



Volume 10

1968-1969

6 SH,  
11  
.A73  
A4  
v.10

STATE OF ALASKA  
Keith H. Miller, Governor



ANNUAL REPORT OF PROGRESS, 1968 - 1969  
FEDERAL AID IN FISH RESTORATION PROJECT F-9-1  
SPORT FISH INVESTIGATIONS OF ALASKA

ALASKA DEPARTMENT OF FISH AND GAME  
Wallace H. Noerenberg, Acting Commissioner

*Alaska* Rupert E. Andrews, Director  
Division of Sport Fish

Louis S. Bandirola, Coordinator

**ARLIS**  
Alaska Resources  
Library & Information Services  
Anchorage, Alaska

ALASKA RESOURCES LIBRARY  
U.S. DEPT. OF THE INTERIOR  
ANCHORAGE, ALASKA  
EST. 1957

44  
11  
A 93  
A 4  
6.10  
Volume 10

THE STATE OF ALASKA  
MILLER, GOV.

INTRODUCTION

This report of progress involves the findings and work accomplished under the State of Alaska, Federal Aid in Fish Restoration, Project F-9-1, "Sport Fish Investigations of Alaska".

The work conducted during this reporting period constitutes effort on nine separate studies which are crucial in evaluating the sport fishing resources of the State. Recreational demands have necessitated broadening our knowledge of the fishery. All 20 jobs were of continuing nature enabling the Department to keep abreast of present and future impacts on certain fish species. Specifically, the work included work on inventory and cataloging of the sport fish and sport fish waters of the State, sport fishery creel census and access. Special emphasis was given to Dolly Varden, silver salmon, anadromous fish, grayling, salmon, sheefish, pike, and char. The information gathered has provided supporting documentation for better fish management and a basis for necessary future investigations.

The subject matter contained in these reports may be inconclusive. The findings and interpretation are subject to re-evaluation as the work progresses.

CAMP  
MILLER, GOV.

ALASKA  
Alaska Resources

## RESEARCH PROJECT SEGMENT

STATE: ALASKA Name: Sport Fish Investigations of Alaska.  
Project No: F-9-1 Title: Anadromous Fish Population Studies - Upper Cook Inlet Drainage.  
Job No: 9-B

Period Covered: July 1, 1968 to June 30, 1969.

## ABSTRACT

Creel census data obtained during the special king salmon, Oncorhynchus tshawytscha, punch-card fishery disclosed that 1,400 anglers fished 9,800 hours to catch 398 king salmon over 508 mm (20 inches) in length, with a seasonal rate of success of 0.28 fish per angler.

Of the 9,524 king salmon punch cards issued, 70 percent were voluntarily returned to the Department of Fish and Game.

The 1968 king salmon run into the Deshka River was predominately composed of age V (1.3) fish. Escapement counts were obtained by aerial and ground surveys for 11 streams. The Deshka River spawning population was estimated to be 4,863 king salmon.

Creel census data disclosed that 567 anglers fished 2,108 hours to catch 594 silver salmon, O. kisutch; a seasonal rate of success of 0.28 fish per hour.

A total of 82,400 smolt-sized king salmon and 129,300 silver salmon were marked with an adipose fin clip and released into Ship Creek.

## RECOMMENDATIONS

1. Retain the present objectives of the studies.
2. Modify the Ship Creek weir to prevent fish from passing over it during high stream flows.
3. Construct a live fish trap in the vicinity of the Chugach Dam for enumeration of king and silver salmon adults, egg-taking purposes and recovery of marked fish returns.

## OBJECTIVES

1. To determine the sport fish catch of king and silver salmon and evaluate angling pressure in selected freshwater areas of Upper Cook Inlet.

2. To determine the distribution, abundance, time of arrival, age composition, sex ratios, and spawning areas of adult king and silver salmon in the various streams of Upper Cook Inlet.
3. To evaluate the contribution of the Fort Richardson Cooling Pond to the stocks of anadromous fishes to Ship Creek.

#### TECHNIQUES USED

Creel census was undertaken during the king and silver salmon season to accumulate data on angling harvest. Lengths, weights, sex composition and scales from king and silver salmon were obtained during creel census checks of the fishery.

Aerial, river boat, and ground surveys were made to observe distribution, numbers, and time of arrival of adult king and silver salmon in Upper Cook Inlet streams.

An electrical fishing device, fish weir and 100- by 8-foot gill net with 5 1/4-inch stretch mesh were used in capturing adult king salmon.

Cellulose-acetate scale impressions were examined by micro-projector for age determination.

#### FINDINGS

A description of the Upper Cook Inlet study streams and past information collected on this project is presented in the Federal Aid in Fish Restoration Project Reports by Stefanich (1961) and Kubik (1962, 1963, 1964, 1965, 1966, and 1967).

Anglers sport fishing for king salmon during a special season in selected freshwater areas in Upper Cook Inlet were required for the third consecutive year to record their catches by areas and dates on special king salmon punch cards.

During the 1968 special king salmon season, the same quota as in 1966-67 was retained; 250 kings over 508 mm (20 inches) in length with a bag limit of one king salmon over 508 mm per day and two per season. The general area bag limits were in effect for kings under 20 inches in length.

The seasonal fishing period was set to run from June 8 through June 23, but the season was closed by field announcement on June 21 after the census showed that the area quota had been obtained.

#### Punch-Card Fishery

A total of 9,524 king salmon punch cards were issued to anglers for the entire Cook Inlet area during the 1968 season. This was an increase of 48 percent over the total issued during 1967. Seventy percent of the cards were returned to the Department of Fish and Game after the close of the season. Of the 6,724 punch cards voluntarily returned, 51.1 percent of the anglers reported actually fishing for king salmon.

The 1968 recorded catch of king salmon for Upper Cook Inlet streams, regardless of size, was 814 fish, with 51 percent under 508 mm. Table 1 shows the catch of king salmon by stream and date.

TABLE 1 - Catch of King Salmon, 508 mm (20 inches) and over, Upper Cook Inlet, 1966-68.

Year	Date	Deshka River	Alexander Creek	Lake Creek	Chunilna Creek	No. of Kings
1968	6/8	18	6	--	--	24
1968	6/9	9	3	--	--	12
1968	6/10	8	--	--	--	8
1968	6/11	9	1	--	--	10
1968	6/12	7	--	--	--	7
1968	6/13	14	10	--	--	24
1968	6/14	20	9	--	--	29
1968	6/15	35	6	--	--	41
1968	6/16	36	15	--	--	51
1968	6/17	14	5	--	--	19
1968	6/18	29	2	1	--	32
1968	6/19	43	1	1	--	45
1968	6/20	33	6	1	--	40
1968	6/21	<u>49</u>	<u>7</u>	<u>--</u>	<u>--</u>	<u>56</u>
	Total	324	71	3	--	398
	Percent	81.4	17.8	.8	--	100
Kings	under 20"	200	216	--	--	416
1967	6/10	80	6	11	--	97
1967	6/11	16	2	9	--	27
1967	6/12	9	1	4	--	14
1967	6/13	17	--	1	--	18
1967	6/14	13	--	4	--	17
1967	6/15	14	1	5	--	20
1967	6/16	14	4	4	--	22
1967	6/17	37	2	7	1	47
1967	6/18	25	4	10	--	39
1967	6/19	<u>9</u>	<u>--</u>	<u>6</u>	<u>--</u>	<u>15</u>
	Total	234	20	61	1	316
	Percent	74.1	6.3	19.3	.3	100
Kings	under 20"	105	29	33	--	167
1966	5/28	6	--	--	--	6
1966	5/29	6	1	--	--	7
1966	5/30	9	--	--	--	9
1966	6/4	5	--	--	--	5
1966	6/5	0	--	--	--	0
1966	6/11	8	3	--	--	11
1966	6/12	14	2	--	--	16
1966	6/18	63	5	6	--	74
1966	6/19	33	5	4	--	42
1966	6/25	44	5	4	2	55
1966	6/26	<u>17</u>	<u>5</u>	<u>14</u>	<u>2</u>	<u>38</u>
	Total	205	26	28	4	263
	Percent	78.0	9.9	10.6	1.5	100
Kings	under 20"	103	33	22	5	163

Creel census data disclosed that 1,400 anglers fished 9,800 hours to catch 398 kings over 508 mm, with a seasonal rate of success of 0.28 fish per angler.

Extrapolation of the punch-card data provided an estimated catch of 412 king salmon over 508 mm from Upper Cook Inlet. The total catch was estimated by the following ratio:

$$\frac{\text{Fish Creel Checked}}{\text{Punch Card Returned}} \div \frac{\text{Punch Card Not Returned}}{\text{Fish Not Creel Checked}} = \frac{\text{Fish Not Creel Checked}}{\text{Punch Card Returned}} \div \frac{\text{Punch Card Not Returned}}{\text{Punch Card Not Returned}}$$

$$\frac{265}{40} = \frac{93}{X} = 14$$

Total Estimate:

Total Fish Creel Checked	305
Punch Cards Returned, Fish Not Creel Checked	93
Punch Cards Not Returned, Fish Not Creel Checked	<u>14</u>
Total Estimated Catch	412

Out of 2,800 non-reporting anglers, 468 reminder letters (16.7%) were mailed in order to estimate the non-reported catch. Sixty-four anglers (13.6%) responded that they had fished king salmon in Upper Cook Inlet but were unsuccessful-- a success rate of 0 percent.

For the third consecutive year, the most productive stream was the Deshka River. Of the total 398 king salmon over 508 mm taken, 81 percent were caught from the Deshka River. The Deshka also supported 71 percent of the total fishing effort.

Much of the expected effort on Lake Creek was diverted to either the Deshka River or Alexander Lake because of high and turbid stream conditions. Chunilna Creek received very little fishing effort because the main king salmon run does not occur until late June.

The daily harvest by stream for the years 1966 through 1968 is listed in Table 1.

Three hundred and thirteen anglers, or 22 percent of the total anglers checked, were successful in landing one or two king salmon over 508 mm. Thirty-nine (12.5%) of the successful anglers caught the seasonal limit of two king salmon.

A sample of 278 king salmon over 508 mm were measured for catch size composition. The salmon ranged in length from 508 mm to 1,082 mm, with a mean of 716 mm. Males averaged 658 mm while females averaged 869 mm. Figure 1 shows the size composition of sport-caught king salmon for the 1966, 1967 and 1968 seasons.

The sex ratio of males to females in the sport fishery was 2.9:1 as compared to 3.1:1 in 1967.

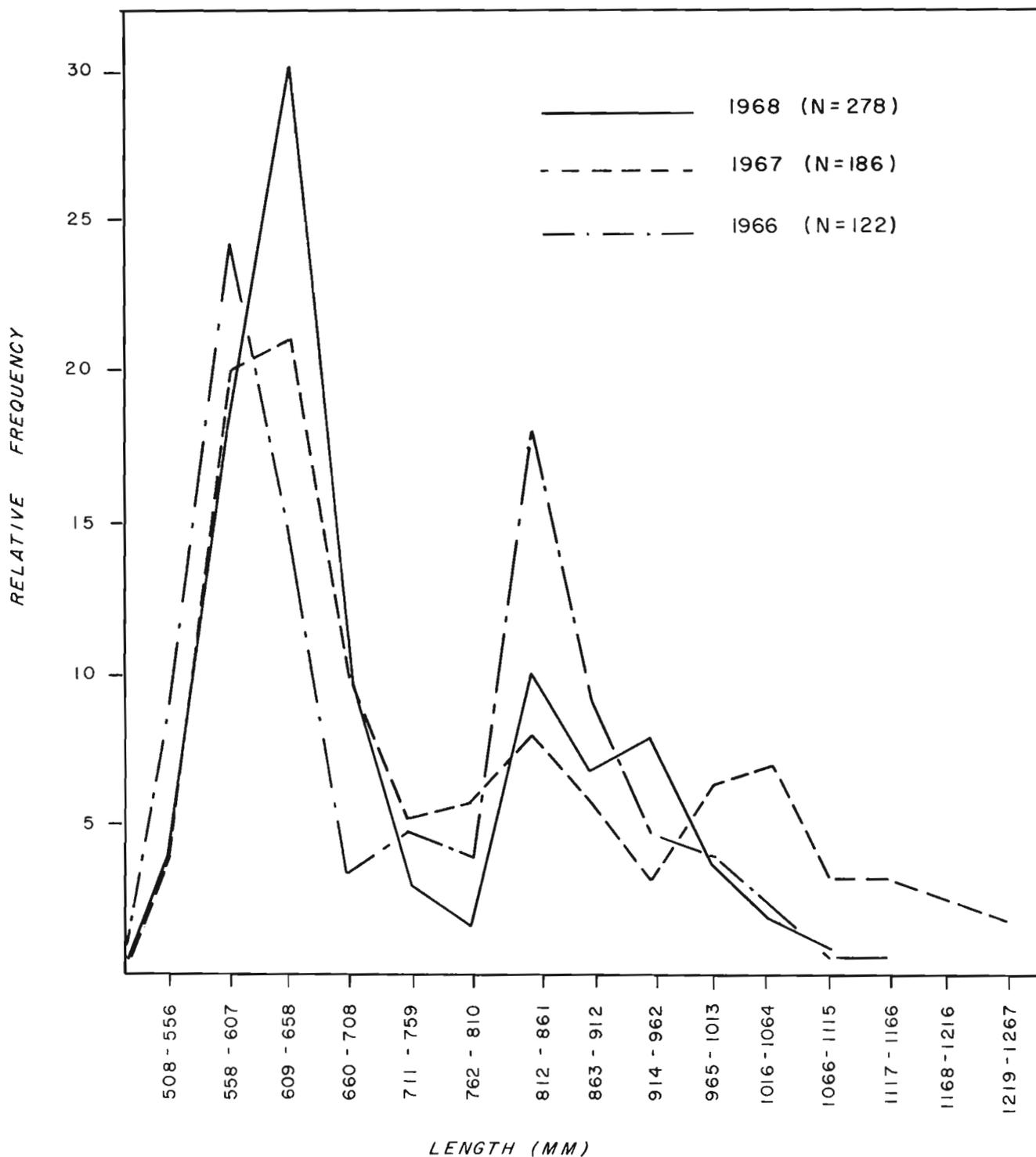


FIGURE 1. SIZE COMPOSITION OF SPORT-CAUGHT KING SALMON IN UPPER COOK INLET, 1966-1968.

In addition to kings 508 mm and over, approximately 416 "jack" kings under 508 mm were caught by anglers during the punch-card fishery. King salmon under 508 mm are included in the general daily freshwater bag limit.

Data collected thus far indicates the sport fishery is partially selective to a male (ages 1.1 and 1.2) and "jack" fishery. Figure 2 compares the catch ratio of king salmon over and under 508 mm for the years 1961 to 1963 and 1966 to 1968. Figure 3 indicates the size composition of sport-caught king salmon during 1961-63.

Age was determined for 151 king salmon over 508 mm caught during the punch-card fishery; composition of the sample indicated that 58.9, 35.8, and 5.3 percent of the catch was four, five and six years old, respectively.

Age classes by length and sex of 99 king salmon from the Deshka River are presented in Table 2. In this sample, age 1.2 fish comprised 63.2 percent; age 1.3 fish 30.6 percent; and age 1.4 fish 6.2 percent.

The 1968 king salmon run into the Deshka River was predominantly composed of five-year-old fish (1.3). Age and length frequency composition indicates a fork length grouping of 762 mm to 1,016 mm for age 1.3 fish. The most prevalent size groups, as indicated in the sport fish catch and carcass survey, are presumed to be age V fish (Figure 4).

TABLE 2 - Age-Length Frequency Distribution, by Sex, of Sport-Caught King Salmon from the Deshka River, 1968.

Length in Millimeters	Age Males			Age Females		Total
	1.2	1.3	1.4	1.3	1.4	
508 - 556	5	--	--	--	--	5
558 - 607	21	--	--	--	--	21
609 - 658	28	--	--	--	--	28
660 - 708	7	--	--	1	--	8
711 - 759	2	--	--	--	--	2
762 - 810	--	--	--	2	--	2
812 - 861	--	3	--	9	--	12
863 - 912	--	1	--	3	1	5
914 - 962	--	6	--	2	2	10
965 - 1013	--	1	--	1	1	3
1016 - 1064	--	--	1	--	--	1
	--	--	1	1	--	2
Total	63	11	2	19	4	99
Percent of Total	63.2	11.2	2.1	19.4	4.1	100

### Escapement

During 1968, population enumeration of king salmon was confined to the same 11 streams surveyed in 1967. Table 3 presents the escapement counts for Upper Cook Inlet streams from 1962 through 1968.

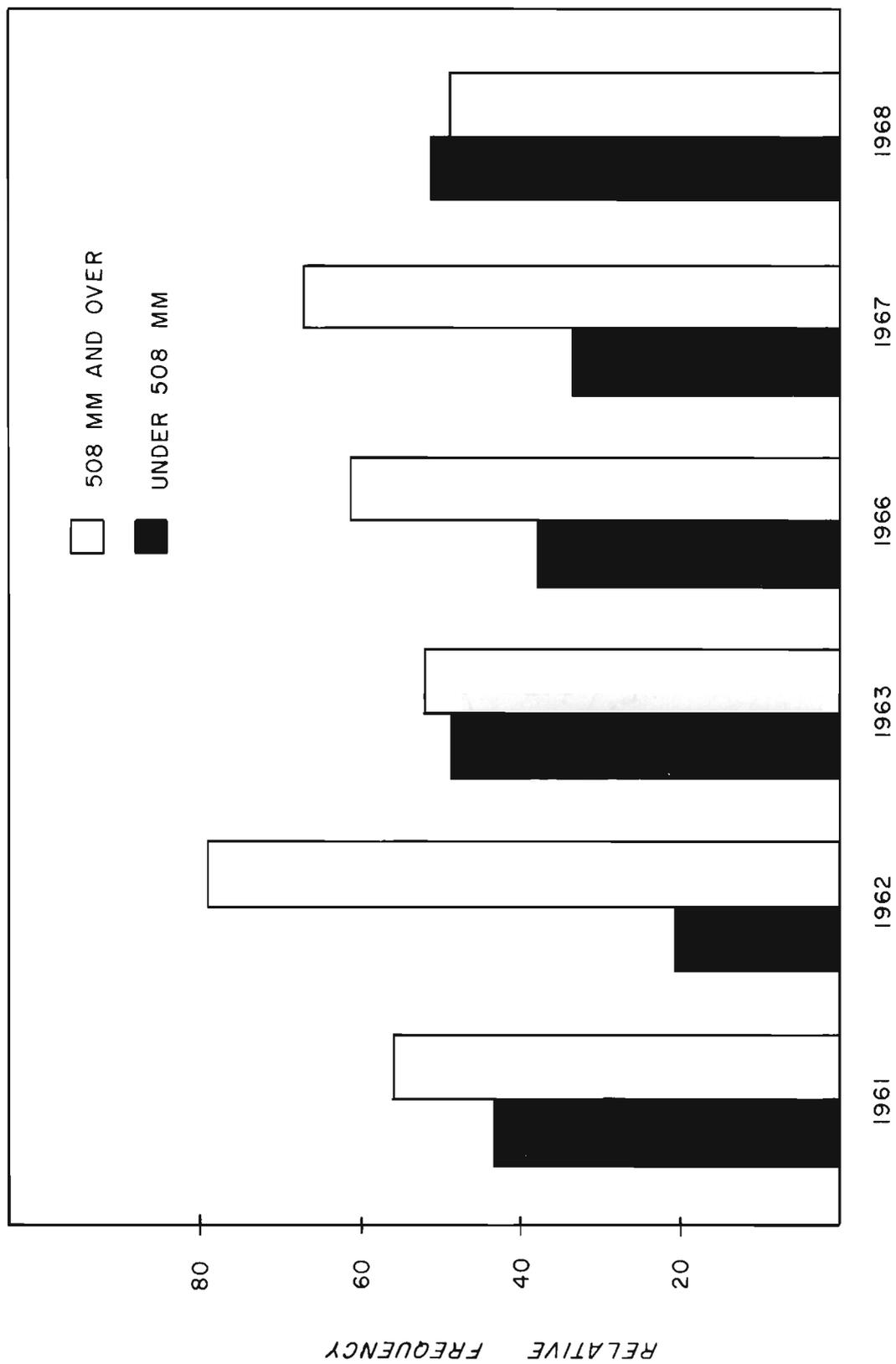


FIGURE 2. RELATION OF ADULT KING SALMON AND "JACK" SALMON IN THE SPORT-FISH CATCH FOR UPPER COOK INLET, 1961-63 AND 1966-68.

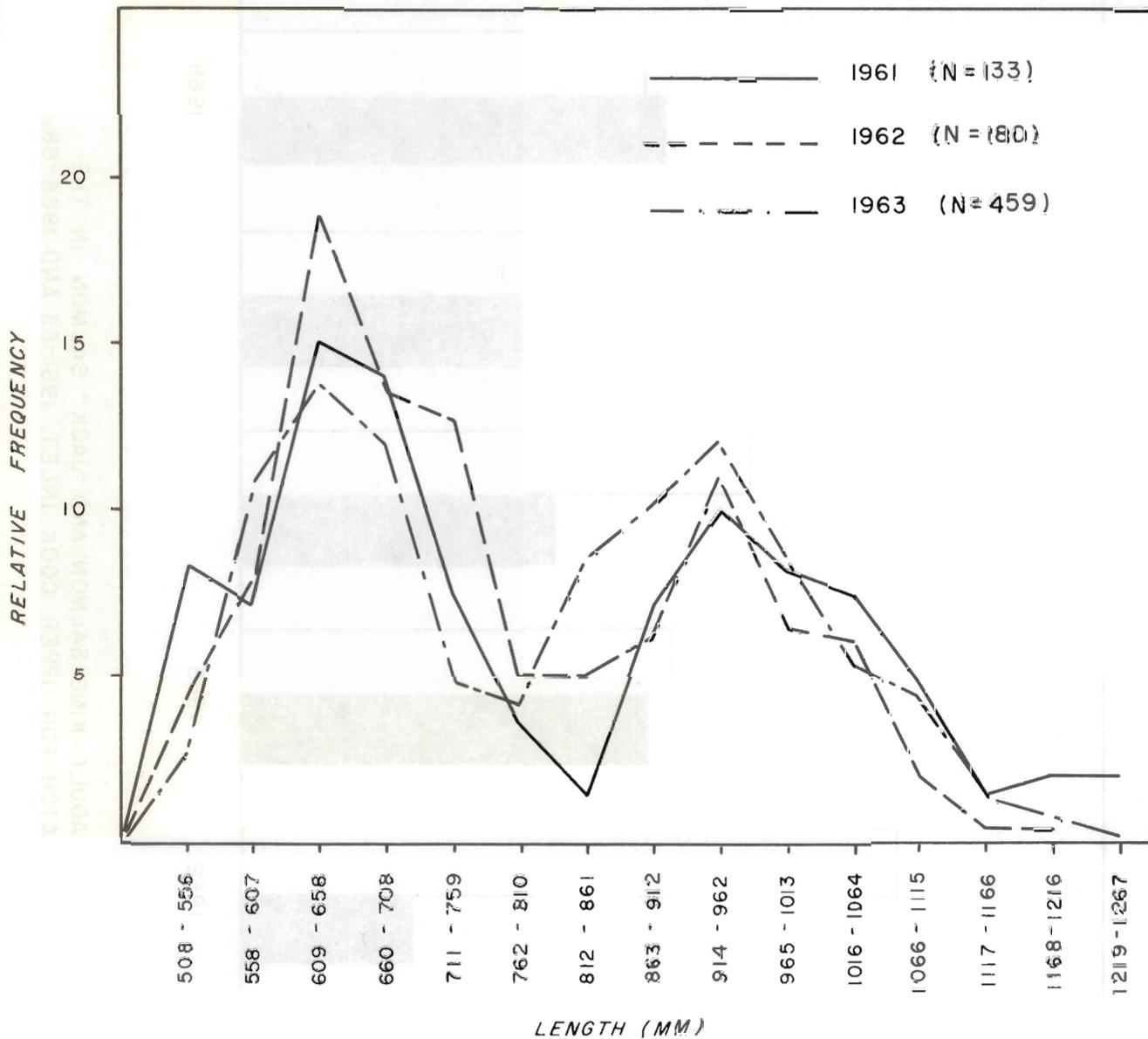


FIGURE 3. SIZE COMPOSITION OF SPORT-CAUGHT KING SALMON, 508 MM AND OVER FOR UPPER COOK INLET, 1961-1963.

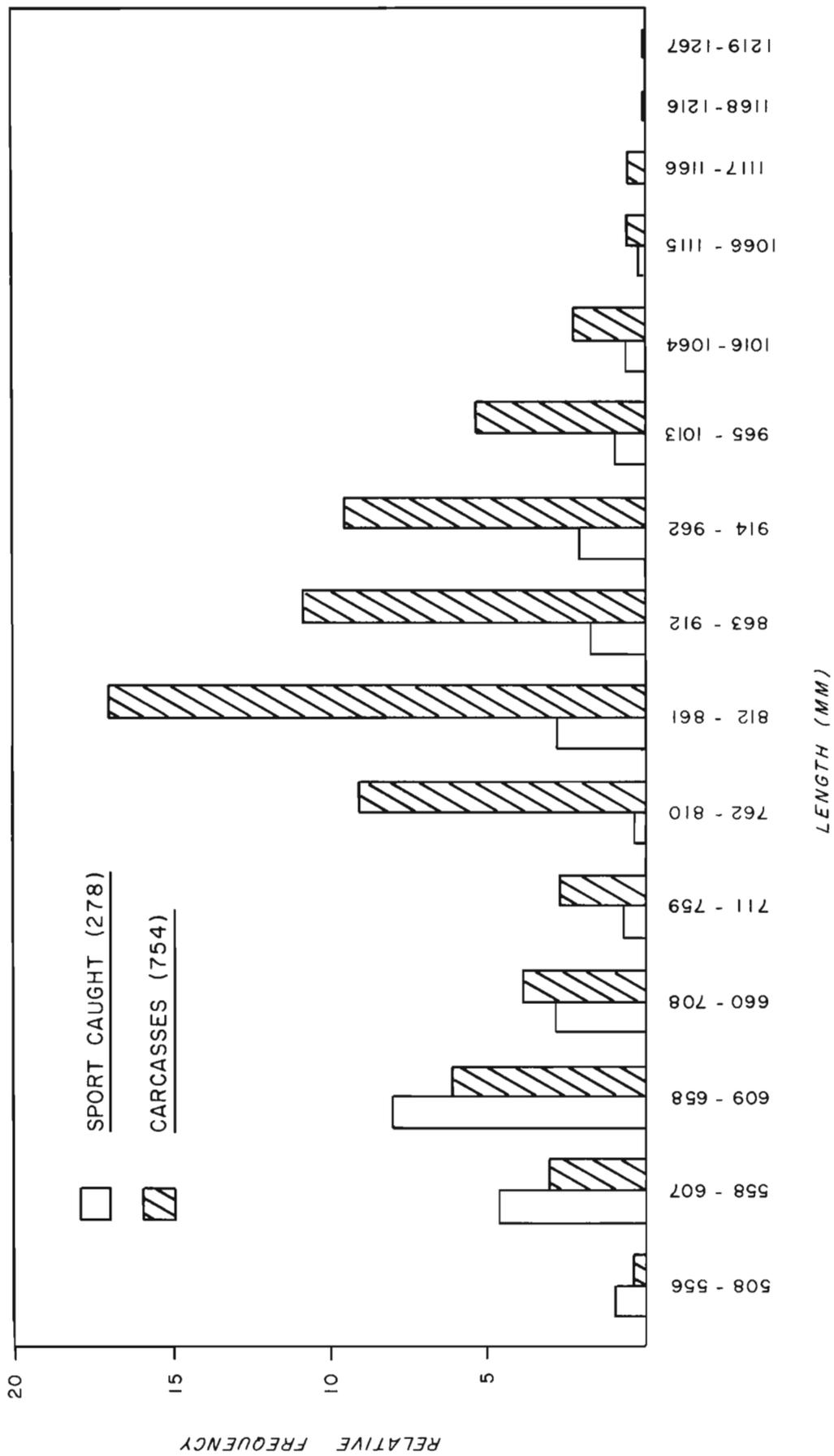


FIGURE 4. SPORT-CAUGHT AND CARCASS LENGTH FREQUENCIES OF KING SALMON 508 MM AND OVER FOR THE DESHKA RIVER, 1968.

TABLE 3 - King Salmon Escapement Counts, Upper Cook Inlet, 1962 to 1968.

Stream	1968	1967	1966	1965	1964	1963	1962	Mean 1962-67
Deshka River	4,863	2,500	2,000	2,749	2,422	131	998	1,800
Alexander Creek	727	500	300	400	205	750	19	362
Lake Creek	1,300	1,000	300	172	290	46	53	310
Chunilna Creek	1,000	*	300	8	319	38	70	147
Totals	7,890	4,000	2,900	3,329	3,236	965	1,140	2,619
Ship Creek	500	200	50	207	94	119	58	121
Campbell Creek	125	300	15	119	116	187	40	129
S.F. Eagle River	28	50	49	159	123	135	*	103
Totals	653	550	114	485	333	441	98	353
Willow Creek	125	24	103	35	51	55	71	56
Little Willow Creek	12	6	38	3	7	11	26	15
Montana Creek	5	2	100	57	75	23	75	55
Sheep Creek	*	*	100	3	*	24	35	40
Totals	142	32	341	98	133	113	207	166

\*No count available.

Three streams on the east side of the Susitna River (Willow, Little Willow, and Montana Creeks) showed a slight increase over the 1967 count and is comparable to the average for the years 1962 through 1968.

Four streams on the west side of the Susitna River showed a marked increase from the 1967 count. Significant factors contributing to the higher count were extremely low and clear water conditions, which improved visual observation.

The estimated 4,863 king salmon enumerated on the Deshka River does not include the 524 kings of all sizes taken by sports anglers during the punch-card fishery. The escapement count for 1968 is believed to be the highest recorded for the Deshka River.

In the Anchorage area, Ship Creek showed a marked increase in adult king salmon escapement over previous years. Numerous "jack" salmon were observed but are not included in the total enumeration.

#### Carcass Counts

In conjunction with enumeration of spawners, all carcasses encountered on the Deshka River were examined for sex and size composition. Dead fish were measured from tip of snout to fork of tail.

A total of 762 king salmon carcasses checked on the Deshka River ranged from 298 mm to 1,231 mm; males averaged 807 mm, while females averaged 838 mm (Figure 5). The average length for both males and females was 826 mm. The ratio of females to males was 1.01:1.

#### Gill-Net Fishing

Test-net sampling was used to obtain general information relative to distribution, timing, age and length-size composition.

Sampling was conducted at the confluence of the Deshka and Susitna Rivers with an 8- by 100-foot gill net with 5 1/4-inch stretch mesh. Captured king salmon were measured and tagged with a Floy tag at the base of the dorsal fin before being released into the Deshka River.

Test fishing commenced on May 17 and terminated on July 17. The gill net was not used during the king salmon punch-card fishery period, June 8 through June 21. The first king was caught on June 2, the last king on July 10.

The fork length of 321 fish sampled ranged from 343 mm to 1,194 mm. The mean length was 744 mm as compared to 701 mm for the 1967 test-net fishery. Figure 6 compares test fishing results for the period 1965 through 1968.

Since all of the fish were tagged and released unharmed, sex determination by external characteristics was not attempted. Three percent of the kings measured in 1968 were under 508 mm.

Estimating age by size composition indicates that 53.8 percent of the test-net-caught king salmon were 1.2 year-old fish; 34.6 percent were 1.3 years old; 8.5 percent were 1.4 years old; and 3.1 percent were 1.1 year-old fish.

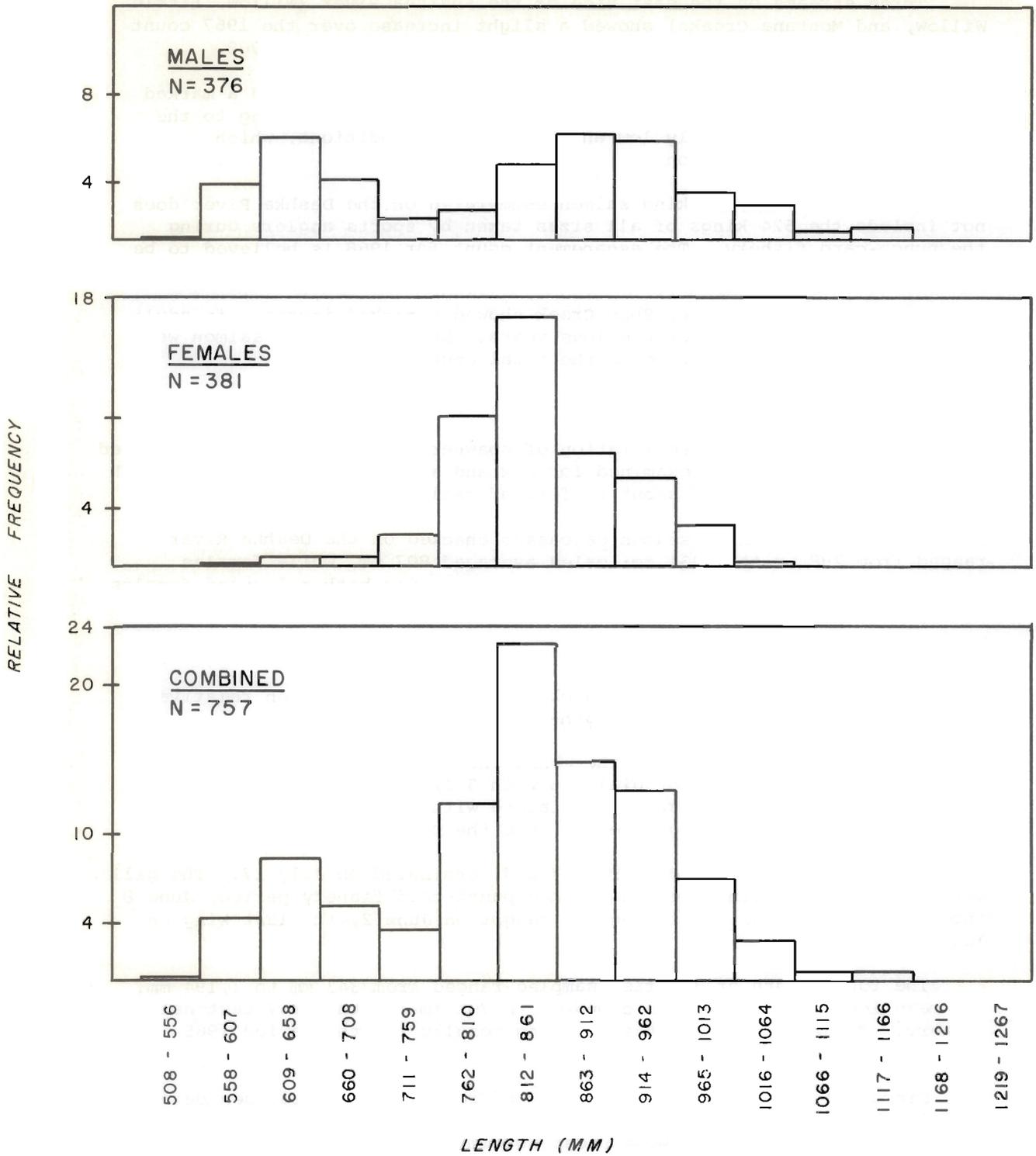


FIGURE 5. LENGTH FREQUENCY OF KING SALMON CARCASSES FROM THE DESHKA RIVER, 1968.

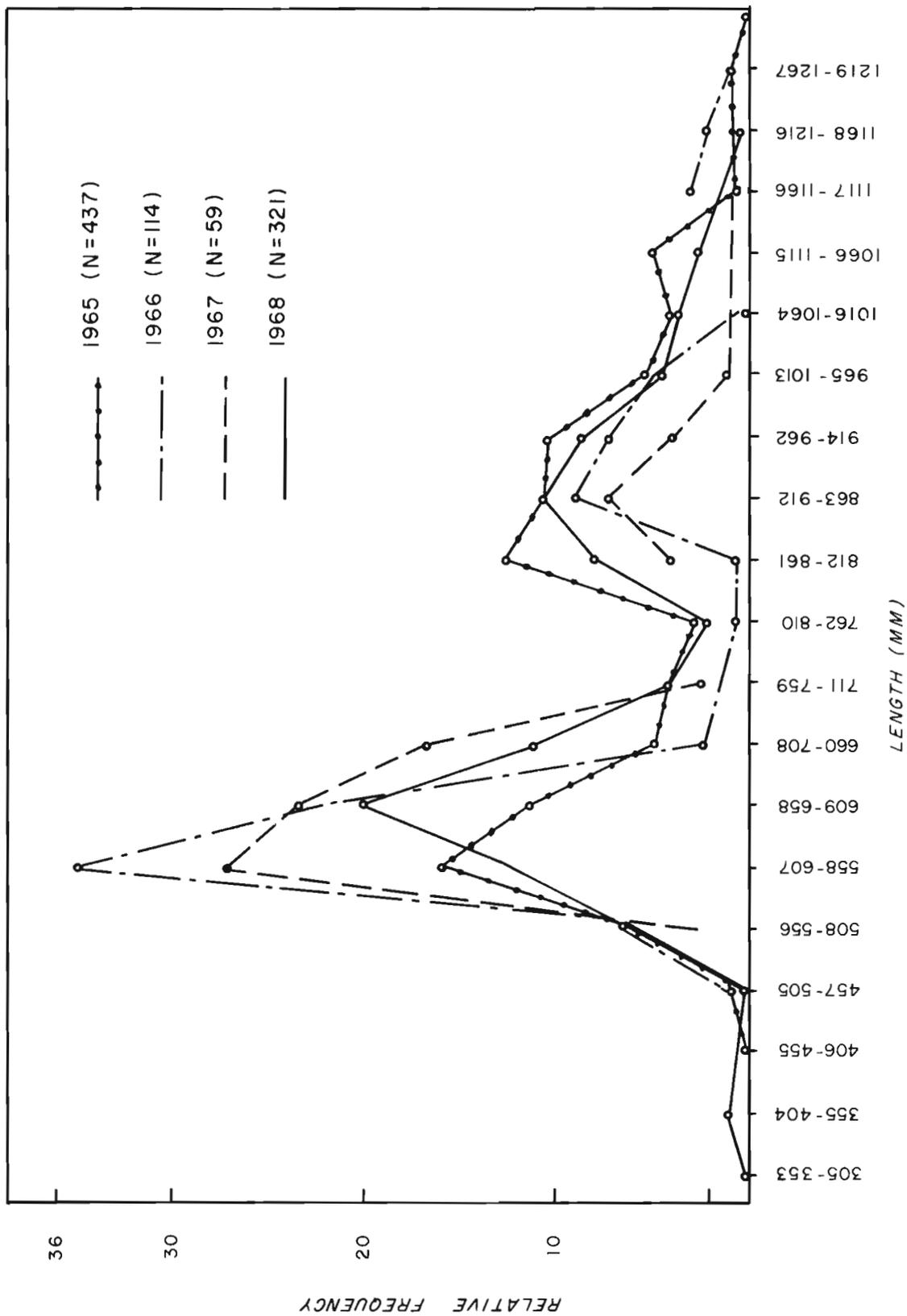


FIGURE 6. LENGTH FREQUENCIES OF NET-CAUGHT KING SALMON FROM DESHKA RIVER, 1965 - 1968.

During the sport fishery, two tagged fish were caught shortly after being marked. Eleven tagged fish were subsequently recovered on the upper Deshka River during carcass enumerations; several tags were observed on live kings during the float trip.

Two tagged kings were taken by hook and line in Chunilna Creek, a distance of 70 miles northeast of the Deshka River. The kings were tagged on June 4 and June 26 and caught on July 6.

Tag and recovery data show tagged fish being observed and captured in Sheep, Montana, Willow and Chunilna Creeks, all east-side tributaries to the Susitna River.

#### King Salmon Egg Take

A total of 260,000 king salmon eggs was obtained from 49 females captured in Ship and Campbell Creeks.

Egg-take activities commenced on July 3 and terminated July 26. Department personnel and conservation agents from Fort Richardson used electrical shocking devices, dip nets and the Ship Creek weir to capture adult king salmon.

The 49 spawned female king salmon ranged in size from 813 mm to 1,117 mm, with a mean length of 960 mm. Age analysis indicated 20 were five-year-old fish and six were six-year-old adults.

During the egg-take operation, six returning "jack" king salmon with adipose fin clips were captured. These 1966 brood-year fish ranged from 419 mm to 483 mm, with an average weight of two pounds. The marked "jacks" were released from the Fort Richardson Cooling Pond into Ship Creek during May, 1967.

A fish weir was constructed approximately two miles from the mouth of Ship Creek during 1968 to facilitate the capture of adult fish. Because of high water flows, the weir was generally ineffective during egg-take activities. During the latter part of July, 11 males and one female king salmon were taken in the trap.

#### Fort Richardson Cooling Pond

A total of 82,400 king salmon fingerlings averaging 28.5 per pound was released into Ship Creek during late May. All of the eggs were obtained from spawning adults from three Anchorage-area streams.

From April 15 through April 22 a total of 129,300 silver salmon fingerlings (of Big Creek, Oregon, origin) was marked and released into Ship Creek with the silvers averaging 19.9 per pound; all were marked by an adipose fin clip.

#### Silver Salmon

During 1968, three streams (Deshka, Alexander and Lake) on the west side of the Susitna River were censused for angling pressure and harvest. Creel census data disclosed that 567 anglers fished 2,108 hours to catch 594 silver salmon, a seasonal rate of success of 0.28 fish per hour.

Strong runs of silvers normally occur in Cook Inlet during even-numbered years. Creel census data, observations and interviews with anglers indicated that the 1968 silver run was one of the smallest during the past four even-numbered years.

Silver salmon harvest studies for the Susitna River Drainage began in 1966, with emphasis on the clearwater tributaries below Devil's Canyon. Creel census surveys on both east- and west-side streams were made as time and other factors permitted.

During 1967 and 1968 silver salmon harvest studies under this project were confined to selected west-side tributaries (Alexander, Deshka, and Lake) of the Susitna River below Talkeetna. It was anticipated that by limiting the area to two or three streams, a more realistic and reliable creel census coverage could be made.

The 1967 silver salmon sport harvest is presented in Volume 9, Job No. 9-B, Federal Aid in Fish Restoration Report for 1967-68.

Since this project was initiated in 1961, with emphasis on king salmon, it was possible to obtain some silver salmon harvest information on three of the west-side streams. Comparative harvest data for these streams during even-numbered years since 1962 is listed in Table 4.

Cook Inlet silver salmon are normally four-year fish. Scales were read from 97 fish sampled from the sport fishery on the Deshka River. Age analysis indicated that 83.6 percent were age 2.1; 14.4 percent age 1.1 and 2 percent were age 3.1 fish.

TABLE 4 - Silver Salmon Sport Harvest - Even-Numbered Years, for the West-Side Susitna Streams.

<u>Year</u>	<u>Stream</u>	<u>Total Anglers</u>	<u>Angler Hours</u>	<u>Total SS</u>	<u>Fish/Angler</u>	<u>Fish/Hour</u>
1968	Alexander Creek	272	978	337	1.23	0.34
1968	Deshka River	231	921	190	.82	0.20
1968	Lake Creek	<u>64</u>	<u>209</u>	<u>67</u>	<u>1.04</u>	<u>0.32</u>
	Totals	567	2,108	594	1.04	0.28
1966	Alexander Creek	432	1,296	553	1.28	0.42
1966	Deshka River	375	1,398	353	0.94	0.25
1966	Lake Creek	<u>84</u>	<u>252</u>	<u>105</u>	<u>1.25</u>	<u>0.41</u>
	Totals	891	2,946	1,011	1.13	0.34
1964	Alexander Creek	88	169	106	1.20	0.62
1964	Deshka River	<u>518</u>	<u>2,202</u>	<u>805</u>	<u>1.55</u>	<u>0.36</u>
	Totals	606	2,371	911	1.50	0.38
1962	Alexander Creek	731	2,018	1,414	1.93	0.70
1962	Deshka River	<u>313</u>	<u>872</u>	<u>470</u>	<u>1.50</u>	<u>0.53</u>
	Totals	1,044	2,890	1,884	1.80	0.65

A sample of 155 silver salmon measured ranged from 432 to 686 mm in length with a mean of 592 mm. The sex ratio of males to females was 1:1.

Forty silver salmon harvested from Lake Creek ranged in size from 483 to 673 mm with an average of 604 mm.

Stream surveys conducted during August in two index west-side Susitna tributaries indicated a low escapement of silver salmon. Very few silvers (less than 50) were observed in Alexander Creek during a float trip. A float trip made on the East Fork of the Deshka River showed an estimated 500 silvers observed. The 1968 count was higher than the 19 silvers observed in the same area during the 1967 float trips and is comparable to the 500+ fish counted in 1966.

Aerial surveys made during late August showed several hundred silver salmon schooled up at the mouths of the Talachulitna River and Lake Creek. Very few silvers were seen in the main stream itself. It is possible that due to extremely low water conditions, the silvers were entering the streams later than usual; this was reflected in the anglers' harvest.

#### Other Anadromous Fish

Pink salmon, O. gorbuscha, which are normally abundant in Upper Cook Inlet streams during even-numbered years, are not rated as highly as silver salmon as a sport fish. Pink salmon are more or less caught incidentally while the angler is fishing for silver salmon. Most pinks are not kept by fishermen because of preference for the silver salmon; however, because of the small run of silvers on the west-side streams during 1968, more pinks were taken (378) than in previous years.

Pink salmon caught on the Deshka River averaged 491 mm in length, with a range from 381 to 610 mm.

Alexander Creek pink salmon ranged from 419 to 559 mm in length, with a mean of 497 mm.

Pinks sampled at Lake Creek, ranged from 406 to 533 mm, and averaged 483 mm in length.

Chum, O. keta, and sockeye, O. nerka, salmon do not contribute substantially to the sport fish harvest. Fifteen chum salmon harvested from Alexander Creek ranged from 610 to 711 mm in length, with an average of 665 mm. No sockeye salmon were observed being caught.

Prepared by:

Approved by:

Stanley W. Kubik  
Fishery Biologist

s/Louis S. Bandirola  
D-J Coordinator

Date: March 15, 1969.

s/Rupert E. Andrews, Director  
Division of Sport Fish