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STATE OF ALASKA

William A. Egan, Governor

ANNUAL REPORT OF PROGRESS, 1964 - 1965

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

SPORT FISH INVESTIGATIONS OF ALASKA

ALASKA DEPARTMENT OF FISH AND GAME
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INTRODUCTION

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

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

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

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

Volume 6 Report No. 12-C

JOB COMPLETION REPORT

RESEARCH PROJECT SEGMENT

STATE: ALASKA Name: Sport Fish Investigations of Alaska.

Project No: F-5-R-6 Title: Investigation of Sport Fish Populations in Selected Western Alaska Lakes.

Job No: 12-C

Period Covered: July 1, 1964 to May 31, 1965.

ABSTRACT

Observations were centered on the rainbow trout populations of Lower Talarik Creek and the Kvichak River. The pressure from commercial, subsistence and sport effort is capable of injuring the trophy status of these populations. At the present time, fish 28 to 30 inches long are still commonly taken by sportsmen.

Mature fish may be classified in two categories according to external characteristics. It is postulated that the bright, silvery fish are leaving Lake Iliamna to enter the stream for eventual spawning, while the more highly-colored specimens are fish that have been in the fluvial environment for some time. Peaks of availability occur in both the spring and fall and are thought to represent migrational movements. Spawning evidently extends over a long period of time and may possibly have two distinct peaks, one in the late fall or early winter and another in the spring.

Collected material has not yet been fully examined. Age determination from scale patterns presents problems requiring further detailed study. Length at a given age is extremely variable, because of the difference in the ages of rapid growth. The increase in growth rate is thought to indicate movement to the lacustrine environment from the nursery stream. This may occur from 2 to 4 years of age, though in some cases the rate of change may be slight or absent. A 26-inch fish is usually 6 to 8 years old.

Tag recoveries show that fall migrants into Lower Talarik Creek are vulnerable to the sport fishery for an extended period. The number of tag returns from the Kvichak River to date, in view of the limited effort that has occurred since tagging, suggests a limited population size.

RECOMMENDATIONS

1. Study of the trophy stocks of rainbow trout in the Kvichak watershed should continue. Materials collected during 1964 should receive more complete analysis.

2. Numbers of rainbow trout should be tagged to give further information on range, movement and growth.

3. A definitive study of rainbow trout scale growth patterns should be undertaken to clarify presently confusing characteristics, provide adequate criteria for reliable age determination and ascertain whether racial differences in rate of growth may exist.

4. A parameter of the numerical size of the population in areas subject to intensive fishing pressure should be obtained. An estimate of total take by sport, commercial and subsistence effort should be calculated. Lower Talarik Creek and the Igiugig-Kaskanak Flats area are recommended for immediate attention.

5. Permits for commercial fishing should include restrictions on winter and spring effort near the mouths of rivers and streams containing spawning populations of rainbow trout. Future developments of the commercial fishery should be observed closely and adequate protective measures should be recommended.

6. The need for regulatory measures adequate to preserve the trophy status of these fish should be given immediate attention.

OBJECTIVES

1. To determine the present status of stocks of sport fish which are or may be affected by existing or potential commercial fisheries; and to assess the immediate and potential long-term effects upon these stocks by such a fishery.

2. To assess the environmental characteristics of the habitats concerned with the production of the sport fish species involved.

TECHNIQUES USED

Fish were sampled from (1) commercial and subsistence catches, (2) by Sport Fish Division personnel using hook and line, seine and gillnet, and (3) during creel census contacts. Juvenile trout were collected from shallow water in the Talarik Creek area with a small-mesh seine.

Aerial surveys of rainbow trout in the Lower Talarik Creek watershed were made from Cessna 180 and Piper Super-Cub aircraft.

Scale readings by Sport Fish Division personnel were made with a low-power binocular microscope both from original scales and plastic impressions.

Rainbow trout gonads were weighed after preservation in 10 percent formalin.

Rainbow trout were tagged with 5/8-inch red Pedersen disc-type tags located immediately anterior of the dorsal fin. Larger concentrations of fish obtained by seining were anaesthetized with tricaine methanesulfonate (MS-222 Sandoz). Fish taken with hook and line were usually tagged without chemical immobilization.

Use is made of material collected prior to the initial date of this project segment.

FINDINGS

Study actually commenced with observations of commercial fishing activities in the Lake Iliamna-Lake Clark watersheds early in 1964. It soon became apparent that any attempt by Sport Fish Division personnel to study more

than a restricted portion of the entire problem would be an impossibility because of a limited staff and previous commitments. The decision was made to concentrate efforts on the rainbow trout populations in one or two important locations where effort in keeping with the Division's present capabilities could be expected to yield results offering promise of wider application. Subsequent efforts centered primarily around Lower Talarik Creek and the Igiugig-Kaskanak Flats area.

Occurrence of Rainbow Trout in the Subsistence and Commercial Fisheries

A subsistence fishery by local residents in which rainbow trout have figured prominently has long been a regular feature near many villages of the Kvichak watershed. Both hook and line and gillnets are employed. Rainbows may be the specific goal of such efforts or they may be only one of several contributing species. This fishery extends throughout the year though it naturally is concentrated at times at locations of abundance.

In the Igiugig area, nets are placed in the Kvichak River immediately after the ice leaves the lake in the spring and they remain there until freezing weather renders them ineffective in the fall. The number of nets fished varies from year to year. In 1964, seven nets were observed. Only two or three of these were placed where an appreciable number of rainbow trout were likely to be taken. Most of the catch of rainbow trout by this method is believed to occur during June, September and October.

In the vicinity of Newhalen and Iliamna villages nets are placed beneath the ice during the winter, as well as fished during the ice-free period. Rainbow are largely incidental to char and lake trout except during the spring and fall. In the spring specific efforts are often made to catch spawning fish at the mouths of streams or rivers. Forays may be made to productive sites at some distance, such as Lower Talarik Creek. Either nets or hook and line may be used, depending upon prevailing local conditions. On such occasions the take of mature rainbow trout from concentrated and vulnerable populations may be very high. Fishing through the ice with hook and line is a common method in the Newhalen River, where Dolly Varden occur commonly in the catch, and at Levelock on the lower Kvichak River, where an early spring fishery takes little except rainbow

trout. Rainbow trout are reported to be uncommon in the eastern Lake Iliamna area and are rarely taken at the village of Pedro Bay. This situation is said to exist at Nondalton on Six Mile Lake below Lake Clark.

Rainbow trout taken in the subsistence fishery are used both fresh and dried for human consumption and food for sled dogs.

Commercial fishing methods commenced as an expansion of customary subsistence practices. To a large extent, the same individuals began fishing in familiar nearby locations with an increased quantity of gear and gradually extended their operations into adjoining waters. The greatest degree of commercial success was found in the Lake Clark-Six Mile Lake area. Rainbow were reported to be seldom taken, though no staff observations have been made to verify this. In the vicinity of Newhalen and Iliamna villages, rainbow trout were taken both during spring and fall operations. Fishing with nets near creek or river mouths in April and May may pose a serious threat to the welfare of the run of this species to the nearby stream.

Effort in Intricate Bay, off the mouth of the Copper River, during March, April and May, 1964 consistently produced a high percentage of rainbow trout in the catch. On at least two occasions observed by Sport Fish Division personnel, large rainbow trout outnumbered commercial species (mostly Dolly Varden/Arctic char) by an approximate ratio of three to one. Detailed records are on file in the Dillingham office.

Sport Fishing for Rainbow Trout in the Kvichak Drainage

The sport fishery of the area is discussed briefly by Paddock (1964). Current comment should emphasize the continuing increase in effort stemming from the heightened public awareness of the outstanding trophy status of these fish. The Kvichak River at Igiugig, Newhalen and Copper Rivers and Lower Talarik Creek all support sport fisheries which have proved, upon investigation, to be much more intensive than formerly supposed.

Further study is necessary before basic considerations of these fisheries can be firmly documented. The following discussion lists preliminary assumptions from early observations and suggests avenues for future investigation.

Observations at Lower Talarik Creek

Observations at Lower Talarik Creek during the fall of 1964 and spring of 1965 suggest a heavy movement into the stream from Lake Iliamna commencing during the latter part of August and continuing at least into late September. Large schools form in the lagoon and outlet stream during this period. These fish are characterized by a bright, silvery appearance with few dark spots, if any, below the lateral line, pink side stripe faint, and bluish coloration on the back with the black markings subdued.

A few specimens that more nearly resembled the usual rainbow coloration were taken from the stream area above the lagoon and lakes at the head of the west fork. The pink side stripe was darker and extended to the operculum. Black spots were numerous below the lateral line and the back was greenish with more prominent and numerous markings.

In mid-October the concentrations in the lagoon had dispersed somewhat and no additional recruitment from Lake Iliamna was indicated. Fish were spread out in apparent spawning array throughout the east fork and numbers were seen at various locations in the spring-fed lakes of the west fork. An aerial count tallied approximately 400 fish.

No further observations were carried out until mid-April of 1965. At this time about 300 fish were estimated by aerial survey. All were schooled in the lagoon and in the lakes at the head of the two forks. Only four fish were seen in the stream itself. None were observed in the outlet of the lagoon. Most fish sampled at the lagoon were ready to spawn but a few were immature. The former were in typical spawning coloration while the immature fish were bright. Limited sampling with hook and line in the lake at the head of the west fork produced two spent fish, one with newly developing ova, some of which had already reached a diameter of approximately 1.0 to 1.5 mm. This would indicate that considerable time had elapsed since completion of spawning.

A survey of the area in late May 1965 showed an almost complete absence of schooled fish in the lagoon and lakes. Paired fish were again observed throughout the east fork. No numerical estimate was possible due to poor visibility. All specimens sampled were found to be spawned out. The dark coloration associated with spawning was rapidly being lost and the presence of these fish in the outlet stream suggests that they may be dropping back into Lake Iliamna at this time.

The most intense sport fishery at Talarik Creek occurs from the latter part of August until weather discourages further effort in late October. Fourteen days were spent at this site by Sport Fish Division personnel during this period.

Though accessible only to float planes, it was unusual for a day to pass without a visit from one or more fishing parties. Most of these are either guests of the NCA "Anglers Paradise" Camps or of other guides, or residents of the Anchorage area. Most guides encourage the release of all fish not wanted for trophy purposes, but many residents retain all fish possible.

Visits to Talarik Creek are difficult during the spring after the ice of the lagoon becomes unsafe for landing. Occasional anglers with large tires on their aircraft do land on the beach, however.

Observations on the Kvichak River

The dates of the fall peak of abundance normally parallel those mentioned for Talarik Creek. The spring fishery usually commences in April and continues with wide variation in both success and effort into June. The peak of availability seems to center about mid-June. The decrease in abundance of larger fish seems to coincide with the arrival of migrating adult red salmon (Oncorhynchus nerka) and continues until late August. Despite this reduction in both individual size and catch per hour (Paddock, 1965), substantial fishing effort is still exerted.

Many anglers are content to fish from shore at the outlet of Lake Iliamna, but others arrange boat transportation to locations downriver between Igiugig and the lower end of Kaskanak Flats. While "holes" near the outlets of Peck's Creek and Ole's Creek are favored locations, trout may be taken from many of the area's numerous islands and gravel bars.

Occasional parties fly into "The Rock," an eddy about 25 miles downstream from Igiugig, where excellent success may often be found even during the summer slump.

Sampling of several locations throughout the length of the river during September of 1964 confirmed that rainbow trout may be taken throughout the length of the river. Outstanding success was experienced at an unlikely looking location at the mouth of a tidal slough on the east bank of the Kvichak River 11 miles above Levelock.

As at Lower Talarik Creek, most Kvichak River rainbow trout may be divided visually into two categories during the fall season. The fishery at the outlet of Lake Iliamna is supported by bright, silvery fish. In the Kaskanak Flat area these are commonly intermixed with the darker, more highly-colored specimens.

Sampling in the Kvichak River from April to June was not as intensive as in the fall, but bright fish appear to predominate at the outlet. At Peck's Creek, Ole's Creek and the

adjoining areas, bright fish are taken together with dark fish which are spawning during the current season.

It is presently thought that rainbow trout may enter the Kvichak River from Lake Iliamna both in the spring and fall months. Those coming into the river in the spring as bright fish may subsequently take on the pink coloration and more intense spotting characteristic of most stream-resident rainbow trout. Bright fish taken in the fall may also be leaving the lake to spawn in the Kvichak River. The possibility that a race of river-resident fish may exist must also be considered.

The author's examination of samples taken during the summer and winter has been limited, so these hypotheses require further substantiation.

Size Composition of the Sport Catch

Table 1 lists information on the size composition of the sport catch by month for both the Igiugig-Kaskanak Flats and Lower Talarik Creek areas. Small fish appear frequently in the take although these are usually not "counted" or reported by anglers in discussions of their fishing success. These appear prominently here inasmuch as most of the sample was obtained by or under the immediate scrutiny of Sport Fish Division personnel.

Examination of a total of 166 fish from these two areas under discussion revealed that 87 were females and 79 were males. This does not differ appreciably from the expected 1:1 ratio in a sample of this size. For fish above 20 inches in length, a length-weight relationship as shown in Table 2 may be considered average.

Age and Growth Rate of Kvichak Watershed Rainbow Trout

Age interpretation from examination of scales requires further detailed study before reliable parameters may be determined. Approximately 700 scales from rainbow trout of all sizes were collected during 1964. Plastic impressions have been made of about 650 of these through the courtesy of the Fisheries Research Institute. Inspection by members of that agency reveals a very low rate of agreement between readers (O. E. Kerns, personal correspondence), indicating the need for a definitive study of growth rates and scale patterns. Only preliminary attention has yet been directed toward this group of scales by Department personnel but some general observations may be reported.

Early growth patterns have been clarified by study of scales from 42 zero-age fish collected at Lower Talarik Creek on October 9, 1964. Counts of the maximum number of circuli

TABLE 1. - Size Composition of Rainbow Trout in the 1964 Sport Catch at the Igiugig-Kaskanak Flat and Lower Talarik Creek Areas by Month

Period	No. in Sample	Range	Mean Length	Percent of Sample 20" Long or Over
Igiugig-Kaskanak Flats:				
May-June *	25	14.0 -29.5	24.04	88
July	71	10.5 -29.5	18.15	32
August	69	9.0 -27.75	16.01	26
September	40	10.125-28.0	18.98	45
October *	29	12.125-31.0	21.24	69
Talarik Creek:**				
September	82	8.00 -28.75	17.81	48
October	19	9.50 -28.25	19.47	58

* Largely from voluntary creel census information; may be biased by non-reporting of small fish.

** Includes only fish taken below the fork of the creek.

TABLE 2. - Length-Weight Relationship of Kvichak Watershed Rainbow Trout Between 20 and 28 Inches in Length, by 2-Inch Increments

Length in Inches	Weight in Pounds and Ounces
20	3 - 14
22	4 - 7
24	5 - 6
26	6 - 14
28	8 - 8

present at that time permit reliable inference of the location of the first annulus on scales from older fish. Fork length (measured after preservation in formalin) ranged from 36 to 70 millimeters. Circuli counts varied from 4 to 10. A pronounced mode occurred at 5 circuli and an average length of 44 millimeters. The wide variation in total body size suggests a prolonged period of emergence from the spawning gravels.

Young of the year were common along the margin of the lagoon and outlet stream and in side channels of the creek itself. Sampling of the East Fork with hook and line during September produced large numbers of juveniles between 5 inches and 12 inches in length. Two-check fish averaged approximately 5 inches, while three-check specimens were grouped having a mean of 7.9 inches. Fish in this portion of the stream having 4 annuli on this date ranged from 10.25 inches to 13.5 inches.

Following the second to fourth winter, an acceleration in the growth rate normally occurs. This may vary widely in extent but is usually associated with a marked increase in length. Individuals with four annuli exhibiting such increased growth may attain a length of 23 inches or more, compared with approximately 12 inches for those lacking it.

Larger fish at both Lower Talarik Creek and Igiugig commonly display from 2 to 6 of the more widely spaced annuli in addition to the tighter nuclear checks. A 25-inch rainbow trout may vary from 5 to 9 years of age. Determination of average age at return and age-length means awaits further analysis of the collected material.

It may be postulated that much of the advance in growth rate is explained by the shift from the stream environment to the waters of Lake Iliamna. Changes in feeding habits associated with increased size may also be responsible for producing a similar effect in the case of some Kvichak watershed populations.

Maturation

Preliminary review of gonad weights tabulated from over 100 specimens collected in September and October at Lower Talarik Creek and the Igiugig area show that the onset of sexual maturation seldom occurs in females before reaching a length of 17 inches, while development may sometimes begin in males prior to attaining a 12 inch length. Degree of gonad maturation in relation to length displays a broad latitude at any given date. Some adult fish apparently do not spawn annually.

Tagging of Rainbow Trout and Discussion of Recoveries

Lower Talarik Creek

Rainbow trout were tagged in three localities of the Kvichak watershed during September and October of 1964. Tags were placed on 77 fish in the Lower Talarik Creek area. At Igiugig and Kaskanak Flats an additional 15 trout were marked; 18 fish in the lower Kvichak River shortly above Levelock were included completing the applications for the season. Detailed information is available at the Dillingham Sport Fish office.

Two recoveries from the Talarik tagging have been reported to date. One 25-inch fish, originally captured on September 7, 1964 by seining in the stream mouth, was released into Lake Iliamna and taken again in a commercial net near Ten Mile Island only 9 days later. Distance between these two points is approximately 20 miles. It is possible that the removal of the fish from the waters of the creek and return to Lake Iliamna may be cause for aberrant behavior. It cannot be conclusively confirmed, therefore, that maturing rainbow trout commonly enter the mouth of this stream enroute to other destinations or on an experimental basis before they are actually ready to return for spawning.

Another fish, tagged below the lagoon on the same date, was recaptured three weeks later just above the lagoon. Several sightings of marked fish in the lagoon and outlet stream area over a month after tagging indicates that some fish may remain in this area for an extended period.

One tagged fish was observed on April 15, 1965 in a large school at the outlet of the lagoon. It is not known, on the basis of this sighting, whether it may have wintered in Talarik Creek or its headwater lakes or have returned to Lake Iliamna and re-entered the creek again in the spring.

Igiugig-Kaskanak Flats Area

Two returns have been received from the September work at Igiugig. A 24-7/8-inch rainbow trout, bright and silvery when tagged at Peck's Creek, was found to be ready to spawn when recaptured at Ole's Creek 7 months later in mid-April of 1965. The distance between these two points is less than three miles.

A 15-inch fish tagged at the outlet of Lake Iliamna on September 13, 1964 was reportedly recovered at the Lake camp at the outlet of Naknek Lake on April 27, 1965. Since this migration represents such a radical departure from other movements indicated by tag returns, it was checked thoroughly and must be tentatively accepted as authentic.

Lower Kvichak River

From the 18 fish tagged at the mouth of a tidal slough on the Kvichak River 11 miles above the village of Levelock on September 10 and 11, 1964 three returns have already been received. All these came from the local hook-and-line subsistence fishery. Two fish were taken near "The Rock," about 10 miles upstream, within three weeks of tagging. The third was taken in late March 1965 about six miles downstream from the tagging point.

In view of the limited effort expended since the dates of tagging, the number of returns received to date lends support to the view that some of these stocks may be of restricted magnitude. Since no reward is offered for return of tags, such returns may also be expected to lag behind actual recoveries.

Occurrence of Other Species

A number of other species have been taken incidentally during efforts directed primarily toward rainbow trout.

Grayling (*Thymallus arcticus*) are commonly taken on sport gear in Lower Talarik Creek and in the Kvichak River. Length of the incidental specimens measured during this study ranged up to 17 inches. Zero-age grayling were found to be abundant in riffles and side channels of Lower Talarik Creek during October. Twenty-one young of the year were included in the catch of a small-mesh seine at that time. Length ranged from 57 to 85 millimeters.

Dolly Varden/Arctic char (*Salvelinus sp.*) are common in the sport fishery at Igiugig. They also form the bulk of the commercial catch in those portions of Lake Iliamna explored by the commercial fishery to date.

Long-nose suckers (*Catostomus catostomus*) were taken in sampling nets in Lake Iliamna near Igiugig, throughout the Kvichak River, and in the lagoon at Lower Talarik Creek. Lengths ranged from 6.75 inches to 21.0 inches. Juvenile young of the year were also found in the lagoon at Talarik Creek, where they were obtained during hand-seining operations.

Pike (*Esox lucius*) were taken in sampling nets at the Lower Talarik Creek lagoon and in typical pike habitat throughout the Kvichak River. Lengths varied between 17.5 inches and 32.75 inches.

Round whitefish (*Prosopium cylindraceum*) occurred in sampling net catches at all locations. They were found to be especially numerous in Lake Iliamna near Igiugig in October.

Mature humpbacked whitefish (Coregonus pidschian) were also taken in the Igiugig vicinity, both in the lake and river, during October. This species reportedly spawns in the Kaskanak Flat area about the time of freeze-up in late October and November. Apparently they begin to enter the river from the lake shortly before that time. Maturing fish sampled during October were between 18.0 and 22.25 inches long. Smaller immature fish were also taken, ranging down to 10.25 inches in length. These smaller specimens evidently occur throughout the length of the Kvichak River during much of the year, as some were collected in the lower portions in September.

Lake trout (S. namaycush) were taken in a standard variable-mesh sampling net set in Lake Iliamna about one mile from its outlet at Igiugig in mid-October. One overnight set in 25 feet of water produced 13 lake trout between 18 inches and 23 inches long. All were males. Since these fish were confined to the two larger meshes, this represents an effort by only 50 feet of net. This set also produced 56 Least Cisco (Coregonus sardinella).

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Brook trout, an introduced species, can be found in several lakes in Southeast Alaska.