

Volume 14

Job No. G-III-D  
Job No. G-III-E  
Job No. G-IV-C

STATE OF ALASKA

*William A. Egan, Governor*



Annual Progress Report for

Study G-III-D Lake and Stream Investigations

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## RESEARCH PROJECT SEGMENT

State: Alaska

Project No.: F-9-5

Name: Sport Fish Investigations  
of Alaska.

Study No.: G-III

Study Title: Lake and Stream Investigations

Job No.: G-III-D

Job Title: POPULATION STUDIES OF GAME  
FISH AND EVALUATION OF MANAGED  
LAKES IN THE UPPER COOK INLET  
DRAINAGE.

Period Covered: April 16, 1972  
to April 15, 1973.

## ABSTRACT

Sampling data are presented for 19 managed lakes.

A discussion of sampling data from a series of managed lakes stocked with rainbow trout, Salmo gairdneri; arctic grayling, Thymallus arcticus; and silver salmon, Oncorhynchus kisutch, is included. Rainbow trout from Ennis, Montana, stocked in the spring of 1971, exhibited poor survival during their second year of growth.

Dissolved oxygen determinations were made on 14 lakes which are known to exhibit partial winter oxygen depletion. A summary and brief discussion of these data area presented.

Evaluation of stocked rainbow trout survival rates in Johnson Lake was continued. Survival of fingerling rainbow trout stocked June 14, 1971, weighing 88, 96, and 333 per pound was 2.9%, 3.5%, and 4.1%, respectively, and were stocked at a density of 110, 90, and 100 fish per surface acre, respectively.

The biomass of rainbow trout in Johnson Lake was estimated at 6.9 pounds per surface acre.

## RECOMMENDATIONS

1. Evaluation of stocked rainbow trout survival rates should be continued in Johnson Lake.
  - a. Evaluation of 7,875 rainbow trout fingerlings stocked in Johnson Lake on August 8, 1972, at a size of 34 per pound, should be completed.
  - b. Johnson Lake should be chemically treated during the fall of 1973 to eradicate all fishes.

## RECOMMENDATIONS (continued)

2. Determine survival, growth and total yield of various sizes and strains of rainbow trout in Long, Marion, Seymour, and Christian-sen lakes, which were chemically treated in the fall of 1972.
3. Determine limnological conditions which influence survival and growth of rainbow trout in Long, Seymour, Marion, and Christian-sen lakes.

## OBJECTIVES

1. To determine and record populations trends of game fishes within managed lakes of the job area.
2. To continue the study of survival and growth of various sizes and numbers of stocked game fish in a land-locked lake. To conclude that phase of the study dealing with competitive effects of indigenous threespine sticklebacks upon the survival of stocked rainbow trout.
3. To determine and record the chemical conditions which influence survival and growth of game fish in lakes within the job area.
4. To provide recommendations for the management of stocked lakes and to direct the course of future studies.

## TECHNIQUES USED

Lakes were sampled with 125' X 6' variable mesh (3/4- to 2-inch bar measure) monofilament gillnets. Either one or two nets were fished approximately 24 hours.

Water samples for dissolved oxygen determinations were collected with a Kemmerer water sampler. Dissolved oxygen levels were determined by titration with PAO.

Survival of stocked rainbow trout fingerlings was evaluated by stocking a known number of marked trout with a size distribution similar to the population to be sampled approximately one week before sampling. Population estimates were based on a ratio of marked-to-unmarked fish in the sampling catch.

## FINDINGS

### Sampling of Managed Lakes

A total of 19 managed lakes were sampled with variable mesh monofilament gill-nets. Sampling was conducted during the winter season to determine growth rates of age 0+ and age 1+ fish. Net catches of older age groups are typically small and of little significance. Catch rates of older age classes have been found to be so variable that little correlation can be made between samples.

In 1972, rainbow trout, Salmo gairdneri, fry were not stocked in local lakes until September, only 2 months before the commencement of winter gillnetting. As expected, few age 0+ trout were captured, since they were not large enough to be vulnerable to gillnets. Catches of 40 and 89 age 0+ rainbow trout were gillnetted in Canoe and Knik lakes, respectively. The trout in these two lakes either exhibited high survival or the condition factor of the trout made them more susceptible to gillnets.

A summary of sampling data from managed lakes is presented in Table 1.

In 1971, rainbow trout fry were obtained from a winter spawning stock reared at Ennis, Montana. These trout were stocked in the spring at the beginning of the 1971 growing season. Redick (1972) noted that this stock grew very rapidly and exhibited high survival during their first year in local lakes.

Sampling in 1972 and 1973 indicated that few age 1+ Ennis rainbow trout remained in Kepler, Bradley, Canoe, Irene, and Knik lakes. Ennis trout grew over 200 mm in length during their first 6 months in these five lakes which are among the most productive waters in the Matanuska Valley. Of the five lakes, the largest catch of age 1+ Ennis trout was obtained in Bradley Lake where only three trout were captured after 24 hours of gillnetting, resulting in a catch rate of 0.14 fish per net hour. Kepler Lake was sampled in November 1972 and January 1973 for a total of 91 gillnet hours, and no age 1+ Ennis trout were captured. Canoe and Irene lakes had catch rates of 0.02 and 0.04 fish per net hour, respectively, after 94 hours of gillnetting. A catch rate of 0.06 was obtained at Knik Lake where three 18-month-old Ennis trout, averaging 427 mm in length.

Age 1+ Ennis trout survival appears better in Rocky, Reed, Ravine and Lower Bonnie lakes. Trout stocked in these lakes during past years have exhibited much slower growth than those stocked in lakes of the Kepler-Bradley lakes complex and Knik Lake. Redick (1972) theorized that residual toxicity had killed part of the 1971 plant in Rocky Lake; it was restocked on August 16, 1971. A total of 25 Ennis trout averaging 268 mm in length were gillnetted on November 29, 1972, from Rocky Lake, for a frequency of 0.52 fish per net hour. Nine Ennis trout averaging 239 mm in length were netted in Reed Lake after a 50-hour set. This is a catch rate of 0.18 fish per net hour. Ravine Lake was sampled on June 19, 1972, and again on February 6, 1973. A catch rate of 0.46 fish per net hour for age 1+ Ennis trout was recorded during June sampling. No Ennis trout were captured in Ravine Lake after 50 hours of gillnetting in February. Lower Bonnie Lake was sampled on July 7, 1972 and February 6, 1973. A total of 31 Ennis trout averaging 105 mm in length were captured during July sampling for a catch rate of 0.65 fish per net hour. The catch rate of Ennis trout averaging 166 mm in length was only 0.14 fish per net hour during February sampling. A mixture of older age groups of rainbow trout and grayling, Thymallus arcticus, were also captured in Lower Bonnie Lake. Weiner Lake was sampled on June 19, 1972 and February 7, 1973. Only one Ennis trout was captured during June and no catch was recorded in February. It is believed that a die-off occurred in this lake during the 1971-72 winter.

TABLE 1 Population Characteristics of Managed Lakes as Defined by Variable Mesh Gill Nets, Matanuska-Susitna Valleys, 1972-1973.

Lake Name & Location	Date Sampled	Sampling Data			Length (mm) Range - Mean		Catch/ Net Hr.	Stocking History			
		Species*** Stocked	Number	Age Class				Date Stocked	Total Number	Per Lb.	Per Acre
Kepler T17N, R1E, Sec. 24	11/17/72	SS	7	I	240-310	279	0.30	6/21/71	5,000*	384	83**
	1/5/73	SS	1	I	291	---	0.02	6/21/71	5,000*	384	83**
		RT	No Catch		---	---	----	5/21/71	28,200*	115	470**
		RT	No Catch		---	---	----	9/5/72	30,000*	172	500**
Bradley T17N, R1E, Sec. 24	11/17/72	RT	3	I	331-347	341	0.14	5/21/71	28,200*	115	470**
		RT	1	0	99	---	0.05	9/5/72	30,000*	172	500**
		SS	2	I	263-297	280	0.09	6/21/71	5,000*	384	83**
Canoe T17N, R1E, Sec. 13	12/28/72	RT	2	I	392-395	394	0.02	5/28/71	6,300	127	300
		RT	40	0	88-114	99	0.43	9/8/72	8,400	172	400
Irene T17N, R1E, Sec. 13	12/28/72	RT	4	I	307-341	324	0.04	5/28/71	8,400	127	400
		RT	3	0	95-105	100	0.03	9/8/72	8,400	172	400
Matanuska T17N, R1E, Sec. 23	11/21/72	RT	73	0	176-245	216	1.66	8/9/72	3,800	34	60
		RT	8	0	94-110	101	0.18	9/5/72	21,200	172	340
Knik T16N, R3W, Sec. 24	11/29/72	RT	1	I	390	---	0.04	5/28/71	20,000	127	400
		RT	89	0	92-110	97	4.04	9/6/72	20,000	172	400
	11/30/72	RT	2	I	412-478	445	0.08	5/28/71	20,000	127	400

TABLE 1 Population Characteristics of Managed Lakes as Defined by Variable Mesh Gill Nets, Matanuska-Susitna Valleys, 1972-1973 (continued)

Lake Name & Location	Date Sampled	Sampling Data		Age Class	Length (mm)		Catch/ Net Hr.	Stocking History			
		Species*** Stocked	Number		Range -	Mean		Date Stocked	Total Number	Per Lb.	Per Acre
Rocky T17N, R3W, Sec. 21	11/29/72	RT	25	I	233-300	268	0.52	8/16/71	14,000	265	240
		RT	1	0	107	---	0.02	9/6/72	23,200	172	400
Florence T19N, R5W, Sec. 23	1/19/73	RT	4	III	396-452	430	0.09	8/6/69	21,000	258	320
		RT	2	0	93- 94	---	0.04	9/6/72	10,800	172	165
Reed T18N, R1E, Sec. 8	11/30/72	RT	9	I	215-275	239	0.18	5/25/71	4,500	126	300
		RT	No Catch		---	---	----	9/6/72	5,600	172	300
Ravine T20N, R6E, Sec. 24	6/19/72 2/6/73	RT	9	II	221-346	240	0.35	8/6/70	5,000	349	400
		RT	12	I	165-210	180	0.46	6/10/71	3,700	162	300
		PT	4	II	290-330	307	0.09	8/6/70	5,000	349	400
Lower Bonnie T20N, R6E, Sec. 23	7/7/72 2/6/73	RT	20	Mixed	133-270	164	0.42	Annual	Mixed	---	---
		RT	31	I	94-121	105	0.65	6/10/71	20,000	162	200
		GR	3	III	275-281	280	0.06	6/10/69	40,000	---	400
		PT	6	I	160-197	166	0.14	6/10/71	20,000	162	200
		RT	1	II	232	---	0.02	9/14/70	12,200	74	122
		GR	1	II	184	---	0.02	Wild	-----	---	---

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TABLE 1 Population Characteristics of Managed Lakes as Defined by Variable Mesh Gill Nets, Matanuska-Susitna Valleys, 1972-1973 (continued)

Lake Name & Location	Date Sampled	Sampling Data		Age Class	Length (mm)		Catch/ Net Hr.	Stocking History				
		Species*** Stocked	Number		Range	Mean		Date Stocked	Total Number	Per Lb.	Per Acre	
Wishbone T19N, R2E, Sec. 24	2/9/73	RT	6	III	415-491	455	0.13	7/17/69	7,500	517	125	
		RT	2	0	93- 95	94	0.04	9/15/72	5,400	151	90	
Weiner T20N, R7E Sec. 22	6/19/72	DV	1	?	348	---	0.01	Unknown	-----	---	---	
		RT	1	I	210	---	0.01	6/10/71	5,400	162	200	
	2/7/73	RT	No Catch			---	---	---	6/10/71	5,400	162	200
		GR	No Catch			---	---	---	7/3/72	25,000	---	925
Harriet T17N, R1E Sec. 24	1/3/73	GR	118	0	102-168	156	5.13	7/3/72	5,000	---	500	
Meirs T17N, R3E, Sec. 18	1/3/73	GR	6	II	298-360	323	0.26	6/30/70	10,000	---	625	
		GR	6	0	114-150	131	0.26	7/3/72	5,000	---	300	
Long T20N, R7E, Sec. 20	6/20/72	GR	30	Mixed	285-409	329	0.63	Wild	-----	---	---	
	2/7/73	GR	2	III	346-353	350	0.05	Wild	-----	---	---	
		GR	10	0	104-122	113	0.23	7/3/72	40,000	---	400	
Victor T17N, R1E, Sec. 14	1/4/73	SS	No Catch		---	---	---	10/12/71	6,000	105	425	
		SS	No Catch		---	---	---	6/8/72	5,400	155	400	

TABLE 1 Population Characteristics of Managed Lakes as Defined by Variable Mesh Gill Nets, Matanuska-Susitna Valleys, 1972-1973 (continued)

Lake Name & Location	Date Sampled	Sampling Data		Age Class	Length (mm)		Catch/ Net Hr.	Stocking History			
		Species*** Stocked	Number		Range - Mean	Date Stocked		Total Number	Per Lb.	Per Acre	
Echo T17N, R1E Sec. 24	1/4/73	SS	1	I	270	---	0.02	6/21/71	9,200	384	400
		SS	11	0	143-183	167	0.23	6/8/72	7,400	155	320
Finger T18N, R1E, Sec. 33	12/8/72	SS	7	II	262-362	323	0.15	6/1/70	22,100	654	185
								6/5/70	112,900	269	185

\* Represents total plant stocked into both Bradley and Kepler Lakes.

\*\* Density computed on total acreage of Kepler and Bradley Lakes.

\*\*\* RT = rainbow trout, SS = silver salmon, GR = grayling, DV = Dolly Varden.

Matanuska Lake was chemically treated in September 1971. It was stocked with 3,800 Ennis trout weighing 34 fish per pound on August 9, 1972. A total of 21,200 rainbow trout from Winthrop, Washington, weighing 172 fish per pound, were stocked on September 5, 1972. A total of 73 Ennis and 8 Winthrop trout were captured on November 21, 1972, for a catch frequency of 1.66 and 0.18 fish per net hour, respectively. The Ennis trout had already reached an average length of 216 mm, while Winthrop trout averaged 101 mm.

Florence and Wishbone lakes were stocked in 1969 and 1972 with Winthrop trout. On January 18, 1973, four age III rainbow trout averaging 430 mm in length were captured in Florence Lake. A total of six age III rainbow trout averaging 455 mm in length were gillnetted in Wishbone Lake on February 9, 1973.

Harriet, Meirs, and Long lakes were stocked with grayling on July 3, 1972. Grayling previously planted in Harriet Lake did not survive the 1970-71 winter. and it was not restocked until 1973. Sampling in Harriet Lake on January 3, 1973, produced a catch of 118 age 0+ grayling averaging 156 mm in length for a catch rate of 5.13 fish per net hour. Meirs Lake was first stocked with grayling on June 30, 1970. A total of six age II, and six age 0+ grayling averaging 323 mm and 131 mm in length, respectively, were netted on January 3, 1973. Long Lake was gillnetted on June 20, 1972 and February 7, 1973. A catch rate of 0.63 fish per net hour was recorded during the June sampling. These grayling were the result of natural spawning. Ten grayling from the 1972 plant were gillnetted in February and averaged 113 mm in length.

Victor and Echo lakes were stocked with silver salmon, Oncorhynchus kisutch, on June 8, 1972. Victor Lake was sampled on January 4, 1973; after 47 hours of gillnetting, no silver salmon were captured. On January 4, 1973, a total of one age 1+ and 11 age 0+ silver salmon averaging 270 mm and 167 mm in length, respectively, were caught after 48 hours of gillnetting in Echo Lake.

Finger Lake is scheduled for rehabilitation in 1973; therefore, it has not been stocked since 1970 to reduce the large numbers of stunted silver salmon present in the lake. Only seven age II silver salmon were caught in 46 hours of gillnetting. The majority of the remaining population will mature and die during the 1973-74 winter.

#### Dissolved Oxygen Sampling

Dissolved oxygen determinations were made on 14 lakes within the job area. A summary of recorded dissolved oxygen levels is presented in Table 2. Emphasis was placed on managed lakes which are known to exhibit partial winter oxygen depletion and on lakes being evaluated for management.

Dissolved oxygen levels dropped below 2.0 ppm in three lakes. Harriet and Klairé lakes, located in the Kepler-Bradley lakes complex, dropped to 0.4 and 0.3 ppm, respectively. Subsequent gillnetting revealed that few if any grayling survived the winter. Stocking in Klairé Lake has been discontinued since dissolved oxygen levels have been consistently low during the past two

TABLE 2 Lakes Tested For Dissolved Oxygen, Matanuska - Susitna Valleys, 1972.

<u>Name</u>	<u>Sample Date</u>	<u>Location</u>			<u>Depth of:</u>		<u>O<sub>2</sub> Sample</u>	
		<u>Township</u>	<u>Range</u>	<u>Section</u>	<u>Snow (in.)</u>	<u>Ice (in.)</u>	<u>Depth (ft.)</u>	<u>ppm</u>
Canoe	2/29	T17N	R1E	Sec. 13	0	30	5	3.7
							10	3.1
							20	0.9
	3/15				4	35	5	3.8
							10	3.0
							20	1.3
	4/20				4	37	5	3.5
							10	1.3
							20	0.3
Harriet	2/29	T17N	R1E	Sec. 24	4	23	5	1.2
							10	0.9
							20	0.3
	3/15				4	28	5	1.4
							10	0.4
							20	0.4
	4/20				6	28	5	0.4
							10	0.3
							20	0.3
Meirs	2/29	T17N	R1E	Sec. 18	4	27	5	5.4
							10	5.6
							20	5.1
							30	4.7
	3/21				3	31	5	4.2
							10	4.1
							20	4.2
							30	4.2
	4/20				4	33	5	3.6
							10	3.9
							20	3.6
							30	3.4

TABLE 2 Lakes Tested for Dissolved Oxygen, Matanuska - Susitna Valleys, 1972. (Continued)

Name	Sample Date	Township	LOCATION		Depth of		O <sub>2</sub> Sample	
			Range	Section	Snow (inches)	Ice (inches)	Depth (feet)	ppm
Lucille	2/29	T17N	R1W	Sec. 8-9	0	34	5	0.8
							7	0.9
	3/2				0	34	5*	1.4
							10	0.8
					15	0.4		
	3/22				0	37	5*	3.1
							10	2.2
							15	0.6
	4/21				5	36	5*	3.1
							10	0.9
15		0.1						
5**		1.9						
Florence	3/2	T19N	R5W	Sec. 23-24	20	30	5	11.7
							10	9.9
							20	12.6
Victor	3/15	T17N	R1E	Sec. 14	2	38	5	2.2
							10	1.5
							20	0.4
Klaire	3/15	T17N	R1E	Sec. 14	2	35	5	0.3
Irene	3/15	T17N	R1E	Sec. 13	2	35	5	4.7
							10	5.0
							20	2.5

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TABLE 2 Lakes Tested for Dissolved Oxygen, Matanuska - Susitna Valleys, 1972. (Continued)

<u>Name</u>	<u>Sample Date</u>	<u>Township</u>	<u>LOCATION</u>		<u>Depth of</u>		<u>O<sub>2</sub> Sample</u>	
			<u>Range</u>	<u>Section</u>	<u>Snow</u> <u>(inches)</u>	<u>Ice</u> <u>(inches)</u>	<u>Depth</u> <u>(feet)</u>	<u>ppm</u>
Reed	3/20	T18N	R1E	Sec. 8	3	37	5	7.9
							10	1.5
Rocky	3/20	T17N	R3W	Sec. 21	10	28	5	10.3
							10	6.7
							20	2.0
Johnson	3/21	T17N	R1E	Sec. 14	3	38	5	4.0
							10	3.1
							20	2.2
Matanuska	3/21	T17N	R1E	Sec. 23	3	36	5	6.0
							10	5.2
							20	5.1
							30	2.1
							35	1.0
Loon	3/22	T18N	R3W	Sec. 36	11	27	5	6.4
							10	3.0
							15	1.7
Knik	3/23	T16N	R3W	Sec. 24	4	32	5	6.6
							10	5.3
							20	1.5

\* Station 1

\*\* Station 2

winters. Oxygen levels in Lucille Lake declined to 0.8 ppm.

Canoe, Harriet, Meirs, and Lucille lakes were sampled in February, March and April to determine when the lowest levels of dissolved oxygen occur. Oxygen levels reached their lowest level on April 20, 1972, in Canoe, Harriet, and Meirs lakes. Ice became unstable and no further sampling was done after that date. The lowest oxygen levels in Lucille Lake were recorded on February 29, 1972.

### Johnson Lake Rainbow Trout Survival Tests

This job segment constitutes the third year of testing survival rates of stocked rainbow trout from time of stocking to the following spring when age I stocked trout enter the fishery.

Johnson Lake morphometric data were described by Redick (1971).

The initial year of testing was designed to define the maximum expected survival of rainbow trout fingerlings under optimum stocking conditions when in competition with indigenous threespine sticklebacks, Gasterosteus aculeatus. A total of 2,496 fingerling trout, weighing 85 per pound, were stocked in Johnson Lake on September 4, 1969, at a stocking density of 62 fish per surface acre. No older game fish were present. Survival of this plant was evaluated in the spring of 1970. Redick (1971) reported a survival of 24.3% based on a total of 1,536 net hours of gillnet sampling. However, Redick noted a sampling bias which could have resulted in an over-estimate of the true survival rate. In 1971, additional data were collected on the survival of the 1969 planting. Redick (1972) concluded that the final survival estimate of the 1969 planting approximated 25%, which he stated should be considered a maximum estimate.

The second planting was designed to duplicate customary stocking procedures in terms of planting density and fingerling size in use in managed lakes of the Matanuska and Susitna valleys. On August 6, 1970, 7,446 rainbow trout fingerlings were stocked in Johnson Lake. These fish averaged 349 per pound and were stocked at a density of 183 fish per surface acre. One older age class of game fish (1969 planting) and an indigenous population of threespine sticklebacks were already in the lake. A total of 322 hours of gillnet sampling was conducted the following spring on May 20, 1971 and June 16, 1971, at various depths and locations. Not a single individual from the 1970 planting could be recovered, which indicated few fish survived long enough to have entered a sport fishery.

On June 14, 1971, 12,018 rainbow trout fingerlings were planted in Johnson Lake. This plant consisted of three different sizes of rainbow trout that were stocked at a total density of 300 fish per surface acre. Various numbers and sizes of trout stocked are as follows:

4,419 fish at 88/pound - LV finclip  
 3,628 fish at 96/pound - RV finclip  
 3,971 fish at 333/pound - no clip

A total of 356 hours of gillnet sampling was conducted from May 24-May 26, 1972. Forty rainbow trout averaging 199 mm in length were captured. Based on this sample, a total of 242 adipose-clipped rainbow trout averaging 200 mm in length were stocked on June 2, 1972. Prior to planting, all adipose-clipped fish were held 48 hours to check for handling mortality.

After allowing five days for the adipose-clipped rainbow trout to distribute themselves in the lake, two fyke nets were set. It was intended that the rainbows be captured, tagged, and released back into the lake. In five days, only nine rainbows were captured and most of them died in the fyke nets. The fyke nets were replaced with variable mesh gillnets that were fished periodically from June 12 through June 23, 1972. A total of 1,158 gillnet hours and 240 hours of fyke netting were conducted to determine survival of the three sizes of rainbow trout. Results of the netting are presented in Table 3.

TABLE #3 Recoveries of Finclipped and Non-Finclipped Rainbow Trout from Johnson Lake, June 7 through June 23, 1972.

Mark*	Sampling Data			Stocking History			
	Catch	Length (mm) Range	Mean	Number	Per lb.	Per Acre	Date Stocked
RV	26	173-291	225	3,628	96	90	6/14/71
LV	24	190-272	224	4,419	88	110	6/14/71
Unmarked	32	105-225	167	3,971	333	100	6/14/71
AD	53	147-248	203	242	4	6	6/2/72

\* RV = Right ventral, LV = Left ventral, AD = Adipose.

Population estimates of each size of rainbow trout were calculated using the standard Petersen population estimate:  $N = MC/R$ . Confidence limits were calculated for each population estimate by setting  $95\% CI = R \pm 1.96(\sigma)$ . Results of these calculations are presented in Table 4.

Mark and recapture methods assume that all adipose-clipped fish are randomly distributed throughout the lake, behavior of all groups of trout make them equally vulnerable to sampling nets, and mortality rates of all sizes of fish are similar.

It would be expected that rainbow trout weighing 88 and 96 per pound would have greater survival than those weighing 333 per pound. The reverse was found to be true, since trout weighing 333 per pound had the greatest survival (4.1%) (Table 4). The lower survival of the two larger sizes of rainbow trout

TABLE 4 Rainbow Trout, Population and Survival Estimates, Johnson Lake, 1972.

Mark*	Population Estimate	Survival Rate %	95% Confidence Limits	
			Population Estimate	Survival Rate %
RV	128	3.5	79-194	2.2-5.4
LV	126	2.9	79-188	1.8-4.3
Unmarked	161	4.1	106-238	2.7-6.0

\* RV = Right Ventral, LV = Left Ventral.

may have been caused by fin-clipping mortality.

No measureable survival was recorded for rainbow trout weighing 349 per pound planted on August 6, 1970. Four percent of rainbow trout of a similar size (333 fish/pound) stocked on June 14, 1971, survived. This lack of survival indicates that 2 months difference in stocking dates may be a critical factor in stocking small fingerlings in a lake containing threespine sticklebacks. The earlier stocking date may allow stocked fish to better adjust to their new environment since food organisms are more abundant during early summer, thus reducing the competition between rainbow trout fingerlings and threespine sticklebacks.

Length-frequency analysis of the 1971 plant and 1972 matching plant indicates that both groups should have been equally susceptible to gillnetting, thus eliminating any sampling bias. The mean length of the 1972 matching plant (200 mm) was almost identical to the 1971 plant of rainbow trout (202 mm). Table 5 lists numbers and percentage of fish by 10 mm length increments for all captured trout.

Redick (1971) noted a marked reduction in catch after the third day of gillnetting which he stated may have been related to a buildup of sampling, eight nets were fished continuously at various locations. In 1972, four nets were initially fished with a marked reduction in catch occurring after the first two days. After the third day, the nets were pulled and cleaned. Three nets were reset four days later and only a slight increase in catch occurred. An additional five nets were set and the catch rate declined. Apparently the decrease in catch rates after the first two days was not associated with algae buildup. Table 6 defines catches, catch rates, and number of rainbow trout available each day to gillnets.

The biomass of rainbow trout in Johnson Lake was calculated by multiplying the average individual weight by the estimated size of the fish population.

TABLE 5 Length-Frequency by Percent of Stocked and Recovered Rainbow Trout, Johnson Lake, 1972.

Length (mm)	1972 Matching Plant*				1971 Plant**			
	Sample of AD Clip		AD Clip Recoveries		Sample of Stocked RT		Stocked RT Recoveries	
	No.	%	No.	%	No.	%	No.	%
Less than 140					2	5.0	3	3.7
141-150	1	1.9	1	1.9	2	5.0	3	3.7
151-160	3	5.5	1	1.9	2	5.0	3	3.7
161-170	3	5.5	3	5.7	2	5.0	12	14.6
171-180	8	14.8	7	13.2	6	15.0	6	7.3
181-190	4	7.4	4	7.5	2	5.0	5	6.1
191-200	5	9.3	8	15.1	2	5.0	4	4.9
201-210	9	16.7	8	15.1	4	10.0	10	12.1
211-220	6	11.1	5	9.4	7	17.5	7	8.5
221-230	10	18.5	10	18.8	4	10.0	11	13.4
231-240	5	9.3	3	5.7	1	2.5	4	4.9
241-250			3	5.7	3	7.5	6	7.3
251-260					2	5.0	4	4.9
261-270							4	4.9
271-280					1	2.5		
TOTALS	54		53		40		82	
Mean Length (mm)	200		203		199		202	
* 242 AD-clipped rainbow trout planted 6/2/72.								
** 12,018 rainbow trout planted 6/14/71.								

TABLE 6 Estimated Numbers of Rainbow Trout Available and Numbers of Trout Caught by Day, Johnson Lake, 1972.

Date	No. Nets Fished	Catch	Catch Rate Fish/Net Hour	Total Est. at Start of Day	Matching 1972 AD Clip	1971 Plant
6/12-13	4	42	0.57	608	239	369
6/13-14	4	26	0.26	566	222	344
6/14-15	4	8	0.08	540	213	327
6/19-20	3	8	0.11	532	209	323
6/20-21	3	13	0.17	524	204	320
6/21-22	8	18	0.10	511	200	311
6/22-23	8	10	0.05	493	194	299
Totals		125			189	294

Results of these calculations are presented in Table 7 which depicts the biomass of age I rainbow trout stocked in June 1971. Trout stocked at a weight of 333 per pound had the largest increase in biomass (0.22 lbs./surface acre) during their first year of growth. Trout weighing 88 per pound showed a decreased biomass of 0.31 pounds per surface acre.

TABLE 7 Biomass of Rainbow Trout in Johnson Lake, June, 1972.

<u>Nos. and lbs. of trout stocked in 1971</u>				<u>Biomass one year after stocking</u>	
<u>No. Stocked</u>	<u>No. Per lb.</u>	<u>Total lb. Stocked</u>	<u>lbs./Surface Acre Stocked</u>	<u>Total lbs.</u>	<u>lbs./Surface Acre</u>
4,419	88	50.2	1.25	37.8	0.94
3,628	96	37.8	0.94	42.2	1.05
3,971	333	11.9	0.30	20.9	0.52
<b>Total</b>		<b>99.9</b>	<b>2.49</b>	<b>100.9</b>	<b>2.51</b>

Rainbow trout stocked in 1969 were still present in 1972 and are part of the total biomass of trout. The number of age III trout present in June 1972 was estimated at 82. This estimate was derived by using a direct proportion between 1969 stocked trout and 1971 stocked trout captured in June 1972. This estimate is considered to be the maximum population size of age III trout since the trout were seeking spawning areas along the shoreline and were more vulnerable to the nets than the age I trout.

Biomass of salmonoid populations varies greatly from one habitat to another. The biomass of rainbow trout in Johnson Lake was estimated at 6.9 pounds per acre. There is presently very little knowledge on the trout biomass in Alaskan lakes. Allin (1955) estimated the biomass of rainbow trout in Daniel Vincent Lake was 6.3 pounds per acre. Baxter (1956) estimated a value of 4.4 pounds per acre for rainbow trout in Honeymoon Lake. Both of these lakes are located on the Kenai Peninsula and contain threespine sticklebacks. For North American lakes and reservoirs, the mean trout biomass was estimated to be about 4 pounds per acre, the maximum being 40 pounds per acre (Bennett, 1962).

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