		790		903	824	926	861
	SD				60	42	47	57
	SE				43	13	23	11
Sexes	Sample size[c]	3	2		3	17	5	62
combined	Avg. length	667	775		907	805	924	781
	SD	55	21		43	63	41	105
	SE	32	15		25	15	18	13

a Sample size for total females includes 8 females of unknown age.

b Sample size for total males includes 7 females of unknown age.

c Sample size for sexes combined total includes 15 fish of unknown age.

Table 7.-Estimated age and sex composition and escapement of large (≥660 mm MEF) and medium (401-659 mm MEF) Chinook salmon in the Keta River, 2007. Estimates are from Chinook salmon sampled on the spawning grounds.

		BROOD YEAR AND AGE CLASS							
		2004	2004	2003	2003	2002	2002	2001	
		0.2	1.1	0.3	1.2	0.4	1.3	1.4	Total
PANEL A: AGE COMPOSITION OF MEDIUM CHINOOK SALMON									
Males[a]	Sample size		2		6				8
	p_{ijk} x100		25.0%		75.0%				100.0%
	$SE(p_{ijk})$x100		16.4%		16.4%				
	N_{ijk}		36		108				144
	$SE(N_{ijk})$		25		43				49
PANEL B: AGE COMPOSITION OF LARGE CHINOOK SALMON									
Males	Sample size	1		1	6	1	14	9	32
	p_{ijk} x100	1.6%		1.6%	9.7%	1.6%	22.6%	14.5%	51.6%
	$SE(p_{ijk})$x100	1.6%		1.6%	3.8%	1.6%	5.4%	4.5%	6.4%
	N_{ijk}	15		15	90	15	210	135	480
	$SE(N_{ijk})$	15		15	38	15	61	47	102
Females	Sample size			2		1	16	11	30
	p_{ijk} x100			3.2%		1.6%	25.8%	17.7%	48.4%
	$SE(p_{ijk})$x100			2.3%		1.6%	5.6%	4.9%	6.4%
	N_{ijk}			30		15	240	165	450
	$SE(N_{ijk})$			21		15	66	53	98
Sexes	Sample size	1		3	6	2	30	20	62
combined	p_{ij} x100	1.6%		4.8%	9.7%	3.2%	48.4%	32.3%	100.0%
	$SE(p_{ij})$x100	1.6%		2.7%	3.8%	2.3%	6.4%	6.0%	
	N_{ij}	15		45	90	30	450	300	930
	$SE(N_{ij})$	15		26	38	21	98	76	161
PANEL C: AGE COMPOSITION OF MEDIUM AND LARGE CHINOOK SALMON									
Males	Sample size	1	2	1	12	1	14	9	40
	p_{ik} x100	1.4%	3.4%	1.4%	18.4%	1.4%	19.6%	12.6%	58.1%
	$SE(p_{ik})$x100	1.4%	2.5%	1.4%	4.9%	1.4%	4.7%	4.0%	5.9%
	N_{jk}	15	36	15	198	15	210	135	624
	$SE(N_{jk})$	15	25	15	57	15	61	47	113
Females	Sample size			2		1	16	11	30
	p_{ik} x100			2.8%		1.4%	22.3%	15.4%	41.9%
	$SE(p_{ik})$x100			2.0%		1.4%	5.0%	4.3%	5.9%
	N_{jk}			30		15	240	165	450
	$SE(N_{jk})$			21		15	66	53	98
Sexes	Sample size	1	2	3	12	2	30	20	70
combined	p_j x100	1.4%	3.4%	4.2%	18.4%	2.8%	41.9%	27.9%	100.0%
	$SE(p_j)$x100	1.4%	0.5%	2.4%	4.9%	2.0%	5.9%	5.4%	
	N_j	15	36	45	198	30	450	300	1,074
	$SE(N_j)$	15	0	26	57	21	98	76	169

a No medium-sized females were sampled.

Table 8.-Estimated average length (mm MEF) by sex and age of the escapement of Chinook salmon in the Keta River, 2007. Estimates are from Chinook salmon sampled on the spawning grounds.

		BROOD YEAR AND AGE CLASS							
		2004	2004	2003	2003	2002	2002	2001	
		0.2	1.1	0.3	1.2	0.4	1.3	1.4	Total
Males	Sample size[a]	1	2	1	12	1	14	9	55
	Avg. length	680	468	705	655	835	806	867	756
	SD		25		61		76	98	130
	SE		18		17		20	33	18
Females	Sample size[b]			2		1	16	11	42
	Avg. length			828		750	847	884	849
	SD			18			54	32	51
	SE			13			13	10	8
Sexes combined	Sample size[c]	1	2	3	12	2	30	20	97
	Avg. length	680	468	787	655	793	828	876	796
	SD		25	72	61	60	67	68	113
	SE		18	41	17	43	12	15	11

a Sample size for total females includes 12 females of unknown age.

b Sample size for total males includes 15 females of unknown age.

c Sample size for sexes combined total includes 27 fish of unknown age.

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APPENDIX A

Appendix A1. – Expenditure details.

Line 100	Vendor/Personnel Name	Description	Amount	Invoice Date
	Kent Crabtree	FB II	$3,520.84	
	Malika Brunette	FB II	$7,773.89	
	Todd Johnson	FB II	$13,396.02	
	Joe Hancock	FWT II	$3,567.52	
	Rich Duncan	FWT II	$2,767.47	
	Seth White	FWT II	$893.97	
	Alex Blaine	FWT III	$6,168.45	
	Christie Hendrich	FWT III	$12,312.51	
	Dale Brandenberger	FWT III	$1,933.89	
	David Dreyer	FWT III	$3,264.00	
	Micah Sanguinetti	FWT III	$3,026.64	
	Roger Hayward	FWT III	$3,586.84	
	Steve Alicandri	FWT III	$4,010.88	
	Wayne Lonn	FWT III	$2,013.11	
	Holiday/Leave Reallocation		$8,094.96	
	Line 100 Subtotal		$76,330.99	
Line 200	Alaska Airlines	Dave Magnus Sitka to KTN	$173.00	7/23/2007
	Alaska Airlines	Dave Magnus KTN to Sitka	$215.00	8/15/2007
	Alaska Airlines	Kent Crabtree/JNU-KTN	$382.80	9/12/2007
	Alaska Airlines	Kent Crabtree/JNU-KTN	$203.00	6/18/2008
	Alaska Airlines	Kent Crabtree/KTN-JNU	$203.00	6/18/2008
	Fiords Flying Service	Wayne Lonn/XIP-JNU	$85.00	6/24/2008
	Alaska Airlines	Wayne Lonn/JNU-KTN	$203.00	6/30/2008
	Alaska Airlines	Wayne Lonn/KTN-JNU	$203.00	6/30/2008
	Dave Magnus	Dave Magnus Sitka-KTN Per diem	$10.00	8/15/2007
	Kent Crabtree	Kent Crabtree Per diem	$10.00	10/8/2007
	Super 8 Motel (Ketchikan)	Kent Crabtree	$119.88	9/13/2007
	Dave Magnus	Magnus Sitka-KTN Per diem	$138.00	8/15/2007
	Kent Crabtree	Kent Crabtree Per diem	$80.00	10/8/2007
	Kent Crabtree	Kent Crabtree Per diem	$108.00	6/20/2008
	Wayne Lonn	Wayne Lonn Per diem	$60.00	6/24/2008
	Agent Fee	Magnus Sitka-KTN - Agent Fee	$17.00	7/23/2007
	Agent Fee	Magnus KTN-Sitka - Agent Fee	$17.00	8/15/2007
	Agent Fee	Crabtree-Agent Fee	$17.00	9/12/2007
	US Travel	Crabtree-Agent Fee	$19.00	6/18/2008
	US Travel	Lonn-Agent Fee	$19.00	6/30/2008
	US Travel	Lonn-Agent Fee	$19.00	6/30/2008
	US Travel	Crabtree-Agent Fee	$19.00	6/30/2008
	Line 200 Subtotal		$2,320.68	
Line 300	Aero Services	Freight	$10.85	3/18/2008
	WCC	Sat. Phone	$604.72	10/31/2007
	WCC	Sat. Phone	$55.77	11/30/2007
	WCC	Sat. Phones	$55.36	1/31/2008
	WCC	Sat. Phone	$55.36	2/29/2008
	Global Star	Sat. Phone	$98.30	3/16/2008
	Ketchikan Landfill	Garbage to dump	$12.50	2/25/2008
	Ketchikan Landfill	Garbage to dump	$12.50	2/25/2008
	Line 300 Subtotal		$905.36	
Line 400	Murray Pacific	Clothing	$575.81	4/1/2008

Tongass Trading	Clothing	$131.93	4/1/2008
Tongass Trading	Clothing	$190.92	4/2/2008
Madison	Building Materials	$1,514.31	6/3/2008
Western Auto Marine	Lures	$35.10	9/12/2007
Murray Pacific	Project Supplies	$6.99	2/28/2008
Murray Pacific	Project Supplies	$111.90	4/1/2008
Tongass Trading	Project Supplies	$106.99	4/1/2008
Tongass Trading	Project Supplies	$64.97	4/2/2008
Madison	Parts & Supplies	$144.39	6/5/2008
Westside Service	Fuel	$61.67	4/2/2008
Line 400 Subtotal		$2,944.98	

Certified as a true accounting of expenditures:

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Charity Buker
Region I Administrative Manager, SFD, ADF&G