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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 5 Report No. 4-A

JOB COMPLETION REPORT

RESEARCH PROJECT SEGMENT

STATE: ALASKA Name: Sport Fish Investigations of Alaska.

Project No: F-5-R-5 Title: Inventory and Cataloging of the Sport Fish and Sport Fish Waters in the Bristol Bay and Lower Kuskokwim Drainages.

Job No: 4-A

Period Covered: July 19, 1963 to March 15, 1964.

Abstract:

The sport fisheries and sport fish waters of Bristol Bay and the Lower Kuskokwim area are discussed. A brief description of certain existing and potential fisheries is presented. Difficulty of access minimizes utilization at most locations. Sport fishing pressure is heavy at a few sites but is generally low or moderate.

Rainbow trout is the most sought after sport fish of the entire area. King salmon and grayling also attract anglers to some waters. Pike and members of the char family are only lightly utilized. There is little knowledge of the population levels of most sport fish stocks.

Fish collections were made by several means to secure age and growth data and to determine distribution. Dolly Varden/Arctic char have been found in all suitable waters sampled to date.

King salmon escapement information was obtained by aerial and float surveys. Accumulated data on the Nushagak Bay king salmon remain to be studied more fully.

Use is made of information previously collected by the writer and from other sources.

Recommendations:

Effort should be directed toward obtaining information on the rainbow trout of the Kvichak watershed, with special reference to the recognition of discrete races, if any, and

their relative abundance. Those fish subject to utilization by existing fisheries should receive priority in this study. Commercial fishing activities in Lake Iliamna should continue to be closely observed.

The status of the rainbow trout stocks of the Naknek, Alagnak and Wood River watersheds should also receive increased investigational attention immediately.

Study of the Naknek and Nushagak king salmon stocks should be continued and intensified. An attempt should be made to find a method of accurately estimating escapement. A weir should be established on a typical spawning stream to enable comparison of actual escapement counts with estimates gained from aerial or float surveys. Naknek and Nushagak silver salmon should be studied concurrently with the king salmon of these systems, insofar as practical limitations will permit.

The grayling of the Ugashik Lakes should be studied to determine the ability of trophy-size fish to withstand increased angling pressure.

Certain lakes accessible from the road system in the Dillingham and Naknek-King Salmon area should be surveyed to determine their suitability for planting.

Inventory and cataloging of unutilized and little utilized sport fish and sport fish waters should be accelerated.

Objectives:

To determine the current status, potential and public availability of Alaska's sport fishing waters for formulation of future management investigations.

To assess environmental characteristics and formulate plans for application of restoration measures, availability of sport fish egg sources for experimental hatching and rearing, population manipulations and catch data as acquired by periodic creel census.

To evaluate multiple water use development projects for proper protection of the sport fish resources.

Techniques Used:

Species composition and distribution were sampled by gill nets of various mesh size and by hook and line.

Juvenile salmon and trout were collected by fine mesh seine and by jigging through the ice with hook and line.

Evaluation of king salmon escapement and spawning success in key areas was made by surveying from aircraft and by floating spawning streams with a rubber raft. The catch of various subsistence fisheries was observed.

Scales were taken and length and sex information collected from fish secured by the aforementioned methods. Age determination has been accomplished by reading scales with a low power binocular microscope.

The commercial king salmon catch of the Nushagak district has been sampled each year since 1956. Scales have been collected and length and sex recorded. Age analysis is being accomplished from scale imprints on acetate cards and magnified by projection.

Unreported information from work accomplished by the writer in previous seasons has been included. Available literature has been studied and is cited.

The present status of the area's sport fish and fisheries are reviewed in this report through individual discussion of each major watershed.

Findings:

The Bristol Bay watersheds are among the outstanding freshwater sport fishing areas in North America. Some of the major existing fisheries have been described (Andrews, 1961). The present freshwater sport fishery has developed largely within the last 15 years. There is no saltwater angling, although the potential exists for a fishery on salmon outside the estuarine influence. New trends and developments are emerging as utilization continues to increase. Creel census studies have been reported since 1960 under Project F-5-R.

The year-round resident population of Bristol Bay is less than 4,000; there is, however, a substantial influx during the summer. Normal entry from points outside the drainage is by plane. The road system for all communities combined is approximately 75 miles. Fishing is good in the immediate vicinity of a few communities, but additional travel by boat or plane is usually required. Access difficulty has contributed to the low degree of utilization of most sport fish stocks.

The topography of the Bristol Bay - Lower Kuskokwim area presents marked contrasts. While altitudes above 3,000 feet are common, these regions of higher elevation usually gradate

sharply into the lower basins which make up the greater portion of the area. The large lake systems in Bristol Bay, famous for their runs of red salmon, are all of moderate elevation. The large lakes of the area are oligotrophic and of glacial origin. Several of these lakes occur in each river system and are usually joined by relatively short, interconnecting rivers. The preponderance of currently utilized sport fishing sites are located in the areas where these rivers enter or leave the main lakes.

Thousands of dystrophic lakes of varying size and turbidity are present, particularly in the lowlands which surround Bristol Bay proper. Many of these are devoid of sport species, although pike (Esox lucius) are found in a few.

Lakes exhibiting eutrophic, or only mildly oligotrophic, characteristics are also found. These may superficially resemble clear, dystrophic lakes but generally are larger and of sufficient depth to maintain year-round oxygen levels adequate to support sport fishes. They are often landlocked and without desirable sport species at present, with the occasional exception of pike. When convenient to centers of population, such lakes offer promise for the time when stocking becomes advisable.

Suitability of sport fish habitat is not a matter of serious concern in most waters accessible to anadromous species. Distribution of both resident and anadromous species is generally excellent although an unexplained lack of certain species exists. Lake trout (Salvelinus namaycush), for example, are absent from the Wood River Lake system. There is no evidence that such absences are the result of ecological variation. Slow growth has been found among trout and char populations in some waters which are strongly oligotrophic. Such a reduced rate of development has been noted particularly at locations where access by anadromous species is prevented by barriers.

A. NAKNEK WATERSHED:

This drainage is the most thoroughly utilized of any Bristol Bay system. The current situation indicates that this will remain true in the immediate future. Rainbow trout (Salmo gairdneri) are heavily exploited in certain locations. Some spawning populations of king salmon (Oncorhynchus tshawytscha) may require protection. By contrast, relatively little effort is directed toward Dolly Varden (Salvelinus malma), Arctic char (Salvelinus alpinus), lake trout and pike. All are abundant. Stocks of these

species are virtually untouched and only occasionally enter the bag of the average angler, except at a few sites.

Naknek River:

The Naknek River is the most accessible fishing area in Bristol Bay. It also plays host to more fishermen each year than any other single body of water in the area. The sport fishery has been briefly described by Andrews (1961), with special reference to the effort of the three military recreational sites. The total take during the 1963 season cannot be fully compared with preceding years inasmuch as census information was not obtained from the King Salmon Air Force Base dock this season and data from the entire river were combined in both 1961 and 1962. Collation is possible, however, between 1963 returns and the 1960 figures listed by Andrews for the Lake and Rapids Camps. The most outstanding trend is the reduction in the catch per hour of rainbow trout at both the Rapids and Lake Camps (Table 1). Such a decrease is not fully explained by speculating that there is a change in angling effort, but probably indicates a lessening of the numbers of available rainbow. Anglers at the Lake Camp primarily seek rainbow trout. Fishermen from the Rapids Camp direct their attention toward both rainbow trout and king salmon. Judging from fishing success, there has been little change in the relative amount of effort directed toward each of these species since 1960 inasmuch as the catch per hour of kings at the Rapids Camp has remained stable. In 1960, 0.23 fish per hour were taken there; the 1963 figure was 0.19 fish per hour.

Personal observations of the King Salmon Base dock fishery and spot checks of the catch indicate a greatly increased king salmon take in spite of the absence of satisfactory returns from the voluntary military census at this site.

Civilian fishing activities have reached a level where this segment of the total effort cannot be ignored in any consideration of the over-all sport fishery on the Naknek River.

King Salmon Creek:

King Salmon Creek rises north of Naknek Lake at the base of Sugarloaf Mountain at the northernmost tip of Katmai National Monument. It follows a meandering course westward until it turns south to enter the Naknek River one and one-half miles from King Salmon.

Much of the Naknek sport fishery on kings centers around its confluence with the main river, both in the

Table 1. Fishing Effort and Rainbow Trout Catch, Naknek River, 1960 and 1963*

Fishing Period**	No. of Anglers		Angler-Hours		No. of Rainbows		Fish Per Hr.	
	1960	1963	1960	1963	1960	1963	1960	1963
Rapids Camp:								
5/26 - 6/8	65	73	411	410	112	67	.27	.16
6/9 - 6/22	83	106	590.5	674	61	47	.10	.07
6/23 - 7/6	84	141	612	962	100	30	.16	.03
7/7 - 7/20	107	100	766	645	112	7	.15	.01
7/21 - 8/3	97	43	671	254	46	68	.07	.27
8/4 - 8/17	68	2	424.5	5	41	0	.10	.00
8/18 - 8/31	1	1	11	13	0	0	.00	.00
Total, Rapids Camp	505	466	3,486	2,963	472	219	.135	.074
Lake Camp:								
5/26(18)-6/8	35	114	212	736	177	250	.83	.34
6/9 - 6/22	30	40	176	296	141	99	.80	.33
6/23 - 7/6	41	35	253.5	220	123	77	.49	.35
7/7 - 7/20	50	9	301.5	47	107	10	.35	.21
7/21 - 8/3	28	1	179.5	5	37	0	.21	.00
8/4 - 8/17	67	-	331.5	-	182	-	.55	-
8/18 - 8/31	32	1	194	4.5	31	0	.16	.00
9/1 - 9/14	42	-	254	-	73	-	.29	-
9/15 - 9/28	-	10	-	46	-	31	-	.67
Total, Lake Camp	325	210	1,902	1,354.5	871	467	.46	.34

* Figures for 1960 from Andrews, 1961.

**Periods listed are for 1963; periods during 1960 were two days later, except for first period at Lake Camp. Starting date for Lake Camp in 1960 is shown in parentheses.

Naknek River itself and on the banks of the creek. Its convenient location close to the airport, the highway, and the Air Force Base greatly increases the vulnerability of mature king salmon bound for the spawning grounds. The area above the vicinity of the Air Force Base is seldom fished.

This drainage is one of the major king salmon spawning areas of the Naknek system. No satisfactory quantitative survey of escapement was obtained on this stream in 1963. All previous surveys are also of limited quality.

Silver salmon (O. kisutch) are taken at the mouth of King Salmon Creek during the month of August.

Big Creek:

Big Creek originates south of Brooks Lake at the southwestern corner of Katmai National Monument. After following a general westerly course, it turns north to its junction with the Naknek River three miles east of King Salmon. Conditions are outstandingly suited for the spawning of king salmon throughout much of its length. Chum salmon (O. keta) also spawn in quantity in its waters. Outboard powered skiffs may ascend this creek for several miles. It is utilized by fishermen from both the Base Dock and Rapids Camp. Grayling (Thymallus arcticus), rainbow trout and Dolly Varden are also taken.

On August 13, 1963, Big Creek was surveyed for numbers of spawning king salmon from a helicopter through the cooperation of the Air Force. This date is close to the peak of king spawning in this stream. Visibility was excellent and a count of 1318 live fish and 27 carcasses was recorded. Comparison with similar king spawning areas within Bristol Bay indicates an acceptable level of escapement, pending further study.

Naknek Lake and waters of Katmai National Monument:

Naknek Lake and other waters within Katmai National Monument were studied by Greenbank (1954). His description of the then existing sport fishery continues to be generally satisfactory, with only a few additions necessary. Andrews (1961) also discusses the sport fishery of the Monument area, but did not report on the extent of the harvest. This information was not obtained in 1963. Consequently, no comparison of present trends or fishing success may be made with those figures listed by Greenbank. A comparison of past with present day angling success for rainbow trout is one of the urgent needs of the area.

The Brooks River fishery, pursued mainly by Guests of the Northern Consolidated Airlines "Angler's Paradise Camp" located at the mouth of the river, continues to be the main center of fishing effort. Rainbow continue to be the most sought after species. Grayling are taken in the river and Dolly Varden and lake trout are taken in the lake at its mouth. Occasional forays are made into nearby pike-producing areas.

A fly-in fishery for the highly colored Dolly Varden (S. malma) of Idavain Lake has developed since they were mentioned by Greenbank. The supply of these fish is felt by many to be limited due to the relatively small size of the lake, so most guides and pilots encourage their release. Success appears to remain at a level acceptable to the average fisherman. The fish are referred to locally as "golden trout" and usually range from 9 to 15 inches in length.

The "Angler's Paradise" Camp at the Coville-Grosvenor connection has been improved in recent years but does not always operate for the entire summer season. Creel census information for late years is partial or missing but success apparently continues to be acceptable. Dolly Varden, lake trout and rainbow trout make up the catch in that order.

The mouth of American River, headwater stream of Coville Lake, has become the site of a fly-in fishery, utilized chiefly by the Northern Consolidated Airlines operation at Brooks and Kulik. Dolly Varden and rainbow trout are the main species taken.

B. ALAGNAK (BRANCH) RIVER WATERSHED:

While "Branch" River is technically a tributary of the Kvichak River, it should for sport fisheries purposes, probably be recognized as an independent system. Rising amid the peaks of the Alaska Range toward the eastern side of the Alaska Peninsula, it drains in two large lakes, Kukaklek and Nonvianuk. These lakes lie in a similar meridian between Lake Iliamna on the north and the Naknek system on the south. Battle Lake lies at the head of Kukaklek Lake, to which it is connected by the three-mile-long Battle River. Kulik Lake is similarly situated above Nonvianuk Lake and joined to it by Kulik River, a stream slightly more than a mile in length. Nonianuk River, draining Nonvianuk Lake, unites with the Alagnak 15 miles southwest of the Kukaklek outlet. The river then meanders over an extremely braided course in a generally westerly direction to its junction with the Kvichak River about 12 miles above the head of Kvichak Bay.

Most angling pressure in the Alagnak System originates from the NCA Kulik Camp at the foot of the Kulik River. Kulik Camp guests are also flown to other nearby locations. The fisheries at Battle River and the Nonvianuk outlet are described by Andrews (1961). Angling success throughout the watershed continues to range from acceptable to excellent. At Kulik River, where pressure is constant, guests at the NCA Camp are encouraged to release the majority of their take of rainbow trout. The catch per hour of this species during August and September 1963 remained relatively high at 0.78 fish per hour.

In addition to the locations described by Andrews, the outlet of Kukaklek Lake and the confluence of Funnel and Moraine Creeks are now regularly utilized. Rainbow lake trout and Arctic char are the predominant species taken at the Kukaklek outlet, together with an occasional grayling. More grayling would be taken by using flies. Red salmon (O. nerka) are also caught during the spawning migration.

Rainbow trout head the list at the junction of Moraine Creek with Funnel Creek. Grayling and lake trout enter the bag occasionally, while red salmon are prominent in season.

While only that portion of the Alagnak and Nonvianuk Rivers immediately adjacent to the lake are fished regularly, the entire length of these streams, past their confluence and on to tidewater, holds a high potential. Rainbow and grayling are common. Pike are abundant in the many ox-bow sloughs. All species of Pacific salmon utilize the available gravels, with the general exception of red salmon which proceed into the lake beyond. Access to most of this area may be gained only by float trips from the lake outlets.

C. KVICHAK RIVER WATERSHED:

The Kvichak River drainage is famous as the home of the world's largest red salmon run. A number of reports are available dealing primarily with factors related to the production of red salmon. Conditions pertinent to the ecology of sport species are discussed in many of these, but little has been written specifically about sport fish. The area is vast and a thorough survey will require a long period of time. This Department's current efforts to monitor the fledgling freshwater commercial fishery are making a contribution in this direction. Sport fishing pressure ranges from nonexistent to moderate, but can be expected to increase.

The fishes of the watershed have been listed and keyed by Bond and Becker (1963). Rainbow trout, some of

which exhibit sea-run characteristics, commonly attain large size and are sought after to the virtual exclusion of the also abundant lake trout, Arctic char, Dolly Varden, pike and grayling. Only rarely is any species other than rainbow taken for sport purposes, except incidentally. This preference can be expected to continue as long as rainbow more than 24 inches in length remain readily available. High fishing success for these large rainbow is apparently responsible for the significant pressures which now exist in certain relatively remote locations.

Availability of rainbows in typical angling situations is greatest during the spring and fall months. Ripe or nearly ripe adults have been observed from fall through spring. Available data do not yet permit clear conclusions regarding the existence of discrete races, though the presence of such is suggested. Knowledge of the annual take or the status of the populations has not yet been obtained.

The following discussion is arbitrarily divided on the basis of both available information and fishing practices, rather than the relative importance of the various locations.

Kvichak River:

The Kvichak River extends over a course of approximately 57 miles, from Iguigig at the outlet of Lake Iliamna to Graveyard Point at the head of Kvichak Bay. Five miles below Lake Iliamna the river spreads out over a braided course for another five miles to form Kaskanak Flats. The tidal influence reaches to the foot of the Flats. Most sport fishing takes place at the outlet of the lake where access is provided by a conveniently located airfield. Two creeks enter Kaskanak Flats from the east and one from the north. Rainbow may be found in the riffles and pools of the river in the vicinity of these creek outlets from early spring until late fall, although availability to angling gear is reduced during the red salmon migration.

Representative creel census figures have not yet been secured for this area, but effort is increasing rapidly resulting from the establishment of additional fishing camps at Iguigig.

Rainbow trout may also be taken in favorable locations between Kaskanak Flats and the village of Levelock which is situated about 20 miles upstream

from Kvichak Bay. Little effort is exerted in this stretch of water, although good numbers of these fish are reportedly taken at the village itself by angling through the ice during late March and April.

Newhalen River:

The Newhalen River, which drains Lake Clark, was one of the first Iliamna tributaries to feel significant sport pressure. A military recreational camp formerly situated on this river is said to have had a severe effect on the spring rainbow fishery (Allin, 1959). Present pressures derive from its close proximity to the villages of Iliamna and Newhalen and to the Iliamna airfield. Angling intensity has risen markedly in recent seasons. Large fish are still reported, but information on the magnitude of the over-all harvest is lacking. Substantial quantities of rainbow and Dolly Varden are taken for subsistence purposes by local residents using both hook and line and nets. A 24-inch female rainbow trout taken from a salmon subsistence net on October 4, 1963 was seven years of age. Scale characteristics were typically anadromous.

Lower Talaric Creek:

As "fly-in" exploitation by both individuals and outfitters has increased in the past few years, the fame of locations formerly known only to a few has spread widely. The mouth of Lower Talaric Creek is typical of such a spot. Because access is virtually limited to private or chartered float aircraft, utilization remains sporadic. Rainbow trout from this stream contribute to a local subsistence fishery. The size of the rainbow taken here is large and fishing success remains at a high level.

Lower Talaric Creek enters Lake Iliamna from the north about 25 miles west of the Newhalen River. A lagoon large enough to afford landing space for small float planes is located at its mouth. The watershed is estimated at 40 square miles. It is heavily utilized as a spawning area by red salmon. The stream forks shortly above the lagoon and a number of small lakes, some of which are spring fed, are found near the headwaters of each branch.

Lengths of seven rainbow trout taken by angling on October 3, 1963 ranged from 17-1/4 to 25-3/4 inches with a mean of 22-3/4 inches. The 5+, 6+ and 7+ age groups were represented. The length of the 5+ fish varied between 17-1/4 inches and 21-1/2 inches. Scales exhibited a period of slow development, followed by an increase in growth rate,

but this increase is not clearly typical of an anadromous history. It may, instead, denote an adfluvial situation.

Copper River:

The Copper River originates in the mountains of the Aleutian Range close to the eastern side of the Alaskan Peninsula and directly south of Lake Iliamna's eastern end. The physical features of the watershed are described in the 1957 Annual Report of the Department of Fish and Game. The 36-foot waterfall located approximately 12 miles from the mouth marks the extent of anadromous access and also apparently limits the rainbow range in this river.

In the 1957 work, only slow-growing Dolly Varden were taken during 18 net hours, using a standard sampling net at the outlet of the river which drains Meadow Lake. Thirty fish were taken for a catch of 0.6 fish per hour. Length varied between 4-7/8 inches and 15-7/8 inches, with a mean length of 10-3/16 inches. Age ranged from three to eight years. This portion of Copper River watershed lying above the falls does not offer much to the angler at present nor are the prospects for future development encouraging.

The outlet of Copper River flows into the southeast portion of the lake. This area, which includes Kokhanok Bay, has many islands and possesses the shallowest average depth of the entire lake (Munn, 1963). The portion of the river below the falls is one of the key red salmon spawning areas of the Kvichak System (Horton and Olsen, 1962). Rainbow are present during all seasons of the year.

Scales were examined from eight fish taken in Intricate Bay during February, 1964, at a location known locally as "The Chutes." Patterns were, in general, similar to those already mentioned for Lower Talaric Creek fish, but growth appeared to be more rapid. Fish with five annuli ranged from 19 inches to 25-3/4 inches with a mean of 23-1/4 inches. The net used was of 4-1/2 inch mesh, 10 feet deep and 300 feet in length. The mesh size of this net may have biased the sample in favor of larger fish. Catch of rainbow trout per net-hour was 0.2 fish. The mature females were approaching spawning condition, with eggs loosely held in the skeins. Dolly Varden and round whitefish (*Prosopium cylindraceum*) were also taken in the sampling net catch.

Gibraltar Lake:

Gibraltar Lake lies south of Lake Iliamna near Kokhanok Bay. It is estimated to be about 3500 acres in

size. It enters Lake Iliamna near the village of Kokhanok via a stream of approximately four miles in length. The Gibraltar Lake watershed is well utilized as a red salmon spawning area. In addition to rainbow, lake trout, Dolly Varden and grayling are also present. Most angling takes place at the Gibraltar outlet, though the entire outlet stream offers excellent fishing. Because calm weather is necessary for a plane to land on Lake Iliamna, there is little effort exerted at the point where this stream enters Lake Iliamna.

Seven fish taken by hook and line on October 4, 1963 ranged from 17-1/2 inches to 23-1/2 inches.

Kokhanok Lakes:

The Kokhanok drainage lies just south of and parallel to the Copper River System. The character of the two lakes and the barriers which occur in the Kokhanok River are descirbed in the 1956 Annual Report of the Alaska Department of Fisheries. Angling success in both the river and lake does not compare favorably with that of other locations, though both rainbow and lake trout are readily taken by trolling. Sport pressure is almost nonexistent.

Rainbow trout predominated the catch during the 1956 survey, followed by lake trout and Dolly Varden. Grayling and round whitefish were also present. Growth of rainbow trout is slow (Table 2). Abundance of rainbow trout was greatest at the outlet of the lower lake but average length was greater in the upper lake (Table 3). Lake trout up to 13 pounds were taken.

Other Iliamna Streams:

Cottonwood and Belinda Creeks, on either side of Big Mountain on the south shore of Lake Iliamna, have been fished for about 10 years by persons associated with the construction and operation of the Distant Early Warning Line station at Big Mountain. No definite information is available on fishing pressure, composition or magnitude of the catch either in the past or at present.

Iliamna River at Iliamna's easterly extremity is reported to have a large population of Arctic char (Bower, 1925). Rainbow trout are reported infrequently from the eastern end of Lake Iliamna.

Lake Clark Area:

Very little information is available relative to the sport fishes of the Lake Clark Area. At one time

Table 2. Age and fork length (inches) of 38 rainbow trout taken from Kokhonak Lakes, Kvichak River watershed, September 24-27, 1956

No. of Annuli	Mean Length	Range	No. of Fish
2	6-15/16	6-1/2 - 6-3/4	2
3	8-11/16	7-1/8 -10-3/8	7
4	12	10-7/16-13-1/8	9
5	14-1/16	12-3/8 -15-3/16	18
6	15-3/4	15-3/4	2

Table 3. Abundance and fork length (inches) of rainbow trout taken from Kokhonak Lakes, Kvichak River watershed, September 24-27, 1956.

Location	No. of Fish	Net-Hours	Catch/Hr.	Range	Mean Length
Upper Lake:					
Mouth of Moose R.	14	15	.93	11-13/16-15-3/4	14
Lower Lake:					
Below rapids between lakes	16	21	.76	6-5/8-13-9/16	9-13/32
Outlet	39	12	3.25	5-3/4-15-1/2	10

a military recreation camp was located near the outlet of Lake Clark. Effort from this camp was centered primarily on the Tazimina River.

Lake trout weighing in excess of 40 pounds are reported to have been taken in Lake Clark.

The Chulitna River System, including Long Lake, is excellent pike water and fish of unusual size are reported.

Grayling, lake trout and Dolly Varden are found in Kejik Lake and its outlet stream.

Small sized grayling and Dolly Varden are present in the two Tazimina Lakes which lie above an impassable falls located about eight miles above the mouth of the Tazimina River. These fish may be taken with moderate success by angling in the stream joining the two lakes.

D. NUSHAGAK BAY WATERSHED:

The western boundary of the Nushagak Bay drainage extends from the shore of Bristol Bay northerly along the Wood River Mountains. A moderate height of land separates from the Kuskokwim watershed to the north. High mountains west of Lake Clark again provide a demarcation in the northeast section, but the divide which separates from the remainder of the Kvichak drainage ranges from moderate to low relief. A series of 13 major lakes with four separate outlets to the sea presses closely against the mountains along the full extent of the western boundary. Drainage from the north and east is by the Nushagak River and its tributaries, including the important Mulchatna River.

The sport fishing picture in this area is one of a potential only partly realized. Fishing pressures are confined to a few outstanding, more readily available sites. Numerous excellent waters are completely unutilized. At only one location, the Agulowak River in the Wood River Lake System, is a regular fishing effort encountered.

The following discussion considers these waters in a clockwise order, commencing at the southwest.

Igushik River Drainage:

This drainage includes two major lakes, Ualik and Amanka, and their tributaries. Ualik Lake, the upper lake,

is connected to Amanka by the Kathlene River, a stream some six miles in length. Amanka Lake is drained by the Igushik River itself. Though this river is over 60 miles long, muddy tidal waters extend within a few miles of the lake. Only that portion of the Igushik River immediately below Lake Amanka is suitable for angling.

The slight sport utilization is confined to the Amanka outlet and, occasionally the mouth of Kathlene River. All access is by float plane. Rainbow trout, Arctic char, Dolly Varden, grayling and silver salmon are available. The system is an important producer of red salmon.

Snake River Drainage:

Lake Nunavaugaluk is the only major lake in the Snake River drainage, although there is a small lake on Weary River, the Snake's only large tributary. Located between the Igushik and the Wood River drainages, Weary River and Lake Nunavaugaluk parallel each other, lying in a general northwest-southeast direction. Snake River resembles the Igushik in that the tidal influence approaches within a short distance of the lake.

No extensive investigation has been made of the sport fish in this area. It is seldom fished. Arctic char may be taken readily by angling at the Nunavaugaluk outlet. Ice fishing for this species is reported to be productive near the islands in the southeast portion of Nunavaugaluk and in the unnamed lake on Weary River.

Wood River Drainage:

The four major Wood River lakes, together with several smaller ones and many tributary streams, comprise one of the outstanding producing areas for both commercial and sport fish in the State of Alaska. They were described by Burgner (1962) as "deep, temperate, and typically oligotrophic."

Accessibility of the area has been improved by completion of a road between the village of Aleknagik, at the outlet of the first lake, and Dillingham, 24 miles distant at the mouth of Wood River. Small boat travel within the area has grown, though the more distant sites are still reached primarily by aircraft. While there is an abundance of excellent angling locations in the Wood River area, reaching these sites constitutes a

problem for the average person. It is prohibitively difficult or expensive to reach even those locations nearest Dillingham, except infrequently. Stocking of suitable small lakes accessible from the Dillingham-Aleknagik road would provide fishing for many who are now unable to travel farther.

Only one commercial facility, John Pearson's Wood River Wilderness Camps, is operated regularly. Headquarters for this camp is at the head of the Agulowak River between Lake Aleknagik and Lake Nerka.

Table 4 lists some of the outstanding fishing locations of the area, together with the dates of greatest availability for the most important species. Rainbow trout is the most popular fish of the area. Fishing success for rainbow is excellent during most of the season but is reduced somewhat in June during the high water following break-up and again in August when red salmon are present in large numbers. Creel census reports from the Wilderness Camps indicate that fishing success is highest during the second half of September.

Little detailed information on size has been obtained. Fish from the Agulowak and Agulukpak Rivers are usually larger than those taken at other sites. Seven rainbow taken from Wind River at the outlet of Lake Kulik during mid-August, 1956, averaged 14-3/4 inches in length, ranging from 10 inches to 17-1/4 inches. Examination of scales from the above fish showed three to six annuli.

Grayling are usually taken incidental to effort directed toward rainbow trout but may be caught any time after mid-June. Size ranges from 12 inches to 20 inches.

The abundance of Arctic char, particularly during the out-migration of red salmon smolt in June and July, attracts the attention of occasional anglers. Arctic char are generally ignored or taken incidental to the rainbow trout fishery. Length ranges from 14 inches to 30 inches with fish above 20 inches long being common.

Pike are found in weedy bays throughout the entire system. They are sought occasionally as a variation from the usual catch. Five pike taken from Lake Aleknagik by angling ranged from 14-3/8 inches to 26-1/8 inches with an average of 19-1/2 inches. A specimen 26 inches long which was taken by a subsistence net in January, 1964 was in its eighth year.

Table 4. Preferred fishing sites and periods of greatest catchability of major sport species in the Wood River System.

Location	Species	Dates	Catchability
Wood River below Lake Aleknagik	Rainbow	Aug. and Sept.	Fair to Good
	Grayling	mid-June to Sept.	Fair to Good
	Silver Salmon	August	Good
Mosquito Point, Lake Aleknagik	Arctic Char	June and July	Very Good
Outlet of Agulowak River	Arctic Char	June and July	Excellent
Head of Agulowak River	Rainbow	mid-Apr. to May, July, Sept. to mid-Oct.	Excellent
		June and August	Fair
	Grayling	mid-June to mid-Oct.	Excellent
	Arctic Char	April to September	Good
Lynx Creek, Lake Nerka	Rainbow	July to September	Good
	Grayling	July	Excellent
Little Togiak River, Lake Nerka	Rainbow	July to September	Fair
	Grayling	mid-June to July	Good
	Arctic Char	July to September	Good
Outlet of Agulukpak River	Arctic Char	June and July	Excellent
Head of Agulukpak River	Rainbow	April, July to mid-Oct.	Excellent
	Grayling	mid-June to September	Excellent
Peace River) Wind River) Grant River)	Rainbow	mid-June to September	Fair to Good
	Grayling	mid-June to September	Fair to Good

Nushagak River Drainage:

The Nushagak River drains the northern and eastern portions of the Nushagak Bay watershed. The six large lakes comprising the Tikchik Lake System discharge through the Nuyakuk River, entering the Nushagak River approximately 115 miles from its junction with Wood River at the head of Nushagak Bay. Above its confluence with the Nuyakuk, the upper Nushagak River drains the northcentral portion of the watershed. The Mulchatna River joins the Nushagak River 20 miles below the mouth of the Nuyakuk, draining the area's most northeasterly extension all the way to Twin and Turquoise Lakes, north of Lake Clark.

Tikchik Lakes and Nuyakuk River:

The Tikchik Lakes present an advancing degree of oligotrophic characteristics as both altitude and latitude increase. The most northerly lakes, Upnuk and Nishlik, do not drain through the Tikchik-Nuyakuk-Chauekuktuli-Chikuminuk chain but flow into the Tikchik River and thence into Tikchik Lake.

Red salmon utilize suitable beaches in Tikchik, Nuyakuk and Chauekuktuli Lakes, as well as spawning in the Tikchik River and the Nuyakuk-Chauekuktuli connection. The Allen River rapids evidently present an impassable barrier, as no salmon have been observed above them. The major portion of the Nushagak Bay pink salmon (O. gorbuscha) run spawns in the Nuyakuk and Tikchik River (Church, 1963).

Two fishing guides regularly operate in the Tikchik Lake area during restricted portions of the season. Other guides and individuals visit the system sporadically but total pressure is light.

Most sport fishing in the area is done at the Narrows between Nuyakuk and Tikchik Lakes, and near the first rapids in the Nuyakuk River below the outlet of Tikchik Lake. Large rainbow are taken at the latter site during September. At the Narrows, grayling and lake trout are usually available to casting gear. Rainbow trout are sometimes taken in this manner, but both rainbow and lake trout are more readily secured by trolling. Pike are available nearby.

Grayling are found throughout the entire system. Lake trout and Arctic char are present in all of the lakes. Rainbow trout are sometimes caught at the Chauekuktuli-Nuyakuk connection. None were found above the Allen River rapids during a reconnaissance of Chikuminuk Lake by the Bureau of Commercial Fisheries River Basin Studies group in August 1963.

Tilchik and Nuyakuk Lakes contain considerable quantities of humpback whitefish (Coregonus pidschian) which attain large size. These whitefish are not now utilized by a sport fishery. From late September through October, a spawning population of this species enters the Tikchik River. Samples taken in a 5-1/2 inch mesh gill net at the Narrows during mid-October ranged in length from 19-7/8 inches to 23-1/2 inches. Ages of these fish were between 11 and 15 years.

Nushagak and Mulchatna River:

With the exception of the steeper gradient of the uppermost extremity of the Mulchatna complex, the character of this drainage is quite uniform. Both main stems and tributaries meander through mature floodplains wooded with willow, spruce and birch and set among barren tundra uplands. Most tributaries are relatively fast moving, clear water streams but a few are sluggish and heavily colored by the influence of peat soil. The latter type of tributary is not suitable for most sport fish species.

Little entry is made into the area by anglers except at the mouths of the King Salmon, Koktuli, and Old Stuyahok Rivers and at the mouth of Portage Creek. Around the villages of Koliganek, Ekwok and New Stuyahok on the main Nushagak, sport species are taken by hook and line for subsistence purposes. Large rainbow trout have been observed to be taken indicentally in the net subsistence fishery for salmon at Ekwok. Such intermittent and far-spread effort has, as yet, had only an imperceptible effect on the resident fish populations of this extensive region.

The King Salmon, Koktuli, Iowithla, and Old Stuyahok Rivers, together with the upper Nushagak, have been sampled for resident species during August. Rainbow trout, grayling and Dolly Varden (including sea-run fish) have been found in abundance. Pike are present in side sloughs and other suitable waters.

Nine rainbow trout taken from the Old Stuyahok River in August, 1963 ranged from 9-1/4 inches to 20 inches in length with a mean of 15-1/4 inches. Six grayling from the same source ranged from 13 inches to 16 inches, with an average of 14-1/4 inches.

E. J. Cramer (letter) found lake trout in Turquoise and Twin Lakes during June of 1963. Lake trout are also

present in Okstukok and neighboring lakes of the Kokwok River drainage.

Anadromous species are also prominent throughout the entire system. The streams listed above as having been sampled for resident species have been found to be spawning areas for king salmon. Other streams shown by aerial surveys to be significant contributors to the total king spawning gravels of the system are the Klutispaw and Chichitnok Rivers, Old Man, Mosquito and Klutuk Creeks. The main Mulchatna River, between the mouths of Mosquito and Old Man Creeks, is also heavily utilized by spawning kings. Incidental observations indicate that distribution of spawning silver salmon is broadly similar to that of the kings. Chum salmon spawn most heavily in the main rivers and in the middle and lower portions of the suitable tributaries. Small concentrations of fluvial anadromous red salmon spawn in scattered but well defined locations in both main stream and tributaries. Numbers of these fish exceeded 20,000 in the 1961 aerial estimate (Church, 1963).

While Nushagak king salmon have been subject to a commercial fishery for 80 years, the first truly significant instance of sport utilization took place during 1963. John Pearson of the Wood River Wilderness Camps found angling success excellent at Portage Creek, about 30 miles from the mouth of the river. Beyond this point the gradient increases and the fish leave the tidal influence. Availability at this point is limited to a period extending approximately from June 15 to July 15, but it can be expected that this fishery will develop rapidly.

There is no evidence that the exploitation of this stock has reached an unhealthy level. The history of the commercial fishery for Nushagak Bay king salmon is discussed in the 1957 Annual Report of the Alaska Department of Fish and Game.

During the 30-year period from 1900 to 1930, the average annual catch was approximately 81,000 fish. The decline in the take of this species which occurred in the 1930's was produced by economic factors and was not related to the availability of fish.

Table 5 lists Nushagak Bay king and silver salmon catches for the years 1954-1963. Total utilization of kings in the last 10 years has only occasionally attained the level of the former long-term average. Surveys have shown that a reduced catch does not necessarily indicate a reduction in the number of returning spawners but that

availability to commercial gear may be influenced by other factors (Alaska Department of Fish and Game 1960). A direct correlation may exist between wind velocity and catch.

Table 5. Nushagak Bay king and silver salmon catches in numbers of fish, 1954 - 1963.*

Year	Numbers of Fish King Salmon	Silver Salmon
1954	38,045	20,423
1955	56,463	13,920
1956	57,441	53,999
1957	79,122	61,454
1958	87,245	127,088
1959	54,299	12,779
1960	81,416	13,457
1961	60,953	16,653
1962	61,283	28,418
1963	45,222	38,701

*Figures for 1954-1959 from Simpson, 1960; 1960-1962 from Statistical Division, Alaska Department of Fish and Game, unpublished reports; 1963 figures from Alaska Department of Fish and Game, 1963 Field Season Report, Bristol Bay Area, Commercial Fisheries Division, (preliminary, mimeographed).

Material related to Nushagak king salmon has been collected by Department personnel since 1956. While findings have been mentioned in Annual Reports of this Department, much of it has not been processed fully. A sizable body of raw information has been made available and study is being continued under this job description. Data from the sampling of the catch and escapement for sex ratio, age and length composition is included. Juveniles have also been collected at varying times and locations for early life history studies.

Sampling of the commercial catch is being continued through the cooperation of the Commercial Fisheries Division. Aerial and float surveys of important spawning areas are being continued in conjunction with the inventory and cataloging of resident fishes. Fingerling collection is also being continued.

During the winter of 1963-1964, fingerling salmon were collected in the vicinity of Koliganek and Ekwok on the main Nushagak River. The fish were taken by jigging through the ice in side sloughs. King salmon were present in the Ekwok collection but silver salmon were in the majority. The Koliganek samples contained only silver salmon.

Angling for silver salmon in this area is insignificant. The full magnitude of the resource remains to be discovered. Commercial catches are generally low (Table 5) but cannot be regarded as representative of the size of the population since major effort normally ceases prior to the passing of the entire run. Some indication of the potential may be seen in the catch of 127,088 fish in 1958 when late commercial effort was unusually heavy due to high availability of pink salmon.

No work has been directed specifically toward any phase of the life history of this race. Fingerlings appear to be abundant and smolts have been taken in quantity at Snag Point near Dillingham in mid-May (Alaska Department of Fish and Game, 1959). Most smolts migrate to sea after spending two winters in fresh water, but some remain for a third year.

E. EGEGIK RIVER WATERSHED:

Like Lake Iliamna, the Egegik drainage practically bisects the Alaska Peninsula. Becharof Lake, it major component, is the second-largest lake in Alaska. The King Salmon River enters the Egegik River near its mouth, draining the area between Becharof and Naknek watershed. All of the major Becharof tributaries are found at the eastern end of the lake. Most are clear-water streams with small individual watersheds. The Kejulik River, largest of these tributaries, is an exception because it is subject to greatly increased flows during periods of seasonal run-off and is often discolored by a burden of glacial silt.

The Becharof Lake area is an important and steady producer of red salmon. The other species of Pacific salmon are not found in quantity, although kings and chums utilize the King Salmon River.

There is no regular sport fishery in this watershed. Egegik residents occasionally fish for rainbow trout through the ice a short distance above the mouth

of the King Salmon River. They also occasionally take Dolly Varden below the rapids at the Becharof outlet. Grayling are present throughout the entire system. Rainbow trout are not reported except from the King Salmon River. Dolly Varden were observed in heavy concentrations in Becharof Creek on July 2, 1963. These were taken readily on hook and line and ranged from 14 inches to 20 inches in length. This indicates that the abundance reported by the Bureau of Fisheries from 1921 to 1925 is still present. Table 6 summarizes the annual catches made by a crew of 3 men engaged in predator control work during this period.

Table 6. Catch of trout from the Becharof Lake area by Bureau of Fisheries personnel, 1921 - 1925.*

Year	No. of Fish	Remarks
1921	7,621	"... practically all Dolly Varden." "...averaged 2-1/2 pounds each."
1922	10,063	"...all Dolly Vardens, averaging 4 pounds each."
1923	17,210	"...all Dolly Vardens." "...averaged 3 pounds ..."
1924	40,307	"...Dolly Varden trout averaging 1-1/2 pounds.."
1925	23,700	"...Dolly Varden trout averaging 1 pound each."

* Ward T. Bower, "Alaska Fisheries and Fur Seal Industries," U. S. Bureau of Fisheries Administrative Reports for the years 1922 - 1926. Washington, D. C.

F. UGASHIK RIVER WATERSHED:

The Ugashik Lakes lie directly south of Becharof Lake. As is the case with the Egegik System, most of the tributaries of the Ugashik Lakes originate in the mountains of the Aleutian Range within a few miles of the Peninsula's Pacific side. The Dog Salmon and King Salmon Rivers enter above the head of Ugashik Bay, draining additional areas south of the main lakes.

Mother Goose Lake lies at the head of King Salmon River; however, the Dog Salmon River System contains no important lakes. Slow-moving Dago Creek enters Ugashik Bay from the north, draining from the low hills and tundra south of Egegik Bay.

The Ugashik Lakes are important, though erratic, producers of red salmon. King and chum salmon spawn in the King Salmon River. Chum salmon are also found in the Dog Salmon River.

Little of a definite nature is known about any of the resident sport fish of the area. Grayling of unusually large size are found both at the Narrows between the Upper and Lower Ugashik Lakes and at the outlet of Lower Ugashik Lake. Grayling exceeding three pounds are frequently taken. Dolly Varden are also found at the Narrows, but it is the grayling fishery which is responsible for attracting most of the sport effort observed in the area. Total effort to date has not been great.

Lake trout are present in the lakes but seldom are taken by anglers. Rainbow trout were mentioned by Dennis Winn as being taken during predator control work in 1922 (Bower, 1923). Since I have never observed rainbow trout there nor found their presence reported by anyone acquainted with the area, Winn's reference to this species is thought to be in error.

A tundra lake east of the village of Ugashik contains a population of self-reproducing silver salmon which are now landlocked. Two specimens collected by hook and line in mid-November, 1958 measured 9-5/8 inches and 11-1/4 inches, respectively. The latter specimen was a female with a number of retained eggs. These fish are regularly taken on hook and line through the ice during the winter months by residents of Ugashik village.

G. TOGIAK BAY WATERSHEDS:

Togiak River Drainage:

Togiak River is the largest and most important of the several major streams entering Togiak Bay. It has its principal source in Upper and Lower Togiak Lakes. A generally southwesterly course is followed to enter salt water at the head of Togiak Bay near the village of Togiak. Several tributaries enter the main river, radiating to the periphery of the watershed in a regular, branch-like fashion. Each major branch contains a lake in its headwater area.

Like other Bristol Bay watersheds, the Togiak System is a strong producer of red salmon. It is also noteworthy for its large population of chum salmon, which occasionally outnumber red salmon in the commercial catch (Simpson, 1960). Kings and silvers are also present but commercial operations have not regularly extended over the full period of the runs. Commercial catches are therefore not indicative of the population levels ot these latter two species.

Little sampling of resident sport species has been accomplished, but rainbow trout, lake trout, Dolly Varden and grayling have been taken at varying locations. Utilization of these species for sport purposes has been nonexistent until very recently. Discovery during 1963 of large rainbow trout at the outlets of Gechiak and Pungokepuk Lakes promises rapid development of fly-in fishing at these locations.

The following discussion considers the lakes and streams of the Togiak System in clockwise order, beginning at the southwest.

Gechiak Lake is the largest of several small lakes drained by Gechiak Creek. It is an irregular-shaped body of water nearly 3 miles in length. Red salmon spawn in quantity both in the lake and its tributary streams. Chum salmon are prominent throughout the system during the spawning season also. Silver salmon are available below the outlet of the lake during the latter half of August. Rainbow are present in the system and excellent success has been experienced during August and September. Dolly Varden may be taken here, also.

Kashiak River originates from Nagugun Lake, a deep, extremely oligotrophic lake lying amid the Ahklun Mountains which separate the Bristol Bay and lower Kuskokwim drainages. Nagugun Lake is not accessible to anadromous species because of a waterfall in the Kashiak River. The height of this falls has been estimated during an aerial survey at 15 feet. Chum, king and silver salmon have been observed spawning in the area downstream from this falls. Sampling with hook and line at the outlet of Nagugun Lake in mid-June, 1959 gave no indication of the presence of sport fishes.

The east fork of the Narogurum River drains Nenevok Lake which lies to the west of Togiak Lake at an altitude of over 1000 feet. Although the East Fork has a very steep gradient, small numbers of red salmon have been observed to

reach the lake. Lake trout which had been feeding heavily on red salmon smolts were readily taken by angling at the outlet of this lake during mid-June, 1959. Average length was about 20 inches.

High Lake is the northernmost body of water in the Togiak System. Its outlet stream joins with Trail Creek, which is a tributary of the connecting river between Togiak and Upper Togiak Lakes. A high waterfall at the confluence of its outlet stream and Trail Creek prevents anadromous access. This lake has not been sampled.

Dolly Varden and grayling are present in Upper and Lower Togiak Lakes.

Ongivinuk Lake lies at the western foot of the Wood River Mountains between Togiak Lake and the western end of Lake Nerka of the Wood River group. It is accessible to anadromous species. Dolly Varden were taken readily at both its inlet and outlet streams in mid-June of 1959. Chum and silver salmon are reported from the Ongivinuk River.

Pungokepuk Lake lies at the foot of the hills of the eastern edge of the Togiak River valley. It is five miles in length and from one-half to one mile in irregular width. The flow of Pungokepuk Creek, which drains it, is limited. Little use is made of the area by spawning red salmon. The first reported use by sport anglers was in 1963, when parties from John Pearson's Wood River Wilderness Camps found large rainbow available at the outlet. Length of these fish ranged between 22 inches and 31 inches. Scales from four fish between 26-1/2 inches and 28 inches in length showed five and six annuli. The entire growth was apparently accomplished in fresh water.

Other Togiak Bay Rivers:

Only aerial reconnaissance has been made of the other Togiak Bay rivers. On occasion these streams have been included in the salmon spawning surveys conducted by the Department. Little is known of the resident sport fish populations.

The Kulukak River originates in the hills west of the Snake and Igushik Systems. It flows southward, entering at the head of Kulukak Bay, an inlet at the western base of the Nushagak Peninsula. The system contains several small lakes, only one of which, Kulukak Lake, appears to be productive. All species of Pacific salmon are found in this system, including good numbers of kings. Dolly Varden are also present.

The Quigmy, Matogak and Osviak Rivers originate in the hills between Togiak and Goodnews Bay, and flow south to enter Togiak Bay along its western shore. They are relatively short, meandering lowland streams with no lakes of importance included in their systems. Chums predominate among the species of Pacific salmon present.

Minor streams such as Slug River, Ungalukthluk River and the Hagemeister Island streams are similar in character to the preceding. They are also excellent producers of chum salmon for their size.

H. KUSKOKWIM BAY DRAINAGES:

Observations by the writer in this area have been confined to the Goodnews and Kanektok Rivers, which flow southwest and west, respectively, from the Ahklun Mountains to enter Kuskokwim Bay between Cape Newenham and the mouth of the Kuskokwim River. Utilization of sport species is, as yet, almost totally confined to subsistence catches by local residents, though a small-scale commercial salmon fishery operated at the mouth of the Kanektok in 1960.

All species of Pacific salmon are present in the Kanektok River in quantity. Red salmon spawn in Kagati Lake, at the head of the river, in a concentration which sometimes exceeds 100,000 fish. Lake trout are also present in Kagati Lake and are readily taken on casting gear at the outlet during the salmon smolt migration. Grayling, rainbow trout and Dolly Varden are readily available to angling in the middle and lower portions of the river. Judging by the numbers of fish of all species which have been observed, productivity of this river seems unusually high.

The three forks of the Goodnews River combine to make a joint entry into salt water at the head of Goodnews Bay. Goodnews Lake is situated at the head of the main river, or North Fork. The Middle Fork branches twice to drain three lakes, one of which lies at the head of each branch. Only the South Fork does not include a lake. All of the above lakes are under four miles in length.

Spawning populations of red salmon have been observed in Goodnews Lake and Kukaktlim Lake. The latter is the largest of the three Middle Fork lakes. Chum, king and silver salmon have been observed in all three forks of the system. All are present in good

numbers but chums predominate.

Lake trout and sea-run Dolly Varden were found to be available to casting gear during mid-August, 1959 at the inlet to Goodnews Lake. The sea-run Dolly Varden were ready to spawn at this date. Large numbers of this species were also observed at this time in the river below the lake.

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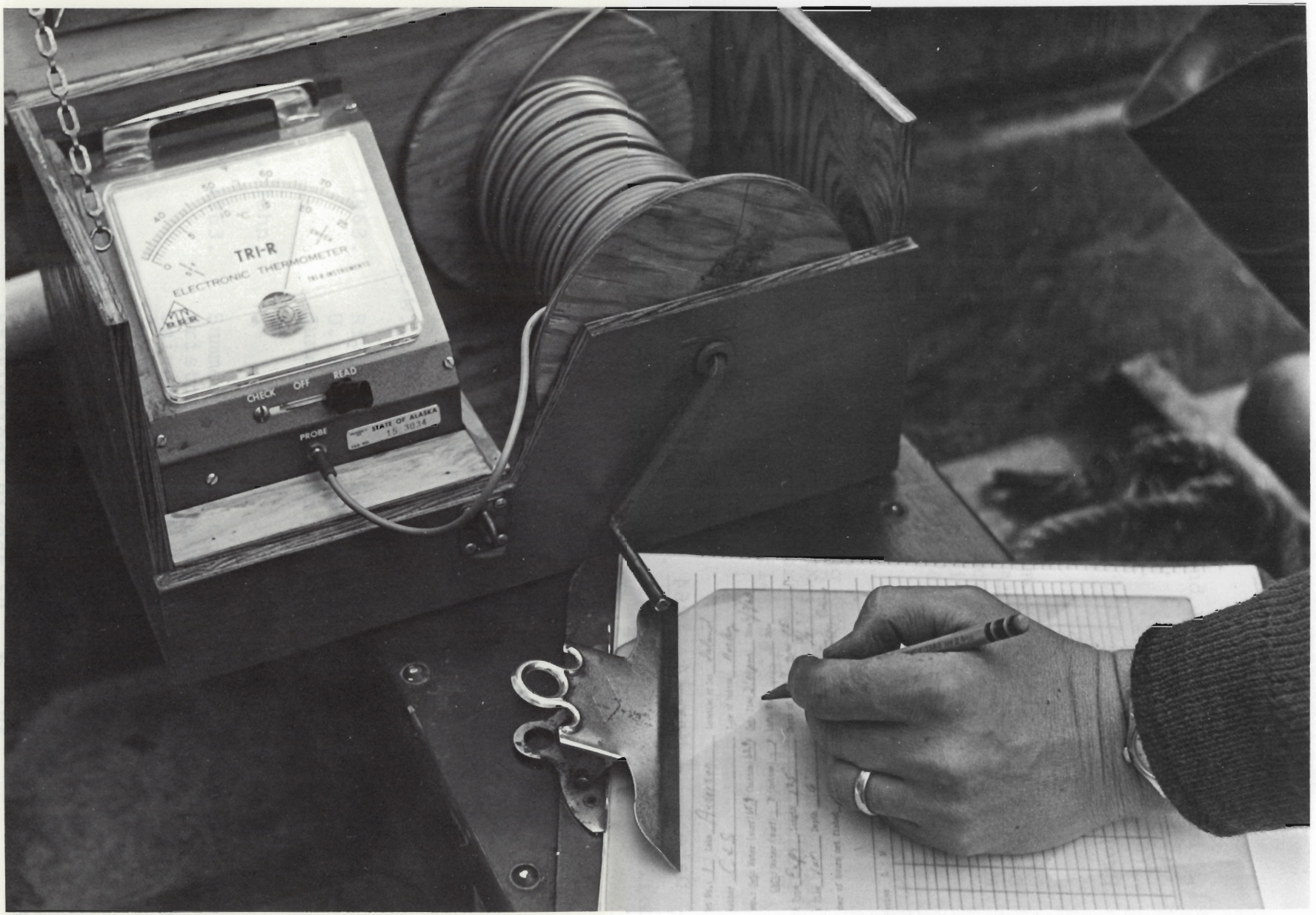

Portable equipment of this type help biologists gather accurate limnological information.