

Goodnews River Fisheries Studies, 1987

By:

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## ABSTRACT

The Goodnews River salmon counting tower operated from 22 June through 30 July 1987. An estimated 2,274 chinook (*Oncorhynchus tshawytscha*), 28,871 sockeye (*O. nerka*), 62 coho (*O. kisutch*), 64 pink (*O. gorbuscha*) and 17,519 chum (*O. keta*) salmon migrated past the counting tower during the 1987 operational period. The chinook and sockeye salmon season passage was below the minimum escapement objective established for the project. Chum salmon season passage was within escapement objectives.

Aerial survey counts of the Goodnews River system, in combination with tower estimates of the Middle Fork Goodnews River, provided a 1987 escapement estimate of 4,490 chinook, 51,989 sockeye and 37,802 chum salmon returning to the Goodnews River. The escapement estimates combined with the reported commercial and the estimated subsistence harvest in Goodnews Bay yields a total run estimate of 8,663 chinook, 80,702 sockeye and 58,761 chum salmon.

## INTRODUCTION

### *Description of the Area*

The Goodnews River originates in the Ahklun Mountains and flows southwest approximately 60 miles to Goodnews Bay (Figure 1). The Middle Fork parallels the length of the mainstem (North Fork) Goodnews River before joining near its mouth. The Goodnews River system drains an area of roughly 910 square miles and contains many lakes. All five species of Pacific salmon reside in the Goodnews River drainage.

### *Commercial Fishery*

Goodnews Bay commercial salmon fishing has occurred annually since 1968. The prevailing commercial gear employed consists of drift gill nets fished in tidal channels radiating from the Goodnews River (Figure 2). The 1987 Goodnews Bay reported commercial harvest totaled 3,357 chinook (*Oncorhynchus tshawytscha*), 27,758 sockeye (*O. nerka*) 29,057 coho (*O. kisutch*), 54 pink (*O. gorbuscha*) and 20,381 chum (*O. keta*) salmon (Table 1). The low pink salmon commercial harvest may not truly reflect abundance as pink salmon is the least commercially valuable species and is not targeted. The odd year pink salmon run is historically smaller than the even year run. The 1987 chinook, coho and pink salmon harvest was below the previous (1982-1986) five year average. The 1987 commercial harvest of sockeye salmon was above the previous five year average of 19,575 sockeye salmon. The 1987 chum salmon commercial harvest was a record exceeding the previous 1973 record of 15,781 chum salmon (Appendix 1).

### *Subsistence Fishery*

Goodnews Bay residents have long depended upon the fishery resources as a source of food. The Department has documented subsistence salmon harvests in Goodnews Bay since 1977 (Appendix 2). Harvest estimates are made by observations and interviews with subsistence fishing families in early August. In 1987 the Division of Commercial Fisheries interviewed 24 subsistence fishing families. Expanding the reported harvest to the estimated 45 subsistence fishing families in the area resulted in an estimated subsistence harvest of 816 chinook, 955 sockeye, 43 coho, and 578 chum salmon (Table 2). The coho salmon subsistence harvest estimate is minimal since subsistence surveys are conducted before the completion of subsistence coho salmon fishery.

### *Escapement Objectives*

Preliminary escapement objectives of 3,000 to 4,000 chinook, 35,000 to 45,000 sockeye and 13,000 to 18,000 chum salmon were established in 1983 (Schultz,

Conservative estimates were made by the crew leader of what percentage of the run was observed during the period of poor visibility from 25 June to 11 July. Adjustments were made to the 20-minute counts accordingly. These estimates of undetected fish are subjective and based on the portion of the river the observer could see, and where most of the fish crossed before and following the period of poor visibility. Because it was necessary to be so subjective, the project crew leader made every effort to error on the conservative side.

The average of the previous and succeeding daily counts was used to estimate daily counts for scheduled crew days off (Sundays and holidays) or during days when unacceptable visibility precluded counting.

### *Migration Timing*

To evaluate fish travel time between the Goodnews Bay commercial fishery and the tower site, tower counts were compared with commercial fishery catch per unit effort (CPUE) statistics. The CPUE calculation assumes that if a fisherman delivered at least once during a commercial period, he fished the entire period. The CPUE is calculated by dividing the catch by the total fisherman hours for that period. Fishing conditions prevailing during the commercial period, salmon abundance and many other factors can influence the CPUE calculations. However, this method was used as a very approximate estimate of travel time.

### *Tagging*

An experimental tagging study was conducted in the Goodnews River in 1987. Thirty sockeye and 29 chum salmon were captured below the tower site and tagged with engineer flagging tape. The flagging extended six inches behind the fish to allow for easy observation from shore. The chum salmon were captured on 14 July approximately two miles below the tower site. The sockeye salmon were captured on 17 July near the confluence of the North Fork and Middle Fork, Goodnews River, approximately 3.5 miles below the tower (Figure 3). Observers recorded any tagged salmon seen during 20-minute counts. The experiment was an effort to evaluate the feasibility of a larger tagging program.

### *Age, Sex and Size*

The Department has established escapement sample objectives for age, length and sex information of 580 chinook, 600 sockeye and 450 chum salmon. The following methods were used to obtain the escapement sample:

1. Beach seining on the Middle Fork Goodnews River to capture migrating salmon.
2. A carcass sampling float trip of the North Fork Goodnews River.

## *Aerial Survey*

The Department conducted an aerial survey on 28 July 1987 to assess escapement on the Goodnews River system. Aerial surveys count only a percentage of the fish present, which may vary depending on the experience of the surveyor, weather conditions and the spawning stage of the salmon at the time of the survey. The percentage of the salmon observed by the surveyor was calculated by comparing the aerial survey count above the tower site with the tower count through that date. Expanding the aerial survey count on the entire Goodnews River to estimate total escapement based on this relationship assumes the surveyor was observing the same percentage of the fish present throughout the survey.

## *Creel Census*

A new task done on a volunteer basis was a Goodnews River sports creel census. Sport fishing guide services were contacted weekly to monitor the number of fishermen, fishermen hours and species harvested and released.

## **RESULTS**

### *Atmospheric and Hydrological Observations*

Atmospheric and hydrological observations at the Goodnews River salmon counting tower site documented unusually high river water levels in early June 1987 (Appendix 7). High water delayed the start of the project until 22 June. The scheduled operational date was 15 June 1987. River water level dropped steadily from 10 June until 27 June. Precipitation in late June contributed to the increasing river water level to flood level on 28 June (Figure 4). Turbidity due to rapidly increasing river water levels affected the project and caused a period (25 June to 11 July) of very poor visibility. The project continued to operate during this period of poor visibility even though observers could only see a portion of the river, and probably only by a portion of the migrating salmon (Appendix 8).

### *Salmon Estimates*

An unexpanded total of 521 chinook, 5,990 sockeye, 18 coho, 17 pink and 4,699 chum salmon were counted during 583 twenty-minute tower counting periods (Tables 3-7). An estimated 32 chinook, 480 sockeye and 31 chum salmon passed the tower undetected during the 20 minute counts because of poor visibility (Tables 8-11). The 20-minute estimates expanded by a factor of three yields of total estimate of 1,620 chinook, 19,046 sockeye, 54 coho, 51 pink and 13,107 chum salmon

passing the site during operational hours. An estimated 2,274 chinook, 28,871 sockeye, 62 coho, 64 pink and 17,519 chum salmon passed the tower site in 1987 when expanding the counts to include the hours the tower was not in operation (Table 12). Historic estimates of daily and cumulative salmon escapements for the Goodnews River counting tower are shown in Appendices 9-13.

The 1987 expanded escapement estimate of 2,274 chinook salmon was 24 percent below the minimum objective of 3,000 chinook salmon. Run timing was near the 1981 to 1985 average (Appendix 14), with 50 percent of the chinook salmon migration passing the tower site by 14 July (Figure 5).

The 1987 expanded escapement estimate of 28,871 sockeye salmon is approximately 18 percent below the minimum escapement objective of 35,000 sockeye salmon. Run timing was average for the seven years the tower has been in operation (Appendix 15). Fifty percent of the run passed by 7 July (Figure 6).

The 1987 expanded escapement estimate of 17,519 chum salmon met the escapement objective of 13,000 to 18,000 chum salmon. Run timing was later than average with 50 percent of the chum salmon migration passing the tower site on 22 July (Figure 7). The average (1981-1986) migration timing is for 50 percent of the migration to pass by 17 July (Appendix 16).

Historic daily cumulative proportions of coho and pink salmon escapement are shown in Appendices 17 and 18. These are incomplete since the tower discontinues operation well before the peak of migration for these species.

Average daily diel count distributions for chinook, sockeye and chum salmon were similar (Appendices 19-21 and Figure 8). Peak passage time was between noon and midnight when approximately 75% of the fish were observed. The best period for chinook and sockeye salmon was between 10:00 pm and 11:00 pm when 11.2% of chinook and 10.6% of sockeye were counted. Peak hour for chum salmon passage was between 1:00 pm and 2:00 pm when 16.6% of the fish were observed.

#### *Migration Timing*

To evaluate fish travel time between the Goodnews Bay commercial fishery and the tower site, the tower counts were compared with the commercial fishery CPUE. In 1987, it appears that sockeye salmon had the most rapid travel time of approximately five to seven days (Figure 6). Chum and chinook salmon had a travel time of 16 to 18 days from fishery to tower (Figures 5 and 7). These travel time estimates are consistent with past observations (Schultz 1987).

#### *Tagging*

Four chum salmon, tagged in the Southern Alaska Peninsula tagging study (Eggers et al. 1987), were observed during the project operational period (Table 13). Eleven chum (38% of those flagged) and four sockeye (13% of those flagged) salmon flagged with engineering tape were observed from the counting tower

during 20-minute counting periods. The experiment assumed that while counting 33% of the flagged chum salmon would be observed. Based on the Goodnews River aerial survey conducted on 28 July, 55% of the sockeye salmon observed were in the Middle Fork Goodnews River. Since the sockeye salmon were flagged at the confluence of the two forks, it was assumed that a similar percentage of flagged salmon would migrate up each drainage. During the 20-minute counting periods, 33% of the 55% assumed to migrate up the Middle Fork (18% of the sockeye flagged) should be seen. Thirteen percent of the sockeye salmon flagged were observed from the counting tower.

#### *Age, Sex and Size*

A total of 75.5 hours was directed toward experimenting with beach seining methods and locations (Hausler, 1987). Successful methods and locations were identified for capturing chum and sockeye salmon, for which sampling objectives were achieved. A total of 39 chinook, 577 sockeye and 467 chum salmon with readable scales were sampled by beach seine in 1987 (Tables 14-16). Chinook salmon were mainly age 6 (49%), sockeye salmon were predominately age 5 (86%) and the majority of chum salmon (60%) were age 4 fish.

Budget considerations canceled the North Fork Goodnews River carcass sampling trip, which had been scheduled to obtain additional chinook salmon samples.

#### *Aerial Survey*

An aerial survey was flown on 28 July to enumerate the salmon escapement in the Goodnews River. The surveyor rated the conditions excellent with clear skies, low and clear river water levels and near peak chinook, sockeye and chum salmon spawning stage. The surveyor counted 4,466 chinook, 44,291 sockeye and 21,937 chum salmon (Table 17). Of this total, 2,191 chinook, 24,505 sockeye and 9,689 chum salmon were counted above the tower site. Based on the tower estimate through the date of the survey the surveyor counted 99.5, 85.2 and 58.0 percent of the chinook, sockeye and chum salmon escapement, respectively.

Assuming the surveyor counted the same percentage throughout the drainage, the total escapement into the Goodnews River was 4,490 chinook, 51,989 sockeye and 37,802 chum salmon (Table 17). The escapement estimates combined with commercial and estimated subsistence harvest in Goodnews Bay result in a total run size estimate of 8,663 chinook, 80,702 sockeye and 58,761 chum salmon. The commercial fishery exploitation rate was approximately 39, 34 and 35 percent of the estimated run size for chinook, sockeye and chum salmon, respectively (Appendix 22).

## Creel Census

A total of 2,406 guided fishermen hours was documented, and 1 rainbow trout (Salmo gairdneri), 20 char (Salvelinus alpinus), 12 grayling (Thymallus japonica), 1 lake trout (Salvelinus namaycush), 10 chinook, 3 sockeye and 27 chum salmon were harvested (Table 18). Two rafters that spent a total of 47 fishermen floatdays on the river harvested 7 rainbow, 2 char, 4 grayling, and 1 chinook salmon (Table 19). Since the majority of the rafters float the North Fork Goodnews River, it is likely that additional floatdays occurred and were not documented.

## DISCUSSION

Adjustment of the time allowed for commercial fishing is the primary method of controlling the harvest in Goodnews Bay. The apparent lag time between the commercial fishery and the tower project is too large to use the tower estimate for in-season management during the early portion of the chinook salmon migration. This inability to accurately assess the run status of chinook salmon early makes it necessary to take a conservative approach towards chinook salmon management. The tower estimates become more useful as an in-season indicator of the chinook salmon run as the season progresses. Preliminary 1987 tower count estimates confirmed preseason forecasts of a poor chinook salmon return, and suggested that chinook salmon escapement objectives would not be achieved. Goodnews Bay commercial fishery managers used this information in remaining on a one 12-hour period per week schedule (18 June, 24 June, 30 June). This schedule is a deviation from the "normal" schedule of two 12-hour periods per week.

Historical commercial fishery statistics are the primary tool available to the managers of the Goodnews Bay commercial fishery during the early portion of the chinook salmon migration. However, managers can use tower estimates as early as 1 July since 11 percent of the historical (1981-1987) average migration has passed the tower by that date. Historically, only 60 to 70 percent of the chinook salmon migration has passed through the commercial fishery by 1 July. This is not too late to adjust commercial periods to accommodate the chinook salmon escapement objective.

The project is an excellent in-season management tool for sockeye salmon which have a short travel time between the commercial fishery and the tower site. It was apparent early in July 1987 that the sockeye salmon escapement was below average. Managers allowed a restrictive two 12-hour period per week schedule ("normal" schedule is three 12-hour periods per week) until 20 July, when the fishery was closed to allow additional sockeye salmon escapement. The commercial harvest of 27,758 sockeye salmon was above the previous five year average (1982-1986) of 19,575 salmon. Sockeye escapement was 18 percent below the objective range established for this system.

The return of chum salmon into the Goodnews Bay fishery coincides with the sockeye salmon migration. There are only limited ways to segregate the harvest of these two species within Goodnews Bay, with sockeye salmon the primary species of management concern. The commercial harvest of 20,381 chum salmon was a record and well above the previous five year average (1982-1986) of 10,015 salmon. The tower escapement estimate of 17,519 chum salmon was within the escapement objective of 13,000 to 18,000 salmon.

The Goodnews River salmon counting tower project had the highest June river water levels most local residents could remember for the past 15 years. The high river water delayed starting operational date and caused poor visibility for over a week, yet the tower project still provided useful data for inseason management. Managers recognized a below average migration and took steps to increase chinook and sockeye salmon escapement.



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## TABLES

Table 1. Goodnews Bay, District 5, commercial harvest by species and fishing effort by period, 1987.

PERIOD	HOURS	PERMITS	LNDGS	CHINOOK		SOCKEYE		COHO		PINK		CHUM	
				NUMBERS	POUNDS	NUMBERS	POUNDS	NUMBERS	POUNDS	NUMBERS	POUNDS	NUMBERS	POUNDS
1 JUNE 18	12	26	30	387	6,784	596	4,199	0	0	0	0	254	2,084
2 JUNE 24	12	33	36	476	7,994	1,892	13,675	0	0	0	0	1,188	9,249
3 JUNE 30	12	33	51	927	18,037	5,094	36,600	0	0	0	0	2,048	15,628
4 JULY 03	12	56	66	391	7,445	5,510	42,238	0	0	0	0	3,074	23,258
5 JULY 07	12	69	82	739	14,912	4,406	32,684	0	0	0	0	4,478	32,620
6 JULY 11	12	75	88	208	4,082	3,826	28,672	0	0	0	0	5,830	40,758
7 JULY 15	12	70	73	77	1,446	2,780	20,965	0	0	1	3	1,944	13,512
8 JULY 20	12	52	55	75	1,433	1,679	12,295	1	5	1	3	1,265	8,579
9 AUGUST 03	12	29	29	24	476	630	4,390	102	729	2	9	105	669
10 AUGUST 10	12	30	31	10	162	398	2,660	933	7,209	3	11	36	255
11 AUGUST 13	12	23	23	5	115	204	1,358	1,102	8,732	4	20	22	140
12 AUGUST 17	12	23	25	7	117	137	1,016	3,002	24,936	7	27	22	162
13 AUGUST 19	12	31	36	10	168	99	641	3,397	28,330	3	15	16	104
14 AUGUST 21	12	31	35	0	0	85	595	1,921	15,497	2	5	10	57
15 AUGUST 24	12	49	54	6	107	66	439	3,804	31,881	2	9	8	43
16 AUGUST 26	12	51	56	4	62	81	537	3,249	27,712	4	18	42	321
17 AUGUST 28	12	53	58	3	35	79	538	3,529	30,022	3	16	11	68
18 AUGUST 31	12	46	50	2	30	74	460	3,143	26,891	8	38	9	59
19 SEPT. 02	12	40	43	5	103	69	471	3,233	27,906	7	39	10	66
20 SEPT. 04	12	41	42	1	25	53	342	1,641	14,055	7	34	9	55
21 SEPT. 07	12	0	0	0	0	0	0	0	0	0	0	0	0
Season Total		116	963	3,357	63,533	27,758	204,775	29,057	243,905	54	247	20,381	147,687
Average Weight					18.93		7.38		8.39		4.57		7.25

Table 2. Goodnews Bay subsistence salmon fishery summary, 1987.

Village	Families contacted	Estimated families not contacted	Fishing families surveyed			Reported harvest					Estimated total fishing families	Expanded harvest				
			No.	People	Dogs	Chinook	Sockeye	Coho	Pink	Chum		Chinook	Sockeye	Coho	Pink	Chum
Goodnews	24	26	17	-	-	311	405	0	0	180	35 <sup>a</sup>	640	834	0	0	371
Platinum	10	5	7	-	-	123	85	30	0	145	10 <sup>a</sup>	176	121	43	0	207
Goodnews Bay Total	34	31	24	-	-	434	490	30	0	325	45	816	955	43	0	578

<sup>a</sup> [(fishing families surveyed/families contacted) x families not contacted] + fishing families surveyed.

Table 3. Chinook salmon escapement tower counts for the Goodnews River by 20-minute observation period, 1987.

Date	No. counting periods	Chinook salmon counted for 20-minute observation during hour:																				Total No. Chinook Salmon Counted					
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19		20	21	22	23	
6/22	8																	0	0	0	0	0	0	0	0	0	0
6/23	17								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/24	18	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/25	18	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/26	18	0							0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
6/27	18	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/28	1	0																									0
6/29	17								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/30	1	0																									0
7/1	5																				0	0	0	1	0		1
7/2	17								0	0	1	0	5	0	0	2	0	0	0	0	0	0	0	0	0	1	9
7/3	1	3																									3
7/4	17								0	0	0	0	0	0	0	0	0	0	0	3	0	4	1	1	0		9
7/5	1	1																									1
7/6	17								3	2	0	1	0	2	3	1	1	5	2	0	3	2	2	3	0		30
7/7	21	1	0	0	1	0	0	0	0	0	1	2	0	1	0	3				1	0	0	1	0		11	
7/8	18	0							0	1	0	0	0	0	2	0	2	0	2	1	0	0	0	0	1		9
7/9	18	2							0	1	0	0	0	0	0	1	2	2	0	1	2	2	0	1	3		17
7/10	24	0	2	6	2	0	0	0	0	0	1	0	0	1	0	0	9	5	1	3	1	0	2	10	0		43
7/11	23	3	0	4	1	0	3	0	0		0	0	0	0	0	2	3	0	0	0	2	0	0	2	0		20
7/12	1	2																									2
7/13	17								-1	1	0	0	1	0	0	0	0	2	3	1	0	0	4	3	0		14
7/14	24	1	0	3	1	8	1	0	0	4	2	0	0	4	2	0	1	10	8	3	9	2	2	9	1		71
7/15	16	7									0	0	0	1	0	6	3	2	3	4	2	0	3	2	1		34
7/16	18	3	3	1							0	0	1	0	0	1	0	0	0	0	0	14	3	4	1		31
7/17	24	0	1	2	1	0	0	0	0	0	0	1	0	1	5	3	2	2	2	2	0	0	4	6	1	7	38
7/18	24	9	1	1	0	0	0	3	0	0	-1	0	0	-1	7	3	2	1	2	0	0	4	2	4	3		40
7/19	3	0	3	2																							5
7/20	15										0	0	0	0	1	0	0	0	3	0	1	0	3	1	3		12
7/21	18	0	1	1					0	0	2	0	1	0	2	1	0	2	1	0	1	0	2	0			14
7/22	18	3	4	0					1	0	0	0	0	0	1	1	1	4	1	2	0	1	0	1			20
7/23	18	0	0	1					2	1	1	0	0	0	0	0	0	1	0	3	0	0	0	4			13
7/24	18	0	2	2					0	1	0	0	2	2	0	4	3	0	2	1	1	1	1	0			21
7/25	17	0	1	0					0	0	3	2	0	1	2	1			0	1	1	2	0	2			16
7/26	3	1	1	0																							2
7/27	17								1	1	1	3	2	4	-2	0	-2	0	0	0	1	-1	0	0	1		9
7/28	18	0							2	0	1	-1	0	0	0	2	1	-1	2	0	0	0	0	0	0		6
7/29	18	1							0	0	0	0	0	0	1	4	0	-1	2	0	0	0	0	0	0		7
7/30	18	1							0	0	1	-1	0	-2	6	0	2	2	0	-1	3	0	0	0	1		12
Total	583	38	19	23	6	8	4	3	5	10	9	6	17	12	30	29	34	36	40	17	33	34	32	46	30		521

Table 4. Sockeye salmon escapement tower counts for the Goodnews River by 20-minute observation period, 1987.

Date	No. of counting periods	Sockeye salmon counted for 20-minute observation during hour:																				Total No. Sockeye Salmon Counted				
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19		20	21	22	23
6/22	8																0	2	17	5	0	0	9	0	33	
6/23	17								2	0	0	0	0	0	0	0	2	6	3	2	16	15	6	1	53	
6/24	18	2							0	0	0	0	0	0	0	0	7	3	8	1	2	7	0	5	35	
6/25	18	2							0	0	0	1	0	4	0	3	25	2	16	3	3	11	9	14	19	112
6/26	18	6							0	1	0	0	1	8	14	0	1	69	20	38	0	1	15	9	0	183
6/27	18	6							1	0	0	0	0	0	2	19	4	52	4	37	3	10	24	24	3	189
6/28	1	0																							0	
6/29	17								4	5	3	11	2	4	14	8	16	11	16	12	12	10	8	4	1	141
6/30	1	2																							2	
7/1	5																			26	11	0	15	16	68	
7/2	17								4	1	5	3	20	13	6	9	9	23	11	17	19	21	12	19	10	202
7/3	1	22																							22	
7/4	17								3	5	2	4	28	20	18	14	22	22	27	49	29	32	22	27	19	343
7/5	1	48																							48	
7/6	17								7	1	4	5	5	19	20	60	17	42	16	32	11	10	81	53	23	406
7/7	21	19	5	10	7	5	7	3	16	0	1	2	12	58	33	5	59			73	27	41	29	26	438	
7/8	18	13							13	19	2	2	0	14	26	9	76	13	3	7	29	32	62	43	32	395
7/9	18	10							6	23	2	0	2	13	9	23	18	34	26	35	22	29	15	11	9	287
7/10	24	3	14	29	12	8	2	-1	20	1	4	0	5	44	0	20	36	15	8	25	22	22	9	93	19	410
7/11	23	20	14	34	17	5	5	4	0			10	1	10	29	10	3	8	12	21	22	16	9	3	14	281
7/12	1	17																							17	
7/13	17								0	0	2	5	1	11	-1	19	0	27	20	17	26	17	96	65	11	316
7/14	24	31	38	18	7	1	1	10	1	17	0	0	9	4	1	3	5	30	63	13	27	5	25	34	32	375
7/15	16	131							6	6	2	50	8	17	26	12	12	18	32	11	12	38	0		381	
7/16	18	2	15	0					1	15	7	2	4	5	34	45	6	17	17	28	13	7	2		220	
7/17	24	4	1	3	14	4	0	11	2	0	0	1	0	0	8	1	3	10	8	4	18	21	12	5	16	146
7/18	24	15	8	2	0	1	1	4	3	1	1	2	0	4	13	5	10	1	14	5	11	17	14	7	10	149
7/19	3	3	6	9																						18
7/20	15										1	3	0	1	3	2	5	12	19	9	13	16	9	6	16	115
7/21	18	1	7	10					0	1	0	0	0	0	1	6	20	14	1	3	5	3	5	5	5	82
7/22	18	6	2	4					3	0	3	2	3	4	10	6	6	31	7	11	16	20	4			138
7/23	18	7	2	4					1	1	0	0	0	0	4	2	12	15	18	10	3	4	5	25		113
7/24	18	4	2	1					0	0	0	0	0	2	11	1	2	10	13	10	7	2	1	3		69
7/25	17	6	7	7					0	1	0	0	2	7	3	9	7		4	9	9	9	18	5		103
7/26	3	8	4	2																						14
7/27	17								1	2	0	0	0	2	0	2	0	1	0	1	4	1	6	2	2	24
7/28	18	7							2	3	0	0	0	1	1	0	0	1	2	2	3	8	1	0	0	31
7/29	18	0							1	0	0	1	0	-1	0	1	1	3	2	1	0	0	4	0	1	14
7/30	18	5							0	0	0	0	0	1	-1	1	3	1	2	1	0	2	-1	2	1	17
Total	583	400	125	133	57	24	16	31	86	79	48	65	107	305	200	252	406	494	372	460	463	404	548	585	330	5,990

Table 5. Coho salmon escapement tower counts for the Goodnews River by 20-minute observation period, 1987.

Date	No. of counting periods	Coho salmon counted for 20-minute observation during hour:																					Total No. Coho Salmon Counted						
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20		21	22	23			
6/22	8																0	0	0	0	0	0	0	0	0	0	0	0	0
6/23	17							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/24	18	0						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/25	18	0						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/26	18	0						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/27	18	0						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/28	1	0																											0
6/29	17							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/30	1	0																											0
7/1	5																				0	0	0	0	0	0	0	0	0
7/2	17							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/3	1	0																											0
7/4	17							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/5	1	0																											0
7/6	17							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/7	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/8	18	0						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/9	18	0						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/10	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/11	23	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/12	1	0																											0
7/13	17							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/14	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/15	16	0																											0
7/16	18	0	0	0				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/17	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/18	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/19	3	0	0	0																									0
7/20	15										0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/21	18	0	0	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/22	18	0	0	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/23	18	0	0	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/24	18	0	0	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/25	17	0	0	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/26	3	0	0	0																									0
7/27	17							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/28	18	0						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/29	18	0						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/30	18	0						0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	1	1	1	12			18
Total	583	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	1	1	12			18	

Table 6. Pink salmon escapement tower counts for the Goodnews River by 20-minute observation period, 1987.

Date	No. of counting periods	Pink salmon counted for 20-minute observation during hour:																					Total No. Pink Salmon Counted			
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20		21	22	23
6/22	8																									0
6/23	17								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/24	18	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/25	18	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/26	18	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/27	18	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/28	1	0																								0
6/29	17								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6/30	1	0																								0
7/1	5																			0	0	0	0	0	0	0
7/2	17								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/3	1	0																								0
7/4	17								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/5	1	0																								0
7/6	17								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/7	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				0	0	0	0	0	0	0
7/8	18	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/9	18	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/10	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/11	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/12	1	0																								0
7/13	17								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/14	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/15	16	0														1	0	0	0	0	0	0	0	0	0	1
7/16	18	0	0	0												0	0	0	0	0	0	0	0	0	0	0
7/17	24	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2
7/18	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
7/19	3	0	0	0																						0
7/20	15									0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	2
7/21	18	0	0	0						0	0	0	0	0	0	2	3	0	0	0	0	0	0	0	0	5
7/22	18	0	0	0						0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
7/23	18	0	0	0						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
7/24	18	2	0	0						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
7/25	17	0	0	0						0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
7/26	3	0	0	0																						0
7/27	17								0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	0	-1
7/28	18	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/29	18	0							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/30	18	0							1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
Total	583	2	1	0	0	0	0	0	1	0	0	0	0	1	-1	0	3	3	0	3	2	0	0	0	2	17





Table 8. Daily estimated chinook salmon escapement past the Goodnews River counting tower, 1987.

Date	Number of twenty minute counts	Salmon counted during twenty minute counts (A)	Estimated counts missed due to poor visibility (B) <sup>a</sup>	Estimated twenty minute count (A+B)	Expanded hour count (A+B)*3	Estimated percent of daily run counted (C)	Estimated daily count [(A+B)*3]/C
6/22	8	0	-	0	0	49.1	0
6/23	17	0	-	0	0	76.1	0
6/24	18	0	-	0	0	80.1	0
6/25	18	0	0	0	0	80.1	0
6/26	18	1	0	1	3	80.1	4
6/27	18	0	0	0	0	80.1	0
6/28	1	0	-	-	-	4.0	8 <sup>b</sup>
6/29	17	0	4	4	12	76.1	16
6/30	1	0	-	-	-	4.0	36 <sup>b</sup>
7/1	5	1	5	6	18	32.3	56
7/2	17	9	8	17	51	76.1	67
7/3	1	3	-	-	-	4.0	59 <sup>b</sup>
7/4	17	9	4	13	39	76.1	51
7/5	1	1	-	-	-	4.0	91 <sup>b</sup>
7/6	17	30	3	33	99	76.1	130
7/7	21	11	1	12	36	83.2	43
7/8	18	9	1	10	30	80.1	37
7/9	18	17	2	19	57	80.1	71
7/10	24	43	4	47	141	100.0	141
7/11	23	20	0	20	60	98.4	61
7/12	1	2	-	-	-	4.0	58 <sup>b</sup>
7/13	17	14	-	14	42	76.1	55
7/14	24	71	-	71	213	100.0	213
7/15	16	34	-	34	102	77.3	132
7/16	18	31	-	31	93	86.6	107
7/17	24	38	-	38	114	100.0	114
7/18	24	40	-	40	120	100.0	120
7/19	3	5	-	-	-	13.4	85 <sup>b</sup>
7/20	15	12	-	12	36	73.2	49
7/21	18	14	-	14	42	86.6	48
7/22	18	20	-	20	60	86.6	69
7/23	18	13	-	13	39	86.6	45
7/24	18	21	-	21	63	86.6	73
7/25	17	16	-	16	48	82.5	58
7/26	3	2	-	-	-	13.4	47 <sup>b</sup>
7/27	17	9	-	9	27	76.1	35
7/28	18	6	-	6	18	80.1	22
7/29	18	7	-	7	21	80.1	26
7/30	18	12	-	12	36	80.1	45
Total	583	521	32	540	1,620		2,274

<sup>a</sup> Unusually high, turbid water conditions from June 25 until July 12 caused poor visibility during tower counts. It is estimated that some fish passage was missed during this period. The counts missed were estimated by the percentage of the river the observer could monitor along where in the river fish passage historically occurs.

<sup>b</sup> Average of previous and following estimated daily count.

Table 9. Daily estimated sockeye salmon escapement past the Goodnews River counting tower, 1987.

Date	Number of twenty minute counts	Salmon counted during twenty minute counts (A)	Estimated counts missed due to poor visibility (B) <sup>a</sup>	Estimated twenty minute count (A+B)	Expanded hour count (A+B)*3	Estimated percent of daily run counted (C)	Estimated daily count [(A+B)*3]/C
6/22	8	33	-	33	99	44.6	222
6/23	17	53	-	53	159	82.3	193
6/24	18	35	-	35	105	86.6	121
6/25	18	112	11	123	370	86.6	427
6/26	18	183	18	201	604	86.6	697
6/27	18	189	47	236	709	86.6	818
6/28	1	0	-	-	-	4.3	794 <sup>b</sup>
6/29	17	141	71	212	635	82.3	771
6/30	1	2	-	-	-	4.3	805 <sup>b</sup>
7/1	5	68	7	75	224	26.7	840
7/2	17	202	101	303	909	82.3	1,104
7/3	1	22	-	-	-	4.3	1,333 <sup>b</sup>
7/4	17	343	86	429	1,286	82.3	1,562
7/5	1	48	-	-	-	4.3	1,595 <sup>b</sup>
7/6	17	406	41	447	1,340	82.3	1,627
7/7	21	438	44	482	1,445	82.1	1,761
7/8	18	395	20	415	1,244	86.6	1,436
7/9	18	287	14	301	904	86.6	1,044
7/10	24	410	21	431	1,292	100.0	1,292
7/11	23	281	0	281	843	96.5	873
7/12	1	17	-	-	-	4.3	1,012 <sup>b</sup>
7/13	17	316	-	316	948	82.3	1,151
7/14	24	375	-	375	1,125	100.0	1,125
7/15	16	381	-	381	1,143	80.9	1,412
7/16	18	220	-	220	660	86.7	762
7/17	24	146	-	146	438	100.0	438
7/18	24	149	-	149	447	100.0	447
7/19	3	18	-	-	-	10.0	449 <sup>b</sup>
7/20	15	115	-	115	345	76.6	450
7/21	18	82	-	82	246	86.7	284
7/22	18	138	-	138	414	86.7	478
7/23	18	113	-	113	339	86.7	391
7/24	18	69	-	69	207	86.7	239
7/25	17	103	-	103	309	80.9	382
7/26	3	14	-	-	-	10.0	235 <sup>b</sup>
7/27	17	24	-	24	72	82.3	87
7/28	18	31	-	31	93	86.6	107
7/29	18	14	-	14	42	86.6	48
7/30	18	17	-	17	51	86.6	59
Total	583	5,990	480	6,349	19,046		28,871

<sup>a</sup> Unusually high, turbid water conditions from June 25 until July 12 caused poor visibility during tower counts. It is estimated that some fish passage was missed during this period. The counts missed were estimated by the percentage of the river the observer could monitor along where in the river fish passage historically occurs.

<sup>b</sup> Average of previous and following estimated daily count.

Table 10. Daily estimated coho and pink salmon escapement past the Goodnews River counting tower, 1987.

Date	Number of twenty minute counts	Salmon counted during twenty minute counts (A)	Estimated counts missed due to poor visibility (B) <sup>a</sup>	Estimated twenty minute count (A+B)	Expanded hour count (A+B)*3	Estimated percent of daily run counted (C) <sup>b</sup>	Estimated daily count [(A+B)*3]/C
Coho Salmon							
7/27	17	0	-	0	0	82.3	0
7/28	18	0	-	0	0	86.6	0
7/29	18	0	-	0	0	86.6	0
7/30	18	18	-	18	54	86.6	62
Total	583	18	-	18	54		62
Pink Salmon							
7/13	17	0	-	0	0	82.3	0
7/14	24	0	-	0	0	100.0	0
7/15	16	1	-	1	3	80.9	4
7/16	18	0	-	0	0	86.7	0
7/17	24	2	-	2	6	100.0	6
7/18	24	1	-	1	3	100.0	3
7/19	3	0	-	-	-	10.0	5 <sup>c</sup>
7/20	15	2	-	2	6	76.6	8
7/21	18	5	-	5	15	86.7	17
7/22	18	1	-	1	3	86.7	3
7/23	18	1	-	1	3	86.7	3
7/24	18	2	-	2	6	86.7	7
7/25	17	1	-	1	3	80.9	4
7/26	3	0	-	-	-	10.0	0 <sup>c</sup>
7/27	17	-1	-	(1)	(3)	82.3	(4)
7/28	18	0	-	0	0	86.6	0
7/29	18	0	-	0	0	86.6	0
7/30	18	2	-	2	6	86.6	7
Total	583	17	-	17	51		64

- <sup>a</sup> Unusually high, turbid water conditions from June 25 until July 12 caused poor visibility during tower counts. It is estimated that some fish passage was missed during this period. The counts missed were estimated by the percentage of the river the observer could monitor along where in the river fish passage historically occur.
- <sup>b</sup> Estimated coho and pink salmon percent of daily run counted is based on sockeye salmon expansion data.
- <sup>c</sup> Average of previous and following estimated daily count.

Table 11. Daily estimated chum salmon escapement past the Goodnews River counting tower, 1987.

Date	Number of twenty minute counts	Salmon counted during twenty minute counts (A)	Estimated counts missed due to poor visibility (B) <sup>a</sup>	Estimated twenty minute count (A+B)	Expanded hour count (A+B)*3	Estimated percent of daily run counted (C)	Estimated daily count [(A+B)*3]/C
6/22	8	0	-	0	0	53.2	0
6/23	17	0	-	0	0	77.5	0
6/24	18	0	-	0	0	82.7	0
6/25	18	0	0	0	0	82.7	0
6/26	18	2	0	2	6	82.7	7
6/27	18	0	0	0	0	82.7	0
6/28	1	0	-	-	-	5.1	9 <sup>b</sup>
6/29	17	3	2	5	14	77.5	17
6/30	1	0	-	-	-	5.1	61 <sup>b</sup>
7/ 1	5	12	1	13	40	37.6	105
7/ 2	17	10	5	15	45	77.5	58
7/ 3	1	3	-	-	-	5.1	89 <sup>b</sup>
7/ 4	17	25	6	31	94	77.5	121
7/ 5	1	2	-	-	-	5.1	141 <sup>b</sup>
7/ 6	17	38	4	42	125	77.5	162
7/ 7	21	43	4	47	142	84.3	168
7/ 8	18	24	1	25	76	82.7	91
7/ 9	18	48	2	50	151	82.7	183
7/10	24	109	5	114	343	100.0	343
7/11	23	92	0	92	276	98.3	281
7/12	1	5	-	-	-	5.1	330 <sup>b</sup>
7/13	17	98	-	98	294	77.5	379
7/14	24	136	-	136	408	100.0	408
7/15	16	77	-	77	231	79.8	289
7/16	18	352	-	352	1,056	86.8	1,216
7/17	24	330	-	330	990	100.0	990
7/18	24	337	-	337	1,011	100.0	1,011
7/19	3	254	-	-	-	12.1	695 <sup>b</sup>
7/20	15	94	-	94	282	74.6	378
7/21	18	209	-	209	627	86.8	722
7/22	18	310	-	310	930	86.8	1,071
7/23	18	428	-	428	1,284	86.8	1,479
7/24	18	327	-	327	981	86.8	1,130
7/25	17	470	-	470	1,410	82.1	1,717
7/26	3	97	-	-	-	12.1	1,069 <sup>b</sup>
7/27	17	109	-	109	327	77.5	422
7/28	18	428	-	428	1,284	82.7	1,532
7/29	18	140	-	140	420	82.7	508
7/30	18	87	-	87	261	82.7	315
Total	583	4,699	31	4,369	13,107		17,519

<sup>a</sup> Unusually high, turbid water conditions from June 25 until July 12 caused poor visibility during tower counts. It is estimated that some fish passage was missed during this period. The counts missed were estimated by the percentage of the river the observer could monitor along where in the river fish passage historically occurs.

<sup>b</sup> Average of previous and following estimated daily count.

Table 12. Daily and cumulative salmon escapement estimates, Goodnews River tower, 1987.

Date	Chinook				Sockeye				Coho				Pink				Chum			
	Daily		Cumulative		Daily		Cumulative		Daily		Cumulative		Daily		Cumulative		Daily		Cumulative	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
6/22	0	0.00	0	0.00	222	0.77	222	0.77									0	0.00	0	0.00
6/23	0	0.00	0	0.00	193	0.67	415	1.44									0	0.00	0	0.00
6/24	0	0.00	0	0.00	121	0.42	536	1.86									0	0.00	0	0.00
6/25	0	0.00	0	0.00	427	1.48	963	3.34									0	0.00	0	0.00
6/26	4	0.18	4	0.18	697	2.41	1660	5.75									7	0.04	7	0.04
6/27	0	0.00	4	0.18	818	2.83	2478	8.58									0	0.00	7	0.04
6/28	8	0.35	12	0.53	794	2.75	3272	11.33									9	0.05	16	0.09
6/29	16	0.70	28	1.23	771	2.67	4043	14.00									17	0.10	33	0.19
6/30	36	1.58	64	2.82	805	2.79	4848	16.79									61	0.35	94	0.54
7/01	56	2.46	120	5.28	840	2.91	5688	19.70									105	0.60	199	1.14
7/02	67	2.95	187	8.23	1104	3.82	6792	23.53									58	0.33	257	1.47
7/03	59	2.60	246	10.83	1333	4.62	8125	28.14					0	0.00	0	0.00	89	0.51	346	1.98
7/04	51	2.24	297	13.07	1562	5.41	9687	33.55					0	0.00	0	0.00	121	0.69	467	2.67
7/05	91	4.01	388	17.08	1595	5.52	11282	39.08					0	0.00	0	0.00	141	0.80	608	3.47
7/06	130	5.72	518	22.80	1627	5.64	12909	44.71					0	0.00	0	0.00	162	0.92	770	4.40
7/07	43	1.89	561	24.69	1761	6.10	14670	50.81					0	0.00	0	0.00	168	0.96	938	5.35
7/08	37	1.63	598	26.32	1436	4.97	16106	55.79					0	0.00	0	0.00	91	0.52	1029	5.87
7/09	71	3.13	669	29.45	1044	3.62	17150	59.40					0	0.00	0	0.00	183	1.04	1212	6.92
7/10	141	6.21	810	35.65	1292	4.48	18442	63.88					0	0.00	0	0.00	343	1.96	1555	8.88
7/11	61	2.68	871	38.34	873	3.02	19315	66.90					0	0.00	0	0.00	281	1.60	1836	10.48
7/12	58	2.55	929	40.89	1012	3.51	20327	70.41					0	0.00	0	0.00	330	1.88	2166	12.37
7/13	55	2.42	984	43.31	1151	3.99	21478	74.39					0	0.00	0	0.00	379	2.16	2545	14.53
7/14	213	9.38	1197	52.68	1125	3.90	22603	78.29					0	0.00	0	0.00	408	2.33	2953	16.86
7/15	132	5.81	1329	58.49	1412	4.89	24015	83.18					4	6.35	4	6.35	289	1.65	3242	18.51
7/16	107	4.71	1436	63.20	762	2.64	24777	85.82					0	0.00	4	6.35	1216	6.94	4458	25.45
7/17	114	5.02	1550	68.22	438	1.52	25215	87.34	0	0.00	0	0.00	6	9.52	10	15.87	990	5.65	5448	31.10
7/18	120	5.28	1670	73.50	447	1.55	25662	88.89	0	0.00	0	0.00	3	4.76	13	20.63	1011	5.77	6459	36.87
7/19	85	3.74	1755	77.24	449	1.56	26111	90.44	0	0.00	0	0.00	5	7.94	18	28.57	695	3.97	7154	40.84
7/20	49	2.16	1804	79.40	450	1.56	26561	92.00	0	0.00	0	0.00	8	12.70	26	41.27	378	2.16	7532	43.00
7/21	48	2.11	1852	81.51	284	0.98	26845	92.98	0	0.00	0	0.00	17	26.98	43	68.25	722	4.12	8254	47.12
7/22	69	3.04	1921	84.55	478	1.66	27323	94.64	0	0.00	0	0.00	3	4.76	46	73.02	1071	6.11	9325	53.23
7/23	45	1.98	1966	86.53	391	1.35	27714	95.99	0	0.00	0	0.00	3	4.76	49	77.78	1479	8.44	10804	61.68
7/24	73	3.21	2039	89.74	239	0.83	27953	96.82	0	0.00	0	0.00	7	11.11	56	88.89	1130	6.45	11934	68.13
7/25	58	2.55	2097	92.30	382	1.32	28335	98.14	0	0.00	0	0.00	4	6.35	60	95.24	1717	9.80	13651	77.93
7/26	47	2.07	2144	94.37	235	0.81	28570	98.96	0	0.00	0	0.00	0	0.00	60	95.24	1069	6.10	14720	84.03
7/27	35	1.54	2179	95.91	87	0.30	28657	99.26	0	0.00	0	0.00	-4	-6.35	56	88.89	422	2.41	15142	86.44
7/28	22	0.97	2201	96.88	107	0.37	28764	99.63	0	0.00	0	0.00	0	0.00	56	88.89	1552	8.86	16694	95.30
7/29	26	1.14	2227	98.02	48	0.17	28812	99.80	0	0.00	0	0.00	0	0.00	56	88.89	508	2.90	17202	98.20
7/30	45	1.98	2272	100.00	59	0.20	28871	100.00	62	100.00	62	100.00	7	11.11	63	100.00	315	1.80	17517	100.00

Table 13. Summary of tagged and flagged salmon observations,  
Goodnews River counting tower, 1987.

South Peninsula Tagging Study:

<u>Species</u>	<u>Date</u>	<u>Comments</u>
Chum Salmon	7/13/87	Spaghetti Tag 16708, Male, 561 mm Length
Chum Salmon	7/24/87	Seen during 1800 count from tower.
Chum Salmon	7/25/87	Seen during 2200 count from tower.
Chum Salmon	7/30/87	Carcass found on gravel bar 200 meters above the tower.

Goodnews River Experimental Tagging Study:

29 Chum Salmon: Captured and Flagged below Tower on 7/14/87:  
30 Sockeye Salmon: Captured and Flagged below Tower on 7/17/87:

<u>Species</u>	<u>Date</u>	<u>Comments</u>
Chum Salmon	7/15/87	Seen during 1500 count from tower.
Chum Salmon	7/17/87	Seen during 1900 count from tower.
Chum Salmon	7/17/87	Seen during 2200 count from tower.
Chum Salmon	7/18/87	Seen during 1300 count from tower.
Sockeye Salmon	7/20/87	Seen during 2300 count from tower.
Sockeye Salmon	7/22/87	Seen during 2400 count from tower.
Chum Salmon	7/22/87	Seen during 2400 count from tower.
Chum Salmon	7/23/87	Seen during 1700 count from tower.
Chum Salmon	7/23/87	Seen during 1100 count from tower.
Chum Salmon	7/23/87	Seen during 1100 count from tower.
Chum Salmon	7/23/87	Seen during 2400 count from tower.
Chum Salmon	7/23/87	Seen during 2400 count from tower.
Chum Salmon	7/24/87	Seen during 1800 count from tower.
Sockeye Salmon	7/24/87	Seen during 2100 count from tower.
Sockeye Salmon	7/27/87	Seen during 1200 count from tower.
	7/30/87	Last day of operation.

Observed 4 Sockeye and 11 Chum Flagged Salmon During Counts.

Table 14. Age, sex, and size composition of chinook salmon beach seine sample from the Goodnews River, 1987.

	Age Class <sup>a</sup>				<u>Total</u>
	<u>1.2</u>	<u>1.3</u>	<u>1.4</u>	<u>1.5</u>	
<u>Females</u>					
Mean Length	537.0	772.9	808.4	862.7	
Std. Error	45.00	40.81	16.61	13.92	
Range	492-582	611-920	742-886	840-888	
Sample Size	2	7	9	3	21
<u>Males</u>					
Mean Length	460.8	760.0	851.0	0.0	
Std. Error	30.85	54.10	19.07	0.00	
Range	397-567	663-850	767-920	0-0	
Sample Size	5	3	10	0	18
<u>Total</u>					
Mean Length	482.6	769.0	830.8	862.7	
Std. Error	27.33	31.24	13.37	13.92	
Range	397-582	611-920	742-920	840-888	
Sample Size	7	10	19	3	39

a European age designation



Table 15. Age, sex, and size composition of sockeye salmon beach seine sample from the Goodnews River, 1987.

	<u>Age Class<sup>a</sup></u>			<u>Total</u>
	<u>1.2</u>	<u>1.3</u>	<u>1.4</u>	
<u>Females</u>				
Mean Length	517.4	559.7	575.3	
Std. Error	6.01	1.76	10.83	
Range	455-584	438-613	527-612	
Sample Size	35	227	9	271
<u>Males</u>				
Mean Length	577.1	600.5	631.0	
Std. Error	7.47	1.63	7.01	
Range	500-622	508-666	577-679	
Sample Size	23	269	14	306
<u>Total</u>				
Mean Length	541.1	581.9	609.2	
Std. Error	6.04	1.50	8.24	
Range	455-622	438-666	527-679	
Sample Size	58	496	23	577

a European age designation

Table 16. Age, sex, and size composition of chum salmon beach seine sample from the Goodnews River, 1987.

	Age Class <sup>a</sup>			<u>Total</u>
	<u>0.2</u>	<u>0.3</u>	<u>0.4</u>	
<u>Females</u>				
Mean Length	540.0	561.7	591.8	
Std. Error	0.00	2.86	3.83	
Range	540-540	435-665	540-685	
Sample Size	1	104	47	152
<u>Males</u>				
Mean Length	0.0	595.4	621.2	
Std. Error	0.00	2.04	2.73	
Range	0-0	501-687	540-713	
Sample Size	0	174	141	315
<u>Total</u>				
Mean Length	540.0	582.8	613.9	
Std. Error	0.00	1.93	2.44	
Range	540-540	435-687	540-713	
Sample Size	1	278	188	467

a European age designation

Table 17. Aerial survey and tower count salmon escapement estimate  
Goodnews River, 1987.

Aerial survey estimates

Goodnews River	<u>Chinook</u>	<u>Sockeye</u>	<u>Coho</u>	<u>Pink</u>	<u>Chum</u>
Middle Fork	2,222	24,505	2,420	520	9,789
North Fork	2,244	19,786	3,715	1,340	12,148
Total	4,466	44,291	6,135	1,860	21,937

Aerial survey and counting tower comparison, 1987

Aerial survey estimate  
above the counting  
tower site

	<u>Chinook</u>	<u>Sockeye</u>	<u>Coho</u>	<u>Pink</u>	<u>Chum</u>
July 28, 1987	2,191	24,505	1,645	320	9,689

Counting tower estimate  
July 28, 1987

	2,203	28,764	0	57	16,696
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Percentage the aerial  
estimate of tower

	99.5%	85.2%		561.4%	58.0%
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Escapement estimate as of July 28, 1987

Goodnews River	<u>Chinook</u>	<u>Sockeye</u>	<u>Coho</u>	<u>Pink</u>	<u>Chum</u>
Middle Fork	2,234	28,764		93	16,868
North Fork	2,256	23,225		239	20,933
Total	4,490	51,989		331	37,802

Table 18. Goodnews River sport fish creel census of guided fishermen, 1987.

Guided Fisherman				Salmon													
Date	Fisherman	Hours	Fishesman Hours	Rainbow		Char		Grayling		Lake Trout		Chinook		Sockeye		Chum	
				H <sup>a</sup>	R <sup>b</sup>	H	R	H	R	H	R	H	R	H	R	H	R
June 20	6	4	24	0	0	0	0	0	0	0	0	0	11	0	0	0	0
June 21	6	9	54	0	2	0	0	0	0	0	0	0	20	0	0	0	0
June 22	6	9	54	0	4	0	0	0	0	0	0	1	4	0	1	1	3
June 23	6	9	54	0	2	0	0	0	0	0	0	0	8	0	0	0	1
June 24	6	9	54	0	0	0	0	0	0	0	0	0	21	0	0	0	1
June 25	6	9	54	1	17	0	0	0	0	0	0	0	9	0	0	0	0
June 26	6	4	24	0	0	0	0	0	0	0	0	0	5	0	0	0	42
June 27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
June 28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
June 29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
June 30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
July 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
July 2	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
July 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
July 4	5	9	45	0	2	0	0	0	0	0	0	0	24	0	1	1	3
July 5	19	14	115	0	3	0	0	0	8	0	0	0	16	0	0	2	7
July 6	19	14	115	0	0	0	0	2	0	0	0	1	9	0	0	1	7
July 7	19	16	143	0	6	0	0	2	4	0	0	0	6	0	0	0	0
July 8	19	10	59	0	4	0	0	1	1	0	0	5	14	0	2	0	4
July 9	19	15	147	0	6	0	0	1	3	0	0	3	8	0	0	1	5
July 10	5	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0
July 11	8	12	48	0	5	0	0	0	5	0	0	0	0	0	0	1	9
July 12	8	17	68	0	7	0	0	2	10	0	0	0	0	0	0	0	15
July 13	8	18	72	0	7	0	3	0	3	0	0	0	6	1	0	2	15
July 14	8	18	72	0	17	0	0	0	5	1	0	0	0	0	1	0	11
July 15	8	18	72	0	15	0	0	0	2	0	0	0	0	0	0	1	18
July 16	8	18	68	0	13	2	1	0	4	0	0	0	1	0	0	0	10
July 17	4	3	12	0	1	0	0	0	0	0	0	0	0	0	0	0	1
July 18	4	2	8	0	6	0	0	0	5	0	0	0	0	0	0	0	21
July 19	13	15	168	0	10	2	10	2	0	0	0	0	0	0	0	0	25
July 20	12	14	152	0	11	0	1	1	0	0	0	0	0	0	0	0	29
July 21	11	11	128	0	12	0	12	0	2	0	0	0	1	1	0	3	32
July 22	12	16	160	0	8	2	40	0	3	0	0	0	0	0	1	1	31
July 23	12	17	164	0	7	3	45	0	2	0	0	0	2	0	0	3	16
July 24	4	9	36	0	6	0	40	0	1	0	0	0	0	0	0	10	23
July 25	5	2	10	0	0	0	3	0	0	0	0	0	0	0	0	0	0
July 26	5	9	45	0	3	4	15	0	2	0	0	0	0	0	0	0	0
July 27	5	9	45	0	1	1	10	0	3	0	0	0	0	0	0	0	1
July 28	5	9	45	0	6	2	10	1	1	0	0	0	0	0	0	0	1
July 29	5	9	45	0	10	0	7	0	0	0	0	0	0	0	0	0	1
July 30	5	9	45	0	3	4	26	0	3	0	0	0	0	0	0	0	1
Subtotal	298	367	2,406	1	199	20	223	12	67	1	0	10	165	3	6	27	333

<sup>a</sup> Harvested  
<sup>b</sup> Released

Table 19. Goodnews River sport fish creel census of unguided fishermen, 1987.

<u>Unguided fisherman, rafters</u>															
<u>Dates</u>	<u>Fisherman Days</u>	<u>Rainbow</u>		<u>Char</u>		<u>Grayling</u>		<u>Lake Trout</u>		<u>Chinook</u>		<u>Salmon Sockeye</u>		<u>Chum</u>	
		<u>H<sup>a</sup></u>	<u>R<sup>b</sup></u>	<u>H</u>	<u>R</u>	<u>H</u>	<u>R</u>	<u>H</u>	<u>R</u>	<u>H</u>	<u>R</u>	<u>H</u>	<u>R</u>	<u>H</u>	<u>R</u>
July 11 to July 15	35	7	?	0	2	2	6	0	2	1	0	0	0	0	6
July 15 to July 20	12	0	65	2	?	2	?							0	2
Subtotal	47	7	65	2	2	4	6	0	2	1	0	0	0	0	8
Guided and Unguided Total		8	264	22	225	16	73	1	2	11	165	3	6	27	341

<sup>a</sup> Harvested

<sup>b</sup> Released

## FIGURES

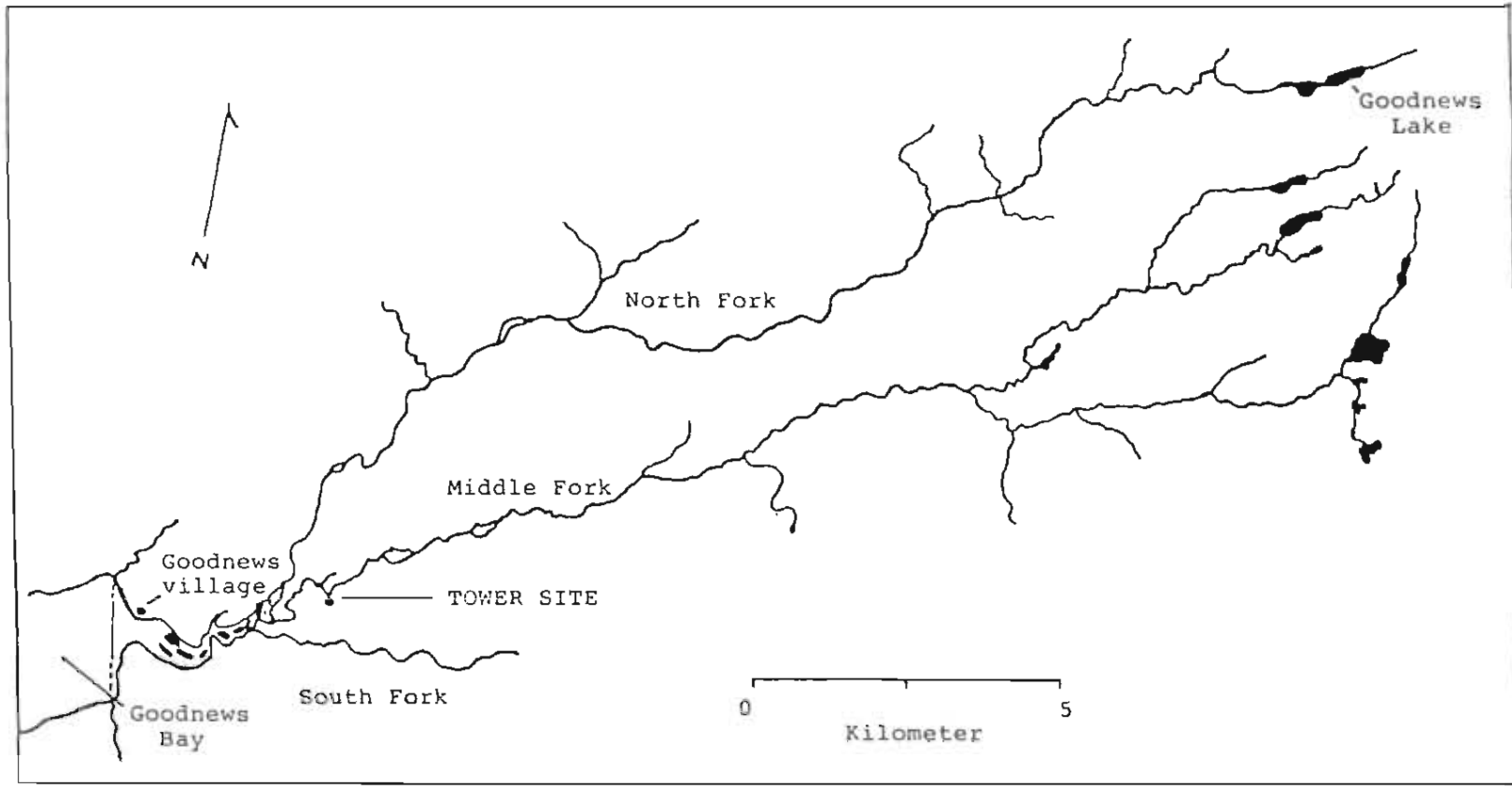


Figure 1. Map of the Goodnews River drainage.

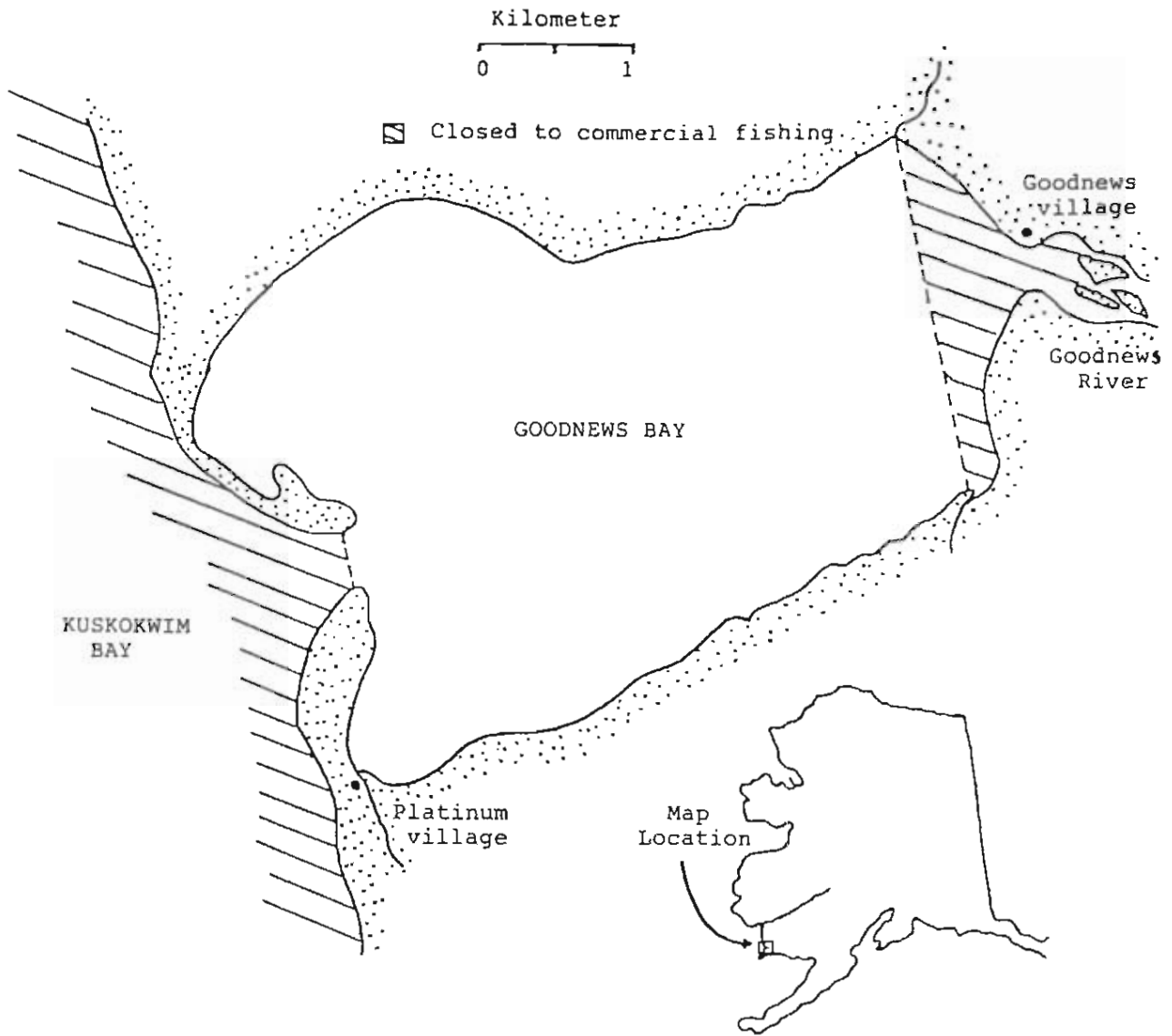


Figure 2. Map of Goodnews Bay, District 5, of the Kuskokwim Management Area.



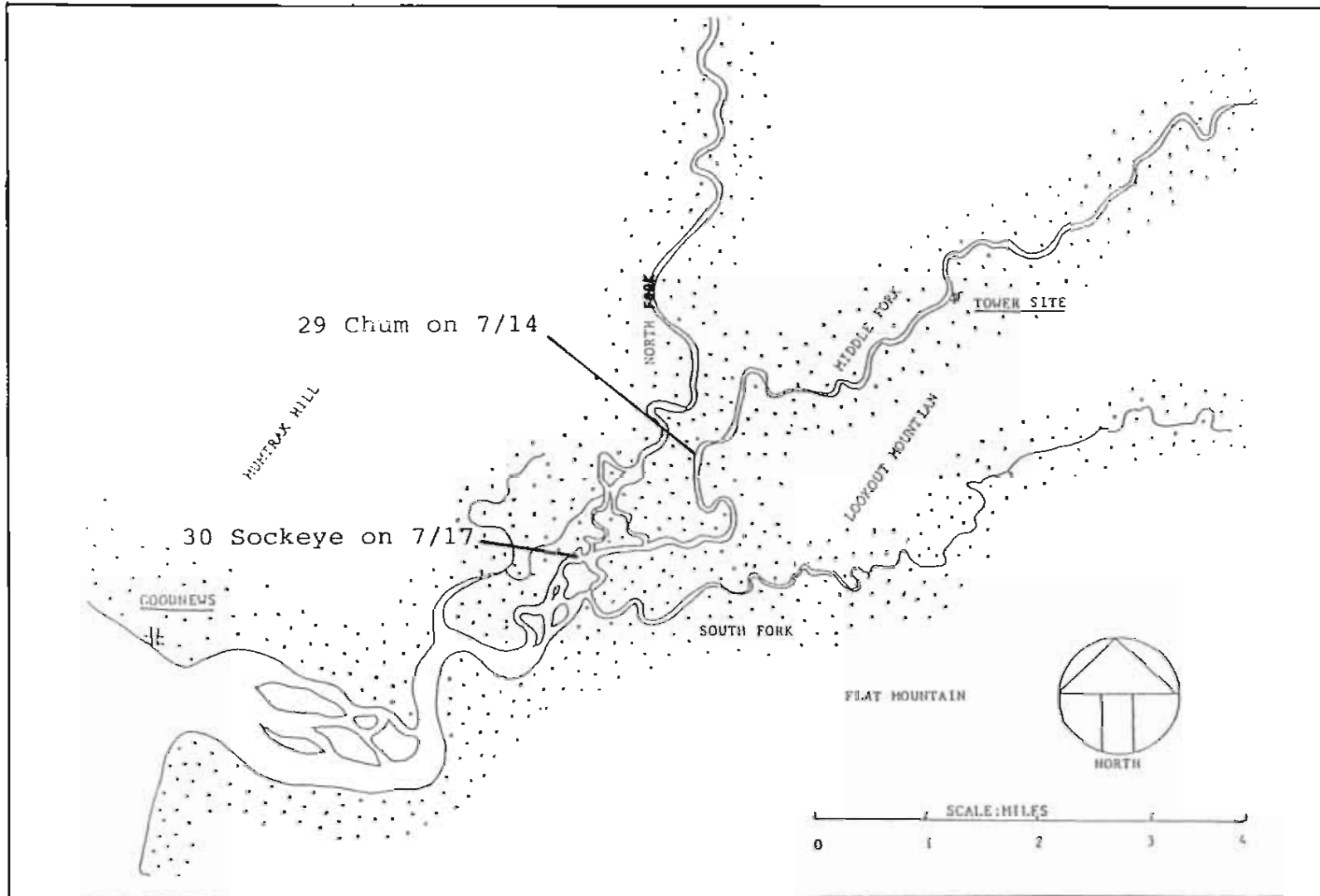


Figure 3. Location of tagged salmon release, Goodnews River, 1987.

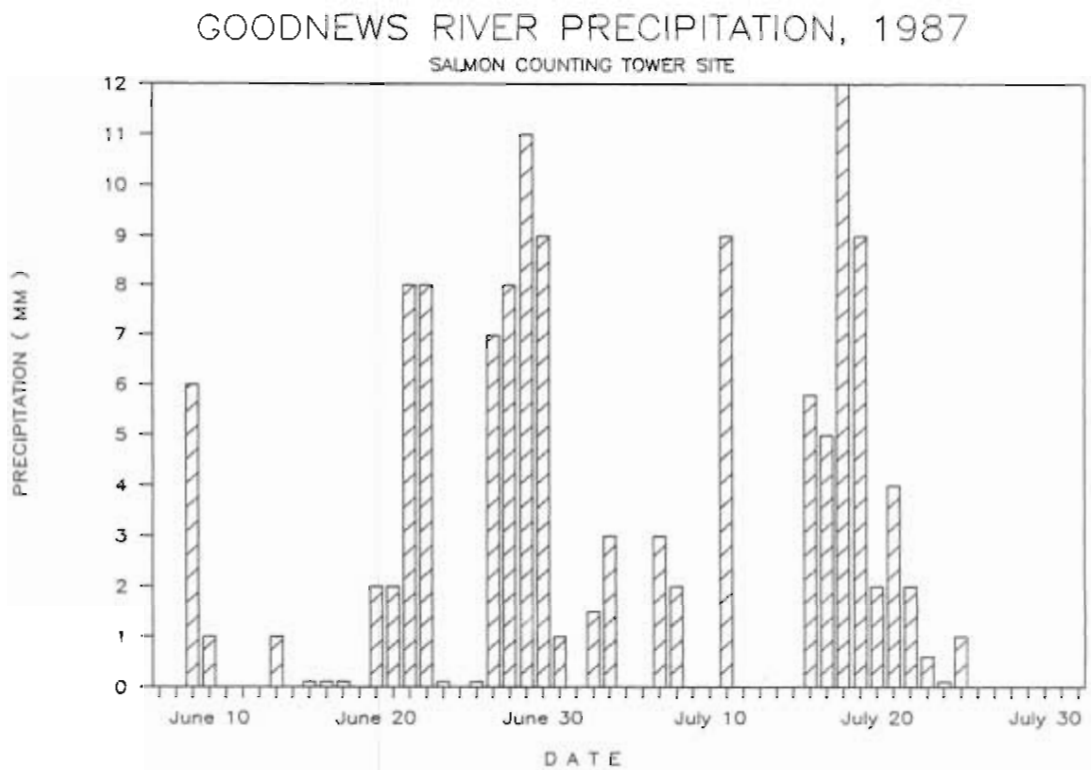
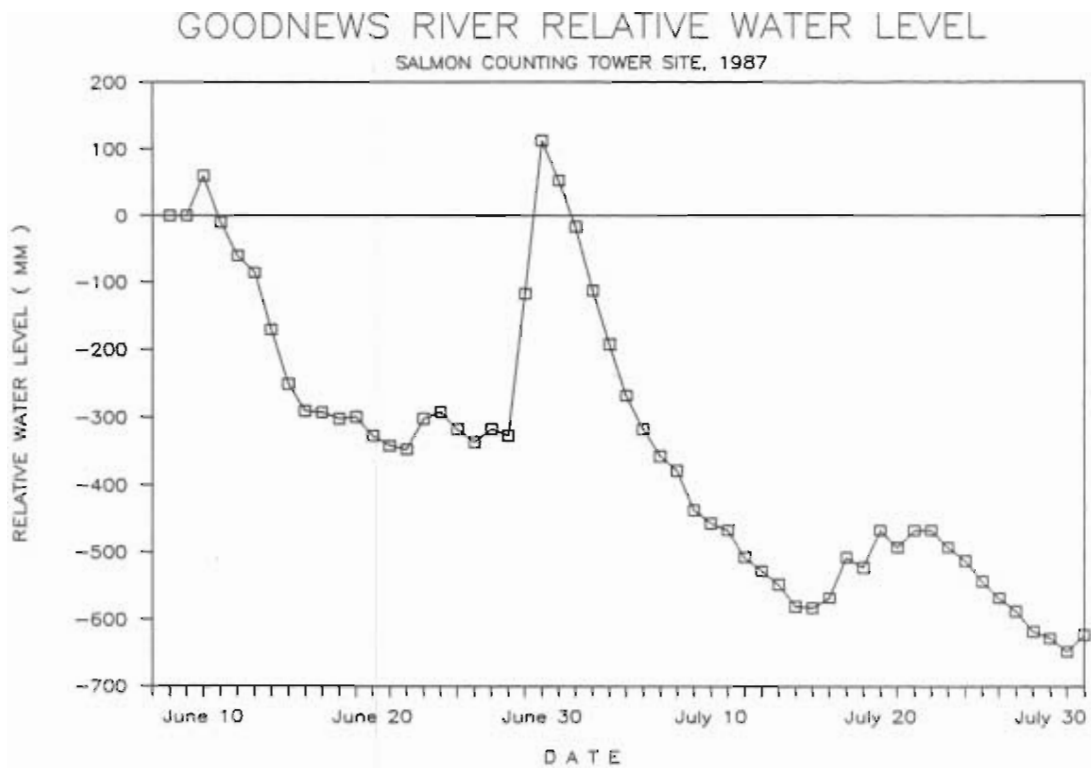


Figure 4. Relative water level and percipitation, Goodnews River counting tower, 1987.

# GOODNEWS RIVER COUNTING TOWER

## CHINOOK SALMON MIGRATION TIMING

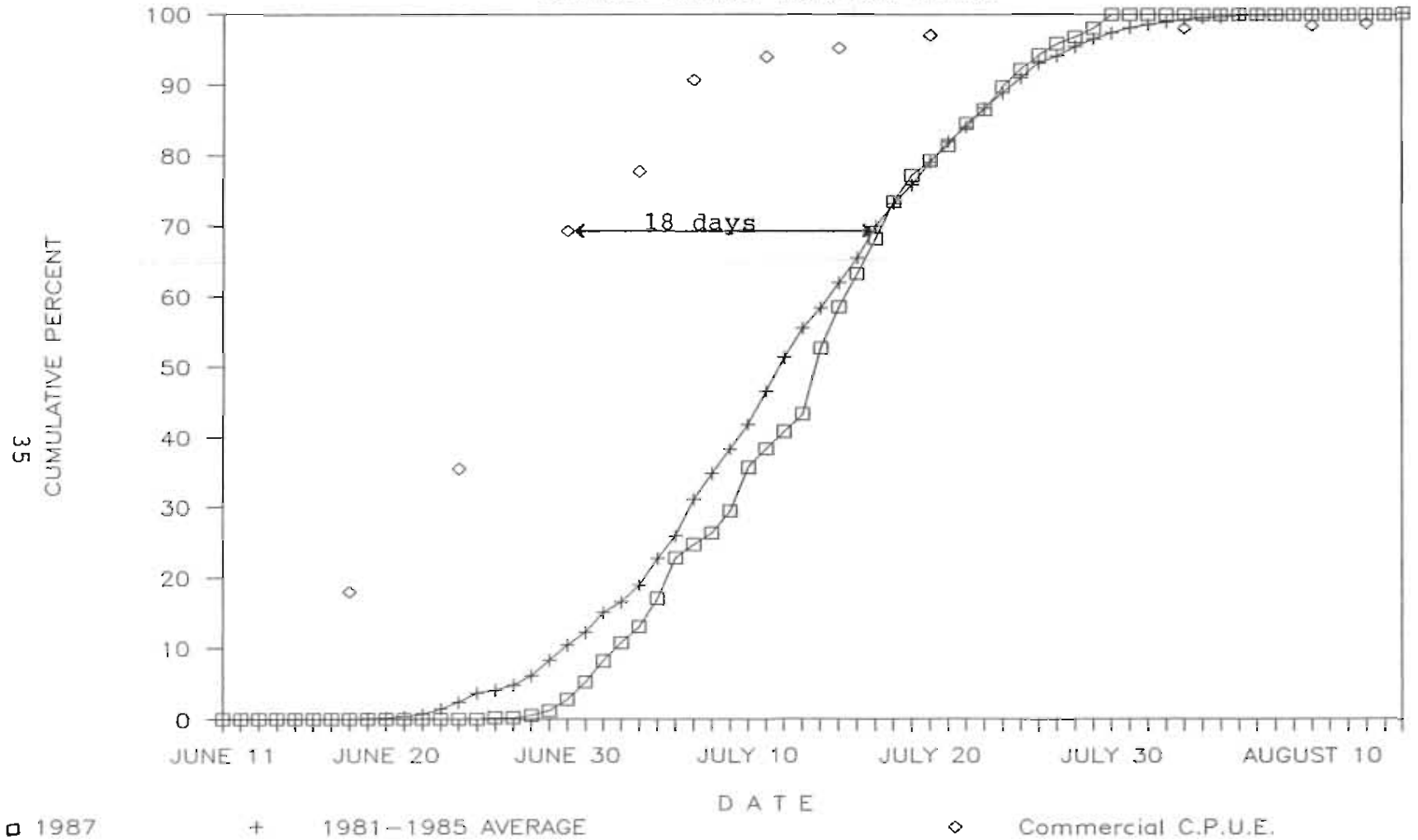


Figure 5. Chinook salmon migration timing, Goodnews River counting tower, 1987.

# GOODNEWS RIVER COUNTING TOWER

## SOCKEYE SALMON MIGRATION TIMING

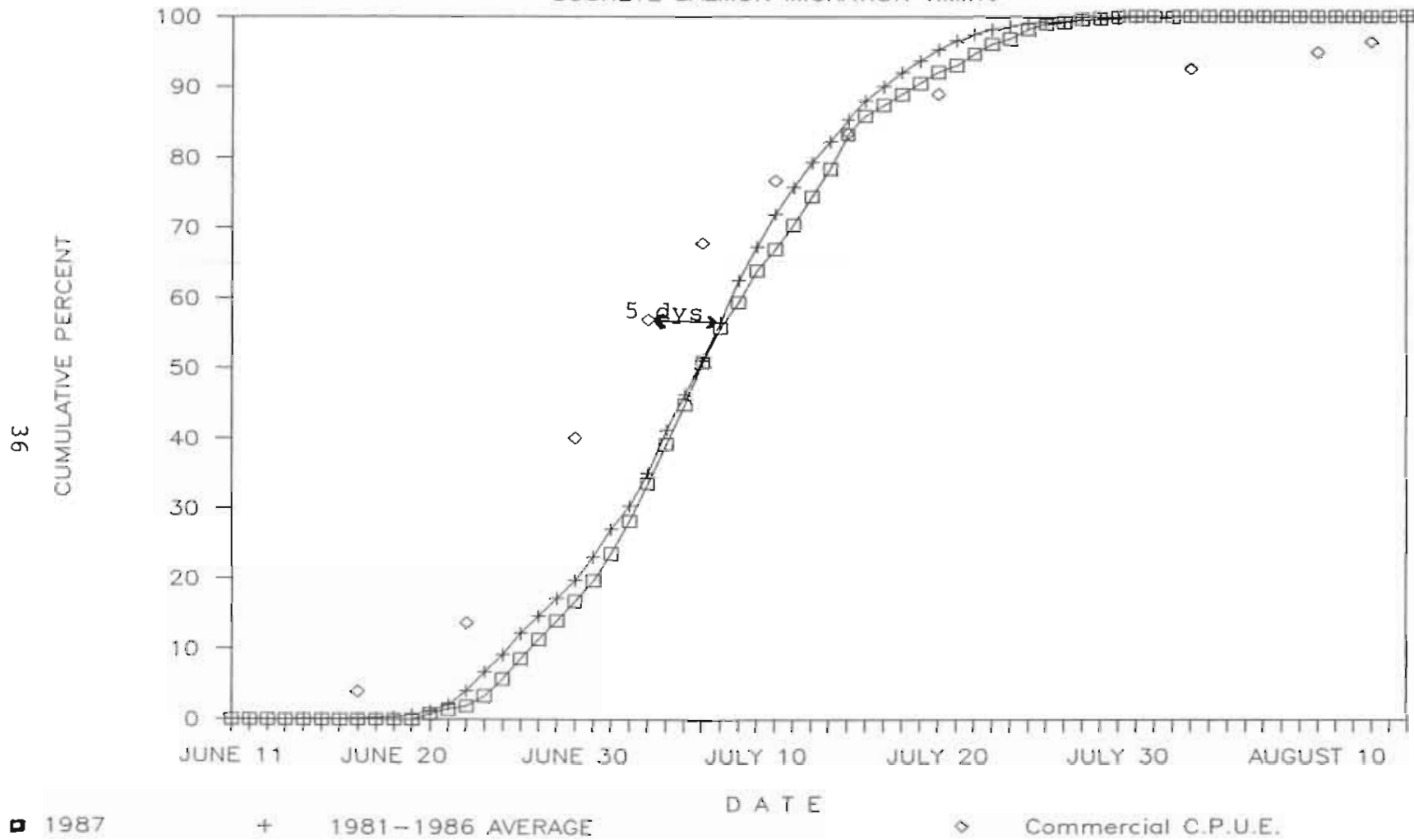


Figure 6. Sockeye salmon migration timing, Goodnews River counting tower, 1987.

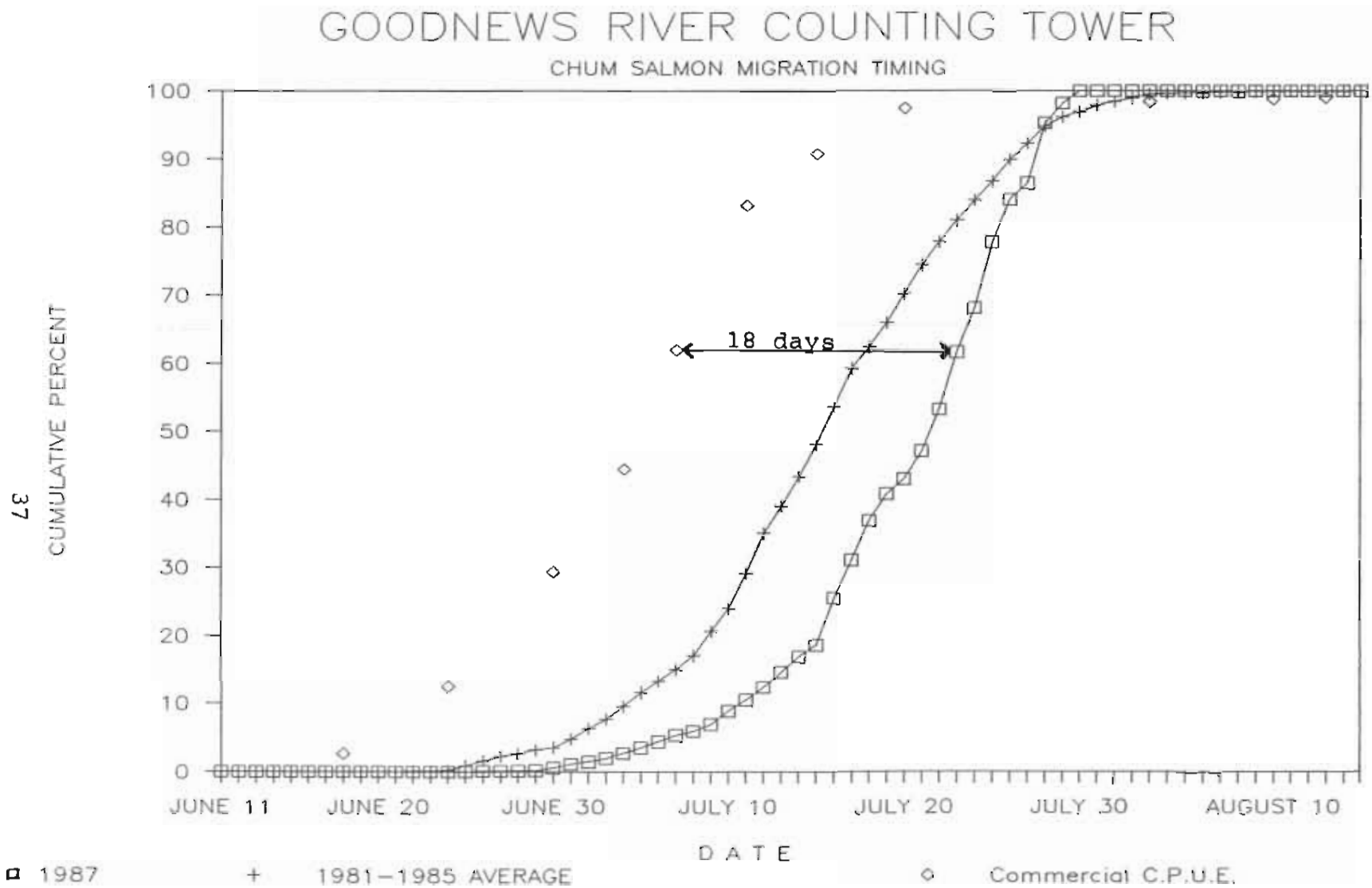


Figure 7. Chum salmon migration timing, Goodnews River counting tower, 1987.

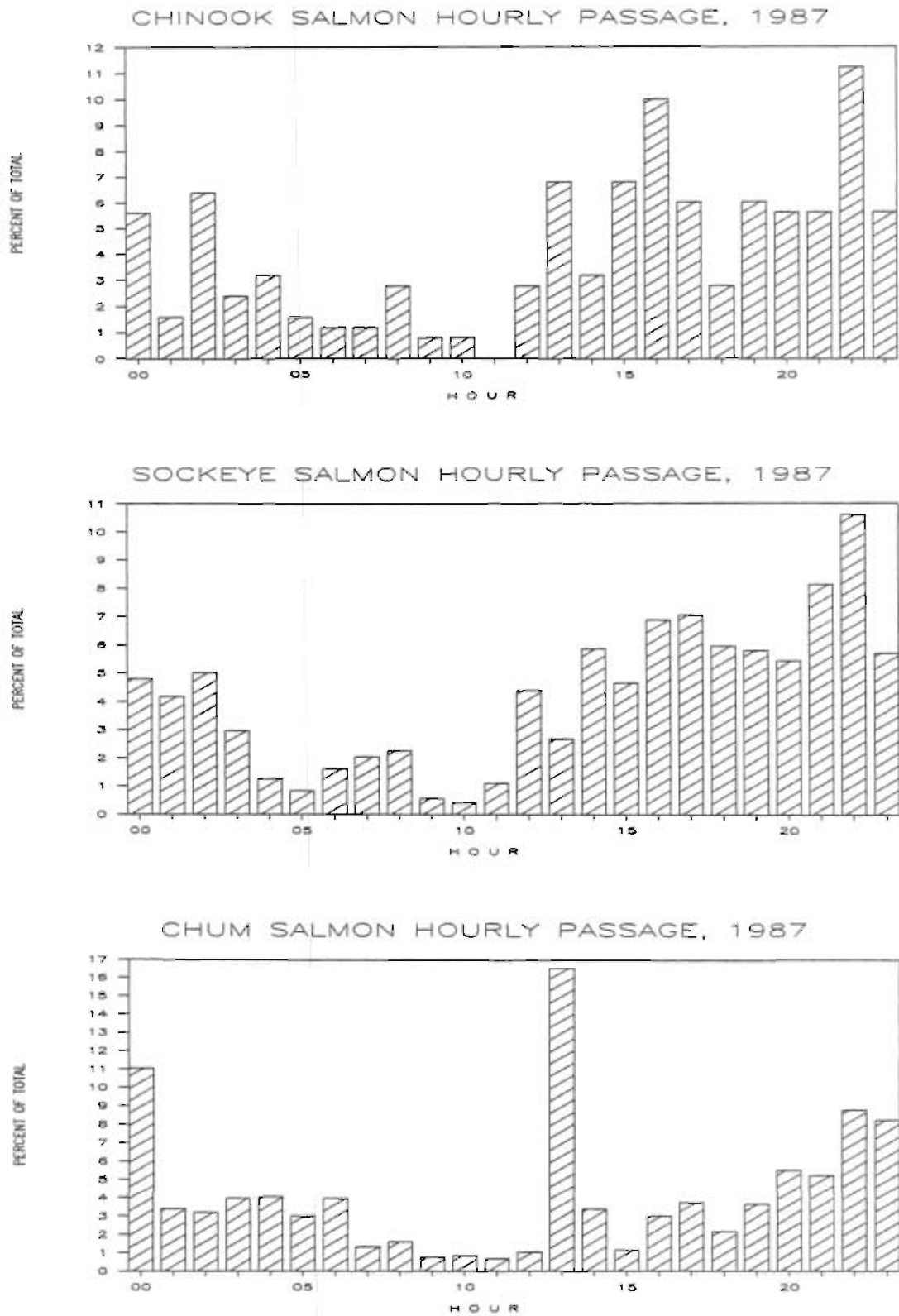


Figure 8. Average daily diel chinook, sockeye and chum salmon count distribution, Goodnews River counting tower, 1987.

## APPENDICES

Appendix 1. Goodnews Bay, District W-5, commercial salmon harvest, 1968 - 1987.

<u>Year</u>	<u>Chinook</u>	<u>Sockeye</u>	<u>Coho</u>	<u>Pink</u>	<u>Chum</u>	<u>Total</u>
1968	-	-	5,458	-	-	5,458
1969	3,978	6,256	11,631	298	5,006	27,169
1970	7,163	7,144	6,794	12,183	12,346	45,630
1971	477	330	1,771	0	301	2,879
1972	264	924	925	66	1,331	3,510
1973	3,543	2,072	5,017	324	15,781	26,737
1974	3,302	9,357	21,340	16,373	8,942	59,314
1975	2,156	9,098	17,889	419	5,904	35,466
1976	4,417	5,575	9,852	8,453	10,354	38,651
1977	3,336	3,723	13,335	29	6,531	26,954
1978	5,218	5,412	13,764	9,103	8,590	42,087
1979	3,204	19,581	42,098	201	9,298	74,382
1980	2,331	28,632	43,256	7,832	11,748	93,799
1981	7,190	40,273	19,749	11	13,642	80,865
1982	9,476	38,877	46,683	4,673	13,829	113,538
1983	14,117	11,716	19,660	0	6,766	52,259
1984	8,612	15,474	71,176	4,711	14,340	114,313
1985	5,793	6,698	16,498	8	4,784	33,781
1986	2,723	25,112	19,378	4,447	10,355	62,015
1987	3,357	27,758	29,057	54	20,381	80,607
Five Year Average (1982-1986)	8,144	19,575	34,679	2,768	10,015	75,181



Appendix 2. Goodnews Bay area subsistence salmon fishery harvest, 1977 - 1987.

Year	Village	Families Surveyed			Reported Harvest					Estimated Total No. Fishing Families	Expanded Harvest Estimates				
		Number	People	Dogs	Chinook	Sockeye	Coho	Pink	Chum		Chinook	Sockeye <sup>a</sup>	Coho <sup>b</sup>	Pink	Chum
1977	Goodnews	26	148	64	-	-	-	-	-	-	574	856	184	-	-
	Platinum	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	TOTAL	26	148	64	-	-	-	-	-	-	574	856	184	-	-
1978	Goodnews	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Platinum	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	TOTAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1979	Goodnews	15	89	21	-	-	-	-	-	-	228	554	176	-	-
	Platinum	6	36	9	-	-	-	-	-	-	110	528	50	-	-
	TOTAL	21	125	30	-	-	-	-	-	-	338	1,082	226	-	-
1980	Goodnews	44	205	75	-	-	-	-	-	-	498	1,823	4,226	-	-
	Platinum	11	28	16	-	-	-	-	-	-	192	0	248	-	-
	TOTAL	55	233	91	-	-	-	-	-	-	690	1,823	4,474	-	-
1981	Goodnews	13	68	40	-	-	-	-	-	-	1,309	3,178	1,622	-	-
	Platinum	4	17	4	-	-	-	-	-	-	100	333	0	-	-
	TOTAL	17	85	44	-	-	-	-	-	-	1,409	3,511	1,622	-	-
1982	Goodnews	17	91	37	-	-	-	-	-	39	1,185	2,210	2,518	-	-
	Platinum	5	24	4	-	-	-	-	-	9	51	544	174	-	-
	TOTAL	22	115	41	-	-	-	-	-	48	1,236	2,754	2,692	-	-
1983	Goodnews	24	170	88	709	702	2	0	221	34	1,004	1,308	3	-	-
	Platinum	6	48	14	53	180	1	0	0	7	62	210	2	-	-
	TOTAL	30	218	102	762	882	3	0	221	41	1,066	1,518	5	-	-
1984	Goodnews	18	138	25	307	474	28	34	97	35	597	922	54	66	189
	Platinum	4	21	20	18	24	57	0	0	7	32	42	100	0	0
	TOTAL	22	159	45	325	498	85	34	97	42	629	964	154	66	189
1985	Goodnews	13	72	27	179	252	94	1	152	29	399	562	210	2	339
	Platinum	3	17	4	20	107	8	0	7	4	27	142	11	0	9
	TOTAL	16	89	31	199	359	102	1	159	33	426	704	221	2	348
1986	Goodnews	20	121	29	311	521	0	0	114	33	513	860	0	0	188
	Platinum	4	21	5	28	55	5	0	2	6	42	83	8	0	3
	TOTAL	24	142	34	339	576	5	0	116	39	555	942	8	0	191
1987 <sup>c</sup>	Goodnews	17	-	-	311	405	0	0	180	35	640	834	0	0	371
	Platinum	7	-	-	123	85	30	0	145	10	176	121	43	0	207
	TOTAL	24	-	-	434	490	30	0	325	45	816	955	43	0	578

<sup>a</sup> 1977 through 1983 some small chinook, pink and chum salmon were reported as sockeye salmon.

<sup>b</sup> In most years, surveys were completed prior to the majority of the coho salmon subsistence harvest.

<sup>c</sup> Preliminary data.

Appendix 3. Historical hourly passage rate for chinook salmon, Goodnews River tower, 1981 - 1987.

Year	No. of Counts	Percent of daily total observed in hour: (Full hour counts)																							Total No. Salmon Counted	
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22		23
1981	6	6.0	6.6	5.7	1.3	0.0	3.8	0.0	1.1	0.7	1.9	6.4	5.1	6.2	6.8	3.8	3.6	6.6	3.8	7.0	7.4	3.4	4.7	5.5	2.6	531
1982	2	3.6	3.0	1.5	1.0	0.0	2.6	1.5	1.0	0.0	2.0	0.5	1.5	2.6	3.1	4.1	1.0	3.1	2.0	11.7	14.4	9.8	12.2	6.6	11.2	196
Year	No. of Counts	Percent of daily total observed in hour: (Twenty minute counts)																							Total No. Salmon Counted	
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22		23
1983	24	3.3	3.9	4.3	1.6	1.2	1.8	1.3	1.6	2.2	1.4	3.0	6.1	6.8	7.5	5.2	5.8	6.9	7.0	4.2	5.5	7.2	6.3	2.7	3.2	1,020
1984	21	3.8	2.9	1.4	0.3	0.0	0.6	1.8	0.9	0.9	0.8	1.3	4.2	3.2	2.8	5.5	6.7	7.2	5.9	10.4	8.1	7.0	8.1	9.7	6.5	781
1985	12	4.8	5.1	8.2	7.4	6.7	2.7	3.8	2.7	1.5	1.5	2.4	1.7	3.6	4.8	3.2	2.5	7.4	5.0	4.4	5.0	4.2	4.6	3.2	3.6	525
1986	6	1.1	6.5	8.6	14.6	7.0	3.8	0.5	0.0	3.2	-1.1	4.9	4.9	2.2	1.6	4.9	1.6	7.0	-0.5	0.0	7.0	1.1	3.2	13.0	4.9	185
1987	6	5.6	1.6	6.4	2.4	3.2	1.6	1.2	1.2	2.8	0.8	0.8	0.0	2.8	6.8	3.2	6.8	10.0	6.0	2.8	6.0	5.6	5.6	11.2	5.6	250
Average		4.0	4.2	5.2	4.1	2.6	2.4	1.4	1.2	1.6	1.0	2.8	3.4	3.9	4.8	4.3	4.0	6.9	4.2	5.8	7.6	5.5	6.4	7.4	5.4	3,488

Appendix 4. Historical hourly passage rate for sockeye salmon, Goodnews River tower, 1981- 1987.

Year	No. of Counts	Percent of total daily count observed in hour: (Full Hour Counts)																							Total No. Salmon Counted	
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22		23
1981	6	1.6	1.4	0.7	0.8	2.8	2.3	2.8	3.6	4.6	4.9	8.3	11.0	5.6	6.1	3.9	4.6	6.4	5.3	5.4	6.9	3.5	2.9	2.2	2.4	10,571
1982	2	2.4	3.6	1.8	1.1	1.6	3.2	2.7	2.3	3.2	3.8	3.2	5.9	5.8	4.6	3.5	4.7	6.3	6.0	6.7	6.6	5.3	5.0	4.2	6.5	2,610
Year	No. of Counts	Percent of total daily count observed in hour: (Twenty minute counts)																							Total No. Salmon Counted	
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22		23
1983	24	2.9	2.1	1.4	2.4	1.9	1.9	2.2	2.8	3.7	4.8	5.4	8.5	6.1	5.9	4.7	6.7	4.3	6.2	4.1	5.0	4.2	5.6	4.5	2.0	5,372
1984	21	6.9	3.7	1.7	1.0	0.5	0.6	3.4	1.0	1.2	1.4	3.1	4.4	4.3	2.8	7.3	4.5	7.1	4.4	8.1	8.0	4.9	6.8	5.8	7.1	7,131
1985	12	7.3	3.5	1.6	2.6	1.4	1.3	2.4	2.4	6.0	2.9	1.8	2.7	4.6	6.4	5.4	7.4	4.2	4.7	7.1	3.8	4.5	6.0	4.9	5.1	4,214
1986	6	4.2	5.8	3.5	2.6	2.1	1.2	2.1	1.5	3.3	0.4	0.6	5.9	2.5	2.7	6.0	9.3	6.0	6.8	6.4	5.3	4.0	4.7	7.8	5.2	3,662
1987	6	4.8	4.2	5.0	3.0	1.3	0.8	1.6	2.0	2.2	0.6	0.4	1.1	4.4	2.7	5.8	4.6	6.9	7.0	5.9	5.8	5.4	8.1	10.6	5.7	1,918
Average		4.3	3.5	2.2	1.9	1.7	1.6	2.5	2.2	3.5	2.7	3.3	5.6	4.8	4.5	5.2	6.0	5.9	5.8	6.2	5.9	4.5	5.6	5.7	5.0	35,478

Appendix 5. Historical hourly passage rate for pink salmon, Goodnews River tower, 1981 - 1987.

Year	No. of Counts	Percent of total daily count observed in hour: (Full hour counts)																							Total No. Salmon Counted	
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22		23
1981	6	0.8	1.6	0.0	2.4	3.1	3.9	0.8	2.4	3.1	1.6	1.6	7.1	5.5	3.1	6.3	4.7	6.4	12.6	7.9	7.1	5.5	5.5	3.9	3.1	127
1982	2	0.7	1.5	0.0	3.8	3.0	3.7	0.7	2.2	3.0	3.0	1.5	6.8	5.3	3.0	6.8	4.5	6.1	12.1	7.6	6.8	5.3	5.3	3.8	3.0	132
Year	No. of Counts	Percent of total daily count observed in hour: (Twenty minute counts)																							Total No. Salmon Counted	
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22		23
1983	24	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	7.7	7.7	15.4	0.0	7.7	3.8	15.4	0.0	7.7	11.5	15.4	0.0	26	
1984	21	5.9	1.8	1.0	0.7	0.8	0.4	1.9	1.5	0.5	0.4	0.4	3.3	0.2	0.8	2.4	2.7	3.0	4.5	6.2	6.7	13.0	10.2	17.9	13.8	2,270
1985	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	33.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	3	
1986	6	9.4	2.7	1.7	0.8	0.4	1.7	4.6	6.9	4.6	1.0	2.5	3.8	2.1	3.6	7.9	7.1	4.8	5.0	6.5	4.8	4.0	8.4	3.3	2.9	478
1987	6	0.0	33.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	33.3	0.0	0.0	0.0	0.0	3
Average		2.4	5.8	0.9	1.1	1.0	1.4	1.1	1.9	1.6	5.6	0.9	3.5	7.7	2.6	5.5	2.7	4.0	5.4	11.0	8.4	5.1	5.8	11.1	3.3	3,039
High Return Year Ave. (1982,84,86)		5.3	2.0	0.9	1.8	1.4	1.9	2.4	3.5	2.7	1.5	1.5	4.6	2.5	2.5	5.5	4.8	4.6	7.2	6.8	6.1	7.4	8.0	8.3	6.6	2,880

Appendix 6. Historical hourly passage rate for chum salmon, Goodnews River tower, 1981 - 1987.

Year	No. of Counts	Percent of total daily count observed in hour: (Full Hour Counts)																						Total No. Salmon Counted		
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21		22	23
1981	6	3.0	3.9	2.1	1.1	1.4	5.5	1.2	0.9	1.7	1.2	6.5	10.5	4.2	5.4	2.4	7.4	10.8	5.1	5.6	6.6	4.0	3.8	3.2	2.5	4,813
1982	2	1.8	3.2	3.6	0.5	3.2	1.9	4.1	1.1	2.4	0.8	1.2	1.1	2.9	0.9	2.5	4.9	3.2	5.0	7.7	9.0	12.5	11.7	7.0	7.8	754
Year	No. of Counts	Percent of total daily count observed in hour: (Twenty Minute Counts)																						Total No. Salmon Counted		
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21		22	23
1983	24	3.8	2.5	1.6	3.5	2.0	1.5	1.7	1.7	3.7	3.6	4.4	5.2	4.8	4.8	4.3	5.4	4.8	5.9	6.5	5.5	5.6	6.2	5.5	6.1	3,784
1984	21	5.9	3.0	1.1	0.7	0.2	0.4	3.4	0.5	0.4	0.4	1.2	7.7	0.6	0.7	1.9	2.0	3.3	3.2	8.7	5.9	11.1	10.1	14.5	13.1	5,418
1985	12	4.6	6.3	4.3	4.1	2.1	1.3	5.6	2.0	0.5	0.6	1.1	1.2	0.5	1.9	2.0	5.5	4.1	4.6	6.9	5.5	7.4	9.0	9.3	9.6	2,150
1986	6	6.3	4.7	6.3	3.7	1.6	3.0	3.1	1.3	1.5	0.5	0.9	0.7	2.1	1.2	3.7	4.3	2.0	5.2	8.2	5.6	4.7	10.6	10.2	8.8	1,279
1987	6	11.0	3.4	3.2	3.9	4.0	3.0	3.9	1.3	1.6	0.7	0.8	0.7	1.0	16.6	3.4	1.1	3.0	3.7	2.2	3.6	5.5	5.2	8.8	8.2	1,069
Average		5.2	3.9	3.2	2.5	2.1	2.4	3.3	1.3	1.7	1.1	2.3	3.9	2.3	4.5	2.9	4.4	4.5	4.7	6.5	6.0	7.3	8.1	8.4	8.0	19,267

Appendix 7. Atmospheric and hydrological observations, Goodnews River salmon counting tower, 1987.

DATE	Time	Water Level (mm)	Visibility	Water Color	Water Temp. (C)	Air Temperatures ( F )			Sky		Precipitation			Wind		Wind (mph)
						At Time	Min	Max	AM	PM	AM	PM	Amt. (mm)	AM	PM	
June 07		-	Poor	3	8	-	-	65	1	2-3	0	0	0	SE	SE	10-15
June 08	1640	450	Poor	3	8	58	-	-	2	3	0	0	0	SE	SE	15-30
June 09	1245	450	Poor	3	5	48	-	-	4		2	2	6	SE	SE	10
June 10	1615	510	Poor	3	7	62	39	65	2	3	0	1	1	SE	SW	10
June 11	1430	440	Poor	2	7.7	55	53	60	2	3	0	0	0	N	SW	14
June 12	1700	390	Poor	2	8.2	52	49	54	4	2	0	0	0	W	NW	13
June 13	1100	365	Fair/Poor	2	5.5	42	38	52	4	4	0	-	0	W	-	<3
June 14	1541	280	Fair/Poor	2	6	46	42	46	4	4	1	1	1	SW	SW	7
June 15	1512	205	Fair	2	7	58	39	61	4	3	0	1	0	NE	E	15
June 16	1209	165	Fair	2	7	54	42	58	4	4	1	-	trace	NE	-	10-15
June 17	1230	145	Fair	2	7.5	59	43	59	3	3	1	-	trace	N	-	7
June 18	1251	135/735	Fair	2	8	60	44	64	3	3	1	-	trace	W	-	0-5
June 19	1206	738	Fair	2	6.5	46	33	60	4	4	0	2	0	W	-	4
June 20	1320	710	Fair	2	7.5	52	40	58	4	4	1	-	2	SE	-	2
June 21	1524	695	Fair	2	9	62	41	62	4	4	1	2	2	NE	NE	2
June 22	1230	690	Fair	2	8.5	56	43	74	4	4	2	2	8	SE	-	<3
June 23	1212	735	Fair/Poor	2	8	51	48	60	4	4	1	-	8	E	-	11-30
June 24	1340	745	Poor	3	9	66	53	70	3	3	0	0	trace	E	E	13
June 25	1230	720	Fair/Poor	2-3	9.5	65	45	68	2	3	0	0	0	SE	NE	10-13
June 26	1225	700	Fair/Poor	3	9	53	46	72	3	4	0	2	trace	NE	-	13
June 27	1155	720	Fair/Poor	2-3	7.5	50	46	55	4	4	2	2	7	SE	-	8
June 28	1200	800	Poor	2-3	8	53	46	54	4	4	2	2	8	SE	-	6
June 29	1150	920	Poor	3	8	47	47	47	4	4	2	2	11	SE	-	20
June 30	1245	460/1150	Very Poor	4	7	48	48	50	4		1	-	9	S-SE	-	10
July 01	1335	400	Very Poor	4	7	50	46	53	4	4	1	-	1	SE	-	9
July 02	1225	330	Very Poor	3.5	8	58	46	60	4	2	0	1	0	NW	-	1-2
July 03	1217	235	Very Poor	3	7.5	52	38	66	4	3	0	1	1.5	E	-	8
July 04	1230	155	Poor	3	8.5	61	43	62	4	3	0	1	3	S	-	7
July 05	1320	80	Poor	2.5	10	60	48	65	2	3	0	1	0	SW	-	12
July 06	1230	30/530	Poor	2	9.5	58	49	63	4	4	0	1	0	W	-	<3
July 07	1247	490	Poor/Fair	2	8.5	57	46	60	4	4	1	1	3	SW	-	<3
July 08	1318	468	Fair	2	9.3	60	36	68	2	3	0	1	2	W	-	<3
July 09	1250	410	Fair	1.5	9.5	60	40	68	3	2	0	1	0	NW	-	<3
July 10	1226	390	Fair	1.5	10	60	58	70	2	3	0	2	0	SW	-	6
July 11	1225	380	Fair	1.5	9.5	60	35	74	1	1	0	0	9	E	-	5
July 12	0900	340	Fair	1.5	-	60	37	68	1	2	0	0	0	W-SW	-	5
July 13	1500	320	Fair	1.5	11.8	58	44	61	2	3	0	0	-	SW	-	10
July 14	1235	300	Fair	1.5	9.8	58	48	62	4	4	0	0	-	SW	-	7
July 15	1150	267	Fair/Good	1.5	10.5	56	46	63	4	-	1	-	0	SW	-	4
July 16	1232	265	Fair/Good	1.5	10.5	58	46	60	3	4	1	2	5.8	SE	-	10
July 17	1225	280	Fair/Good	1.5	10	54	52	64	4	4	2	2	5	E	-	10
July 18	1130	340	Fair	2	9.5	54	50	56	4	4	2	2	12	SE	-	<5
July 19	1250	325	Fair	2	10.5	56	51	71	4	4	2	2	9	SE	-	<5
July 20	1225	380	Fair	2	9.5	52	48	59	4	4	1	1	2	SW	-	<5
July 21	1150	355	Fair	2	9.3	50	47	56	4	4	2	2	4	SE	-	6
July 22	1250	380	Fair	2	9.8	54	49	55	4	4	1	-	2	SSE	-	13
July 23	1225	380	Fair	1.5	9.7	55	48	60	4	4	0	1	0.6	SW	-	<5

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Appendix 7. (page 2 of 2)

DATE	Time	Water Level (mm)	Visibility	Water Color	Water Temp. (C)	Air Temperatures ( F)			Sky		Precipitation			Wind		Wind (mph)
						At Time	Min	Max	AM	PM	AM	PM	Amt. (mm)	AM	PM	
July 24	1228	355	Fair	2	10	52	46	58	4	-	1	0	trace	WSW	-	<5
July 25	1245	335	Fair	2	10.5	60	47	62	4	2	0	0	1	SW	-	<5
July 26	1700	305	Fair	2	15	67	46	67	1	1	0	0	0	W	-	1
July 27	1310	280	Fair	2	13.5	73	37	78	1	1	0	0	0	W	-	8
July 28	1155	260	Fair	2	13	63	40	79	3	1	0	0	0	W	-	4
July 29	1925	230	Fair	1.5	16	66	-	72	1	1	0	0	0	N	-	12
July 30	1211	220	Good	1.5	13	62	52	66	3	1	0	0	0	W	-	<5
July 31	1425	200	Good	1.5	14	68	41	73	1	1	0	0	0	W	-	<5
Aug 01	1130	185	Good	1	12.5	55	35	70	4	-	0	0	0	SW	-	<5

CODES:

WATER COLOR

- 1 = Clear
- 2 = Light brown
- 3 = Brown
- 4 = Dark brown or muddy
- 5 = Glacial

SKY CONDITIONS

- 1 = Clear sky to 1/10 cloud cover
- 2 = Cloud cover 2/10 to 5/10
- 3 = Cloud cover 6/10 to 9/10
- 4 = Overcast
- 5 = Fog or thick haze

PRECIPITATION

- 0 = None
- 1 = Scattered showers or mist
- 2 = Rain
- 3 = Snow
- 4 = Sleet
- 5 = Hail
- 6 = Thunderstorm, with or without rain

Appendix 8. Observer remarks during the period of poor visibility, Goodnews River Salmon Counting Tower, June 25 to July 12, 1987.

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<u>DATE</u>	<u>OBSERVER'S REMARKS</u>
June 25-26	Visibility poor to fair. Visibility poorest in the deepest part of the river where most of the chinook salmon pass. Estimate approximately 10 percent of the chinook salmon passed undetected. Sockeye salmon counts should be accurate since the majority of the sockeye salmon migrate nearer to the banks. May have counted a few chum salmon as sockeye, but most of the fish passing were sockeye salmon.
June 27	Very poor visibility. Possibility missed up to 25 percent of all sockeye and chum salmon. Estimate all chinook salmon passed undetected. No chinook salmon were counted.
June 28	No count, scheduled day off.
June 29	Visibility extremely poor, could only see two panels (approximately 8 feet). Very likely some chinook salmon had passed undetected. An estimated 50 percent of the sockeye and chum salmon passed undetected.
June 30	No counts attempted because of unacceptable visibility.
July 01	Visibility extremely poor. Counted only five hours with only 3 panels visible (approximately 12 feet). Estimate percent of the sockeye and chum salmon passed undetected. Twenty percent of the chinook salmon undetected.
July 02	Visibility extremely poor. Approximately four panels visible (16 feet). Estimate 50 percent of the chinook and sockeye salmon passed undetected.
July 03	No counts, scheduled day off.
July 04	Poor visibility with approximately 8 panels visible (25 feet). Estimate 25 percent of the sockeye and chum salmon and 40 percent of the chinook salmon passed undetected.
July 05	No count, scheduled day off.

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Appendix 8. (page 2 of 2)

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<u>DATE</u>	<u>OBSERVER'S REMARKS</u>
July 06-07	Visibility fair to poor. Probably underestimated all salmon species by 10 percent.
July 08-09	Visibility fair to poor. Probably underestimated chinook salmon by 10 percent and sockeye and chum salmon by 5 percent.
July 10-11	Visibility fair. Probably underestimated sockeye and chum salmon by 5 percent.
July 12	Resume normal operation.

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Appendix 9. Historic estimates of daily and cumulative chinook salmon escapement, Goodnews River tower, 1981 - 1987.

Date	YEAR													
	1981		1982		1983		1984		1985		1986		1987	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
6/11					5	5								
6/12					0	5								
6/13	0	0			0	5								
6/14	0	0			-5	0								
6/15	0	0			0	0	0	0						
6/16	0	0			0	0	0	0			0	0		
6/17	2	2			0	0	0	0			6	6		
6/18	0	2			0	0	0	0			0	6		
6/19	4	6			0	0	4	4			6	12		
6/20	9	15			5	5	4	8			0	12		
6/21	11	26			16	21	12	20			0	12		
6/22	10	36			64	85	9	29			0	12	0	0
6/23	16	52	0	0	186	271	6	35			0	12	0	0
6/24	21	73	22	22	118	389	26	61			0	12	0	0
6/25	41	114	28	50	106	495	46	107			26	38	0	0
6/26	30	144	4	54	55	550	15	122			0	38	4	4
6/27	82	226	2	56	21	571	11	133	4	4	79	117	0	4
6/28	92	318	0	56	171	742	51	184	0	4	45	162	8	12
6/29	166	484	0	56	341	1083	11	195	11	15	50	212	16	28
6/30	54	538	0	56	520	1603	8	203	10	25	55	267	36	64
7/1	86	624	0	56	273	1876	57	260	8	33	129	396	56	120
7/2	186	810	3	59	263	2139	105	365	38	71	41	437	67	187
7/3	90	900	2	61	113	2252	57	422	32	103	90	527	59	246
7/4	134	1034	23	84	172	2424	58	480	60	163	65	592	51	297
7/5	252	1286	44	128	231	2655	59	539	87	250	40	632	91	388
7/6	237	1523	11	139	61	2716	105	644	132	382	53	685	130	518
7/7	192	1715	24	163	656	3372	145	789	99	481	67	752	43	561
7/8	206	1921	44	207	147	3519	158	947	66	547	57	809	37	598
7/9	102	2023	50	257	102	3621	170	1117	126	673	38	847	71	669
7/10	133	2156	26	283	198	3819	135	1252	132	805	87	934	141	810
7/11	110	2266	66	349	205	4024	188	1440	192	997	78	1012	61	871
7/12	78	2344	106	455	282	4306	105	1545	186	1183	64	1076	58	929
7/13	92	2436	104	559	263	4569	159	1704	45	1228	86	1162	55	984
7/14	61	2497	49	608	67	4636	202	1906	45	1273	109	1271	213	1197
7/15	142	2639	85	693	157	4793	124	2030	45	1318	139	1410	132	1329
7/16	67	2706	117	810	130	4923	46	2076	108	1426	79	1489	107	1436
7/17	68	2774	96	906	116	5039	223	2299	141	1567	26	1515	114	1550
7/18	69	2843	59	965	92	5131	70	2369	189	1756	84	1599	120	1670
7/19	76	2919	22	987	106	5237	40	2409	183	1939	76	1675	85	1755
7/20	81	3000	39	1026	160	5397	100	2509	162	2101	79	1754	49	1804
7/21	26	3026	55	1081	187	5584	113	2622	96	2197	83	1837	48	1852
7/22	48	3074	34	1115	67	5651	136	2758	30	2227	147	1984	69	1921
7/23	68	3142	33	1148	58	5709	159	2917	96	2323	64	2048	45	1966
7/24	85	3227	32	1180	89	5798	43	2960	97	2420	44	2092	73	2039
7/25	50	3277	31	1211	79	5877	62	3022	101	2521			58	2097
7/26	43	3320	31	1242	96	5973	54	3076	115	2636			47	2144

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Appendix 9. (page 2 of 2)

Date	YEAR													
	1981		1982		1983		1984		1985		1986		1987	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
7/27	23	3343	19	1261	38	6011	59	3135	20	2656			35	2179
7/28	23	3366	36	1297	16	6027	59	3194	40	2696			22	2201
7/29	39	3405	15	1313			39	3233	60	2756			26	2227
7/30	18	3423	13	1326			19	3252	57	2813			45	2272
7/31	34	3457	29	1355			8	3260	18	2831				
8/01	33	3490	17	1372										
8/02	46	3536	5	1377										
8/03	28	3564	18	1395										
8/04	36	3600												
8/05	36	3636												
8/06	20	3656												
8/07	13	3669												
8/08	12	3681												
8/09	7	3688												
8/10	7	3688												

Appendix 10 . Historic estimates of daily and cumulative sockeye salmon escapement, Goodnews River tower, 1981 - 1987.

Date	YEAR													
	1981		1982		1983		1984		1985		1986		1987	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
6/11					0	0								
6/12					0	0								
6/13	0	0			0	0								
6/14	1	1			0	0								
6/15	0	1			0	0	92	92						0
6/16	0	1			3	3	8	100			0	0		0
6/17	32	33			0	3	11	111			0	0		0
6/18	107	140			0	3	13	124			0	0		0
6/19	259	399			0	3	143	267			0	0		0
6/20	104	503			3	6	100	367			0	0		0
6/21	291	794			0	6	452	819			292	292		0
6/22	571	1365			0	6	289	1108			276	568	222	222
6/23	669	2034	1822	1822	0	6	203	1311			261	829	193	415
6/24	633	2667	4201	6023	799	805	379	1690			59	888	121	536
6/25	868	3535	6010	12033	527	1332	554	2244			697	1585	427	963
6/26	690	4225	5019	17052	404	1736	630	2874			431	2016	697	1660
6/27	3108	7333	2559	19611	410	2146	1005	3879	125	125	1299	3315	818	2478
6/28	2039	9372	98	19709	262	2408	1461	5340	235	360	1657	4972	794	3272
6/29	1877	11249	268	19977	462	2870	1141	6481	616	976	1505	6477	771	4043
6/30	1511	12760	438	20415	315	3185	1236	7717	825	1801	1353	7830	805	4848
7/1	1798	14558	608	21023	481	3666	1546	9263	1033	2834	2514	10344	840	5688
7/2	1861	16419	675	21698	1053	4719	1855	11118	883	3717	2487	12831	1104	6792
7/3	1438	17857	966	22664	647	5366	1484	12602	565	4282	2442	15273	1333	8125
7/4	1865	19722	2328	24992	1177	6543	1733	14335	1044	5326	2587	17860	1562	9687
7/5	2970	22692	3690	28682	1708	8251	1981	16316	1523	6849	2732	20592	1595	11282
7/6	2487	25179	2755	31437	1150	9401	1474	17790	1016	7865	3192	23784	1627	12909
7/7	1511	26690	1578	33015	1483	10884	1931	19721	1087	8952	3651	27435	1761	14670
7/8	2176	28866	2912	35927	1131	12015	2419	22140	1158	10110	3158	30593	1436	16106
7/9	2195	31061	4382	40309	1166	13181	2907	25047	1680	11790	2700	33293	1044	17150
7/10	2169	33230	2364	42673	1179	14360	1417	26464	1212	13002	3075	36368	1292	18442
7/11	2778	36008	2194	44867	1961	16321	1018	27482	1362	14364	1896	38264	873	19315
7/12	1476	37484	2023	46890	1617	17938	992	28474	777	15141	2098	40362	1012	20327
7/13	1889	39373	1319	48209	1091	19029	862	29336	780	15921	1953	42315	1151	21478
7/14	1223	40596	1567	49776	701	19730	774	30110	774	16695	1809	44124	1125	22603
7/15	1450	42046	1097	50873	992	20722	549	30659	768	17463	1553	45677	1412	24015
7/16	1439	43485	1513	52386	1002	21724	323	30982	753	18216	1243	46920	762	24777
7/17	946	44431	785	53171	763	22487	260	31242	963	19179	799	47719	438	25215
7/18	476	44907	534	53705	866	23353	121	31363	1077	20256	1104	48823	447	25662
7/19	758	45665	282	53987	549	23902	117	31480	1038	21294	660	49483	449	26111
7/20	753	46418	385	54372	439	24341	124	31604	1074	22368	486	49969	450	26561
7/21	351	46769	238	54610	607	24948	124	31728	771	23139	311	50280	284	26845
7/22	447	47216	202	54812	336	25284	97	31825	468	23607	331	50611	478	27323
7/23	386	47602	187	54999	87	25371	70	31895	121	23728	307	50918	391	27714
7/24	212	47814	172	55171	129	25500	22	31917	221	23949	151	51069	239	27953
7/25	183	47997	157	55328	91	25591	19	31936	102	24051			382	28335
7/26	144	48141	142	55470	65	25656	37	31973	37	24088			235	28570

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Date	YEAR													
	1981		1982		1983		1984		1985		1986		1987	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
7/27	116	48257	120	55590	91	25747	34	32007	18	24106			87	28657
7/28	197	48454	90	55680	66	25813	26	32033	11	24117			107	28764
7/29	228	48682	73	55753			17	32050	4	24121			48	28812
7/30	127	48809	83	55836			7	32057	0	24121			59	28871
7/31	44	48853	92	55928			-4	32053	10	24131				
8/1	57	48910	109	56037										
8/2	47	48957	126	56163										
8/3	39	48996	92	56255										
8/4	53	49049												
8/5	39	49088												
8/6	7	49095												
8/7	1	49096												
8/8	7	49103												
8/9	2	49105												
8/10	0	49105												
8/11	11	49116												
8/12	-6	49110												
8/13	0	49110												
8/14	-2	49108												
8/15	0	49108												

Appendix 11. Historic estimates of daily and cumulative chin salmon escapement, Goodnews River tower, 1981 - 1987.

Date	YEAR													
	1981		1982		1983		1984		1985		1986		1987	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
6/11					0	0								
6/12					0	0					0			
6/13	0	0			0	0					0			
6/14	0	0			0	0					0			
6/15	0	0			0	0	0	0			0			
6/16	1	1			0	0	0	0			0			
6/17	0	1			0	0	0	0			0			
6/18	0	1			0	0	0	0			0			
6/19	0	1			0	0	0	0			0			
6/20	4	5			0	0	0	0			0			
6/21	5	10			0	0	0	0			0			
6/22	35	45			0	0	0	0			0		0	0
6/23	16	61	0	0	0	0	0	0			0		0	0
6/24	16	77	42	42	3	3	23	23			0		0	0
6/25	217	294	141	183	0	3	45	68			0		0	0
6/26	147	441	163	346	30	33	15	83			0		7	7
6/27	411	852	82	428	17	50	37	120	0	0	0		0	7
6/28	372	1224	0	428	0	50	107	227	0	0	0		9	16
6/29	293	1517	4	432	148	198	55	282	0	0	15	15	17	33
6/30	166	1683	8	440	82	280	55	337	0	0	30	45	61	94
7/1	339	2022	12	452	560	840	145	482	0	0	125	170	105	199
7/2	556	2578	6	458	613	1453	234	716	11	11	68	238	58	257
7/3	189	2767	30	488	445	1898	491	1207	4	15	326	564	89	346
7/4	387	3154	65	553	545	2443	404	1611	78	93	404	968	121	467
7/5	353	3507	100	653	646	3089	316	1927	152	245	482	1450	141	608
7/6	552	4059	47	700	409	3498	264	2191	88	333	447	1897	162	770
7/7	443	4502	27	727	682	4180	232	2423	55	388	411	2308	168	938
7/8	653	5155	126	853	459	4639	433	2856	21	409	268	2576	91	1029
7/9	659	5814	326	1179	892	5531	633	3489	81	490	422	2998	183	1212
7/10	960	6774	224	1403	572	6103	680	4169	228	718	1478	4476	343	1555
7/11	803	7577	308	1711	642	6745	1507	5676	570	1288	699	5175	281	1836
7/12	1058	8635	391	2102	1079	7824	906	6582	708	1996	412	5587	330	2166
7/13	658	9293	339	2441	588	8412	1108	7690	288	2284	570	6157	379	2545
7/14	439	9732	490	2931	157	8569	1295	8985	450	2734	729	6886	408	2953
7/15	643	10375	371	3302	433	9002	1310	10295	612	3346	1457	8343	289	3242
7/16	727	11102	380	3682	407	9409	1323	11620	972	4318	934	9277	1216	4458
7/17	664	11766	212	3894	372	9781	2286	13906	777	5095	709	9986	990	5448
7/18	455	12221	167	4061	398	10179	396	14302	690	5785	755	10741	1011	6459
7/19	790	13011	122	4183	401	10580	159	14461	873	6658	433	11174	695	7154
7/20	1186	14197	193	4376	784	11364	466	14927	630	7288	512	11686	378	7532
7/21	711	14908	175	4551	1034	12398	964	15891	358	7646	592	12278	722	8254
7/22	1179	16087	197	4748	671	13069	630	16521	85	7731	1181	13459	1071	9325
7/23	1168	17255	219	4967	215	13284	284	16805	444	8175	981	14440	1479	10804
7/24	628	17883	242	5209	447	13731	201	17006	440	8615	324	14764	1130	11934
7/25	605	18488	264	5473	433	14164	256	17262	323	8938		14764	1717	13651
7/26	545	19033	286	5759	409	14573	441	17703	404	9342			1069	14720

-Continued-

Date	YEAR													
	1981		1982		1983		1984		1985		1986		1987	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
7/27	326	19359	204	5963	381	14954	514	18217	261	9603			422	15142
7/28	717	20076	116	6079	594	15548	300	18517	230	9833			1552	16694
7/29	406	20482	132	6211			211	18728	198	10031			508	17202
7/30	270	20752	83	6294			121	18849	113	10144			315	17517
7/31	177	20929	74	6368			154	19003	223	10367				
8/1	135	21064	104	6472										
8/2	104	21168	134	6606										
8/3	103	21271	161	6767										
8/4	107	21378												
8/5	119	21497												
8/6	75	21572												
8/7	34	21606												
8/8	37	21643												
8/9	43	21686												
8/10	20	21706												
8/11	30	21736												
8/12	25	21761												
8/13	18	21779												
8/14	10	21789												
8/15	38	21827												

Appendix 12. Historic estimates of daily and cumulative coho salmon escapement, Goodnews River tower, 1981 - 1987.

Date	YEAR													
	1981		1982		1983		1984		1985		1986		1987	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
7/17	0	0	2	2	0	0	0	0	0	0	3	3	0	0
7/18	0	0	1	3	0	0	0	0	0	0	0	3	0	0
7/19	2	2	1	4	0	0	0	0	0	0	0	3	0	0
7/20	4	6	1	5	0	0	0	0	0	0	2	5	0	0
7/21	6	12	0	5	0	0	3	3	0	0	4	9	0	0
7/22	3	15	0	5	0	0	4	7	0	0	134	143	0	0
7/23	1	16	0	5	0	0	4	11	0	0	17	160	0	0
7/24	2	18	0	5	0	0	25	36	0	0	3	163	0	0
7/25	2	20	1	6	0	0	7	43	7	7			0	0
7/26	1	21	3	9	0	0	35	78	78	85			0	0
7/27	1	22	5	14	0	0	21	99	51	136			0	0
7/28	1	23	9	23	0	0	39	138	45	181			0	0
7/29	9	32	10	33			30	168	38	219			0	0
7/30	4	36	6	39			21	189	29	248			62	62
7/31	4	40	4	43			60	249	34	282				
8/1	24	64	5	48										
8/2	14	78	6	54										
8/3	22	100	37	91										
8/4	15	115												
8/5	50	165												
8/6	22	187												
8/7	13	200												
8/8	22	222												
8/9	33	255												
8/10	16	271												
8/11	29	300												
8/12	25	325												
8/13	28	353												
8/14	3	356												
8/15	0	356												



Appendix 13. Historic estimates of daily and cumulative pink salmon escapement, Goodnews River tower, 1981 - 1987.

Date	YEAR													
	1981		1982		1983		1984		1985		1986		1987	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
7/3	0	0	0	0	0	0	11	11	0	0	0	0	0	0
7/4	0	0	0	0	0	0	10	21	0	0	4	4	0	0
7/5	0	0	3	3	0	0	8	29	0	0	7	11	0	0
7/6	2	2	1	4	0	0	18	47	0	0	16	27	0	0
7/7	2	4	4	8	0	0	18	65	0	0	25	52	0	0
7/8	9	13	10	18	9	9	42	107	0	0	60	112	0	0
7/9	9	22	42	60	0	9	84	191	0	0	20	132	0	0
7/10	17	39	17	77	12	21	61	252	0	0	93	225	0	0
7/11	10	49	61	138	9	30	431	683	0	0	63	288	0	0
7/12	13	62	105	243	3	33	266	949	0	0	117	405	0	0
7/13	16	78	225	468	0	33	176	1125	0	0	175	580	0	0
7/14	15	93	227	695	0	33	276	1401	0	0	232	812	0	0
7/15	26	119	183	878	9	42	459	1860	0	0	644	1456	4	4
7/16	47	166	413	1291	0	42	642	2502	0	0	346	1802	0	4
7/17	64	230	255	1546	0	42	1457	3959	0	0	329	2131	6	10
7/18	48	278	183	1729	3	45	973	4932	0	0	532	2663	3	13
7/19	81	359	110	1839	18	63	510	5442	0	0	481	3144	5	18
7/20	101	460	223	2062	3	66	363	5805	9	9	924	4068	8	26
7/21	58	518	484	2546	9	75	676	6481	5	14	1366	5434	17	43
7/22	123	641	858	3404	0	75	702	7183	0	14	1376	6810	3	46
7/23	161	802	848	4252	0	75	727	7910	0	14	987	7797	3	49
7/24	76	878	837	5089	21	96	597	8507	3	17	337	8134	7	56
7/25	41	919	827	5916	0	96	491	8998	27	44			4	60
7/26	48	967	817	6733	0	96	753	9751	58	102			0	60
7/27	55	1022	994	7727	0	96	789	10540	7	109			-4	56
7/28	63	1085	680	8407	6	102	1071	11611	6	115			0	56
7/29	12	1097	520	8927			871	12482	4	119			0	56
7/30	18	1115	525	9452			671	13153	18	137			7	63
7/31	26	1141	1144	10596			591	13744	7	144				
8/1	25	1166	1083	11679										
8/2	37	1203	1022	12701										
8/3	17	1220	1154	13855										
8/4	22	1242												
8/5	18	1260												
8/6	7	1267												
8/7	16	1283												
8/8	19	1302												
8/9	4	1306												
8/10	6	1312												
8/11	11	1323												
8/12	2	1325												
8/13	1	1326												
8/14	1													
8/15	0													

Appendix 14. Historic daily cumulative proportion of chinook salmon escapement at the Goodnews River counting tower, 1981 - 1987.

Date	1981	1982	1983	1984	1985	1986	1987	Ave.
6/11	0.0000	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0001
6/12	0.0000	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0001
6/13	0.0000	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0001
6/14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6/15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6/16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6/17	0.0005	0.0000	0.0000	0.0000	0.0000	0.0029	0.0000	0.0004
6/18	0.0005	0.0000	0.0000	0.0000	0.0000	0.0029	0.0000	0.0004
6/19	0.0016	0.0000	0.0000	0.0012	0.0000	0.0057	0.0000	0.0011
6/20	0.0041	0.0000	0.0008	0.0025	0.0000	0.0057	0.0000	0.0016
6/21	0.0070	0.0000	0.0035	0.0061	0.0000	0.0057	0.0000	0.0028
6/22	0.0098	0.0000	0.0141	0.0089	0.0000	0.0057	0.0000	0.0048
6/23	0.0141	0.0000	0.0450	0.0107	0.0000	0.0057	0.0000	0.0117
6/24	0.0198	0.0158	0.0645	0.0187	0.0000	0.0057	0.0000	0.0190
6/25	0.0309	0.0358	0.0821	0.0328	0.0000	0.0182	0.0000	0.0339
6/26	0.0390	0.0387	0.0913	0.0374	0.0000	0.0182	0.0018	0.0447
6/27	0.0613	0.0401	0.0947	0.0408	0.0014	0.0559	0.0018	0.0628
6/28	0.0862	0.0401	0.1231	0.0564	0.0014	0.0774	0.0053	0.0760
6/29	0.1312	0.0401	0.1797	0.0598	0.0053	0.1013	0.0123	0.0958
6/30	0.1459	0.0401	0.2660	0.0623	0.0088	0.1276	0.0282	0.1233
7/1	0.1692	0.0401	0.3113	0.0798	0.0117	0.1893	0.0528	0.1559
7/2	0.2196	0.0423	0.3549	0.1120	0.0251	0.2089	0.0823	0.1845
7/3	0.2440	0.0437	0.3737	0.1294	0.0364	0.2519	0.1083	0.2063
7/4	0.2804	0.0602	0.4022	0.1472	0.0576	0.2830	0.1307	0.2318
7/5	0.3487	0.0918	0.4405	0.1653	0.0883	0.3021	0.1708	0.2660
7/6	0.4130	0.0996	0.4506	0.1975	0.1349	0.3274	0.2280	0.3000
7/7	0.4650	0.1168	0.5595	0.2420	0.1699	0.3595	0.2469	0.3428
7/8	0.5209	0.1484	0.5839	0.2905	0.1932	0.3867	0.2632	0.3742
7/9	0.5485	0.1842	0.6008	0.3426	0.2377	0.4049	0.2945	0.4087
7/10	0.5846	0.2029	0.6336	0.3840	0.2844	0.4465	0.3565	0.4494
7/11	0.6144	0.2502	0.6677	0.4417	0.3522	0.4837	0.3834	0.4923
7/12	0.6356	0.3262	0.7145	0.4739	0.4179	0.5143	0.4089	0.5333
7/13	0.6605	0.4007	0.7581	0.5227	0.4338	0.5554	0.4331	0.5700
7/14	0.6771	0.4358	0.7692	0.5847	0.4497	0.6076	0.5268	0.6074
7/15	0.7156	0.4968	0.7953	0.6227	0.4656	0.6740	0.5849	0.6472
7/16	0.7337	0.5806	0.8168	0.6368	0.5037	0.7118	0.6320	0.6832
7/17	0.7522	0.6495	0.8361	0.7052	0.5535	0.7242	0.6822	0.7218
7/18	0.7709	0.6918	0.8513	0.7267	0.6203	0.7643	0.7350	0.7558
7/19	0.7915	0.7075	0.8689	0.7390	0.6849	0.8007	0.7724	0.7824
7/20	0.8134	0.7355	0.8955	0.7696	0.7421	0.8384	0.7940	0.8113
7/21	0.8205	0.7749	0.9265	0.8043	0.7761	0.8781	0.8151	0.8376
7/22	0.8335	0.7993	0.9376	0.8460	0.7866	0.9484	0.8455	0.8668
7/23	0.8520	0.8229	0.9472	0.8948	0.8206	0.9790	0.8653	0.8914
7/24	0.8750	0.8459	0.9620	0.9080	0.8548	1.0000	0.8974	0.9131
7/25	0.8886	0.8681	0.9751	0.9270	0.8905	1.0000	0.9230	0.9306
7/26	0.9002	0.8903	0.9910	0.9436	0.9311	1.0000	0.9437	0.9472
7/27	0.9065	0.9039	0.9973	0.9617	0.9382	1.0000	0.9591	0.9557
7/28	0.9127	0.9297	1.0000	0.9798	0.9523	1.0000	0.9687	0.9660
7/29	0.9233	0.9412	1.0000	0.9917	0.9735	1.0000	0.9802	0.9752
7/30	0.9281	0.9505	1.0000	0.9975	0.9936	1.0000	1.0000	0.9837
7/31	0.9374	0.9713	1.0000	1.0000	1.0000	1.0000	1.0000	0.9886
8/1	0.9463	0.9835	1.0000	1.0000	1.0000	1.0000	1.0000	0.9912
8/2	0.9588	0.9871	1.0000	1.0000	1.0000	1.0000	1.0000	0.9932
8/3	0.9664	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9958
8/4	0.9761	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9970
8/5	0.9859	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9982
8/6	0.9913	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9989
8/7	0.9948	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9994
8/8	0.9981	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9998
8/9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Appendix 15. Historic daily cumulative proportion of sockeye salmon escapement at the Goodnews River counting tower, 1981 - 1987.

Date	1981	1982	1983	1984	1985	1986	1987	Ave.
6/11	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.00001
6/12	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.00001
6/13	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.00001
6/14	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.00002
6/15	0.0000	0.0000	0.0001	0.0029	0.0000	0.0000	0.0000	0.00038
6/16	0.0000	0.0000	0.0002	0.0031	0.0000	0.0000	0.0000	0.00042
6/17	0.0007	0.0000	0.0002	0.0035	0.0000	0.0000	0.0000	0.00055
6/18	0.0029	0.0000	0.0002	0.0039	0.0000	0.0000	0.0000	0.00087
6/19	0.0081	0.0000	0.0002	0.0083	0.0000	0.0000	0.0000	0.00209
6/20	0.0102	0.0000	0.0003	0.0114	0.0000	0.0000	0.0000	0.00276
6/21	0.0162	0.0000	0.0003	0.0256	0.0000	0.0057	0.0000	0.00597
6/22	0.0278	0.0000	0.0003	0.0346	0.0000	0.0111	0.0077	0.01019
6/23	0.0414	0.0324	0.0003	0.0409	0.0000	0.0162	0.0144	0.02172
6/24	0.0543	0.1071	0.0313	0.0527	0.0000	0.0174	0.0186	0.04125
6/25	0.0720	0.2139	0.0517	0.0700	0.0000	0.0310	0.0334	0.06975
6/26	0.0860	0.3031	0.0674	0.0897	0.0000	0.0395	0.0575	0.09717
6/27	0.1493	0.3486	0.0833	0.1210	0.0052	0.0649	0.0858	0.13141
6/28	0.1908	0.3504	0.0934	0.1666	0.0149	0.0974	0.1133	0.15713
6/29	0.2291	0.3551	0.1113	0.2022	0.0404	0.1268	0.1400	0.18574
6/30	0.2598	0.3629	0.1235	0.2408	0.0746	0.1533	0.1679	0.21437
7/1	0.2964	0.3737	0.1421	0.2890	0.1174	0.2025	0.1970	0.25124
7/2	0.3343	0.3857	0.1829	0.3469	0.1540	0.2512	0.2353	0.28973
7/3	0.3636	0.4029	0.2080	0.3932	0.1774	0.2991	0.2814	0.32388
7/4	0.4016	0.4443	0.2536	0.4472	0.2207	0.3497	0.3355	0.36965
7/5	0.4621	0.5099	0.3198	0.5090	0.2838	0.4032	0.3908	0.42792
7/6	0.5127	0.5588	0.3643	0.5550	0.3259	0.4657	0.4471	0.47939
7/7	0.5435	0.5869	0.4218	0.6153	0.3710	0.5372	0.5081	0.52859
7/8	0.5878	0.6386	0.4656	0.6907	0.4190	0.5991	0.5579	0.58075
7/9	0.6325	0.7165	0.5108	0.7814	0.4886	0.6519	0.5940	0.63835
7/10	0.6767	0.7586	0.5564	0.8256	0.5388	0.7121	0.6388	0.68457
7/11	0.7332	0.7976	0.6324	0.8574	0.5953	0.7493	0.6690	0.72962
7/12	0.7633	0.8335	0.6950	0.8883	0.6275	0.7903	0.7041	0.76742
7/13	0.8018	0.8570	0.7373	0.9152	0.6598	0.8286	0.7439	0.80064
7/14	0.8267	0.8848	0.7645	0.9394	0.6918	0.8640	0.7829	0.83039
7/15	0.8562	0.9043	0.8029	0.9565	0.7237	0.8944	0.8318	0.85959
7/16	0.8855	0.9312	0.8417	0.9666	0.7549	0.9188	0.8582	0.88501
7/17	0.9048	0.9452	0.8713	0.9747	0.7948	0.9344	0.8734	0.90437
7/18	0.9145	0.9547	0.9048	0.9785	0.8394	0.9560	0.8889	0.92293
7/19	0.9299	0.9597	0.9261	0.9821	0.8824	0.9689	0.9044	0.93874
7/20	0.9452	0.9665	0.9431	0.9860	0.9269	0.9785	0.9200	0.95362
7/21	0.9524	0.9708	0.9666	0.9899	0.9589	0.9846	0.9298	0.96548
7/22	0.9615	0.9743	0.9796	0.9929	0.9783	0.9910	0.9464	0.97550
7/23	0.9693	0.9777	0.9830	0.9951	0.9833	0.9970	0.9599	0.98146
7/24	0.9736	0.9807	0.9880	0.9958	0.9925	1.0000	0.9682	0.98618
7/25	0.9774	0.9835	0.9915	0.9963	0.9967	1.0000	0.9814	0.98997
7/26	0.9803	0.9860	0.9940	0.9975	0.9982	1.0000	0.9896	0.99257
7/27	0.9827	0.9882	0.9976	0.9986	0.9990	1.0000	0.9926	0.99440
7/28	0.9867	0.9898	1.0001	0.9994	0.9994	1.0000	0.9963	0.99615
7/29	0.9913	0.9911	1.0001	0.9999	0.9996	1.0000	0.9980	0.99738
7/30	0.9939	0.9926	1.0001	1.0001	0.9996	1.0000	1.0000	0.99829
7/31	0.9948	0.9942	1.0001	1.0000	1.0000	1.0000	1.0000	0.99864
8/1	0.9960	0.9961	1.0001	1.0000	1.0000	1.0000	1.0000	0.99903
8/2	0.9969	0.9984	1.0001	1.0000	1.0000	1.0000	1.0000	0.99943
8/3	0.9977	1.0000	1.0001	1.0000	1.0000	1.0000	1.0000	0.99973
8/4	0.9988	1.0000	1.0001	1.0000	1.0000	1.0000	1.0000	0.99986
8/5	0.9996	1.0000	1.0001	1.0000	1.0000	1.0000	1.0000	0.99996
8/6	0.9997	1.0000	1.0001	1.0000	1.0000	1.0000	1.0000	0.99998
8/7	0.9998	1.0000	1.0001	1.0000	1.0000	1.0000	1.0000	0.99998
8/8	0.9999	1.0000	1.0001	1.0000	1.0000	1.0000	1.0000	1.00000
8/9	0.9999	1.0000	1.0001	1.0000	1.0000	1.0000	1.0000	1.00001
8/10	0.9999	1.0000	1.0001	1.0000	1.0000	1.0000	1.0000	1.00001
8/11	1.0002	1.0000	1.0001	1.0000	1.0000	1.0000	1.0000	1.00003
8/12	1.0000	1.0000	1.0001	1.0000	1.0000	1.0000	1.0000	1.00002
8/13	1.0000	1.0000	1.0001	1.0000	1.0000	1.0000	1.0000	1.00002
8/14	1.0000	1.0000	1.0001	1.0000	1.0000	1.0000	1.0000	1.00001
8/15	1.0000	1.0000	1.0001	1.0000	1.0000	1.0000	1.0000	1.00001

Appendix 16. Historic daily cumulative proportion of chum salmon escapement at the Goodnews River counting tower, 1981 - 1987.

Date	1981	1982	1983	1984	1985	1986	1987	Ave.
6/11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00000
6/12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00000
6/13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00000
6/14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00000
6/15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00000
6/16	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00001
6/17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00001
6/18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00001
6/19	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00001
6/20	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00003
6/21	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00006
6/22	0.0021	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00026
6/23	0.0028	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.00035
6/24	0.0035	0.0062	0.0002	0.0012	0.0000	0.0000	0.0000	0.00150
6/25	0.0135	0.0270	0.0002	0.0036	0.0000	0.0000	0.0000	0.00670
6/26	0.0202	0.0511	0.0021	0.0044	0.0000	0.0000	0.0004	0.01241
6/27	0.0390	0.0632	0.0032	0.0063	0.0000	0.0000	0.0004	0.01854
6/28	0.0561	0.0632	0.0032	0.0119	0.0000	0.0000	0.0009	0.02240
6/29	0.0695	0.0638	0.0127	0.0148	0.0000	0.0010	0.0019	0.02776
6/30	0.0771	0.0650	0.0180	0.0177	0.0000	0.0030	0.0054	0.03732
7/1	0.0926	0.0668	0.0540	0.0254	0.0000	0.0115	0.0114	0.05345
7/2	0.1181	0.0677	0.0935	0.0377	0.0011	0.0161	0.0147	0.06567
7/3	0.1268	0.0721	0.1221	0.0635	0.0014	0.0382	0.0198	0.07882
7/4	0.1445	0.0817	0.1571	0.0848	0.0090	0.0656	0.0267	0.09571
7/5	0.1607	0.0965	0.1987	0.1014	0.0236	0.0982	0.0347	0.11494
7/6	0.1860	0.1034	0.2250	0.1153	0.0321	0.1285	0.0440	0.13433
7/7	0.2063	0.1074	0.2688	0.1275	0.0374	0.1563	0.0535	0.15707
7/8	0.2362	0.1261	0.2984	0.1503	0.0395	0.1745	0.0587	0.17771
7/9	0.2664	0.1742	0.3557	0.1836	0.0473	0.2031	0.0692	0.21598
7/10	0.3103	0.2073	0.3925	0.2194	0.0693	0.3032	0.0888	0.26075
7/11	0.3471	0.2528	0.4338	0.2987	0.1242	0.3505	0.1048	0.30633
7/12	0.3956	0.3106	0.5032	0.3464	0.1925	0.3784	0.1237	0.35768
7/13	0.4258	0.3607	0.5410	0.4047	0.2203	0.4170	0.1453	0.39509
7/14	0.4459	0.4331	0.5511	0.4728	0.2637	0.4664	0.1686	0.43589
7/15	0.4753	0.4880	0.5790	0.5418	0.3228	0.5651	0.1851	0.48695
7/16	0.5086	0.5441	0.6052	0.6115	0.4165	0.6284	0.2545	0.54272
7/17	0.5391	0.5754	0.6291	0.7318	0.4915	0.6764	0.3110	0.59411
7/18	0.5599	0.6001	0.6547	0.7526	0.5580	0.7273	0.3687	0.62964
7/19	0.5961	0.6181	0.6805	0.7610	0.6422	0.7568	0.4084	0.66217
7/20	0.6504	0.6467	0.7309	0.7855	0.7030	0.7915	0.4300	0.69810
7/21	0.6830	0.6725	0.7974	0.8362	0.7375	0.8316	0.4712	0.73793
7/22	0.7370	0.7016	0.8406	0.8694	0.7457	0.9116	0.5323	0.78013
7/23	0.7905	0.7340	0.8544	0.8843	0.7886	0.9781	0.6168	0.82025
7/24	0.8193	0.7698	0.8831	0.8949	0.8310	1.0000	0.6813	0.85074
7/25	0.8470	0.8088	0.9110	0.9084	0.8622	1.0000	0.7793	0.88159
7/26	0.8720	0.8510	0.9373	0.9316	0.9011	1.0000	0.8403	0.90943
7/27	0.8869	0.8812	0.9618	0.9586	0.9263	1.0000	0.8644	0.92968
7/28	0.9198	0.8983	1.0000	0.9744	0.9485	1.0000	0.9530	0.95859
7/29	0.9384	0.9178	1.0000	0.9855	0.9676	1.0000	0.9820	0.97254
7/30	0.9507	0.9301	1.0000	0.9919	0.9785	1.0000	1.0000	0.98140
7/31	0.9589	0.9410	1.0000	1.0000	1.0000	1.0000	1.0000	0.98749
8/1	0.9650	0.9564	1.0000	1.0000	1.0000	1.0000	1.0000	0.99018
8/2	0.9698	0.9762	1.0000	1.0000	1.0000	1.0000	1.0000	0.99325
8/3	0.9745	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.99682
8/4	0.9794	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.99743
8/5	0.9849	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.99811
8/6	0.9883	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.99854
8/7	0.9899	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.99873
8/8	0.9916	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.99895
8/9	0.9935	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.99919
8/10	0.9945	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.99931
8/11	0.9958	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.99948
8/12	0.9970	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.99962
8/13	0.9978	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.99973
8/14	0.9983	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.99978
8/15	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.00000

Appendix 17. Historic daily cumulative proportion of coho salmon escapement at the Goodnews River counting tower, 1981 - 1987.

Date	1981	1982	1983	1984	1985	1986	1987	Ave.
7/17	0.0000	0.0220		0.0000	0.0000	0.0184	0.0000	0.00577
7/18	0.0000	0.0330		0.0000	0.0000	0.0184	0.0000	0.00734
7/19	0.0056	0.0440		0.0000	0.0000	0.0184	0.0000	0.00971
7/20	0.0169	0.0549		0.0000	0.0000	0.0307	0.0000	0.01464
7/21	0.0337	0.0549		0.0120	0.0000	0.0552	0.0000	0.02227
7/22	0.0421	0.0549		0.0281	0.0000	0.8773	0.0000	0.14321
7/23	0.0449	0.0549		0.0442	0.0000	0.9816	0.0000	0.16081
7/24	0.0506	0.0549		0.1446	0.0000	1.0000	0.0000	0.17858
7/25	0.0562	0.0659		0.1727	0.0248	1.0000	0.0000	0.18852
7/26	0.0590	0.0989		0.3133	0.3014	1.0000	0.0000	0.25322
7/27	0.0618	0.1538		0.3976	0.4823	1.0000	0.0000	0.37079
7/28	0.0646	0.2527		0.5542	0.6418	1.0000	0.0000	0.50192
7/29	0.0899	0.3626		0.6747	0.7766	1.0000	0.0000	0.55769
7/30	0.1011	0.4286		0.7590	0.8794	1.0000	1.0000	0.73831
7/31	0.1124	0.4725		1.0000	1.0000	1.0000	1.0000	0.79784
8/1	0.1798	0.5275		1.0000	1.0000	1.0000	1.0000	0.81532
8/2	0.2191	0.5934		1.0000	1.0000	1.0000	1.0000	0.83036
8/3	0.2809	1.0000		1.0000	1.0000	1.0000	1.0000	0.89727
8/4	0.3230	1.0000		1.0000	1.0000	1.0000	1.0000	0.90329
8/5	0.4635	1.0000		1.0000	1.0000	1.0000	1.0000	0.92335
8/6	0.5253	1.0000		1.0000	1.0000	1.0000	1.0000	0.93218
8/7	0.5618	1.0000		1.0000	1.0000	1.0000	1.0000	0.93740
8/8	0.6236	1.0000		1.0000	1.0000	1.0000	1.0000	0.94623
8/9	0.7163	1.0000		1.0000	1.0000	1.0000	1.0000	0.95947
8/10	0.7612	1.0000		1.0000	1.0000	1.0000	1.0000	0.96589
8/11	0.8427	1.0000		1.0000	1.0000	1.0000	1.0000	0.97753
8/12	0.9129	1.0000		1.0000	1.0000	1.0000	1.0000	0.98756
8/13	0.9916	1.0000		1.0000	1.0000	1.0000	1.0000	0.99880
8/14	1.0000	1.0000		1.0000	1.0000	1.0000	1.0000	1.00000
8/15	1.0000	1.0000		1.0000	1.0000	1.0000	1.0000	1.00000

Appendix 18. Historic daily cumulative proportion of pink salmon escapement at the Goodnews River counting tower, 1981 - 1987.

Date	1981	1982	1983	1984	1985	1986	1987	Ave.
7/3	0.0000	0.0000	0.0000	0.0008	0.0000	0.0000	0.0000	0.00123
7/4	0.0000	0.0000	0.0000	0.0015	0.0000	0.0005	0.0000	0.00182
7/5	0.0000	0.0002	0.0000	0.0021	0.0000	0.0014	0.0000	0.00246
7/6	0.0015	0.0003	0.0000	0.0034	0.0000	0.0033	0.0000	0.00325
7/7	0.0030	0.0006	0.0000	0.0047	0.0000	0.0064	0.0000	0.00463
7/8	0.0098	0.0013	0.0882	0.0078	0.0000	0.0138	0.0000	0.01847
7/9	0.0166	0.0043	0.0882	0.0139	0.0000	0.0162	0.0000	0.02260
7/10	0.0294	0.0056	0.2059	0.0183	0.0000	0.0277	0.0000	0.04290
7/11	0.0369	0.0100	0.2941	0.0497	0.0000	0.0354	0.0000	0.06221
7/12	0.0467	0.0175	0.3235	0.0690	0.0000	0.0498	0.0000	0.07639
7/13	0.0588	0.0338	0.3235	0.0819	0.0000	0.0713	0.0000	0.09164
7/14	0.0701	0.0502	0.3235	0.1019	0.0000	0.0998	0.0000	0.10829
7/15	0.0897	0.0634	0.4118	0.1353	0.0000	0.1790	0.0635	0.15144
7/16	0.1251	0.0932	0.4118	0.1820	0.0000	0.2215	0.0635	0.17919
7/17	0.1733	0.1116	0.4118	0.2881	0.0000	0.2620	0.1587	0.22582
7/18	0.2095	0.1248	0.4412	0.3588	0.0000	0.3274	0.2063	0.26637
7/19	0.2705	0.1327	0.6176	0.3960	0.0000	0.3865	0.2857	0.32149
7/20	0.3466	0.1488	0.6471	0.4224	0.0625	0.5001	0.4127	0.38310
7/21	0.3904	0.1838	0.7353	0.4716	0.0972	0.6681	0.6825	0.47505
7/22	0.4830	0.2457	0.7353	0.5226	0.0972	0.8372	0.7302	0.54120
7/23	0.6044	0.3069	0.7353	0.5755	0.0972	0.9586	0.7778	0.59940
7/24	0.6616	0.3673	0.9412	0.6190	0.1181	1.0000	0.8889	0.67181
7/25	0.6925	0.4270	0.9412	0.6547	0.3056	1.0000	0.9524	0.72107
7/26	0.7287	0.4860	0.9412	0.7095	0.7083	1.0000	0.9524	0.79357
7/27	0.7702	0.5577	0.9412	0.7669	0.7569	1.0000	0.8889	0.81836
7/28	0.8176	0.6068	1.0000	0.8448	0.7986	1.0000	0.8889	0.86003
7/29	0.8267	0.6443	1.0000	0.9082	0.8264	1.0000	0.8889	0.88334
7/30	0.8402	0.6822	1.0000	0.9570	0.9514	1.0000	1.0000	0.92885
7/31	0.8598	0.7648	1.0000	1.0000	1.0000	1.0000	1.0000	0.95308
8/1	0.8787	0.8429	1.0000	1.0000	1.0000	1.0000	1.0000	0.96520
8/2	0.9066	0.9167	1.0000	1.0000	1.0000	1.0000	1.0000	0.97791
8/3	0.9194	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.98992
8/4	0.9359	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.99199
8/5	0.9495	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.99369
8/6	0.9548	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.99435
8/7	0.9668	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.99586
8/8	0.9812	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.99765
8/9	0.9842	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.99802
8/10	0.9887	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.99859
8/11	0.9970	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.99962
8/12	0.9985	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.99981
8/13	0.9992	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.99991
8/14	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.00000
8/15	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.00000

Appendix 19. Chinook salmon counts obtained during periods of 24 consecutive hourly observations, Goodnews River tower, 1987.

Date	Total Hour Count																							Total Chinook Salmon Counted	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22		23
7/6								3	2	0	1	0	2	3	1	1	5	2	0	3	2	2	3	0	30
7/7	1	0	0	1	0	0	0																		2
7/9								0	1	0	0	0	0	0	1	2	2	0	1	2	2	0	1	3	15
7/10	0	2	6	2	0	0	0																		20
7/10								0	0	1	0	0	1	0	0	9	5	1	3	1	0	2	10	0	33
7/11	3	0	4	1	0	3	0																		11
7/14	1	0	3	1	8	1	0	0	4	2	0	0	4	2	0	1	10	8	3	9	2	2	9	1	71
7/17	0	1	2	1	0	0	0	0	0	0	1	0	1	5	3	2	2	2	0	0	4	6	1	7	38
7/18	9	1	1	0	0	0	3	0	0	-1	0	0	-1	7	3	2	1	2	0	0	4	2	4	3	40
Total	14	4	16	6	8	4	3	3	7	2	2	0	7	17	8	17	25	15	7	15	14	14	28	14	250
Percent Total	5.6	1.6	6.4	2.4	3.2	1.6	1.2	1.2	2.8	0.8	0.8	0.0	2.8	6.8	3.2	6.8	10.0	6.0	2.8	6.0	5.6	5.6	11.2	5.6	100.0

Appendix 20. Sockeye salmon counts obtained during periods of 24 consecutive hourly observations, Goodnews River tower, 1987.

Date	Total Hour Count																							Total Sockeye Salmon Counted	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22		23
7/6								7	1	4	5	5	19	20	60	17	42	16	32	11	10	81	53	23	406
7/7	19	5	10	7	5	7	3																		56
7/9								6	23	2	0	2	13	9	23	18	34	26	35	22	29	15	11	9	277
7/10	3	14	29	12	8	2	-1																		67
7/10								20	1	4	0	5	44	0	20	36	15	8	25	22	22	9	93	19	343
7/11	20	14	34	17	5	5	4																		99
7/14	31	38	18	7	1	1	10	1	17	0	0	9	4	1	3	5	30	63	13	27	5	25	34	32	375
7/17	4	1	3	14	4	0	11	2	0	0	1	0	0	8	1	3	10	8	4	18	21	12	5	16	146
7/18	15	8	2	0	1	1	4	3	1	1	2	0	4	13	5	10	1	14	5	11	17	14	7	10	149
Total	92	80	96	57	24	16	31	39	43	11	8	21	84	51	112	89	132	135	114	111	104	156	203	109	1918
Percent Total	4.8	4.2	5.0	3.0	1.3	0.8	1.6	2.0	2.2	0.6	0.4	1.1	4.4	2.7	5.8	4.6	6.9	7.0	5.9	5.8	5.4	8.1	10.6	5.7	100.0



Appendix 21. Chum salmon counts obtained during periods of 24 consecutive hourly observation, Goodnews River tower, 1987.

Date	Total Hour Count																							Total Chum Salmon Counted	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22		23
7/6								0	1	1	0	2	3	2	2	2	0	2	3	0	0	3	13	4	38
7/7	2	3	0	1	0	4	1																		11
7/9								1	5	2	1	0	1	1	5	1	6	1	1	4	6	5	3	4	47
7/10	1	6	7	1	2	2	0																		19
7/10								7	0	1	2	0	4	3	8	6	4	10	8	19	2	1	6	9	90
7/11	4	7	8	2	18	15	7																		61
7/14	9	4	10	31	7	7	9	2	2	1	-1	0	1	1	2	2	7	7	3	5	3	7	14	3	136
7/17	51	6	3	4	14	3	21	1	-1	1	2	2	0	116	9	-1	2	3	5	5	25	16	28	15	330
7/18	51	10	6	3	2	1	4	3	10	2	5	3	2	54	10	2	13	17	3	6	23	24	30	53	337
Total	118	36	34	42	43	32	42	14	17	8	9	7	11	177	36	12	32	40	23	39	59	56	94	88	1069
Percent Total	11.0	3.4	3.2	3.9	4.0	3.0	3.9	1.3	1.6	0.7	0.8	0.7	1.0	16.6	3.4	1.1	3.0	3.7	2.2	3.6	5.5	5.2	8.8	8.2	100.0

Appendix 22. Historical estimated salmon run size and commercial exploitation rate, Goodnews River, 1981 - 1987.

Year	Species	Middle Fork Tower Estimate	Middle Fork Aerial Survey Count as a Percentage of Tower Estimate	Goodnews River Escapement Estimate	Goodnews Bay Subsistence Harvest Estimate	Goodnews Bay Commercial Harvest	Goodnews Bay Total Run Size Estimate	Exploitation <sup>a</sup> Percentage of Run Size
1981 <sup>b</sup>	Chinook	3,688	-	-	1,409	7,190	-	-
	Sockeye	49,108	-	-	3,511 <sup>c</sup>	40,273	-	-
	Chum	21,827	-	-	-	13,642	-	-
1982 <sup>b</sup>	Chinook	1,395	-	-	1,236	9,476	-	-
	Sockeye	56,255	-	-	2,754 <sup>c</sup>	38,877	-	-
	Chum	6,767	-	-	-	13,829	-	-
1983	Chinook	6,027	36 %	14,398	1,066	14,117	29,581	51 %
	Sockeye	25,816	22 %	69,955	1,518 <sup>c</sup>	11,716	83,189	16 %
	Chum	15,548	-	-	-	6,766	-	-
1984	Chinook	3,260	35 %	8,743	629	8,612	17,984	51 %
	Sockeye	32,053	27 %	67,213	964	15,474	83,651	20 %
	Chum	19,003	35 %	117,739	189	14,340	132,268	11 %
1985	Chinook	2,831	70 %	7,979	426	5,793	14,198	44 %
	Sockeye	24,131	11 %	50,481	704	6,698	57,883	13 %
	Chum	10,367	32 %	25,025	348	4,784	30,157	17 %
1986	Chinook	2,083	57 %	4,094	555	2,723	7,372	44 %
	Sockeye	51,069	28 %	93,228	942	22,608	116,778	20 %
	Chum	14,765	38 %	51,910	191	10,355	62,456	17 %
1987	Chinook	2,274	100 %	4,490	816	3,357	8,663	48 %
	Sockeye	28,871	85 %	51,989	955	27,758	80,702	36 %
	Chum	17,519	58 %	37,802	578	20,381	58,761	36 %

a Subsistence and commercial exploitation

b Incomplete aerial survey results.

c Subsistence caught chum salmon is included in subsistence sockeye salmon harvest.