

JOB COMPLETION REPORT

RESEARCH PROJECT SEGMENT

STATE: ALASKA Name: Sport Fish Investigations of Alaska.

Project No: F-5-R-5 Title: Evaluation of the King Salmon Sport Fisheries on the Lower Kenai Peninsula.

Job No: 7-B-2

Period Covered: July 1, 1963 to June 30, 1964.

Abstract:

A creel census was conducted on the Anchor River from May 23 to July 5 to determine king salmon harvest and effort. An estimated 1,158 fish were taken by 5,747 man-days of effort. King salmon escapement on the Anchor River, determined by aerial and foot surveys, was estimated at 1,340. The catch was sampled for age composition, size and sex ratios. The dominant age group was 5₂'s which comprised 50 per cent of the sample. A brief discussion of the status of the king salmon stocks in the lower Kenai Peninsula streams is presented.

Recommendations:

It is recommended that escapement surveys be continued on the Anchor River during the 1964-1965 segment to determine population trends of king salmon stocks where fishing mortality has recently been eliminated.

Objectives:

To investigate and measure the sport fish population trends and fishing success, with emphasis on king salmon, in the major recreational fishing streams on the lower Kenai Peninsula.

To evaluate the effect of management procedures currently applied to these sport fishing waters.

To provide recommendations for management of king salmon in these waters and direct the course of future studies.

Techniques Used:

The Alaska Department of Fish and Game continued their creel census program to measure king salmon sport harvest and effort on the Anchor River during 1963. A creel census clerk was stationed on the river during the upstream migration. The sampling method employed followed closely that designed by Neuhold and Lu (1957). All weekend days and four of the five weekdays were sampled, but week ends and weekdays were treated separately in the analysis. The length of the fishing day, 20 hours, was divided into five 4-hour periods. Previous studies have shown that king salmon anglers fished very little between the hours of 2200 and 0200 and that they fished an average of about 4 hours per day. Each of the five daily periods was further divided into four 1-hour periods. One hour was required to count all fishermen from the confluence of the North and South Forks to the mouth of the river. During each census day two fishermen counts were conducted and these were stratified on the basis of each daily and hourly period. Completed fishermen were interviewed along the streamside to determine the number of king salmon taken and hours of effort expended.

Fishing effort for the season was computed by expanding the mean number of fishermen per count by the total possible fishing hours in the season. Total harvest was determined by multiplying the total fishing pressure in fishermen hours by the mean catch per hour.

King salmon escapement was determined by aerial and foot surveys. Approximately a three-mile section, from the new highway bridge downstream to the Forks, of the South Fork of the Anchor River was surveyed by foot and correlated with aerial surveys conducted a short time before over this same section and the entire stream. This method with slight variations was used to estimate escapement in Deep Creek, Ninilchik River and Stariski Creek.

Age was determined by examination of key scales, using a micro-projector after the scales had been impressed on 0.02-inch-thick cellulose acetate.

Findings:

The Anchor River again served as an index stream to measure king salmon population trends and fishing success because of the past catch and escapement information available. Although the largest, it is typical of the lower Kenai Peninsula king salmon streams and has been described by Allin (1954, 1956, 1957), Dunn (1960) and Logan (1961).

The creel census on the Anchor River extended from May 23 to July 5 and measured nearly all of the upstream migration. As in past years, the bulk of the harvest and effort occurred from late May until the middle of June. The total legal king salmon catch was estimated at 1,158 fish. This estimate was based on interviews with 1,195 completed fishermen who had taken 230 king salmon. Although this is the highest catch recorded, it is remarkably similar to that of the 1960 and 1961 seasons (Table 1). The catch per hour was 0.047 and the mean number of king salmon per fisherman was 0.20.

Table 1. The estimated king salmon harvest, effort (man-days) and catch per hour on the Anchor River for past years.

Year	Harvest	Effort	Catch/hour	Period of Census
1954	355	2,640	0.034	5/28 to 7/22
1955	870	2,010	0.099	5/28 to 7/8
1957	335	4,590	0.024	5/1 to 7/9
1960	1,150	5,300		5/7 to 7/14
1961	1,012	6,165	0.059	5/20 to 7/4
1962	502	2,325	0.053	5/19 to 6/27
1963	1,158	5,747	0.047	5/23 to 7/5

Total fishing effort was estimated at 5,747 man-days with 20.8 per cent of the anglers being contacted. Estimates of fishing effort on king salmon prior to 1960 have been calculated from past Fish and Wildlife studies (Allin, 1954, 1956, 1957). Angling effort expended on all weekends (2,735 man-days) was slightly less (47.6 per cent) than of all weekdays (3,012 man-days). A similar distribution was apparent in 1961 and 1962 when 50.7 and 53.4 per cent, respectively, of the season's pressure was during the weekends. The mean number of fishermen enumerated per one-hour count was 50.5 on weekends and 21.2 on weekdays. The average number of hours fished per angler was 4.5.

Surveys to estimate king salmon escapement extended from July 6 to August 4. The longest period between a

foot and aerial survey on the same stream was three days. This was not considered enough time to seriously affect the escapement estimates due to fish movement because most of the kings had passed through the fishery and were concentrated on the spawning grounds. The Anchor River minimum escapement based on an aerial and foot survey made on August 3 and 4, respectively, was estimated at 1,340 king salmon. Although this is the greatest estimated escapement since these surveys were initiated in 1960, it is still only about half of those enumerated by weirs in 1954 and 1957 (Table 2). It is of considerable importance to note that there has been extensive variability between the individual surveys currently employed on these streams. Therefore, the aerial and foot estimates should not be given the same degree of consideration as weir counts. The greatest value of aerial and foot surveys on these streams lies in their use as an index and not as a total count. The estimated king salmon escapements for all of the lower Kenai Peninsula streams are presented in Table 3. No dead fish were observed during surveys conducted between July 6 and 11, but 20.8 per cent of the kings seen on surveys made on August 3 and 4 were dead.

Table 2. Estimated king salmon escapements on the Anchor River for past years.

Year	Escapement	Method of Determination	Agency
1954	2,700	Weir counts	FWS
1957	2,400	Weir counts	FWS
1960	1,200	Aerial and foot surveys	ADF&G
1961	850	Aerial and foot surveys	ADF&G
1962	970	Aerial and foot surveys	ADF&G
1963	1,340	Aerial and foot surveys	ADF&G

Table 3. Estimated king salmon escapements in the Lower Kenai Peninsula streams for 1963.

Stream	Escapement	Period of Survey
Anchor River	1,340	August 3-4
Deep Creek	605	July 9-10
Ninilchik River	450	July 9-11
Stariski Creek	265	July 6-9

The catch was periodically sampled during the creel census and a key scale was collected from 152 king salmon. However, 53 scales (34.9 per cent) showed regeneration in the lacustrine area so were eliminated from the sample. The number and percentage of fish in each age group is shown in Table 4. The major age group was 5₂'s which comprised 49.5 per cent of the sample.

Table 4. The number and percentage of fish in each age group for 99 king salmon taken from the Anchor River in 1963.

Age Group	Number	Percentage
3 ₂	10	10.1
4 ₁	1	1.0
4 ₂	19	19.2
5 ₂	49	49.5
6 ₂	20	20.2

These fish are the progeny of the 1957 escapement of 2,400 fish (Table 2). A 5₂ refers to a king salmon which migrated to sea in its second year and returned as an adult in its fifth year. Ten per cent of the sample were precocious males, "jacks," less than 500 mm (20 inches) in length and are generally considered excess males in most spawning migrations. In this sample 99 per cent of the fish migrated to sea in their second year of life. The length frequency

by sex is presented in Figure 1. The mean length for males and females was 719.3 and 905.8 mm, respectively. A summary of the age and length data by sexes for 1960, 1961 and 1963 is shown in Table 5. The 1962 sample was omitted because of its small size. Two age groups, 5₂ and 6₂ dominated all samples but neither age group was constantly the major one. While the males were present in all age groups, females were found only in those with three or more ocean annuli (4₁, 5₂, 6₂). This agrees closely with the age and sex determinations made by Yancey and Thorsteinson (1963) for king salmon from the Cook Inlet commercial catch. From Table 5 and Figure 1 it is apparent that the age of nearly all king salmon in age groups 3₂ and 4₂ can be determined from their fork length. Determination of age by length for the remaining age groups is not possible because there is considerable overlap.

The sex ratios from 1960 through 1963 have been fairly constant (Table 6). These were determined by randomly sampling the catch throughout the census to avoid bias due to the possibility of a differential migration time by sex. The sex ratios are biased slightly in favor of males because the regulations permitted a more liberal bag limit for king salmon under 20 inches in length. These fish constituted from 5.7 to 19.3 per cent of the male samples.

The 1963 Cook Inlet king salmon commercial harvest of 17,752 fish was the lowest in the history of the fishery (Table 7). Catch statistics after 1960 are not directly comparable to those of earlier years because the later opening dates of the season (June 6-8) were designed by the Commercial Fisheries Division to reduce the take by approximately 50 per cent. The commercial harvest does not provide a direct index to the status of the king salmon sport fishery after 1956. This is chiefly because stocks returning to the lower Kenai Peninsula streams have not been subjected to commercial fishing since the elimination of traps in 1959 and set nets on the beaches south of Ninilchik in 1957. Prior to 1957, the magnitude of effort in the commercial fishery undoubtedly influenced the number of king salmon returning to these streams and the declining commercial catch statistics are very likely to be indicative of their status. The low catch per hour of 0.034 in 1954 indicates the run in Anchor River was probably already at a low level when sport fishing effort began increasing in the early 1950's with the advent of the Homer road. Since elimination of commercial fishing effort on these streams, the king salmon stocks have shown little change. Examination of the

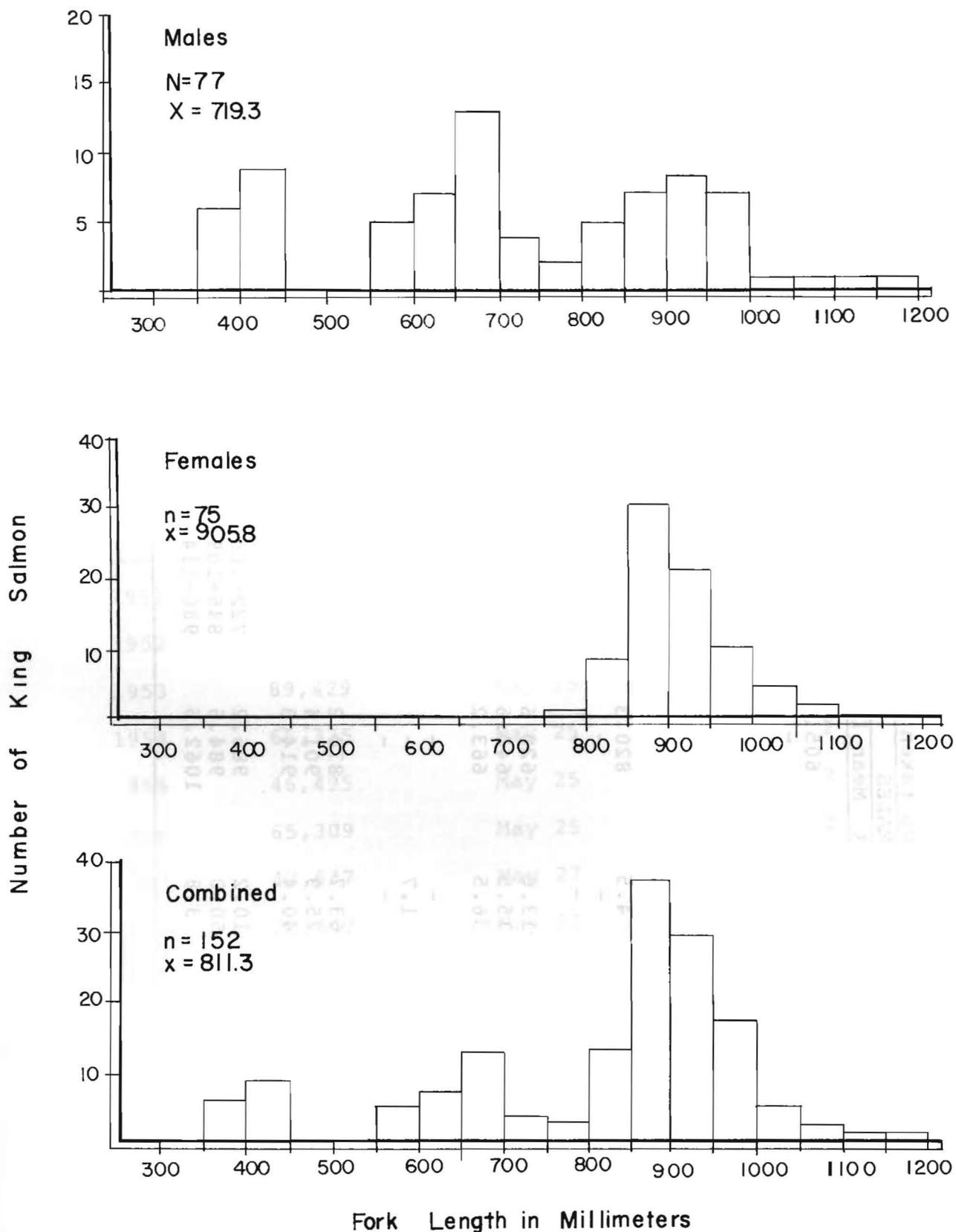


Figure 1. Length frequency of king salmon caught in the Anchor River in 1963.

Table 5. The number, percentage, mean fork length and range (millimeters) by sex of king salmon in each age group taken from the Anchor River in 1960, 1961 and 1963.

Age Group	Year	MALES				FEMALES			
		Number	Per Cent	Mean Length	Range	Number	Per Cent	Mean Length	Range
3 ₁	1960	2	2.3	605.0	575-635	-	-	-	-
	1961	-	-	-	-	-	-	-	-
	1963	-	-	-	-	-	-	-	-
3 ₂	1960	5	5.7	423.6	397-474	-	-	-	-
	1961	4	6.9	407.0	389-442	-	-	-	-
	1963	10	19.3	411.0	380-445	-	-	-	-
4 ₁	1960	4	4.5	820.3	676-930	1	1.1	-	752
	1961	-	-	-	-	-	-	-	-
	1963	-	-	-	-	1	2.1	-	825
4 ₂	1960	12	13.6	620.6	511-715	-	-	-	-
	1961	9	15.5	640.6	533-754	-	-	-	-
	1963	19	36.5	663.2	575-800	-	-	-	-
5 ₁	1960	-	-	-	-	-	-	-	-
	1961	1	1.7	-	1080	-	-	-	-
	1963	-	-	-	-	-	-	-	-
5 ₂	1960	56	63.7	870.2	742-981	83	87.3	845.3	748-930
	1961	15	25.9	901.4	826-973	8	16.3	751.8	826-914
	1963	21	40.4	914.3	810-1050	28	59.6	885.6	825-950
6 ₂	1960	9	10.2	986.2	722-1096	11	11.6	949.7	850-1068
	1961	29	50.0	984.6	846-1092	41	83.7	955.8	876-1080
	1963	2	3.8	1062.5	980-1145	18	38.3	952.4	840-1080

Table 6. The ratio of male to female king salmon determined from the sport catch on the Anchor River from 1960 to 1963

Year	Sex Ratio	Number in Sample	Period of Sample
1960	0.9:1	199	5/21 - 8/13
1961	1.2:1	112	5/25 - 6/30
1962	0.8:1	71	5/22 - 6/27
1963	1.0:1	152	5/22 - 7/5

Table 7. The commercial harvest, open date of season and fishing days per week for king salmon in Cook Inlet from 1951 to 1963.

Year	Harvest	Opening date of Season	Fishing days per week
1951	187,511	May 20	3.5
1952	74,469	May 28	2
1953	89,429	May 25	2
1954	65,325	May 25	2
1955	46,495	May 25	2
1956	65,309	May 25	2
1957	42,647	May 27	2
1958	22,847	May 27	2
1959	32,723	May 25	2
1960	24,276	May 23	2
1961	19,778	June 8	2
1962	20,261	June 7	2
1963	17,752	June 6	2

sport harvest, effort and catch per hour data (Table 1) from the Anchor River shows these measurements of the fishery to be relatively constant for 1963, 1961 and 1960. The lower harvest and effort in 1962 was due chiefly to unfavorable fishing conditions during the peak of the migration (Logan, 1962). Also, estimated escapements (Table 2) have not varied greatly in the past four years. The average catch per hour of 0.053 from 1961 to 1963 is similar to the mean catch per hour of 0.052 from 1954 to 1957. Considering the information collected thus far, the possibility is suggested that the king salmon stocks on the lower Kenai Peninsula streams are at a low level of abundance and have not declined further since the mid-1950's.

Because of the general decline of king salmon stocks in Cook Inlet the Board of Fish and Game, in December of 1963, closed Cook Inlet and its drainages to sport and commercial fishing for king salmon. The commercial season in the Inlet will open on June 25 and the kings taken incidental to the red salmon fishery can not be sold. This later opening is expected to reduce the commercial harvest of king salmon by approximately 70 to 75 per cent.

Year	Catch per hour	Effort	Harvest	Escapement
1954	0.052			
1955				
1956				
1957	0.052			
1960	0.053			
1961	0.053			
1962				
1963	0.053			

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