Fishery Data Series No. 14-25

Migratory Timing and Abundance Estimates of Sockeye Salmon into Upper Cook Inlet, Alaska, 2012

by

Aaron W. Dupuis

and

T. Mark Willette

May 2014

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

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

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 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)

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

FISHERY DATA SERIES NO. 14-25

MIGRATORY TIMING AND ABUNDANCE ESTIMATES OF SOCKEYE SALMON INTO UPPER COOK INLET, ALASKA, 2012

by
Aaron W. Dupuis and T. Mark Willette
Alaska Department of Fish and Game, Division of Commercial Fisheries, Soldotna

Alaska Department of Fish and Game
Division of Sport Fish, Research and Technical Services
333 Raspberry Road, Anchorage, Alaska, 99518-1565

May 2014

ADF&G Fishery Data Series was established in 1987 for the publication of Division of Sport Fish technically oriented results for a single project or group of closely related projects, and in 2004 became a joint divisional series with the Division of Commercial Fisheries. Fishery Data Series reports are intended for fishery and other technical professionals and are available through the Alaska State Library and on the Internet: http://www.adfg.alaska.gov/sf/publications/ This publication has undergone editorial and peer review.

Aaron Dupuis and T. Mark Willette,
Alaska Department of Fish and Game, Division of Commercial Fisheries,
43961 Kalifornsky Beach Road, Suite B, Soldotna, AK 99669-8367, USA

This document should be cited as:
Dupuis, A. W., and T. M. Willette. 2014. Migratory timing and abundance estimates of sockeye salmon into Upper Cook Inlet, Alaska, 2012. Alaska Department of Fish and Game, Fishery Data Series No. 14-25, Anchorage.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF APPENDICES (Continued)

ABSTRACT

Two offshore test fisheries (OTF) operated during the 2012 season in Upper Cook Inlet (UCI). The southern OTF originates on the east side of Cook Inlet near Anchor Point. Its objective is to assess the size and timing of the sockeye salmon *Oncorhynchus nerka* run entering UCI, including the Kenai River. The southern OTF was conducted from 1 July through 30 July and captured 2,721 sockeye salmon representing 2,052 catch per unit of effort (CPUE) index points. The midpoint of the 2012 sockeye salmon run at the southern OTF occurred on 14 July. One formal inseason estimate of the size and timing of the 2012 sockeye salmon run was made on 24 July; the best-fit estimator from the analysis predicted a total run to UCI of 6.73 million sockeye salmon. This estimate deviated from the actual total run of 6.61 million fish by 1.8%. One inseason estimate of the total Kenai River sockeye salmon run was also made and was projected to range between 4.66 and 9.02 million fish. The first best-fit Kenai River total run estimate from this analysis (4.66 million) differed from the preseason Kenai River total run estimate by approximately 15%. Genetic stock identification (GSI) of samples collected during the test fishery showed similar stock compositions to previous years. A second UCI northern test fishery began in 2012 UCI to assess the potential of spatial and temporal separation of Susitna River sockeye salmon migrating through Cook Inlet using genetic stock identification (GSI). This new northern OTF was located in the northern area of the Central District with the transect running across UCI from the Blanchard Line to the Drift River. Operated from July 1 through July 30, the new UCI test fishery captured 9,118 sockeye salmon. Of these fish, approximately 2,830 individuals were sampled for GSI.

Key words: Pacific salmon, *Oncorhynchus* spp., Upper Cook Inlet, Alaska, test fishery, migratory behavior, genetic stock identification.

INTRODUCTION

In 1979, the Alaska Department of Fish and Game (ADF&G) began an offshore test fish (OTF) project (hereafter referred as the southern OTF) near the southern boundary of the Upper Cook Inlet (UCI) salmon management area between Anchor Point and the Red River Delta (Figure 1). These stations have been fished since 1992 (Tarbox 1994) and were established based on analyses that showed they provided the most reliable estimates of inseason run size and timing. Station 6.5 was not fished prior to 1992; analyses concluded that the addition of station 6.5 increased sampling power, but did not alter estimates of run timing (Tarbox and King 1992). The project was designed to estimate the total sockeye salmon *Oncorhynchus nerka* run (including run timing) returning to UCI during the commercial salmon fishing season. These data have become extremely important to ADF&G staff, helping to adjust commercial fishing times and areas to most efficiently harvest surplus sockeye salmon or restrict fisheries that may overharvest specific stocks. In recent years, the Alaska Board of Fisheries (BOF) has assembled various management plans requiring inseason abundance estimates of the annual sockeye salmon run to implement specific plan provisions. The OTF project has increasingly become one of the most important tools fishery managers utilize to make inseason fishery management decisions that comply with BOF management directives.

Test fishing results have been reported annually since 1979 (Waltemyer 1983a, 1983b, 1986a, 1986b; Hilsinger and Waltemyer 1987; Hilsinger 1988; Tarbox and Waltemyer 1989; Tarbox 1990–1991, 1994–1998a, 1998b, 1999; Tarbox and King 1992; Shields 2000, 2001, 2003; Shields and Willette 2004, 2005, 2007, 2008, 2009a, 2009b, 2010, 2011). This report presents the results of the 2012 test fishing project.

In 2012, a second test fishery project (hereafter referred as northern OTF) was added. This project collected tissue samples from sockeye salmon for genetic stock identification (GSI) in order to assess the spatial and temporal separation of Susitna River sockeye salmon as they migrate through Cook Inlet. This vessel fished 7 stations along a transect running from the Kenai Peninsula near the Blanchard Line across the northern tip of Kalgin Island to near the mouth of Drift River (Figure 2). This project was funded through Capital Improvement Project (CIP) monies provided by the Alaska Legislature, and is expected to run for a minimum of 5 years (2012–2016).

OBJECTIVES

The objectives of the Southern OTF project were to

1. Develop an inseason estimate of the 2012 UCI sockeye salmon total run,
2. Develop an inseason estimate the 2012 Kenai River sockeye salmon total run, and
3. Collect samples from sockeye salmon for postseason GSI.

The objective of the Northern OTF project was to

1. Use GSI information to determine if Susitna River sockeye salmon stocks could be spatially or temporally separated from other sockeye salmon stocks in Cook Inlet.

METHODS

TEST FISHING

Southern OTF

Sockeye salmon returning to UCI were sampled by fishing 6 geographically fixed stations at the southern OTF sites (Figure 1). Stations were numbered consecutively from east to west, with station locations (latitude and longitude) determined with global positioning system technology. A chartered test fishing vessel, F/V *Ryan J*, sampled all 6 stations (numbered 4, 5, 6, 6.5, 7 and 8) daily, traveling east to west on odd-numbered days and west to east on even-numbered days. Sampling started on 1 July and continued through 29 July. The vessel fished 366 m (1,200 ft or 200 fathoms) of multi-filament drift gillnet with a mesh size of 13 cm (5 1/8 inches). The net was 45 meshes deep and constructed of double knot Super Crystal[1] shade number 1, with filament size 53/S6F. Catch and catch per unit effort (CPUE) data for missed stations were interpolated using a simple linear regression between catches from the day before and the day after for each station not fished.

The following physical and chemical readings were taken at the start of each set: air temperature, water temperature and salinity (at 1 m below the surface), wind velocity and direction, tide stage, water depth, and water clarity. Air and water temperatures (°C) and salinity (ppt) were measured using a YSI[1] salinity/temperature meter. Wind speed was measured in knots and direction was recorded as 0 (no wind), 1 (north), 2 (northeast), 3 (east), 4 (southeast), 5 (south), 6 (southwest), 7 (west), or 8 (northwest) using a pocket weather tracker. Tide stage was classified as 1 (high slack), 2 (low slack), 3 (flooding), or 4 (ebbing) by observing the movement of the vessel while drifting with the gill net. Water depth was measured in fathoms (fm) using a Simrad echo sounder, and water clarity was measured in meters (m) using a 17.5 cm secchi disk, following methods described by Koenings et al. (1987).

---

[1] Product names used in this report are included for scientific completeness, but do not constitute a product endorsement.

All salmon captured in the drift gillnet were identified by species and enumerated. Sockeye salmon (n<50 at each station) were measured for length (mideye to fork of tail) to the nearest mm and also had the left axillary process removed for genetic analysis (as described by Habicht et al. 2007).

The number of fish captured at each station s on each day i was expressed as a CPUE statistic, or index point, and standardized to the number of fish caught in 100 fathoms of gear in one hour of fishing time:

$$CPUE_{s,i} = \frac{100\,fm \times 60\,\text{min} \times number\ of\ fish}{fm\ of\ gear \times MFT} \quad . \tag{1}$$

Mean fishing time (MFT) was:

$$MFT = (C - B) + \frac{(\text{B} - \text{A}) + (\text{D} - \text{C})}{2} \quad , \tag{2}$$

where: A = time net deployment started,

B = time net fully deployed,

C = time net retrieval started, and

D = time net fully retrieved.

Once deployed at a station, the drift gillnets fished 30 minutes before retrieval started. However, the net was capable of capturing fish prior to being fully deployed, as it was during the time it was being retrieved. MFT was therefore adjusted by summing the total time it took to set and retrieve the net, then dividing this time in half, and adding it to the time when the entire net was deployed and fished.

Daily $CPUE_i$ data were summed for all m stations (typically 6) as follows:

$$CPUE_i = \sum_{s=1}^{m} CPUE_{s,i} \quad . \tag{3}$$

Cumulative $CPUE_i$ ($CCPUE_d$) was given by:

$$CCPUE_d = \sum_{i=1}^{d} CPUE_i \ , \tag{4}$$

where: d = date of the estimate.

Northern OTF

In 2012, the northern OTF was established in UCI. At this new project, a drift gillnet vessel was contracted by ADF&G to fish 7 stations (Figure 2) on a daily schedule from 1 July to 30 July, very similar to the fishing pattern of the northern OTF. At each station, all salmon captured were enumerated and identified to species, with GSI samples collected from up to 75 sockeye salmon at each station. The number of fish captured at each station on each day was also expressed as a CPUE statistic using the same methods as the southern OTF.

DESCRIBING THE SALMON MIGRATION AND PROJECTING TOTAL RUN

For the southern OTF, the sockeye salmon run was described for each of the previous years based on the respective test fishing data, as described in Mundy (1979):

$$Y_{yr,d} = 1 \Big/ (1 + e^{-(a + bd)}) \ , \tag{5}$$

where: $Y_{yr,d}$ = modeled cumulative proportion of $CCPUE_{yr,f}$ (f = final day of season) for year *yr* as of day *d*, and

a and *b* = model parameters.

Variables without the subscript *yr* refer to the current year's estimate. To determine which of the previous run timing curves most closely fit the current year's data, and to estimate total run for the entire season (TR_f), a projection of the current year's $CCPUE_d$ at the end of the season ($CCPUE_f$) was estimated as per Waltemyer (1983a):

$$CCPUE_f = \frac{\sum_{d=0}^{D} CCPUE_d^{\ 2}}{\sum_{d=0}^{d} Y_{yr,d} \cdot CCPUE_d} . \tag{6}$$

This model assumes that the modeled cumulative proportions ($Y_{yr,d}$) for previous year *yr* are the same as for the current year (Mundy 1979). To test this assumption, inseason Y_d was estimated as

$$Y_d = \frac{CCPUE_d}{CCPUE_f} \ , \tag{7}$$

and mean squared error (*MSE*) between Y_d and $Y_{yr,d}$ was estimated as

$$MSE = \frac{\sum_{d=0}^{D} \left(Y_{yr,d} - Y_d\right)^2}{d + 1} . \tag{8}$$

Years were ranked from lowest *MSE* (best model) to highest (worst), and the best fit years were used to estimate $CCPUE_f$ for the current year. Catchability, or the fraction of the available population taken by a defined unit of fishing effort, was estimated as:

$$q_d = \frac{CCPUE_d}{r_d} \tag{9}$$

where q_d = estimated cumulative catchability as of day *d*, and

r_d = cumulative total run as of day *d*.

The cumulative total run on day *d* was the sum of all estimates for commercial, recreational, and personal use harvests to date, total escapement to date, and the number of residual (i.e., residing) sockeye salmon in the district. Commercial harvest data was estimated inseason from catch reports called or faxed into the ADF&G office. All commercially harvested salmon in UCI, whether sold or kept for personal use, are required to be reported to the Soldotna ADF&G office by the fishermen or processors within 12 hours of the close of a fishing period. Personal use and recreational harvests were estimated inseason by examining catch statistics from previous years' fisheries on similar sized runs. Total escapement to date included estimated escapements into all monitored systems (Crescent, Susitna, Kenai and Kasilof rivers, and Fish Creek) and unmonitored systems, which are assumed to be 15% of the escapement into monitored systems (Tobias and Willette 2003). The number of residual fish in the district was estimated by assuming exploitation rates of 70% in setnet fisheries, 35–40% in districtwide driftnet fisheries (based on the number of boats that fished), and 25% in reduced district driftnet fisheries (Mundy et al. 1993). For example, if the drift gillnet fleet harvested 500,000 sockeye salmon on an inlet wide fishing period, the number of sockeye salmon originally in the district would be 1,250,000 (500/0.40=1,250) where the number remaining, or the residual, is 750,000 (1,250–500=750).

Passage rate, as of day *d*, the expansion factor used to convert CPUE into estimated numbers of salmon passing the test fishing transect line into UCI, was

$$PR_d = 1/q_d \; . \tag{10}$$

Total run at the end of the season (TR_f) was

$$TR_f = PR_d \cdot CCPUE_f. \tag{11}$$

The midpoint of the run, *M*, the day that approximately 50% of the total run has passed the OTF transect, was

$$M = a/b \, , \tag{12}$$

where: *a* and *b* = model parameters.

Because the test fishery does not encompass the entire sockeye salmon run, the total $CCPUE_f$ for the test fishery is estimated postseason using 2 methods (Equations 13 and 14):

$$CCPUE_f^h = CCPUE_f \cdot \frac{H_t}{H_L} \; , \tag{13}$$

where: $CCPUE_f^h$ = total estimated $CCPUE_f$ for the season, based on harvest,

H_t = total commercial harvest for the season,

H_L = total commercial harvest through final day of test fishery (*f*+2), and

L = number of days (lag time) it took salmon to travel from test fishery to commercial harvest areas (2 days):

$$CCPUE_t^r = CCPUE_f \cdot \frac{E_t + H_t}{E_L + H_L} \, , \tag{14}$$

where $CCPUE_t^r$ = total estimated $CCPUE_f$ for the season, based upon total run,

E_t = total escapement for the season,

H_t = total commercial harvest for the season,

E_L = total UCI escapement through the final day of the test fishery, summed from 6 different streams,

H_L = total UCI commercial harvest through the final day of the test fishery, and

L = number of days (lag time) it took salmon to travel from the test fishery to spawning streams or commercial harvest areas.

The total run adjustment to $CCPUE_f$ (Equation 14) has replaced adjustments based on harvest alone (Equation 13), primarily due to changes to commercial fishing management plans made by the BOF. Management plans now provide much less fishing time in August than in the past; therefore, adjustments based on harvest alone would not have accurately reflected the additional fish that entered the district after the test fishery ceased. The total run to date on the last day of the test fishery was the sum of all commercial harvest data and escapement. Escapement estimates were derived by summing passage from 3 sockeye salmon sonar enumeration sites (Kenai, Kasilof, and Crescent rivers) and adding to that an expansion of the cumulative weir counts at Chelatna, Judd, and Larson lakes to reflect the total Susitna River sockeye salmon escapement, plus the weir count at Fish Creek, and an estimate of escapement to all unmonitored systems through day *d*. An estimate of escapement to all non-monitored systems in UCI is considered to be 15% of the monitored runs (Tobias and Willette 2003). Lag times are the approximate time for fish to migrate from the test fish transect to a particular destination. As suggested by Mundy et al. (1993), lag times must be considered when estimating the total run passing the test fish transect on day *d*. A lag time of up to 2 days was assumed for fish harvested in the commercial fishery. We estimated lag times between the test fishery and escapement projects as follows: Crescent River, 1 day; Kasilof and Kenai rivers, 4 days; Fish Creek, 7 days (Mundy et al. 1993); and Susitna River weirs, 14 days. The number of sockeye salmon harvested in sport and personal use fisheries after test fishing has ceased that have not been estimated in the escapement are assumed to be insignificant, and therefore are not utilized in the $CCPUE_f$ after the test fishery adjustment.

Adjusted estimates of $CCPUE_f$ ($CCPUE_t^h$ and $CCPUE_t^r$) were used for postseason estimates of TR_f.

RESULTS AND DISCUSSION

SOUTHERN OTF

In 2012, rough seas prevented the test boat from fishing some (but not all) of the stations on 11 July and 12 July (Table 1). A total of 2,721 sockeye salmon were captured during the 2012 test fishery, as well as 277 pink salmon *O. gorbuscha*, 664 chum salmon *O. keta*, 200 coho salmon *O. kisutch*, and 5 Chinook salmon *O. tshawytscha* (Tables 1–2; Appendices A1–A13). Sockeye salmon daily catches ranged from 4 fish on 25 July to 377 fish on 20 July. The total sockeye salmon $CCPUE_f$ for the 2012 project was 2,052 with daily CPUE values ranging from 3 to 217 (Table 1). Analysis of variance (ANOVA) showed that the 1992–2012 annual test fish unadjusted $CCPUE_f$ and the total annual run of sockeye salmon to UCI (Figure 3) were not significantly (α=0.05) correlated (P=0.056 and r^2=0.18), with 82% of the variation unexplained, indicating that the $CCPUE_f$ statistic by itself would not be a reliable predictor of the total annual sockeye salmon run.

As expected, the distribution of sockeye salmon catches along the test fish transect was similar to the distribution of CPUE values (Tables 2 and 3), since fishing occurs at fixed intervals at each station.

INSEASON ABUNDANCE ESTIMATES

Tarbox and Waltemyer (1989) provided detail about the assumptions used in the curve fitting procedures to estimate the $CCPUE_f$ statistic during the season. One of the major assumptions is that 24 June represents the first day of the sockeye salmon run to UCI. Variability in actual runs can therefore result in an average or early run being misclassified as late, especially during the first couple weeks of the test fish program. For this reason, 20 July was chosen as the earliest date that inseason formal estimates of each year's total run size and run timing should be made. By then, there are enough data points in the current year's run timing curve to provide a more accurate estimate of the $CCPUE_f$. In addition, Tarbox and King (1992) and later OTF annual reports demonstrated that the initial first choice (best fit) estimate of the $CCPUE_f$ statistic and total run made around mid-July was often not the best fit estimate later in July. Therefore, when making formal inseason estimates of the total run, the top 5 or 6 best fits are evaluated. Careful consideration is given to years whose fits reveal the least day to day change in the predicted $CCPUE_f$. These years are identified as potentially being the final best fit at the end of the season, especially if the *MSE* (Equation 8), also referred to as the mean sum of squares, statistic is also improving. Salmon run timing from other areas of the state is also considered to help predict UCI run timing (Willette et al. 2010).

The only formal inseason abundance estimate of the 2012 UCI sockeye salmon run occurred on 24 July, using commercial, sport and personal use harvests, escapement, and test fishery data through 23 July . The 2012 test fish $CCPUE_d$ curve was mathematically compared to run curves from 1979 through 2011, with the estimates ranked from best to worst based on *MSE* (Table 4). The passage rate was estimated to be 2,757 based on a run of 5.54 million fish through 23 July (includes residual fish abundance in the district; Table 4). Sockeye salmon harvest in the setnet fishery on the east side (ESSN) of UCI is an important component for estimating the number of residual fish in the district; in 2012, the ESSN fished only 3 days in July (Shields and Dupuis 2013, which was a significant departure from how the fishery is normally prosecuted. The 2012 test fish $CCPUE_d$ curve most closely tracked the 1995 run, estimating a $CCPUE_f$ of 2,453 index points. The total run estimate was 6.73 million fish given a passage rate of 2,757. As cautioned earlier, the first best fit (lowest *MSE*) on approximately 20 July often turns out not to be the best fit at the end of July, so the top 5 fits were considered, which included run timing curves from 2006, 1991, 1983, and 2004 (in order of best fit). Using these data, total run estimates ranged from 6.73 to 12.94 million sockeye salmon. The best fits included runs from 2 to 9 days late, reinforcing ADF&G staff's confidence in late-run curves.

The total sockeye salmon run to UCI in 2012 (postseason data) was estimated at approximately 6.61 million fish, including commercial, sport, and personal use harvests, as well as escapement to all systems. Therefore, the first best fit total run estimate from the formal inseason projection of the 2012 run was approximately 1.8% higher than the actual run size. However, because the top 5 best fits from each analysis were given careful consideration inseason, the ranges in error from these projections are highlighted here. Based on data through 23 July, the difference between the projected total run to UCI and the actual value ranged from 1.8% to 95%.

KENAI RIVER RUN ESTIMATE

In addition to making inseason estimates of the total size of the annual sockeye salmon run, UCI commercial fishery management plans require ADF&G to make an inseason estimate of the number of Kenai River sockeye salmon in the run. Various management actions in both sport and commercial fisheries are tied to the total abundance of Kenai River sockeye salmon, which is characterized by 3 different size ranges: less than 2.3 million fish, between 2.3 and 4.6 million fish, and greater than 4.6 million fish (Shields and Dupuis 2012). As previously described, the $CCPUE_d$

curves from the top 5 best fits of previous year's test fish data were used to project the $CCPUE_f$ for 2012, which was then used to estimate the UCI total run. The Kenai River component of the run was determined in part from a weighted age-composition allocation method to estimate the stock composition of the commercial harvest (Tobias and Tarbox 1999). This method (Bernard 1983) allocates the commercial harvest to various stocks by comparing the age composition of the escapement in the major river systems of UCI to the age composition of sockeye salmon harvested commercially (Tobias and Willette 2004). Three important assumptions of the weighted age-composition method are that: 1) the age compositions of fish escaping into the various river systems are representative of the age composition in the commercial harvest; 2) the commercial harvest in specific areas is composed of nearby stocks; and 3) exploitation rates are equal among stocks within age classes. The Kenai River run to date is estimated by summing: 1) the commercial harvest of Kenai River stocks; 2) the estimated (using dual frequency identification sonar (DIDSON)) passage of sockeye salmon in the Kenai River; and 3) an estimate of sport and personal use harvest below the river mile 19 sonar site. Finally, the remainder of the run that will be Kenai River origin is projected by subtracting the run to date from the total run estimate, and then applying an estimate of the proportion of the run remaining that will be Kenai River by reviewing previous years' data for runs of similar timing.

Using the 24 July total UCI run estimate, the total Kenai River sockeye salmon run was projected to range between 4.66 and 9.02 million fish (Table 5). Assuming 3.27 million Kenai River sockeye salmon had returned to date, that meant 1.40 to 5.76 million fish remained in the run. The preseason forecast for the Kenai River had projected a total run of 4.03 million fish, requiring commercial fisheries management to follow guidelines for a run of 2.3 to 4.6 million sockeye salmon. However, all of the top 5 best fit estimators from the 24 July assessment were projecting a Kenai River run greater than 4.6 million fish, with estimates as high as 9.02 million fish. The significant variation between the preseason forecast and the 24 July assessment indicated to staff that the appropriate commercial fishery management approach would be to follow the guidelines for a run to the Kenai River greater than 4.6 million fish.

Postseason data showed the 2012 Kenai River sockeye salmon run to be approximately 4.67 million fish. The total run estimate included sport (preliminary), personal use, and educational fishery annual harvest estimates; the final sport harvest estimates will not be available until later in 2013. The inseason estimates of the Kenai River total run deviated from the actual run by <1% to 93% using data through 23 July. The first best fit estimator from 24 July assessment projected a total Kenai River run that was <1% more than the actual run. Run projections based on OTF data remain a critical tool for managers when making inseason decisions.

OTF ERROR

The absolute percent error (APE) between actual total run and CCPUE-predicted total run in the 20 July estimate (or shortly thereafter) has been >30% only for runs 1 or more days early (Table 6; Figure 4). For all early runs, the mean APE is 34% (median=19%), while for runs on time or late, the 20 July mean APE is only 11% (median=7%). As stated earlier, the 20 July first best fit estimator has proven over time to not always be the best fit of the data just a few days later; this was the case in 2011. In 2012, the first best fit estimate was the most accurate; the total sockeye salmon run estimate to UCI using catch, escapement, and test fish data through 23 July produced a first best fit estimate that was approximately 1.8% more than the actual run.

RUN TIMING

The last day of test fishing typically occurs on 30 July each year, which means the "tail-end" of the sockeye salmon run is not assessed by the project. In 2012, the test fish project ended on 30 July, but escapement monitoring continued through 13 August in the Kasilof River, 16 August in the Kenai River, 15 August at Fish Creek and into the last week of August at Judd, Chelatna, and Larson lakes. Because the Crescent River sonar project ended on 29 July, there was no need to account for fish that entered after the test fish project ended. In addition, commercial fishing also continued into September. Therefore, to estimate the proportion of the run that occurred after the test fishery ceased, 2 methods were used to adjust the $CCPUE_f$ statistic to reflect what it would have been had the project continued through the end of the sockeye salmon run.

The first method used the number of fish harvested commercially after the test fishery ended (Equation 13), while the second method enumerated both escapement and commercial catch (total run) after the test fishery terminated (Equation 14). The sport and personal use harvest of sockeye salmon occurring after the test fishery was assumed to be minimal because the major personal use fisheries are either closed or slowing down at this point, and sport fisheries begin to target coho salmon; therefore these were not considered. Although differences between annual inseason and postseason (adjusted by either harvest or total run) $CCPUE_f$ statistics were often relatively minor, they affected calculations of the *a* and *b* coefficients in the equations used to describe historical run timing curves (Equation 5), which in turn had an effect on estimates of subsequent $CCPUE_f$ values (Table 7). Beginning in 2002, the total run method was used to make postseason adjustments to all previous years' $CCPUE_f$ statistics (Shields 2003). For the 2012 season, the test fish $CCPUE_f$ of 2,052 was adjusted to 2,141 based on the number of fish that were commercially harvested and escaped after the test fishery ceased (Table 7). Therefore, this method estimated that approximately 5% of the sockeye salmon run occurred after the test fishery terminated. Historical *a* and *b* coefficients calculated using total run-adjusted $CCPUE_f$ values are now used for all inseason run projections. Using the total run-adjusted values, the relationship between total run (logged) and test fishery $CCPUE_f$ was not significantly (α=0.05) correlated (P=0.056 and r^2=0.18), with 82% of the variation remaining unexplained. Therefore, like the unadjusted $CCPUE_f$ statistic, using the total run-adjusted $CCPUE_f$ statistic by itself may not be a reliable predictor of the total annual sockeye salmon run.

A nonlinear mathematical model (Mundy 1979) was fit to the $CCPUE_d$ proportions of the 2012 sockeye salmon run to UCI. Using the total run-adjusted $CCPUE_f$, this analysis suggested that 4% of the run had passed the OTF transect line prior to the start of test fishing on 1 July, and that the run was approximately 98% complete at project termination on 30 July (Figure 5 and Appendix A14). Therefore, the mathematical model suggests the 2012 test fishery covered approximately 93% of the run. The test fish passage rate for the season can be calculated by dividing the total number available to capture by the test fishery by the unadjusted $CCPUE_f$. In 2012, the estimated final passage rate was 2,757.

The midpoint of the 2012 UCI sockeye salmon run, or the day on which approximately 50% of the total run had entered UCI at the test fish transect, occurred on day 21.2, or 14 July, which was one day early compared to the historical mean date of 15 July (Table 8).

ENVIRONMENTAL VARIABLES

Surface water temperatures measured along the test fish transect ranged from 8.3°C to 11.9°C and averaged 9.6°C for the year (Appendices A15 and A16). These water temperature data were very similar to the 1992–2011 average surface water temperature of 10.3°C (Appendix A17). Water temperatures are believed by many to play a significant role in the timing of salmon runs (Burgner 1980), so these data have been closely monitored. In general, warmer water temperatures are thought to result in early runs, while cooler temperatures produce later runs. For example, in Bristol Bay, Burgner (1980) reported that the arrival dates of sockeye salmon were early during years when water temperatures were warmer than average. In a later Bristol Bay study, Ruggerone (1997) found that the change in temperature from winter to spring was a better predictor of run timing than water temperature alone. However, water temperature data alone may or may not be an accurate predictive tool for gauging the run timing of UCI salmon stocks. The 2005 UCI sockeye salmon run was the second latest run ever observed, yet surface water temperatures along the test fish transect were the warmest ever measured. Conversely, the 2008 run was 4 days early, yet surface water temperatures were much cooler than average. Therefore, it appears that factors other than just water temperature likely play a role in determining salmon run timing in UCI. Pearcy (1992) summarized some of the factors that affect the coastal migration of returning adult salmon. He reviewed the orientation mechanisms used by salmon in coastal waters and concluded that prior to entering estuaries adult salmon probably rely on cues that are different from those used in the open ocean phases of their migration.

Salinity, temperature, currents, and bathymetry were all thought to play a role in migration. Another dynamic to consider that could affect run timing is the age composition of the run, which relates to fish size; larger fish swim faster than smaller fish (Flynn and Hilborn 2004). Finally, it should be noted that when classifying total sockeye salmon run timing in UCI, the magnitude of the Kenai River run should be considered. Kenai River sockeye salmon return to UCI later than any other numerically significant stock, and because the Kenai River run is the largest in UCI, runs classified as late in general tend to be large Kenai River runs. For example, from 1979–2011, the average Kenai River annual run (DIDSON-based) for years where the UCI return was classified as early (n=13), was 2.8 million fish, yet for UCI runs classified as on time or late (n=20), the Kenai River run averaged 4.4 million fish. Thus, a combination of these factors (water temperature, salinity, currents, bathymetry, fish size, and stock composition of the run) likely affects fish migration and ultimately classifying the run timing as early or late.

To better understand and predict sockeye salmon migrations into UCI, ADF&G conducted a companion study on the test fish vessel from 2002 to 2005. Using side-looking sonar, fish distribution in the water column was measured in relation to various oceanographic data, such as water temperature, salinity, tide stage, and water clarity. These data have not been published, but one of the objectives of the study was to determine whether or not the OTF inseason run forecasting model could be improved using this additional information.

In 2012, air temperatures along the test fish transect ranged from 4° to 14°C and averaged 11°C, or the sixth coldest average air temperature since the test fishery began in 1979. Wind velocity averaged 5.1 knots for the month. Wind direction was variable, but in general, winds originated out of the southeast, the predominate wind orientation in UCI during July. The 2012 seasonal average salinity of 29.4 ppt was slightly lower than the 1992–2011 average of 29.6 ppt. Koenings et al. (1987) describe a secchi disk as a black and white circular plate that is used to easily estimate the degree of visibility in natural waters. Secchi disk readings in 2012 were similar to the averages from all previous years. In general, water clarity along the test fish transect decreases as you travel from east to west as a result of numerous glacial watersheds draining into the west side of Cook Inlet. From 2002–2011, the average secchi disk depth was 7.9 m at station 4 and decreased to 3.0 m at station 8. Finally, station 4 was the shallowest station, averaging 23.9 fathoms (144 feet) in depth. Changes in depth are a result of different stages of tide as well as minor differences in set location from day to day.

GSI ANALYSIS

ADF&G has developed and refined sockeye salmon GSI techniques since the early 1990s (Seeb et al. 1997, 2000; Habicht et al. 2007; Barclay et al. 2010a, 2010b). Beginning in 2006, fish captured in the test fishery that were previously measured to estimate mean length were also sampled for GSI analysis. Approximately 10,500 samples collected from 2006–2011 were successfully genotyped (Tables 9 and 10). Samples were pooled into discrete time periods to meet sample size goals (n=400), resulting in 4 periods in 2006 and 2008, 5 periods in 2007, 2010 and 2011, and 6 periods in 2009. The data from these 6 years revealed similar findings (i.e., during the third and fourth weeks in July, Kenai River sockeye salmon were the dominant stock entering Cook Inlet, whereas during the first part of the month, Kasilof River sockeye salmon stocks were equally or more abundant than Kenai River stocks). The GSI analyses also showed that Susitna River sockeye salmon stocks (labeled as JCL and SusYen) comprised 11% of all fish captured in 2006, 12% in 2007, 13% in 2008, 9% in 2009, and 7% in 2011 (unweighted average). The 2012 test fish samples had not been analyzed at the time this report was prepared.

The efficacy of using GSI analyses in combination with the test fishery for inseason management of the UCI commercial fishery remains unclear. While it could be useful to know when specific stocks are entering the Central District, inter and intra-annual variability in migration routes through the district would make adjusting commercial fishing periods to increase or decrease stock-specific exploitation problematic. Therefore, in order to better understand the spatial and temporal distribution of sockeye salmon stocks transiting the Central District, ADF&G sought and received funding from the Alaska Legislature to conduct a second UCI test fishery beginning with the 2012 season.

NORTHERN OTF

In 2012, poor weather, mechanical difficulties, and boat traffic prevented some stations from being fished on 10 out of the 30 days of the Kalgin Island offshore test fishery project. A total of 9,118 sockeye salmon were estimated to have been captured during the 2012 test fishery, as well as 743 pink, 1,319 chum, 291 coho, and 3 Chinook salmon (Appendices B1–B15). Catch and CPUE numbers were not interpolated for days with missing stations because this project was designed to gather genetic information on sockeye salmon and was not intended to estimate run size or timing. Sockeye salmon daily catches ranged from 5 fish on 4 July to 1,976 fish on 13 July. The total sockeye salmon CPUE for the 2012 project was 3,695 with daily CPUE values ranging from 4 to 431 (Appendix B1). GSI samples were collected from approximately 2,830 sockeye salmon. However, the results from the genetic analyses were not finalized by the time this report was published. The results from the genetic analyses are expected to identify the spatial and temporal distribution of the various sockeye salmon stocks captured migrating across the test fish transect. The UCI test fisheries continue to provide fishery managers with very important data about sockeye salmon stock composition, abundance, and run timing. Since commercial, sport, and personal use fishery management plans depend on inseason sockeye salmon run estimates, the UCI test fishery project remains one of the most essential tools available for their management.

ACKNOWLEDGEMENTS

The authors would like to thank Robert Maw (captain of the F/V *Ryan J*) and Roland Maw (captain of the F/V *Americanus*), and the test fishery crew members for conducting safe and efficient maritime activities.

REFERENCES CITED

Barclay, A. W., C. Habicht, W. D. Templin, H. A. Hoyt, T. Tobias, and T. M. Willette. 2010a. Genetic stock identification of Upper Cook Inlet sockeye salmon harvest, 2005-2008. Alaska Department of Fish and Game, Fishery Manuscript No. 10-01, Anchorage.

Barclay, A. W., C. Habicht, T. Tobias, and T. M. Willette. 2010b. Genetic stock identification of Upper Cook Inlet sockeye salmon harvest, 2009. Alaska Department of Fish and Game, Fishery Data Series No. 10-93, Anchorage.

Barclay, A. W., C. Habicht, T. Tobias, and T. M. Willette. 2013. Genetic stock identification of Upper Cook Inlet sockeye salmon harvest, 2010. Alaska Department of Fish and Game, Fishery Data Series No. 13-56, Anchorage.

Bernard, D. R. 1983. Variance and bias of catch allocations that use the age composition of escapements. Alaska Department of Fish and Game, Division of Commercial Fisheries, Informational Leaflet No. 227, Anchorage.

Burgner, R. L. 1980. Some features of the ocean migrations and timing of Pacific salmon. Pages 153-163. [*In*]: Salmonid ecosystems of the north Pacific. W. J. McNeil and D. C. Himsworth, editors. Oregon State University Press, Corvallis, Oregon.

Flynn L., and R. Hilborn. 2004. Test fishery indices for sockeye salmon (*Oncorhynchus nerka*) as affected by age composition and environmental variables. Canadian Journal of Fisheries and Aquatic Science 61:80-92.

Habicht, C., W. D. Templin, L. W. Seeb, L. F. Fair, T. M. Willette, S. W. Raborn, and T. L. Lingnau. 2007. Postseason stock composition analysis of Upper Cook Inlet sockeye salmon harvest, 2005–2007. Alaska Department of Fish and Game, Fishery Manuscript No. 07-07, Anchorage.

Hilsinger, J. R. 1988. Run strength analysis of the 1987 sockeye salmon return to Upper Cook Inlet, Alaska. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2A88-19, Anchorage.

Hilsinger, J. R., and D. Waltemyer. 1987. Run strength analysis of the 1986 sockeye salmon return to Upper Cook Inlet, Alaska. Alaska Department of Fish and Game, Division of Commercial Fisheries, Upper Cook Inlet Area Data Report 87-6, Soldotna.

Koenings, J. P., J. A. Edmundson, G. B. Kyle and J. M. Edmundson. 1987. Limnology field and laboratory manual: methods for assessing aquatic production. Alaska Department of Fish and Game, Fisheries Rehabilitation, Enhancement, and Development Division Report 71, Juneau.

Mundy, P. R. 1979. A quantitative measure of migratory timing illustrated by application to the management of commercial salmon fisheries. Doctoral dissertation, University of Washington, Seattle.

Mundy, P. R., K. K. English, W. J. Gazey, and K. E. Tarbox. 1993. Evaluation of the harvest management strategies applied to sockeye salmon populations of Upper Cook Inlet, Alaska, using run reconstruction analysis. [*In*]: G. Kruse, D. M. Eggers, R. J. Marasco, C. Pautzke, and T. J. Quinn II editors. Proceedings of the international symposium on management strategies for exploited fish populations. Alaska Sea Grant College Program, University of Alaska, Fairbanks.

Pearcy, W. G. 1992. Ocean ecology of North Pacific salmonids. Washington Sea Grant Program. University of Washington Press, Seattle.

REFERENCES CITED (Continued)

Ruggerone, G. T. 1997. Preseason forecast of sockeye salmon run timing in Bristol Bay, Alaska, 1996. Prepared for Bristol Bay salmon processors by Natural Resources Consultants, Seattle.

Seeb, L. W., C. Habicht, W. D. Templin, K. E. Tarbox, R. Z. Davis, L. K. Brannian, and J. E. Seeb. 2000. Genetic diversity of sockeye salmon of Cook Inlet, Alaska, and its application to management of populations affected by the Exxon Valdez oil spill. Transactions of the American Fisheries Society 129:1223–1249.

Seeb, L. W., W. D. Templin, K. E. Tarbox, R. Z. Davis, and J. E. Seeb. 1997. Kenai River sockeye salmon restoration, Restoration Project 96255-2 Final Report, *Exxon Valdez* Oil Spill Trustee Council, Anchorage.

Shields, P. A. 2000. An estimate of the migratory timing and abundance of sockeye salmon into Upper Cook Inlet, Alaska, in 2000. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2A00-30, Anchorage.

Shields, P. A. 2001. An estimate of the migratory timing and abundance of sockeye salmon into Upper Cook Inlet, Alaska, in 2001. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2A01-14, Anchorage.

Shields, P. A. 2003. An estimate of the migratory timing and abundance of sockeye salmon into Upper Cook Inlet, Alaska, in 2002. Alaska Department of Fish and Game, Commercial Fisheries Division, Regional Information Report 2A03-01, Anchorage.

Shields, P., and A. Dupuis. 2012. Upper Cook Inlet commercial fisheries annual management report, 2011. Alaska Department of Fish and Game, Fishery Management Report No. 12-25, Anchorage.

Shields, P., and A. Dupuis. 2013. Upper Cook Inlet commercial fisheries annual management report, 2012. Alaska Department of Fish and Game, Fishery Management Report No. 13-21, Anchorage.

Shields, P. A., and T. M. Willette. 2004. An estimate of the migratory timing and abundance of sockeye salmon into Upper Cook Inlet, Alaska, in 2003. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2A04-15, Anchorage.

Shields, P., and T. M. Willette. 2005. An estimate of the migratory timing and abundance of sockeye salmon into Upper Cook Inlet, Alaska, 2004. Alaska Department of Fish and Game, Fishery Data Series No. 05-64, Anchorage.

Shields, P., and T. M. Willette. 2007. An estimate of the migratory timing and abundance of sockeye salmon into Upper Cook Inlet, Alaska, 2005. Alaska Department of Fish and Game, Fishery Data Series No. 07-39, Anchorage.

Shields, P., and T. M. Willette. 2008. An estimate of the migratory timing and abundance of sockeye salmon into Upper Cook Inlet, Alaska, 2006. Alaska Department of Fish and Game, Fishery Data Series No. 08-53 Anchorage.

Shields, P., and T. M. Willette. 2009a. Migratory timing and abundance estimates of sockeye salmon into Upper Cook Inlet, Alaska, 2007. Alaska Department of Fish and Game, Fishery Data Series No. 09-15, Anchorage.

Shields, P., and T. M. Willette. 2009b. Migratory timing and abundance estimates of sockeye salmon into Upper Cook Inlet, Alaska, 2008. Alaska Department of Fish and Game, Fishery Data Series No. 09-59, Anchorage.

Shields, P., and T. M. Willette. 2010. Migratory timing and abundance estimates of sockeye salmon into Upper Cook Inlet, Alaska, 2009. Alaska Department of Fish and Game, Fishery Data Series No. 10-56, Anchorage.

Shields, P., and T. M. Willette. 2011. Migratory timing and abundance estimates of sockeye salmon into Upper Cook Inlet, Alaska, 2010. Alaska Department of Fish and Game, Fishery Data Series No. 11-74, Anchorage.

Tarbox, K. E. 1990. An estimate of the migratory timing of sockeye salmon into Upper Cook, Alaska, in 1989 using a test fishery. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2S90-04, Anchorage.

REFERENCES CITED (Continued)

Tarbox, K. E. 1991. An estimate of the migratory timing of sockeye salmon into Upper Cook, Alaska, in 1990 using a test fishery. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2S91-06, Anchorage.

Tarbox, K. E. 1994. An estimate of the migratory timing and abundance of sockeye salmon into Upper Cook Inlet, Alaska, in 1993. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2A94-13, Anchorage.

Tarbox, K. E. 1995. An estimate of migratory timing and abundance of sockeye salmon into Upper Cook Inlet, Alaska, in 1994. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2A95-15, Anchorage.

Tarbox, K. E. 1996. An estimate of migratory timing and abundance of sockeye salmon into Upper Cook Inlet, Alaska, in 1995. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2A96-07, Anchorage.

Tarbox, K. E. 1997. An estimate of migratory timing and abundance of sockeye salmon into Upper Cook Inlet, Alaska, in 1996. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2A97-01, Anchorage.

Tarbox, K. E. 1998a. An estimate of migratory timing and abundance of sockeye salmon into Upper Cook Inlet, Alaska, in 1997. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2A98-22, Anchorage.

Tarbox, K. E. 1998b. An estimate of migratory timing and abundance of sockeye salmon into Upper Cook Inlet, Alaska, in 1998. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report 2A98-30, Anchorage.

Tarbox, K. E. 1999. An estimate of migratory timing and abundance of sockeye salmon into Upper Cook Inlet, Alaska, in 1999. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2A99-13, Anchorage.

Tarbox, K. E., and B. King. 1992. An estimate of the migratory timing of sockeye salmon into Upper Cook Inlet, Alaska, in 1991 using a test fishery. Division of Commercial Fisheries, Regional Information Report 2A92-07, Anchorage.

Tarbox, K. E., and D. Waltemyer. 1989. An estimate of the 1988 total sockeye salmon return to Upper Cook Inlet, Alaska using a test fishery. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2S89-4, Anchorage.

Tobias, T. M., and K. E. Tarbox. 1999. An estimate of total return of sockeye salmon to Upper Cook Inlet, Alaska 1976-1998. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2A99-11, Anchorage.

Tobias, T. M., and T. M. Willette. 2003. An estimate of total return of sockeye salmon to Upper Cook Inlet, Alaska, 1976–2002. Alaska Department of Fish and Game, Commercial Fisheries Division, Regional Information Report 2A03-11, Anchorage.

Tobias, T. M., and T. M. Willette. 2004. An estimate of the total return of sockeye salmon to Upper Cook Inlet, Alaska 1976-2003. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2A04-11, Anchorage.

Waltemyer, D. L. 1983a. Migratory timing and abundance estimation of the 1982 sockeye salmon return to Upper Cook Inlet based on a test fishing program. Alaska Department of Fish and Game, Division of Commercial Fisheries, Upper Cook Inlet Data Report 83-01, Soldotna.

Waltemyer, D. L. 1983b. Describing the migrations of salmon and estimating abundance of sockeye salmon returning in 1983 to Upper Cook Inlet based on a test fishery. Alaska Department of Fish and Game, Division of Commercial Fisheries, Upper Cook Inlet Data Report 84-01, Soldotna.

REFERENCES CITED (Continued)

Waltemyer, D. L. 1986a. Use of a test fishery to describe and estimate the sockeye salmon total return to Upper Cook Inlet in 1984. Alaska Department of Fish and Game, Division of Commercial Fisheries, Upper Cook Inlet Data Report 86-01, Soldotna.

Waltemyer, D. L. 1986b. Run strength analysis of the 1985 sockeye salmon return to Upper Cook Inlet, Alaska based on a test fishery. Alaska Department of Fish and Game, Division of Commercial Fisheries, Upper Cook Inlet Data Report 86-05, Soldotna.

Willette, T. M., W. S. Pegau, and R. D. DeCino. 2010. Monitoring dynamics of the Alaska coastal current and development of applications for management of Cook Inlet salmon – a pilot study. *Exxon Valdez* Oil Spill Gulf Ecosystem Monitoring and Research Project Final Report (GEM Project 030670), Alaska Department of Fish and Game, Commercial Fisheries Division, Soldotna, Alaska.

TABLES AND FIGURES

Table 1.–Summary of sockeye salmon fishing effort, daily and cumulative catch and catch per unit of effort (CPUE), and mean fish length, Upper Cook Inlet southern offshore test fish project, 2012.

Date	Number of Stations	Mean Fishing Time (min)	Catch		CPUE		Mean Length (mm)
			Daily	Cum	Daily	Cum	
1 July	6	227.5	85	85	66	66	598
2 July	6	215.5	31	116	25	90	594
3 July	6	216.5	50	166	45	135	588
4 July	6	217.0	61	227	49	184	589
5 July	6	217.5	79	306	64	249	584
6 July	6	220.5	72	378	58	306	583
7 July	6	210.0	67	445	70	377	603
8 July	6	223.0	79	524	62	439	593
9 July	6	214.0	13	537	11	450	590
10 July	6	223.5	65	602	53	502	581
11 July	4[a]	164.5	208	810	151	653	593
12 July	2[a]	86.5	254	1,064	181	835	587
13 July	6	225.5	161	1,225	127	961	561
14 July	6	229.0	189	1,414	136	1,097	581
15 July	6	224.0	79	1,493	67	1,164	576
16 July	6	217.5	20	1,513	16	1,180	584
17 July	6	209.0	253	1,766	196	1,376	592
18 July	6	206.5	74	1,840	84	1,459	583
19 July	6	235.0	199	2,039	137	1,597	571
20 July	6	262.5	377	2,416	217	1,814	578
21 July	6	218.5	116	2,532	91	1,905	559
22 July	6	210.5	54	2,586	43	1,948	560
23 July	6	211.5	19	2,605	15	1,963	567
24 July	6	209.5	6	2,611	5	1,968	559
25 July	6	214.0	4	2,615	3	1,971	562
26 July	6	212.0	8	2,623	7	1,978	562
27 July	6	196.5	64	2,687	47	2,024	561
28 July	6	214.0	19	2,706	15	2,039	566
29 July	6	212.5	11	2,717	9	2,049	551
30 July	6	211.5	4	2,721	3	2,052	558

[a] Not all stations fished due to weather; the data for missing stations were interpolated.

Table 2.–Estimated sockeye salmon catch by date and station, Upper Cook Inlet southern offshore test fish project, 2012.

	Station Number						
Date	4	5	6	6.5	7	8	Total
1 July	1	14	27	13	29	1	85
2 July	1	22	0	0	8	0	31
3 July	0	20	7	2	13	8	50
4 July	0	1	0	15	18	27	61
5 July	2	1	10	1	16	49	79
6 July	9	17	15	0	24	7	72
7 July	3	0	58	5	1	0	67
8 July	0	1	28	13	30	7	79
9 July	3	6	4	0	0	0	13
10 July	26	22	3	9	4	1	65
11 July[a]	56	38	74	34	5	1	208
12 July[a]	23	95	93	37	5	1	254
13 July	0	3	111	40	6	1	161
14 July	0	34	124	7	22	2	189
15 July	6	32	0	40	0	1	79
16 July	0	5	15	0	0	0	20
17 July	0	2	39	116	83	13	253
18 July	0	6	50	18	0	0	74
19 July	4	22	11	45	117	0	199
20 July	21	9	0	141	172	34	377
21 July	30	5	3	30	40	8	116
22 July	5	0	40	1	5	3	54
23 July	0	17	0	0	0	2	19
24 July	1	4	0	0	1	0	6
25 July	0	4	0	0	0	0	4
26 July	0	0	0	4	0	4	8
27 July	2	0	25	34	3	0	64
28 July	0	4	12	2	1	0	19
29 July	6	3	1	0	1	0	11
30 July	3	1	0	0	0	0	4
Total	202	388	750	607	604	170	2,721
Percent	7%	14%	28%	22%	22%	6%	100%

[a] Not all stations fished due to weather; the data for missing stations were interpolated.

Table 3.–Estimated sockeye salmon catch per unit of effort, by date and station, Upper Cook Inlet southern offshore test fish project, 2012.

	Station Number						
Date	4	5	6	6.5	7	8	Total
1 July	0.8	11.1	20.5	10	22.3	0.8	65.5
2 July	0.9	17.1	0.0	0.0	6.5	0.0	24.5
3 July	0.0	20.8	5.8	1.7	10.4	6.7	45.4
4 July	0.0	0.9	0.0	12.3	14.2	21.6	49.0
5 July	1.7	0.9	8.2	0.8	12.8	39.7	64.1
6 July	7.5	13.8	11.8	0.0	18.9	5.8	57.8
7 July	2.5	0.0	63.3	3.8	0.8	0.0	70.4
8 July	0.0	0.8	22.1	10.7	22.5	5.8	61.9
9 July	2.4	5.1	3.4	0.0	0.0	0.0	10.9
10 July	21.1	17.6	2.3	7.3	3.8	0.8	52.9
11 July[a]	39.5	29.2	51.6	25.5	4.2	0.8	150.8
12 July[a]	17.5	61.0	68.6	29.0	4.5	0.8	181.4
13 July	0.0	2.5	85.9	32.4	4.9	0.8	126.5
14 July	0.0	24.6	85.5	5.8	18.1	1.6	135.6
15 July	4.9	25.3	0.0	36.3	0.0	0.8	67.3
16 July	0.0	4.1	11.5	0.0	0.0	0.0	15.6
17 July	0.0	1.5	29.9	89.2	64.7	10.7	196.0
18 July	0.0	4.9	65.2	13.7	0.0	0.0	83.8
19 July	3.3	16.9	8.9	34.2	73.8	0.0	137.1
20 July	17.3	7.3	0.0	81.3	86.7	24.8	217.4
21 July	23.1	4.0	2.4	24.3	30.4	6.9	91.1
22 July	5.0	0.0	30.0	0.9	4.2	2.5	42.6
23 July	0.0	13.3	0.0	0.0	0.0	1.6	14.9
24 July	0.8	3.4	0.0	0.0	0.8	0.0	5.0
25 July	0.0	3.3	0.0	0.0	0.0	0.0	3.3
26 July	0.0	0.0	0.0	3.3	0.0	3.4	6.7
27 July	1.7	0.0	18.5	23.9	2.5	0.0	46.6
28 July	0.0	3.3	9.4	1.7	0.8	0.0	15.2
29 July	5.1	2.5	0.8	0.0	0.8	0.0	9.2
30 July	2.4	0.9	0.0	0.0	0.0	0.0	3.3
Total	158	296	606	448	409	136	2,052
Percent	8%	14%	30%	22%	20%	7%	100%

[a] Not all stations fished due to weather; the data for missing stations were interpolated.

Table 4.–Total run estimates for sockeye salmon to Upper Cook Inlet, Alaska, made during the 2012 season.

Based on data through 7/23/2012	
Escapement	1,647,893
Cumulative Catch (Commercial, Sport, and Personal Use)	3,243,977
Residual in District	650,000
Total Run Through 7/23/2012 =	5,541,870
2012 Cumulative OTF CPUE through 7/23 =	2,010
Passage Rate (Total Run/Cumulative CPUE) through 7/23 =	2,757

Run Estimates Based on Model Results (Fit of Current Year to Past Years)

Year	Mean Square Error	Estimated Total CPUE Current	Estimated Total CPUE Previous Day	Estimated Total CPUE Difference	Timing	Estimated Total Run
1995	0.000545	2,439	2,453	-14	On Time	6,726,569
2006	0.000709	4,696	4,796	-100	Late 9 days	12,948,970
1991	0.000755	2,814	2,854	-39	Late 2 days	7,760,244
1983	0.000777	2,540	2,555	-15	On Time	7,004,710
2004	0.000801	2,865	2,907	-43	Late 2 days	7,898,667
1994	0.000882	3,565	3,620	-56	Late 4 days	9,828,918
2003	0.000921	2,324	2,328	-4	Early 2 days	6,408,169
2007	0.001051	3,238	3,305	-66	Late 4 days	8,929,530
1987	0.001057	3,263	3,331	-68	Late 2 days	8,996,893
2005	0.001097	3,811	3,862	-51	Late 7 days	10,508,540
1996	0.001352	2,222	2,219	3	Early 2 days	6,126,030
1997	0.001490	2,955	2,977	-22	Late 1 day	8,148,269
1998	0.001493	2,912	2,933	-21	Late 3 days	8,030,334
1999	0.001607	2,946	3,007	-61	Late 3 days	8,123,094
1986	0.001678	2,533	2,540	-7	Late 1 day	6,983,974
2011	0.001691	2,588	2,627	-39	Late 2 days	7,137,177
1992	0.001995	2,848	2,907	-59	Late 2 days	7,853,804
1993	0.002000	2,405	2,406	-1	Early 1 day	6,631,493
2009	0.002007	2,156	2,149	7	Early 2 days	5,944,839
2000	0.002011	2,055	2,044	11	Early 2 days	5,666,119
1982	0.002028	2,590	2,597	-7	Late 2 days	7,140,734
1985	0.003188	2,465	2,464	1	On Time	6,798,096
1990	0.003296	3,248	3,350	-102	Late 3 days	8,957,049
1988	0.003600	2,395	2,391	4	Early 2 days	6,604,387
2002	0.004148	2,101	2,087	14	Early 1 days	5,792,133
2001	0.004772	2,091	2,076	15	Early 2 days	5,764,752
2010	0.006243	2,443	2,433	10	On Time	6,735,117
1989	0.009712	2,537	2,520	16	On Time	6,994,480
1984	0.010634	2,039	2,017	22	Early 4 days	5,622,579
2008	0.016005	2,109	2,084	25	Early 4 days	5,816,068
1979	0.020676	1,860	1,829	31	Early 5 days	5,129,056
1981	0.050073	1,742	1,702	40	Early 9 days	4,803,321
1980	0.050450	1,786	1,747	40	Early 9 days	4,925,172

Table 5.–Projected total Kenai River sockeye salmon run (millions) in 2012 estimated from total southern offshore test fish (OTF) CPUE and age composition stock allocation data through 23 July, 2012.

Data through 23 July

Year	MSE	Est. Total OTF CPUE Current	Est. Total OTF CPUE Prev. Day	Est. Total OTF CPUE Timing	Passage Rate	Estimated UCI Total Run	Estimated UCI Run to Date[a]	Estimated UCI Run Remaining	Estimated Kenai Run to Date	Prop. Kenai	Estimated Kenai Run Remaining	Estimated Total Kenai Return
1995	0.00055	2,439	2,453	On Time	2,757	6.73	4.73	2.00	3.265	70%	1.40	4.66
2006	0.00071	4,696	4,796	Late 9 days	2,757	12.95	4.73	8.22	3.265	70%	5.76	9.02
1991	0.00076	2,814	2,854	Late 2 days	2,757	7.76	4.73	3.03	3.265	70%	2.12	5.39
1983	0.00078	2,540	2,555	On Time	2,757	7.00	4.73	2.28	3.265	70%	1.59	4.86
2004	0.00080	2,865	2,907	Late 2 days	2,757	7.90	4.73	3.17	3.265	70%	2.22	5.48

Note: CPUE is catch per unit of effort and MSE is the mean square error.

[a] Does not include residual fish resident in the Central District.

Table 6.–Absolute percent error (APE) using the first best fit estimate of southern test fish data on or after July 20 to project the total annual Upper Cook Inlet sockeye salmon run 1988–2012.

Year	Actual Run (millions)	July 23 estimate	APE	Run Timing
1988	8.52	11.30	32.6%	1 day early
1990	5.00	4.90	1.9%	4 day late
1991	3.66	3.90	6.5%	2 day late
1992	10.90	11.40	4.5%	2 day late
1993	6.48	6.40	1.2%	on time
1994	5.51	5.30	3.8%	5 day late
1995	4.51	4.50	0.2%	on time
1996	5.63	8.50	51.0%	1 day early
1997	6.41	6.00	6.4%	3 day late
1998	3.00	3.40	13.3%	3 day late
1999	4.57	5.20	13.7%	3 day late
2000	2.94	3.20	8.8%	2 day early
2001	3.53	6.20	75.4%	2 day early
2002	4.84	5.50	13.6%	2 day early
2003	6.29	6.79	8.0%	1 day early
2004	7.92	8.94	12.8%	2 day late
2005	7.92	9.17	15.8%	7 day late
2006	4.96	3.60	27.5%	9 day late
2007	5.44	4.65	14.6%	4 day late
2008	4.13	5.17	25.3%	4 day early
2009	4.29	9.11	112.5%	2 day early
2010[a]	5.26	4.69	10.8%	1 day early
2011	8.60	11.56	34.4%	2 day late
2012	6.61	6.73	1.8%	1 day early
			Average	Median
		All runs	21%	13%
		On time +	11%	7%
		All early	34%	19%

[a] Total run estimated by summing harvest and escapement throughout Upper Cook Inlet. In the Kenai and Kasilof rivers, escapements were converted to Bendix-equivalent units.

Table 7.–A comparison of models used to make postseason adjustments to the southern offshore test fish final catch per unit of effort (CPUE), 1979–2012.

	Final		Total Run Adjusted Model Parameters	
Year	OTF CPUE	Total Run-adjusted CPUE	*a*	*b*
1979	602	664	-3.3380	0.2004
1980	740	777	-2.2403	0.1612
1981	364	387	-2.5243	0.1819
1982	651	786	-3.7156	0.1633
1983	2,464	2,474	-4.2732	0.1884
1984	1,331	1,341	-3.4018	0.1834
1985	1,422	1,563	-3.5633	0.1626
1986	1,653	1,714	-3.8642	0.1719
1987	1,404	1,428	-4.6385	0.1785
1988	1,131	1,169	-3.5655	0.1662
1989	619	692	-2.7031	0.1238
1990	1,358	1,426	-5.7085	0.2211
1991	1,574	1,740	-4.6331	0.1919
1992	2,021	2,195	-5.4043	0.2217
1993	1,815	1,913	-3.9018	0.1797
1994	1,012	1,199	-3.9757	0.1453
1995	1,712	1,850	-4.6219	0.2078
1996	1,723	1,796	-4.4605	0.2144
1997	1,656	1,826	-3.7000	0.1496
1998	1,158	1,313	-3.7142	0.1515
1999	2,226	2,419	-5.1500	0.2081
2000	1,520	1,565	-4.9141	0.2480
2001	1,586	1,630	-3.9823	0.2041
2002	1,736	1,825	-4.0642	0.2068
2003	1,787	1,848	-4.4402	0.2068
2004	2,028	2,345	-4.6374	0.1903
2005	2,643	3,191	-3.7152	0.1302
2006	1,507	1,969	-4.0762	0.1308
2007	2,584	2,924	-4.6427	0.1793
2008	1,594	1,675	-2.8021	0.1521
2009	2,487	2,616	-4.4130	0.2173
2010	2,055	2,266	-3.1347	0.1459
2011	3,715	3,835	-5.5481	0.2304
2012	2,052	2,141	-5.0793	0.2399

Table 8.–Midpoint dates of the sockeye salmon run across the southern test fish transect in Upper Cook Inlet, 1979–2012.

	Mean Date[a]	
Year	Coded	Calendar
1979	16.7	10 Jul
1980	13.9	7 Jul
1981	13.9	7 Jul
1982	22.8	16 Jul
1983	22.7	16 Jul
1984	18.5	12 Jul
1985	21.9	15 Jul
1986	22.5	15 Jul
1987	26.0	19 Jul
1988	21.5	14 Jul
1989	21.8	15 Jul
1990	25.8	19 Jul
1991	24.1	17 Jul
1992	24.4	17 Jul
1993	21.7	15 Jul
1994	27.4	20 Jul
1995	22.2	15 Jul
1996	20.8	14 Jul
1997	24.7	18 Jul
1998	24.5	18 Jul
1999	24.7	18 Jul
2000	19.8	13 Jul
2001	19.5	13 Jul
2002	19.7	13 Jul
2003	21.5	14 Jul
2004	24.4	17 Jul
2005	28.5	22 Jul
2006	31.2	24 Jul
2007	25.9	19 Jul
2008	18.4	11 Jul
2009	20.3	13 Jul
2010	21.5	14 Jul
2011	24.1	17 Jul
2012	21.2	14 Jul
Average	22.3	15 Jul

[a] Day 1 = 24 June.

Table 9.–Genetic stock composition estimates, standard deviation (SD), 90% credibility interval (CI), sample size (n), and effective sample size (n_{eff}) for mixtures of sockeye salmon captured in the Upper Cook Inlet southern offshore test fishery in 2006–2011.

			Reporting Group[a]							
			Crescent	West	JCL	SusYen	Fish	KTNE	Kenai	Kasilof
			2006							
Start Date	7/01	Proportion	0.04	0.06	0.01	0.05	0.00	0.03	0.30	0.51
End Date	7/09	SD	0.01	0.02	0.01	0.02	0.00	0.01	0.04	0.04
n	325	Lower 90% CI	0.02	0.03	0.00	0.02	0.00	0.01	0.24	0.45
n_{eff}	325	Upper 90% CI	0.06	0.09	0.02	0.08	0.00	0.06	0.36	0.57
Start Date	7/10	Proportion	0.00	0.11	0.06	0.11	0.00	0.05	0.33	0.33
End Date	7/16	SD	0.00	0.04	0.02	0.04	0.00	0.02	0.04	0.04
n	266	Lower 90% CI	0.00	0.06	0.03	0.04	0.00	0.02	0.27	0.27
n_{eff}	263	Upper 90% CI	0.01	0.18	0.09	0.18	0.01	0.09	0.39	0.39
Start Date	7/17	Proportion	0.02	0.07	0.05	0.07	0.00	0.02	0.60	0.17
End Date	7/23	SD	0.01	0.02	0.02	0.02	0.00	0.01	0.03	0.03
n	401	Lower 90% CI	0.00	0.05	0.03	0.04	0.00	0.01	0.55	0.13
n_{eff}	397	Upper 90% CI	0.04	0.10	0.08	0.11	0.00	0.03	0.66	0.21
Start Date	7/24	Proportion	0.00	0.07	0.05	0.02	0.00	0.03	0.70	0.12
End Date	8/01	SD	0.00	0.02	0.01	0.02	0.00	0.02	0.03	0.02
n	393	Lower 90% CI	0.00	0.04	0.03	0.00	0.00	0.01	0.65	0.09
n_{eff}	391	Upper 90% CI	0.01	0.11	0.08	0.05	0.00	0.06	0.75	0.16

-continued-

Table 9.–Page 2 of 6.

			Reporting Group[a]							
			Crescent	West	JCL	SusYen	Fish	KTNE	Kenai	Kasilof
						2007				
Start Date	7/01	Proportion	0.08	0.16	0.03	0.03	0.02	0.05	0.39	0.23
End Date	7/09	SD	0.02	0.03	0.01	0.01	0.01	0.02	0.03	0.03
n	374	Lower 90% CI	0.05	0.11	0.02	0.01	0.00	0.02	0.34	0.19
n_{eff}	372	Upper 90% CI	0.12	0.22	0.05	0.05	0.03	0.09	0.45	0.28
Start Date	7/10	Proportion	0.03	0.08	0.05	0.10	0.01	0.03	0.53	0.17
End Date	7/13	SD	0.01	0.02	0.01	0.02	0.01	0.01	0.03	0.03
n	444	Lower 90% CI	0.02	0.04	0.03	0.07	0.00	0.01	0.47	0.13
n_{eff}	437	Upper 90% CI	0.06	0.11	0.07	0.14	0.02	0.05	0.59	0.22
Start Date	7/14	Proportion	0.04	0.02	0.07	0.11	0.00	0.03	0.61	0.12
End Date	7/18	SD	0.01	0.01	0.02	0.03	0.00	0.01	0.03	0.02
n	404	Lower 90% CI	0.02	0.01	0.05	0.06	0.00	0.01	0.56	0.08
n_{eff}	399	Upper 90% CI	0.06	0.05	0.10	0.15	0.00	0.05	0.66	0.16
Start Date	7/19	Proportion	0.05	0.02	0.04	0.08	0.00	0.03	0.67	0.10
End Date	7/23	SD	0.01	0.01	0.01	0.02	0.00	0.01	0.03	0.02
n	429	Lower 90% CI	0.04	0.01	0.03	0.05	0.00	0.02	0.62	0.06
n_{eff}	427	Upper 90% CI	0.08	0.04	0.07	0.11	0.00	0.05	0.72	0.13
Start Date	7/24	Proportion	0.05	0.04	0.05	0.06	0.00	0.02	0.69	0.09
End Date	8/02	SD	0.02	0.01	0.01	0.02	0.00	0.01	0.03	0.02
n	438	Lower 90% CI	0.03	0.02	0.03	0.03	0.00	0.00	0.64	0.06
n_{eff}	434	Upper 90% CI	0.08	0.06	0.08	0.09	0.00	0.04	0.74	0.13

-continued-

Table 9.–Page 3 of 6.

			Reporting Group[a]							
			Crescent	West	JCL	SusYen	Fish	KTNE	Kenai	Kasilof
			2008							
Start Date	7/01	Proportion	0.03	0.11	0.05	0.04	0.01	0.03	0.27	0.45
End Date	7/07	SD	0.01	0.02	0.01	0.02	0.01	0.01	0.03	0.03
n	422	Lower 90% CI	0.02	0.07	0.04	0.02	0.00	0.02	0.22	0.40
n_{eff}	418	Upper 90% CI	0.05	0.15	0.08	0.08	0.03	0.05	0.32	0.50
Start Date	7/08	Proportion	0.04	0.12	0.07	0.10	0.00	0.01	0.43	0.22
End Date	7/12	SD	0.01	0.02	0.01	0.02	0.00	0.01	0.03	0.02
n	465	Lower 90% CI	0.02	0.09	0.05	0.07	0.00	0.00	0.39	0.18
n_{eff}	457	Upper 90% CI	0.06	0.16	0.10	0.14	0.00	0.02	0.48	0.26
Start Date	7/13	Proportion	0.05	0.13	0.10	0.05	0.00	0.03	0.49	0.15
End Date	7/17	SD	0.01	0.02	0.02	0.02	0.00	0.01	0.03	0.02
n	436	Lower 90% CI	0.03	0.09	0.07	0.01	0.00	0.01	0.44	0.11
n_{eff}	429	Upper 90% CI	0.07	0.16	0.14	0.09	0.00	0.05	0.54	0.19
Start Date	7/18	Proportion	0.03	0.13	0.06	0.04	0.00	0.02	0.58	0.14
End Date	7/31	SD	0.01	0.02	0.01	0.01	0.00	0.01	0.03	0.02
n	438	Lower 90% CI	0.01	0.10	0.04	0.02	0.00	0.01	0.54	0.11
n_{eff}	426	Upper 90% CI	0.05	0.16	0.08	0.06	0.00	0.03	0.63	0.18

-continued-

Table 9.–Page 4 of 6.

			Reporting Group[a]							
			Crescent	West	JCL	SusYen	Fish	KTNE	Kenai	Kasilof
						2009				
Start Date	7/01	Proportion	0.02	0.24	0.02	0.00	0.03	0.04	0.33	0.31
End Date	7/05	SD	0.01	0.03	0.01	0.00	0.01	0.01	0.03	0.03
n	401	Lower 90% CI	0.00	0.20	0.01	0.00	0.02	0.02	0.28	0.26
neff	392	Upper 90% CI	0.04	0.28	0.04	0.01	0.05	0.06	0.38	0.36
Start Date	7/06	Proportion	0.04	0.18	0.03	0.09	0.01	0.04	0.33	0.28
End Date	7/09	SD	0.01	0.03	0.02	0.03	0.01	0.01	0.03	0.03
n	445	Lower 90% CI	0.02	0.13	0.00	0.05	0.02	0.02	0.28	0.23
neff	431	Upper 90% CI	0.07	0.22	0.06	0.14	0.06	0.06	0.38	0.33
Start Date	7/10	Proportion	0.07	0.20	0.05	0.09	0.01	0.03	0.48	0.07
End Date	7/13	SD	0.02	0.03	0.02	0.03	0.01	0.01	0.03	0.02
n	407	Lower 90% CI	0.04	0.15	0.03	0.04	0.01	0.01	0.43	0.04
neff	398	Upper 90% CI	0.10	0.25	0.08	0.14	0.05	0.05	0.53	0.10
Start Date	7/14	Proportion	0.07	0.13	0.03	0.06	0.01	0.02	0.63	0.05
End Date	7/16	SD	0.02	0.02	0.01	0.02	0.01	0.01	0.03	0.02
n	406	Lower 90% CI	0.04	0.09	0.01	0.04	0.00	0.01	0.58	0.03
neff	395	Upper 90% CI	0.10	0.16	0.05	0.09	0.03	0.03	0.68	0.08
Start Date	7/17	Proportion	0.07	0.10	0.02	0.07	0.01	0.02	0.67	0.04
End Date	7/22	SD	0.02	0.03	0.01	0.03	0.01	0.01	0.03	0.02
n	402	Lower 90% CI	0.05	0.06	0.01	0.02	0.00	0.01	0.62	0.01
neff	397	Upper 90% CI	0.10	0.15	0.04	0.11	0.02	0.04	0.72	0.07
Start Date	7/23	Proportion	0.05	0.12	0.04	0.02	0.00	0.03	0.72	0.01
End Date	7/30	SD	0.02	0.02	0.01	0.01	0.00	0.01	0.03	0.02
n	331	Lower 90% CI	0.03	0.09	0.02	0.01	0.00	0.01	0.67	0.00
neff	324	Upper 90% CI	0.08	0.16	0.06	0.05	0.00	0.05	0.77	0.04

-continued-

Table 9.–Page 5 of 6.

			Reporting Group[a]							
			Crescent	West	JCL	SusYen	Fish	KTNE	Kenai	Kasilof
					2010					
Start Date	7/01	Proportion	0.05	0.16	0.03	0.03	0.09	0.05	0.46	0.14
End Date	7/04	SD	0.01	0.02	0.01	0.01	0.02	0.01	0.03	0.02
n	358	Lower 90% CI	0.03	0.11	0.01	0.01	0.07	0.03	0.41	0.11
n_{eff}	357	Upper 90% CI	0.07	0.20	0.04	0.06	0.12	0.07	0.51	0.17
Start Date	7/05	Proportion	0.02	0.17	0.04	0.05	0.06	0.05	0.50	0.12
End Date	7/10	SD	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.02
n	464	Lower 90% CI	0.01	0.14	0.02	0.03	0.04	0.03	0.45	0.09
n_{eff}	464	Upper 90% CI	0.03	0.21	0.05	0.07	0.08	0.07	0.54	0.15
Start Date	7/11	Proportion	0.03	0.13	0.03	0.04	0.01	0.04	0.68	0.05
End Date	7/16	SD	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.01
n	448	Lower 90% CI	0.02	0.10	0.02	0.02	0.01	0.02	0.64	0.03
n_{eff}	448	Upper 90% CI	0.04	0.16	0.04	0.05	0.03	0.05	0.72	0.07
Start Date	7/17	Proportion	0.04	0.12	0.05	0.03	0.00	0.03	0.71	0.02
End Date	7/23	SD	0.01	0.02	0.01	0.01	0.00	0.01	0.02	0.01
n	390	Lower 90% CI	0.02	0.10	0.03	0.02	0.00	0.01	0.67	0.01
n_{eff}	389	Upper 90% CI	0.06	0.15	0.07	0.05	0.00	0.04	0.75	0.04
Start Date	7/24	Proportion	0.03	0.11	0.02	0.02	0.00	0.01	0.78	0.03
End Date	7/29	SD	0.01	0.02	0.01	0.01	0.00	0.01	0.02	0.01
n	426	Lower 90% CI	0.02	0.09	0.01	0.01	0.00	0.00	0.74	0.01
n_{eff}	426	Upper 90% CI	0.05	0.14	0.03	0.03	0.01	0.02	0.81	0.04

-continued-

Table 9.–Page 6 of 6.

			Reporting Group[a]							
			Crescent	West	JCL	SusYen	Fish	KTNE	Kenai	Kasilof
						2011				
Start Date	7/01	Proportion	0.04	0.22	0.03	0.08	0.03	0.02	0.48	0.08
End Date	7/13	SD	0.01	0.02	0.01	0.02	0.01	0.01	0.03	0.01
n	449	Lower 90% CI	0.03	0.19	0.02	0.06	0.02	0.01	0.44	0.06
		Upper 90% CI	0.06	0.26	0.05	0.11	0.05	0.04	0.52	0.11
Start Date	7/14	Proportion	0.03	0.13	0.02	0.04	0.02	0.02	0.72	0.02
End Date	7/18	SD	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.01
n	423	Lower 90% CI	0.02	0.10	0.01	0.02	0.01	0.01	0.68	0.01
		Upper 90% CI	0.04	0.16	0.04	0.06	0.03	0.04	0.76	0.04
Start Date	7/19	Proportion	0.02	0.15	0.00	0.04	0.00	0.01	0.76	0.02
End Date	7/24	SD	0.01	0.02	0.00	0.01	0.00	0.01	0.02	0.01
n	382	Lower 90% CI	0.01	0.12	0.00	0.02	0.00	0.00	0.72	0.01
		Upper 90% CI	0.03	0.18	0.01	0.06	0.01	0.02	0.80	0.04
Start Date	7/25	Proportion	0.00	0.15	0.02	0.04	0.00	0.00	0.78	0.01
End Date	7/30	SD	0.00	0.02	0.01	0.01	0.00	0.00	0.02	0.01
n	387	Lower 90% CI	0.00	0.12	0.01	0.03	0.00	0.00	0.74	0.00
		Upper 90% CI	0.00	0.18	0.03	0.06	0.00	0.00	0.81	0.03

Source: Reproduced from Barclay et al. 2010a, 2010b and 2013 with current unpublished data on file at ADF&G, Gene Conservation Laboratory, Division of Commercial Fisheries, Anchorage.

Note: Effective sample size (*neff*) is number of samples successfully screened from each stratum after excluding individuals with <80% scorable markers. Proportions for a given mixture may not sum to 1 due to rounding error.

[a] Crescent = largest producer on the west side of Cook Inlet; West = the remaining West Cook Inlet producers; JCL= the lakes with weirs in the Susitna/Yentna Rivers (Judd/Chelatna/Larson); SusYen = the remaining producers in the Susitna/Yentna Rivers; Fish = the only major creek with a weir in the Knik/Turnagain/Northeast Cook Inlet area; KTNE = the remaining Knik/Turnagain/Northeast Cook Inlet producers; Kenai = the composite of all populations within the Kenai River; Kasilof = the composite of all populations within the Kasilof River.

Table 10.–Genetic stock composition estimates, standard deviation (SD), and 90% credibility interval (CI), and effective sample size (n_{eff}) for spatially grouped mixtures of sockeye salmon captured in the Cook Inlet southern offshore test fishery by station from 1 to 30 July, 2011.

		Reporting Group							
		Crescent	West	JCL	SusYen	Fish	KTNE	Kenai	Kasilof
Station 4	Proportion	0.00	0.11	0.02	0.04	0.02	0.00	0.76	0.04
n_{eff} = 128	SD	0.01	0.03	0.01	0.02	0.01	0.00	0.04	0.02
	Lower 90% CI	0.00	0.07	0.01	0.01	0.01	0.00	0.69	0.02
	Upper 90% CI	0.02	0.16	0.05	0.07	0.05	0.00	0.82	0.08
Station 5	Proportion	0.00	0.13	0.03	0.07	0.02	0.02	0.66	0.06
n_{eff} = 253	SD	0.00	0.02	0.01	0.02	0.01	0.01	0.03	0.02
	Lower 90% CI	0.00	0.10	0.01	0.04	0.01	0.01	0.61	0.04
	Upper 90% CI	0.00	0.17	0.05	0.11	0.04	0.04	0.71	0.09
Station 6	Proportion	0.02	0.16	0.01	0.05	0.01	0.02	0.68	0.04
n_{eff} = 425	SD	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.01
	Lower 90% CI	0.01	0.13	0.01	0.03	0.01	0.01	0.64	0.03
	Upper 90% CI	0.03	0.19	0.03	0.07	0.02	0.04	0.72	0.06
Station 6.5	Proportion	0.01	0.18	0.03	0.04	0.01	0.02	0.69	0.03
n_{eff} = 348	SD	0.01	0.02	0.01	0.01	0.00	0.01	0.03	0.01
	Lower 90% CI	0.01	0.15	0.01	0.02	0.00	0.01	0.65	0.01
	Upper 90% CI	0.03	0.22	0.04	0.06	0.01	0.03	0.73	0.04
Station 7	Proportion	0.03	0.18	0.02	0.04	0.02	0.00	0.67	0.04
n_{eff} = 343	SD	0.01	0.02	0.01	0.01	0.01	0.00	0.03	0.01
	Lower 90% CI	0.02	0.15	0.01	0.02	0.01	0.00	0.62	0.02
	Upper 90% CI	0.05	0.22	0.03	0.07	0.03	0.00	0.71	0.05
Station 8	Proportion	0.11	0.20	0.01	0.05	0.01	0.00	0.61	0.01
n_{eff} = 144	SD	0.03	0.03	0.01	0.02	0.01	0.00	0.04	0.01
	Lower 90% CI	0.06	0.15	0.00	0.02	0.00	0.00	0.54	0.00
	Upper 90% CI	0.16	0.26	0.02	0.09	0.03	0.01	0.68	0.03

Note: Reproduced from A. Barclay, ADF&G, Gene Conservation Laboratory, Division of Commercial Fisheries, Anchorage. Effective sample size (n_{eff}) is the number of samples successfully screened from each stratum after excluding individuals with <80% scorable markers. Proportions for a given mixture may not sum to 1 due to rounding error.

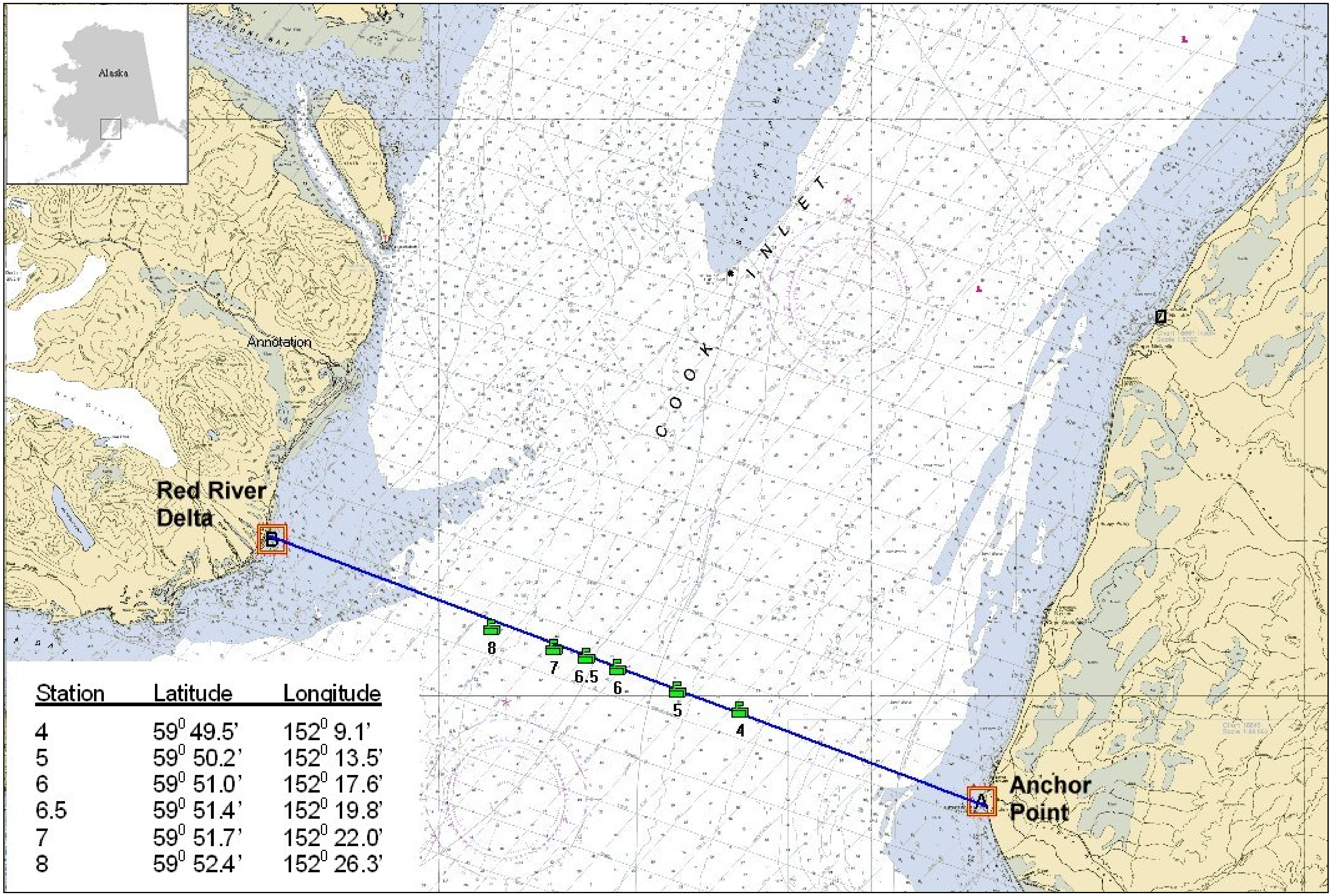
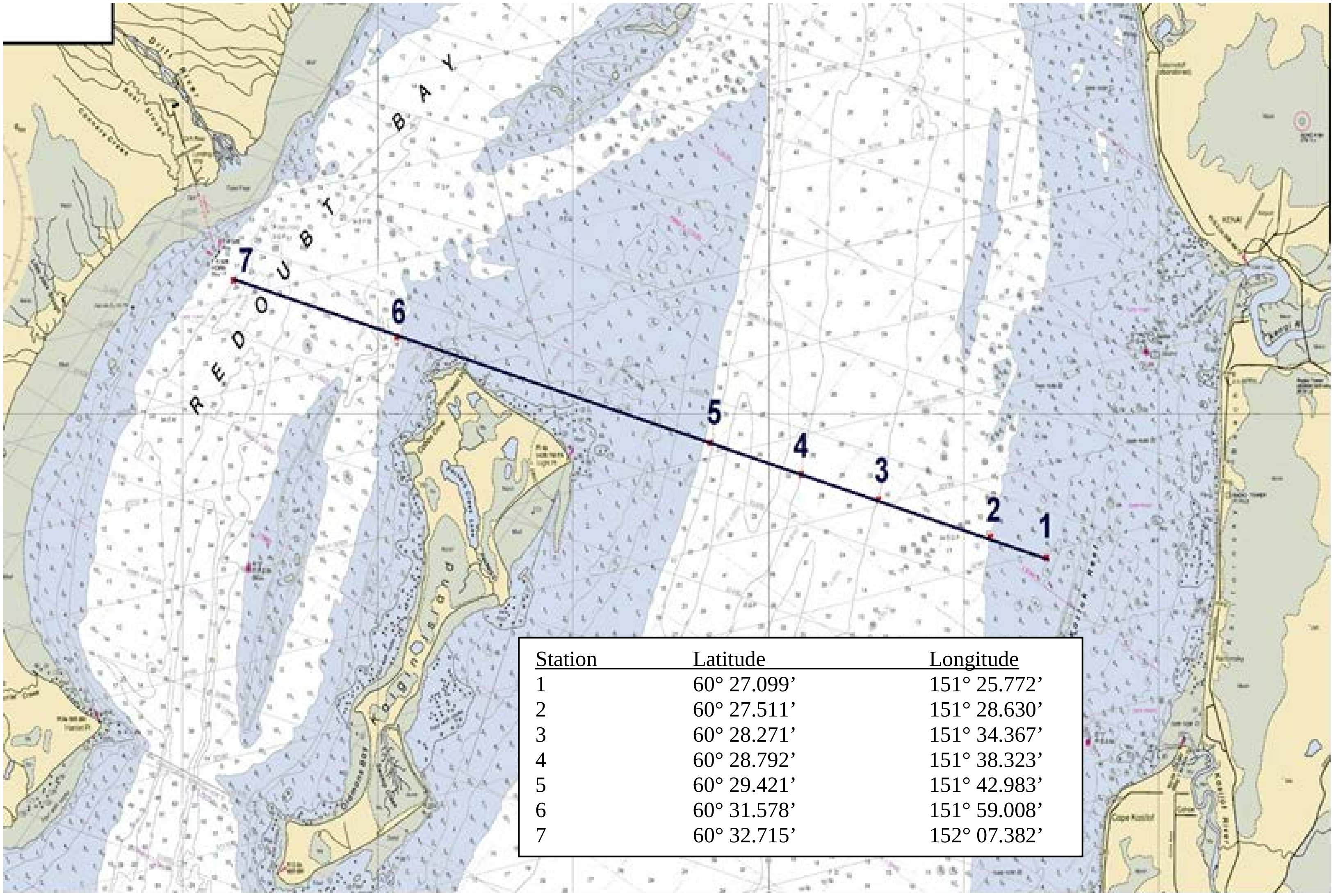


Figure 1.–Location of the southern offshore test fish transect and fishing stations in Cook Inlet, Alaska, 2012.



Station	Latitude	Longitude
1	60° 27.099’	151° 25.772’
2	60° 27.511’	151° 28.630’
3	60° 28.271’	151° 34.367’
4	60° 28.792’	151° 38.323’
5	60° 29.421’	151° 42.983’
6	60° 31.578’	151° 59.008’
7	60° 32.715’	152° 07.382’

Figure 2.–Location of the northern offshore test fish transect and fishing stations in Upper Cook Inlet, Alaska, 2012.

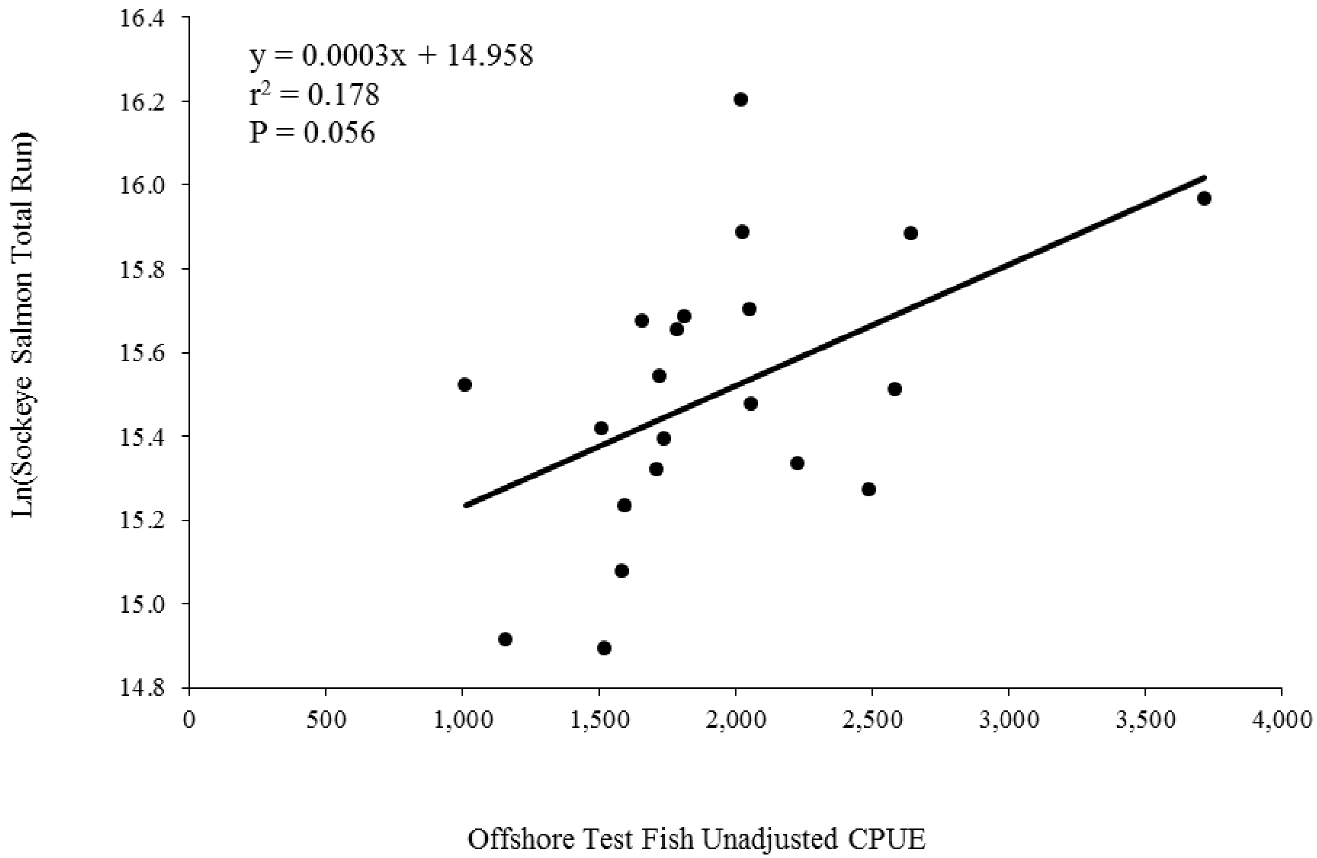


Figure 3.–Linear regression of the relationship between southern offshore test fish unadjusted cumulative catch per unit of effort (CPUE) and Upper Cook Inlet logged sockeye salmon total annual run, 1992–2012.

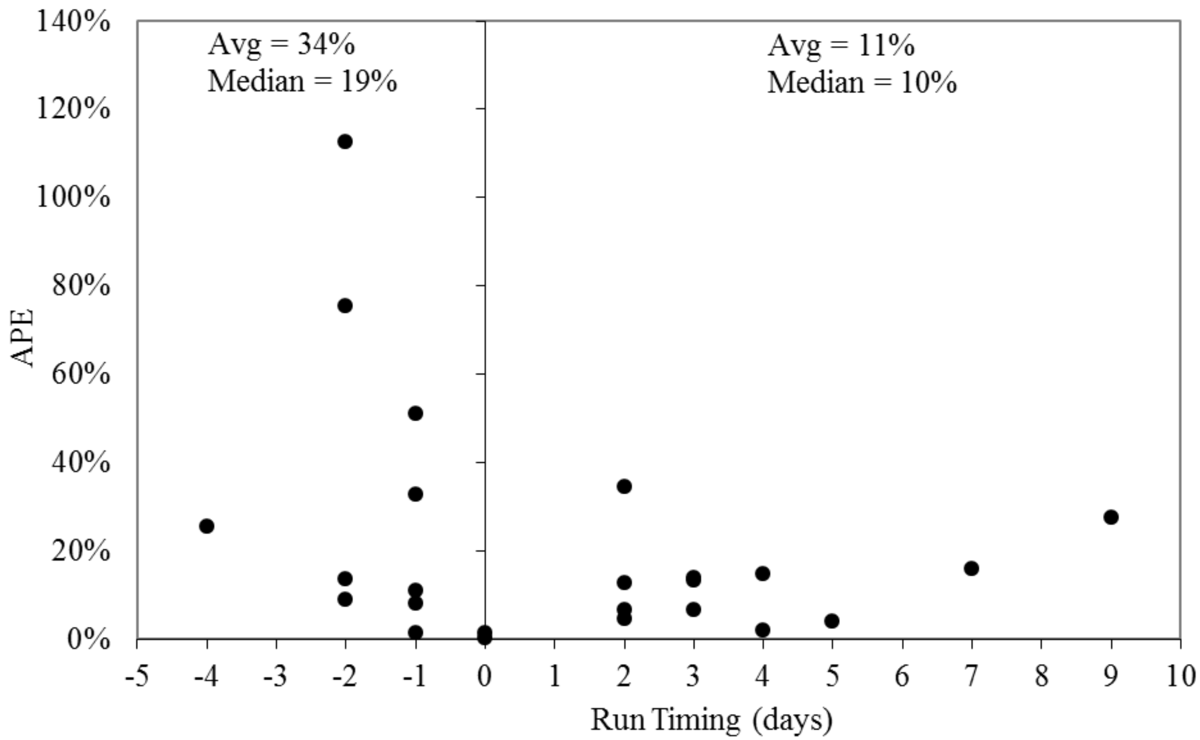


Figure 4.–Absolute percentage error (APE) in forecasting the total sockeye salmon run to Upper Cook Inlet using the 20 July best fit estimate, 1988–2012.

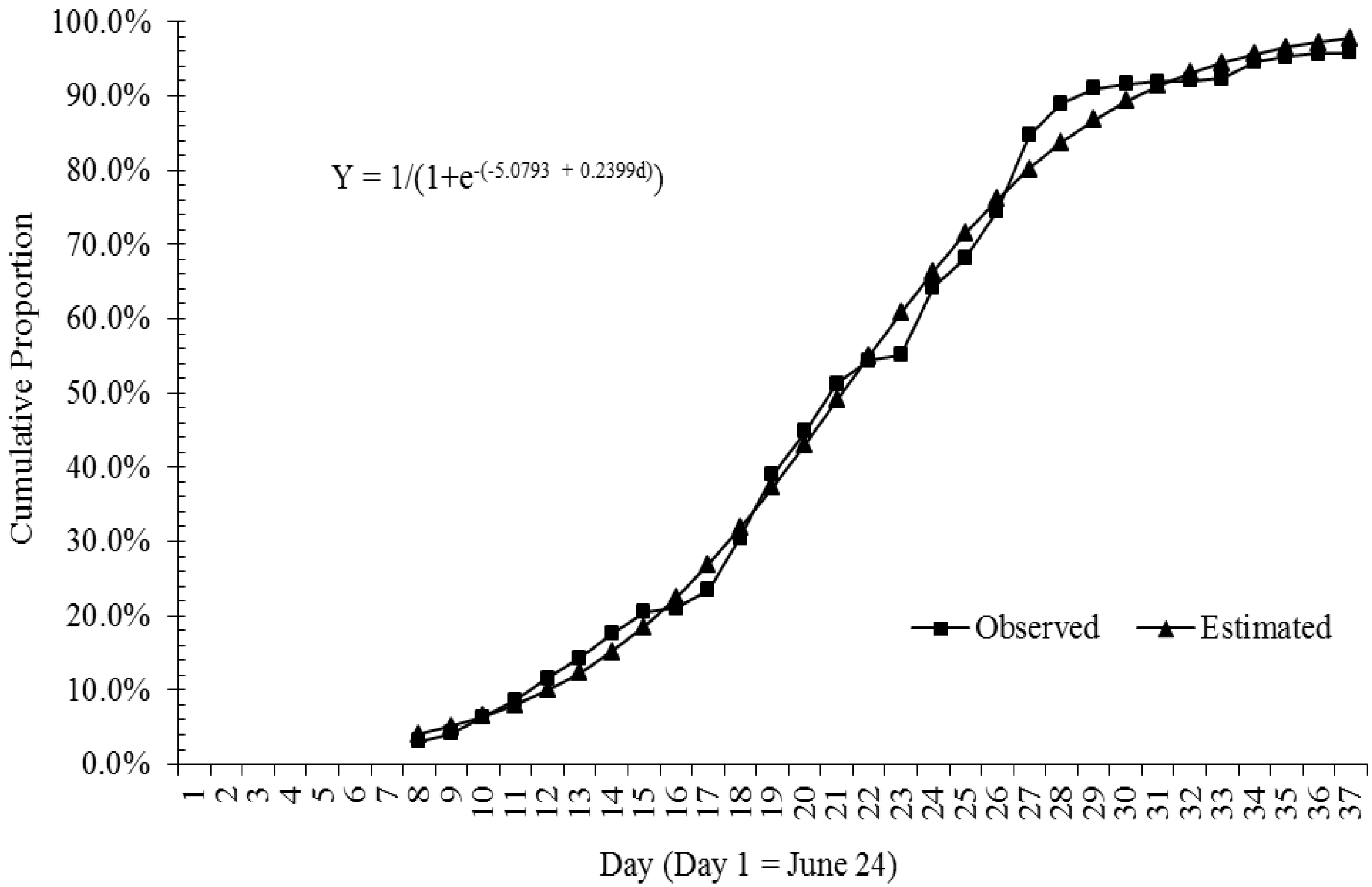


Figure 5.–Observed and estimated cumulative catch per unit of effort (CPUE) proportions for the sockeye salmon run to Upper Cook Inlet, Alaska, 2012.

APPENDIX A

Appendix A1.–Summary of pink salmon fishing effort, daily and cumulative catch, and daily and cumulative catch per unit of effort (CPUE), Upper Cook Inlet southern offshore test fish project, 2012.

Date	Number of Stations	Mean Fishing Time (min)	Catch		CPUE	
			Daily	Cum	Daily	Cum
1 July	6	227.5	0	0	0	0
2 July	6	215.5	0	0	0	0
3 July	6	216.5	0	0	0	0
4 July	6	217.0	0	0	0	0
5 July	6	217.5	0	0	0	0
6 July	6	220.5	1	1	1	1
7 July	6	210.0	1	2	1	2
8 July	6	223.0	0	2	0	2
9 July	6	214.0	0	2	0	2
10 July	6	223.5	1	3	1	3
11 July	4[a]	164.5	8	11	6	8
12 July	2[a]	86.5	7	18	5	13
13 July	6	225.5	7	25	5	18
14 July	6	229.0	6	31	4	23
15 July	6	224.0	7	38	6	29
16 July	6	217.5	2	40	2	30
17 July	6	209.0	10	50	8	38
18 July	6	206.5	2	52	2	40
19 July	6	235.0	12	64	10	50
20 July	6	262.5	41	105	25	74
21 July	6	218.5	18	123	14	88
22 July	6	210.5	13	136	10	99
23 July	6	211.5	1	137	1	100
24 July	6	209.5	0	137	0	100
25 July	6	214.0	22	159	18	118
26 July	6	212.0	18	177	14	132
27 July	6	196.5	40	217	30	162
28 July	6	214.0	24	241	19	181
29 July	6	212.5	5	246	4	185
30 July	6	211.5	31	277	25	210

[a] Not all stations fished due to weather; the data for missing stations were interpolated.

Appendix A2.–Estimated pink salmon catch by date and station, Upper Cook Inlet southern offshore test fish project, 2012.

	Station Number						
Date	4	5	6	6.5	7	8	Total
1 July	0	0	0	0	0	0	0
2 July	0	0	0	0	0	0	0
3 July	0	0	0	0	0	0	0
4 July	0	0	0	0	0	0	0
5 July	0	0	0	0	0	0	0
6 July	0	1	0	0	0	0	1
7 July	0	0	1	0	0	0	1
8 July	0	0	0	0	0	0	0
9 July	0	0	0	0	0	0	0
10 July	0	0	0	0	1	0	1
11 July[a]	2	1	3	0	1	1	8
12 July[a]	0	0	3	1	0	3	7
13 July	0	0	2	1	0	4	7
14 July	0	4	2	0	0	0	6
15 July	2	0	4	1	0	0	7
16 July	0	2	0	0	0	0	2
17 July	0	0	2	0	8	0	10
18 July	0	1	1	0	0	0	2
19 July	0	3	8	1	0	0	12
20 July	2	6	1	18	13	1	41
21 July	9	2	0	2	3	2	18
22 July	0	0	9	3	1	0	13
23 July	0	0	1	0	0	0	1
24 July	0	0	0	0	0	0	0
25 July	1	19	0	1	1	0	22
26 July	0	15	0	3	0	0	18
27 July	7	0	20	13	0	0	40
28 July	0	10	12	0	2	0	24
29 July	5	0	0	0	0	0	5
30 July	30	1	0	0	0	0	31
Total	58	65	69	44	30	11	277
%	21%	23%	25%	16%	11%	4%	100%

[a] Not all stations fished due to weather; the data for missing stations were interpolated.

Appendix A3.–Estimated pink salmon catch per unit of effort (CPUE) by date and station, Upper Cook Inlet southern offshore test fish project 2012.

	Station Number						
Date	4	5	6	6.5	7	8	Total
1 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6 July	0.0	0.8	0.0	0.0	0.0	0.0	0.8
7 July	0.0	0.0	0.9	0.0	0.0	0.0	0.9
8 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 July	0.0	0.0	0.0	0.0	0.8	0.0	0.8
11 July[a]	1.4	0.8	2.1	0.0	0.8	0.8	5.9
12 July[a]	0.0	0.0	1.8	0.8	0.0	2.0	4.6
13 July	0.0	0.0	1.5	0.8	0.0	3.1	5.4
14 July	0.0	2.9	1.4	0.0	0.0	0.0	4.3
15 July	1.6	0.0	3.4	0.8	0.0	0.0	5.8
16 July	0.0	1.6	0.0	0.0	0.0	0.0	1.6
17 July	0.0	0.0	1.5	0.0	6.2	0.0	7.7
18 July	0.0	0.8	1.3	0.0	0.0	0.0	2.1
19 July	0.0	2.3	6.5	0.8	0.0	0.0	9.6
20 July	1.6	4.8	0.8	10.4	6.5	0.7	24.8
21 July	6.9	1.6	0.0	1.6	2.3	1.7	14.1
22 July	0.0	0.0	6.8	2.6	0.8	0.0	10.2
23 July	0.0	0.0	0.9	0.0	0.0	0.0	0.9
24 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25 July	0.8	15.6	0.0	0.8	0.8	0.0	18.0
26 July	0.0	12.7	0.0	1.6	0.0	0.0	14.3
27 July	5.9	0.0	14.8	9.2	0.0	0.0	29.9
28 July	0.0	8.2	9.4	0.0	1.7	0.0	19.3
29 July	4.2	0.0	0.0	0.0	0.0	0.0	4.2
30 July	24.3	0.9	0.0	0.0	0.0	0.0	25.2
Total	47	53	53	29	20	8	210
Percent	22%	25%	25%	14%	9%	4%	100%

[a] Not all stations fished due to weather; the data for missing stations were interpolated.

Appendix A4.–Summary of chum salmon fishing effort, daily and cumulative catch, and daily and cumulative catch per unit of effort (CPUE), Upper Cook Inlet southern offshore test fish project, 2012.

Date	Number of Stations	Mean Fishing Time (min)	Catch		CPUE	
			Daily	Cum	Daily	Cum
1 July	6	227.5	2	2	2	2
2 July	6	215.5	2	4	2	3
3 July	6	216.5	3	7	2	6
4 July	6	217.0	9	16	7	13
5 July	6	217.5	0	16	0	13
6 July	6	220.5	11	27	9	22
7 July	6	210.0	16	43	17	38
8 July	6	223.0	44	87	34	72
9 July	6	214.0	7	94	6	78
10 July	6	223.5	40	134	31	109
11 July	4[a]	164.5	42	176	31	140
12 July	2[a]	86.5	53	229	39	179
13 July	6	225.5	39	268	30	209
14 July	6	229.0	32	300	24	233
15 July	6	224.0	13	313	11	244
16 July	6	217.5	19	332	15	259
17 July	6	209.0	35	367	27	286
18 July	6	206.5	77	444	86	372
19 July	6	235.0	21	465	14	386
20 July	6	262.5	72	537	44	430
21 July	6	218.5	24	561	19	449
22 July	6	210.5	13	574	10	459
23 July	6	211.5	10	584	8	467
24 July	6	209.5	0	584	0	467
25 July	6	214.0	3	587	3	469
26 July	6	212.0	10	597	6	475
27 July	6	196.5	20	617	14	490
28 July	6	214.0	35	652	28	517
29 July	6	212.5	9	661	7	524
30 July	6	211.5	3	664	2	527

[a] Not all stations fished due to weather; the data for missing stations were interpolated.

Appendix A5.–Estimated chum salmon catch by date and station, Upper Cook Inlet southern offshore test fish project, 2012.

	Station Number						
Date	4	5	6	6.5	7	8	Total
1 July	0	1	1	0	0	0	2
2 July	0	2	0	0	0	0	2
3 July	0	0	0	1	2	0	3
4 July	0	0	0	3	6	0	9
5 July	0	0	0	0	0	0	0
6 July	1	2	2	1	5	0	11
7 July	1	0	14	0	1	0	16
8 July	0	1	0	11	32	0	44
9 July	0	0	6	0	1	0	7
10 July	0	2	33	1	4	0	40
11 July[a]	7	1	17	9	6	2	42
12 July[a]	8	8	20	5	7	5	53
13 July	0	0	22	1	9	7	39
14 July	0	4	13	4	11	0	32
15 July	2	5	4	2	0	0	13
16 July	0	1	17	0	0	1	19
17 July	0	1	3	23	8	0	35
18 July	0	2	51	24	0	0	77
19 July	1	2	1	2	14	1	21
20 July	2	5	9	31	21	4	72
21 July	1	0	8	2	12	1	24
22 July	0	0	11	1	1	0	13
23 July	0	10	0	0	0	0	10
24 July	0	0	0	0	0	0	0
25 July	0	0	3	0	0	0	3
26 July	4	1	0	4	1	0	10
27 July	0	0	4	16	0	0	20
28 July	0	4	31	0	0	0	35
29 July	0	7	0	2	0	0	9
30 July	2	0	1	0	0	0	3
Total	29	59	271	143	141	21	664
Percent	4%	9%	41%	22%	21%	3%	100%

[a] Not all stations fished due to weather; the data for missing stations were interpolated.

Appendix A6.–Estimated chum salmon catch per unit of effort (CPUE) by date and station, Upper Cook Inlet southern offshore test fish project, 2012.

	Station Number						
Date	4	5	6	6.5	7	8	Total
1 July	0.0	0.8	0.8	0.0	0.0	0.0	1.6
2 July	0.0	1.6	0.0	0.0	0.0	0.0	1.6
3 July	0.0	0.0	0.0	0.8	1.6	0.0	2.4
4 July	0.0	0.0	0.0	2.5	4.7	0.0	7.2
5 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6 July	0.8	1.6	1.6	0.8	3.9	0.0	8.7
7 July	0.8	0.0	15.3	0.0	0.8	0.0	16.9
8 July	0.0	0.8	0.0	9.0	24.0	0.0	33.8
9 July	0.0	0.0	5.1	0.0	0.8	0.0	5.9
10 July	0.0	1.6	25.4	0.8	3.2	0.0	31.0
11 July[a]	4.9	0.8	11.9	6.8	4.6	1.8	30.8
12 July[a]	6.0	5.1	14.4	3.8	6.0	3.6	38.9
13 July	0.0	0.0	16.9	0.8	7.3	5.4	30.4
14 July	0.0	2.9	8.9	3.3	9.0	0.0	24.1
15 July	1.6	3.9	3.4	1.6	0.0	0.0	10.5
16 July	0.0	0.8	13.1	0.0	0.0	0.8	14.7
17 July	0.0	0.8	2.3	17.7	6.2	0.0	27.0
18 July	0.0	1.7	66.5	18.2	0.0	0.0	86.4
19 July	0.8	1.5	0.8	1.5	8.8	0.8	14.2
20 July	1.6	4.1	7.4	17.8	10.5	2.9	44.3
21 July	0.7	0.0	6.5	1.6	9.1	0.8	18.7
22 July	0.0	0.0	8.3	0.9	0.8	0.0	10.0
23 July	0.0	7.8	0.0	0.0	0.0	0.0	7.8
24 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25 July	0.0	0.0	2.5	0.0	0.0	0.0	2.5
26 July	3.5	0.8	0.0	0.8	0.8	0.0	5.9
27 July	0.0	0.0	2.9	11.3	0.0	0.0	14.2
28 July	0.0	3.3	24.2	0.0	0.0	0.0	27.5
29 July	0.0	5.9	0.0	1.2	0.0	0.0	7.1
30 July	1.6	0.0	0.8	0.0	0.0	0.0	2.4
Total	22	46	239	101	102	16	527
Percent	4%	9%	45%	19%	19%	3%	100%

[a] Not all stations fished due to weather; the data for missing stations were interpolated.

Appendix A7.–Summary of coho salmon fishing effort, daily and cumulative catch, and daily and cumulative catch per unit of effort (CPUE), Upper Cook Inlet southern offshore test fish project, 2012.

Date	Number of Stations	Mean Fishing Time (min)	Catch		CPUE	
			Daily	Cum	Daily	Cum
1 July	6	227.5	1	1	1	1
2 July	6	215.5	0	1	0	1
3 July	6	216.5	0	1	0	1
4 July	6	217.0	0	1	0	1
5 July	6	217.5	4	5	3	4
6 July	6	220.5	0	5	0	4
7 July	6	210.0	1	6	1	5
8 July	6	223.0	1	7	1	6
9 July	6	214.0	0	7	0	6
10 July	6	223.5	1	8	1	6
11 July	4[a]	164.5	4	12	3	9
12 July	2[a]	86.5	3	15	2	12
13 July	6	225.5	5	20	4	16
14 July	6	229.0	5	25	4	19
15 July	6	224.0	3	28	2	22
16 July	6	217.5	2	30	2	23
17 July	6	209.0	17	47	13	36
18 July	6	206.5	12	59	12	48
19 July	6	235.0	2	61	1	50
20 July	6	262.5	31	92	20	70
21 July	6	218.5	23	115	18	88
22 July	6	210.5	1	116	1	89
23 July	6	211.5	3	119	2	91
24 July	6	209.5	0	119	0	91
25 July	6	214.0	12	131	10	101
26 July	6	212.0	4	135	3	104
27 July	6	196.5	42	177	31	135
28 July	6	214.0	4	181	3	138
29 July	6	212.5	4	185	3	141
30 July	6	211.5	15	200	13	154

[a] Not all stations fished due to weather; the data for missing stations were interpolated.

Appendix A8.–Estimated coho salmon catch by date and station, Upper Cook Inlet southern offshore test fish project, 2012.

	Station Number						
Date	4	5	6	6.5	7	8	Total
1 July	0	0	1	0	0	0	1
2 July	0	0	0	0	0	0	0
3 July	0	0	0	0	0	0	0
4 July	0	0	0	0	0	0	0
5 July	0	0	2	0	0	2	4
6 July	0	0	0	0	0	0	0
7 July	0	0	0	1	0	0	1
8 July	0	0	0	0	1	0	1
9 July	0	0	0	0	0	0	0
10 July	0	0	0	1	0	0	1
11 July[a]	2	0	0	0	1	1	4
12 July[a]	0	0	0	0	1	2	3
13 July	0	0	0	0	2	3	5
14 July	0	3	1	1	0	0	5
15 July	0	1	0	2	0	0	3
16 July	0	0	2	0	0	0	2
17 July	0	0	3	7	7	0	17
18 July	0	0	5	6	1	0	12
19 July	0	0	0	1	1	0	2
20 July	0	1	8	12	7	3	31
21 July	0	0	13	3	7	0	23
22 July	0	0	0	0	1	0	1
23 July	0	1	0	0	0	2	3
24 July	0	0	0	0	0	0	0
25 July	0	1	9	0	2	0	12
26 July	0	0	0	3	0	1	4
27 July	0	0	13	24	2	3	42
28 July	0	3	0	0	1	0	4
29 July	0	3	1	0	0	0	4
30 July	8	6	1	0	0	0	15
Total	10	19	59	61	34	17	200
Percent	5%	10%	30%	31%	17%	9%	100%

[a] Not all stations fished due to weather; the data for missing stations were interpolated.

Appendix A9.–Estimated coho salmon catch per unit of effort (CPUE) by date and station, Upper Cook Inlet southern offshore test fish project, 2012.

	Station Number						
Date	4	5	6	6.5	7	8	Total
1 July	0.0	0.0	0.8	0.0	0.0	0.0	0.8
2 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5 July	0.0	0.0	1.6	0.0	0.0	1.6	3.2
6 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7 July	0.0	0.0	0.0	0.8	0.0	0.0	0.8
8 July	0.0	0.0	0.0	0.0	0.8	0.0	0.8
9 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 July	0.0	0.0	0.0	0.8	0.0	0.0	0.8
11 July[a]	1.4	0.0	0.0	0.0	0.8	0.8	3.0
12 July[a]	0.0	0.0	0.0	0.0	0.8	1.6	2.4
13 July	0.0	0.0	0.0	0.0	1.6	2.3	3.9
14 July	0.0	2.2	0.7	0.8	0.0	0.0	3.7
15 July	0.0	0.8	0.0	1.6	0.0	0.0	2.4
16 July	0.0	0.0	1.5	0.0	0.0	0.0	1.5
17 July	0.0	0.0	2.3	5.4	5.4	0.0	13.1
18 July	0.0	0.0	6.5	4.5	0.9	0.0	11.9
19 July	0.0	0.0	0.0	0.8	0.6	0.0	1.4
20 July	0.0	0.8	6.6	6.9	3.5	2.2	20.0
21 July	0.0	0.0	10.5	2.4	5.3	0.0	18.2
22 July	0.0	0.0	0.0	0.0	0.8	0.0	0.8
23 July	0.0	0.7	0.0	0.0	0.0	1.6	2.3
24 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25 July	0.0	0.8	7.4	0.0	1.7	0.0	9.9
26 July	0.0	0.0	0.0	2.5	0.0	0.8	3.3
27 July	0.0	0.0	9.6	16.9	1.6	2.4	30.5
28 July	0.0	2.4	0.0	0.0	0.8	0.0	3.2
29 July	0.0	2.5	0.8	0.0	0.0	0.0	3.3
30 July	6.5	5.2	0.8	0.0	0.0	0.0	12.5
Total	8	15	49	43	25	13	154
Percent	5%	10%	32%	28%	16%	9%	100%

[a] Not all stations fished due to weather; the data for missing stations were interpolated.

Appendix A10.–Summary of Chinook salmon fishing effort, daily and cumulative catch, and daily and cumulative catch per unit of effort (CPUE), Upper Cook Inlet southern offshore test fish project, 2012.

Date	Number of Stations	Mean Fishing Time (min)	Catch		CPUE	
			Daily	Cum	Daily	Cum
1 July	6	227.5	0	0	0	0
2 July	6	215.5	0	0	0	0
3 July	6	216.5	0	0	0	0
4 July	6	217.0	1	1	1	1
5 July	6	217.5	0	1	0	1
6 July	6	220.5	0	1	0	1
7 July	6	210.0	0	1	0	1
8 July	6	223.0	0	1	0	1
9 July	6	214.0	0	1	0	1
10 July	6	223.5	2	3	2	3
11 July	4[a]	164.5	0	3	0	3
12 July	2[a]	86.5	0	3	0	3
13 July	6	225.5	0	3	0	3
14 July	6	229.0	0	3	0	3
15 July	6	224.0	0	3	0	3
16 July	6	217.5	2	5	2	4
17 July	6	209.0	0	5	0	4
18 July	6	206.5	0	5	0	4
19 July	6	235.0	0	5	0	4
20 July	6	262.5	0	5	0	4
21 July	6	218.5	0	5	0	4
22 July	6	210.5	0	5	0	4
23 July	6	211.5	0	5	0	4
24 July	6	209.5	0	5	0	4
25 July	6	214.0	0	5	0	4
26 July	6	212.0	0	5	0	4
27 July	6	196.5	0	5	0	4
28 July	6	214.0	0	5	0	4
29 July	6	212.5	0	5	0	4
30 July	6	211.5	0	5	0	4

[a] Not all stations fished due to weather; the data for missing stations were interpolated.

Appendix A11.–Estimated Chinook salmon catch by date and station, Upper Cook Inlet southern offshore test fish project, 2012.

	Station Number						
Date	4	5	6	6.5	7	8	Total
1 July	0	0	0	0	0	0	0
2 July	0	0	0	0	0	0	0
3 July	0	0	0	0	0	0	0
4 July	0	0	1	0	0	0	1
5 July	0	0	0	0	0	0	0
6 July	0	0	0	0	0	0	0
7 July	0	0	0	0	0	0	0
8 July	0	0	0	0	0	0	0
9 July	0	0	0	0	0	0	0
10 July	0	0	0	1	1	0	2
11 July[a]	0	0	0	0	0	0	0
12 July[a]	0	0	0	0	0	0	0
13 July	0	0	0	0	0	0	0
14 July	0	0	0	0	0	0	0
15 July	0	0	0	0	0	0	0
16 July	0	0	0	1	1	0	2
17 July	0	0	0	0	0	0	0
18 July	0	0	0	0	0	0	0
19 July	0	0	0	0	0	0	0
20 July	0	0	0	0	0	0	0
21 July	0	0	0	0	0	0	0
22 July	0	0	0	0	0	0	0
23 July	0	0	0	0	0	0	0
24 July	0	0	0	0	0	0	0
25 July	0	0	0	0	0	0	0
26 July	0	0	0	0	0	0	0
27 July	0	0	0	0	0	0	0
28 July	0	0	0	0	0	0	0
29 July	0	0	0	0	0	0	0
30 July	0	0	0	0	0	0	0
Total	0	0	1	2	2	0	5
Percent	0%	0%	20%	40%	40%	0%	100%

[a] Not all stations fished due to weather; the data for missing stations were interpolated.

Appendix A12.–Estimated Chinook salmon catch per unit of effort (CPUE) by date and station, Upper Cook Inlet southern offshore test fish project, 2012.

Date	Station Number						Total
	4	5	6	6.5	7	8	
1 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4 July	0.0	0.0	0.9	0.0	0.0	0.0	0.9
5 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10 July	0.0	0.0	0.0	0.8	0.8	0.0	1.6
11 July[a]	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12 July[a]	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16 July	0.0	0.0	0.0	0.8	0.8	0.0	1.6
17 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30 July	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.0	0.0	1	1.6	1.6	0.0	4
Percent	0%	0%	22%	39%	39%	0%	100%

[a] Not all stations fished due to weather; the data for missing stations were interpolated.

Appendix A13.–Final cumulative catch and catch per unit of effort (CPUE) values by year for pink salmon, chum salmon, coho salmon, and Chinook salmon from the Upper Cook Inlet southern offshore test fish project, 1992–2012.

	Pink		Chum		Coho		Chinook	
Year	Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
1992	326	227	667	443	444	299	3	3
1993	53	45	205	153	325	258	5	4
1994	227	166	521	345	752	513	1	1
1995	155	97	1,129	687	941	595	3	2
1996	119	84	491	319	758	534	3	2
1997	203	158	420	306	502	375	4	3
1998	556	406	438	312	547	403	3	2
1999	31	23	451	331	404	307	7	6
2000	908	608	1,031	672	1,157	766	2	1
2001	283	229	933	655	1,209	838	11	8
2002	809	572	1,537	1013	1,184	798	6	4
2003	182	126	1,000	713	506	368	13	10
2004	650	439	652	447	1,119	785	4	3
2005	186	150	448	300	546	344	8	6
2006	1,023	655	988	635	1,613	1037	12	8
2007	348	247	398	265	692	482	5	4
2008	306	226	405	273	1,024	718	3	2
2009	701	526	454	303	512	361	11	8
2010	266	176	1,155	736	700	454	3	2
2011	90	64	768	532	374	264	7	5
1992–2011 Avg	371	261	705	472	765	525	6	4
2012	277	210	664	527	200	154	5	4

Appendix A14.–Entry pattern of sockeye salmon into Upper Cook Inlet, Alaska, 2012 estimated from daily catch per unit of effort (CPUE) measured at the latitude of Anchor Point.

Day	Date	Input *y*	Estimated *y*	Residual	Change in Input *Y*	Change in Estimated *Y*
8	1 Jul	0.0306	0.0407	-0.0101		
9	2 Jul	0.042	0.0512	-0.0091	0.0114	0.0105
10	3 Jul	0.0632	0.0642	-0.0009	0.0212	0.013
11	4 Jul	0.0861	0.0802	0.0059	0.0229	0.016
12	5 Jul	0.1161	0.0998	0.0163	0.0299	0.0196
13	6 Jul	0.1431	0.1235	0.0196	0.027	0.0237
14	7 Jul	0.1759	0.1519	0.0241	0.0329	0.0284
15	8 Jul	0.2049	0.1854	0.0194	0.0289	0.0335
16	9 Jul	0.2099	0.2244	-0.0145	0.0051	0.039
17	10 Jul	0.2347	0.2689	-0.0343	0.0247	0.0445
18	11 Jul	0.3051	0.3186	-0.0135	0.0704	0.0497
19	12 Jul	0.3898	0.3728	0.017	0.0847	0.0542
20	13 Jul	0.4489	0.4304	0.0185	0.0591	0.0576
21	14 Jul	0.5122	0.4899	0.0223	0.0633	0.0595
22	15 Jul	0.5437	0.5497	-0.0061	0.0314	0.0598
23	16 Jul	0.551	0.6081	-0.0572	0.0073	0.0584
24	17 Jul	0.6425	0.6636	-0.0211	0.0915	0.0555
25	18 Jul	0.6816	0.7149	-0.0333	0.0391	0.0513
26	19 Jul	0.7457	0.7612	-0.0155	0.064	0.0463
27	20 Jul	0.8472	0.8021	0.0451	0.1015	0.0409
28	21 Jul	0.8898	0.8374	0.0523	0.0426	0.0354
29	22 Jul	0.9097	0.8675	0.0421	0.0199	0.0301
30	23 Jul	0.9166	0.8928	0.0239	0.007	0.0252
31	24 Jul	0.919	0.9137	0.0053	0.0023	0.0209
32	25 Jul	0.9205	0.9308	-0.0103	0.0015	0.0171
33	26 Jul	0.9236	0.9447	-0.0211	0.0031	0.0139
34	27 Jul	0.9454	0.956	-0.0106	0.0218	0.0113
35	28 Jul	0.9525	0.9651	-0.0126	0.0071	0.0091
36	29 Jul	0.9568	0.9723	-0.0155	0.0043	0.0072
37	30 Jul	0.9583	0.9781	-0.0198	0.0015	0.0058

Appendix A15.–Chemical and physical observations made in Upper Cook Inlet, Alaska, during the 2012 southern offshore test fish project.

Date	Sta	Air Temp (c)	Water Temp (c)	Wind Vel. (knots)	Wind Direction	Tide Stage	Salinity (ppt)	Water Depth (f)	Secchi (m)
1 Jul	4	12	8.8	7	southwest	ebb	30.1	25.5	6.5
	5	12	9.2	8	southwest	ebb	29.2	37.4	4.0
	6	13	9.7	9	southwest	ebb	28.2	46.4	3.0
	6.5	13	9.8	6	southwest	flood	28.2	42.2	4.0
	7	12	9.8	10	southwest	flood	28.4	46.8	4.0
	8	13	9.6	9	southwest	flood	28.9	29.3	2.5
2 Jul	8	4	8.9	4	southeast	ebb	29.5	32.3	3.5
	7	11	9.2	10	southeast	ebb	29.3	45.0	5.0
	6.5	12	9.2	10	southeast	ebb	29.2	43.3	4.0
	6	12	9.4	11	southeast	ebb	29.1	44.5	3.5
	5	11	8.8	10	southeast	ebb	30.1	35.9	5.0
	4	11	9.0	9	southeast	low	30.3	23.6	5.0
3 Jul	4	10	8.8	4	south	ebb	30.4	24.5	6.0
	5	12	9.0	3	south	ebb	29.9	37.0	5.0
	6	11	9.2	2	south	ebb	29.4	46.5	5.0
	6.5	11	9.3	1	south	flood	29.2	41.6	3.5
	7	12	9.2	1	south	flood	29.2	46.8	2.5
	8	10	9.6	4	south	flood	28.8	25.9	3.5
4 Jul	8	8	9.0	6	east	flood	29.5	33.8	3.0
	7	9	9.0	8	east	high	29.5	46.8	3.5
	6.5	9	8.9	5	east	ebb	29.7	62.6	4.0
	6	9	8.8	9	east	ebb	29.7	48.6	4.5
	5	10	8.9	5	east	ebb	29.9	36.8	5.5
	4	10	8.9	6	east	ebb	31.3	22.8	5.5
5 Jul	4	9	8.4	7	north	ebb	30.6	24.0	6.0
	5	10	9.2	9	north	ebb	30.3	35.4	5.5
	6	10	9.3	12	north	ebb	29.3	44.3	2.5
	6.5	10	9.4	13	north	ebb	29.1	42.8	2.5
	7	10	9.4	15	northwest	flood	29.1	46.2	2.0
	8	11	9.5	17	northwest	flood	28.8	27.3	2.5
6 Jul	8	9	9.2	8	north	flood	29.5	33.7	2.5
	7	10	9.1	8	north	high	29.6	47.1	3.0
	6.5	10	9.1	9	north	high	29.7	41.4	4.0
	6	10	9.1	7	north	ebb	29.7	49.3	4.5
	5	10	9.6	7	north	ebb	30.3	33.5	5.5
	4	10	8.4	9	north	ebb	30.6	23.0	6.0

-continued-

Date	Sta	Air Temp (c)	Water Temp (c)	Wind Vel. (knots)	Wind Direction	Tide Stage	Salinity (ppt)	Water Depth (f)	Secchi (m)
7 Jul	4	10	8.3	7	northwest	ebb	30.3	29.5	11
	5	13	8.8	4	northwest	ebb	30.2	36.0	6.5
	6	13	9.8	3	northwest	ebb	28.9	46.8	4.5
	6.5	13	10.2	3	northwest	ebb	28.6	42.1	3.5
	7	13	9.7	6	northwest	low	29.0	45.0	2
	8	13	9.8	3	northeast	flood	28.7	29.2	2.0
8 Jul	8	12	9.6	3	southwest	flood	28.7	32.7	2.0
	7	11	9.4	3	southwest	flood	29.3	47.3	3.5
	6.5	12	9.0	4	southwest	flood	29.0	45.0	4.5
	6	12	8.7	3	southwest	flood	30.1	51.6	5.5
	5	13	8.5	2	southeast	flood	30.4	34.6	9.0
	4	14	8.3	0	north	ebb	30.6	25.0	14.5
9 Jul	4	11	8.4	2	northwest	flood	30.7	27.4	12.0
	5	12	8.7	4	northwest	ebb	30.4	37.1	9.5
	6	12	8.3	5	north	ebb	29.6	46.5	5.5
	6.5	13	9.1	2	north	ebb	28.8	42.4	4.0
	7	14	10.0	2	northeast	ebb	28.9	45.7	3.5
	8	11	9.7	2	southwest	ebb	29.0	27.3	2.5
10 Jul	8	10	9.7	7	southwest	low	29.0	31.8	3.0
	7	10	9.6	7	south	low	28.9	46.7	4.0
	6.5	10	9.7	7	south	flood	28.8	42.9	4.0
	6	9	9.7	7	south	flood	29.0	51.3	4.0
	5	10	8.7	4	south	flood	30.4	38.7	9.5
	4	12	8.7	6	south	flood	30.5	25.9	9.5
11 Jul	4	9	8.7	9	northeast	flood	30.4	27.4	8.0
	5	10	8.7	11	northeast	flood	30.4	38.3	6.0
	6	10	9.8	15	northeast	ebb	29.0	47.1	3.5
	6.5	11	10.0	11	northeast	ebb	28.5	43.3	4.0
	7	nd	nd	nd	nd	nd	nd	nd	nd
	8	nd	nd	nd	nd	nd	nd	nd	nd
12 Jul	4	8	10.0	23	north	flood	30.4	26.7	6.0
	5	8	8.8	24	north	flood	30.3	38.6	6.5
	6	nd	nd	nd	nd	nd	nd	nd	nd
	6.5	nd	nd	nd	nd	nd	nd	nd	nd
	7	nd	nd	nd	nd	nd	nd	nd	nd
	8	nd	nd	nd	nd	nd	nd	nd	nd

-continued-

Appendix A15.–Page 3 of 5.

Date	Sta	Air Temp (c)	Water Temp (c)	Wind Vel. (knots)	Wind Direction	Tide Stage	Salinity (ppt)	Water Depth (f)	Secchi (m)
13 Jul	4	11	8.9	2	north	flood	30.5	25.7	8.0
	5	11	8.8	2	north	flood	30.6	38.3	7.0
	6	11	8.8	2	north	flood	30.7	48.6	8.0
	6.5	13	8.9	0	north	flood	30.7	42.5	14.0
	7	11	10.3	6	southwest	ebb	29.7	47.2	4.0
	8	11	8.9	8	southwest	ebb	28.8	30.4	3.0
14 Jul	8	11	10.2	7	southwest	ebb	28.2	31.4	3.5
	7	11	10.5	5	southwest	ebb	27.5	46.1	4.0
	6.5	10	10.3	3	southwest	ebb	27.7	42.8	4.0
	6	11	10.4	5	southwest	ebb	27.7	48.2	4.0
	5	11	9.3	4	west	low	30.2	36.7	6.0
	4	11	8.9	2	west	low	30.6	25.0	9.0
15 Jul	4	10	8.4	9	north	flood	30.8	26.8	9.0
	5	10	8.4	6	north	flood	30.8	38.3	9.5
	6	10	9.1	5	north	flood	29.9	47.8	5.5
	6.5	11	10.1	0	north	ebb	28.1	44.2	3.5
	7	11	10.2	1	north	ebb	27.7	46.4	4.0
	8	11	11.9	1	north	ebb	27.4	30.5	4.0
16 Jul	8	11	10.1	3	southwest	ebb	27.7	32.6	3.5
	7	11	10.1	6	southwest	ebb	27.5	44.0	3.5
	6.5	11	11.2	5	southwest	ebb	27.4	44.0	4.0
	6	11	9.9	9	southwest	ebb	28.1	47.9	5.0
	5	10	8.5	6	southwest	ebb	30.6	34.4	9.0
	4	11	8.8	4	southwest	ebb	30.5	24.4	9.0
17 Jul	4	11	8.8	0	southeast	ebb	30.5	23.7	8.0
	5	11	10.0	1	southwest	ebb	30.2	36.8	8.0
	6	12	9.5	1	southwest	flood	29.3	47.0	7.5
	6.5	12	9.5	2	southwest	flood	29.7	43.8	6.5
	7	12	10.1	2	southwest	flood	29.8	46.8	4.5
	8	12	10.5	2	southwest	flood	27.2	31.6	3.0
18 Jul	8	11	10.2	7	southwest	flood	27.2	33.5	3.0
	7	11	10.5	5	southwest	flood	27.4	46.7	4.0
	6.5	11	10.5	5	southwest	flood	27.3	44.7	4.5
	6	11	10.5	4	southwest	flood	27.4	48.3	4.5
	5	10	9.5	8	south	flood	29.4	35.6	7.0
	4	11	8.9	2	south	flood	30.3	23.7	9.0

-continued-

Date	Sta	Air Temp (c)	Water Temp (c)	Wind Vel. (knots)	Wind Direction	Tide Stage	Salinity (ppt)	Water Depth (f)	Secchi (m)
19 Jul	4	11	8.8	6	south	ebb	30.7	23.4	9.0
	5	11	9.2	5	southeast	ebb	30.2	38.6	7.0
	6	11	9.3	6	southeast	ebb	29.9	47.2	8.5
	6.5	11	9.6	5	southeast	ebb	29.6	44.1	5.5
	7	11	10.5	4	southeast	ebb	28.5	47.3	6.0
	8	12	10.9	5	southeast	ebb	27.7	30.3	4.5
20 Jul	8	12	10.1	8	east	ebb	28.0	30.6	3.0
	7	11	10.2	15	east	ebb	28.5	47.3	3.5
	6.5	11	9.7	8	east	ebb	28.7	40.7	4.0
	6	11	10.1	10	east	ebb	28.5	47.1	4.0
	5	11	9.4	8	east	low	29.8	33.0	7.0
	4	11	9.4	4	east	flood	30.6	24.1	7.0
21 Jul	4	11	9.0	5	northeast	low	30.6	25.0	7.0
	5	11	9.1	7	northeast	flood	30.4	37.7	6.5
	6	10	9.4	6	northeast	flood	29.9	49.3	4.5
	6.5	10	9.4	2	northeast	flood	29.8	43.2	5.0
	7	11	9.7	2	northeast	flood	29.7	48.2	4.5
	8	10	9.5	3	northeast	flood	29.5	30.4	4.0
22 Jul	8	7	9.8	6	northwest	flood	29.1	33.5	4.0
	7	11	9.5	3	northwest	high	29.5	46.4	4.0
	6.5	11	9.1	3	northwest	high	30.0	45.3	6.5
	6	11	9.1	2	east	ebb	30.1	48.9	7.0
	5	11	9.1	4	east	ebb	30.0	36.1	7.5
	4	11	8.6	3	east	ebb	30.4	23.0	8.0
23 Jul	4	11	9.0	0	northwest	ebb	30.5	24.5	11.5
	5	11	9.6	1	northwest	ebb	29.8	35.9	8.5
	6	11	9.9	2	northwest	ebb	29.1	47.3	3.5
	6.5	11	10.2	1	north	ebb	28.7	43.0	4.5
	7	11	9.3	4	north	ebb	28.6	46.4	3.0
	8	11	9.8	4	north	ebb	28.6	28.2	2.0
24 Jul	8	12	10.1	1	south	flood	28.5	27.7	2.5
	7	14	10.0	1	south	flood	29.0	46.8	4.0
	6.5	13	10.8	1	east	flood	29.4	45.5	4.5
	6	13	9.3	1	south	flood	30.0	50.2	8.5
	5	13	9.1	1	south	flood	30.2	38.7	8.5
	4	11	9.2	1	south	flood	30.3	25.2	11.0

-continued-

Appendix A15.–Page 5 of 5.

Date	Sta	Air Temp (c)	Water Temp (c)	Wind Vel. (knots)	Wind Direction	Tide Stage	Salinity (ppt)	Water Depth (f)	Secchi (m)
25 Jul	4	12	9.2	0	west	flood	30.4	27.2	12.5
	5	12	9.4	1	west	high	30.2	38.0	9.0
	6	14	9.9	1	west	high	29.8	48.4	6.0
	6.5	12	10.1	0	west	high	29.3	43.6	4.0
	7	12	11.0	3	south	ebb	28.8	46.0	4.0
	8	12	10.2	2	south	ebb	28.9	29.3	3.0
26 Jul	8	11	10.2	4	southeast	flood	28.8	31.8	3.0
	7	11	10.3	4	south	ebb	28.7	46.4	3.5
	6.5	11	10.4	5	south	ebb	28.7	43.8	3.5
	6	11	10.5	2	south	ebb	28.8	51.2	4.0
	5	11	10.3	2	south	ebb	30.1	38.2	7.5
	4	11	9.3	2	south	ebb	30.4	26.6	12.0
27 Jul	4	11	9.4	1	south	flood	30.6	27.1	11.0
	5	11	9.4	5	south	flood	30.3	37.8	8.0
	6	11	9.9	2	south	flood	30.1	50.8	8.5
	6.5	12	10.2	1	south	ebb	29.2	44.9	6.0
	7	12	10.4	2	southwest	ebb	29.1	46.8	4.0
	8	12	11.6	3	south	ebb	28.8	30.5	5.5
28 Jul	8	12	10.4	3	southwest	ebb	28.8	30.7	3.0
	7	12	10.6	7	southeast	ebb	28.9	45.0	3.5
	6.5	12	11.2	11	southeast	ebb	27.7	43.5	4.0
	6	11	11.2	13	southeast	low	27.9	49.7	3.5
	5	11	9.8	14	southeast	low	30.1	35.8	6.5
	4	11	9.5	8	southeast	flood	30.5	27.1	11.0
29 Jul	4	11	9.6	2	northeast	flood	30.4	26.7	9.5
	5	11	9.5	1	northeast	flood	30.3	37.9	8.0
	6	11	10.8	2	northeast	ebb	28.6	48.0	5.0
	6.5	11	10.8	5	northeast	ebb	28.6	43.8	4.5
	7	11	10.6	1	northeast	ebb	28.7	46.1	4.0
	8	11	10.8	2	southwest	ebb	28.8	27.2	4.0
30 Jul	8	11	10.8	2	southwest	ebb	28.9	27.3	4.0
	7	11	11.0	1	northeast	ebb	28.1	46.1	4.5
	6.5	11	10.1	2	northeast	ebb	28.1	44.2	5.0
	6	11	11.4	5	northeast	ebb	29.0	49.6	5.5
	5	11	10.6	5	northeast	low	26.8	38.2	7.5
	4	10	9.8	5	northeast	flood	30.2	26.8	8.5
Averages		11	9.6	5.1	southeast	ebb	29.4	38.5	5.5
Min		4	8.3	0	na	na	26.8	22.8	2.0
Max		14	11.9	24	na	na	31.3	62.6	14.5

Appendix A16.–Yearly mean values of physical observations made during the conduct of the 2001–2012 southern offshore test fish project.

Sta	Year	Air Temp (c)	Water Temp (c)	Wind Vel. (knots)	Wind Dir	Salinity (ppt)	Water Depth (f)	Secchi (m)
4	2001	12.9	9.8	11.1	SE	31.5	23.6	8.4
	2002	12.6	9.5	12.6	S	31.4	23.6	8.1
	2003	14.1	10.6	12.0	S	31.2	23.4	8.3
	2004	10.7	9.6	7.1	E	31.3	23.8	7.9
	2005	12.9	10.9	6.2	S	31.0	24.5	7.4
	2006	11.1	9.9	6.0	SE	30.7	23.9	7.7
	2007	10.8	8.6	4.7	SE	31.2	23.9	8.1
	2008	11.0	9.3	8.0	SE	30.6	22.8	8.5
	2009	11.0	9.1	6.2	SE	33.3	24.4	7.3
	2010	10.7	9.6	5.9	S	31.2	24.1	7.6
	2011	10.8	8.8	3.7	S	31.5	23.9	7.7
	2012	10.8	8.9	4.8	SE	30.5	25.4	8.9
	Avg	11.6	9.5	7.4	SE	31.3	23.9	8.0
5	2001	12.9	10.1	11.2	SE	31.0	35.5	6.9
	2002	12.8	9.7	13.9	S	30.9	35.8	6.3
	2003	14.0	11.0	13.3	SE	30.6	35.7	6.3
	2004	10.7	9.9	7.2	SE	30.7	34.7	7.1
	2005	13.1	11.1	5.9	S	30.6	36.3	6.5
	2006	11.1	10.2	7.6	S	30.2	35.4	5.6
	2007	10.8	8.7	4.6	S	30.9	35.4	7.2
	2008	10.4	8.8	6.7	SE	30.4	35.4	6.4
	2009	11.1	9.6	6.6	SE	32.4	35.9	5.8
	2010	11.0	9.5	5.5	SE	30.8	35.3	6.7
	2011	11.6	9.2	4.0	S	31.1	36.0	6.4
	2012	11.0	9.2	5.7	SE	30.1	36.8	7.2
	Avg	11.7	9.8	7.7	SE	30.8	35.7	6.5

Sta	Year	Air Temp (c)	Water Temp (c)	Wind Vel. (knots)	Wind Dir	Salinity (ppt)	Water Depth (f)	Secchi (m)
6	2001	12.8	10.7	10.7	S	30.5	46.2	5.2
	2002	12.8	10.1	13.4	S	30.4	45.1	4.2
	2003	14.7	11.5	12.9	S	29.5	46.4	4.9
	2004	10.6	10.3	8.0	SE	30.1	46.6	4.6
	2005	12.8	11.6	8.0	S	29.4	45.8	4.7
	2006	12.8	11.6	8.0	S	29.8	45.8	4.7
	2007	11.0	9.5	6.0	S	30.0	47.2	4.8
	2008	10.4	9.3	6.2	S	29.5	47.3	5.0
	2009	11.5	10.2	6.0	SE	31.3	46.7	4.0
	2010	11.2	9.9	6.1	S	30.1	46.6	4.7
	2011	11.7	9.8	3.2	S	30.6	45.7	5.0
	2012	11.1	9.7	5.6	SE	29.2	48.2	5.1
	Avg	11.9	10.4	7.8	S	30.0	46.5	4.7
6.5	2001	12.8	11.1	11.8	S	29.4	42.7	4.0
	2002	12.6	10.4	13.7	S	30.0	42.6	3.3
	2003	14.4	11.7	14.9	S	29.1	41.3	4.1
	2004	10.7	10.8	10.1	SE	29.4	41.6	3.6
	2005	13.2	12.2	7.4	S	28.7	42.8	4.2
	2006	11.2	10.3	8.5	SE	29.7	41.6	3.4
	2007	11.1	9.7	6.2	S	29.8	42.9	4.3
	2008	10.4	9.6	6.3	S	29.2	42.3	4.4
	2009	11.8	10.4	6.4	S	31.0	42.5	3.7
	2010	11.2	10.1	6.2	S	29.7	41.7	3.7
	2011	11.3	10.2	4.5	S	29.9	42.5	4.2
	2012	11.3	9.9	4.5	SE	28.9	44.0	4.7
	Avg	11.8	10.5	8.4	S	29.6	42.4	4.0

-continued-

Appendix A16.–Page 2 of 2.

Sta	Year	Air Temp (c)	Water Temp (c)	Wind Vel. (knots)	Wind Dir	Salinity (ppt)	Water Depth (f)	Secchi (m)
7	2001	13.1	11.4	9.9	SE	29.0	43.6	3.5
	2002	12.4	10.4	12.4	SE	29.9	44.0	2.8
	2003	14.3	11.6	13.0	S	29.0	44.3	3.6
	2004	10.6	11.0	9.7	SE	28.8	44.7	2.7
	2005	12.9	12.3	7.6	S	28.3	44.8	3.6
	2006	10.8	9.9	6.8	S	29.4	42.4	3.1
	2007	11.2	9.9	6.2	S	29.5	45.5	3.8
	2008	10.6	9.8	6.2	S	29.4	44.9	4.2
	2009	11.7	10.4	5.5	S	31.2	45.0	3.5
	2010	11.4	10.3	5.7	S	29.4	44.9	2.9
	2011	11.5	10.4	3.9	S	29.8	44.8	3.8
	2012	11.3	10.0	5.1	SE	28.8	46.4	3.8
	Avg	11.8	10.6	7.7	S	29.4	44.6	3.4

Sta	Year	Air Temp (c)	Water Temp (c)	Wind Vel. (knots)	Wind Dir	Salinity (ppt)	Water Depth (f)	Secchi (m)
8	2001	12.8	11.3	9.5	SE	29.0	28.9	3.1
	2002	12.1	10.3	11.8	SE	30.0	29.4	2.4
	2003	13.7	11.2	11.6	SE	28.1	28.9	3.1
	2004	10.8	11.0	9.1	SE	29.3	28.7	2.4
	2005	12.8	12.1	7.7	S	28.5	29.8	3.3
	2006	11.8	10.5	6.7	S	29.0	30.4	3.0
	2007	11.2	9.9	5.5	S	29.5	29.8	3.2
	2008	10.9	9.7	5.9	SW	29.2	29.9	3.7
	2009	11.6	10.5	5.9	S	31.2	29.6	3.4
	2010	11.7	10.2	5.2	SE	29.3	29.9	2.7
	2011	12.2	10.3	3.8	S	29.8	29.6	3.2
	2012	10.8	10.0	4.8	SE	28.6	30.4	3.2
	Avg	11.9	10.6	7.3	SE	29.3	29.6	3.1

Appendix A17.–Yearly mean values for selected chemical and physical variables collected during the southern offshore test fish project, 1979–2012.

Year	Air Temp. (c)	Water Temp. (c)	Wind Vel. (knots)	Salinity (ppt)	Secchi (m)
1979	12.4	12.2	5.9	25.0	5.7
1980	12.4	10.0	8.2	24.8	4.2
1981	13.4	11.0	10.1	23.1	4.1
1982	12.0	8.5	9.0	20.3	5.0
1983	14.9	10.9	9.4	20.6	4.7
1984	13.5	10.8	9.1	-	5.3
1985	10.8	8.2	9.2	28.0	5.5
1986	10.6	9.1	8.2	-	5.4
1987	12.6	10.1	4.1	28.4	5.1
1988	14.2	9.1	8.9	30.2	4.7
1989	13.1	10.0	4.4	27.7	4.7
1990	12.3	11.4	8.5	21.3	4.6
1991	10.9	9.9	6.6	-	4.1
1992	12.0	11.1	5.4	28.4	4.3
1993	13.5	10.5	6.9	26.2	5.0
1994	13.0	10.0	9.3	29.0	6.0
1995	13.1	9.5	7.9	26.5	4.6
1996	12.6	10.0	9.1	30.8	4.7
1997	13.8	10.5	10.0	30.6	4.0
1998	12.5	10.3	8.3	30.0	5.4
1999	13.4	10.3	12.4	30.2	4.5
2000	13.5	10.5	12.2	30.1	5.2
2001	12.9	10.7	10.7	30.1	5.2
2002	12.5	10.1	13.0	30.4	4.5
2003	14.2	11.3	12.9	29.6	5.0
2004	10.7	10.4	8.5	30.0	4.7
2005	13.0	11.7	7.1	29.4	5.0
2006	11.3	10.3	7.2	28.4	4.6
2007	11.0	9.4	5.5	30.2	5.3
2008	10.5	9.3	6.3	29.7	5.3
2009	11.4	10.0	6.1	31.8	4.7
2010	11.2	9.9	5.8	30.1	4.7
2011	11.5	9.8	3.9	30.4	5.1
1992-2011 Avg	12.4	10.3	8.4	29.6	4.9
2012	11.0	9.6	5.1	29.4	5.5

APPENDIX B

Appendix B1.–Summary of sockeye salmon fishing effort, daily and cumulative catch, and daily and cumulative catch per unit of effort (CPUE), Upper Cook Inlet northern offshore test fish project, 2012.

	Number of	Mean Fishing Time	Catch		CPUE	
Date	Stations	(min)	Daily	Cum	Daily	Cum
1 July	7	265	29	29	23	23
2 July	7	256	6	35	5	28
3 July	7	252	13	48	11	38
4 July	7	251	5	53	4	42
5 July	5	184	13	66	10	53
6 July	7	255	8	74	7	59
7 July	7	257	11	85	10	69
8 July	6	219	10	95	8	77
9 July	7	253	9	104	7	85
10 July	7	275	35	139	24	109
11 July	5	191	19	158	15	123
12 July	5	252	180	338	84	208
13 July	5	385	1,976	2,314	431	638
14 July	4	316	1,747	4,061	381	1,019
15 July	7	288	159	4,220	109	1,128
16 July	7	320	527	4,747	285	1,413
17 July	7	349	631	5,378	284	1,696
18 July	6	290	543	5,921	273	1,969
19 July	7	279	298	6,219	240	2,208
20 July	7	280	304	6,523	117	2,325
21 July	7	269	738	7,261	278	2,603
22 July	5	255	721	7,982	258	2,861
23 July	7	301	224	8,206	142	3,003
24 July	7	297	306	8,512	168	3,171
25 July	7	306	201	8,713	126	3,297
26 July	7	278	146	8,859	106	3,403
27 July	7	271	80	8,939	49	3,452
28 July	3	131	111	9,050	57	3,509
29 July	7	280	30	9,080	19	3,529
30 July	5	197	38	9,118	28	3,557

Appendix B2.–Estimated sockeye salmon catch by date and station, Upper Cook Inlet northern offshore test fish project, 2012.

	Station Number							
Date	1	2	3	4	5	6	7	Total
1 July	5	6	7	7	4	0	0	29
2 July	0	1	1	2	2	0	0	6
3 July	2	3	3	1	1	2	1	13
4 July	2	1	1	1	0	0	0	5
5 July	3	0	0	10	0	–	–	13
6 July	0	2	3	0	0	2	1	8
7 July	0	0	2	2	4	2	1	11
8 July	–	2	3	0	3	0	2	10
9 July	0	1	0	4	3	1	0	9
10 July	3	3	3	5	19	0	2	35
11 July	0	1	–	5	12	1	–	19
12 July	0	0	20	76	84	–	–	180
13 July	0	0	772	1,195	9	–	–	1,976
14 July	0	19	255	1,473	–	–	–	1,747
15 July	12	41	62	15	29	0	0	159
16 July	0	189	217	104	14	2	1	527
17 July	1	2	320	296	11	1	0	631
18 July	1	5	268	134	135	0	–	543
19 July	1	0	1	141	0	27	128	298
20 July	38	41	69	8	143	4	1	304
21 July	1	28	155	552	2	–	–	738
22 July	1	14	53	651	2	–	–	721
23 July	5	16	67	77	43	7	9	224
24 July	6	15	207	66	9	1	2	306
25 July	20	22	38	101	2	2	16	201
26 July	17	31	51	12	29	0	6	146
27 July	1	5	8	56	3	1	6	80
28 July	–	–	–	109	–	0	2	111
29 July	0	0	22	5	2	1	0	30
30 July	10	8	7	13	0	–	–	38
Total	129	456	2,615	5,121	565	54	178	9,118
Percent	1%	5%	29%	56%	6%	1%	2%	100%

Note: Dashes indicate a station that was not fished.

Appendix B3.–Estimated sockeye salmon catch per unit of effort (CPUE) by date and station, Upper Cook Inlet northern offshore test fish project, 2012.

	Station Number							
Date	1	2	3	4	5	6	7	Total
1 July	3.4	4.7	5.7	5.5	3.3	0.0	0.0	22.6
2 July	0.0	0.8	0.8	1.7	1.6	0.0	0.0	4.9
3 July	1.6	2.6	2.5	0.8	0.9	1.7	0.8	10.9
4 July	1.6	0.8	0.8	0.8	0.0	0.0	0.0	4.0
5 July	2.4	0.0	0.0	8.0	0.0	–	–	10.4
6 July	0.0	1.6	2.5	0.0	0.0	1.6	0.8	6.5
7 July	0.0	0.0	1.6	1.7	3.2	2.6	0.8	9.9
8 July	–	1.6	2.5	0.0	2.5	0.0	1.6	8.2
9 July	0.0	0.8	0.0	3.3	2.5	0.8	0.0	7.4
10 July	2.6	2.4	2.5	3.9	10.8	0.0	1.6	23.8
11 July	0.0	0.8	–	4.1	9.0	0.8	–	14.7
12 July	0.0	0.0	15.6	35.0	33.6	–	–	84.2
13 July	0.0	0.0	189.0	235.0	6.7	–	–	430.7
14 July	0.0	16.1	122.4	242.0	–	–	–	380.5
15 July	8.9	30.0	40.0	11.1	19.3	0.0	0.0	109.3
16 July	0.0	101.2	108.5	62.4	10.0	1.6	0.8	284.5
17 July	0.8	1.7	141.2	131.6	7.5	0.8	0.0	283.6
18 July	0.8	4.0	123.7	63.8	80.2	0.0	–	272.5
19 July	0.8	0.0	0.8	86.3	0.0	18.2	133.5	239.6
20 July	26.8	29.3	49.9	6.0	1.0	3.3	0.8	117.1
21 July	0.8	16.0	81.2	178.1	1.4	–	–	277.5
22 July	0.8	10.5	31.8	213.4	1.6	–	–	258.1
23 July	4.1	10.3	37.9	47.1	29.7	5.5	7.3	141.9
24 July	4.7	11.7	100.1	41.7	7.2	0.8	1.7	167.9
25 July	16.2	16.7	25.3	54.0	1.6	1.4	11.2	126.4
26 July	13.8	23.8	35.2	9.9	18.7	0.0	4.6	106.0
27 July	0.8	4.1	6.2	30.3	2.4	0.7	4.8	49.3
28 July	–	–	–	55.4	–	0.0	1.6	57.0
29 July	0.0	0.0	12.8	3.7	1.7	0.9	0.0	19.1
30 July	7.9	6.1	5.3	9.1	0.0	–	–	28.4
Total	99	298	1,146	1,546	256	41	172	3,557
Percent	3%	8%	32%	43%	7%	1%	5%	100%

Note: Dashes indicate a station that was not fished.

Appendix B4.–Summary of pink salmon fishing effort, daily and cumulative catch, and daily and cumulative catch per unit of effort (CPUE), Upper Cook Inlet northern offshore test fish project, 2012.

Date	Number of Stations	Mean Fishing Time (min)	Catch		CPUE	
			Daily	Cum	Daily	Cum
1 July	7	265	0	0	0	0
2 July	7	256	0	0	0	0
3 July	7	252	0	0	0	0
4 July	7	251	0	0	0	0
5 July	5	184	0	0	0	0
6 July	7	255	0	0	0	0
7 July	7	257	0	0	0	0
8 July	6	219	0	0	0	0
9 July	7	253	0	0	0	0
10 July	7	275	2	2	1	1
11 July	5	191	2	4	2	3
12 July	5	252	1	5	1	4
13 July	5	385	2	7	2	5
14 July	4	316	8	15	4	9
15 July	7	288	7	22	5	14
16 July	7	320	18	40	10	23
17 July	7	349	24	64	12	35
18 July	6	290	23	87	11	46
19 July	7	279	6	93	4	50
20 July	7	280	12	105	9	59
21 July	7	269	23	128	13	72
22 July	5	255	39	167	13	85
23 July	7	301	77	244	47	133
24 July	7	297	68	312	41	173
25 July	7	306	95	407	53	226
26 July	7	278	134	541	92	318
27 July	7	271	54	595	35	352
28 July	3	131	50	645	26	378
29 July	7	280	54	699	33	411
30 July	5	197	44	743	41	452

Appendix B5.–Estimated pink salmon catch by date and station, Upper Cook Inlet northern offshore test fish project, 2012.

	Station Number							
Date	1	2	3	4	5	6	7	Total
1 July	0	0	0	0	0	0	0	0
2 July	0	0	0	0	0	0	0	0
3 July	0	0	0	0	0	0	0	0
4 July	0	0	0	0	0	0	0	0
5 July	0	0	0	0	0	–	–	0
6 July	0	0	0	0	0	0	0	0
7 July	0	0	0	0	0	0	0	0
8 July	–	0	0	0	0	0	0	0
9 July	0	0	0	0	0	0	0	0
10 July	0	1	0	0	1	0	0	2
11 July	1	1	–	0	0	0	–	2
12 July	0	0	1	0	0	–	–	1
13 July	0	0	1	0	1	–	–	2
14 July	0	1	5	2	–	–	–	8
15 July	0	0	2	0	5	0	0	7
16 July	0	7	3	7	1	0	0	18
17 July	0	0	15	4	5	0	0	24
18 July	0	0	11	7	5	0	–	23
19 July	0	0	0	0	0	3	3	6
20 July	2	0	9	1	0	0	0	12
21 July	0	0	2	9	12	–	–	23
22 July	0	0	0	38	1	–	–	39
23 July	1	16	39	3	17	1	0	77
24 July	1	3	48	3	13	0	0	68
25 July	0	1	23	68	1	1	1	95
26 July	1	11	22	3	97	0	0	134
27 July	2	3	17	32	0	0	0	54
28 July	–	–	–	49	–	1	0	50
29 July	1	1	45	4	2	0	1	54
30 July	6	11	11	13	3	–	–	44
Total	15	56	254	243	164	6	5	743
Percent	2%	8%	34%	33%	22%	1%	1%	100%

Note: Dashes indicate a station that was not fished.

Appendix B6.–Estimated pink salmon catch per unit of effort (CPUE) by date and station, Upper Cook Inlet northern offshore test fish project, 2012.

	Station Number							
Date	1	2	3	4	5	6	7	Total
1 July	0	0	0	0	0	0	0	0.0
2 July	0	0	0	0	0	0	0	0.0
3 July	0	0	0	0	0	0	0	0.0
4 July	0	0	0	0	0	0	0	0.0
5 July	0	0	0	0	0	–	–	0.0
6 July	0	0	0	0	0	0	0	0.0
7 July	0	0	0	0	0	0	0	0.0
8 July	–	0	0	0	0	0	0	0.0
9 July	0	0	0	0	0	0	0	0.0
10 July	0	0.8	0	0	0.6	0	0	1.4
11 July	0.8	0.8	–	0	0	0	–	1.6
12 July	0	0	0.8	0	0	–	–	0.8
13 July	0	0	0.8	0	0.8	–	–	1.6
14 July	0	0.8	2.4	0.3	–	–	–	3.5
15 July	0	0	1.3	0	3.3	0	0	4.6
16 July	0	3.7	1.5	4	0.7	0	0	9.9
17 July	0	0	6.6	1.8	3.4	0	0	11.8
18 July	0	0	5.1	3.3	2.3	0	–	10.7
19 July	0	0	0	0	0	2	2.3	4.3
20 July	1.4	0	6.5	0.8	0	0	0	8.7
21 July	0	0	1.5	2.9	8.6	–	–	13.0
22 July	0	0	0	12.6	0.8	–	–	13.4
23 July	0.8	10.3	22	1.8	11.7	0.8	0	47.4
24 July	0.8	2.3	23.4	3.8	10.4	0	0	40.7
25 July	0	0.8	15.2	34.3	0.8	0.8	0.8	52.7
26 July	0.8	8.5	15.2	4.4	62.6	0	0	91.5
27 July	1.7	2.5	13.2	17.3	0	0	0	34.7
28 July	–	–	–	24.9	–	0.8	0	25.7
29 July	0.8	0.7	26.2	2.9	1.7	0	0.8	33.1
30 July	12.7	8.4	8.4	9.1	2.4	–	–	41.0
Total	20	40	150	124	110	4	4	452
Percent	4%	9%	33%	27%	24%	1%	1%	100%

Note: Dashes indicate a station that was not fished.

Appendix B7.–Summary of chum salmon fishing effort, daily and cumulative catch, and daily and cumulative catch per unit of effort (CPUE), Upper Cook Inlet northern offshore test fish project, 2012.

Date	Number of Stations	Mean Fishing Time (min)	Catch		CPUE	
			Daily	Cum	Daily	Cum
1 July	7	265	2	2	2	2
2 July	7	256	1	3	1	2
3 July	7	252	0	3	0	2
4 July	7	251	0	3	0	2
5 July	5	184	0	3	0	2
6 July	7	255	3	6	1	3
7 July	7	257	1	7	1	4
8 July	6	219	0	7	0	4
9 July	7	253	0	7	0	4
10 July	7	275	316	323	184	188
11 July	5	191	16	339	12	200
12 July	5	252	129	468	59	259
13 July	5	385	128	596	275	534
14 July	4	316	58	654	13	547
15 July	7	288	26	680	17	564
16 July	7	320	73	753	41	605
17 July	7	349	57	810	29	635
18 July	6	290	74	884	37	671
19 July	7	279	25	909	16	687
20 July	7	280	10	919	8	695
21 July	7	269	45	964	19	714
22 July	5	255	51	1,015	17	731
23 July	7	301	51	1,066	31	761
24 July	7	297	30	1,096	15	777
25 July	7	306	43	1,139	23	800
26 July	7	278	21	1,160	14	814
27 July	7	271	41	1,201	25	838
28 July	3	131	15	1,216	8	846
29 July	7	280	41	1,257	26	872
30 July	5	197	62	1,319	45	917

Appendix B8.–Estimated chum salmon catch by date and station, Upper Cook Inlet northern offshore test fish project, 2012.

	Station Number							
Date	1	2	3	4	5	6	7	Total
1 July	0	0	1	1	0	0	0	2
2 July	0	0	0	1	0	0	0	1
3 July	0	0	0	0	0	0	0	0
4 July	0	0	0	0	0	0	0	0
5 July	0	0	0	0	0	–	–	0
6 July	0	0	0	0	0	3	0	3
7 July	0	0	0	1	0	0	0	1
8 July	–	0	0	0	0	0	0	0
9 July	0	0	0	0	0	0	0	0
10 July	1	3	0	18	294	0	0	316
11 July	0	0	–	2	14	0	–	16
12 July	0	0	14	36	79	–	–	129
13 July	0	0	48	80	0	–	–	128
14 July	0	0	12	46	–	–	–	58
15 July	1	0	8	3	14	0	0	26
16 July	0	21	19	29	4	0	0	73
17 July	0	0	29	11	17	0	0	57
18 July	0	0	31	26	17	0	–	74
19 July	0	0	3	22	0	0	0	25
20 July	0	1	5	2	1	1	0	10
21 July	0	0	19	25	1	–	–	45
22 July	0	0	0	51	0	–	–	51
23 July	0	14	22	4	11	0	0	51
24 July	0	1	26	3	0	0	0	30
25 July	0	1	5	37	0	0	0	43
26 July	1	1	2	0	17	0	0	21
27 July	0	0	8	30	0	0	3	41
28 July	–	–	–	15	–	0	0	15
29 July	0	0	25	15	1	0	0	41
30 July	3	12	4	42	1	–	–	62
Total	6	54	281	500	471	4	3	1,319
Percent	0%	4%	21%	38%	36%	0%	0%	100%

Note: Dashes indicate a station that was not fished.

Appendix B9.–Estimated chum salmon CPUE by date and station, Upper Cook Inlet northern offshore test fish project, 2012.

	Station Number							
Date	1	2	3	4	5	6	7	Total
1 July	0	0	0.8	0.8	0	0	0	1.6
2 July	0	0	0	0.8	0	0	0	0.8
3 July	0	0	0	0	0	0	0	0.0
4 July	0	0	0	0	0	0	0	0.0
5 July	0	0	0	0	0	–	–	0.0
6 July	0	0	0	0	0	0.8	0	0.8
7 July	0	0	0	0.9	0	0	0	0.9
8 July	–	0	0	0	0	0	0	0.0
9 July	0	0	0	0	0	0	0	0.0
10 July	0.9	2.4	0	14.2	166.4	0	0	183.9
11 July	0	0	–	1.8	10.5	0	–	12.3
12 July	0	0	10.9	16	31.6	–	–	58.5
13 July	0	0	117.6	157.3	0	–	–	274.9
14 July	0	0	5.76	7.6	–	–	–	13.4
15 July	0.7	0	5.2	2.2	9.3	0	0	17.4
16 July	0	11.2	9.5	17.4	2.9	0	0	41.0
17 July	0	0	12.8	4.9	11.6	0	0	29.3
18 July	0	0	14.3	12.3	10.1	0	–	36.7
19 July	0	0	2.5	13.5	0	0	0	16.0
20 July	0	0.8	3.6	1.5	0.8	0.8	0	7.5
21 July	0	0	10	8.1	0.8	–	–	18.9
22 July	0	0	0	16.7	0	–	–	16.7
23 July	0	8.4	12.5	2.4	7.6	0	0	30.9
24 July	0	0.8	12.7	1.9	0	0	0	15.4
25 July	0	0.8	3.3	18.7	0	0	0	22.8
26 July	0.8	0.8	1.3	0	11	0	0	13.9
27 July	0	0	6.2	16.2	0	0	2.4	24.8
28 July	–	–	–	7.6	–	0	0	7.6
29 July	0	0	14.6	11	0.8	0	0	26.4
30 July	2.4	9.1	3	29.3	0.8	–	–	44.6
Total	5	34	247	363	264	2	2	917
Percent	1%	4%	27%	40%	29%	0%	0%	100%

Note: Dashes indicate a station that was not fished.

Appendix B10.–Summary of coho salmon fishing effort, daily and cumulative catch, and daily and cumulative catch per unit of effort (CPUE), Upper Cook Inlet northern offshore test fish project, 2012.

	Number	Mean Fishing	Catch		CPUE	
Date	of Stations	Time (min)	Daily	Cum	Daily	Cum
1 July	7	265	0	0	0	0
2 July	7	256	0	0	0	0
3 July	7	252	0	0	0	0
4 July	7	251	0	0	0	0
5 July	5	184	0	0	0	0
6 July	7	255	1	1	1	1
7 July	7	257	0	1	0	1
8 July	6	219	0	1	0	1
9 July	7	253	0	1	0	1
10 July	7	275	2	3	2	2
11 July	5	191	1	4	1	3
12 July	5	252	1	5	1	4
13 July	5	385	8	13	3	7
14 July	4	316	5	18	2	9
15 July	7	288	6	24	4	13
16 July	7	320	7	31	4	17
17 July	7	349	16	47	9	26
18 July	6	290	13	60	7	32
19 July	7	279	4	64	3	35
20 July	7	280	17	81	13	48
21 July	7	269	12	93	6	54
22 July	5	255	24	117	8	62
23 July	7	301	17	134	10	72
24 July	7	297	12	146	7	79
25 July	7	306	36	182	22	101
26 July	7	278	25	207	17	118
27 July	7	271	21	228	13	130
28 July	3	131	33	261	17	147
29 July	7	280	11	272	7	155
30 July	5	197	19	291	14	169

Appendix B11.–Estimated coho salmon catch by date and station, Upper Cook Inlet northern offshore test fish project, 2012.

	Station Number							
Date	1	2	3	4	5	6	7	Total
1 July	0	0	0	0	0	0	0	0
2 July	0	0	0	0	0	0	0	0
3 July	0	0	0	0	0	0	0	0
4 July	0	0	0	0	0	0	0	0
5 July	0	0	0	0	0	–	–	0
6 July	0	0	0	0	0	1	0	1
7 July	0	0	0	0	0	0	0	0
8 July	–	0	0	0	0	0	0	0
9 July	0	0	0	0	0	0	0	0
10 July	0	0	0	2	0	0	0	2
11 July	0	0	–	0	0	1	–	1
12 July	0	0	0	0	1	–	–	1
13 July	0	0	6	0	2	–	–	8
14 July	0	0	3	2	–	–	–	5
15 July	0	0	1	0	2	3	0	6
16 July	0	2	2	2	0	1	0	7
17 July	0	0	6	4	6	0	0	16
18 July	0	0	6	4	3	0	–	13
19 July	0	0	0	0	0	2	2	4
20 July	1	1	8	2	0	5	0	17
21 July	0	0	3	6	3	–	–	12
22 July	0	0	0	24	0	–	–	24
23 July	0	0	13	1	1	1	1	17
24 July	0	0	2	4	6	0	0	12
25 July	1	1	12	18	0	3	1	36
26 July	2	0	3	0	18	1	1	25
27 July	0	0	2	15	2	2	0	21
28 July	–	–	–	33	–	0	0	33
29 July	0	0	6	3	1	0	1	11
30 July	1	4	6	6	2	–	–	19
Total	5	8	79	126	47	20	6	291
Percent	2%	3%	27%	43%	16%	7%	2%	100%

Note: Dashes indicate a station that was not fished.

Appendix B12.–Estimated coho salmon catch per unit of effort (CPUE) by date and station, Upper Cook Inlet northern offshore test fish project, 2012.

	Station Number							
Date	1	2	3	4	5	6	7	Total
1 July	0	0	0	0	0	0	0	0
2 July	0	0	0	0	0	0	0	0
3 July	0	0	0	0	0	0	0	0
4 July	0	0	0	0	0	0	0	0
5 July	0	0	0	0	0	–	–	0
6 July	0	0	0	0	0	0.8	0	1
7 July	0	0	0	0	0	0	0	0
8 July	–	0	0	0	0	0	0	0
9 July	0	0	0	0	0	0	0	0
10 July	0	0	0	1.6	0	0	0	2
11 July	0	0	–	0	0	0.8	–	1
12 July	0	0	0	0	0.8	–	–	1
13 July	0	0	1.5	0	1.5	–	–	3
14 July	0	0	1.4	0.3	–	–	–	2
15 July	0	0	0.6	0	1.3	2.4	0	4
16 July	0	1.1	1	1.2	0	0.8	0	4
17 July	0	0	2.6	1.8	4.1	0	0	9
18 July	0	0	2.8	1.9	1.8	0	–	7
19 July	0	0	0	0	0	1.8	1.9	4
20 July	0.7	0.8	5.8	1.5	0	4.2	0	13
21 July	0	0	1.6	1.9	2.1	–	–	6
22 July	0	0	0	7.9	0	–	–	8
23 July	0	0	7.4	0.7	0.7	0.8	0.8	10
24 July	0	0	2.9	2.5	1.6	0	0	7
25 July	0.8	0.8	7.9	9.1	0	2.1	0.8	22
26 July	1.6	0	2.1	0	11.6	0.8	0.8	17
27 July	0	0	1.6	8.1	1.6	1.4	0	13
28 July	–	–	–	16.8	–	0	0	17
29 July	0	0	3.5	2.2	0.8	0	0.8	7
30 July	0.8	3	4.6	4.2	1.6	–	–	14
Total	4	6	47	62	30	16	5	169
Percent	2%	3%	28%	36%	17%	9%	3%	100%

Note: Dashes indicate a station that was not fished.

Appendix B13.–Summary of Chinook salmon fishing effort, daily and cumulative catch, and daily and cumulative catch per unit of effort (CPUE), Upper Cook Inlet northern offshore test fish project, 2012.

Date	Number of Stations	Mean Fishing Time (min)	Catch		CPUE	
			Daily	Cum	Daily	Cum
1 July	7	265	0	0	0	0
2 July	7	256	1	1	1	1
3 July	7	252	0	1	0	1
4 July	7	251	0	1	0	1
5 July	5	184	0	1	0	1
6 July	7	255	0	1	0	1
7 July	7	257	0	1	0	1
8 July	6	219	0	1	0	1
9 July	7	253	0	1	0	1
10 July	7	275	1	2	1	2
11 July	5	191	0	2	0	2
12 July	5	252	0	2	0	2
13 July	5	385	0	2	0	2
14 July	4	316	0	2	0	2
15 July	7	288	0	2	0	2
16 July	7	320	0	2	0	2
17 July	7	349	0	2	0	2
18 July	6	290	0	2	0	2
19 July	7	279	0	2	0	2
20 July	7	280	1	3	1	2
21 July	7	269	0	3	0	2
22 July	5	255	0	3	0	2
23 July	7	301	0	3	0	2
24 July	7	297	0	3	0	2
25 July	7	306	0	3	0	2
26 July	7	278	0	3	0	2
27 July	7	271	0	3	0	2
28 July	3	131	0	3	0	2
29 July	7	280	0	3	0	2
30 July	5	197	0	3	0	2

Appendix B14.–Estimated Chinook salmon catch by date and station, Upper Cook Inlet northern offshore test fish project, 2012.

	Station Number							
Date	1	2	3	4	5	6	7	Total
1 July	0	0	0	0	0	0	0	0
2 July	0	1	0	0	0	0	0	1
3 July	0	0	0	0	0	0	0	0
4 July	0	0	0	0	0	0	0	0
5 July	0	0	0	0	0	–	–	0
6 July	0	0	0	0	0	0	0	0
7 July	0	0	0	0	0	0	0	0
8 July	–	0	0	0	0	0	0	0
9 July	0	0	0	0	0	0	0	0
10 July	0	0	0	0	0	1	0	1
11 July	0	0	–	0	0	0	–	0
12 July	0	0	0	0	0	–	–	0
13 July	0	0	0	0	0	–	–	0
14 July	0	0	0	0	–	–	–	0
15 July	0	0	0	0	0	0	0	0
16 July	0	0	0	0	0	0	0	0
17 July	0	0	0	0	0	0	0	0
18 July	0	0	0	0	0	0	–	0
19 July	0	0	0	0	0	0	0	0
20 July	0	0	0	1	0	0	0	1
21 July	0	0	0	0	0	–	–	0
22 July	0	0	0	0	0	–	–	0
23 July	0	0	0	0	0	0	0	0
24 July	0	0	0	0	0	0	0	0
25 July	0	0	0	0	0	0	0	0
26 July	0	0	0	0	0	0	0	0
27 July	0	0	0	0	0	0	0	0
28 July	–	–	–	0	–	0	0	0
29 July	0	0	0	0	0	0	0	0
30 July	0	0	0	0	0	–	–	0
Total	0	1	0	1	0	1	0	3
Percent	0%	33%	0%	33%	0%	33%	0%	100%

Note: Dashes indicate a station that was not fished.

Appendix B15.–Estimated Chinook salmon catch per unit of effort (CPUE) by date and station, Upper Cook Inlet northern offshore test fish project, 2012.

	Station Number							
Date	1	2	3	4	5	6	7	Total
1 July	0	0	0	0	0	0	0	0.0
2 July	0	0.8	0	0	0	0	0	0.8
3 July	0	0	0	0	0	0	0	0.0
4 July	0	0	0	0	0	0	0	0.0
5 July	0	0	0	0	0	–	–	0.0
6 July	0	0	0	0	0	0	0	0.0
7 July	0	0	0	0	0	0	0	0.0
8 July	–	0	0	0	0	0	0	0.0
9 July	0	0	0	0	0	0	0	0.0
10 July	0	0	0	0	0	0.8	0	0.8
11 July	0	0	–	0	0	0	–	0.0
12 July	0	0	0	0	0	–	–	0.0
13 July	0	0	0	0	0	–	–	0.0
14 July	0	0	0	0	–	–	–	0.0
15 July	0	0	0	0	0	0	0	0.0
16 July	0	0	0	0	0	0	0	0.0
17 July	0	0	0	0	0	0	0	0.0
18 July	0	0	0	0	0	0	–	0.0
19 July	0	0	0	0	0	0	0	0.0
20 July	0	0	0	0.8	0	0	0	0.8
21 July	0	0	0	0	0	–	–	0.0
22 July	0	0	0	0	0	–	–	0.0
23 July	0	0	0	0	0	0	0	0.0
24 July	0	0	0	0	0	0	0	0.0
25 July	0	0	0	0	0	0	0	0.0
26 July	0	0	0	0	0	0	0	0.0
27 July	0	0	0	0	0	0	0	0.0
28 July	–	–	–	0	–	0	0	0.0
29 July	0	0	0	0	0	0	0	0.0
30 July	0	0	0	0	0	–	–	0.0
Total	0.0	0.8	0.0	0.8	0.0	0.8	0.0	2
Percent	0%	33%	0%	33%	0%	33%	0%	100%

Note: Dashes indicate a station that was not fished.