

Informational Leaflet **31**

RED SALMON SMOLTS - KVICHAK RIVER SYSTEM, 1961

By:

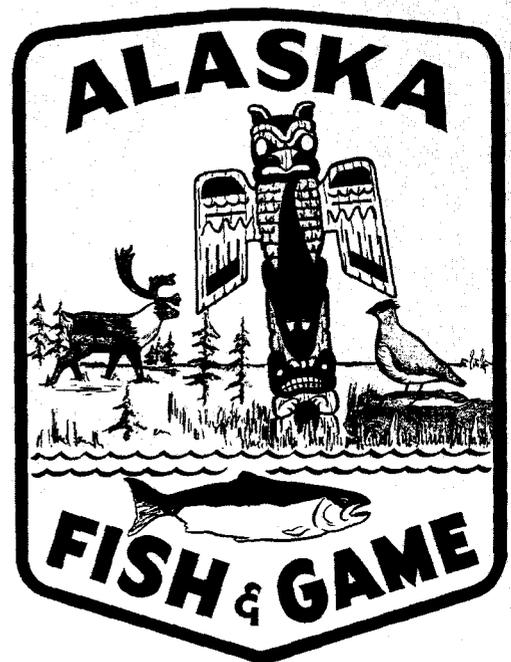
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Division of Commercial Fisheries
Dillingham, Alaska

July 31, 1963

STATE OF ALASKA
WILLIAM A. EGAN - GOVERNOR

**DEPARTMENT OF
FISH AND GAME**

WALTER KIRKNESS - COMMISSIONER
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Informational Leaflet

#3

ALASKA DEPARTMENT OF FISH AND GAME

WILLIAM A. EGAN, GOVERNOR

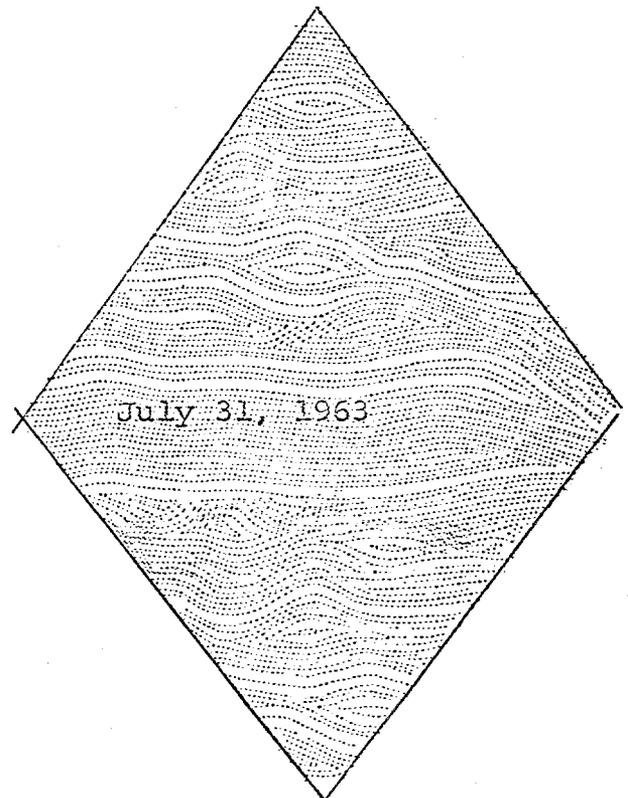
WALTER KIRKNESS, COMMISSIONER

RED SALMON SMOLTS

KVICHAK RIVER
SYSTEM - 1961

BY

WILBUR CHURCH
Division of Commercial Fisheries



ABUNDANCE, SIZE, AND AGE OF RED SALMON SMOLTS FROM
THE KVICHAK RIVER SYSTEM, 1961

INTRODUCTION

In 1961 the Alaska Department of Fish and Game conducted smolt enumeration and sampling at the outlet of Lake Iliamna. This was the seventh consecutive year for this project, although the first for the Department. The Fisheries Research Institute initiated the program in 1955 and continued through 1960.

Results were kept comparable with past records through continuation of methods developed and used by the Fisheries Research Institute.

METHODS

Field operations began on May 20 and continued through June 20. A single fyke net was fished from 10:00 P.M. to 1:00 A.M. each night, the previously established index hours.

Smolts in the catch were counted when they were few and weighed when they were many. When catches were weighed, one-pound sample counts were made in order to convert total weight into numbers of fish. Throughout the season, samples of fish were anesthetized and measured. Except when specimens were needed for parasite or scale studies, fish were released at the fyke net site.

Size composition was determined from length measurements of 1,429 smolts contained in 26 one-pound samples. Age determination was based on readings of 150 scales; five to ten fish were selected each night for this purpose. In addition, one condition index measurement was taken.

TIMING OF THE MIGRATION

Catches during the index hours were heaviest in the first hour (57.9%), decreased in the second hour (36.1%), and tapered off still more in the last hour (6.0%). Catches by hour and day are shown in Table 1.

Of the 22 fishing nights, catches were highest during the second hour more often than in the first hour (ten times and nine times, respectively). The large catch during the first index hour of June 2 accounts for the higher percentage of first hour catches.

Although equipment was ready for operation shortly after arrival at the station on May 10, ice conditions did not permit fishing until May 23 when the first catches were made. Undoubtedly, the smolt migration had begun at least a few days earlier, since the third and second highest catches of the season were made on this and the following night, respectively.

Table 1. Kvichak River smolt catches, 1961 - by hour and day (index hours 2100-0100).

Date	2200 2300	2300 2400	2400 0100	Daily Total	Cumulative Total	Cumulative Index Points
May 23	499	2,132	575	3,206	3,206	.18
24	664	2,839	766	4,269	7,475	.39
25						
26						
27						
28						
29						
30						
31						
June 1	1,059	218	8	1,285	8,760	.46
2	12,332	3,079	65	15,476	24,236	1.27
3	2	9	11	22	24,258	1.27
4	7	158	5	170	24,428	1.28
5	11	48	19	78	24,506	1.28
6	63	99	13	175	24,681	1.29
7	629	50	0	679	25,360	1.33
8	1,282	1,211	26	2,519	27,879	1.46
9	36	5	20	61	27,940	1.46
10	115	2	1	118	28,058	1.47
11	172	505	72	749	28,807	1.51
12	23	2	1	26	28,833	1.51
13	11	33	6	50	28,883	1.51
14	0	6	87	93	28,976	1.51
15	26	0	21	47	29,023	1.52
16	0	211	3	214	29,237	1.53
17	0	62	0	62	29,299	1.53
18	1	65	50	116	29,415	1.54
19	0	1	38	39	29,454	1.54
20	283	2	11	296	29,750	1.56
Totals	17,215	10,737	1,798	29,750	29,750	1.56

After two nights of fishing on May 23 and 24, the flow of ice again prevented fishing until the night of June 1. Although a comparatively small catch was made on this night, the largest catch of the season was made on June 2, the following night.

Alternate fishing sites were also choked with ice during the week's interval from May 24 to June 1, so the migration pattern for that time is a matter of speculation. It is considered most likely that the migration built up gradually from its May 24 level to the peak on June 2. However, there is also the alternative that the peak was reached and the migration was already on the decline by that time, June 1, when fishing was resumed. At any rate, it is certain that no large migration occurred during the non-fishing period. Tern activity was light, most char and trout stomachs examined did not contain fingerlings, and there were no other indications of a heavy smolt run.

After the June 2 peak, catches were small throughout the remainder of the season with the exception of a minor peak on June 8. Daily catches are shown in Figure 1.

INDEX OF ABUNDANCE

The total catch during the index hours for the 1961 season was 29,750 smolts (Table 1). This is equivalent to 1.56 index points, using 1958 as the base year with the assigned value of 100.

The 1961 index is the second lowest value obtained in the seven years of Kvichak smolt enumeration (Figure 2). However, this represents the minimum possible value, since any attempt at interpolation for the non-fishing period will result in an increased index. Addition of a reasonable estimate of the smolt migration between May 24 and June 1 places the 1961 value between 3 and 6 index points. Even with the larger value, the 1961 smolt index is among the smallest of those recorded.

SIZE AND AGE COMPOSITION

Length and age data were grouped in five-day periods, except the first period which is two days. Altogether there are five periods. The number of smolts caught in each period, number of samples taken, number of fish measured, and number of scales read are shown in Table 2.

Combined length frequencies for each period are shown in Figure 3, with the dividing line between Age I and II as determined by scale readings indicated by vertical dashes. This line indicates that the number of Age II fish to the left equals that of Age I fish to the right of the line. These frequencies were calculated in percentages. There is little progression in size during the season except for the final period.

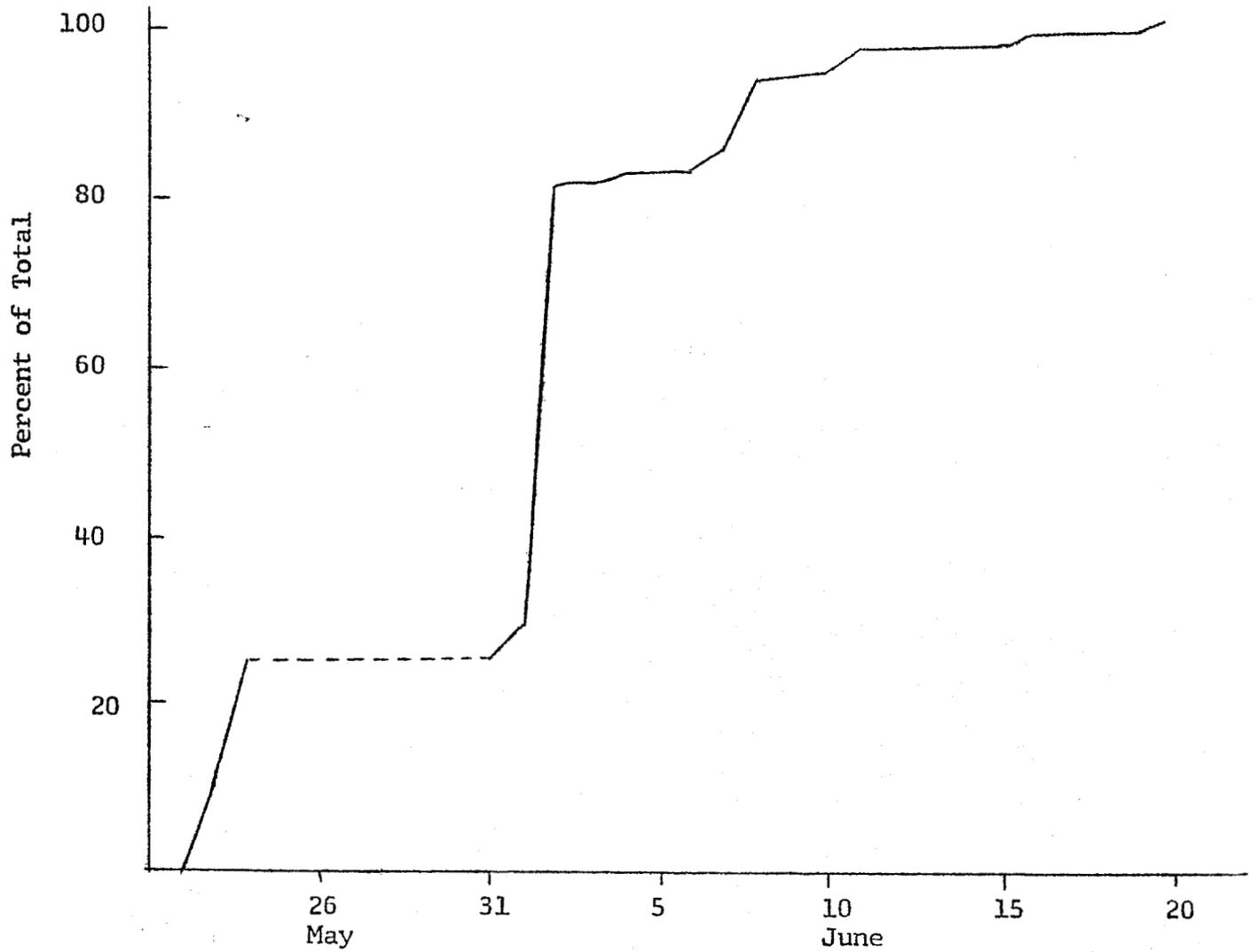


Figure 1. Cumulative daily catch of smolts in percent of season's total, Kvichak River, 1961.

(Dashed line indicates period of no fishing due to ice flow).

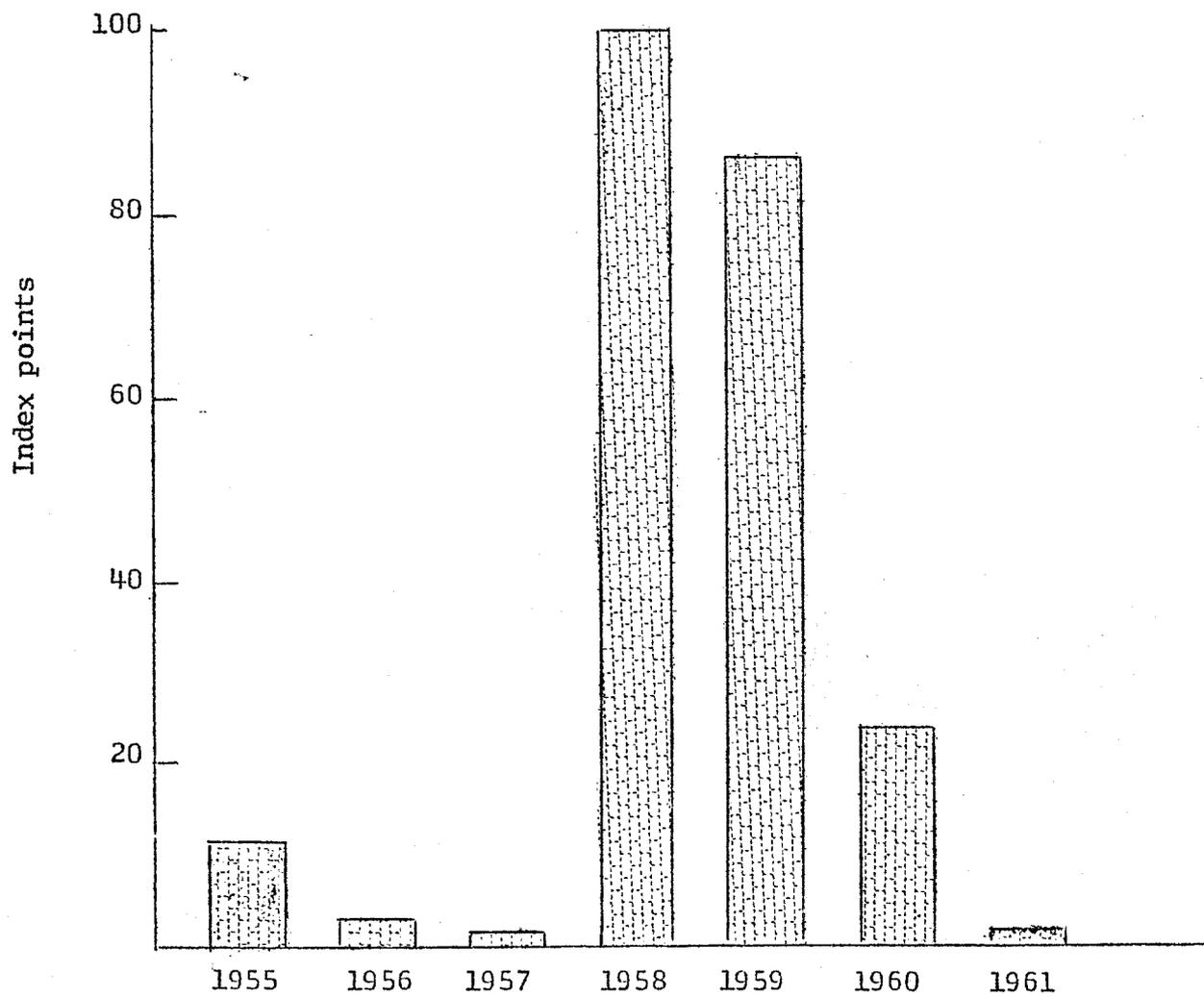


Figure 2. Red salmon smolt index from the Kvichak River, 1955-1961.

Table 2. Kvichak smolt sampling data, 1961.

Period No.	Date	No. of Smolts	Pct. of Season's Total	No. of l# Samples Measured	No. of Fish Measured	No. of Scales Read
1	5/23-24	7,475	25.13	4	176	10
2	6/1-5	17,031	57.25	6	322	20
3	6/6-10	3,552	11.94	7	410	58
4	6/11-15	965	3.24	5	307	40
5	6/16-20	<u>727</u>	<u>2.44</u>	<u>4</u>	<u>214</u>	<u>22</u>
	TOTAL	29,750	100.00	26	1,429	150

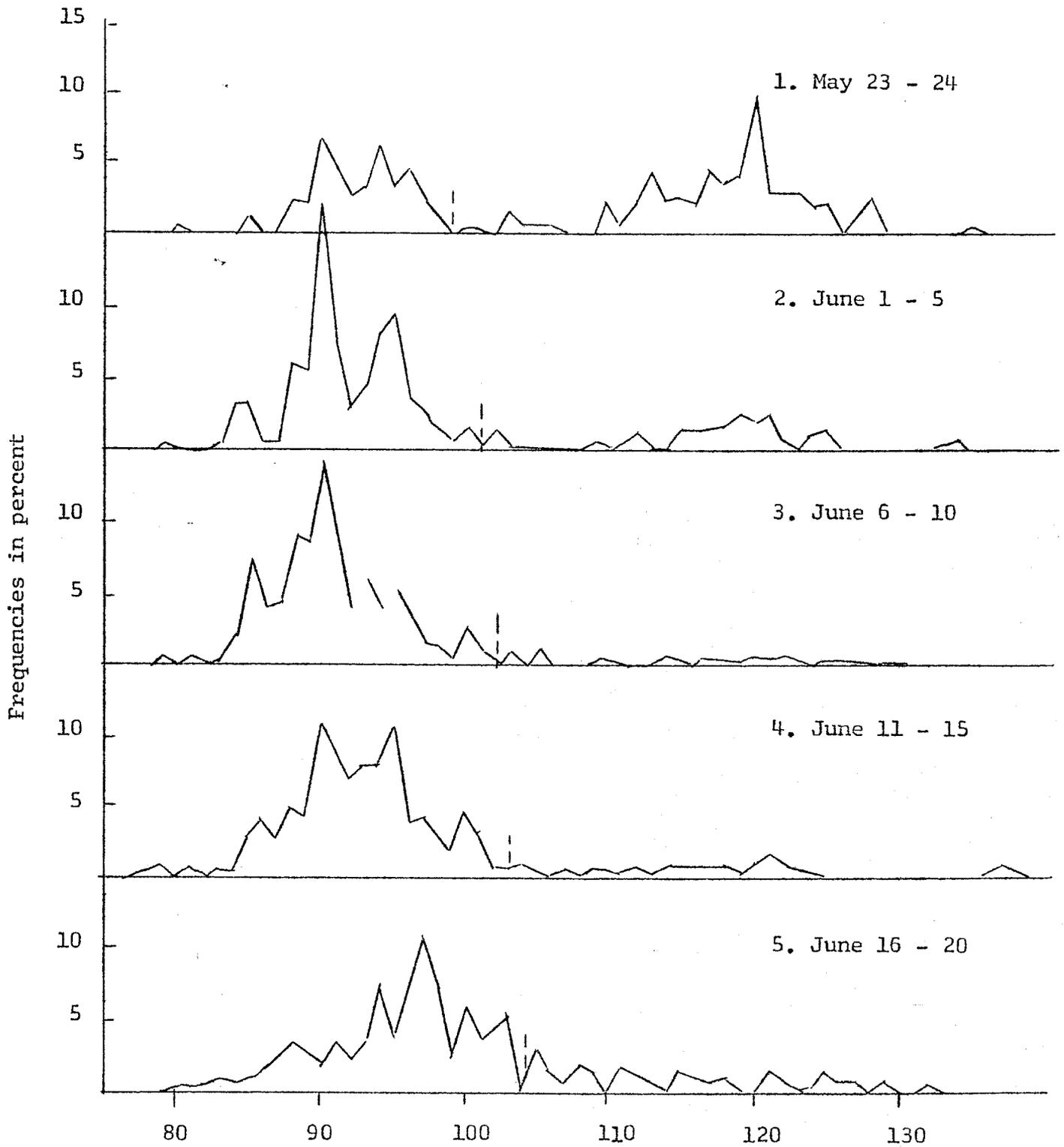


Figure 3. Length frequencies of red salmon smolts from the Kvichak River, 1961.
 (Vertical dash lines divided Age I and Age II)

The percentage and mean length of each age group and of the weighted season's total were calculated (Table 3). Age I smolts comprised 72.2% of the total catch and averaged 91.8 mm. Age II smolts were 27.8% of the total and averaged 117.2 mm. The total weighted length frequency is shown in Figure 4, in which the dominance of Age I group in the catch is apparent.

The mean length of both age groups decreased as the season progressed. This is probably due to the tendency of the larger fish to migrate early in the season. The percentage of Age II fish in the catch also decreased from 56.6% of the total in the first period to 7.7% of the catch in the fourth period. Because the ice flow interrupted fishing at a time when the Age II fish comprised a majority of the migration, the percentage of Age II fish in the total migration is probably higher than that indicated by the catch figures. Although Age I fish were probably in the majority, the percentage of Age II fish may have been as high as 40%, depending on the numbers and age composition of smolts in the migration during the unmeasured part of the run.

CONDITION INDEX

Condition index of smolts was calculated on the basis of weight per fish of a given length. Fish were measured in millimeters and collected in 5 mm groupings. Each group of ten fish was weighed in grams and weight per fish was calculated.

The 1961 condition index was obtained from the runs of June 6 and 7. Fish throughout the size range appeared healthy and in excellent condition. Average weight of fish in each 5 mm group is shown below:

Length in mm	Weight in gms	:	Length in mm	Weight in gms
85	5.16	:	110	10.74
90	5.99	:	115	12.09
95	7.29	:	120	13.81
100	8.51	:	125	15.42
105	9.38	:		

SUMMARY

The red salmon smolt index of 1.56 for 1961 in the Kvichak River is one of the smallest recorded. This is a minimum figure because several days fishing were missed early in the season during a period of ice flow in the river. Probable adjusted index would be between 3 and 6 index points.

Table 3. Length and age of red salmon smolts from the Kvichak River system, 1961.

Period No.	Date	Line Dividing Age I & Age II	Mean Length of Age Group		Percentage of Age Group	
			I	II	I	II
1	5/23-24	99	92.4	118.0	43.4	56.6
2	6/1-5	101	91.8	116.6	79.6	20.4
3	6/6-10	102	90.4	115.6	90.6	9.4
4	6/11-15	103	92.5	115.5	92.3	7.7
5	6/16-20	104	<u>95.4</u>	<u>114.4</u>	<u>80.2</u>	<u>19.8</u>
WEIGHTED SEASON'S TOTAL			91.8	117.2	72.2	27.8

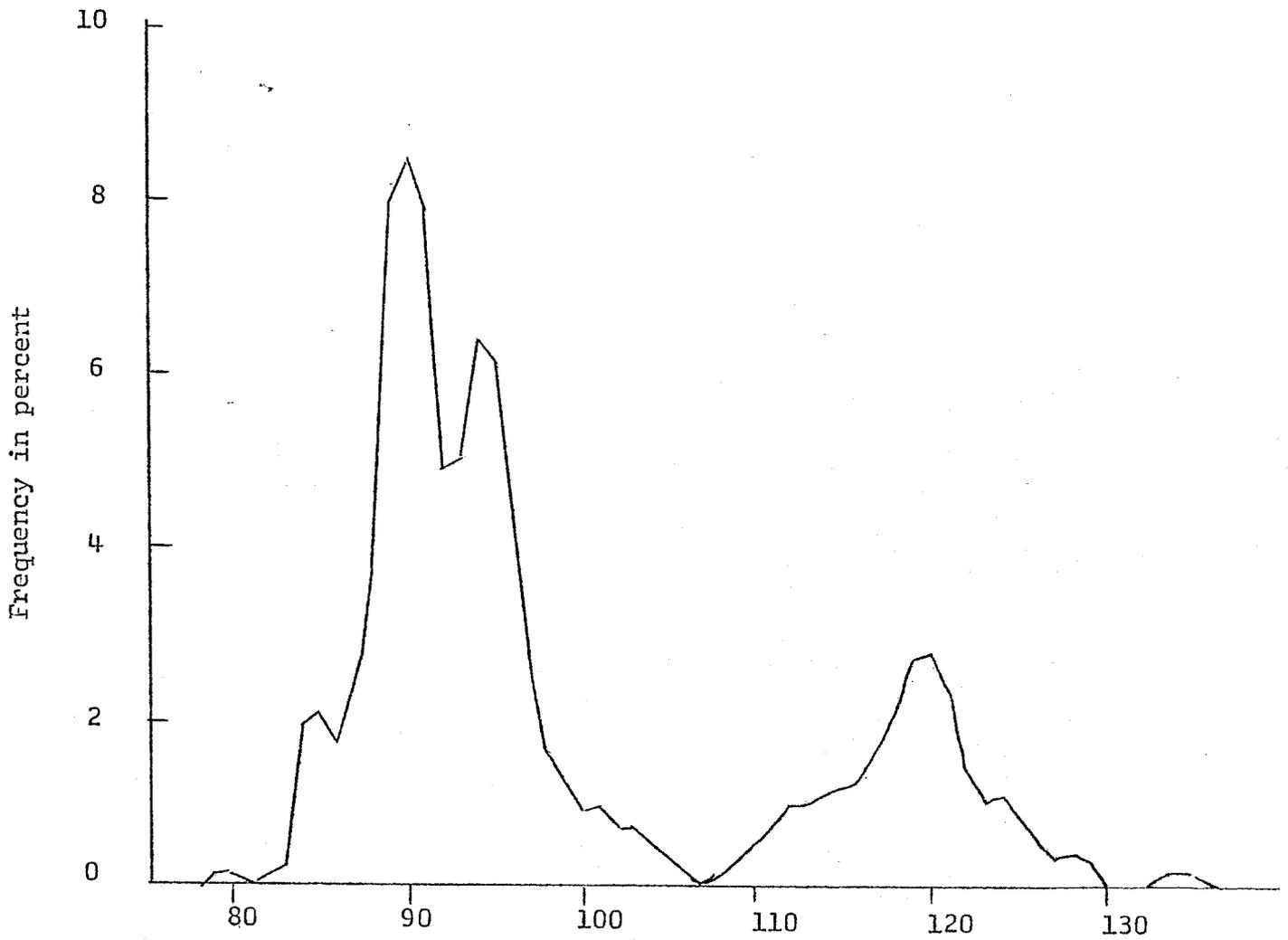


Figure 4. Season's weighted length frequency of red salmon smolts from the Kvichak River, 1961.

(Smoothed by moving average of 3's.)

The percentage of Age II fish in the migration decreased as the season progressed, as did the mean length of both age groups. Because of the tendency of the larger fish to run early, there were probably more Age II fish in the migration than the 27.8% indicated by the weighted catches. Adjustment for the missed fishing period would raise the Age II percentage, possibly to as high as 40%.

Average size of smolts in the catches were 91.8 mm for Age I fish and 117.2 mm for Age II. Adjustment for missed fishing would not change these figures appreciably.

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