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AN ESTIMATE OF THE MIGRATORY TIMING AND ABUNDANCE OF SOCKEYE SALMON INTO UPPER COOK INLET, ALASKA, IN 1993

By: Kenneth E. Tarbox

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TABLE OF CONTENTS

Page

LIST OF TABLES ii

LIST OF FIGURES iii

LIST OF APPENDICES iv

ABSTRACT vi

INTRODUCTION 1

METHODS 1

Test Fishing 1

Describing the Salmon Migration 2

RESULTS 4

DISCUSSION 5

LITERATURE CITED 6

TABLES 7

FIGURES 14

APPENDICES 16

LIST OF TABLES

Table | Page

1. Summary of fishing time, daily and cumulative sockeye salmon catch and CPUE, Upper Cook Inlet offshore test fishing project, 1993 7

2. Estimated sockeye salmon catch by date and station, Upper Cook Inlet offshore test fishing project, 1993 8

3. Estimated sockeye salmon CPUE by date and station, Upper Cook Inlet offshore test fishing project, 1993 9

4. Mean date of the sockeye salmon run across Anchor Point transect, Upper Cook Inlet offshore test fishing project, 1979-1993 10

5. The 1993 Upper Cook Inlet commercial salmon harvest 11

6. Total offshore test fishing CPUE and total sockeye salmon run estimates, Upper Cook Inlet, 1993 13

LIST OF FIGURES

Figure Page

1. Location of fishing districts and offshore test fish transect in Cook Inlet, Alaska, 1993 14

2. Cumulative proportions estimated for the sockeye salmon return to Upper Cook Inlet, Alaska, 1993 15

LIST OF APPENDICES

Table | Page

A.1. Summary of pink salmon fishing effort, daily and cumulative catch, and daily and cumulative CPUE, Upper Cook Inlet offshore test fishing project, 1993 16

A.2. Estimated pink salmon catch by date and station, Upper Cook Inlet offshore test fishing project, 1993 17

A.3. Estimated pink salmon CPUE by date and station, Upper Cook Inlet offshore test fishing project, 1993 18

B.1. Summary of chum salmon fishing effort, daily and cumulative catch, and daily and cumulative CPUE, Upper Cook Inlet offshore test fishing project, 1993 19

B.2. Estimated chum salmon catch by date and station, Upper Cook Inlet offshore test fishing project, 1993 20

B.3. Estimated chum salmon CPUE by date and station, Upper Cook Inlet offshore test fishing project, 1993 21

C.1. Summary of coho salmon fishing effort, daily and cumulative catch, and daily and cumulative CPUE, Upper Cook Inlet offshore test fishing project, 1993 22

C.2. Estimated coho salmon catch by date and station, Upper Cook Inlet offshore test fishing project, 1993 23

C.3. Estimated coho salmon CPUE by date and station, Upper Cook Inlet offshore test fishing project, 1993 24

LIST OF APPENDICES (continued)

Table | Page

D.1. Summary of chinook salmon fishing effort, daily and cumulative catch, and daily and cumulative CPUE, Upper Cook Inlet offshore test fishing project, 1993 25

D.2. Estimated chinook salmon catch by date and station, Upper Cook Inlet offshore test fishing project, 1993 26

D.3. Estimated chinook salmon CPUE by date and station, Upper Cook Inlet offshore test fishing project, 1993 27

E.1. Entry pattern of sockeye salmon into Upper Cook Inlet, Alaska, 1993, estimated from daily CPUE measured at the latitude of Anchor Point 28

F.1. Environmental measurements and observations made in Upper Cook Inlet, 1993, Alaska during the offshore test fishing project 29

ABSTRACT

During the 1993 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 2,453 sockeye salmon representing 1,815 CPUE points. Mean date of the run was 14 July, and the test fishery encompassed approximately 95% of the total run.

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 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). This report presents the results of the 1993 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 366 m (1,200 ft) of 2.1 cm (5 1/8 in) multifilament gill net 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:

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

where: $CPUE_s$ = CPUE for station s, and
MFT = mean fishing time.

Mean fishing time was calculated as:

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

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 ($CPUE_d$) was calculated as:

$$CPUE_d = \sum_{s=1}^{n} CPUE_s \qquad (3)$$

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

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

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:

$$PR = 1/q_d = \text{passage rate} \tag{5}$$

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

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

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 $CPUE_t$, based on a non-linear model:

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

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

To calculate mean date of return, the following formula was used:

$$M = a/b \tag{8}$$

where: M = mean date of return.

RESULTS

A total of 2,453 sockeye salmon, 53 pink salmon, *O. gorbuscha*, 205 chum salmon, *O. keta*, 325 coho salmon, *O. kisutch*, and 5 chinook salmon, *O. tshawytscha*, were captured during the 1993 test fishery (Table 1, Appendices A-D). Daily sockeye salmon catches ranged from 1 to 335 fish (Table 1).

Sockeye salmon daily CPUE values ranged from 0.9 on 30 July to 220.8 on 17 July. Cumulative total CPUE for the duration of the project was 1,814.9 (Table 1). Using post season commercial harvest figures, test fishing spanned approximately 96% of the total run. Therefore, total CPUE for the test fishery would have been 1,882 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 post season) of the sockeye salmon run to UCI suggested that 7% of the run had passed the transect prior to the start of test fishing on 1 July and that the run was 95% completed at project termination (Appendix E; Figure 2). The mean date of the run was 14 July 1993 which was on time relative to the historic average (Table 4).

The total sockeye salmon run to UCI in 1993 was estimated to be 6.5 million fish of which 4.8 million were harvested in the commercial fishery (Table 5). Estimated passage rate for the season was 3,454 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 14.0°C in mid-July (Appendix F). Air temperatures fluctuated between 8°C and 20°C during the project (Appendix F). Wind velocities were generally low to moderate. However, winds of 20 knots or greater were recorded on 5 days (Appendix F). Wind direction was typically from the south or southeast.

During the commercial salmon fishing season five estimates of the sockeye salmon total run were made (Table 6). Past studies suggested that the initial best fit estimate was not accurate in predicting total run during the season and that the second or third best fit estimate was usually more useful. This pattern was evident in 1993 as the initial best fit estimate (1987 run timing)

on 14 July was 9.2 million fish. The second and third best fit was 1982 and 1986 with estimates of 7.0 and 6.5 million fish, respectively. However, following this initial estimate the remaining estimates were the best fit and were within 11% of the true population size.

DISCUSSION

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

The 1993 UCI commercial salmon fishery proceeded in an orderly fashion early in the season and run size estimates were not a significant factor until after 14 July (Ruesch, personal communication, ADF&G, Soldotna). Therefore, the program provided useful and valuable information in the management of the commercial fishery as run estimates were reasonably accurate. Even the initial estimate, when combined with commercial catch and escapement estimates, alerted management biologists to a run above forecast.

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Table 1. Summary of fishing time, daily and cumulative sockeye salmon catch and CPUE, Upper Cook Inlet offshore test fishing project, 1993.

Date	Number of Stations	Mean Fishing Time (min)	Catch		CPUE		Mean Length (mm)
			Daily	Cumul.	Daily	Cumul.	
01-Jul	6	242.0	209	209	122.5	122.5	548
02-Jul	5	169.5	35	244	31.3	153.8	551
03-Jul	6	222.0	51	295	39.8	193.6	549
04-Jul	5	187.0	64	359	47.0	240.6	563
05-Jul	6	224.0	46	405	36.4	277.0	550
06-Jul	5	165.0	20	425	31.0	308.0	551
07-Jul	6	247.5	261	686	166.7	474.7	560
08-Jul	5	185.5	20	706	15.9	490.7	554
09-Jul	6	228.5	73	779	54.0	544.7	556
10-Jul	5	198.0	99	878	68.5	613.2	564
11-Jul	6	226.0	39	917	29.1	642.3	547
12-Jul	5	185.0	17	934	13.3	655.6	547
13-Jul	6	229.5	93	1027	70.8	726.3	558
14-Jul	5	191.0	209	1236	138.9	865.2	569
15-Jul	6	202.5	124	1360	94.2	959.5	560
16-Jul	5	185.0	52	1412	41.8	1001.2	566
17-Jul	6	244.5	335	1747	220.8	1222.1	574
18-Jul	5	189.5	103	1850	76.9	1299.0	572
19-Jul	6	230.0	89	1939	68.4	1367.4	572
20-Jul	5	187.0	22	1961	17.6	1385.0	569
21-Jul	6	230.0	68	2029	50.4	1435.3	569
22-Jul	5	184.5	37	2066	29.4	1464.8	564
23-Jul	6	239.0	150	2216	107.7	1572.4	563
24-Jul	5	194.0	121	2337	83.0	1655.4	573
25-Jul	0	-1.0	0	2337	53.0	1708.4	
26-Jul	5	167.5	26	2363	23.7	1732.1	571
27-Jul	6	237.5	43	2406	32.2	1764.4	581
28-Jul	5	161.0	26	2432	33.6	1797.9	581
29-Jul	6	219.5	20	2452	16.2	1814.1	565
30-Jul	5	174.5	1	2453	0.9	1814.9	515

Table 2. Estimated sockeye salmon catch by date and station, Upper Cook Inlet offshore test fishing project, 1993.

	Station Number						
Date	4	5	6	6.5	7	8	Total
01-Jul	1	16	158	30	4	0	209
02-Jul	3	7	19		2	4	35
03-Jul	6	28	10	0	3	4	51
04-Jul	1	51	1		11	0	64
05-Jul	5	17	1	4	14	5	46
06-Jul	4	11	0		2	3	20
07-Jul	1	26	52	149	22	11	261
08-Jul	10	0	4		6	0	20
09-Jul	41	2	24	1	1	4	73
10-Jul	14	24	0		61	0	99
11-Jul	2	15	21	1	0	0	39
12-Jul	0	0	2		8	7	17
13-Jul	5	13	20	18	35	2	93
14-Jul	4	9	62		128	6	209
15-Jul	53	49	1	4	13	4	124
16-Jul	12	15	20		3	2	52
17-Jul	35	158	115	19	3	5	335
18-Jul	31	68	0		4	0	103
19-Jul	17	22	19	15	14	2	89
20-Jul	4	10	5		3	0	22
21-Jul	4	43	3	2	14	2	68
22-Jul	2	13	17		4	1	37
23-Jul	3	64	57	2	6	18	150
24-Jul	1	28	85		1	6	121
25-Jul							0
26-Jul	4	9	1		10	2	26
27-Jul	4	12	11	12	3	1	43
28-Jul	1	12	9		4	0	26
29-Jul	1	10	0	0	3	6	20
30-Jul	1	0	0		0	0	1
Total	270	732	717	257	382	95	2453
%	11.0	29.8	29.2	10.5	15.6	3.9	100.0

Table 3. Estimated sockeye salmon CPUE by date and station, Upper Cook Inlet offshore test fishing project, 1993.

	Station Number						
Date	4	5	6	6.5	7	8	Total
01-Jul	0.9	13.0	83.2	22.2	3.3	0.0	122.5
02-Jul	5.3	6.5	15.2		1.5	2.8	31.3
03-Jul	4.9	21.0	8.1	0.0	2.5	3.3	39.8
04-Jul	0.8	36.4	0.8		8.9	0.0	47.0
05-Jul	4.1	13.2	0.8	3.3	10.9	4.0	36.4
06-Jul	3.1	23.8	0.0		1.7	2.5	31.0
07-Jul	0.8	21.1	37.1	82.0	16.9	8.8	166.7
08-Jul	7.9	0.0	3.2		4.8	0.0	15.9
09-Jul	29.3	1.8	18.2	0.8	0.8	3.1	54.0
10-Jul	10.9	17.8	0.0		39.8	0.0	68.5
11-Jul	1.7	11.2	15.4	0.8	0.0	0.0	29.1
12-Jul	0.0	0.0	1.7		6.2	5.5	13.3
13-Jul	4.2	10.3	16.0	13.7	25.0	1.6	70.8
14-Jul	3.4	10.6	43.3		76.8	4.9	138.9
15-Jul	37.8	36.3	3.3	3.2	10.1	3.4	94.2
16-Jul	9.3	12.5	15.8		2.5	1.6	41.8
17-Jul	26.2	98.7	74.2	15.0	2.5	4.2	220.8
18-Jul	23.2	50.4	0.0		3.3	0.0	76.9
19-Jul	12.7	16.7	14.8	11.5	10.9	1.7	68.4
20-Jul	3.2	8.1	3.9		2.4	0.0	17.6
21-Jul	3.3	31.5	2.4	1.6	9.9	1.7	50.4
22-Jul	1.7	10.3	13.4		3.2	0.8	29.4
23-Jul	2.5	40.4	45.0	1.6	4.5	13.7	107.7
24-Jul	0.8	21.0	55.4		0.8	4.9	83.0
25-Jul							53.0
26-Jul	6.2	7.2	0.8		7.9	1.6	23.7
27-Jul	2.8	8.3	8.7	9.2	2.4	0.8	32.2
28-Jul	0.8	9.6	20.0		3.1	0.0	33.6
29-Jul	0.8	8.0	0.0	0.0	2.4	4.9	16.2
30-Jul	0.9	0.0	0.0		0.0	0.0	0.9
Total	209.7	545.7	500.7	165.0	265.1	75.7	1814.9
%	11.6	30.1	27.6	9.1	14.6	4.2	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[a]	
	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
1979-1993	21.9	July 14

[a] Day (1) = June 24.

Table 5. The 1993 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
6-02 Wed	11	71	71	1,930	1,930							2,001	2,001
6-04 Fri	14	25	96	1,464	3,394							1,489	3,490
6-07 Mon	76	1,255	1,351	2,304	5,698							3,559	7,049
6-09 Wed	17	91	1,442	3,639	9,337							3,730	10,779
6-11 Fri	15	38	1,480	2,199	11,536							2,237	13,016
6-14 Mon	86	1,747	3,227	1,784	13,320	1	1					3,532	16,548
6-16 Wed	14	59	3,286	1,420	14,740		1					1,479	18,027
6-18 Fri	34	48	3,334	1,091	15,831		1			1	1	1,140	19,167
6-21 Mon	59	174	3,508	760	16,591		1				1	934	20,101
6-23 Wed	5	2	3,510	322	16,913		1				1	324	20,425
6-25 Fri	338	164	3,674	13,021	29,934	13	14	17	17	766	767	13,981	34,406
6-28 Mon	662	344	4,018	60,306	90,240	76	90	31	48	1,143	1,910	61,900	96,306
7-02 Fri	859	415	4,433	126,952	217,192	960	1,050	137	185	2,597	4,507	131,061	227,367
7-05 Mon	963	927	5,360	165,441	382,633	879	1,929	157	342	2,681	7,188	170,085	397,452
7-08 Thu	314	527	5,887	24,466	407,099	13	1,942	177	519	91	7,279	25,274	422,726
7-09 Fri	595	1,081	6,968	17,820	424,919	238	2,180	304	823	225	7,504	19,668	442,394
7-12 Mon	940	1,027	7,995	584,244	1,009,163	3,376	5,556	1,863	2,686	3,159	10,663	593,669	1,036,063
7-13 Tue	555	366	8,361	130,095	1,139,258	140	5,696	422	3,108	160	10,823	131,183	1,167,246
7-14 Wed	999	1,021	9,382	256,418	1,395,676	730	6,426	718	3,826	192	11,015	259,079	1,426,325
7-16 Fri	1286	772	10,154	459,000	1,854,676	10,265	16,691	5,206	9,032	6,040	17,055	481,283	1,907,608
7-17 Sat	1004	852	11,006	196,765	2,051,441	1,001	17,692	3,564	12,596	918	17,973	203,100	2,110,708
7-18 Sun	915	705	11,711	235,096	2,286,537	1,315	19,007	5,615	18,211	1,321	19,294	244,052	2,354,760
7-19 Mon	1311	495	12,206	612,823	2,899,360	23,439	42,446	12,078	30,289	10,035	29,329	658,870	3,013,630
7-20 Tue	926	512	12,718	165,290	3,064,650	1,073	43,519	5,498	35,787	575	29,904	172,948	3,186,578
7-21 Wed	986	469	13,187	183,414	3,248,064	1,387	44,906	6,323	42,110	655	30,559	192,248	3,378,826
7-22 Thu	584	316	13,503	97,222	3,345,286	1,650	46,556	3,597	45,707	1,010	31,569	103,795	3,482,621
7-23 Fri	1090	626	14,129	324,400	3,669,686	30,195	76,751	12,684	58,391	12,921	44,490	380,826	3,863,447
7-24 Sat	459	385	14,514	46,346	3,716,032	1,384	78,135	2,100	60,491	481	44,971	50,696	3,914,143
7-25 Sun	23		14,514	16,883	3,732,915	656	78,791	23	60,514	889	45,860	18,451	3,932,594
7-26 Mon	1164	603	15,117	402,279	4,135,194	39,504	118,295	13,109	73,623	18,708	64,568	474,203	4,406,797
7-27 Tue	500	470	15,587	75,954	4,211,148	2,586	120,881	2,192	75,815	807	65,375	82,009	4,488,806
7-28 Wed	590	406	15,993	89,838	4,300,986	6,111	126,992	2,122	77,937	1,157	66,532	99,634	4,588,440
7-29 Thu	431	310	16,303	65,404	4,366,390	6,982	133,974	2,319	80,256	2,049	68,581	77,064	4,665,504
7-30 Fri	1111	557	16,860	140,923	4,507,313	55,738	189,712	10,406	90,662	20,423	89,004	228,047	4,893,551
7-31 Sat	510	586	17,446	40,571	4,547,884	3,810	193,522	2,028	92,690	663	89,667	47,658	4,941,209
8-01 Sun	290	236	17,682	38,023	4,585,907	2,378	195,900	630	93,320	325	89,992	41,592	4,982,801
8-02 Mon	852	381	18,063	71,408	4,657,315	31,720	227,620	4,161	97,481	17,179	107,171	124,849	5,107,650
8-03 Tue	229	186	18,249	11,930	4,669,245	1,527	229,147	401	97,882	168	107,339	14,212	5,121,862
8-04 Wed	234	144	18,393	23,767	4,693,012	3,591	232,738	423	98,305	487	107,826	28,412	5,150,274
8-06 Fri	341	122	18,515	23,108	4,716,120	16,823	249,561	797	99,102	5,017	112,843	45,867	5,196,141
8-07 Sat	131	61	18,576	9,996	4,726,116	1,565	251,126	123	99,225	136	112,979	11,881	5,208,022
8-09 Mon	441	110	18,686	17,073	4,743,189	16,999	268,125	1,144	100,369	5,642	118,621	40,968	5,248,990
8-11 Wed	16		18,686	1,450	4,744,639	1,215	269,340	33	100,402	98	118,719	2,796	5,251,786

- 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
8-13 Fri	188	26	18,712	5,301	4,749,940	11,730	281,070	253	100,655	2,103	120,822	19,413	5,271,199
8-16 Mon	103	2	18,714	1,884	4,751,824	7,599	288,669	114	100,769	971	121,793	10,570	5,281,769
8-20 Fri	34		18,714	720	4,752,544	1,406	290,075	38	100,807	198	121,991	2,362	5,284,131
8-23 Mon	49	4	18,718	770	4,753,314	4,529	294,604	53	100,860	194	122,185	5,550	5,289,681
8-27 Fri	42	1	18,719	511	4,753,825	4,954	299,558	28	100,888	359	122,544	5,853	5,295,534
8-30 Mon	34		18,719	385	4,754,210	2,966	302,524	8	100,896	101	122,645	3,460	5,298,994
9-03 Fri	25		18,719	297	4,754,507	2,321	304,845	20	100,916	112	122,757	2,750	5,301,744
9-06 Mon	12		18,719	14	4,754,521	421	305,266	2	100,918	8	122,765	445	5,302,189
9-10 Fri	18		18,719	145	4,754,666	1,133	306,399		100,918	2	122,767	1,280	5,303,469
9-13 Mon	10		18,719	32	4,754,698	423	306,822		100,918		122,767	455	5,303,924

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

Date	Cum CPUE[a]	Best Fit Year	MSSDEV[b]	Passage Rate	Total CPUE	Total Run Estimate (X 10^6)	Percent Error[c]
14 July	865	1982	.0003	3,088	2,975	9.2	41.5
17 July	1,222	1987	.0004	2,354	2,858	6.7	3.1
22 July	1,464	1986	.0005	3,032	2,122	6.4	-1.5
23 July	1,572	1982	.0005	3,169	2,290	7.2	10.8
26 July	1,732	1986	.0005	3,233	2,109	6.8	4.6

[a] Cumulative CPUE from start of test fishing to estimated end of total run.
[b] Mean sum of squared deviation.
[c] Percent error = $\frac{\text{predicted-actual}}{\text{actual}} * 100$

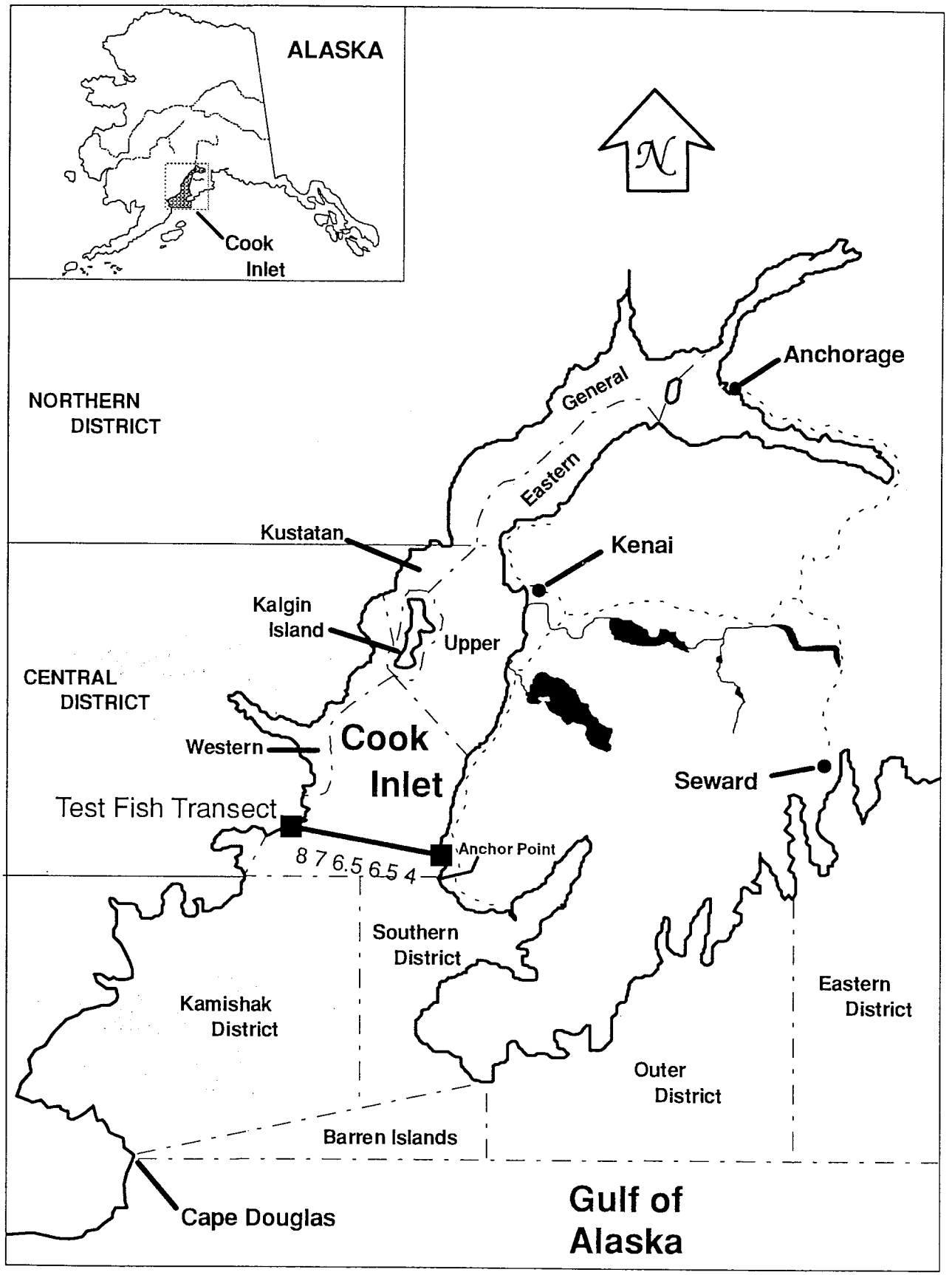

Figure 1. Location of fishing districts and offshore test fish transect in Cook Inlet, Alaska, 1993.

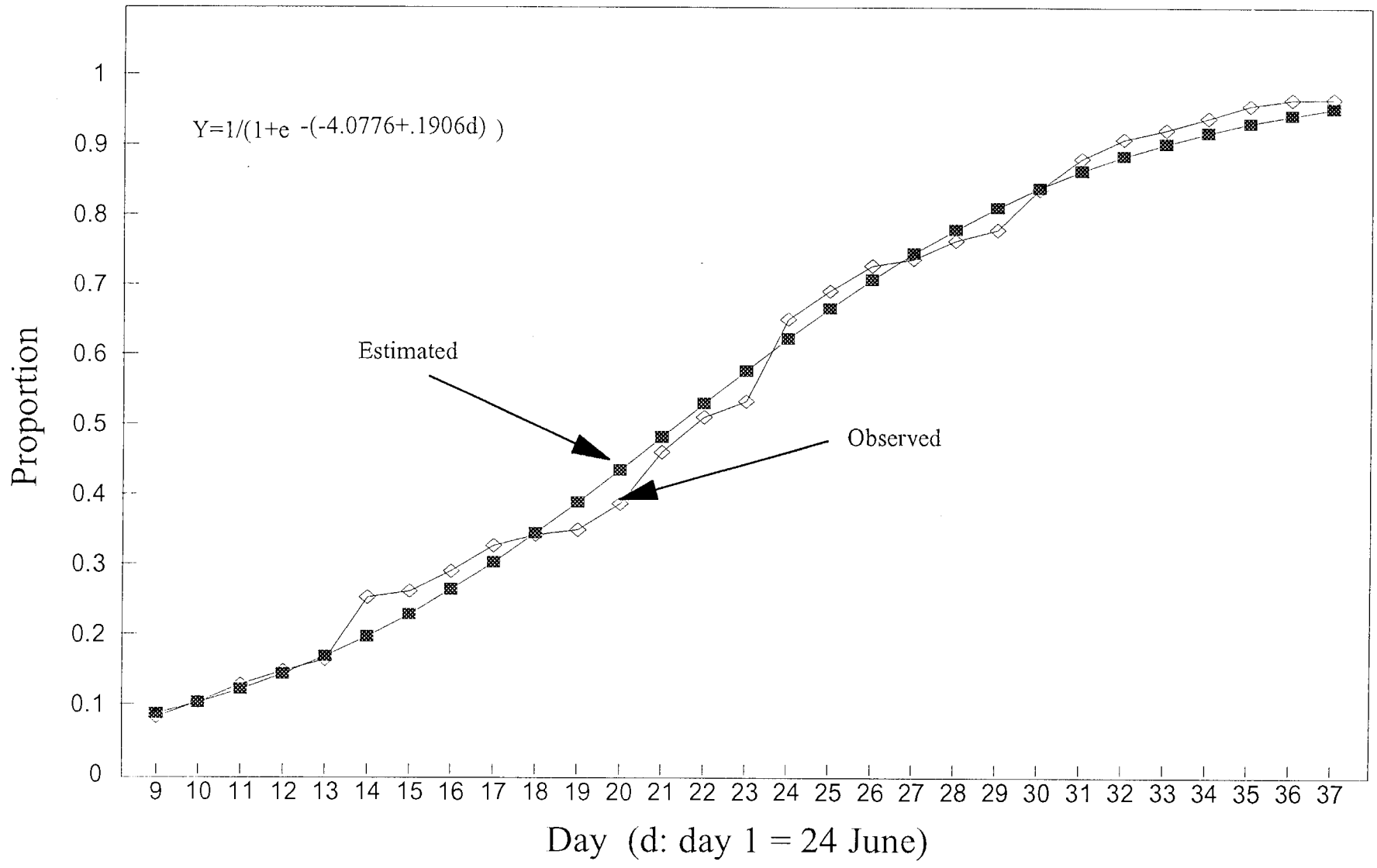

Figure 2. Cumulative proportions estimated for the sockeye salmon return to Upper Cook Inlet, Alaska, 1993.

Appendix A.1. Summary of pink salmon fishing effort, daily and cumulative catch, and daily and cumulative CPUE, Upper Cook Inlet offshore test fishing project, 1993.

Date	Number of Stations	Mean Fishing Time (min)	Catch		CPUE	
			Daily	Cum	Daily	Cum
01-Jul	6	242.0	0	0	0.0	0.0
02-Jul	5	169.5	0	0	0.0	0.0
03-Jul	6	222.0	0	0	0.0	0.0
04-Jul	5	187.0	0	0	0.0	0.0
05-Jul	6	224.0	0	0	0.0	0.0
06-Jul	5	165.0	0	0	0.0	0.0
07-Jul	6	247.5	1	1	0.5	0.5
08-Jul	5	185.5	0	1	0.0	0.5
09-Jul	6	228.5	2	3	1.5	2.1
10-Jul	5	198.0	1	4	0.8	2.8
11-Jul	6	226.0	0	4	0.0	2.8
12-Jul	5	185.0	0	4	0.0	2.8
13-Jul	6	229.5	2	6	1.5	4.4
14-Jul	5	191.0	2	8	1.4	5.8
15-Jul	6	202.5	2	10	1.5	7.2
16-Jul	5	185.0	2	12	1.6	8.8
17-Jul	6	244.5	3	15	2.0	10.8
18-Jul	5	189.5	0	15	0.0	10.8
19-Jul	6	230.0	5	20	3.8	14.6
20-Jul	5	187.0	2	22	1.6	16.2
21-Jul	6	230.0	1	23	0.8	17.0
22-Jul	5	184.5	4	27	3.2	20.2
23-Jul	6	239.0	9	36	6.7	26.9
24-Jul	5	194.0	1	37	0.7	27.5
25-Jul	0	-1.0	0	37	0.0	27.5
26-Jul	5	167.5	7	44	5.6	33.2
27-Jul	6	237.5	3	47	2.3	35.5
28-Jul	5	161.0	3	50	6.7	42.2
29-Jul	6	219.5	2	52	1.6	43.8
30-Jul	5	174.5	1	53	0.8	44.6

Appendix A.2. Estimated pink salmon catch by date and station, Upper Cook Inlet offshore test fishing project, 1993.

	Station Number						
Date	4	5	6	6.5	7	8	Total
01-Jul	0	0	0	0	0	0	0
02-Jul	0	0	0		0	0	0
03-Jul	0	0	0	0	0	0	0
04-Jul	0	0	0		0	0	0
05-Jul	0	0	0	0	0	0	0
06-Jul	0	0	0		0	0	0
07-Jul	0	0	0	1	0	0	1
08-Jul	0	0	0		0	0	0
09-Jul	0	0	2	0	0	0	2
10-Jul	1	0	0		0	0	1
11-Jul	0	0	0	0	0	0	0
12-Jul	0	0	0		0	0	0
13-Jul	0	0	0	0	1	1	2
14-Jul	0	0	2		0	0	2
15-Jul	1	1	0	0	0	0	2
16-Jul	0	0	2		0	0	2
17-Jul	0	2	0	1	0	0	3
18-Jul	0	0	0		0	0	0
19-Jul	3	0	2	0	0	0	5
20-Jul	0	0	2		0	0	2
21-Jul	0	0	0	1	0	0	1
22-Jul	0	2	2		0	0	4
23-Jul	0	2	5	0	2	0	9
24-Jul	0	0	1		0	0	1
25-Jul							0
26-Jul	0	1	1		3	2	7
27-Jul	0	0	1	2	0	0	3
28-Jul	0	0	3		0	0	3
29-Jul	0	1	0	0	0	1	2
30-Jul	0	0	1		0	0	1
Total	5	9	24	5	6	4	53
%	9.4	17.0	45.3	9.4	11.3	7.5	100.0

Appendix A.3. Estimated pink salmon CPUE by date and station, Upper Cook Inlet offshore test fishing project, 1993.

	Station Number						
Date	4	5	6	6.5	7	8	Total
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	0.5	0.0	0.0	0.5
08-Jul	0.0	0.0	0.0		0.0	0.0	0.0
09-Jul	0.0	0.0	1.5	0.0	0.0	0.0	1.5
10-Jul	0.8	0.0	0.0		0.0	0.0	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	0.7	0.8	1.5
14-Jul	0.0	0.0	1.4		0.0	0.0	1.4
15-Jul	0.7	0.7	0.0	0.0	0.0	0.0	1.5
16-Jul	0.0	0.0	1.6		0.0	0.0	1.6
17-Jul	0.0	1.2	0.0	0.8	0.0	0.0	2.0
18-Jul	0.0	0.0	0.0		0.0	0.0	0.0
19-Jul	2.2	0.0	1.6	0.0	0.0	0.0	3.8
20-Jul	0.0	0.0	1.6		0.0	0.0	1.6
21-Jul	0.0	0.0	0.0	0.8	0.0	0.0	0.8
22-Jul	0.0	1.6	1.6		0.0	0.0	3.2
23-Jul	0.0	1.3	3.9	0.0	1.5	0.0	6.7
24-Jul	0.0	0.0	0.7		0.0	0.0	0.7
25-Jul							0.0
26-Jul	0.0	0.8	0.8		2.4	1.6	5.6
27-Jul	0.0	0.0	0.8	1.5	0.0	0.0	2.3
28-Jul	0.0	0.0	6.7		0.0	0.0	6.7
29-Jul	0.0	0.8	0.0	0.0	0.0	0.8	1.6
30-Jul	0.0	0.0	0.8		0.0	0.0	0.8
Total	3.7	6.4	22.9	3.7	4.6	3.3	44.6
%	8.4	14.4	51.3	8.3	10.3	7.3	100.0

Appendix B.1. Summary of chum salmon fishing effort, daily and cumulative catch, and daily and cumulative CPUE, Upper Cook Inlet offshore test fishing project, 1993.

Date	Number of Stations	Mean Fishing Time (min)	Catch		CPUE	
			Daily	Cum	Daily	Cum
01-Jul	6	242.0	3	3	2.1	2.1
02-Jul	5	169.5	0	3	0.0	2.1
03-Jul	6	222.0	5	8	4.0	6.2
04-Jul	5	187.0	2	10	1.4	7.6
05-Jul	6	224.0	1	11	0.8	8.4
06-Jul	5	165.0	1	12	0.8	9.2
07-Jul	6	247.5	16	28	10.5	19.8
08-Jul	5	185.5	1	29	0.8	20.6
09-Jul	6	228.5	3	32	2.3	22.8
10-Jul	5	198.0	4	36	2.7	25.5
11-Jul	6	226.0	6	42	4.5	30.0
12-Jul	5	185.0	1	43	0.8	30.8
13-Jul	6	229.5	8	51	5.8	36.6
14-Jul	5	191.0	5	56	3.0	39.6
15-Jul	6	202.5	4	60	3.0	42.6
16-Jul	5	185.0	3	63	2.5	45.1
17-Jul	6	244.5	9	72	6.0	51.0
18-Jul	5	189.5	2	74	1.5	52.5
19-Jul	6	230.0	9	83	7.0	59.6
20-Jul	5	187.0	4	87	3.2	62.7
21-Jul	6	230.0	6	93	4.7	67.5
22-Jul	5	184.5	10	103	8.0	75.5
23-Jul	6	239.0	60	163	43.7	119.2
24-Jul	5	194.0	11	174	7.6	126.8
25-Jul	0	-1.0	0	174	0.0	126.8
26-Jul	5	167.5	5	179	4.0	130.8
27-Jul	6	237.5	6	185	4.6	135.4
28-Jul	5	161.0	8	193	7.7	143.1
29-Jul	6	219.5	8	201	6.6	149.6
30-Jul	5	174.5	4	205	3.4	153.0

Appendix B.2. Estimated chum salmon catch by date and station, Upper Cook Inlet offshore test fishing project, 1993.

	Station Number						
Date	4	5	6	6.5	7	8	Total
01-Jul	1	0	1	1	0	0	3
02-Jul	0	0	0		0	0	0
03-Jul	1	1	1	1	0	1	5
04-Jul	0	2	0		0	0	2
05-Jul	0	0	0	0	1	0	1
06-Jul	0	0	0		1	0	1
07-Jul	1	1	2	8	3	1	16
08-Jul	0	0	0		1	0	1
09-Jul	0	0	3	0	0	0	3
10-Jul	0	1	0		3	0	4
11-Jul	0	0	5	0	1	0	6
12-Jul	0	0	0		1	0	1
13-Jul	0	1	0	1	6	0	8
14-Jul	0	0	0		5	0	5
15-Jul	1	1	0	0	2	0	4
16-Jul	0	1	1		1	0	3
17-Jul	1	4	3	1	0	0	9
18-Jul	1	1	0		0	0	2
19-Jul	1	2	4	1	0	1	9
20-Jul	0	2	2		0	0	4
21-Jul	0	1	2	0	1	2	6
22-Jul	1	1	5		3	0	10
23-Jul	1	19	18	5	13	4	60
24-Jul	0	2	8		1	0	11
25-Jul							0
26-Jul	0	2	0		2	1	5
27-Jul	0	0	0	6	0	0	6
28-Jul	0	1	1		6	0	8
29-Jul	1	0	0	1	1	5	8
30-Jul	0	0	4		0	0	4
Total	10	43	60	25	52	15	205
%	4.9	21.0	29.3	12.2	25.4	7.3	100.0

Appendix B.3. Estimated chum salmon CPUE by date and station, Upper Cook Inlet offshore test fishing project, 1993.

	Station Number						
Date	4	5	6	6.5	7	8	Total
01-Jul	0.9	0.0	0.5	0.7	0.0	0.0	2.1
02-Jul	0.0	0.0	0.0		0.0	0.0	0.0
03-Jul	0.8	0.7	0.8	0.8	0.0	0.8	4.0
04-Jul	0.0	1.4	0.0		0.0	0.0	1.4
05-Jul	0.0	0.0	0.0	0.0	0.8	0.0	0.8
06-Jul	0.0	0.0	0.0		0.8	0.0	0.8
07-Jul	0.8	0.8	1.4	4.4	2.3	0.8	10.5
08-Jul	0.0	0.0	0.0		0.8	0.0	0.8
09-Jul	0.0	0.0	2.3	0.0	0.0	0.0	2.3
10-Jul	0.0	0.7	0.0		2.0	0.0	2.7
11-Jul	0.0	0.0	3.7	0.0	0.8	0.0	4.5
12-Jul	0.0	0.0	0.0		0.8	0.0	0.8
13-Jul	0.0	0.8	0.0	0.8	4.3	0.0	5.8
14-Jul	0.0	0.0	0.0		3.0	0.0	3.0
15-Jul	0.7	0.7	0.0	0.0	1.6	0.0	3.0
16-Jul	0.0	0.8	0.8		0.8	0.0	2.5
17-Jul	0.7	2.5	1.9	0.8	0.0	0.0	6.0
18-Jul	0.7	0.7	0.0		0.0	0.0	1.5
19-Jul	0.7	1.5	3.1	0.8	0.0	0.9	7.0
20-Jul	0.0	1.6	1.6		0.0	0.0	3.2
21-Jul	0.0	0.7	1.6	0.0	0.7	1.7	4.7
22-Jul	0.8	0.8	3.9		2.4	0.0	8.0
23-Jul	0.8	12.0	14.2	3.9	9.7	3.0	43.7
24-Jul	0.0	1.5	5.2		0.8	0.0	7.6
25-Jul							0.0
26-Jul	0.0	1.6	0.0		1.6	0.8	4.0
27-Jul	0.0	0.0	0.0	4.6	0.0	0.0	4.6
28-Jul	0.0	0.8	2.2		4.7	0.0	7.7
29-Jul	0.8	0.0	0.0	0.8	0.8	4.1	6.6
30-Jul	0.0	0.0	3.4		0.0	0.0	3.4
Total	7.9	29.9	46.7	17.6	38.7	12.1	153.0
%	5.2	19.5	30.5	11.5	25.3	7.9	100.0

Appendix C.1. Summary of coho salmon fishing effort, daily and cumulative catch, and daily and cumulative CPUE, Upper Cook Inlet offshore test fishing project, 1993.

Date	Number of Stations	Mean Fishing Time (min)	Catch		CPUE	
			Daily	Cum	Daily	Cum
01-Jul	6	242.0	0	0	0.0	0.0
02-Jul	5	169.5	0	0	0.0	0.0
03-Jul	6	222.0	1	1	0.7	0.7
04-Jul	5	187.0	0	1	0.0	0.7
05-Jul	6	224.0	2	3	1.6	2.3
06-Jul	5	165.0	0	3	0.0	2.3
07-Jul	6	247.5	5	8	3.3	5.7
08-Jul	5	185.5	0	8	0.0	5.7
09-Jul	6	228.5	6	14	4.7	10.3
10-Jul	5	198.0	3	17	2.0	12.4
11-Jul	6	226.0	7	24	5.5	17.9
12-Jul	5	185.0	2	26	1.6	19.5
13-Jul	6	229.5	9	35	6.8	26.3
14-Jul	5	191.0	13	48	8.7	35.0
15-Jul	6	202.5	4	52	5.6	40.6
16-Jul	5	185.0	1	53	0.8	41.4
17-Jul	6	244.5	6	59	4.3	45.7
18-Jul	5	189.5	16	75	12.4	58.2
19-Jul	6	230.0	16	91	12.4	70.5
20-Jul	5	187.0	9	100	7.2	77.7
21-Jul	6	230.0	40	140	29.2	106.9
22-Jul	5	184.5	21	161	16.8	123.7
23-Jul	6	239.0	97	258	74.0	197.8
24-Jul	5	194.0	3	261	2.2	200.0
25-Jul	0	-1.0	0	261	0.0	200.0
26-Jul	5	167.5	2	263	1.6	201.6
27-Jul	6	237.5	32	295	24.5	226.1
28-Jul	5	161.0	12	307	16.6	242.8
29-Jul	6	219.5	15	322	12.4	255.2
30-Jul	5	174.5	3	325	2.5	257.7

Appendix C.2. Estimated coho salmon catch by date and station, Upper Cook Inlet offshore test fishing project, 1993.

	Station Number						
Date	4	5	6	6.5	7	8	Total
01-Jul	0	0	0	0	0	0	0
02-Jul	0	0	0		0	0	0
03-Jul	0	1	0	0	0	0	1
04-Jul	0	0	0		0	0	0
05-Jul	0	0	0	0	1	1	2
06-Jul	0	0	0		0	0	0
07-Jul	0	1	2	2	0	0	5
08-Jul	0	0	0		0	0	0
09-Jul	0	0	2	2	2	0	6
10-Jul	0	1	0		2	0	3
11-Jul	0	0	3	2	2	0	7
12-Jul	0	0	1		0	1	2
13-Jul	1	0	0	3	4	1	9
14-Jul	0	0	3		7	3	13
15-Jul	0	2	1	0	1	0	4
16-Jul	0	0	1		0	0	1
17-Jul	1	0	3	0	2	0	6
18-Jul	0	9	5		0	2	16
19-Jul	2	5	1	2	5	1	16
20-Jul	0	2	1		6	0	9
21-Jul	0	0	2	7	31	0	40
22-Jul	0	0	10		11	0	21
23-Jul	0	6	35	19	27	10	97
24-Jul	0	1	1		0	1	3
25-Jul							0
26-Jul	0	0	0		1	1	2
27-Jul	0	6	6	11	9	0	32
28-Jul	0	1	5		5	1	12
29-Jul	0	0	7	1	7	0	15
30-Jul	0	0	3		0	0	3
Total	4	35	92	49	123	22	325
%	1.2	10.8	28.3	15.1	37.8	6.8	100.0

Appendix C.3. Estimated coho salmon CPUE by date and station, Upper Cook Inlet offshore test fishing project, 1993.

	Station Number						
Date	4	5	6	6.5	7	8	Total
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	0.7	0.0	0.0	0.0	0.0	0.7
04-Jul	0.0	0.0	0.0		0.0	0.0	0.0
05-Jul	0.0	0.0	0.0	0.0	0.8	0.8	1.6
06-Jul	0.0	0.0	0.0		0.0	0.0	0.0
07-Jul	0.0	0.8	1.4	1.1	0.0	0.0	3.3
08-Jul	0.0	0.0	0.0		0.0	0.0	0.0
09-Jul	0.0	0.0	1.5	1.5	1.6	0.0	4.7
10-Jul	0.0	0.7	0.0		1.3	0.0	2.0
11-Jul	0.0	0.0	2.2	1.7	1.6	0.0	5.5
12-Jul	0.0	0.0	0.8		0.0	0.8	1.6
13-Jul	0.8	0.0	0.0	2.3	2.9	0.8	6.8
14-Jul	0.0	0.0	2.1		4.2	2.4	8.7
15-Jul	0.0	1.5	3.3	0.0	0.8	0.0	5.6
16-Jul	0.0	0.0	0.8		0.0	0.0	0.8
17-Jul	0.7	0.0	1.9	0.0	1.7	0.0	4.3
18-Jul	0.0	6.7	4.1		0.0	1.7	12.4
19-Jul	1.5	3.8	0.8	1.5	3.9	0.9	12.4
20-Jul	0.0	1.6	0.8		4.8	0.0	7.2
21-Jul	0.0	0.0	1.6	5.7	21.9	0.0	29.2
22-Jul	0.0	0.0	7.9		8.9	0.0	16.8
23-Jul	0.0	3.8	27.6	14.8	20.2	7.6	74.0
24-Jul	0.0	0.7	0.7		0.0	0.8	2.2
25-Jul							0.0
26-Jul	0.0	0.0	0.0		0.8	0.8	1.6
27-Jul	0.0	4.1	4.7	8.5	7.2	0.0	24.5
28-Jul	0.0	0.8	11.1		3.9	0.8	16.6
29-Jul	0.0	0.0	5.9	0.8	5.7	0.0	12.4
30-Jul	0.0	0.0	2.5		0.0	0.0	2.5
Total	3.1	25.4	81.9	37.9	92.1	17.4	257.7
%	1.2	9.8	31.8	14.7	35.7	6.8	100.0

Appendix D.1. Summary of chinook salmon fishing effort, daily and cumulative catch, and daily and cumulative CPUE, Upper Cook Inlet offshore test fishing project, 1993.

Date	Number of Stations	Mean Fishing Time (min)	Catch		CPUE	
			Daily	Cum	Daily	Cum
01-Jul	6	242.0	0	0	0.0	0.0
02-Jul	5	169.5	0	0	0.0	0.0
03-Jul	6	222.0	0	0	0.0	0.0
04-Jul	5	187.0	0	0	0.0	0.0
05-Jul	6	224.0	2	2	1.6	1.6
06-Jul	5	165.0	0	2	0.0	1.6
07-Jul	6	247.5	0	2	0.0	1.6
08-Jul	5	185.5	0	2	0.0	1.6
09-Jul	6	228.5	1	3	0.8	2.3
10-Jul	5	198.0	0	3	0.0	2.3
11-Jul	6	226.0	0	3	0.0	2.3
12-Jul	5	185.0	0	3	0.0	2.3
13-Jul	6	229.5	2	5	1.5	3.8
14-Jul	5	191.0	0	5	0.0	3.8
15-Jul	6	202.5	0	5	0.0	3.8
16-Jul	5	185.0	0	5	0.0	3.8
17-Jul	6	244.5	0	5	0.0	3.8
18-Jul	5	189.5	0	5	0.0	3.8
19-Jul	6	230.0	0	5	0.0	3.8
20-Jul	5	187.0	0	5	0.0	3.8
21-Jul	6	230.0	0	5	0.0	3.8
22-Jul	5	184.5	0	5	0.0	3.8
23-Jul	6	239.0	0	5	0.0	3.8
24-Jul	5	194.0	0	5	0.0	3.8
25-Jul	0	-1.0	0	5	0.0	3.8
26-Jul	5	167.5	0	5	0.0	3.8
27-Jul	6	237.5	0	5	0.0	3.8
28-Jul	5	161.0	0	5	0.0	3.8
29-Jul	6	219.5	0	5	0.0	3.8
30-Jul	5	174.5	0	5	0.0	3.8

Appendix D.2. Estimated chinook salmon catch by date and station, Upper Cook Inlet offshore test fishing project, 1993.

	Station Number						
Date	4	5	6	6.5	7	8	Total
01-Jul	0	0	0	0	0	0	0
02-Jul	0	0	0		0	0	0
03-Jul	0	0	0	0	0	0	0
04-Jul	0	0	0		0	0	0
05-Jul	0	1	0	0	1	0	2
06-Jul	0	0	0		0	0	0
07-Jul	0	0	0	0	0	0	0
08-Jul	0	0	0		0	0	0
09-Jul	0	0	1	0	0	0	1
10-Jul	0	0	0		0	0	0
11-Jul	0	0	0	0	0	0	0
12-Jul	0	0	0		0	0	0
13-Jul	0	0	0	1	1	0	2
14-Jul	0	0	0		0	0	0
15-Jul	0	0	0	0	0	0	0
16-Jul	0	0	0		0	0	0
17-Jul	0	0	0	0	0	0	0
18-Jul	0	0	0		0	0	0
19-Jul	0	0	0	0	0	0	0
20-Jul	0	0	0		0	0	0
21-Jul	0	0	0	0	0	0	0
22-Jul	0	0	0		0	0	0
23-Jul	0	0	0	0	0	0	0
24-Jul	0	0	0		0	0	0
25-Jul							0
26-Jul	0	0	0		0	0	0
27-Jul	0	0	0	0	0	0	0
28-Jul	0	0	0		0	0	0
29-Jul	0	0	0	0	0	0	0
30-Jul	0	0	0		0	0	0
Total	0	1	1	1	2	0	5
%	0.0	20.0	20.0	20.0	40.0	0.0	100.0

Appendix D.3. Estimated chinook salmon CPUE by date and station, Upper Cook Inlet offshore test fishing project, 1993.

	Station Number						
Date	4	5	6	6.5	7	8	Total
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	0.8	0.0	0.0	0.8	0.0	1.6
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	0.8	0.0	0.0	0.0	0.8
10-Jul	0.0	0.0	0.0		0.0	0.0	0.0
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	0.8	0.7	0.0	1.5
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	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
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	0.8	0.8	0.8	1.5	0.0	3.8
%	0.0	20.6	20.0	20.0	39.4	0.0	100.0

Appendix E.1. Entry pattern of sockeye salmon into Upper Cook Inlet, Alaska, 1993, estimated from daily CPUE measured at the latitude of Anchor Point.

Day	Date	Estimated Y	Input Y
9	702	.0861	.0817
10	703	.1023	.1029
11	704	.1212	.1278
12	705	.1430	.1472
13	706	.1680	.1636
14	707	.1963	.2523
15	708	.2282	.2607
16	709	.2634	.2894
17	710	.3020	.3258
18	711	.3437	.3413
19	712	.3878	.3483
20	713	.4339	.3859
21	714	.4812	.4597
22	715	.5288	.5098
23	716	.5759	.5320
24	717	.6216	.6493
25	718	.6653	.6902
26	719	.7064	.7266
27	720	.7443	.7359
28	721	.7788	.7627
29	722	.8099	.7783
30	723	.8375	.8355
31	724	.8618	.8796
32	725	.8830	.9078
33	726	.9013	.9204
34	727	.9170	.9375
35	728	.9304	.9553
36	729	.9418	.9639
37	730	.9514	.9644

Appendix F.1. Environmental measurements and observations made in Upper Cook Inlet, 1993, Alaska during the offshore test fishing project.

Date	Station	Air Temp. (c)	Water Temp. (c)	Wind Vel. (knots)	Wind Dir^	Tide Stage~	Salinity (ppt)	Water Depth (f)	Secchi (m)
01-Jul	4	11	9	0	0	4	24.5	25	6
	5	14	9	5	8	4	27	37	5
	6	15	10	0	0	4	27	48	5
	6.5	11	11	0	0	4	26	43	4.5
	7	15	11	0	0	1	26	45	4
	8	11	9	0	0	3	27	30	3
02-Jul	8	8	9	22	8	3	26.5	28	2.5
	7	9	9	18	8	3	27	45	3.5
	6	9	9	15	8	2	28	46	3
	5	9	9	10	8	4	28	37	6
	4	9	9	18	1	4	29	26	7
03-Jul	4	10	9	0	0	3	27.5	25	6.5
	5	13	9	0	0	2	28	38	4.5
	6	10	9	5	4	4	28	40	2.5
	6.5	10	9	5	4	4	28	45	2.5
	7	11	10	0	0	4	28	47	3.5
	8	9	9	10	4	4	28	30	2.5
04-Jul	8	9	9	0	0	3	27	27	3
	7	8	9	0	0	3	27.5	45	3
	6	9	9	0	0	3	27.5	43	4
	5	10	10	10	4	3	27	34	3
	4	10	9	0	0	2	28	18	8.5
05-Jul	4	12	9	10	5	3	27	22	6
	5	15	10	10	5	2	27	42	4
	6	14	10	15	6	4	27.5	45	3
	6.5	13	11	15	6	4	26.5	44	2
	7	11	11	20	6	4	26.5	44	2.5
	8	11	10	20	6	4	26.5	26	2.5
06-Jul	8	11	10	7	5	1	26	28	11
	7	13	10	8	4	3	27	48	3
	6	15	10	5	4	3	27.5	46	3
	5	14	10	10	4	3	27	33	5
	4	13	9	5	4	3	28	23	9
07-Jul	4	14	10	0	0	3	27	25	8
	5	15	10	5	5	2	27	37	3
	6	14	10	5	5	4	27	45	3
	6.5	15	11	3	5	4	26	46	3
	7	15	11	7	5	4	26	42	2.5
	8	13	11	5	5	4	26	26	2.5

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Appendix F.1. (p 2 of 4)

Date	Station	Air Temp. (c)	Water Temp. (c)	Wind Vel. (knots)	Wind Dir^	Tide Stage~	Salinity (ppt)	Water Depth (f)	Secchi (m)
08-Jul	8	13	10	0	0	4	26	27	2.5
	7	13	10	0	0	1	26.5	45	3.5
	6	13	10	3	5	3	27	45	4.5
	5	16	9	0	0	3	27.5	37	5
	4	15	9	0	0	3	28	22	8
09-Jul	4	17	10	0	0	3	27	26	9
	5	14	10	4	5	3	27	34	5.5
	6	15	12	5	5	3	25.5	48	5
	6.5	16	12	5	6	2	26	45	3
	7	15	12	10	6	4	25	45	3
	8	15	12	10	6	4	25.5	25	3.5
10-Jul	8	13	11	0	0	4	26	29	3.5
	7	14	11	3	6	4	26.5	45	3.5
	6	14	9	0	0	4	28	49	9
	5	12	9	10	1	1	28	37	9
	4	13	10	5	7	3	28	25	9
11-Jul	4	15	10	0	0	1	27	25	10
	5	16	10	0	0	3	28	37	9
	6	17	11	0	0	3	28	47	3
	6.5	20	11	3	6	3	28	43	4
	7	20	11	3	6	3	28	45	3.5
	8	20	12	5	6	3	28	29	4
12-Jul	8	13	11	0	0	4	26	27	3
	7	13	10	0	0	4	27	43	4
	6	14	10	0	0	4	27	48	7
	5	16	10	0	0	4	27	37	8
	4	16	10	0	0	4	28	25	11
13-Jul	4	13	10	11	5	4	28.5	27	9
	5	13	10	10	5	4	28	37	7
	6	13	11	15	5	1	27	45	6
	6.5	14	11	15	5	3	26.5	41	3.5
	7	13	11	15	5	3	26	46	3.5
	8	14	12	15	5	3	25.5	26	5
14-Jul	8	11	12	0	0	3	25	27	4
	7	12	12	8	5	3	25	44	4
	6	14	12	5	5	2	24.5	48	3
	5	15	10	0	0	4	27	41	6.5
	4	13	10	3	5	4	28	27	7
15-Jul	4	14	10	5	5	4	28	27	6
	5	16	11	5	5	4	27.5	38	6
	6	16	11	5	5	4	27	48	6

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Appendix F.1. (p 3 of 4)

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	18	12	0	0	1	25	44	4.5
	7	19	4	10	5	3	23	45	4
	8	17	14	5	5	3	24	28	4
16-Jul	8	13	12	15	6	3	24	27	3.5
	7	14	13	15	6	3	23.5	44	4
	6	18	13	3	6	3	24	47	4
	5	13	12	5	4	1	26	36	6
	4	14	10	5	4	4	27	26	7
17-Jul	4	17	11	15	4	4	26	25	5
	5	16	11	15	4	4	26	40	6
	6	16	12	18	4	4	25	48	5.5
	6.5	17	12	19	6	4	25	44	4
	7	17	12	18	6	1	25	46	4
	8	14	12	20	6	3	25	28	3.5
18-Jul	8	12	11	20	4	3	25	23	2
	7	12	11	18	4	3	25.5	44	4
	6	15	11	16	5	3	25.5	43	4
	5	13	11	10	5	3	26.5	38	5
	4	13	10	0	0	2	27	23	7
19-Jul	4	13	10	10	5	3	26.5	25	6
	5	13	10	10	5	4	27	40	7
	6	13	10	13	6	4	27	46	5
	6.5	14	11	9	6	4	26	43	4.5
	7	14	11	11	6	4	26	44	3
	8	13	11	10	6	1	26	28	3
20-Jul	8	11	11	10	5	4	25.5	30	3.5
	7	11	11	10	5	1	26	46	3
	6	11	11	10	5	3	26	48	5
	5	12	10	10	4	3	27	30	5
	4	13	10	0	0	3	27	23	7
21-Jul	4	15	10	5	5	3	27	22	5
	5	18	10	5	5	4	27.5	35	5.5
	6	18	11	3	5	4	26	45	3
	6.5	18	11	0	0	4	26	42	3
	7	15	11	5	4	4	26	46	2.5
	8	13	11	3	4	3	26	28	3
22-Jul	8	11	11	7	4	4	24	32	3
	7	11	10	5	4	1	25	47	4
	6	12	10	5	4	3	26	48	4
	5	12	10	8	4	3	26	40	5.5
	4	13	10	8	4	3	26.5	25	8

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Appendix F.1. (p 4 of 4)

Date	Station	Air Temp. (c)	Water Temp. (c)	Wind Vel. (knots)	Wind Dir^	Tide Stage~	Salinity (ppt)	Water Depth (f)	Secchi (m)
23-Jul	4	11	10	18	5	3	25.5	25	6
	5	11	10	20	5	3	25	39	4
	6	12	11	20	5	2	25	47	4
	6.5	13	11	18	5	4	25	46	2
	7	13	11	10	5	4	25	44	2.5
	8	13	11	10	5	4	25.5	29	3
24-Jul	8	11	11	10	6	4	25	30	3
	7	11	11	8	6	1	25	45	3
	6	11	10	5	6	3	26	49	5.5
	5	12	10	7	6	3	26	37	5.5
	4	12	10	5	6	3	26	25	7
25-Jul	-1	-1	-1	-1	-1	-1	-1	-1	-1
26-Jul	8	11	11	10	8	4	25	27	2.5
	7	12	11	12	8	4	25	46	3
	6	12	10.5	8	8	4	26	48	6
	5	13	10	5	8	4	26	40	7
	4	12	9	0	0	1	26.5	25	12
27-Jul	4	17	9	0	0	4	25	26	11
	5	15	9	0	0	1	26	38	9.5
	6	19	13	0	0	3	23.5	48	3
	6.5	18	13	3	5	3	24	47	3
	7	18	13	3	5	3	24	45	3
	8	18	12	3	5	3	24	26	3.5
28-Jul	8	13	13	3	6	3	23	25	3
	7	13	13	10	6	2	23	45	3
	6	12	11	10	6	4	25	47	5
	5	10	10	5	2	4	26	38	9
	4	10	9	0	0	4	27	27	10
29-Jul	4	13	10	15	1	4	23	26	8
	5	14	9	12	1	4	25.5	37	8
	6	16	10	3	1	4	25	48	13
	6.5	18	11	0	0	1	25	44	3.5
	7	17	12	5	6	3	25	47	4
	8	16	12	12	6	3	24	28	3
30-Jul	8	12	12	5	5	3	22.5	29	3.5
	7	13	12	3	5	3	23.5	44	3.5
	6	14	12	3	5	3	22.5	44	4
	5	14	10	3	5	2	26	36	9
	4	15	11	0	0	4	25	26	11.5

^ Wind direction code 1=north,2=northeast,3=east,4=southeast,
5=south,6=southwest,7=west,8=northwest
~ Tide stage code 1=high,2=low,3=ebb,4=flood

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