

Fishery Data Series No. 09-19

Bristol Bay Sockeye Salmon Inriver Test Fishing, 2007

by

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Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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Weights and measures (metric)		General		Measures (fisheries)	
centimeter	cm	Alaska Administrative Code	AAC	fork length	FL
deciliter	dL	all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.	mid-eye to fork	MEF
gram	g	all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.	mid-eye to tail fork	METF
hectare	ha	at	@	standard length	SL
kilogram	kg	compass directions:		total length	TL
kilometer	km	east	E		
liter	L	north	N	Mathematics, statistics	
meter	m	south	S	<i>all standard mathematical signs, symbols and abbreviations</i>	
milliliter	mL	west	W	alternate hypothesis	H _A
millimeter	mm	copyright	©	base of natural logarithm	<i>e</i>
		corporate suffixes:		catch per unit effort	CPUE
Weights and measures (English)		Company	Co.	coefficient of variation	CV
cubic feet per second	ft ³ /s	Corporation	Corp.	common test statistics	(F, t, χ^2 , etc.)
foot	ft	Incorporated	Inc.	confidence interval	CI
gallon	gal	Limited	Ltd.	correlation coefficient (multiple)	R
inch	in	District of Columbia	D.C.	correlation coefficient (simple)	r
mile	mi	et alii (and others)	et al.	covariance	cov
nautical mile	nmi	et cetera (and so forth)	etc.	degree (angular)	°
ounce	oz	exempli gratia	e.g.	degrees of freedom	df
pound	lb	(for example)		expected value	<i>E</i>
quart	qt	Federal Information Code	FIC	greater than	>
yard	yd	id est (that is)	i.e.	greater than or equal to	≥
		latitude or longitude	lat. or long.	harvest per unit effort	HPUE
Time and temperature		monetary symbols		less than	<
day	d	(U.S.)	\$, ¢	less than or equal to	≤
degrees Celsius	°C	months (tables and figures): first three letters	Jan, ..., Dec	logarithm (natural)	ln
degrees Fahrenheit	°F	registered trademark	®	logarithm (base 10)	log
degrees kelvin	K	trademark	™	logarithm (specify base)	log ₂ , etc.
hour	h	United States (adjective)	U.S.	minute (angular)	'
minute	min	United States of America (noun)	USA	not significant	NS
second	s	U.S.C.	United States Code	null hypothesis	H ₀
		U.S. state	use two-letter abbreviations (e.g., AK, WA)	percent	%
Physics and chemistry				probability	P
all atomic symbols				probability of a type I error (rejection of the null hypothesis when true)	α
alternating current	AC			probability of a type II error (acceptance of the null hypothesis when false)	β
ampere	A			second (angular)	"
calorie	cal			standard deviation	SD
direct current	DC			standard error	SE
hertz	Hz			variance	
horsepower	hp			population	Var
hydrogen ion activity (negative log of)	pH			sample	var
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

FISHERY DATA REPORT NO. 09-19

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by

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ABSTRACT

Drift gillnets were fished daily at 2 stations, located on opposite river banks, prior to every high slack tide in the Kvichak, Egegik, and Ugashik Rivers, Bristol Bay, Alaska, from mid June to mid July 2007 to estimate sockeye salmon inriver abundance. Fishery managers used preliminary test fish escapement estimates as an inseason management tool to regulate commercial harvests and achieve escapement goals. The daily inriver test fish index for each river was the mean of catch per unit effort values obtained from all test drifts made on a given day. Numbers of sockeye salmon that entered the river were estimated using (1) travel time analysis in which the most recent daily tower count was divided by daily inriver test fish indices and lagged back in time by daily increments and (2) the historical mean fish per index point (FPI) value. Travel time estimates could not be made until a meaningful relationship between daily test fish indices and tower counts developed. Mean FPI estimates were available on the first day of each project. For the negotiated travel time model, median FPI for the Kvichak River was 85 with a median travel time of 1.5 days (d); Egegik River median FPI was 63 with a median travel time of 3.0 d; and Ugashik River median FPI was 85 with a median travel time of 3.0 d.

Key words: sockeye salmon, *Oncorhynchus nerka*, inriver test fishing, inriver abundance estimation, fisheries management, Bristol Bay

INTRODUCTION

The Bristol Bay Management Area supports the largest sockeye salmon *Oncorhynchus nerka* fishery in the world (Figure 1). The 10 year average (1996–2005) of the total sockeye run to Bristol Bay was 30.0 million fish and total harvest has averaged 18.8 million fish. Sockeye salmon runs to Bristol Bay are brief in duration and this, combined with the large numbers of fish involved, makes it one of the most intense salmon fisheries in the world. Sockeye salmon in Bristol Bay are managed on an escapement goal range policy, with ranges set for individual rivers. Fishery managers control the commercial harvest to meet these ranges by limiting time, area and gear used by commercial fishermen. The most important information used by managers to meet these goals are estimates of total fish that have returned to date. Total run is a combination of harvest and escapement. Inseason harvest estimates are obtained from the processing companies and escapement estimates are obtained by visually counting salmon migrating upstream from aluminum scaffolding referred to as a counting tower. However, estimating the number of fish that have passed upstream of the fishery is often difficult, especially once they have moved inriver, but have not passed the counting tower.

Inriver gillnet test fish projects are used to estimate the number of fish that passed the commercial fishery but have yet to pass at the counting tower site, referred to as estimated river fish (ERF). Inriver test fishery data are available approximately 1 d after sockeye salmon have passed through the commercial fishing district and several days earlier than estimates based on visual counts from observation towers. Inriver test fish data assists management biologists in regulating commercial fishing periods to maximize harvests and achieve escapement goals.

In 2000 and 2001, monies from the Western Alaska Disaster Grant (WADG) were used to evaluate all inriver test fish projects in Bristol Bay. Evaluation of these projects consisted of examining site location, optimal gillnet mesh sizes, and fishing times. In addition, seasonal factors (e.g., water temperature, river discharge, escapement abundance, escapement age composition, and average length of fish in the escapement) were examined to determine how they affect inriver fish abundance estimates and if they can be used to improve estimates. Accuracy and precision were compared between travel time analysis, maximum likelihood, and regression methods for estimating inriver abundance, using both daily and cumulative data.

Results suggested that alternate site locations did not produce noticeably better estimates, current mesh sizes were efficient, and drifting should occur 15 min sooner than traditional times at Ugashik River (Schwanke et al. 2003). Changes in water temperature had no obvious affect on test fish results. River discharge, escapement abundance, and escapement composition (age and average length) were significantly correlated with test fish results at some of the sites. Evaluation and experimentation with modeling procedures suggested that the travel time method using cumulative escapement information could be improved by using daily escapement numbers.

Inriver test fishing projects have operated at the Kvichak River since 1960, at the Egegik River since 1963, and at the Ugashik River since 1961 (McBride 1978; Seibel 1965; West 2008). An inriver test fishing project also operated on Igushik River from 1976–1989 and 1991–2000 (West et al. 2000). Igushik inriver test fish was not operated in 1990 and has not operated since 2000. Summary statistics for the Kvichak, Egegik and Ugashik inriver test fish projects for years 1997–2006 are provided in Appendices D, E, and F, respectively. This report summarizes 2007 inriver test fish data for the Kvichak, Egegik and Ugashik Rivers and evaluates the accuracy of inseason forecasting methods.

OBJECTIVES

Specific objectives of the inriver test fish projects were to:

1. Estimate the number of sockeye salmon that have passed the commercial fishery but are still unaccounted for at the tower enumeration project.
2. Estimate the travel time of sockeye salmon between the inriver test site and the counting tower site.

METHODS

INRIVER TEST FISHING

A test fish station on each riverbank was fished with drift gillnets in the lower sections of the Kvichak, Egegik, and Ugashik Rivers, respectively (Table 1; Figure 1). Test fish stations were close to the commercial fishing district boundaries and were assumed to be above sockeye salmon milling areas. Station locations for Egegik and Ugashik Rivers have remained the same since 1987 (Fried and Bue 1988a). Beginning in 2003, Alagnak escapement numbers reached record levels and continue to be extremely strong. To alleviate concerns regarding catching Alagnak bound fish at the original Kvichak River test fish stations, both sites were moved upriver near the village of Levelock in 2006 (Figure 2).

All drifts were made perpendicular and close to shore based on the assumption that sockeye salmon migrate parallel to and near the riverbank (Becker 1962). Drifts at all stations ended when the inshore end of the net drifted about 25 m offshore or when it was no longer fishing efficiently (saturated with fish). Two short drifts of <15 min duration were made at each station of each river beginning about 1.5 h before every high slack tide to minimize currents carrying the gillnet offshore. When catches increased to the point where 2 drifts per station per tide were difficult to process, only one drift was made.

All gillnets were 45.7 m (150 ft or 25 fathoms) in length and 29 meshes deep. Monotwist web, hung evenly with #50 twine and dyed Momoi shade #1, was used for test fishing on all rivers. Multistrand monofilament was used until 1989; however, this web type is now illegal for commercial use and is no longer stocked by suppliers. A stretched mesh size of 12.70 cm (5 in) was used at the Kvichak River and 13.02 cm (5-1/8 in) was used at the Egegik and Ugashik Rivers because of differences in average fish size.

Catch per unit of effort (CPUE), or the number of sockeye salmon caught in 180 m (600 ft or 100 fathoms) of gillnet fished for 1 h, was estimated for each set. Water temperature (°C) was recorded at all rivers on every high tide prior to test fishing.

DATA ANALYSIS

Our current data analysis approach is based on methods described in Seibel (1965), Paulus (1968) and Meacham (1980).

Inseason Evaluation

Mean fishing time (MT), in minutes, was calculated for each set as

$$MT = SI - FO + \frac{(FO - SO) + (FI - SI)}{2}, \quad (1)$$

where:

SO = time the gillnet first entered water,

FO = time the gillnet was fully deployed,

SI = time the gillnet retrieval began, and

FI = time the gillnet retrieval was completed.

The CPUE value, C_j , or the number of sockeye salmon caught per 100 fathom hours, was calculated for set j as follows:

$$C_j = 6,000 \times \frac{N_j}{G_j MT_j}, \quad (2)$$

where:

N = number of sockeye salmon caught, and

G = gillnet length in fathoms.

The daily inriver test fish index, I_i , for day i was calculated as the mean of individual CPUE values obtained from sets made the same day, or

$$I_i = \frac{\sum_{j=1}^s C_j}{S}, \quad (3)$$

where:

S = number of sets made during day i .

Two methods were used to estimate daily inriver abundance: (1) travel-time fish per index (FPI_d), and (2) mean historical fish per index point FPI value (FPI_a).

Travel-time of inriver fish was based on the number of days it took sockeye salmon to travel from test fish sites to counting tower sites. A range of travel-time estimates was calculated by matching daily test fish indices to daily tower counts. The number of sockeye salmon represented by each index point was calculated by dividing the most recent cumulative tower count by cumulative test fish indices lagged back in time by daily increments such that

$$FPI_d = \frac{\sum_{i=1}^t E_i}{\sum_{i=1}^{t-d} I_i}, \quad (4)$$

where:

FPI_d = number of sockeye salmon represented by each test fishing index point based

on a travel-time of d days,

E_i = number of sockeye salmon traveling past counting tower on day i , and

t = day of most recent inriver fish abundance estimate.

We chose lag d that minimized the following sum of squares, SS , between the cumulative test fish indices and the tower counts where

$$SS = \sum_{j=1}^t (FPI \cdot \sum_{i=1}^j I_{i-d} - \sum_{i=1}^j E_i)^2 \quad (5)$$

However, travel times that seemed unrealistic based on results of past studies or produced unreasonable escapement estimates (e.g., less than observed escapement) were rejected even if they produced the best statistical fit to the data.

Total inriver fish abundance was calculated as

$$\hat{E}_{t+d} = FPI_d \sum_{i=1}^t I_i, \quad (6)$$

where:

E_{t+d} = estimated number of sockeye salmon that would travel past counting tower on day $t+d$.

Inseason, the travel time model was used to estimate the number of fish in the river between the test fishing site and the tower. In practice however, the estimated number of inriver fish from the model was often modified with ancillary information provided by an area manager, which may have included:

- Fish abundance observed during recent aerial surveys;
- District test fish catch per unit effort; and
- Up-to-the-minute escapements not included in the daily model.

In this report, the direct output from the SS model is termed the travel time model and the negotiated inriver fish estimate using ancillary information released to the public has been termed the published model.

Mean FPI values of inriver fish abundance in 2007 were based on historical values. For the Kvichak River, the mean FPI of 47 was based on a 5 year mean of the most recent annual median FPI (Table 2). The mean FPIs for Egegik and Ugashik Rivers was calculated using an average of the 1989–2006 starting FPIs after lag time relationships "locked in" and the midpoint of the escapement count each year. The mean FPI estimate of inriver fish abundance is the product of the mean FPI and the cumulative inriver test fish index. Mean FPI value estimates of inriver fish abundance were used until travel time analysis estimates proved more accurate, generally 5–10 days into the project.

Postseason Evaluation

Three statistics were used to measure performance of the various inriver fish abundance estimators. Percent error (PE) was used to measure daily performance:

$$PE_t = 100 \times \frac{T_{t,a} - \sum_{i=1}^{t+d} E_i}{\sum_{i=1}^{t+d} E_i}, \quad (7)$$

where:

$T_{t,a}$ = estimated daily inriver fish abundance on day t based on method a .

Mean percent error (MPE) was used to measure relative error:

$$MPE = \frac{\sum_{t=1}^n PE_t}{n} \quad (8)$$

where:

n = total number of days that inriver fish abundance estimates based on test fishing were available.

Mean absolute percent error (MAPE) was used to measure overall accuracy because it treated under- and over-estimation errors similarly:

$$MAPE = \frac{\sum_{t=1}^n \left| \left(100 \times \frac{T_{t,a} - \sum_{i=1}^{t+d} E_i}{\sum_{i=1}^{t+d} E_i} \right) \right|}{n} \quad (9)$$

To better understand if the use of ancillary information to negotiate the FPI in our published model was successful in hindsight, an analysis to compare the errors associated with each inriver forecast method was developed. Because the true number of fish between the test fishing site and tower was unknown, necessary assumptions were used to calculate an “actual” number of inriver fish. This analysis was done for travel time and published model forecasts by relating the respective inriver estimate to the corresponding lag time from the SS model output. For example, if a travel time of 2 d applied, the actual number of inriver fish was calculated by subtracting escapement on day $t+2$ minus escapement on day t . Taking the absolute difference of the actual escapement versus forecasts estimated from the travel time or published approach determined model errors.

RESULTS

KVICHAK RIVER

Test fishing began 22 June and ended 15 July. A total of 3,935 sockeye salmon were caught, producing 34,987 index points (Table 2; Appendix A1). The preseason calculated mean FPI value of 47, based on median FPIs from 2002–2006, was used for test fish inriver fish abundance estimates for 22–28 June. Sufficient spawning escapement data were collected by 29 June to allow estimation of FPI values based on travel time. Estimated travel times during the season ranged from 1.0 to 2.0 d. On the last day of project operation, the estimate of travel time was 1.0 d and the negotiated FPI was 87 (Table 2; Appendix B1). Median seasonal travel time was 1.5 d

and the median FPI was 85. A complete summary of catch by day, species and fishing time at the Kvichak River test fish project is presented in Appendix C1.

Daily inriver fish abundance estimates based on daily travel time analysis (29 June–15 July) ranged from 69% less to 81% greater than observed tower counts (Table 2; Figure 3). The final daily travel time analysis estimate of 40,363 sockeye salmon on 15 July had an error of 4% greater than the 1.0 d lag tower count of 38,706 (16 July; Table 2). Our best performing ERF occurred on 12 July with an estimated 201,232 fish inriver compared to the 1.0 d observed escapement of 196,422, resulting in an error of 2%.

Accuracy (MAPE) and relative error (MPE) of the inriver abundance estimates compared to lagged daily tower counts were 35% and -4% respectively (Table 2). The published forecast provided lower or similar errors than the straight travel time model (Figure 4). The greatest errors were associated with greater than expected passage rates at the tower from 5 July through 8 July.

EGEGIK RIVER

Test fishing began 15 June and ended 12 July. A total of 3,815 sockeye salmon were caught producing a cumulative index of 16,809 (Table 3; Appendix A2). The preseason calculated mean FPI ranged from 40 to 55 and was based on an average of the 1989–2006 starting FPIs after lag time relationships "locked in" and the midpoint of the escapement count each year. An FPI of 40 was used for test fish inriver fish abundance estimates for 15–19 June and an FPI of 55 was used for 20 June. Sufficient spawning escapement data were collected by 21 June to allow estimation of FPI values based on the travel time method. Estimated travel times during this period using negotiated FPI values ranged from 1.0 to 4.0 d. On the last day of project operation, the negotiated estimate of travel time was 3.0 d and the FPI was 62 (Table 3; Appendix B2). Median seasonal travel time was 3.0 d and the median FPI was 63. A complete summary of catch by day, species and fishing time at the Egegik River test fish project is presented in Appendix C2.

Daily inriver fish abundance estimates based on daily travel time analysis (21 June–12 July) ranged from 88% less to 382% greater than tower counts (Table 3; Figure 5). The final daily travel time analysis estimate of 203,160 sockeye salmon on 12 July had an error of 148% greater than the 3.0 d lag tower count of 81,894 (i.e., the 3.0 d observed escapement of 81,894 was the sum of the escapements on 13, 14 and 15 July; Table 3). Our best performing ERF occurred on 6 July with an estimated 248,680 fish inriver compared to the 3.0 d observed escapement of 254,814, resulting in an error of -3%.

Accuracy (MAPE) and relative error (MPE) of the inriver abundance estimates compared to tower counts were 60% and 23% respectively (Table 3). The published forecast provided lower or similar errors than the straight travel time model (Figure 6). The greatest errors associated with higher than expected passage rates at the tower from 3 July through 5 July and lower than expected passage rates 10 July through 12 July.

UGASHIK RIVER

Test fishing began 25 June and ended 16 July. A total of 3,342 sockeye salmon were caught producing a cumulative index of 19,912 (Table 4; Appendix A3). The preseason calculated mean FPI ranged from 30 to 54 and was based on an average of the 1989–2006 starting FPIs

after lag time relationships "locked in" and the midpoint of the escapement count each year. An FPI of 30 was used for 25 through 28 June. FPIs of 49 and 54 were used for 29 and 30 June respectively. Sufficient spawning escapement data were collected by 1 July to allow estimation of FPI values based on travel time. Estimated travel times during this period ranged from 1.5 to 3.0 d based on negotiated FPI data. On the last day of project operation, the estimate of travel time was 3.0 d and the FPI was 122 (Table 4; Appendix B3). Median seasonal travel time was estimated at 3.0 d and the median negotiated FPI was 85. A complete summary of catch by day, species and fishing time at the Ugashik River test fish project is presented in Appendix C3.

Daily inriver fish abundance estimates based on daily travel time analysis (1 July–16 July) ranged from 76% less to 1,957% greater than visual counts from towers (Table 4; Figure 7). The final daily travel time analysis estimate of 207,480 sockeye salmon on 16 July had an error of 19% greater than the 3.0 d lag tower count of 174,972 (17, 18 and 19 July; Table 4). Our best performing ERF occurred on 15 July with an estimated 301,869 fish inriver compared to the 3.0 d observed escapement of 274,146, resulting in an error of 10%.

Accuracy (MAPE) and relative error (MPE) of the inriver abundance estimates compared to lagged tower counts were 219% and 151% respectively (Table 4). For Ugashik River, the published method generally provided similar or lower errors than the straight travel time approach except for 5 and 7 July when the straight travel time model performed better. The greatest errors were associated with larger than expected passage rates between 5 July and 8 July and again between 12 and 14 July (Figure 8).

DISCUSSION

The objectives were successfully met for all 3 inriver test fish projects. Inriver abundance estimates of sockeye salmon were provided daily to fishery managers. In addition, we were able to provide estimates of travel time of sockeye salmon between the inriver test sites and the counting tower sites. Even though we were able to meet the project objectives, there were concerns regarding the preseason FPI estimates, inseason FPI estimates, inriver abundance estimates and the variability of travel times throughout the season.

Providing reliable early-season estimates of inriver abundance during the first week of the inriver test fish projects has consistently been difficult. A few days of escapement estimates are needed before inriver abundance estimates can be made using the travel time model. Different methods have been used to estimate a preseason FPI that can be used to provide an early-season estimate of inriver abundance. Means of season-ending FPIs for each river were used prior to 2005. Median FPI values from the previous 5 years were used as the preseason FPI for each river in 2005 and 2006. In 2007, the same method was used for the Kvichak River as in 2006. For the Egegik and Ugashik Rivers, the mean FPI was calculated using an average of the 1989–2006 starting FPIs after lag time relationships "locked in" and the midpoint of the escapement count each year. This method was expected to account for the long travel times and low FPIs usually observed at the start of the season. During 2007, the preseason FPI values were low for all 3 rivers when compared to the median FPI (Tables 2–4). The differences were largest at the Ugashik River (preseason FPI = 30; median FPI = 85), followed by the Kvichak River (preseason FPI = 47; median FPI = 85), and finally the Egegik River (preseason FPI = 40; median FPI = 63). We will continue to evaluate the median FPI and explore other methods of calculating a preseason FPI.

There was a large amount of variability associated with the published inriver abundance estimates for all 3 rivers during 2007. The majority of the inriver abundance estimates underestimated the actual escapement for all 3 rivers. Several factors may have contributed to the large errors associated with the inriver abundance estimates: 1) longer than predicted travel times for all 3 rivers, 2) a large component of age 1.2 fish on all 3 rivers, and 3) the record sockeye run in the Ugashik River. The greatest errors in our inriver abundance estimates on the Kvichak and Ugashik rivers were associated with large counts at the tower counting sites several days beyond our predicted travel times based on both the travel time and published model estimates.

Additionally, the inseason FPI estimates increased over their preseason mean FPI values on all 3 rivers. The cause may be related to the large number of age 1.2 fish found in the 3 districts with inriver test fish projects. Similar to 2006, the 2007 return of 2-ocean fish was high in all 3 rivers (Kvichak River = 66%, Egegik River = 50%, and Ugashik River = 65%). The high FPI estimates in relation to 2-ocean fish is also supported by the results from our evaluation of inriver test fish projects in 2000 and 2001 which showed a positive relationship between percent 2-ocean and FPI for all rivers (Schwanke et al. 2003).

The Ugashik River had a record run of sockeye in 2007. The ERFs were overestimated at the start of the season and underestimated beginning 4 July for the remainder of the season. The index was greater than expected on the first day of test fishing and then decreased for the next 4 days. The index increased substantially 30 June and continued for the next 7 days. The first several days of tower counts were also high and coincided with the high indexes. Therefore, the model assumed a 1 or 2 day travel time when in actuality the travel time was 4 or 5 days. If test fishing had begun 1 or 2 days earlier, the model may have identified the longer travel time quicker. Overall, the straight travel time method provided better estimates than the negotiated model with an MPE of 112 compared to 151 (Table 4). Both methods underestimated the travel time in the beginning of the season with 1 and 2 day lag times. The seasons median lag time of 4 d for the straight travel time model provided better estimates than the median travel time of 3 d for the negotiated method.

The travel time of sockeye salmon from the test fishing sites to the tower counting sites was variable in all 3 rivers during 2007. Based on the negotiated method, travel time ranged from 1.0 d to 2.0 in the Kvichak River, 1.0 d to 4.0 d in the Egegik River, and 1.5 d to 3.5 d in the Ugashik River. Travel time of sockeye salmon decreases as the season progresses in all 3 rivers. It takes longer for a sockeye salmon to travel from the test fishing sites to the tower counting sites early in the season compared to later in the season. This information may be valuable to fishery managers. It is likely that the travel time of sockeye salmon, later in the season, is not only faster inriver, but is also faster through the districts where commercial fisheries are prosecuted.

Travel time and ERF estimates are additionally impacted when an ERF is negotiated with the manager. When negotiating an ERF to publish for the day a manager at times is reluctant to issue a large ERF estimate only to discover they were just “paper fish” after having made an important management decision. As large pulses of fish are observed at the test fish sites for the first time during the season, a manager may wish to stay conservative is publishing an ERF until the index can be verified at the tower. The problem occurs when we reduce the ERF to stay conservative; the negotiated model reduces the FPI which in turn reduces the travel time confounding the real travel time.

The traditional travel time model has generally under-forecasted the ERF when large surges of fish enter the river and then over forecast several days later. Scott Raborn with Bristol Bay Science and Research Institute (BBSRI; formally ADF&G) is continuing to develop models originally proposed by Ray Hilborn from the University of Washington. These models explore the standard travel time approach, a density-dependent lag time approach, and a temporal lag time approach. The density dependent model accounts for large surges of fish encountered at the test fish site pushing fish already inriver quicker to the tower site. The temporal model assumes that fish travel speed is directly related to time (stage of the run). Unlike the standard travel time model, the density-dependent and temporal models do not assume that all fish travel at the same speed. For example, a portion of the fish may take 1 day to travel to the tower where others may take anywhere from slightly more than 1 day to up to 3 or 4 days. Results in 2007 were similar to that of the standard travel time method with the models overestimating the daily ERF. These models will continue to be tested in 2008.

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TABLES AND FIGURES

Table 1.–Locations of Bristol Bay sockeye salmon inriver test fishing projects.

Project	Test Fishing Stations	Riverbank	GPS ^a Coordinates	
			Latitude	Longitude
Kvichak River	1	West	N 59° 05.585'	W 156° 52.216
	2	East	N 59° 07.108'	W 156° 48.704'
Egegik River	1	South	N 58° 11.993'	W 157° 11.087'
	2	North	N 58° 12.150'	W 157° 10.465'
Ugashik River	1	East	N 57° 33.244'	W 157° 25.365'
	2	West	N 57° 33.423'	W 157° 25.554'

^a GPS = Global Positioning System. GPS coordinates are generally considered to be accurate within 17 meters.

Table 2.–Sockeye salmon inriver test fishing data summary and comparison to tower counts, Kvichak River, 2007.

Date	Test Fishing				Model Estimates									Published Inriver Estimate	Observation Tower		Daily % Error of Negotiated ERF
	Fishing Time (min)	Catch (no)	Daily Index	Cum. Index	Historical Mean FPI			Travel Time FPI ^a			Negotiated FPI ^b				Daily Esc.	Cum. Esc.	
					FPI ^c	Forecast	Estimated River Fish	Lag	FPI ^c	Estimated River Fish	Lag	FPI ^c	Estimated River Fish				
6/19														0	0		
6/20														0	0		
6/21														60	60		
6/22 ^d	37.1	0	0	0	47	0	0							144	204		
6/23	73.1	11	37	37	47	1,743	1,389							150	354		
6/24 ^e	80.6	22	66	103	47	4,831	4,165							312	666		
6/25	77.4	12	37	140	47	6,558	3,162							2,730	3,396		
6/26	87.2	1	3	142	47	6,695	869							2,430	5,826		
6/27 ^f	42.7	4	24	166	47	7,814	0							2,400	8,226		
6/28	74.8	34	118	284	47	13,357	4,297							834	9,060		
6/29 ^g	60.9	105	576	861				2.0	62	43,143	2.0	62	43,143	40,000	1,272	10,332	-69
6/30 ^h	22.1	77	881	1,741				1.0	61	53,754	1.5	88	100,700	100,000	42,192	52,524	-38
7/01	35.6	246	1,976	3,717				2.0	174	497,846	1.5	130	333,253	300,000	97,446	149,970	81
7/02 ⁱ	33.5	171	1,275	4,992				2.0	161	524,254	1.5	86	148,522	150,000	130,824	280,794	-5
7/03	28.8	259	2,353	7,345				1.0	77	182,180	1.0	77	182,180	180,000	105,774	386,568	78
7/04	28.4	316	2,849	10,194				1.0	67	189,702	1.0	67	189,702	150,000	102,468	489,036	-4
7/05	30.2	285	2,411	12,605				1.0	67	139,843	1.5	69	159,812	150,000	197,742	686,778	-61
7/06	46.5	210	1,052	13,656				2.0	97	336,170	1.5	83	143,746	150,000	302,940	989,718	-59
7/07	50.1	213	1,143	14,799				2.0	96	210,578	2.0	96	210,578	200,000	220,026	1,209,744	-46
7/08	41.8	158	1,037	15,836				2.0	107	233,588	1.5	105	199,192	200,000	253,944	1,463,688	-20
7/09	17.6	472	7,556	23,392				2.0	108	930,933	2.0	90	502,096	500,000	139,596	1,603,284	7
7/10 ^j	22.9	348	3,846	27,238				2.0	115	1,313,027	1.5	80	355,470	350,000	220,386	1,823,670	9
7/11	24.8	275	2,690	29,928				3.0	131	1,844,451	1.0	78	261,748	250,000	249,066	2,072,736	68
7/12 ^k	30.4	280	2,313	32,241				1.0	87	201,232	1.0	87	201,232	200,000	155,388	2,228,124	2
7/13	33.9	205	1,611	33,852				1.0	87	139,915	1.0	87	139,915	140,000	196,422	2,424,546	13
7/14	48.8	132	670	34,522				1.0	86	57,767	1.0	86	57,767	60,000	123,432	2,547,978	-23
7/15	50.9	99	465	34,987				1.0	87	40,363	1.0	87	40,363	50,000	74,844	2,622,822	4
7/16														38,706	2,661,528		
7/17														35,592	2,697,120		
Total	1,080.1	3,935	34,987				Mean	1.6	100		1.4	86			MPE ^l		-4
							Median	2.0	92		1.5	85			MAPE ^l		35

-continued-

- ^a Based on the best fit as determined by the lowest sums of squares value.
- ^b Closest to published value based on input from manager, aerial surveys, and/or passage rates at tower.
- ^c The mean FPI of 47, based on median FPIs from 2002–2006, was used through 28 June. Thereafter, FPIs were based on lag-time relationships.
- ^d Missed afternoon drifts on 22 June. Skiff beached from previous high tide.
- ^e Only one set of drifts were scheduled because of tide change over. Averaged morning drifts from 24 June and morning drifts from 25 June to simulate 24 June evening drifts.
- ^f Missed both set of drifts on 27 June due to mechanical difficulties. Averaged evening drifts from June 26 and morning drifts from June 28.
- ^g Only able to complete drifts at station 2 for morning drift session on 29 June. Used morning station 1 drifts from June 28 to calculate index.
- ^h Missed all drifts on 30 June because of mechanical difficulties. Averaged evening drifts from 29 June and morning drifts from 1 July.
- ⁱ Missed morning drifts on 2 July because crew was setting fishing boundary markers on the Alagnak River. Averaged morning drifts from 1 July and 3 July.
- ^j Only one set of drifts were scheduled because of tide change over. Averaged evening drifts from 9 July and morning drifts from 11 July to simulate 10 July evening drifts.
- ^k ERFs for 12 July and the remainder of the season were calculated by adjusting the daily index on 9 July from 7,556 to 3,237. The large index was never observed at the tower site and reducing the index produced a better fit with the lag times. The morning drifts averaging 11,874 index were removed to produce a daily index of 3,237.
- ^l MPE = Mean Percent Error, MAPE = Mean Absolute Percent Error.

Table 3.–Sockeye salmon inriver test fishing data summary and comparison to tower counts, Egegik River, 2007.

Date	Test Fishing				Model Estimates									Published Inriver Estimate	Observation Tower		Daily % Error of Negotiated ERF
	Fishing Time (min)	Catch (no)	Daily Index	Cum. Index	Historical Mean FPI			Travel Time FPI ^a			Negotiated FPI ^b				Daily Esc.	Cum. Esc.	
					FPI ^c	Forecast	Estimated River Fish	Lag	FPI ^c	Estimated River Fish	Lag	FPI ^c	Estimated River Fish				
6/15	45.8	26	157	157	40	6,278	6,278								d	d	
6/16	49.0	39	181	338	40	13,526	13,526								d	d	
6/17	50.5	44	211	549	40	21,955	21,955								d	d	
6/18	55.7	57	239	788	40	31,518	31,518						30,000		d	d	
6/19	57.4	31	125	913	40	36,519	35,397						35,000	1,122		1,122	
6/20	58.2	93	364	1,277	55	70,213	57,679						60,000	11,412		12,534	
6/21	57.4	106	431	1,708				5.0	39	53,333	4.0	46	65,378	65,000	636	13,170	-30
6/22	61.1	89	341	2,049				5.0	71	106,577	4.0	53	69,587	70,000	25,830	39,000	-21
6/23	59.5	53	199	2,248				5.0	103	149,684	3.0	63	61,465	60,000	41,784	80,784	34
6/24	64.0	57	206	2,454				5.0	110	170,000	2.0	49	19,927	20,000	19,914	100,698	-24
6/25	57.5	7	25	2,480				2.0	48	11,025	2.0	48	11,025	11,000	6,258	106,956	-69
6/26 ^e	65.1	47	157	2,637				2.0	52	9,439	3.5	59	28,795	29,000	19,830	126,786	-41
6/27	59.3	31	115	2,752				2.0	57	15,615	4.0	66	39,230	40,000	15,588	142,374	-5
6/28	60.8	146	529	3,280				2.0	56	36,143	4.0	60	49,865	50,000	5,796	148,170	24
6/29	62.5	130	477	3,757				2.0	63	63,312	3.0	66	73,595	75,000	25,086	173,256	382
6/30	63.3	67	242	3,999				3.0	64	80,305	3.0	64	80,305	75,000	3,906	177,162	23
7/01	69.6	121	403	4,402				5.0	70	122,874	1.5	48	27,738	30,000	6,396	183,558	-13
7/02	50.3	374	2,533	6,935				5.0	69	286,653	2.0	49	151,294	150,000	4,974	188,532	34
7/03	52.8	346	2,228	9,163				5.0	74	434,407	1.5	43	151,777	150,000	53,700	242,232	-25
7/04	54.4	342	1,738	10,900				5.0	80	573,309	1.0	20	34,760	35,000	59,310	301,542	-88
7/05	62.5	74	264	11,164				3.0	85	359,520	2.5	75	247,680	250,000	288,078	589,620	-49
7/06	62.9	141	526	11,690				3.0	98	248,344	3.0	98	248,344	250,000	310,608	900,228	-3
7/07	63.1	183	733	12,423				3.0	95	144,628	3.0	95	144,628	150,000	134,820	1,035,048	-32
7/08	66.2	160	577	13,000				3.0	99	182,026	3.0	99	182,026	180,000	71,502	1,106,550	-4
7/09	74.3	340	1,042	14,042				3.0	99	232,341	3.0	97	207,032	200,000	48,492	1,155,042	10
7/10	65.0	375	1,324	15,366				3.0	100	295,272	3.0	100	295,272	300,000	91,734	1,246,776	125
7/11 ^f	55.7	259	1,178	16,543				3.0	100	353,332	3.0	96	291,631	300,000	49,752	1,296,528	135
7/12	65.4	77	265	16,809				3.0	96	264,658	3.0	62	203,160	200,000	46,740	1,343,268	148
7/13															34,962	1,378,230	
7/14															42,276	1,420,506	
7/15															4,656	1,425,162	
							Mean	3.5	79			2.8	66			MPE ^g	23
Total	1,669.3	3,815	16,809				Median	3.0	77			3.0	63			MAPE ^g	60

- ^a Based on the best fit as determined by the lowest sums of squares value.
- ^b Closest to published value based on input from manager, aerial surveys, and/or passage rates at tower.
- ^c The FPI used to estimate the daily ERFs prior to using lag time relationships was calculated using an average of the 1989–2006 starting FPIs after lag time relationships "locked in" and the midpoint of the escapement count each year. This method was used until June 22 when FPIs were based on lag-time relationships.
- ^d Observation towers not in operation.
- ^e Only one set of drifts were scheduled because of tide change over. Averaged morning drifts from 26 and 27 June to simulate evening drifts.
- ^f Only one set of drifts were scheduled because of tide change over. Averaged evening drifts from 10 July and morning drifts from 12 July to simulate 11 July evening drifts.
- ^g MPE = Mean Percent Error, MAPE = Mean Absolute Percent Error.

Table 4.–Sockeye salmon inriver test fishing data summary and comparison to tower counts, Ugashik River, 2007.

Date	Test Fishing				Model Estimates									Published Inriver Estimate	Observation Tower		Daily % Error of Negotiated ERF
	Fishing Time (min)	Catch (no)	Daily Index	Cum. Index	Historical Mean FPI		Travel Time FPI ^a			Negotiated FPI ^b			Daily Esc.		Cum. Esc.		
					FPI ^c	Forecast	Estimated River Fish	Lag	FPI ^c	Estimated River Fish	Lag	FPI ^c				Estimated River Fish	
6/25	64.7	27	101	101	30	3,031	3,031						3,000	d	d		
6/26 ^e	63.3	18	68	169	30	5,075	5,075						5,000	d	d		
6/27	63.2	15	56	226	30	6,770	6,770						7,000	d	d		
6/28	63.3	13	49	275	30	8,239	8,239						10,000	d	d		
6/29	66.3	8	29	304	49	14,887	14,887						15,000	d	d		
6/30	59.0	160	691	995	54	49,647	45,567						50,000	4,080	4,080		
7/01 ^f	29.8	90	729	1,724				1.0	25	18,269	2.0	82	116,526	100,000	22,470	26,550	146
7/02	57.0	382	1,791	3,515				1.0	39	69,352	1.5	56	130,056	130,000	41,856	68,406	1,957
7/03	42.9	319	1,848	5,363				2.0	43	156,027	1.5	30	86,952	80,000	5,532	73,938	744
7/04	33.4	278	2,062	7,425				5.0	249	1,845,684	2.0	21	84,013	80,000	1,584	75,522	-20
7/05	30.7	312	2,501	9,926				1.0	13	31,345	3.0	26	169,752	170,000	17,448	92,970	-76
7/06	31.9	274	2,065	11,990				4.0	48	405,522	3.0	21	207,836	200,000	87,582	180,552	-76
7/07	36.1	102	701	12,691				5.0	108	986,826	3.0	51	268,084	250,000	209,832	390,384	-70
7/08	42.7	112	626	13,317				5.0	147	1,171,581	3.0	80	269,879	270,000	411,930	802,314	-45
7/09	47.8	121	608	13,924				5.0	140	908,347	3.0	87	167,392	170,000	247,812	1,050,126	-37
7/10	41.3	267	1,729	15,653				5.0	127	726,816	3.0	99	293,995	300,000	221,820	1,271,946	85
7/11 ^g	47.7	207	1,044	16,697				4.0	101	404,936	3.5	98	353,414	350,000	23,316	1,295,262	-42
7/12 ^h	47.8	144	720	17,417				4.0	98	401,493	2.5	89	246,101	250,000	21,120	1,316,382	-58
7/13	47.9	160	801	18,217				4.0	102	437,354	2.5	89	202,863	200,000	114,438	1,430,820	-73
7/14	46.8	156	825	19,043				4.0	108	365,567	3.0	107	349,613	350,000	269,538	1,700,358	-46
7/15	45.0	102	550	19,593				4.0	126	365,663	3.0	123	301,869	300,000	407,712	2,108,070	10
7/16	53.1	75	319	19,912				4.0	128	319,602	3.0	122	207,480	200,000	122,994	2,231,064	19
7/17														116,016	2,347,080		
7/18														35,136	2,382,216		
7/19														23,820	2,406,036		
Total	1,061.6	3,342	19,912					Mean	3.6	100		2.7	74			MPE ⁱ	151
								Median	4.0	105		3.0	85			MAPE ⁱ	219

-continued-

- ^a Estimated river fish is a subjective estimate of fish that have entered the river but have not passed the counting tower based on all available information.
- ^b Closest to published value based on input from manager, aerial surveys, and/or passage rates at tower.
- ^c The FPI used to estimate the daily ERFs prior to using lag time relationships was calculated using an average of the 1989–2006 starting FPIs after lag time relationships "locked in" and the midpoint of the escapement count each year. This method was used until July 1 when FPIs were based on lag-time relationships.
- ^d Observation towers not in operation.
- ^e Only one set of drifts were scheduled on 26 June because of tide change over. Averaged morning drifts from 26 and 27 June to simulate evening drifts.
- ^f Missed entire day of drifts on 1 July. Test fish crew assisted with the transport of a new skiff upriver to the tower site. Averaged evening drifts from 30 June and morning drifts from 2 July to estimate daily index.
- ^g Only one set of drifts were scheduled 11 July because of tide change over. Averaged evening drifts from 9 and 10 July to simulate evening drifts.
- ^h Missed morning drifts 12 July because trip line went missing and crew was unable to retrieve boat in time to drift. Used morning drifts from 13 July to simulate missed drifts.
- ⁱ MPE = Mean Percent Error, MAPE = Mean Absolute Percent Error.

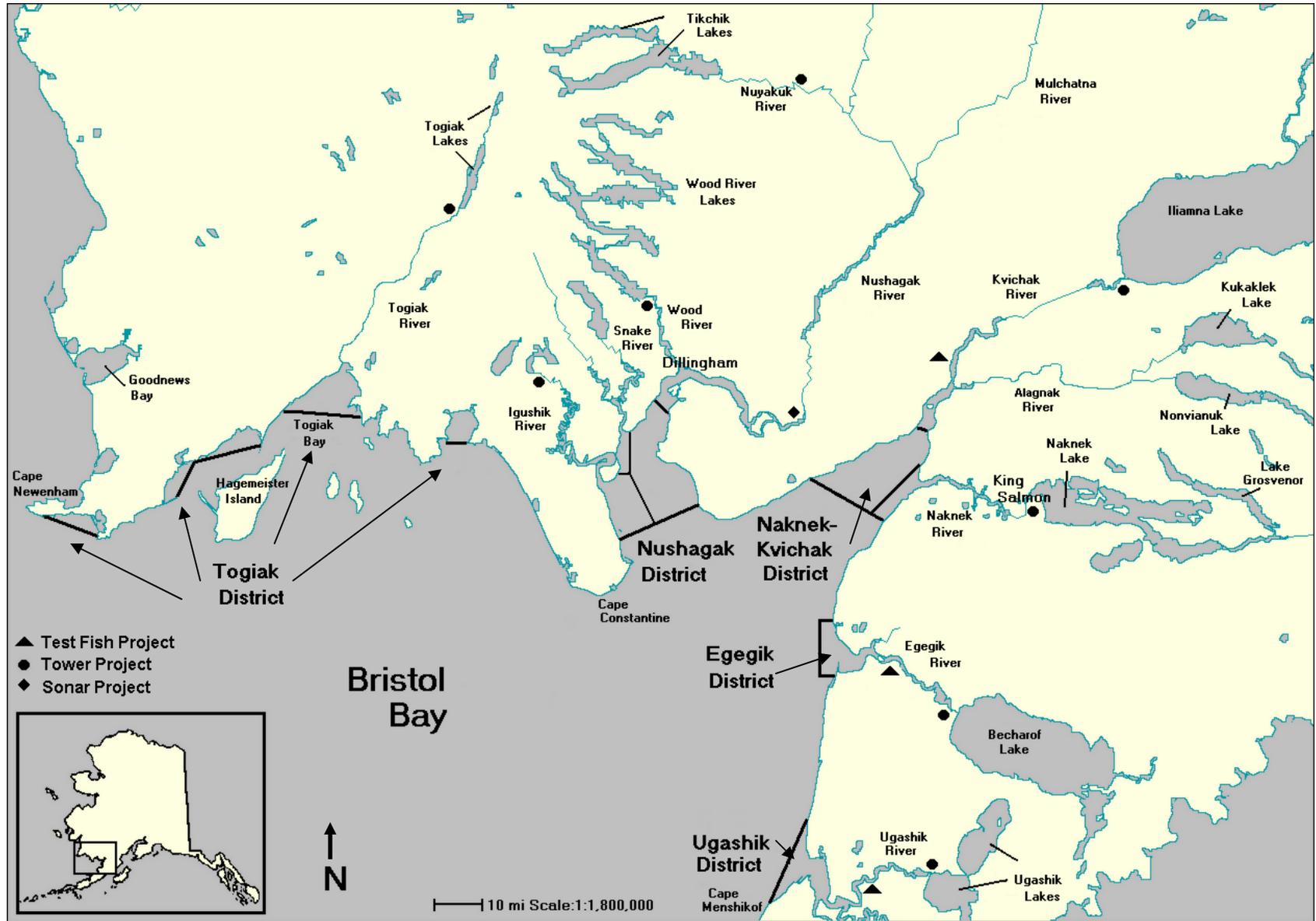


Figure 1.—Major river systems, commercial salmon fishing districts, and escapement projects in Bristol Bay.

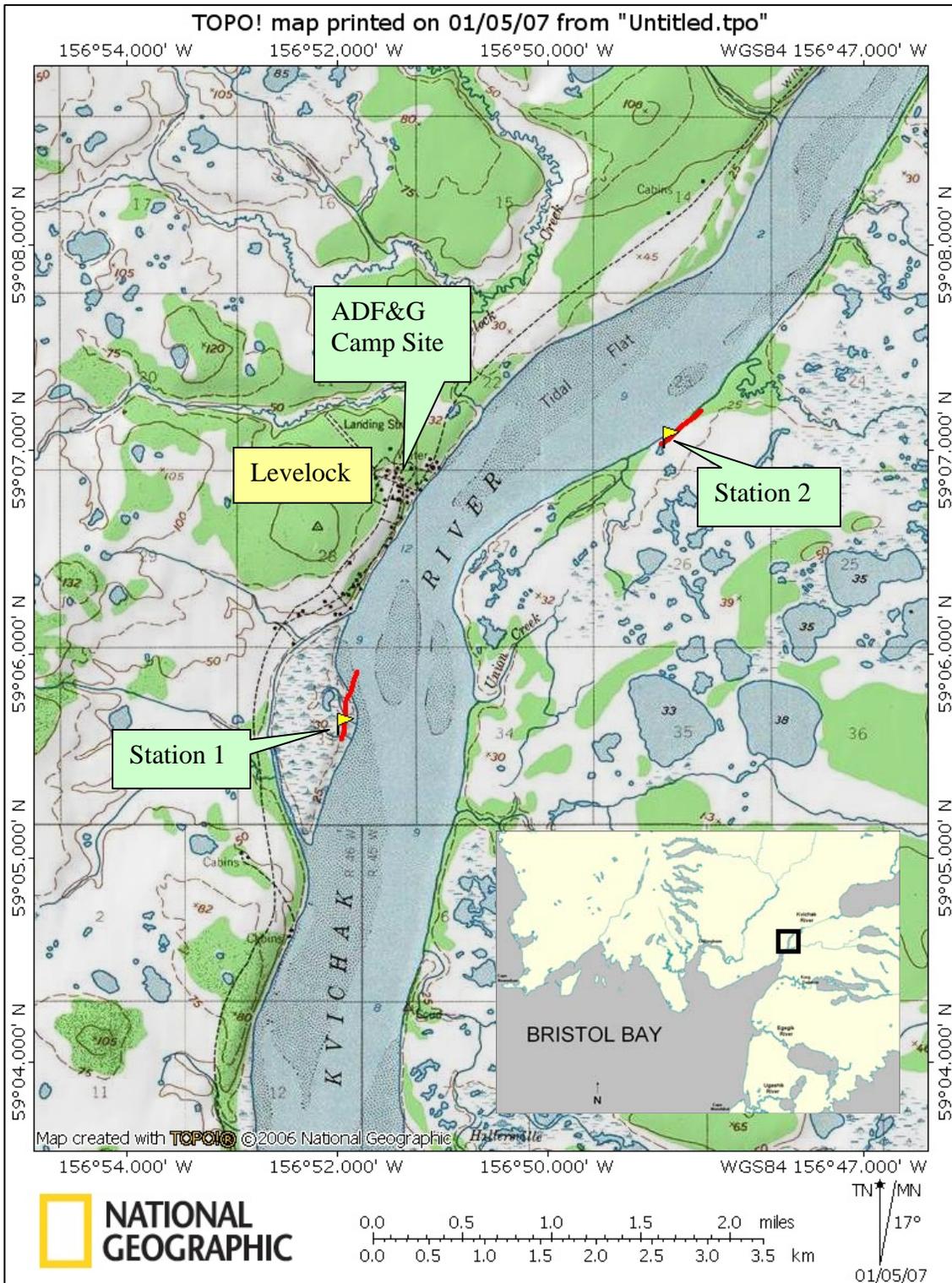


Figure 2.—Current Kvichak River inriver test fishing sites.

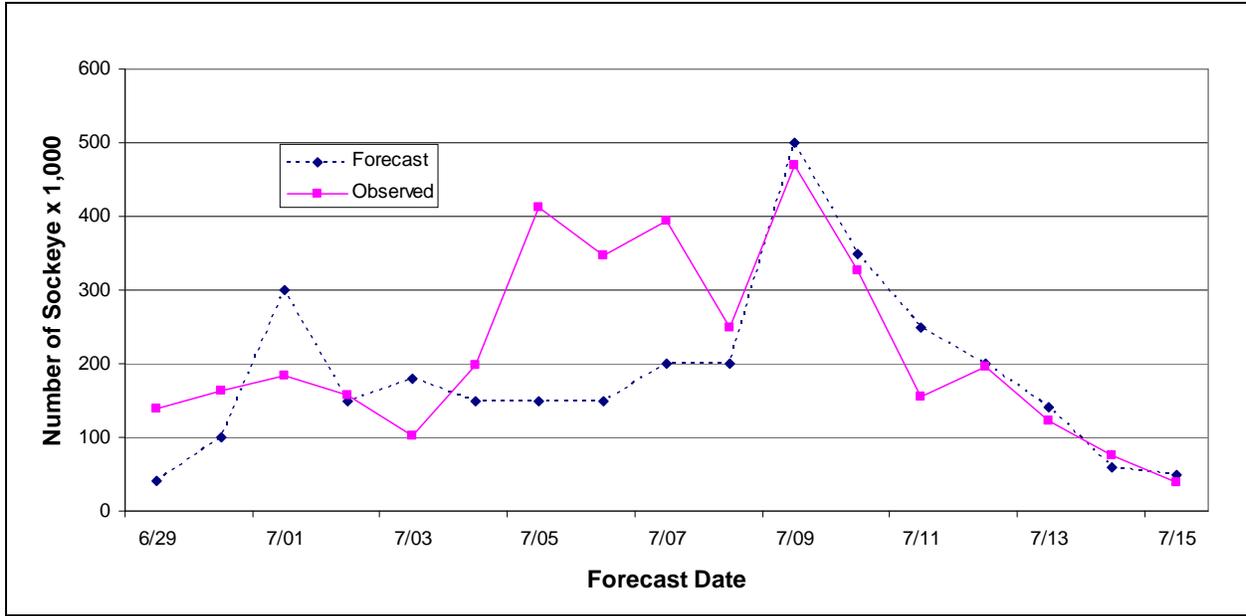


Figure 3.—Comparison of inseason daily sockeye salmon test fish published forecast and lagged observed escapement, Kvichak River, 2007.

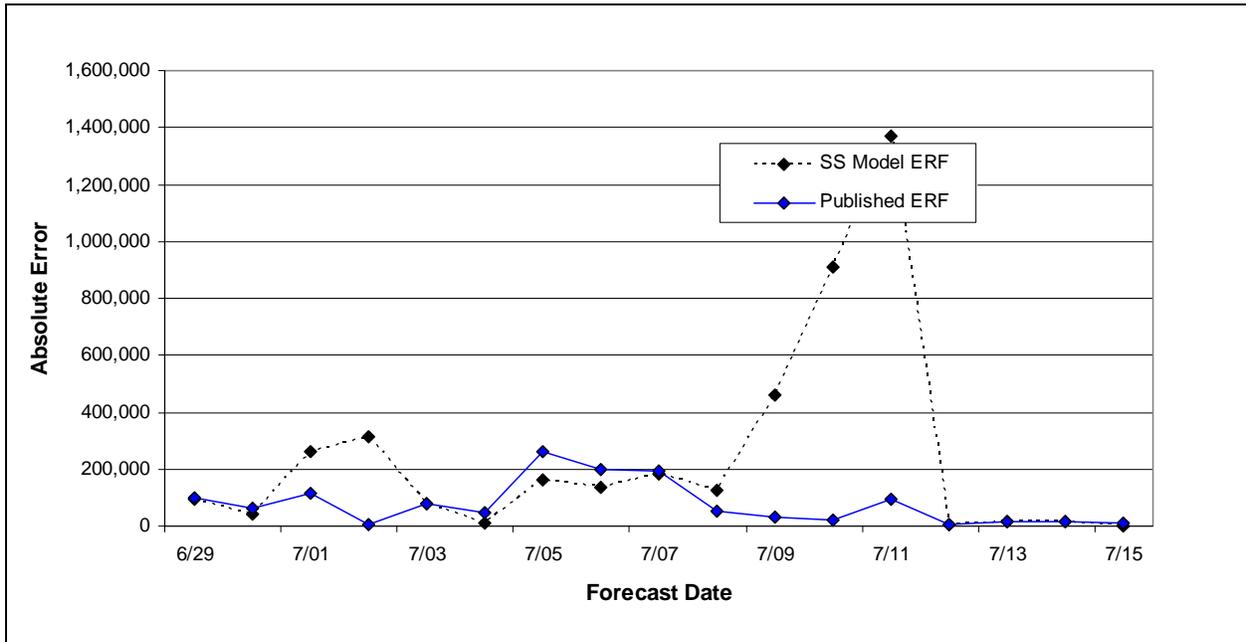


Figure 4.—Comparison of the absolute errors between the SS Model ERF and the Published ERF methods, Kvichak River, 2007.

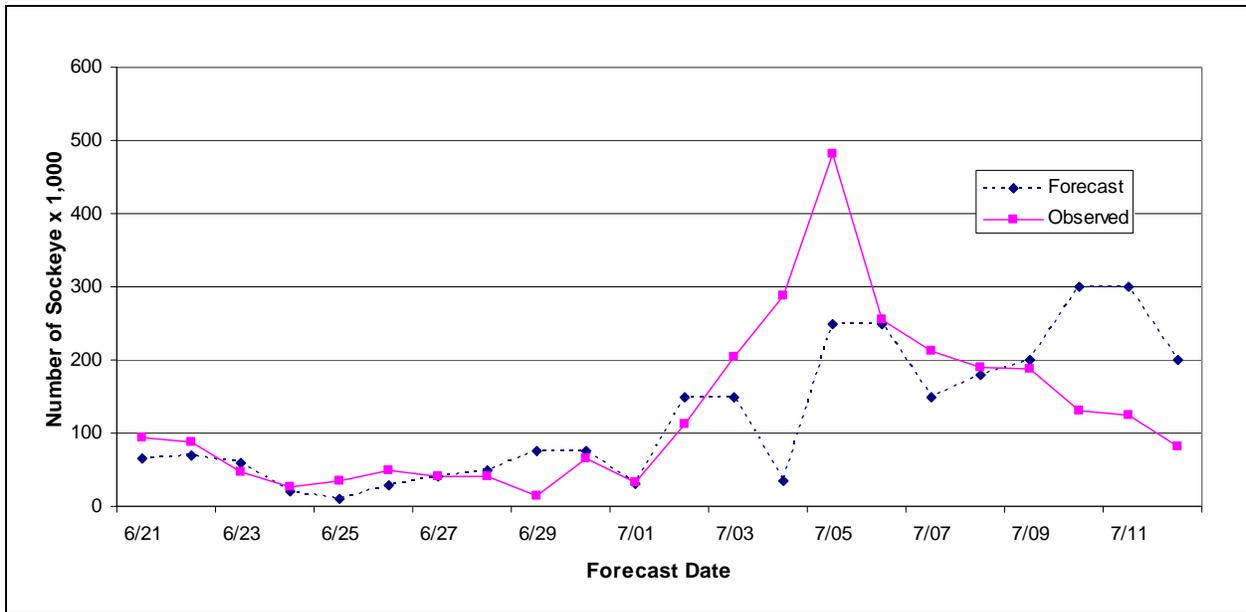


Figure 5.—Comparison of inseason daily sockeye salmon test fish published forecast and lagged observed escapement, Egegik River, 2007.

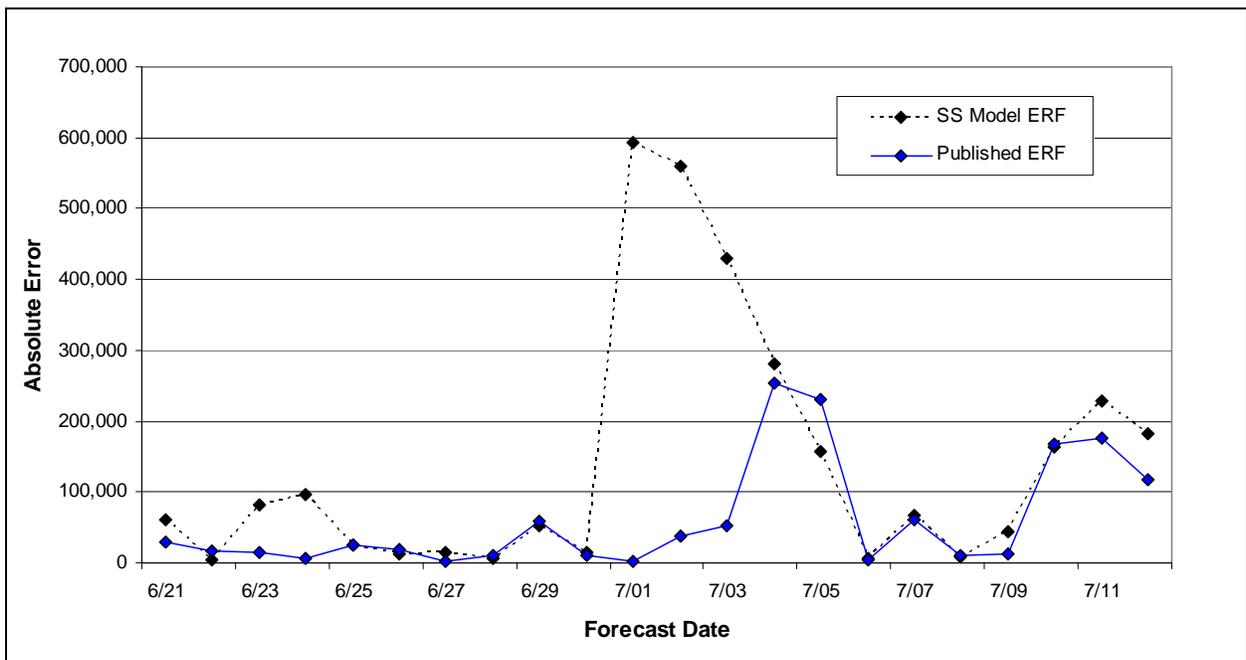


Figure 6.—Comparison of the absolute errors between the SS Model ERF and the Published ERF methods, Egegik River, 2007.

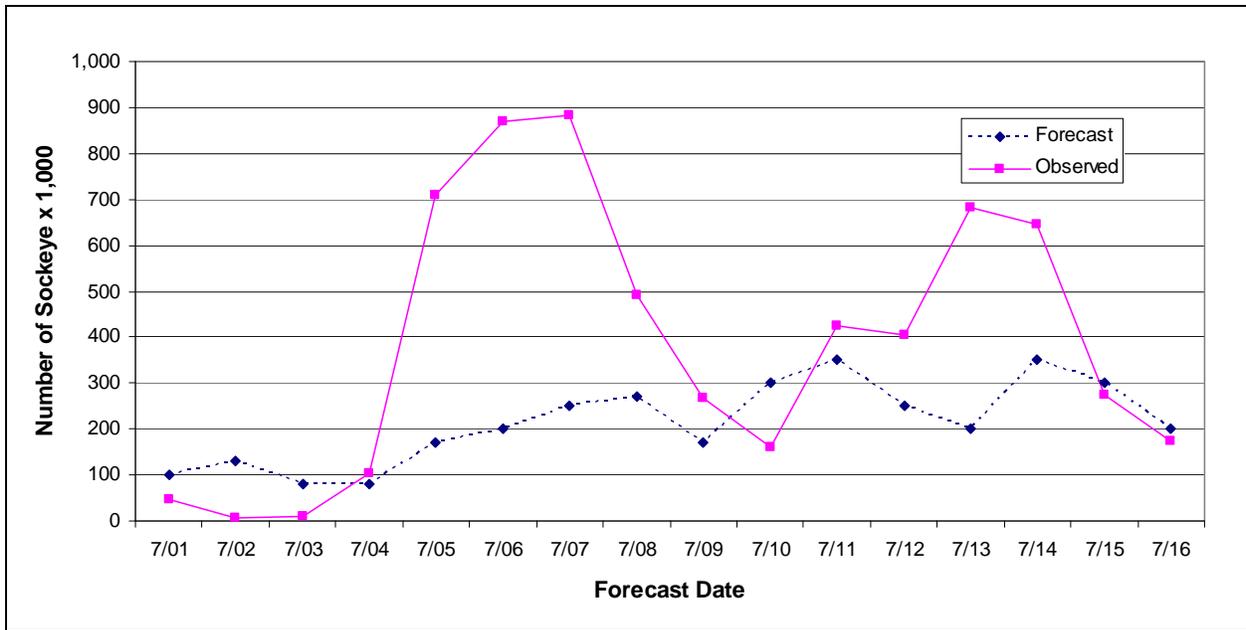


Figure 7.—Comparison of inseason daily sockeye salmon test fish published forecast and lagged observed escapement, Ugashik River, 2007.

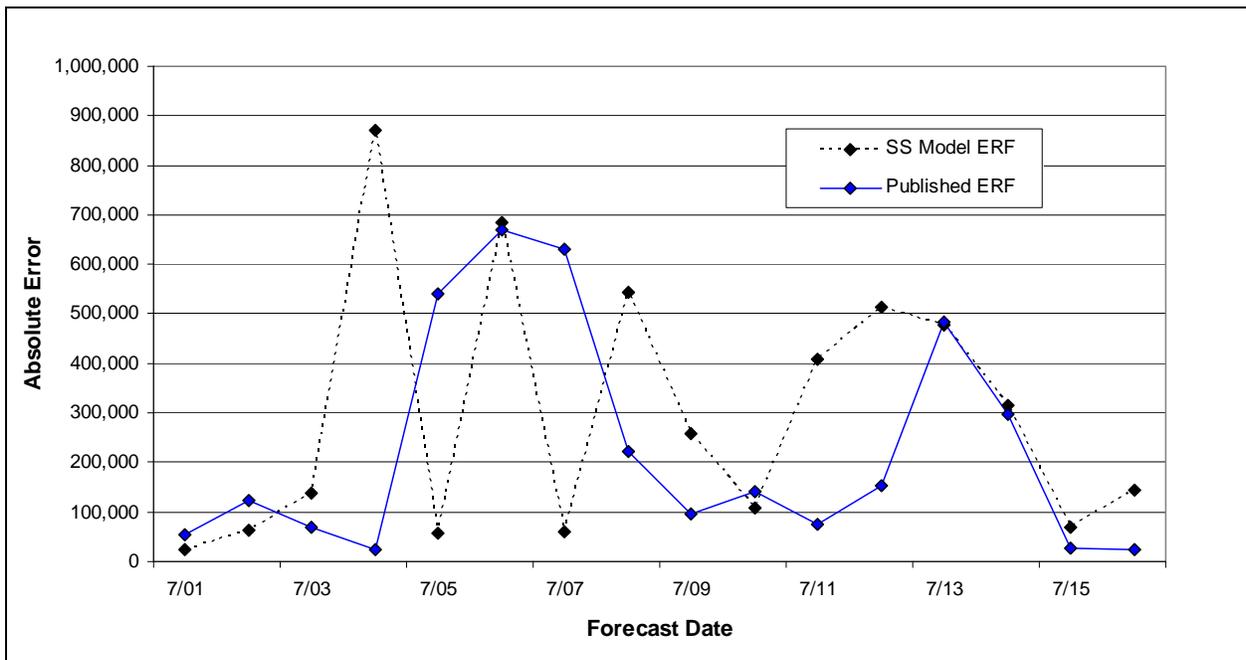


Figure 8.—Comparison of the absolute errors between the SS Model ERF and the Published ERF methods, Ugashik River, 2007.

**APPENDIX A. DAILY SOCKEYE SALMON INRIVER TEST
FISHING DATA**

Appendix A1.–Sockeye salmon inriver test fishing data, Kvichak River, 2007.

Date	Set No.	Station	Mean Fishing Time (min)	Sockeye Catch (No. of fish)	Catch per Unit Effort (CPUE)
6/22	1	1	5.6	0	0
6/22	2	1	6.5	0	0
6/22	3	2	13.3	0	0
6/22	4	2	11.7	0	0
6/22	5 ^a			0	0
6/22	6 ^a			0	0
6/22	7 ^a			0	0
6/22	8 ^a			0	0
Daily			37.1	0	0
6/23	9	1	8.7	0	0
6/23	10	1	7.9	1	30
6/23	11	2	8.5	2	56
6/23	12	2	11.3	1	21
6/23	13	1	9.5	1	25
6/23	14	1	8.3	2	58
6/23	15	2	8.8	3	82
6/23	16	2	10.1	1	24
Daily			73.1	11	37
6/24	17	1	11.2	8	171
6/24	18	1	8.9	5	135
6/24	19	2	11.3	0	0
6/24	20	2	10.0	0	0
6/24	21 ^b	1	10.9	4	88
6/24	22 ^b	1	8.8	3	82
6/24	23 ^b	2	10.2	1	24
6/24	24 ^b	2	9.3	1	26
Daily			80.6	22	66
6/25	25	1	8.5	1	28
6/25	26	1	9.0	1	27
6/25	27	2	8.6	1	28
6/25	28	2	10.5	0	0
6/25	29	1	10.0	2	48
6/25	30	1	9.9	3	73
6/25	31	2	10.8	3	67
6/25	32	2	10.1	1	24
Daily			77.4	12	37
6/26	33	1	10.7	0	0
6/26	34	1	10.0	0	0
6/26	35	2	11.1	0	0
6/26	36	2	10.9	0	0
6/26	37	1	10.3	0	0
6/26	38	1	10.3	0	0
6/26	39	2	13.6	0	0
6/26	40	2	10.3	1	23
Daily			87.2	1	3

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Appendix A1.–Page 2 of 5.

Date	Set No.	Station	Mean Fishing Time (min)	Sockeye Catch (No. of fish)	Catch per Unit Effort (CPUE)
6/27	41 ^c	1	10.0	2	48
6/27	42 ^c	1	10.1	1	24
6/27	43 ^c	2	12.4	0	0
6/27	44 ^c	2	10.2	1	24
Daily			42.7	4	24
6/28	45	1	9.7	3	74
6/28	46	1	9.9	1	24
6/28	47	2	11.2	0	0
6/28	48	2	10.1	2	48
6/28	49	1	8.0	4	120
6/28	50	1	5.8	6	248
6/28	51	2	9.1	8	211
6/28	52	2	11.0	10	218
Daily			74.8	34	118
6/29	53 ^d	1	9.7	3	74
6/29	54 ^d	1	9.9	1	24
6/29	55	2	9.6	9	225
6/29	56	2	9.6	13	325
6/29	57	2	4.8	15	750
6/29	58	2	3.5	29	1,989
6/29	59	1	6.5	18	665
6/29	60	1	7.3	17	559
Daily			60.9	105	576
6/30	61 ^e	2	5.0	20	960
6/30	62 ^e	2	4.3	22	1,228
6/30	63 ^e	1	5.8	19	786
6/30	64 ^e	1	7.0	16	549
Daily			22.1	77	881
7/01	65	1	6.6	15	545
7/01	66	1	5.0	21	1,008
7/01	67	2	5.0	15	720
7/01	68	2	5.6	24	1,029
7/01	69	1	5.0	59	2,832
7/01	70	1	2.8	29	2,486
7/01	71	2	2.5	41	3,936
7/01	72	2	3.1	42	3,252
Daily			35.6	246	1,976
7/02	73 ^f		4.1	21	1,229
7/02	74 ^f		4.4	22	1,214
7/02	75 ^f		3.5	15	1,043
7/02	76 ^f		5.3	17	747
7/02	77	1	4.5	30	1,600
7/02	78	1	5.1	16	753
7/02	79	2	3.1	26	2,013
7/02	80	2	3.6	24	1,600
Daily			33.5	171	1,275

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Appendix A1.–Page 3 of 5.

Date	Set No.	Station	Mean Fishing Time (min)	Sockeye Catch (No. of fish)	Catch per Unit Effort (CPUE)
7/03	81	2	2.6	19	1,754
7/03	82	2	3.7	29	1,881
7/03	83	1	1.9	10	1,263
7/03	84	1	4.0	18	1,080
7/03	85	2	6.1	60	2,361
7/03	86	2	5.3	43	1,947
7/03	87	1	1.7	42	5,929
7/03	88	1	3.5	38	2,606
Daily			28.8	259	2,353
7/04	89	1	4.9	34	1,665
7/04	90	1	4.1	37	2,166
7/04	91	2	3.9	42	2,585
7/04	92	2	4.9	53	2,596
7/04	93	2	2.7	46	4,089
7/04	94	2	2.4	43	4,300
7/04	95	1	2.9	25	2,069
7/04	96	1	2.6	36	3,323
Daily			28.4	316	2,849
7/05	97	2	4.4	34	1,855
7/05	98	2	4.6	41	2,139
7/05	99	1	4.9	35	1,714
7/05	100	1	4.2	33	1,886
7/05	101	2	2.6	48	4,431
7/05	102	2	2.8	41	3,514
7/05	103	1	3.1	20	1,548
7/05	104	1	3.6	33	2,200
Daily			30.2	285	2,411
7/06	105	2	5.2	25	1,154
7/06	106	2	6.7	37	1,325
7/06	107	1	6.4	28	1,050
7/06	108	1	5.8	31	1,283
7/06	109	2	4.2	10	571
7/06	110	2	5.0	13	624
7/06	111	1	6.3	33	1,257
7/06	112	1	6.9	33	1,148
Daily			46.5	210	1,052
7/07	113	2	4.9	42	2,057
7/07	114	2	6.1	38	1,495
7/07	115	1	7.6	20	632
7/07	116	1	6.7	31	1,110
7/07	117	2	4.3	29	1,619
7/07	118	2	4.4	26	1,418
7/07	119	1	8.2	10	293
7/07	120	1	7.9	17	516
Daily			50.1	213	1,143

-continued-

Date	Set No.	Station	Mean Fishing Time (min)	Sockeye Catch (No. of fish)	Catch per Unit Effort (CPUE)
7/08	121	2	3.1	12	929
7/08	122	2	3.5	21	1,440
7/08	123	1	3.7	23	1,492
7/08	124	1	3.8	29	1,832
7/08	125	2	6.7	27	967
7/08	126	2	6.0	21	840
7/08	127	1	7.3	10	329
7/08	128	1	7.7	15	468
Daily			41.8	158	1,037
7/09	129 ^g	2	2.9	132	10,924
7/09	130 ^g	2	1.6	74	11,100
7/09	131 ^g	1	1.3	77	14,215
7/09	132 ^g	1	1.3	61	11,262
7/09	133	2	3.7	35	2,270
7/09	134	2	2.7	21	1,867
7/09	135	1	1.5	32	5,120
7/09	136	1	2.6	40	3,692
Daily			17.6	472	7,556
7/10	137	1	4.9	79	3,869
7/10	138	1	3.6	58	3,867
7/10	139	2	1.9	46	5,811
7/10	140	2	1.7	39	5,506
7/10	141 ^h		3.1	34	2,632
7/10	142 ^h		3.2	32	2,400
7/10	143 ^h		1.8	29	3,977
7/10	144 ^h		2.8	31	2,705
Daily			22.9	348	3,846
7/11	145	1	2.5	33	3,168
7/11	146	1	3.7	42	2,724
7/11	147	2	2.0	26	3,120
7/11	148	2	2.9	22	1,821
7/11	149	1	2.7	29	2,578
7/11	150	1	3.1	40	3,097
7/11	151	2	3.7	35	2,270
7/11	152	2	4.2	48	2,743
Daily			24.8	275	2,690
7/12	153	1	2.7	29	2,578
7/12	154	1	3.1	40	3,097
7/12	155	2	3.7	35	2,270
7/12	156	2	4.2	48	2,743
7/12	157	1	3.7	51	3,308
7/12	158	1	3.6	37	2,467
7/12	159	2	4.6	19	991
7/12	160	2	4.8	21	1,050
Daily			30.4	280	2,313

-continued-

Date	Set No.	Station	Mean Fishing Time (min)	Sockeye Catch (No. of fish)	Catch per Unit Effort (CPUE)
7/13	161	1	2.7	30	2,667
7/13	162	1	3.8	33	2,084
7/13	163	2	4.9	21	1,029
7/13	164	2	2.4	22	2,200
7/13	165	1	4.1	30	1,756
7/13	166	1	4.7	26	1,328
7/13	167	2	5.6	23	986
7/13	168	2	5.7	20	842
Daily			33.9	205	1,611
7/14	169	1	4.5	19	1,013
7/14	170	1	5.1	24	1,129
7/14	171	2	5.6	18	771
7/14	172	2	5.0	15	720
7/14	173	1	8.7	29	800
7/14	174	1	8.3	16	463
7/14	175	2	6.0	4	160
7/14	176	2	5.6	7	300
Daily			48.8	132	670
7/15	177	1	6.5	14	517
7/15	178	1	7.6	19	600
7/15	179	2	6.1	9	354
7/15	180	2	6.8	7	247
7/15	181	1	5.6	9	386
7/15	182	1	5.6	14	600
7/15	183	2	6.6	16	582
7/15	184	2	6.1	11	433
Daily			50.9	99	465
Total			1,080.1	3,935	30,987
Max			13.6	132	14,215
Mean			6.0	23	1,645
Min			1.3	0	0

^a Missed afternoon drifts on 22 June. Skiff beached from previous high tide.

^b Only one set of drifts were scheduled because of tide change over. Averaged morning drifts from 24 June and morning drifts from 25 June to simulate 24 June evening drifts.

^c Missed both set of drifts on 27 June due to mechanical difficulties. Averaged evening drifts from June 26 and morning drifts from June 28.

^d Only able to complete drifts at station 2 for morning drift session on 29 June. Used morning station 1 drifts from June 28 to calculate index.

^e Missed all drifts on 30 June because of mechanical difficulties. Averaged evening drifts from 29 June and morning drifts from 1 July.

^f Missed morning drifts on 2 July because crew was setting fishing boundary markers on the Alagnak River. Averaged morning drifts from 1 July and 3 July.

^g ERFs for 12 July and the remainder of the season were calculated by adjusting the daily index on 9 July from 7,556 to 3,237. The large index was never observed at the tower site and reducing the index produced a better fit with the lag times The morning drifts averaging 11,874 index were removed to produce a daily index of 3,237.

^h Only one set of drifts were scheduled because of tide change over. Averaged evening drifts from 9 July and morning drifts from 11 July to simulate 10 July evening drifts.

Appendix A2.–Sockeye salmon inriver test fishing data, Egegik River, 2007.

Date	Set No.	Station	Mean Fishing Time (min)	Sockeye Catch (No. of fish)	Catch per Unit Effort (CPUE)	Mean Water Temp (°C)
6/15	1	1	5.0	0	0	
6/15	2	2	6.8	1	35	
6/15	3	1	5.8	0	0	
6/15	4	2	7.8	2	62	
6/15	5	1	3.8	9	568	
6/15	6	2	6.0	2	80	
6/15	7	1	4.3	3	167	
6/15	8	2	6.3	9	343	
Daily			45.8	26	157	ND
6/16	9	1	5.6	0	0	
6/16	10	2	5.8	3	124	
6/16	11	1	5.3	1	45	
6/16	12	2	7.0	4	137	
6/16	13	1	7.3	16	526	
6/16	14	2	5.5	8	349	
6/16	15	1	6.1	3	118	
6/16	16	2	6.4	4	150	
Daily			49.0	39	181	11.5
6/17	17	1	5.5	0	0	
6/17	18	2	7.0	2	69	
6/17	19	1	6.4	0	0	
6/17	20	2	6.5	6	222	
6/17	21	1	5.3	10	453	
6/17	22	2	5.5	7	305	
6/17	23	1	7.0	9	309	
6/17	24	2	7.3	10	329	
Daily			50.5	44	211	11.3
6/18	25	1	6.8	0	0	
6/18	26	2	6.5	2	74	
6/18	27	1	6.4	0	0	
6/18	28	2	6.8	4	141	
6/18	29	1	6.8	20	706	
6/18	30	2	8.3	12	347	
6/18	31	1	7.1	14	473	
6/18	32	2	7.0	5	171	
Daily			55.7	57	239	11.0
6/19	33	1	6.6	0	0	
6/19	34	2	6.6	1	36	
6/19	35	1	7.1	0	0	
6/19	36	2	8.5	3	85	
6/19	37	1	7.4	6	195	
6/19	38	2	6.8	6	212	
6/19	39	1	6.6	2	73	
6/19	40	2	7.8	13	400	
Daily			57.4	31	125	11.0

-continued-

Date	Set No.	Station	Mean Fishing Time (min)	Sockeye Catch (No. of fish)	Catch per Unit Effort (CPUE)	Mean Water Temp (°C)
6/20	41	1	7.0	1	34	
6/20	42	2	7.5	15	480	
6/20	43	1	6.3	1	38	
6/20	44	2	7.5	13	416	
6/20	45	1	8.3	36	1,041	
6/20	46	2	6.8	9	318	
6/20	47	1	7.5	11	352	
6/20	48	2	7.3	7	230	
Daily			58.2	93	364	12.5
6/21	49	1	6.8	0	0	
6/21	50	2	6.8	6	212	
6/21	51	1	7.0	1	34	
6/21	52	2	7.3	14	460	
6/21	53	1	6.8	14	494	
6/21	54	2	7.1	30	1,014	
6/21	55	1	7.6	2	63	
6/21	56	2	8.0	39	1,170	
Daily			57.4	106	431	12.0
6/22	57	1	6.8	5	176	
6/22	58	2	7.8	26	800	
6/22	59	1	6.8	3	106	
6/22	60	2	8.3	34	983	
6/22	61	1	9.5	5	126	
6/22	62	2	6.8	5	176	
6/22	63	1	7.8	0	0	
6/22	64	2	7.3	11	362	
Daily			61.1	89	341	10.5
6/23	65	1	6.8	3	106	
6/23	66	2	8.3	23	665	
6/23	67	1	6.6	1	36	
6/23	68	2	8.0	23	690	
6/23	69	1	6.8	0	0	
6/23	70	2	7.8	0	0	
6/23	71	1	7.8	1	31	
6/23	72	2	7.4	2	65	
Daily			59.5	53	199	9.5
6/24	73	1	7.0	4	137	
6/24	74	2	8.3	6	173	
6/24	75	1	7.0	2	69	
6/24	76	2	7.0	18	617	
6/24	77	1	7.5	1	32	
6/24	78	2	10.8	1	22	
6/24	79	1	6.4	0	0	
6/24	80	2	10.0	25	600	
Daily			64.0	57	206	10.0

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Appendix A2.–Page 3 of 6.

Date	Set No.	Station	Mean Fishing Time (min)	Sockeye Catch (No. of fish)	Catch per Unit Effort (CPUE)	Mean Water Temp (°C)
6/25	81	1	6.8	0	0	
6/25	82	2	7.0	1	34	
6/25	83	1	6.8	1	35	
6/25	84	2	6.7	0	0	
6/25	85	1	6.5	0	0	
6/25	86	2	7.3	0	0	
6/25	87	1	6.4	1	38	
6/25	88	2	10.0	4	96	
Daily			57.5	7	25	10.0
6/26	89	1	11.8	15	305	
6/26	90	2	8.0	6	180	
6/26	91	1	6.8	5	176	
6/26	92	2	6.5	0	0	
6/26	93 ^a		9.2	7	184	
6/26	94 ^a		8.2	8	236	
6/26	95 ^a		7.1	2	68	
6/26	96 ^a		7.7	4	110	
Daily			65.1	47	157	10.5
6/27	97	1	6.5	0	0	
6/27	98	2	8.3	10	289	
6/27	99	1	7.3	0	0	
6/27	100	2	8.8	7	191	
6/27	101	1	7.8	13	400	
6/27	102	2	6.8	0	0	
6/27	103	1	6.5	1	37	
6/27	104	2	7.3	0	0	
Daily			59.3	31	115	12.0
6/28	105	1	6.9	0	0	
6/28	106	2	7.8	17	523	
6/28	107	1	7.3	1	33	
6/28	108	2	7.3	7	230	
6/28	109	1	8.4	83	2,371	
6/28	110	2	7.0	1	34	
6/28	111	1	8.8	32	873	
6/28	112	2	7.3	5	164	
Daily			60.8	146	529	11.0
6/29	113	1	6.4	0	0	
6/29	114	2	7.0	16	549	
6/29	115	1	8.5	3	85	
6/29	116	2	8.8	27	736	
6/29	117	1	8.3	6	173	
6/29	118	2	8.5	41	1,158	
6/29	119	1	8.0	36	1,080	
6/29	120	2	7.0	1	34	
Daily			62.5	130	477	11.0

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Date	Set No.	Station	Mean Fishing Time (min)	Sockeye Catch (No. of fish)	Catch per Unit Effort (CPUE)	Mean Water Temp (°C)
6/30	121	1	6.5	1	37	
6/30	122	2	8.0	3	90	
6/30	123	1	7.5	0	0	
6/30	124	2	7.0	2	69	
6/30	125	1	6.9	9	313	
6/30	126	2	7.8	20	615	
6/30	127	1	8.3	17	492	
6/30	128	2	11.3	15	319	
Daily			63.3	67	242	11.0
7/01	129	1	7.6	1	32	
7/01	130	2	10.3	16	373	
7/01	131	1	7.1	0	0	
7/01	132	2	13.1	12	220	
7/01	133	1	8.1	30	889	
7/01	134	2	8.0	18	540	
7/01	135	1	9.0	44	1,173	
7/01	136	2	6.4	0	0	
Daily			69.6	121	403	11.5
7/02	137	1	6.9	1	35	
7/02	138	2	7.8	3	92	
7/02	139	1	7.5	1	32	
7/02	140	2	10.0	9	216	
7/02	141	1	4.0	116	6,960	
7/02	142	2	4.5	92	4,907	
7/02	143	1	5.6	64	2,743	
7/02	144	2	4.0	88	5,280	
Daily			50.3	374	2,533	12.5
7/03	145	1	7.3	0	0	
7/03	146	2	10.8	31	689	
7/03	147	1	7.5	1	32	
7/03	148	2	12.3	72	1,405	
7/03	149	1	3.8	114	7,200	
7/03	150	2	3.0	47	3,760	
7/03	151	1	3.5	31	2,126	
7/03	152	2	4.6	50	2,609	
Daily			52.8	346	2,228	14.0
7/04	153	1	7.3	7	230	
7/04	154	2	6.9	37	1,287	
7/04	155	1	7.8	6	185	
7/04	156	2	8.8	77	2,100	
7/04	157	1	5.3	71	3,215	
7/04	158	2	4.0	76	4,560	
7/04	159	1	6.3	35	1,333	
7/04	160	2	8.0	33	990	
Daily			54.4	342	1,738	13.0

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Date	Set No.	Station	Mean Fishing Time (min)	Sockeye Catch (No. of fish)	Catch per Unit Effort (CPUE)	Mean Water Temp (°C)
7/05	161	1	7.5	2	64	
7/05	162	2	8.0	10	300	
7/05	163	1	7.5	0	0	
7/05	164	2	9.5	31	783	
7/05	165	1	6.5	4	148	
7/05	166	2	8.5	7	198	
7/05	167	1	7.0	4	137	
7/05	168	2	8.0	16	480	
Daily			62.5	74	264	13.5
7/06	169	1	7.3	1	33	
7/06	170	2	7.3	23	756	
7/06	171	1	7.3	6	197	
7/06	172	2	7.4	31	1,005	
7/06	173	1	8.0	10	300	
7/06	174	2	9.3	15	387	
7/06	175	1	7.5	7	224	
7/06	176	2	8.8	48	1,309	
Daily			62.9	141	526	14.0
7/07	177	1	7.6	2	63	
7/07	178	2	9.3	35	903	
7/07	179	1	7.8	3	92	
7/07	180	2	8.0	32	960	
7/07	181	1	7.8	2	62	
7/07	182	2	8.5	33	932	
7/07	183	1	7.8	6	185	
7/07	184	2	6.3	70	2,667	
Daily			63.1	183	733	14.5
7/08	185	1	7.4	12	389	
7/08	186	2	8.3	44	1,272	
7/08	187	1	7.1	12	406	
7/08	188	2	8.3	50	1,446	
7/08	189	1	7.3	3	99	
7/08	190	2	9.5	16	404	
7/08	191	1	8.5	10	282	
7/08	192	2	9.8	13	318	
Daily			66.2	160	577	14.0
7/09	193	1	8.5	4	113	
7/09	194	2	10.3	61	1,421	
7/09	195	1	8.6	5	140	
7/09	196	2	10.5	67	1,531	
7/09	197	1	9.0	9	240	
7/09	198	2	8.8	95	2,591	
7/09	199	1	8.1	5	148	
7/09	200	2	10.5	94	2,149	
Daily			74.3	340	1,042	14.5

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Date	Set No.	Station	Mean Fishing Time (min)	Sockeye Catch (No. of fish)	Catch per Unit Effort (CPUE)	Mean Water Temp (°C)
7/10	201	1	8.9	17	458	
7/10	202	2	8.8	94	2,564	
7/10	203	1	9.1	32	844	
7/10	204	2	9.6	131	3,275	
7/10	205	1	6.5	0	0	
7/10	206	2	7.3	42	1,381	
7/10	207	1	8.0	3	90	
7/10	208	2	6.8	56	1,976	
Daily			65.0	375	1,324	14.5
7/11	209	1	7.3	6	197	
7/11	210	2	6.0	82	3,280	
7/11	211	1	6.1	5	197	
7/11	212	2	6.3	85	3,238	
7/11	213 ^b		7.0	1	35	
7/11	214 ^b		7.4	26	843	
7/11	215 ^b		7.7	2	62	
7/11	216 ^b		8.0	52	1,570	
Daily			55.7	259	1,178	14.0
7/12	217	1	7.4	3	97	
7/12	218	2	7.5	10	320	
7/12	219	1	7.4	1	32	
7/12	220	2	9.1	48	1,266	
7/12	221	1	7.6	1	32	
7/12	222	2	9.3	8	206	
7/12	223	1	8.0	3	90	
7/12	224	2	9.1	3	79	
Daily			65.4	77	265	13.8
Total			1,669.3	3,815	16,809	
Max			13.1	131	7,200	14.5
Mean			7.5	17	600	12.2
Min			3.0	0	0	9.5

^a Only one set of drifts were scheduled because of tide change over. Averaged morning drifts from 26 and 27 June to simulate evening drifts.

^b Only one set of drifts were scheduled because of tide change over. Averaged evening drifts from 10 July and morning drifts from 12 July to simulate 11 July evening drifts.

Appendix A3.–Sockeye salmon inriver test fishing data, Ugashik River, 2007.

Date	Set No.	Station	Mean Fishing Time (min)	Sockeye Catch (No. of fish)	Catch per Unit Effort (CPUE)	Mean Water Temp (oC)
6/25	1	1	8.1	6	178	
6/25	2	2	8.1	4	119	
6/25	3	1	7.9	8	243	
6/25	4	2	7.5	3	96	
6/25	5	1	7.9	0	0	
6/25	6	2	8.4	3	86	
6/25	7	1	8.8	1	27	
6/25	8	2	8.0	2	60	
Daily			64.7	27	101	10.0
6/26	9	1	7.8	2	62	
6/26	10	2	8.0	5	150	
6/26	11	1	8.3	0	0	
6/26	12	2	8.1	4	119	
6/26 ^a	13		7.9	1	31	
6/26 ^a	14		7.8	3	93	
6/26 ^a	15		7.2	1	33	
6/26 ^a	16		8.3	2	58	
Daily			63.3	18	68	10.0
6/27	17	1	7.9	0	0	
6/27	18	2	7.5	0	0	
6/27	19	1	6.1	2	79	
6/27	20	2	8.4	0	0	
6/27	21	1	7.8	0	0	
6/27	22	2	8.4	8	229	
6/27	23	1	8.8	0	0	
6/27	24	2	8.3	5	145	
Daily			63.2	15	56	11.0
6/28	25	1	7.9	2	61	
6/28	26	2	7.9	2	61	
6/28	27	1	7.6	0	0	
6/28	28	2	7.9	2	61	
6/28	29	1	8.1	1	30	
6/28	30	2	8.1	2	59	
6/28	31	1	8.0	3	90	
6/28	32	2	7.8	1	31	
Daily			63.3	13	49	11.5
6/29	33	1	8.5	0	0	
6/29	34	2	8.1	1	30	
6/29	35	1	7.9	1	30	
6/29	36	2	8.1	1	30	
6/29	37	1	8.5	1	28	
6/29	38	2	9.4	1	26	
6/29	39	1	7.8	0	0	
6/29	40	2	8.0	3	90	
Daily			66.3	8	29	12.0

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Appendix A3.–Page 2 of 5.

Date	Set No.	Station	Mean Fishing Time (min)	Sockeye Catch (No. of fish)	Catch per Unit Effort (CPUE)	Mean Water Temp (oC)
6/30	38	1	7.6	16	505	
6/30	39	2	8.1	14	415	
6/30	40	1	7.9	9	273	
6/30	41	2	8.1	5	148	
6/30	42	1	7.9	17	516	
6/30	43	2	6.5	51	1,883	
6/30	44	1	6.5	21	775	
6/30	45	2	6.4	27	1,013	
Daily			59.0	160	691	11.0
7/01	^b 46		7.9	18	547	
7/01	^b 47		7.2	32	1,067	
7/01	^b 48		7.3	17	563	
7/01	^b 49		7.5	23	741	
Daily			29.8	90	729	-
7/02	50	1	7.9	18	547	
7/02	51	2	7.9	14	425	
7/02	52	1	8.0	12	360	
7/02	53	2	8.5	19	536	
7/02	54	1	6.8	25	882	
7/02	55	2	5.8	80	3,310	
7/02	56	1	5.8	34	1,407	
7/02	57	2	6.3	180	6,857	
Daily			57.0	382	1,791	13.0
7/03	58	1	5.8	23	952	
7/03	59	2	5.6	24	1,029	
7/03	60	1	6.0	16	640	
7/03	61	2	6.1	48	1,889	
7/03	62	1	6.9	64	2,226	
7/03	63	2	4.4	73	3,982	
7/03	64	1	4.5	50	2,667	
7/03	65	2	3.6	21	1,400	
Daily			42.9	319	1,848	14.0
7/04	66	1	4.4	11	600	
7/04	67	2	3.9	28	1,723	
7/04	68	1	4.9	12	588	
7/04	69	2	4.4	36	1,964	
7/04	70	1	4.0	53	3,180	
7/04	71	2	3.9	57	3,508	
7/04	72	1	3.9	49	3,015	
7/04	73	2	4.0	32	1,920	
Daily			33.4	278	2,062	13.0

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Date	Set No.	Station	Mean Fishing Time (min)	Sockeye Catch (No. of fish)	Catch per Unit Effort (CPUE)	Mean Water Temp (oC)
7/05	74	1	4.1	31	1,815	
7/05	75	2	4.0	34	2,040	
7/05	76	1	4.0	10	600	
7/05	77	2	4.1	24	1,405	
7/05	78	1	3.6	90	6,000	
7/05	79	2	3.8	38	2,400	
7/05	80	1	3.5	41	2,811	
7/05	81	2	3.6	44	2,933	
Daily			30.7	312	2,501	13.0
7/06	82	1	4.4	31	1,691	
7/06	83	2	3.9	36	2,215	
7/06	84	1	3.8	16	1,011	
7/06	85	2	3.8	25	1,579	
7/06	86	1	3.9	58	3,569	
7/06	87	2	3.9	21	1,292	
7/06	88	1	3.9	53	3,262	
7/06	89	2	4.3	34	1,898	
Daily			31.9	274	2,065	14.0
7/07	90	1	4.1	5	293	
7/07	91	2	5.1	13	612	
7/07	92	1	4.0	24	1,440	
7/07	93	2	4.1	21	1,229	
7/07	94	1	4.0	12	720	
7/07	95	2	5.0	11	528	
7/07	96	1	4.9	11	539	
7/07	97	2	4.9	5	245	
Daily			36.1	102	701	13.0
7/08	98	1	3.9	6	369	
7/08	99	2	4.8	11	550	
7/08	100	1	5.3	14	634	
7/08	101	2	5.8	19	786	
7/08	102	1	5.0	21	1,008	
7/08	103	2	5.5	15	655	
7/08	104	1	6.1	11	433	
7/08	105	2	6.3	15	571	
Daily			42.7	112	626	14.3
7/09	106	1	6.1	24	944	
7/09	107	2	6.4	11	413	
7/09	108	1	5.6	13	557	
7/09	109	2	6.0	7	280	
7/09	110	1	5.9	9	366	
7/09	111	2	5.8	15	621	
7/09	112	1	6.0	16	640	
7/09	113	2	6.0	26	1,040	
Daily			47.8	121	608	14.0

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Date	Set No.	Station	Mean Fishing Time (min)	Sockeye Catch (No. of fish)	Catch per Unit Effort (CPUE)	Mean Water Temp (oC)
7/10	114	1	5.0	50	2,400	
7/10	115	2	4.0	39	2,340	
7/10	116	1	4.0	63	3,780	
7/10	117	2	3.9	36	2,215	
7/10	118	1	5.8	8	331	
7/10	119	2	6.0	31	1,240	
7/10	120	1	6.3	18	686	
7/10	121	2	6.3	22	838	
Daily			41.3	267	1,729	14.5
7/11	122	1	6.0	31	1,240	
7/11	123	2	5.9	63	2,563	
7/11	124	1	5.8	21	869	
7/11	125	2	5.9	20	814	
7/11	126 ^c		5.9	8	328	
7/11	127 ^c		5.9	23	936	
7/11	128 ^c		6.2	17	663	
7/11	129 ^c		6.2	24	937	
Daily			47.7	207	1,044	14.0
7/12	130 ^d		5.6	2	86	
7/12	131 ^d		6.0	5	200	
7/12	132 ^d		6.1	3	118	
7/12	133 ^d		6.1	5	197	
7/12	134	1	6.0	41	1,640	
7/12	135	2	6.0	21	840	
7/12	136	1	6.0	42	1,680	
7/12	137	2	6.0	25	1,000	
Daily			47.8	144	720	13.0
7/13	138	1	5.6	2	86	
7/13	139	2	6.0	5	200	
7/13	140	1	6.1	3	118	
7/13	141	2	6.1	5	197	
7/13	142	1	6.0	41	1,640	
7/13	143	2	5.9	31	1,261	
7/13	144	1	6.3	25	952	
7/13	145	2	5.9	48	1,953	
Daily			47.9	160	801	13.0
7/14	146	1	5.9	4	163	
7/14	147	2	6.0	2	80	
7/14	148	1	6.0	1	40	
7/14	149	2	6.0	5	200	
7/14	150	1	4.5	30	1,600	
7/14	151	2	5.9	49	1,993	
7/14	152	1	7.0	33	1,131	
7/14	153	2	5.5	32	1,396	
Daily			46.8	156	825	13.0

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Date	Set No.	Station	Mean Fishing Time (min)	Sockeye Catch (No. of fish)	Catch per Unit Effort (CPUE)	Mean Water Temp (oC)
7/15	154	1	5.9	6	244	
7/15	155	2	5.9	4	163	
7/15	156	1	5.5	5	218	
7/15	157	2	5.5	1	44	
7/15	158	1	5.5	37	1,615	
7/15	159	2	5.8	19	786	
7/15	160	1	5.3	18	815	
7/15	161	2	5.6	12	514	
Daily			45.0	102	550	13.0
7/16	162	1	5.6	6	257	
7/16	163	2	5.8	2	83	
7/16	164	1	5.9	1	41	
7/16	165	2	6.0	4	160	
7/16	166	1	6.6	16	582	
7/16	167	2	7.8	12	369	
7/16	168	1	7.8	18	554	
7/16	169	2	7.6	16	505	
Daily			53.1	75	319	13.0
Total			1,061.6	3,342	19,912	
Max			9.4	180	6,857	14.5
Mean			6.2	19	909	12.7
Min			3.5	0	0	10.0

^a Only one set of drifts were scheduled because of tide change over. Averaged morning drifts from 26 and 27 June to simulate evening drifts.

^b Missed entire day of drifts on 1 July. Test fish crew assisted with the transport of a new skiff upriver to the tower site. Averaged evening drifts from 30 June and morning drifts from 2 July to estimate daily index.

^c Only one set of drifts were scheduled because of tide change over. Averaged evening drifts from 9 and 10 July to simulate evening drifts.

^d Missed morning drifts because trip line went missing and crew was unable to retrieve boat in time to drift. Used morning drifts from 13 July to simulate missed drifts.

**APPENDIX B. HISTORICAL INRIVER TEST FISHING
DATA SUMMARY BY RIVER**

Appendix B1.–Kvichak River sockeye salmon inriver test fishing data summary, 1979–2007.

Year	Travel Time (d)	Cum. Index	Last Date Fished	FPI ^a	Cumulative Tower Count	Date ^b	Data Reference
1979 ^c	2.0	21,901	6/29	243	5,330,532	7/1	Meacham (1980)
1980	2.0	106,315	7/9	174	18,508,524	7/11	Bue & Meacham (1981)
1981	2.0	20,813	7/1	83	1,723,506	7/13	Bue (1982)
1982	2.0	17,718	7/21	63	1,119,996	7/23	Bue (1984)
1983	2.0	13,234	7/12	216	2,853,198	7/14	Yuen (1985)
1984	3.0	45,584	7/12	222	10,111,152	7/15	Yuen et al. (1985)
1985 ^d	5.0	41,649	7/16	171	7,120,506	7/23	Bue et al. (1988)
1986	1.0	25,923	7/15	43	1,102,242	7/16	Yuen et al. (1988)
1987	2.0	55,881	7/14	106	5,945,994	7/16	Fried & Bue (1988a)
1988	1.0	38,743	7/17	104	4,045,500	7/18	Fried & Bue (1988b)
1989	2.0	58,044	7/16	141	8,163,918	7/18	Stratton et al. (1990)
1990	3.0	44,794	7/15	149	6,673,872	7/18	Stratton (1990)
1991	2.0	56,669	7/17	71	4,114,932	7/19	Stratton & Woolington (1992)
1992	4.0	46,755	7/16	106	4,686,828	7/20	Stratton & Crawford (1994)
1993	1.0	47,449	7/20	84	4,007,712	7/21	Stratton & Crawford (1996)
1994	2.0	55,073	7/15	142	7,631,076	7/17	Gray et al. (1999)
1995	2.0	62,556	7/18	154	9,702,972	7/20	Gray et al. (1999)
1996	2.0	18,089	7/17	77	1,396,710	7/19	Gray et al. (1999)
1997	2.0	25,228	7/16	58	1,434,504	7/18	Gray et al. (1999)
1998	2.0	25,041	7/16	91	2,290,584	7/18	Gray et al. (1999)
1999	4.0	73,725	7/16	85	6,266,625	7/20	Gray (2000)
2000	2.0	40,186	7/16	51	1,791,282	7/18	West et al. (2000)
2001	2.0	29,771	7/15	34	1,060,890	7/17	Crawford et al. (2002)
2002	2.0	34,177	7/15	21	703,536	7/17	West (2003)
2003	2.0	57,220	7/12	29	1,612,560	7/14	West (2004)
2004	2.0	101,557	7/16	56	5,432,844	7/18	West (2007)
2005	1.0	76,402	7/15	38	2,237,250	7/16	West (2006)
2006 ^e	2.0	22,471	7/12	113	2,535,642	7/14	West (2008)
2007	1.0	34,987	7/15	87	2,661,528	7/16	Current Report

^a FPI value from travel time analysis on the final day of test fishing.

^b Cumulative spawning escapement date is last date fished at test fishing site plus travel time to tower site.

^c Sites used from 1979–1984 were located on west bank above Nakeen (site 1), and on east bank about 2 km above Sea Gull Flat Island.

^d Data from 1985 to present may not be comparable with those from 1979–1984. Test fishing sites were relocated in 1985 about 20 km upriver from old sites, and changes were made in mesh size (from 13.65 cm to 12.7 cm) and in web material (from multifilament nylon to multistrand monofilament).

^e In 2006, test fish sites were relocated upriver near the village of Levelock. GPS coordinates for site 1, N 59° 05.585' W 156° 52.216 and site 2, N 59° 07.108' W 156° 48.704'

Appendix B2.–Egegik River sockeye salmon inriver test fishing data summary, 1979–2007.

Year	Travel Time (d)	Cum. Index	Last Date Fished	FPI ^a	Cumulative Tower Count	Date ^b	Data Reference
1979 ^c	1.0	23,980	7/10	38	905,034	7/11	Meacham (1980)
1980	4.0	13,312	7/16	80	1,060,860	7/20	Bue & Meacham (1981)
1981	3.0	18,921	7/13	37	691,764	7/16	Bue (1982)
1982	3.0	30,361	7/12	34	1,029,684	7/15	Bue (1984)
1983	1.0	16,276	7/10	44	718,368	7/11	Yuen (1985)
1984	3.0	26,947	7/12	43	1,151,028	7/15	Yuen et al. (1985)
1985 ^d	4.0	19,974	7/9	53	1,052,250	7/13	Bue et al. (1988)
1986	1.0	16,370	7/14	60	981,841	7/15	Yuen et al. (1988)
1987	2.0	21,810	7/14	53	1,162,464	7/16	Fried & Bue (1988a)
1988	1.0	21,024	7/16	76	1,591,752	7/17	Fried & Bue (1988b)
1989	3.0	30,343	7/12	52	1,590,234	7/15	Stratton et al. (1990)
1990	3.0	17,578	7/16	127	2,155,062	7/19	Stratton (1990)
1991	4.0	31,066	7/12	82	2,722,476	7/16	Stratton & Woolington (1992)
1992	3.0	24,498	7/11	89	1,795,542	7/14	Stratton & Crawford (1994)
1993	1.0	17,189	7/10	75	1,346,160	7/11	Stratton & Crawford (1996)
1994	2.0	12,777	7/12	137	1,708,998	7/14	Gray et al. (1999)
1995	2.0	11,769	7/12	100	1,139,724	7/14	Gray et al. (1999)
1996	2.0	15,043	7/12	72	1,039,428	7/14	Gray et al. (1999)
1997	2.0	20,136	7/12	52	1,051,500	7/14	Gray et al. (1999)
1998	3.0	16,476	7/13	65	1,032,480	7/16	Gray et al. (1999)
1999	5.0	20,568	7/13	82	1,686,576	7/18	Gray (2000)
2000	2.0	13,517	7/13	80	1,024,800	7/15	West et al. (2000)
2001	2.0	16,381	7/12	58	959,598	7/14	Crawford et al. (2002)
2002	2.0	12,611	7/12	79	993,318	7/14	West (2003)
2003	1.5	19,668	7/11	59	1,147,368	7/13	West (2004)
2004	1.0	15,037	7/13	86	1,285,062	7/14	West (2007)
2005	1.0	18,732	7/11	85	1,580,706	7/12	West (2006)
2006	2.0	12,579	7/12	116	1,447,002	7/14	West (2008)
2007	3.0	16,809	7/12	62	1,425,162	7/15	Current Report

^a FPI value from travel time analysis on the final day of test fishing.

^b Cumulative spawning escapement date is last date fished at test fishing site plus travel time to tower site.

^c Sites used from 1979–2000 were located about 3 km upriver from tip of Egg Island on the south (site 1), and on the north bank (site 2).

^d Data from 1985 to present may not be comparable with those from 1979–1984 because changes were made in gillnet mesh size (from 13.65 cm to 13.02 cm) and in web material (from multifilament nylon to multistrand monofilament).

Appendix B3.–Ugashik River sockeye salmon inriver test fishing data summary, 1979–2007.

Year	Travel	Cum. Index	Last Date		Cumulative		Data Reference
	Time (d)		Fished	FPI ^a	Tower Count	Date ^b	
1979 ^c	9.0	42,880	7/13	39	1,662,348	7/22	Meacham (1980)
1980	3.0	85,711	7/17	30	2,550,174	7/20	Bue & Meacham (1981)
1981 ^d	3.0	73,861	7/16	18	1,304,022	7/19	Bue (1982)
1982 ^e	4.0	48,057	7/15	23	1,120,680	7/19	Bue (1984)
1983	1.0	15,485	7/16	54	831,744	7/17	Yuen (1985)
1984	8.0	20,138	7/17	61	1,223,286	7/25	Yuen et al. (1985)
1985 ^f	7.0	30,903	7/16	32	997,026	7/26	Bue et al. (1988)
1986	9.0	36,786	7/15	27	1,001,492	7/24	Yuen et al. (1988)
1987 ^g	6.0	14,393	7/17	41	587,964	7/23	Fried & Bue (1988a)
1988	2.0	16,106	7/24	39	625,752	7/26	Fried & Bue (1988b)
1989	5.0	36,562	7/21	46	1,669,350	7/26	Stratton et al. (1990)
1990	3.0	20,113	7/20	35	692,310	7/23	Stratton (1990)
1991	4.0	27,359	7/15	89	2,255,216	7/19	Stratton & Woolington (1992)
1992	2.0	21,601	7/18	99	1,997,058	7/20	Stratton & Crawford (1994)
1993	2.0	14,793	7/13	87	1,292,046	7/15	Stratton & Crawford (1996)
1994	1.0	8,180	7/17	94	766,638	7/18	Gray et al. (1999)
1995	3.0	15,833	7/19	81	1,249,398	7/22	Gray et al. (1999)
1996	2.0	18,617	7/18	36	610,926	7/20	Gray et al. (1999)
1997	3.0	21,969	7/18	22	481,356	7/21	Gray et al. (1999)
1998	2.0	8,243	7/18	71	589,920	7/20	Gray et al. (1999)
1999	5.0	17,549	7/18	84	1,474,116	7/23	Gray (2000)
2000	2.0	14,901	7/20	42	557,268	7/22	West et al. (2000)
2001	3.0	25,409	7/16	32	816,222	7/19	Crawford et al. (2002)
2002	1.5	18,260	7/15	45	848,754	7/17	West (2003)
2003	2.0	21,806	7/13	32	716,892	7/15	West (2004)
2004	1.0	21,712	7/15	30	652,650	7/16	West (2007)
2005	1.0	18,673	7/19	39	725,520	7/20	West (2006)
2006	2.0	8,274	7/15	111	887,722	7/17	West (2008)
2007	3.0	19,912	7/16	122	2,406,036	7/19	Current Report

^a FPI value from travel time analysis on the final day of test fishing.

^b Cumulative spawning escapement date is last date fished at test fishing site plus travel time to tower site.

^c Three sites used from 1979–1980 located about 1 km downriver from Ugashik Village on east bank (site 1), and on the west bank about 4 km and 5 km upriver from Ugashik Village (sites 2 & 3, respectively).

^d Two sites used beginning 1981 located on east bank about 7 km upriver from Ugashik Village (site 1) and on west bank about 8 km upriver from Ugashik Village (site 2).

^e Site 1 moved to east bank about 5 km upriver from Ugashik Village and Site 2 moved to west bank about 5 km upriver from Ugashik Village.

^f Data from 1985 to present may not be comparable with those from 1979–1984 because changes were made in gillnet mesh size (from 13.65 cm to 13.02 cm) and in web material (from multifilament nylon to multistrand monofilament).

^g Site 1 moved to east bank about 8 km upriver from Ugashik Village and Site 2 moved to west bank about 8 km upriver from Ugashik Village.

APPENDIX C. DRIFT GILLNET CATCHES BY DAY AND SPECIES

Appendix C1.–Drift gillnet catches by day and species at the Kvichak inriver test fish project, 2007.

Date	Fishing	Species Catch							
	Time (min)	Sockeye Salmon	Chinook Salmon	Chum Salmon	Coho Salmon	Pink Salmon	Arctic Char	Rainbow Trout	Starry Flounder
6/22	37.1	0	0	0	0	0	0	0	0
6/23	73.1	11	0	0	0	0	0	0	0
6/24	80.6	22	0	1	0	0	0	0	0
6/25	77.4	12	0	0	0	0	0	0	0
6/26	87.2	1	0	0	0	0	0	0	0
6/27	42.7	4	0	0	0	0	0	0	0
6/28	74.8	34	2	0	0	0	0	0	0
6/29	60.9	105	0	0	0	0	0	0	0
6/30	22.1	77	0	0	0	0	0	0	0
7/01	35.6	246	1	0	0	0	0	0	0
7/02	33.5	171	0	0	0	0	0	0	0
7/03	28.8	259	0	0	0	0	0	0	0
7/04	28.4	316	0	0	0	0	0	0	0
7/05	30.2	285	1	0	0	0	0	0	0
7/06	46.5	210	0	0	0	0	0	0	0
7/07	50.1	213	1	0	0	0	0	0	0
7/08	41.8	158	0	0	0	0	0	0	0
7/09	17.6	472	0	0	0	0	0	0	0
7/10	22.9	348	0	0	0	0	0	0	0
7/11	24.8	275	1	1	0	0	0	0	0
7/12	30.4	280	0	0	0	0	0	0	0
7/13	33.9	205	1	1	0	0	0	0	0
7/14	48.8	132	0	0	0	0	0	0	0
7/15	50.9	99	0	0	0	0	0	0	0
Total		3,935	7	3	0	0	0	0	0

Appendix C2.–Drift gillnet catches by day and species at the Egegik inriver test fish project, 2007.

Date	Fishing Time (min)	Species Catch							
		Sockeye Salmon	Chinook Salmon	Chum Salmon	Coho Salmon	Pink Salmon	Arctic Char	Rainbow Trout	Starry Flounder
6/15	45.8	26	1	0	0	0	0	0	0
6/16	49.0	39	0	0	0	0	0	0	0
6/17	50.5	44	1	0	0	0	0	0	0
6/18	55.7	57	1	0	0	0	0	0	1
6/19	57.4	31	0	0	0	0	0	0	0
6/20	58.2	93	1	0	0	0	0	0	0
6/21	57.4	106	1	0	0	0	0	0	0
6/22	61.1	89	0	0	0	0	0	0	0
6/23	59.5	53	0	1	0	0	0	0	1
6/24	64.0	57	0	0	0	0	0	0	0
6/25	57.5	7	1	0	0	0	0	0	0
6/26	65.1	47	0	1	0	0	0	0	3
6/27	59.3	31	0	0	0	0	0	0	0
6/28	60.8	146	1	0	0	0	0	0	0
6/29	62.5	130	0	0	0	0	0	0	0
6/30	63.3	67	0	0	0	0	0	0	0
7/01	69.6	121	0	1	0	0	0	0	0
7/02	50.3	374	0	0	0	0	0	0	0
7/03	52.8	346	0	0	0	0	0	0	0
7/04	54.4	342	0	0	0	0	0	0	1
7/05	62.5	74	0	0	0	0	0	0	0
7/06	62.9	141	0	0	0	0	0	0	0
7/07	63.1	183	0	0	0	0	0	0	0
7/08	66.2	160	0	0	0	0	0	0	0
7/09	74.3	340	0	0	0	0	0	0	0
7/10	65.0	375	0	0	0	0	0	0	0
7/11	55.7	259	1	0	0	0	0	0	0
7/12	65.4	77	0	2	0	0	0	0	0
Total		3,815	8	5	0	0	0	0	6

Appendix C3.–Drift gillnet catches by day and species at the Ugashik inriver test fish project, 2007.

Date	Fishing	Species Catch							
	Time (min)	Sockeye Salmon	Chinook Salmon	Chum Salmon	Coho Salmon	Pink Salmon	Arctic Char	Rainbow Trout	Starry Flounder
6/25	64.7	27	1	0	0	0	0	0	0
6/26	63.3	18	1	0	0	0	0	0	0
6/27	63.2	15	0	0	0	0	0	0	0
6/28	63.3	13	1	0	0	0	1	0	0
6/29	66.3	8	1	0	0	0	0	0	0
6/30	59.0	160	0	0	0	0	0	0	0
7/01	29.8	90	0	0	0	0	0	0	0
7/02	57.0	382	1	0	0	0	0	0	0
7/03	42.9	319	0	0	0	0	0	0	0
7/04	33.4	278	0	0	0	0	0	0	0
7/05	30.7	312	0	0	0	0	0	0	0
7/06	31.9	274	0	10	0	0	0	0	0
7/07	36.1	102	0	0	0	0	0	0	0
7/08	42.7	112	0	1	0	0	0	0	0
7/09	47.8	121	0	0	0	0	0	0	0
7/10	41.3	267	0	0	0	0	0	0	0
7/11	47.7	207	1	0	0	0	0	0	0
7/12	47.8	144	2	0	0	0	0	0	0
7/13	47.9	160	0	0	0	0	0	0	0
7/14	46.8	156	0	1	0	0	0	0	0
7/15	45.0	102	0	0	0	0	0	0	0
7/16	53.1	75	0	2	0	0	0	0	0
Total		3,342	8	14	0	0	1	0	0

**APPENDIX D. KVICHAK RIVER INRIVER TEST FISHING
AND TOWER COUNT DATA, 1997–2006**

Appendix D1.—Sockeye salmon inriver test fishing data summary and comparison to tower counts, Kvichak River, 1997.

Date	Test Fishing					Estimated River Fish ^b	Observation Tower		% Error of Test Fishing Estimate	
	Fishing Time (min)	Catch (no)	Daily Index	Cum. Index	Forecasted Cumulative Escapement EPI ^a		Date Plus Travel Time ^c	Cumulative Escapement		
6/21	48.9	0	0	0	84	0	6/23	^d		
6/22	87.1	4	10	10	84	840	6/24	2,676	-69	
6/23	86.4	4	10	20	84	1,680	6/25	6,300	-73	
6/24	86.7	7	19	39	84	3,276	6/26	15,108	-78	
6/25	88.1	12	32	71	84	5,964	6/27	41,760	-86	
6/26	90.2	9	23	94	84	7,896	6/28	59,904	-87	
6/27	85.6	11	33	127	84	10,668	6/29	66,636	-84	
6/28	77.7	4	15	142	84	11,928	6/30	72,720	-84	
6/29	68.3	7	26	168	84	14,112	7/01	75,894	-81	
6/30	67.2	21	73	241	84	20,244	7/02	82,920	-76	
7/01	78.2	35	111	352	84	29,568	7/03	115,974	-75	
7/02	33.8	105	739	1,091	84	91,644	7/04	157,986	-42	
7/03	51.8	195	1,004	2,095	99	207,405	7/05	206,040	1	
7/04	42.3	227	1,304	3,399	109	370,491	7/06	299,526	24	
7/05	28.1	228	1,913	5,312	79	419,648	7/07	439,404	-4	
7/06	21.0	327	4,213	9,525	61	581,025	7/08	637,146	-9	
7/07	33.9	486	3,587	13,112	64	839,168	7/09	796,824	5	
7/08	22.9	221	2,324	15,436	67	1,034,212	7/10	949,566	9	
7/09	30.3	288	2,933	18,369	66	1,212,354	7/11	1,052,790	15	
7/10	33.5	234	1,677	20,046	59	1,182,714	7/12	1,139,928	4	
7/11	36.4	131	903	20,949	57	1,194,093	7/13	1,200,360	-1	
7/12	35.8	156	1,056	22,005	56	1,232,280	7/14	1,291,050	-5	
7/13	36.8	130	869	22,874	57	1,303,818	7/15	1,348,704	-3	
7/14	33.5	83	600	23,474	58	1,361,492	7/16	1,381,290	-1	
7/15	18.0	75	1,024	24,498	58	1,420,884	7/17	1,410,996	1	
7/16	37.9	113	730	25,228	58	1,463,224	7/18	1,434,504	2	
6/22–7/16					Mean Percent Error (MPE)					-32
					Mean Absolute Percent Error (MAPE)					37
7/03–7/16					Mean Percent Error (MPE)					3
					Mean Absolute Percent Error (MAPE)					6

^a The 1985–1996 mean escapement per index point relationship (84 EPI) was used until 3 July when lag-time relationships began to prove more accurate.

^b Estimated river fish is a subjective estimate of fish that have entered the river but have not passed the counting tower based on all available information. *Source:* Bristol Bay Salmon Fishery, preliminary sockeye salmon daily run summary, 1997.

^c Best travel time estimate at the end of the season was 2 d.

^d Observation towers not in operation.

^e No estimate river fish recorded in the test fish files or the daily run summary for this date.

Appendix D2.—Sockeye salmon inriver test fishing data summary and comparison to tower counts, Kvichak River, 1998.

Date	Test Fishing						Observation Tower		% Error of Test Fishing Estimate	
	Fishing Time (min)	Catch (no)	Daily Index	Cum. Index	EPI ^a	Forecasted Cumulative Escapement	Estimated River Fish ^b	Date Plus Travel Time ^c		Cumulative Escapement
6/21	75.5	1	4	4	81	324		6/23	^d	
6/22	51.1	0	0	4	81	324		6/24	60	440
6/23	85.5	0	0	4	81	324		6/25	84	286
6/24	83.2	2	6	10	81	810	1,000	6/26	1,020	-21
6/25	79.9	20	59	69	81	5,589	5,000	6/27	3,048	83
6/26	77.0	48	142	211	81	17,091	15,000	6/28	5,742	198
6/27	79.7	5	14	225	81	18,225	25,000	6/29	16,086	13
6/28	74.6	4	13	238	81	19,278	25,000	6/30	26,130	-26
6/29	79.5	19	53	291	76	22,116	30,000	7/01	31,758	-30
6/30	79.4	16	49	340	68	23,120	30,000	7/02	32,112	-28
7/01	79.5	264	873	1,213	58	70,354	55,000	7/03	84,348	-17
7/02	40.4	325	1,983	3,196	53	169,388	150,000	7/04	232,902	-27
7/03	21.0	131	1,497	4,693	80	375,440	300,000	7/05	417,390	-10
7/04	41.1	432	2,546	7,239	69	499,491	300,000	7/06	597,258	-16
7/05	38.1	272	1,714	8,953	84	752,052	350,000	7/07	752,646	0
7/06	38.6	175	1,076	10,029	84	842,436	275,000	7/08	832,662	1
7/07	42.4	149	853	10,882	81	881,442	150,000	7/09	979,920	-10
7/08	42.2	267	1,518	12,400	80	992,000	200,000	7/10	1,365,540	-27
7/09	26.6	476	4,673	17,073	81	1,382,913	450,000	7/11	1,795,476	-23
7/10	37.6	384	2,410	19,483	85	1,656,055	335,000	7/12	2,070,624	-20
7/11	33.0	208	1,579	21,062	95	2,000,890	250,000	7/13	2,181,300	-8
7/12	29.3	249	2,108	23,170	100	2,317,000	300,000	7/14	2,238,450	4
7/13	35.9	177	1,109	24,279	99	2,403,621	250,000	7/15	2,269,344	6
7/14	35.6	23	138	24,417	95	2,319,615	125,000	7/16	2,279,946	2
7/15	35.4	22	153	24,570	92	2,260,440	25,000	7/17	2,284,782	-1
7/16	19.8	40	471	25,041	91	2,278,731	50,000	7/18	2,290,584	-1
6/22–7/16						Mean Percent Error (MPE)				31
						Mean Absolute Percent Error (MAPE)				52
6/29–7/16						Mean Percent Error (MPE)				-11
						Mean Absolute Percent Error (MAPE)				13

^a The 1985–1997 mean escapement per index point relationship (81 EPI) was used until 29 June when lag-time relationships began to prove more accurate.

^b Estimated river fish is a subjective estimate of fish that have entered the river but have not passed the counting tower based on all available information. *Source:* Bristol Bay Salmon Fishery, preliminary sockeye salmon daily run summary, 1998.

^c Best travel time estimate at the end of the season was 2 d.

^d Observation towers not in operation.

Appendix D3.—Sockeye salmon inriver test fishing data summary and comparison to tower counts, Kvichak River, 1999.

Date	Test Fishing						Observation Tower		% Error of Test Fishing Estimate	
	Fishing Time (min)	Catch (no)	Daily Index	Cum. Index	EPI ^a	Forecasted Cumulative Escapement	Estimated River Fish ^b	Date Plus Travel Time ^c		Cumulative Escapement
6/21	8.1	0	0	0	106	0		6/25	54	
6/22	39.5	0	0	0	106	0		6/26	90	
6/23	80.9	0	0	0	106	0		6/27	180	
6/24	81.4	14	42	42	106	4,452	4,000	6/28	204	2,082
6/25	78.9	2	6	48	106	5,088	5,000	6/29	438	1,062
6/26	82.3	0	0	48	106	5,088	5,000	6/30	17,400	-71
6/27	68.7	1	4	52	106	5,512	5,000	7/01	104,850	-95
6/28	80.6	0	0	52	106	5,512	5,000	7/02	337,092	-98
6/29	70.7	298	1,322	1,374	106	145,644	150,000	7/03	748,320	-81
6/30	40.2	560	4,944	6,318	106	669,708	700,000	7/04	1,086,408	-38
7/01	18.0	653	11,383	17,701	106	1,876,306	1,800,000	7/05	1,523,532	23
7/02	23.4	378	4,095	21,796	106	2,310,376	2,000,000	7/06	1,827,804	26
7/03	19.7	282	6,631	28,427	106	3,013,262	2,100,000	7/07	2,256,162	34
7/04	14.6	649	11,439	39,866	106	4,225,796	3,000,000	7/08	2,788,716	52
7/05	9.9	251	6,091	45,957	106	4,871,442	3,000,000	7/09	3,192,648	53
7/06	25.9	237	2,348	48,305	80	3,864,400	2,000,000	7/10	3,588,606	8
7/07	32.1	85	648	48,953	79	3,867,287	1,500,000	7/11	3,804,456	2
7/08	15.0	56	945	49,898	69	3,442,962	700,000	7/12	4,032,456	-15
7/09	30.0	53	438	50,336	70	3,523,520	350,000	7/13	4,332,018	-19
7/10	31.1	38	298	50,634	76	3,848,184	300,000	7/14	4,649,838	-17
7/11	27.6	264	2,553	53,187	79	4,201,773	400,000	7/15	4,948,680	-15
7/12	26.3	446	4,751	57,938	80	4,635,040	650,000	7/16	5,111,028	-9
7/13	31.8	278	2,141	60,079	86	5,166,794	850,000	7/17	5,421,666	-5
7/14	30.6	186	1,522	61,601	86	5,297,686	650,000	7/18	5,850,216	-9
7/15	26.4	578	6,034	67,635	85	5,748,975	800,000	7/19	6,039,222	-5
7/16	23.7	475	6,090	73,725	85	6,266,625	1,100,000	7/20	6,109,500	3
6/24–7/16						Mean Percent Error (MPE)				125
6/24–7/16						Mean Absolute Percent Error (MAPE)				166
7/6–7/16						Mean Percent Error (MPE)				-7
7/6–7/16						Mean Absolute Percent Error (MAPE)				10

^a The 1985–1998 mean escapement per index point relationship (106 EPI) was used until 6 July when lag-time relationships began to prove more accurate.

^b Estimated river fish is a subjective estimate of fish that have entered the river but have not passed the counting tower based on all available information. *Source*: Bristol Bay Salmon Fishery, preliminary sockeye salmon daily run summary, 1999.

^c Best travel time estimate at the end of the season was 4 d.

Appendix D4.–Sockeye salmon inriver test fishing data summary and comparison to tower counts, Kvichak River, 2000.

Date	Test Fishing					Forecasted Cumulative Escapement	Estimated River Fish ^b	Observation Tower		% Error of Test Fishing Estimate
	Fishing Time (min)	Catch (no)	Daily Index	Cum. Index	EPI ^a			Date Plus Travel Time ^c	Cumulative Escapement	
6/21	73.5	0	0	0	105	0		6/23	108	
6/22	75.7	1	4	4	105	420		6/24	180	133
6/23	75.5	1	3	7	105	735		6/25	210	250
6/24	31.2	2	17	23	105	2,415		6/26	3,570	-32
6/25	73.0	146	668	691	105	72,555	70,000	6/27	21,474	238
6/26	58.8	155	657	1,349	105	141,645	140,000	6/28	41,886	238
6/27	31.1	2	16	1,365	105	143,325	140,000	6/29	66,486	116
6/28	48.0	206	1,196	2,561	105	268,905	250,000	6/30	143,766	87
6/29	18.0	36	284	2,845	105	298,725	400,000 ^d	7/01	214,206	39
6/30	24.5	272	3,390	6,235	105	654,675	500,000	7/02	390,126	68
7/01	25.6	406	4,407	10,641	105	1,117,305	650,000	7/03	606,708	84
7/02	34.4	69	495	11,136	49	545,664	300,000	7/04	701,700	-22
7/03	34.8	18	124	11,260	49	551,740	100,000	7/05	725,208	-24
7/04	59.6	3	12	11,272	54	608,688	10,000	7/06	731,790	-17
7/05	74.7	6	18	11,290	55	620,950	10,000	7/07	734,226	-15
7/06	73.8	0	0	11,290	56	632,240	10,000	7/08	737,634	-14
7/07	28.1	166	1,492	12,782	56	715,792	70,000	7/09	790,482	-9
7/08	29.8	136	1,107	13,889	56	777,784	100,000	7/10	869,382	-11
7/09	54.3	37	184	14,072	54	759,888	70,000	7/11	891,570	-15
7/10	32.4	195	1,561	15,633	55	859,815	100,000	7/12	1,080,930	-20
7/11	26.7	272	2,950	18,583	56	1,040,648	350,000	7/13	1,358,364	-23
7/12	^e		4,123	22,706	62	1,407,772	350,000	7/14	1,508,904	-7
7/13	17.1	311	5,295	28,001	66	1,848,066	500,000	7/15	1,650,666	12
7/14	24.6	303	3,664	31,665	53	1,678,245	500,000	7/16	1,713,084	-2
7/15	13.2	295	5,488	37,153	56	2,080,568	300,000	7/17	1,759,458	18
7/16	9.1	91	3,033	40,186	51	2,049,486	125,000	7/18	1,791,282	14
<hr/>										
6/24–7/16						Mean Percent Error (MPE)			31	
						Mean Absolute Percent Error (MAPE)			49	
<hr/>										
7/2–7/16						Mean Percent Error (MPE)			-9	
						Mean Absolute Percent Error (MAPE)			15	

^a The 1985–1999 mean escapement per index point relationship (105 EPI) was used until 2 July when lag-time relationships began to prove more accurate.

^b Estimated river fish is a subjective estimate of fish that have entered the river but have not passed the counting tower based on all available information. *Source:* Bristol Bay Salmon Fishery, preliminary sockeye salmon daily run summary, 2000.

^c Best travel time estimate at the end of the season was 2 d.

^d Afternoon drifts missed due to motor problems. Estimated River Fish (ERF) was estimated using afternoon drifts from 28 June and morning drifts from 29 June.

^e No test fishing conducted due to motor problems. Daily index was interpolated using data from 11–13 July.

Appendix D5.–Sockeye salmon inriver test fishing data summary and comparison to tower counts, Kvichak River, 2001.

Date	Test Fishing						Model Estimates									Observation Tower Cumulative Escapement	% Error of Test Fishing Estimate	
	Fishing			Forecasted			Historical Mean EPI			Travel Time EPI ^a			Negotiated EPI ^b					Published Inriver Estimate
	Time (min)	Catch (no)	Daily Index	Cum. Index	EPI ^c	Escapement	Estimated			Estimated			Estimated					
							FPI	Forecast	River Fish	Lag	FPI	River Fish	Lag	FPI	River Fish			
6/21	40.7	3	18	18	70	1,260	70	1,231	1,189						1,000	42	2,900	
6/22	70.7	1	3	21	70	1,470	70	1,467	1,167						1,000	300	390	
6/23	69.4	35	143	164	70	11,480	70	11,489	10,907						10,000	582	1,873	
6/24	61.9	54	279	443	70	31,010	70	31,008	30,270						30,000	738	4,102	
6/25	53.6	61	523	966	50	48,300	50	48,295	46,177 ^d						46,000	2,118	2,180	
6/26 ^e	49.8	63	986	1,952	50	97,600	50	90,939	85,953						85,000	4,986	1,857	
6/27 ^f	47.4	156	1,929	3,881	50	194,050	50	187,388	173,102	2	15	41,144	3	32	106,581	14,286	1,258	
6/28	49.3	82	634	4,515	23	103,845				1	11	7,183	2	23	59,856	42,480	144	
6/29	39.5	187	1,224	5,739	16	91,824				2	16	28,847	2	16	28,847	58,188	58	
6/30	11.2	65	1,398	7,137	19	135,603				2	19	49,789	2	19	49,789	85,716	58	
7/01	17.8	107	2,349	9,486	32	303,552				4	40	221,887	3	34	169,174	153,642	98	
7/02	19.4	81	1,838	11,324	32	362,368				5	66	490,776	2	36	150,112	255,924	42	
7/03	20.2	89	1,820	13,144	39	512,616				5	69	591,502	3	43	260,450	309,486	66	
7/04	17.5	172	4,027	17,171	35	600,985				5	69	788,497	2	35	204,400	395,844	52	
7/05	25.0	116	1,222	18,393	39	717,327				5	65	732,505	2	35	185,509	464,472	54	
7/06	21.9	66	871	19,264	40	770,560				4	53	416,938	2	35	72,493	594,564	30	
7/07	19.2	117	2,514	21,778	42	914,676				4	53	453,419	3	38	127,019	690,210	33	
7/08	17.5	124	3,676	25,454	40	1,018,160				3	41	286,910	2	39	240,140	747,390	36	
7/09	17.6	77	1,574	27,028	41	1,108,148				3	43	334,190	2	42	219,581	829,242	34	
7/10	20.8	79	1,184	28,212	39	1,100,268				3	40	259,384	2	37	103,042	877,932	25	
7/11	22.4	41	507	28,719	36	1,033,884				2	35	59,433	3	37	121,822	949,530	9	
7/12 ^h	22.4	41	507	29,226	35	1,022,910				2	35	35,774	2	35	35,774	994,800	3	
7/13 ^{i,j}	22.4	41	507	29,733	35	1,040,655				2	35	35,798	1	35	17,588	1,013,364	3	
7/14	25.6	2	18	29,751	35	1,041,285				2	35	18,372	2	35	18,372	1,021,356	2	
7/15	12.4	1	20	29,771	35	1,041,985				2	34	1,337	2	34	1,337	1,024,464	2	
6/21–7/15														Mean Percent Error (MPE)			612	
6/21–7/15														Mean Absolute Percent Error (MAPE)			612	
6/29–7/15														Mean Percent Error (MPE)			35	
6/29–7/15														Mean Absolute Percent Error (MAPE)			35	

-continued-

- ^a Based on the best fit as determined by the lowest sums of squares value.
- ^b Closest to published value based on input from manager, aerial surveys, and/or passage rates at tower.
- ^c The 1991–2000 mean escapement per index point relationship (70 EPI) was used until 24 June; the mean EPI was then downgraded from 70 to 50, based on an analysis of escapement versus EPI and catch rates, and the downgraded value (50 EPI) was used through 27 June. Thereafter, EPIs were based on lag-time relationships.
- ^d Inriver fish estimate based on analysis of escapement vs. EPI and catch rates similar to last year. EPI downgraded from 70 to 50.
- ^e One afternoon drift missed on 26 June due to time spent giving away fish to Levelock residents for subsistence use. Estimated River Fish (ERF) was estimated using prior afternoon drift from 26 June.
- ^f One morning drift missed on 27 June. Estimated River Fish (ERF) was estimated using the previous drift from 27 June.
- ^g Deleted all test fish data collected prior to 27 June for this analysis.
- ^h All drifts missed on 12 July due to time spent helping the genetics crew collect Alagnak River samples. Estimated River Fish (ERF) was estimated using drifts from 11 July.
- ⁱ All morning drifts were missed on 13 July due to fuel problems. Estimated River Fish (ERF) was estimated using morning drifts from 11 July.
- ^j All afternoon drifts were missed on 13 July due to the outboard motor overheating and a clogged fuel filter. Estimated River Fish (ERF) was estimated using afternoon drifts from 11 July.

Appendix D6.--Sockeye salmon inriver test fishing data summary and comparison to tower counts, Kvichak River, 2002.

Date	Test Fishing				Model Estimates						Published Inriver Estimate	Observation Tower		Daily % Error of Test Fishing Estimate					
	Fishing Time (min)	Catch (no)	Daily Index	Cum. Index	Historical Mean FPI		Travel Time FPI ^a		Negotiated FPI ^b			Inriver Estimate	Daily Esc.		Cum. Esc.				
					FPI ^c	Forecast River Fish	Lag	FPI ^c	Estimated River Fish	Lag						FPI ^c	Estimated River Fish		
																		Estimated River Fish	
6/21	35.0	0	0	0	49	0	0					162	162						
6/22	69.4	0	0	0	49	0	0					348	510						
6/23	66.6	3	11	11	49	539	0					570	1,080						
6/24	8.0	4	14	25	49	1,225	0					270	1,350						
6/25	66.1	1	3	28	49	1,372	22	1	55	186		54	1,404						
6/26	41.5	12	56	84	49	4,116	2,540	1	55	3,087		210	1,614						
6/27	54.1	87	428	512	49	25,088	23,344	2	61	29,506		162	1,776						
6/28 ^d	46.1	176	1,461	1,973				1	11	16,396	1.5	30	53,450	50,000	3,978	5,754	74		
6/29	17.9	102	1,695	3,668				1	12	28,847	1.5	28	79,422	80,000	11,796	17,550	40		
6/30	19.2	105	1,502	5,170				2	31	99,032	2.0	31	99,032	100,000	37,830	55,380	-7		
7/01	14.9	322	6,020	11,190				2	27	202,197	2.0	27	202,197	200,000	37,494	92,874	-2		
7/02 ^e	18.0	234	3,134	14,324				2	31	287,482	2.0	29	253,022	250,000	69,504	162,378	26		
7/03	16.0	201	3,072	17,396				2	27	166,262	2.0	27	166,262	170,000	137,400	299,778	86		
7/04	12.6	126	2,549	19,945				2	25	142,389	2.0	25	142,389	140,000	63,054	362,832	74		
7/05	19.0	218	3,010	22,955				1	20	58,707	1.5	21	93,050	90,000	26,184	389,016	30		
7/06	21.7	229	2,727	25,682				2	22	127,907	1.5	21	94,604	90,000	55,704	444,720	119		
7/07	17.6	145	2,305	27,987				2	21	104,457	1.5	20	83,201	80,000	31,824	476,544	78		
7/08	19.3	139	1,853	29,840				2	19	80,855	1.5	19	52,623	50,000	22,872	499,416	-14		
7/09	19.8	100	1,240	31,080				2	20	60,485	2.0	20	60,485	70,000	47,868	547,284	57		
7/10	21.9	40	477	31,557				2	19	33,047	2.0	19	25,263	25,000	27,036	574,320	-25		
7/11	12.7	7	131	31,688				2	19	11,456	2.0	19	16,363	15,000	11,394	585,714	-80		
7/12 ^f	13.2	7	654	32,342				2	19	15,120	3.0	20	38,832	45,000	22,290	608,004	-55		
7/13	17.6	98	1,372	33,714				2	21	42,604	1.5	21	41,365	35,000	58,614	666,618	68		
7/14	26.4	25	244	33,958				2	21	34,332	1.5	21	25,747	15,000	20,736	687,354	147		
7/15	24.9	22	219	34,177				2	21	9,521	2.0	21	9,521	7,000	7,626	694,980	11		
7/16															5,616	700,596			
7/17															2,940	703,536			
6/28- 7/15																		Mean Percent Error (MPE)	35
																		Mean Absolute Percent Error (MAPE)	55

-continued-

- ^a Based on the best fit as determined by the lowest sums of squares value.
- ^b Closest to published value based on input from manager, aerial surveys, and/or passage rates at tower.
- ^c A 3 year mean EPI of 49, based on a 3 year hindcasting MAPE analysis, was used through 27 June. Thereafter, EPIs were based on lag-time relationships.
- ^d Missed 2 of 4 scheduled afternoon drifts. Estimated River Fish (ERF) was estimated using index values from the previous 2 drifts.
- ^e Afternoon drifts missed due to outboard motor overheating. Estimated River Fish (ERF) was estimated using morning drifts from 2 July.
- ^f Missed evening drifts on 12 July because crew was picking up aerial survey markers upriver. Crew observed high catch rates in subsistence nets in front of Levelock on the evening of 12 July. Estimated River Fish (ERF) was estimated using morning drifts from 12 July and the average index from drifts on the morning of 13 July.

- ^a Based on the best fit as determined by the lowest sums of squares value.
- ^b Closest to published value based on input from manager, aerial surveys, and/or passage rates at tower.
- ^c A preseason calculated mean FPI of 50, based on time series relationships of FPI values used within the last 3 to 5 years, was determined to be high inseason and downgraded. A mean of the last 3 years of season ending FPIs, resulting in an FPI of 35, was used from 22 June to 23 June. The FPI was downgraded further to 20, based on catch rates similar to last year, and was used through 25 June when lag time relationships became more accurate.
- ^d Observation towers not in operation.
- ^e Missed morning drifts on 25 June. Estimated River Fish (ERF) was estimated using index values from the morning drifts on 24 June.
- ^f Only completed 2 of 4 afternoon scheduled drifts. Plane brought in replacement crewmember late.
- ^g Catch rate high on station 2 during morning drifts. Skipped last drift and interpolated by repeating station 2 index.
- ^h Catch rate high on both stations during the first 2 evening drifts. Skipped remaining drifts and interpolated by repeating index values of previous 2 drifts.
- ⁱ Catch rate high on station 2 during morning drifts. Skipped last drift and interpolated by repeating station 2 index.
- ^j Catch rates high at station 2 on 6–8 July. Skipped last drift of each drifting session and interpolated each missed drift by repeating each index from first drift at station 2.
- ^k Only 1 set of drifts were scheduled because of tide change over. Used morning drifts from 10 July to simulate evening drifts.

Appendix D8.—Sockeye salmon inriver test fishing data summary and comparison to tower counts, Kvichak River, 2004.

Date	Test Fishing				Model Estimates									Published Inriver Estimate	Observation Tower		Daily % Error of Negotiated ERF
	Fishing Time (min)	Catch (no)	Daily Index	Cum. Index	Historical Mean FPI			Travel Time FPI ^a			Negotiated FPI ^b				Daily Esc.	Cum. Esc.	
					FPI ^c	Forecast	Estimated River Fish	Lag	FPI ^c	Estimated River Fish	Lag	FPI ^c	Estimated River Fish				
6/20	104.6	18	48	48	85	4080	4080								d	d	
6/21	74.8	7	46	94	85	7,997	7,997								d	d	
6/22	68.2	0	0	94	85	7,997	7,997								d	d	
6/23	68.8	86	312	406	85	34,513	34,123								390	390	
6/24	59.8	44	178	584	85	49,624	48,520						50,000	714	1,104		
6/25	61.7	10	42	626				3.0	50	26,399	3.0	50	26,399	27,000	3,570	4,674	-45
6/26	54.9	3	14	640				3.0	55	12,879	3.0	50	9,551	10,000	19,290	23,964	-83
6/27	60.1	11	45	685				3.0	75	7,468	3.0	75	7,468	8,000	23,364	47,328	-98
6/28	23.7	133	1,492	2,177				3.0	78	120,209	2.0	76	116,839	115,000	4,992	52,320	-61
6/29 ^e	35.0	322	2,951	5,128				3.0	120	820,157	1.5	76	492,689	400,000	28,038	80,358	4
6/30	21.7	365	5,136	10,264				2.0	160	1,313,669	2.0	150	1,212,897	1,200,000	270,870	351,228	94
7/01	34.0	161	2,563	12,827				2.0	148	1,172,632	2.0	142	1,097,700	1,000,000	410,034	761,262	240
7/02 ^f	26.6	250	6,818	19,645				1.0	76	517,519	1.0	76	517,519	500,000	216,042	977,304	383
7/03	20.7	225	4,654	24,299				2.0	84	966,578	1.5	66	523,110	500,000	107,070	1,084,374	35
7/04 ^g	23.4	244	4,065	28,364				1.0	54	219,337	1.0	54	219,337	200,000	230,514	1,314,888	-30
7/05 ^g	18.8	375	9,657	38,021				1.0	69	842,851	1.0	66	733,014	700,000	315,216	1,630,104	317
7/06 ^{f,g}	8.9	489	13,160	51,181				2.0	77	1,746,312	1.5	65	1,211,581	1,200,000	175,680	1,805,784	87
7/07	9.4	322	8,376	59,557				2.0	65	1,539,818	1.5	53	866,843	900,000	350,016	2,155,800	0
7/08 ^{g,h}	23.8	221	3,561	63,118				2.0	59	708,200	1.5	54	397,428	400,000	598,722	2,754,522	-46
7/09	17.9	312	6,071	69,189				2.0	60	579,727	2.0	64	825,089	800,000	543,888	3,298,410	20
7/10	20.5	197	3,762	72,951				2.0	63	622,072	2.0	61	468,002	500,000	393,456	3,691,866	-10
7/11 ⁱ	7.8	319	10,037	82,988				2.0	62	853,210	2.0	62	853,210	800,000	291,966	3,983,832	29
7/12 ^j	12.6	260	5,370	88,358				2.0	62	951,529	2.0	62	951,529	900,000	227,874	4,211,706	22
7/13	14.3	279	5,025	93,383				2.0	59	617,122	2.0	59	617,122	600,000	432,930	4,644,636	11
7/14	14.8	291	5,185	98,568				2.0	60	609,872	1.5	58	447,273	400,000	349,326	4,993,962	64
7/15	36.5	105	757	99,325				2.0	59	348,742	2.0	58	283,100	250,000	208,080	5,202,042	66
7/16	27.2	151	2,232	101,557				2.0	57	169,812	2.0	56	125,794	130,000	129,144	5,331,186	24
7/17															41,892	5,373,078	
7/18															59,766	5,432,844	
6/25–7/16						Mean		2.1	75.1		1.9	69.7				MPE ^k	49
						Median		2.0	62.5		2.0	62.0				MAPE ^k	84

-continued-

- ^a Based on the best fit as determined by the lowest sums of squares value.
- ^b Closest to published value based on input from manager, aerial surveys, and/or passage rates at tower.
- ^c The preseason FPI of 85 was based on the season ending FPI in 1999. 2004 had a similar run projection of an inshore return and age composition as that which occurred in 1999. The preseason FPI of 85 was used through 24 June. Thereafter, FPIs were based on lag-time relationships.
- ^d Observation towers not in operation.
- ^e Missed evening drifts on 29 June because of a problem with the outboard motor. Interpolated these data by repeating Index values from morning drifts.
- ^f The expected number of inriver fish calculated by the average index of 6,818 on 2 July was not observed several days later at the tower. The daily index on 6 July was adjusted to a value of 2,000 to help stabilize the model for the remainder of the inriver estimates.
- ^g Catch rate high on station 2 during evening drifts. Skipped last drift and interpolated by repeating station 2 index.
- ^h Missed Set No. 137 through 140 because of a problem with the lower unit on the outboard motor. Used average index values (9,979, 16,457, 9,240, and 10,330) from evening drifts on 6 July and morning drifts from 7 July to estimate the ERF for 8 July. Used the average index values from morning drifts on 7 July and morning drifts on 8 July to estimate the ERF for 9 July and beyond.
- ⁱ Only 1 set of drifts were scheduled because of tide change over. Used morning drifts from 12 July to simulate evening drifts.
- ^j Catch rate high on station 2 during morning drifts. Skipped last drift and interpolated by repeating station 2 index.
- ^k MPE = Mean Percent Error, MAPE = Mean Absolute Percent Error.

Appendix D9.–Sockeye salmon inriver test fishing data summary and comparison to tower counts, Kvichak River, 2005.

Date	Test Fishing				Model Estimates									Published Inriver Estimate	Observation Tower		Daily % Error of Negotiated ERF
	Fishing Time (min)	Catch No.	Daily Index	Cum. Index	Historical Mean FPI			Travel Time FPI ^a			Negotiated FPI ^b				Daily Esc.	Cum. Esc.	
					FPI ^c	Forecast	Estimated River Fish	Lag	FPI ^c	Estimated River Fish	Lag	FPI ^c	Estimated River Fish				
6/20															144	144	
6/21	80.9	2	6	6	41	238	0								126	270	
6/22 ^d	54.4	0	0	6	41	238	0								402	672	
6/23	88.7	0	0	6	41	238	0								426	1,098	
6/24	87.5	0	0	6	41	238	0								336	1,434	
6/25	88.3	0	0	6	41	238	0								420	1,854	
6/26	85.2	4	11	17	41	687	0								204	2,058	
6/27	88.6	4	11	28	41	1,134	0								1,938	3,996	
6/28	81.3	33	104	132	41	5,070	0						50,000		22,410	26,406	
6/29 ^e	38.3	334	2,749	2,881				2.0	1,108	5,549,592	2.0	30	120,411	100,000	4,242	30,648	-27
7/30 ^{e,f}	15.9	262	3,937	6,818				2.0	509	6,839,636	2.0	20	208,174	200,000	32,310	62,958	-36
7/01 ^e	15.8	328	4,753	11,572				1.0	14	132,975	1.5	25	375,844	375,000	131,670	194,628	28
7/02 ^e	14.6	317	4,990	16,562				1.0	17	160,643	1.5	23	357,542	350,000	191,190	385,818	22
7/03 ^{e,g}	21.7	356	3,911	20,473				2.0	26	531,190	1.5	21	316,887	300,000	206,346	592,164	35
7/04 ^{e,g}	18.0	343	4,584	25,057				2.0	24	633,150	1.0	17	239,584	200,000	172,584	764,748	94
7/05 ^g	21.0	396	4,478	29,535				1.0	27	240,764	1.0	25	161,697	150,000	123,630	888,378	64
7/06 ^g	19.0	364	4,647	34,182				1.0	23	218,359	1.0	22	141,654	100,000	98,496	986,874	-14
7/07	6.0	235	5,938	40,120				1.0	22	133,349	1.0	22	133,349	130,000	165,186	1,152,060	-43
7/08	16.2	242	3,629	43,748				1.0	35	125,454	1.5	38	275,400	250,000	234,966	1,387,026	8
7/09	15.1	225	3,574	47,322				1.0	36	128,828	1.5	37	173,997	170,000	189,894	1,576,920	-21
7/10	18.4	239	2,945	50,267				1.0	36	106,264	1.5	37	152,073	150,000	130,872	1,707,792	-40
7/11	25.3	339	3,165	53,432				2.0	40	243,439	1.5	39	198,215	225,000	177,822	1,885,614	-1
7/12	21.2	274	3,119	56,551				2.0	41	254,570	1.5	39	169,174	150,000	150,690	2,036,304	34
7/13	26.0	134	1,449	57,999				2.0	40	182,642	1.0	38	54,727	90,000	100,140	2,136,444	6
7/14	52.5	160	731	58,731				1.0	38	27,583	1.0	38	27,583	40,000	51,498	2,187,942	11
7/15	26.3	61	557	59,287				1.0	38	20,972	1.0	38	20,972	20,000	24,750	2,212,692	-15
7/16															24,558	2,237,250	
7/17															17,760	2,255,010	
Total	1,026.2	4,652	59,287					Mean	1.4	122.0		1.4	29.9			MPE ^h	6
								Median	1.0	36.0		1.5	30.0			MAPE ^h	29

-continued-

- ^a Based on the best fit as determined by the lowest sums of squares value.
- ^b Closest to published value based on input from manager, aerial surveys, and/or passage rates at tower.
- ^c The mean FPI of 41, based on median FPIs from 2000–2004, was used through 28 June. Thereafter, FPIs were based on lag-time relationships.
- ^d Missed morning drifts on 22 June because of a problem with running line. No interpolation completed for missed drifts.
- ^e Indexes for 29 June–4 July were calculated incorrectly inseason. The corrected indexes are presented here but the FPIs and ERFs are what we used inseason.
- ^f Only one set of drifts were scheduled because of tide change over. Used morning drifts from 1 July to simulate evening drifts.
- ^g ERFs for 8 July and the remainder of the season were calculated by doubling mean fishing times for all test fish sets between 3 July and 6 July to account for possible Alagnak fish caught at the inriver test sites. Test fish indexes were reduced from 7,317 to 3,911 for 3 July, 9,168 to 4,584 for 4 July, 8,956 to 4,478 for 5 July and 9,294 to 4,647 for 6 July.
- ^h MPE = Mean Percent Error, MAPE = Mean Absolute Percent Error.

Appendix D10.--Sockeye salmon inriver test fishing data summary and comparison to tower counts, Kvichak River, 2006.

Date	Test Fishing				Model Estimates						Published Inriver Estimate	Observation Tower		Daily % Error of Negotiated ERF			
	Fishing Time (min)	Catch (no)	Daily Index	Cum. Index	Historical Mean FPI		Travel Time FPI ^a		Negotiated FPI ^b			Daily Esc.	Cum. Esc.				
					FPI ^c	Forecast	Estimated River Fish	Lag	FPI ^c	Estimated River Fish					Lag	FPI ^c	Estimated River Fish
6/19													0	0			
6/20													0	0			
6/21													12	12			
6/22	50.2	0	0	0	36	0	0						84	96			
6/23	60.1	1	4	4	36	150	0						126	222			
6/24 ^d	64.8	1	3	7	36	264	0						240	462			
6/25	59.9	0	0	7	36	264	0						276	738			
6/26	68.4	0	0	7	36	264	0						300	1,038			
6/27	76.0	32	123	130	36	4,680	3,348						294	1,332			
6/28	61.0	48	218	348				1.0	19	4,118	1.0	19	4,118	4,000	1,164	2,496	-42
6/29	52.4	51	334	683				1.0	28	9,199	1.0	28	9,199	9,000	7,080	9,576	-35
6/30	26.8	57	575	1,258				2.0	68	61,962	1.5	38	24,086	25,000	14,142	23,718	-73
7/01 ^e	35.5	73	583	1,841				3.0	194	289,235	1.5	76	74,311	75,000	43,728	67,446	-51
7/02 ^f	46.7	88	453	2,294				3.0	228	366,835	2.0	124	128,042	125,000	87,942	155,388	-34
7/03	31.7	198	1,950	4,244				3.0	224	668,981	1.5	127	257,304	250,000	126,306	281,694	111
7/04	14.5	269	4,946	9,190				2.0	152	1,047,086	2.0	73	350,146	300,000	66,600	348,294	-14
7/05 ^g	10.2	111	2,657	11,847				3.0	200	1,910,275	2.5	73	406,168	400,000	110,376	458,670	-38
7/06	15.9	34	729	12,576				3.0	178	1,479,795	2.0	88	352,936	350,000	295,092	753,762	-24
7/07	27.0	218	3,146	15,722				2.0	85	328,965	2.0	93	456,274	450,000	252,084	1,005,846	-17
7/08	26.5	168	1,966	17,687				2.0	97	494,040	2.0	92	411,686	400,000	209,712	1,215,558	-38
7/09	27.6	142	1,334	19,021				2.0	99	326,381	2.0	103	404,001	400,000	339,624	1,555,182	-32
7/10 ^h	33.3	128	1,056	20,077				2.0	106	253,688	2.0	111	350,729	350,000	322,632	1,877,814	-22
7/11 ⁱ	18.0	72	1,141	21,218				2.0	113	248,735	2.0	118	350,480	350,000	275,478	2,153,292	12
7/12	29.2	94	1,253	22,471				2.0	116	277,525	2.0	113	212,083	200,000	173,874	2,327,166	2
7/13															140,334	2,467,500	
7/14															68,142	2,535,642	
Total	785.3	1,785	22,471					Mean	2.2	127		1.8	85			MPE ^j	-20
								Median	2.0	113		2.0	92			MAPE ^j	36

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- ^a Based on the best fit as determined by the lowest sums of squares value.
- ^b Closest to published value based on input from manager, aerial surveys, and/or passage rates at tower.
- ^c The mean FPI of 36, based on median FPIs from 20012005, was used through 27 June. Thereafter, FPIs were based on lag-time relationships.
- ^d Missed morning drifts on 24 June. Used morning drifts from 23 June to represent missed drifts.
- ^e Only able to complete the first 2 drifts at station 1 because of fuel hose problem. Used morning station 2 drifts to represent missed afternoon station 2 drifts.
- ^f Missed morning drifts because crew was setting out aerial survey markers. Used morning drifts from 1 July to represent missed drifts.
- ^g Only one set of drifts were scheduled because of tide change over. Averaged morning drifts from 4 July and 6 July to simulate 5 July morning drifts.
- ^h Missed morning drift session entirely and only able to complete drifts at station 2 during the evening tide because of motor problems. Used morning drifts and evening station 1 drifts from 9 July to estimate ERF.
- ⁱ Missed morning drift session entirely and only able to complete drifts at station 2 during the evening tide because of severe winds and waves. Did not interpolate missed morning drifts but averaged the evening station 1 drifts from 9 July and the morning drifts from 12 July to estimate the missed evening drifts at station 1.
- ^j MPE = Mean Percent Error, MAPE = Mean Absolute Percent Error.

**APPENDIX E. EGEGIK RIVER INRIVER TEST FISHING
AND TOWER COUNT DATA, 1997–2006**

Appendix E1.—Sockeye salmon inriver test fishing data summary and comparison to tower counts, Egegik River, 1997.

Date	Test Fishing					Forecasted Cumulative Escapement	Estimated River Fish ^b	Observation Tower		% Error of Test Fishing Estimate
	Fishing Time (min)	Catch (no)	Daily Index	Cum. Index	EPI ^a			Date Plus Travel Time ^c	Cumulative Escapement	
6/15	14.6	18	279	279	80	22,320		6/17	^d	
6/16	34.9	78	498	777	80	62,160		6/18	^d	
6/17	47.0	116	640	1,417	80	113,360		6/19	14,634	675
6/18	25.1	66	742	2,159	80	172,720		6/20	40,734	324
6/19	50.9	124	634	2,793	80	223,440		6/21	54,300	311
6/20	49.3	72	350	3,143	80	251,440		6/22	89,130	182
6/21	49.3	135	652	3,795	80	303,600		6/23	99,702	205
6/22	52.9	71	363	4,158	80	332,640	100,000	6/24	105,960	214
6/23	47.1	52	260	4,418	31	136,958	40,000	6/25	112,284	22
6/24	48.3	32	183	4,601	27	124,227	23,000	6/26	119,694	4
6/25	44.7	30	165	4,766	26	123,916	16,000	6/27	144,858	-14
6/26	52.0	36	171	4,937	27	133,299	15,000	6/28	187,494	-29
6/27	42.6	74	452	5,389	31	167,059	25,000	6/29	231,528	-28
6/28	48.9	79	422	5,811	40	232,440	50,000	6/30	266,094	-13
6/29	45.3	94	649	6,460	42	271,320	46,000	7/01	282,390	-4
6/30	47.0	89	514	6,974	42	292,908	50,000	7/02	289,008	1
7/01	53.9	23	103	7,077	45	318,465	40,000	7/03	302,622	5
7/02	23.4	66	775	7,852	43	337,636	50,000	7/04	310,578	9
7/03	55.1	89	454	8,306	42	348,852	50,000	7/05	319,830	9
7/04	51.9	74	378	8,684	40	347,360	50,000	7/06	338,082	3
7/05	50.2	107	875	9,559	38	363,242	50,000	7/07	508,746	-29
7/06	36.8	131	1,351	10,910	38	414,580	85,000	7/08	636,552	-35
7/07	33.2	380	3,853	14,763	49	723,387	230,000	7/09	675,780	7
7/08	44.6	163	968	15,731	49	770,819	150,000	7/10	688,032	12
7/09	52.8	178	921	16,652	43	716,036	60,000	7/11	864,228	-17
7/10	45.0	174	1,299	17,951	43	771,893	100,000	7/12	945,528	-18
7/11	47.0	223	1,486	19,437	50	971,850	125,000	7/13	1,013,658	-4
7/12	45.7	111	699	20,136	52	1,047,072	75,000	7/14	1,051,500	0
6/17–7/12						Mean Percent Error (MPE)			69	
6/17–7/12						Mean Absolute Percent Error (MAPE)			84	
6/23–7/12						Mean Percent Error (MPE)			-6	
6/23–7/12						Mean Absolute Percent Error (MAPE)			13	

^a The 1985–1996 mean escapement per index point relationship (80 EPI) was used until 23 June when lag-time relationships began to prove more accurate.

^b Estimated river fish is a subjective estimate of fish that have entered the river but have not passed the counting tower based on all available information. *Source*: Bristol Bay Salmon Fishery, preliminary sockeye salmon daily run summary, 1997.

^c Best travel time estimate at the end of the season was 2 d.

^d Observation towers not in operation.

Appendix E2.—Sockeye salmon inriver test fishing data summary and comparison to tower counts, Egegik River, 1998.

Date	Test Fishing						Observation Tower		% Error of Test Fishing Estimate	
	Fishing Time (min)	Catch (no)	Daily Index	Cum. Index	EPI ^a	Forecasted Cumulative Escapement	Estimated River Fish ^b	Date Plus Travel Time ^c		Cumulative Escapement
6/14	28.9	17	127	127	72	9,144		6/17	^d	
6/15	51.4	66	327	454	72	32,688		6/18	24	136,100
6/16	56.0	45	227	681	72	49,032	45,000	6/19	216	22,600
6/17	56.7	18	82	763	72	54,936	50,000	6/20	2,232	2,361
6/18	54.5	20	89	852	72	61,344	50,000	6/21	3,780	1,523
6/19	59.5	24	94	946	72	68,112	58,000	6/22	4,914	1,286
6/20	59.3	27	108	1,054	72	75,888	50,000	6/23	19,980	280
6/21	59.8	64	266	1,320	72	95,040	^e	6/24	41,178	131
6/22	25.6	108	1,044	2,364	72	170,208	80,000	6/25	68,652	148
6/23	66.9	83	290	2,654	72	191,088	80,000	6/26	90,600	111
6/24	55.6	152	773	3,427	46	157,642	100,000	6/27	122,994	28
6/25	73.6	257	870	4,297	46	197,662	90,000	6/28	148,452	33
6/26	52.0	82	392	4,689	41	192,249	100,000	6/29	198,480	-3
6/27	58.5	154	835	5,524	41	226,484	100,000	6/30	244,722	-7
6/28	57.4	46	187	5,711	41	234,151	75,000	7/01	340,398	-31
6/29	50.6	192	1,184	6,895	43	296,485	100,000	7/02	425,676	-30
6/30	38.1	298	2,173	9,068	45	408,060	160,000	7/03	439,296	-7
7/01	65.7	62	238	9,306	55	511,830	170,000	7/04	489,732	5
7/02	64.5	34	122	9,428	55	518,540	90,000	7/05	504,582	3
7/03	51.6	110	721	10,149	43	436,407	90,000	7/06	575,598	-24
7/04	63.3	94	392	10,541	55	579,755	90,000	7/07	677,466	-14
7/05	47.0	231	1,332	11,873	54	641,142	130,000	7/08	713,742	-10
7/06	26.3	107	1,862	13,735	57	782,895	200,000	7/09	731,004	7
7/07	56.7	80	347	14,082	62	873,084	200,000	7/10	776,106	12
7/08	56.0	48	203	14,285	60	857,100	150,000	7/11	835,200	3
7/09	62.6	31	120	14,405	58	835,490	100,000	7/12	859,476	-3
7/10	62.4	79	318	14,723	63	927,549	70,000	7/13	889,242	4
7/11	58.9	151	682	15,405	61	939,705	60,000	7/14	953,022	-1
7/12	73.2	29	99	15,504	61	945,744	50,000	7/15	1,018,110	-7
7/13	60.4	208	972	16,476	65	1,070,940	150,000	7/16	1,032,480	4
6/15–7/13						Mean Percent Error (MPE)			5,672	
6/15–7/13						Mean Absolute Percent Error (MAPE)			5,682	
6/24–7/13						Mean Percent Error (MPE)			-2	
6/24–7/13						Mean Absolute Percent Error (MAPE)			12	

^a The 1985–1997 mean escapement per index point relationship (72 EPI) was used until 24 June when lag-time relationships began to prove more accurate.

^b Estimated river fish is a subjective estimate of fish that have entered the river but have not passed the counting tower based on all available information. *Source*: Bristol Bay Salmon Fishery, preliminary sockeye salmon daily run summary, 1998.

^c Best travel time estimate at the end of the season was 2 d.

^d Observation towers not in operation.

^e No inriver fish estimate published on this date.

Appendix E3.—Sockeye salmon inriver test fishing data summary and comparison to tower counts, Egegik River, 1999.

Date	Test Fishing					Estimated River Fish ^b	Observation Tower		% Error of Test Fishing Estimate
	Fishing Time (min)	Catch (no)	Daily Index	Cum. Index	EPI ^a		Forecasted Cumulative Escapement	Date Plus Travel Time ^c	
6/14	28.6	5	41	41	62	2,542	6/19	0	
6/15	59.9	10	42	83	62	5,146	6/20	0	
6/16	63.1	9	31	114	62	7,068	6/21	24	29,350
6/17	59.5	51	199	313	62	19,406	6/22	48	40,329
6/18	62.7	151	574	887	62	54,994	6/23	114	48,140
6/19	62.1	77	285	1,172	62	72,664	6/24	144	50,361
6/20	62.3	115	512	1,684	62	104,408	6/25	162	64,349
6/21	63.9	92	339	2,023	62	125,426	6/26	240	52,161
6/22	61.9	37	146	2,169	62	134,478	6/27	690	19,390
6/23	37.1	80	486	2,655	62	164,610	6/28	750	21,848
6/24	49.5	134	652	3,307	62	205,034	6/29	3,720	5,412
6/25	56.5	75	312	3,619	62	224,378	6/30	9,318	2,308
6/26	61.1	9	29	3,648	62	226,176	7/01	65,718	244
6/27	54.3	160	802	4,450	62	275,900	7/02	126,720	118
6/28	32.8	212	1,636	6,086	62	377,332	7/03	338,682	11
6/29	55.3	264	1,167	7,253	62	449,686	7/04	437,118	3
6/30	53.1	352	1,627	8,880	62	550,560	7/05	536,760	3
7/01	39.4	377	2,624	11,504	62	713,248	7/06	710,244	0
7/02	50.2	313	1,790	13,294	62	824,228	7/07	973,116	-15
7/03	27.2	270	2,891	16,185	62	1,003,470	7/08	1,136,394	-12
7/04	24.1	209	2,230	18,415	62	1,141,730	7/09	1,330,404	-14
7/05	34.7	72	480	18,895	62	1,171,490	7/10	1,472,382	-20
7/06	25.6	99	916	19,811	62	1,228,282	7/11	1,562,754	-21
7/07	64.5	30	97	19,908	75	1,493,100	7/12	1,648,578	-9
7/08	76.8	11	33	19,941	75	1,495,575	7/13	1,671,756	-11
7/09	52.0	9	38	19,979	75	1,498,425	7/14	1,688,616	-11
7/10						50,000 ^d	7/15	1,708,188	
7/11	17.6	8	109	20,088	82	1,647,216	7/16	1,716,000	-4
7/12	41.4	37	214	20,302	82	1,664,764	7/17	1,727,772	-4
7/13	31.8	39	266	20,568	82	1,686,576	7/18	1,727,772	-2
6/16–7/13						Mean Percent Error (MPE)			12,367
6/16–7/13						Mean Absolute Percent Error (MAPE)			12,376
7/7–7/13						Mean Percent Error (MPE)			-7
7/7–7/13						Mean Absolute Percent Error (MAPE)			7

^a The 1986–1998 mean escapement per index point relationship (62 EPI) was used until 7 July when lag-time relationships began to prove more accurate.

^b Estimated river fish is a subjective estimate of fish that have entered the river but have not passed the counting tower based on all available information. *Source:* Bristol Bay Salmon Fishery, preliminary sockeye salmon daily run summary, 1999.

^c Best travel time estimate at the end of the season was 5 d.

^d 1999 Bristol Bay Salmon Data, 3-ring binder notebook, Egegik R Test Fish section.

Appendix E4.—Sockeye salmon inriver test fishing data summary and comparison to tower counts, Egegik River, 2000.

Date	Test Fishing						Observation Tower		% Error of Test Fishing Estimate	
	Fishing Time (min)	Catch (no)	Daily Index	Cum. Index	EPI ^a	Forecasted Cumulative Escapement	Estimated River Fish ^b	Date Plus Travel Time ^c		Cumulative Escapement
6/14	37.4	2	13	13	77	1,001		6/16	d	
6/15	71.0	10	33	46	77	3,542		6/17	d	
6/16	78.5	12	37	83	77	6,391		6/18	d	
6/17	67.0	40	151	234	77	18,018		6/19	6,234	189
6/18	67.6	94	335	569	77	43,813	40,000	6/20	12,330	255
6/19	66.5	187	683	1,252	77	96,404	96,000	6/21	21,348	352
6/20	53.3	88	406	1,658	77	127,666	113,000	6/22	28,776	344
6/21	72.2	51	177	1,835	77	141,295	120,000	6/23	42,750	231
6/22	68.4	15	52	1,887	77	145,299	100,000	6/24	91,734	58
6/23	64.3	20	86	1,973	77	151,921	100,000	6/25	185,790	-18
6/24	31.0	340	3,294	5,267	77	405,559	300,000	6/26	345,258	17
6/25	54.3	231	1,391	6,658	77	512,666	300,000	6/27	547,164	-6
6/26	74.0	39	123	6,781	77	522,137	200,000	6/28	592,398	-12
6/27	35.5	19	128	6,909	77	531,993	20,000	6/29	610,608	-13
6/28	70.5	28	95	7,004	77	539,308	40,000	6/30	618,366	-13
6/29	71.7	73	231	7,235	90	651,150	40,000	7/01	641,946	1
6/30	71.1	66	220	7,455	89	663,495	40,000	7/02	651,606	2
7/01	69.6	17	57	7,512	91	683,592	40,000	7/03	675,546	1
7/02	67.6	60	218	7,730	87	672,510	30,000	7/04	697,440	-4
7/03	72.9	4	14	7,744	90	696,960	25,000	7/05	763,170	-9
7/04	53.0	300	1,912	9,656	90	869,040	185,000	7/06	779,808	11
7/05	66.4	86	302	9,958	98	975,884	150,000	7/07	786,168	24
7/06	66.1	15	55	10,013	80	801,040	30,000	7/08	792,000	1
7/07	61.4	9	34	10,047	78	783,666	7,000	7/09	795,906	-2
7/08	73.0	15	47	10,094	79	797,426	7,000	7/10	805,986	-1
7/09	68.1	39	136	10,230	79	808,170	10,000	7/11	855,006	-5
7/10	72.1	293	1,000	11,230	79	887,170	10,000	7/12	917,130	-3
7/11	83.1	238	744	11,974	83	993,842	100,000	7/13	962,082	3
7/12	33.3	132	947	12,921	81	1,046,601	125,000	7/14	1,011,306	3
7/13	79.5	200	593	13,514	80	1,081,120	125,000	7/15	1,024,800	5
6/17–7/13						Mean Percent Error (MPE)				52
						Mean Absolute Percent Error (MAPE)				59
6/29–7/13						Mean Percent Error (MPE)				2
						Mean Absolute Percent Error (MAPE)				5

^a The 1985–1999 mean escapement per index point relationship (77 EPI) was used until 29 June when lag-time relationships began to prove more accurate.

^b Estimated river fish is a subjective estimate of fish that have entered the river but have not passed the counting tower based on all available information. *Source:* Bristol Bay Salmon Fishery, preliminary sockeye salmon daily run summary, 2000.

^c Best travel time estimate at the end of the season was 2 d.

^d Observation towers not in operation.

Appendix E5.--Sockeye salmon inriver test fishing data summary and comparison to tower counts, Egegik River, 2001.

Date	Test Fishing						Model Estimates								Published Inriver Estimate	Observation Tower Cumulative Escapement	% Error of Test Fishing Estimate	
	Fishing		Daily Index	Cum. Index	EPI ^c	Forecasted Cumulative Escapement	Historical Mean EPI			Travel Time EPI ^a		Negotiated EPI ^b						
	Time (min)	Catch (no)					FPI	Forecast	Estimated River Fish	Lag	FPI	Estimated River Fish	Lag	FPI				Estimated River Fish
6/14	55.6	26	118	118	76	8,968	76	8,962	8,962									d
6/15	57.7	13	46	164	76	12,464	76	12,478	12,478									d
6/16	64.9	52	177	341	76	25,916	76	25,930	25,930									d
6/17	38.9	62	380	721	76	54,796	76	54,812	54,812									d
6/18	64.5	99	339	1,060	76	80,560	76	80,541	63,753						80,000		16,788	380
6/19	62.0	157	591	1,651	76	125,476	76	125,434	98,602	1	25	14,956	3	79	102967	100,000	26,832	368
6/20	67.4	155	510	2,161	64	138,304	64	138,274	100,780 ^e	1	23	11,587	3	52	74827	100,000	37,494	269
6/21	71.8	188	563	2,724	64	174,336	64	174,325	125,503	1	23	12,729	3	46	76,662	75,000	48,822	257
6/22	63.8	159	527	3,251	64	208,064	64	208,047	82,863	5	174	439,067	2	58	63,168	80,000	125,184	66
6/23	69.5	89	273	3,524	64	225,536	64	225,499	48,511	5	167	411,454	2	65	51,956	48,000	176,988	27
6/24	67.3	146	522	4,046	64	258,944	64	258,915	45,765	4	99	185,970	2	66	52,116	45,000	213,150	21
6/25	53.2	306	1,401	5,447	64	348,608	64	348,554	116,498	4	85	231,928	2	66	126,663	110,000	232,056	50
6/26	51.1	250	1,295	6,742	64	431,488	64	431,418	156,396	4	85	295,280	2	68	183,235	125,000	275,022	57
6/27	63.6	24	97	6,839	59	403,501	64	437,600	116,702	5	99	354,069	2	59	81,981	90,000	320,898	26
6/28	67.9	120	403	7,242	62	449,004				2	62	30,711	2	62	30,711	30,000	414,636	8
6/29	58.8	131	612	7,854	69	541,926				2	69	76,691	2	69	76,691	75,000	465,288	16
6/30	67.7	119	389	8,243	69	568,767				2	69	69,397	2	69	69,397	60,000 ^f	501,978	13
7/01	38.4	103	581	8,824	67	591,208				3	72	113,434	2	66	64,150	70,000	519,126	14
7/02	67.3	110	358	9,182	64	587,648				2	65	60,721	2	65	60,721	50,000	532,944	10
7/03	45.0	212	1,145	10,327	61	629,947				2	62	92,701	2	62	92,701	80,000	544,278	16
7/04	59.8	228	932	11,259	59	664,281				2	60	125,233	2	60	125,233	100,000	553,698	20
7/05	54.5	368	1,820	13,079	60	784,740				3	68	263,360	2	60	165,354	160,000	620,544	26
7/06	49.1	263	1,319	14,398	61	878,278				2	64	199,903	2	64	199,903	175,000	717,006	22
7/07	51.1	171	797	15,195	62	942,090				2	63	134,123	2	63	134,123	120,000	828,834	14
7/08	50.8	167	775	15,970	62	990,140				2	62	97,513	2	62	97,513	100,000	892,524	11
7/09	64.4	60	165	16,135	61	984,235				2	61	59,169	2	61	59,169	60,000	932,322	6
7/10	70.4	40	137	16,272	60	976,320				2	59	17,833	2	59	17,833	30,000	942,774	4
7/11	64.8	9	34	16,306	59	962,054				1	58	1,956	2	59	9,996	15,000	946,224	2
7/12	61.7	20	75	16,381	58	950,098				1	58	4,339	2	58	6,306	5,000	946,878	0
6/18-7/12															Mean Percent Error (MPE)			68
															Mean Absolute Percent Error (MAPE)			68
6/28-7/12															Mean Percent Error (MPE)			12
															Mean Absolute Percent Error (MAPE)			12

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Appendix E5.–Page 2 of 2.

- ^a Based on the best fit as determined by the lowest sums of squares value.
- ^b Closest to published value based on input from manager, aerial surveys, and/or passage rates at tower.
- ^c The 1991–2000 mean escapement per index point relationship (76 EPI) was used until 19 June; the mean EPI was then downgraded from 76 to 64, based on an analysis of escapement versus EPI and catch rates, and the downgraded value (64 EPI) was used through 28 June when lag-time relationships became more accurate.
- ^d Observation towers not in operation.
- ^e Historical mean EPI downgraded from 76 to 64 based on analysis of escapement vs. EPI (personal communication, Lowell Fair, Commercial Fisheries Biologist, ADF&G, Anchorage).
- ^f Inriver fish estimate based on 8:00 am, 7/01, aerial survey and 2-day lag time estimate

Appendix E6.—Sockeye salmon inriver test fishing data summary and comparison to tower counts, Egegik River, 2002.

Date	Test Fishing				Model Estimates									Published Inriver Estimate	Observation Daily Esc.	Tower Cum. Esc.	Daily % Error of Test Fishing Estimate		
	Fishing Time (min)	Catch (no)	Daily Index	Cum. Index	Historical Mean FPI			Travel Time FPI ^a			Negotiated FPI ^b								
					FPI ^c	Forecast	Estimated River Fish	Lag	FPI ^c	Estimated River Fish	Lag	FPI ^c	Estimated River Fish						
6/14	61.8	3	12	12	67	783	783									d	d		
6/15	63.1	55	205	217	67	14,510	14,510									d	d		
6/16	64.5	54	199	416	67	27,829	27,829									d	d		
6/17	57.1	118	420	836	67	55,994	55,994							55,000		d	d		
6/18	66.0	65	224	1,060	67	71,005	62,053	3.0	41	34,854				65,000	8,952	8,952			
6/19	60.2	11	40	1,100	67	73,653	60,237	3.0	32	22,091				60,000	4,464	13,416			
6/20	60.5	11	44	1,144	67	76,605	40,113	3.0	44	13,432	3.5	58	29802	30,000	23,076	36,492	-47		
6/21	33.0	6	44	1,188	67	79,524	20,568	3.0	56	7,074	3.5	64	17,012	17,000	22,464	58,956	-82		
6/22	61.5	25	97	1,285	67	85,994	11,840	4.0	70	15,654	3.0	68	13,090	13,000	15,198	74,154	-90		
6/23	67.4	151	487	1,772	67	118,652	39,464	4.0	72	48,380	2.5	68	41,240	45,000	5,034	79,188	-78		
6/24 ^e	48.7	252	1,809	3,581				4.0	93	225,721	1.5	75	162,546	165,000	26,742	105,930	-1		
6/25	45.4	342	1,881	5,462				1.0	57	107,034	1.5	83	249,521	250,000	97,776	203,706	34		
6/26	63.2	49	181	5,643				1.0	62	295,280	1.5	83	130,403	130,000	134,112	337,818	7		
6/27	67.4	199	637	6,280				2.0	81	66,229	2.0	80	60,135	60,000	104,328	442,146	-11		
6/28	73.6	110	313	6,593				2.0	85	80,478	1.5	82	62,652	60,000	35,664	477,810	23		
6/29	69.7	234	825	7,418				2.0	81	92,429	1.5	79	75,780	75,000	32,274	510,084	64		
6/30	72.5	100	308	7,726				2.0	83	94,175	2.0	83	94,175	90,000	37,704	547,788	48		
7/01	77.4	316	941	8,667				2.0	76	95,207	2.0	77	102,018	100,000	17,142	564,930	-22		
7/02	72.2	267	836	9,503				2.0	79	140,773	2.0	78	129,225	130,000	46,686	611,616	-14		
7/03	63.0	119	426	9,929				2.0	80	101,280	2.0	80	101,280	100,000	83,286	694,902	32		
7/04	64.9	66	236	10,165				2.0	80	53,026	2.0	80	53,026	50,000	66,132	761,034	42		
7/05	71.9	156	476	10,641				2.0	78	55,301	2.0	78	55,301	50,000	10,422	771,456	2		
7/06	34.6	6	42	10,683				2.0	79	40,713	2.0	79	40,713	40,000	26,892	798,348	-43		
7/07	70.4	204	624	11,307				2.0	78	51,704	2.0	78	51,704	50,000	27,528	825,876	-44		
7/08	67.8	123	370	11,677				2.0	81	80,992	2.0	81	75,992	75,000	44,352	870,228	-7		
7/09	68.4	50	169	11,846				2.0	81	59,169	2.0	82	52,988	50,000	48,060	918,288	-2		
7/10	76.0	210	593	12,439				2.0	82	62,131	2.0	82	62,131	60,000	33,642	951,930	148		
7/11	61.9	35	130	12,569				2.0	82	59,354	1.5	80	33,036	40,000	20,460	972,390	356		
7/12	61.5	11	42	12,611				2.0	79	13,541	2.0	79	19,262	20,000	4,548	976,938	18		
7/13															5,388	982,326			
7/14															10,992	993,318			
6/24–7/12																		Mean Percent Error (MPE)	14
																		Mean Absolute Percent Error (MAPE)	53

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- ^a Based on the best fit as determined by the lowest sums of squares value.
- ^b Closest to published value based on input from manager, aerial surveys, and/or passage rates at tower.
- ^c The starting EPI value of 67 was based on a mean EPI univariate time series model with a moving average parameter of 2. This value was used through 19 June. Thereafter, EPIs were based on lag-time relationships.
- ^d Observation towers not in operation.
- ^e Only completed 2 of 4 scheduled afternoon drifts because of the extremely high catch rates from the first 2 drifts. Estimated River Fish (ERF) was estimated using the average index value from the first 2 drifts.

Appendix E7.—Sockeye salmon inriver test fishing data summary and comparison to tower counts, Egegik River, 2003.

Date	Test Fishing				Model Estimates									Published Inriver Estimate	Observation Tower		Daily % Error of Test Fishing Estimate
	Fishing Time (min)	Catch (no)	Daily Index	Cum. Index	Historical Mean FPI			Travel Time FPI ^a			Negotiated FPI ^b				Daily Esc.	Cum. Esc.	
					FPI ^c	Forecast	River Fish	Lag	FPI ^c	River Fish	Lag	FPI ^c	River Fish				
6/15	52.8	22	110	110	70	7,711	7,711								d	d	
6/16	46.4	55	270	380	70	26,582	26,582								d	d	
6/17	47.4	67	292	671	70	47,002	47,002						45,000		d	d	
6/18	49.2	72	333	1,005	70	70,324	70,324						70,000	186		186	
6/19	46.2	106	545	1,550	70	108,500	97,898						100,000	10,416		10,602	
6/20	52.4	98	427	1,977	70	138,420	108,228	4.0	80	127,028			105,000	19,590		30,192	
6/21	51.2	57	238	2,215				4.0	58	89,064	3.0	40	49,877	50,000	8,544	38,736	32
6/22	48.0	19	91	2,306				4.0	56	73,261	3.0	38	31,060	30,000	17,826	56,562	-12
6/23	52.6	152	654	2,960				3.0	33	32,063	3.0	35	39,077	40,000	7,962	64,524	-47
6/24 ^e	52.6	152	654	3,614				3.0	35	48,280	3.0	35	50,039	55,000	11,934	76,458	-57
6/25	44.2	390	2,554	6,168				3.0	40	153,885	1.5	28	80,835	80,000	15,414	91,872	10
6/26	48.7	210	958	7,126				1.0	22	21,493	1.5	30	75,421	70,000	46,494	138,366	-15
6/27	53.1	341	1,565	8,691				3.0	53	270,033	1.5	30	68,511	65,000	53,862	192,228	-33
6/28	47.4	245	1,477	10,169				1.0	30	44,709	1.5	33	72,558	70,000	70,782	263,010	-5
6/29	53.6	49	223	10,391				1.0	32	7,118	2.0	37	59,345	60,000	62,124	325,134	-57
6/30	53.0	131	646	11,038				1.0	34	21,971	2.0	36	55,117	50,000	28,140	353,274	-76
7/01	52.7	317	1,444	12,482				3.0	46	105,714	3.0	46	109,487	105,000	111,414	464,688	-74
7/02	49.1	416	2,211	14,693				4.0	57	258,096	3.0	56	242,656	240,000	115,446	580,134	-46
7/03	48.3	371	1,868	16,561				1.0	49	92,424	1.5	54	167,269	170,000	146,868	727,002	-29
7/04	50.7	166	720	17,280				1.0	54	38,828	1.5	58	108,966	110,000	166,296	893,298	-29
7/05	57.6	135	522	17,803				1.0	60	31,227	2.0	62	70,430	70,000	140,034	1,033,332	33
7/06	66.6	76	261	18,063				1.0	60	15,513	1.5	61	42,551	30,000	25,980	1,059,312	15
7/07	64.5	144	483	18,546				1.0	60	29,055	1.5	61	44,979	35,000	27,042	1,086,354	92
7/08	58.4	71	268	18,814				1.0	60	15,954	1.5	61	41,697	30,000	19,602	1,105,956	137
7/09	59.0	58	206	19,020				1.0	59	12,203	1.5	60	27,530	20,000	7,722	1,113,678	18
7/10	31.6	77	531	19,552				1.0	60	31,665	1.0	60	31,665	30,000	19,680	1,133,358	337
7/11	45.9	23	117	19,668				1.0	58	6,821	1.5	59	10,005	10,000	7,242	1,140,600	95
7/12															3,474	1,144,074	
7/13															3,294	1,147,368	
6/21–7/11												Mean Percent Error (MPE)			14		
												Mean Absolute Percent Error (MAPE)			60		

-continued-

- ^a Based on the best fit as determined by the lowest sums of squares value.
- ^b Closest to published value based on input from manager, aerial surveys, and/or passage rates at tower.
- ^c A starting FPI of 70, based on a model that incorporated average length, age composition, escapement, and time series analysis, was used through 20 June. Thereafter, FPIs were based on lag-time relationships.
- ^d Observation towers not in operation.
- ^e Missed both drift sessions on 24 June because boat sank with previous evening's incoming tide. Interpolated these data by replacing missed drifts with index's from 23 June.

Appendix E8.—Sockeye salmon inriver test fishing data summary and comparison to tower counts, Egegik River, 2004.

Date	Test Fishing				Model Estimates									Published Inriver Estimate	Observation Tower		Daily % Error of Negotiated ERF	
	Fishing Time (min)	Catch (no)	Daily Index	Cum. Index	Historical Mean FPI			Travel Time FPI ^a			Negotiated FPI ^b				Daily Esc.	Cum. Esc.		
					FPI ^c	Forecast	Estimated River Fish	Lag	FPI ^c	Estimated River Fish	Lag	FPI ^c	Estimated River Fish					
6/14	42.8	20	119	119	81	9,663	9,663										d	d
6/15	51.0	8	34	153	81	12,400	12,400										d	d
6/16	54.1	39	160	313	81	25,377	25,377						25,000				d	d
6/17	50.8	79	406	719	81	58,286	43,568						45,000	14,718	14,718			
6/18	47.9	28	147	866	81	70,223	38,777						40,000	16,728	31,446			
6/19	50.4	13	60	926	81	75,055	34,447	5.0	340	263,313			35,000	9,132	40,578			
6/20	46.0	148	875	1,801				3.0	97	104,626	2.5	89	90,771	90,000	28,968	69,546		25
6/21	50.3	40	194	1,995				4.0	173	195,743	1.5	100	74,826	75,000	55,188	124,734		336
6/22	53.9	42	184	2,179				4.0	162	212,643	2.0	92	60,226	60,000	15,600	140,334		866
6/23	55.3	13	55	2,234				4.0	155	202,665	2.0	77	28,590	30,000	3,150	143,484		467
6/24	49.3	12	58	2,292				1.0	66	3,772	1.0	66	3,772	4,000	3,084	146,568		92
6/25	69.0	9	32	2,324				1.0	65	2,054	1.0	65	2,054	2,000	1,962	148,530		-93
6/26	44.6	458	3,015	5,339				1.0	77	231,855	1.0	73	211,087	210,000	30,156	178,686		44
6/27	42.3	290	2,473	7,812				1.0	61	150,525	1.0	65	182,881	180,000	146,256	324,942		-9
6/28	59.7	85	286	8,098				1.0	67	19,204	1.0	67	19,204	20,000	200,346	525,288		-84
6/29 ^e	48.6	42	207	8,305				1.0	80	58,052	1.0	80	58,052	60,000	119,562	644,850		68
6/30	54.7	108	461	8,766				1.0	82	41,907	1.0	82	41,907	40,000	34,458	679,308		136
7/01	55.8	100	367	9,133				1.0	80	37,020	1.5	82	55,319	50,000	17,784	697,092		492
7/02	55.0	28	120	9,253				1.0	77	9,276	1.5	78	16,948	15,000	7,710	704,802		107
7/03	56.8	60	249	9,502				1.0	77	19,089	1.0	76	14,126	15,000	3,270	708,072		44
7/04	62.1	29	111	9,613				1.0	76	8,375	1.5	77	18,164	15,000	9,798	717,870		-68
7/05	54.8	245	1,111	10,724				1.0	76	84,162	1.0	76	84,162	90,000	10,560	728,430		-10
7/06	53.6	339	1,554	12,278				1.0	77	119,131	1.5	80	159,832	140,000	93,960	822,390		3
7/07	57.8	253	1,032	13,310				1.0	74	76,526	1.5	78	127,440	120,000	88,296	910,686		-38
7/08	55.9	88	359	13,669				1.0	79	28,208	1.5	82	75,766	80,000	134,364	1,045,050		-51
7/09	55.4	78	325	13,994				1.0	87	28,143	1.5	88	46,792	50,000	139,614	1,184,664		23
7/10	56.9	76	310	14,304				1.0	87	26,922	1.5	88	41,908	35,000	32,130	1,216,794		20
7/11	50.6	80	376	14,680				1.0	86	32,292	1.0	86	32,292	30,000	11,730	1,228,524		-31
7/12 ^f	50.3	44	213	14,893				1.0	87	18,534	1.0	87	18,534	20,000	46,578	1,275,102		216
7/13	50.9	28	144	15,037				1.0	86	12,411	1.0	86	12,411	10,000	5,856	1,280,958		202
7/14															4,104	1,285,062		
6/20–7/13						Mean		1.5	88.9		1.3	80.0				MPE ^g		115
						Median		1.0	79.5		1.3	80.0				MAPE ^g		147

-continued-

Appendix E8.–Page 2 of 2.

- ^a Based on the best fit as determined by the lowest sums of squares value.
- ^b Closest to published value based on input from manager, aerial surveys, and/or passage rates at tower.
- ^c A mean FPI of 81, based on 6 years (1989, 1990, 1995, 1997, 1999, and 2002) with season ending FPIs of large inshore runs with a high 2 ocean age component, was used through 19 June. Thereafter, FPIs were based on lag-time relationships.
- ^d Observation towers not in operation.
- ^e Only 1 set of drifts were scheduled because of tide change over. Repeated morning index values from 29 June to simulate evening drifts.
- ^f Only 1 set of drifts were scheduled because of tide change over. Used morning drifts from 13 July to simulate evening drifts.
- ^g MPE = Mean Percent Error, MAPE = Mean Absolute Percent Error.

Appendix E9.–Page 2 of 2.

- ^a Based on the best fit as determined by the lowest sums of squares value.
- ^b Closest to published value based on input from manager, aerial surveys, and/or passage rates at tower.
- ^c A mean FPI of 64, based on 3 years (2000, 2001, and 2003) with median FPIs of inshore runs with a high 3 ocean age component was used through 17 June. Thereafter, FPIs were based on lag-time relationships.
- ^d Observation towers not in operation.
- ^e Only one set of drifts were scheduled because of tide change over. Repeated morning index values from 19 June to simulate evening drifts.
- ^f MPE = Mean Percent Error, MAPE = Mean Absolute Percent Error.

Appendix E10.--Sockeye salmon inriver test fishing data summary and comparison to tower counts, Egegik River, 2006.

Date	Test Fishing				Model Estimates									Published Inriver Estimate	Observation Tower		Daily % Error of Negotiated ERF
	Fishing Time (min)	Catch (no)	Daily Index	Cum. Index	Historical Mean FPI			Travel Time FPI ^a			Negotiated FPI ^b				Daily Esc.	Cum. Esc.	
					FPI ^c	Forecast	Estimated River Fish	Lag	FPI ^c	Estimated River Fish	Lag	FPI ^c	Estimated River Fish				
6/15	48.7	17	84	84	70	5,894	5,894								d	d	
6/16	49.0	7	34	118	70	8,294	8,294								d	d	
6/17	49.2	7	32	150	70	10,505	10,505								d	d	
6/18 ^e	50.0	9	43	194	70	13,547	13,325					5,000	222	222			
6/19	53.2	5	23	216	70	15,129	12,117					2,000	2,790	3,012			
6/20	54.8	10	42	259	70	18,103	12,607					10,000	2,484	5,496			
6/21	55.6	48	210	469				4.0	42	13,254	2.0	30	7,825	7,500	744	6,240	-43
6/22 ^e	53.9	26	109	578				4.0	42	15,987	2.0	27	7,554	7,500	1,812	8,052	-75
6/23	53.1	34	147	725				2.0	42	10,883	1.0	35	5,472	5,000	11,856	19,908	-71
6/24	54.5	12	53	778				3.0	82	25,428	2.0	69	15,054	15,000	18,702	38,610	-70
6/25	54.3	99	436	1,214				3.0	92	58,579	2.5	85	49,924	50,000	14,628	53,238	-58
6/26	49.5	211	1,159	2,373				1.0	73	84,728	1.5	81	103,530	100,000	35,454	88,692	26
6/27	44.5	187	1,146	3,519				1.0	57	65,749	1.0	53	50,341	50,000	47,676	136,368	-27
6/28	44.6	159	954	4,473				1.0	58	55,806	1.0	57	49,214	50,000	69,396	205,764	-48
6/29	49.6	32	185	4,659				2.0	85	97,115	1.5	73	40,252	40,000	94,068	299,832	37
6/30	55.7	128	573	5,231				1.0	68	39,112	2.0	71	53,920	50,000	18,378	318,210	6
7/01 ^f	54.5	146	661	5,892				1.0	65	42,976	1.0	84	154,608	150,000	22,104	340,314	441
7/02	44.8	248	1,546	7,438				1.0	63	96,814	1.0	63	92,721	90,000	28,584	368,898	76
7/03	53.2	20	87	7,526				1.0	57	4,955	1.5	65	67,643	60,000	52,626	421,524	-70
7/04	53.9	376	2,189	9,714				2.0	75	170,141	2.0	78	201,648	200,000	134,520	556,044	-52
7/05	57.1	205	874	10,588				3.0	99	311,922	1.5	88	195,240	200,000	180,486	736,530	-37
7/06	56.1	80	296	10,885				2.0	100	117,456	2.0	104	157,311	150,000	238,176	974,706	-31
7/07 ^g	58.1	37	137	11,021				2.0	106	45,795	2.0	108	70,636	75,000	144,966	1,119,672	-67
7/08	60.6	38	140	11,162				2.0	111	30,617	2.5	112	47,325	50,000	83,130	1,202,802	-77
7/09	56.3	144	571	11,732				2.0	121	86,190	2.0	126	142,433	150,000	133,056	1,335,858	54
7/10	59.8	145	521	12,254				2.0	125	136,402	2.0	126	149,839	150,000	58,296	1,394,154	266
7/11	56.3	43	168	12,422				2.0	122	83,975	2.0	119	49,804	50,000	34,260	1,428,414	314
7/12	44.9	30	156	12,579				2.0	117	38,015	2.0	116	18,057	20,000	6,672	1,435,086	52
7/13															5,364	1,440,450	
7/14															6,552	1,447,002	
Total	1430.9	2,473	12,422				Mean	2.0	82			1.7	80			MPE ^h	25
							Median	2.0	79			2.0	80			MAPE ^h	91

-Continued-

- ^a Based on the best fit as determined by the lowest sums of squares value.
- ^b Closest to published value based on input from manager, aerial surveys, and/or passage rates at tower.
- ^c The mean FPI of 70, based on median FPIs from 2001-2005, was used through 20 June. Thereafter, FPIs were based on lag-time relationships.
- ^d Observation towers not in operation.
- ^e Only one set of drifts were scheduled because of tide change over. Averaged morning drifts from 22 and 23 June to simulate evening drifts.
- ^f The 1 July ERF was inadvertently calculated using test fish index data from 2 July. Data in table is information we used inseason but travel time changed to 2 d, FPI changed to 73, and ERF changed to 90,087. The daily % error improved to only 11%.
- ^g Only one set of drifts were scheduled because of tide change over. Used morning drifts from 8 July to simulate evening drifts.
- ^h MPE = Mean Percent Error, MAPE = Mean Absolute Percent Error.

**APPENDIX F. UGASHIK RIVER INRIVER TEST FISHING
AND TOWER COUNT DATA, 1997–2006**

Appendix F1.—Sockeye salmon inriver test fishing data summary and comparison to tower counts, Ugashik River, 1997.

Date	Test Fishing						Observation Tower		% Error of Test Fishing Estimate	
	Fishing Time (min)	Catch (no)	Daily Index	Cum. Index	EPI. ^a	Forecasted Cumulative Escapement	Estimated River Fish ^b	Date Plus Travel Time ^c		Cumulative Escapement
6/24	113.4	16	34	34	30	1,020		6/27	d	
6/25	112.3	12	27	61	30	1,830		6/28	d	
6/26	117.4	16	31	92	30	2,760	3,000	6/29	d	
6/27	112.9	22	51	143	30	4,290	4,000	6/30	d	
6/28	90.6	32	96	239	30	7,170	14,000	7/01	d	
6/29	90.5	19	51	290	30	8,700	8,000	7/02	210	4,043
6/30	84.7	47	135	425	30	12,750	12,000	7/03	1,500	750
7/01	41.4	15	89	514	30	15,420	15,000	7/04	2,976	418
7/02	84.3	25	72	586	30	17,580	17,500	7/05	4,680	276
7/03	94.0	20	51	637	30	19,110	18,000	7/06	7,050	171
7/04	95.3	28	71	708	30	21,240	20,000	7/07	16,338	30
7/05	81.9	38	112	820	30	24,600	25,000	7/08	29,838	-18
7/06	66.1	63	229	1,049	30	31,470	45,000	7/09	61,218	-49
7/07	27.7	121	1,358	2,407	44	105,908	85,000	7/10	95,448	11
7/08	20.7	127	1,686	4,093	36	147,348	120,000	7/11	143,538	3
7/09	21.2	157	1,794	5,887	33	194,271	160,000	7/12	192,594	1
7/10	21.7	131	1,480	7,367	31	228,377	140,000	7/13	229,674	-1
7/11	20.7	243	3,013	10,380	30	311,400	175,000	7/14	273,246	14
7/12	19.7	125	1,620	12,000	32	384,000	200,000	7/15	334,122	15
7/13	18.8	164	2,181	14,181	33	467,973	240,000	7/16	355,146	32
7/14	18.6	195	2,662	16,843	24	404,232	140,000	7/17	391,242	3
7/15	19.2	153	2,094	18,937	25	473,425	150,000	7/18	416,160	14
7/16	20.2	49	638	19,575	23	450,225	100,000	7/19	429,414	5
7/17	37.1	112	797	20,372	22	448,184	80,000	7/20	453,222	-1
7/18	12.9	75	1,597	21,969	22	483,318	80,000	7/21	481,356	0
6/29–7/18						Mean Percent Error (MPE)			286	
6/29–7/18						Mean Absolute Percent Error (MAPE)			293	
7/7–7/18						Mean Percent Error (MPE)			8	
7/7–7/18						Mean Absolute Percent Error (MAPE)			8	

^a The 1985–1996 mean escapement per index point relationship (30 EPI) was used until 7 July when lag-time relationships began to prove more accurate.

^b Estimated river fish is a subjective estimate of fish that have entered the river but have not passed the counting tower based on all available information. *Source:* Bristol Bay Salmon Fishery, preliminary sockeye salmon daily run summary, 1997.

^c Best travel time estimate at the end of the season was 3 d.

^d Observation towers not in operation.

Appendix F2.—Sockeye salmon inriver test fishing data summary and comparison to tower counts, Ugashik River, 1998.

Date	Test Fishing							Observation Tower		% Error of Test Fishing Estimate
	Fishing Time (min)	Catch (no)	Daily Index	Cum. Index	EPI. ^a	Forecasted Cumulative Escapement	Estimated River Fish ^b	Date Plus Travel Time ^c	Cumulative Escapement	
6/26	111.6	24	53	53	54	2,862		6/28	d	
6/27	116.4	14	29	82	54	4,428	2,000	6/29	d	
6/28	120.1	17	34	116	54	6,264	3,000	6/30	d	
6/29	121.1	13	25	141	54	7,614	3,500	7/01	d	
6/30	119.1	8	16	157	54	8,478	4,000	7/02	72	11,675
7/01	119.6	13	26	183	54	9,882	5,000	7/03	1,698	482
7/02	120.1	4	8	191	54	10,314	5,000	7/04	2,466	318
7/03	116.9	13	27	218	54	11,772	5,000	7/05	3,600	227
7/04	116.9	3	6	224	54	12,096	5,000	7/06	5,136	136
7/05	58.3	4	16	240	54	12,960	5,000	7/07	11,976	8
7/06	118.5	30	61	301	54	16,254	5,000	7/08	22,146	-27
7/07	89.7	76	220	521	43	22,403	10,000	7/09	37,260	-40
7/08	65.0	84	348	869	53	46,057	25,000	7/10	52,482	-12
7/09	71.3	68	279	1,148	53	60,844	25,000	7/11	86,538	-30
7/10	76.6	172	540	1,688	53	89,464	40,000	7/12	141,216	-37
7/11	19.6	121	1,427	3,115	53	165,095	150,000	7/13	239,064	-31
7/12	38.1	294	1,911	5,026	64	321,664	225,000	7/14	402,414	-20
7/13	40.0	217	1,304	6,330	76	481,080	250,000	7/15	494,700	-3
7/14	39.6	112	677	7,007	76	532,532	125,000	7/16	522,144	2
7/15	35.8	76	528	7,535	78	587,730	90,000	7/17	538,890	9
7/16	38.4	42	262	7,797	73	569,181	50,000	7/18	557,562	2
7/17	39.6	26	156	7,953	71	564,663	30,000	7/19	575,118	-2
7/18	40.2	49	290	8,243	71	585,253	30,000	7/20	589,920	-1
<hr/>										
6/30–7/18						Mean Percent Error (MPE)			666	
						Mean Absolute Percent Error (MAPE)			687	
<hr/>										
7/7–7/18						Mean Percent Error (MPE)			-13	
						Mean Absolute Percent Error (MAPE)			16	

^a The 1985–1997 mean escapement per index point relationship (54 EPI) was used until 7 July when lag-time relationships began to prove more accurate.

^b Estimated river fish is a subjective estimate of fish that have entered the river but have not passed the counting tower based on all available information. *Source:* Bristol Bay Salmon Fishery, preliminary sockeye salmon daily run summary, 1998.

^c Best travel time estimate at the end of the season was 2 d.

^d Observation towers not in operation.

Appendix F3.—Sockeye salmon inriver test fishing data summary and comparison to tower counts, Ugashik River, 1999.

Date	Test Fishing						Observation Tower		% Error of Test Fishing Estimate	
	Fishing Time (min)	Catch (no)	Daily Index	Cum. Index	EPI. ^a	Forecasted Cumulative Escapement	Estimated River Fish ^b	Date Plus Travel Time ^c		Cumulative Escapement
6/24	19.4	0	0	0	54	0		6/29	d	
6/25	82.4	5	15	15	54	810	800	6/30	d	
6/26	63.0	7	27	42	54	2,268	2,000	7/01	d	
6/27	59.2	13	53	95	54	5,130	5,000	7/02	0	
6/28	61.9	13	50	145	54	7,830	7,000	7/03	0	
6/29	62.4	28	108	253	54	13,662	10,000	7/04	0	
6/30	56.0	82	360	613	54	33,102	30,000	7/05	0	
7/01	55.6	101	459	1,072	54	57,888	50,000	7/06	0	
7/02	44.3	161	1,148	2,220	54	119,880	80,000	7/07	6	
7/03	11.4	27	573	2,793	54	150,822	100,000	7/08	33,186	354
7/04	12.8	81	1,792	4,585	54	247,590	200,000	7/09	237,126	4
7/05	13.8	164	2,779	7,364	54	397,656	350,000	7/10	426,780	-7
7/06	11.2	220	4,732	12,096	54	653,184	500,000	7/11	610,188	7
7/07	6.0	69	2,727	14,823	54	800,442	500,000	7/12	938,928	-15
7/08	25.2	101	1,437	16,260	54	878,040	600,000	7/13	1,293,270	-32
7/09	43.3	48	263	16,523	54	892,242	450,000	7/14	1,371,798	-35
7/10							^e	7/15	1,460,058	
7/11	25.1	37	353	16,876	54	911,304	150,000	7/16	1,505,904	-39
7/12	23.6	24	239	17,115	54	924,210	150,000	7/17	1,527,366	-39
7/13	5.5	1	44	17,159	54	926,586	^f	7/18	1,537,914	-40
7/14	26.3	9	82	17,241	54	931,014	^f	7/19	1,540,962	-40
7/15	28.1	10	86	17,327	54	935,658	^f	7/20	1,547,310	-40
7/16	29.1	8	66	17,393	54	939,222	^f	7/21	1,555,998	-40
7/17	13.7	5	87	17,480	83	1,450,840	20,000	7/22	1,580,808	-8
7/18	53.5	15	69	17,549	84	1,474,116	20,000	7/23	1,606,242	-8
<hr/>										
7/3–7/18						Mean Percent Error (MPE)			2	
						Mean Absolute Percent Error (MAPE)			44	
<hr/>										
7/17–7/18						Mean Percent Error (MPE)			-8	
						Mean Absolute Percent Error (MAPE)			8	

^a The 1986–1998 mean escapement per index point relationship (54 EPI) was used until 17 July when lag-time relationships began to prove more accurate.

^b Estimated river fish is a subjective estimate of fish that have entered the river but have not passed the counting tower based on all available information. *Source:* Bristol Bay Salmon Fishery, preliminary sockeye salmon daily run summary, 1999.

^c Best travel time estimate at the end of the season was 5 d.

^d Observation towers not in operation.

^e No inriver fish estimate calculated for 7/10. One mid-day high tide on this date; entire drift session missed due to high winds.

^f No inriver fish estimates published for these dates according to 1999 Bristol Bay Salmon Data, 3-ring binder notebook, Ugashik R Test Fish section.

Appendix F4.—Sockeye salmon inriver test fishing data summary and comparison to tower counts, Ugashik River, 2000.

Date	Test Fishing						Observation Tower		% Error of Test Fishing Estimate	
	Fishing Time (min)	Catch (no)	Daily Index	Cum. Index	EPI. ^a	Forecasted Cumulative Escapement	Estimated River Fish ^b	Date Plus Travel Time ^c		Cumulative Escapement
6/24	26.1	6	54	54	58	3,132		6/26	d	
6/25	71.6	10	32	86	58	4,988	5,000	6/27	d	
6/26	97.7	7	17	103	58	5,974	6,000	6/28	d	
6/27	94.7	4	10	113	58	6,554	7,000	6/29	d	
6/28	44.8	5	27	140	58	8,120	8,000	6/30	d	
6/29	78.3	53	174	314	58	18,212	18,000	7/01	d	
6/30	36.5	111	676	990	58	57,420	60,000	7/02	d	
7/01	14.9	89	1,271	2,261	58	131,138	135,000	7/03	58,800	123
7/02	11.9	87	1,785	4,046	58	234,668	220,000	7/04	126,780	85
7/03	23.0	134	1,380	5,426	58	314,708	260,000	7/05	166,986	88
7/04	50.6	32	176	5,602	58	324,916	200,000	7/06	178,044	82
7/05	67.2	17	67	5,669	58	328,802	50,000	7/07	181,680	81
7/06	94.6	12	30	5,699	58	330,542	10,000	7/08	183,822	80
7/07	92.6	8	21	5,720	31	177,320	2,000	7/09	186,210	-5
7/08	94.6	37	95	5,815	31	180,265	4,000	7/10	187,956	-4
7/09	93.3	41	105	5,920	32	189,440	8,000	7/11	194,394	-3
7/10	98.5	66	161	6,081	32	194,592	15,000	7/12	207,936	-6
7/11	82.9	74	228	6,309	32	201,888	15,000	7/13	230,886	-13
7/12	42.9	39	221	6,530	34	222,020	20,000	7/14	238,134	-7
7/13	66.8	95	340	6,870	36	247,320	30,000	7/15	249,948	-1
7/14	71.0	100	356	7,226	36	260,136	30,000	7/16	267,522	-3
7/15	49.5	92	439	7,665	36	275,940	30,000	7/17	338,490	-18
7/16	20.8	200	2,347	10,012	36	360,432	100,000	7/18	422,568	-15
7/17	18.8	123	1,602	11,614	33	383,262	75,000	7/19	481,506	-20
7/18	21.2	81	1,071	12,685	35	443,975	70,000	7/20	514,998	-14
7/19	23.7	102	1,182	13,867	40	554,680	90,000	7/21	537,996	3
7/20	11.1	52	1,034	14,901	42	625,842	^e	7/22	557,268	12
<hr/>										
7/1–7/20						Mean Percent Error (MPE)				22
						Mean Absolute Percent Error (MAPE)				33
<hr/>										
7/7–7/20						Mean Percent Error (MPE)				-7
						Mean Absolute Percent Error (MAPE)				9

^a The 1985–1999 mean escapement per index point relationship (58 EPI) was used until 7 July when lag-time relationships began to prove more accurate.

^b Estimated river fish is a subjective estimate of fish that have entered the river but have not passed the counting tower based on all available information. *Source:* Bristol Bay Salmon Fishery, preliminary sockeye salmon daily run summary, 2000.

^c Best travel time estimate at the end of the season was 2 d.

^d Observation towers not in operation.

^e No inriver estimate published for this date.

Appendix F5.—Sockeye salmon inriver test fishing data summary and comparison to tower counts, Ugashik River, 2001.

Date	Test Fishing						Model Estimates						Published Inriver Estimate	Observation Tower Cumulative Escapement	% Error of Test Fishing Estimate				
	Fishing		Daily		Cum. Index	EPI ^c	Forecasted Cumulative Escapement	Historical Mean EPI		Travel Time EPI ^a		Negotiated EPI ^b							
	Time (min)	Catch (no)	Index	Index				FPI	Forecast	River Fish	Estimated	Lag				FPI	River Fish	Estimated	Lag
6/24	61.8	21	81	81	40	3,240	40	3,230	3,230								15,000	d	
6/25	64.6	14	52	133	40	5,320	40	5,323	5,323								15,000	d	
6/26	63.1	16	60	193	40	7,720	40	7,705	7,705								12,000	d	
6/27	69.0	16	57	250	40	10,000	40	9,997	9,997								12,000	d	
6/28	64.0	39	147	397	40	15,880	40	15,880	15,880								15,000	d	
6/29	65.7	42	154	551	40	22,040	40	22,023	19,089	3	23	9,204	4	36	17,070	19,000		2,934	651
6/30	67.2	61	218	769	40	30,760	40	30,758	20,720	5	75	47,963	3	40	20,847	20,000		10,038	206
7/01	33.9	30	214	983	40	39,320	40	39,325	23,425	5	119	101,562	2	40	23,474	20,000		15,900	147
7/02	66.8	47	169	1,152	40	46,080	40	46,079	26,303	5	79	71,380	3	36	21,602	25,000		19,776	133
7/03	66.9	36	129	1,281	40	51,240	40	51,244	26,110	5	63	55,971	4	46	33,350	25,000		25,134	104
7/04	66.9	66	236	1,517	29	43,993	40	60,695	32,495	3	24	8,945	3	29	15,325	15,000		28,200	56
7/05	53.2	89	459	1,976	25	49,400				2	23	16,055	3	26	21,171	20,000		29,586	67
7/06	13.7	197	3,378	5,354	30	160,620				2	23	86,906	4	30	125,375	130,000		34,368	367
7/07	11.8	235	4,651	10,005	32	320,160				2	28	226,190	3	37	311,435	260,000		55,674	475
7/08	14.8	219	3,861	13,866	26	360,516				2	24	208,212	2	24	208,212	230,000		130,974	175
7/09	16.1	208	3,207	17,073	26	443,898				2	24	168,822	2	24	168,822	190,000		238,992	86
7/10	14.6	185	3,037	20,110	30	603,300				2	28	172,761	2	28	172,761	200,000		383,634	57
7/11	16.6	150	2,349	22,459	35	786,065				3	39	337,423	2	32	171,771	200,000		544,470	44
7/12	17.4	136	1,874	24,333	36	875,988				3	40	290,165	2	34	143,282	200,000		682,350	28
7/13	26.6	85	821	25,154	34	855,236				3	37	186,275	2	33	89,114	100,000		742,740	15
7/14	51.8	30	140	25,294	33	834,702				2	32	30,425	3	34	97,241	40,000		770,364	8
7/15	48.3	16	77	25,371	32	811,872				2	31	6,793	3	32	33,549	20,000		786,486	3
7/16	50.9	8	38	25,409	32	813,088				2	31	3,597	3	32	8,048	6,000		794,334	2
6/29–7/16													Mean Percent Error (MPE)			146			
6/29–7/16													Mean Absolute Percent Error (MAPE)			146			
7/7–7/16													Mean Percent Error (MPE)			90			
7/7–7/16													Mean Absolute Percent Error (MAPE)			90			

^a Estimated river fish is a subjective estimate of fish that have entered the river but have not passed the counting tower based on all available information.

^b Closest to published value based on input from manager, aerial surveys, and/or passage rates at tower.

^c The 1991–2000 trimmed mean escapement per index point relationship (40 EPI) was used until 4 July when lag-time relationships became more accurate.

^d Observation towers not in operation.

- ^a Estimated river fish is a subjective estimate of fish that have entered the river but have not passed the counting tower based on all available information.
- ^b Closest to published value based on input from manager, aerial surveys, and/or passage rates at tower.
- ^c A preseason calculated mean FPI of 45, based on time series relationships of FPI values used within the last 3 to 5 years, was determined to be high inseason and downgraded. A 6-year mean of season ending FPIs from years with the lowest water velocity measurements at Ugashik Smolt resulted in an FPI of 31. This value was used through 28 June when lag time relationships became more accurate.
- ^d Observation towers not in operation.
- ^e The daily escapement value was doubled to 10,000 to estimate ERFs from 29 June–8 July. Counts began at noon on 28 June.
- ^f Missed morning drifts on 2 July because of high wind and waves. Interpolated these data by averaging mean fishing time and catch from the morning drifts on 1 July and evening drifts on 2 July.
- ^g Missed last drift at station 2 because of a problem with steering system on the skiff. Interpolated missed drift by repeating previous station 2 index.
- ^h Missed morning drifts on 6 July because of a problem with steering system on the skiff. Interpolated these data by averaging mean fishing time and catch from the morning drifts on 5 July and evening drifts on 6 July.

Appendix F8.--Sockeye salmon inriver test fishing data summary and comparison to tower counts, Ugashik River, 2004.

Date	Test Fishing				Model Estimates									Published Inriver Estimate	Observation Tower		Daily % Error of Negotiated ERF	
	Fishing Time (min)	Catch (no)	Daily Index	Cum. Index	Historical Mean FPI			Travel Time FPI ^a			Negotiated FPI ^b				Daily Esc.	Cum. Esc.		
					FPI ^c	Forecast	Estimated River Fish	Lag	FPI ^c	Estimated River Fish	Lag	FPI ^c	Estimated River Fish					
6/22	34.5	30	252	252	65	16,390	16,390										d	d
6/23	49.3	18	90	342	65	22,227	22,227						22,000				d	d
6/24	47.4	24	126	468	65	30,341	30,341						30,000				d	d
6/25	42.6	7	39	507	65	32,980	32,980						30,000				d	d
6/26	43.4	9	48	555	65	34,610	34,610						25,000	1506	1,506			
6/27 ^e	44.6	6	36	591	65	38,463	36,135						20,000	822	2,328			
6/28	41.9	5	30	621	65	18,168	14,840						15,000	600	2,928			
6/29	21.8	3	33	654				4.0	6	1,069	8.0	20	10,494	10,000	198	3,126		80
6/30	40.3	6	35	689				4.0	6	862	7.0	24	10,224	10,000	450	3,576		90
7/01	41.9	3	19	708				4.0	7	782	6.0	13	5,228	5,000	480	4,056		6
7/02	43.5	3	14	722				4.0	7	696	3.0	7	947	1,000	234	4,290		-5
7/03	44.6	6	29	751				4.0	7	672	3.0	7	947	1,000	258	4,548		-35
7/04	41.4	6	29	780				4.0	7	658	3.0	8	964	1,000	474	5,022		-76
7/05	36.0	13	87	867				4.0	7	1,186	3.0	7	1,058	1,000	264	5,286		-97
7/06 ^f	38.7	32	173	1,040				4.0	8	2,455	2.0	65	11,245	10,000	720	6,006		-71
7/07 ^g	22.7	219	2,395	3,435				1.0	9	20,659	2.0	65	155,675	160,000	2,964	8,970		0
7/08	18.6	243	3,135	6,570				2.0	52	286,658	2.0	52	286,658	280,000	35,970	44,940		4
7/09	18.3	342	4,634	11,204				2.0	48	373,302	2.5	51	406,372	400,000	120,090	165,030		40
7/10	17.8	195	2,699	13,903				2.0	49	357,974	2.0	45	304,888	300,000	155,706	320,736		68
7/11	20.4	181	2,624	16,527				1.0	29	77,274	1.5	34	152,421	150,000	88,740	409,476		17
7/12	21.1	154	1,869	18,396				1.0	30	56,827	1.5	33	104,553	100,000	93,018	502,494		10
7/13 ^h	22.0	131	1,603	19,999				1.0	31	50,199	1.5	32	63,804	70,000	73,638	576,132		20
7/14	21.2	98	1,174	21,173				1.0	31	36,367	1.0	31	36,367	35,000	43,140	619,272		82
7/15 ⁱ	20.9	45	540	21,712				1.0	30	16,289	1.0	30	16,289	15,000	19,956	639,228		21
7/16															13,422	652,650		
6/29-7/15						Mean		2.6	21.4		2.9	30.8					MPE ^j	9
						Median		2.0	9.0		2.0	31.0					MAPE ^j	42

-continued-

- ^a Estimated river fish is a subjective estimate of fish that have entered the river but have not passed the counting tower based on all available information.
- ^b Closest to published value based on input from manager, aerial surveys, and/or passage rates at tower.
- ^c The mean FPI value of 65 was based on season ending FPIs of recent year inshore runs (1999 and 2002) that contained a high 2 ocean age component. Thereafter, FPIs were based on lag-time relationships.
- ^d Observation towers not in operation.
- ^e Fish caught on 22 June likely passed the tower before counting began on 26 June. Removed 22 June drifts for ERF estimates on 27 and 28 June.
- ^f Ignored all prior drifts and used the starting mean FPI of 65 and the daily index of 173 to estimate the ERF For 6 July. Assumed 2 day travel time.
- ^g Ignored all prior drifts and used the starting mean FPI of 65 and the daily index of 2,395 to estimate the ERF for July 7. Assumed 2 day travel time.
- ^h Only one set of drifts were scheduled because of tide change over. Used morning drifts from July 13 to estimate evening drifts.
- ⁱ Missed last set of drifts on the evening of 15 July because of a problem with the lower unit on the outboard motor. Interpolated these data by using half of the catch from each evening drift on 14 July to estimate index values for the missed drifts.
- ^j MPE = Mean Percent Error, MAPE = Mean Absolute Percent Error.

Appendix F9.–Sockeye salmon inriver test fishing data summary and comparison to tower counts, Ugashik River, 2005.

Date	Test Fishing				Model Estimates									Published Inriver Estimate	Observation Tower		Daily % Error of Negotiated ERF		
	Fishing Time (min)	Catch (no)	Daily Index	Cum. Index	Historical Mean FPI			Travel Time FPI ^a			Negotiated FPI ^b				Daily Esc.	Cum. Esc.			
					FPI ^c	Forecast	Estimated River Fish	Lag	FPI ^c	Estimated River Fish	Lag	FPI ^c	Estimated River Fish						
6/24	42.3	12	64	64	34	2,166	2,166										d	d	
6/25	44.9	4	21	85	34	2,894	2,894						2,000				d	d	
6/26	56.0	3	13	98	34	3,345	3,345						3,000				d	d	
6/27	55.1	7	31	129	34	4,382	4,382						3,000				d	d	
6/28	51.0	7	33	162	34	5,494	5,494						4,000				d	d	
6/29	54.9	17	75	236	34	8,024	8,024						5,000				d	d	
6/30	47.5	100	516	752	34	25,568	25,568						20,000	60	60				
7/01	39.1	243	1,509	2,261				1.0	3	4,369	2.0	28	61,137	60,000	2,118	2,178			15
7/02 ^e	31.9	235	1,767	4,028				1.0	4	6,638	2.5	28	104,284	100,000	6,318	8,496			-17
7/03 ^f	35.4	210	1,419	5,447				3.0	73	344,712	2.0	26	86,370	85,000	46,746	55,242			-7
7/04	34.0	178	1,271	6,717				2.0	30	80,315	2.0	30	81,315	80,000	65,040	120,282			69
7/05	38.9	128	805	7,522				2.0	27	56,363	1.5	24	32,618	32,000	27,630	147,912			27
7/06	37.1	67	437	7,959				2.0	25	31,122	1.5	23	14,715	15,000	20,430	168,342			-16
7/07	32.8	94	696	8,655				2.0	24	26,915	1.5	23	20,355	20,000	10,368	178,710			-66
7/08 ^g	26.6	262	2,328	10,983				2.0	24	71,837	1.5	23	58,019	60,000	14,424	193,134			-63
7/09	28.4	188	1,601	12,584				1.0	26	41,263	1.0	28	69,213	70,000	89,484	282,618			-48
7/10	36.8	109	696	13,280				2.0	38	86,935	1.5	37	75,536	75,000	133,350	415,968			-22
7/11	31.6	182	1,397	14,676				2.0	38	78,512	1.0	38	78,512	80,000	56,316	472,284			-3
7/12	34.3	138	1,007	15,684				2.0	42	100,132	1.0	39	58,584	50,000	80,796	553,080			17
7/13	35.7	140	983	16,667				2.0	41	81,797	1.5	39	46,932	45,000	50,004	603,084			-1
7/14	34.7	64	438	17,105				2.0	41	57,822	1.5	39	29,284	25,000	34,746	637,830			-13
7/15	51.1	68	314	17,419				2.0	40	29,905	1.0	39	16,486	15,000	25,026	662,856			-5
7/16	46.3	38	204	17,623				2.0	40	20,571	1.0	39	7,956	10,000	17,424	680,280			-20
7/17	38.8	31	193	17,816				2.0	40	15,726	1.0	39	7,564	10,000	9,942	690,222			-4
7/18	41.8	63	396	18,212				2.0	40	23,348	1.0	39	15,528	15,000	7,902	698,124			21
7/19 ^h	37.6	70	461	18,673				2.0	40	34,221	1.0	39	18,007	15,000	12,870	710,994			24
7/20															14,526	725,520			
7/21															15,876	741,396			
							Mean	1.9	33.5			1.4	32.6				MPE ⁱ		-7
Total	1,044.6	2,658	18,673				Median	2.0	38.0			1.5	37.0				MAPE ⁱ		27

-continued-

- ^a Estimated river fish is a subjective estimate of fish that have entered the river but have not passed the counting tower based on all available information.
- ^b Closest to published value based on input from manager, aerial surveys, and/or passage rates at tower.
- ^c The mean FPI of 34, based on median FPIs from 2000–20004, was used through 30 June. Thereafter, FPIs were based on lag-time relationships.
- ^d Observation towers not in operation.
- ^e Only 1 set of drifts were scheduled because of tide change over. Used morning drifts from 3 July to estimate evening drifts.
- ^f Missed last drift from morning drift session on 3 July because of fog. Used previous station 2 drift information to estimate index.
- ^g Missed last 2 drifts from evening drift session on 8 July because of mechanical difficulties. Repeated first 2 drifts to estimate index.
- ^h Only one set of drifts were scheduled because of tide change over. Used morning drifts from 19 July to estimate evening drifts.
- ⁱ MPE = Mean Percent Error, MAPE = Mean Absolute Percent Error.

Appendix F10.–Sockeye salmon inriver test fishing data summary and comparison to tower counts, Ugashik River, 2006.

Date	Test Fishing				Model Estimates									Published Inriver Estimate	Observation Tower		Daily % Error of Negotiated ERF	
	Fishing Time (min)	Catch (no)	Daily Index	Cum. Index	Historical Mean FPI			Travel Time FPI ^a			Negotiated FPI ^b				Daily Esc.	Cum. Esc.		
					FPI ^c	Forecast	Estimated River Fish	Lag	FPI ^c	Estimated River Fish	Lag	FPI ^c	Estimated River Fish					
6/23	53.7	6	26	26	35	922	922								d	d		
6/24	55.9	4	15	42	35	1,463	1,463								d	d		
6/25 ^e	33.2	1	7	49	35	1,717	1,717								d	d		
6/26	50.0	6	29	78	35	2,717	2,717								d	d		
6/27	52.1	7	32	110	35	3,839	3,839								d	d		
6/28	52.6	12	55	165	35	5,767	5,767								d	d		
6/29 ^f	52.2	16	71	236	35	8,255	8,255								d	d		
6/30 ^f	52.5	15	70	305	35	10,692	9,252								1,440	1,440		
7/01 ^f	52.4	15	70	376	35	13,153	7,699	2.0	23	3,236	2.0	23	3,236	3,000	3,966	5,406	59	
7/02 ^f	52.3	9	42	418				2.0	20	2,304	2.0	20	2,304	1,000	798	6,204	-36	
7/03	52.7	19	87	505				2.0	20	2,571	2.0	20	2,571	3,000	1,242	7,446	-93	
7/04	54.5	61	269	773				2.0	24	8,364	2.0	24	8,364	3,000	2,346	9,792	-93	
7/05	54.3	112	496	1,269				1.0	60	29,525	1.5	75	49,096	50,000	36,270	46,062	-51	
7/06	52.6	67	322	1,591				1.0	102	33,044	1.5	144	99,096	100,000	83,988	130,050	157	
7/07	27.7	98	846	2,438				1.0	103	87,038	1.5	109	101,987	100,000	33,636	163,686	80	
7/08	53.3	219	994	3,431				2.0	109	200,152	2.0	80	101,412	100,000	9,894	173,580	-73	
7/09	52.2	163	758	4,190				2.0	109	190,411	2.0	99	149,888	150,000	93,390	266,970	-59	
7/10 ^g	38.1	146	881	5,071				2.0	160	262,820	2.0	163	276,483	275,000	285,300	552,270	126	
7/11	42.6	75	445	5,516				2.0	150	198,880	2.0	132	99,614	100,000	78,342	630,612	37	
7/12	45.0	56	306	5,822				2.0	133	99,701	2.0	123	42,653	40,000	44,164	674,776	-35	
7/13 ^h	45.7	29	152	5,974				2.0	127	58,340	1.5	124	39,085	35,000	28,290	703,066	-13	
7/14	46.4	63	327	6,301				2.0	127	60,829	2.0	126	54,892	40,000	37,314	740,380	60	
7/15 ⁱ	32.1	61	457	6,758				2.0	126	98,992	2.0	123	76,386	70,000	15,732	756,112	28	
7/16	47.3	188	1,092	7,850				2.0	123	190,076	2.0	111	97,998	100,000	18,594	774,706	9	
7/17	47.4	78	424	8,274				2.0	121	182,769	2.0	111	95,374	100,000	41,304	816,010	33	
7/18															48,240	864,250		
7/19															23,472	887,722		
							Mean	1.8	96			1.9	95				MPE ^j	8
Total	1198.7	1,526	8,274				Median	2.0	109			2.0	111				MAPE ^j	61

-continued-

- ^a Estimated river fish is a subjective estimate of fish that have entered the river but have not passed the counting tower based on all available information.
- ^b Closest to published value based on input from manager, aerial surveys, and/or passage rates at tower.
- ^c The mean FPI of 35, based on median FPIs from 2001-20005, was used through 30 June. Thereafter, FPIs were based on lag-time relationships.
- ^d Observation towers not in operation.
- ^e Only completed one morning drift on 25 June because of fog.
- ^f Missed evening drifts on 29 June, all drifts on 30 June and 1 July and morning drifts on 2 July because of motor problems. Interpolated missed drifts by averaging the individual MFT and catch from the previous 2 days drifts sessions (e.g. MFT and Catch from drift number 5 from 27 June and 28 June were averaged to calculate drift number 5 for 29 June).
- ^g Missed morning drifts on 10 July because of high winds. Interpolated missed drifts by averaging morning drifts from 9 July and 11 July.
- ^h Missed morning drifts on 13 July because of high winds. Used morning drifts from 14 July to represent missed drifts.
- ⁱ Only completed 2 drifts during morning tide on 15 July because steering system broke.
- ^j MPE = Mean Percent Error, MAPE = Mean Absolute Percent Error.