

CHIROSKY RIVER COUNTING TOWER

1976

(From AYK Area Arctic Anadromous Fish Investigations)  
Completion Report for July 1, 1976 to June 30, 1977

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## CHIROSKY RIVER COUNTING TOWER, 1976

### INTRODUCTION

Although large numbers of pink salmon return to the Unalakleet River system during some years, commercial fishing effort has concentrated on chum salmon. The result has been a management scheme based on chum salmon abundance. Aerial surveys have been the primary source of escapement information; however they are often inaccurate because of weather, water conditions, pilot experience, observer ability and other factors. The initiation of a salmon counting tower project on the Chirosky River in 1975 was an attempt to improve escapement enumeration accuracy and to develop an in-season indicator of chum salmon escapements to the entire Unalakleet River drainage (Figure 5).

### OBJECTIVES

1. Develop indices of king, pink and chum salmon abundance in the Unalakleet River.
2. Obtain daily and seasonal timing of salmon escapements into the Chirosky River.

### METHODS AND MATERIALS

#### Counting procedures

A crew of three counted salmon for two 3-hour shifts each (total of 18 hours) from 0000 hours to 0700 hours and from 1300 hours to 2400 hours daily. A 24-hour counting schedule was maintained every fourth day to estimate migration during non-counted hours.

"Unexpanded" hourly counts were totaled and live salmon moving downstream were subtracted from the total. Ten-minute counts were made at the beginning of each counting hour to determine if 10-minute counts could be used as a basis for estimating hourly migration. Ten-minute counts were "expanded" by a factor of six to obtain an estimate of hourly migration.

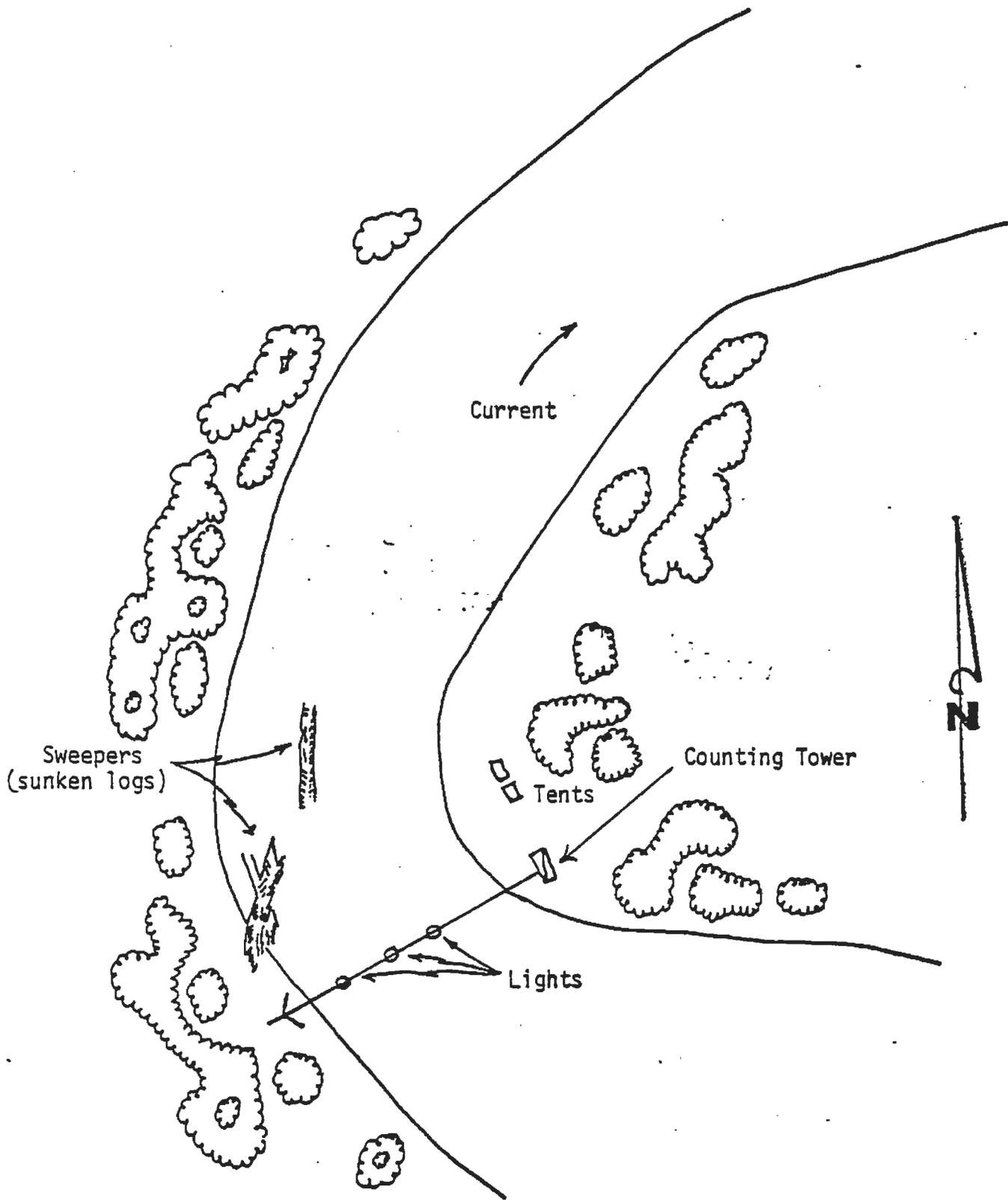


Figure 5. Chirosky River salmon counting tower site, 1976.

At times it was impossible to make counts of salmon escapement due to weather, inadequate lighting, etc. Missing count periods were compensated for by averaging the last complete hourly/daily count with the next complete hourly/daily count.

Aerial surveys of the spawning escapement were also made of the Unalakleet River and major tributaries including the Chirosky and North Rivers from a chartered Cessna 180 to obtain a total river escapement estimate.

### Age, sex and size

Age, sex and size composition data were recorded for chum and king salmon at the Chirosky River counting tower, while similar data was collected at a commercial processing plant in Unalakleet. All commercial fish sampled were measured for length to the nearest millimeter from mid-eye to fork of tail over the body curvature; however, due to caudal fin deterioration of salmon spawners, carcass samples were measured from mid-eye to hypural plate. Sex determination of fish was made on the basis of external dimorphic characteristics; when there was doubt, sex of the carcass was determined by internal examination of the gonads. Fish were sampled in the Chirosky and Unalakleet Rivers and were examined subjectively to determine relative amounts of milt or roe retained. The following classifications were employed: 1) spent; 2) mostly spent; 3) partially spent and 4) not spent. In addition, a limited number of unspawned female salmon were sampled for fecundity estimates; i.e. number of eggs per female.

Scales taken for age determination were removed from the area of the first or second row above the lateral line on a diagonal from the insertion of the dorsal fin to the origin of the anal fin. Scales were placed on gum cards and later impressed onto acetate cards. Scales were interpreted for age, using the Gilbert-Rich age designations.

Estimates of the age composition of the king salmon run were made by visually estimated<sup>ing</sup> the length of the fish. Painted facsimiles of king salmon on the background panel provided immediate references for estimating king salmon total length. The length estimate classes were as follows: less than 50 centimeters, 50 to 60 centimeters, 60 to 80 centimeters and larger than 80 centimeters.

## RESULTS

### Salmon enumeration

The counting tower began operation on June 19 and continued through July 25. Salmon were first observed passing the counting tower on July 6.

An "unexpanded total" or actual count of 17 king, 25,064 pink and 858 chum salmon was enumerated past the tower (Table 1). Ten-minute counts were expanded resulting in an unexpanded escapement of 29,916 pink and 786 chum salmon (Table 2). The peak of the chum salmon run occurred during the period of July 20-22, while the peak of the pink salmon run occurred during the period of July 11-13 (Figure 6). Due to small numbers of king salmon passing the counting tower no peak in migration was evident.

Chum and pink salmon hourly migration peaked during the late evening and early morning hours (from 2200 to 0100 hours). Hourly migration is represented in Figure 7.

### King salmon length estimates

The number of king salmon passing the Chirosky River tower (estimated by length) were as follows: 1 (less than 50 centimeters), 7 (50 to 60 centimeters), 9 (60-80 centimeters) and 0 (greater than 80 centimeters).

### Subsistence and commercial harvest

Subsistence surveys and interviews conducted of 30 subsistence fishing families indicated 142 king, 694 coho, 5,316 pink and 2,832 chum salmon were harvested in the Unalakleet subdistrict. The bulk of this catch came from subsistence fishing activities in the Unalakleet River.

A total of 1,198 king, 5,147 coho, 37,113 pink, 24,848 chum and 1 red salmon were harvested by commercial fishermen in the Unalakleet subdistrict. Annual commercial and subsistence harvest information is presented in Appendix Table 1.

### Age, sex and size composition

One hundred twenty-seven king and 156 chum salmon were sampled

Table 1. Daily/hourly salmon migration past Chirosky River counting tower, 1976.

Species: KING

Hour Date	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	21	22	23	Daily Total	$\bar{x}$ Daily	
7/6															1									1	5.9	
7/7		1																			4				5	29.3
7/8	1												1												2	11.8
7/9																									0	-
7/10																									0	-
7/11																									0	-
7/12																									0	-
7/13													1									1			2	11.8
7/14																				1				1	2	11.8
7/15	1																								1	5.9
7/16			1																						1	5.9
7/17																					-1				-1	-5.9
7/18																	1					1		-1	1	5.9
7/19																									0	-
7/20																									0	-
7/21																									0	-
7/22																									0	-
7/23																									-2	-11.8
7/24																									4	23.5
7/25															1										1	5.9
Hourly Totals	2	1	1										2	2				-1				6	3	1	17	
$\bar{x}$ of	11.8		5.9										11.8					-5.9				35.3		5.9		
Hourly totals		5.9											11.8					-5.9					17.5			100

Table 1. Daily/hourly salmon migration past Chirosky River counting tower, 1976 (cont.) Species: PINK

Hour Date	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Daily Total	% of Total	
7/6	-1	13	22	3	10	-	-	-	-	-	-	-	-	-	-	22	100	71	73	84	23	43	99	562	2.2		
7/7	99	84	69	13	68	33	-	-	-	-	-	-	-	35	37	-1	-1	160	16	-	-	79	33	178	902	3.6	
7/8	109	117	59	-	-	-	-	-	-	-	-	-	-	-	-	-	111	24	-	122	-	50	61	74	727	2.9	
7/9	46	86	121	7	7	11	-	-	-	-	-	-	-	-	-	-	-	-	1	166	121	71	220	87	944	3.8	
7/10	134	169	152	29	20	41	46	-	-	-	-	-	-	-	-	-	41	-	-	392	145	-	342	351	1,862	7.4	
7/11	194	280	412	75	93	87	133	-	-	-	-	-	-	-1	-2	-1	149	96	367	151	140	216	340	370	3,099	12.1	
7/12	277	370	245	91	-371	-82	88	-	-	-	-	-	-	15	21	5	-3	-1	75	393	675	253	460	326	2,837	11.1	
7/13	306	478	205	70	57	161	19	19	1	-5	-	-2	2	-6	-16	34	34	83	110	139	98	280	481	312	2,860	11.1	
7/14	278	339	150	19	-28	-	-	-	-	-	-	-	-	-	-18	11	58	10	183	232	165	240	324	205	2,168	8.6	
7/15	154	159	157	28	-21	-18	-6	-	-	-	-	-	-	-3	-9	54	-12	104	10	29	82	244	209	244	1,405	5.6	
7/16	212	182	197	68	32	-66	-41	-	-	-	-	-	-	-12	10	40	2	84	16	71	210	22	343	201	1,571	6.3	
7/17	214	88	112	32	-19	-2	4	-3	-47	-25	-10	-13	-13	-5	3	29	34	9	107	152	47	177	198	144	1,213	4.8	
7/18	56	124	36	30	6	18	-6	-	-	-	-	-	-	-4	-13	2	50	89	194	175	85	134	400	168	1,544	6.2	
7/19	160	103	46	32	6	-27	-11	-	-	-	-	-	-	-9	-10	11	26	-11	19	50	17	20	47	22	491	2.0	
7/20	14	20	12	-	-	13	-4	-	-	-	-	-	-	22	18	48	53	18	17	122	166	115	132	157	923	3.7	
7/21	234	75	-51	5	-14	-34	-10	-3	2	-11	-	-3	-6	11	4	5	10	29	82	1	16	113	201	158	814	3.2	
7/22	40	46	64	23	-4	1	-5	-	-	-	-	-	-	-7	-9	4	-8	52	79	50	36	66	101	77	605	2.4	
7/23	38	71	41	-10	-1	2	-	-	-	-	-	-	-	2	2	-2	13	-3	-8	-6	49	4	-	27	219	0.9	
7/24	5	-28	-4	-8	-13	-3	1	-	-	-	-	-	-	8	1	16	21	29	-3	36	13	8	28	11	118	0.5	
7/25	22	28	4	23	4	-14	-5	-	-	-	-10	-5	-3	-12	2	14	6	20	22	14	32	31	25	2	200	0.8	
HOURLY TOTALS	2591		2049		-168		203		-44		-20		-20		21		565		1358		2181		3988		25,064		
% OF HOURLY TOTALS	10.4		8.2		-0.7		0.8		-0.2		-0.1		-0.1		0.1		2.3		5.4		8.7		15.9		100		
		11.2		2.1		0.5		0.1		-0.2		-0.1		0.1		1.1		3.7		9.4		8.6		12.8			

Table 1. Daily/hourly salmon migration past Chirosky River counting tower, 1976 (cont.) Species: CHUM

HOUR DATE	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	DAILY TOTAL	% Daily TOTAL		
7/6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	8	16	11	14	7	7	5	72	8.4			
7/7	9	9	4	1	8	-	-	-	-	-	-	-	4	3	-	-	1	-	-	-	2	-2	-	39	4.6			
7/8	7	5	3	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	-	2	5	1	25	2.9			
7/9	-	3	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	2	6	6	4	30	3.5		
7/10	9	4	-	-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	4	-	2	1	27	3.2		
7/11	1	11	11	1	3	1	-	-	-	-	-	-	-	-	-	1	1	2	1	2	3	6	6	51	5.9			
7/12	6	5	3	-	-2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	8	12	4	2	4	44	5.1		
7/13	6	5	3	-	1	3	-1	-1	-1	-	-	-	-	-	-	-	3	2	5	-	4	9	7	45	5.2			
7/14	1	11	3	-1	1	-	-	-	-	-	-	-	-	-	-1	-	1	-	-	6	2	2	4	1	30	3.5		
7/15	2	4	3	1	-1	-	-1	-	-	-	-	-	-	-	-	2	-	1	-3	-	2	6	8	3	27	3.2		
7/16	5	3	5	-	-	1	1	-	-	-	-	-	-	-	-	-	-	1	-	3	3	2	15	1	40	4.7		
7/17	3	4	1	-	1	-2	-1	-1	-	-	-	-1	-	2	-	-	1	1	7	1	2	2	5	2	27	3.2		
7/18	1	3	1	3	-	2	-	-	-	-	-	-	-	-	-	-	3	8	7	2	4	11	7	51	5.9			
7/19	2	3	2	-	2	-	1	-	-	-	-	-	-	-	-	-	-1	-	2	1	3	1	-1	1	15	1.7		
7/20	-	0	-	2	1	3	-	-	-	-	-	-	3	1	3	3	4	1	8	24	11	9	10	91	10.6			
7/21	9	10	-2	-5	-	1	-1	1	1	1	-	-	-1	1	2	2	4	8	-	1	4	15	11	62	7.2			
7/22	10	2	6	3	-	-1	-	-	-	-	-	-	2	-1	-	-2	4	3	1	-1	8	3	7	44	5.1			
7/23	5	6	7	2	1	-	-1	-	-	-	-	-	-	-	1	-1	-1	1	1	8	-	-	3	33	3.9			
7/24	2	5	-	1	-1	-1	-	-	-	-	-	-	-	-	-	4	2	-	4	1	1	6	-	25	2.9			
7/25	16	15	10	9	4	-1	1	-	-	-	-	-	4	-1	4	1	1	7	1	1	6	2	-	80	9.3			
HOURLY		115		16	7		-1	-1	1		-1	14		12		14	34		71		75		74		858			
TOTALS	94		64		18		-2		-		-			4		14		54		83		112		74		858		
% OF																												
HOURLY		13.4		1.9	.8		-.1		.1		-.1	1.6		1.4		4.0		8.3		8.7		8.6				100.0		
TOTALS	11.0		7.4		2.1		-.2		-		-			.5		1.6		6.3		9.7		13.0						

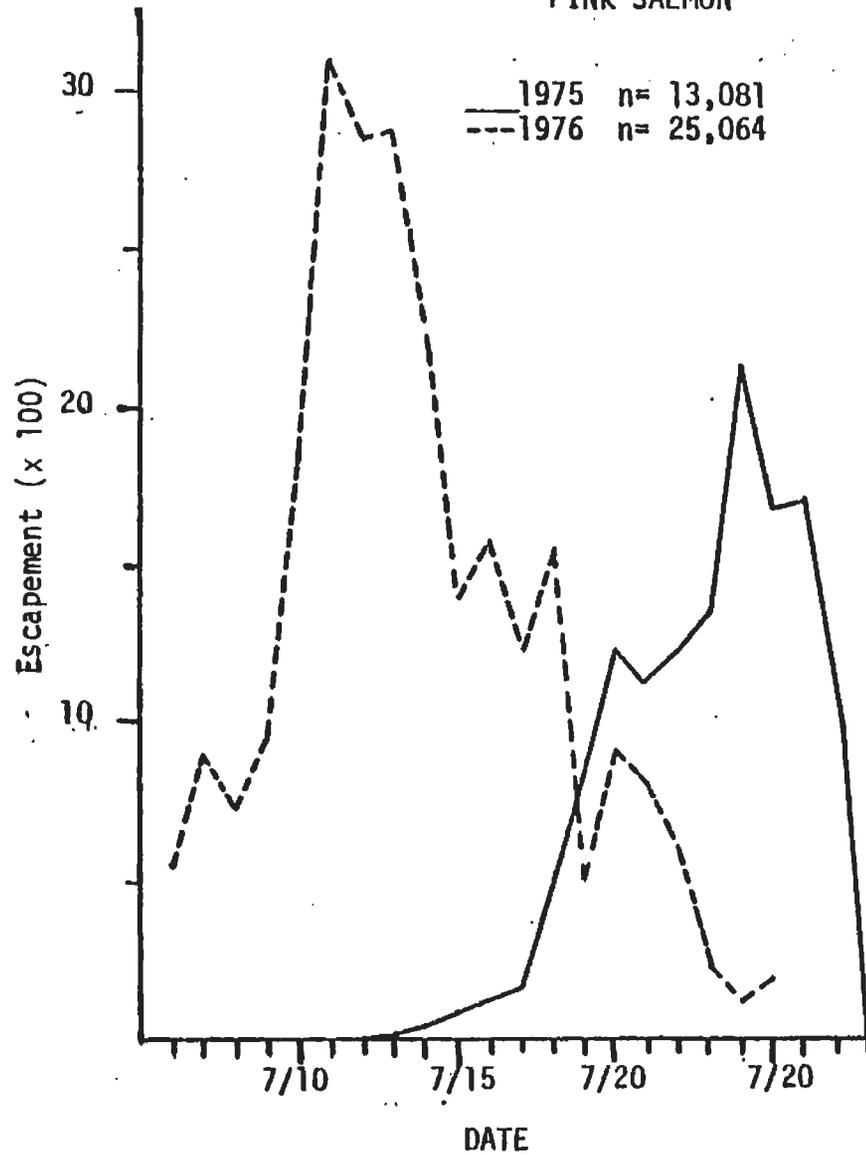
Table 2. Expanded 10-minute counts and actual counts for pink and chum salmon enumerated past the Chirosky River tower, 1976.

Date	Pink			Chum		
	10-minute	Expanded	Actual	10-Minute	Expanded	Actual
7/6	190	1,140	562	11	66	72
7/7	118	708	902	10	60	39
7/8	202	1,212	727	4	24	25
7/9	138	828	944	5	30	30
7/10	420	2,520	1,862	2	12	27
7/11	666	3,996	3,099	7	42	51
7/12	756	4,536	2,837	11	66	44
7/13	332	1,992	2,860	1	6	45
7/14	278	1,668	2,168	3	18	30
7/15	356	2,136	1,405	5	30	27
7/16	278	1,668	1,571	3	18	40
7/17	249	1,494	1,213	2	12	27
7/18	333	1,998	1,544	9	54	51
7/19	103	618	491	3	18	15
7/20	134	804	923	5	30	91
7/21	218	1,308	814	16	96	62
7/22	83	498	605	5	30	41
7/23	70	420	219	7	42	33
7/24	33	198	118	8	48	25
7/25	29	174	200	14	84	80
<b>TOTAL</b>	<b>4,986</b>	<b>29,916</b>	<b>25,064</b>	<b>131</b>	<b>786</b>	<b>858</b>

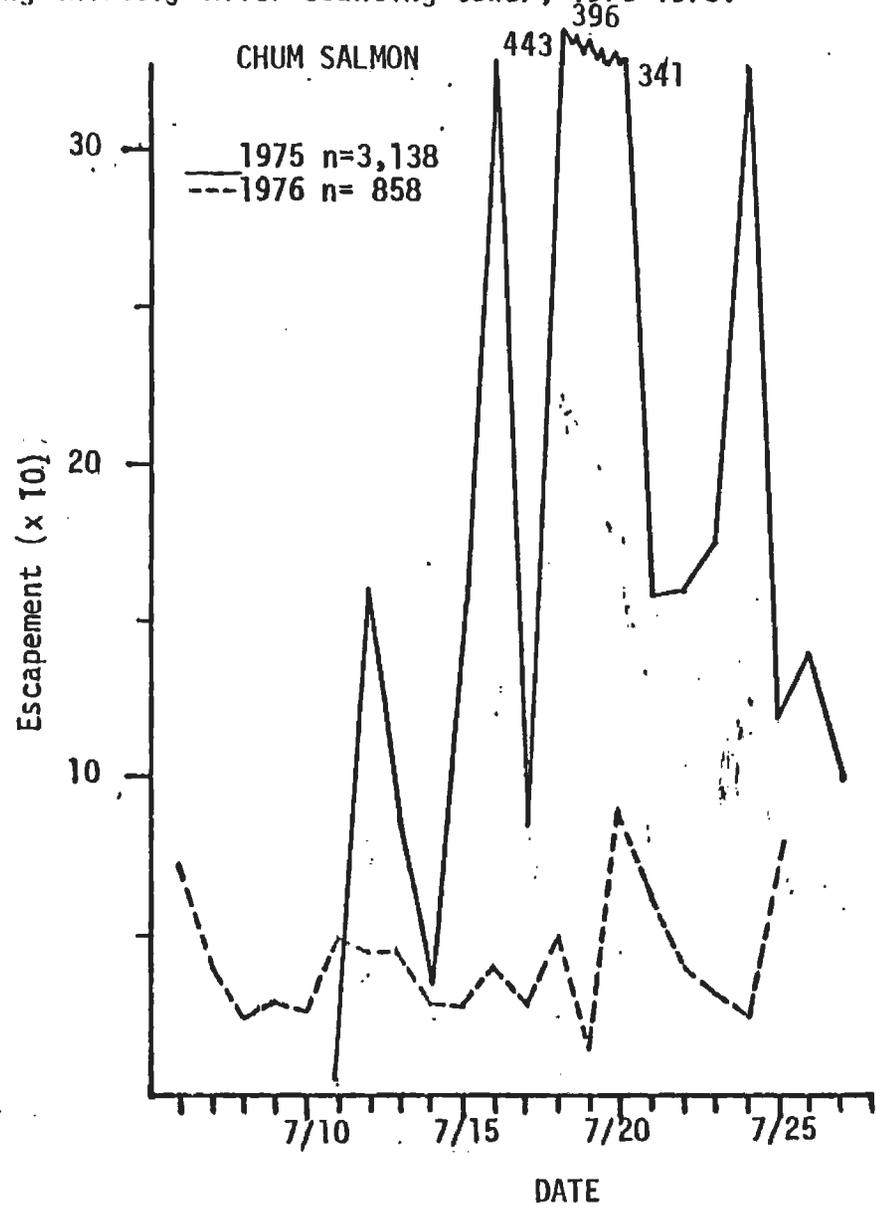
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Figure 6. Daily salmon migration passing Chirosky River counting tower, 1975-1976.

PINK SALMON



CHUM SALMON



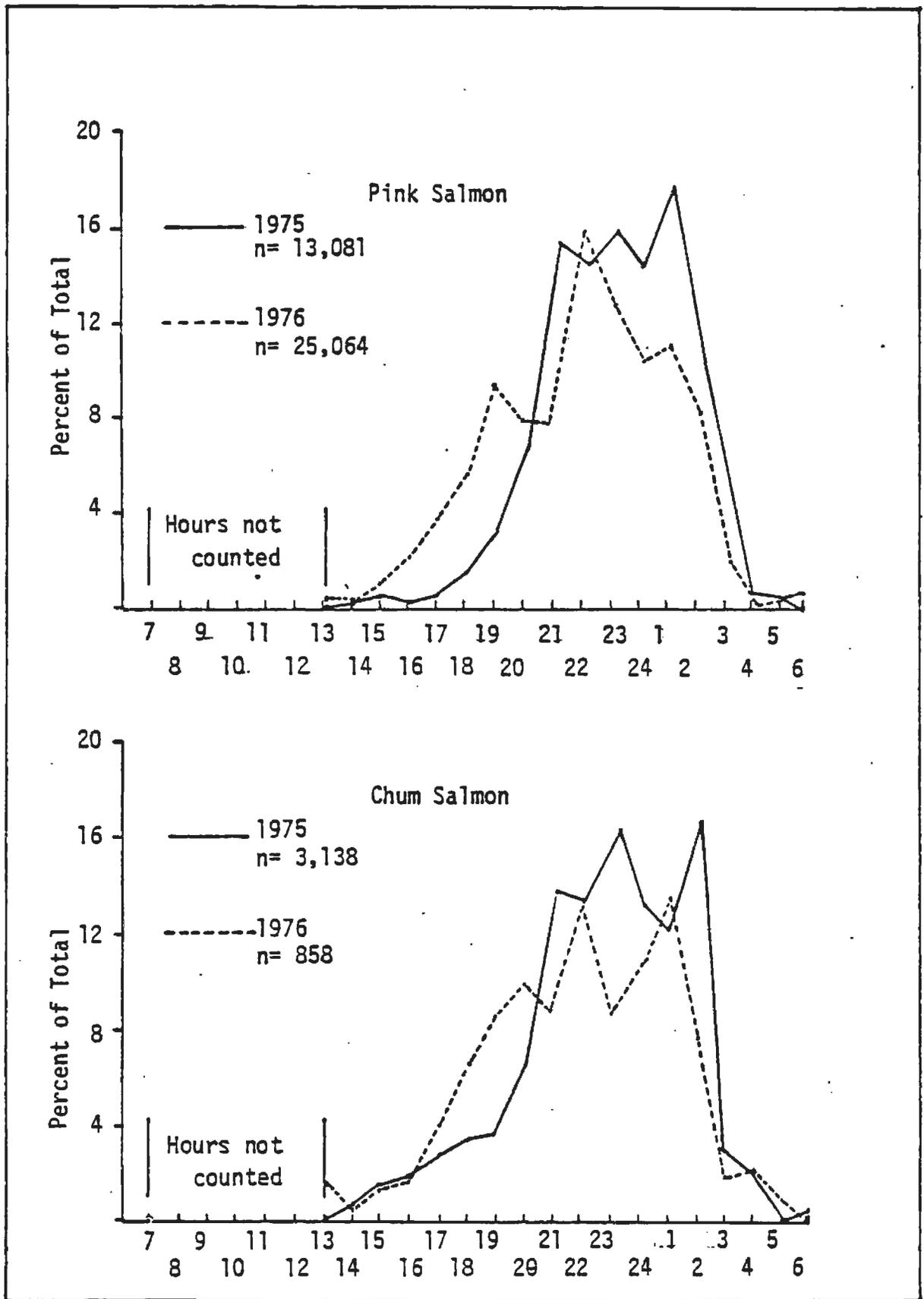


Figure 7. Hourly salmon migration by percent of total passing Chirosky River counting tower, Chirosky River, 1975-1976.

for age, sex and size from the Unalakleet subdistrict commercial fishery at the village of Unalakleet. The data are presented for king and chum salmon in Table 3 and Table 4, respectively.

A male to female ratio of 1.5:1.0 was determined from the 127 king salmon sampled at Unalakleet. Age composition (from scales) of this sample was 7.9%, 64.6% and 27.5% for age 4<sub>2</sub>, 5<sub>2</sub> and 6<sub>2</sub>, respectively.

A male to female ratio of 0.7:1.0 was determined from the 156 chum salmon sampled at Unalakleet. Age composition of this sample was 15.4% age 4<sub>1</sub>, 76.9% age 5<sub>1</sub> and 7.7% age 6<sub>1</sub>.

Twenty-one chum salmon were sampled at the Chirosky River for age, sex and length information. The female to male ratio was found to be 2.5:1.0. Age classes 4<sub>1</sub> and 5<sub>1</sub> compiled 47.6% and 52.4%, respectively, of the escapement sample (Table 5).

## DISCUSSION

### Salmon enumeration

There were 4 days during the study period when 24-hour counting schedules were maintained. No upstream migrants were observed during hours normally not enumerated in the 18-hour counting schedule (0700-1300 hours), therefore, it is assumed that negligible upstream migration occurred during these non-counted hourly periods for the entire season. This corresponds with results noted in 24-hour counting schedules conducted in 1975. Consequently, the observed king, pink and chum escapements of 17, 25,064 and 858, respectively, represent total escapements past the tower.

The Chirosky River appears to support few king salmon, as indicated by observed escapements of 29 and 17 fish in 1975 and 1976, respectively. Recent pink salmon escapements of 13,081 and 25,064 indicate an abundance of this species, however, the relative abundance of chum salmon is more difficult to evaluate due to the lack of comparative escapement data and to the small escapement counts of 3,158 and 858 made in 1975 and 1976, respectively. ~~In the absence of mitigating factors affecting counting operations, such as poor water conditions,~~ the observed escapements <sup>two</sup> do not seem to indicate a large population of chums in the Chirosky River system.

Daily migration figures were similar during 1975-1976, with pink and chum salmon migrations peaking near 2400 hours (Figure 7). Daily pink and chum salmon seasonal migrations peaked July 24 and July 18, respectively,

Table 3 . Age, sex and size composition of Norton Sound district king salmon commercial catch samples taken at Unalakleet (subdistrict 6), 1976.<sup>17</sup>

Dates of Samples	Combined Age Classes		Age 4 <sub>2</sub>			Age 5 <sub>2</sub>			Age 6 <sub>2</sub>			
	Sex	No.	%	No.	%	(length)	No.	%	(Length)	No.	%	(Length)
6/21-6/23	Males	3	75.0				3	75.0	(771.3)			
	Females	1	25.0				1	25.0	(810.0)			
	Total	4	100.0				4	100.0	(781.0)			
6/24-6/27	Males	8	57.1	1	7.1	(613.0)	6	42.9	(782.7)	1	7.1	(885.0)
	Females	6	42.9				4	28.6	(721.0)	2	14.3	(842.2)
	Total	14	100.0	1	7.1	(613.0)	10	71.5	(758.0)	3	21.4	(856.7)
6/28-6/30	Males	10	58.8				8	47.1	(758.2)	2	11.7	(816.0)
	Females	7	41.2				4	23.5	(832.5)	3	17.7	(911.5)
	Total	17	100.0				12	70.6	(783.0)	5	29.4	(838.6)
7/1-7/4	Males	9	56.2	4	25.0	(551.2)	3	18.7	(758.3)	2	12.5	(875.0)
	Females	7	43.8	0	0.0		5	31.3	(691.8)	2	12.5	(890.5)
	Total	16	100.0	4	25.0	(551.2)	8	50.0	(716.8)	4	25.0	(882.8)
7/5-7/7	Males	14	73.7	3	15.8	(603.7)	7	36.9	(682.3)	4	21.0	(864.0)
	Females	5	26.3				4	21.0	(731.0)	1	5.3	(995.0)
	Total	19	100.0	3	15.8	(603.7)	11	57.9	(700.0)	5	26.3	(890.2)
7/8-7/11	Males	15	53.6	1	3.6	(534.0)	13	46.4	(677.1)	1	3.6	(749.0)
	Females	13	46.4				6	21.4	(761.0)	7	25.0	(730.3)
	Total	28	100.0	1	3.6	(534.0)	19	67.8	(703.6)	8	28.6	(732.6)
7/12-7/14	Males	19	65.5	2	6.9	(507.5)	13	44.8	(595.0)	4	13.8	(884.3)
	Females	10	34.5				4	13.8	(715.5)	6	20.7	(872.8)
	Total	29	100.0	2	6.9	(507.5)	17	58.6	(623.4)	10	34.5	(877.4)

Table 3. (continued) Age, sex and size composition of Norton Sound district king salmon commercial catch samples taken at Unalakleet (subdistrict 6), 1976.<sup>1/</sup>

Dates of Samples	Combined Age Classes		Age 4 <sub>2</sub>			Age 5 <sub>2</sub>			Age 6 <sub>2</sub>		
	Sex	No.	%	No.	% (length)	No.	% (Length)	No.	% <sup>2</sup> (length)		
TOTALS	Males	78	61.4	11	8.7 (561.6)	53	41.7 (691.8)	14	11.0 (857.7)		
	Females	<u>49</u>	<u>38.6</u>			<u>28</u>	<u>22.0 (744.1)</u>	<u>21</u>	<u>16.6 (750.6)</u>		
	Total	127	100.0	11	8.7 (561.6)	81	63.7 (709.9)	35	27.6 (793.4)		
Weighted Percentages <sup>2/</sup>	Males		60.6		7.9		42.5		10.2		
	Females		<u>39.4</u>		<u>8.0</u>		<u>22.1</u>		<u>17.3</u>		
	Total		100.0		7.9		64.6		27.5		

<sup>1/</sup> Type of measurement: mid-eye to fork of tail, in millimeters, mean length presented.

<sup>2/</sup> Weighted by commercial catch.

Table 4. Age, sex and size composition of Norton Sound district chum salmon, commercial catch sample, taken at Unalakleet (subdistrict 6), 1976.

Dates of Samples	Combined Age classes		Age 3 <sub>1</sub>			Age 4 <sub>1</sub>			Age 5 <sub>1</sub>			Age 6 <sub>1</sub>		
	Sex	No. %	No.	%	(Length) <sup>1/</sup>	No.	%	(Length) <sup>1/</sup>	No.	%	(Length) <sup>1/</sup>	No.	%	(Length) <sup>1/</sup>
6/21-23	Male	12 48.0				1	4.0	(573.0)	10	40.0	(630.6)	1	4.0	(615.0)
	Female	13 52.0	1	4.0	(525.0)	3	12.0	(565.7)	8	32.0	(602.0)	1	4.0	(587.0)
	TOTAL	25 100.0	1	4.0	(525.0)	4	16.0	(567.5)	18	72.0	(617.9)	2	8.0	(601.0)
6/24-27	Male	19 42.2				4	8.9	(582.5)	14	31.1	(603.9)	1	2.2	(655.0)
	Female	26 57.8				5	11.1	(560.8)	21	46.7	(590.2)			
	TOTAL	45 100.0				9	20.0	(570.4)	35	77.8	(595.7)	1	2.2	(655.0)
6/28-30	Male	12 40.0				1	3.3	(605.0)	9	30.0	(611.4)	2	6.7	(621.0)
	Female	18 60.0				4	13.3	(566.5)	14	46.7	(588.0)			
	TOTAL	30 100.0				5	26.6	(574.2)	23	76.7	(597.2)	2	6.7	(621.0)
7/8-11	Male	10 35.7							6	21.4	(603.2)	4	14.3	(607.3)
	Female	18 64.3				2	7.1	(539.5)	16	57.2	(584.1)			
	TOTAL	28 100.0				2	7.1	(539.5)	22	78.6	(589.3)	4	14.3	(607.3)
7/12-14	Male	11 39.3				3	10.7	(588.7)	6	21.4	(622.8)	2	7.2	(608.0)
	Female	17 60.7				3	10.7	(565.0)	14	50.0	(596.8)			
	TOTAL	28 100.0				6	21.4	(576.8)	20	71.4	(604.6)	2	7.2	(608.0)
TOTALS	Male	64 41.0				9	5.8	(586.0)	45	28.8	(613.8)	10	6.4	(615.7)
	Female	92 59.0	1	0.6	(525.0)	17	10.9	(561.2)	73	46.9	(591.0)	1	0.6	(587.0)
	TOTAL	156 100.0	1	0.6	(525.0)	26	16.7	(569.8)	118	75.7	(599.7)	11	7.0	(613.1)
Weighted Percentages	Males	39.1						5.1					7.7	
	Females	60.9						10.3					50.6	
	TOTAL	100.0						15.4					76.9	

<sup>1/</sup>Type of measurement: mid-eye to fork of tail, in millimeters, over the body, mean length shown.

<sup>2/</sup>Weighted by commercial catch.

Table 5. Age, sex and size composition of Norton Sound chum salmon, escapement samples, taken at Chirosky River, 1976.<sup>1/</sup>

Dates of Samples	Combined Age Classes			Age 4 <sub>1</sub>			Age 5 <sub>1</sub>		
	Sex	No.	%	No.	%	(Length) <sup>2/</sup>	No.	%	(Length) <sup>2/</sup>
7/15	Male	1	100.0				1	100.0	(615.0)
	Female								
	Total	1	100.0				1	100.0	(615.0)
7/27	Male	2	100.0				2	100.0	(610.0)
	Female								
	Total	2	100.0				2	100.0	(610.0)
7/29	Male	1	100.0	1	100.0	(555.0)			
	Female								
	Total	1	100.0	1	100.0	(555.0)			
7/29	Male	11	64.7	4	23.5	(586.5)	7	41.2	(605.6)
	Female	6	35.3	5	29.4	(554.8)	1	5.9	(606.0)
	Total	17	100.0	9	52.9	(568.9)	8	47.1	(605.6)
TOTALS	Male	15	71.4	5	23.8	(580.2)	10	47.6	(607.4)
	Female	6	28.6	5	23.8	(554.8)	1	4.8	(606.0)
	Total	21	100.0	10	47.6	(567.5)	11	52.4	(607.3)
7/31 <sup>3/</sup>	Female	8	100.0	4	50.0	(596.8)	4	50.0	(603.8)
	Male								
	Total	8	100.0	4	50.0	(596.8)	4	50.0	(603.8)

<sup>1/</sup> Type of gear: beach seine.

<sup>2/</sup> Type of measurement: mid-eye to fork of tail, over the body in millimeters, mean length shown.

<sup>3/</sup> Fecundity sample, only females taken, for information only.

in 1975, while 1976 migrations peaked July 11 and July 21. The 1976 season's figures indicated pink and chum were passing the tower prior to initiation of counting operations. Due to the few kings enumerated, daily/seasonal timing patterns could not be determined.

Comparison of 1975-1976 "10-minute" counts show that pink salmon numbers were over-estimated by 12.7% and 19.5%, respectively. Numbers of chum salmon were over and underestimated by 15.1% and -8.4%. The percentage error between the expanded 10-minute count estimates and the observed counts is within an acceptable range for management purposes.

#### King salmon length estimation

Visual king salmon size data may not be representative of the total run. For example, large mesh commercial set net gear has been shown to be selective in the capture of larger fish which results in skewed commercial catch samples. Additionally, visual size estimates from the tower were of total length, while commercial catch samples are measured from mid-eye to fork of tail. The 1975-1976 observed king salmon escapements of 29 and 17 fish, respectively, were too small to allow valid projections of age composition, however, for informational purposes, the 1976 projection is composed of 17.7%, 76.5% and 5.8% of age 4<sub>2</sub>, 5<sub>2</sub> and 6<sub>2</sub>, respectively (Table 6).

### RECOMMENDATIONS

The Chirosky River counting tower was initiated to assess its applicability as an in-season indicator of the chum salmon escapement to the Unalakleet River system. The counting tower has not proven to be an effective management tool during two seasons of operation due to inadequate numbers of chum salmon passing the tower and the distance between the tower and the commercial fishery. The project has been valuable in providing baseline data regarding Chirosky River fishery resources, however, it should not be continued in 1977.

Table 6. Age and size composition of commercial king salmon samples taken at Unalakleet vs visual size and projected age composition<sup>1/</sup> of king salmon obtained at the Chirosky River counting tower, 1976.

Length(cm) <sup>2/</sup>	Age Class	Commercial Samples		Tower Counts	
		#	%	#	%
Less than 50	4 <sub>2</sub>	3	75.0	1	75.0
	5 <sub>2</sub>	1	25.0	-	25.0
		<u>4</u>	<u>100.0</u>	<u>1</u>	<u>100.0</u>
50-60	4 <sub>2</sub>	4	21.0	1	21.0
	5 <sub>2</sub>	15	79.0	6	79.0
		<u>19</u>	<u>100.0</u>	<u>7</u>	<u>100.0</u>
60-80	4 <sub>2</sub>	4	7.8	1	7.8
	5 <sub>2</sub>	43	84.4	7	84.4
	6 <sub>2</sub>	4	7.8	1	7.8
		<u>51</u>	<u>100.0</u>	<u>9</u>	<u>100.0</u>
Greater than 80	5 <sub>2</sub>	22	41.5	0	0.0
	6 <sub>2</sub>	31	58.5	0	0.0
		<u>53</u>	<u>100.0</u>	<u>0</u>	<u>0.0</u>
Summary	4 <sub>2</sub>	11	8.7	3	17.7
	5 <sub>2</sub>	81	63.7	13	76.5
	6 <sub>2</sub>	35	27.6	1	5.8
		<u>127</u>	<u>100.0</u>	<u>17</u>	<u>100.0</u>

<sup>1/</sup> Escapement age composition is a function of percentage class by length category as found in the commercial catch sample.

<sup>2/</sup> Estimates of length are of the total length for visual length estimates and mid-eye to fork of tail for commercial samples.