

Eldorado River Salmon Counting Tower
Project Summary Report, 1999

by

Tom Kohler

Alaska Department of Fish & Game
Commercial Fisheries Division, AYK Region
333 Raspberry Road
Anchorage, Alaska 99518-1599

Regional Informational Report¹ No. 3A00-05

January 2000

¹The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate timely reporting of recently collected information, reports in this series undergo only limited internal review and may contain preliminary data; this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the author or the Commercial Fisheries Division.

This project was funded through a cooperative agreement between Kwarak Inc. and the Alaska Department of Fish and Game.

OFFICE OF EQUAL OPPORTUNITY (OEO) STATEMENT

The Alaska Department of Fish and Game conducts all programs and activities free from discrimination on the basis of sex, color, race, religion, national origin, age, marital status, pregnancy, parenthood or disability. For information on alternative formats available for this and other department publications, please contact the department ADA Coordinator at (voice) 907-465-4120, (TDD) 1-800-478-3648, or (fax) 907-586-6596. Any person who believes s/he has been discriminated against should write to: ADF&G, P.O. Box 25526, Juneau, AK 99802-5526; or O.E.O., U.S. Department of Interior, Washington, DC 20240.

TABLE OF CONTENTS

List of Tables.....	ii
List of Figures	iii
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 migration of all salmon species past the Eldorado River counting tower, Norton Sound, 1999	5
2.	Expanded daily hourly chum salmon migration past the Eldorado River counting tower, Norton Sound, 1999	6
3.	Expanded daily hourly pink salmon migration past the Eldorado River counting tower, Norton Sound, 1999	7
4.	Expanded daily hourly king salmon migration past the Eldorado River counting tower, Norton Sound, 1999	8
5.	Expanded daily hourly coho salmon migration past the Eldorado River counting tower, Norton Sound, 1999	9
6.	Reported hourly chum salmon observations at the Eldorado River counting tower, Norton Sound, 1999	10
7.	Reported hourly pink salmon observations at the Eldorado River counting tower, Norton Sound, 1999	11
8.	Reported hourly king salmon observations at the Eldorado River counting tower, Norton Sound, 1999	12
9.	Reported hourly coho salmon observations at the Eldorado River counting tower, Norton Sound, 1999	13

LIST OF FIGURES

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

<u>Figure</u>	<u>Page</u>
13. Diurnal pattern of king salmon past the Eldorado River counting tower, Norton Sound, 1999.....	21
14. Diurnal pattern of coho salmon migration past the Eldorado River counting tower, Norton Sound, 1999.....	21
15. Expanded cumulative migration of chum salmon past the Eldorado River counting tower, Norton Sound, 1995-1999.....	22
16. Expanded cumulative odd year migration of pink salmon past the Eldorado River counting tower, Norton Sound, 1995-1999.....	22
17. Expanded cumulative even year migration of pink salmon past the Eldorado River counting tower, Norton Sound, 1996-1998.....	23
18. Expanded cumulative migration of king salmon past the Eldorado River counting tower, Norton Sound, 1995-1999.....	23
19. Expanded cumulative migration of coho salmon past the Eldorado River counting tower, Norton Sound, 1995-1999.....	24

INTRODUCTION

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

The counting tower has successfully operated since 1995 (Rob 1995, 1997, 1998 and 1999). The 1999 season was the fifth year a salmon counting tower has been operated on the Eldorado River. The project is operated to obtain timely and accurate escapement information required for the active management of the salmon stocks throughout the season. The Eldorado River drains into Safety Sound approximately 14 miles east of Nome (Figure 1). Historically this drainage supports the largest escapements of chum salmon of the various streams in the Nome Subdistrict.

OBJECTIVES

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

METHODS

The Eldorado River counting tower camp is located on Sitnasuak Native Corporation land, just above the furthest upstream connecting channel to the Flambeau River. The camp is approximately 45 minutes by boat from the Safety Sound highway bridge.

A tent camp with two tent frames and an outhouse was set up at the end of June. A 15 foot high scaffolding tower was erected on the bank of the river to serve as an observation platform. A 50' x 8' 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. An array of four 120 volt lights was mounted on a post below the tower to illuminate the flash panel during periods of low light and darkness.

Counting began on 10 July and ended on 1 September. The counting schedule was 18 half-hour counts each day from 12 noon to 0600 hours the following day. A 24 hour count and one day off were scheduled weekly. The daily counts considered in this report run from 0000 hours to 2400 hours. The counts for each half hour shift were doubled to produce the reported hourly counts for each species. Each day the reported hourly counts were added to produce a daily unexpanded total. Every day, the daily and cumulative unexpanded totals for each species were relayed to the Nome office by radio.

The expanded counts for this report were calculated using the following methods. The 18 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 18 hours of the day off. Next an expansion factor was calculated to compensate for the 6 hours not normally counted. This factor was derived from the weekly 24 hour count by dividing the total count from 0600 hours to 1200 hours during the 24 hour count by the total normal 18 hour count during the 24 hour count. Then each 18 hour count for the remaining days was expanded to 24 hour counts by applying the expansion factor to the three days before and after each 24 hour count by multiplying each days 18 hour total by the 24 hour expansion factor, and adding that number to the 18 hour count for each day. This expansion was done for all species counted.

The expanded counts for the days missed were linearly interpolated as follows. For a day with the normal 18 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 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 18 hour count was expanded to a 24 hour count by multiplying each day's 18 hour total by the nearest 24 hour expansion factor, and adding that number to the 18 hour count for each day.¹

RESULTS

Table 1 shows the expanded daily and cumulative totals for each species. The reported total hourly counts were: 3,450 chum salmon, 544 pink salmon, 26 king salmon, and 342 coho salmon (Tables 6-9). The expanded counts were: 4,218 chum salmon, 977 pink salmon, 28 king salmon, and 510 coho salmon (Tables 2-5).

Chum salmon were observed on 10 July, the first day of counting. Pink salmon were first observed on 19 July. Coho salmon were first observed on 18 August. The daily peak count of 519 chum salmon occurred on 14 July; the daily peak count of 105 pink salmon occurred on 7 August; the daily peak count of 76 coho salmon occurred on 31 August (Table 1).

Most chum salmon returned during the three week period from 10 July through 25 July when 83% passed the tower, although smaller numbers were counted through August (Table 2 and Figures 3 and 4). Pink salmon returned from 19 July through 30 August with a peak date of 7 August. (Table 3 and Figures 5 and 6). Few king salmon were

¹ From Rob 1999

counted (Table 4 and Figures 7 and 8). All coho salmon counted returned during the last fifteen days of counting (Table 5 and Figures 9 and 10).

All species counted exhibited a diurnal pattern of migration past the counting tower. During the 14 hour period from 1400 through 0400 hours, 94% of the chum salmon passed the tower (Table 2 and Figure 11). During the 12 hour period from 1700 through 0500 hours, 94% of the pink salmon passed the tower (Table 3 and Figure 12). During the 14 hour period from 1300 through 0300 hours, 100% of the king salmon passed the tower (Table 4 and Figure 13). Ninety-six per cent of coho salmon passed the counting tower between 1900 and 0500 hours (Table 5 and Figure 14).

An aerial survey of the Eldorado River counted 1,741 chum salmon on 23 July, 1999. The total season expanded tower count of chum salmon was 4,218. The aerial survey counted 26% of the total season expanded tower count of chum salmon. The aerial survey counted 1,661 chum salmon above the counting tower on 23 July, when the cumulative tower count of chum salmon was 3,206. The aerial survey counted 52% of the cumulative tower count on 23 July (Table 1).

An aerial survey of the Eldorado River counted 6 pink salmon on 22 July, 1999. The total season expanded tower count of pink salmon was 977. The aerial survey counted 6% of the total season expanded tower count of pink salmon. The aerial survey counted 0 pink salmon above the counting tower on 23 July, when the cumulative tower count of pink salmon was 100.

DISCUSSION

This was the fifth consecutive year of operation for the Eldorado River counting tower. The 1999 escapement of chum salmon was the latest and weakest since the project began in 1995. The size of the 1995 escapement was three times larger than in 1996, 1997 and 1998 (Figure 15). The 1999 escapement of pink salmon was very similar to that of its parent year 1997 (Figure 16). The even year escapement of pink salmon in 1998 was 2 percent of its parent year 1996 (Figure 17). The 1999 escapement of king salmon was about the same as in 1998 (Figure 18). The 1997 escapement of coho salmon began eleven days earlier than in 1995, 1996 and 1998. The 1999 coho salmon escapement was the latest on record (Figure 19).

The value of a counting tower on this watershed is evident. The chum salmon escapement documented from 1995 to the present shows the relative importance of the Eldorado and Flambeau watersheds to the various salmon user groups in the Nome Subdistrict. The Eldorado tower provided fishery managers a valuable tool for assessing the salmon returns to the Safety Sound watersheds.

It is recommended that if funding is available the project should start yet another week earlier to more fully count chum, pink and king salmon, and if additional funding is available should remain in operation three weeks later to more fully count coho salmon.

ACKNOWLEDGEMENTS

The ADF&G thanks Kawerak Corporation for operating this project and in particular the tower crew who operated the tower. A draft of this report was reviewed by Larry Buklis.

LITERATURE CITED

- Rob, Peter J. 1995. Eldorado River Counting Tower. A cooperative project funded by Sitnasuak Native Corporation. Project Summary Report, 1995. Alaska Department of Fish & Game, Commercial Fisheries Management and Development Division, Nome.
- Rob, Peter J. 1997. Eldorado River Salmon Counting Tower Project Summary Report, 1996. Regional Information Report 3A97-06. Alaska Department of Fish & Game, Commercial Fisheries Management and Development Division, Anchorage.
- Rob, Peter J. 1998. Eldorado River Salmon Counting Tower Project Summary Report, 1997. Regional Information Report 3A98-01. Alaska Department of Fish & Game, Commercial Fisheries Management and Development Division, Anchorage.
- Rob, Peter J. 1999. Eldorado River Salmon Counting Tower Project Summary Report, 1998. Regional Information Report 3A99-04. Alaska Department of Fish & Game, Commercial Fisheries Management and Development Division, Anchorage.

Table 1. Expanded daily and cumulative migration of all salmon species past the Eldorado River counting tower, Norton Sound, 1999.

Date	Chum	Cumulative Chum	Pink	Cumulative Pink	King	Cumulative King	Coho	Cumulative Coho
10-Jul	32	32	0	0	0	0	0	0
11-Jul	107	139	0	0	0	0	0	0
12-Jul	83	222	0	0	0	0	0	0
13-Jul	119	341	0	0	0	0	0	0
14-Jul	519	860	0	0	0	0	0	0
15-Jul	226	1,086	0	0	4	4	0	0
16-Jul	232	1,318	0	0	1	5	0	0
17-Jul	155	1,473	0	0	0	5	0	0
18-Jul	258	1,731	0	0	0	5	0	0
19-Jul	404	2,135	34	34	4	9	0	0
20-Jul	202	2,337	50	84	2	11	0	0
21-Jul	316	2,653	10	94	4	15	0	0
22-Jul	260	2,913	4	98	0	15	0	0
23-Jul	293	3,206	2	100	2	17	0	0
24-Jul	193	3,399	5	105	1	18	0	0
25-Jul	108	3,507	10	115	0	18	0	0
26-Jul	34	3,541	2	117	0	18	0	0
27-Jul	27	3,568	14	131	0	18	0	0
28-Jul	55	3,623	2	133	0	18	0	0
29-Jul	42	3,665	14	147	0	18	0	0
30-Jul	28	3,693	15	162	0	18	0	0
31-Jul	22	3,715	11	173	0	18	0	0
1-Aug	22	3,737	11	184	0	18	0	0
2-Aug	22	3,759	11	195	0	18	0	0
3-Aug	19	3,778	14	209	0	18	0	0
4-Aug	4	3,782	28	237	0	18	0	0
5-Aug	24	3,806	43	280	0	18	0	0
6-Aug	30	3,836	65	345	0	18	0	0
7-Aug	32	3,868	105	450	0	18	0	0
8-Aug	16	3,884	21	471	2	20	0	0
9-Aug	40	3,924	39	510	0	20	0	0
10-Aug	44	3,968	39	549	2	22	0	0
11-Aug	100	4,068	57	606	2	24	0	0
12-Aug	12	4,080	12	618	4	28	0	0
13-Aug	14	4,094	21	639	0	28	0	0
14-Aug	14	4,108	24	663	0	28	0	0
15-Aug	14	4,122	24	687	0	28	0	0
16-Aug	14	4,136	24	711	0	28	0	0
17-Aug	10	4,146	23	734	0	28	0	0
18-Aug	11	4,157	19	753	0	28	2	2
19-Aug	8	4,165	13	766	0	28	26	28
20-Aug	3	4,168	15	781	0	28	38	66
21-Aug	6	4,174	37	818	0	28	56	122
22-Aug	4	4,178	14	832	0	28	26	148
23-Aug	1	4,179	33	865	0	28	44	192
24-Aug	6	4,185	42	907	0	28	46	238
25-Aug	24	4,209	40	947	0	28	30	268
26-Aug	4	4,213	4	951	0	28	30	298
27-Aug	2	4,215	8	959	0	28	25	323
28-Aug	2	4,217	8	967	0	28	25	348
29-Aug	1	4,218	4	971	0	28	18	366
30-Aug	0	4,218	6	977	0	28	14	380
31-Aug	0	4,218	0	977	0	28	76	456
1-Sep	0	4,218	0	977	0	28	54	510

Table 2. Expanded daily hourly chum salmon migration past the Eldorado 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	
10-Jul	Start of the counting season							0	0	0	0	0	0	12	4	2	0	2	4	0	32	0.8%
11-Jul	4	8	6	12	8	0	1	0	0	0	0	0	0	0	0	0	4	4	0	60	107	2.5%
12-Jul	0	16	70	2	-2	-6	1	0	0	0	0	0	0	0	0	0	0	0	0	2	83	2.0%
13-Jul	18	28	62	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	10	0	119	2.8%
14-Jul	22	44	44	74	0	0	5	0	0	0	0	0	0	272	58	0	0	0	0	0	519	12.3%
15-Jul	0	22	118	50	24	0	2	0	2	0	0	0	0	0	0	0	0	0	10	0	226	5.4%
16-Jul	0	70	30	94	8	0	2	0	1	0	0	0	0	0	0	0	0	5	19	3	232	5.5%
17-Jul	6	38	15	47	4	0	1	0	0	0	0	0	0	0	0	0	0	10	28	6	155	3.7%
18-Jul	12	6	0	0	0	0	2	6	74	0	0	2	70	0	0	22	64	0	0	0	258	6.1%
19-Jul	22	84	66	18	16	10	0	0	6	0	24	4	46	84	4	10	0	0	10	0	404	9.8%
20-Jul	20	24	8	4	0	0	0	0	0	14	10	28	10	8	12	28	32	0	4	0	202	4.8%
21-Jul	26	58	48	24	20	6	0	0	0	0	0	18	0	30	8	12	18	12	32	0	316	7.5%
22-Jul	6	0	10	6	0	0	0	0	0	0	228	0	0	0	0	4	0	0	0	6	260	6.2%
23-Jul	46	30	38	12	0	0	0	0	0	2	115	0	4	0	3	2	13	25	3	0	293	6.9%
24-Jul	36	26	25	6	4	0	0	0	0	4	2	0	8	0	6	0	26	50	0	0	193	4.6%
25-Jul	26	22	12	0	8	0	0	4	0	0	0	0	0	0	0	0	8	10	18	0	108	2.6%
26-Jul	4	8	0	10	0	4	2	0	4	0	0	0	0	0	0	0	0	0	2	0	34	0.8%
27-Jul	8	4	0	10	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	27	0.6%
28-Jul	0	0	4	0	2	0	3	4	36	0	0	0	0	0	2	0	0	4	0	0	55	1.3%
29-Jul	12	0	6	0	4	0	2	0	2	4	2	2	0	0	0	0	0	0	8	0	42	1.0%
30-Jul	4	2	0	0	6	0	1	0	1	4	2	1	0	1	0	0	2	4	0	0	28	0.7%
31-Jul	2	1	0	0	3	0	1	0	1	4	2	1	0	1	0	0	2	4	0	0	22	0.5%
1-Aug	2	1	0	0	3	0	1	0	1	4	2	1	0	1	0	0	2	4	0	0	22	0.5%
2-Aug	2	1	0	0	3	0	1	0	1	4	2	1	0	1	0	0	2	4	0	0	22	0.5%
3-Aug	2	1	0	0	3	0	1	0	0	4	2	0	0	2	0	0	4	0	0	0	19	0.5%
4-Aug	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	4	0.1%
5-Aug	1	0	2	0	4	0	12	0	0	1	1	0	0	0	0	2	0	1	0	0	24	0.6%
6-Aug	1	0	2	0	4	0	15	0	0	1	1	0	0	0	0	4	0	2	0	0	30	0.7%
7-Aug	2	0	4	0	8	0	19	0	0	0	0	2	2	-4	0	0	0	2	0	0	32	0.8%
8-Aug	0	-6	4	-4	6	-4	8	0	0	0	0	0	0	0	12	0	0	0	0	0	16	0.4%
9-Aug	0	4	8	0	4	2	20	0	0	0	0	0	0	0	0	0	2	0	0	0	40	0.9%
10-Aug	2	0	4	8	0	0	22	0	0	0	0	4	0	2	0	-4	6	0	0	0	44	1.0%
11-Aug	4	10	12	0	4	4	50	0	6	0	0	4	0	0	2	0	0	4	0	0	100	2.4%
12-Aug	0	6	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0.3%
13-Aug	2	0	0	0	2	0	7	0	0	0	0	0	0	0	0	0	0	3	0	0	14	0.3%
14-Aug	1	0	2	0	1	0	7	0	0	0	0	0	0	0	0	0	0	3	0	0	14	0.3%
15-Aug	1	0	2	0	1	0	7	0	0	0	0	0	0	0	0	0	0	3	0	0	14	0.3%
16-Aug	1	0	2	0	1	0	7	0	0	0	0	0	0	0	0	0	0	3	0	0	14	0.3%
17-Aug	1	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	10	0.2%
18-Aug	0	0	4	0	0	0	0	0	0	0	4	0	0	0	0	0	0	3	0	0	11	0.3%
19-Aug	0	0	3	0	0	0	0	0	0	0	2	0	0	0	0	0	0	3	0	0	8	0.2%
20-Aug	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0.1%
21-Aug	0	0	2	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	6	0.1%
22-Aug	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	4	0.1%
23-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0.0%
24-Aug	0	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0.1%
25-Aug	0	2	4	4	2	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	24	0.6%
26-Aug	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.1%
27-Aug	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.0%
28-Aug	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.0%
29-Aug	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.0%
30-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
31-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
1-Sep	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Total	296	511	625	381	163	16	221	14	135	48	401	82	196	406	99	100	190	235	159	4,218	100%	
	7.0%	12.1%	14.8%	9.0%	3.9%	0.4%	5.2%	0.3%	3.2%	1.1%	9.5%	1.5%	3.7%	9.6%	2.3%	2.4%	4.5%	5.6%	3.8%	100.0%		

Table 3. Expanded daily hourly pink salmon migration past the Eldorado 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				
10-Jul	Start of the counting season							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%		
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%		
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%		
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%		
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%		
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%		
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%		
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%		
19-Jul	0	12	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	3.5%	
20-Jul	10	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	50	5.1%	
21-Jul	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	1.0%	
22-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	4	0.4%	
23-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0.2%	
24-Jul	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0.5%	
25-Jul	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	1.0%	
26-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.2%	
27-Jul	4	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	1.4%	
28-Jul	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.2%	
29-Jul	4	0	2	0	2	2	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	14	1.4%	
30-Jul	4	0	0	0	4	0	0	0	0	0	0	2	0	2	0	0	0	3	0	0	0	0	15	1.5%	
31-Jul	2	0	0	0	2	0	0	0	0	0	0	2	0	2	0	0	0	3	0	0	0	0	11	1.1%	
1-Aug	2	0	0	0	2	0	0	0	0	0	0	2	0	2	0	0	0	3	0	0	0	0	11	1.1%	
2-Aug	2	0	0	0	2	0	0	0	0	0	0	2	0	2	0	0	0	3	0	0	0	0	11	1.1%	
3-Aug	2	0	0	0	2	0	0	0	0	0	0	0	0	4	0	0	0	6	0	0	0	0	14	1.4%	
4-Aug	0	0	0	0	0	0	0	0	0	0	0	5	0	5	0	0	0	0	0	0	0	0	28	2.9%	
5-Aug	5	6	3	2	0	2	0	0	3	0	0	5	4	3	0	0	0	7	3	0	0	0	43	4.4%	
6-Aug	5	6	3	2	0	2	22	0	0	3	0	0	4	0	4	0	0	0	8	0	0	0	65	6.7%	
7-Aug	10	12	8	4	0	4	35	0	0	0	0	0	4	2	10	4	0	14	0	0	0	0	105	10.7%	
8-Aug	0	0	5	0	4	0	7	0	0	0	0	0	0	0	9	2	0	0	0	0	0	0	21	2.1%	
9-Aug	6	8	4	8	0	0	19	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	39	4.0%	
10-Aug	8	4	0	2	0	0	12	0	0	0	0	0	6	0	0	4	0	0	2	0	0	0	39	4.0%	
11-Aug	4	6	5	4	0	4	15	0	0	0	5	2	0	0	0	0	4	0	0	0	0	0	57	5.8%	
12-Aug	4	4	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	1.2%	
13-Aug	0	5	2	-4	2	4	7	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	21	2.1%	
14-Aug	3	4	1	-1	1	4	5	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	24	2.5%	
15-Aug	3	4	1	-1	1	4	5	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	24	2.5%	
16-Aug	3	4	1	-1	1	4	5	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	24	2.5%	
17-Aug	3	4	1	-1	1	4	5	0	0	4	0	0	0	0	4	0	0	0	0	0	0	0	23	2.4%	
18-Aug	6	2	0	2	0	4	3	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	19	1.9%	
19-Aug	3	1	0	1	0	2	2	0	0	0	1	0	0	0	1	2	0	0	0	0	0	0	13	1.3%	
20-Aug	3	1	0	1	0	2	2	0	0	0	0	0	0	0	2	4	0	0	0	0	0	0	15	1.5%	
21-Aug	0	0	0	0	0	0	5	0	0	0	0	0	0	0	4	0	4	2	22	0	0	0	37	3.8%	
22-Aug	0	0	0	4	0	2	2	0	0	0	0	0	0	0	0	2	0	4	0	0	0	0	14	1.4%	
23-Aug	4	0	5	0	4	0	5	0	0	0	0	3	0	0	2	1	0	4	2	0	0	0	33	3.4%	
24-Aug	2	3	6	2	2	3	9	0	0	0	0	6	0	0	4	0	0	4	4	0	0	0	42	4.3%	
25-Aug	0	6	4	4	0	6	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	4.1%	
26-Aug	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.4%	
27-Aug	0	3	1	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0.8%	
28-Aug	0	3	1	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0.8%	
29-Aug	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.4%	
30-Aug	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0.6%	
31-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%
1-Sep	0	0	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	117	138	97	36	30	53	202	0	0	24	11	23	25	26	44	35	26	49	41	977	100%				
	12.0%	14.1%	9.9%	3.7%	3.1%	5.4%	20.7%	0.0%	0.0%	2.5%	1.1%	2.4%	2.6%	2.7%	4.5%	3.6%	2.7%	5.0%	4.2%						

Table 4. Expanded daily hourly king salmon migration past the Eldorado 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	
10-Jul	Start of the counting season																				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%
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%
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%
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%
15-Jul	0	0	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	4	14.3%
16-Jul	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	3.6%
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%
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%
19-Jul	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	4	14.3%
20-Jul	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2	7.1%
21-Jul	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	14.3%
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%
23-Jul	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	7.1%
24-Jul	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3.6%
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%
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%
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%
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%
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%
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%
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%
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%
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%
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%
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%
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%
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%
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%
8-Aug	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2	7.1%
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%
10-Aug	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	7.1%
11-Aug	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	7.1%
12-Aug	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	14.3%
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%
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%
15-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
16-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
17-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
18-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
19-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
20-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
21-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
22-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
23-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
24-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
25-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
26-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
27-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
28-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
29-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
30-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
31-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
1-Sep	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Total	2	3	10	2	0	0	0	0	3	2	0	0	2	4	0	0	0	0	0	0	28	100%
	7.1%	10.7%	35.7%	7.1%	0.0%	0.0%	0.0%	0.0%	10.7%	7.1%	0.0%	0.0%	7.1%	14.3%	0.0%	0.0%	0.0%	0.0%	0.0%			

Table 5. Expanded daily hourly coho salmon migration past the Eldorado 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	Total		
10-Jul	Start of the counting season							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%	
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%	
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%	
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%	
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	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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
10-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	
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%	
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%	
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%	
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%	
15-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	
16-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	
17-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	
18-Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	
19-Aug	0	0	4	2	4	3	2	0	0	0	0	0	0	0	0	7	2	1	1	26	5.1%		
20-Aug	0	0	4	2	4	3	3	0	0	0	0	0	0	0	0	14	4	2	2	38	7.5%		
21-Aug	0	0	8	4	8	6	4	0	0	0	0	0	0	0	6	2	8	0	10	56	11.0%		
22-Aug	0	4	2	8	0	4	2	0	0	0	0	0	0	0	0	0	0	0	0	26	5.1%		
23-Aug	4	8	12	0	6	0	3	0	0	0	0	0	0	0	0	0	2	2	0	44	8.6%		
24-Aug	2	7	8	6	3	0	4	0	0	0	0	0	0	0	0	0	4	4	8	46	9.0%		
25-Aug	0	6	4	12	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	30	5.9%		
26-Aug	0	4	2	8	0	0	8	0	0	0	0	0	0	0	0	0	0	4	4	30	5.9%		
27-Aug	0	5	3	8	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	25	4.9%		
28-Aug	0	5	3	8	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	25	4.9%		
29-Aug	0	5	2	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	3.5%		
30-Aug	0	6	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	2.7%		
31-Aug	8	0	4	0	0	0	0	0	0	0	0	2	0	0	26	0	4	32	0	76	14.9%		
1-Sep	16	0	12	8	0	0	0	0	0	0	0	0	0	0	0	14	4	0	0	54	10.6%		
Total	39	50	73	72	25	16	48	0	0	0	9	0	2	0	32	37	28	52	45	510	100.0%		
	5.8%	9.8%	14.3%	14.1%	4.9%	3.1%	9.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%	6.3%	7.3%	5.5%	10.2%	8.8%				

Table 6. Reported hourly chum salmon observations at the Eldorado River counting tower, Norton Sound, 1999.

Outlined areas indicate hours not counted																								Total	% of Total							
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						
10-Jul																			12	4	2	0	2	4	8	32	0.9%					
11-Jul	4	8	6	12	8	0	Start of the counting season										0	0	0	0	0	0	0	4	4	0	60	196	3.1%			
12-Jul	0	16	70	2	-2	-4											0	0	0	0	0	0	0	0	0	0	2	82	2.4%			
13-Jul	18	28	62	0	0	0											0	0	0	0	0	0	0	0	0	0	10	0	118	3.4%		
14-Jul	22	44	44	74	0	0											0	0	0	0	0	0	272	58	0	0	0	0	514	14.9%		
15-Jul	0	22	116	50	24	0											0	2	8	0	0	0	0	0	0	0	10	0	228	6.6%		
16-Jul	0	70	30	94	8	0											0	0	0	0	0	0	0	0	0	10	28	6	202	5.8%		
17-Jul																	0	0	0	0	0	0	0	0	0	10	28	6	44	1.3%		
18-Jul	12	6	0	0	0	0											8	74	0	0	2	70	0	0	22	64	0	0	256	7.4%		
19-Jul	22	64	66	18	16	10											0	8	0	24	4	46	84	4	10	0	0	10	404	11.7%		
20-Jul	20	24	8	4	0	0											0	0	14	10	28	10	8	12	28	32	0	4	202	5.9%		
21-Jul	28	58	48	24	26	6											0	0	0	0	18	0	30	8	12	18	12	32	318	9.2%		
22-Jul	6	0	10	6	0	0											0	0	0	0	0	0	0	0	0	4	0	0	6	260	7.5%	
23-Jul	46	30	38	12	0	0											0	0	0	0	0	0	0	0	0	0	0	0	0	126	3.7%	
24-Jul																	0	0	4	2	0	8	0	6	0	26	50	0	96	2.8%		
25-Jul	28	22	12	0	8	0											4	0	0	0	0	0	0	0	0	0	8	10	18	108	3.1%	
26-Jul	4	8	0	10	0	4											0	4	0	0	0	0	0	0	0	0	0	0	2	32	0.9%	
27-Jul	8	4	0	10	4	0											0	0	0	0	0	0	0	0	0	0	0	0	0	26	0.8%	
28-Jul	0	0	4	0	2	0											4	36	0	0	0	0	0	0	2	0	0	4	0	52	1.5%	
29-Jul	12	0	6	0	4	0											0	0	0	0	0	2	0	0	0	0	0	8	0	42	1.2%	
30-Jul	4	2	0	0	6	0											0	2	4	2	2	0	0	0	0	0	0	0	0	12	0.3%	
31-Jul																															0	0.0%
1-Aug																															0	0.0%
2-Aug																															0	0.0%
3-Aug																	0	0	4	2	0	0	2	0	0	4	0	0	0	12	0.3%	
4-Aug	0	0	0	0	0	0											0	0	2	2	0	0	0	0	0	0	0	0	0	4	0.1%	
5-Aug																															0	0.0%
6-Aug																															6	0.2%
7-Aug	2	0	4	0	8	0											0	0	0	0	0	2	2	-4	0	0	0	2	16	0.5%		
8-Aug	0	-6	4	-4	8	-4											0	0	0	0	0	0	0	0	12	0	0	0	8	0.2%		
9-Aug	0	4	8	0	4	2											0	0	0	0	0	0	0	0	0	0	2	0	20	0.6%		
10-Aug	2	0	4	8	0	0											0	0	0	0	0	4	0	2	0	-4	6	0	22	0.6%		
11-Aug	4	10	12	0	4	4											0	6	0	0	4	0	0	2	0	0	4	0	50	1.4%		
12-Aug	0	8	0	0	0	0											0	0	0	0	0	0	0	0	0	0	0	0	0	12	0.3%	
13-Aug	2	0	0	0	2	0																									4	0.1%
14-Aug																															0	0.0%
15-Aug																															0	0.0%
16-Aug																															0	0.0%
17-Aug																	0	0	0	0	0	0	0	0	0	0	0	8	0	8	0.2%	
18-Aug	0	0	4	0	0	0											0	0	0	4	0	0	0	0	0	0	0	0	0	4	0.1%	
19-Aug																															0	0.0%
20-Aug																	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	
21-Aug	0	0	2	0	0	0											0	0	0	0	0	0	0	0	4	0	0	0	0	6	0.2%	
22-Aug	0	0	0	2	0	0											0	0	0	0	0	0	0	0	0	0	0	0	2	4	0.1%	
23-Aug	0	0	0	0	0	0																									0	0.0%
24-Aug																	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	
25-Aug	0	2	4	4	2	0											0	0	0	0	0	0	0	0	0	0	0	0	0	12	0.3%	
26-Aug	0	0	2	0	0	0											0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.1%	
27-Aug																															0	0.0%
28-Aug																															0	0.0%
29-Aug																															0	0.0%
30-Aug	9	9	0	0	0	0											0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	
31-Aug	9	0	0	0	0	0											0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	
1-Sep	3	0	0	0	0	0											0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	
Total	249	442	592	328	130	16	0	2	2	0	8	2	14	130	28	274	58	152	402	96	96	164	158	152	3,450	100%						
	7.0%	12.8%	18.3%	9.4%	3.8%	0.5%	0.0%	0.1%	0.1%	0.0%	0.2%	0.1%	0.4%	3.8%	0.8%	7.9%	1.7%	4.6%	11.7%	2.8%	2.8%	4.8%	4.5%	4.4%	100.0%							

Table 7. Reported hourly pink salmon observations at the Eldorado 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																
10-Jul							Start of the counting season						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%												
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%						
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%	
14-Jul	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
16-Jul	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
18-Jul	0	0	0	0	0	0																									0	0	0	0	0	0	0	0	0	0	0	0
19-Jul	0	12	22	0	0	0																									0	0	0	0	0	0	0	0	0	0	0	0
20-Jul	10	30	0	0	0	0																									0	0	0	0	0	0	0	0	0	0	10	0
21-Jul	0	0	10	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
23-Jul	0	0	0	0	0	0																																				
24-Jul																															0	0	0	0	0	0	0	0	0	0	0	0
25-Jul	10	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
27-Jul	4	0	0	10	0	0																									0	0	0	0	0	0	0	0	0	0	0	0
28-Jul	0	0	2	0	0	0																									0	0	0	0	0	0	0	0	0	0	0	0
29-Jul	4	0	2	0	2	2																									0	0	0	0	0	0	0	0	0	0	0	0
30-Jul	4	0	0	0	4	0																																				
31-Jul																																										
1-Aug																																										
2-Aug																																										
3-Aug																															0	0	0	0	0	0	4	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
5-Aug																																										
6-Aug																															0	0	0	0	0	4	0	4	0	0	0	0
7-Aug	10	12	0	4	0	0																									0	0	0	0	0	4	2	10	4	0	14	0
8-Aug	0	0	0	0	4	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
10-Aug	0	4	0	2	0	0																									0	0	0	0	0	0	0	0	0	4	0	0
11-Aug	4	0	0	4	0	4																									0	0	0	0	0	0	0	0	0	0	0	4
12-Aug	4	4	0	0	0	0																									0	0	0	0	0	0	0	0	0	0	0	0
13-Aug	0	0	2	-4	2	4																																				
14-Aug																																										
15-Aug																																										
16-Aug																																										
17-Aug																															0	0	4	0	0	0	0	4	0	0	0	0
18-Aug	0	2	0	2	0	4																									0	0	0	2	0	0	0	0	0	0	0	0
19-Aug																																										
20-Aug																															0	0	0	0	0	0	0	0	2	4	0	0
21-Aug	0	0	0	0	0	0																									0	0	0	0	0	0	0	0	4	0	4	2
22-Aug	0	0	0	4	0	2																									0	0	0	0	0	0	0	0	0	0	2	0
23-Aug	4	0	0	0	4	0																																				
24-Aug																															0	0	0	0	0	0	0	4	0	0	4	4
25-Aug	0	0	4	4	0	0																									0	0	0	0	0	0	0	0	0	0	0	0
26-Aug	0	0	2	0	0	0																									0	0	0	0	0	0	0	0	0	0	0	0
27-Aug																																										
28-Aug																																										
29-Aug																																										
30-Aug	0	0	0	0	0	0																									0	0	0	0	0	0	0	0	0	0	0	0
31-Aug	0	0	0	0	0	0																									0	0	0	0	0	0	0	0	0	0	0	0
1-Sep	0	0	0	0	0	0																									0	0	0	0	0	0	0	0	0	0	0	0
Total	74	96	78	32	18	26							0	8	0	-2	2	0													0	0	10	10	12	20	14	20	30	14	38	38
	12.8%	17.8%	14.3%	5.9%	2.9%	4.8%							0.0%	1.5%	0.0%	-0.4%	0.4%	0.0%	0.0%	0.0%	1.8%	1.8%	2.2%	3.7%							2.6%	5.5%	5.5%	2.6%	7.0%	6.8%	100.0%					

Table 8. Reported hourly king salmon observations at the Eldorado 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		
10-Jul																										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%	
13-Jul	0	0	0	0	0	0																				0	0.0%	
14-Jul	0	0	0	0	0	0																				0	0.0%	
15-Jul	0	0	2	0	0	0																				4	15.4%	
16-Jul	0	0	0	0	0	0																				0	0.0%	
17-Jul																										0	0.0%	
18-Jul	0	0	0	0	0	0																				0	0.0%	
19-Jul	0	0	0	0	0	0															4	0	0	0	0	4	15.4%	
20-Jul	0	0	0	0	0	0															0	0	0	0	0	2	7.7%	
21-Jul	2	0	2	0	0	0															0	0	0	0	0	4	15.4%	
22-Jul	0	0	0	0	0	0															0	0	0	0	0	0	0	0.0%
23-Jul	0	2	0	0	0	0															0	0	0	0	0	2	7.7%	
24-Jul																										0	0.0%	
25-Jul	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%
27-Jul	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%
29-Jul	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%	
31-Jul																										0	0.0%	
1-Aug																										0	0.0%	
2-Aug																										0	0.0%	
3-Aug																										0	0.0%	
4-Aug	0	0	0	0	0	0															0	0	0	0	0	0	0	0.0%
5-Aug																										0	0.0%	
6-Aug																										0	0.0%	
7-Aug	0	0	0	0	0	0															0	0	0	0	0	0	0	0.0%
8-Aug	0	0	0	0	0	0															2	0	0	0	0	2	7.7%	
9-Aug	0	0	0	0	0	0															0	0	0	0	0	0	0	0.0%
10-Aug	0	0	2	0	0	0															0	0	0	0	0	2	7.7%	
11-Aug	0	0	2	0	0	0															0	0	0	0	0	2	7.7%	
12-Aug	0	0	2	2	0	0															0	0	0	0	0	4	15.4%	
13-Aug	0	0	0	0	0	0																				0	0.0%	
14-Aug																										0	0.0%	
15-Aug																										0	0.0%	
16-Aug																										0	0.0%	
17-Aug																										0	0.0%	
18-Aug	0	0	0	0	0	0															0	0	0	0	0	0	0	0.0%
19-Aug																										0	0.0%	
20-Aug																										0	0.0%	
21-Aug	0	0	0	0	0	0															0	0	0	0	0	0	0	0.0%
22-Aug	0	0	0	0	0	0															0	0	0	0	0	0	0	0.0%
23-Aug	0	0	0	0	0	0																				0	0.0%	
24-Aug																										0	0.0%	
25-Aug	0	0	0	0	0	0															0	0	0	0	0	0	0	0.0%
26-Aug	0	0	0	0	0	0															0	0	0	0	0	0	0	0.0%
27-Aug																										0	0.0%	
28-Aug																										0	0.0%	
29-Aug																										0	0.0%	
30-Aug	0	0	0	0	0	0															0	0	0	0	0	0	0	0.0%
31-Aug	0	0	0	0	0	0															0	0	0	0	0	0	0	0.0%
1-Sep	0	0	0	0	0	0															0	0	0	0	0	0	0	0.0%
Total	2	2	10	2	0	0	0	0	0	0	0	0	0	2	2	0	0	2	4	0	0	0	0	0	0	26	100.0%	
	7.7%	7.7%	38.5%	7.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	7.7%	7.7%	0.0%	0.0%	7.7%	15.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%		

Table 9. Reported hourly coho salmon observations at the Eldorado 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		
10-Jul								Start of the counting season					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	0	0	0	0	0.0%	
16-Jul	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%	
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	0	0	0	0	0.0%	
23-Jul	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%	
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	0	0	0	0	0.0%	
30-Jul	0	0	0	0	0	0																					0.0%	
31-Jul																											0.0%	
1-Aug																											0.0%	
2-Aug																											0.0%	
3-Aug													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%	
6-Aug																	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	
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	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%	
14-Aug																											0.0%	
15-Aug																											0.0%	
16-Aug																											0.0%	
17-Aug													0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	
18-Aug	0	0	0	0	0	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%	
19-Aug																											0.0%	
20-Aug													0	0	0	0	0	0	0	0	0	0	14	4	2	2	22	6.4%
21-Aug	0	0	8	4	8	6							0	0	0	0	0	0	0	0	0	6	2	8	0	10	52	15.2%
22-Aug	0	4	2	0	0	4	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26	7.6%
23-Aug	4	8	12	0	0	0																					30	8.6%
24-Aug													0	0	0	0	0	0	0	0	0	0	4	4	0	0	16	4.7%
25-Aug	0	6	4	12	0	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	6.4%
26-Aug	0	4	2	8	0	0	0	2	4	0	0	2	0	0	0	0	0	0	0	0	0	0	0	4	4	4	30	8.6%
27-Aug																											0	0.0%
28-Aug																											0	0.0%
29-Aug																											0	0.0%
30-Aug	0	6	4	4	0	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	4.1%
31-Aug	8	0	4	0	0	0							0	0	0	0	0	2	0	26	0	4	20	0	0	78	22.2%	
1-Sep	16	0	12	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	4	0	0	54	15.8%	
Total	28	26	48	44	14	10	0	4	4	0	0	2	0	0	0	0	0	2	0	32	30	24	42	30	342	100%		
	8.2%	8.2%	14.0%	12.9%	4.1%	2.9%	0.0%	1.2%	1.2%	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	0.0%	9.4%	8.8%	7.0%	12.3%	8.8%	100.0%			

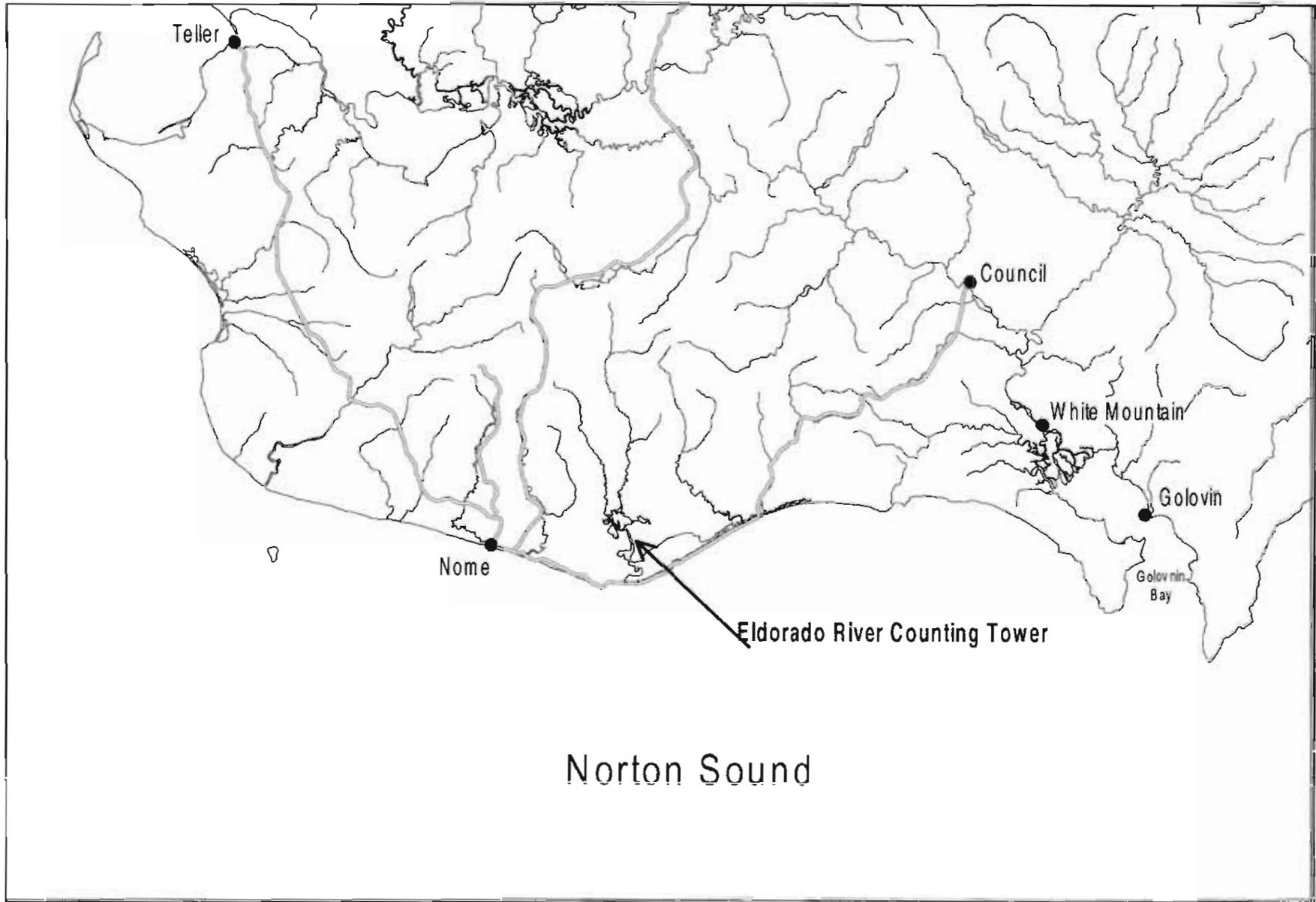


Figure 1. Area location map of the Eldorado River counting tower project site, Norton Sound, 1999.

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

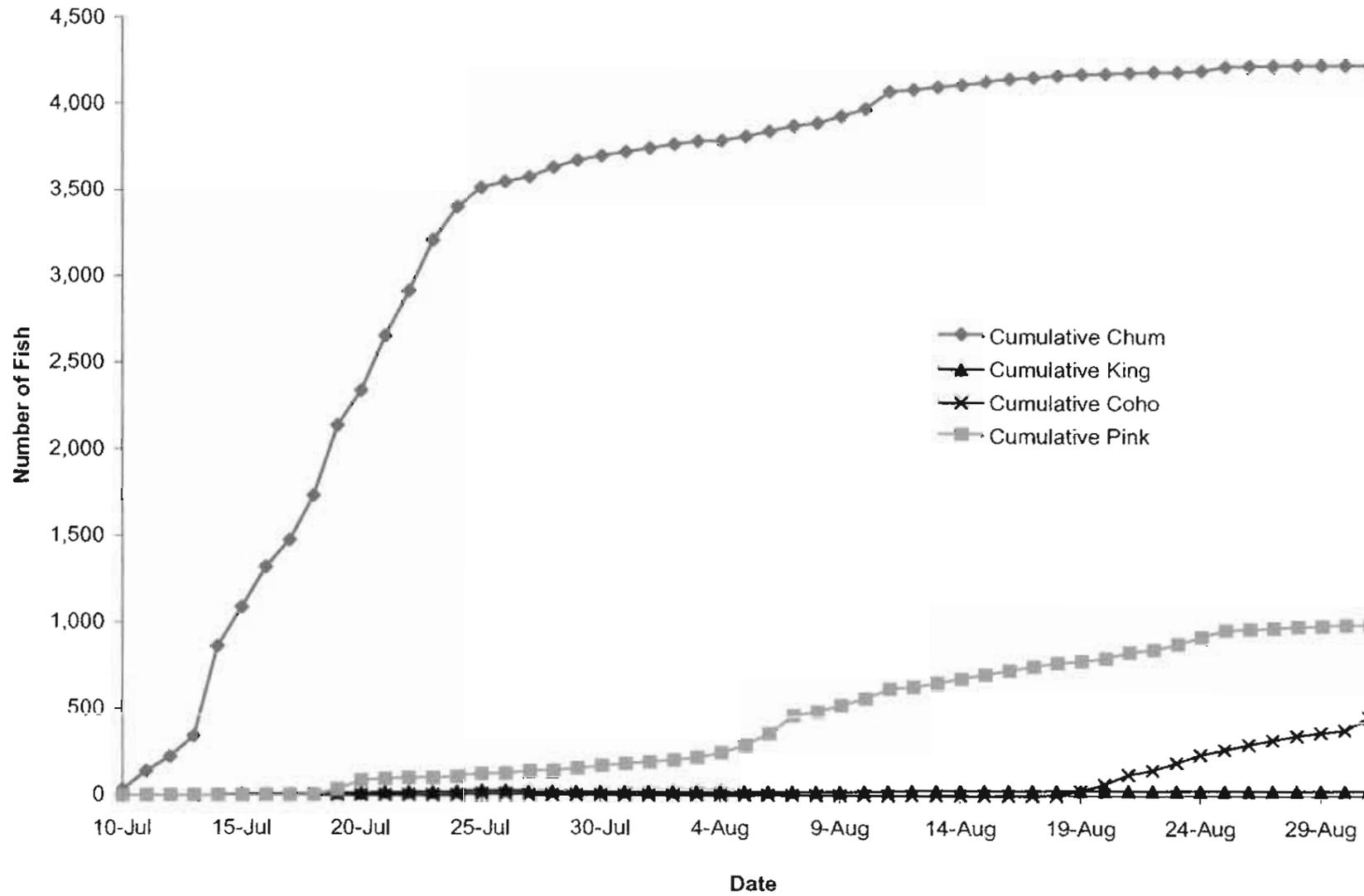


Figure 3. Daily chum salmon migration past the Eldorado River counting tower, Norton Sound, 1999.

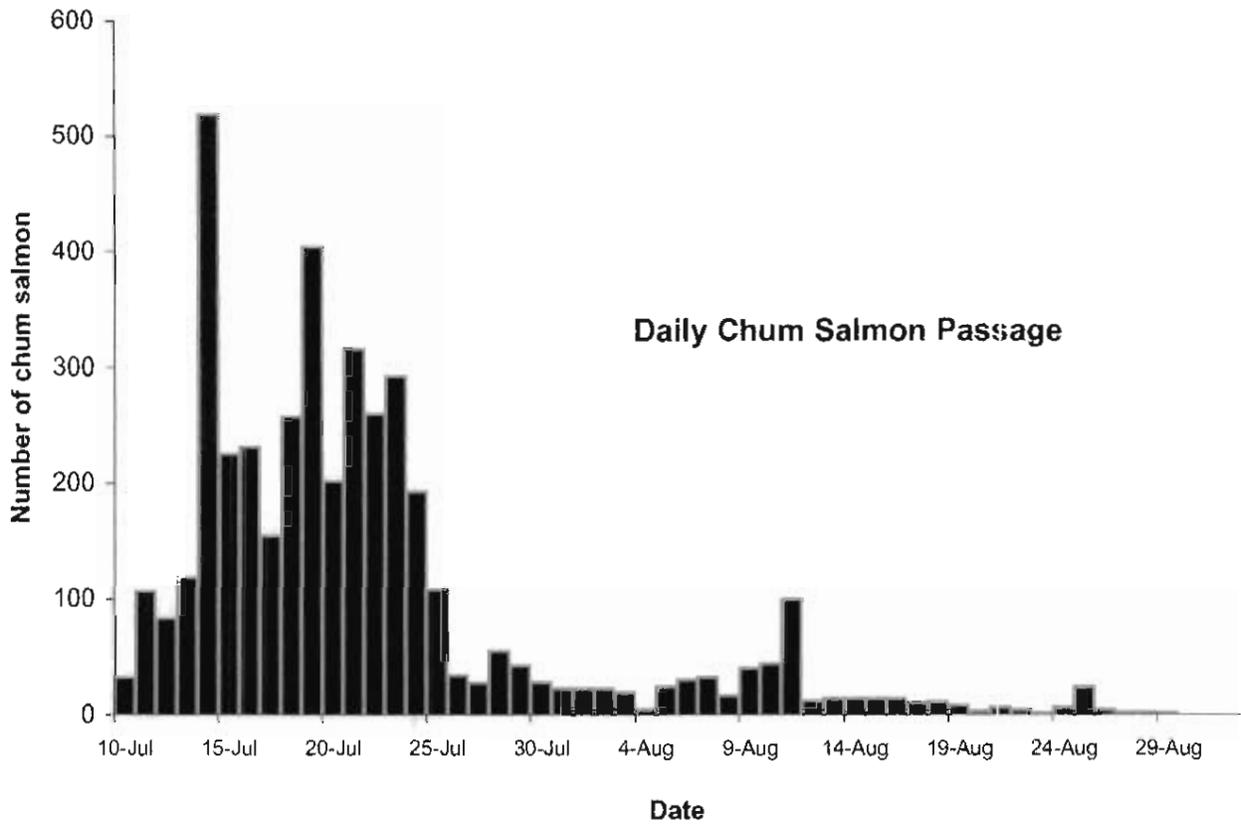


Figure 4. Cumulative chum salmon migration past the Eldorado River counting tower, Norton Sound, 1999.

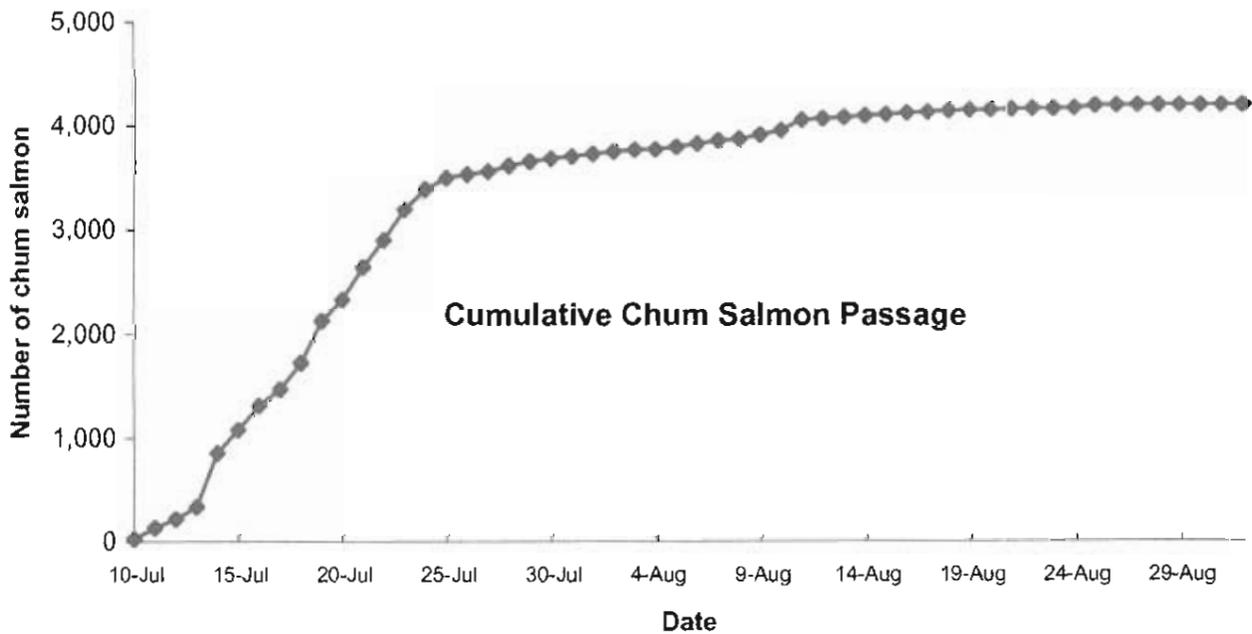


Figure 5. Daily pink salmon migration past the Eldorado River counting tower, Norton Sound, 1999.

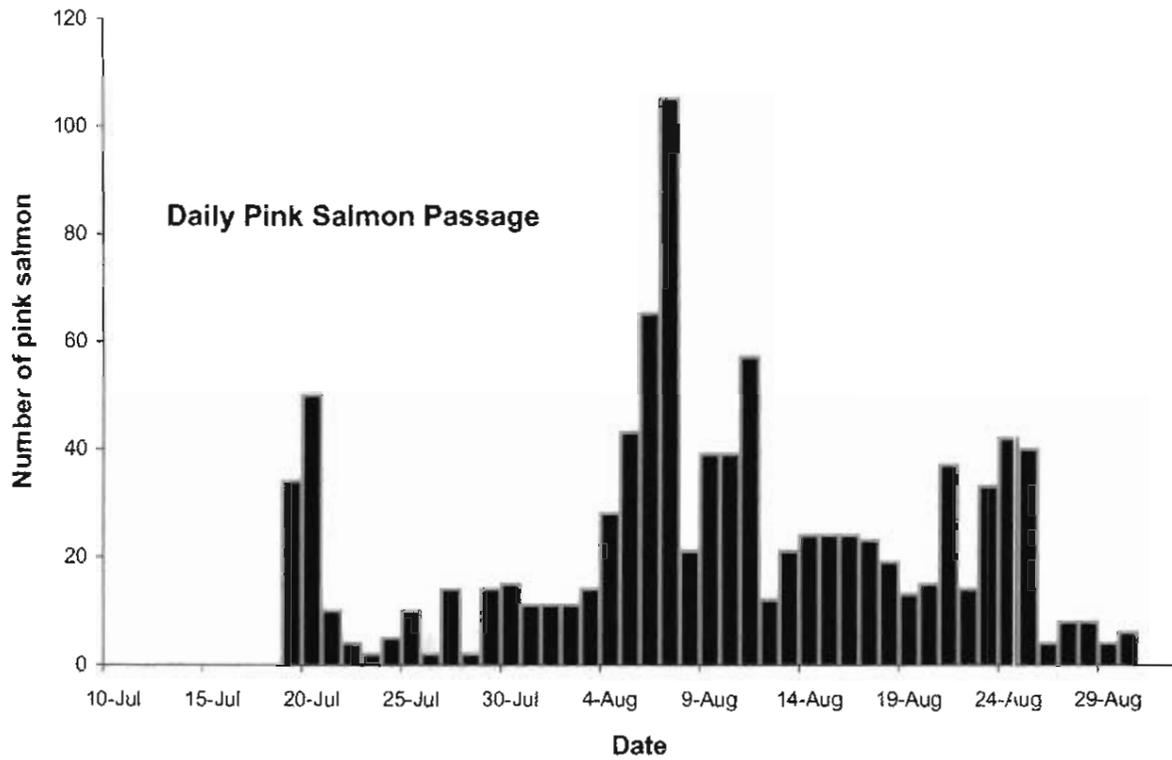


Figure 6. Cumulative pink salmon migration past the Eldorado River counting tower, Norton Sound, 1999.

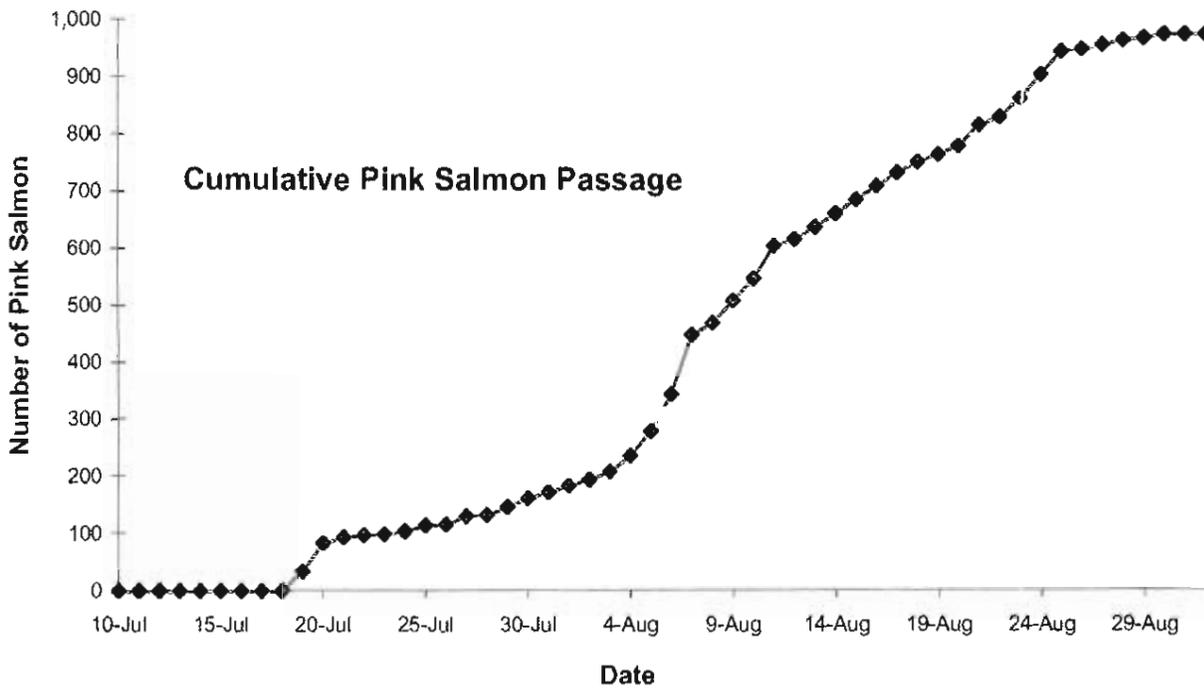


Figure 7. Daily king salmon migration past the Eldorado River counting tower, Norton Sound, 1999.

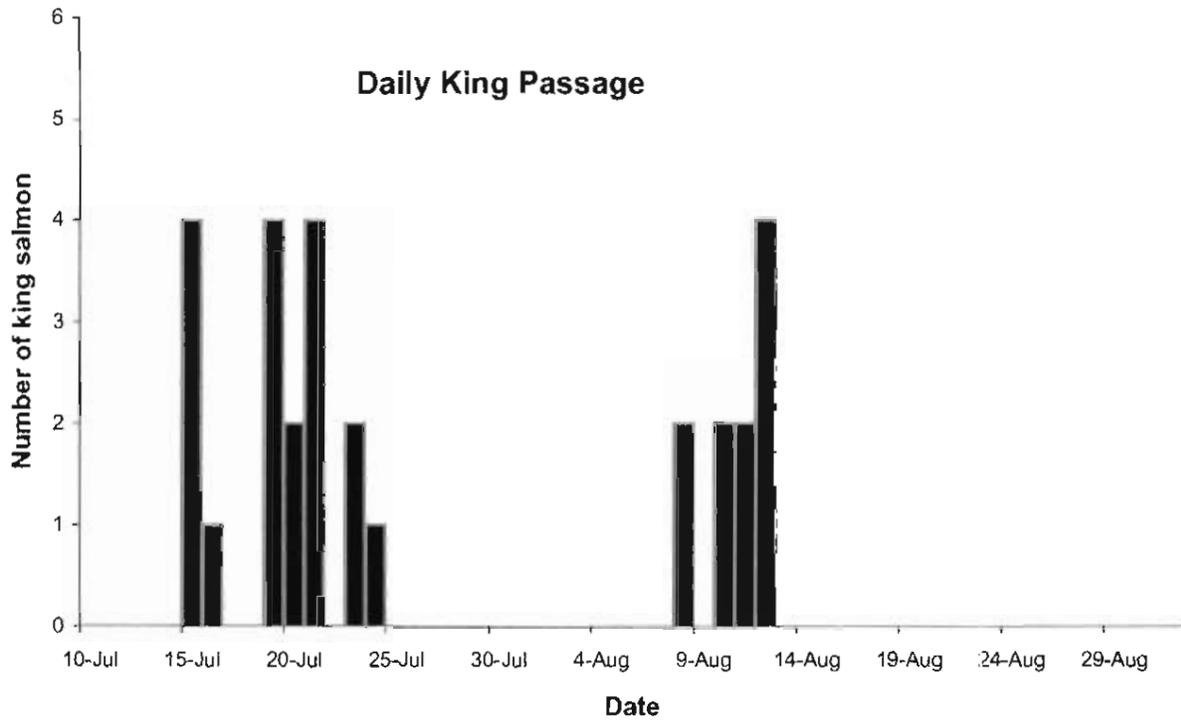


Figure 8. Cumulative king salmon migration past the Eldorado River counting tower, Norton Sound, 1999.

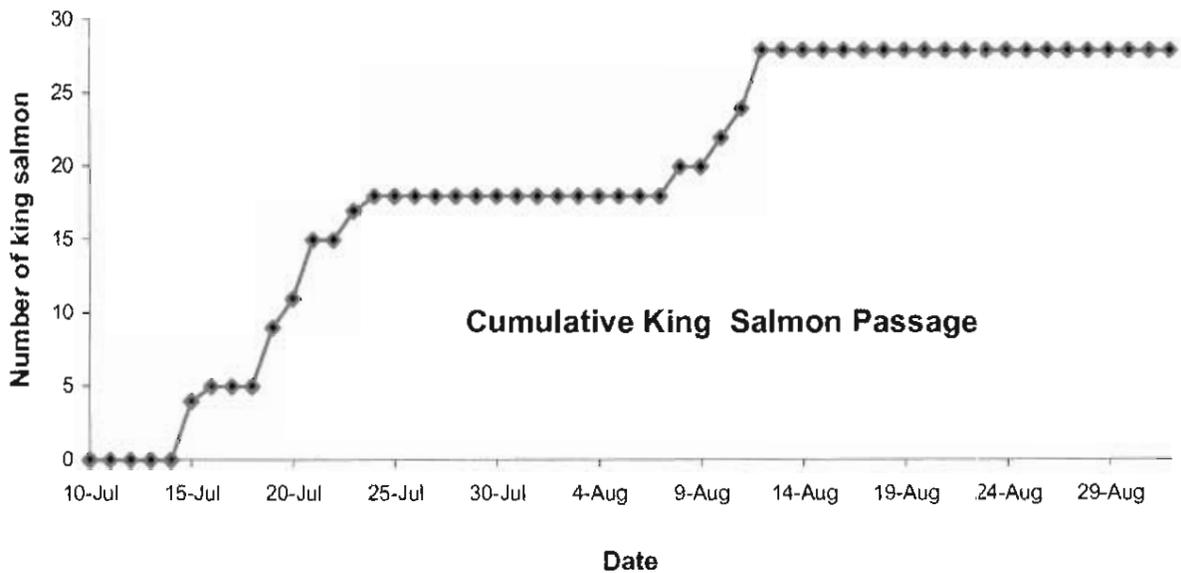


Figure 9. Daily coho salmon migration past the Eldorado River counting tower, Norton Sound, 1999.

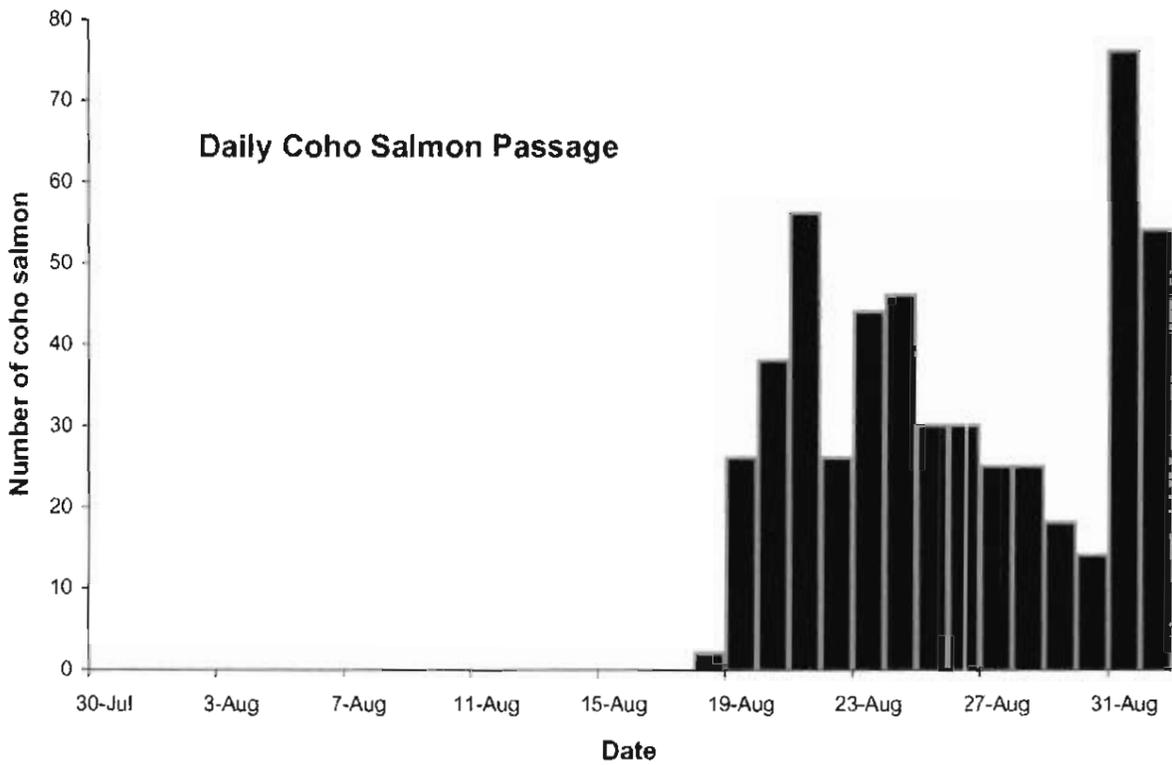


Figure 10. Cumulative coho salmon migration past the Eldorado River counting tower, Norton Sound, 1999.

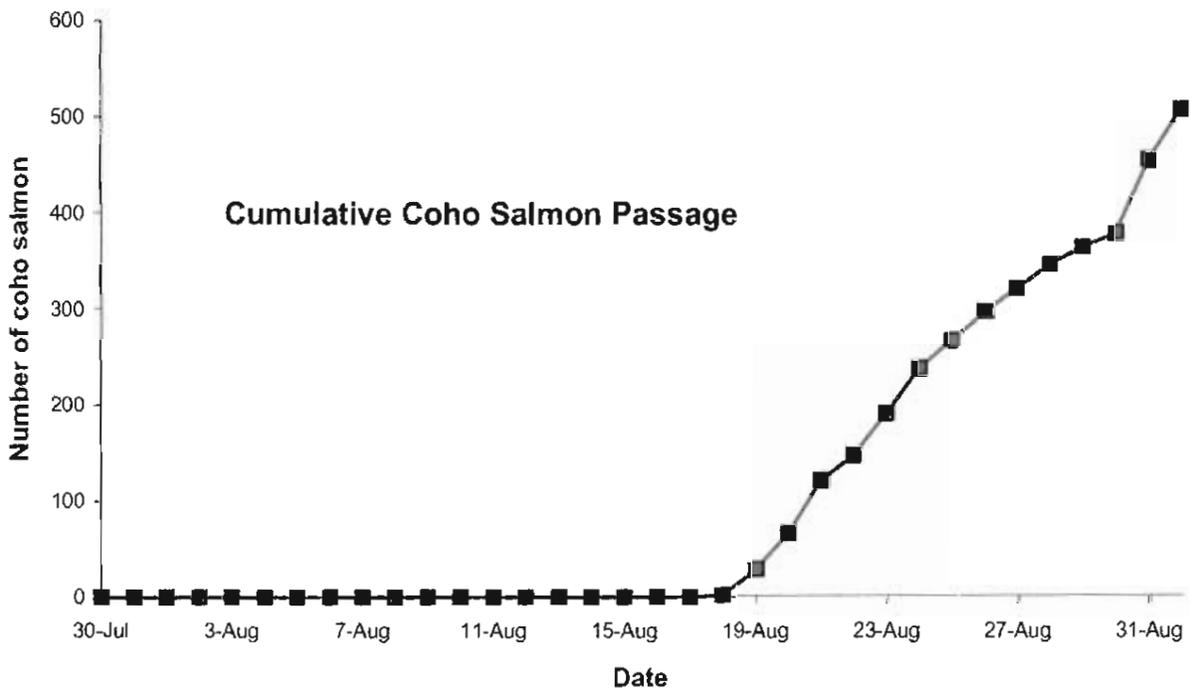


Figure 11. Diurnal pattern of chum salmon migration past the Eldorado River counting tower, Norton Sound, 1999.

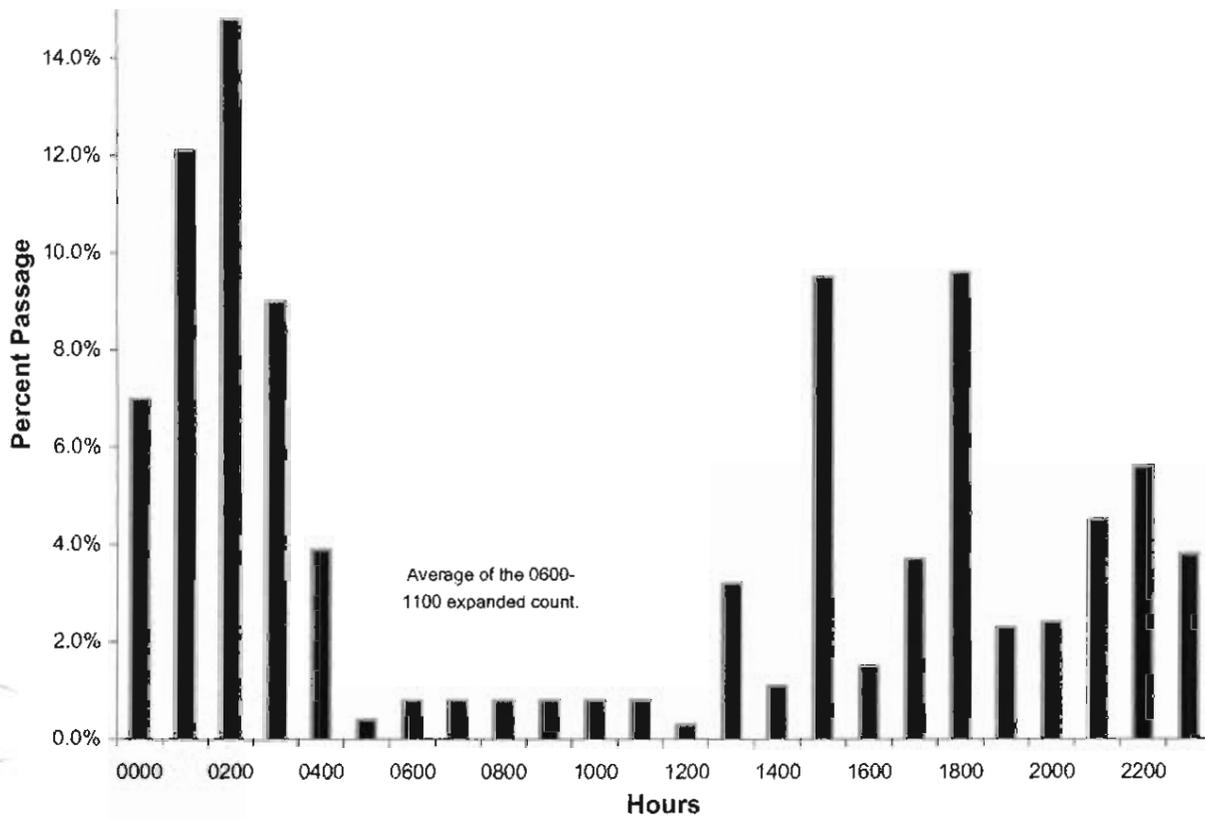


Figure 12. Diurnal pattern of pink salmon migration past the Eldorado River counting tower, Norton Sound, 1999.

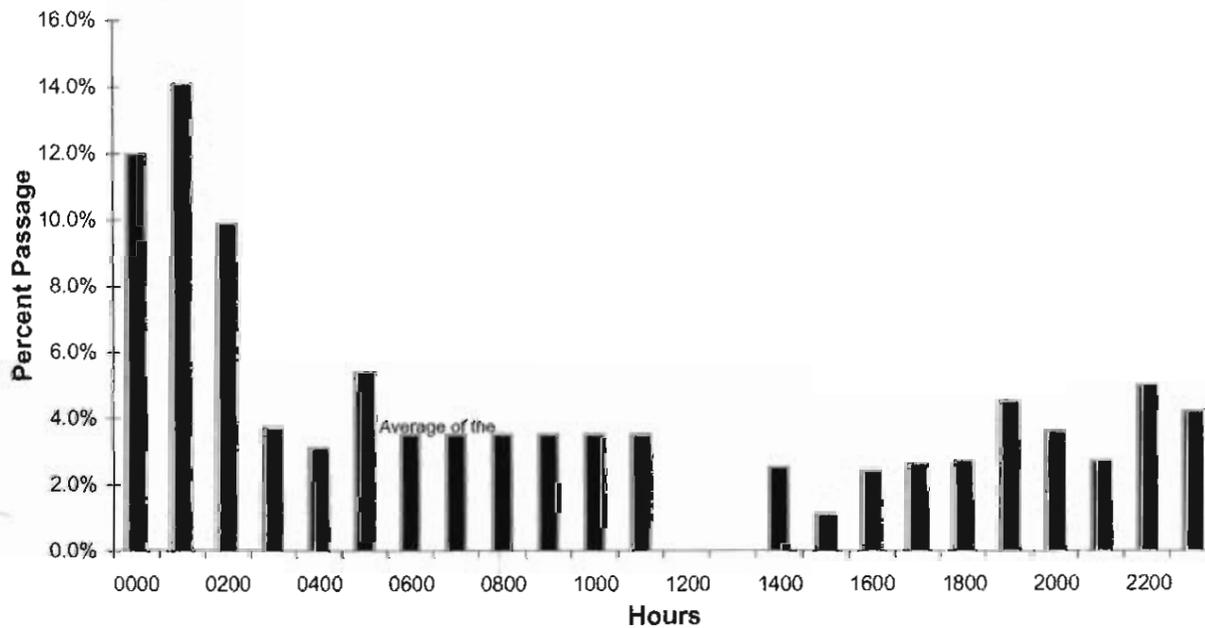


Figure 13. Diurnal pattern of king salmon migration past the Eldorado River counting tower, Norton Sound, 1999.

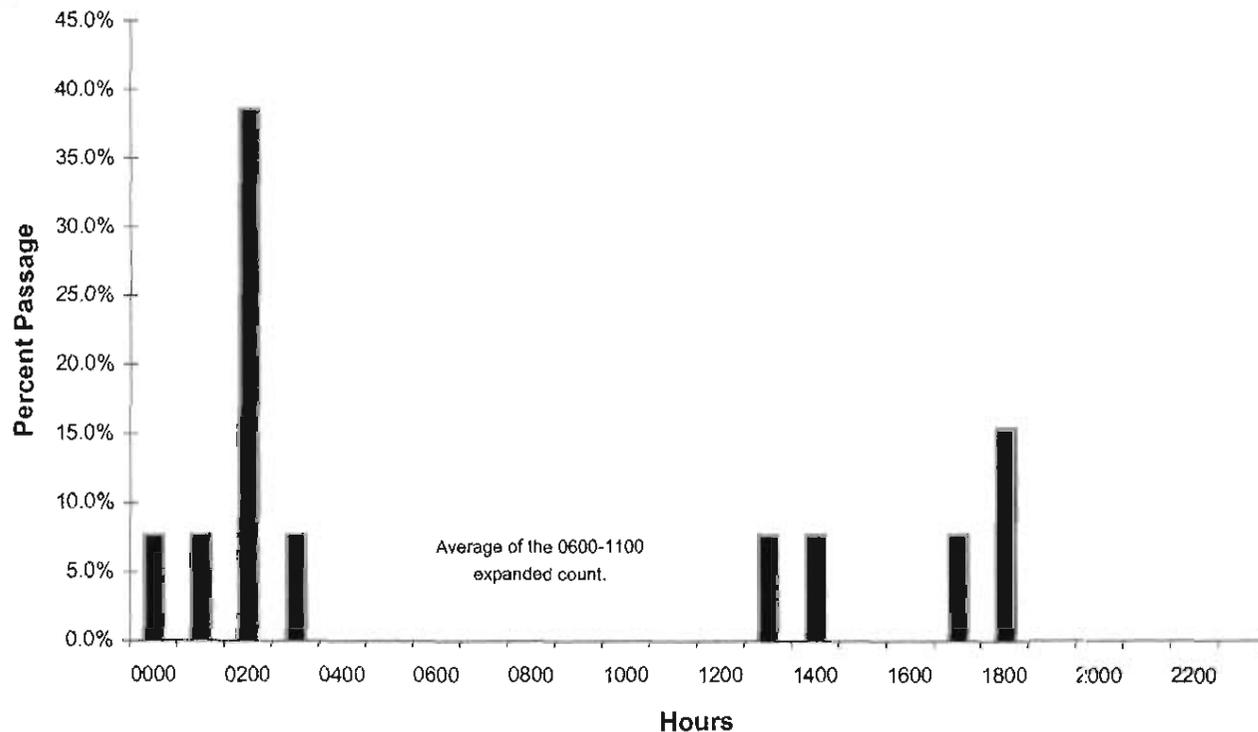


Figure 14. Diurnal pattern of coho salmon migration past the Eldorado River counting tower, Norton Sound, 1999.

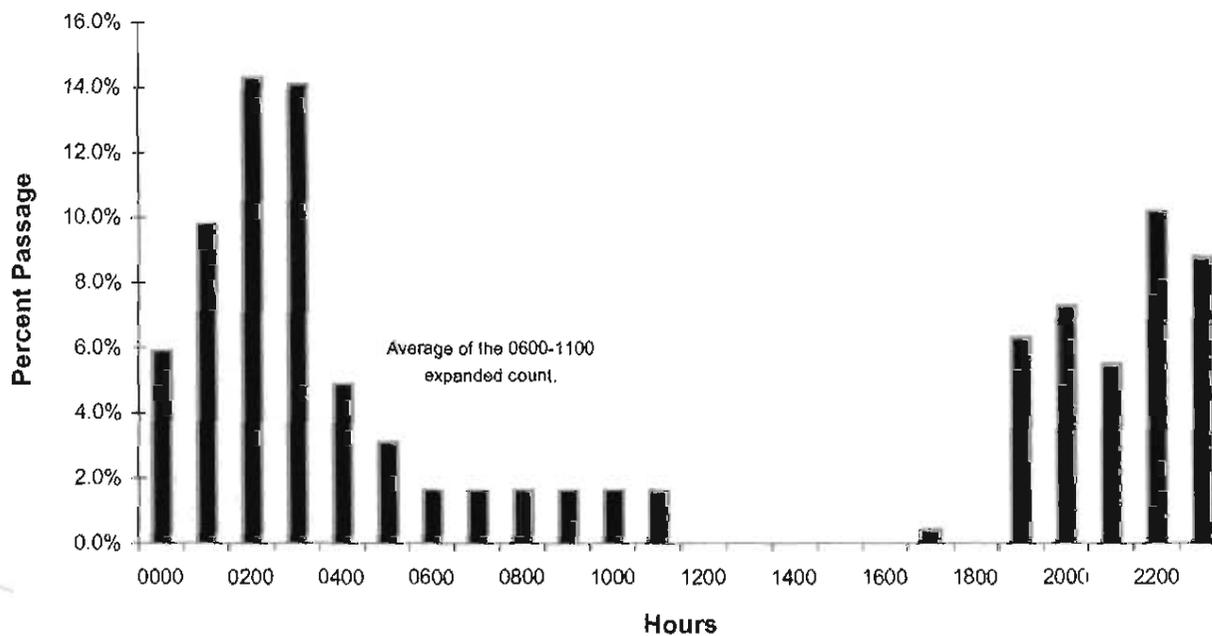


Figure 15. Expanded cumulative migration of chum salmon past the Eldorado River counting tower, Norton Sound, 1995-1999.

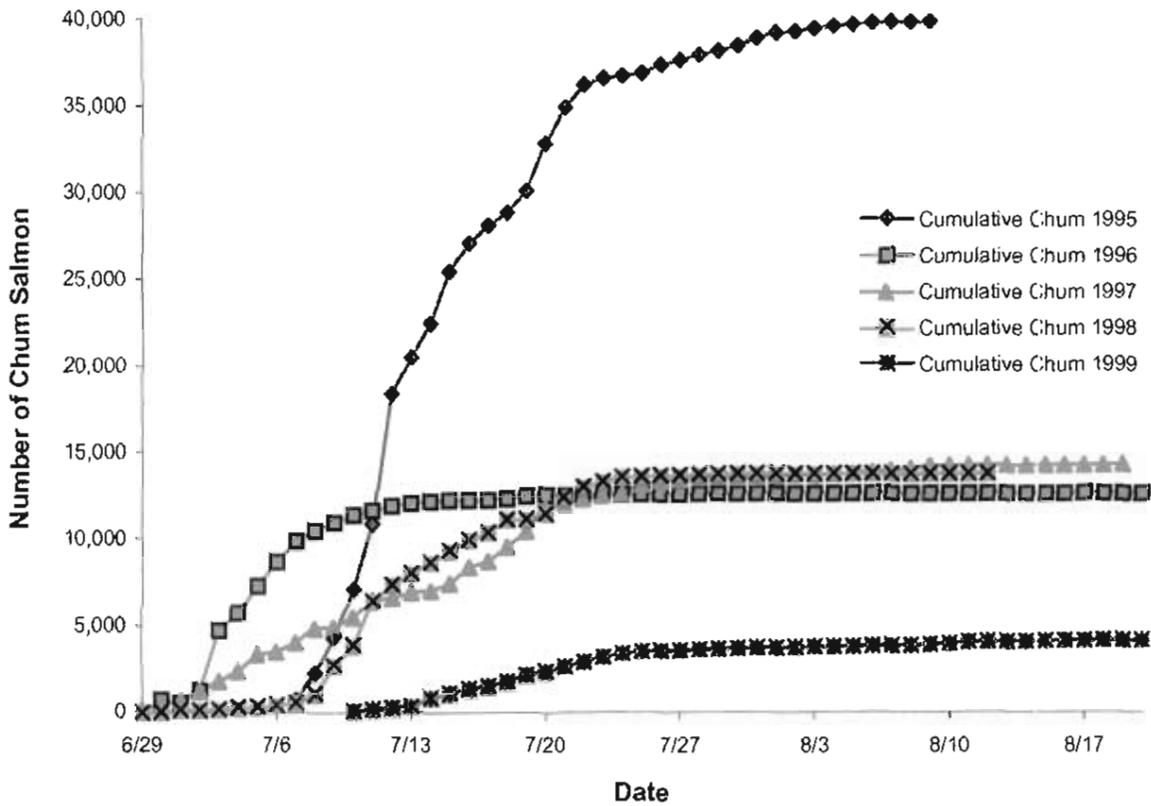


Figure 16. Expanded cumulative odd year migration of pink salmon past the Eldorado River counting tower, Norton Sound, 1995-1999.

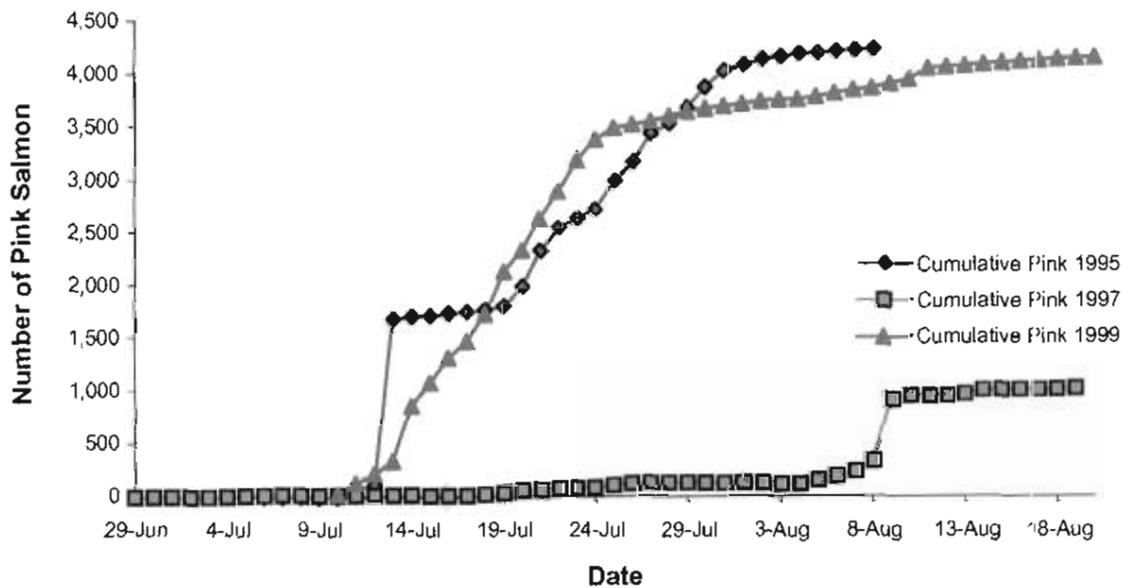


Figure 17. Expanded cumulative even year migration of pink salmon past the Eldorado River counting tower, Norton Sound, 1996-1999.

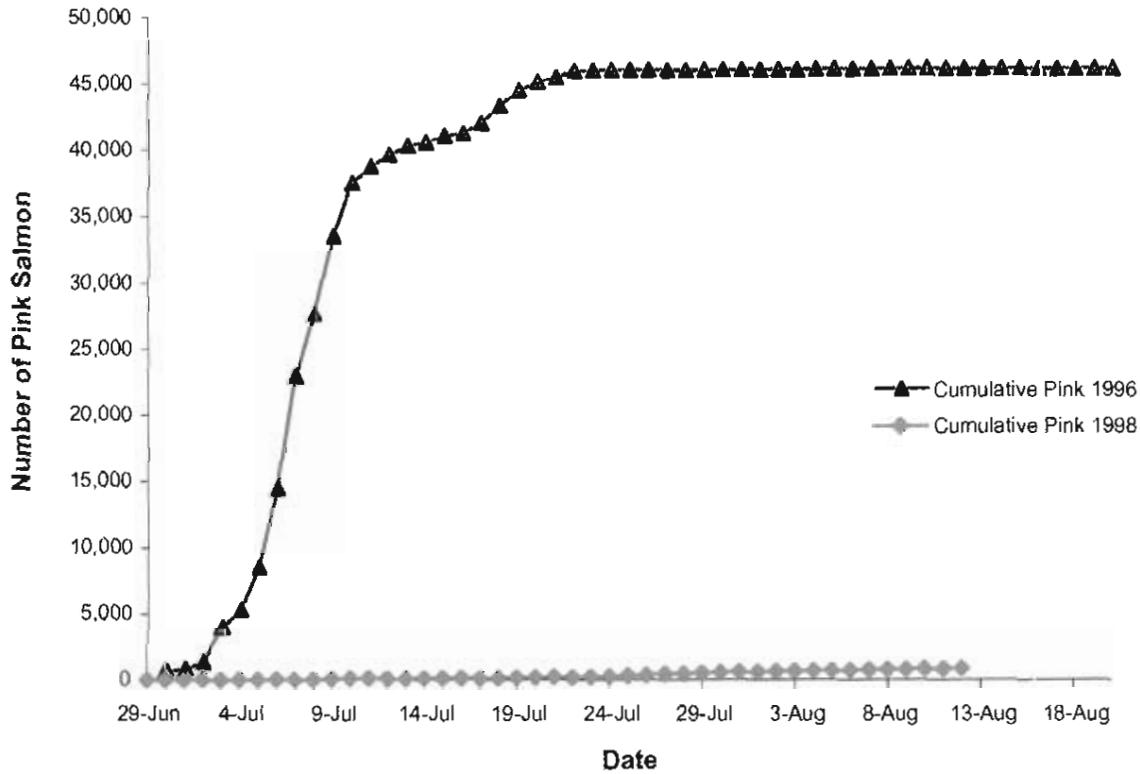


Figure 18. Expanded cumulative migration of king salmon past the Eldorado River counting tower, Norton Sound, 1995-1999.

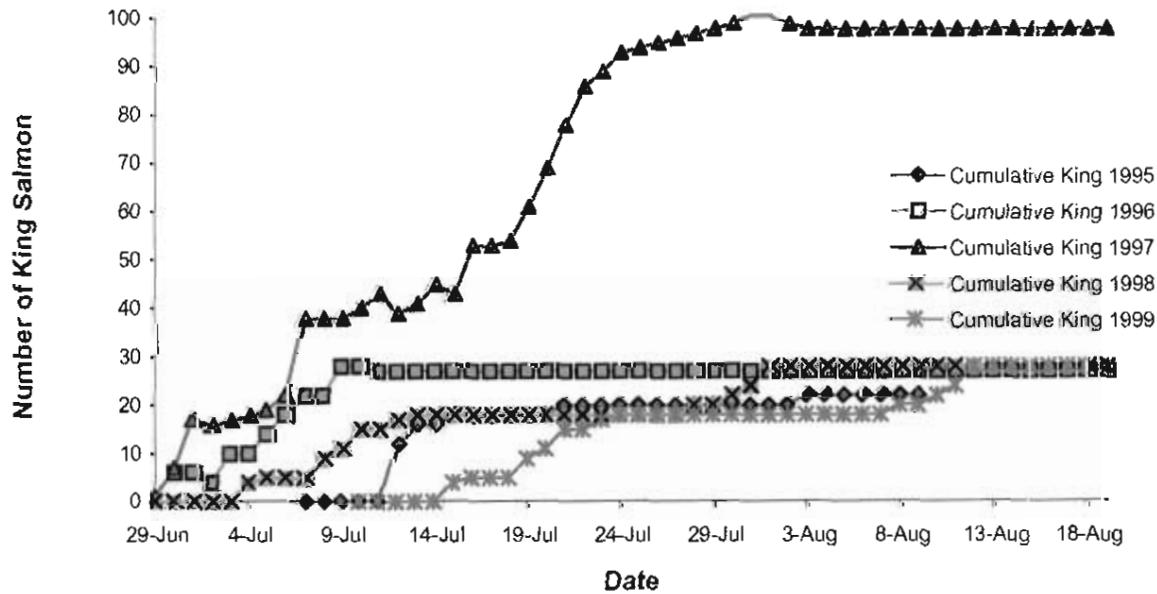


Figure 19. Expanded cumulative migration of coho salmon past the Eldorado River counting tower, Norton Sound, 1995-1999.

