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Volume 5 1963-1964

STATE OF ALASKA

William A. Egan, Governor

ANNUAL REPORT OF PROGRESS, 1963 - 1964

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

SPORT FISH INVESTIGATIONS OF ALASKA

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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-5, "Sport Fish Investigations of Alaska."

The project is composed of 25 separate studies designed to evaluate the various aspects of the State's recreational fishery resources. Of these, eight jobs are designed to continue the cataloging and inventory of the numerous State waters in an attempt to prepare an index of the recreational waters. Four jobs are designed for specific sport fishery 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, egg take program and a residual toxaphene study. The information gathered from the combined studies will provide the necessary background data for a better understanding of local management problems and 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 No. 5 Report No. 8-B

JOB COMPLETION REPORT

RESEARCH PROJECT SEGMENT

STATE: ALASKA Name: Sport Fish Investigations of Alaska.

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

Job No: 8-B

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

Abstract:

Creel census data disclosed that 2,262 anglers fished 8,203 hours to catch 1,121 king salmon, a seasonal rate of success of 0.14 fish per hour.

Measurements were made of 887 sport caught king salmon which had an average length of 23.8 inches and a weight of 7.0 pounds. Of the fish measured, 62 per cent were under 25 inches. An average of 33.6 inches in length was found for 282 salmon sampled at a cannery. Sex determinations of sport caught king salmon indicated males predominated at a 3.7 to 1 ratio. Commercial fishermen caught equal numbers of male and female fish.

A sample of 297 king salmon checked for age indicated that 16 per cent were 6 years old, 51 per cent were 5 years old, 22 per cent were 4 years old, 10 per cent were 3 years old, and 1 per cent were 2 years old.

Aerial and ground surveys revealed a total of 2,086 king salmon observed in 29 streams.

Possible factors contributing to the decline of king salmon stocks are presented.

Objectives:

To determine the distribution, numbers, seasonal timing, age and growth of king salmon in Cook Inlet drainages.

To determine the present sport fish catch of king salmon and to evaluate angling pressure trends and their possible impact on existing king salmon stocks.

To determine the need for specific management regulations.

Techniques Used:

Creel census was undertaken during the king salmon season to provide data on fishing pressure, harvest and catch per unit of effort. When possible, the fish were weighed, measured, sexed and a scale sample collected for age analysis. Data were also obtained on other species of fish caught.

Lengths, weights and scales from king salmon were obtained from a local cannery.

Service personnel from a military fishing camp on Sheep Creek provided the Department with creel census records in that area.

Aerial and river boat surveys were made to observe the distribution, numbers and time of arrival of adult salmon in the Susitna River Drainage. Information regarding the physical description, spawning facilities, water temperatures, etc., of streams was recorded. Commercial Fisheries Division personnel provided additional data.

Scales were prepared using the plastic impression method and age determined by Department personnel.

Recommendations:

1. This study should be continued.

2. Spawning facilities should be more thoroughly surveyed.

3. More data is needed on post-spawning, incubation and emergence of king salmon fry.

4. Continual efforts should be made to determine distribution, numbers and timing of adult king salmon. Some development of techniques for estimating population size is desired.

Findings:

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.

Sport Fishery:

With the increased population in the Anchorage area, interest in sport fishing for salmon has expanded rapidly.

An estimated 32,060 people lived in the Anchorage area in 1950 and the figure has increased to an estimated 82,833 in 1960. With literally hundreds of lakes and streams in the vicinity of the metropolitan area, fishing pressure on anadromous fish stocks has increased.

King salmon in Upper Cook Inlet attracts many anglers when they arrive in the streams during May and June. Streams on the east side of the Susitna River, readily reached by automobile, railroad and float plane, receive heavy fishing pressure. Angler access to the west side of the river is limited to river boat and float aircraft.

The Deshka River is subject to intense fishing pressure from the third week in May to the end of the king salmon season in July. The Deshka, occasionally called Kroto Creek, is located on the west side of the Susitna River approximately 40 air miles northwest of Anchorage. Float planes from Hood Lake in Anchorage and surrounding areas frequent the Deshka. As many as 30 different float planes were observed in the lower 4 miles of the river within a 2-hour period. A local guide started a boat livery at the mouth of the river and the business appears to be successful.

The 1,127 anglers contacted on the Deshka fished 4,609 hours to catch 758 king salmon, or 67.6 per cent of the total sport catch for king salmon in the Susitna Drainage. Figure 1 shows daily catch records on the Deshka River.

Montana Creek, located approximately 60 air miles north of Anchorage, is readily accessible by automobile and railroad. It is not uncommon to observe 20 to 30 anglers fishing elbo to elbow at the mouth of the Creek when the big kings arrive. Interviews of 337 anglers at this stream indicated they fished 1,163 hours to catch 143 king salmon (Table 1).

An intensive creel census study on the Susitna River Basin revealed that 2,262 anglers fished 8,203 hours to catch 1,121 king salmon, a seasonal rate of success of 0.14 fish per hour. An additional 35 king salmon were caught in 585 hours of fishing; the number of anglers was not indicated. This information was provided by guides, anglers and military personnel. Average fishing effort was 3.6 hours per day. An estimated 50 per cent of all anglers who fished king salmon in the Susitna Drainage were contacted during the 1963 season. Using the 50 per cent figure, it is estimated that 4,400 anglers fished approximately 15,840 hours. Taking the estimated total hours multiplied by the seasonal success rate of 0.14 fish per hour gives an estimated total of 2,217.6 king salmon caught by the sports angler.

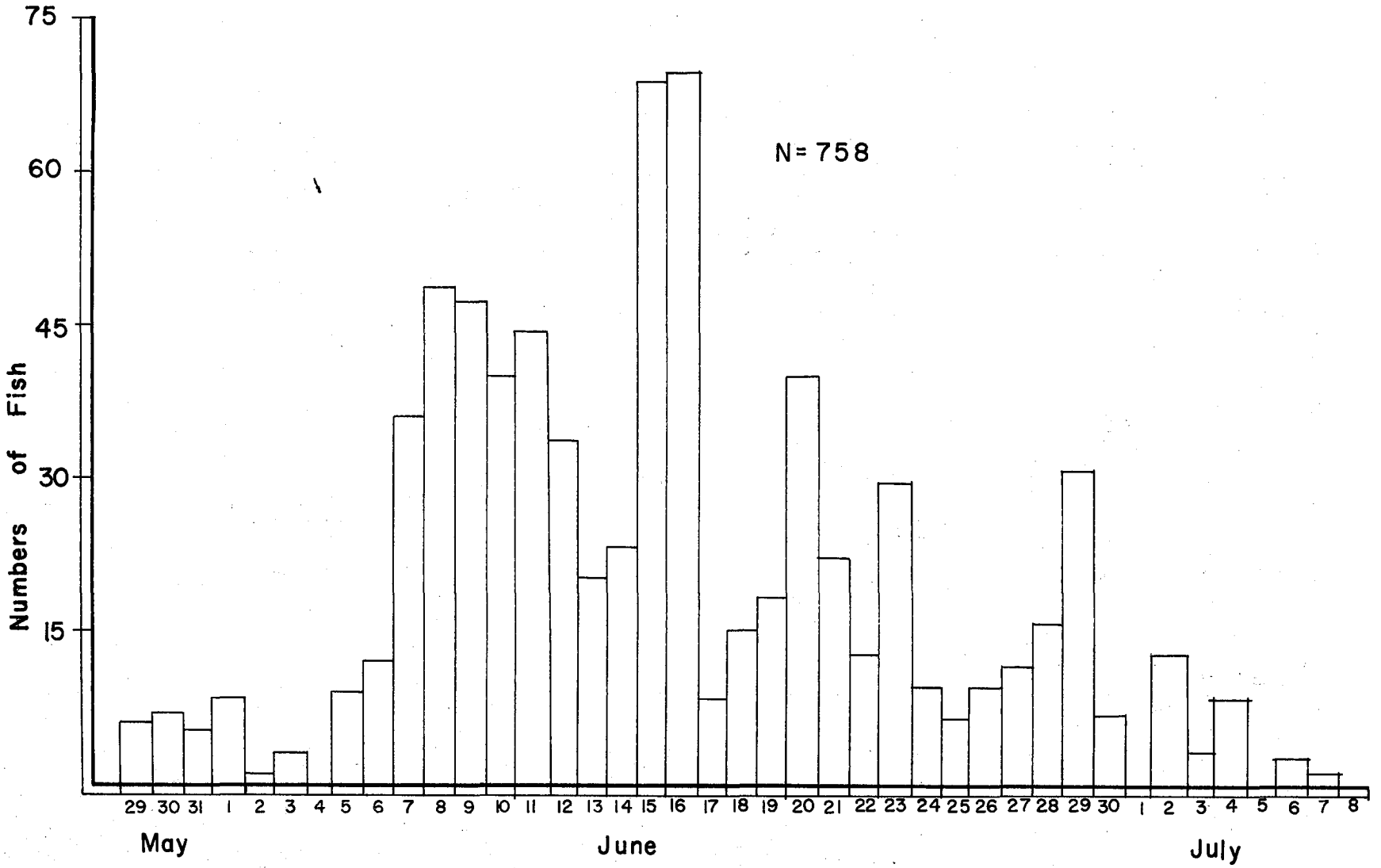

Figure I. Daily catch of king salmon in Deshka River during 1963.

Table 1. Summary of creel census data of the various streams during the 1963 Susitna River Drainage.

Stream	Species								Hours Fished for Kings	Catch of King Salmon Per Hour
	Kings	Silvers	Pink	Chum	RB*	GR*	WF*	DV*		
Deshka River	758	667			251	68	56		4609	.16
Lake Creek	51				20	5	5	2	363	.14
Alexander Creek	47	3			50	9	2		123	.38
Montana Creek	143				29	15		1	1863	.08
Talachulitna River	4				122		2	8	32	.12
Willow Creek	23					7			389	.06
Kashwitna River	2				22	15			131	.01
Sheep Creek	41	8		25	24	60	7	3	697	.06
Caswell Creek	81				3	39	13		504	.16
Little Willow Creek					5	16		1	43	
Little Susitna River	2				2		1	1		
Fish Creek	4				7				23	.17
Gray Creek					7	32				
Goose Creek		2			17	12				
TOTALS	1156	680		25	559	278	86	16	8777	.13

*RB - Rainbow trout
WF - Whitefish
GR - Grayling
DV - Dolly Varden

Table 2. Species composition of the Sport Fish harvest for various streams in the Susitna River Drainage 1961, 1962, 1963.

				1961				
Kings	Silvers	Pink	Chum	RB	GR	WF	DV	Total
423	269	5	73	545	72	42	46	1475
28.7%	18.2%	.3%	4.9%	37.0%	4.9%	2.9%	3.1%	100.0%
				1962				
Kings	Silvers	Pink	Chum	RB	GR	WF	DV	Total
352	1986	57	27	539	113	51	31	3156
11.1%	62.9%	1.8%	.9%	17.1%	3.6%	1.6%	1.0%	100.0%
				1963				
Kings	Silvers	Chum	RB	GR	WF	DV		Total
1156	680	25	559	287	87	16		2810
41.1%	24.2%	.9%	19.9%	10.2%	3.1%	.6%		100.0%

Table 2 summarizes catch records obtained by creel census for the past 3 years in the Susitna River Drainage. This is a biased sample due to emphasis made on gathering king salmon data and only a partial creel census was obtained on other species.

Commercial Fishery:

The fishing industry is one of the most important within the Cook Inlet area. Prior to 1959, Cook Inlet salmon were caught with traps, hand seines, gill nets, set nets and by trolling. Salmon in the lower inlet area have received intense fishing pressure for many years, and since 1951 the king salmon stocks have gradually declined to the point where the preservation of runs presents serious management problems (Table 3).

Table 3. The case pack of king salmon in Cook Inlet for the years 1951 to 1963.

Year	No. of Cases	Year	No. of Cases
1951	59,973	1958	6,601
1952	22,931	1959	7,057
1953	28,952	1960	6,936
1954	23,995	1961	5,135
1955	15,034	1962	4,509
1956	16,995	1963	5,421
1957	12,549		

Timing:

Timing of the escapement into most of the streams was difficult to determine because of the turbid water conditions. In the lower streams of the Susitna River, king salmon appeared in Alexander Creek and Deshka River about the third week in May. They were observed in the Sheep Creek and Montana Creek area the first week in June and in the Yentna-Skwentna River systems by July 1.

Streams and dates showing when king salmon were first observed are presented in Table 4.

Escapement:

Enumeration of king salmon in the Susitna River Drainage is difficult to accomplish because of extreme turbidity. Some escapement counts were obtained in the clear water streams from aerial and boat surveys, but these 2 methods of sampling fish populations have been only

Table 4. Dates when king salmon were first observed in the various tributaries of the Susitna River, 1963.

Name of Stream	Date	Tributary to:
Alexander Creek	6/11	Susitna River
Bear Creek	7/9	Kahiltna River
Camp Creek	7/4	Lake Creek
Caswell Creek	6/9	Susitna River
Chunilna Creek	7/7	Talkeetna River
Deshka River	5/23	Susitna River
Lake Creek	6/18	Yentna River
Little Willow Creek	7/9	Susitna River
Martin Creek	7/9	Peters Creek
Montana Creek	6/14	Susitna River
Moose Creek	6/27	Yentna River
Kashwitna River	6/22	Susitna River
Prairie Creek	8/7	Talkeetna River
Sheep Creek	6/17	Susitna River
Sunflower Creek	7/9	Lake Creek
Sucker Creek	8/14	Alexander Creek
Sunshine Creek	7/7	Susitna River
Talachitulna Creek	7/29	Talachitulna River
Talachitulna Creek	7/6	Skwentna River
Willow Creek	6/18	Susitna River
Twin Creek	7/9	Lake Creek
Birch Creek	7/7	Susitna River
Fish Creek	7/13	Yentna River
	BELUGA AREA	
Chuit River	7/10	Cook Inlet
Lewis River	6/3	Cook Inlet
Theodore River	5/18	Cook Inlet
Olson Creek	7/11	Beluga River
	ANCHORAGE AREA	
Ship Creek	6/7	Cook Inlet
Campbell Creek	6/5	Cook Inlet
Eagle River	7/22	Cook Inlet

partially successful, even when ideal water conditions exist. In 1961 and 1962 attempts were made to obtain a total count of king salmon escapement in 2 different streams using a weir and counting tower. Observation of the salmon was impossible due to high and murky water. Possibly, test netting in the glacial and muddy streams will prove more helpful in determining relative abundance.

In 1963, 63 streams were surveyed but counts could be made only on 29. A total of 2,086 king salmon was observed in these tributaries, with a high count of 750 made in Alexander Creek. Table 5 shows the highest escapement counts made on king salmon in various streams of Upper Cook Inlet for the years 1958, 1961, 1962 and 1963.

Annual variations from year to year in the same stream may be attributed to several factors other than salmon being absent or less numerous in the stream: (1) limited visual means because of turbid water, (2) poor flying conditions (weather), (3) different observers, (4) observations vary with different types of aircraft, i.e., a smaller plane is more maneuverable and flies at a slower speed than a larger aircraft, (5) areas inaccessible to observers, (6) air surveys require periodic visits to streams during spawning periods. Only 1 or 2 visits may miss the peak. The escapement figures are minimum and no trend is indicated. The spawning population for 1963 is believed to be roughly the same as it has been for 1961 and 1962.

Age Determination:

A sample of 297 commercial cannery and sport caught king salmon checked for age indicated all but 1 spent one year in fresh water. An analysis of 238 sport caught salmon indicated that 15 per cent (37) were 6 years old, 48 per cent (114) were 5 years old, 23 per cent (55) were 4 years old, 13 per cent (30) were 3 years old, and 1 per cent (2) were 2 years old. The dominant age groups for king salmon in Cook Inlet are from 4 to 6 years. Table 6 shows the combined age groups.

Age of maturity for males varied from 2 to 6 years and most of the females attained maturity in their 5th and 6th year. Age analysis indicated one female returned to spawn in its fourth year.

Age determination was made by department personnel and several scale impressions were sent to three qualified biologist outside the department to verify the author's interpretation. There was a high per cent of disagreement

Table 5. The highest escapement counts, and dates counted, of king salmon in the Susitna River drainage during the years 1958, 1961, 1962 and 1963.

Stream	1958		1961		1962		1963	
	Date	Number	Date	Number	Date	Number	Date	Number
Alexander	5/29	1	7/11	0	7/23	19	8/16	750
Alder Creek	7/22	0	--	--	--	--	8/19	0
Answer Creek	7/15	0	--	--	--	--	--	--
Bear Creek	--	--	--	--	7/23	9	7/9	13
Birch Creek	--	--	6/27	80	--	--	7/7	6
Bishop Creek	--	--	6/27	80	8/1	6	--	--
Boulder Creek	7/29	0	--	--	--	--	--	--
Cache Creek	7/23	0	--	--	7/23	4	6/25	0
Camp Creek	--	--	7/26	86	7/23	34	7/9	10
Campbell Creek	--	--	--	--	8/9	40	8/18	187
Canyon Creek	--	--	--	--	7/27	23	7/13	0
Caswell Creek	6/10	0	7/6	6	--	--	7/7	0
Cheechako Creek	--	--	--	--	7/19	0	--	--
Chuit River	--	--	--	--	8/1	147	7/11	45
Chulitna River	7/11	3	--	--	--	--	--	--
Chunilna Creek	7/11	3	7/14	300	7/11	70	7/29	38
Coal Creek (Beluga)	7/21	8	--	--	7/27	25	8/19	0
Coal Creek (Chulitna)	--	--	--	--	7/30	5	8/19	0
Coffee Creek	--	--	--	--	--	--	8/19	0
Deadhorse Creek	--	--	--	--	7/19	0	--	--
Deshka River	5/29	3	6/24	11	8/11	998	7/30	131
Disappointment Creek	8/1	5	--	--	7/19	0	--	--
Donkey Creek	--	--	--	--	--	--	7/6	0
Eight Mile Creek	--	--	6/17	0	7/4	2	--	--
Fish Creek (Croto Slough)	--	--	6/8	0	7/3	0	8/14	0
Fish Creek (Flathorn Lake)	5/19	1	6/3	0	--	--	--	--
Fish Creek (Yentna River)	--	--	6/29	0	--	--	6/28	0
Friday Creek	--	--	7/6	0	8/2	0	8/14	0
Gold Creek	--	--	--	--	7/20	0	--	--
Goose Creek	7/15	1	7/25	0	6/27	0	7/7	0

Table 5. (Continued) The highest escapement counts, and dates counted, of king salmon in the Susitna River drainage during the years 1958, 1961, 1962, 1963.

Streams	1958		1961		1962		1963	
	Date	Number	Date	Number	Date	Number	Date	Number
Hayes River	7/21	0	--	--	--	--	--	--
Hewitt Creek	--	--	--	--	8/2	0	--	--
Hiline Creek	--	--	7/10	0	7/12	0	--	--
Indian River (Skwentna)	8/14	225	--	--	--	--	--	--
Indian River (Susitna)	--	--	--	--	7/30	28	8/19	0
Johnson Creek	7/21	0	--	--	7/27	0	7/3	0
Kahiltna River	7/23	0	6/17	0	7/5	0	7/4	0
Kashwitna River	7/4	0	7/13	0	7/31	0	7/7	0
Kichatna River	--	--	--	--	--	--	7/3	0
Lake Creek	--	--	6/27	60	7/12	10	6/21	4
Lane Creek	7/17	5	6/27	0	7/19	0	--	--
Lewis River	--	--	--	--	8/1	69	7/11	5
Little Coal Creek (Chulitna)	--	--	--	--	7/30	0	8/19	0
Little Susitna River	7/2	14	--	--	--	--	7/31	2
Little Willow Creek	--	--	6/27	112	7/16	26	7/9	11
Martin Creek	--	--	--	--	7/23	6	7/9	5
McKenzie Creek	--	--	6/27	0	7/19	0	--	--
Montana Creek	7/11	43	7/13	65	6/30	75	7/9	23
Moose Creek	7/11	0	6/29	0	7/5	0	6/27	2
Nakochna River	--	--	--	--	--	--	7/6	0
Nikolai Creek	6/19	0	--	--	--	--	--	--
N.F. Kashwitna River	--	--	7/25	35	7/31	19	7/7	3
Old Man Creek	--	--	--	--	--	--	7/13	0
Olson Creek	7/1	2	--	--	--	--	7/11	30
Partin Creek	--	--	--	--	--	--	8/19	0
Pass Creek	--	--	--	--	7/30	15	8/19	0
Peters Creek	--	--	--	--	8/14	3	6/25	0
Portage Creek (Skwentna)	7/7	2	--	--	--	--	--	--
Portage Creek (Susitna)	--	--	--	--	7/30	27	8/15	0
Prairie Creek	--	--	--	--	7/30	142	8/7	275

Table 5. (Continued) The highest escapement counts, and dates counted, of king salmon in the Susitna River drainage during the years 1958, 1961, 1962, and 1963.

Stream	1958		1961		1962		1963	
	Date	Number	Date	Number	Date	Number	Date	Number
Pretty Creek	6/25	1	--	--	--	--	--	--
Question Creek	7/15	0	7/25	0	6/27	0	7/7	0
Rabideux Creek	--	--	--	--	6/27	0	--	--
Red Creek	7/21	27	--	--	7/27	11	--	--
Sevenmile Creek	--	--	7/3	0	7/4	0	7/29	0
Sheep Creek	6/15	200	7/6	70	7/16	35	8/7	24
Shell Creek	--	--	6/17	0	8/3	0	6/19	0
Sherman Creek	--	--	--	--	7/10	0	--	--
Ship Creek	--	--	--	--	8/11	58	8/7	119
Skwentna River	6/12	0	--	--	--	--	--	--
South Fork Eagle River	--	--	--	--	--	--	7/23	135
Spink Creek	7/7	60	--	--	--	--	8/19	0
Sucker Creek	--	--	--	--	--	--	8/14	15
Sunflower Creek	--	--	7/26	16	7/23	19	8/14	32
Sunshine Creek	6/10	0	7/25	0	6/27	20	7/7	25
Talachulitna Creek	8/29	0	--	--	7/27	12	--	--
Talachulitna River	6/25	0	6/29	32	7/27	78	7/29	56
Theodore Creek	--	--	--	--	8/1	42	7/29	64
Thursday Creek	--	--	6/17	0	8/2	0	8/14	0
Tokichitna River	7/25	0	--	--	--	--	--	--
Trinity Creek	--	--	7/10	0	8/2	0	--	--
Troublesome Creek	7/7	100	--	--	--	--	--	--
Twin Creek	--	--	--	--	--	--	7/9	20
Unnamed Creek(Vic.Youngstown)	7/21	7	--	--	--	--	7/3	0
Unnamed Creek(Vic.Deshka)	--	--	--	--	6/21	0	6/27	0
Unnamed Creek(S.E. Moose Cr.)	--	--	--	--	--	--	6/27	0
Unnamed Creek(S.W. Moose Cr.)	--	--	--	--	7/5	0	6/27	0
Unnamed Creek(N.W. Canyon	--	--	--	--	--	--	7/13	0
Willow Creek	7/4	300	7/6	170	7/31	71	7/30	55
Yenlo Creek	--	--	--	--	7/27	33	6/25	0
Youngstown Creek	--	--	--	--	7/27	13	7/6	0

Table 6. Age of spawning king salmon from the various areas in Cook Inlet.

Location	Year	Age FW*	Age SW**	Total Age In Years	Number	Percentage pf Scales Read
Cook Inlet (Scattered)	1954			3	4	1.5
				4	92	35.7
				5	121	46.9
				6	41	15.9
Anchor River	1960	1	2	3_1	2	1.5
		2	1	3_2	6	3.0
		2	2	4_2	13	6.5
		2	3	5_2	153	79.0
		2	4	6_2	20	10.0
Kalgin Island (Vicinity)	1961			3	3	14.0
				3	6	29.0
				5	12	57.0
Susitna River and Upper Cook Inlet	1962	2	1	3_2	13	11.0
		2	2	4_2	45	39.0
		2	3	5_2	43	37.0
		2	4	6_2	15	13.0
Susitna River and Upper Cook Inlet	1963	2	0	2_2	2	.6
		2	1	3_2	30	10.1
		2	2	4_2	65	22.0
		3	2	5_3	1	.3
		2	3	5_2	151	51.0
		2	4	6_2	48	16.0

* FW - Year in which fish migrated to sea.
**SW - Actual number of ocean annuli.

between readers on total age. One reader indicated that the majority of the scales demonstrate an ocean-type nucleus. The other three readers agreed that all the scales were of the "stream-nucleus" type. A summary of difference between readers is shown in Table 7. Young salmon that have migrated seaward during the first year are said to have an ocean nucleus and those that stay in fresh water a full year and migrate to sea during their second year of life have a stream-type nucleus. Readers 1, 2 and 3 reached a high per cent of agreement (96-100) on freshwater growth but differed greatly on ocean growth.

Table 7. Agreement in percentage between readers in visual reading of king salmon scales.

Number of Scales Read	Freshwater Growth	Ocean Growth	Total Age	Readers
53	96.0	83.0	79.0	1, 2
62	97.0	66.0	62.0	1, 3
69	9.0	87.0	5.0	1, 4
23	100.0	74.0	74.0	2, 3
30	0	63.0	0	4, 3

Varying interpretation of scale marks by individual readers indicates a need for improved techniques in age determinations.

The Gilbert-Rich formula (1927) was used in age designation for king salmon. The large Arabic figure represents the age at maturity and the smaller number indicates the year in which the fish migrated to sea. For example, a 5_2 designation refers to a salmon that has migrated to sea in its second year and is returning to spawn in its fifth year.

Length frequencies of 887 king salmon caught by sports anglers were obtained. Lengths were measured from tip of snout to fork of tail. The mean length for this sample was 23.8 inches, with a size range from 11.5 to 49.0 inches. Of the fish measured, 62 per cent were under 25 inches (Figure 2).

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 fish in these ranges were predominately males. A smaller grouping of 34 to 40 inch king salmon were predominately females (Figure 3).

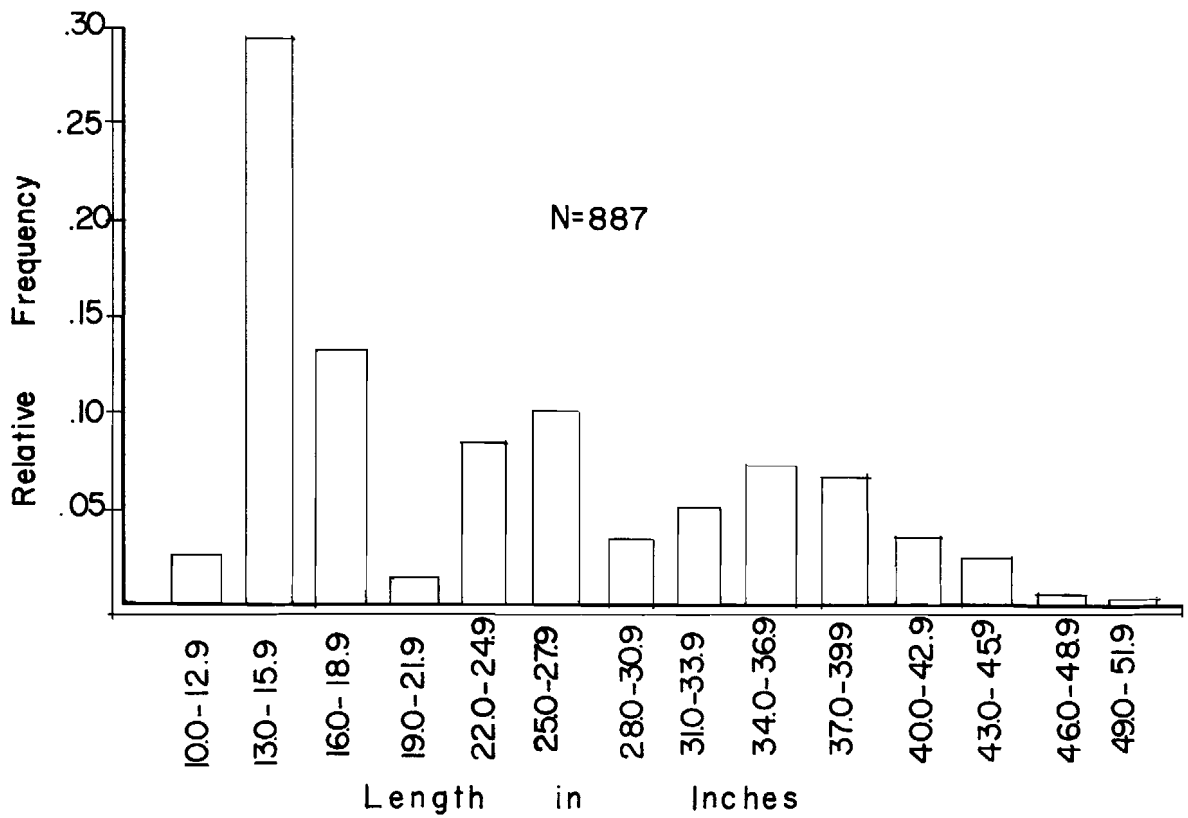

Figure 2. - Length frequencies of king salmon caught in Susitna River Drainage, 1963.

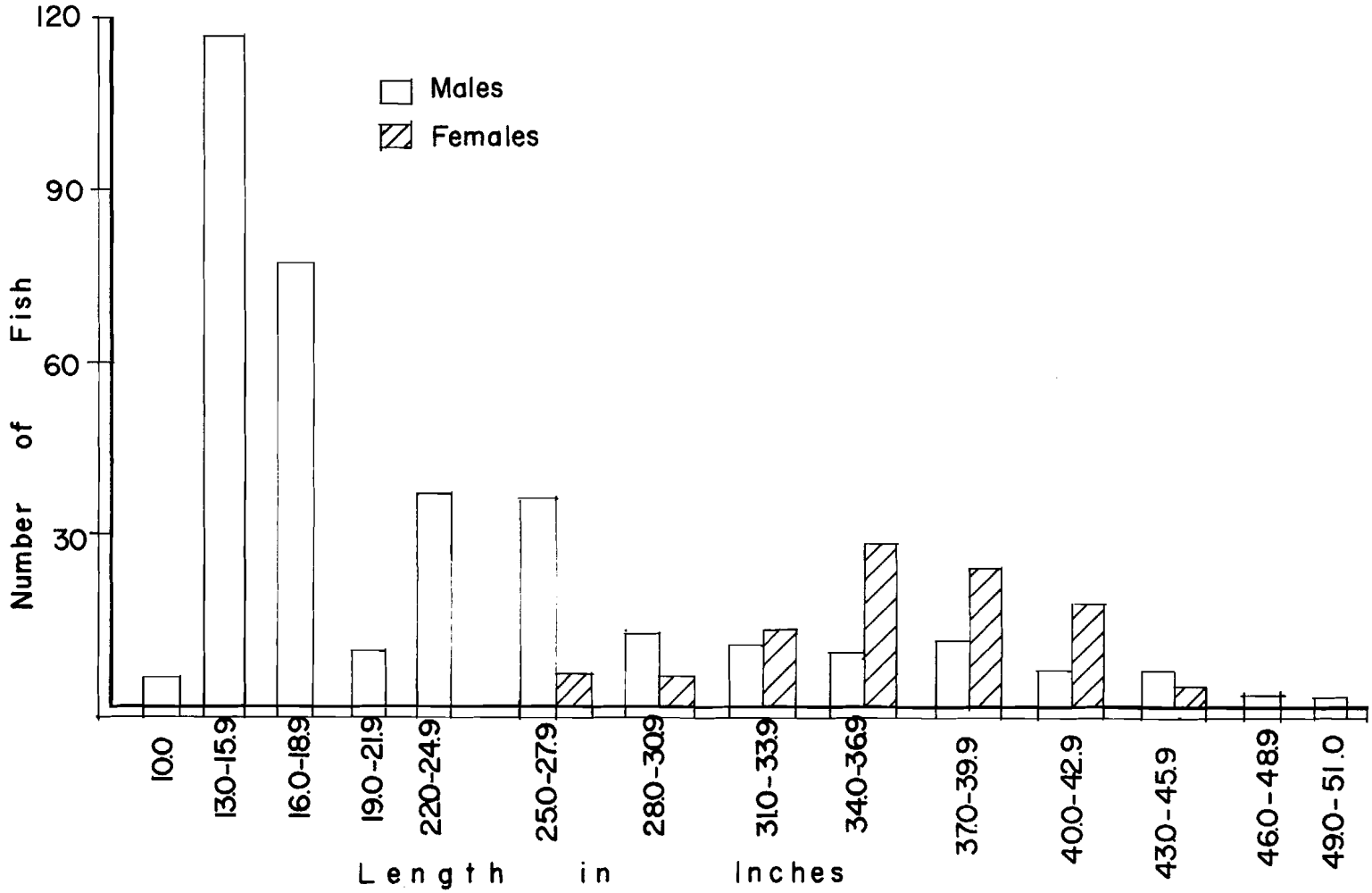

Figure 3.- Length frequencies and sex composition of king salmon caught in Susitna River Drainage during 1963.

Age analysis indicates that king salmon ranging from 12 to 20 inches in length are predominately 3 year old fish and make up 52.5 per cent of the sport fish catch. Four year old fish range from 20.5 to 29.0 inches with some overlapping of 5 year old fish at 25 inches. The 4 year olds formed 13.5 per cent of the catch, and 5 and 6 year olds made up for less than 34.0 per cent of the total sport fish catch.

The size range of 339 males sampled was 11.5 to 49.0 inches with an average of 20.7 inches, and 92 females averaged 36.0 inches with a range from 23.3 to 44.0 inches. The average length of males was less than that of females due to the greater proportion of precocious males or "jack" salmon.

Accurate weights were obtained on 328 fish, giving a mean weight of 14.5 pounds. This is recognized as a biased sample because the smaller fish were not sampled in proportion to the larger fish.

The average length of 282 commercially caught king salmon sampled at a local cannery was 33.6 inches with a range from 18.0 to 47.8 inches; 135 females averaged 36.12 inches with a range from 30.5 to 43.0 inches; 138 males averaged 31.25 inches with a range from 18.0 to 47.8 inches. The mean weight for 51 cannery sampled fish was 24.4 pounds (Figure 4). The commercial catch is selective to the larger fish because of the 5-1/4 inch mesh nets used by the fishery.

Sex frequencies of 431 sport caught king salmon were determined by examination of the gonads. Three hundred thirty-nine (339) were males and 92 were females, or a 3.7 to 1 ratio. Large catches of "jack" salmon attributed to the unequal sex ratio. Numerous king salmon under 25 inches were caught in 1961 and 1962 (Figures 5 and 6).

Environmental Conditions:

Salmon have exacting environmental requirements, so the species is not very adaptable to any great changes in the surrounding medium.

Water Temperature - Water temperatures were taken periodically during salmon spawning migration to determine if any afflictive conditions existed that might be detrimental to salmon productivity.

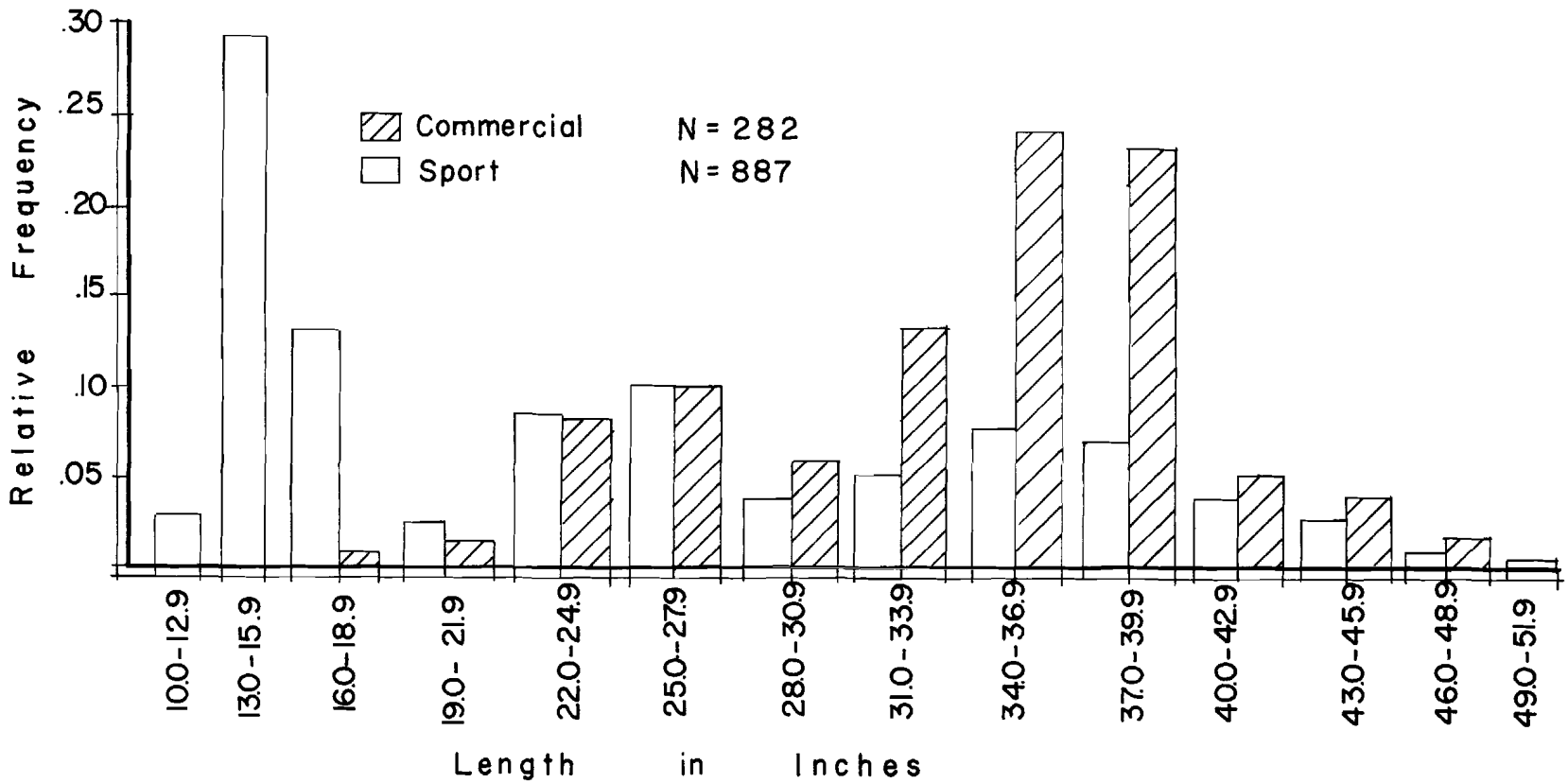

Figure 4. Size composition of Cook Inlet king salmon, 1963.

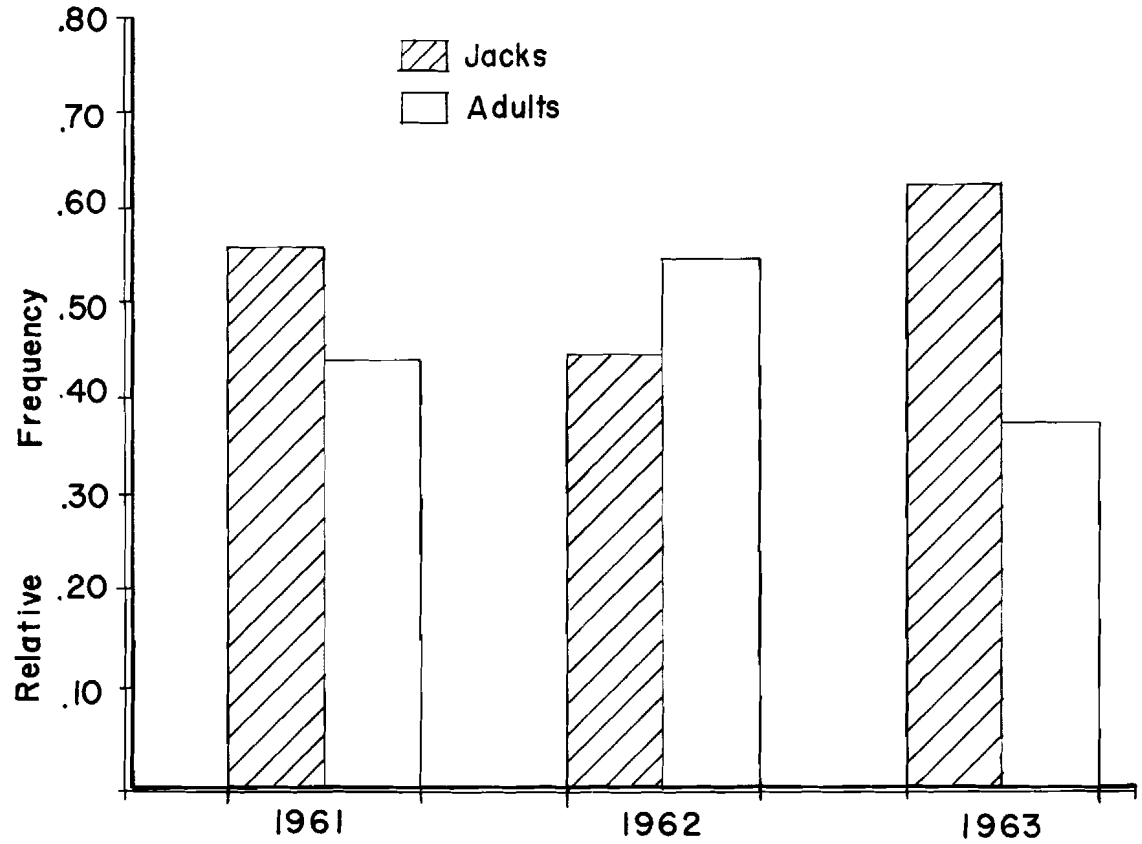

Figure 5. Relation of adult king salmon and jack salmon in the sport fish catch in Susitna River Drainage during 1961, 1962 and 1963.

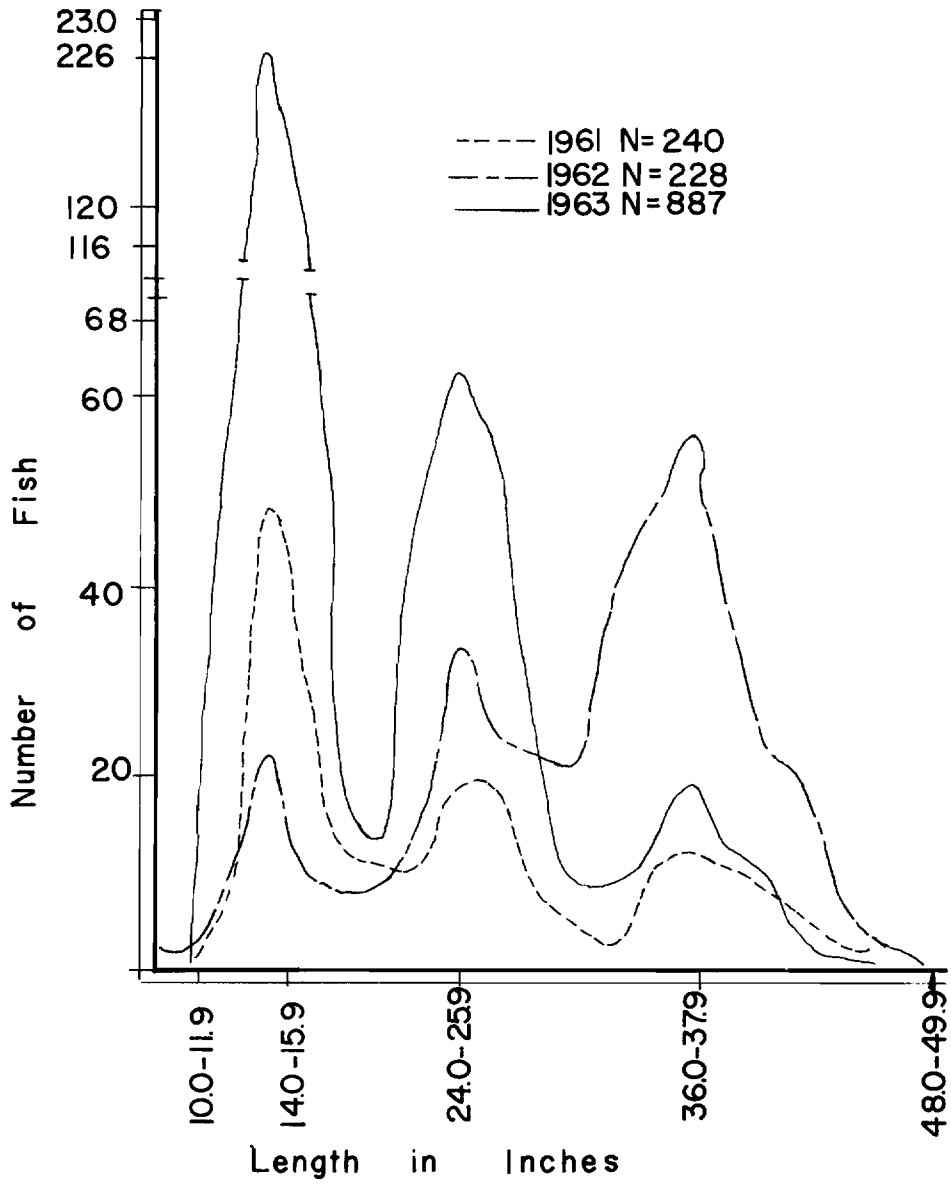

Figure 6. Size composition of Susitna River king salmon.

Average monthly temperatures on the Deshka River were as follows:

May	44.2°F.
June	49°F.
July	58.7°F.
August (early)	55°F.

Lowest temperature recorded - 42°F., May 23. Highest 65°F. on July 9.

The recorded water temperatures for the stream were within the required range during egg deposition and initial incubation period.

Floods - Eroding banks on many of the streams are a source of potential damage within the basin and there is a possibility of spawn losses due to the high velocities of water. Floods in the Cook Inlet Basin are usually the result of run-off from melting snow during June and July. Following the spring break-up, flows increase rapidly and continue to rise with further increase in temperatures into the early summer. Peak flows generally occur in June or July.

Loss of Spawning Area - Loss of spawning area because of man-created activities is relatively unknown in the Susitna River Basin. The Willow Creek and Peters Creek area has some mining, but it is not known whether any losses to spawning area have occurred.

Losses due to agricultural and forestry developments are infinitesimal.

Pollution - Stream pollution is not a problem in the Susitna River Drainage because of the low population density and the absence of major industries.

Predation - Predation on king salmon fry and fingerlings is unknown but should not be overlooked as an important factor. There are no significant data on ocean mortality of adult salmon from predation. Numerous beluga whales and seals have been observed at the mouth of the Susitna River and may be detrimental to returning adult salmon and downstream migrants.

No downstream migrant king salmon were present or observed in collections obtained by beach seine and spot checking with liquid rotenone. Sculpins, sticklebacks, pink and silver salmon smolts were taken.

The Commercial Fisheries Division initiated a test fishery program on the lower Susitna River to obtain general

information relative to magnitude and peak of runs of king salmon. Continued investigation is needed before any trend is indicated.

In an effort to protect the declining stock of king salmon in Cook Inlet, the Alaska Board of Fish and Game in December of 1963 announced the closure of king salmon to Commercial and Sport fishing. How long this closure will remain in effect depends on future Board action and recommendations by the Alaska Department of Fish and Game. Continued effort will be made on population studies of king salmon in Cook Inlet.

Other Game Fish:

Most streams in the Susitna River Drainage provide excellent sport fishing for rainbow trout, grayling and silver salmon.

Silver salmon enter the streams in mid-July and the areas within easy access are heavily fished. Length measurements were made on 237 silver salmon. The mean length was 23.5 inches with a size range from 15.9 inches to 28.0 inches. Scale determinations indicate that these salmon return to spawn in their fourth year of life.

The rainbow trout caught averaged 13.2 inches with a size range from 7.0 inches to 24.0 inches. The grayling caught had a mean length of 11.5 inches with a range of 7.0 inches to 16.5 inches. Several grayling in the 16.0 inch to 18.0 inch range have been reported by sport anglers.

Numerous whitefish, both the round whitefish (*Prosopium cylindraceum*) and the common whitefish (*Coregonus clupeaformis*), were caught and added to the creel. Anglers are finding out that the whitefish is a desirable food fish and provides the fishermen with additional sport. Whitefish caught averaged 13.9 inches with a size range from 7.5 inches to 19.0 inches.

Dolly Varden distribution and numbers are apparently limited in the Upper Cook Inlet tributaries. A few are caught in Montana, Sheep and Little Willow Creeks.

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These young steelhead trout will some day provide sport for fishermen in waters where they were once nonexistent.