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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.

## RESEARCH PROJECT SEGMENT

STATE: ALASKA Name: Sport Fish Investigations of Alaska.  
Project No: F-5-R-8 Title: Inventory and Cataloging of the Sport Fish and Sport Fish Waters In the Cook Inlet Drainage.  
Job No: 11-A  
Period Covered: January 1, 1966 to September 15, 1966<sup>1/</sup>

## ABSTRACT

Fourteen lakes were surveyed, 12 of which were located within the Nancy Lake State Recreation Area. Resident game fish populations were found in all but Little Lonely Lake.

A volumetric measurement of Goose Lake was completed.

Nineteen lakes were tested for dissolved oxygen concentrations. Four lakes, two of which have been stocked, were found to have 2.0 ppm or less dissolved oxygen.

Nine stocked lakes were test gill-netted to determine changes in population parameters.

Preliminary sampling of the hooligan Thaleichthys pacificus, migration in the Matanuska River was initiated. Small-mesh gill nets appeared to be the most feasible means of sampling this species.

Winter creel census of stocked lakes within the Matanuska Valley indicated that Big Lake and Finger Lake were the most popular. Dolly Varden Salvelinus malma, and landlocked silver salmon Oncorhynchus kisutch, made up a numerical majority of the catch.

## RECOMMENDATIONS

1. That the inventory and cataloging program be continued.
2. That emphasis be placed on additional physical, biological, and chemical data on lakes and streams within the Nancy Lake State Recreation Area. Specific data needed are:
  - (a) Timing and magnitude of anadromous fish migrations.
  - (b) Volumetric and surface acreage data on those lakes which appear worthy of chemical treatment and stocking with desirable fish species.
  - (c) Number and size of inlets and outlets and feasible locations for fish-tight control structures.
  - (d) Winter dissolved oxygen determinations of all lakes that appear capable of supporting recreational fisheries.
  - (e) Determination of resident fish populations in those lakes which have not yet been inventoried.

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<sup>1/</sup> The biologist in charge of this job was killed in an automobile accident prior to the reporting date. Consequently, portions of this report are fragmentary.

3. That counts of spawning silver salmon be initiated, where feasible, in those streams supporting significant runs of silver salmon. Index areas should be defined where possible.
4. That the investigation of hooligan runs in upper Cook Inlet streams be continued to determine seasonal timing and abundance.
5. That surveys of remote area lakes be continued on a low priority basis.
6. That population sampling in heavily fished managed lakes be continued as necessary to define numerical and size changes in game fish populations.

#### OBJECTIVES

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

#### TECHNIQUES USED

A Hach colorimeter was used for determining dissolved oxygen and pH. Accuracy of dissolved oxygen tests was checked by titration, and pH tests were checked by comparison with standardized buffers.

Population sampling was conducted with 125- by 6-foot, variable mesh (3/4- to 2-inch bar measure), monofilament gill nets. Net sets were overnight and most sets averaged about 24 hours. However, in calculating catch per hour rates, only the hours between sunset and sunrise are considered. This method assumes no fish are caught during the daylight hours and therefore a bias is interjected into the catch rate calculations. The amount of bias is directly correlated to the number of daylight hours in the day. This method of data compilation was used to allow comparisons with gill net sampling completed in past years.

Volumetric measurements on ice covered lakes were made by use of surveyor's chain, transit and stadia, and sounding lines. Depths were measured during summer months by a Ross battery-operated fathometer.

Hooligan populations were sampled with dip nets, a 50-foot beach seine, and small-mesh gill nets.

Creel census checks were random with emphasis placed on lakes where the greatest number of anglers were observed during prior creel checks. Principal data collected were species composition and size of fish caught. No attempt was made to estimate total angler effort or harvest.

#### FINDINGS

Fourteen lakes were surveyed during the current reporting period. Population sampling results for all surveyed lakes are shown in Table 1.

#### Nancy Lake Recreation Area

Emphasis was placed on lakes located within the Nancy Lake State Recreation Area. The Nancy Lake Recreation Area is the State of Alaska's first State park and was created by the 1966 Alaska Legislature.

TABLE 1 - Population Sampling Data from Matanuska Valley Lakes Surveyed During 1966,

Lake	Location	Species	Total Catch	Range (mm)	Mean Length		Total Nets	Night Hrs/Net*	Frequency**	Percent Composition		
					(mm)	(inches)						
Milo #1	T 18N	RB	5	374 - 483	440	17.3	2	5.0	0.50	33		
	R 5W	SS	3	153 - 234	191	7.5					0.30	20
	S 12	LNS	7								0.70	47
Lynx	T 18N	WF	22	203 - 407	292	11.5	2	4.75	2.31	48		
	R 4W	RB	9	224 - 409	333	13.1					0.95	20
	S 19	LNS	15								1.58	32
North Rolly	T 18N	RB	24	168 - 468	264	10.4	2	4.75	2.53	100		
	R 5W											
	S 2											
South Rolly	T 18N	RB	10	173 - 356	277	10.9	2	4.75	1.05	91		
	R 5W	LNS	1	305	305	12.0					0.11	9
	S 11											
Bald	T 18N	RB	1	366	366	14.4	1	4.75	0.21	8		
	R 4W	SS	12	181 - 366	224	8.8					2.53	92
	S 5											
James	T 18N	RB	4	427 - 496	468	18.2	2	4.75	0.42	57		
	R 5W	SS	3	158 - 216	178	7.0					0.32	43
	S 24											
Frazer	T 18N	RB	9	160 - 437	305	12.0	2	4.75	0.95	82		
	R 4W	WF	2	323 - 442	381	15.0					0.21	18
	S 17											
Chicken	T 18N	SS	25	168 - 234	203	8.0	2	4.75	2.63	100		
	R 5W											
	S 24											
Rhein	T 18N	RB	11	229 - 427	328	12.9	2	4.75	1.16	100		
	R 5W											
	S 1											

171

TABLE 1 - Population Sampling Data from Matanuska Valley Lakes Surveyed During 1966 (Continued).

Lake	Location	Species	Total Catch	Range (mm)	Mean Length		Total Nets	Night Hrs/Net*	Frequency**	Percent Composition
					(mm)	(inches)				
Little Lonely	T 19N R 5W S 26		None				1	4.75	0.00	
Butterfly	T 17N	RB	3	249 - 433	353	13.9	2	4.75	0.32	11
	R 5W	WF	2	219 - 356	287	11.3			0.21	8
	S 1	LNS	21						2.21	81
Buckley #2	T 18N R 4W S 32	SS	1	427	427	16.8	1	4.75	0.21	100
Alexander	T 19N	WF	54	188 - 381	353	13.9	3	5.5	3.27	22
	R 9W	RB	1	356	356	14.0			0.06	
	S --	LNS	196						11.88	78
Judd	T 17N	DV	17	269 - 452	369	14.5	3	5.5	1.03	35
	R 13W	WF	18	266 - 406	353	13.9			1.09	37
	S --	LNS	13						0.79	26
		BB	1	574	574	22.6			0.06	2

\* Total hours from sunset to sunrise.

\*\* Catch per night hour per net.

RB - Rainbow      SS - Silver Salmon      LNS - Long Nose Sucker      WF - Whitefish      DV - Dolly Varden      BB - Burbot (Ling Cod)

The unit is 28 air miles north of Anchorage and encompasses approximately 15,000 acres (Figure 1). There are 79 lakes and ponds within the unit.

During 1966, preliminary survey work was completed on 12 lakes within the recreation area. Morphometric information on the 12 lakes is presented in Table 2. Nine lakes totaling 1,251 surface acres were classified as primary sport fisheries. Lakes in this classification are judged to be capable of withstanding the greater fishing effort which would result from increased accessibility and developed camping areas.

The remaining three lakes investigated in 1966 total 271 surface acres and are classified as secondary sport fisheries.

Secondary lakes are lakes believed capable of supporting an increased fishery either after chemical rehabilitation and stocking, or by annual stocking if now barren of desirable game fish.

Sixty-five lakes and ponds remain to be surveyed and classified within the recreation unit. Nancy Lake and Red Shirt Lake, the two largest lakes within the unit, were surveyed in prior studies (Andrews, 1959), and are classified as primary sport fisheries.

#### Remote Lakes

Alexander and Judd Lakes were the only lakes surveyed which are not located in the Nancy Lake State Recreation Area.

Alexander Lake was found to contain dense populations of whitefish Coregonus spp., and longnose suckers Catostomus catostomus. Access is by air or by riverboat up Alexander Creek via the Susitna River. Maximum depth was found to be only eight feet with the bottom composed of silt. Good spawning gravel was present in all four inlet streams. This lake apparently serves as a summer forage area for migrant fish populations. It has little value as a site for recreational fishing.

Judd Lake, accessible only by air, was found to contain sizable populations of Dolly Varden and whitefish. The lake is also utilized by spawning red salmon Oncorhynchus nerka. Good spawning gravel is present in both the inlet streams and in the outlet. Good angling for rainbow Salmo gairdneri, grayling Thymallus arcticus, and Dolly Varden was found in those areas. At the present rate of recreational utilization of our waters, Judd Lake can expect little increase in angler use during the next few years.

#### Accessible Lakes

A summary of population sampling in stocked lakes by variable mesh gill nets is presented in Table 3. Nine stocked lakes were sampled during the current reporting period to define population changes and trends. Variability in size and number of fish caught from year to year reflects changes in stocking and harvest rates. Cumulative sampling data is a principal tool used in making hatchery stocking recommendations.

It should be noted in Table 3 that test netting was done during periods of few night hours; therefore, significant bias exists in the catch rate summaries.

Volumetric measurements were made on Goose Lake. This lake was found to have a maximum depth of 14 feet, a surface area of 16.8 acres and contain 84.7 acre feet of water. Figure 2 depicts a depth contour map of Goose Lake.

Nineteen lakes were tested for dissolved oxygen during late winter and the results are summarized in Table 4. Four lakes, Irene, Gooding, Goose and Reedy Lakes, were found to contain 2.0 ppm or less dissolved oxygen.

Data collected in 1966 from Irene Lake are comparable to data collected in prior years. McGinnis (1965, 1966) reported this lake contained less than 2.0 ppm dissolved oxygen during both 1964 and 1965. Irene Lake has been irregularly planted with rainbow and grayling since 1958 and, despite consistent low dissolved oxygen concentrations, over-winter survival has been repeatedly demonstrated by gill netting.

Gooding Lake has maintained higher dissolved oxygen levels in past years with concentrations in excess of 5.0 ppm recorded in both 1963 and 1964 (McGinnis, 1965, 1966). This

Figure 1. Nancy Lake State Recreation Area.

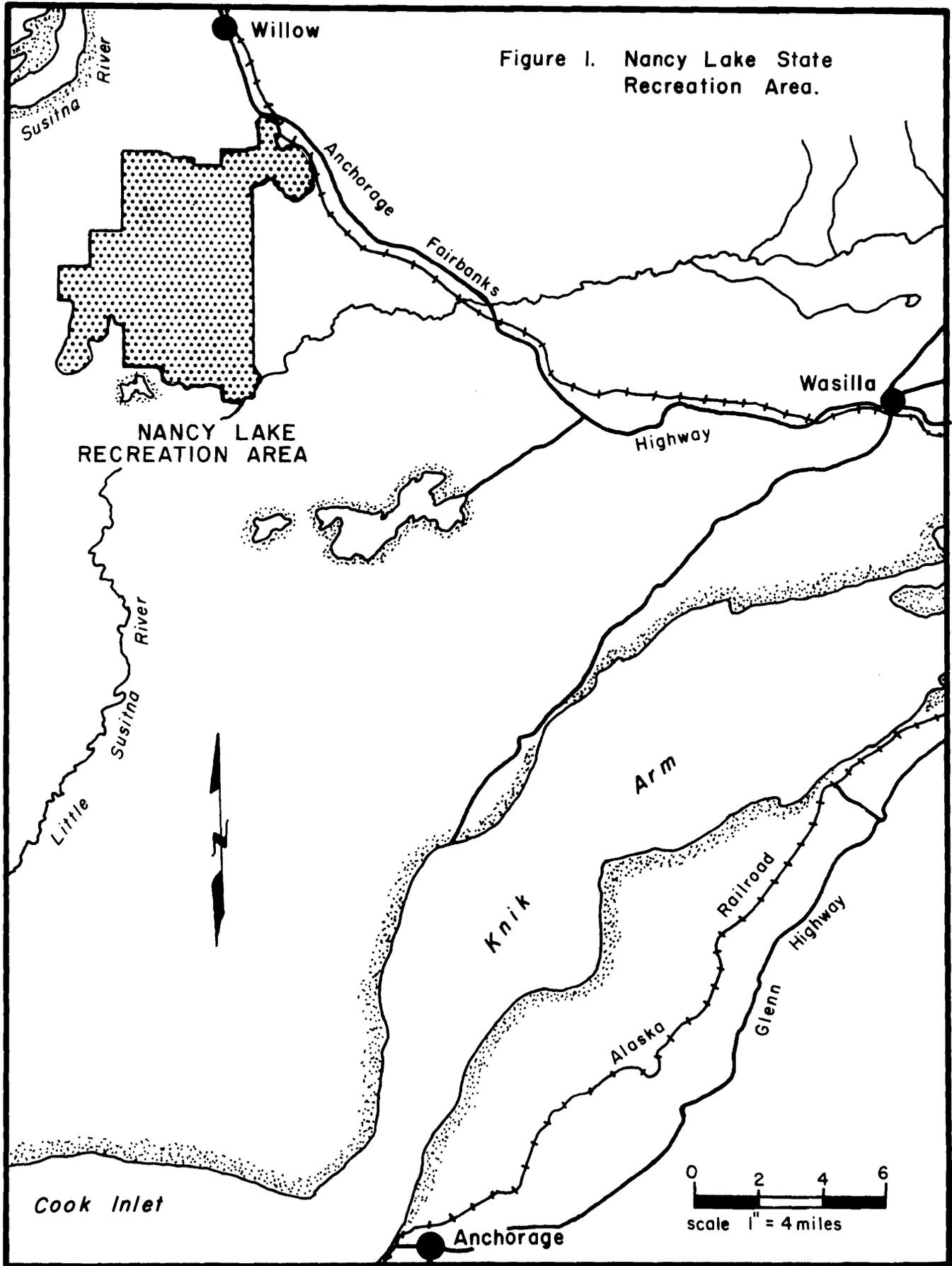


TABLE 2 - Preliminary Morphometric Data from Lakes Surveyed Within Nancy Lake State Recreation Area, 1966.

<u>Name</u>	<u>Classification</u>	<u>Surface Acreage</u>	<u>Maximum Recorded Depth</u>	<u>Inlets</u>	<u>Outlets</u>
Milo #1	Primary	105	95	Yes	Yes
South Rolly	Primary	113	59	Yes	Yes
North Rolly	Primary	118	39	Several	Unknown
Lynx	Primary	315	50	4	2
Bald	Primary	35	Not Recorded	None	Yes
Frazer	Primary	70	25	Yes	Yes
Rhein	Primary	80	34	Yes	Yes
Chicken	Secondary	138	25	Yes	Yes
James	Primary	105	26	Yes	Marsh Seepage
Butterfly	Primary	310	20	3	Marsh Seepage
Little Lonely	Secondary	40	58	None	Marsh Seepage
Buckley #2	Secondary	93	15	Yes	Yes

175

TABLE 3 - Population Trends in Stocked Matanuska Valley Lakes as Defined by Variable Mesh Monofilament Gill Nets, 1966.

Lake	Species	Total Catch	Range (mm)	Mean Length		Total Nets	Night Hrs/Nets*	Frequency**	Percent Composition
				(mm)	(inches)				
Bonnie	RB	53	127 - 445	247	9.7	2	10.5	2.52	100
Echo	RB	7	236 - 445	313	12.3	2	9.0	0.39	87
	SS	1	209	209	8.2			0.05	13
Falk	RB	16	280 - 351	323	12.7	2	9.0	0.89	84
	SS	3	252 - 287	267	10.5			0.17	16
Finger	RB	3	391 - 572	518	20.4	4	10.25	0.07	8
	SS	36	117 - 559	229	9.0			0.88	92
176 Long (Mile 86)	GR	27	290 - 450	325	12.8	2	10.5	1.28	96
	BB	1	323	323	12.7			0.05	4
Meirs		0				2	9.0	0.00	
Ravine	RB	13	219 - 363	297	11.7	2	10.5	0.62	100
Rocky	RB	10	203 - 376	290	11.4	2	10.5	0.48	100
Wiener	RB	1	435	435	17.1	2	5.0	0.10	17
	DV	5	168 - 280	234	9.2			0.50	83

\* Total hours from sunset to sunrise.  
 \*\* Catch per night hour per net.

RB - Rainbow Trout    SS - Silver Salmon    GR - Grayling    BB - Burbot    DV - Dolly Varden

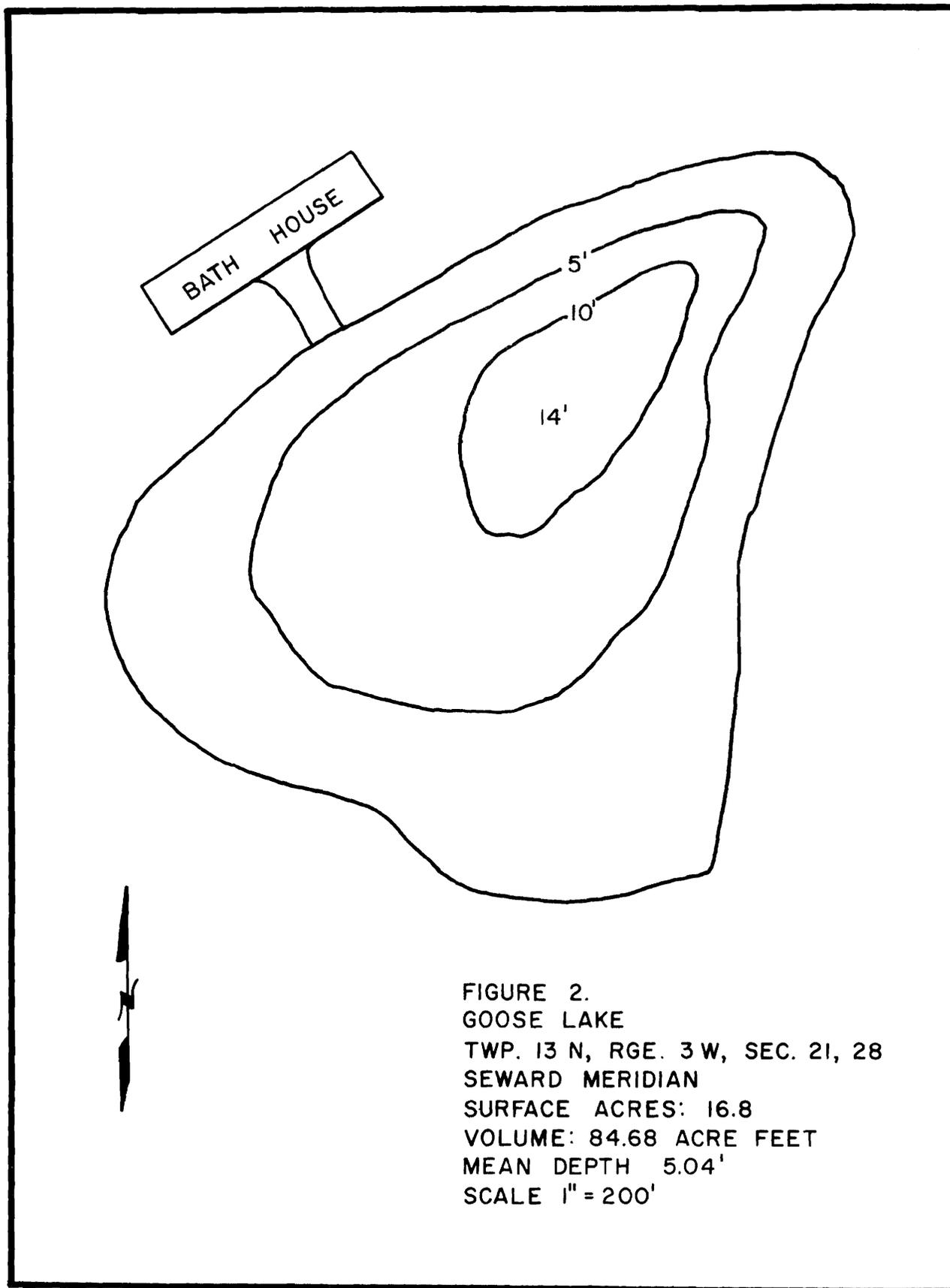


FIGURE 2.  
GOOSE LAKE  
TWP. 13 N, RGE. 3 W, SEC. 21, 28  
SEWARD MERIDIAN  
SURFACE ACRES: 16.8  
VOLUME: 84.68 ACRE FEET  
MEAN DEPTH 5.04'  
SCALE 1" = 200'

TABLE 4 - Lakes Tested for Dissolved Oxygen and pH Levels, 1966.

Name	Date	Location			Depth of:		O2 Sample		pH
		Township	Range	Section	Snow	Ice	Depth	ppm	
Nancy	2/25/66	18N - 19N	4W	3, 4, 28, 33, 34	8"	35"	5' 10' 15'	6.6 6.6 5.1	6.8
Goose	3/14/66	13N	3W	21, 28	20"	37"	5'	0.3	6.0
Canoe	3/15/66	17N	1E	13	4"	41"	5' 10' 20'	5.1 5.2 1.4	7.4
Irene	3/15/66	17N	1E	13	4"	40"	5' 10' 20'	1.5 1.2 0.8	7.3
178 Echo	3/16/66	17N	1E	24	6"	42"	5' 10'	4.5 4.5	7.2
Kepler-Bradley	3/16/66	17N	1E	23, 24	8"	38"	5' 10'	4.8 4.3	6.8
Long (Kepler Area)	3/17/66	17N	1E	13, 14	6"	43"	5' 10'	5.8 5.1	7.0
Triangle	3/17/66	17N	1E	13, 14, 23 24	6"	40"	5' 10'	3.3 3.7	7.2
Lucille	4/1/66	17N	1W	8, 9	1"	42"	5' 10'	4.3 4.1	6.9
Finger	4/1/66	17N	1E	4, 33, 34	0	38"	5' 10'	6.8 4.7	6.8
Memory	4/1/66	18N	1W	22, 23 26, 27	1"	42"	5' 10'	5.0 5.0	6.5
Gooding	4/1/66	18N	1E	22, 23 26, 27	1"	40"	5' 10'	2.0 0.5	6.5

TABLE 4 - Lakes Tested for Dissolved Oxygen and pH Levels, 1966 (Continued).

Name	Date	Location			Depth of:		O <sub>2</sub> Sample		pH
		Township	Range	Section	Snow	Ice	Depth	ppm	
Reedy	4/1/66	18N	1E	8	1"	42"	5'	0.9	6.3
							10'	0.8	
Falk	4/6/66	17N	2E	14	4"	40"	5'	5.1	6.5
							10'	4.0	
Lynn	4/7/66	19N	4W	19	2"	30"	5'	8.4	7.1
							10'	6.0	
Ravine	4/8/66	20N	6E	19	5"	46"	5'	4.6	6.5
							10'	3.8	
Bonnie (Lower)	4/8/66	20N	6E	19, 20	4"	42"	5'	6.5	6.5
							10'	5.3	
Wiener	4/9/66	20N	7E	22	4"	39"	5'	3.7	6.8
							10'	3.1	
Long (Mile 86)	4/9/66	20N	7E	20, 21	2"	44"	5'	5.9	6.5
							10'	4.7	

lake was unsuccessfully stocked in 1964 with grayling fry. The failure of the plant may have been due to insufficient dissolved oxygen or competition from an indigenous three-spine stickleback Gasterosteus aculeatus, population.

Goose Lake was tested for the first time in 1966.

Reedy Lake was tested in 1962 (McGinnis, 1963) and 0.7 ppm dissolved oxygen was recorded. Neither Goose Lake nor Reedy Lake has ever been planted with game fish.

Sampling of the hooligan Thaleichthys pacificus, run in the Matanuska River was initiated in 1966. Preliminary sampling was directed primarily toward developing sampling methods and determining the migratory period for hooligan in Matanuska Valley streams.

Hooligan could not be captured with either seines or dip nets. Small mesh gill nets appear to be the best means of sampling hooligan in Matanuska Valley streams. Gill net catches of hooligan from Matanuska River are summarized in Table 5. Variation in sampling methods precluded compilation of a catch per net hour rate. The reason for the high percentage of males in the catch is unknown but may indicate a difference in migratory timing for each sex.

TABLE 5 - Gill Net Catches of Hooligan from the Matanuska River, 1966.

<u>Date</u>	<u>Total Catch</u>	<u>Sex Ratio in Percent</u>	
		<u>Male</u>	<u>Female</u>
5/13-18	None		
5/19	27	100	
5/20	136	94.9	5.1
5/21	153	91.5	8.5
5/22	High tide prevented checking net		
5/23	64	85.9	14.1
5/24	18	100	0.0

Ninety-five creel census checks were made on 14 Matanuska Valley lakes during the winter ice fishery. Fifty-five creel checks revealed no anglers present. In the remaining 50 creel checks, anglers were present but may not have made catches.

Of the lakes censused, Big and Finger Lakes were the most heavily fished. As shown in Table 6, 20 creel census checks of these two lakes showed anglers were present on 17 occasions.

Sample sizes are limited but the data indicated that the catch rate improved and the percentage of rainbow in the catch declined as the winter progressed. The reason for these trends is unknown but may be due to sampling variation.

TABLE 6 - Winter Creel Census of Two Matanuska Valley Lakes, 1966.

Lake	Month	Census Checks	Times Anglers Present	Total Anglers	Species	Mean Length		Percent Composition	Fish/Hour
						(mm)	(inches)		
Big	January	4	3	17	RB	292	11.5	18.2	0.16
					DV	267	10.5	81.8	
	February	5	5	12	RB	292	11.5	12.5	0.50
					DV	269	10.6	87.5	
	March	1	1	3	RB	None	None	100	0.33
					DV	280	11.0		
Finger	January	5	3	28	RB	546	21.5	40.0	0.07
					SS	132	5.2	60.0	
	February	3	3 21	RB	437	17.2	36.8	0.38	
					SS	366	14.4	63.2	
	March	2	2	15	RB	191	7.5	33.0	0.40
					SS	346	13.6	67.0	

RB - Rainbow Trout      DV - Dolly Varden      SS - Silver Salmon

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