

SH  
11  
A73  
A4  
V. 11

STATE OF ALASKA

William A. Egan, Governor



ANNUAL REPORT OF PROGRESS, 1969 - 1970

FEDERAL AID IN FISH RESTORATION PROJECT F-9-2

SPORT FISH INVESTIGATIONS OF ALASKA

ALASKA DEPARTMENT OF FISH AND GAME

Wallace H. Noerenberg, Commissioner

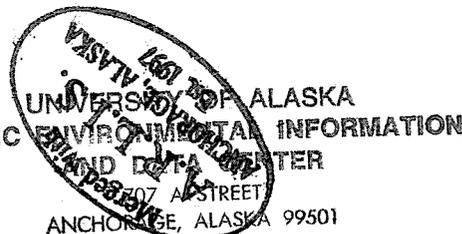
*Alaska* DIVISION OF SPORT FISH

Rupert E. Andrews, Director

Howard E. Metsker, Coordinator

**ARLIS**

Alaska Resources  
Library & Information Services  
Anchorage Alaska



3 3755 000 85595 7

## INTRODUCTION

This report of progress consists of Job Segment Reports from the State of Alaska, Federal Aid In Fish Restoration, Project F-9-2, "Sport Fish Investigations of Alaska".

The studies reported herein are investigations evaluating the sport fish resources of the state. Recreational and other impacts on the fishery resources necessitates a continuous endeavor of ascertaining facts and knowledge of the fisheries. The 24 jobs reported on are of a continuing nature. The investigations are composed of 11 projects involved with the inventory and cataloging of the sport fish waters of the state, sport fishery creel censuses, and access. Fish species that received special investigational effort include: Dolly Varden, anadromous fish, grayling, sheefish, whitefish, pike, char, and salmon. The information gathered from the combined studies provides necessary background data for a better understanding of management problems and constitutes a basis for necessary future investigations.

The subject matter contained in these reports is incomplete, and the findings and interpretations subject to re-evaluation as work progresses.

## RESEARCH PROJECT SEGMENT

*State:* Alaska

*Project No.:* F-9-2

*Name:* Sport Fish Investigations of Alaska.

*Job No.:* 1-A

*Title:* Inventory and Cataloging of the Sport Fish and Sport Fish Waters in Southeast Alaska.

*Period Covered:* July 1, 1969 to June 30, 1970.

## ABSTRACT

The inventory and cataloging of Southeast Alaska waters was continued in 1969, with emphasis placed on determination of sport fishing potential of lakes reasonably accessible from population centers.

Fifty-four lakes were examined; fifteen were planted with rainbow trout, Salmo gairdneri, and four were planted with Arctic grayling, Thymallus arcticus. Stocking recommendations for seven additional lakes have been submitted.

A small sample of spawning kokanee, Oncorhynchus nerka, taken at Thayer Lake confirmed the success of establishing a population of the species by adult transplants into a lake inhabited by Dolly Varden, Salvelinus malma, and cutthroat trout, Salmo clarki.

## RECOMMENDATIONS

1. Further evaluate the kokanee transplant in Thayer Lake.
2. Increase inventory and cataloging efforts in areas of anticipated multiple use, emphasizing recent findings regarding the importance of rearing areas in trout and salmon streams.
3. Continue the evaluation of stocking projects and surveillance of fish populations in lakes and streams receiving angling pressure and in areas of increasing demand.
4. Critically evaluate locations for suitability for life history studies on cutthroat trout, steelhead trout, and king salmon.

## TECHNIQUES USED

Information and results obtained from prior studies were used for directing some phases of the work activity.

Fish population sampling, water chemistry determinations, and accumulation of related biological and physical survey data was accomplished by standard techniques as discussed in previous reports (Heckart, 1966).

Multiple-use activities affecting the sport fish stocks and the biological environment were monitored and recommendations made to various authorities as warranted.

Complete files of field data obtained during the 1969-70 fiscal year are maintained in the respective Sport Fish Division field offices and the Headquarters office.

## FINDINGS

### Upper Southeast Alaska

The upper southeast area includes an approximate 30,000 square-mile area which encompasses the major communities of Juneau, Sitka, Wrangell, Petersburg, Haines, Skagway, and Yakutat.

Major investigations and management emphasis was in the area of the larger population centers of Juneau, Sitka, and Petersburg. The degree of survey and investigational work conducted on any lake or stream was governed by current management needs, with cognizance of potential demands through road and trail extensions, or angler requests.

Waters more than 50 miles from the population centers were generally given lower priority for survey work as these lakes and streams support less angling pressure due to the cost of transportation.

#### Kokanee Studies:

Thayer Lake, located on Admiralty Island, was sampled in September, 1969, to evaluate the success of the adult kokanee salmon transplant program completed in 1967 (Heckart, 1967).

Fyke nets were fished for a total of 144 hours in 1968 and captured one adult kokanee. In 1969 nets were fished for a total of 720 hours in an attempt to capture spawning kokanee which as three-year-old spawners would represent the progeny of the 1,105 adults transplanted in 1966. A total of eight mature kokanee, six males and two females, was captured. In addition to the eight kokanee, a total of 212 cutthroat trout, Salmo clarki (Richardson), and 180 Dolly Varden, Salvelinus malma (Walbaum), were captured and released.

With the capture of the eight kokanee, it appears that a small population of kokanee salmon is becoming established in Thayer Lake. Continued annual sampling is recommended to monitor the growth and development of this kokanee population.

#### Lake Investigations:

Survey work was conducted on 33 lakes in Upper Southeast Alaska during the 1969 field season. Of these lakes, 11 received initial surveys under the program of basic inventory and cataloging. The remaining 22 lakes were re-evaluated to determine the current effects of angling, the success of previous stockings, and related biological information. The names and locations of those lakes receiving initial surveys are presented in Table 1.

Presented in Table 2 is a summation of 33 lakes sampled for fish populations analyzed in Upper Southeast Alaska during the 1969 field season. Variable mesh monofilament gill nets were used for sampling. Nets were

normally fished for 48 hours. The intent of the test netting was to capture a sample of the existing fish population for biological analysis and for determination of the suitability of the population for recreational fishing.

TABLE 1 Initial Lake Surveys, Upper Southeast Alaska, 1969.

	<u>Location</u>	<u>Latitude</u>	<u>Longitude</u>	<u>Quadrangle</u>
SITKA AREA:				
Klag Bay*	Chichagof Island	57°39'N	136°04'W	Sitka C-6
Lower Big Bay*	Baranof Island	56°50'N	135°18'W	P. Alex D-4
Upper Big Bay*	Baranof Island	56°51'N	135°18'W	P. Alex D-4
Upper Starrigavan*	Baranof Island	57°07'N	135°17'W	Sitka A-4
PETERSBURG:				
Boot*	Kupreanof Island	56°57'N	133°50'W	Petersburg D-6
Fall	Bradfield Canal	50°16'N	131°40'W	Bradfield C. B-5
Glory	Farragut Bay	57°19'N	133°56'W	Sumdum B-3
Government Creek	Stikine River	56°37'N	132°14'W	Petersburg C-1
Farragut	Farragut Bay	57°15'N	132°57'W	Sumdum B-3
Lower Harding*	Bradfield Canal	56°14'N	131°40'W	Bradfield C. A-5
Sherman Peak*	Kupreanof Island	56°54'N	133°02'W	Petersburg D-4

\*Unofficial Name

#### Fish Stockings:

A total of ten lakes in Upper Southeast Alaska was stocked during 1969, in which nine lakes received plants of rainbow trout and one lake received Arctic grayling. Lakes stocked during 1969 are presented in Table 3.

Two barren lakes and five lakes already in production are recommended for fish plants in 1970. These lakes, their locations, and the recommended species of fish to be stocked are presented in Table 4.

#### Petersburg Area Creel Census, 1969:

A creel census program to assess the sport fish harvest in the Petersburg area streams was conducted during August and September. Petersburg Creek on Kupreanof Island and Falls Creek and Blind Slough on Mitkof Island received good runs of coho, Oncorhynchus kisutch (Walbaum), and pink salmon, O. gorbuscha (Walbaum), with lesser numbers of chum salmon, O. keta (Walbaum). Anadromous Dolly Varden and cutthroat trout were abundant in two of the systems, Petersburg Creek and Blind Slough. These three streams support the majority of the freshwater sport fishing effort in the Petersburg area and were selected for the census study. Falls Creek and Blind Slough, adjacent to the Mitkof Highway, are accessible by automobile and Petersburg Creek is easily accessible by small skiff.

Petersburg Creek is located on Kupreanof Island one-half mile across the Wrangell Narrows from the town of Petersburg. The most popular and productive fishing area of Petersburg Creek is the intertidal area

TABLE 2 Test Netting Summaries, Upper Southeast Alaska, 1969.

<u>Lake Name</u>	<u>Species*</u>	<u>No. of Fish</u>	<u>Length Range Centimeters</u>	<u>Mean Length Centimeters</u>	<u>Catch Frequency**</u>	<u>% Comp</u>
Baranof Island:						
Beaver	GR	25	10.6 - 31.8	18.3	1.04	100
Blue	RT	33	10.9 - 26.7	14.4	1.60	100
Eagle	RT	27	11.8 - 25.2	16.3	1.35	73
	DV	10	12.2 - 21.3	18.3	0.50	27
Green	B	34	12.7 - 25.4	19.3	0.55	100
Hart	B	72	13.9 - 26.7	20.1	2.11	100
Pass	RT	54	11.9 - 35.3	23.6	1.50	100
Salmon	DV	23	11.4 - 50.0	25.9	0.63	42.6
	CT	8	13.2 - 33.0	23.4	0.02	14.8
	RS	23	10.2 - 12.2	11.2	0.63	42.6
Starrigavan Peak	No Fish Taken					
Swan	CT	9	23.2 - 30.6	25.4	0.60	81
	DV	2	26.4 - 36.0	31.2	0.16	19
Thimbleberry	B	48	12.0 - 26.5	18.9	4.00	100
Baranof	CT	32	12.0 - 33.0	25.4	0.76	100
Biorka Island:						
Biorka	RT	3	29.9 - 31.7	30.9	0.12	100
Chichagof Island:						
Klag Bay	DV	37	14.5 - 40.6	22.6	1.32	45.1
	CT	27	11.9 - 34.1	23.1	1.03	32.9
	RS	18	47.7 - 65.1	56.4	0.64	22.0
Kruzof Island:						
Surprise	No Fish Taken					
Admiralty Island:						
Eliza	DV	23	13.9 - 46.7	27.4	0.47	100
Partofshikof Island:						
Partofshikof	No Fish Taken					
Mainland - Skagway:						
Lower Dewey	RT	67	11.4 - 27.9	17.8	2.00	100

TABLE 2 (Cont.) Test Netting Summaries, Upper Southeast Alaska, 1969.

<u>Lake Name</u>	<u>Species*</u>	<u>No. of Fish</u>	<u>Length Range Centimeters</u>	<u>Mean Length Centimeters</u>	<u>Catch Frequency**</u>	<u>% Comp</u>
Mainland - Petersburg-Wrangell:						
Anan	CT	10	18.8 - 28.2	23.8	0.20	55
	DV	1	---	13.2	0.02	7
	KK	4	12.2 - 15.7	13.2	0.08	22
Boulder	CT	41	17.8 - 34.0	26.0	0.85	67
	DV	1	---	14.0	0.02	2
	SS	19	Smolts		0.39	31
DeBoer	RT	60	10.1 - 41.9	18.8	0.62	100
Fall	DV	86	12.7 - 44.4	21.6	1.79	100
Glory	DV	53	10.9 - 19.1	14.2	0.55	100
Goat	RT	5	24.8 - 34.3	29.7	0.05	100
Government Creek	DV	30	11.2 - 49.3	16.0	0.62	20
	KK	113	12.2 - 16.3	14.7	2.35	80
Lower Harding	CT	9	13.5 - 27.9	20.6	0.02	57
	SS	7	Smolts		0.02	43
Farragut	DV	90	10.6 - 15.7	12.9	1.87	100
Spurt	RT	45	9.4 - 29.2	16.8	0.07	100
Tyee	GR	42	17.8 - 34.3	23.8	0.87	100
Kupreanof Island:						
Boot	No Fish Taken					
Petersburg	CT	18	13.5 - 40.1	25.1	0.37	29
	DV	3	20.3 - 43.2	31.0	0.06	5
	RS	39	33.0 - 66.0	50.8	0.81	63
	SS	1	Smolts		0.01	3
Sherman Peak	No Fish Taken					
Mitkof Island:						
Crane	CT	16	12.2 - 32.0	24.7	0.33	72
Kosciusko Island:						
Shipley	DV	38	17.5 - 34.5	26.1	0.79	86
	RT	1	---	34.3	0.02	3
	RS	5	56.6 - 64.5	57.1	0.10	11

\*DV - Dolly Varden; RT - Rainbow trout; CT - Cutthroat trout; GR - Grayling; KK - Kokanee; SS - Silver Salmon; RS - Red Salmon; B - Brook trout.

\*\*Fish catch per hour in 125' variable mesh gill net.

TABLE 3 Lake Stockings, Upper Southeast Alaska, 1969.

<u>Lake</u>	<u>Location</u>	<u>Species</u>	<u>Number</u>
Sitka Area:			
Partofshikof	Partofshikof Island	Grayling	7,900
Biorka	Biorka Island	Rainbow	3,500
Dianne	Baranof Island	Rainbow	2,700
Swan	Baranof Island	Rainbow	15,050
Petersburg:			
Spurt	Thomas Bay	Rainbow	23,850
Goat	Stikine River	Rainbow	13,100
Juneau Area:			
Q.T.	Mendenhall Flats	Rainbow	2,000
Louie	Mendenhall Flats	Rainbow	2,000
Norton	Mendenhall Flats	Rainbow	4,000
Marshall	Mendenhall Flats	Rainbow	2,000

TABLE 4 Fish Stocking Recommendations, Upper Southeast Alaska, 1970.

<u>Lake</u>	<u>Location</u>	<u>Species</u>
Sitka:		
Swan	Baranof Island	Rainbow
Biorka	Biorka Island	Rainbow
Surprise	Kruzof Island	Rainbow
Partofshikof	Partofshikof Island	Grayling
Petersburg:		
Boot	Kupreanof Island	Rainbow
Sherman Peak	Kupreanof Island	Rainbow
Spurt	Thomas Bay	Rainbow

which extends nearly two miles upstream from Wrangell Narrows. The fishing success in this intertidal area varies with the tide level, with the best catches occurring two hours before to two hours after low water.

The creel census of sport fishermen was initiated the first week in August and continued until September 20. Census was conducted on two randomly selected weekdays and one weekend day each weekly period. The census was conducted twice daily, once during high tide and again at low water. Although some fishing effort occurred for steelhead trout, red salmon, pink salmon, cutthroat trout, and Dolly Varden before the first of August, the major effort was for coho salmon during August and September.

Fisherman success on Petersburg Creek was fair to good in August with pink salmon, cutthroat trout, and Dolly Varden comprising most of the catch. The numbers of coho salmon increased during early September and fishing remained good throughout the census period which ended September 20. Table 5 presents creel census summaries by weekly periods for Petersburg Creek.

**TABLE 5** Petersburg Creek Creel Census Summaries by Weekly Period, 1969.

<u>Weekly Period</u>	<u>No. of Anglers</u>	<u>No. of Hours</u>	<u>Fish Caught</u>				<u>Fish/ Hour</u>	<u>Fish/ Angler</u>
			<u>SS</u>	<u>PS</u>	<u>CT</u>	<u>DV</u>		
8/ 3-8/ 9	11	37	1	13	3	16	0.89	3.00
8/10-8/16	13	37	1	8	13	22	1.18	3.38
8/17-8/23	2	4	--	4	3	2	2.25	4.50
8/24-8/30	24	74	8	--	22	24	0.72	2.25
8/31-9/ 6	22	85	21	--	18	15	0.63	2.45
9/ 7-9/13	14	49	24	--	--	--	0.49	1.71
9/14-9/20	<u>37</u>	<u>127</u>	<u>33</u>	<u>--</u>	<u>3</u>	<u>--</u>	<u>0.28</u>	<u>0.97</u>
Totals	123	413	88	25	62	79	0.61	2.06

Falls Creek crosses the Mitkof Highway at Milepost 9. The most popular fishing area begins 300 feet below the fish ladder and extends approximately one-half mile out on the tide flats. As this area is intertidal, fishing success is closely related to tide level. Anglers fishing from the shore are most successful from two hours before to two hours after high tide. Fishermen fishing from skiffs are most successful just before to just after low tide.

Falls Creek receives an early run of coho salmon with fish present from late June to early September. The pink salmon return to Falls Creek in 1969 was very poor. Together with the poor showing of coho, this resulted in very little fishing effort expended. Unlike Petersburg Creek and Blind Slough, very few anadromous Dolly Varden and cutthroat trout are present in the intertidal area of Falls Creek. Without the trout to take up some of the slack caused by the poor salmon runs, the catch per angler at Falls Creek was considerably less than that for Petersburg Creek and Blind Slough.

Creel census at Falls Creek was conducted on the same random schedule as Petersburg Creek from the first week in August until the termination of the census on September 20. Census was conducted twice daily, once by skiff at low water on Wrangell Narrows and again by vehicle at high tide adjacent to the Mitkof Highway. Fisherman success was poor throughout August and had stopped entirely by mid-September when all the coho salmon had moved on upstream. Table 6 summarizes the creel census on Falls Creek.

**TABLE 6** Falls Creek Creel Census Summaries by Weekly Period, 1969.

<u>Weekly Period</u>	<u>No. of Anglers</u>	<u>No. of Hours</u>	<u>Fish Caught</u>		<u>Fish/ Hour</u>	<u>Fish/ Angler</u>
			<u>SS</u>	<u>PS</u>		
8/ 3-8/ 9	0					
8/10-8/16	8	14	5	-	0.35	0.62
8/17-8/23	18	38	3	-	0.07	0.16
8/24-8/30	11	23	1	2	0.13	0.27
8/31-9/ 6	3	6	-	-		
9/ 7-9/13	5	11	2	-	0.18	0.40
9/14-9/20	<u>2</u>	<u>4</u>	<u>-</u>	<u>-</u>	<u>    </u>	<u>    </u>
Totals	47	96	11	2	0.13	0.27

Blind Slough is adjacent to the Mitkof Highway from Milepost 14 to Milepost 22 and can be reached by walking a short distance from the highway. The most popular and productive fishing area is the "rapids", an intertidal area approximately one mile above Wrangell Narrows. The "rapids" are reached either by a one-quarter mile foot trail that leaves the Mitkof Highway at Milepost 14, or by skiff at high tide. Fish are present in the "rapids" area at all tide levels as salmon and trout move in and out with the tide. Blind Slough receives a good run of coho salmon that enter the lower areas of the slough in late August and peak in abundance in mid-September. The chum salmon run to Blind Slough in 1969 was light and did not add materially to the sport fishing. Anadromous Dolly Varden and cutthroat trout are present in the slough throughout the year and reach their peak of abundance during the fall salmon runs.

Blind Slough was censused from the first week in August to September 20 on the same random schedule as Petersburg and Falls creeks. The census was conducted twice each day, once via skiff at the mouth of Wrangell Narrows and again at high tide at the "rapids". Fishing success was poor during early August, but improved and reached a peak during mid-September as shown in Table 7.

**TABLE 7** Blind Slough Creel Census Summaries by Weekly Period, 1969.

<u>Weekly Period</u>	<u>No. of Anglers</u>	<u>No. of Hours</u>	<u>Fish Caught</u>				<u>Fish/ Hour</u>	<u>Fish/ Angler</u>
			<u>SS</u>	<u>CS</u>	<u>CT</u>	<u>DV</u>		
8/ 3-8/ 9	2	2	--	1	6	4	5.50	5.50
8/10-8/16	0							
8/17-8/23	12	27	14	--	2	2	0.66	1.50
8/24-8/30	33	94	15	1	13	21	0.53	0.51
8/31-9/ 6	2	2	2	--	--	--	1.00	1.00
9/ 7-9/13	5	26	10	--	6	2	0.69	3.60
9/14-9/20	<u>47</u>	<u>202</u>	<u>54</u>	<u>--</u>	<u>27</u>	<u>31</u>	<u>0.55</u>	<u>2.38</u>
Totals	101	353	95	2	54	60	0.59	2.08

The expanded all-season catch for Petersburg Creek, Falls Creek and Blind Slough is presented in Table 8. The angler catch censused on the sample days was expanded to provide the estimated all-season catch. Data obtained on census days was applied to total days in the month with an estimated two-thirds of all anglers contacted on any given census day. Each stream system censused was expanded separately to avoid bias due to sample size.

**TABLE 8** Expanded All-Season Catch, Petersburg, 1969.

Creek Name	Total Anglers	Angler Hours	Fish Caught					Fish/ Hour	Fish/ Angler
			SS	PS	CS	CT	DV		
Petersburg	461	1,549	330	94	--	233	296	0.62	2.07
Falls	176	360	41	8	--	--	--	0.14	0.28
Blind Slough	379	2,324	356	--	8	203	225	0.60	2.09
Totals	1,016	3,233	727	102	8	436	521	0.55	1.77

Comparative annual Petersburg Creek and Blind Slough sport catches since the inception of census in 1966 are presented in Table 9.

**TABLE 9** Comparative All-Season Catches, Petersburg Creek and Blind Slough, 1966-1969.

	Petersburg Creek				Blind Slough			
	1966	1967	1968	1969	1966	1967	1968	1969
Anglers	369	198	570	461	465	365	343	379
Angler Hours	765	396	1,581	1,549	1,141	862	1,063	1,324
Coho	118	81	541	330	349	212	358	356
Pink	224	--	53	94	--	--	--	--
Chum	7	--	--	--	--	--	104	8
Cutthroat	33	99	58	233	76	32	158	203
Dolly Varden	145	72	185	296	251	176	109	225
Fish/Hour	0.69	0.64	0.53	0.62	0.59	0.49	0.69	0.60
Fish/Angler	1.43	1.27	1.47	2.07	1.45	1.15	2.13	2.09

Blind Slough Coho Escapements:

The assessment of coho salmon spawning in Blind Slough has been conducted each fall since 1966. These counts are made in late October to coincide with the peak spawning activity in most of the spawning areas. Total escapement counts have varied from a low of 858 coho in 1967 to the high of 2,040 in 1968. These figures, shown in Table 10, are peak spawning counts and do not include a small number of coho that enter the slough in November and December.

**TABLE 10** Coho Salmon Escapements, Blind Slough, 1966-1969.

Year	Coho Escapement
1966	1,400
1967	858
1968	2,040
1969	1,133

## Lower Southeast Alaska

Lakes and streams were investigated in line with angler pressure outward from Ketchikan. The lack of roads in the district makes transportation a boat-travel or plane-use proposition. Time efficiency precludes the use of a boat in most cases. Air charter is expensive and subject to weather conditions, but is still the most efficient method for on-the-scene inspection for visible, basic physical and biological data.

### Physical-Chemical Characteristics

The geologic history of the Ketchikan District is one of recent glacial ice cover and recession. Land contour is generally steep and rough, stream beds are mostly of shallow gravels or exposed bedrock with abrupt grades. Lake bottom contours are typical of glacial gouging with depths often below sea level and as great as 200 meters. Rainfall varies within the district from 250 - 500 cm annually. Soil covers are thin or nil. Runoff water is pure, soft, and generally on the acidic side. Ground cover is mostly forest (spruce-hemlock-cedar) and "sour" areas with vegetative mats (muskeg). The underlying bedrock is not particularly high in basic nutrients. Alpine conditions are noted above 700- to 800-meter elevation, and perennial snow fields exist on north slopes as low as the 1,000-meter elevation.

Lake surface areas range up to 800 hectares and most are ice covered every winter. Surface water temperatures will occasionally exceed 21°C during a warm weather spell in the summer. Where lake bottoms will support vegetative growth, Nuphar, Valisnaria, Potamogeton, and Creataphyllum may be noted. Bog lakes have a much more abundant flora and suffer oxygen depletion in the winter.

Plankton blooms are typical of pure cold waters. Production is not as great as could be expected. Copepods, crustaceans, aquatic insect larvae, and hirudineans make up the bulk of observed zooplankters. Barren lakes have significantly higher populations of plankton than do those with fish. Thermoclines establish between 10 - 15 meters.

Water flows from the land surfaces average 2.07 liters per second per hectare (19 cfs/sq./mi. Fed. Power Comm., 1947). However, rates fluctuate widely between winter low temperature flows, spring melt runoffs, and summer dry spell lows. October is normally the month of heaviest rainfall often averaging over 2.5 cm per day. Drainage areas to lakes of the district range from as little as two to four hectares to 10,000 hectares for Humpback Lake.

In most instances, lake shorelines are rough bedrock or steep alluvial fills. Bog lakes are to be found with floating peripheries, but most are solid and often overhung by forest growth or even by the bedrock itself. Most lake bottoms pitch rather steeply beyond the zone of wave influence. Many lakes have reefs and islands; some of the larger islands also have lakes. Bottoms show a leveling in the depths composed of the more easily water transported alluvial material.

Very few lakes do not have accessible adequate gravels in the inlet or outlet streams for the spawning needs of fish populations. Often, spring shorelines are utilized and meet the limited recruitment necessary.

Rearing capacities of lakes restrict some species of fish and favor others. Most have rough sides and shores providing cover and pelagic plankton. The low dissolved nutrient quotient (seldom over 15 ppm of Ca hardness) is the greatest limiting factor. Those lakes which are accessible to fish from tidewater have established migratory fish populations.

Chemical data has been collected in the past and shows a similar pattern from year to year. Most of the lakes have not been altered materially and relatively pristine conditions continue to exist. In several instances, land surface uses have brought about changes resulting from removal of ground cover. These changes have been mostly physical such as altering stream flow patterns, temperature fluctuations and alluviation. The first survey of a lake has been for the physical features, access, and fish populations. Visual inspection

and fish sampling give an estimate of preliminary data requirements. Experience of past work strongly indicates what fish populations to expect and netting positively identifies the fish population. Conditions intolerable to fish are easily noted. Barren lakes which will support fish also have obvious characteristics such as a high density of invertebrates which are normally cropped to a low point by feeding fish.

Age, growth, and productivity are closely related and readily noted by scale or otolith readings. Where basic nutrients are scarce and planktonic levels not high, fish population levels become quite delicately balanced as indicated by Wilson Lake where the sport fishery harvested many of the piscivorous large cutthroat trout and the Dolly Varden population was able to break out of the forage fish position and attain a size considerably greater than before.

Barren lakes with the uncropped food supply produce large, heavy fish immediately after stocking and until they mature and spawn. The progeny, being numerous, reduce the food supply. Natural attrition takes most of the originally planted fish and the population assumes balance with the lake productivity. This is evidenced by a normal size range and slower growth rates than evidenced by the stocked fish.

Freshwater anglers had a normal harvest with the addition of grayling from several formerly barren lakes and a rainbow trout fishery in Walker Lake. These lakes are accessible by float plane only. It is notable that Yes Bay Lodge restricted customers to five fish per day on the premium rainbow fishing to which their clients were flown.

#### Lakes Investigated:

Table 11 shows waters investigated in Lower Southeast Alaska, either for the first time or in the progress of some management investigation, in 1969.

#### Creel Census:

Creel census on the saltwater fishing was intensively conducted and reported as a separate project. Freshwater creel census was carried on as random checks were made possible during project work. With the number, scatter, and lack of vehicular access of freshwater fishing locations in the Ketchikan District, to census the widely distributed fishing pressure is cost-prohibitive. The number of angler-days on most of the district is estimated to be less than one angler-day per surface-acre per year.

#### Rehabilitation:

Several potential rehabilitation jobs exist in the Ketchikan vicinity, all within reach of the local road system and by hiking. All have some complication such as cost due to large water volume and transportation difficulties. Domestic water supplies have an almost untouchable status.

Potential sites are as follows:

Whitman Lake: This lake is populated by stunted brook trout, Dolly Varden hybrids, and is unattractive to local anglers. A dam in the outlet would allow a 30-foot drawdown. It is presently being used by a small group of people as a domestic water supply. The potential benefits justify a better fishery approach.

Perseverance Lake: The lake is 206 surface acres and 13,100 acre feet. The fish population is eastern brook trout dominating a few rainbow trout. The fishery potential of the lake is not being met at present. Removal of the unpopular fish population and replacing with rainbow trout would result in better fishing.

TABLE 11 Lower Southeast Alaska Waters Investigated, 1969.

<u>Lake</u>	<u>Surface Acres</u>	<u>Elevation (feet)</u>	<u>Depth (feet)</u>	<u>Watershed Acreage</u>	<u>Air Miles from Ketchikan</u>	<u>Fish</u>
Essowah(2)	589	15	100+	11,000	62	Anadromous trout, salmon
	269	12				
Hidden Inlet	640	205	300+	6,835	56	Cutthroat trout, Dolly Varden
Kasook	62	50	50	1,188	50	Anadromous trout, salmon
Marten Arm	320	490	200+	3,699	43	None
Maude	134	1,357	200+	953	43	None
Nakat	179	60	80	1,760	46	Anadromous trout, salmon
Nakat Mtn.	256	295	100+	3,282	52	Cutthroat trout
Punkie	115	2,070	200+	704	42	None
Ratz	198	182	100+	4,730	53	Anadromous trout, salmon
Reef	352	281	100+	3,936	58	Cutthroat trout
Reef Point	141	235	75+	5,000	58	Cutthroat trout
Rowena	154	1,235	200+	1,984	46	None
Saks	307	575	200+	13,120	50	Cutthroat trout, Dolly Varden
Shinaku(3)	20	1,175	65+	1,613	60	None
	83					
	21					
Snipe Island	179	199	100+	4,258	48	Cutthroat trout
Sukkwan	124	280	75+	1,488	49	Cutthroat trout
Three Island	166	65	75+	1,453	35	Cutthroat trout, Dolly Varden
Twin Riff	160	1,294	100+	1,375	44	Dolly Varden
Upper McDonald	236	608	300+	11,251	48	Dolly Varden
Whitesox	128	1,860	100+	678	41	None

Rosa Lakes (2): These two small lakes, 37.6 and 12.8 acres, respectively, are on the Tongass Narrows' side of the north end of Gravina Island and eight air miles from downtown Ketchikan. The fish population is stunted by Dolly Varden. Access is by boat and then a one-mile hike to the lakes. The production of the lakes, even if rehabilitated and planted with rainbow trout, is not anticipated to be great. Probably a program of nutrient manipulation would solve the problem; however, these lakes have a questionable priority for very intensive management at the present time by reason of physical difficulty of access.

Lower Lunch Creek Lake: A 20-acre lake of considerable depth lies in the head of Lunch Creek at the terminus of the North Tongass Highway. The surface elevation is 1,270 feet. It is miles from the road with no trail between, and the fish population is stunted Dolly Varden. When better access is established, management considerations should be given to this lake.

Lower Mahoney Lake: The lake is 155 surface acres with a depth of 220 feet. It is located at an elevation of 80 feet and has a volume of 204,000 acre feet. Fish populations are searun trout and salmon (except kings), cottids, and stickleback. At present, it lies three miles from the end of the South Tongass Highway. There is no real purpose in rehabilitating this lake unless it is selected as a water supply for a fish hatchery.

Stocking:

Waters stocked in 1969, including both lakes devoid of fish and those in need of additional fish, are tabulated in Table 12. It is of note that few lakes failed to maintain their own fish populations following the initial plant. Failure of natural spawning has been the reason for restocking to date.

TABLE 12 Lower Southeast Alaska Waters Stocked, 1969.

<u>Lake</u>	<u>Grayling (fry)</u>	<u>Rainbow (fry)</u>
Upper Mahoney	10,000	
Rex Strong	10,000	
Minne	10,000	
Chopper		2,500 (restock)
Crater (Helm Bay)		2,500
Niblock Point		2,500
Venison		5,000
Moira		9,000
Kendrick		2,500 (restock)

A number of cirque lakes above the 550-foot elevation with barrier falls in their outlets are devoid of fish by reason of geologic isolation. When deep enough to hold dissolved oxygen during the winter, these lakes produce excellent trout and/or grayling. Common to most lakes of the district is low nutrient content and correspondingly low standing crops of fish. Those lakes suffering from eutrophication generally host no fish as winter oxygen balances drop below fish tolerances.

Egg-Take Sites:

Two locations that are worthy of further investigation regarding the possible taking of spawn are Nakat Lake (unofficial name) and Ratz Lake. Both have runs of desirable trout and salmon, but the magnitude is uncertain. The Ratz Lake watershed has been completely logged and Nakat Lake watershed is small (less than 2,000 acres). These physical factors may also limit the possible use of the sites. No attempt was made to weir or trap fish during the report period.

Anadromous fish used only three of the lakes surveyed during the 1969 season. The other 18 lakes are isolated by barriers of geological origin and physical land characteristics. King salmon were absent from the three lakes surveyed.

Access:

Access to fishing areas has not presented a problem in the Ketchikan District. With the exception of the Ketchikan Township withdrawal, all lands of the district are part of the Tongass National Forest. Physical access is a problem as it is an area of few roads and trails. Airplanes are normally used on lakes over one-half mile long and beyond hiking distance from the beach. Many of the headwater lakes have trails leading from the saltwater terminus.

LITERATURE CITED

Anonymous. 1947. Water Powers Southeast Alaska. Federal Power Commission and the Forest Service, U.S.D.A.

Heckart, Larry J. 1966. Inventory and Cataloging of the Sport Fish and Sport Fish Waters in Southeast Alaska. Alaska Department of Fish and Game. Federal Aid In Fish Restoration, Annual Report of Progress, 1965-1966, Project F-5-R-7, 7:1-17.

\_\_\_\_\_. 1967. Inventory and Cataloging of the Sport Fish and Sport Fish Waters in Southeast Alaska. Alaska Department of Fish and Game. Federal Aid In Fish Restoration, Annual Report of Progress, 1966-1967, Project F-5-R-8, 8:1-13.

*Prepared by:*

*Approved by:*

Michael J. McHugh  
Fishery Biologist  
Project Leader

s/Howard E. Metsker  
D-J Coordinator

Darwin E. Jones  
Fishery Biologist

s/Rupert E. Andrews, Director  
Division of Sport Fish

Robert T. Baade  
Fishery Biologist

*Date:* June 30, 1970.