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STATE OF ALASKA

William A. Egan, Governor



ANNUAL REPORT OF PROGRESS, 1969 - 1970

FEDERAL AID IN FISH RESTORATION PROJECT F-9-2

SPORT FISH INVESTIGATIONS OF ALASKA

ALASKA DEPARTMENT OF FISH AND GAME

Wallace H. Noerenberg, Commissioner

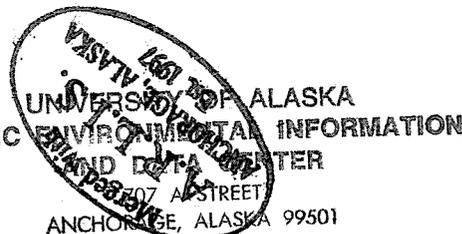
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INTRODUCTION

This report of progress consists of Job Segment Reports from the State of Alaska, Federal Aid In Fish Restoration, Project F-9-2, "Sport Fish Investigations of Alaska".

The studies reported herein are investigations evaluating the sport fish resources of the state. Recreational and other impacts on the fishery resources necessitates a continuous endeavor of ascertaining facts and knowledge of the fisheries. The 24 jobs reported on are of a continuing nature. The investigations are composed of 11 projects involved with the inventory and cataloging of the sport fish waters of the state, sport fishery creel censuses, and access. Fish species that received special investigational effort include: Dolly Varden, anadromous fish, grayling, sheefish, whitefish, pike, char, and salmon. The information gathered from the combined studies provides necessary background data for a better understanding of management problems and constitutes a basis for necessary future investigations.

The subject matter contained in these reports is incomplete, and the findings and interpretations subject to re-evaluation as work progresses.

RESEARCH PROJECT SEGMENT

State: Alaska

Project No.: F-9-2 *Name:* Sport Fish Investigations of Alaska.

Job No.: 7-A *Title:* Inventory and Cataloging of Kenai Peninsula-Cook Inlet-Prince William Sound Drainages and Fish Stocks.

Period Covered: July 1, 1969 to June 30, 1970.

ABSTRACT

Cataloging and inventory activities were performed on six Kenai Peninsula lakes. Five of these waters contained game fish with rainbow trout, Salmo gairdneri, the most common species present. Physical and biological characteristics of these waters are presented.

The Kenai River subsistence fishery for smelt (eulachon), Thaleichthys pacificus, was monitored. Fifty-nine of the 172 permits issued were returned. The mean catch per permit was 226.7 fish with a reported catch of 13,379 smelt.

Silver salmon, Oncorhynchus kisutch, escapement surveys conducted on selected index tributaries of the Swanson River are presented. Causes of a fish kill in the Swanson River are discussed.

RECOMMENDATIONS

Retain the present objectives of the study with emphasis directed toward the following:

1. Introduce Arctic grayling into Iceberg Lake to establish a sport fishery.
2. Extend the closing date of the Kenai River subsistence smelt season from May 20 to May 25 and determine the fishing success of non-reporting permits.

OBJECTIVES

1. To assess the environmental characteristics of the existing or potential recreational fishery waters of the job area; to obtain estimates of existing and/or potential angler use and sport fish harvest.
2. To evaluate application of fishery restoration measures and availability of sport fish egg sources.
3. To assist, as required, in the investigation of public access status to the area's fishing waters and to make specific recommendations for segregation of public fishing access sites.
4. To evaluate multiple water use, development projects (public and private) and their effects on the area's streams and lakes for the proper protection of sport fish resources.

5. To investigate, evaluate, and develop plans for the enhancement of anadromous fish stocks.
6. To provide recommendations for the management of sport fish resources in these waters and direct the course of future studies.

TECHNIQUES USED

Lake surveys were conducted using standard methods. A P-100 Ross depth finder was used to record bottom contours and chemical data was obtained with a Hach AL-36-WR kit. Fish populations were sampled with monofilament gill nets (125- x 6-foot) having five mesh sizes ranging from 3/4- to 2-inch bar measure. A minimum of two overnight sets were made in all waters.

The harvest of smelt (eulachon) in the Kenai River was determined by the analysis of subsistence permits.

The relative adult silver salmon abundance on selected index areas on the Swanson River tributaries was measured by foot surveys. The effects of the Swanson River forest fire on the fish populations in the Swanson River were determined by foot and canoe surveys.

FINDINGS

Lake Surveys

Basic surveys were conducted on six lakes during the reporting period. A brief description of the physical and biological characteristics of each lake is given below.

Iceberg Lake:

This lake is located on the Kenai National Moose Range, 36 miles southeast of Soldotna, and is accessible only by float plane. It has a surface area of 250 acres and a maximum depth of 108 feet. The lake can be characterized as alpine and lies at an elevation of 2,650 feet. No fish were taken in three overnight gill-net sets. Iceberg Lake has less than a 5% shoal area (less than 15 feet) and virtually no aquatic vegetation. Stream spawning area is limited to 50 feet in the outlet. It has a pH of 6.8 and a total alkalinity of 34. It is recommended that Arctic grayling, Thymallus arcticus, be introduced to establish a sport fishery.

Neckshorta Lake:

This lake is situated 39 miles northeast of Soldotna on the Kenai National Moose Range. Access is by float plane. The lake has a maximum depth of 25 feet, a surface area of 163 acres, and 60% of the lake can be considered shoal area. Two overnight gill-net sets captured 23 rainbow trout, Salmo gairdneri, averaging 345.0 mm. There was no apparent stream spawning area and the fish population is believed to have migrated into the lake from Seven Egg Creek during periods of high water. The lake's tributaries were dry at the time of the survey on August 29.

Packers Creek Lake:

This lake is located on the north end of Kalgin Island in Cook Inlet. It has a maximum depth of 84 feet and a surface area of 475 acres, with shoal area comprising 10% of the lake. Three overnight gill-net sets yielded 14 adult red salmon, Oncorhynchus nerka; 3 juvenile silver salmon, O. kisutch; 1 Dolly Varden, Salvelinus malma; and 38 rainbow trout. The lake has a good reputation for rainbow trout angling. The

red salmon migration into this lake is earlier than most Cook Inlet systems with "bright" fish being taken on June 12. This lake has numerous beaver dams in the outlet which are frequently a barrier to fish movements. A public access site has been requested on the east edge of the outlet area.

Phalarope Lake:

This lake is situated 36 miles northeast of Soldotna on the Kenai National Moose Range with access being by float plane. It has a surface area of 380 acres, a maximum depth of 37 feet, and 60% of the lake is shoal area. Three overnight gill-net sets captured two rainbow trout, 392 and 445 mm. The lake's tributaries were dry at the time of the survey, and the size of the fish suggests that they migrated into the lake from Seven Egg Creek prior to 1968, a year of low precipitation. The rainbow trout population of this lake is characteristic of numerous lakes in the northern portion of the refuge in which ingress occurs only during years of high water.

Puppy Dog Lake:

This lake is located eight miles north of Kenai and is accessible by an unimproved dirt road. The department has a reserve-use site on the peninsula on the north edge of the lake. The lake has a maximum depth of 20 feet and a surface area of 143 acres. No stream spawning area was observed, and rainbow trout in the lake undoubtedly migrated from Bishop Creek or Beaver Creek during periods of high water. Two overnight gill-net sets captured 54 rainbow trout and 6 longnose suckers, Catostomus catostomus. The rainbow trout and longnose suckers had mean lengths of 343.3 and 401.2 mm, respectively, with the rainbow trout being heavily parasitized.

Tangerra Lake:

This lake is situated 40 miles northeast of Soldotna on the Kenai National Moose Range with access being by float plane. It has a surface area of 150 acres and a maximum depth of 45 feet with shoal area constituting 15% of the lake. Two overnight gill-net sets caught 41 rainbow trout having an average length of 296.6 mm. The lake tributaries were dry when this survey was conducted, but the rainbow trout found in the lake are believed to have migrated from Dipper Lake Creek during periods of high water.

With the exception of Iceberg Lake, all waters surveyed contained threespine stickleback, Gasterosteus aculeatus. The four lakes sampled on the northern portion of the refuge contained rainbow trout populations which appeared to have no recruitment since early 1968. Both 1968 and 1969 were years of low precipitation on the northwestern Kenai Peninsula. These low-water years do not permit rainbow trout ingress to these lakes from spawning areas downstream. Because the outlets of these lakes have small volumes, usually less than one cfs, any extended periods of low precipitation lasting several years would virtually eliminate rainbow trout angling in these lakes.

The location and physical characteristics of the lakes surveyed are presented in Table 1; the gill-net samples are summarized in Table 2.

Kenai River Smelt Fishery

A gill-net subsistence fishery for smelt (eulachon), Thaleichthys pacificus, occurs each spring in the Kenai River. Although this type of fishery cannot be considered "typical" sport fishing, it is primarily recreational in nature. Despite a subsistence permit being required prior to 1969, under Section 5 AAC 21.980 of the Commercial Fishing Regulations, this was not generally adhered to due to the public's confusion concerning this regulation. In 1969, the Board of Fish and Game promulgated subsistence regulations for smelt which

specifically stated the following: (1) Smelt may be taken for subsistence purposes under the authority of a permit issued by the Department. (2) Gill nets may be used providing they have a mesh size of not more than two inches. (3) Fishermen taking smelt in the Kenai River must be physically present at the net at all times the net is being fished.

TABLE 1 The Location, Surface Acreage, and Maximum Depth of Lakes Surveyed on the Kenai Peninsula, 1969.

<u>Lake</u>	<u>Location</u>	<u>Surface Acreage*</u>	<u>Maximum Observed Depth (feet)</u>
Iceberg	T2N R5W Sec. 33, 34	250	108
Neckshorta	T10N R6W Sec. 8, 18	163	25
Packers Creek	T4N R15W Sec. 5, 8	475	84
Phalarope	T10N R6W Sec. 30, 31	380	37
Puppy Dog	T7N R11W Sec. 27	143	20
Tangerra	T10N R6W Sec. 8, 9, 17	150	45

*Acreages determined by map grid from U. S. Geological Survey maps having a scale of 1:63,360.

TABLE 2 Gill-Net Summaries of Lakes Surveyed on the Kenai Peninsula, 1969.

<u>Lake</u>	<u>Survey Date</u>	<u>Species*</u>	<u>No. of Fish</u>	<u>Length Range (mm)</u>	<u>Mean Length (mm)</u>	<u>Catch/ Hour**</u>
Neckshorta	8/29	RT	23	266-550	345.0	0.50
Packers Creek	6/12	RT	38	178-440	288.6	0.58
		DV	1	180		0.02
		RS	14	408-582	536.1	0.21
		SS	3	116-153	134.7	0.05
Phalarope	8/30	RT	2	392-445	418.5	0.04
Puppy Dog	8/26	RT	54	254-425	343.3	1.27
		LS	6	301-535	401.2	0.14
Tangerra	8/29	RT	41	180-490	296.6	0.98
Iceberg	9/18	No fish taken				

*RT - rainbow trout, DV - Dolly Varden, RS - red salmon, SS - silver salmon, LS - longnose sucker

**Catch per gill-net hour using 125-foot variable mesh gill nets (3/4- to 2-inch bar mesh).

This fishery generally occurs from the terminus of the Kenai River with Cook Inlet to Soldotna Creek, 22 miles upstream. Over half of the effort takes place on a one-mile section of the Kenai River adjacent to the city of Kenai. Virtually all of the smelt are captured using a gill net tied along a pole approximately 15-foot long. A rope attached to the pole is held by the fisherman as the pole, with attached gill net, is drifted with the current or tide. This type of gear was fished at all tide levels which ranged from -3.9 - 23.8 feet during the fishery.

Tidal influence in the Kenai River extends to the Eagle Rock area, 12.5 miles upstream. Kenai River stream-flow data for 1969 is not yet available, but previous flows during this period have averaged 2,500 cfs. These large stream flows make the usual method of capturing smelt by dip netting difficult, so little effort is exerted. As the Kenai River is glacial, light penetration into the water does not affect gill-net efficiency.

A total of 242 permits was issued during this fishery with 97% being issued from Soldotna. The areas for which permits were issued are as follows: Kenai River - 172 permits (71.1%); Cook Inlet - 42 permits (17.3%); Kenai River and Cook Inlet - 28 permits (11.6%). Ninety-four (38.8%) of the permits were returned. A summary of these returns is shown in Table 3. The residency of the various permittees was determined, showing that 95.0% were from the Kenai Peninsula. The origin of smelt fishermen by general area is presented in Table 4.

TABLE 3 A Summary of Permits Issued and Returned During the Kenai River Smelt Subsistence Fishery, 1969.

<u>Area</u>	<u>No. Issued</u>	<u>No. Returned</u>	<u>% Returned</u>
Kenai River	172	59	34.3
Cook Inlet	42	9	21.4
Kenai River and Cook Inlet	28	1	3.6
Permits not fishing or no fish taken		25	10.3
Total	242	94	38.8

TABLE 4 Origin of Fishermen Subsistence Fishing for Smelt in the Kenai River and Cook Inlet, 1969.

	<u>Kenai to North Kenai Area</u>	<u>Soldotna to Sterling Area</u>	<u>Kasilof to Homer Area</u>	<u>Anchorage to Fairbanks Area</u>	<u>Total</u>
Number of Permits	160	46	24	12	242
Percent	66.1	19.0	9.9	5.0	100.0

Nine Cook Inlet permits were returned taking a total of 1,707 smelt and 804 Pacific herring, Clupea harengus. The average number of smelt and herring captured per permit was 189.7 and 89.3, respectively. Twenty days of effort were reported with a mean of 85.4 smelt and 40.2 herring being taken per net-day. This fishery occurred between May 3 and May 28 on the beaches between the Ninilchik and Swanson rivers. The bulk of the effort occurred on Salamatof Beach situated between the Kenai River and the East Forelands.

A total of 59 permits from the Kenai River fishery were returned with an estimated 13,379 smelt being recorded. The mean number of smelt per permit was 226.7. An average of 107.0 smelt was caught per net-day in 125 days of fishing effort. The Kenai River fishery occurred from May 2 through May 20. Permits were terminated on May 20 because it was believed that red salmon were becoming abundant in the Kenai River, although no data has been collected to substantiate this. Four Dolly Varden and 50 herring were also reported during this period.

The greatest catch per net-day of 210 smelt occurred on May 10, with fish still being abundant on May 20 when the permits expired (Figure 1). Effort increased gradually throughout the fishery, attaining a peak on May 20. No projection of total catch was made since it was questionable whether the permits returned (34.3%) were representative of the entire fishery.

Swanson River Silver Salmon Surveys

The Swanson River is the most important silver salmon producer on the northwest portion of the Kenai Peninsula. This 35-mile long stream drains into Cook Inlet and is situated on the Kenai National Moose Range. Since 1964, surveys have been conducted on selected index streams to measure relative silver salmon abundance. These index areas can easily be foot surveyed, so a total salmon enumeration can be obtained at the time of the survey. It is evident, however, that the escapement counts are minimal since some silver salmon migrate into the index areas after the date of survey. Descriptions of the index streams are presented in Table 5. The Upper Canoe Creek index area includes a chain of four small lakes connecting Canoe Lake to Martin Lake.

TABLE 5 Descriptions and Locations of Silver Salmon Escapement Index Streams in the Swanson River Drainage.

<u>Index Area</u>	<u>Location</u>	<u>Length (yards)</u>	<u>Mean Width (yards)</u>
Airport Creek	Swanson River to Gruskie Lake	1,670	1.8
Lower Canoe Creek	Swan Lake Road to Swanson River	970	2.1
Upper Canoe Creek	Canoe Lake to Martin Lake	890	1.5

The silver salmon escapement surveys from 1964 through 1969 are summarized in Table 6. These surveys suggest wide disparities in silver salmon abundance. The 1969 survey of 893 fish in Lower and Upper Canoe creeks was the highest observed and is 201% greater than the four-year mean of 297 fish for these two index areas. The increased escapement is believed to be due primarily to the more restrictive seasons in the Cook Inlet commercial fishery. This restricted fishery was due chiefly to the overall poor silver salmon run

in Cook Inlet coupled with the subsistence closures resulting from the Swanson River fish kill. Swanson River silver salmon are primarily age 2.1 (Engel, 1968).

TABLE 6 A Summary of the Silver Salmon Escapements in Selected Index Streams in the Swanson River Drainage, 1964-1969.

<u>Survey Date</u>	<u>Airport Creek</u>	<u>Lower Canoe Creek</u>	<u>Upper Canoe Creek</u>
9/27/64	279		
10/6/64			83
10/22/64		309	
10/3/66	45		
10/6/66		164	
10/9/66			40
10/18/67		228	134
10/9/68	0*		
10/11/68		174	55
10/15/69		499	394

*Stream was almost dry.

Swanson River Fish Kill:

A forest fire occurred on the Kenai National Moose Range on August 3, 1969, burning an area of 83,000 acres including large areas along a 20-mile section of the Swanson River. Dead silver salmon were reported in this stream on August 13. A foot survey of the Swanson River to a point 1.5 miles upstream from its mouth revealed 97 dead and moribund adult silver salmon. The entire Swanson River, from the upper burn area to the mouth, was surveyed by helicopter on August 16. An accurate stream survey was not possible, but dead salmon were observed from tidewater to a point nine miles upstream. A canoe survey was conducted on August 18 through the same stream area with a minimum of 501 dead adult silver salmon being enumerated. A minimum of 1,000 rainbow trout and juvenile silver salmon were also estimated to have been killed per mile of stream.

The section of stream, nine miles above tidewater, where the fish kill was observed had large concentrations of fire retardant in the stream and on adjacent banks. The retardant (Phoschek-202) was dropped by aircraft chartered by the Bureau of Land Management. The constituents of Phoschek-202 are di-ammonium phosphate, carboxymethyl cellulose, tricalcium phosphate, and ferric oxide. No dead fish were observed in the portion of the stream upstream from the area where the Phoschek-202 was dropped. This section of stream was severely burned, thus discounting the possibility of large quantities of ash dropping into the stream and causing the fish mortality. The stream temperature on August 18 was 51°F in the burn area which was within normal range of August stream temperatures.

LITERATURE CITED

Engel, Larry J. 1968. Inventory and Cataloging of the Sport Fish and Waters in the Kenai, Cook Inlet-Prince

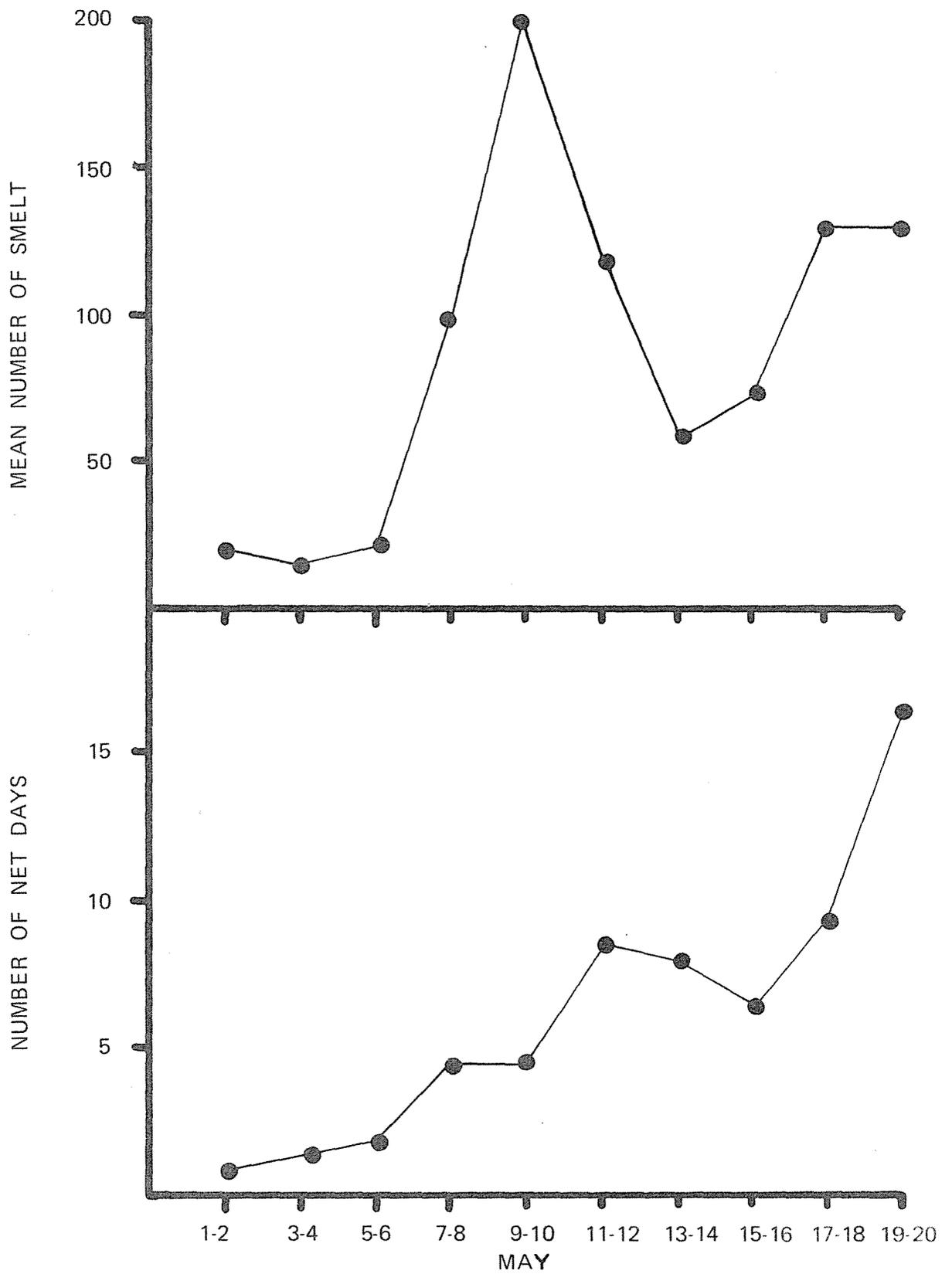


FIGURE 1 OBSERVED SMELT CATCH AND EFFORT, KENAI RIVER, 1969.

William Sound Areas. Alaska Department of Fish and Game. Federal Aid In Fish Restoration, Annual Report of Progress, 1967-1968, Project F-5-R-9, 9:95-116.

Prepared by:

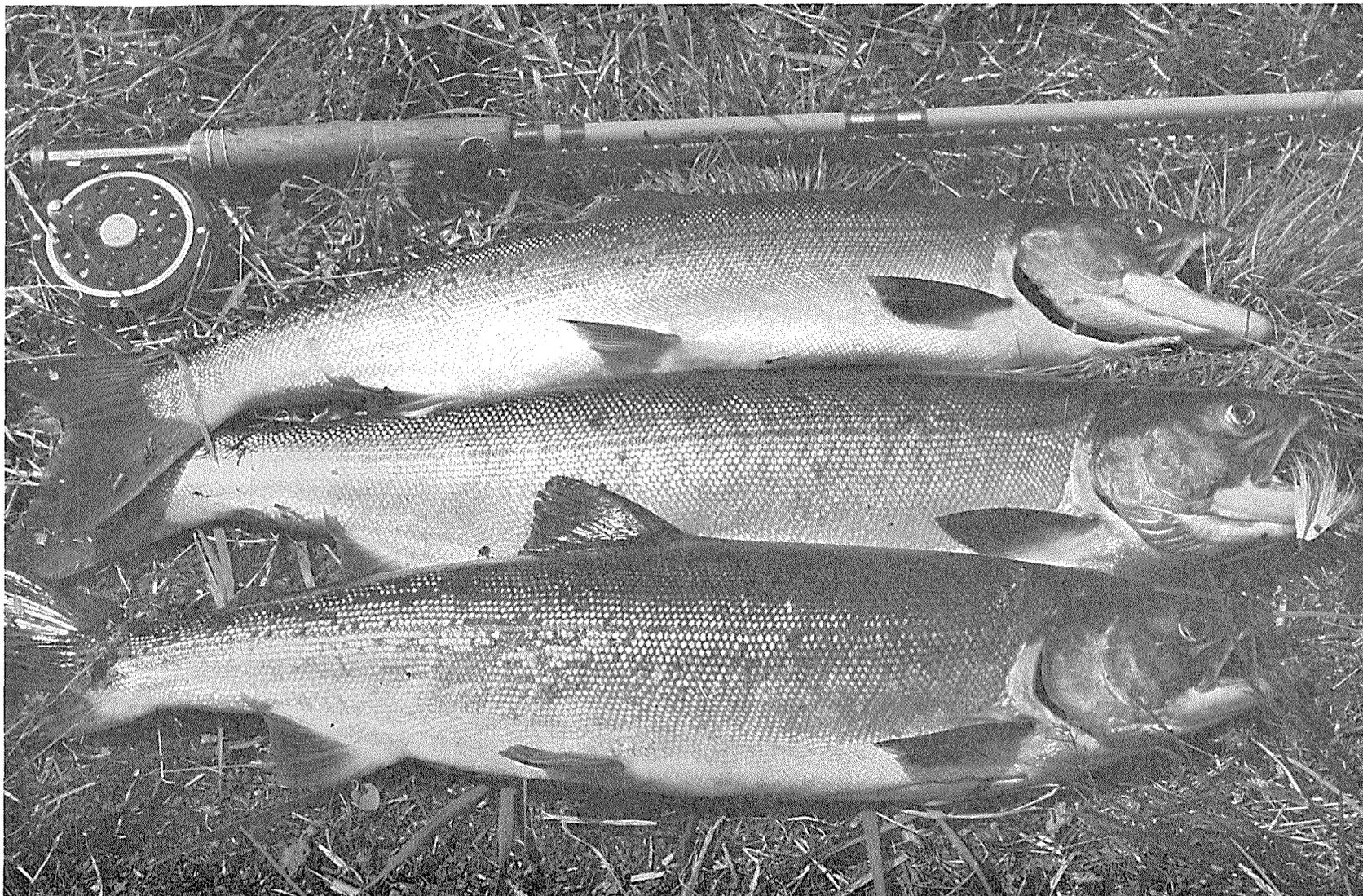
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Approved by:

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



THE RUSSIAN RIVER RED SALMON FLY FISHERY LOCATED ON THE KENAI PENINSULA IS THE LARGEST FRESHWATER SPORT FISHERY IN ALASKA.