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STATE OF ALASKA

William A. Egan, Governor

ANNUAL REPORT OF PROGRESS, 1964 - 1965

FEDERAL AID IN FISH RESTORATION PROJECT F-5-R-6

SPORT FISH INVESTIGATIONS OF ALASKA

ALASKA DEPARTMENT OF FISH AND GAME
Walter Kirkness, Commissioner

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INTRODUCTION

This report of progress consists of Job Segment Reports from the State of Alaska Federal Aid in Fish Restoration Project F-5-R-6, "Sport Fish Investigations of Alaska."

The project during this report period is composed of 23 separate studies designed to evaluate the various aspects of the State's recreational fishery resources. Of these, eight jobs are designed to pursue the cataloging and inventory of the numerous State waters in an attempt to index the potential recreational fisheries. Four jobs are designed for collection of specific sport fisheries creel census while the remainder of the jobs are more specific in nature. These include independent studies on king salmon, silver salmon, grayling, Dolly Varden, a statewide access evaluation program and an egg take program.

A report concerning the residual effects of toxaphene accumulates the findings of a three-year study. The report presented here terminates this segment and is a final report. The information gathered from the combined studies will provide the necessary background data for a better understanding of local management problems and will assist in the development of future investigational studies.

The subject matter contained within these reports is often fragmentary in nature. The findings may not be conclusive and the interpretations contained therein are subject to re-evaluation as the work progresses.

Volume 6 Report No. 9-B

JOB COMPLETION REPORT

RESEARCH PROJECT SEGMENT

STATE: ALASKA Name: Sport Fish Investigations of Alaska.

Project No.: F-5-R-6 Title: Population Studies of King Salmon in the Upper Cook Inlet Drainage.

Job No.: 9-B

Period Covered: March 15, 1964 to March 15, 1965.

ABSTRACT

One hundred and eleven king salmon caught by nets averaged 29.6 inches, of which 41 percent were under 25 inches.

A total of 4,247 king salmon was observed in 37 streams; 57 percent of these fish were counted out of the Deshka River.

Four hundred and twenty-eight king salmon from the Fort Richardson Cooling Pond were marked and released into Ship Creek.

Sex ratio determinations of the gill net fishing showed males predominated at a 4 to 1 ratio, and on the spawning grounds females showed greater numbers at a 2.3 to 1 ratio.

Scale analysis for 78 king salmon indicated 53.8 percent were 4 years old; 19.2 percent were 5 years old; 15.4 percent were 6 years old; 9.0 percent were 3 years old and 2.6 percent were 2 years old.

RECOMMENDATIONS

1. That this study be continued.

2. An increased effort be made on the spawning grounds to obtain representative samples of dead king salmon.

3. Continued efforts should be made to catch downstream migrants to obtain a knowledge of the scale structure of young king salmon during the freshwater stages.

4. That a variable mesh size net be used as a means of sampling a representative portion of the king salmon population without being selective to any one size or age group.

5. Glacial streams tributary to Cook Inlet be studied to determine if they are utilized by king salmon.

OBJECTIVES

To determine the distribution, abundance, time of arrival, age growth, sex ratios and spawning areas of adult king salmon in the various streams of upper Cook Inlet Drainage.

To explore the practicability of artificially rearing king salmon smolts in the Fort Richardson cooling pond and to evaluate their contribution to the stocks of Ship Creek.

TECHNIQUES USED

Aerial, riverboat and ground surveys were made to observe distribution, numbers and time of arrival of adult salmon in the Susitna River Basin.

Lengths, weights and scales from king salmon were obtained from a test net fishery in the Susitna River System and a fish trap at Chugach Dam on Ship Creek.

Scales were prepared using the plastic impression method and age analysis was accomplished by Department personnel.

Some creel census was undertaken during the summer to provide data on fishing pressure and harvest on fish other than king salmon.

FINDINGS

A description of the area investigated has been presented in the 1961 and 1962 Dingell-Johnson Project Reports F-5-R-3 and F-5-R-4, Job number 8-B.

The king salmon fishery in Cook Inlet had been so seriously depleted in recent years that in 1963 the Alaska Board of Fish and Game declared a closure of king salmon fishing to both commercial and sport fishing in an effort to increase escapement and rebuild the salmon runs.

Since 1951, king salmon stocks steadily diminished; this was reflected in the commercial Cook Inlet pack which was the only index to changes in abundance. Concern over this decline led to an investigation by the U. S. Fish and Wildlife Service in 1958 and 1959 to gain knowledge of the distribution, timing and relative magnitude of the king salmon in Cook Inlet (Yance and Thorsteinson 1963). This was the first effort of this kind in the Cook Inlet area and continued efforts by the Alaska Department of Fish and Game since that time are being made on king salmon population studies.

Prior to 1964, king salmon in upper Cook Inlet attracted many anglers when they arrived in the streams during May and June. The greatest numbers of fishermen were reported to be on the streams during the king salmon runs. In 1963, 1,127 anglers were contacted on the Deshka River as compared to 120 anglers checked on the same river during the same fishing period in 1964. This decrease in angling was also noticed on the other streams in the drainage. In 1964, 1,132 anglers were contacted in the upper Cook Inlet, of which 80-85 percent were checked during July and August. Table 1 summarizes catch records obtained by creel census for the past four years in the Susitna River Drainage.

TABLE 1. - Species Composition of the Sport Fish Harvest for Various Streams in the Susitna River Drainage 1961, 1962, 1963 and 1964

Year	Kings	Silvers	Pinks	Chum	RB*	GR*	WF*	DV*	TOTAL
1961	423	269	5	73	545	72	42	46	1475
	28.6%	18.3%	.3%	5.0%	37.0%	4.8%	2.9%	3.1%	
1962	352	1986	57	27	539	113	51	31	3156
	11.1%	63.0%	1.8%	.8%	17.0%	3.6%	1.7%	1.0%	
1963	1156	680	-	25	559	287	87	16	2810
	41.2%	24.2%	-	.9%	19.9%	10.2%	3.1%	.6%	
1964	-	911	273	3	117	70	8	15	1397
	-	65.2%	19.5%	.2%	8.4%	5.0%	.6%	1.1%	

* Rainbow
Grayling
Whitefish
Dolly Varden

Timing

Adult Susitna River king salmon make their appearance in the lower streams as early as the third week in May and migrations continue until the first week in July. On the west side of the Susitna River, king salmon were observed in the Deshka River on May 23, Moose Creek (Yentna River) June 9 and, during the third week in June, were observed in the upper Yentna-Skwentna River systems. On the east side of upper Cook Inlet, king salmon appeared at the Chugach Dam on Ship Creek on June 8, and in the Sunshine-Sheep Creeks area the third week in June.

Catch records obtained from the Commercial Fisheries Division's test fishery on the lower Susitna River indicate that the peak king salmon migration in the Susitna Drainage is mid-June; 86.6 percent of the sampled catch was taken prior to June 25.

The peak of spawning activity occurs in mid-August for most Susitna River king salmon.

Escapement

King salmon escapement counts were determined by test net fishing and by float and aerial surveys. In some instances some information was obtained by interviewing local residents.

Escapement counts do not indicate the actual total escapement and are used only as an index of the relative abundance at the time of survey. If a sample section of a stream is observed from year to year in a comparable method, fairly reliable population trends can be obtained (Table 2).

TABLE 2. - Comparison of Counts of Spawning King Salmon in Some of the Tributaries of the Susitna River for 1961-1964

Stream	No. of fish-1961	No. of fish-1962	No. of fish-1963	No. of fish-1964
Alexander Creek	0	19	750	205
Camp Creek	86	34	10	94
Chunilna Creek	300	70	38	319
Deshka River	18	998	131	2422
Little Willow Creek	112	26	11	7
Montana Creek	65	75	23	75
Sheep Creek	70	35	24	0
Sunflower Creek	16	19	32	151
Talachulitna River	32	78	56	95
Willow Creek	170	71	55	51
TOTAL	869	1,425	1,130	3,419

The two surveying methods most commonly used to obtain escapement estimates are ground and aerial counts. Sometimes the use of these two methods is limited because of visual restrictions due to poor weather conditions, turbid water and areas inaccessible to observers. In 1964 an attempt was made to construct a weir on the Deshka River which would provide a fairly accurate count of total escapement, but high and murky water prevented completion of the weir in time for the king salmon run (Figures 1 and 2).

There was considerable variation between aerial and float survey counts on the same stream. Aerial surveys are a fast and most economical means of covering a large number of streams in a short period of time, but float surveys are more reliable on streams that offer poor visibility from the air. More fish were seen during a float trip over the same section of a particular stream than during air surveys (Table 3). Both counting methods, however, have value as an index.

TABLE 3. - Some Comparisons Between Aerial and Float Survey Counts in the Susitna River Drainage, 1964

Stream	Date	Type of Survey	No. of fish	Difference
Chiuk Creek	8-7	Aerial	31	
	8-9	Float	238	207
Chunilna Creek	7-17	Aerial	117	
	7-21-23	Float	319	202
Moose Creek-Deshka River	7-29	Aerial	135	
	7-31, 8-5	Float	1,590	1,455
Trappers Creek	8-5	Aerial	2	
	8-10-12	Float	234	232

Escapement counts were made during July and August when the streams were low and clear and the king salmon were on the spawning grounds. From a total of 87 streams surveyed in 1964, 50 streams were found to have a population of king salmon. Counts were made on 37 of the 50 streams with a resultant count of 4,247 king salmon (Table 4). The remaining 13 streams, being too turbid for visual observations, were test netted or the information was obtained from local residents.

Escapement counts in 1964 were approximately 82 percent higher than in 1963. This higher count may be attributed to: (1) effects of the closure, allowing more fish to reach the spawning grounds; (2) more intensive aerial and ground surveys; (3) more streams were surveyed and (4) streams were lower and clearer, improving visual conditions.

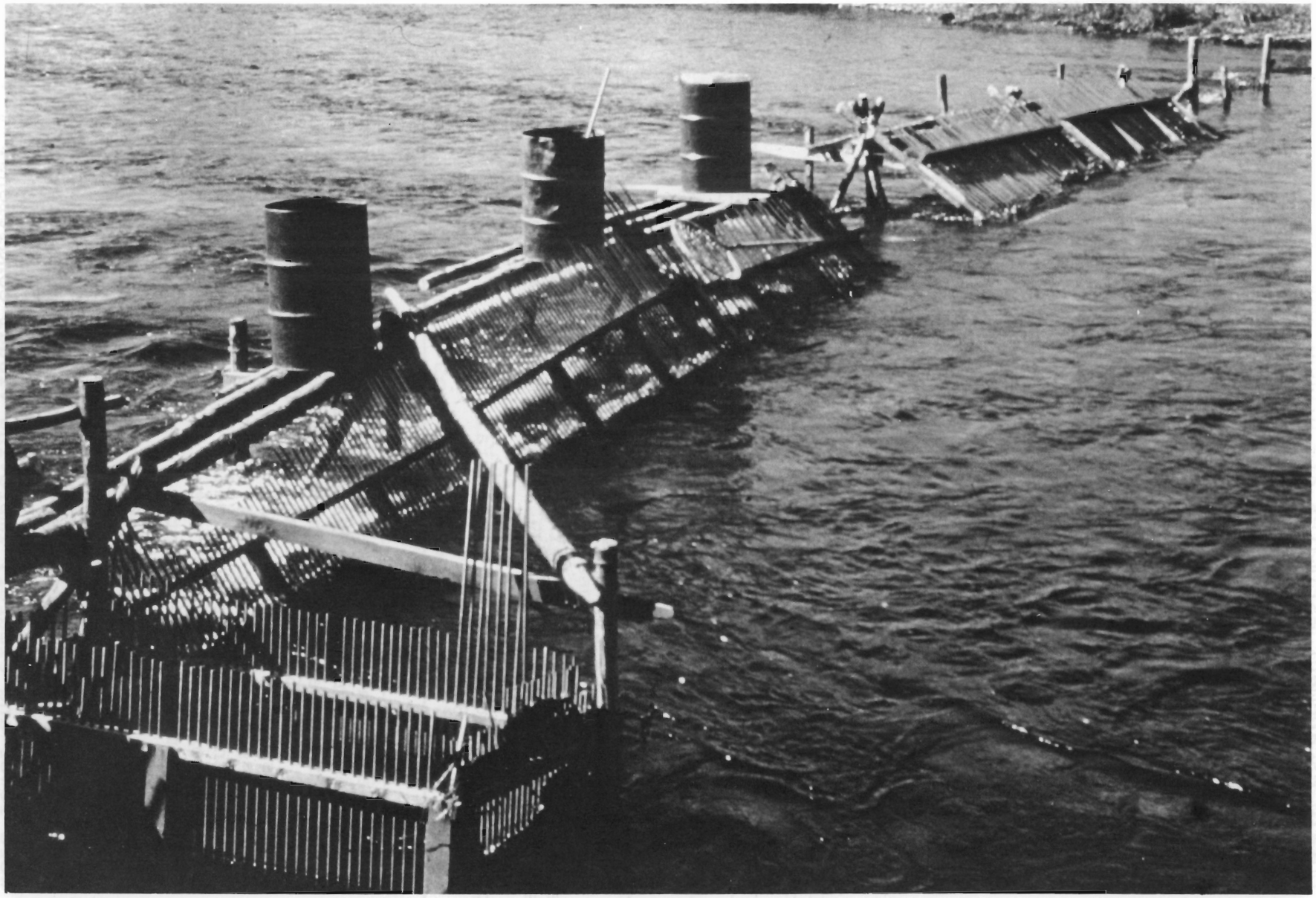

FIGURE 1 - Upstream view of the Deshka River Weir.

FIGURE 2 - Downstream view of the Deshka River Weir during high water.

TABLE 4. - High Counts of Spawning King Salmon in Some of the Tributaries of Upper Cook Inlet, 1964

Stream	Date	Type Survey	Number Salmon
Alexander Creek	7-29, 7-31	Float	205
Bear Creek	7-29	Air	4
Bird Creek	7-13	Air	4
Bishop Creek	7-25	Air	81
Byers Creek	8-27	Air	2
Camp Creek	7-29	Air	94
Campbell Creek	8-5, 8-7	Walked	116
Chiuk Creek	8-9	Float	238
Chuit River	7-25	Air	159
Chunilna Creek	7-21, 7-23	Float	319
Clear Creek	8-5	Air	9
Deshka River - West Fork	8-17, 8-20	Float	311
East Fork Talachulitna River	7-25	Air	25
Indian River	8-12	Air	2
Lake Creek	7-29	Air	45
Little Willow Creek	8-13	Air	7
Martin Creek	7-29	Air	12
Montana Creek	8-4, 8-5	Walked	75
Moose Creek (Deshka River)	7-31, 8-5	Float	1,590
North Fork Kashwitna River	7-17	Air	14
Olson Creek	7-25	Air	8
Prairie Creek	7-17	Air	138
Rabideux Creek	8-5	Air	8
Ship Creek	7-29, 8-10	Walked	94
South Fork Eagle River	7-26	Walked	123
Sunflower Creek	7-29	Air	151
Talachulitna River	7-28	Air	70
Theodore Creek	7-25	Air	8
Trappers Creek (Deshka River)	8-10, 8-12	Float	234
Tributary to Beluga	8-26	Air	2
Tributary to Sheep Creek (Talkeetna)	7-17	Air	5
Twentymile Creek	8-7	Air	11
Twin Creek	7-29	Air	7
Upper Little Susitna	8-27	Walked	3
Willow Creek	8-2	Float	51
Wolverine Creek	8-5	Air	14
Yenlo Creek	7-29	Air	8
TOTAL			4,247

King salmon showed a pattern of spawning in small groups over a widely scattered area. Observations indicate that small populations of king salmon spawn in numerous streams rather than large numbers of fish spawning in a few streams.

The Commercial Fisheries Division, in cooperative programming with the Sport Fish Division, conducted aerial and ground surveys on 51 streams. Six hundred

twenty-nine king salmon were counted in 17 streams. Counts were not obtained on the remaining 34 streams.

Test Fishing

Test net sampling by the Sport Fish Division was used to obtain general information relative to distribution, timing, length frequencies, age and sex composition. One set net with 5-1/4-inch mesh, 8 feet in depth and 100 feet in length was used in sampling the run at the mouth of each stream (Table 5). A 5-1/4-inch mesh rarely takes fish less than 20 inches in fork length and, as a result, the frequency of sizes and age groups is biased.

TABLE 5. - Results of Gill Net Sets, Susitna River, 1964

Location	Dates Fished	Hrs. Fished 5-1/4" Mesh	Fish Taken
Fish Creek-Croto Slough	6-8, 6-9	17.0	61 KS*
Fish Creek-Croto Slough	6-12	1.5	none
Moose Creek	6-9, 6-10	12.0	6 KS
Fish Creek-Lake Creek	6-13	.75	2 KS
Twentymile Slough	6-14	4.0	2 KS
Big Bend Slough	6-15	1.0	none
Snag Creek	6-22	3.15	5 KS
Deshka River	6-24	8.0	2 KS
" "	6-25	6.0	2 KS
" "	6-23	2.0	none
" "	6-26	2.5	14 KS
" "	6-28	1.5	6 KS
" "	7-5	2.0	none
" "	7-6	2.5	none
" "	7-8	3.15	5 KS 1 SS*
" "	7-9	3.5	5 SS 1 PS*
" "	7-10	2.0	none
" "	7-11	2.5	3 KS 1 SS
Hewitt Creek	6-30	2.0	2 KS
Bear Creek	6-30	25.0	4 KS 2 RS*
Cabin Creek	7-1, 7-2	18.0	5 RS 1 RB*
TOTAL		120.05	114 KS 7 SS 7 RS 1 PS 1 RB

* KS - king salmon
SS - silver salmon
RS - red salmon
PS - pink salmon
RB - rainbow trout

Captured king salmon were measured, weighed, sexed by examination of the gonads and a scale sample was taken. The experimental gill net captured fish from 21.8 to 47.5

inches. Sex ratio of males to females was 4 to 1. Three-year-old fish were practically absent from the sample and no two-year-old kings were caught.

The Commercial Fisheries Division continued a test fishery program, initiated in 1963 on the lower Susitna River, to obtain information relative to magnitude and peak of runs of king salmon. One to four gill nets, 8-1/2-inch mesh (stretch measure), and 5-1/4-inch mesh (stretch measure) were set in the eddies of the lower Susitna River. Each net was checked on the average of twice daily. Results of the fishery are shown in Table 6.

TABLE 6. - Commercial Fish Test Fishing Susitna River, 1964

Month	Sex	Number	Mean Length (inches)
May	Male	68	22.9
	Female	22	33.6
June	Male	159	30.9
	Female	200	34.9
July	Male	18	25.5
	Female	2	31.5
TOTAL	Male	245	28.3
	Female	224	34.7

22.8% under 25 inches
2.0% under 20 inches
1 female under 25 inches

Collections of small fish were made in effort to obtain downstream migrants (Table 7). The resultant catch was so small, however, that no definite downstream migration pattern can be established. From available data it appears that there is no mass exodus of king salmon smolts as in some other species of Pacific salmon. King salmon fry were caught from April 24 to July 13 and no peak of migration was indicated.

The mean length for 31 king salmon smolts sampled in Campbell Creek during April and May was 2.4 inches (Table 8). Scales from four young king salmon were analyzed to determine age of the fisn between emergence from gravel and seaward migration. A smear of scales was taken from the area above the lateral line and between the dorsal and adipose fins. Several scales from each fish were examined for well developed circuli, and

TABLE 7. - Summary of Small Fish Collections, Upper Cook Inlet, 1964

Date	Location	Method of Capture	SPECIES							
			SS**	KS**	CS**	SB**	Scul-pin	DV**	Lamp-rey	Bur-bot
4-24	Campbell Creek	Fyke Net	2	3				1		
4-25	" "	" "	3	9						
4-27	" "	" "	2	4				3		
4-28	" "	" "	1	1			1			
4-29	" "	" "	4	5				2		
4-30	" "	" "	2	2	1			1		
5- 1	" "	" "		4	1					
5- 4	" "	" "	1	2			1	1		
5- 5	" "	" "	1	1				1		
5- 6	" "	" "	1				1			
5- 8	" "	" "	2	4				1		
5-11	" "	" "						1		
5-13	" "	" "	1	2				1		
5-15	" "	" "	5							
5-18	" "	" "	4				5	1		
5-20	" "	" "	6	1			3	1		
5-22	" "	" "	7	2	1		3	2		
5-31	Deshka River	" "				31				
6- 3	" "	" "				*				
6- 6	" "					*			*	1
6- 7	" "	" "				*			*	1
6-10	Ship Creek	Trap	3	1	2					
6-12	Deshka River	Fyke Trap				*			*	
6-13	Montana Creek	" "	2							
6-17	" "	" "	1	1						
6-18	" "	" "	1							
6-19	" "	" "	1							
6-22	Deshka River	" "	1	1		6			29	-
6-23	" "	"" "				5	1		23	
6-24	" "	" "		1		5			17	
6-25	" "	" "							2	
6-26	" "	" "							*	
6-27	" "	" "				*			*	1

TABLE 7 (Cont.) - Summary of Small Fish Collections, Upper Cook Inlet, 1964

Date	Location	Method of Capture	SPECIES							
			SS**	KS**	CS**	SB**	Scul-pin	DV**	Lam-prey	Bur-bot
6-28	Deshka River	Fyke Net				3			17	1
7-2	Cabin Creek	" "		1						
7-6	Deshka River	" "				6			5	1
7-7	" "	" "				3			3	1
7-8	" "	" "				2			3	
7-12	" "	" "				2				
7-13	" "	" "				2				

* Unknown
** SS - Silver Salmon
KS - King Salmon
CS - Chum Salmon
SB - Stickleback
DV - Dolly Varden

an average was calculated. Circuli were counted from the base plate to the outermost edge. Three of the smolts were caught at Campbell Creek on April 27; all measured 2.4 inches and had circuli counts of 4, 5, 6 respectively. A smolt 3.2 inches in length which contained 8 circuli was caught in Cabin Creek on July 2. None of these fish exhibited any type of annulus at this early growth stage.

TABLE 8. - Ranges and Mean Fork Lengths in Inches of King Salmon Fry at Campbell Creek, 1964

Date	Number	Range	Mean Fork Length
4/24 - 4/30	16	2.2 - 2.7	2.4
4/31 - 5/ 6	7	2.1 - 2.6	2.3
5/ 7 - 5/13	6	1.5 - 2.5	1.9
5/14 - 5/20	1	2.7	2.7
5/21 - 5/27	2	2.4 - 2.6	2.5

King salmon young may go to sea during the first year after emergence from the gravel or remain at least a year in the stream. Ninety-two percent of adult scales analyzed indicated that most of the kings migrate seaward in their second year of life (Table 9).

Lengths and Weights

Lengths from 111 king salmon caught in the sport fish test nets were measured from tip of snout to fork of tail. The mean length was 29.6 inches, with a range of 21.8 to 47.0 inches. Of the fish measured, 41 percent were under 25 inches. Breakdown of lengths by sex and age is presented in Table 9. The most numerous size group represented in the test net fishery is the 22.0 to 27.9-inch fish. Notably absent from the catch were salmon less than 20 inches long. In 1963 the most numerous size taken in the sport fishery was in the 12 to 19 inch range with another peak at 22 to 28 inches. The test net fishery apparently eliminated sampling of the smaller fish. Individual lengths and weights were taekn from 63 males and 12 females. The males averaged 25.4 inches in length with a range from 21.8 to 43.7 inches and an average weight of 9.1 pounds. Females ranged from 21.9 to 44.0 inches, the mean length being 33.9 inches. The mean weight for this sample was 19.4 pounds. Length and sex ratios were obtained from 108 king salmon in the gill net fishery. Eighty-five males ranged from 21.8 to 47.0 inches with an average of 27.7 inches. Twenty-three females averaged 34.9 inches with a range from 21.9 to 44.0 inches. The ratio of males to females was 4 to 1.

Thirty-five king salmon were measured at the Chugach trap on Ship Creek during July and 62 percent (22) of these fish were under 25 inches. The mean length for this sample was 22.2 inches, with a range of 11.8 to 40.7 inches. Lengths and weights were obtained on 26 fish with a mean of 22.2 inches and 6.4 pounds respectively.

Figure 3 presents the length ranges of the 146 king salmon measured in upper Cook Inlet. During 1964 sampling the presence of large numbers of "jack" salmon were present in the catch. Forty-four percent of the salmon measured were under 25 inches. An arbitrary length of 25 inches, fork length, was used as dividing line to separate "jacks" from larger adult kings. King salmon under 25 inches are almost exclusively males.

This high percentage of small fish was an important factor in the comparatively low average weight and length of king salmon.

Length Frequencies by Age Group

Comparisons made between lengths and age of the sampled catch showed considerable overlap in the older fish (Table 10) and is indicative of the various races and difference in growth rates which change from year to year. Age analysis indicates that king salmon ranging from 12.0 to 20.0 inches in length are predominately three-year-old fish. Possibly the three-year-old group can be separated out of the sample by length measurements alone.

Carcass Count

A float trip was made on the West Fork of the Deshka River on August 17 to obtain length and sex ratios from spawned-out king salmon. Fifty-one females averaged 26.5 inches with a range from 19.5 to 39.0 inches. Twenty-two males ranged from 18.0 to 37.0 inches with a mean average of 28.5 inches. The ratio of females to males was 2.3 to 1.

More than one carcass count should be made over the same area to get a representative sample. A single survey might not represent the entire escapement due to a difference in the time of spawning and post-spawning die-off between sexes and age classes. It appears that the males tend to die earlier in the season than the females, hence the preponderance of females over males on the spawning ground during the carcass count.

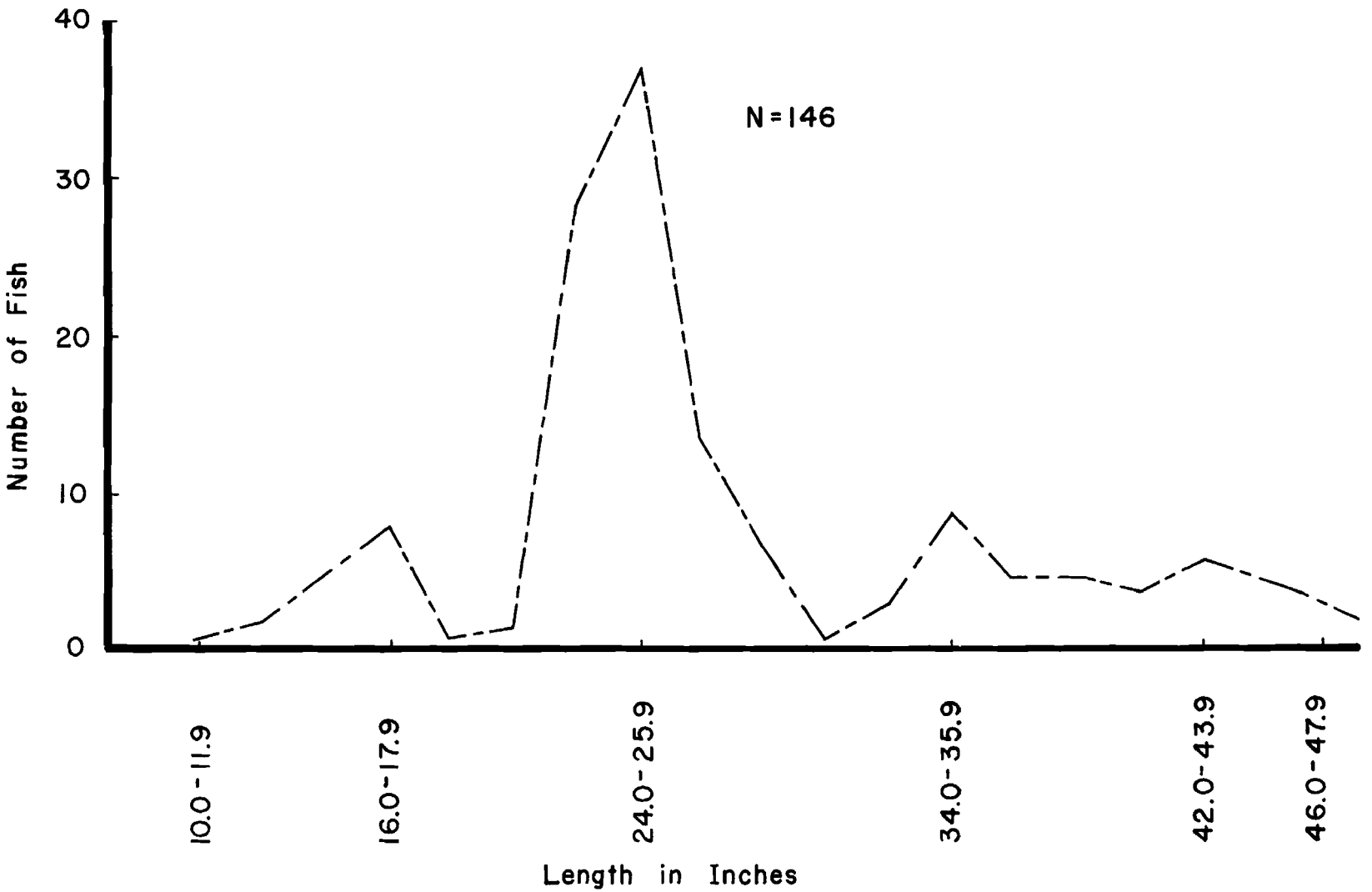

Figure 3. Length frequencies of King Salmon caught in upper Cook Inlet, 1964.

TABLE 9. - Lengths of King Salmon in 8 Age Groups in Upper Cook Inlet, Test Net Catch, 1964

	MALES				FEMALES			
Age Group	Number	Percent of Total ♂ & ♀	Length Range	Average Length	Number	Percent of Total ♂ & ♀	Length Range	Average Length
0.1	2	2.6	24.8-26.0	25.4	0	-	-	-
1.1	7	8.8	14.4-18.5	15.9	0	-	-	-
0.3	1	1.3	25.0	25.0	0	-	-	-
1.2	38	48.8	21.8-28.5	24.4	3	3.8	22.0-27.0	25.3
0.4	2	2.6	43.0-45.0	44.0	0	-	-	-
1.3	3	3.8	29.0-30.5	29.7	10	12.8	32.0-38.0	35.1
0.5	1	1.3	45.0	45.0	0	-	-	-
1.4	9	11.6	35.7-47.0	43.9	2	2.6	36.0-38.5	37.3

TABLE 10. - Length of King Salmon in 6 Age Groups in Upper Cook Inlet, Sport Fish Catch, 1962-1963

	MALES				FEMALES			
Age Group and Year	Number	Percent of Total ♂ & ♀	Length Range	Average Length	Number	Percent of Total ♂ & ♀	Length Range	Average Length
1.0 1962	0	-	-	-	0	-	-	-
1963	2	1.5	12.5-13.25	12.9	0	-	-	-
1.1 1962	11	20.0	9.5-17.5	14.6	0	-	-	-
1963	19	14.1	13.0-20.0	15.7	0	-	-	-
1.2 1962	25	45.3	21.7-29.0	25.3	0	-	-	-
1963	24	17.7	22.0-29.0	25.2	0	-	-	-
1.3 1962	8	14.6	25.4-36.0	31.9	9	16.4	29.0-36.5	33.4
1963	17	12.5	23.0-40.25	33.5	46	34.0	25.0-40.25	34.5
2.2 1962	0	-	-	-	0	-	-	-
1963	1	1.0	24.5	24.5	0	-	-	-
1.4 1962	0	-	-	-	2	3.7	40.0-41.0	40.5
1963	6	5.0	39.0-49.0	44.4	20	14.2	36.0-44.0	40.2

Age Composition

Age determination based on gill net catch scale samples alone misrepresents the age composition of the total run because the 5-1/4 inch mesh gill net catches a larger proportion of the large fish and lets a large share of the small fish, 20 inches and under, escape.

The European formula was used in age designation for king salmon. For example, a 1.2 designation refers to a salmon with one winter (annuli) in freshwater, two winters (annuli) in ocean, and returning to spawn in its fourth year. In reference to marine life only, a .2 salmon refers to two winters of marine life.

In 1964 age was determined for 116 king salmon. Thirty-two percent of the scales were regenerate or questionable and discarded. Eight age groups were found in the test net catch (Table 9). The 1.2 age group made up 52 percent of the total catch. The 1.3 age group was second in abundance with 16 percent, and 1.4 next with 14 percent. In 1962, scale sampling from a sport fishery demonstrated that the 1.2 age group was dominant and in 1963 the 1.3 age group was dominant (Table 10).

Age was determined for 258 king salmon caught in the lower Susitna River by the Commercial Fisheries Division (Table 11). King salmon in the 1.3 age group were the most numerous, followed by the 1.4 age group.

TABLE 11. - Age Composition of King Salmon from Commercial Test Net Fishery, Susitna River Drainage, 1964

	0.1	1.1	0.3	1.2	1.3	2.2	1.4	2.0
Number	1	2	4	67	101	1	80	2
Percentage	.38	.78	1.55	25.97	39.15	.38	36.01	.78

During 1962 and 1963 the Sport Fish Division obtained scale samples from Emards Cannery. In 1962 five-year-old fish provided 45.6 percent of the sample and in 1963 five-year-olds again dominated the sample with 63.2 percent (Table 12).

Fort Richardson Cooling Pond

Army conservationists at Fort Richardson have worked closely with State fish biologists in improving the sports fisheries in the Anchorage-Matanuska Valley area. Fort Richardson conservationists aid in planting sports fish fingerlings in area waters and since 1959 have been using the Post power plant cooling pond for controlled raising and feeding of fish fry for release.

TABLE 12. - Length of King Salmon in 3 Age Groups in Cook Inlet, Emards Cannery, 1962-63

Age Group and Year	MALES				FEMALES			
	Number	Percent of Total ♂ & ♀	Length Range	Average Length	Number	Percent of Total ♂ & ♀	Length Range	Average Length
1.2 1962	18	31.3	22.0-26.2	24.8	1	1.8	39.0	39.0
1963	10	17.4	25.0-29.5	26.2	0	-	-	-
1.3 1962	6	10.3	25.5-42.0	34.5	20	35.6	30.0-36.0	33.1
1963	12	21.1	28.5-38.5	33.5	24	42.1	32.0-30.5	35.1
1.4 1962	10	17.4	35.0-40.7	38.4	2	3.6	36.0-37.0	36.5
1963	5	8.8	35.5-45.5	40.5	6	10.6	37.5-43.0	40.1

FIGURE 4 - Fort Richardson Power Plant Cooling Pond.

The Fort Richardson cooling pond is 256 feet long and 146 feet wide (Figure 4). Water level is normally maintained about 4 feet deep, giving the pond an average content of 139,400 cubic feet of water. Water for the pond originates from Ship Creek, from which the post power plant draws water to cool its turbines. This heated water, returned to the pond for cooling and re-use maintains the pond temperature year around between 48° and 56° F.

On November 14, 1963, 13,500 king salmon eggs from the State's Fire Lake Hatchery were transferred to the Fort Richardson cooling pond on an experimental basis to evaluate rearing potential under controlled conditions. The king salmon were to be released into Ship Creek in late May of 1964, but there was a large mortality of fish due to the March 27 earthquake and only 428 kings were released into the creek. A sample of 50 king salmon was measured with the average length being 3 inches. The salmon were marked with a right-pelvic and adipose fin clip before being released.

During 1963, king salmon eggs were obtained from Ship Creek and reared at the Fire Lake Hatchery until a predetermined size was reached. On November 3, 1964, 2,616 king salmon fry were transferred to the cooling pond. By the time the king salmon are to be released in late May, it is hoped that both State and Fort Richardson conservationists will have benefited from data obtained on rearing fish under controlled conditions, and their contributions to the stocks of Ship Creek evaluated.

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