Fishery Data Series No. 09-15

Migratory Timing and Abundance Estimates of Sockeye Salmon into Upper Cook Inlet, Alaska, 2007

by

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and

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March 2009

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

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Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Measures (fisheries)

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

Mathematics, statistics

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

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March 2009

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This document should be cited as:
Shields, P., and M. Willette. 2009. 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.

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ABSTRACT

In 2007 an Offshore Test Fishery (OTF) was conducted during the Upper Cook Inlet (UCI) commercial salmon fishing season. The primary objective of the test fishery was to estimate the abundance and timing of the sockeye salmon *Oncorhynchus nerka* run, as measured along a transect near the southern boundary of the UCI management area. The test fishery was conducted from 1 July through 2 August and captured 4,036 sockeye salmon, representing 2,584 catch per unit of effort (CPUE) points. The mid-point of the 2007 run occurred on 19 July, which was 4 days late relative to the historical mean date of 15 July. This represents the third latest run-timing since the test fishery began in 1979. A non-linear mathematical model estimated the 2007 test fish project spanned approximately 89% of the sockeye salmon run. The test fish final passage rate was estimated at approximately 1,900 sockeye salmon per CPUE point. Two formal estimates of the size and timing of the 2007 sockeye salmon run were made during the commercial fishing season, with the first best-fit estimator from each analysis forecasting a total run to UCI of 4.66 and 4.71 million sockeye salmon, respectively. These estimates deviated from the actual total run estimate of 5.28 million by -12% and -11%, respectively. The test fish project once again provided valuable data used to aid in critical inseason commercial fishery management decisions.

Key words: Salmon, *Oncorhynchus*, Upper Cook Inlet, Alaska, test fishery, migratory behavior

INTRODUCTION

In 1979 the Alaska Department of Fish and Game (ADF&G) began an Offshore Test Fish (OTF) project near the southern boundary of the Upper Cook Inlet (UCI) salmon management area (Figure 1). The objectives of the project have been to estimate the total run and run-timing of sockeye salmon *Oncorhynchus nerka* returning to UCI during the commercial salmon fishing season. These data have become extremely important to ADF&G staff, as the data are used to help adjust commercial fishing times and areas fished to most efficiently harvest sockeye salmon that are surplus to spawning needs or to conserve stocks that could potentially be over-harvested. Moreover, the Alaska Board of Fisheries (BOF) has assembled various management plans, many of which require inseason estimates of the size of the annual sockeye salmon run in order to implement specific provisions of the plans. The OTF project has increasingly become one of the most important tools fishery managers utilize to make inseason fishery management decisions.

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

OBJECTIVES

The primary objectives of the project are to:

1. Estimate the annual sockeye salmon *Oncorhynchus nerka* total run (and run-timing) in UCI during the commercial salmon fishing season.
2. Present the results of the 2007 test-fishing project.

METHODS

TEST FISHING

Sockeye salmon returning to UCI were sampled by fishing 6 geographically fixed stations between Anchor Point and the Red River Delta (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, *FV Americanus*, 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 2 August. The vessel fished 366 m (1,200 ft or 200 fathoms) of 13 cm (5 1/8 in) multi-filament drift gillnet. The net was 45 meshes deep and constructed of double knot Super Crystal[1] shade number 1, with a filament size of number 53/S6F.

The following physical and chemical readings were taken at the start of each set: air temperature, water temperature (at 1 m below the surface), wind velocity and direction, tide stage, water depth, and water clarity. Air and water temperatures were measured using a YSI 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). 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.

All salmon captured in the drift gillnet were enumerated and identified to species and sex. Sockeye salmon ($n \leq 30$ at each station) were measured for fork length (mid eye to fork of tail) to the nearest mm and also had a scale removed for age determination (as described by Koo 1955) and an axillary process removed for genetic analysis (as described by Habicht et al. 2007). Scales were mounted on gum cards and impressions made in cellulose acetate, as described by Clutter and Whitesel (1956). The age of each fish was determined after examining scales with a microfiche viewer under 40x magnification. Ages were reported in European notation (Koo 1962) and followed criteria established by Mosher (1969) and Tobias et al. (1994).

The number of fish caught at each station (s) on each day (i) was expressed as a catch per unit of effort (CPUE) statistic, or index, and standardized to the number of fish caught in 100 fathoms of gear in one hour of fishing time.

$$CPUE_{s,i} = \frac{100\,fm \;\; x \;\; 60\,\text{min} \;\; x \;\; number\ of\ fish}{fm\ of\ gear \;\; x \;\; MFT} \qquad (1)$$

where: MFT = mean fishing time.

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

Mean fishing time (MFT) was calculated as:

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

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 gillnet was fished 30 minutes before retrieval started. However, the net was capable of capturing fish prior to being fully deployed, and 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:

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

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

$$CCPUE_d = \sum_{i=1}^{d} CPUE_i \quad (4)$$

where: d = day for which estimate is being made.

DESCRIBING THE SALMON MIGRATION AND PROJECTING TOTAL RUN

The run entry pattern was described for each of the previous years based on the respective test fishing data as per Mundy (1979):

$$Y_{yr,d} = 1 \big/ \left(1 + e^{-(\mathrm{a} + \mathrm{bd})}\right) \quad (5)$$

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

a and *b* = model parameters.

Variables without the subscript yr indicating year refer to the current year's estimate. To determine which of the previous run-timing models 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):

$$CCPUE_f = \frac{\sum_{i=0}^{d} CCPUE_d{}^2}{\sum_{i=0}^{d} Y_{yr,d} \cdot CCPUE_d} \quad (6)$$

This model assumes that the average day of return and its variance for previous year *yr* is the same as for the current year (Mundy 1979). To test this assumption, inseason Y_d was estimated as:

$$Y_d = \frac{CCPUE_d}{CCPUE_f} \quad (7)$$

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

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

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:

$$q_d = \frac{CCPUE_d}{r_d} \quad (9)$$

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

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

The cumulative total run on day d was estimated from the sum of all commercial, recreational, and personal use harvests to date, the estimated total escapement to date, and an estimate of the number of sockeye salmon residual (i.e. residing) in the district at that time. 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 fishermen or the processors they sell their fish to within 12 hours of the close of a fishing period. For a complete list of reporting requirements, please see the following statute: 16.05.690(a) and regulation: 5 AAC 39.130. Recreational harvest data was estimated inseason and provided by Sport Fish Division staff. Personal use harvests were also estimated inseason from daily reports from the various fisheries in combination with an assessment of previous year's personal use catches from runs of similar abundance. 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 fish residual in the district was estimated by assuming exploitation rates of 70% in set net fisheries, 40% in district-wide drift net fisheries, and 25% in reduced district drift net fisheries (Mundy et al. 1993). For example, if the drift gillnet fleet harvested 500 thousand sockeye salmon on an inlet wide fishing period, the number of sockeye salmon originally in the district would have been estimated at 1,250 thousand (500/0.40 = 1,250) and the number remaining, or the residual, would have been estimated at 750 thousand (1,250–500 = 750).

Passage rate, the expansion factor used to convert CPUE into estimated numbers of salmon passing the test fishing transect, was calculated as:

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

Total run at the end of the season (TR_f) was then estimated from

$$TR = PR \cdot CCPUE_f \tag{11}$$

To calculate the midpoint of the run, which is the day on which approximately 50% of the total run had passed the OTF transect, the following formula was used:

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

where: M = Mean date of run,

a and b= model parameters.

Because the test fishery did not encompass the entire sockeye salmon run, the total $CCPUE_f$ for the test fishery was estimated after the season using the following 2 methods:

$$CCPUE_f^h = CCPUE_f \cdot \frac{H_t}{H_L} \quad (13)$$

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).

$$CCPUE_t^r = CCPUE_f \cdot \frac{E_t + H_t}{\sum_{S=1}^{6} E_L + H_L} \quad (14)$$

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 Upper Cook Inlet escapement through final day of test fishery,

H_L = total Upper Cook Inlet commercial harvest through final day of test fishery,

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

The total run adjustment to $CCPUE_f$ (Equation 14) has replaced adjustments based on harvest alone (Equation 9) primarily due to modifications 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 computed by summing all commercial harvest data and estimates of escapement from the 4 sockeye salmon sonar enumeration sites, one weir site, and an estimate of escapement to all unmonitored systems through day *d*. An estimate of sockeye salmon escapement to all non-monitored systems in UCI is considered to be 15% of the monitored runs. Lag times are the approximate time needed for fish to migrate from the test fish transect to a destination. As suggested by Mundy et al. (1993), lag times must be accounted for 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. The following lag times were assumed for fish entering the escapement: Crescent River, 1 day; Kasilof and Kenai Rivers, 2 days; and

Yentna River and Fish Creek, 7 days (15% of these totals are allocated to unmonitored systems) (Mundy et al. 1993). The number of sockeye salmon harvested in sport and personal use fisheries after test fishing ceased that are not already accounted for in escapement monitoring are assumed to be insignificant and therefore are not utilized in the $CCPUE_f$ post 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

A total of 4,036 sockeye salmon were captured during the 2007 test fishery, as well as 348 pink salmon *O. gorbuscha*, 398 chum salmon *O. keta*, 692 coho salmon *O. kisutch*, and 5 Chinook salmon *O. tshawytscha* (Tables 1–2, Appendices A1–A12). It should be noted, however, that these numbers include estimates of the number of fish that would have been caught for stations that were not fished due to rough seas. In 2007, the test boat missed 2 stations on 17 July, all 6 stations on 25 July, and 1 station on 30 July. Catch data for these days were interpolated by averaging catches from the day before and the day after for each station that was not fished. Sockeye salmon daily cumulative catches ranged from 2 on 1 Aug to 566 fish on 17 July (Tables 1–2). The unadjusted total sockeye salmon $CCPUE_f$ for the 2007 project was 2,584 with daily CPUE values ranging from 2 to 225. The $CCPUE_f$ of 2,584 represented the second highest unadjusted $CCPUE_f$ since 1992, which is when the number of stations sampled by the test fish boat was standardized to the current 6 still being fished (Tarbox 1994). The relationship between the 1992–2007 annual test fish unadjusted $CCPUE_f$ and the total annual run of sockeye salmon to UCI (Figure 2) is not significantly correlated ($P = 0.08$ and $R^2 = 0.21$), indicating that the $CCPUE_f$ statistic by itself would not be a reliable predictor of the total annual sockeye salmon run. However, the annual $CCPUE_f$ statistic is dependable enough to provide a rough estimate of annual run strength, as the linear regression of the unadjusted $CCPUE_f$ value plotted against the total annual sockeye salmon run provided a predicted value that varied from the actual total run by an average of 27% annually.

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

Tarbox and Waltemeyer (1989) provided detail into some of the assumptions used in the curve fitting procedures to estimate the total CPUE 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 are made. By this date there are enough data points in the current year's run-timing curve to provide a more accurate estimate of what the $CCPUE_f$ will be at the end of the season. In addition, Tarbox and King (1992) and later OTF annual reports demonstrated that the initial first choice (best fit) estimate made around mid July was not always the most accurate, i.e., the second or third best fitting estimates should carefully be considered. Therefore, the method now used when making formal inseason estimates of the total run includes an examination of the top 5 or 6 best fits. Careful consideration is given to those years whose fits reveal the least day to day change in predicting what the $CCPUE_f$ will be. These years are identified as being potentially better fits, especially if the mean sum of squares statistic is also improving. Sockeye salmon run-timing from other areas of the state are also considered to see if a consistent pattern exists.

The first formal estimate of the 2007 UCI sockeye salmon run was made on 24 July, using commercial harvest, escapement, and test fishery data through 23 July (Table 4). The 2007 test fish CCPUE curve was mathematically compared (mean sum of squares statistic) to runs from 1979 through 2006, with fits of the data ranked from best to worst. Based on an estimate of the run to date of 3.44 million sockeye salmon through 23 July (this estimate included the number of fish residual in the district), a passage rate of 1,773 was calculated. The best fit of the 2007 test fish CCPUE curve tracked the 1992 run, which was a 2 day late run, and projected that 4.65 million fish would return to UCI in 2007. As cautioned earlier, the first best fit using data from approximately 20 July often turns out not to be the best fit by year's end, so the top 5 best fits were considered, which included runs from 1999, 1987, 2004, and 1991 (in order of best fit). From the top 5 best fits, a total run estimate of 4.59 to 5.35 million fish was made. The top 5 best fits all tracked runs that were late (2 to 3 days) relative to the 15 July mean date of entry at the test fish transect line.

UCI commercial fishery management plans compel the Department to make an inseason estimate of the number of sockeye salmon in each year's run that are of Kenai River origin. 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 million fish, between 2 and 4 million fish, and greater than 4 million fish (Shields 2007b). The CCPUE curves from the top 5 best fits of previous year's test fish data were used to project the $CCPUE_f$ for 2007 and also the total run for the year. From these data an estimate can also be made of the Kenai River component of the run. Using data through 23 July, the estimated total 2007 Kenai River sockeye salmon run was projected to be between 2.48 and 2.87 million fish (Table 5). With 1.77 million Kenai River sockeye salmon estimated in the run to date, this meant that 0.71 to 1.10 million fish remained in the run. This run projection was very similar to the preseason forecast for the Kenai River sockeye salmon run of 2.41 million fish (Shields 2007b). The final Kenai River sockeye salmon total run was estimated to be 3.12 million fish, so this first inseason formal projection was within 9–26% of the actual run.

The next formal estimate of the total run of sockeye salmon to UCI in 2007 was made following the 26 July inlet wide commercial fishing period (Table 4). The run to date was now estimated at 3.98 million fish, with the test fish CCPUE at 2,204. The passage rate was consequently estimated at 1,808 fish per CPUE point. The 2007 CCPUE curve still most closely tracked the 1992 run, and projected a $CCPUE_f$ of 2,600 and a total run of 4.70 million fish. The top 5 best fits came from the same years as the previous formal estimate and projected total runs to UCI of 4.70 to 5.37 million fish. The actual total run of sockeye salmon to UCI in 2007 was 5.28 million fish, which included commercial, sport, and personal use harvests, as well as escapement to all systems. Therefore, the first best fit total-run estimate from the 2 formal inseason projections of the 2007 run were approximately 12% and 11% lower, respectively, than the actual run size. The total Kenai River sockeye salmon run was now projected to range between 2.67 and 3.02 million fish (Table 5). Approximately 2.20 million Kenai River sockeye salmon had already been accounted for, which meant that 480–830 thousand fish of Kenai River origin remained in the 2007 run. These inseason estimates of the Kenai River run strongly indicated that the management plan provisions for Kenai runs of 2–4 million fish should remain in place.

Figure 3 depicts the OTF error in projecting the total sockeye salmon run on or soon after 20 July using the first best fit of the current CCPUE curve to previous year's CCPUE curves. As can be seen in this figure, the error in the 20 July estimate has been >30% only on runs that were 2 or more days early. For runs that were 1 day early, on time, or late, the OTF error in predicting the annual total run ranged from -27.5% to +15.9%, with a mean actual percentage error of 9.1%. Conversely, for runs that entered the district 2 or more days earlier than average, the OTF curve-fitting estimator did not perform nearly as well, with a range in error of +8.8% to +75.4%, or a mean actual percentage error of +36.3%. For all runs, the mean absolute percentage error was 16.3%. On July 20, 2007, the OTF curve-fitting estimator projected a total run that was 11.1% less than the actual run.

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 2007, the test boat fished through 2 August. The primary reason for the extra fishing days was to determine if there was still a significant number of fish entering the district late in the season. The 2006 run had been 9 days late, which resulted in large numbers of sockeye salmon entering the Kenai River in August (Shields 2007a). In 2006, the upper end of the escapement goal for this system was 950,000 fish, but approximately 1.5 million were estimated to have passed the river mile-19 sonar site, with approximately 860,000 of that occurring in August. In 2007, the extra days fished by the test boat did not indicate abnormally large numbers of fish entering the district.

Two methods were examined to estimate the percentage of the run that occurred after the test fishery ceased each year so that postseason adjustments could be made to 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 accounted for 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 that occurred after the test fishery terminated was assumed to be minimal and therefore was not considered. Table 6 shows the differences in the annual $CCPUE_f$ statistic after postseason adjustments were made using either the harvest or total run method. Although the differences were usually relatively minor, they did affect estimates of the *a* & *b* coefficients in the equation describing historical run timing curves potentially affecting estimates of $CCPUE_f$ in the future. Beginning in 2002, the total run method was used to make postseason adjustments to all previous years' $CCPUE_f$ statistics (Shields 2003). For the 2007 season, the test fish $CCPUE_f$ of 2,584 was adjusted to 2,924 based on the number of sockeye salmon that were commercially harvested or escaped after the test fishery ceased. Therefore, this method estimated that approximately 12% of the total sockeye salmon run occurred after the test fishery ceased. Historical *a* & *b* coefficients calculated using total run-adjusted $CCPUE_f$ are now being used for all inseason run projections.

A non-linear mathematical model (Mundy 1979) was fit to the CCPUE proportions of the sockeye salmon run to UCI. Using the total run-adjusted $CCPUE_f$, this analysis suggested that 3.9% of the run had passed the transect prior to the start of test fishing on 1 July, and that the run was 92.6% complete at project termination on 2 Aug (Figure 4 and Appendix A13). Therefore, the mathematical model indicated that test fishing covered approximately 89% of the run. The midpoint of the 2007 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 25.9, or 19 July, which was 4 days late relative to the historic average mean date of 15 July (Table 7). This was the fourth consecutive year the UCI sockeye salmon run was late.

Surface water temperatures measured along the test fish transect ranged from 7.5°C to 13.5°C and averaged 9.4°C for the year (Appendices A14 and A15). This was the coldest average water temperature measured in the past 10 years. Water temperatures are believed to play a significant role in the timing of salmon runs (Burgner 1980), so these data have been closely monitored. However, water temperature data alone may or may not be an accurate predictive tool for gauging the run-timing of UCI salmon stocks. For example, the 2005 UCI sockeye salmon run was the 2nd latest run ever observed in UCI, yet surface water temperatures along the test fish transect were the warmest ever measured. Warmer water temperatures are often correlated with early returns of salmon. In Bristol Bay, Burgner (1980) reported that the arrival dates of sockeye salmon were early during years when water temperatures were warmer than average. Therefore, considering the fact that surface water temperatures at the test fish transect in 2005 were warmer than average, it could have been expected that the sockeye salmon run would have been early. Near average sea surface temperatures in 2006 also would not have predicted a 9 day late run, which was the latest run ever measured in UCI. It would seem then that factors other that water temperature likely play a role in determining salmon run timing in UCI. In the third volume of a series of books dealing with Fishery Oceanography, 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). Therefore, it is likely that a combination of factors affects fish migration and run timing. In fact, in an attempt to better understand and predict sockeye salmon migrations into UCI, ADF&G conducted a companion study on board the test fish vessel in 2002–2005. Using side-scan 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 yet, 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 2007, air temperatures along the test fish transect ranged from 8° to 15°C and averaged 11.0°C, with station averages nearly identical to the previous 10 year averages (Appendices A14 and A15). Wind velocities averaged 5.5 knots for the month, which represented the 2nd calmest conditions observed during the past 10 years and the 4th lowest average since the test fishery began in 1979. Wind direction was variable, but in general winds originated out of the south to southeast. Salinity and secchi disk readings were similar to the averages from all previous years (Appendices A15 and A16).

Appendix A15 provides a summary of the physical data that has been collected at each of the 6 test fish stations for the past 10 years. Station 4, which is on the east side of Cook Inlet (Figure 1), was the shallowest station, averaging 23.9 fathoms (144 feet) in depth. It should be noted, though, that changes in depth are a result of different stages of tide as well as minor differences in set location from day to day. Station 4 also had the clearest water, with a 1998–2007 secchi disk average depth of 8.3 m. In general, water clarity along the test fish transect decreases from east to west (secchi disk average depth decreases from 8.3 m at station 4 to 2.9 m at station 8) as a result of numerous glacial watersheds draining into the west side of Cook Inlet.

Since 2002, scale samples have been collected from all sockeye salmon that were measured to estimate mean length. The dominant age-class of sockeye salmon entering UCI at the test fish transect in 2007 was 1.3 (5 year olds), comprising 76% of the run (Table 8). This estimate compared very closely with age composition samples collected from the Central District drift gillnet harvest, which showed the 1.3 age-class comprised 78% of the harvest (Table 9). In fact, the age composition of fish entering the Central District at the test fish transect is remarkably similar to samples collected from drift gillnet harvests throughout the district.

The scale samples from the OTF program were also collected with the intent of assessing whether or not Kenai River sockeye salmon, which are the dominant stock in Cook Inlet runs, might be identified using “size at age” criteria as they entered the district at the test fish transect. Statistical analyses will be conducted comparing the average size of each age-class of sockeye salmon collected at various escapement monitoring sites throughout UCI to the average size of the same age-classes collected at the 6 stations along the test fish transect. The results of this “mixture-model” analysis will be summarized in future test fish annual reports.

ADF&G has been developing and refining the technique of genetic stock identification (GSI) since the early 1990’s (Habicht et al. 2007). Beginning in 2006, fish sampled for ASL data were also sampled for GSI analysis. Nearly 3,500 of the samples that were collected in 2006 and 2007 were successfully genotyped. Table 10 provides a summary of the results. Samples were pooled into discrete time periods to meet sample size goals, resulting in 4 time periods in 2006 and 5 periods in 2007. The data from these 2 years revealed somewhat similar findings, i.e. as you progressed into the month of July the proportion of Kasilof River sockeye salmon stocks decreased while Kenai River stocks increased. By the end of July, Kenai River sockeye salmon comprised approximately 70% of the sockeye salmon population passing the test fishery transect.

The efficacy of using these data, however, for inseason management of the commercial fishery is still ambiguous. While it could be very useful to know when specific stocks are entering the Central District, the variability of their migration routes both inter- and intra-annually through the district makes adjustments of commercial fishing periods for the purpose of increasing or decreasing exploitation on specific stocks very subjective, at best. That said, GSI data will no doubt serve as the foundation for future research projects aimed at attempting to more clearly understand stock specific migration run-timing and migration through UCI.

The UCI test fishery continues to provide fishery managers with very important data about the strength and timing of each year’s sockeye salmon run. Since commercial, sport, and personal use fishery management plans depend on inseason sockeye salmon run estimates, the UCI test fishery project is essential to management of these fisheries.

ACKNOWLEDGEMENTS

The authors would like to thank Roland Maw, captain of the *FV Americanus*, and the test fish crewmembers for conducting safe and efficient maritime activities.

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TABLES AND FIGURES

Table 1.–Summary of sockeye salmon fishing effort, daily and cumulative catch, and daily and cumulative CPUE, Upper Cook Inlet offshore test fish project, 2007.

Date	Number of Stations	Mean Fishing Time (min)	CATCH Daily	CATCH Cum	CPUE Daily	CPUE Cum	Mean Length (mm)
7/1	6	234.5	62	62	46	46	555
7/2	6	224.5	33	95	26	73	570
7/3	6	227.0	47	142	35	108	563
7/4	6	223.0	36	178	29	137	569
7/5	6	221.0	49	227	40	177	552
7/6	6	222.5	30	257	24	200	556
7/7	6	217.5	8	265	7	207	572
7/8	6	239.0	22	287	17	224	563
7/9	6	229.5	91	378	69	293	576
7/10	6	236.5	140	518	102	395	591
7/11	6	249.0	177	695	125	520	586
7/12	6	242.0	141	836	94	613	587
7/13	6	243.5	186	1,022	130	744	581
7/14	6	252.0	273	1,295	153	897	591
7/15	6	280.5	370	1,665	215	1,112	590
7/16	6	230.0	52	1,717	40	1,152	572
7/17[a]	4[a]	232.0	566	2,283	225	1,377	578
7/18	6	236.0	63	2,346	47	1,424	571
7/18	6	259.0	264	2,610	165	1,588	578
7/18	6	256.0	241	2,851	157	1,745	576
7/18	6	223.5	27	2,878	20	1,765	569
7/18	6	220.5	36	2,914	29	1,794	563
7/18	6	268.5	274	3,188	154	1,948	569
7/18	6	256.0	237	3,425	151	2,099	568
7/25[a]	0[a]	0.0	135	3,560	88	2,187	568
7/26	6	226.5	32	3,592	25	2,212	569
7/27	6	221.5	40	3,632	32	2,243	577
7/28	6	222.5	205	3,837	196	2,440	562
7/29	6	215.0	7	3,844	6	2,446	545
7/30[a]	5[a]	210.0	127	3,971	86	2,531	566
7/31	6	215.0	37	4,008	31	2,562	562
8/1	6	217.0	2	4,010	2	2,564	586
8/2	6	222.5	26	4,036	21	2,584	564

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

Table 2.–Estimated sockeye salmon catch by date and station, Upper Cook Inlet offshore test fish project 2007.

	Station Number						
Date	4	5	6	6.5	7	8	Total
7/1	6	19	25	4	5	3	62
7/2	5	0	10	6	7	5	33
7/3	0	24	21	0	0	2	47
7/4	1	14	9	10	2	0	36
7/5	6	10	14	9	8	2	49
7/6	3	0	13	11	3	0	30
7/7	0	6	1	0	0	1	8
7/8	1	14	0	2	2	3	22
7/9	21	3	32	26	9	0	91
7/10	33	53	29	18	3	4	140
7/11	33	56	9	36	43	0	177
7/12	17	39	82	0	1	2	141
7/13	88	36	26	8	26	2	186
7/14	213	45	15	0	0	0	273
7/15	56	36	45	164	69	0	370
7/16	4	0	12	21	15	0	52
7/17[a]	4	1	323	227	9	2	566
7/18	10	25	15	7	2	4	63
7/18	14	4	108	86	23	29	264
7/18	13	23	53	34	114	4	241
7/18	1	21	4	1	0	0	27
7/18	15	19	1	0	0	1	36
7/18	0	9	26	109	120	10	274
7/18	7	8	92	81	11	38	237
7/25[a]	4	5	46	47	9	24	135
7/26	1	1	0	13	7	10	32
7/27	2	3	12	11	12	0	40
7/28	1	4	93	50	3	54	205
7/29	0	1	3	0	3	0	7
7/30[a]	33	3	8	15	65	3	127
7/31	10	12	1	1	8	5	37
8/1	0	2	0	0	0	0	2
8/2	0	2	15	3	2	4	26
Total	602	498	1,143	1,000	581	212	4,036
%	14.9%	12.3%	28.3%	24.8%	14.4%	5.3%	100%

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

Table 3.–Estimated sockeye salmon CPUE by date and station, Upper Cook Inlet offshore test fish project, 2007.

	Station Number						
Date	4	5	6	6.5	7	8	Total
7/1	4	15	18	3	4	2	46
7/2	4	0	8	5	6	4	26
7/3	0	18	16	0	0	2	35
7/4	1	11	7	8	2	0	29
7/5	5	8	12	7	7	2	40
7/6	2	0	10	9	2	0	24
7/7	0	5	1	0	0	1	7
7/8	1	11	0	2	2	2	17
7/9	16	3	24	20	7	0	69
7/10	24	37	21	14	2	3	102
7/11	23	38	7	27	29	0	125
7/12	13	25	53	0	1	2	94
7/13	59	26	18	6	19	2	130
7/14	111	32	11	0	0	0	153
7/15	40	25	29	78	44	0	215
7/16	3	0	9	16	12	0	40
7/17[a]	3	1	117	95	7	2	225
7/18	8	19	10	5	2	3	47
7/18	11	3	60	51	17	22	165
7/18	10	17	37	23	66	3	157
7/18	1	15	3	1	0	0	20
7/18	12	15	1	0	0	1	29
7/18	0	7	18	60	61	8	154
7/18	6	6	53	50	9	26	151
7/25[a]	3	4	27	30	7	17	88
7/26	1	1	0	10	5	8	25
7/27	2	3	9	9	9	0	32
7/28	1	3	57	97	2	37	196
7/29	0	1	2	0	3	0	6
7/30[a]	23	2	8	12	37	3	86
7/31	8	9	1	1	6	6	31
8/1	0	2	0	0	0	0	2
8/2	0	2	12	2	2	3	21
TOTAL	395	360	660	642	369	158	2,584
%	15.3%	13.9%	25.5%	24.9%	14.3%	6.1%	100%

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

Table 4.–Total return estimates for sockeye salmon to Upper Cook Inlet, Alaska, made 'during the 2007 season.

Based on data through 7/23/2007						
Escapement						724,867
Cumulative Catch (Commercial, Sport, & PU)						2,513,598
Residual in District						201,429
Total Run Through 7/23/2007 =						3,439,893
2007 Cumulative OTF CPUE through 7/23 =						1,940
Passage Rate (Total Run/Cumulative CPUE) through 7/23 =						1,773
Run Estimates Based on Model Results (Fit of Current Year to Past Years)						
	Mean Sum	Estimated Total CPUE				Estimated
Year	of Squares	Current	Previous Day	Difference	Timing	Total Run
1992	0.000544	2,623	2,647	-24	Late 2 days	4,651,435
1999	0.000565	2,716	2,740	-24	Late 3 days	4,816,518
1987	0.000798	3,016	3,041	-25	Late 2 days	5,348,721
2004	0.000953	2,635	2,641	-6	Late 2 days	4,672,609
1991	0.001003	2,587	2,590	-3	Late 2 days	4,587,328
2006	0.001069	4,362	4,393	-31	Late 9 days	7,735,061
1990	0.001118	3,014	3,077	-63	Late 3 days	5,345,582
1994	0.001736	3,294	3,300	-6	Late 4 days	5,841,006
1995	0.001959	2,228	2,211	17	On Time	3,951,366
2005	0.002295	3,509	3,505	4	Late 7 days	6,223,431
1983	0.002708	2,324	2,306	18	On Time	4,121,946
2003	0.003507	2,118	2,093	26	Early 2 days	3,756,598
1997	0.003742	2,715	2,697	19	Late 1 day	4,815,489
1998	0.003805	2,675	2,656	19	Late 3 days	4,744,076
1996	0.004675	2,021	1,990	31	Early 2 days	3,584,085
1986	0.004823	2,317	2,291	26	Late 1 day	4,108,787
1982	0.005366	2,371	2,343	27	Late 2 days	4,203,804
1993	0.005715	2,196	2,166	30	Early 1 day	3,894,193
2000	0.005849	1,861	1,824	37	Early 2 days	3,300,809
1985	0.007629	2,253	2,219	34	On Time	3,995,647
1988	0.008477	2,187	2,151	36	Early 2 days	3,878,215
2002	0.010132	1,908	1,867	41	Early 1 days	3,383,288
2001	0.011184	1,899	1,857	42	Early 2 days	3,367,239
1989	0.016712	2,319	2,268	51	On Time	4,112,990
1984	0.020072	1,853	1,804	49	Early 4 days	3,285,256
1979	0.034623	1,686	1,630	55	Early 5 days	2,989,620
1980	0.072153	1,622	1,559	63	Early 9 days	2,876,284
1981	0.072394	1,580	1,518	63	Early 9 days	2,802,087

-continued-

Table 4.–Page 2 of 2.

Based on data through 7/26/2007	
Escapement	968,569
Cumulative Catch (Commercial, Sport, & PU)	2,868,754
Residual in District	147,207
Total Run Through 7/26/2007 =	3,984,530
2007 Cumulative OTF CPUE through 7/26 =	2,204
Passage Rate (Total Run/Cumulative CPUE) through 7/26 =	1,808

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

	Mean Sum	Estimated Total CPUE				Estimated
Year	of Squares	Current	Previous Day	Difference	Timing	Total Run
1992	0.000519	2,600	2,610	-11	Late 2 days	4,699,576
1999	0.000550	2,687	2,700	-13	Late 3 days	4,858,090
1987	0.000787	2,972	2,993	-21	Late 2 days	5,372,879
2004	0.000857	2,646	2,648	-2	Late 2 days	4,783,587
1991	0.000914	2,605	2,605	0	Late 2 days	4,710,080
2006	0.001054	4,259	4,310	-51	Late 9 days	7,698,947
1990	0.001477	2,897	2,936	-39	Late 3 days	5,237,072
1994	0.001559	3,281	3,297	-16	Late 4 days	5,931,147
2005	0.002049	3,514	3,527	-13	Late 7 days	6,352,071
1995	0.002276	2,302	2,284	19	On Time	4,162,243
1983	0.002829	2,396	2,379	17	On Time	4,332,038
1997	0.003482	2,775	2,766	10	Late 1 day	5,017,525
1998	0.003561	2,738	2,727	11	Late 3 days	4,949,043
2003	0.004189	2,214	2,189	25	Early 2 days	4,003,151
1986	0.004932	2,406	2,385	21	Late 1 day	4,350,026
1982	0.005370	2,461	2,440	21	Late 2 days	4,448,825
1996	0.005834	2,131	2,101	30	Early 2 days	3,852,954
1993	0.006106	2,298	2,272	26	Early 1 day	4,153,583
1985	0.007824	2,361	2,334	27	On Time	4,269,232
2000	0.008327	1,990	1,954	37	Early 2 days	3,598,262
1988	0.008841	2,301	2,272	29	Early 2 days	4,160,761
2002	0.012032	2,042	2,005	37	Early 1 days	3,691,295
2001	0.013135	2,035	1,997	38	Early 2 days	3,679,706
1989	0.016482	2,466	2,429	37	On Time	4,457,738
1984	0.022128	2,005	1,963	43	Early 4 days	3,624,964
1979	0.038396	1,857	1,808	49	Early 5 days	3,357,581
1980	0.074576	1,811	1,757	54	Early 9 days	3,274,311
1981	0.075927	1,769	1,715	55	Early 9 days	3,198,905

Table 5.–Total Kenai River sockeye run (millions) in 2007 estimated from total offshore test fish CPUE and age composition run stock, data allocation by stock, data through July 23, and July 26, 2007.

Data through 23-July

Year	MSS	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
1992	0.00054	2,623	2,647	Late 2 days	1,773	4.65	3.19	1.46	1.77	51%	0.745	2.511
1999	0.00057	2,716	2,740	Late 3 days	1,773	4.82	3.19	1.62	1.77	51%	0.830	2.596
1987	0.00080	3,016	3,041	Late 2 days	1,773	5.35	3.19	2.16	1.77	51%	1.102	2.867
2004	0.00095	2,635	2,641	Late 2 days	1,773	4.67	3.19	1.48	1.77	51%	0.756	2.522
1991	0.00100	2,587	2,590	Late 2 days	1,773	4.59	3.19	1.39	1.77	51%	0.713	2.478

Data through 26-July

Year	MSS	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
1992	0.00052	2,600	2,610	Late 2 days	1,808	4.70	3.78	0.92	2.20	52%	0.478	2.673
1999	0.00055	2,687	2,700	Late 3 days	1,808	4.86	3.78	1.08	2.20	52%	0.561	2.756
1987	0.00079	2,972	2,993	Late 2 days	1,808	5.37	3.78	1.59	2.20	52%	0.829	3.024
2004	0.00086	2,646	2,648	Late 2 days	1,808	4.78	3.78	1.00	2.20	52%	0.522	2.717
1991	0.00091	2,605	2,605	Late 2 days	1,808	4.71	3.78	0.93	2.20	52%	0.484	2.679

Note: MSS is the mean sum of squares.

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

Table 6.–A comparison of methods used to make post-season adjustments to the offshore test fish final CPUE.

	Final	Postseason OTF CPUE Adjustment		Harvest Adjusted		Total Run Adjusted	
Year	OTF CPUE	Harvest-adjusted	Total Run-adjusted	*a*	*b*	*a*	*b*
1979	602	651	664	-3.2451	0.1876	-3.3380	0.2004
1980	740	770	777	-2.2537	0.1640	-2.2403	0.1612
1981	364	383	387	-2.5459	0.1856	-2.5243	0.1819
1982	651	775	786	-3.6839	0.1522	-3.7156	0.1633
1983	2,464	2,472	2,474	-4.2719	0.1883	-4.2732	0.1884
1984	1,331	1,334	1,341	-3.4257	0.1855	-3.4018	0.1834
1985	1,422	1,575	1,563	-3.4581	0.1523	-3.5633	0.1626
1986	1,653	1,731	1,714	-3.7671	0.1633	-3.8642	0.1719
1987	1,404	1,422	1,428	-4.3442	0.1689	-4.6385	0.1785
1988	1,131	1,145	1,169	-3.3682	0.1639	-3.5655	0.1662
1989	619	682	692	-2.7114	0.1258	-2.7031	0.1238
1990	1,358	1,404	1,426	-5.7913	0.2259	-5.7085	0.2211
1991	1,574	1,759	1,740	-4.5806	0.1885	-4.6331	0.1919
1992	2,021	2,186	2,195	-5.4366	0.2235	-5.4043	0.2217
1993	1,815	1,882	1,913	-4.0776	0.1906	-3.9018	0.1797
1994	1,012	1,145	1,199	-4.0770	0.1553	-3.9757	0.1453
1995	1,712	1,828	1,850	-4.7036	0.2131	-4.6219	0.2078
1996	1,723	1,765	1,796	-4.6328	0.2266	-4.4605	0.2144
1997	1,656	1,705	1,826	-3.8265	0.1621	-3.7000	0.1496
1998	1,158	1,355	1,313	-3.6700	0.1473	-3.7142	0.1515
1999	2,226	2,475	2,419	-5.3100	0.2175	-5.1500	0.2081
2000	1,520	1,532	1,565	-5.1094	0.2614	-4.9141	0.2480
2001	1,586	1,594	1,630	-3.9323	0.2002	-3.9823	0.2041
2002	1,736	1,749	1,825	-4.3694	0.2292	-4.0642	0.2068
2003	1,787	1,824	1,848	-4.5091	0.2117	-4.4402	0.2068
2004	2,028	2,220	2,345	-4.6374	0.1903	-4.6374	0.1903
2005	2,643	3,032	3,191	-3.7460	0.1354	-3.7152	0.1302
2006	1,507	1,756	1,969	-4.2031	0.1438	-4.0762	0.1308
2007	2,584	2,774	2,924	-4.9217	0.1962	-4.6427	0.1793

Table 7.–Mean date of the sockeye salmon run across the Anchor Point transect, Upper Cook Inlet offshore test fish project, 1979–2007.

	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
1979-2006 Average	22.4	15-Jul
2007	25.9	19-Jul

[a] Day (1) = June 24.

Table 8.–Sockeye salmon age-composition, mean length (mm), and number of samples by station, Upper Cook Inlet offshore test fish project, 2007.

Age Composition (percentage)

Station No.	Sample Size	0.3	1.2	1.3	2.2	1.4	2.3	2.4	3.2	3.3
4	288	1.0	6.0	79.4	2.8	3.8	7.0			
5	362		8.2	76.5	4.2	1.4	9.4	0.2		
6	442	0.9	8.6	77.3	4.3	3.0	6.0			
6.5	376	0.8	9.1	72.5	6.6	3.5	7.5			
7	263	1.2	6.9	77.8	4.1	1.9	8.1			
8	130	0.9	6.1	72.6	6.6	0.9	12.7			
Weighted Avg =		1.0	8.0	76.3	5.0	3.0	8.3	0.2		

Mean Length (mm)

Station No.	Sample Size	0.3	1.2	1.3	2.2	1.4	2.3	2.4	3.2	3.3
4	288	570	498	585	516	632	558			
5	362		513	587	527	625	571	630		
6	442	559	514	582	530	619	563			
6.5	376	556	521	587	525	608	571			
7	263	594	518	581	515	618	566			
8	130	580	518	578	533	630	561			
Weighted Avg =		570	514	584	525	620	566	630		

No. Samples

Station No.	Sample Size	0.3	1.2	1.3	2.2	1.4	2.3	2.4	3.2	3.3
4	288	3	17	229	8	11	20			
5	362		30	277	15	5	34	1		
6	442	4	38	342	19	13	26			
6.5	376	3	34	273	25	13	28			
7	263	3	18	205	11	5	21			
8	130	1	8	95	8	1	17			
Station Total =		14	145	1421	86	48	146	1	0	0

Table 9.–Age, sex and length composition of sockeye salmon in the 2007 Central District commercial drift gillnet harvest, Upper Cook Inlet, Alaska.

	Age Group												
	0.2	1.1	0.3	1.2	0.4	1.3	2.2	1.4	2.3	3.2	2.4	3.3	Total
Males	157	124	14,308	87,155	28	652,420	28,397	6,204	66,356		1,779	81	857,009
Percent	0.01	0.01	0.79	4.79	0	35.87	1.56	0.34	3.65		0.1	0	47.12
Sample Size	1	1	31	254	1	1,988	81	19	246		5	1	2,628
Mean Length	431	359	595	502	566	592	509	637	571		604	613	579
Std. Error			8	2		1	5	9	3		27		1
Females	295	517	15,357	54,148		768,446	26,217	5,356	89,793	28	1,470	182	961,809
Percent	0.02	0.03	0.84	2.98		42.25	1.44	0.29	4.94	0	0.08	0.01	52.88
Sample Size	2	1	43	253		2,200	95	15	351	1	6	3	2,970
Mean Length	491	430	582	506		578	518	619	569	486	601	557	572
Std. Error			5	3		1	5	5	2				1
Both Sexes	452	641	29,665	141,303	28	1,420,866	54,614	11,560	156,149	28	3,249	263	1,818,818
Percent	0.02	0.04	1.63	7.77	0	78.12	3	0.64	8.59	0	0.18	0.01	100
Sample Size	3	2	74	507	1	4,188	176	34	597	1	11	4	5,598
Mean Length	470	416	588	504	566	584	513	629	570	486	602	574	575
Std. Error			4	2		1	4	5	2		27		1

Table 10.–Stock composition estimate and the number of fish successfully screened for mixtures of fish captured in the Cook Inlet offshore test fishery in 2006 and 2007. (Reproduced from Habicht, et al, 2007).

Date(s)	N	West	Yentna	Susitna	Knik	Northeast	Kenai	Kasilof
					2006			
7/1-9	325	0.11	0.06	0.00	0.01	0.00	0.30	0.51
		(0.08 - 0.15)	0.04 - 0.10)	(0.00 - 0.01)	(0.00 - 0.02)	(0.00 - 0.00)	(0.24 - 0.36)	(0.45 - 0.58)
7/10-16	266	0.08	0.13	0.07	0.05	0.00	0.34	0.33
		(0.05 - 0.12)	(0.07 - 0.19)	(0.04 - 0.11)	(0.02 - 0.08)	(0.00 - 0.00)	(0.27 - 0040)	(0.26 - 0.39)
7/17-23	401	0.10	0.09	0.02	0.02	0.00	0.61	0.16
		(0.07 - 0.13)	(0.06 - 0.13)	(0.01 - 0.03)	(0.01 - 0.03)	(0.00 - 0.00)	(0.56 - 0.67)	(0.12 - 0.21)
7/24-8/1	393	0.05	0.07	0.03	0.02	0.00	0.70	0.12
		(0.03 - 0.07)	(0.03 - 0.12)	(0.00 - 0.07)	(0.01 - 0.04)	(0.00 - 0.01)	(0.65 - 0.75)	(0.08 - 0.16)

Date(s)	N	West	Yentna	Susitna	Knik	Northeast	Kenai	Kasilof
					2007			
7/1-9	374	0.17	0.12	0.01	0.06	0.00	0.41	0.24
		(0.12 - 0.22)	(0.07 - 0.16)	(0.00 - 0.02)	(0.04 - 0.09)	(0.00 - 0.01)	(0.35 - 0.47)	(0.18 - 0.29)
7/10-13	444	0.07	0.15	0.02	0.04	0.00	0.54	0.18
		(0.05 - 0.10)	(0.11 - 0.19)	(0.00 - 0.04)	(0.02 - 0.07)	(0.00 - 0.00)	(0.48 - 0.60)	(0.13 - 0.23)
7/14-18	404	0.07	0.13	0.04	0.03	0.00	0.62	0.12
		(0.04 - 0.10)	(0.08 - 0.18)	(0.01 - 0.09)	(0.01 - 0.04)	(0.00 - 0.00)	(0.57 - 0.67)	(0.08 - 0.16)
7/19-23	429	0.08	0.08	0.05	0.03	0.00	0.68	0.09
		(0.06 - 0.11)	(0.05 - 0.12)	(0.02 - 0.08)	(0.01 - 0.04)	(0.00 - 0.00)	(0.63 - 0.73)	(0.06 - 0.13)
7/24-8/2	439	0.07	0.07	0.05	0.01	0.00	0.71	0.09
		(0.05 - 0.10)	(0.04 - 0.10)	(0.03 - 0.07)	(0.00 - 0.02)	(0.00 - 0.00)	(0.66 - 0.76)	(0.06 - 0.13)

Note: Credibility intervals (90%) are included in parentheses. Proportions are estimated from BAYES using a SPAM prior.

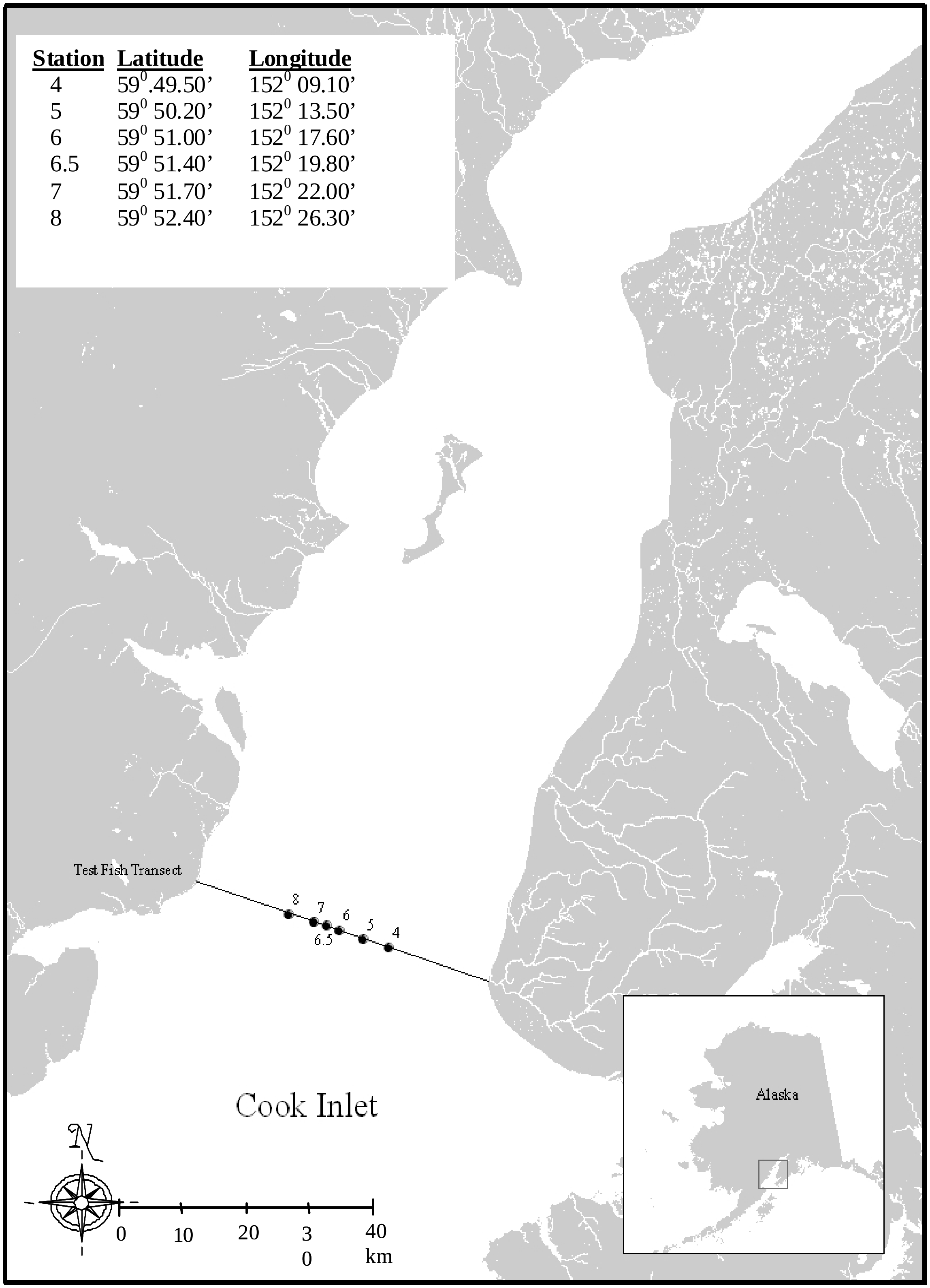

Figure 1.–Location of offshore test fish transect and fishing stations in Cook Inlet, Alaska, 2007.

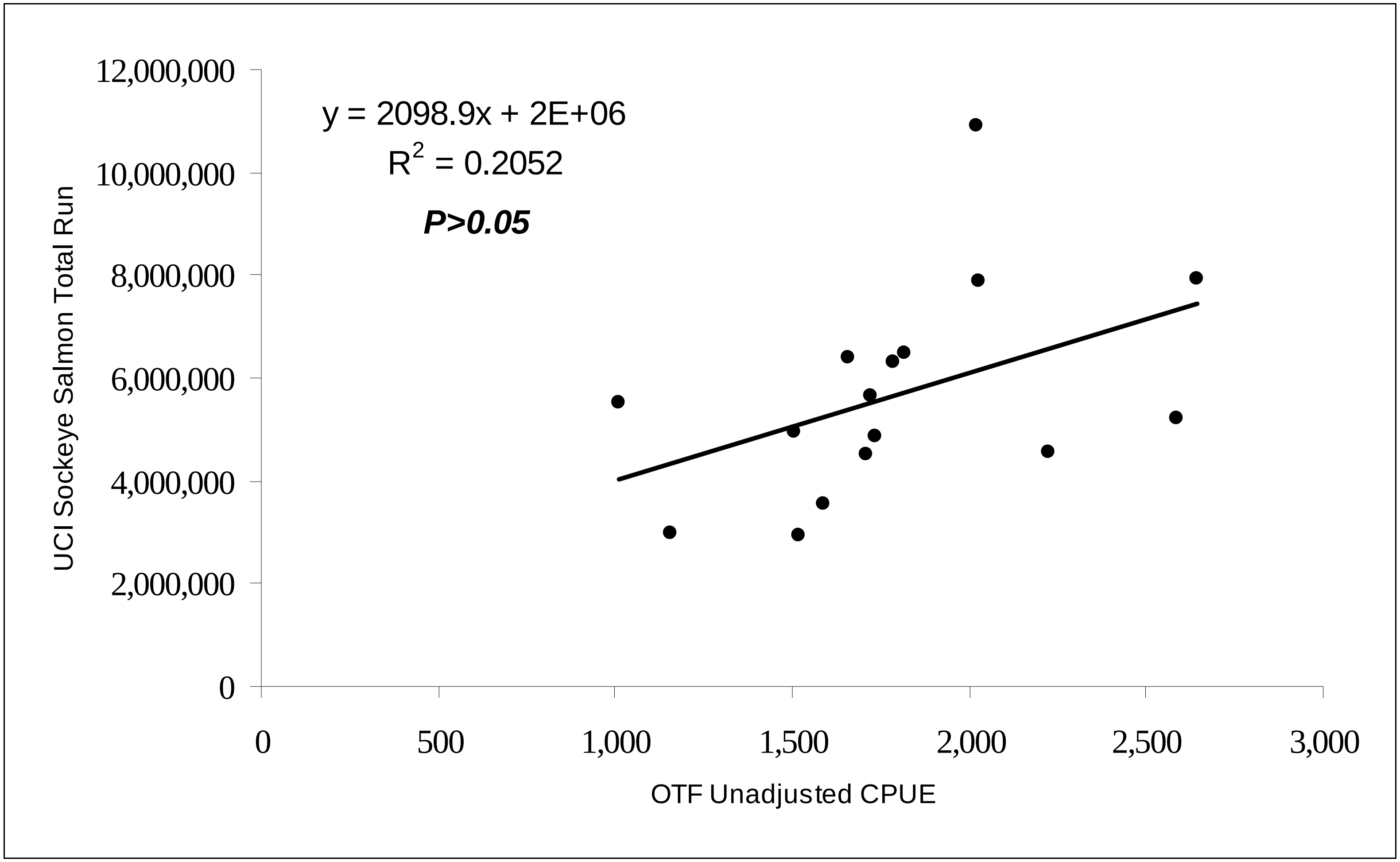

Figure 2.–Linear regression of the relationship between offshore test fish unadjusted cumulative CPUE and Upper Cook Inlet sockeye salmon total annual run, 1992–2007.

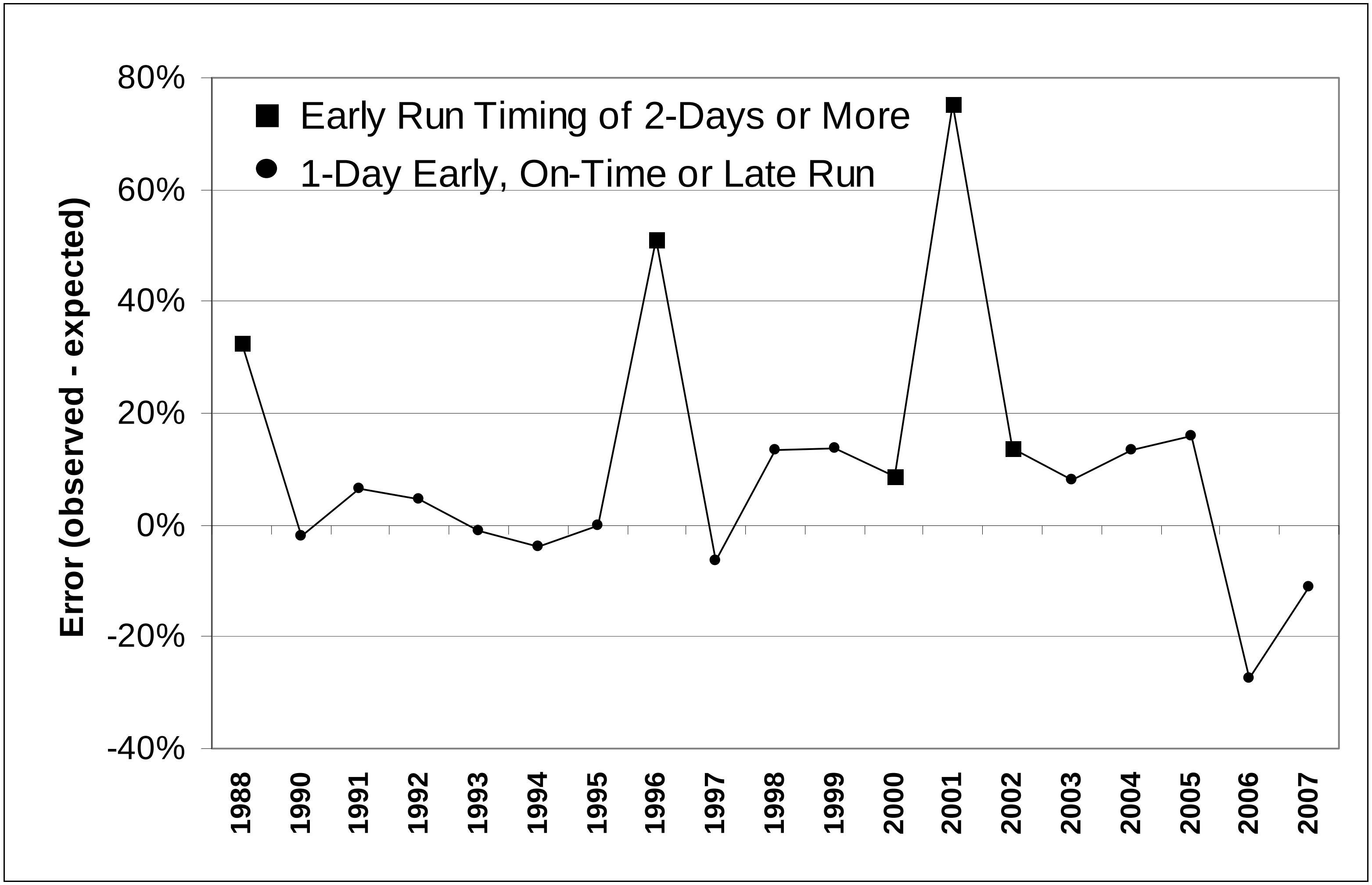

Figure 3.–Offshore test fish error in forecasting the total run of sockeye salmon to Upper Cook Inlet using the 20 July best-fit estimate.

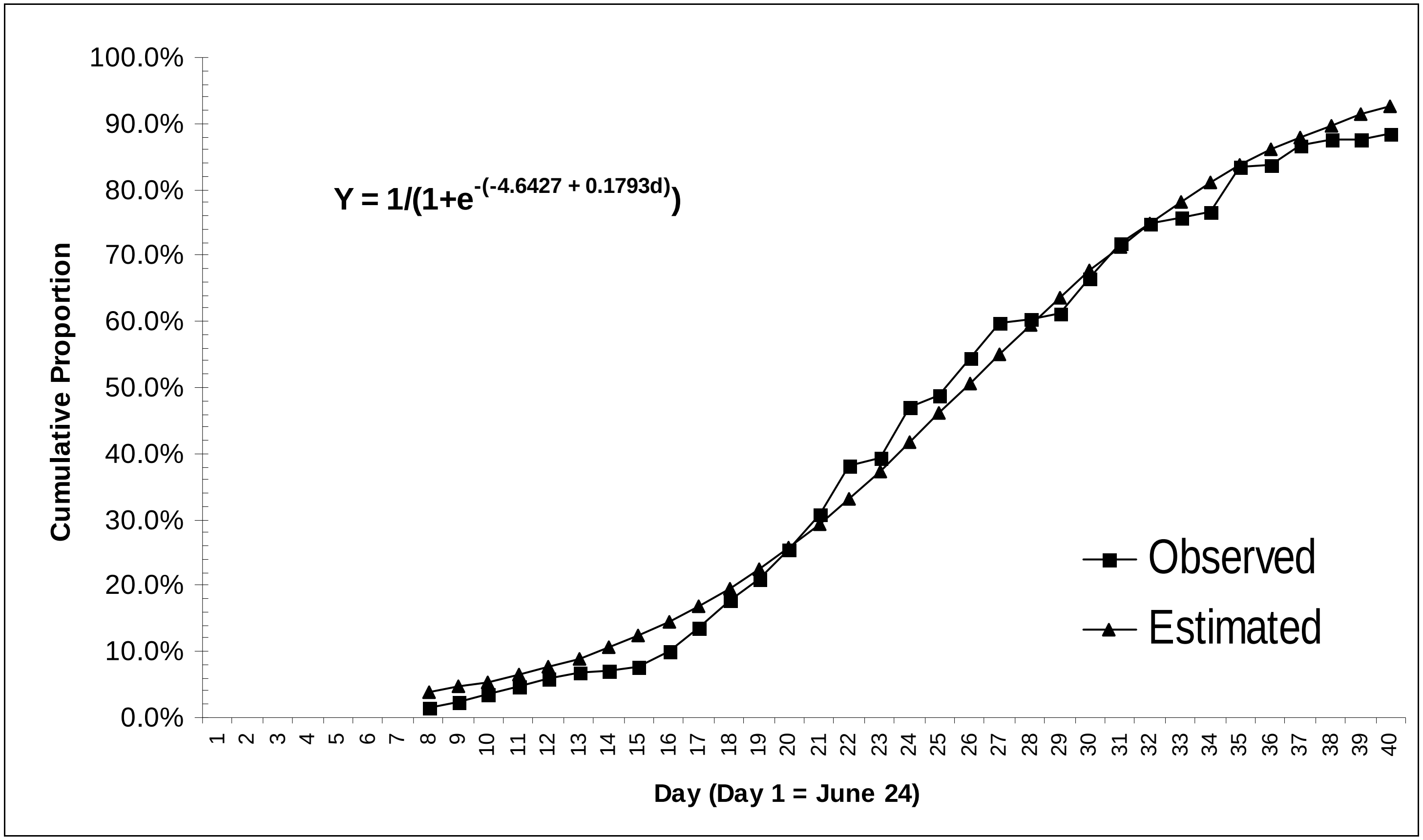

Figure 4.–Cumulative proportions estimated for the sockeye salmon run to Upper Cook Inlet, Alaska, 2007.

APPENDIX A.

Appendix A1.–Summary of pink salmon fishing effort, daily and cumulative catch, and daily and cumulative CPUE, Upper Cook Inlet offshore test fish project, 2007.

Date	Number of Stations	Mean Fishing Time (min)	CATCH		CPUE	
			Daily	Cum	Daily	Cum
7/1	6	234.5	3	3	2	2
7/2	6	224.5	2	5	2	4
7/3	6	227.0	1	6	1	5
7/4	6	223.0	1	7	1	5
7/5	6	221.0	2	9	2	7
7/6	6	222.5	2	11	2	9
7/7	6	217.5	1	12	1	10
7/8	6	239.0	1	13	1	10
7/9	6	229.5	6	19	5	15
7/10	6	236.5	17	36	12	27
7/11	6	249.0	9	45	6	34
7/12	6	242.0	6	51	4	38
7/13	6	243.5	20	71	14	53
7/14	6	252.0	5	76	4	56
7/15	6	280.5	20	96	12	68
7/16	6	230.0	7	103	5	73
7/17[a]	4[a]	306.5	13	116	6	79
7/18	6	236.0	6	122	4	83
7/18	6	259.0	27	149	17	100
7/18	6	256.0	34	183	22	121
7/18	6	223.5	6	189	5	126
7/18	6	220.5	7	196	6	132
7/18	6	268.5	32	228	19	151
7/18	6	256.0	20	248	14	164
7/25[a]	0[a]	241.3	17	265	10	175
7/26	6	226.5	9	274	7	182
7/27	6	221.5	7	281	6	187
7/28	6	222.5	18	299	22	210
7/29	6	215.0	3	302	3	212
7/30[a]	5[a]	239.8	21	323	14	226
7/31	6	215.0	13	336	11	237
8/1	6	217.0	1	337	1	238
8/2	6	222.5	11	348	9	247

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

Appendix A2.–Estimated pink salmon catch by date and station, Upper Cook Inlet offshore test fish project, 2007.

	Station Number						
Date	4	5	6	6.5	7	8	Total
7/1	0	1	1	0	0	1	3
7/2	0	0	1	0	1	0	2
7/3	0	0	0	0	1	0	1
7/4	0	0	0	1	0	0	1
7/5	0	0	0	1	1	0	2
7/6	0	0	0	0	2	0	2
7/7	0	1	0	0	0	0	1
7/8	0	1	0	0	0	0	1
7/9	1	1	1	1	2	0	6
7/10	2	7	4	2	2	0	17
7/11	2	1	2	1	2	1	9
7/12	1	0	3	0	1	1	6
7/13	1	1	4	0	14	0	20
7/14	1	0	3	1	0	0	5
7/15	0	1	8	9	1	1	20
7/16	0	1	2	2	2	0	7
7/17[a]	1	0	7	4	1	0	13
7/18	1	2	2	1	0	0	6
7/18	0	1	10	10	4	2	27
7/18	0	2	4	5	20	3	34
7/18	0	0	4	0	0	2	6
7/18	2	0	0	0	1	4	7
7/18	1	1	5	17	8	0	32
7/18	1	1	5	5	6	2	20
7/25[a]	1	1	3	4	5	3	17
7/26	0	1	0	2	3	3	9
7/27	0	1	0	3	2	1	7
7/28	0	0	2	8	2	6	18
7/29	1	0	0	1	1	0	3
7/30[a]	6	0	0	4	10	1	21
7/31	2	7	0	0	2	2	13
8/1	0	0	0	1	0	0	1
8/2	0	0	5	2	2	2	11
TOTAL	24	32	76	85	96	35	348
Percent	7	9	22	24	28	10	100

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

Appendix A3.–Estimated pink salmon CPUE by date and station, Upper Cook Inlet offshore test fish project, 2007.

	Station Number						
Date	4	5	6	6.5	7	8	Total
7/1	0.0	0.8	0.7	0.0	0.0	0.8	2.3
7/2	0.0	0.0	0.8	0.0	0.8	0.0	1.6
7/3	0.0	0.0	0.0	0.0	0.8	0.0	0.8
7/4	0.0	0.0	0.0	0.8	0.0	0.0	0.8
7/5	0.0	0.0	0.0	0.8	0.8	0.0	1.6
7/6	0.0	0.0	0.0	0.0	1.6	0.0	1.6
7/7	0.0	0.8	0.0	0.0	0.0	0.0	0.8
7/8	0.0	0.8	0.0	0.0	0.0	0.0	0.8
7/9	0.8	0.8	0.8	0.8	1.5	0.0	4.7
7/10	1.4	4.8	2.9	1.6	1.6	0.0	12.3
7/11	1.4	0.7	1.5	0.8	1.4	0.8	6.5
7/12	0.8	0.0	2.0	0.0	0.8	0.8	4.3
7/13	0.7	0.7	2.8	0.0	10.2	0.0	14.4
7/14	0.5	0.0	2.2	0.8	0.0	0.0	3.5
7/15	0.0	0.7	5.1	4.3	0.6	0.8	11.6
7/16	0.0	0.9	1.5	1.5	1.5	0.0	5.4
7/17[a]	0.8	0.0	2.5	1.7	0.8	0.0	5.8
7/18	0.8	1.5	1.3	0.8	0.0	0.0	4.4
7/18	0.0	0.8	5.5	5.9	3.0	1.5	16.7
7/18	0.0	1.5	2.8	3.4	11.6	2.3	21.6
7/18	0.0	0.0	3.2	0.0	0.0	1.7	4.9
7/18	1.6	0.0	0.0	0.0	0.8	3.3	5.7
7/18	0.9	0.8	3.5	9.4	4.1	0.0	18.6
7/18	0.8	0.8	2.9	3.1	4.7	1.4	13.7
7/25[a]	0.4	0.8	1.5	2.3	3.5	1.9	10.4
7/26	0.0	0.8	0.0	1.6	2.3	2.4	7.1
7/27	0.0	0.8	0.0	2.4	1.5	0.8	5.6
7/28	0.0	0.0	1.2	15.5	1.6	4.1	22.3
7/29	0.8	0.0	0.0	0.8	0.8	0.0	2.5
7/30[a]	4.3	0.0	0.0	3.1	5.7	1.2	14.2
7/31	1.6	5.3	0	0	1.6	2.4	10.8
8/1	0	0	0	0.82	0	0	0.8
8/2	0	0	3.9	1.64	1.6	1.62	8.8
Total	17	24	49	64	65	28	247
Percent	7	10	20	26	27	11	100

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

Appendix A4.–Summary of chum salmon fishing effort, daily and cumulative catch, and daily and cumulative CPUE, Upper Cook Inlet offshore test fish project, 2007.

Date	Number of Stations	Mean Fishing Time (min)	CATCH Daily	CATCH Cum	CPUE Daily	CPUE Cum
7/1	6	234.5	0	0	0	0
7/2	6	224.5	1	1	1	1
7/3	6	227.0	2	3	1	2
7/4	6	223.0	1	4	1	3
7/5	6	221.0	2	6	2	5
7/6	6	222.5	2	8	2	6
7/7	6	217.5	0	8	0	6
7/8	6	239.0	5	13	4	10
7/9	6	229.5	1	14	1	11
7/10	6	236.5	8	22	6	16
7/11	6	249.0	2	24	1	18
7/12	6	242.0	4	28	3	20
7/13	6	243.5	22	50	16	36
7/14	6	252.0	5	55	4	40
7/15	6	280.5	20	75	11	51
7/16	6	230.0	1	76	1	52
7/17[a]	4[a]	306.5	24	100	9	60
7/18	6	236.0	10	110	7	68
7/18	6	259.0	16	126	9	77
7/18	6	256.0	35	161	22	99
7/18	6	223.5	3	164	2	102
7/18	6	220.5	7	171	6	107
7/18	6	268.5	59	230	33	140
7/18	6	256.0	24	254	15	155
7/25[a]	0[a]	241.3	19	273	12	167
7/26	6	226.5	12	285	9	176
7/27	6	221.5	14	299	11	187
7/28	6	222.5	50	349	43	231
7/29	6	215.0	2	351	2	232
7/30[a]	5[a]	239.8	28	379	17	250
7/31	6	215.0	16	395	12	262
8/1	6	217.0	1	396	1	263
8/2	6	222.5	2	398	2	265

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

Appendix A5.–Estimated chum salmon catch by date and station, Upper Cook Inlet offshore test fish project, 2007.

	Station Number						
Date	4	5	6	6.5	7	8	Total
7/1	0	0	0	0	0	0	0
7/2	0	0	1	0	0	0	1
7/3	0	0	2	0	0	0	2
7/4	0	1	0	0	0	0	1
7/5	0	2	0	0	0	0	2
7/6	0	0	1	1	0	0	2
7/7	0	0	0	0	0	0	0
7/8	1	4	0	0	0	0	5
7/9	1	0	0	0	0	0	1
7/10	6	2	0	0	0	0	8
7/11	0	1	0	0	1	0	2
7/12	1	2	1	0	0	0	4
7/13	4	4	6	2	6	0	22
7/14	1	0	2	1	1	0	5
7/15	1	0	7	11	1	0	20
7/16	0	0	0	1	0	0	1
7/17[a]	0	0	23	1	0	0	24
7/18	0	8	2	0	0	0	10
7/18	1	0	7	8	0	0	16
7/18	1	5	2	3	23	1	35
7/18	0	0	1	0	2	0	3
7/18	5	1	0	0	1	0	7
7/18	0	2	1	24	27	5	59
7/18	0	1	11	10	0	2	24
7/25[a]	0	1	6	6	5	1	19
7/26	0	0	0	2	10	0	12
7/27	0	0	7	4	3	0	14
7/28	0	0	15	8	3	24	50
7/29	0	0	2	0	0	0	2
7/30[a]	0	0	3	5	20	0	28
7/31	7	6	1	0	2	0	16
8/1	0	0	0	1	0	0	1
8/2	0	0	0	1	0	1	2
Total	29	40	101	89	105	34	398
Percent	7	10	25	22	26	9	100

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

Appendix A6.–Estimated chum salmon CPUE by date and station, Upper Cook Inlet offshore test fish project, 2007.

	Station Number						
Date	4	5	6	6.5	7	8	Total
7/1	0	0	0	0	0	0	0
7/2	0	0	1	0	0	0	1
7/3	0	0	1	0	0	0	1
7/4	0	1	0	0	0	0	1
7/5	0	2	0	0	0	0	2
7/6	0	0	1	1	0	0	2
7/7	0	0	0	0	0	0	0
7/8	1	3	0	0	0	0	4
7/9	1	0	0	0	0	0	1
7/10	4	1	0	0	0	0	6
7/11	0	1	0	0	1	0	1
7/12	1	1	1	0	0	0	3
7/13	3	3	4	2	4	0	16
7/14	1	0	1	1	1	0	4
7/15	1	0	4	5	1	0	11
7/16	0	0	0	1	0	0	1
7/17[a]	0	0	8	0	0	0	9
7/18	0	6	1	0	0	0	7
7/18	1	0	4	5	0	0	9
7/18	1	4	1	2	13	1	22
7/18	0	0	1	0	2	0	2
7/18	4	1	0	0	1	0	6
7/18	0	2	1	13	14	4	33
7/18	0	1	6	6	0	1	15
7/25[a]	0	0	3	4	4	1	12
7/26	0	0	0	2	8	0	9
7/27	0	0	5	3	2	0	11
7/28	0	0	9	15	2	16	43
7/29	0	0	2	0	0	0	2
7/30[a]	0	0	2	4	11	0	17
7/31	5	5	1	0	2	0	12
8/1	0	0	0	1	0	0	1
8/2	0	0	0	1	0	1	2
Total	21	30	59	66	65	24	265
Percent	8	11	22	25	25	9	100

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

Appendix A7.–Summary of coho salmon fishing effort, daily and cumulative catch, and daily and cumulative CPUE, Upper Cook Inlet offshore test fish project, 2007.

Date	Number of Stations	Mean Fishing Time (min)	CATCH		CPUE	
			Daily	Cum	Daily	Cum
7/1	6	234.5	2	2	2	2
7/2	6	224.5	1	3	1	2
7/3	6	227.0	4	7	3	5
7/4	6	223.0	1	8	1	6
7/5	6	221.0	2	10	2	8
7/6	6	222.5	4	14	3	11
7/7	6	217.5	3	17	2	13
7/8	6	239.0	12	29	7	20
7/9	6	229.5	14	43	11	31
7/10	6	236.5	16	59	12	43
7/11	6	249.0	12	71	9	52
7/12	6	242.0	13	84	9	61
7/13	6	243.5	37	121	27	87
7/14	6	252.0	37	158	24	111
7/15	6	280.5	67	225	40	151
7/16	6	230.0	2	227	2	152
7/17[a]	4[a]	306.5	33	260	14	166
7/18	6	236.0	21	281	15	181
7/18	6	259.0	81	362	49	230
7/18	6	256.0	29	391	20	250
7/18	6	223.5	9	400	7	257
7/18	6	220.5	9	409	7	264
7/18	6	268.5	67	476	39	303
7/18	6	256.0	53	529	35	338
7/25[a]	0[a]	241.3	28	557	18	356
7/26	6	226.5	1	558	1	357
7/27	6	221.5	7	565	6	362
7/28	6	222.5	50	615	63	426
7/29	6	215.0	5	620	4	430
7/30[a]	5[a]	239.8	39	659	25	455
7/31	6	215.0	12	671	10	465
8/1	6	217.0	14	685	12	476
8/2	6	222.5	7	692	6	482

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

Appendix A8.–Estimated coho salmon catch by date and station, Upper Cook Inlet offshore test fish project, 2007.

	Station Number						
Date	4	5	6	6.5	7	8	Total
7/1	0	0	1	1	0	0	2
7/2	0	0	1	0	0	0	1
7/3	0	1	1	0	1	1	4
7/4	0	0	0	0	1	0	1
7/5	0	0	0	1	1	0	2
7/6	1	0	1	0	2	0	4
7/7	0	1	0	1	1	0	3
7/8	11	1	0	0	0	0	12
7/9	9	2	1	2	0	0	14
7/10	0	4	6	4	2	0	16
7/11	1	1	1	6	3	0	12
7/12	3	0	9	0	1	0	13
7/13	0	5	14	2	16	0	37
7/14	16	12	4	4	1	0	37
7/15	1	3	38	20	4	1	67
7/16	0	0	2	0	0	0	2
7/17[a]	1	3	22	7	0	0	33
7/18	7	2	11	1	0	0	21
7/18	0	4	53	8	12	4	81
7/18	0	4	5	4	10	6	29
7/18	0	1	5	1	0	2	9
7/18	0	9	0	0	0	0	9
7/18	0	0	10	27	22	8	67
7/18	0	1	12	17	8	15	53
7/25[a]	0	1	6	9	4	8	28
7/26	0	0	0	1	0	0	1
7/27	0	0	5	2	0	0	7
7/28	0	0	10	23	10	7	50
7/29	2	0	1	2	0	0	5
7/30[a]	6	0	5	1	26	1	39
7/31	4	4	0	2	0	2	12
8/1	0	1	2	11	0	0	14
8/2	1	3	2	0	1	0	7
Total	63	63	228	157	126	55	692
Percent	9	9	33	23	18	8	100

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

Appendix A9.–Estimated coho salmon CPUE by date and station, Upper Cook Inlet offshore test fish project, 2007.

	Station Number						
Date	4	5	6	6.5	7	8	Total
7/1	0	0	1	1	0	0	2
7/2	0	0	1	0	0	0	1
7/3	0	1	1	0	1	1	3
7/4	0	0	0	0	1	0	1
7/5	0	0	0	1	1	0	2
7/6	1	0	1	0	2	0	3
7/7	0	1	0	1	1	0	2
7/8	6	1	0	0	0	0	7
7/9	7	2	1	2	0	0	11
7/10	0	3	4	3	2	0	12
7/11	1	1	1	5	2	0	9
7/12	2	0	6	0	1	0	9
7/13	0	4	10	2	12	0	27
7/14	8	8	3	3	1	0	24
7/15	1	2	24	10	3	1	40
7/16	0	0	2	0	0	0	2
7/17[a]	1	2	8	3	0	0	14
7/18	5	2	7	1	0	0	15
7/18	0	3	29	5	9	3	49
7/18	0	3	4	3	6	5	20
7/18	0	1	4	1	0	2	7
7/18	0	7	0	0	0	0	7
7/18	0	0	7	15	11	6	39
7/18	0	1	7	11	6	10	35
7/25[a]	0	0	4	6	3	5	18
7/26	0	0	0	1	0	0	1
7/27	0	0	4	2	0	0	6
7/28	0	0	6	45	8	5	63
7/29	2	0	1	2	0	0	4
7/30[a]	4	0	4	1	15	1	25
7/31	3	3	0	2	0	2	10
8/1	0	1	2	9	0	0	12
8/2	1	2	2	0	1	0	6
Total	9	10	29	27	17	9	100
Percent	42	47	141	129	83	41	482

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

Appendix A10.–Summary of Chinook salmon fishing effort, daily and cumulative catch, and daily and cumulative CPUE, Upper Cook Inlet offshore test fish project, 2007.

Date	Number of Stations	Mean Fishing Time (min)	CATCH		CPUE	
			Daily	Cum	Daily	Cum
7/1	6	234.5	0	0	0	0
7/2	6	224.5	0	0	0	0
7/3	6	227.0	1	1	1	1
7/4	6	223.0	0	1	0	1
7/5	6	221.0	1	2	1	2
7/6	6	222.5	0	2	0	2
7/7	6	217.5	0	2	0	2
7/8	6	239.0	1	3	1	2
7/9	6	229.5	1	4	1	3
7/10	6	236.5	0	4	0	3
7/11	6	249.0	0	4	0	3
7/12	6	242.0	1	5	1	4
7/13	6	243.5	0	5	0	4
7/14	6	252.0	0	5	0	4
7/15	6	280.5	0	5	0	4
7/16	6	230.0	0	5	0	4
7/17[a]	4[a]	306.5	0	5	0	4
7/18	6	236.0	0	5	0	4
7/18	6	259.0	0	5	0	4
7/18	6	256.0	0	5	0	4
7/18	6	223.5	0	5	0	4
7/18	6	220.5	0	5	0	4
7/18	6	268.5	0	5	0	4
7/18	6	256.0	0	5	0	4
7/25[a]	0[a]	241.3	0	5	0	4
7/26	6	226.5	0	5	0	4
7/27	6	221.5	0	5	0	4
7/28	6	222.5	0	5	0	4
7/29	6	215.0	0	5	0	4
7/30[a]	5[a]	239.8	0	5	0	4
7/31	6	215.0	0	5	0	4
8/1	6	217.0	0	5	0	4
8/2	6	222.5	0	5	0	4

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

Appendix A11.–Estimated Chinook salmon catch by date and station, Upper Cook Inlet offshore test fish project, 2007.

	Station Number						
Date	4	5	6	6.5	7	8	Total
7/1	0	0	0	0	0	0	0
7/2	0	0	0	0	0	0	0
7/3	0	0	0	0	0	1	1
7/4	0	0	0	0	0	0	0
7/5	0	0	0	0	1	0	1
7/6	0	0	0	0	0	0	0
7/7	0	0	0	0	0	0	0
7/8	0	0	1	0	0	0	1
7/9	0	0	0	0	1	0	1
7/10	0	0	0	0	0	0	0
7/11	0	0	0	0	0	0	0
7/12	0	0	0	1	0	0	1
7/13	0	0	0	0	0	0	0
7/14	0	0	0	0	0	0	0
7/15	0	0	0	0	0	0	0
7/16	0	0	0	0	0	0	0
7/17[a]	0	0	0	0	0	0	0
7/18	0	0	0	0	0	0	0
7/18	0	0	0	0	0	0	0
7/18	0	0	0	0	0	0	0
7/18	0	0	0	0	0	0	0
7/18	0	0	0	0	0	0	0
7/18	0	0	0	0	0	0	0
7/18	0	0	0	0	0	0	0
7/25[a]	0	0	0	0	0	0	0
7/26	0	0	0	0	0	0	0
7/27	0	0	0	0	0	0	0
7/28	0	0	0	0	0	0	0
7/29	0	0	0	0	0	0	0
7/30[a]	0	0	0	0	0	0	0
7/31	0	0	0	0	0	0	0
8/1	0	0	0	0	0	0	0
8/2	0	0	0	0	0	0	0
Total	0	0	1	1	2	1	5
Percent	0	0	20	20	40	20	100

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

Appendix A12.–Estimated Chinook salmon CPUE by date and station, Upper Cook Inlet offshore test fish project, 2007.

	Station Number						
Date	4	5	6	6.5	7	8	Total
7/1	0	0	0	0	0	0	0
7/2	0	0	0	0	0	0	0
7/3	0	0	0	0	0	1	1
7/4	0	0	0	0	0	0	0
7/5	0	0	0	0	1	0	1
7/6	0	0	0	0	0	0	0
7/7	0	0	0	0	0	0	0
7/8	0	0	1	0	0	0	1
7/9	0	0	0	0	1	0	1
7/10	0	0	0	0	0	0	0
7/11	0	0	0	0	0	0	0
7/12	0	0	0	1	0	0	1
7/13	0	0	0	0	0	0	0
7/14	0	0	0	0	0	0	0
7/15	0	0	0	0	0	0	0
7/16	0	0	0	0	0	0	0
7/17[a]	0	0	0	0	0	0	0
7/18	0	0	0	0	0	0	0
7/18	0	0	0	0	0	0	0
7/18	0	0	0	0	0	0	0
7/18	0	0	0	0	0	0	0
7/18	0	0	0	0	0	0	0
7/18	0	0	0	0	0	0	0
7/18	0	0	0	0	0	0	0
7/25[a]	0	0	0	0	0	0	0
7/26	0	0	0	0	0	0	0
7/27	0	0	0	0	0	0	0
7/28	0	0	0	0	0	0	0
7/29	0	0	0	0	0	0	0
7/30[a]	0	0	0	0	0	0	0
7/31	0	0	0	0	0	0	0
8/1	0	0	0	0	0	0	0
8/2	0	0	0	0	0	0	0
Total	0	0	1	1	2	1	4
Percent	0	0	20	21	39	20	100

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

Appendix A13.–Entry pattern of sockeye salmon into Upper Cook Inlet, Alaska, 2007 estimated from daily 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	0.0158	0.0389	-0.0230		
9	2-Jul	0.0248	0.0461	-0.0213	0.0090	0.0073
10	3-Jul	0.0369	0.0547	-0.0178	0.0120	0.0086
11	4-Jul	0.0468	0.0648	-0.0180	0.0099	0.0100
12	5-Jul	0.0604	0.0765	-0.0161	0.0136	0.0117
13	6-Jul	0.0685	0.0902	-0.0217	0.0081	0.0137
14	7-Jul	0.0707	0.1060	-0.0353	0.0022	0.0158
15	8-Jul	0.0765	0.1242	-0.0477	0.0058	0.0182
16	9-Jul	0.1002	0.1451	-0.0448	0.0237	0.0209
17	10-Jul	0.1351	0.1688	-0.0337	0.0348	0.0237
18	11-Jul	0.1778	0.1954	-0.0177	0.0427	0.0267
19	12-Jul	0.2098	0.2252	-0.0154	0.0321	0.0297
20	13-Jul	0.2544	0.2580	-0.0036	0.0446	0.0328
21	14-Jul	0.3068	0.2938	0.0131	0.0525	0.0358
22	15-Jul	0.3804	0.3323	0.0481	0.0736	0.0385
23	16-Jul	0.3940	0.3732	0.0207	0.0135	0.0409
24	17-Jul	0.4708	0.4160	0.0548	0.0769	0.0428
25	18-Jul	0.4869	0.4601	0.0268	0.0160	0.0441
26	19-Jul	0.5432	0.5049	0.0383	0.0563	0.0447
27	20-Jul	0.5968	0.5495	0.0473	0.0536	0.0447
28	21-Jul	0.6036	0.5934	0.0102	0.0068	0.0439
29	22-Jul	0.6135	0.6359	-0.0223	0.0100	0.0424
30	23-Jul	0.6662	0.6763	-0.0100	0.0527	0.0404
31	24-Jul	0.7177	0.7142	0.0035	0.0515	0.0380
32	25-Jul	0.7478	0.7494	-0.0016	0.0301	0.0352
33	26-Jul	0.7564	0.7815	-0.0252	0.0086	0.0322
34	27-Jul	0.7672	0.8106	-0.0434	0.0109	0.0291
35	28-Jul	0.8344	0.8366	-0.0022	0.0672	0.0260
36	29-Jul	0.8364	0.8597	-0.0233	0.0020	0.0231
37	30-Jul	0.8657	0.8799	-0.0142	0.0293	0.0203
38	31-Jul	0.8762	0.8976	-0.0214	0.0105	0.0177
39	1-Aug	0.8768	0.9130	-0.0362	0.0006	0.0153
40	2-Aug	0.8839	0.9262	-0.0423	0.0071	0.0132

Appendix A14.–Chemical and physical observations made in Upper Cook Inlet, Alaska during the 2007 offshore test fish project.

Date	Sta	Air Temp (c)	Water Temp (c)	Wind Vel. (knots)	Wind Dir	Tide Stage	Salinity (ppt)	Water Depth (f)	Secchi (m)
1-Jul	4	8	8.2	8	southeast	ebb	31.2	23.0	8.0
	5	9	8.8	10	southeast	ebb	29.8	35.5	4.0
	6	8	8.3	5	southeast	flood	30.3	44.8	3.5
	6.5	10	8.7	2	east	flood	30.0	43.1	4.0
	7	9	8.9	4	southeast	flood	29.7	45.9	4.0
	8	11	8.7	1	east	flood	29.9	29.3	4.0
2-Jul	4	15	8.2	3	southeast	ebb	31.2	22.5	7.0
	5	10	7.6	1	east	ebb	31.4	33.0	10.0
	6	9	8.2	4	south	ebb	30.4	47.0	6.0
	6.5	11	8.2	3	east	high	30.4	48.1	5.5
	7	9	8.2	3	southwest	high	30.4	45.9	4.5
	8	9	8.1	2	east	flood	30.4	32.3	5.0
3-Jul	4	9	7.5	2	southeast	ebb	31.6	23.8	14.5
	5	10	7.9	4	south	ebb	30.2	35.0	9.0
	6	10	9.0	10	southwest	ebb	29.8	43.6	4.5
	6.5	10	9.0	8	southwest	ebb	30.0	41.1	4.0
	7	10	9.0	8	southwest	ebb	29.8	44.6	4.0
	8	10	8.8	8	southwest	flood	29.9	27.9	1.5
4-Jul	4	11	7.7	2	southeast	high	31.4	23.1	12.5
	5	10	7.7	3	southeast	flood	31.3	34.5	10.5
	6	9	7.7	5	southeast	high	31.1	49.9	8.0
	6.5	10	8.0	3	south	flood	30.9	44.9	6.0
	7	9	8.5	5	south	flood	30.5	46.7	3.5
	8	10	8.8	3	southwest	flood	29.9	31.6	3.0
5-Jul	4	9	7.6	7	southeast	ebb	31.5	25.6	6.0
	5	9	7.8	10	southeast	ebb	31.2	36.2	7.5
	6	9	8.8	11	southeast	ebb	30.2	46.8	4.0
	6.5	10	9.0	10	southeast	ebb	29.9	37.0	4.5
	7	10	9.0	10	southeast	ebb	30.0	44.6	4.5
	8	11	9.0	7	southeast	low	29.8	27.5	2.0
6-Jul	4	11	7.8	3	east	ebb	31.4	23.6	6.0
	5	12	7.9	2	east	low	31.1	34.4	10.0
	6	13	7.9	1	southeast	flood	31.0	48.9	9.0
	6.5	11	8.7	0	south	flood	30.4	44.5	7.0
	7	11	8.8	1	southeast	flood	30.1	46.8	5.0
	8	10	9.1	3	south	flood	29.8	31.5	4.0

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Date	Sta	Air Temp (c)	Water Temp (c)	Wind Vel. (knots)	Wind Dir	Tide Stage	Salinity (ppt)	Water Depth (f)	Secchi (m)
7-Jul	4	10	7.9	3	south	flood	31.4	25.5	13.0
	5	10	8.1	5	southwest	flood	31.1	36.7	10.0
	6	10	8.7	4	south	flood	30.8	48.8	7.0
	6.5	10	9.3	10	south	ebb	30.2	43.6	5.0
	7	10	9.6	12	south	ebb	29.9	45.0	4.0
	8	11	9.4	8	south	ebb	29.9	27.6	3.5
8-Jul	4	9	8.0	3	south	flood	31.4	24.9	10.0
	5	10	8.1	5	south	flood	31.1	37.4	9.0
	6	11	9.2	1	southeast	flood	30.1	47.6	4.0
	6.5	10	9.2	5	east	flood	30.0	43.3	4.0
	7	10	9.3	4	southeast	flood	29.3	45.6	3.0
	8	10	9.2	5	east	ebb	30.0	30.7	2.5
9-Jul	4	11	8.3	2	west	flood	31.1	24.3	7.0
	5	10	8.5	5	west	flood	30.9	37.5	7.0
	6	10	9.3	8	northwest	flood	30.1	47.1	4.5
	6.5	11	9.2	9	northwest	flood	30.4	43.2	5.5
	7	11	9.5	17	northwest	flood	30.0	45.4	4.0
	8	11	9.3	16	northwest	ebb	30.0	28.6	4.0
10-Jul	4	11	8.2	11	north	flood	31.3	24.9	9.0
	5	11	8.4	9	north	flood	31.2	34.7	7.0
	6	11	9.2	10	north	flood	30.2	48.7	4.0
	6.5	12	9.3	6	north	low	30.0	42.5	3.0
	7	11	9.7	8	north	ebb	29.5	44.4	3.5
	8	11	9.6	8	north	ebb	29.9	30.4	3.0
11-Jul	4	10	8.7	2	east	flood	31.2	23.5	10.0
	5	12	8.6	2	southeast	flood	30.9	37.0	6.0
	6	12	9.4	5	northeast	flood	30.2	48.5	5.0
	6.5	11	9.0	6	northeast	flood	30.6	44.0	6.0
	7	11	9.8	8	northeast	flood	30.0	46.0	3.0
	8	11	9.5	4	northeast	flood	30.1	30.7	3.0
12-Jul	4	11	8.6	4	southwest	flood	31.2	24.5	9.0
	5	12	8.9	3	south	flood	30.7	36.2	6.0
	6	11	10.5	9	south	ebb	28.7	45.4	3.0
	6.5	10	9.6	9	south	ebb	29.9	41.2	4.0
	7	11	9.7	9	south	ebb	29.7	43.6	3.0
	8	10	9.8	10	south	ebb	29.7	29.8	3.0

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Date	Sta	Air Temp (c)	Water Temp (c)	Wind Vel. (knots)	Wind Dir	Tide Stage	Salinity (ppt)	Water Depth (f)	Secchi (m)
13-Jul	4	11	8.9	4	southeast	ebb	31.1	22.4	7.0
	5	10	9.1	2	southwest	flood	30.6	36.0	6.0
	6	11	9.3	3	southwest	flood	30.3	46.8	4.0
	6.5	11	9.3	1	southwest	flood	30.3	42.8	3.0
	7	11	9.6	5	southwest	flood	30.1	46.0	4.0
	8	11	9.7	5	southwest	flood	29.8	30.3	3.0
14-Jul	4	11	9.1	1	south	flood	31.0	24.0	6.0
	5	11	9.0	1	south	ebb	30.6	35.5	5.5
	6	11	9.6	2	southwest	ebb	29.9	45.0	3.0
	6.5	11	9.7	2	southwest	ebb	29.7	43.2	4.0
	7	11	9.5	3	southwest	ebb	30.0	45.0	4.0
	8	12	9.3	2	southwest	ebb	30.3	30.7	3.5
15-Jul	4	11	9.1	2	south	ebb	30.9	22.1	5.0
	5	11	9.2	4	southwest	ebb	30.6	34.5	4.5
	6	11	9.3	3	west	flood	30.3	48.6	3.0
	6.5	11	9.4	3	west	flood	30.3	43.2	4.0
	7	12	9.1	1	west	flood	30.6	46.8	5.0
	8	10	9.5	4	south	flood	30.2	30.0	4.0
16-Jul	4	10	8.2	2	south	ebb	31.4	22.2	9.0
	5	10	8.3	2	south	ebb	31.3	33.7	10.0
	6	10	9.0	5	south	ebb	30.5	49.2	6.0
	6.5	11	9.1	4	south	ebb	30.4	42.5	5.0
	7	11	9.2	3	southeast	flood	30.3	47.0	5.0
	8	11	9.5	3	southeast	flood	29.9	30.2	3.5
17-Jul[a]	4	9	8.1	14	south	ebb	31.3	23.8	6.0
	5	10	8.9	11	south	ebb	31.1	34.4	6.0
	6	11	9.7	10	south	ebb	30.0	46.1	3.0
	6.5	11	9.8	10	southwest	ebb	30.1	42.0	3.0
	7	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-
18-Jul	4	11	8.5	8	north	ebb	31.3	23.8	5.0
	5	12	8.7	2	south	ebb	30.1	32.5	6.0
	6	10	9.2	6	south	ebb	30.5	48.6	6.0
	6.5	11	9.3	7	south	high	30.4	43.6	4.0
	7	13	9.5	1	west	high	30.2	46.4	4.0
	8	12	9.8	3	south	flood	29.9	32.2	3.0

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Date	Sta	Air Temp (c)	Water Temp (c)	Wind Vel. (knots)	Wind Dir	Tide Stage	Salinity (ppt)	Water Depth (f)	Secchi (m)
19-Jul	4	11	8.7	5	south	ebb	31.0	23.6	9.0
	5	11	9.0	5	south	ebb	30.9	32.2	6.0
	6	11	10.3	10	south	ebb	29.7	46.4	4.0
	6.5	13	10.2	7	south	flood	29.8	42.0	3.0
	7	12	10.4	4	southeast	flood	29.8	45.3	3.0
	8	12	11.1	4	southeast	flood	29.8	28.7	2.5
20-Jul	4	11	8.9	9	southwest	ebb	31.0	23.3	7.0
	5	11	8.8	9	southeast	ebb	30.9	35.5	7.0
	6	11	9.7	11	southeast	ebb	30.4	49.5	5.0
	6.5	11	9.7	10	southeast	high	30.4	43.9	5.0
	7	11	10.1	8	southeast	flood	29.7	46.1	4.0
	8	11	10.3	8	southeast	flood	29.6	28.2	3.5
21-Jul	4	11	8.7	4	southeast	flood	31.2	24.7	10.0
	5	11	8.9	2	east	flood	31.0	37.1	8.0
	6	12	11.5	3	east	high	29.1	49.1	3.5
	6.5	12	10.6	9	southeast	ebb	29.6	43.4	3.5
	7	12	10.6	6	south	ebb	29.8	45.0	4.0
	8	13	10.4	6	south	ebb	29.8	28.2	3.5
22-Jul	4	11	9.5	3	south	ebb	30.5	23.7	7.0
	5	10	10.3	6	south	ebb	29.7	36.4	4.0
	6	11	10.3	4	south	ebb	29.8	49.2	4.5
	6.5	11	10.4	4	south	high	29.6	43.3	4.0
	7	11	10.4	4	south	flood	29.8	45.6	3.5
	8	11	10.3	5	south	flood	29.8	31.4	3.0
23-Jul	4	10	9.0	3	northeast	flood	31.0	24.5	7.5
	5	12	8.8	1	northeast	flood	31.0	37.2	7.5
	6	11	10.6	1	northeast	flood	29.4	48.4	3.5
	6.5	11	11.0	4	northeast	flood	28.5	43.1	3.5
	7	12	11.0	3	northeast	high	28.7	45.3	3.0
	8	11	10.6	4	northwest	ebb	29.3	26.4	4.0
24-Jul	4	10	8.6	3	northeast	flood	31.3	24.7	6.0
	5	10	8.9	4	north	flood	31.1	36.4	6.0
	6	11	9.7	8	north	flood	30.3	47.1	5.0
	6.5	12	10.6	6	north	flood	29.2	43.1	3.0
	7	12	11.1	7	north	low	28.3	46.4	3.5
	8	12	11.0	10	north	ebb	28.3	30.5	3.0

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Date	Sta	Air Temp (c)	Water Temp (c)	Wind Vel. (knots)	Wind Dir	Tide Stage	Salinity (ppt)	Water Depth (f)	Secchi (m)
25-Jul[a]	4	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-
	6.5	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-
26-Jul	4	11	9.3	5	northwest	ebb	30.8	24.4	7.0
	5	11	9.1	6	northwest	ebb	31.1	35.6	7.5
	6	12	9.4	6	northwest	ebb	30.7	46.1	5.0
	6.5	12	10.4	8	northwest	ebb	29.3	42.0	4.0
	7	12	11.0	5	northwest	low	28.4	45.0	4.0
	8	13	11.5	3	northwest	flood	27.5	27.1	3.5
27-Jul	4	11	9.1	3	southeast	flood	31.0	24.6	9.0
	5	11	9.1	5	south	flood	31.3	36.3	7.0
	6	12	11.6	6	south	ebb	26.5	42.1	4.0
	6.5	12	12.1	8	south	ebb	25.5	42.3	4.0
	7	12	11.8	9	south	ebb	26.6	44.2	4.0
	8	12	11.0	7	south	ebb	28.9	28.9	3.0
28-Jul	4	11	9.2	2	northwest	ebb	31.1	24.4	10.0
	5	11	9.1	3	northwest	low	31.0	35.8	9.0
	6	15	9.3	0	northwest	flood	30.7	46.8	9.0
	6.5	12	9.6	2	west	flood	30.5	42.9	8.0
	7	15	11.4	0	west	flood	27.6	46.1	4.0
	8	14	13.5	4	west	flood	26.4	29.6	4.0
29-Jul	4	12	9.5	3	southeast	flood	31.1	23.7	10.0
	5	12	9.2	2	southeast	flood	31.1	35.5	9.0
	6	12	9.6	3	southeast	ebb	30.4	47.4	5.0
	6.5	12	11.2	5	southeast	ebb	28.1	42.0	3.5
	7	12	11.0	5	southeast	ebb	28.5	43.6	3.0
	8	12	11.0	5	southeast	ebb	28.6	29.6	3.0
30-Jul[a]	4	12	9.2	17	southwest	ebb	31.0	22.4	6.0
	5	11	9.4	11	southwest	low	30.7	35.5	6.0
	6	12	10.2	15	southwest	flood	29.7	47.3	5.0
	6.5	12	10.3	12	southwest	flood	29.7	42.9	4.0
	7	12	10.7	15	southwest	flood	29.3	46.4	3.0
	8	-	-	-	-	-	-	-	-

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Date	Sta	Air Temp (c)	Water Temp (c)	Wind Vel. (knots)	Wind Dir	Tide Stage	Salinity (ppt)	Water Depth (f)	Secchi (m)
31-Jul	4	11	9.5	8	southwest	flood	30.8	23.3	5.0
	5	11	9.4	9	southwest	low	30.7	33.6	5.0
	6	11	10.3	13	southwest	ebb	29.7	46.4	3.0
	6.5	11	10.4	16	southwest	ebb	29.4	42.5	3.5
	7	11	10.6	16	south	ebb	29.0	43.6	3.0
	8	11	10.3	11	south	ebb	29.4	30.9	3.0
1-Aug	4	12	9.1	1	southeast	ebb	31.3	24.9	8.5
	5	12	9.0	2	south	ebb	31.1	34.7	8.0
	6	11	10.2	7	south	ebb	29.6	46.4	4.0
	6.5	11	10.2	6	southwest	low	29.7	41.4	3.0
	7	11	10.2	7	southwest	flood	29.8	44.6	3.0
	8	13	10.4	3	southwest	flood	29.3	29.6	2.0
2-Aug	4	12	9.3	4	north	ebb	31.2	23.1	8.0
	5	11	9.2	2	north	ebb	31.1	35.2	8.0
	6	12	9.4	3	north	ebb	30.7	47.5	6.0
	6.5	12	9.8	2	north	ebb	30.1	43.9	4.0
	7	12	9.7	2	north	flood	30.2	45.7	4.5
	8	11	9.9	4	north	flood	30.0	32.5	4.0
Averages		11.3	9.4	5.5	South	Ebb	30.2	37.5	5.3

Appendix A15.–Yearly mean values of physical observations made during the conduct of the 1998–2007 offshore test fish project.

Sta	Year	Air Temp (c)	Water Temp (c)	Wind Vel. (knots)	Wind Dir	Salinity (ppt)	Water Depth (f)	Secchi (m)	Sta	Year	Air Temp (c)	Water Temp (c)	Wind Vel. (knots)	Wind Dir	Salinity (ppt)	Water Depth (f)	Secchi (m)
4	1998	12.5	9.7	9.7	SE	31.0	24.4	9.5	6.5	1998	12.7	10.5	7.7	SE	29.5	43.3	3.5
	1999	13.1	9.6	10.6	SE	31.4	24.3	7.6		1999	13.4	10.5	13.0	SE	29.7	43.2	3.5
	2000	13.8	9.7	10.0	SE	31.5	23.5	10.0		2000	13.6	10.8	13.0	S	29.7	42.9	3.7
	2001	12.9	9.8	11.1	SE	31.5	23.6	8.4		2001	12.8	11.1	11.8	S	29.4	42.7	4.0
	2002	12.6	9.5	12.6	S	31.4	23.6	8.1		2002	12.6	10.4	13.7	S	30.0	42.6	3.3
	2003	14.1	10.6	12.0	S	31.2	23.4	8.3		2003	14.4	11.7	14.9	S	29.1	41.3	4.1
	2004	10.7	9.6	7.1	E	31.3	23.8	7.9		2004	10.7	10.8	10.1	SE	29.4	41.6	3.6
	2005	12.9	10.9	6.2	S	31.0	24.5	7.4		2005	13.2	12.2	7.4	S	28.7	42.8	4.2
	2006	11.1	9.9	6.0	SE	30.7	23.9	7.7		2006	11.2	10.3	8.5	SE	29.7	41.6	3.4
	2007	10.8	8.6	4.7	SE	31.2	23.9	8.1		2007	11.1	9.7	6.2	S	29.8	42.9	4.3
Avg		12.4	9.8	9.0	SE	31.2	23.9	8.3	Avg		12.8	10.8	10.6	S	29.5	42.5	3.8
5	1998	12.8	9.8	9.8	SE	31.1	35.2	8.5	7	1998	12.3	10.7	8.4	SE	29.1	44.3	3.0
	1999	13.4	10.0	12.9	SE	30.6	38.9	6.2		1999	13.3	10.6	13.0	S	29.5	42.7	2.9
	2000	13.5	10.1	11.8	SE	30.7	35.9	7.1		2000	13.1	10.9	13.6	S	29.4	43.3	3.0
	2001	12.9	10.1	11.2	SE	31.0	35.5	6.9		2001	13.1	11.4	9.9	SE	29.0	43.6	3.5
	2002	12.8	9.7	13.9	S	30.9	35.8	6.3		2002	12.4	10.4	12.4	SE	29.9	44.0	2.8
	2003	14.0	11.0	13.3	SE	30.6	35.7	6.3		2003	14.3	11.6	13.0	S	29.0	44.3	3.6
	2004	10.7	9.9	7.2	SE	30.7	34.7	7.1		2004	10.6	11.0	9.7	SE	28.8	44.7	2.7
	2005	13.1	11.1	5.9	S	30.6	36.3	6.5		2005	12.9	12.3	7.6	S	28.3	44.8	3.6
	2006	11.1	10.2	7.6	S	30.2	35.4	5.6		2006	10.8	9.9	6.8	S	29.4	42.4	3.1
	2007	10.8	8.7	4.6	S	30.9	35.4	7.2		2007	11.2	9.9	6.2	S	29.5	45.5	3.8
Avg		12.5	10.0	9.8	SE	30.7	35.9	6.8	Avg		12.4	10.9	10.0	S	29.2	43.9	3.2

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Appendix A15.–Page 2 of 2.

Sta	Year	Air Temp (c)	Water Temp (c)	Wind Vel. (knots)	Wind Dir	Salinity (ppt)	Water Depth (f)	Secchi (m)
6	1998	12.4	10.3	10.9	S	30.0	46.1	4.7
	1999	13.5	10.3	12.5	SE	29.8	44.4	4.3
	2000	13.5	10.6	11.1	SE	29.9	45.4	4.9
	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	9.4	6.0	S	30.0	47.2	4.8
Avg		12.7	10.6	10.1	S	29.9	45.9	4.7

Sta	Year	Air Temp (c)	Water Temp (c)	Wind Vel. (knots)	Wind Dir	Salinity (ppt)	Water Depth (f)	Secchi (m)
8	1998	12.5	10.7	9.1	S	29.1	29.3	2.8
	1999	13.6	10.5	11.8	SE	30.0	25.9	2.6
	2000	13.2	11.0	14.0	S	29.5	29.1	2.6
	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
Avg		12.5	10.9	9.7	SE	29.2	29.0	2.9

Appendix A16.–Yearly mean values for selected chemical and physical variables collected during conduct of the offshore test fish project, 1979–2007.

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	14.3	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	13.1	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
1992-2006 Avg	12.8	10.5	9.4	29.3	4.8
2007	11.0	9.4	5.5	30.2	5.3