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AN ESTIMATE OF THE MIGRATORY TIMING AND ABUNDANCE OF  
SOCKEYE SALMON INTO UPPER COOK INLET, ALASKA, IN 1994

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## ABSTRACT

During the 1994 Upper Cook Inlet, Alaska, commercial salmon fishing season a test fishery was used to estimate the timing of the sockeye salmon *Oncorhynchus nerka* run as it passed a transect along the southern boundary of the management area. The test fishery operated from 1 July to 30 July and captured 1,401 sockeye salmon representing 1,012 CPUE points. The test fishery encompassed approximately 90.5% of the total run and approximately 50% of the total run had passed the transect by 19 July.

**KEY WORDS:** Salmon, *Oncorhynchus*, Upper Cook Inlet, Alaska, test fishery, migratory behavior



## INTRODUCTION

In 1979, the Alaska Department of Fish and Game (ADF&G) began a test fishing project near the southern boundary of the Upper Cook Inlet (UCI) salmon management area (Figure 1). The objective of this project was to estimate the total run of sockeye salmon *Oncorhynchus nerka* to UCI before these salmon reached commercial harvest areas. Such information has helped ADF&G management biologists set commercial fishing times and areas to harvest sockeye salmon surplus to spawning needs. Test fishing results have been reported annually since 1979 (Waltemyer 1983a, 1983b, 1986a, 1986b, Hilsinger and Waltemyer 1987, Hilsinger 1988, Tarbox and Waltemyer 1989, Tarbox, 1990, 1992, 1994). This report presents the results of the 1994 test fishing project.

## METHODS

### *Test Fishing*

Sockeye salmon returning to Upper Cook Inlet were sampled by fishing geographically fixed stations between Anchor Point and Red River Delta (Figure 1). Stations were numbered consecutively from east to west. Station locations were determined from LORAN C coordinates. A chartered test fishing vessel sampled stations 4 - 8 daily. To increase sampling power an additional station (6.5) was sampled every other day.

Sampling started on 1 July 93 and continued through 30 July. The chartered vessel, *F/V Corrina Kay*, fished a multifilament gill net 366 m (1,200 ft) long with 2.1 cm (5 1/8 in) stretched mesh during test fishing. Drift gill net web had a filament size number of 53/S6F, was 45 meshes deep, and was constructed of double knot Super Crystal, shade number 1.

All salmon captured were identified to species. All sockeye salmon were measured for length (mid-eye to fork of tail in mm). The number of each species caught at each station was expressed as a catch per unit of effort (CPUE) statistic:

$$\text{CPUE}_s = \frac{100 \text{ fm} \times 60 \text{ min} \times \text{number of fish}}{\text{fm of gear} \times \text{MFT}}, \quad (1)$$

where: CPUE<sub>s</sub> = CPUE for station *s*, and  
MFT = mean fishing time.

Mean fishing time was calculated as:

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

where: A = time net deployment started,  
B = time net fully deployed,  
C = time net retrieval started, and  
D = time net fully retrieved.

Once deployed at a station, gill nets were fished 30 min before retrieval started.

Daily CPUE ( $\text{CPUE}_d$ ) was calculated as:

$$\text{CPUE}_d = \sum_{s=1}^n \text{CPUE}_s. \quad (3)$$

The following physical and chemical measurements were taken at the start of each set: air temperature, water temperature (1 m below the surface), wind velocity and direction, tide stage, water depth, and water clarity. Air and water temperatures were measured using a YSI salinity/temperature meter. Unfortunately, the salinity meter malfunctioned during the project. Wind speed was measured in knots and direction was recorded as 0 (no wind), 1 (north), 2 (northeast), 3 (east), 4 (southeast), 5 (south), 6 (southwest), 7 (west), or 8 (northwest). Tide stage was classed as flood, ebb or slack by observing the movement of the vessel while drifting with the gill net. Water depth was measured in fm using a Simrad echo sounder, and water clarity was measured in m using a 17.5 cm secchi disk.

### *Describing the Salmon Migration*

Catchability, the fraction of the available population taken by a defined unit of fishing effort, was estimated as:

$$q_d = c_d / r_d, \quad (4)$$

where:  $q_d$  = estimated catchability on day  $d$ ,  
 $r_d$  = adjusted cumulative total return on day  $d$ , and  
 $c_d$  = cumulative CPUE on day  $d$ .

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

$$P = 1/q_d ,$$

where:  $P$  = passage rate. (5)

Since the test fishery did not encompass the entire sockeye salmon run, the total estimated CPUE for the test fishery was estimated after the season using the following relationship:

$$CPUE_t = CPUE_f \times \frac{H_t}{H_{(f+2)}} , \quad (6)$$

where:  $CPUE_t$  = total estimated CPUE for the season,  
 $CPUE_f$  = cumulative CPUE through final day,  $f$ , of test fishing,  
 $H_t$  = total commercial harvest for the season  
 $H_{(f+2)}$  = total commercial catch through final day of test fishery  
 $(f+2)$ , and  
 $2$  = number of days it took salmon to travel from test fishery  
to commercial harvest areas.

Estimates of  $CPUE_t$  and  $CPUE_d$  values were used to estimate daily and cumulative proportions of  $CPUE_v$  based on a non-linear model:

$$y_d = 1/(1 + e^{-(a+bd)}) , \quad (7)$$

where:  $y_d$  = cumulative proportion of CPUE or return on day  $d$ ,  
 $a$  and  $b$  = coefficients of model, and  
 $d$  = day of observation.

To calculate the day on which approximately 50% of the total run had passed the transect, referred to as the mean date of return, the following formula was used:

$$M = a/b \quad , \quad (8)$$

where:  $M$  = mean date of return.

## RESULTS

A total of 1,401 sockeye salmon, 227 pink salmon *O. gorbuscha*, 521 chum salmon *O. keta*, 752 coho salmon *O. kisutch*, and 1 chinook salmon *O. tshawytscha* were captured during the 1994 test fishery (Table 1, Appendices A-D). Daily sockeye salmon catches ranged from 1 to 148 fish (Table 1).

Sockeye salmon daily CPUE values ranged from 0.8 on 4 July to 104.6 on 25 July. Cumulative total CPUE for the duration of the project was 1,011.5 (Table 1). Using postseason commercial harvest figures, test fishing spanned approximately 90.5% of the total run. Therefore, total CPUE for the test fishery would have been 1,118 if test fishing had continued throughout the duration of the run. Sockeye salmon catches along the transect were similar to the distribution of CPUE values (Tables 2 and 3).

Examination of daily and cumulative proportions (estimated postseason) of the sockeye salmon run to UCI suggested that 5.5% of the run had passed the transect prior to the start of test fishing on 1 July and that 84% had passed at project termination (Appendix E; Figure 2). Mean date of the run was 19 July 1994 four days later than the 1979-1993 average (Table 4).

The total sockeye salmon run to UCI in 1994 was estimated to be 5.6 million fish of which 3.6 million were harvested in the commercial fishery (Table 5). Estimated passage rate for the season was 5,009 sockeye salmon per CPUE index point.

Water temperatures measured along the transect generally increased during the season from a low of 9.0°C early in July to a high of 12.0°C in mid-July (Appendix F). Air temperatures fluctuated between 9°C and 25°C during the project (Appendix F). Wind velocities were generally low to moderate. However, winds of 20 knots or greater were recorded on 8 days (Appendix F). Wind direction was typically from the southeast or southwest.

During the commercial salmon fishing season five formal estimates of the sockeye salmon total run were made (Table 6). Past studies suggested that the first best-fit estimate was not accurate in predicting total run during the season. The second or third best fit estimate were usually better predictors. This pattern was also evident in 1994. The initial best-fit estimate (1990 run timing) on 13 July was only 3.7 million fish, much lower than the actual

total run. The second and third best-fit estimates based on 1987 and 1992 run timing, were within 12.5% and 5.4% of the actual total run. The remaining two estimates were within 14% of the actual total run.

## DISCUSSION

The objective of the offshore test fish program is to provide UCI management biologists with early total abundance and run timing estimates for sockeye salmon. This information, used in conjunction with age, sex, size and stock identification data; harvest and escapement data; and observations on fishing patterns are used to formulate management strategy during the fishing season. It is in this context that the utility of the offshore test fish program must be viewed.

The 1994 UCI commercial salmon fishery proceeded in an orderly fashion early in the season, and run size estimates were not a significant factor in management decisions until after 14 July (Ruesch, personal communication, ADF&G, Soldotna). The program provided useful and valuable information for management of the commercial fishery since run estimates were reasonably accurate.

During the 1994 field season, the Commissioner of ADF&G overruled local staff recommendations and prohibited additional UCI commercial fishing time from 7 pm on 29 July to 7 am on 1 August. Stated reasons were conservation concerns for Kenai River and Yentna River runs. Kenai River sockeye salmon escapement at this point was approximately 441,000, within the stated Kenai River management goal of 400,000 to 700,000 fish. Susitna River escapement was approximately 85,000, only 15,000 sockeye salmon short of the goal of 100,000 to 150,000 fish. On 29 July offshore test fish data provided a total run estimate of 4.8 million sockeye salmon to UCI. Since catch and escapement at this time totaled 4.0 million fish, an additional 800,000 fish were still estimated to be available for harvest or escapement. As a result of the Commissioner's decision, Kenai River escapement reached approximately 1.0 million fish while Susitna escapement approached the high end of the escapement goal range. The offshore test fish program has proved to be a good estimator of UCI sockeye salmon abundance, and should not be ignored when making management decisions, particularly during the latter portion of the season.

## LITERATURE CITED

- Hilsinger, J.R. 1988. Run strength analysis of the 1987 sockeye salmon return to Upper Cook Inlet, Alaska. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2A88-19, Anchorage.
- Hilsinger, J.R. and D. Waltemyer. 1987. Run strength analysis of the 1986 sockeye salmon return to Upper Cook Inlet, Alaska. Alaska Department of Fish and Game, Division of Commercial Fisheries, Upper Cook Inlet Area Data Report 87-6, Soldotna.
- Tarbox, K.E. 1990. An estimate of the migratory timing of sockeye salmon into Upper Cook, Alaska, in 1989 using a test fishery. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2S90-4, Anchorage.
- Tarbox, K.E. 1992. An estimate of the migratory timing of sockeye salmon into Upper Cook Inlet, Alaska, in 1991 using a test fishery. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2A92-07, Anchorage.
- Tarbox, K.E. 1994. An estimate of the migratory timing and abundance of sockeye salmon into Upper Cook Inlet, Alaska, in 1993. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Regional Information Report 2A94-13, Anchorage.
- Tarbox, K.E. and D. Waltemyer. 1989. An estimate of the 1988 total sockeye salmon return to Upper Cook Inlet, Alaska using a test fishery. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2S89-4, Anchorage.
- Waltemyer, D.L. 1983a. Migratory timing and abundance estimation of the 1982 sockeye salmon return to Upper Cook Inlet based on a test fishing program. Alaska Department of Fish and Game, Division of Commercial Fisheries, Upper Cook Inlet Data Report 83-1, Soldotna.
- \_\_\_\_\_ 1983b. Describing the migrations of salmon and estimating abundance of sockeye salmon returning in 1983 to Upper Cook Inlet based on a test fishery. Alaska Department of Fish and Game, Division of Commercial Fisheries, Upper Cook Inlet Data Report 84-1, Soldotna.
- \_\_\_\_\_ 1986a. Use of a test fishery to describe and estimate the sockeye salmon total return to Upper Cook Inlet in 1984. Alaska Department of Fish and Game, Division of Commercial Fisheries, Upper Cook Inlet Data Report 86-1, Soldotna.

## LITERATURE CITED, continued

\_\_\_\_\_ 1986b. Run strength analysis of the 1985 sockeye salmon return to Upper Cook Inlet, Alaska based on a test fishery. Alaska Department of Fish and Game, Division of Commercial Fisheries, Upper Cook Inlet Data Report 86-5, Soldotna.

Table 1. Summary of sockeye salmon fishing effort, daily and cumulative catch, and daily and cumulative CPUE, Upper Cook Inlet offshore test fish project, 1994.

Date	Number of Stations	Mean Fishing Time (min)	Catch		CPUE		Mean Length (mm)
			Daily	Cum.	Daily	Cum.	
01-Jul	6	228.0	18	18	14.4	14.4	542
02-Jul	5	187.0	12	30	9.2	23.6	538
03-Jul	6	234.5	43	73	32.6	56.2	522
04-Jul	5	185.0	1	74	0.8	57.0	
05-Jul	6	224.5	61	135	49.0	106.0	525
06-Jul	5	156.5	6	141	4.9	110.9	504
07-Jul	6	239.5	86	227	58.4	169.3	526
08-Jul	5	187.5	47	274	32.4	201.8	545
09-Jul	6	220.0	20	294	16.3	218.1	522
10-Jul	5	192.5	80	374	61.8	279.9	517
11-Jul	6	210.0	22	396	18.2	298.1	
12-Jul	5	176.5	6	402	5.4	303.5	528
13-Jul	6	221.0	23	425	17.4	320.9	539
14-Jul	5	188.5	16	441	12.2	333.1	548
15-Jul	6	239.0	56	497	36.8	370.0	527
16-Jul	5	192.0	49	546	34.3	404.3	541
17-Jul	6	230.0	55	601	42.8	447.1	534
18-Jul	5	191.5	24	625	16.5	463.6	553
19-Jul	6	232.0	92	717	64.3	527.9	542
20-Jul	5	185.0	80	797	62.5	590.5	546
21-Jul	5	193.5	54	851	40.7	631.2	537
22-Jul	5	196.5	55	906	38.7	669.9	538
23-Jul	6	222.0	38	944	29.6	699.5	543
24-Jul	5	156.0	5	949	4.1	703.6	552
25-Jul	6	235.0	148	1097	104.6	808.2	545
26-Jul	5	188.5	58	1155	39.8	848.0	561
27-Jul	6	218.0	12	1167	9.2	857.2	561
28-Jul	5	184.0	23	1190	17.8	875.0	
29-Jul	6	255.0	141	1331	79.9	954.9	541
30-Jul	5	190.5	70	1401	56.5	1011.5	535

Table 2. Estimated sockeye salmon catch by date and station, Upper Cook Inlet offshore test fish project, 1994.

Date	Station Number						Total
	4	5	6	6.5	7	8	
01-Jul	1	8	5	4	0	0	18
02-Jul	9	1	0		2	0	12
03-Jul	6	14	4	12	7	0	43
04-Jul	0	1	0		0	0	1
05-Jul	3	1	8	14	23	12	61
06-Jul	0	4	2		0	0	6
07-Jul	2	1	6	46	30	1	86
08-Jul	0	44	1		2	0	47
09-Jul	3	4	0	3	2	8	20
10-Jul	40	26	3		6	5	80
11-Jul	5	1	3	0	1	12	22
12-Jul	0	0	1		5	0	6
13-Jul	0	8	14	0	1	0	23
14-Jul	2	3	1		10	0	16
15-Jul	1	2	15	36	2	0	56
16-Jul	2	32	1		14	0	49
17-Jul	17	11	14	5	8	0	55
18-Jul	0	1	19		4	0	24
19-Jul	0	1	1	23	56	11	92
20-Jul	3	76	0		1	0	80
21-Jul	0	6	12	10	26	0	54
22-Jul	2	33	20		0	0	55
23-Jul	0	25	10	1	0	2	38
24-Jul	0	3	0		0	2	5
25-Jul	0	63	70	10	4	1	148
26-Jul	0	54	0		4	0	58
27-Jul	12	0	0	0	0	0	12
28-Jul	0	22	1		0	0	23
29-Jul	1	10	66	63	0	1	141
30-Jul	2	2	24		41	1	70
Total	111	457	301	227	249	56	1401
%	7.9	32.6	21.5	16.2	17.8	4.0	100.0

Table 3. Estimated sockeye salmon CPUE by date and station, Upper Cook Inlet offshore test fish project, 1994.

Date	Station Number						Total
	4	5	6	6.5	7	8	
01-Jul	0.8	6.4	3.7	3.5	0.0	0.0	14.4
02-Jul	6.9	0.8	0.0		1.5	0.0	9.2
03-Jul	4.6	10.6	3.0	9.0	5.4	0.0	32.6
04-Jul	0.0	0.8	0.0		0.0	0.0	0.8
05-Jul	2.4	0.8	6.2	10.8	18.9	9.9	49.0
06-Jul	0.0	3.3	1.6		0.0	0.0	4.9
07-Jul	1.6	0.8	4.9	30.7	19.6	0.8	58.4
08-Jul	0.0	30.0	0.8		1.6	0.0	32.4
09-Jul	2.8	3.0	0.0	2.5	1.6	6.4	16.3
10-Jul	30.4	20.2	2.3		5.0	3.9	61.8
11-Jul	4.1	0.8	2.5	0.0	0.9	9.9	18.2
12-Jul	0.0	0.0	0.9		4.5	0.0	5.4
13-Jul	0.0	6.6	10.0	0.0	0.8	0.0	17.4
14-Jul	1.6	2.4	0.8		7.4	0.0	12.2
15-Jul	0.7	1.6	11.0	21.8	1.7	0.0	36.8
16-Jul	1.6	23.1	0.8		8.8	0.0	34.3
17-Jul	13.0	8.6	11.0	4.0	6.2	0.0	42.8
18-Jul	0.0	0.8	12.5		3.2	0.0	16.5
19-Jul	0.0	0.8	0.8	16.4	37.4	8.9	64.3
20-Jul	2.5	59.2	0.0		0.8	0.0	62.5
21-Jul	0.0	4.6	9.5	7.8	18.8		40.7
22-Jul	1.6	22.5	14.6		0.0	0.0	38.7
23-Jul	0.0	19.0	8.2	0.8	0.0	1.6	29.6
24-Jul	0.0	2.5	0.0		0.0	1.6	4.1
25-Jul	0.0	45.0	48.0	7.6	3.2	0.8	104.6
26-Jul	0.0	36.4	0.0		3.4	0.0	39.8
27-Jul	9.2	0.0	0.0	0.0	0.0	0.0	9.2
28-Jul	0.0	17.0	0.8		0.0	0.0	17.8
29-Jul	0.9	8.1	39.6	30.5	0.0	0.8	79.9
30-Jul	2.2	2.5	24.3		26.7	0.8	56.5
Total	86.9	338.4	217.8	145.4	177.4	45.4	1011.5
%	8.6	33.5	21.5	14.4	17.5	4.5	100.0

Table 4. Mean date of the sockeye salmon run across Anchor Point transect, Upper Cook Inlet offshore test fishing project, 1979-1993.

Year	Mean Date <sup>a</sup>	
	Coded	Calendar
1979	18.4	July 11
1980	22.7	July 15
1981	13.2	July 06
1982	24.2	July 17
1983	22.6	July 15
1984	18.4	July 11
1985	22.7	July 15
1986	23.0	July 16
1987	25.7	July 18
1988	20.6	July 13
1989	21.6	July 14
1990	25.6	July 18
1991	24.3	July 17
1992	24.3	July 17
1993	21.4	July 14
1994	26.2	July 19
1979-1993	22.2	July 15

<sup>a</sup> Day (1) = June 24; File OTF94t4.w51

Table 5. The 1994 Upper Cook Inlet commercial salmon harvest.

Date	Number of Deliveries	Chinook		Sockeye		Coho		Pink		Chum		Total	
		Daily	Cumulative	Daily	Cumulative	Daily	Cumulative	Daily	Cumulative	Daily	Cumulative	Daily	Cumulative
6-01 Wed	15	105	105	368	368							473	473
6-03 Fri	14	79	184	472	840							551	1,024
6-06 Mon	91	1,757	1,941	642	1,482	40	40					2,439	3,463
6-08 Wed	11	66	2,007	265	1,747	56	96					387	3,850
6-10 Fri	13	36	2,043	640	2,387		96					676	4,526
6-13 Mon	73	1,348	3,391	991	3,378		96					2,339	6,865
6-15 Wed	9	29	3,420	236	3,614		96					265	7,130
6-17 Fri	23	56	3,476	329	3,943	1	97	5	5			391	7,521
6-20 Mon	9	30	3,506	54	3,997		97		5			84	7,605
6-24 Fri	16	13	3,519	239	4,236		97	6	11	1	1	259	7,864
6-27 Mon	222	116	3,635	6,984	11,220	70	167	25	36	743	744	7,938	15,802
7-01 Fri	699	719	4,354	54,174	65,394	4,108	4,275	2,431	2,467	8,471	9,215	69,903	85,705
7-04 Mon	788	862	5,216	68,424	133,818	3,926	8,201	2,96	2,763	10,561	19,776	84,069	169,774
7-08 Fri	926	1,136	6,352	162,779	296,597	14,019	22,220	2,969	5,732	44,621	64,397	225,524	395,298
7-10 Sun	247	437	6,789	18,558	315,155	134	22,354	290	6,022	68	64,465	19,487	414,785
7-11 Mon	459	636	7,425	22,499	337,654	3,773	26,127	778	6,800	1,179	65,644	28,865	443,650
7-15 Fri	1138	996	8,421	523,726	861,380	55,018	81,145	42,270	49,070	33,031	98,675	655,041	1,098,691
7-16 Sat	159	503	8,924	35,394	896,774	256	81,401	551	49,621	46	98,721	36,750	1,135,441
7-17 Sun	149	392	9,316	52,576	949,350	276	81,677	583	50,204	4	98,725	53,831	1,189,272
7-18 Mon	1191	841	10,157	488,401	1,437,751	75,116	156,793	54,540	104,744	22,781	121,506	641,679	1,830,951
7-19 Tue	190	450	10,607	49,573	1,487,324	552	157,345	1,962	106,706	22	121,528	52,559	1,883,510
7-20 Wed	137	449	11,056	34,426	1,521,750	667	158,012	1,205	107,911	9	121,537	36,756	1,920,266
7-21 Thu	170	391	11,447	31,656	1,553,406	1,067	159,079	1,545	109,456	67	121,604	34,726	1,954,992
7-22 Fri	215	382	11,829	57,844	1,611,250	5,446	164,525	3,023	112,479	184	121,788	66,879	2,021,871
7-23 Sat	212	283	12,112	89,480	1,700,730	1,379	165,904	2,342	114,821	38	121,826	93,522	2,115,393
7-24 Sun	675	515	12,627	136,151	1,836,881	5,192	171,096	7,037	121,858	1,787	123,613	150,682	2,266,075
7-25 Mon	1133	1,240	13,867	384,584	2,221,465	72,955	244,051	37,947	159,805	34,734	158,347	531,460	2,797,535
7-26 Tue	722	1,155	15,022	65,857	2,287,322	5,274	249,325	5,612	165,417	1,781	160,128	79,679	2,877,214
7-27 Wed	934	996	16,018	311,578	2,598,900	56,918	306,243	30,551	195,968	30,926	191,054	430,969	3,308,183
7-28 Thu	562	881	16,899	106,373	2,705,273	6,002	312,245	8,902	204,870	1,394	192,448	123,552	3,431,735
7-29 Fri	1118	817	17,716	229,373	2,934,646	52,801	365,046	31,808	236,678	32,820	225,268	347,619	3,779,354
8-01 Mon	1025	295	18,011	216,446	3,151,092	42,359	407,405	33,702	270,380	19,897	245,165	312,699	4,092,053
8-02 Tue	628	444	18,455	76,832	3,227,924	4,947	412,352	27,378	297,758	973	246,138	110,574	4,202,627
8-03 Wed	782	329	18,784	66,698	3,294,622	15,007	427,359	37,769	335,527	4,507	250,645	124,310	4,326,937
8-04 Thu	601	325	19,109	57,179	3,351,801	5,324	432,683	35,636	371,163	938	251,583	99,402	4,426,339

- Continued -

Table 5. (p. 2 of 2)

Date	Number of Deliveries	Chinook		Sockeye		Coho		Pink		Chum		Total	
		Daily	Cumulative	Daily	Cumulative	Daily	Cumulative	Daily	Cumulative	Daily	Cumulative	Daily	Cumulative
8-05 Fri	843	355	19,464	80,148	3,431,949	28,876	461,559	46,024	417,187	20,347	271,930	175,750	4,602,089
8-06 Sat	374	224	19,688	21,242	3,453,191	4,556	466,115	25,449	442,636	190	272,120	51,661	4,653,750
8-07 Sun	276	167	19,855	12,843	3,466,034	3,045	469,160	21,284	463,920	79	272,199	37,418	4,691,168
8-08 Mon	590	187	20,042	29,376	3,495,410	21,231	490,391	30,673	494,593	11,223	283,422	92,690	4,783,858
8-10 Wed	18		20,042	3,650	3,499,060	1,460	491,851	139	494,732	58	283,480	5,307	4,789,165
8-12 Fri	449	145	20,187	27,686	3,526,746	25,871	517,722	18,596	513,328	8,848	292,328	81,146	4,870,311
8-15 Mon	359	72	20,259	18,418	3,545,164	21,300	539,022	6,694	520,022	4,556	296,884	51,040	4,921,351
8-17 Wed	14		20,259	5,704	3,550,868	1,239	540,261	40	520,062	23	296,907	7,006	4,928,357
8-19 Fri	111		20,259	3,129	3,553,997	13,939	554,200	199	520,261	1,116	298,023	18,383	4,946,740
8-22 Mon	83		20,259	4,339	3,558,336	6,788	560,988	104	520,365	259	298,282	11,490	4,958,230
8-24 Wed	28		20,259	2,719	3,561,055	896	561,884	18	520,383	36	298,318	3,669	4,961,899
8-26 Fri	67		20,259	3,307	3,564,362	5,106	566,990	21	520,404	295	298,613	8,729	4,970,628
8-29 Mon	49	1	20,260	204	3,564,566	5,652	572,642	29	520,433	455	299,068	6,341	4,976,969
8-31 Wed	16		20,260	1,068	3,565,634	1,134	573,776	4	520,437	20	299,088	2,226	4,979,195
9-02 Fri	47		20,260	837	3,566,471	3,977	577,753	28	520,465	193	299,281	5,035	4,984,230
9-05 Mon	20		20,260	176	3,566,647	960	578,713	7	520,472	4	299,285	1,147	4,985,377
9-07 Wed	5		20,260	122	3,566,769	382	579,095	5	520,477		299,285	509	4,985,886
9-09 Fri	11		20,260	231	3,567,000	684	579,779	3	520,480	12	299,297	930	4,986,816
9-12 Mon	11		20,260	296	3,567,296	535	580,314	1	520,481	3	299,300	835	4,987,651
9-14 Wed	2		20,260	85	3,567,381	131	580,445		520,481		299,300	216	4,987,867
9-19 Mon	1		20,260	4	3,567,385	16	580,461		520,481		299,300	20	4,987,887
9-30 Fri	1		20,260	7	3,567,392	106	580,567		520,481		299,300	113	4,988,000

Table 6. Total offshore test fishing CPUE and total sockeye salmon run estimates, Upper Cook Inlet, 1993.

Date	Cum CPUE	Best Fit Year	MSSDEV <sup>b</sup>	Passage Rate	Total CPUE <sup>a</sup>	Total Run Estimate (X 10 <sup>6</sup> )	Percent Error <sup>c</sup>
13 July	321	1990	.0004	1,966	1,882	3.7	-33.9
15 July	370	1991	.0010	4,441	1,101	4.9	-12.5
18 July	467	1987	.0011	4,762	1,121	5.3	-5.4
25 July	808	1987	.0010	4,517	1,069	4.8	-14.3
29 July	955	1987	.0009	4,502	1,077	4.8	-14.3

<sup>a</sup> Cumulative CPUE from start of test fishing to estimated end of total run.

<sup>b</sup> Mean sum of squared deviation.

<sup>c</sup> Percent error =  $\frac{\text{predicted-actual}}{\text{actual}} * 100$

<sup>d</sup> File name OTF94t6.w51

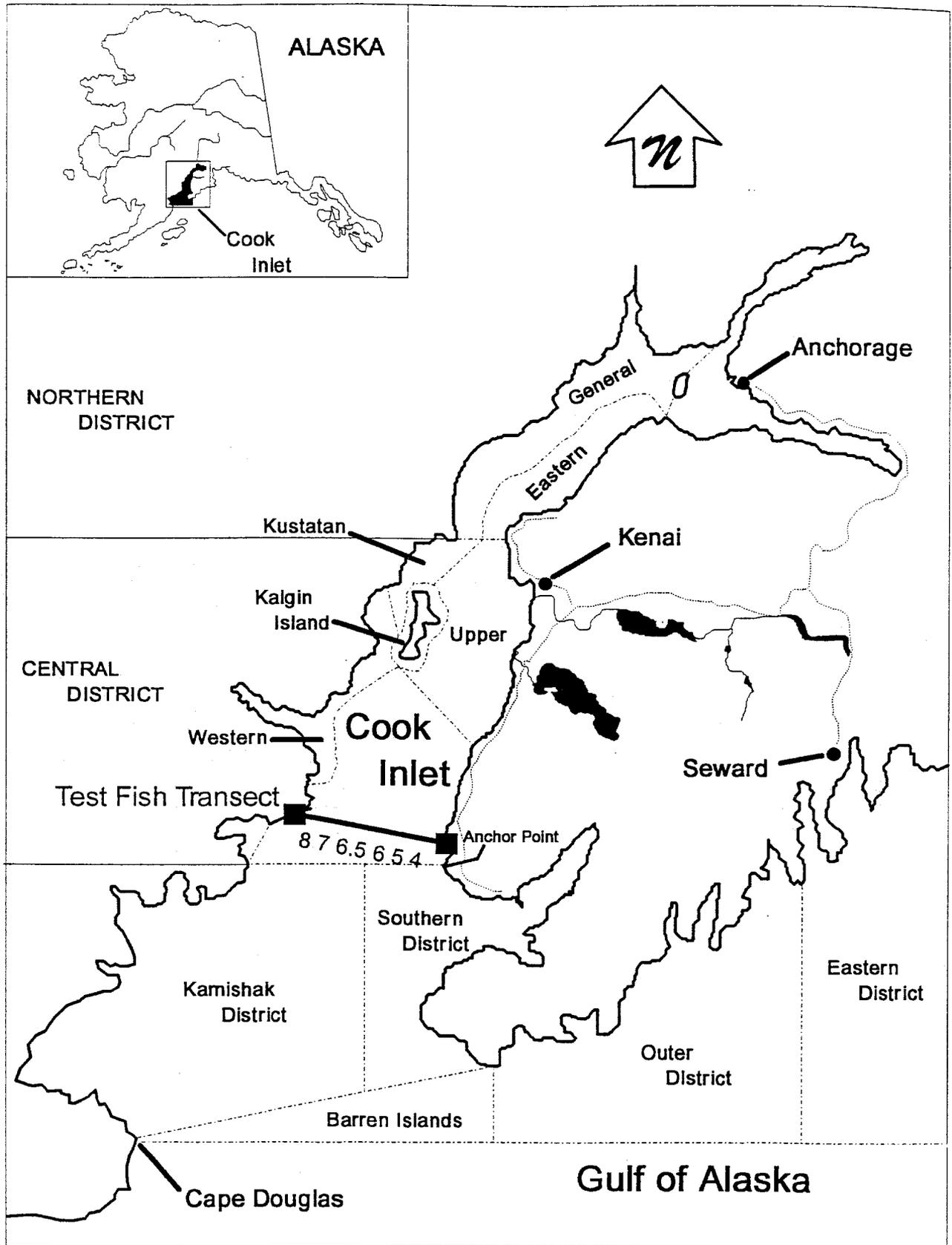


Figure 1. Location of fishing districts and offshore test fish transect in Cook Inlet, Alaska, 1994.

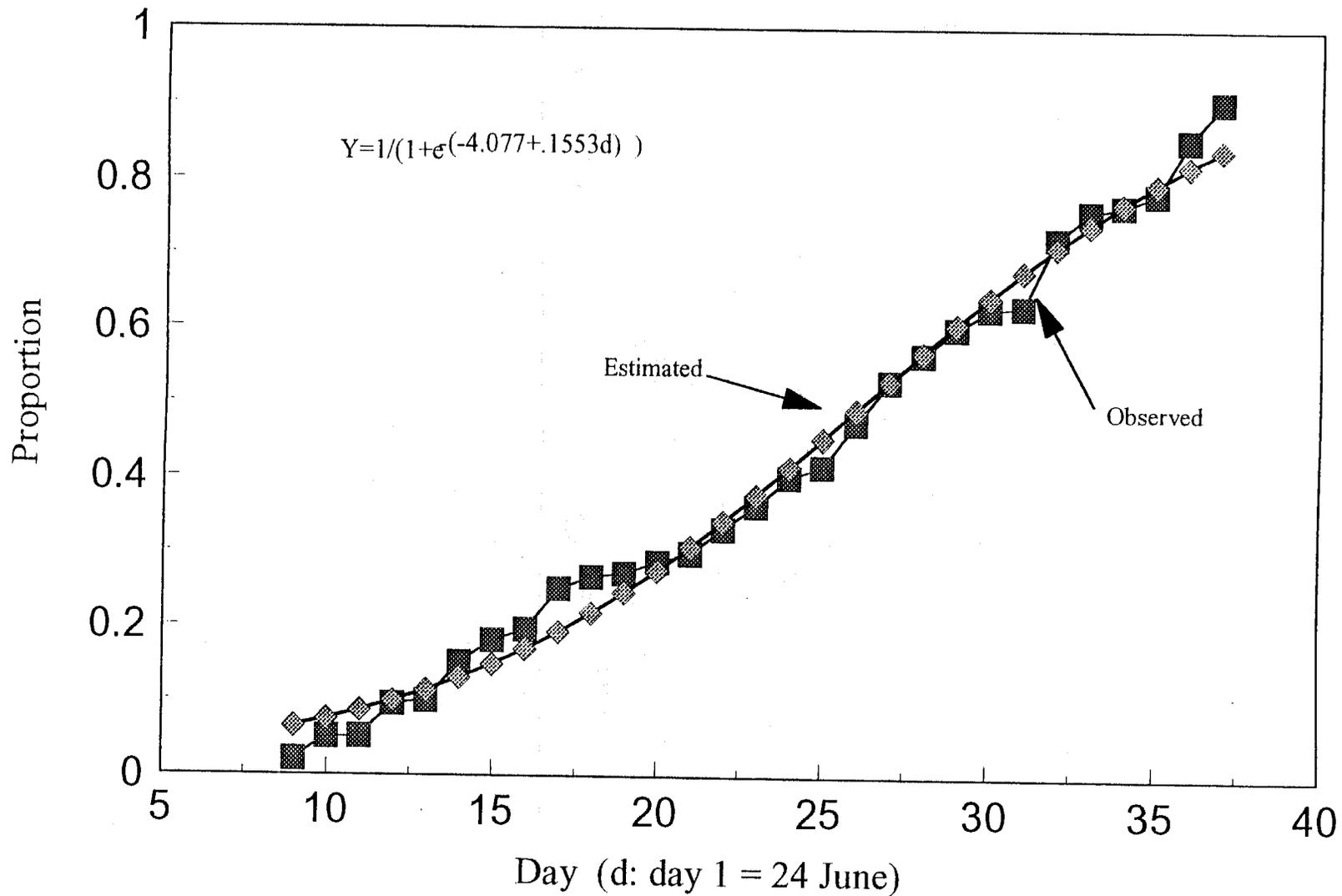


Figure 2. Cumulative proportions estimated for the sockeye salmon return to Unner Cook Inlet Alaska 1994

Appendix A1. Summary of pink salmon fishing effort, daily and cumulative catch, and daily and cumulative CPUE, Upper Cook Inlet offshore test fish project, 1994.

Date	Number of Stations	Mean Fishing Time (min)	Catch		CPUE	
			Daily	Cum.	Daily	Cum.
01-Jul	6	228.0	0	0	0.0	0.0
02-Jul	5	187.0	0	0	0.0	0.0
03-Jul	6	234.5	0	0	0.0	0.0
04-Jul	5	185.0	0	0	0.0	0.0
05-Jul	6	224.5	1	1	0.8	0.8
06-Jul	5	156.5	0	1	0.0	0.8
07-Jul	6	239.5	2	3	1.3	2.1
08-Jul	5	187.5	4	7	3.1	5.2
09-Jul	6	220.0	0	7	0.0	5.2
10-Jul	5	192.5	4	11	3.1	8.3
11-Jul	6	210.0	4	15	3.4	11.7
12-Jul	5	176.5	0	15	0.0	11.7
13-Jul	6	221.0	5	20	3.7	15.5
14-Jul	5	188.5	4	24	3.0	18.4
15-Jul	6	239.0	20	44	13.7	32.2
16-Jul	5	192.0	25	69	17.4	49.6
17-Jul	6	230.0	17	86	13.4	63.0
18-Jul	5	191.5	14	100	10.2	73.2
19-Jul	6	232.0	20	120	14.0	87.2
20-Jul	5	185.0	3	123	2.4	89.6
21-Jul	5	193.5	23	146	17.7	107.3
22-Jul	5	196.5	19	165	14.1	121.4
23-Jul	6	222.0	3	168	2.3	123.7
24-Jul	5	156.0	3	171	2.4	126.2
25-Jul	6	235.0	13	184	9.7	135.9
26-Jul	5	188.5	3	187	2.3	138.2
27-Jul	6	218.0	3	190	2.4	140.6
28-Jul	5	184.0	2	192	1.6	142.2
29-Jul	6	255.0	22	214	12.1	154.3
30-Jul	5	190.5	13	227	12.0	166.4

Appendix A2. Estimated pink salmon catch by date and station, Upper Cook Inlet offshore test fish project, 1994.

Date	Station Number						Total
	4	5	6	6.5	7	8	
01-Jul	0	0	0	0	0	0	0
02-Jul	0	0	0	0	0	0	0
03-Jul	0	0	0	0	0	0	0
04-Jul	0	0	0	1	0	0	1
05-Jul	0	0	0	0	0	0	0
06-Jul	0	0	0	1	1	0	2
07-Jul	0	2	2	0	0	0	4
08-Jul	0	0	0	0	0	0	0
09-Jul	0	2	0	0	0	0	4
10-Jul	2	0	1	0	2	0	4
11-Jul	1	0	0	0	0	0	0
12-Jul	0	1	4	0	0	0	5
13-Jul	0	1	0	0	3	0	4
14-Jul	0	0	12	7	0	0	20
15-Jul	1	1	3	0	14	1	25
16-Jul	6	1	3	8	3	2	17
17-Jul	0	0	7	0	5	2	14
18-Jul	0	0	1	9	9	1	20
19-Jul	0	1	2	0	0	0	3
20-Jul	0	4	8	5	5	0	23
21-Jul	1	5	8	0	1	4	19
22-Jul	1	2	1	0	0	0	3
23-Jul	0	0	1	0	0	2	3
24-Jul	0	1	4	4	4	0	13
25-Jul	0	1	0	0	0	0	3
26-Jul	2	1	0	0	0	1	3
27-Jul	1	1	0	0	0	0	2
28-Jul	1	0	10	11	0	1	22
29-Jul	0	0	2	0	4	1	13
30-Jul	6	0	0	0	0	0	6
Total	22	24	69	46	51	15	227
%	9.7	10.6	30.4	20.3	22.5	6.6	100.0

Appendix A3. Estimated pink salmon CPUE by date and station,  
Upper Cook Inlet offshore test fish project,  
1994.

Date	Station Number						Total
	4	5	6	6.5	7	8	
01-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
02-Jul	0.0	0.0	0.0		0.0	0.0	0.0
03-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
04-Jul	0.0	0.0	0.0		0.0	0.0	0.0
05-Jul	0.0	0.0	0.0	0.8	0.0	0.0	0.8
06-Jul	0.0	0.0	0.0		0.0	0.0	0.0
07-Jul	0.0	0.0	0.0	0.7	0.7	0.0	1.3
08-Jul	0.0	1.4	1.7		0.0	0.0	3.1
09-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10-Jul	1.5	1.6	0.0		0.0	0.0	3.1
11-Jul	0.8	0.0	0.8	0.0	1.8	0.0	3.4
12-Jul	0.0	0.0	0.0		0.0	0.0	0.0
13-Jul	0.0	0.8	2.9	0.0	0.0	0.0	3.7
14-Jul	0.0	0.8	0.0		2.2	0.0	3.0
15-Jul	0.7	0.0	8.8	4.2	0.0	0.0	13.7
16-Jul	4.7	0.7	2.4		8.8	0.8	17.4
17-Jul	0.0	0.8	2.3	6.4	2.3	1.6	13.4
18-Jul	0.0	0.0	4.6		4.0	1.6	10.2
19-Jul	0.0	0.0	0.8	6.4	6.0	0.8	14.0
20-Jul	0.0	0.8	1.6		0.0	0.0	2.4
21-Jul	0.8	3.1	6.3	3.9	3.6		17.7
22-Jul	0.8	3.4	5.9		0.8	3.2	14.1
23-Jul	0.0	1.5	0.8	0.0	0.0	0.0	2.3
24-Jul	0.0	0.0	0.8		0.0	1.6	2.4
25-Jul	0.0	0.7	2.8	3.0	3.2	0.0	9.7
26-Jul	1.6	0.7	0.0		0.0	0.0	2.3
27-Jul	0.8	0.8	0.0	0.0	0.0	0.8	2.4
28-Jul	0.8	0.8	0.0		0.0	0.0	1.6
29-Jul	0.0	0.0	6.0	5.3	0.0	0.8	12.1
30-Jul	6.6	0.0	2.0		2.6	0.8	12.0
Total	19.2	17.9	50.6	30.6	36.0	12.1	166.4
%	11.5	10.7	30.4	18.4	21.6	7.3	100.0

Appendix B1. Summary of chum salmon fishing effort, daily and cumulative catch, and daily and cumulative CPUE, Upper Cook Inlet offshore test fish project, 1994.

Date	Number of Stations	Mean Fishing Time (min)	Catch		CPUE	
			Daily	Cum.	Daily	Cum.
01-Jul	6	228.0	13	13	10.1	10.1
02-Jul	5	187.0	0	13	0.0	10.1
03-Jul	6	234.5	30	43	22.9	33.0
04-Jul	5	185.0	2	45	1.6	34.6
05-Jul	6	224.5	8	53	6.5	41.1
06-Jul	5	156.5	0	53	0.0	41.1
07-Jul	6	239.5	7	60	4.6	45.7
08-Jul	5	187.5	15	75	11.1	56.8
09-Jul	6	220.0	16	91	12.4	69.2
10-Jul	5	192.5	15	106	11.6	80.9
11-Jul	6	210.0	6	112	5.1	85.9
12-Jul	5	176.5	0	112	0.0	85.9
13-Jul	6	221.0	8	120	6.0	92.0
14-Jul	5	188.5	16	136	12.1	104.1
15-Jul	6	239.0	31	167	19.2	123.3
16-Jul	5	192.0	26	193	17.2	140.4
17-Jul	6	230.0	14	207	10.9	151.3
18-Jul	5	191.5	11	218	7.5	158.8
19-Jul	6	232.0	26	244	17.8	176.6
20-Jul	5	185.0	6	250	4.7	181.3
21-Jul	5	193.5	34	284	25.2	206.5
22-Jul	5	196.5	17	301	12.3	218.8
23-Jul	6	222.0	2	303	1.6	220.4
24-Jul	5	156.0	0	303	0.0	220.4
25-Jul	6	235.0	13	316	8.9	229.3
26-Jul	5	188.5	14	330	10.1	239.4
27-Jul	6	218.0	1	331	0.8	240.2
28-Jul	5	184.0	6	337	4.8	245.0
29-Jul	6	255.0	159	496	82.3	327.3
30-Jul	5	190.5	25	521	17.7	345.0

Appendix B2. Estimated chum salmon catch by date and station, Upper Cook Inlet offshore test fish project, 1994.

Date	Station Number						Total
	4	5	6	6.5	7	8	
01-Jul	4	5	4	0	0	0	13
02-Jul	0	0	0		0	0	0
03-Jul	0	0	17	7	4	2	30
04-Jul	0	2	0		0	0	2
05-Jul	0	3	1	1	3	0	8
06-Jul	0	0	0		0	0	0
07-Jul	0	0	0	2	5	0	7
08-Jul	0	10	2		3	0	15
09-Jul	2	11	0	0	2	1	16
10-Jul	2	2	6		1	4	15
11-Jul	0	1	2	0	2	1	6
12-Jul	0	0	0		0	0	0
13-Jul	0	2	5	0	1	0	8
14-Jul	2	2	0		12	0	16
15-Jul	0	0	3	28	0	0	31
16-Jul	1	4	1		19	1	26
17-Jul	2	1	5	1	5	0	14
18-Jul	0	0	9		1	1	11
19-Jul	0	0	0	6	19	1	26
20-Jul	0	6	0		0	0	6
21-Jul	0	5	1	8	20		34
22-Jul	2	9	3		2	1	17
23-Jul	0	1	1	0	0	0	2
24-Jul	0	0	0		0	0	0
25-Jul	0	1	12	0	0	0	13
26-Jul	0	10	0		4	0	14
27-Jul	1	0	0	0	0	0	1
28-Jul	0	3	3		0	0	6
29-Jul	0	3	29	124	3	0	159
30-Jul	0	0	4		21	0	25
Total	16	81	108	177	127	12	521
%	3.1	15.5	20.7	34.0	24.4	2.3	100.0

Appendix B3. Estimated chum salmon CPUE by date and station, Upper Cook Inlet offshore test fish project, 1994.

Date	Station Number						Total
	4	5	6	6.5	7	8	
01-Jul	3.1	4.0	3.0	0.0	0.0	0.0	10.1
02-Jul	0.0	0.0	0.0		0.0	0.0	0.0
03-Jul	0.0	0.0	13.0	5.3	3.0	1.6	22.9
04-Jul	0.0	1.6	0.0		0.0	0.0	1.6
05-Jul	0.0	2.5	0.8	0.8	2.5	0.0	6.5
06-Jul	0.0	0.0	0.0		0.0	0.0	0.0
07-Jul	0.0	0.0	0.0	1.3	3.3	0.0	4.6
08-Jul	0.0	6.9	1.7		2.5	0.0	11.1
09-Jul	1.8	8.2	0.0	0.0	1.6	0.8	12.4
10-Jul	1.5	1.6	4.6		0.8	3.1	11.6
11-Jul	0.0	0.8	1.6	0.0	1.8	0.8	5.1
12-Jul	0.0	0.0	0.0		0.0	0.0	0.0
13-Jul	0.0	1.6	3.6	0.0	0.8	0.0	6.0
14-Jul	1.6	1.6	0.0		8.9	0.0	12.1
15-Jul	0.0	0.0	2.2	17.0	0.0	0.0	19.2
16-Jul	0.8	2.9	0.8		11.9	0.8	17.2
17-Jul	1.5	0.8	3.9	0.8	3.9	0.0	10.9
18-Jul	0.0	0.0	5.9		0.8	0.8	7.5
19-Jul	0.0	0.0	0.0	4.3	12.7	0.8	17.8
20-Jul	0.0	4.7	0.0		0.0	0.0	4.7
21-Jul	0.0	3.8	0.8	6.2	14.4		25.2
22-Jul	1.6	6.1	2.2		1.6	0.8	12.3
23-Jul	0.0	0.8	0.8	0.0	0.0	0.0	1.6
24-Jul	0.0	0.0	0.0		0.0	0.0	0.0
25-Jul	0.0	0.7	8.2	0.0	0.0	0.0	8.9
26-Jul	0.0	6.7	0.0		3.4	0.0	10.1
27-Jul	0.8	0.0	0.0	0.0	0.0	0.0	0.8
28-Jul	0.0	2.3	2.5		0.0	0.0	4.8
29-Jul	0.0	2.4	17.4	60.0	2.5	0.0	82.3
30-Jul	0.0	0.0	4.0		13.7	0.0	17.7
Total	12.7	60.0	77.0	95.7	90.1	9.5	345.0
%	3.7	17.4	22.3	27.7	26.1	2.8	100.0

Appendix C1. Summary of coho salmon fishing effort, daily and cumulative catch, and daily and cumulative CPUE, Upper Cook Inlet offshore test fish project, 1994.

Date	Number of Stations	Mean Fishing Time (min)	Catch		CPUE	
			Daily	Cum.	Daily	Cum.
01-Jul	6	228.0	8	8	5.9	5.9
02-Jul	5	187.0	1	9	0.8	6.7
03-Jul	6	234.5	14	23	10.8	17.5
04-Jul	5	185.0	1	24	0.8	18.3
05-Jul	6	224.5	13	37	10.6	28.9
06-Jul	5	156.5	3	40	2.5	31.4
07-Jul	6	239.5	23	63	15.4	46.8
08-Jul	5	187.5	17	80	12.5	59.3
09-Jul	6	220.0	12	92	9.5	68.8
10-Jul	5	192.5	12	104	9.4	78.2
11-Jul	6	210.0	18	122	15.4	93.6
12-Jul	5	176.5	0	122	0.0	93.6
13-Jul	6	221.0	38	160	27.6	121.2
14-Jul	5	188.5	32	192	24.4	145.5
15-Jul	6	239.0	104	296	64.6	210.1
16-Jul	5	192.0	52	348	34.3	244.4
17-Jul	6	230.0	24	372	18.9	263.3
18-Jul	5	191.5	22	394	15.2	278.5
19-Jul	6	232.0	52	446	36.6	315.1
20-Jul	5	185.0	11	457	8.6	323.7
21-Jul	5	193.5	17	474	12.6	336.2
22-Jul	5	196.5	43	517	33.1	369.4
23-Jul	6	222.0	14	531	10.7	380.1
24-Jul	5	156.0	4	535	3.4	383.5
25-Jul	6	235.0	28	563	19.8	403.3
26-Jul	5	188.5	17	580	11.8	415.1
27-Jul	6	218.0	9	589	7.1	422.2
28-Jul	5	184.0	11	600	8.8	431.0
29-Jul	6	255.0	129	729	66.2	497.2
30-Jul	5	190.5	23	752	15.9	513.1

Appendix C2. Estimated coho salmon catch by date and station, Upper Cook Inlet offshore test fish project, 1994.

Date	Station Number						Total
	4	5	6	6.5	7	8	
01-Jul	0	0	7	0	1	0	8
02-Jul	0	1	0		0	0	1
03-Jul	1	0	3	2	5	3	14
04-Jul	1	0	0		0	0	1
05-Jul	1	2	2	0	4	4	13
06-Jul	0	0	3		0	0	3
07-Jul	0	0	0	6	15	2	23
08-Jul	0	11	6		0	0	17
09-Jul	1	7	2	2	0	0	12
10-Jul	1	2	3		0	6	12
11-Jul	1	6	1	0	8	2	18
12-Jul	0	0	0		0	0	0
13-Jul	0	4	34	0	0	0	38
14-Jul	1	10	1		20	0	32
15-Jul	0	0	9	95	0	0	104
16-Jul	1	2	8		40	1	52
17-Jul	1	0	11	2	6	4	24
18-Jul	0	1	18		2	1	22
19-Jul	0	0	9	13	28	2	52
20-Jul	0	11	0		0	0	11
21-Jul	0	2	1	4	10		17
22-Jul	1	9	5		11	17	43
23-Jul	0	11	0	2	1	0	14
24-Jul	0	2	2		0	0	4
25-Jul	0	2	20	1	1	4	28
26-Jul	0	15	0		2	0	17
27-Jul	7	1	0	1	0	0	9
28-Jul	0	5	6		0	0	11
29-Jul	0	0	32	97	0	0	129
30-Jul	2	0	0		21	0	23
Total	19	104	183	225	175	46	752
%	2.5	13.8	24.3	29.9	23.3	6.1	100.0

Appendix C3. Estimated coho salmon CPUE by date and station, Upper Cook Inlet offshore test fish project, 1994.

Date	Station Number						Total
	4	5	6	6.5	7	8	
01-Jul	0.0	0.0	5.1	0.0	0.8	0.0	5.9
02-Jul	0.0	0.8	0.0		0.0	0.0	0.8
03-Jul	0.8	0.0	2.2	1.5	3.8	2.5	10.8
04-Jul	0.8	0.0	0.0		0.0	0.0	0.8
05-Jul	0.8	1.6	1.6	0.0	3.3	3.3	10.6
06-Jul	0.0	0.0	2.5		0.0	0.0	2.5
07-Jul	0.0	0.0	0.0	4.0	9.8	1.6	15.4
08-Jul	0.0	7.5	5.0		0.0	0.0	12.5
09-Jul	0.9	5.2	1.7	1.7	0.0	0.0	9.5
10-Jul	0.8	1.6	2.3		0.0	4.7	9.4
11-Jul	0.8	5.1	0.8	0.0	7.1	1.6	15.4
12-Jul	0.0	0.0	0.0		0.0	0.0	0.0
13-Jul	0.0	3.3	24.3	0.0	0.0	0.0	27.6
14-Jul	0.8	7.9	0.8		14.8	0.0	24.4
15-Jul	0.0	0.0	6.6	58.0	0.0	0.0	64.6
16-Jul	0.8	1.4	6.3		25.0	0.8	34.3
17-Jul	0.8	0.0	8.6	1.6	4.7	3.2	18.9
18-Jul	0.0	0.8	11.9		1.6	0.8	15.2
19-Jul	0.0	0.0	7.2	9.1	18.7	1.6	36.6
20-Jul	0.0	8.6	0.0		0.0	0.0	8.6
21-Jul	0.0	1.5	0.8	3.1	7.2		12.6
22-Jul	0.8	6.1	3.7		8.9	13.6	33.1
23-Jul	0.0	8.3	0.0	1.6	0.8	0.0	10.7
24-Jul	0.0	1.7	1.7		0.0	0.0	3.4
25-Jul	0.0	1.4	13.6	0.8	0.8	3.2	19.8
26-Jul	0.0	10.1	0.0		1.7	0.0	11.8
27-Jul	5.4	0.8	0.0	0.9	0.0	0.0	7.1
28-Jul	0.0	3.9	4.9		0.0	0.0	8.8
29-Jul	0.0	0.0	19.2	47.0	0.0	0.0	66.2
30-Jul	2.2	0.0	0.0		13.7	0.0	15.9
Total	15.7	77.7	130.8	129.2	122.8	36.9	513.1
%	3.1	15.1	25.5	25.2	23.9	7.2	100.0

Appendix D1. Summary of chinook salmon fishing effort, daily and cumulative catch, and daily and cumulative CPUE, Upper Cook Inlet offshore test fish project, 1994.

Date	Number of Stations	Mean Fishing Time (min)	Catch		CPUE	
			Daily	Cum.	Daily	Cum.
01-Jul	6	228.0	0	0	0.0	0.0
02-Jul	5	187.0	0	0	0.0	0.0
03-Jul	6	234.5	0	0	0.0	0.0
04-Jul	5	185.0	0	0	0.0	0.0
05-Jul	6	224.5	0	0	0.0	0.0
06-Jul	5	156.5	0	0	0.0	0.0
07-Jul	6	239.5	0	0	0.0	0.0
08-Jul	5	187.5	0	0	0.0	0.0
09-Jul	6	220.0	0	0	0.0	0.0
10-Jul	5	192.5	1	1	0.8	0.8
11-Jul	6	210.0	0	1	0.0	0.8
12-Jul	5	176.5	0	1	0.0	0.8
13-Jul	6	221.0	0	1	0.0	0.8
14-Jul	5	188.5	0	1	0.0	0.8
15-Jul	6	239.0	0	1	0.0	0.8
16-Jul	5	192.0	0	1	0.0	0.8
17-Jul	6	230.0	0	1	0.0	0.8
18-Jul	5	191.5	0	1	0.0	0.8
19-Jul	6	232.0	0	1	0.0	0.8
20-Jul	5	185.0	0	1	0.0	0.8
21-Jul	5	193.5	0	1	0.0	0.8
22-Jul	5	196.5	0	1	0.0	0.8
23-Jul	6	222.0	0	1	0.0	0.8
24-Jul	5	156.0	0	1	0.0	0.8
25-Jul	6	235.0	0	1	0.0	0.8
26-Jul	5	188.5	0	1	0.0	0.8
27-Jul	6	218.0	0	1	0.0	0.8
28-Jul	5	184.0	0	1	0.0	0.8
29-Jul	6	255.0	0	1	0.0	0.8
30-Jul	5	190.5	0	1	0.0	0.8

Appendix D2. Estimated chinook salmon catch by date and station, Upper Cook Inlet offshore test fish project, 1994.

Date	Station Number						Total
	4	5	6	6.5	7	8	
01-Jul	0	0	0	0	0	0	0
02-Jul	0	0	0	0	0	0	0
03-Jul	0	0	0	0	0	0	0
04-Jul	0	0	0	0	0	0	0
05-Jul	0	0	0	0	0	0	0
06-Jul	0	0	0	0	0	0	0
07-Jul	0	0	0	0	0	0	0
08-Jul	0	0	0	0	0	0	0
09-Jul	0	0	0	0	0	0	0
10-Jul	0	0	0	0	0	1	1
11-Jul	0	0	0	0	0	0	0
12-Jul	0	0	0	0	0	0	0
13-Jul	0	0	0	0	0	0	0
14-Jul	0	0	0	0	0	0	0
15-Jul	0	0	0	0	0	0	0
16-Jul	0	0	0	0	0	0	0
17-Jul	0	0	0	0	0	0	0
18-Jul	0	0	0	0	0	0	0
19-Jul	0	0	0	0	0	0	0
20-Jul	0	0	0	0	0	0	0
21-Jul	0	0	0	0	0	0	0
22-Jul	0	0	0	0	0	0	0
23-Jul	0	0	0	0	0	0	0
24-Jul	0	0	0	0	0	0	0
25-Jul	0	0	0	0	0	0	0
26-Jul	0	0	0	0	0	0	0
27-Jul	0	0	0	0	0	0	0
28-Jul	0	0	0	0	0	0	0
29-Jul	0	0	0	0	0	0	0
30-Jul	0	0	0	0	0	0	0
Total	0	0	0	0	0	1	1
%	0.0	0.0	0.0	0.0	0.0	100.0	100.0

Appendix D3. Estimated chinook salmon CPUE by date and station, Upper Cook Inlet offshore test fish project, 1994.

Date	Station Number						Total
	4	5	6	6.5	7	8	
01-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
02-Jul	0.0	0.0	0.0		0.0	0.0	0.0
03-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
04-Jul	0.0	0.0	0.0		0.0	0.0	0.0
05-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
06-Jul	0.0	0.0	0.0		0.0	0.0	0.0
07-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
08-Jul	0.0	0.0	0.0		0.0	0.0	0.0
09-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10-Jul	0.0	0.0	0.0		0.0	0.8	0.8
11-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12-Jul	0.0	0.0	0.0		0.0	0.0	0.0
13-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14-Jul	0.0	0.0	0.0		0.0	0.0	0.0
15-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16-Jul	0.0	0.0	0.0		0.0	0.0	0.0
17-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18-Jul	0.0	0.0	0.0		0.0	0.0	0.0
19-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20-Jul	0.0	0.0	0.0		0.0	0.0	0.0
21-Jul	0.0	0.0	0.0	0.0	0.0		0.0
22-Jul	0.0	0.0	0.0		0.0	0.0	0.0
23-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24-Jul	0.0	0.0	0.0		0.0	0.0	0.0
25-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26-Jul	0.0	0.0	0.0		0.0	0.0	0.0
27-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28-Jul	0.0	0.0	0.0		0.0	0.0	0.0
29-Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30-Jul	0.0	0.0	0.0		0.0	0.0	0.0
Total	0.0	0.0	0.0	0.0	0.0	0.8	0.8
%	0.0	0.0	0.0	0.0	0.0	100.0	100.0

Appendix E. Entry pattern of sockeye salmon into Upper Cook Inlet, Alaska, 1994, estimated from daily CPUE measured at the latitude of Anchor Point.

Day	Date	Input Y	Estimated Y
8	01-Jul	0.0129	.0555
9	02-Jul	0.0211	.0642
10	03-Jul	0.0503	.0742
11	04-Jul	0.0510	.0856
12	05-Jul	0.0948	.0986
13	06-Jul	0.0992	.1133
14	07-Jul	0.1515	.1298
15	08-Jul	0.1805	.1484
16	09-Jul	0.1951	.1691
17	10-Jul	0.2503	.1921
18	11-Jul	0.2666	.2174
19	12-Jul	0.2714	.2449
20	13-Jul	0.2870	.2748
21	14-Jul	0.2980	.3068
22	15-Jul	0.3309	.3408
23	16-Jul	0.3616	.3765
24	17-Jul	0.3999	.4136
25	18-Jul	0.4147	.4517
26	19-Jul	0.4722	.4904
27	20-Jul	0.5282	.5292
28	21-Jul	0.5646	.5676
29	22-Jul	0.5992	.6053
30	23-Jul	0.6257	.6417
31	24-Jul	0.6294	.6766
32	25-Jul	0.7229	.7096
33	26-Jul	0.7585	.7405
34	27-Jul	0.7667	.7693
35	28-Jul	0.7827	.7957
36	29-Jul	0.8542	.8198
37	30-Jul	0.9047	.8416

Appendix F. Chemical and physical observations made in Upper Cook Inlet, Alaska during the conduct of the 1994 offshore test fish project.

Date	Station	Air Temp. (c)	Water Temp. (c)	Wind Vel. (knots)	Wind Dir <sup>^</sup>	Tide Stage <sup>~</sup>	Salinity (ppt)	Water Depth (f)	Secchi (m)
01-Jul	4	14	9.0	0	0	4	23.5	27	6.0
	5	13	9.0	5	4	4	30.5	37	5.5
	6	13	10.0	15	4	4	29.0	48	4.0
	6.5	12	10.0	20	4	3	30.0	44	-1.0
	7	12	10.0	15	4	3	30.0	45	4.0
02-Jul	8	12	10.0	5	4	2	29.5	28	3.5
	8	9	10.0	7	6	2	28.5	28	3.5
	7	10	10.0	12	6	4	28.0	46	3.5
	6	11	10.0	15	6	4	29.0	47	3.5
	5	10	9.0	12	6	4	30.5	40	6.0
03-Jul	4	9	9.0	12	8	4	31.0	27	8.0
	4	16	9.0	7	4	4	31.0	26	7.0
	5	12	9.0	10	5	4	30.5	39	6.0
	6	14	10.5	15	5	4	29.0	48	5.0
	6.5	12	11.0	20	6	4	28.0	43	4.0
04-Jul	7	12	10.5	20	6	4	28.0	46	4.0
	8	13	10.0	20	4	3	29.0	27	4.0
	8	9	10.0	3	8	3	29.0	30	3.5
	7	9	11.0	5	8	3	28.5	45	3.3
	6	9	10.0	15	8	3	27.0	47	3.5
05-Jul	5	9	10.0	15	8	2	29.5	37	4.3
	4	9	9.0	15	1	2	30.0	26	7.5
	4	9	9.0	15	6	2	30.0	26	7.0
	5	10	9.0	5	6	4	30.0	37	5.5
	6	9	9.5	10	1	4	29.5	48	4.5
06-Jul	6.5	11	10.0	3	5	4	28.0	44	4.0
	7	14	10.0	3	5	4	28.0	46	2.5
	8	14	10.0	5	5	1	28.5	28	3.8
	8	12	10.0	0	0	3	28.5	29	5.0
	7	14	10.0	0	0	3	28.5	45	3.5
07-Jul	6	12	10.5	12	6	3	28.0	47	3.5
	5	17	9.0	7	4	2	30.0	35	9.0
	4	15	9.0	12	4	2	30.0	26	9.5
	4	20	9.0	5	4	3	30.5	23	10.0
	5	25	9.0	0	0	2	36.5	43	9.0
	6	25	9.5	0	0	4	30.0	47	6.5
	6.5	16	10.0	0	0	4	30.0	42	4.5
	7	23	11.0	0	0	4	28.0	46	4.0
8	16	12.0	7	6	4	27.0	30	4.0	

-continued-

Appendix F. (p 2 of 5)

Date	Station	Air Temp. (c)	Water Temp. (c)	Wind Vel. (knots)	Wind Dir <sup>^</sup>	Tide Stage <sup>~</sup>	Salinity (ppt)	Water Depth (f)	Secchi (m)
08-Jul	8	14	10.0	7	5	3	25.0	27	4.0
	7	15	10.0	8	5	3	28.0	44	4.0
	6	14	10.0	10	4	3	28.5	44	4.5
	5	14	10.0	15	4	3	28.5	40	4.0
09-Jul	4	13	9.0	17	4	2	30.5	25	9.0
	4	12	10.0	15	5	3	29.0	23	4.0
	5	14	9.5	12	5	3	30.0	40	6.0
	6	13	10.0	18	5	4	28.0	45	5.0
	6.5	12	10.0	5	5	4	29.0	41	3.5
10-Jul	7	14	10.5	3	5	4	28.5	46	3.0
	8	12	10.0	3	5	4	28.5	30	2.5
	8	9	10.0	22	8	3	28.0	29	3.5
	7	9	10.0	22	1	3	29.0	44	6.0
	6	10	9.0	15	1	3	30.0	46	4.5
11-Jul	5	10	9.5	20	8	3	30.0	40	5.5
	4	10	9.0	20	8	3	30.5	24	7.5
	4	11	9.0	10	1	3	30.5	24	10.5
	5	12	10.0	20	8	3	30.0	33	6.0
	6	12	10.0	13	8	3	29.5	46	3.5
12-Jul	6.5	12	10.0	15	2	2	29.0	42	3.5
	7	12	10.0	10	8	2	30.0	44	3.0
	8	14	11.0	5	2	2	28.0	27	3.5
	8	10	10.0	5	6	4	29.0	32	4.0
	7	11	9.0	5	6	4	30.0	45	6.8
13-Jul	6	11	9.0	0	0	1	28.5	47	8.0
	5	11	9.0	0	0	1	30.0	37	11.0
	4	12	9.0	5	4	3	30.0	24	12.0
	4	16	10.0	4	4	3	29.0	24	13.0
	5	16	10.0	4	6	3	29.5	36	11.0
14-Jul	6	11	11.0	4	6	3	28.0	47	4.0
	6.5	16	10.0	0	0	3	29.0	45	3.0
	7	16	12.0	5	6	2	28.0	44	2.5
	8	19	11.0	0	0	2	28.5	31	2.0
	8	11	10.5	8	5	4	28.0	28	3.0
15-Jul	7	10	10.0	5	5	4	29.0	46	4.5
	6	11	9.0	0	0	1	30.0	48	10.5
	5	11	9.0	4	5	3	30.5	42	10.5
	4	12	9.0	8	6	3	30.5	25	10.5
	4	11	9.0	0	0	1	30.5	28	13.5
15-Jul	5	11	8.0	0	0	1	30.5	36	14.0
	6	12	10.0	0	0	3	29.0	48	4.5

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Appendix F. (p 3 of 5)

Date	Station	Air Temp. (c)	Water Temp. (c)	Wind Vel. (knots)	Wind Dir^	Tide Stage~	Salinity (ppt)	Water Depth (f)	Secchi (m)
15-Jul	6.5	13	11.0	8	6	3	28.0	45	4.0
	7	12	11.0	10	6	3	29.0	45	4.5
	8	11	10.0	0	0	3	29.0	31	3.0
16-Jul	8	11	11.0	15	2	3	29.0	31	2.0
	7	12	10.5	18	2	3	28.0	46	3.5
	6	11	10.0	18	8	3	29.0	47	4.5
	5	11	10.0	18	8	3	30.0	38	9.0
17-Jul	4	12	9.0	18	1	1	30.5	28	9.5
	4	11	9.0	15	8	4	30.0	26	10.0
	5	15	9.0	6	8	4	30.0	38	10.0
	6	15	9.0	9	8	1	30.0	48	10.0
18-Jul	6.5	13	11.0	8	8	3	28.0	43	4.5
	7	14	10.5	6	8	3	28.5	45	4.5
	8	13	11.0	10	8	3	28.0	29	35.0
	8	11	10.5	12	2	3	28.5	25	4.0
	7	11	11.0	10	1	3	27.0	44	4.5
19-Jul	6	10	10.0	8	2	1	29.0	45	4.5
	5	11	10.0	10	8	4	30.0	37	7.0
	4	10	10.0	8	8	4	30.0	27	10.5
	4	-1	9.0	0	0	2	31.0	27	10.5
	5	15	11.0	0	0	4	28.0	28	10.0
20-Jul	6	16	10.0	4	6	4	30.0	48	6.5
	6.5	14	12.0	5	4	4	28.0	44	4.0
	7	17	12.0	7	6	4	28.0	46	4.0
	8	15	12.0	18	5	4	28.0	31	3.5
21-Jul	8	12	10.5	25	4	3	28.0	32	-1.0
	7	12	11.0	25	4	3	27.0	44	-1.0
	6	12	11.0	8	4	3	27.0	44	3.5
	5	12	10.0	0	0	2	29.5	37	10.0
22-Jul	4	14	10.0	10	4	4	30.0	28	10.0
	4	10	10.0	15	8	2	29.0	24	6.0
	5	11	9.0	18	8	4	30.0	38	5.0
	6	11	10.0	23	8	4	29.0	46	4.0
23-Jul	6.5	11	10.0	25	8	4	29.0	43	3.5
	7	11	10.0	25	2	4	29.0	45	-1.0
	8	12	10.0	20	8	3	28.5	24	2.5
	7	14	10.0	25	8	3	28.0	45	-1.0
	6	13	10.0	22	8	3	29.0	45	4.0
23-Jul	5	12	9.0	25	8	3	30.0	37	5.5
	4	12	9.0	18	8	2	30.0	25	9.0
	4	15	10.0	10	2	3	29.0	23	7.0

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Appendix F. (p 4 of 5)

Date	Station	Air Temp. (c)	Water Temp. (c)	Wind Vel. (knots)	Wind Dir <sup>^</sup>	Tide Stage <sup>~</sup>	Salinity (ppt)	Water Depth (f)	Secchi (m)
23-Jul	5	14	10.0	10	2	3	29.0	36	7.0
	6	13	10.0	10	8	2	29.0	48	3.5
	6.5	13	10.0	10	8	2	29.0	40	3.0
	7	15	9.0	10	8	4	29.0	46	3.0
24-Jul	8	14	11.0	7	8	4	28.5	29	3.0
	8	12	11.0	5	7	1	27.0	34	4.0
	7	12	10.0	5	6	3	28.0	45	3.0
	6	13	10.0	0	0	3	29.0	48	6.0
25-Jul	5	15	9.0	0	0	3	30.0	34	9.0
	4	15	9.0	0	0	3	30.0	25	10.0
	4	15	10.0	0	0	3	29.0	24	9.0
	5	13	10.0	0	0	3	29.0	35	5.5
26-Jul	6	14	10.0	5	8	3	29.0	47	3.5
	6.5	12	10.0	10	8	2	28.5	42	3.0
	7	12	10.0	10	8	4	28.5	46	3.0
	8	12	11.0	13	8	4	27.5	30	2.5
27-Jul	8	12	10.0	7	8	4	28.0	30	3.0
	7	13	10.0	12	1	4	29.0	47	4.0
	6	13	10.0	8	7	4	29.0	49	7.0
	5	13	10.0	8	7	1	29.0	37	9.0
28-Jul	4	13	9.0	8	7	3	29.0	25	11.0
	4	15	9.0	5	4	3	30.0	26	8.0
	5	15	10.0	0	0	3	29.0	36	8.5
	6	14	10.0	0	0	3	28.0	45	3.0
29-Jul	6.5	15	10.0	5	2	3	28.5	41	3.0
	7	15	11.0	7	8	2	28.0	45	3.0
	8	15	11.0	10	8	2	28.0	29	2.0
	8	12	10.0	0	0	4	28.0	27	2.0
30-Jul	7	15	10.0	0	0	4	28.0	46	3.5
	6	13	9.0	0	0	1	29.0	50	8.0
	5	15	10.0	0	0	3	29.0	38	9.5
	4	15	9.0	0	0	3	31.0	25	11.0
29-Jul	4	16	10.0	0	0	1	30.0	27	13.0
	5	18	10.0	0	0	3	29.5	37	12.0
	6	20	11.0	8	6	3	28.0	50	5.0
	6.5	20	12.0	6	4	3	27.0	48	4.0
30-Jul	7	20	11.0	10	5	3	28.0	45	3.5
	8	20	12.0	10	5	4	28.0	27	3.5
	8	11	12.0	18	5	4	26.0	26	2.5
	7	12	11.0	22	5	4	27.0	45	4.5
	6	12	11.0	18	5	4	28.0	47	4.0

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Appendix F. (p 5 of 5)

Date	Station	Air Temp. (c)	Water Temp. (c)	Wind Vel. (knots)	Wind Dir <sup>^</sup>	Tide Stage <sup>~</sup>	Salinity (ppt)	Water Depth (f)	Secchi (m)
30-Jul	5	12	10.0	20	5	4	29.0	37	6.0
	4	13	10.0	18	5	4	30.0	26	12.0

<sup>^</sup> Wind direction code 1=north,2=northeast,3=east,4=southeast,  
5=south,6=southwest,7=west,8=northwest

<sup>~</sup> Tide stage code 1=high,2=low,3=ebb,4=flood

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