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STATE OF ALASKA

Walter J. Hickel, Governor

ANNUAL REPORT OF PROGRESS, 1966 - 1967

FEDERAL AID IN FISH RESTORATION PROJECT F-5-R-8

SPORT FISH INVESTIGATIONS OF ALASKA

ALASKA DEPARTMENT OF FISH AND GAME
Urban C. Nelson, Commissioner

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INTRODUCTION

This report of progress consists of findings and work accomplished under the State of Alaska Federal Aid In Fish Restoration Project F-5-R-8, "Sport Fish Investigations of Alaska."

The project during this report period is composed of 20 separate studies. Some are specific to certain areas, species or fisheries, while others deal with a common need for information. Each job has been developed to meet the needs of various aspects of the State's recreational fishery resource. Seven jobs are designed to pursue the cataloging and inventory of the numerous State waters. These are divided into logical utilization areas and are jobs of a continuing nature. It will be many years before an index of the potential recreational fishing waters is completed. Six jobs are directed toward specific sport fish studies. These include special efforts toward the anadromous Dolly Varden of Southeastern Alaska, silver salmon in Resurrection Bay, king salmon stocks on the lower Kenai Peninsula, king and other salmon stocks in Upper Cook Inlet, and Arctic grayling and sheefish in Interior Alaska. Special reports have been prepared on specific phases of the Dolly Varden life history and appear in the Department's special "Research Report" series.

The Statewide access evaluation remains one of the most important jobs conducted under this Federal Aid Program. It provides the Department with a tool to recommend withdrawal of suitable access sites on potential recreational fisheries throughout the State.

The remaining jobs include creel census efforts on specific fisheries in high use areas of the State, an egg-take program directed toward locating suitable indigenous stocks, perfecting advanced techniques in taking, handling and rearing species that are not normally associated with standard fish cultural practices, and continuation of the evaluation of the Fire Lake System.

The material contained in this report is often fragmentary in nature. The findings, evaluations and interpretations contained herein are subject to re-evaluation as the work progresses and additional data are collected.

Volume 8 Report No. 14-A

RESEARCH PROJECT SEGMENT

STATE. ALASKA Name: Sport Fish Investigations of Alaska.

Project No: F-5-R-8 Title: Inventory and Cataloging of Sport Fish Waters of the Copper River and Prince William Sound Drainage, and the Upper Susitna River.

Job No: 14-A

Period Covered: March 16, 1966 to March 15, 1967

ABSTRACT

Sixty-five lakes were investigated to determine their present and future sport fishery potentials.

Studies were conducted on grayling, Thymallus arcticus, in the Tolsona-Moose Lake complex and on lake trout, Salvelinus namaycush, in Susitna Lake. Emphasis was placed on spawning studies. Experimental egg takes were conducted during early May with grayling, and during mid-September with lake trout. Approximately 1,262,000 grayling eggs and 69,000 lake trout eggs were obtained for experimental hatching and rearing.

Assistance was provided access biologists in selecting and assessing sites for withdrawal during the course of field investigations.

Two canoe trips were made down the Gulkana River as a continuation of preliminary surveys and population sampling in that drainage.

Assistance relating to fish management needs was provided to the Alaska Department of Highways during road construction projects, and during planning of proposed highway projects in the work project area.

RECOMMENDATIONS

1. It is recommended that the present job objectives be continued with expansion of cataloging and inventory surveys of remote, fly-in waters in the job area.

2. Grayling egg take investigations in the Moose Lake-Tolsona Lake drainage should be expanded to determine migratory patterns, mortality rates, age and growth studies, and enumeration of mature grayling within this closed system.

3. It is recommended that lake trout egg taking investigations be discontinued.

4. An intensive program should be pursued to locate an economical and feasible silver salmon egg taking site within the Prince William Sound area.

5. Whitefish age and growth studies should be continued in Crosswind Lake, Susitna Lake, and Lake Louise.

6. It is recommended that studies be expanded to determine sport fishing participation and harvest rates in the area.

7. The program of winter dissolved oxygen determinations in selected lakes should be continued.

8. Effort should be directed toward increasing the recreational use of the fisheries during the winter months through a concerted educational and informational effort.

OBJECTIVES

1. To assess the environmental characteristics of the fishery waters of the job area and, where practicable, obtain estimates of the sport fish harvest.

2. To determine the current status and public availability of the sport fish waters within the job area. To assist as required in the investigation of public access studies to the area's fishery waters and to make recommendations for withdrawal of sport fish access sites.

3. To evaluate multiple water use development projects (public and private) and the effects on the area's streams and lakes for the proper protection of the sport fish resources.

4. To locate sport fish egg sources and to make egg takes as required for experimental hatching and stocking.

5. To evaluate application of sport fish restoration and stocking measures and to formulate recommendations for the artificial stocking of area waters.

TECHNIQUES USED

Fish populations were sampled with 125 X 6-foot, variable mesh (3/4- to 2-inch bar measure) gill nets.

Lake trout at Susitna Lake were collected for an experimental egg take using the variable mesh gill nets noted above, a 200 X 6-foot X 1-inch bar measure gill net and a 200 X 6-foot X 1/2-inch bar measure gill net. All nets were rigged to sink.

The lake trout were held until ripe in conventional wooden live-cars and two barrel-shaped, net live-cars.

Self-contained underwater breathing apparatus (SCUBA) was used to a limited degree to determine lake trout spawning areas.

FINDINGS

Population Sampling

Gill net sampling was conducted on 31 lakes to determine population composition and results of experimental stocking (Tables 1 and 2).

Crater Lake:

This lake, located on the Lake Louise road, was sampled during the summer. Rainbow trout, Salmo gairdneri, stocked in 1965, were found to have reached an average fork length of 224 mm. This lake is easily accessible and received only moderate fishing pressure during 1966.

Gergie Lake:

Net catch frequency of 1966 gill net catches of rainbow trout and grayling from Gergie Lake declined to 0.97 from the 1965 net frequency of 1.79 due to reduced plantings of rainbow trout. An increased stocking ratio should return the population to past levels.

Moore Lake:

Stocked with rainbow trout in 1962, it was sampled and only two rainbow trout were taken. Moore Lake was stocked again in 1966 and will be put on a regular alternate year stocking basis.

Moose Lake:

This lake was sampled to determine grayling population trends. The net catch frequency for grayling in 1966 was 5.03 as compared to 3.09 in 1965.

TABLE 1 - Test Net Summaries, Managed Lakes, 1966.

Name	Location	No. of Fish	Species*	Length (mm) Range	Mean Length (mm)	Frequency**	Percent Composition
Burnt	Lat. 62° 6' N Long. 146° 23' W	48 20 3	LNS WF GR	150 - 432 234 - 326 163 - 193	259 287 178	1.0 .43 .06	68 28 4
Crater (Lake Louise)	Lat. 62° 5' N Long. 146° 22' W	21	RB	196 - 246	224	.77	100
Crosswind	Lat. 62° 20' N Long. 146° 00' W	95 2 1 1	WF LNS LT BB	208 - 442 --- 439 541	330 --- 439 541	1.09 .02 .01 .01	96 2 1 1
Gergie	Lat. 62° 2' N Long. 146° 28' W	45 9 4	GR LNS RB	173 - 386 368 - 546 325 - 381	292 493 343	.87 .17 .08	78 16 6
Moore	Lat. 63° 8' N Long. 145° 29' W	3	RB	216 - 381	310	.21	100
Moose	Lat 62° 9' N Long. 146° 6' W	130 51 1	GR LNS SS	178 - 401 155 - 404 ---	300 269 ---	5.03 1.41 --	72 28 --
Nita	Lat. 62° 46' N Long. 145° 30' W	30 13 11 3	LNS WF GR BB	--- 168 - 450 163 - 300 ---	412 290 241 ---	.47 .20 .17 .06	52 23 20 5
Tex Smith	Lat. 62° 6' N Long. 146° 17' W	14	RB	178 - 366	208	.39	100
Tolsona	Lat. 62° 7' N Long. 146° 4' W	162 27 15	GR LNS SS	178 - 414 254 - 437 168 - 475	307 361 216	4.27 .71 .39	79 13 8
Three Mile	Lat. 61° 34' N Long. 144° 26' W	52 7	GR RB	188 - 229 183 - 310	208 239	1.08 .29	88 12

TABLE 1 (Cont.) - Test Net Summaries, Managed Lakes, 1966.

Name	Location	No. of Fish	Species*	Length (mm) Range	Mean Length (mm)	Frequency**	Percent Composition
Two Mile	Lat. 61° 33' N	32	GR	193 - 259+	227	.66	71
	Long. 144° 26' W	13	RB	191 - 239	234	.54	29

* GR - Grayling
RB - Rainbow
LNS - Longnose Sucker
LT - Lake Trout
DV - Dolly Varden
BB - Burbot
WF - Whitefish
SS - Silver Salmon

** Frequency is the number of fish per net hour.

TABLE 2 - Test Net Summaries, New Lakes, 1966.

Name	Location	No. of Fish	Species*	Length (mm) Range	Mean Length (mm)	Frequency**	Percent Composition
Be Be Lake	R6W, T11N, S31	50	WF	152 - 381	257	1.4	86
		7	GR	178 - 254	226	.2	12
		1	LNS	279	279	.03	2
Caribou (West Fork)	R5W, T9N, S9 & 10	24	WF	330 - 511	432	.67	80
		6	LT	483 - 762	615	.17	20
Ewan	Lat. 62° 25' N	270	WF	165 - 498	267	2.8	61
	Long. 145° 48' W	113	GR	160 - 338	246	1.2	25.6
		54	LNS	216 - 470	384	.56	13
		2	BB	523 - 533	528	.02	.4
Furface	Lat. 62° 24' N	48	GR	285 - 432	376	1.2	96
	Long. 146° 33' W	2	BB	389 - 447	417	.05	4
Jans	R6W, T6N, S20 & 21	NO FISH TAKEN					
Osar	Lat. 63° 00' N	166	WF	---	---	3.07	56
	Long. 146° 20' W	131	LNS	---	---	2.4	44
		1	BB	---	---	.02	
Rat Lake	Lat. 62° 30' N	7	WF	224 - 386	292	.4	44
	Long. 145° 44' W	6	LNS	419 - 490	465	.3	37.5
		3	GR	254 - 320	290	.15	18.5
Sandy	R12E, T11N, S23 & 26	26	LT	---	---	.72	41
		19	WF	---	---	.53	30
		15	LNS	---	---	.42	23
		4	GR	---	---	.11	6
Scoter	R8W, T3N, S6	87	GR	152 - 302	244	1.67	100
Lower 12 Mile	R3W, T12N, S31	47	WF	---	---	1.27	70
		10	GR	---	---	.25	15
		9	LNS	---	---	.22	13
		1	LT	---	---	.02	2

TABLE 2 (Cont.) - Test Net Summaries, New Lakes, 1966.

Name	Location	No. of Fish	Species*	Length (mm) Range	Mean Length (mm)	Frequency**	Percent Composition
Wolverine	R12E, T13N, S18 & 19	10	WF	---	---	.30	50
		10	LNS	---	---	.30	50
Jerry	Mile 125.5 Denali Highway	28	GR	231 - 356	310	1.73	100
Joe	Mile 125.5 Denali Highway	4	GR	185 - 300	262	.25	100
Stevenson	Mile 84 Denali Highway	11	GR	211 - 315	274	.55	100
Wright	Mile 131 Denali Highway	19	WF	257 - 320	300	1.26	100
Summit	Cantwell	42	WF	249 - 409	330	1.17	74
		11	GR	236 - 328	285	.3	19
		4	LT	356 - 470	401	.1	7
Big Swede	Lat. 63° 00' N	62	WF	183 - 348	282	1.7	58
	Long. 145° 52' W	36	GR	102 - 343	300	1.0	34
		7	LT	229 - 813	495	.2	7
		1	BB	452+	452+	.03	1
Little Swede	Lat. 63° 05' N Long. 145° 54' W	36	LT	254 - 610	442	1.06	100
Mirror	Denali (Cantwell)	30	WF	234 - 333	279	1.05	100
Monsoon	R7W, T12N, S17 & 18	NO FISH TAKEN					

* GR - Grayling
RB - Rainbow
LNS - Longnose Sucker
LT - Lake Trout
DV - Dolly Varden
BB - Burbot
WF - Whitefish
SS - Silver Salmon

** Frequency is the number of fish per net hour.

Nita Lake; June Lake:

Population sampling was again conducted to determine the survival of rainbow trout and silver salmon stocked several times since 1961. As in 1965, neither of these species was taken. No future stocking of Nita Lake, or the interconnected June Lake is planned.

Tex Smith Lake:

Population sampling indicated increased rainbow trout numbers between 1965 and 1966 and annual stocking will continue. Tex Smith Lake is quite popular with local anglers, although the average size of the catch is less than 12 inches.

Tolsona Lake:

Sampled for population changes as a result of grayling egg taking and observed heavier than usual fishing pressure. The net catch frequency of grayling during 1966 sampling was 4.27 as compared to 2.30 during 1965. The net catch frequency of 0.39 for silver salmon remained nearly the same as for 1965.

Fly-In Lake Surveys

Caribou Lakes Complex:

An aerial survey was conducted of lakes located between the Richardson Highway west to the Susitna River and from the Denali Highway south to the West Fork, Gulkana River (Figure 1). Forty-one lakes were visually checked and the following characteristics noted: (1) visible fish life, (2) capacity of the lake to handle various sized aircraft on floats, (3) estimated depth. If the bottom of a lake was clearly visible over the entire lake then the lake was classified as shallow and judged to be unsuitable for supporting fish life. Shallow lakes were eliminated from any future investigations.

Twenty-three lakes were classified as deep; nine as shallow; and nine as questionable due to colored water. Fish were observed in five of the lakes classified as deep; these lakes were selected along with two other lakes for preliminary surveys to determine fish species present and size class frequencies, Table 2.

Caribou Lake is part of a large complex of waters scattered over 70 square miles of rolling hills. Caribou Lake has an estimated surface area of 800 acres and sustains good populations of grayling, lake trout, and lake whitefish, Coregonus clupeaformis. The lake is interconnected to seven other lakes by short streams, lending itself to future development as a canoe portage system. Caribou Lake lies 28 airmiles from the nearest commercial air charter facilities at Meirs Lake, Milepost 170, Richardson Highway.

Ewan Lake and Rat Lake drain north to the West Fork, Gulkana River. Ewan Lake is southerly to Rat Lake and flows directly into Rat Lake. Ewan Lake has an estimated surface area of 6,000 acres and Rat Lake has an estimated 2,000 acres.

Ewan Lake has dense populations of lake whitefish and grayling. The lake is relatively shallow with a maximum recorded depth of 20 feet.

Rat Lake, joined to Ewan by 500 yards of stream, is weed choked and very shallow with a maximum recorded depth of 8 feet. Fish populations present in Rat Lake include lake whitefish, longnose suckers, Catostomus catostomus, and grayling. The limited depth and large amount of submerged aquatic vegetation present in Rat Lake may preclude over-wintering of salmon and trout species due to low, winter dissolved oxygen concentrations. An oxygen sample taken in January, 1965, contained 3.0 ppm at a depth of four feet. By March, Rat Lake may have up to four feet of ice, drastically reducing the available habitat for over-wintering fish.

Jan's Lake is located 4 miles east of Lake Louise and has an estimated surface area of 360 acres with a maximum recorded depth of 30 feet. Considerable shoal area is present. No inlets or outlets are present. Population sampling with variable mesh gill nets produced no fish and the lake is assumed barren. An experimental planting with rainbow trout fingerlings will be made in 1967.

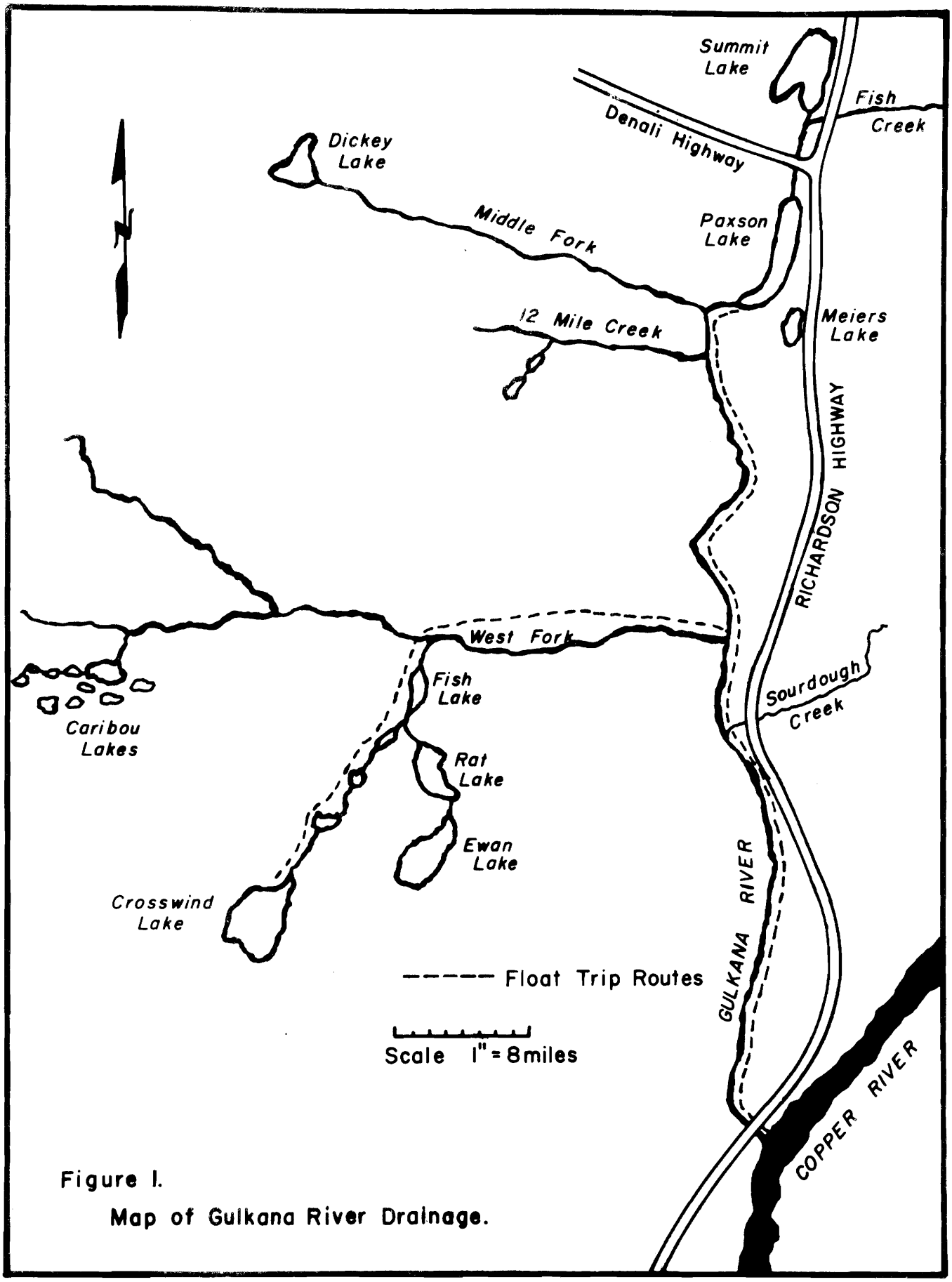

Figure 1.

Map of Gulkana River Drainage.

Furface Lake is located 1/2-mile northeast of Lake Louise and has an estimated surface area of ten acres with a maximum recorded depth of 40 feet. No inlets or permanent outlets are present. Burbot and grayling populations are present. Furface Lake can be reached by a 1/4-mile portage from Beaver Lake.

Big Swede Lake is located three miles south of Mile 14 on the Denali Highway and is accessible by foot. The trail is sometimes used by 4-wheel drive vehicles. The lake is about 800 acres in size and has a maximum depth of 40 feet. The lake supports extensive populations of grayling and whitefish. The net catch frequency of lake trout was low but reports from fishermen indicate that the population is actually greater than the gill net catches indicate. A report was received (Cramer, 1965, personal communication) that rainbow trout were present in the lake. In addition, a local commercial pilot has reported seeing red salmon carcasses in the lake on several occasions (Lannie, 1966, personal communication). Neither red salmon nor rainbow trout were found during the preliminary survey.

Little Swede Lake, located one mile north of Big Swede Lake, is 20 surface acres and has a maximum depth of 50 feet. The only fish taken in gill nets were lake trout, averaging 442 mm and ranging up to 610 mm. Fishing pressure on these two lakes is light due to their distance from the Denali Highway and the relatively short fishing season for all lakes in the Denali area.

Gulkana River Survey:

The predominant species of fish in this drainage are grayling, whitefish, and lake trout. Rainbow trout are present from Paxson Lake to Sourdough Creek but their presence in other parts of the drainage has not been established. King salmon and red salmon are present in most of the drainage during the summer months.

Because of the relative importance of the Gulkana River system as a sport fishery, surveys were initiated in 1965. During 1965 and 1966, work was limited to cursory surveys conducted via float trips and fly-in surveys to some of the larger lakes. Those portions of the drainage that have been floated by canoe are denoted by dotted lines on the map shown in Figure 1.

Two canoe trips were made on this drainage during 1966. The first trip was made from Crosswind Lake to the confluence of the Gulkana River with the Copper River. Species of fish encountered were red salmon, Oncorhynchus nerka, king salmon, Oncorhynchus tschawytscha, grayling, lake whitefish, and lake trout. The purpose of this trip was not only to continue investigations on the sport fishery in the area, but also to investigate the possibility of establishing red salmon runs in the Crosswind-Fish Lake drainage. Spawning areas for red salmon were found to be limited in the streams surveyed, and prospects appear poor for establishing a red salmon run in the Crosswind-Fish Lake drainage.

The second trip was made from Paxson Lake to Sourdough Creek during the fall. Unseasonably low water made the trip quite difficult. Gill net sampling produced only red salmon and grayling. One rainbow trout was found a few miles below Paxson Lake in a near dead condition. Sampling with hook and line produced no rainbow trout. Sampling would suggest that reports of excellent rainbow trout fishing in the Gulkana River may be exaggerated.

Lake Trout Investigations:

During September, lake trout investigations were conducted at Susitna Lake. All fish were collected with gill nets.

Net mortality was, as in 1965, lower when the 1-inch and 1/2-inch bar mesh gill nets were used. Two lake trout were found dead in the 1-inch and 1/2-inch nets whereas 28 lake trout were found dead in the variable mesh nets.

During the 1966 investigations, 198 lake trout, 2,852 whitefish, 161 longnose suckers, 23 grayling, and 16 burbot, Lota lota, were collected. Unfortunately, lack of time prevented collecting biological data on any species other than lake trout.

Sixty-one lake trout were identified with Peterson disc tags and released. The tagged fish ranged from 434 mm to 882 mm.

The first ripe lake trout were taken when water temperatures lowered to 50°F. After the temperature had declined to 46°F. very few mature, ripe lake trout were taken.

Eggs were stripped from 11 female lake trout. An estimated 69,000 eggs were delivered to the Fire Lake Hatchery for an average of 6,270 eggs per fish.

The spawned female lake trout ranged in length from 737 mm to 882 mm and averaged 800 mm. The smallest, mature, spawning female measured 660 mm and the smallest, mature, spawning male was 514 mm.

Scale samples were taken from 156 lake trout. An age analysis of 88 scale samples compared closely to age frequency information gathered during the 1965 spawning investigation, Table 3.

TABLE 3 - Age Determinations of Lake Trout, Susitna Lake, 1966.

Age Class	Sample Size	Average Fork Length in Millimeters	Length Range Fork Length in Millimeters
III	1	173	173
V	4	345	277 - 368
VI	6	439	386 - 488
VII	4	490	470 - 503
VIII	4	506	493 - 513
IX	14	579	487 - 711
X	5	612	582 - 655
XI	6	729	693 - 744
XII	7	744	658 - 782
XIII	10	754	683 - 833
XIV	17	798	724 - 876
XV	6	841	793 - 881
XVI	4	887	864 - 909
TOTAL	88		

Considerable loss occurred in the live-cars during the holding period. Muskrats continually chewed holes in the live-cars and at least 35 lake trout escaped. Another 30 lake trout died in the live-cars. Probable causes of this loss were (1) injuries received from being gill-netted and handled, (2) insufficient oxygen due to improper location of the live-cars, and (3) injuries to small fish received by being bumped and crowded by large, aggressive males. Although the causes of mortality are not definitely known, mortality of smaller fish was definitely higher.

As in 1965, the two primary problems associated with lake trout investigations were capture of adequate numbers of fish, and keeping the fish alive for extended periods of time until they were ripe. The first problem can be solved by more small-mesh gill nets. Use of small-mesh gill nets, however, will increase the mortality of associated species such as whitefish. Holding mortality could be reduced by using larger and more elaborate live-cars which should be held in deeper water.

Weather conditions at Susitna Lake were again quite variable and sometimes very severe. Due to high winds on at least two occasions, nets could not be checked for over 48 hours.

Twelve different areas of Susitna Lake were netted with no significant difference in the catch rate of lake trout. Had these 12 different areas been netted at the same time, however, a difference in catch rate might have been detectable.

Grayling Investigations:

Grayling investigations were conducted at Tolsona and Moose Lakes in the same manner as previous years (Williams, 1965). Bessie Creek, tributary to Tolsona Lake, was checked early in May for signs of a grayling migration. The first grayling were noted on May 9 when only the mouth of the stream was ice free. A "V" trap was installed and by May 13, a total of 1,330 grayling had been captured.

Artificial spawning operations were conducted on the same date (May 14) as in 1965. Three hundred and thirty-nine female grayling were stripped of eggs and the eggs fertilized. An estimated total of 1,262,000 eggs was taken for an average of 3,735 eggs per female. The 1966 number of eggs obtained was less than the 1965 average of 4,269 eggs per female. Complete egg counts were made from five female grayling for an average of 4,714 eggs per female.

The total estimated run of grayling in Bessie Creek amounted to 2,654 fish which compares favorably to the total estimated run in 1965 of 3,000. Fifty-eight percent of the grayling taken in the trap were females.

As in 1965, some difficulty was encountered extracting milt from male grayling. Only small amounts could be taken from individual fish. However, on the day after the egg take it was found that both females and males gave up their eggs and milt much more readily.

Male grayling used for egg taking purposes ranged in length from 229 to 376 mm and averaged 279 mm. Females ranged in length from 216 mm to 351 mm and averaged 302 mm. In 1965, both males and females averaged 312 mm (Williams, 1966).

Following egg taking, the adipose fin was removed from 489 male grayling and 665 females. Scale samples were collected for age analysis.

Randomly selected scales from 111 male and female grayling entering Bessie Creek were analyzed for age. A summary of age and size classes is shown in Table 4. The average length of age III male grayling in Bessie Creek was significantly smaller than corresponding age III females. As indicated from the sample, age III grayling composed an estimated 64 percent of the trapped fish during the egg taking operations at Bessie Creek.

TABLE 4 - Age Classes of Grayling Trapped at Bessie Creek, 1966.

Age Class	Sample Size		Average Fork Length in Millimeters		Length Range Fork Length in Millimeters	
	Male	Female	Male	Female	Male	Female
II		9		233		229 - 241
III	35	36	263	292	229 - 300	274 - 305
IV	20	9	321	303	312 - 338	287 - 318
V	2	—	317		317	
TOTAL	57	54				

Subsistence Fishing Studies

The number of subsistence fishing permits issued during 1966 increased 13.0 percent over 1965 (Table 5). A total of 1,271 permits was issued of which 89 percent were for dip netting and the remainder for fish wheels.

TABLE 5 - Number of Subsistence Permits and Reported Catch in the Upper Copper River, 1961 through 1966.

	1961	1962	1963	1964	1965	1966
No. of permits issued	326	448	624	994	1,125	1,271
No. of catch records returned *	200	420	344	682	729	797
Percent of catch records returned	62	94	55	68.6	64.8	63
No. of salmon recorded on catch records	15,991	16,273	15,743	12,743	13,452	17,576
Average no. of salmon taken per permit	80	38.7	44.2	18.7	18.5	28.5
Percent of red salmon in catch	96	93	93	94	94.9	96
Percent of king salmon in catch	2	5	3	5.5	4.7	3
Percent of silver salmon in catch	2	2	4	.5	.4	0
Percent of other fish in catch **	0	0	0	0	0	1
Estimated total salmon catch	24,075	15,984	25,580	18,550	20,625	27,901

* Unused permits are not used in computing the average and estimated total catch.

** Includes grayling, burbot, suckers, and Dolly Varden.

The average recorded catch was 28.5 fish per permit during 1964 and 1965. The average catch is biased upward since several people sometimes fish on a single permit.

The total estimated harvest was 27,901 fish of which 96 percent were red salmon and 3 percent were king salmon. The remaining 1 percent consisted of grayling, burbot, Dolly Varden, and suckers. The 1966 catch is the largest harvest of fish recorded during the period from 1961 to 1966. For the first time in six years silver salmon were not recorded in the catch. Generally, silver salmon comprise from 0.5 to 4.0 percent of the total catch.

It is believed subsistence fishing will continue to increase although the rate of increase seems to have slowed. From 1961 to 1965, the average annual increase in subsistence permits has been 32.5 percent. The locations where dip netting can be successfully carried out are limited and on most weekends during the summer these areas are saturated with dip netters. Many times fishermen must wait their turn because of the limited area available.

The number of fish wheels has remained fairly constant over the last five years ranging from 29 to 33. The number of fish wheels are also limited by the availability of accessible locations. Additional access roads would no doubt increase fish wheel use.

Multiple Use and Road Construction Projects Investigations:

During the summer of 1966 a major highway construction project was initiated on the Richardson Highway between Paxson and Summit Lakes. This construction included diversion of the Gulkana River at four locations. Because of red salmon spawning, careful planning was necessary to minimize damage to the fishery. Under the supervision of fishery biologists the stream was diverted at four locations just prior to the major run of red salmon. Approximately 350 red salmon were trapped as a result of the diversion and were hand carried to the new stream sections. No fish losses were observed.

Glacier Creek, near Valdez, was checked as a possible source of pollution of Robe Lake. Several years ago a dike was constructed to prevent the heavily silted Glacier Creek from entering Robe Lake. Robe Lake is used by spawning salmon and sea run Dolly Varden. Due to erosion, the dike is presently in danger of being breached by Glacier Creek.

During spring runoff the outlet of Tolsona Lake was severely eroded with the lake level lowered one foot. Since the maximum depth of Tolsona Lake is 14 feet, a large loss of fish habitat occurred. Gates were subsequently installed in the outlet so the lake level could be returned to normal and maintained. After construction was completed the lake level slowly began to rise. Unfortunately, there was insufficient precipitation prior to winter freeze-up and the lake failed to reach a normal level. It is expected that spring runoff in 1967 will refill the lake.

During road construction on the Richardson Highway, a bridge across Little Tonsina River at Mile 70 was replaced by a culvert. The culvert increased the stream velocity and caused a partial block to the upstream migration of grayling, Dolly Varden and, to a lesser extent, king salmon. A meeting with the Alaska Department of Highways engineers resulted in the installation of an additional culvert to handle the flow of water.

An inspection of the proposed Lake Louise road was made with the access biologist and a Department of Highways representative. Six pullouts were recommended by Department of Fish and Game personnel, in addition to the 12 pullouts already included in the Department of Highways road plans. The pullouts are located near lakes and many join portions of the old road which will provide additional camping areas.

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