

Snake River Salmon Counting Tower  
Project Summary Report, 1999

by

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## TABLE OF CONTENTS

List of Tables.....	ii
List of Figures .....	iii
Abstract.....	v
Introduction .....	1
Objectives.....	1
Methods.....	1
Results.....	2
Discussion .....	3
Acknowledgments.....	4
Literature Cited.....	4
Tables .....	5
Figures.....	14

## LIST OF TABLES

<u>Table</u>		<u>Page</u>
1.	Expanded daily and cumulative salmon migration past the Snake River counting tower, Norton Sound, 1999 .....	5
2.	Expanded daily hourly chum salmon migration past the Snake River counting tower, Norton Sound, 1999 .....	6
3.	Expanded daily hourly pink salmon migration past the Snake River counting tower, Norton Sound, 1999 .....	7
4.	Expanded daily hourly king salmon migration past the Snake River counting tower, Norton Sound, 1999 .....	8
5.	Expanded daily hourly coho salmon migration past the Snake River counting tower, Norton Sound, 1999 .....	9
6.	Reported hourly chum salmon observations at the Snake River counting tower, Norton Sound, 1999 .....	10
7.	Reported hourly pink salmon observations at the Snake River counting tower, Norton Sound, 1999 .....	11
8.	Reported hourly king salmon observations at the Snake River counting tower, Norton Sound, 1999 .....	12
9.	Reported hourly coho salmon observations at the Snake River counting tower, Norton Sound, 1999 .....	13

## LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Area location map of the Snake River counting tower project site, Norton Sound, 1999 .....	14
2. Cumulative migration of all species past the Snake River counting tower, Norton Sound, 1999 .....	15
3. Daily chum salmon migration past the Snake River counting tower, Norton Sound, 1999 .....	16
4. Cumulative chum salmon migration past the Snake River counting tower, Norton Sound, 1999 .....	16
5. Daily pink salmon migration past the Snake River counting tower, Norton Sound, 1999 .....	17
6. Cumulative pink salmon migration past the Snake River counting tower, Norton Sound, 1999 .....	17
7. Daily coho salmon migration past the Snake River counting tower, Norton Sound, 1999 .....	18
8. Cumulative coho salmon migration past the Snake River counting tower, Norton Sound, 1999 .....	18
9. Diurnal pattern of chum salmon migration past the Snake River counting tower, Norton Sound, 1999 .....	19
10. Diurnal pattern of pink salmon migration past the Snake River counting tower, Norton Sound, 1999 .....	19
11. Diurnal pattern of coho salmon migration past the Snake River counting tower, Norton Sound, 1999 .....	20
12. Chum salmon run-timing past the Snake River counting tower, Norton Sound, 1995-1999 .....	21
13. Pink salmon run-timing past the Snake River counting tower, Norton Sound, 1995-1999 .....	21

## LIST OF FIGURES (Continued)

<u>Figure</u>		<u>Page</u>
14.	Coho salmon run-timing past the Snake River counting tower, Norton Sound, 1995-1999 .....	22
15.	Cumulative chum salmon migration past the Snake River counting tower, Norton Sound, 1995-1999 .....	22
16.	Cumulative odd year pink salmon migration past the Snake River counting tower, Norton Sound, 1995-1999 .....	23
17.	Cumulative even year pink salmon migration past the Snake River counting tower, Norton Sound, 1996-1998 .....	23
18.	Cumulative coho salmon migration past the Snake River counting tower, Norton Sound, 1995-1999 .....	24

## ABSTRACT

The Snake River counting tower is located approximately 5 miles from Nome or about 15 minutes by boat upstream from the boat harbor. The Snake River counting tower project is a cooperative project funded and operated by the Kawerak Corporation. 1999 was the fifth consecutive year a salmon counting tower was operated on the Snake River. The objective of the project is to obtain daily and seasonal information concerning the timing and magnitude of the chum, pink, king and coho salmon escapement to the Snake River. Counting began on 2 July and ended on 14 August in 1999. The crew counted 24 half-hour counts each day. The counts for each half hour shift were doubled to produce the expanded hourly counts for each species. The expanded counts for 1999 were: 484 chum salmon, 116 pink salmon, 10 king salmon, and 90 coho salmon. The chum, pink, and coho salmon counts past the tower were the latest and weakest since the project started in 1995. The king salmon count past the tower was similar to previous years.

## INTRODUCTION

The Snake River counting tower is a cooperative project funded and operated by the Kawerak Corporation. The Alaska Department of Fish & Game (ADF&G) analyzed the tower count data and produced this report as part of its contribution to this cooperative effort.

This was the fifth consecutive year a counting tower has been operated on the Snake River (Rob 1995, 1997, 1998 and 1999). The project is operated to obtain timely and accurate escapement information required for the active management of the salmon stocks throughout the season. The Snake River drains into Norton Sound at the Port of Nome (Figure 1).

## OBJECTIVES

To obtain daily and seasonal information concerning the timing and magnitude of the chum, pink, king and coho salmon escapement to the Snake River.

## METHODS

The Snake River counting tower camp is located approximately 5 miles from Nome where the Snake River turns north. The camp is approximately 15 minutes by boat from the Nome boat harbor.

A tent camp with two tent frames and an outhouse was established during late June. A 15 foot high scaffolding tower was erected on the east bank of the river to serve as an observation platform. A 50 x 8 foot vinyl canvas flash panel was placed on the river bottom directly in front of the tower. A weir to direct the fish over the flash panel was built from the mid-stream end of the flash panel to the opposite bank. This weir was made of livestock fencing and thawfield pipes. An array of 120 volt lights was mounted on the tower to illuminate the flash panel during periods of low light and darkness.

The counting schedule began on 2 July and ended on 14 August. The two person crew counted 16 half-hour counts each day from 12 noon to 0400 hours the following day. A 24 hour count and one day off were scheduled weekly. Daily counts were radioed to the Nome office of the Kawerak Corporation, which relayed them to the Nome office of ADF&G every morning. These counts were then expanded to account for the time periods not counted.

The expanded counts in this report were calculated by first multiplying the half hour counts by two to obtain hourly counts. The crew began the 24 hour counts at 0800 hours on one day and finished the 24 hour count at 0800 hours the following day. This schedule counted the hours normally taken off in separate 4 hour blocks on two days. The expanded counts

were compiled from 0800 hours to 0800 hours the following day to follow this schedule. The 16 hour counts for the days off were estimated by adding the counts of each hour of the day before to the counts of each hour of the day following and dividing the result by two, giving expanded hourly counts for the 16 hours of the day off. Next an expansion factor was calculated to compensate for the 4 hours not normally counted from 0800 to 1200 hours and for the 4 hours not normally counted from 0400 to 0800 hours. These factors were derived from the weekly 24 hour count by dividing the total count from 0800 hours to 1200 hours during the 24 hour count by the total normal sixteen hour count during the 24 hour count and by dividing the total count from 0400 hours through 0700 hours during the 24 hour count by the total normal sixteen hour count during the 24 hour count. Then each 16 hour count for the remaining days was expanded to 24 hour counts by applying the expansion factors to the three days before and after each 24 hour count by first multiplying each days 16 hour total by the 0800 to 1200 hours expansion factor and then multiplying each days 16 hour total by the 0400 through 0800 hours expansion factor and then adding both numbers to the 16 hour count for each day. This expansion was done for all species counted.

The expanded counts for other days missed were linearly interpolated as follows. For a day with the normal 16 hour count missed, the count for the missing day was calculated by adding the counts of each hour of the day before the missed period to the counts of each hour of the day following the missed period and dividing the result by two. If two or more normal 16 hour count days were missed the count for the missing days was calculated by adding the counts of each hour of the day before the missed period to the counts of each hour of the day following the missed period and dividing the result by two. Then each 16 hour count was expanded to a 24 hour count by multiplying each days 16 hour total by the nearest 24 hour expansion factors, and adding those numbers to the 16 hour count for each day.

Expanded counts for the calendar days were then calculated to give daily totals that can be compared to those of other years (Rob 1999).

## RESULTS

Table 1 shows the expanded daily and cumulative totals for each salmon species. Figure 2 shows the cumulative migration of all salmon species. The reported total hourly counts were: 320 chum salmon, 128 pink salmon, 18 king salmon, and 90 coho salmon (Tables 6-9). The expanded counts were: 484 chum salmon, 116 pink salmon, 10 king salmon, and 90 coho salmon (Tables 2-5). Dolly Varden were not counted.

Chum salmon were observed on 15 July, the fourteenth day of counting although the expansion for missing counts places the first count on 12 July. Pink salmon were first observed on 29 July. Coho salmon were first observed on 25 July. King salmon were first observed on 10 August. The daily peak count of 106 chum salmon occurred on 28 July; the

## METHODS

### *Hydroacoustic Data Acquisition*

#### Equipment

Sonar equipment for the right bank (relative to a downstream perspective) of the Yukon River included: 1) a Biosonics<sup>1</sup> Model 101 (SN 83-036) 120/420 kHz echosounder configured to transmit and receive at 120 kHz; 2) an International Transducer Co. (I.T.C.) Model 5398 120 kHz transducer (SN 003) configured for dual-beam use as Case II (3.6°x9.2° narrow, 12.3°x22° wide beam); 3) two 304.8 m (1,000 ft) Carol Model 1302 microphone conductor cables (SN's 201 and 202) connecting sounder to transducer; 4) a Hydroacoustic Technology, Inc. (H.T.I.) Model 401 digital chart recorder coupled with a Panasonic KXP 1624 dot matrix printer; and 5) a Hewlett-Packard Model 54501A digital storage oscilloscope.

Left-bank sonar equipment included: 1) a Biosonics 102 (SN 89-019) 120/420 kHz echosounder configured to operate at 120 kHz; 2) an I.T.C. Model 5398 120 kHz transducer (SN 008) configured for dual-beam use, Case I (2.0°x4.9° narrow, 4.2°x9.9° wide beam); an I.T.C. Model 5398 120 kHz transducer (SN 005) configured for dual-beam use, Case I (2.1°x4.9° narrow, 3.8°x9.7° wide beam); 3) four 304.8 m (1,000 ft) Belden Model 8412 microphone conductor cables (SN's 501 and 502 were used with transducer 008, and 503 and 504 were used with transducer 005) connecting sounder to transducers; 4) H.T.I. Models 401 and 403 digital chart recorders coupled with Panasonic KXP 1624 and KXP 2624 dot matrix printers; and 5) a Hewlett-Packard Model 54501A digital storage oscilloscope. The preseason plan was to use transducer 008 to monitor fish passage from 0-350 m and to deploy transducer 005 if significant numbers of fish were observed from 0-20 m. This proved to be unnecessary since the majority of the fish passed beyond 20 m.

In addition, a complete backup system was kept in camp in the event of a failure. This backup system consisted of: 1) a Biosonics Model 101 (SN 83-039) echosounder configured to operate at 120 kHz; 2) an I.T.C. Model 5398 120 kHz transducer (SN 004) configured for dual-beam use, Case I (2.0°x4.6° narrow, 3.9°x9.2° wide beam) and Case II (4°x9.4° narrow, 13°x22.5° wide beam); 3) two 304.8 m (1,000 ft) Belden Model 8412 microphone conductor cables (SN's 605K and 606K); 4) an H.T.I. Model 403 digital chart recorder; and 5) three Panasonic KXP 1624 dot matrix printers.

Each sounder/transducer/cable configuration was calibrated prior to the field season (Table 1). Dual-beam data were digitized, processed, and electronically stored with a Biosonics Model 281 echo signal processor (ESP) installed in a Compaq 386 20e personal computer.

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<sup>1</sup> Mention of a company's name does not constitute endorsement by ADF&G.

the eight hour period from 0700 to 1500 hours (Tables 6-9), and it is recommended that this be the non-counting period in the future.

It is also recommended that the 24 hour count run from 0000 hours through 2400 hours so that the expansion can be performed simply.

The value of a counting tower on this watershed is evident. The salmon escapements documented by the Snake River tower provided fishery managers a valuable tool for assessing the salmon returns to the Nome area watersheds.

#### ACKNOWLEDGMENTS

The ADF&G thanks Kawerak Incorporated for funding and operating this project. A draft of this report was reviewed by Larry Buklis.

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Table 1. Expanded daily and cumulative salmon migration past the Snake River counting tower, Norton Sound, 1999.

Date	Daily Chum	Cumulative Chum	Daily Pink	Cumulative Pink	Daily King	Cumulative King	Daily Coho	Cumulative Coho
2-Jul	0	0	0	0	0	0	0	0
3-Jul	0	0	0	0	0	0	0	0
4-Jul	0	0	0	0	0	0	0	0
5-Jul	0	0	0	0	0	0	0	0
6-Jul	0	0	0	0	0	0	0	0
7-Jul	0	0	0	0	0	0	0	0
8-Jul	0	0	0	0	0	0	0	0
9-Jul	0	0	0	0	0	0	0	0
10-Jul	0	0	0	0	0	0	0	0
11-Jul	0	0	0	0	0	0	0	0
12-Jul	-6	-6	0	0	0	0	0	0
13-Jul	-6	-12	0	0	0	0	0	0
14-Jul	-6	-18	0	0	0	0	0	0
15-Jul	-12	-30	0	0	0	0	0	0
16-Jul	-6	-36	0	0	0	0	0	0
17-Jul	-6	-42	0	0	0	0	0	0
18-Jul	0	-42	0	0	0	0	0	0
19-Jul	31	-11	0	0	0	0	0	0
20-Jul	-11	-22	0	0	0	0	0	0
21-Jul	3	-19	0	0	0	0	0	0
22-Jul	-22	-41	0	0	0	0	0	0
23-Jul	-11	-52	0	0	0	0	0	0
24-Jul	13	-39	0	0	0	0	0	0
25-Jul	39	0	0	0	0	0	8	8
26-Jul	25	25	0	0	0	0	0	8
27-Jul	37	62	0	0	0	0	0	8
28-Jul	106	168	0	0	0	0	0	8
29-Jul	54	222	2	2	0	0	0	8
30-Jul	54	276	2	4	0	0	0	8
31-Jul	54	330	2	6	0	0	0	8
1-Aug	54	384	2	8	0	0	0	8
2-Aug	3	387	4	12	0	0	0	8
3-Aug	0	387	0	12	0	0	0	8
4-Aug	0	387	30	42	0	0	0	8
5-Aug	4	391	-4	38	0	0	0	8
6-Aug	-4	387	12	50	0	0	0	8
7-Aug	22	409	23	73	0	0	0	8
8-Aug	22	431	23	96	0	0	0	8
9-Aug	48	479	49	145	0	0	0	8
10-Aug	6	485	-16	129	10	10	46	54
11-Aug	3	488	52	181	0	10	36	90
12-Aug	1	489	4	185	6	16	0	90
13-Aug	3	492	-18	167	10	26	0	90
14-Aug	-8	484	-51	116	-6	20	0	90

Table 2. Expanded daily hourly chum salmon migration past the Snake River counting lower, Norton Sound, 1999

Date	0000	0100	0200	0300	0400	0500	0600-1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Total	% of Total	
2-Jul								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
3-Jul	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
4-Jul	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
5-Jul	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
6-Jul	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
7-Jul	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
8-Jul	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
9-Jul	0	0	0	0	0	0		0	0	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	0	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	0	0	0	0	0	0	0.0%
12-Jul	0	0	0	0	0	0	-6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1.2%
13-Jul	0	0	0	0	0	0	-6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1.2%
14-Jul	0	0	0	0	0	0	-5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1.2%
15-Jul	0	0	0	0	0	0	-12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2.5%
16-Jul	0	0	0	0	0	0	-6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1.2%
17-Jul	0	0	0	0	0	0	-6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1.2%
18-Jul	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
19-Jul	0	0	0	0	0	0		-11	0	0	0	0	0	0	0	0	0	34	0	0	31	6.4%
20-Jul	0	0	0	0	0	0		-11	0	0	0	0	0	0	0	0	0	0	0	0	0	-2.3%
21-Jul	0	14	0	0	0	0		-11	0	0	0	0	0	0	0	0	0	0	0	0	3	0.6%
22-Jul	0	0	0	0	0	0		-22	0	0	0	0	0	0	0	0	0	0	0	0	0	-4.5%
23-Jul	0	0	0	0	0	0		-11	0	0	0	0	0	0	0	0	0	0	0	0	0	-2.3%
24-Jul	0	0	0	0	0	0		-11	0	0	24	0	0	0	0	0	0	0	0	0	13	2.7%
25-Jul	0	0	0	0	0	0		-3	0	2	-2	-4	8	2	4	0	22	2	2	6	39	8.1%
26-Jul	0	4	0	0	0	0		-3	0	0	0	0	0	6	8	2	4	0	4	0	25	5.2%
27-Jul	0	0	0	2	0	0		-3	2	0	0	0	0	0	0	0	36	0	0	0	37	7.6%
28-Jul	0	0	0	0	0	0		-8	2	0	0	0	0	0	0	0	0	0	32	80	106	21.9%
29-Jul	0	0	0	0	0	0		-4	1	0	0	0	0	1	0	0	0	0	16	40	54	11.2%
30-Jul	0	0	0	0	0	0		-4	1	0	0	0	0	1	0	0	0	0	16	40	54	11.2%
31-Jul	0	0	0	0	0	0		-4	1	0	0	0	0	1	0	0	0	0	16	40	54	11.2%
1-Aug	0	0	0	0	0	0		-4	1	0	0	0	0	1	0	0	0	0	16	40	54	11.2%
2-Aug	0	0	0	0	0	0		0	1	0	0	0	0	2	0	0	0	0	0	0	3	0.6%
3-Aug	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
4-Aug	0	0	0	0	0	-4		0	0	0	0	0	0	0	0	0	0	4	0	0	0	0.0%
5-Aug	0	0	0	0	0	0		0	0	0	0	0	0	4	0	0	0	0	0	0	4	0.8%
6-Aug	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	-4	-0.8%
7-Aug	0	0	0	0	0	0		0	0	0	0	10	0	11	3	0	0	0	-2	0	22	4.5%
8-Aug	0	0	0	0	0	0		0	0	0	0	10	0	11	3	0	0	0	-2	0	22	4.5%
9-Aug	0	0	0	0	0	0		0	0	0	0	20	0	22	6	0	0	0	0	0	48	9.9%
10-Aug	0	0	0	0	0	0		6	0	0	0	0	0	0	0	0	0	0	0	0	6	1.2%
11-Aug	0	0	0	0	0	0		-1	0	0	0	2	2	0	0	0	0	0	0	0	3	0.6%
12-Aug	0	0	0	0	0	0		-1	0	0	0	0	0	0	0	0	0	0	2	0	1	0.2%
13-Aug	0	0	0	0	0	0		-1	0	4	0	0	0	0	0	0	0	0	0	0	3	0.6%
14-Aug	0	0	0	0	0	0		-8	0	0	0	0	0	0	0	0	0	0	0	0	-8	-1.7%
Total	0	26	0	2	-4	-42	-115	9	6	22	-4	50	20	56	14	62	40	96	246	484	100.0%	
	0.0%	5.4%	0.0%	0.4%	-0.8%	-8.7%	-23.8%	1.9%	1.2%	4.5%	-0.8%	10.3%	4.1%	11.6%	2.9%	12.8%	8.3%	19.6%	50.8%	100.0%		

Table 3. Expanded daily hourly pink salmon migration past the Snake River counting tower, Norton Sound, 1999.

Outlined areas indicate hours not counted. Numbers in outlined areas indicate estimated passage.

Date	0000	0100	0200	0300	0400	0500	0600-1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Total	% of Total	
2-Jul								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
3-Jul	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
4-Jul	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
5-Jul	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
6-Jul	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
7-Jul	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
8-Jul	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
9-Jul	0	0	0	0	0	0		0	0	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	0	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	0	0	0	0	0	0	0.0%
12-Jul	0	0	0	0	0	0		0	0	0	0	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	0	0	0	0	0	0	0.0%
14-Jul	0	0	0	0	0	0		0	0	0	0	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	0	0	0	0	0	0	0.0%
16-Jul	0	0	0	0	0	0		0	0	0	0	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	0	0	0	0	0	0	0.0%
18-Jul	0	0	0	0	0	0		0	0	0	0	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	0	0	0	0	0	0	0.0%
20-Jul	0	0	0	0	0	0		0	0	0	0	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	0	0	0	0	0	0	0.0%
22-Jul	0	0	0	0	0	0		0	0	0	0	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	0	0	0	0	0	0	0.0%
24-Jul	0	0	0	0	0	0		0	0	0	0	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	0	0	0	0	0	0	0.0%
26-Jul	0	0	0	0	0	0		0	0	0	0	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	0	0	0	0	0	0	0.0%
28-Jul	0	0	0	0	0	0		0	0	0	0	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	0	0	0	0	0	0	0.0%
30-Jul	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
31-Jul	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
1-Aug	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
2-Aug	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
3-Aug	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
4-Aug	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
5-Aug	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
6-Aug	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
7-Aug	-25	10	0	0	0	0		0	0	1	0	3	-1	1	2	29	3	0	0	0	23	19.8%
8-Aug	-25	10	0	0	0	0		0	0	1	0	3	-1	1	2	29	3	0	0	0	23	19.8%
9-Aug	-25	10	0	0	0	0		0	0	0	0	0	0	0	0	58	6	0	0	0	49	42.2%
10-Aug	-50	20	0	0	0	0		0	-8	0	-2	0	10	0	0	0	0	4	4	6	-16	-13.8%
11-Aug	0	0	0	0	0	0		0	10	2	2	-4	22	8	12	-4	4	0	2	0	52	44.8%
12-Aug	0	0	0	0	0	0		-25	4	0	2	0	2	4	6	10	0	0	2	0	4	3.4%
13-Aug	6	0	0	-4	0	0		-25	0	-2	0	-4	2	0	0	8	2	-2	0	2	-18	-15.5%
14-Aug	2	0	-4	0	0	0		-52	0	0	-2	0	0	4	0	0	1	-1	0	0	-51	-44.0%
Total	-117	50	-4	-4	0	0		-104	0	4	0	4	32	18	28	124	19	15	30	15	116	100%
	-100.0%	43.1%	-3.4%	-3.4%	0.0%	0.0%		-89.7%	5.2%	3.4%	0.0%	3.4%	27.8%	15.5%	24.1%	106.9%	16.4%	12.9%	25.9%	12.9%	100%	

Table 4. Expanded daily hourly king salmon migration past the Snake River counting tower, Norton Sound, 1999.

Outlined areas indicate hours not counted. Numbers in outlined areas indicate estimated passage.

Date	0000	0100	0200	0300	0400	0500	0600-1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Total	% of Total	
2-Jul								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
3-Jul	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
4-Jul	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
5-Jul	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
6-Jul	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
7-Jul	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
8-Jul	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
9-Jul	0	0	0	0	0	0		0	0	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	0	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	0	0	0	0	0	0	0.0%
12-Jul	0	0	0	0	0	0		0	0	0	0	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	0	0	0	0	0	0	0.0%
14-Jul	0	0	0	0	0	0		0	0	0	0	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	0	0	0	0	0	0	0.0%
16-Jul	0	0	0	0	0	0		0	0	0	0	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	0	0	0	0	0	0	0.0%
18-Jul	0	0	0	0	0	0		0	0	0	0	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	0	0	0	0	0	0	0.0%
20-Jul	0	0	0	0	0	0		0	0	0	0	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	0	0	0	0	0	0	0.0%
22-Jul	0	0	0	0	0	0		0	0	0	0	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	0	0	0	0	0	0	0.0%
24-Jul	0	0	0	0	0	0		0	0	0	0	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	0	0	0	0	0	0	0.0%
26-Jul	0	0	0	0	0	0		0	0	0	0	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	0	0	0	0	0	0	0.0%
28-Jul	0	0	0	0	0	0		0	0	0	0	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	0	0	0	0	0	0	0.0%
30-Jul	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
31-Jul	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
1-Aug	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
2-Aug	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
3-Aug	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
4-Aug	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
5-Aug	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
6-Aug	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
7-Aug	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
8-Aug	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
9-Aug	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
10-Aug	0	0	0	0	0	0		0	2	0	0	0	0	0	0	0	0	0	8	0	10	100.0%
11-Aug	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
12-Aug	0	0	0	0	0	0		-5	0	0	0	0	0	0	0	4	0	0	0	2	1	10.0%
13-Aug	0	2	0	0	0	0		-5	0	0	0	0	0	-2	2	4	2	2	0	0	5	50.0%
14-Aug	0	2	0	0	0	0		-10	0	0	0	0	0	0	0	1	1	0	0	0	-6	-60.0%
Total	0	4	0	0	0	0		-20	0	2	0	0	0	-2	2	8	3	3	8	2	10	100.0%
		0.0%	40.0%	0.0%	0.0%	0.0%		-200.0%	0.0%	20.0%	0.0%	0.0%	0.0%	-20.0%	20.0%	80.0%	30.0%	30.0%	80.0%	20.0%	100%	

Table 5. Expanded daily hourly coho salmon migration past the Snake River counting tower, Norton Sound, 1999

Outlined areas indicate hours not counted. Numbers in outlined areas indicate estimated passage.

Date	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Total	% of Total	
2-Jul														0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
3-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
4-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
5-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
6-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
7-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
8-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
9-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	0	0	0	0	0	0	0	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	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	0	0	0	0	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	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	0	0	0	0	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	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	0	0	0	0	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	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	0	0	0	0	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	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	0	0	0	0	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	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	0	0	0	0	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	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	0	0	0	0	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	0	0	0	0	0	0	0	4	4	0	0	8	8.9%
26-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	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	0	0	0	0	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	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
31-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
1-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
2-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
3-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
4-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
5-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
6-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
7-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
8-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
9-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
10-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	4	0	16	0	0	0	0	46	51.1%
11-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	4	10	4	0	6	2	0	4	4	26	40.0%	
12-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
13-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
14-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	4	44	0	0	22	0	4	4	4	4	90	100.0%



Table 7. Reported hourly pink salmon observations at the Snake River counting tower, Norton Sound, 1999.

Date	Hour																								Total	% of Total
	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300		
3-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
4-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
5-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
6-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
7-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
8-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
9-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	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	0	0	0	0	0	0	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	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	0	0	0	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	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	0	0	0	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	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	0	0	0	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	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	0	0	0	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	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	0	0	0	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	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	0	0	0	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	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	0	0	0	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	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	0	0	0	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	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	0	0	0	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	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
31-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
1-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
2-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
3-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
4-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
5-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
6-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
7-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
8-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
9-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
10-Aug	-50	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	64	30.0%
11-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-16	-12.8%
12-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	40.6%
13-Aug	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	23.4%
14-Aug	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	5.3%
Total	-42	20	-4	-4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	128	100.0%

Outlined areas indicate hours not counted

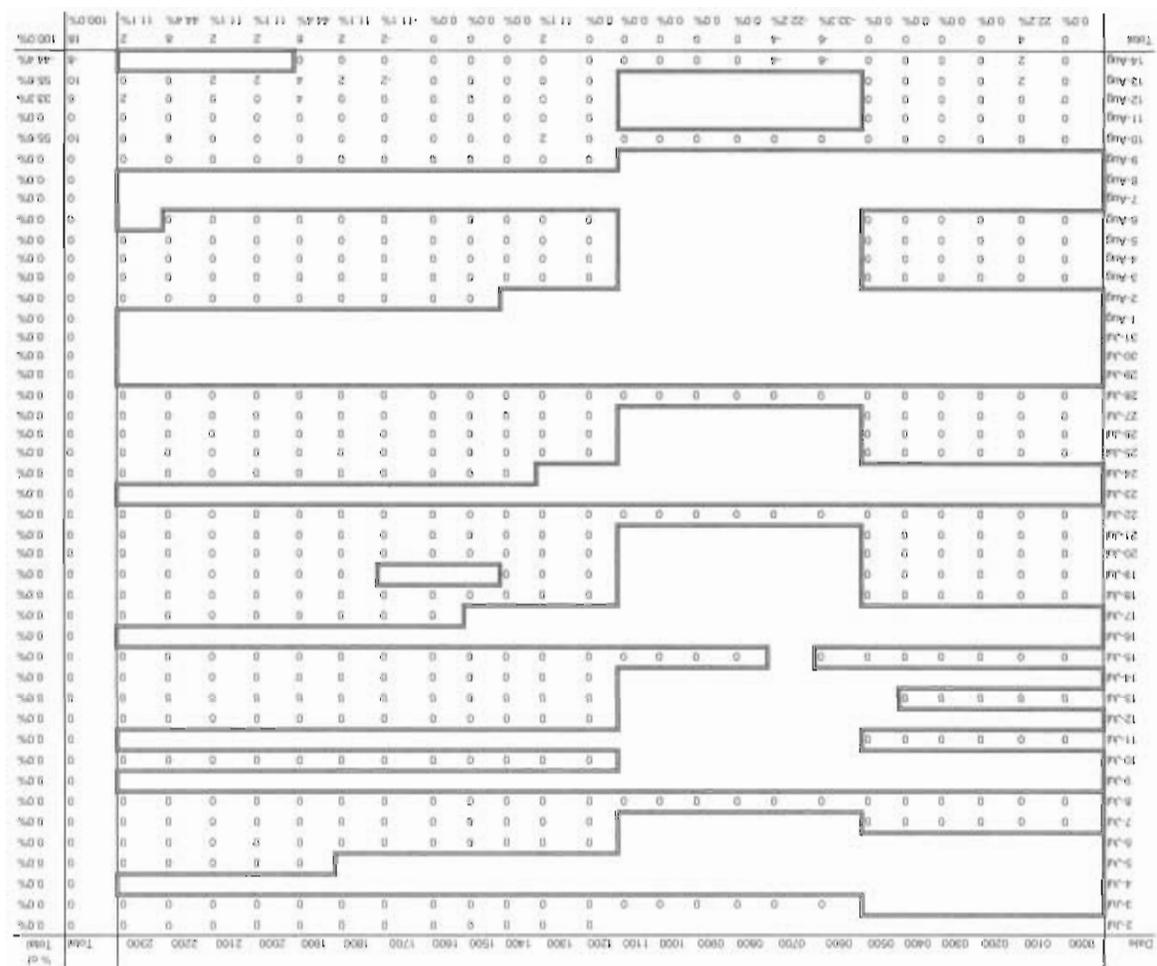


Table 8. Reported hourly king salmon observations at the Snake River counting tower, Nerton Sound, 1999

Outlined areas indicate hours not counted

Table 9. Reported hourly coho salmon observations at the Snake River counting tower, Norton Sound, 1999.

Outlined areas indicate hours not counted

Date	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Total	% of Total	
2-Jul													0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
3-Jul							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
4-Jul																										0	0.0%
5-Jul																						0	0	0	0	0	0.0%
6-Jul													0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
7-Jul	0	0	0	0	0	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
8-Jul	0	0	0	0	0	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
9-Jul																										0	0.0%
10-Jul													0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
11-Jul	0	0	0	0	0	0																				0	0.0%
12-Jul													0	0	0	0	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	0	0	0	0	0	0	0.0%
14-Jul													0	0	0	0	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	0	0	0	0	0	0	0	0.0%
16-Jul																										0	0.0%
17-Jul																										0	0.0%
18-Jul	0	0	0	0	0	0							0	0	0	0	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	0	0	0	0	0	0	0.0%
20-Jul	0	0	0	0	0	0							0	0	0	0	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	0	0	0	0	0	0	0.0%
22-Jul	0	0	0	0	0	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
23-Jul																										0	0.0%
24-Jul																										0	0.0%
25-Jul	0	0	0	0	0	0							0	0	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	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	0	0	0	0	0	0	0.0%
28-Jul	0	0	0	0	0	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
29-Jul																										0	0.0%
30-Jul																										0	0.0%
31-Jul																										0	0.0%
1-Aug																										0	0.0%
2-Aug																										0	0.0%
3-Aug	0	0	0	0	0	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
4-Aug	0	0	0	0	0	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
5-Aug	0	0	0	0	0	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
6-Aug	0	0	0	0	0	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
7-Aug																										0	0.0%
8-Aug																										0	0.0%
9-Aug																										0	0.0%
10-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	-4	0	16	0	0	0	0	0	48	51.1%
11-Aug	0	0	0	0	0	0							0	2	0	4	10	4	0	6	2	0	4	4	0	36	40.0%
12-Aug	0	0	0	0	0	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
13-Aug	0	0	0	0	0	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
14-Aug	0	0	0	0	0	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	4	44	0	0	22	6	4	4	4	4	90	100.0%
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.2%	0.0%	4.4%	48.9%	0.0%	0.0%	24.4%	6.7%	4.4%	4.4%	4.4%	4.4%	100.0%	

Figure 1. Area location map of the Snake River counting tower project site. Norton Sound, 1999.

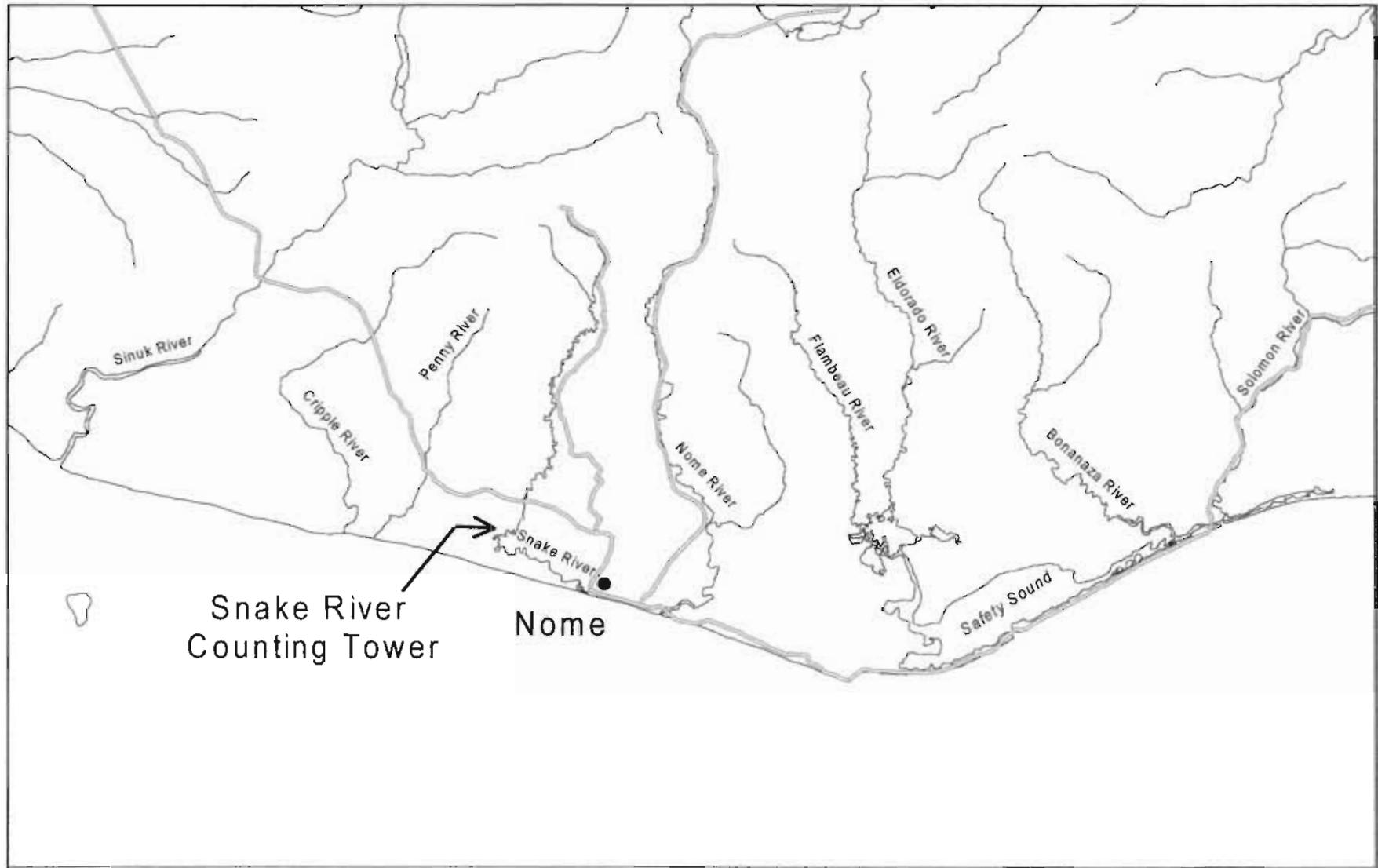


Figure 2. Cumulative migration of all species past the Snake River counting tower, Norton Sound, 1999.

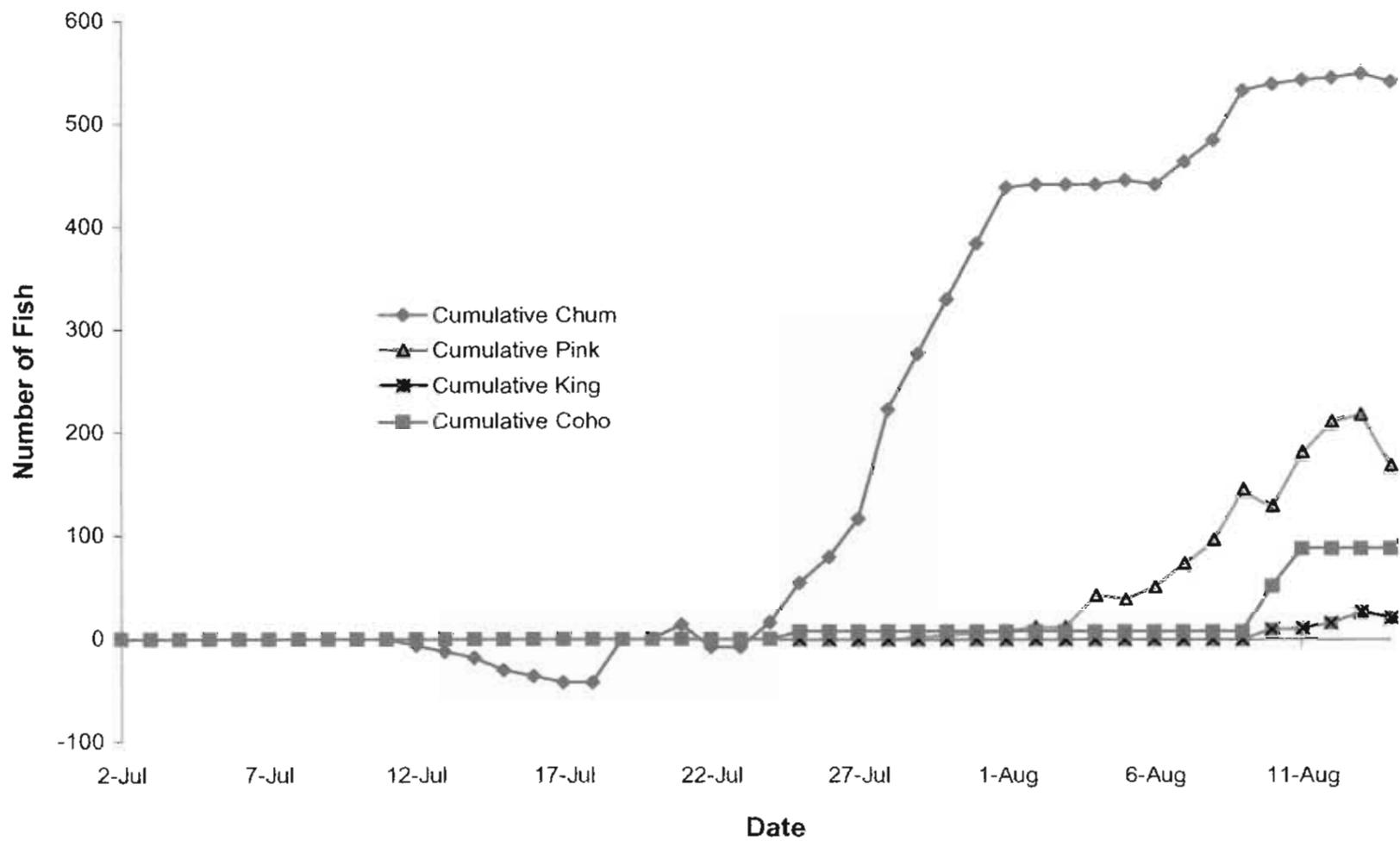


Figure 3. Daily chum salmon migration past the Snake River counting tower, Norton Sound, 1999.

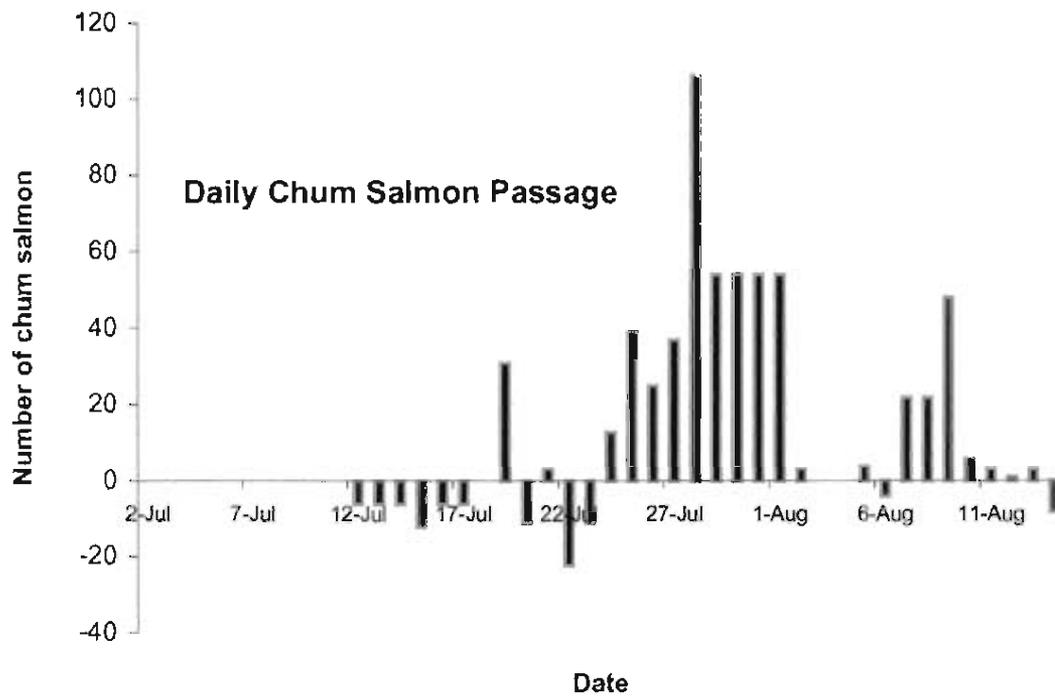


Figure 4. Cumulative chum salmon migration past the Snake River counting tower, Norton Sound, 1999.

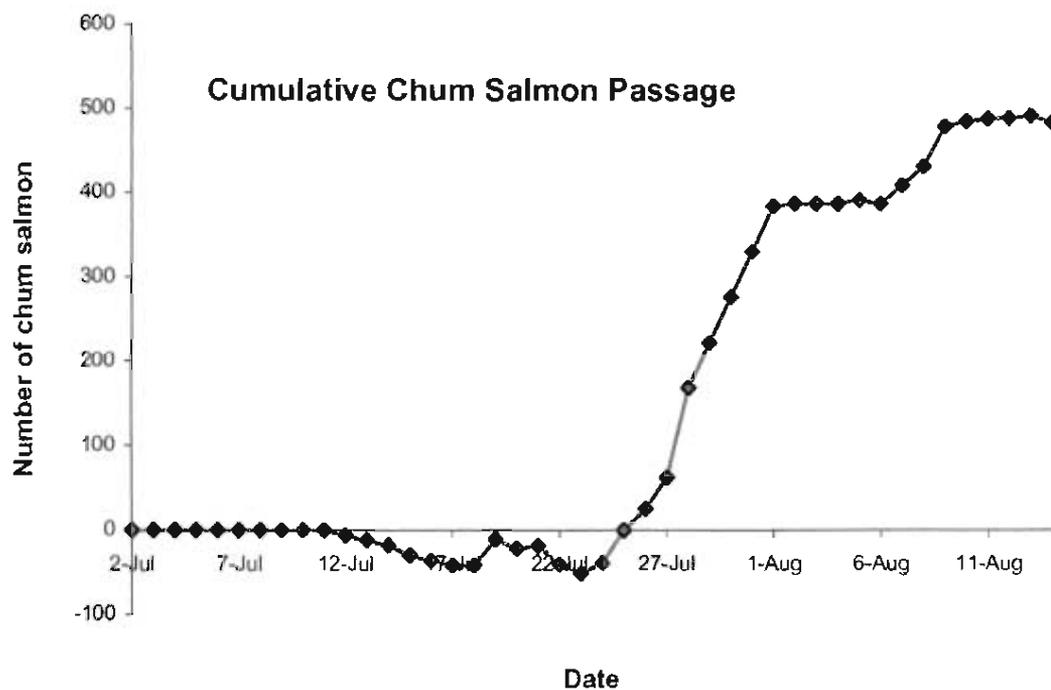


Figure 5. Daily pink salmon migration past the Snake River counting tower, Norton Sound, 1999.

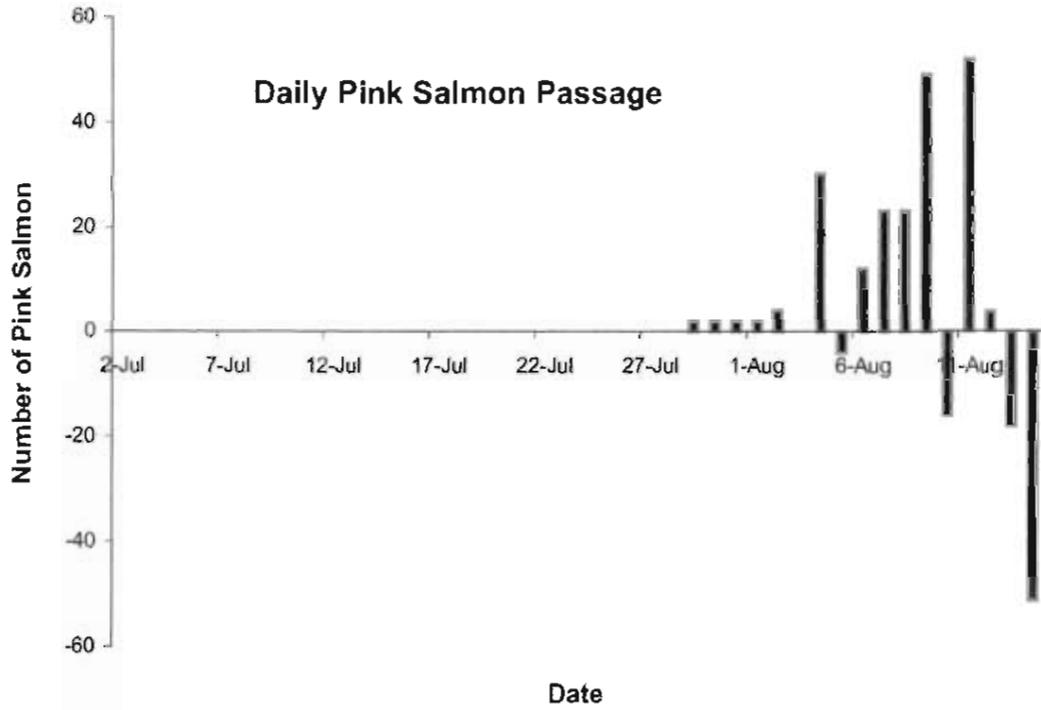


Figure 6. Cumulative pink salmon migration past the Snake River counting tower, Norton Sound, 1999.

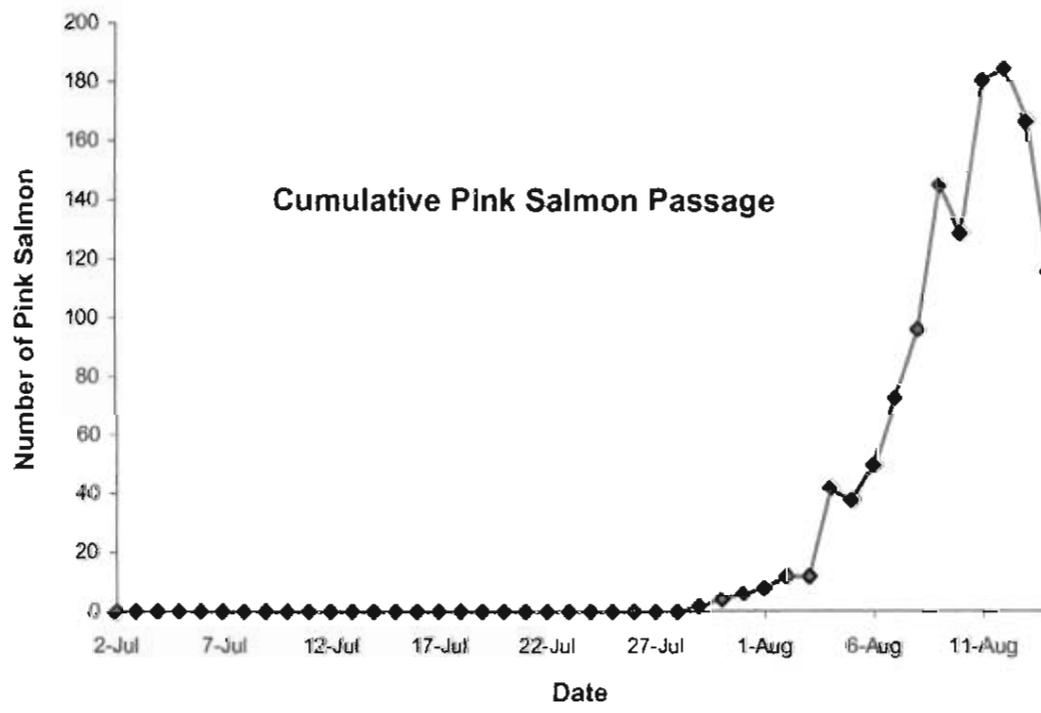


Figure 7. Daily coho salmon migration past the Snake River counting tower, Norton Sound, 1999.

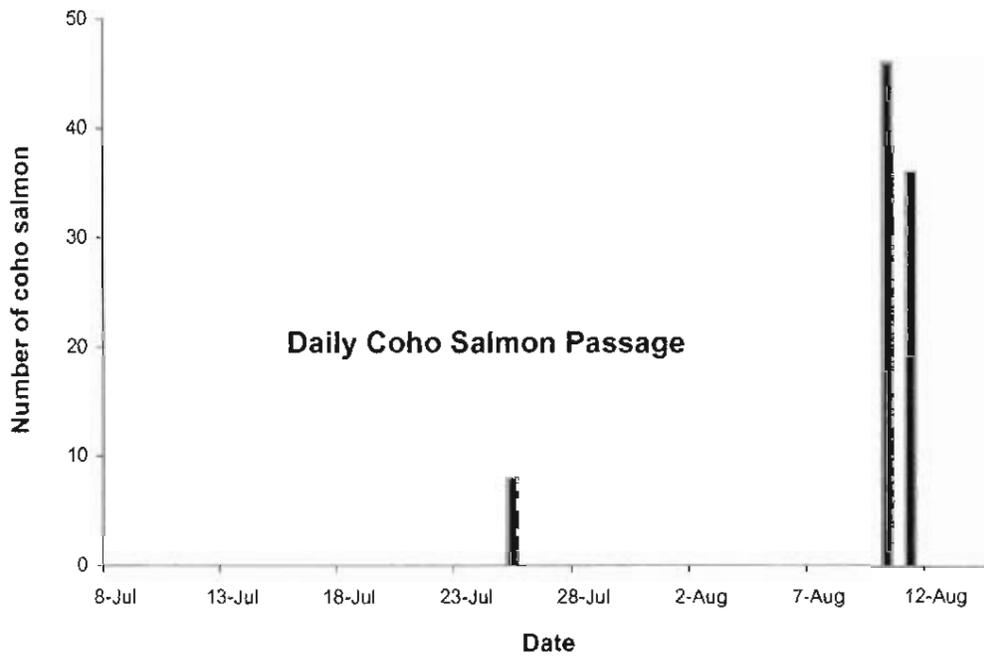


Figure 8. Cumulative coho salmon migration past the Snake River counting tower, Norton Sound, 1999.

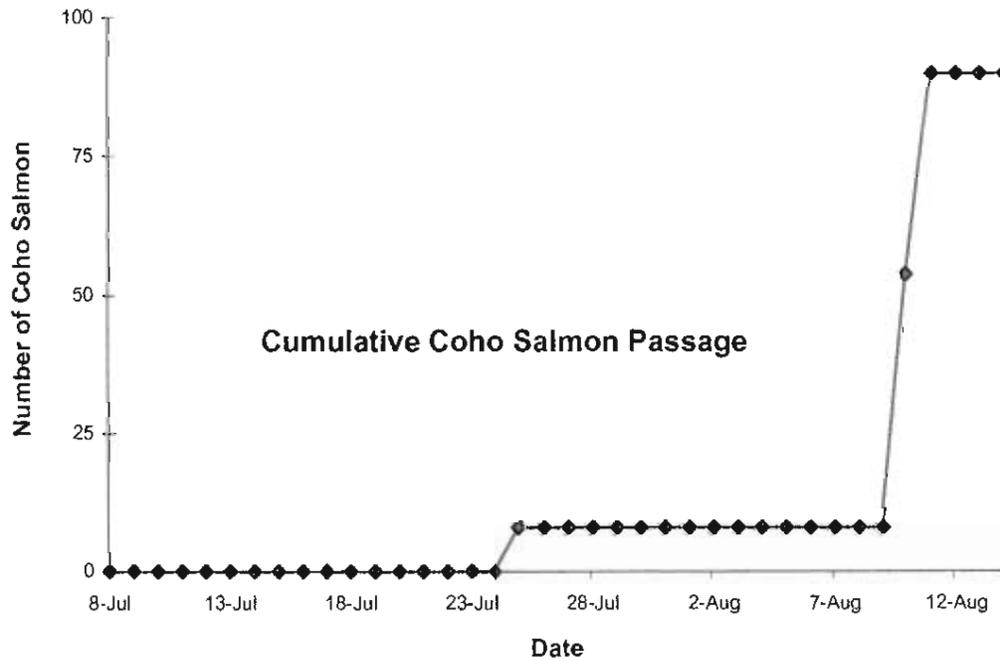


Figure 9. Diurnal pattern of chum salmon migration past the Snake River counting tower, Norton Sound, 1999.

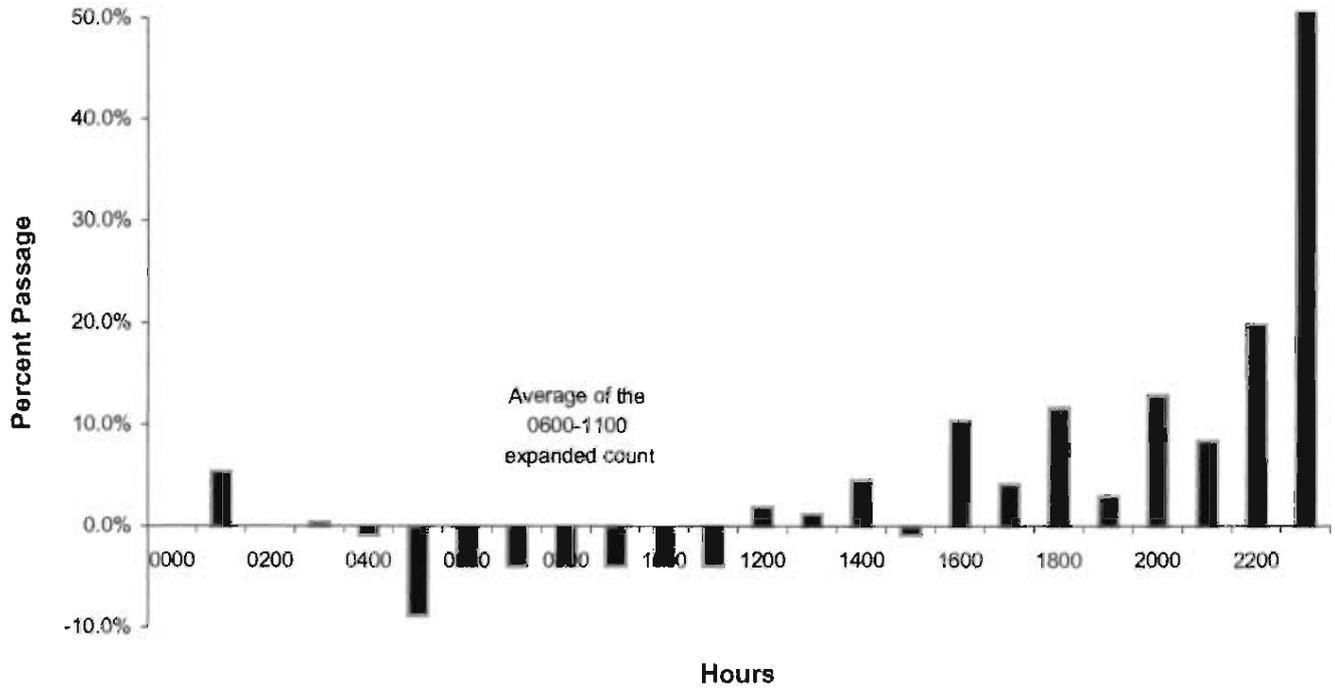


Figure 10. Diurnal pattern of pink salmon migration past the Snake River counting tower, Norton Sound, 1999.

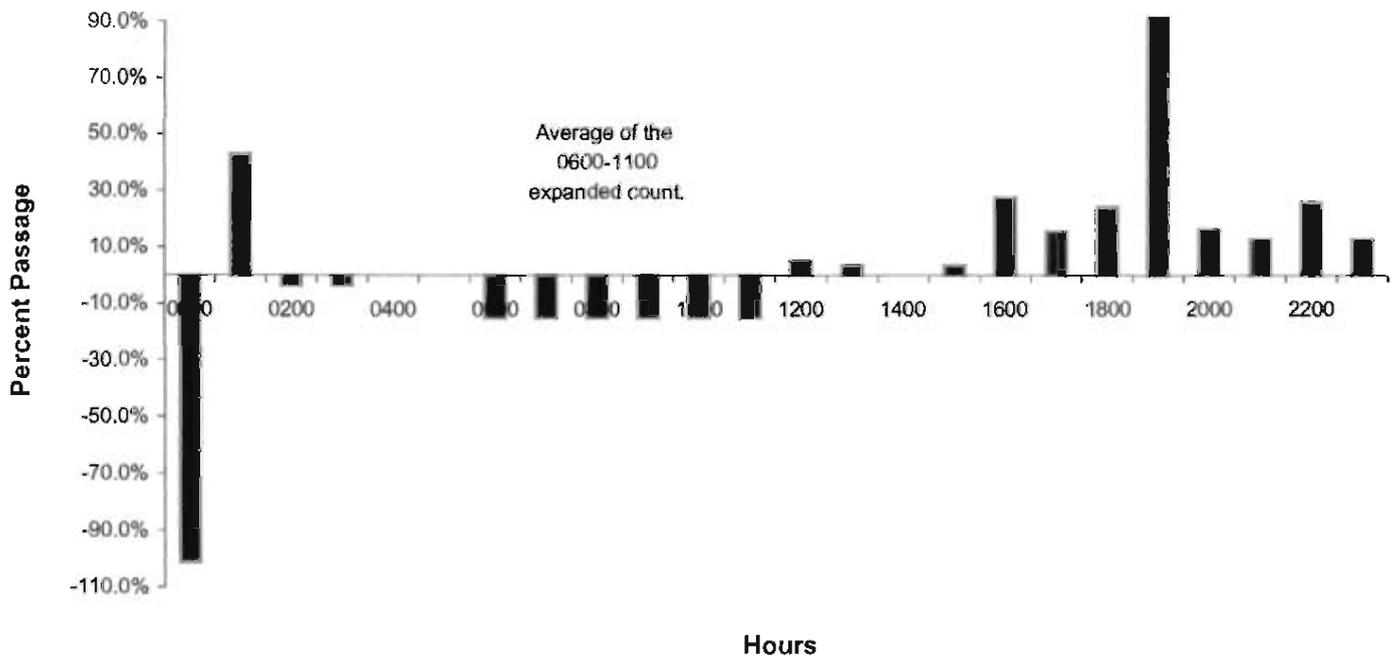


Figure 11. Diurnal pattern of coho salmon migration past the Snake River counting tower, Norton Sound, 1999.

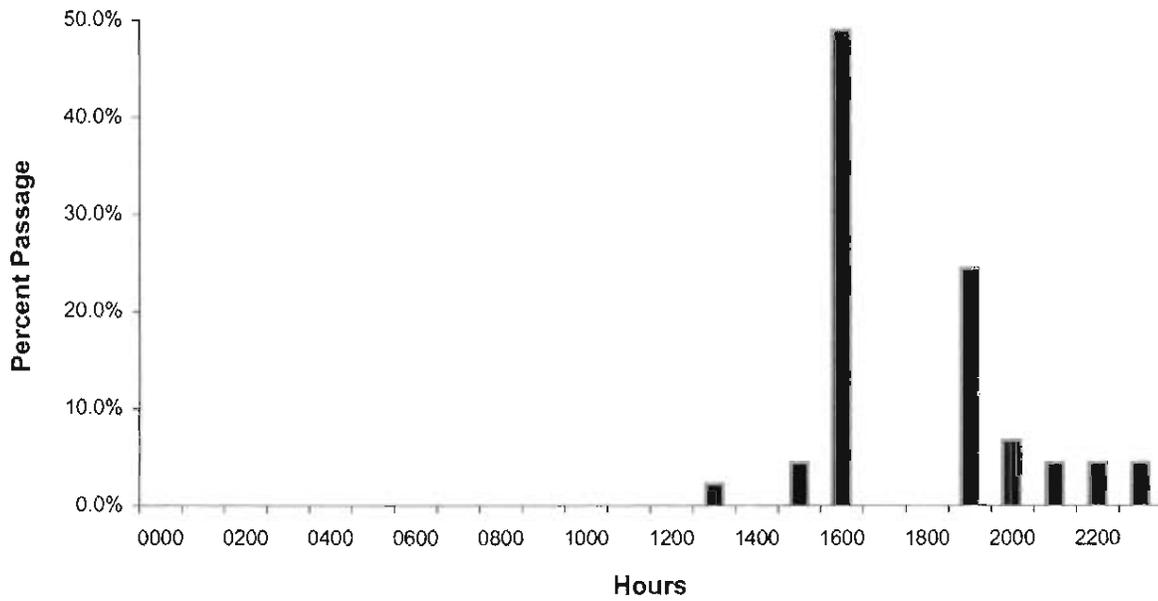


Figure 12. Chum salmon run-timing past the Snake River counting tower, Norton Sound, 1995-1999.

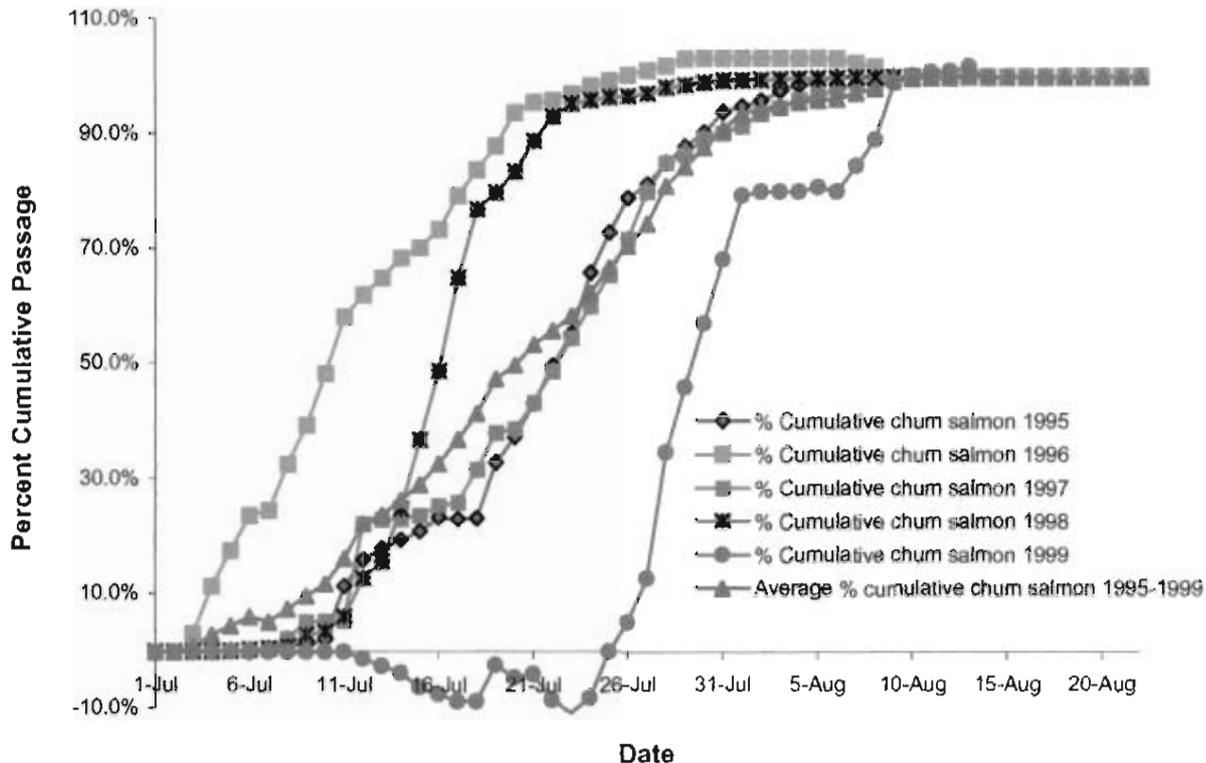


Figure 13. Pink salmon run-timing past the Snake River counting tower, Norton Sound, 1995-1999.

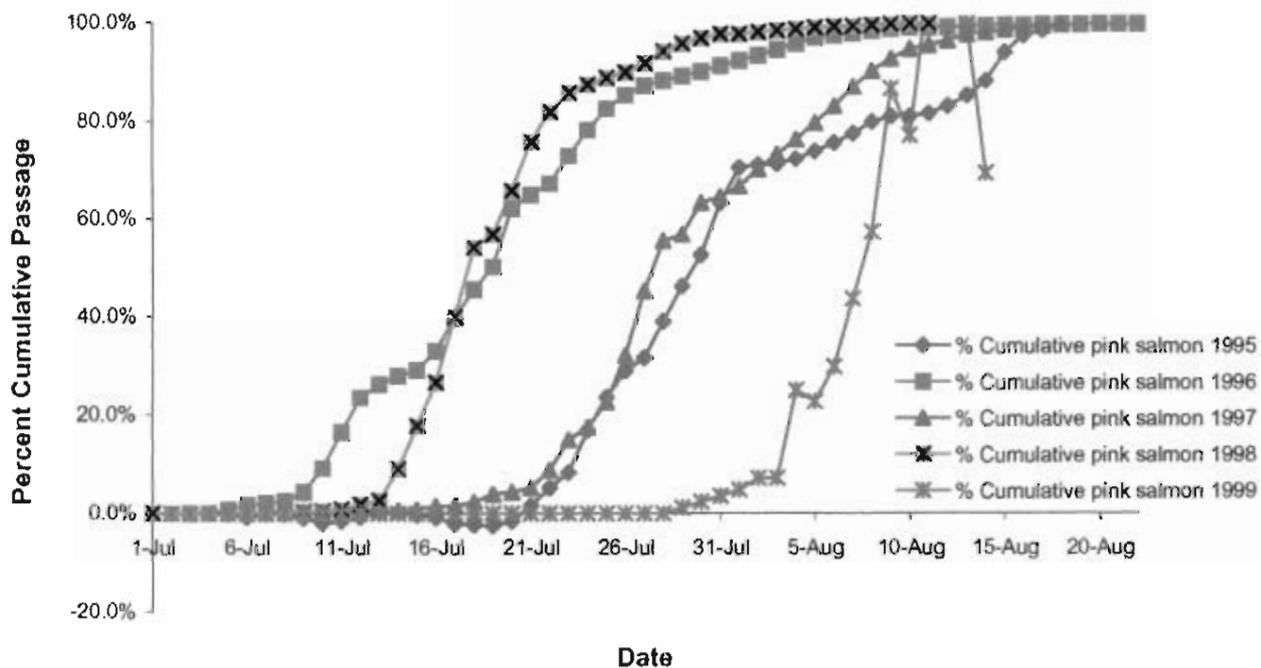


Figure 14. Coho salmon run-timing past the Snake River counting tower, Norton Sound, 1995-1999.

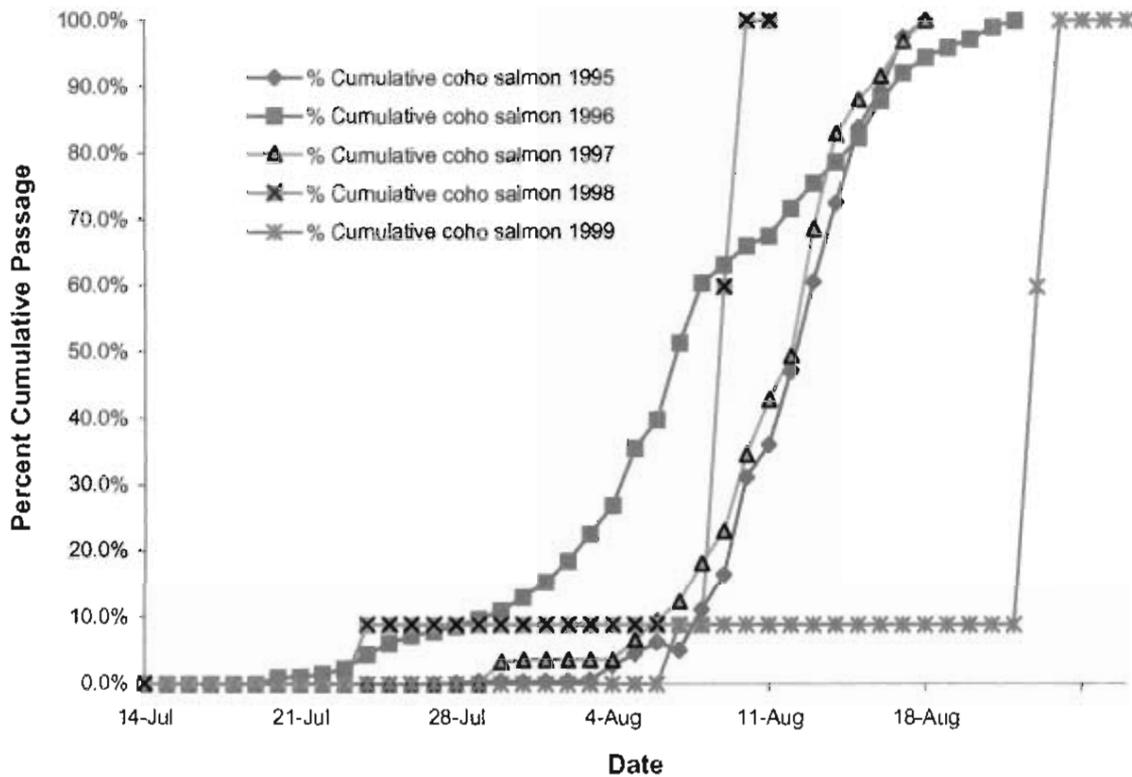


Figure 15. Cumulative chum salmon migration past the Snake River counting tower, Norton Sound, 1995-1999.

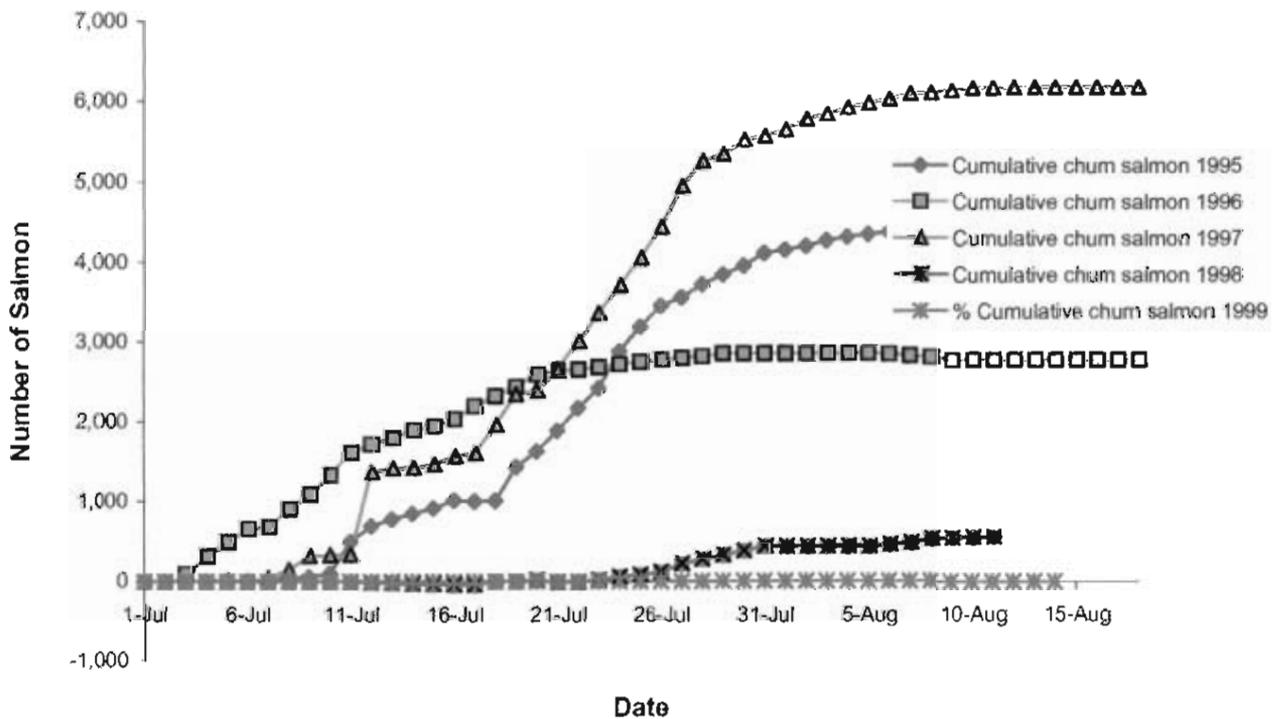


Figure 16. Cumulative odd year pink salmon migration past the Snake River counting tower, Norton Sound, 1995 - 1999.

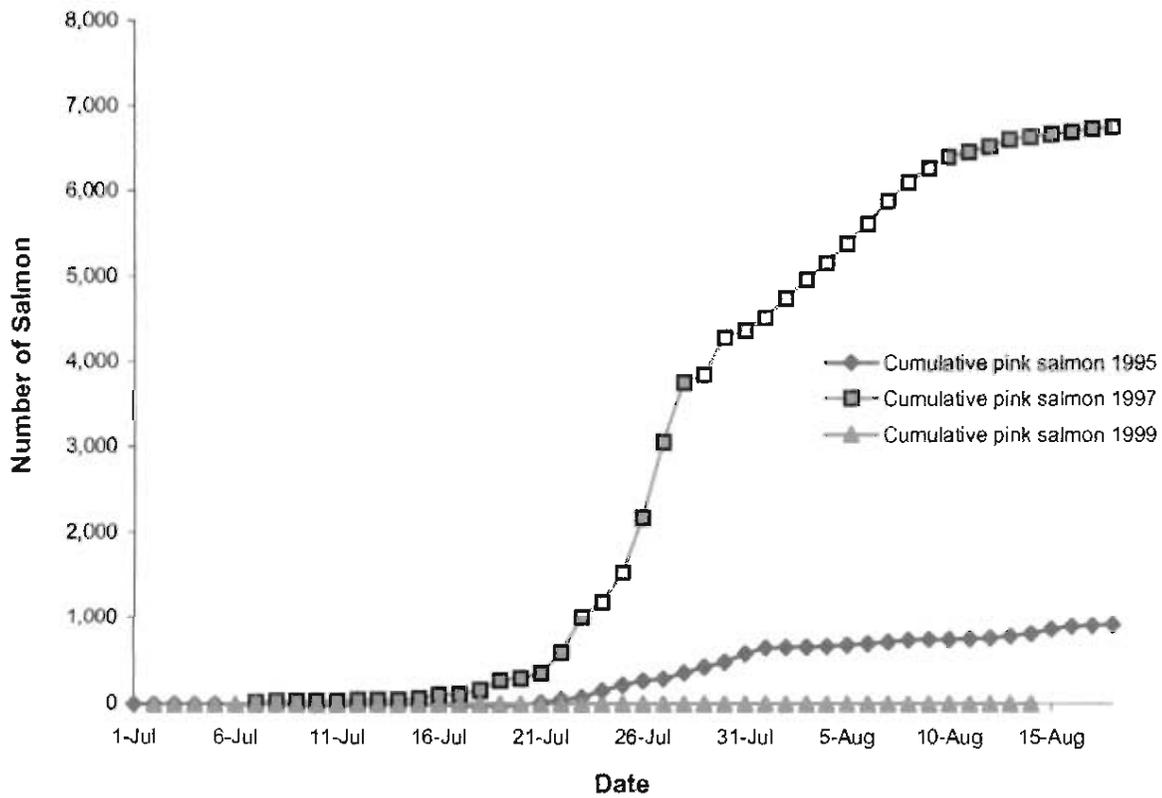


Figure 17. Cumulative even year pink salmon migration past the Snake River counting tower, Norton Sound, 1996 - 1998.

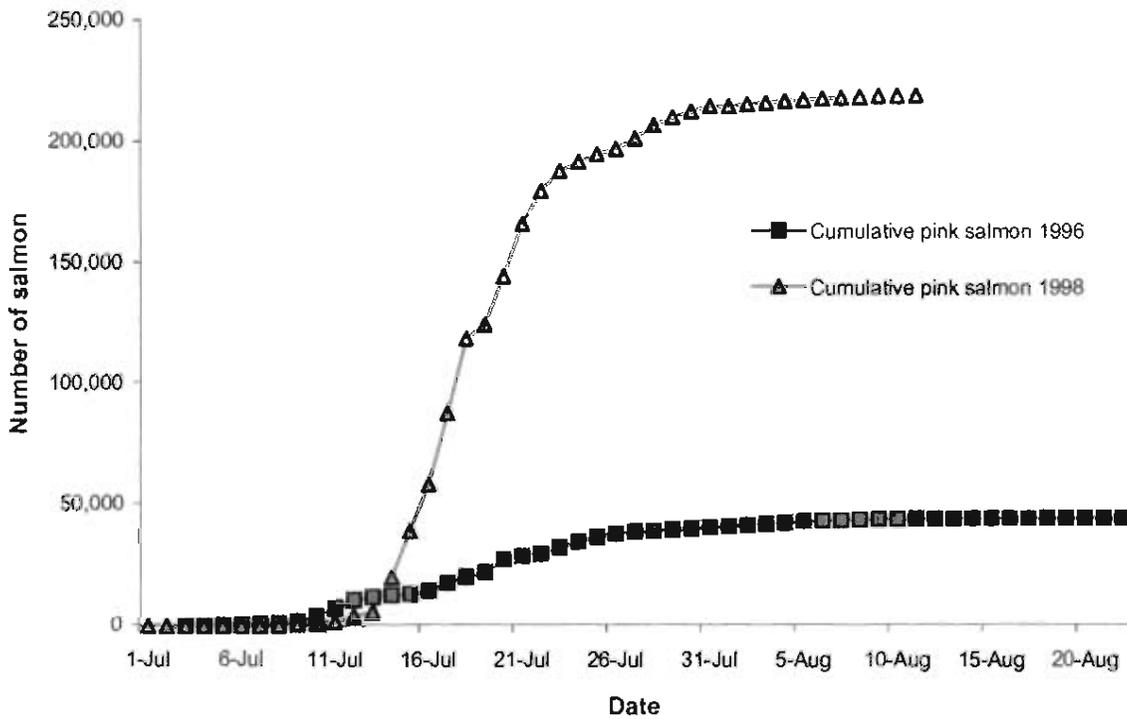


Figure 18. Cumulative coho salmon migration past the Snake River counting tower, Norton Sound, 1995-1999.

