STATE OF ALASKA

Jay S. Hammond, Governor

Annual Performance Report for

INVENTORY OF HIGH QUALITY RECREATIONAL FISHING WATERS IN SOUTHEAST ALASKA

by

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RESEARCH PROJECT SEGMENT

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Job No.: G-I-R Job Title: Inventory of High Quality Recreational Fishing Waters in Southeast Alaska

Cooperator: Artwin E. Schmidt

Period Covered: July 1, 1981 to June 30, 1982

ABSTRACT

Limnological investigations were conducted on three popular recreational-use lakes, Avoss, Baronof and Sikoh. These lakes were sampled intensively every fourth week from May 1 through September 1, 1981.

Population estimates of resident salmonids were attempted, and recreational analyses were conducted for all three lakes.

KEY WORDS

Southeast Alaska, Sitkoh, Baronof and Avoss Lakes, Limnological data, productivity.

BACKGROUND

Limnological investigations have been conducted in several lakes in southeast Alaska (Schmidt, 1974; Schmidt and Robards, 1975; Schmidt, 1976; 1977; 1978; 1979; 1980). One continuing objective of this project is to determine the relationship of physical, chemical, and biological characteristics to fish production.

The Alaska Department of Fish and Game (ADF&G), Sport Fish Division, has long attempted to obtain additional protection for high-quality fishing waters. Since 1972, ADF&G and the U.S. Forest Service (USFS) have been coordinating their efforts to minimize forest-use impacts on identified high-quality watersheds. This investigation was conducted to further quantify the recreational value and productivity of high-use lake systems.

Selected lakes included Avoss, Baranof, and Sitkoh (Figure 1). Table 1 lists common and scientific names of fish enumerated.

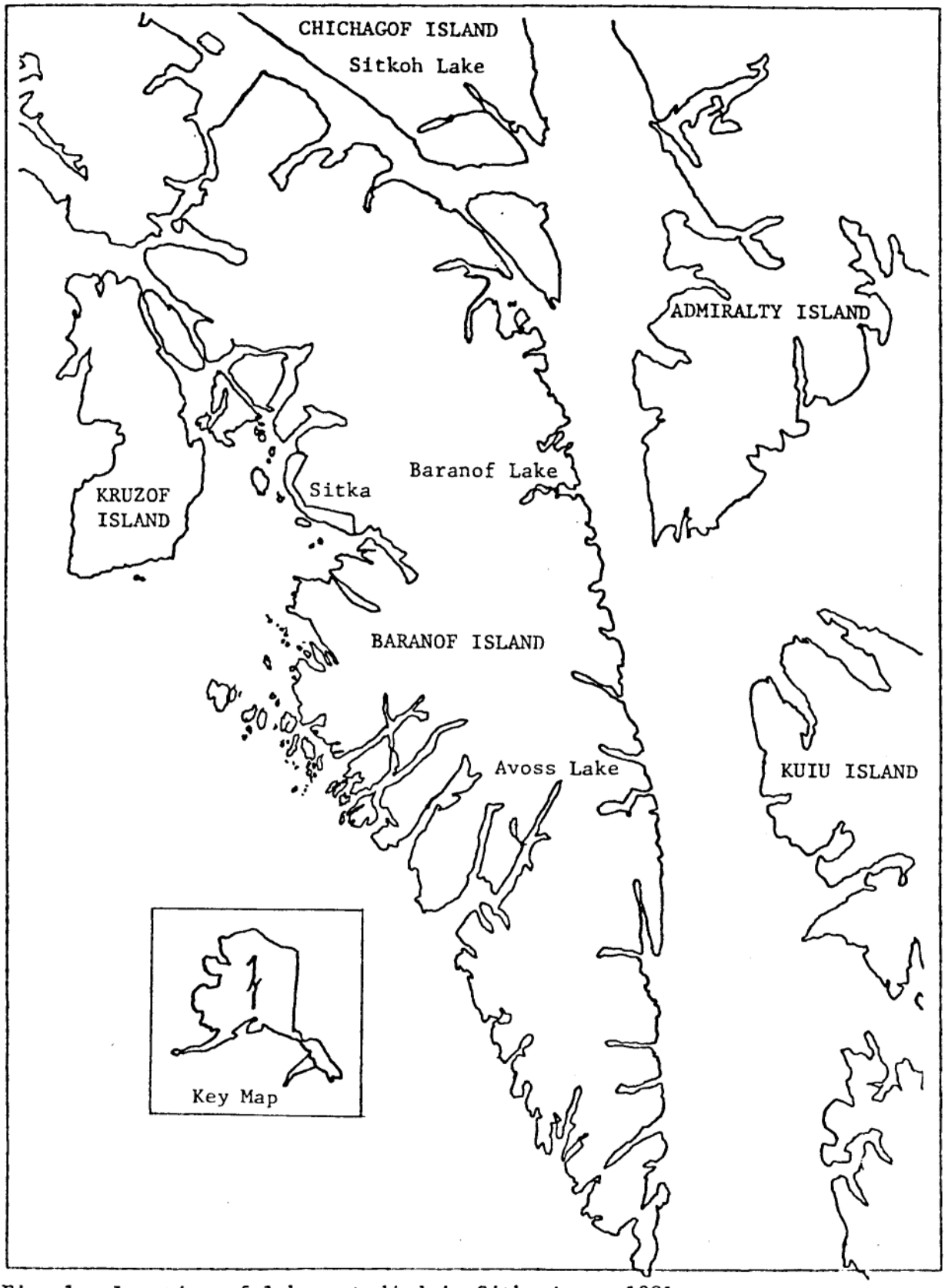

Fig. 1. Location of lakes studied in Sitka Area, 1981.

Table 1. List of common and scientific names.

Common Name	Scientific Name and Author	Abbreviation
Cutthroat Trout	*Salmo clarki* Richardson	CT
Steelhead	*Salmo gairdneri* Richardson	SH
Rainbow Trout	*Salmo gairdneri* Richardson	RT
Coho Salmon	*Oncorhynchus kisutch* (Walbaum)	SS
Sculpin	*Cottus* spp.	SSC
Dolly Varden	*Salvelinus malma* (Walbaum)	DV
Sockeye Salmon	*Oncorhynchus nerka* (Walbaum)	RS
Chum Salmon	*Oncorhynchus keta* (Walbaum)	CS
Pink Salmon	*Oncorhynchus gorbuscha* (Walbaum)	PS
Prickly Sculpin	*Cottus asper* Richardson	PSC

RECOMMENDATIONS

Avoss Lake

None.

Baranof Lake

Baranof Lake is a popular recreation site for many Southeast sportsmen. It receives moderate fishing pressure, but the quality of the fishery remains high. Further population work and life history studies of the cutthroat trout in Baranof Lake would increase our understanding of lakes similar to Baranof and lead to better management of fish populations.

Sitkoh Lake

Sitkoh Lake and Sitkoh Creek are high-use recreational areas. The main emphasis are on fishing for steelhead and cutthroat trout. The steelhead population may already be at a depressed level. The proposed weir (1982) for Sitkoh Creek, if it is installed, could provide some valuable information regarding this run of steelhead trout. Also, the proposed logging activity in the area would increase the impact on the fish populations in this system.

Further study on the Sitkoh system is needed. One interesting observation made on Sitkoh Creek was the high density of resident rainbow trout in the creek. These fish could be competing with rearing steelhead trout in the creek.

OBJECTIVE

1. To determine the relationship of physical, chemical, and biological characteristics of Sitkoh, Baranof, and Avoss Lakes. Productivity potential of these lakes will be related to fish production and compared with other lakes in southeast Alaska.

TECHNIQUES USED

Relationships of Limnological Characteristics to Fish Production

Limnological relationships existing in three lakes were investigated. The three lakes (Avoss, Figure 2; Baranof, Figure 3; Sitkoh, Figure 4) were sampled intensively every fourth week, May 1 through September 1, 1981.

Sampling stations were established at approximately the deepest portion of each lake. Vertical profiles of temperature and specific conductance were recorded at each station. Water samples for comprehensive chemical analyses were collected and preserved from each station once during the season. Comprehensive chemical determinations on preserved samples were conducted by the ADF&G limnological laboratory using atomic absorption and gas chromatographic analyses.

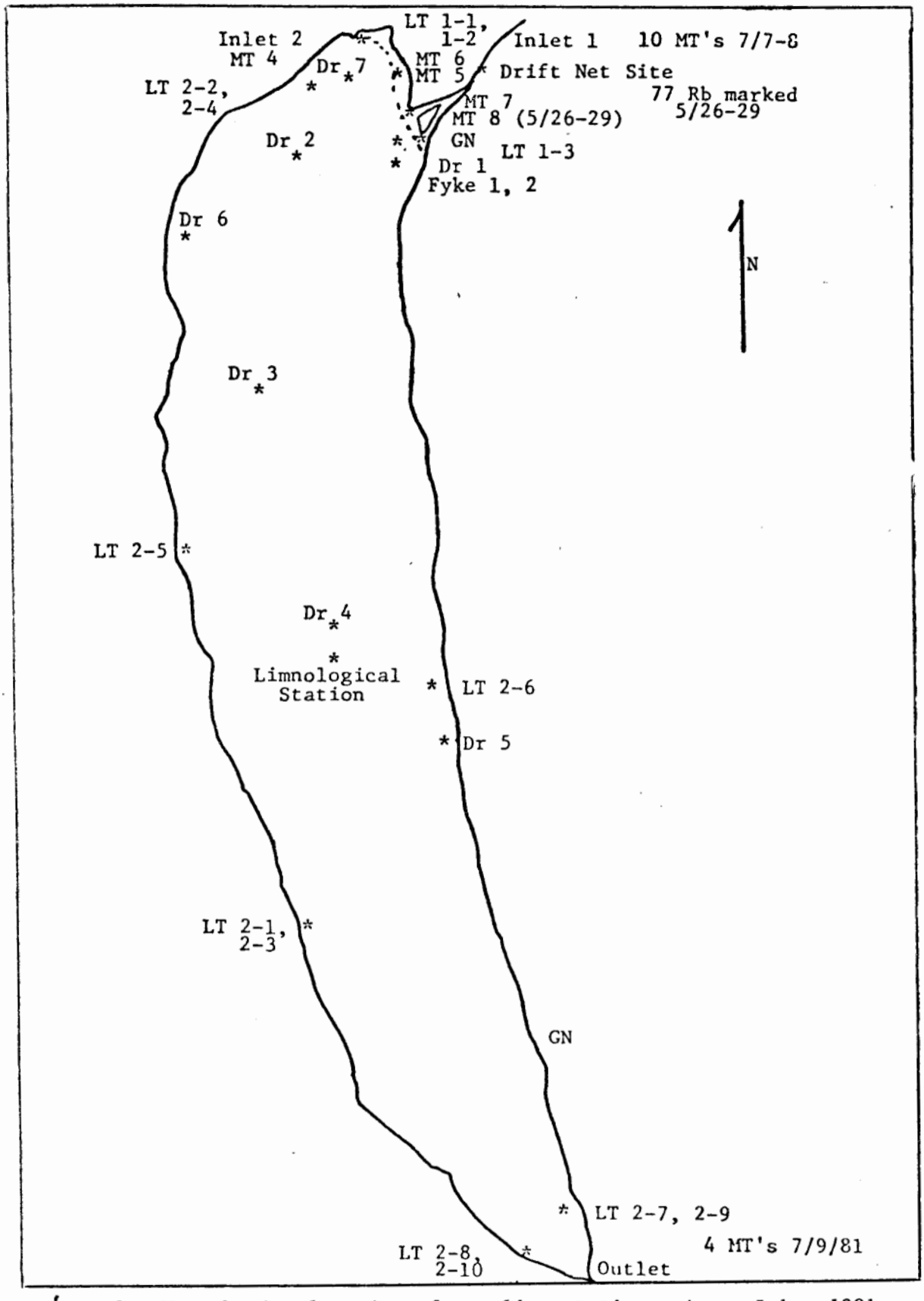

Figure 2. Map showing location of sampling stations, Avoss Lake, 1981.

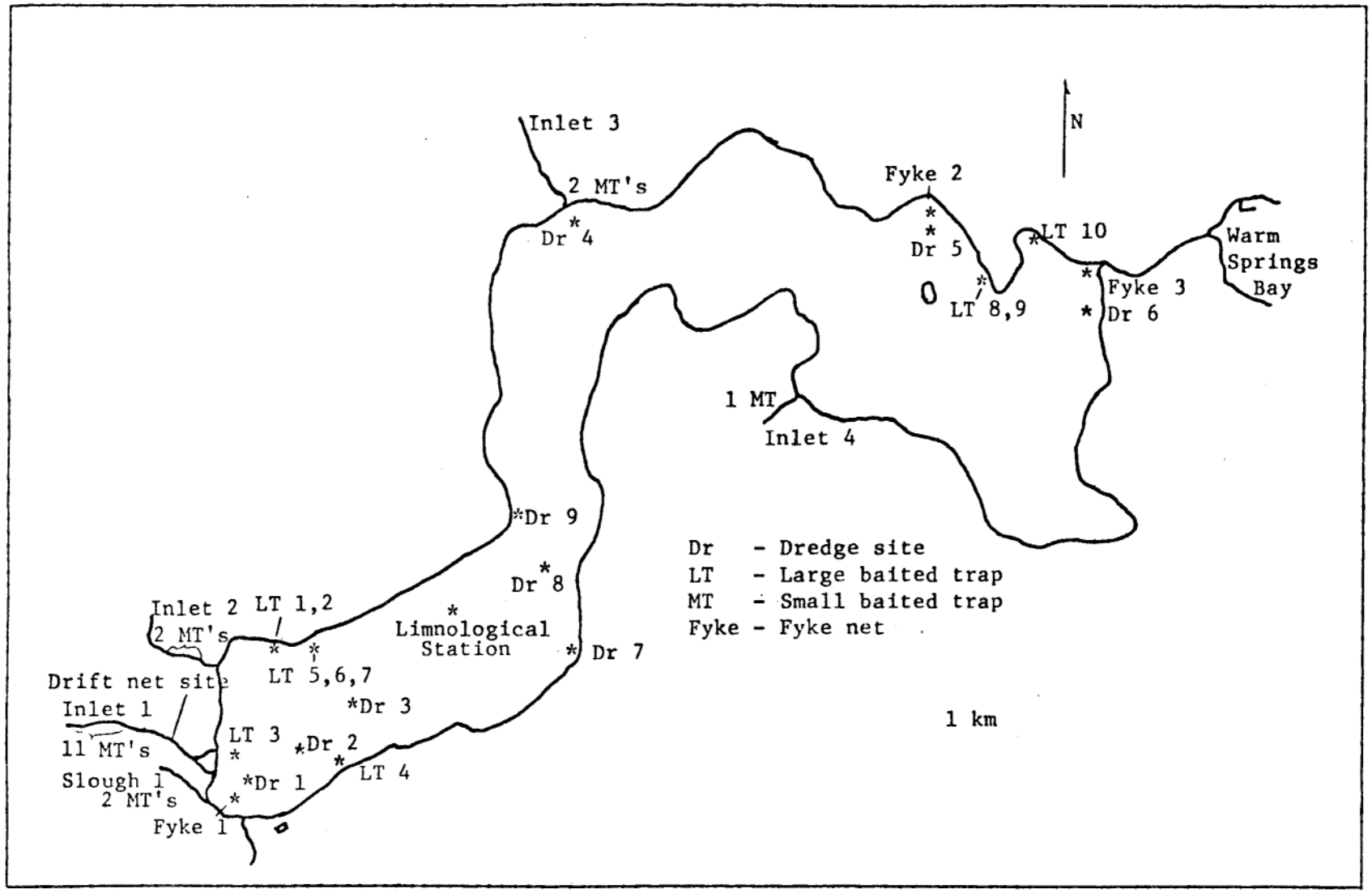

Fig. 3. Map showing location of sampling stations, Baranof Lake, 1981.

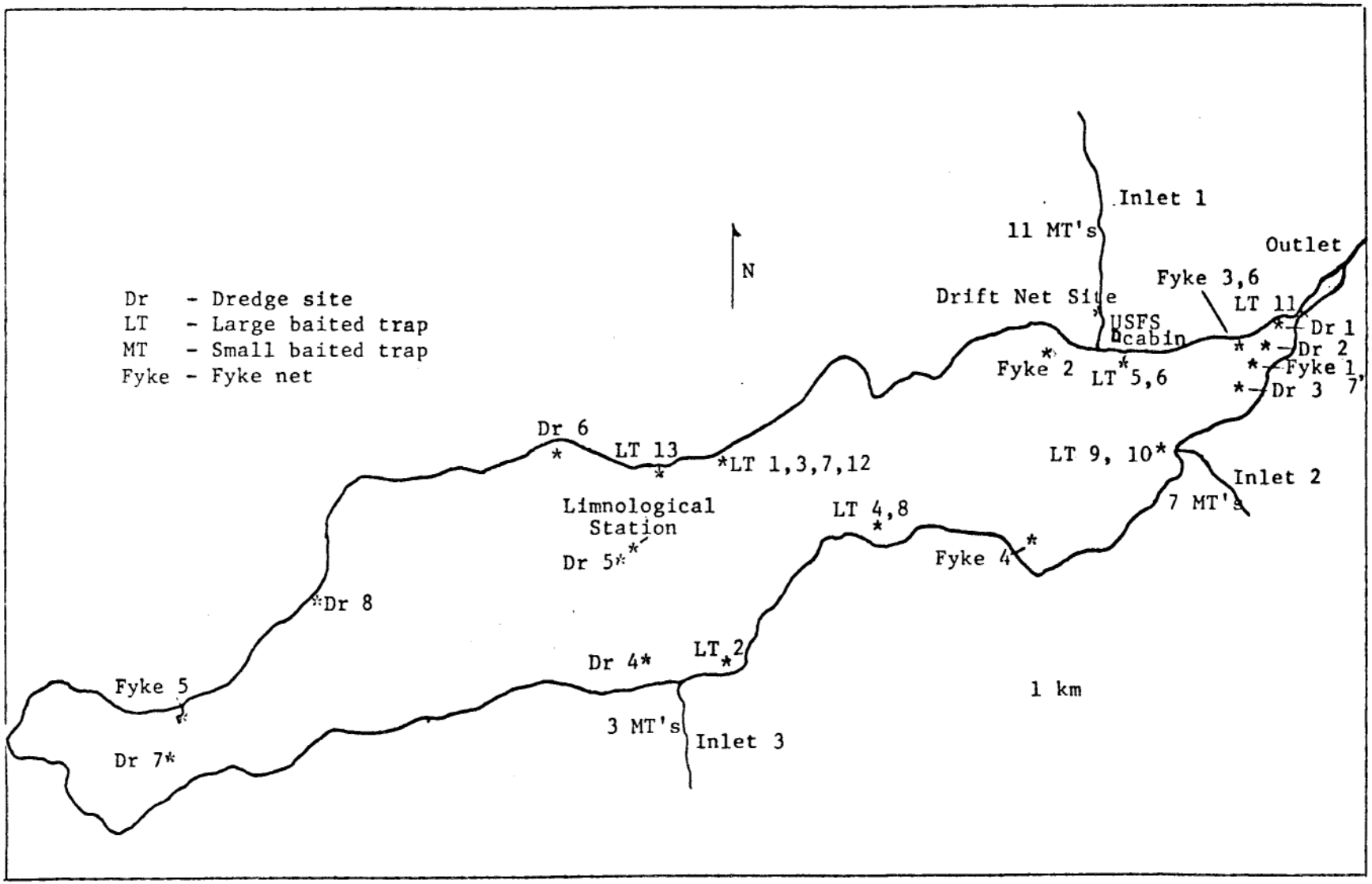

Fig. 4. Map showing location of sampling stations, Sitkoh Lake, 1981.

Bathymetric maps were prepared for all three lakes. A Simrad EYM fathometer was used to record depth contours on transects crossing each lake. The depth contours were transformed into bathymetric maps and morphometric data were calculated from these maps.

Zooplankton were collected four times throughout the summer from Baranof and Sitkoh Lakes and five times from Avoss Lake. Two 50 m vertical tows were made at each occasion. The net used was 0.5 m diameter and 1.7 m long. The straining cloth had apertures of 153 microns and 45% open area. Plankton were identified and counted. Dry and ash weights of plankton were determined by gravimetric analyses. The efficiency of the nets was not accounted for in the calculations. Thermal profiles and Secchi disc readings were taken in conjunction with the plankton tows.

Stream drift organisms were collected by placing a net in the main inlet. The net used was 30.5 cm square and 91.4 cm long. The netting was made of Nitex with pore size of 280 microns and 45% open area. Stream drift organisms were preserved in 70% ETOH and later identified and enumerated in the laboratory.

Bottom fauna were collected by dredging with an Ekman 152.4-mm dredge. Bottom samples were washed through three graduated mesh screens, the finest having 28 meshes per inch. Organisms were preserved in 70% ETOH until laboratory analysis.

Adult and juvenile fish were collected by hook and line, large and small baited traps, fyke nets, and gill nets. Age, growth, and food habits of fish in the lakes were determined from fish collected throughout the study period.

Population estimates of resident trout were attempted on the lakes during the course of our investigations. Fyke nets, large baited fish traps, and hook and line sampling were used to capture the fish.

Surface and sinking gill nets were also fished during the last trip to Avoss Lake in order to get more recaptures. The fish were anesthetized, measured, marked by punching a hole in the caudal fin, and released. The marks were readily identifiable throughout the sampling season. A modified Schnabel multiple mark and recapture formula was used to estimate population sizes of the trout in the three lakes.

Population estimates included only those fish that were 180 mm or longer. This was done to target our estimates on the portion of the population accepted as "catchable" by anglers.

Evaluation of Recreational Fishing Waters

The recreational potential of Avoss, Baranof, and Sitkoh Lakes was evaluated. Information evaluated included; 1) ability of the area to support a viable sport fishery, 2) uniqueness of the area and aesthetics, 3) recreational opportunities available at the lake, 4) present-use patterns, 5) accessibility, 6) accommodations, and 7) proximity to other similar recreational areas.

FINDINGS

Relationship of Limnological Characteristics to Fish Production

Morphometry:

The depth, size, and shape of lakes strongly influence the physical and chemical conditions which prevail in them. Since these physical and chemical parameters limit species composition and abundance, it is essential to study the morphometric features of lakes. Bathymetric maps of Avoss Lake (Figure 5), Baranof Lake (Figure 6), and Sitkoh Lake (Figure 7) were prepared from sounding data. Morphometric data for these lakes is presented in Tables 2 through 4, respectively.

Physical and Chemical Considerations

Observations of temperature, Secchi disc visibility, pH, conductivity, alkalinity, and hardness were made on lakes during the survey period. Thermal data from Avoss, Baranof, and Sitkoh Lakes are presented in Table 5. Alkalinity, conductivity, dissolved oxygen, hardness, pH, Secchi disc visibility, and water temperature for the three lakes studied are presented in Table 6. Water quality analyses of the lakes are presented in Table 7.

The morphoedaphic index (MEI)(Ryder, 1964; 1965) is an emperically- derived formula that was described initially as a convenient method of rapidly calculating potential fish yields from unexploited north-temperate lakes. Since its inception the constraints on the use of the MEI have been relaxed, as it has been applied to sets of lakes other than those for which it was originally devised. Various investigators have clarified our understanding of the MEI (Jenkins, 1967; Regier et al., 1971; Henderson et al., 1973) and have extended the application of this index to other climatic systems.

The MEI for 33 lakes studied so far in southeast Alaska are presented in Table 8.

Zooplankton:

Although a standing crop of plankton does not measure production, net plankton samples may show some distinction between oligotrophic and eutrophic lakes. Rawson (1953) stated that the standing crop of No. 20 net plankton measured by total vertical hauls exhibits this distinction in western Canada. He gives this range as 10- to 40-kg/ha dry weight for alpine and large oligotrophic lakes, while mesotrophic and moderable eutrophic lakes have up to 100 kg/ha.

Plankton composition and density from Avoss, Baranof, and Sitkoh Lakes are presented in Table 9.

The standing crop of net plankton was calculated using an assumed net efficiency of 25%. Average standing crop (organic weight in kg/ha) of net plankton was Avoss Lake, 7.9; Baranof Lake, 14.1; and Sitkoh Lake, 20.7. This shows all three lakes to be in the oligotrophic category.

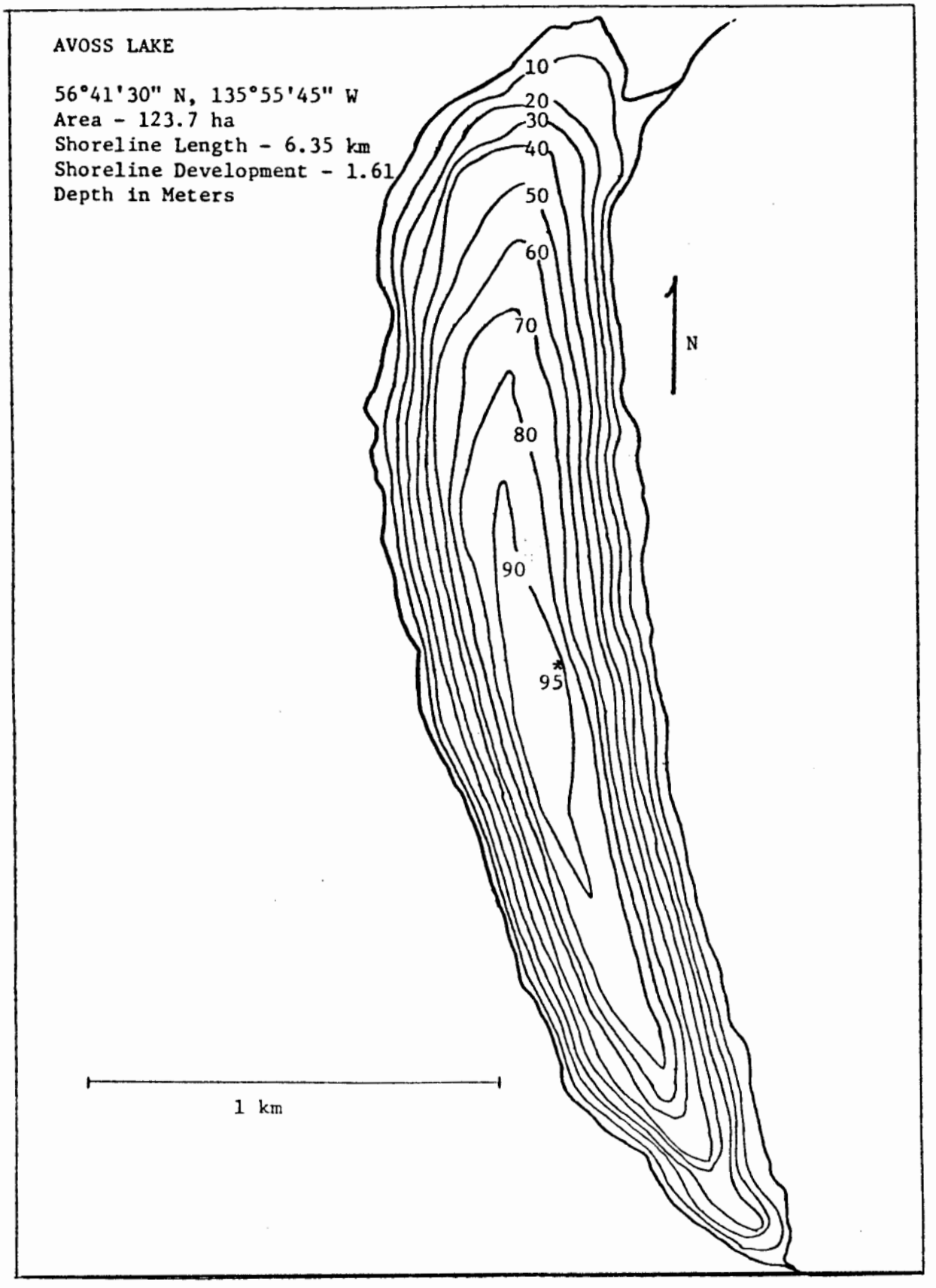

Fig. 5. Bathymetric map of Avoss Lake.

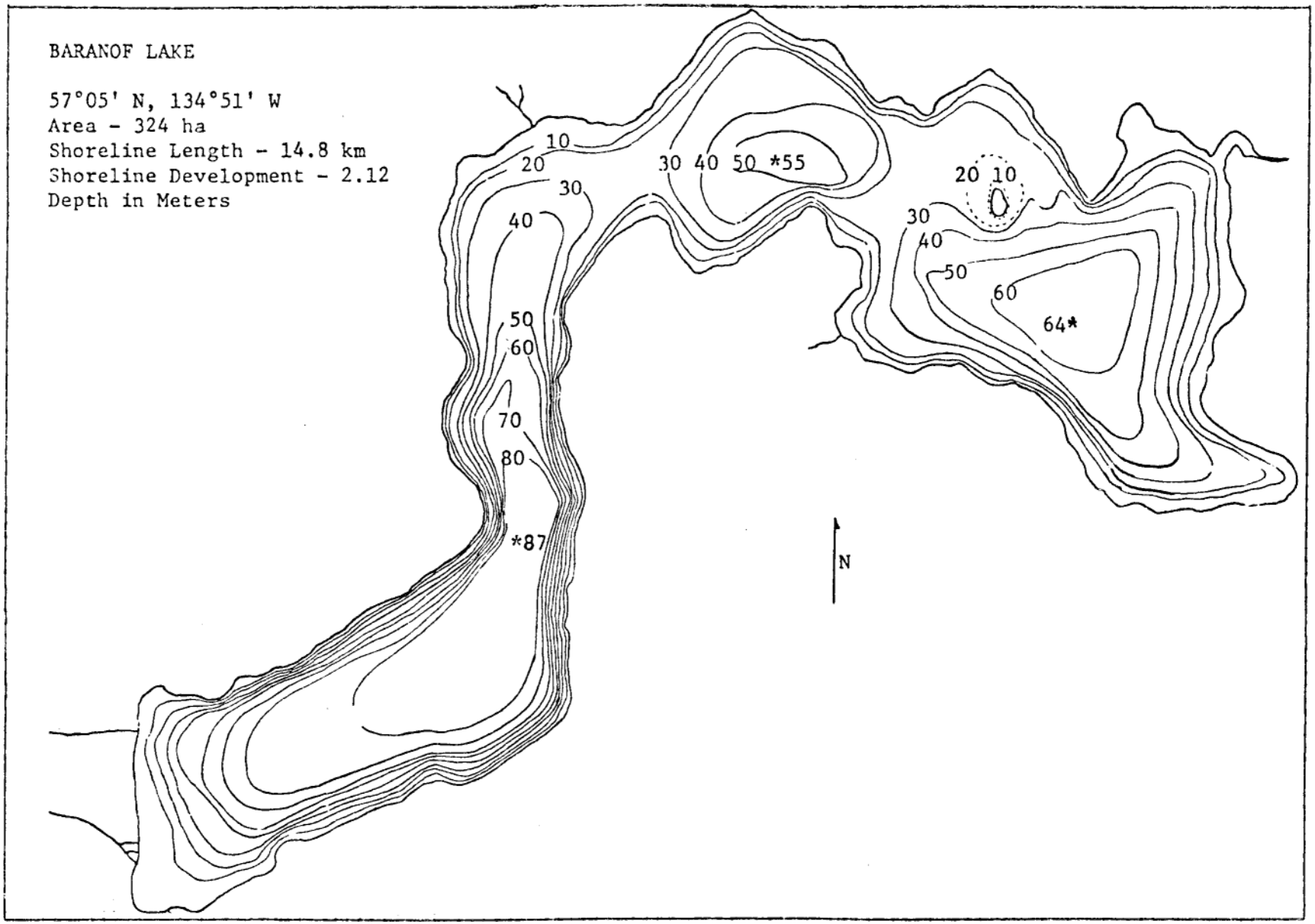

Fig. 6. Bathymetric map of Baranof Lake.

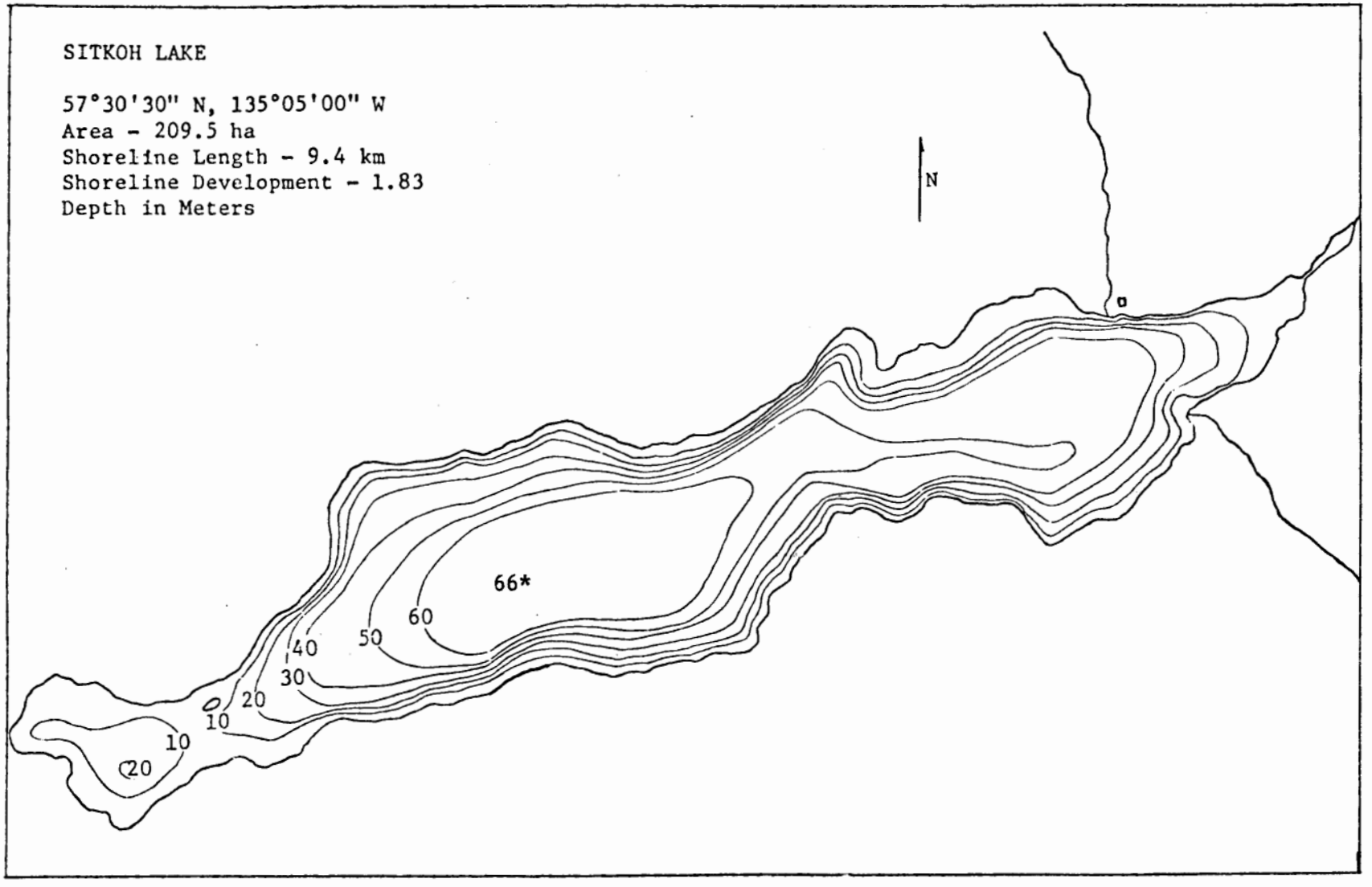

Fig. 7. Bathymetric map of Sitkoh Lake.

Table 2. Morphometry of Avoss Lake.

Water Area 1,237,000 m^2

Area By Depth Zone

Depth Zone (m)	Area (m^2)	Percent of Total Area
0-10	177,000	14.3
10-20	130,000	10.5
20-30	124,000	10.0
30-40	121,000	9.8
40-50	123,000	9.9
50-60	126,000	10.2
60-70	110,000	8.9
70-80	120,000	9.7
80-90	137,000	11.1
90-95	69,000	5.6

Water Volume 56,600,422 m^3

Volume by Depth Zone

Depth Zone (m)	Volume (m^3)	Percent of Total Volume
0-10	11,473,617	20.3
10-20	9,942,915	17.6
20-30	8,672,610	15.3
30-40	7,446,803	13.2
40-50	6,224,865	11.0
50-60	4,976,690	8.8
60-70	3,796,698	6.7
70-80	2,637,149	4.7
80-90	1,314,075	2.3
90-95	115,000	0.2

Maximum Depth = 95.0 m

Mean Depth 45.76 m

Shoreline Length = 6.35 km

Shoreline Development = 1.61

Table 3. Morphometry of Baranof Lake.

Water Area 3,236,000 m^2

Area by Depth Zone

Depth Zone (m)	Area (m^2)	Percent of Total Area
0-10	437,300	13.5
10-20	327,800	10.1
20-30	553,800	17.1
30-40	502,000	15.5
40-50	379,700	11.7
50-60	297,900	9.2
60-70	270,500	8.4
70-80	200,000	6.2
80-87	267,800	8.3

Water Volume 126,115,262 m^3

Volume by Depth Zone

Depth Zone (m)	Volume (m^3)	Percent of Total Volume
0-10	30,226,464	24.0
10-20	26,625,365	21.1
20-30	22,055,374	17.5
30-40	16,588,283	13.2
40-50	12,172,742	9.7
50-60	8,655,108	6.9
60-70	5,538,000	4.4
70-80	3,629,059	2.9
80-87	624,867	0.5

Maximum Depth = 87.0 Mean Depth = 38.97 m

Shoreline Length = 14.78 km Shoreline Development 2.12

Table 4. Morphometry of Sitkoh Lake.

Water Area 2,095,200 m^2

Area by Depth Zone

Depth Zone (m)	Area (m^2)	Percent of Total Area
0-10	404,800	19.3
10-20	248,700	11.9
20-30	206,300	9.8
30-40	232,800	11.1
40-50	425,900	20.3
50-60	243,400	11.6
60-66	333,300	15.9

Water Volume 73,761,300 m^3

Volume by Depth Zone

Depth Zone (m)	Volume (m^3)	Percent of Total Volume
0-10	18,513,000	25.1
10-20	15,568,200	21.1
20-30	13,328,000	18.1
30-40	11,169,800	15.1
40-50	7,799,000	10.6
50-60	4,494,700	6.1
60-66	2,888,600	3.9

Maximum Depth = 66.0 m Mean Depth = 35.2 m

Shoreline Length = 9.41 km Shoreline Development = 1.834

Table 5. Thermal data (°C) from lakes studied, 1981.

	Avoss Lake				Baranof Lake				Sitkoh Lake			
Depth (m)	May 20	May 28	July 8	Aug. 5	May 20	June 11	July 2	July 29	May 20	June 3	June 24	July 21
S	9.0	10.0	12.0	15.0	7.8	10.0	9.0	10.8	10.3	12.5	16.0	16.0
1	9.0	10.0	12.0	15.0	7.8	9.8	9.0	10.0	10.2	12.9	15.5	15.0
2	8.0	10.0	11.5	15.5	7.8	7.8	9.0	9.5	10.1	12.8	15.3	15.0
3	7.2	9.9	11.5	15.0	7.2	7.8	8.8	8.5	10.0	12.8	15.0	14.8
4	7.0	9.4	11.5	14.5	6.7	7.1	8.5	8.5	9.9	12.4	14.9	14.5
5	5.9	9.1	11.0	14.5	6.3	6.8	8.5	8.5	9.8	12.1	14.8	14.5
6	5.7	9.0	11.0	12.5	6.1	6.8	8.2	8.5	9.7	11.9	14.2	14.0
7	5.5	8.0	10.2	11.5	5.9	6.5	8.0	8.2	8.8	10.5	13.3	13.8
8	5.3	6.8	9.0	10.0	5.6	6.3	8.0	8.2	8.7	9.2	10.8	13.8
9	5.2	6.3	7.2	8.0	5.5	6.0	8.0	8.2	8.3	8.1	9.0	13.0
10	5.0	6.0	6.5	7.0	5.3	6.0	8.0	7.9	6.5	7.8	8.0	12.5
11	...	5.8	6.0	6.5	...	5.5	7.8	7.8	...	6.8	7.0	11.0
12	...	...	5.2	5.5	...	5.3	7.5	7.8	...	6.7	6.5	11.0
13	...	...	5.0	4.8	...	5.3	7.2	7.5	...	6.2	5.9	10.2
14	...	...	4.8	4.5	...	5.3	7.0	7.5	...	5.8	5.8	9.7
15	4.3	4.9	4.5	4.2	5.1	5.2	7.0	7.5	5.3	5.1	5.5	8.0
20	4.1	4.2	4.0	4.0	5.0	4.8	6.0	6.0	4.9	4.7	4.9	5.5
25	4.0	4.0	3.8	3.8	4.7	4.6	5.0	5.0	4.7	4.2	4.8	4.8
30	4.0	4.0	3.5	3.5	4.3	3.8	4.8	4.0	4.6	4.1	4.5	4.5
35	3.8	...	...	...	4.0	...	...	...	...	...	...	...
40	3.7	...	...	...	4.0	...	...	...	...	...	...	...
45	3.7	...	...	...	3.9	...	...	...	...	...	...	...
50	3.7	...	...	...	3.8	...	...	...	...	...	...	...

Table 6. Alkalinity, conductivity, dissolved oxygen, hardness, pH, Secchi disc visibility, and water temperature for lakes studied, 1981.

Lake and Date	Alkalinity (mg/l)	Conductivity (m mhos)	Dissolved Oxygen (mg/l)	Hardness		pH	Secchi Disc Visibility (m)	Surface Temperature (°C)
				Calcium	Total			
Avoss,								
May 20	2.1	20	12.0	2.8	3.2	5.1	9.5	9.0
May 28	1.1	15	10.0	1.5	2.2	6.6	9.5	10.0
July 8	3.2	22	11.0	2.0	2.4	6.7	15.0	12.0
August 5	3.7	19	10.0	4.2	3.8	6.7	8.5	15.0
Baranof,								
May 20	2.4	22	12.3	4.2	4.4	5.4	8.5	9.0
June 11	3.7	27	9.0	...	2.6	6.6	6.5	10.0
July 2	3.2	24	11.0	...	...	6.8	5.5	9.0
July 29	3.1	12	10.0	3.2	2.0	6.7	3.3	10.8
Sitkoh,								
May 20	2.7	39	11.8	10.0	11.8	6.2	12.0	10.3
June 3	8.0	29	9.0	9.4	12.2	6.8	5.0	12.0
June 24	4.2	37	9.0	9.6	12.4	6.9	6.2	16.0
July 22	11.2	18	9.0	9.4	12.4	7.0	6.0	16.0

Table 7. Water quality analysis of Avoss, Baranof, and Sitkoh Lakes, 1981.

Parameter, Unit	Avoss Lake		Baranof Lake		Sitkoh Lake			
	May 20		May 20		May 20		May 22	
	1 m	50 m	1 m	50 m	1 m	20 m	1 m	20 m
Specific Conductance, μ mhos/cm	12.0	12.0	12.0	12.0	34.0	34.0	35.0	34.0
pH	6.2	5.8	6.1	6.2	6.6	6.6	6.8	6.6
Alkalinity, mg/l	3.0	2.0	4.0	4.0	10.0	10.0	12.0	12.0
Calcium, mg/l	1.4	1.4	2.2	2.2	5.5	5.5	5.5	5.5
Magnesium, mg/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Dissolved Solids, mg/l	...	...	...	5.0	...	...	14.0	...
Total Phosphorus, μg/l as P	1.2	2.6	3.6	1.9	6.4	1.8	3.8	3.2
Total Filterable Phosphorus, μg/l as P	1.5	1.6	2.9	1.8	3.6	10.3*	2.5	...
Filterable Reactive Phosphorus, μg/l as P	0.9	1.3	2.7	1.3	4.3	8.1*	2.3	2.4
Nitrate + Nitrite, μg/l as N	29.0	38.0	52.0	73.0	35.0	66.0	34.0	56.0
Ammonium, μg/l as N	<1.0	3.0	1.0	<1.0	8.0	14.0	3.0	7.0
Reactive Silica, μg/l as Si	583.0	552.0	900.0	954.0	2,072.0	2,028.0	2,014.0	2,071.0

*Filtering contamination

Table 8. Morphoedaphic Index of 33 lakes in Southeast Alaska.

Lake	Specific Conductance (μ mhos)	Residue Dissolved Calculated Sum (mg/l)	Surface Area (ha)	$\bar{x}$ Depth (m)	MEI*	Potential Yield** (kg/ha)
Helen	50	35***	14.5	3.7	12.07	3.36
Red	93	65***	166.0	10.4	6.25	2.41
Mountain	100	59	83.0	20.5	2.88	1.64
Situk	105	60	408.0	27.3	2.20	1.43
Streets	30	21	60.7	11.0	1.91	1.34
Finger	28	20***	347.0	10.7	1.87	1.32
Tammy	25	18***	134.0	10.0	1.80	1.30
Green	39	22	70.0	12.3	1.79	1.29
Bear	29	21***	30.7	12.2	1.66	1.24
Klawak	39	24	1,177.0	17.7	1.36	1.13
Hofstad	17	12***	60.3	9.8	1.22	1.07
Auke	28	20	46.0	19.0	1.05	0.99
Virginia	18	13***	258.0	13.0	1.00	0.97
Manzanita	60	42***	625.0	49.0	0.86	0.89
Salmon Bay	30	21***	388.0	26.7	0.79	0.86
Sitkoh	39	27***	209.5	35.2	0.77	0.85
Heckman	17	14	163.0	19.7	0.71	0.81
Spurt	16	14	107.0	22.2	0.63	0.77
Karta	26	16	508.0	27.6	0.58	0.74
Bugge	20	14***	66.8	24.0	0.58	0.74
Akwe	48	28	216.0	50.1	0.56	0.72
De Boer	13	13	51.0	23.0	0.56	0.72
Wilson	51	36***	468.0	54.0	0.67	0.69
Ella	47	33***	710.0	70.0	0.47	0.66
Patching	17	14	207.0	30.2	0.46	0.66
Blue	33	22	538.0	52.0	0.42	0.63
Turner	15	10***	1,270.0	30.0	0.33	0.55
Osprey	20	14	109.0	60.0	0.23	0.46
Baranof	22	8***	323.6	39.0	0.20	0.43
Swan	20	16	208.0	91.4	0.18	0.41
Avoss	21	8***	123.7	45.8	0.18	0.41
Lonieof	5	4***	179.0	55.1	0.07	0.25
Rezanof	3	2***	354.0	71.2	0.03	0.17

*MEI = Morphoedaphic Index = $\frac{\text{Total Dissolved Solids (TDS)}}{\text{Mean Depth (z)}}$ (Ryder, 1965)

**Ryder (1965) described the equation y 2 /x where y = yield in pounds per acre and mean depth (z) was in feet. The metric expression (Ryder et al., 1974) is therefore y 0.966 /x where yield is fish yield as kg/ha and x = MEI.

***Calculated as 0.70 x specific conductance in micromhos.

Table 9. Plankton composition, density (organisms per square meter), and weight (milligrams per square meter) as collected with No. 153 Nitex plankton net, Avoss, Baranof, and Sitkoh Lakes, 1981.

Lake	Avoss						Baranof	
Date	May 20	May 29	June 17	July 8	August 5	August 18	May 20	June 11
Depth of Tow (m)	50	50	50	50	50	50	50	50
Cladocera								
Bosminidae	233	33	400	50	600	600	0	0
Daphnidae	500	433	2,700	1,850	966	900	33	82
Holopedidae	567	166	1,700	1,500	1,300	1,200	200	165
Polyphomidae	0	133	300	50	167	150	0	0
Cladocera Eggs	167	166	500	450	66	250	0	332
Copepoda								
Cyclopoida	1,600	933	1,533	1,700	1,433	1,500	5,200	15,832
Calanoida	3,333	3,766	3,933	2,500	1,800	2,250	3,366	8,000
Nauplii	8,100	666	2,033	900	333	1,350	1,500	415
Copepod Eggs	33	33	0	50	0	200	0	1,583
Rotifera								
Kellicottia longispina	533	66	433	200	66	200	33	250
Conochiloides	66	0	100	700	1,333	3,550	0	0
Other	0	0	0	0	0	0	133	0
Dry Weight	88.1	164.0	469.6	258.2	237.8	215.9	290.8	705.4
Organic Weight	86.1	127.8	433.4	201.7	175.7	166.5	276.1	659.1
Ash Weight	2.0	36.2	36.2	56.5	62.1	49.4	14.7	46.3

Table 9. (cont.) Plankton composition, density (organisms per square meter), and weight (milligrams per square meter) as collected with No. 153 Nitex plankton net, Avoss, Baranof, and Sitkoh Lakes, 1981.

Lake	Baranof		Sitkoh			
Date	July 2	July 31	May 20	June 3	June 26	July 22
Depth of Tow (m)	50	50	30	30	30	30
Cladocera						
Bosminidae	0	0	2,800	20,766	45,266	18,200
Daphnidae	0	0	7,466	12,600	26,833	11,666
Holopedidae	1,166	600	700	462	462	0
Polyphomidae	0	0	0	0	0	0
Cladocera Eggs	600	467	10,500	20,300	933	700
Copepoda						
Cyclopoida	6,200	8,133	38,967	21,933	22,633	25,900
Calanoida	1,833	1,866	0	0	0	0
Nauplii	300	7,800	0	0	0	0
Copepod Eggs	367	267	700	0	0	0
Rotifera						
Kellicottia longispina	0	66	1,167	5,133	1,167	1,166
Conchiloides	200	0	0	0	0	0
Other	0	0	0	0	0	0
Dry Weight	139.5	411.5	285.2	1,063.4	546.4	420.7
Organic Weight	127.8	345.8	270.4	990.1	484.8	329.0
Ash Weight	11.7	65.7	14.8	73.3	61.6	91.7

Bottom Fauna:

Bottom fauna collected by dredging and screening benthic material from Avoss, Baranof and Sitkoh Lakes are identified and enumerated in Table 10.

Stream Drift Organisms:

Analysis of stream drift organisms from these lakes (Table 11) shows poor productivity of the inlet streams.

Fish:

A summary of fish catch and effort information for the lakes studied is presented in Table 12. A discussion of the limnology, fishery, and recreation potential of each lake follows:

Avoss Lake. Avoss Lake (lat. 56°31'30" N, long. 135°55'45" W) is a 123.7-ha lake located just off the Great Arm of Whale Bay, 46 km south southeast of Sitka. The lake is 2.8 km long and approximately 0.4 km wide. Its maximum depth is 95 m and the average depth is 45.8 m. There is one major inlet located at the north end of the lake and a short, cascading outlet at the south end. The surface elevation of Avoss Lake is approximately 230 m.

Access to Avoss Lake is by floatplane. Weather, however, is definitely a factor to be considered. Low clouds on the lake or extreme turbulence at the outlet may extend one's stay or make the trip in or out less than enjoyable.

The USFS maintains a recreational cabin by the main inlet of Avoss Lake. The cabin is equipped with an oil stove, and a small skiff is provided. There are a few sites along the lake suitable for tent camping. The lake shore is not too conducive to hiking, so tent campers should have some sort of watercraft to get around the lake.

The primary recreational activities of visitors to Avoss Lake, according to the cabin log, are hiking, scenic enjoyment, fishing, and hunting. Hiking is often done in the river valley behind the cabin and in the outlet area where one can reach alpine areas with little trouble. Hunting is primarily for deer in several areas around the lake. Fishing has become less important to the recreational users of Avoss Lake during the past few years.

Avoss Lake contains a monospecific population of rainbow trout resulting from stocking by the U.S. Fish and Wildlife Service in 1957. The origin of these fish is unknown.

Avoss Lake was known as a big trout lake in the 1960's (two rainbow trout over 762 mm fork length in 1964). Recently, the fish have averaged much smaller. The largest rainbow sampled was 354 mm fork length, and the majority were under 250 mm fork length. This reduction in size tends to follow a commonly observed phenomenon for stocked trout lakes where fish grow very fast the first few seasons after introduction until the food supply becomes a limiting factor and slows the growth rate.

Table 10. Identification and enumeration (organisms per square meter) of benthic organisms from Avoss, Baranof, and Sitkoh Lakes, 1981.

Lake	Avoss	Baranof	Sitkoh
Depth Range	1.5-64.0 m	5.0-74.0 m	1.0-34.5 m
Number of Samples	6	9	9
Oligochaeta	126	849	89
Planariidae	7	0	0
Amphipoda	67	0	0
Sphaeriidae	37	242	227
Planorbidae	0	0	5
Isotomidae	7	0	0
Hirudinea	0	0	10
Baetis bicaudatus	0	5	0
Centroptilum sp.	0	0	5
Ameletus sp.	0	5	0
Zapada oregonensis	0	35	0
Psychoglypha sp.	15	0	5
Onocosmoecus sp.	0	5	0
Chironomidae	0	0	0
Macropelopia sp.	15	5	0
Procladius sp.	37	5	94
Protanypus sp.	0	0	10
Guttipelopia sp.	0	0	20
Pseudodiamesa sp.	0	5	0
Heterotrissocladius sp. A.	30	5	0
Paraphaenocladius sp.	7	89	0
Phaenopsectra sp.	333	222	316
Polypedillum fallax	7	5	0
Chironomini	0	0	5
Einfeldia sp.	0	5	0
Chironomus sp.	0	5	10
Micropsectra sp.	37	10	0
Empididae	0	0	5
Bezzia sp.	0	0	5

Table 11. Identification and enumeration of stream drift organisms from Avoss, Baranof, and Sitkoh Lakes, 1981.

Lake	Avoss	Baranof	Sitkoh
Date	5/278/5/81	6/307/29/81	6/37/21/81
Number of Samples	2	2	3
Oligochaeta	0	1	0
Baetis tricaudatus	0	0	4
B. bicaudatus	126	38	6
Baetidae	0	2	0
Ameletus sp.	1	6	4
Cinygmula sp.	2	1	4
Paraleptophlebia temporalis	3	0	0
Ephemerella sp.	0	1	0
E. coloradensis	10	0	0
Heptageniidae	0	1	0
Chloroperlinae	3	2	0
Zapada cinctipes	3	0	0
Z. oregonensis	6	5	0
Podmosta sp.	0	0	1
Despaxia augustus	1	0	0
Paraleuctra sp.	2	0	0
Limnephilidae	4	1	0
Onocosmoecus sp.	1	0	2
Psychoglypha sp.	2	0	2
Dolophilodes sp.	1	0	0
Rhyacophila alberta	2	0	0
R. narvae	1	0	0
R. verrula	2	0	0
Deronectes sp.	1	0	1
Staphylinidae	3	8	0
Acarina	10	8	2
Aphididae	1	0	0
Lepidoptera	0	1	0
Poduridae	3	0	0
Empididae	0	0	1
Thysanoptera	2	0	0
Salmonidae	2	0	0
Dicranota sp.	2	1	0
Nematocera	1	0	0
Chironomidae	7	0	1
Zavrelimyia sp.	0	7	1
Diamesa sp.	0	5	1
Brillia sp. A.	1	0	0
Brillia sp.	0	1	0
Cricotopus sp.	0	1	0
Orthocladiinae	0	1	0

Table 11. (cont'd.) Identification and enumeration of stream drift organisms from Avoss, Baranof, and Sitkoh Lakes, 1981.

Lake	Avoss	Baranof	Sitkoh
Date	5/27-8/5/81	6/30-7/29/81	6/3-7/21/81
Number of Samples	2	2	3
Orthocladius sp.	3	17	0
Parphaenocladius sp.	12	3	0
Thienemanniella sp.	3	2	0
Polypedilum fallax	0	0	1
Phaenopsectra sp.	0	1	0
Microsectra sp.	1	0	0
Empididae	0	1	0
Bibionidae	1	0	0
Prosimulium sp.	5	2	0
Bezzia sp.	1	0	0
Psychodidae	0	0	1

Table 12. Summary of fish sampling effort and catch data from lakes studied, 1981.

Date	Location	Gear Type	Total Hours Set	Catch
		Avoss Lake		
5/26	Inlet No. 1	Hook and Line	...	3 RT (185-286 mm)
5/27	Inlet No. 1	Hook and Line	...	38 RT (130-285 mm)
5/27-28	Inlet No. 1	3 Large Traps	22:50	7 RT (150-285 mm)
5/27-28	Inlet End of Lake	5 Fry Traps	44:05	1 RT (147 mm)
5/28	Inlet No. 1	Hook and Line	4:30	32 RT (147-324 mm)
5/29	Inlet No. 1	Hook and Line	...	12 RT (183-344 mm)
7/06	Lake	Hook and Line	0:50	2 RT (Unmeasured)
7/06-09	Lake	3 Fyke Nets	...	1 RT (110 mm)
7/07	Lake	Hook and Line	4:15	4 RT (167-248 mm)
7/07-08	Inlet No. 1	10 Fry Traps	13:25	1 RT (105 mm)
7/07-09	Lake	10 Large Traps	...	4 RT (92-264 mm)
7/08	Lake	Hook and Line	2:00	0
7/09	Lake	Hook and Line	3:05	14 RT (164-280 mm)
7/09	Outlet	4 Fry Traps	10:35	1 RT (113 mm)
8/03	Lake	Hook and Line	1:45	12 RT (180-292 mm)
8/04	Lake	Hook and Line	1:15	6 RT (230-294 mm)
8/04-07	Lake	3 Fyke Nets	71:35	41 RT (101-259 mm)
8/05	Lake	Hook and Line	3:20	6 RT (136-236 mm)
8/06	Lake	Hook and Line	8:30	9 RT (127-267 mm)
8/19-20	Lake	Sinking Gill Net	14:30	8 RT (176-279 mm)
8/19-20	Lake	Floating Gill Net	11:10	1 RT (172 mm)
		Baranof Lake		
6/08	Lake	Hook and Line	1:00	0
6/09	Outlet	Hook and Line	...	25 CT (197-499 mm)
6/09-12	Lake	7 Large Traps	110:50	23 CT (90-179 mm)

Table 12. (cont.) Summary of fish sampling effort and catch data from lakes studied, 1981.

Date	Location	Gear Type	Total Hours Set	Catch
6/10	Outlet	Hook and Line	...	21 CT (197-387 mm)
6/10	Lake	Hook and Line	...	3 CT (416-438 mm)
6/11	Lake	Hook and Line	...	5 CT (308-383 mm)
6/12	Lake	Hook and Line	...	5 CT (334-430 mm)
6/29-7/02	Lake	3 Fyke Nets	52:16	2 CT (162, 450 mm)
6/30	Lake	Hook and Line	12:40	23 CT (190-475 mm)
7/01	Inlet No. 3	1 Fry Trap	5:05	1 CT (74-91 mm)
7/01	Inlet No. 4	2 Fry Traps	8:10	3 CT (74-91 mm)
7/01	Lake	Hook and Line	0:50	4 CT (202-300 mm)
7/01-02	Lake	3 Large Traps	46:15	1 CT (108 mm)
7/02	Slough No. 1	2 Fry Traps	4:10	0
7/02	Lake	Hook and Line	3:40	7 CT (277-385 mm)
7/03	Lake	Hook and Line	3:20	6 CT (282-385 mm)
7/27	Lake	Hook and Line	3:10	2 CT (331, 346 mm)
7/28	Lake	Hook and Line	5:10	6 CT (289-437 mm)
7/29	Lake	Hook and Line	2:50	2 CT (373, 384 mm)
7/30	Lake	Hook and Line	0:50	1 CT (370 mm)
7/30	Inlet No. 1	11 Fry Traps	47:50	10 CT (76-125 mm)
7/31	Inlet No. 2	2 Fry Traps	2:15	0
		Sitkoh Lake		
6/01	Lake	Hook and Line	...	13 CT (196-342 mm); 1 RT (165 mm); 1 SS (181 mm)
6/02	Lake	Hook and Line	...	16 CT (180-351 mm)
6/03	Lake	Hook and Line	...	17 CT (177-368 mm)
6/04	Lake	Hook and Line	...	41 CT (145-316 mm)
6/04	Inlet No. 1	5 Fry Traps	5:00	2 CT (123, 128 mm); 2 Cottids; 4 DV (94-114 mm); 4 SS

Table 12. (cont.) Summary of fish sampling effort and catch data from lakes studied, 1981.

Date	Location	Gear Type	Total Hours Set	Catch
6/05	Lake	Hook and Line	...	12 CT (204-339 mm); 1 DV (210 mm)
6/22	Cabin Area	Hook and Line	1:45	11 CT (184-340 mm)
6/22-26	Lake	7 Fyke Nets	147.25	34 CT (141-314 mm); 12 SS; 1 DV; 1 RT; 31 Cottids
6/22-26	Lake	16 Large Traps	112:40	17 CT (129-305 mm)
6/23	Cabin Area	Hook and Line	1:40	6 CT (224-335 mm); 1 RT (450 mm)
6/23	Inlet No. 1	6 Fry Traps	8:35	1 CT (123 mm); 35 SS; 14 DV
6/24	Cabin Area	1 Fry Trap	1:00	1 DV; 1 CT (142 mm); 5 SS; 1 Cottid
6/24	Cabin Area	Hook and Line	1:50	9 CT (215-301 mm)
6/24	Inlet No. 3	3 Fry Traps	...	5 RT (57-70 mm); 5 DV; 21 SS; 1 Cottid
6/25	Cabin Area	Hook and Line	2:15	16 CT (223-336 mm)
7/21	Inlet No. 2	7 Fry Traps	...	13 CT (88-132 mm); 16 DV; 19 SS; 1 RT (95 mm); 18 Cottids
7/21	Cabin Area	Hook and Line	1:00	0
7/21	Cabin Area	1 Large Trap	2:05	1 DV; 39 SS; 1 Cottid
7/21-24	Outlet Area	3 Fyke Nets	72:05	5 CT (133-352 mm); 2 RS; 1 Bufonid
7/22	Cabin Area	Hook and Line	0:40	1 CT (278 mm)
7/23	Cabin Area	Hook and Line	0:15	0

Due to the small size of rainbow trout in Avoss Lake and the difficulty most anglers have in catching them, fishing is probably not a prime consideration of recreational users of Avoss Lake.

One of the major parts of the study on Avoss Lake was attempting to make a population estimate of catchable-size (180 mm or larger) rainbow trout. The first 4-day trip to Avoss Lake (May 26-29) coincided with the spawning run of trout into the main inlet. Approximately 200 mature trout were observed spawning in the lower 0.5 km of the inlet. Thirty-one trout were marked in the inlet and numerous other trout were captured and released unmarked. The unmarked fish were primarily mature males 130 to 160 mm fork length. Marking and recapture of fish was continued on subsequent trips to the lake.

Using a modified Schnabel mark and recapture formula, we arrived at an estimate of 494 rainbow trout of 180 mm or larger in Avoss Lake (Table 13). The 95% confidence interval was 265 to 1,011 fish. Although the confidence interval is wide, even the high figure is only 4.8 fish per hectare of lake surface area.

Sampling with traps, nets, and hook and line indicates that the lake is the primary rearing area for rainbow trout in the Avoss system. Numerous emergent fry were observed scattered along the shoal areas at the inlet end of the lake in August, 1980 and 1981. No spawning activity was observed in the outlet or two small inlets accessible to trout.

Avoss Lake rainbow trout are slow-growing fish. The maximum size of the fish sampled was 354 mm. Many of the males were mature at 150-180 mm and grew very little after maturing. Age-length relationships of Avoss Lake rainbow trout are presented in Table 14.

Rainbow trout in Avoss Lake are very opportunistic in their feeding habits (Table 15). Their diets were more varied than those of fish from Baranof and Sitkoh Lakes.

Baranof Lake. Baranof Lake (lat. 57°05' N, long. 134°51' W) is a 324-ha lake at the head of Warm Springs Bay, 25 km east of Sitka. Baranof Lake is 4.8 km long and approximately 0.6 km wide. Its maximum depth is 88 m and the average depth is 39 m. The surface elevation is 44 m, and the water is slightly glacial. There is one major inlet to Baranof Lake (Baranof River), located at the west end of the lake, and a 0.4-km long outlet terminating in a 28-m falls at the head of Warm Springs Bay.

Access to Baranof Lake is by floatplane or via a 0.5-km trail from Warm Springs Bay. Also, at least two parties backpacked to Baranof Lake from Silver Bay this past summer.

The USFS maintains a recreational-use cabin, with woodstove, at the east end of the lake. There are two USFS skiffs at the cabin. There are several sites along Baranof Lake suitable for tent camping, but cliffs along parts of the lake make a boat a necessity for moving about the lake.

Baranof Lake has a monospecific population of cutthroat trout, result of stocking in 1918. Coho salmon and pink salmon were also introduced in 1919

Table 13. Schnabel estimate of population size for Avoss Lake rainbow trout (180 mm or longer), 1981.

Date	M_t	C_t	R_t	M	M_tC_t	$S(M_tC_t)$	R_t	$N = \frac{S(C_tM_t)}{R + 1}$
May 27	0	9	0	9	0	210	0	0
28	9	17	0	17	153	153	0	153
29	26	5	3	5	224	377	3	94
July 07	31	5	1	4	155	532	4	106
09	35	13	0	13	455	987	4	197
Aug. 03	48	13	1	12	624	1,611	5	268
04	60	6	2	4	360	1,971	7	246
05	64	5	0	5	320	2,291	7	286
06	69	13	0	13	897	3,188	7	398
18	82	2	0	1	164	3,352	7	419
19	83	4	1	2	332	3,684	8	409
20	85	9	0	6	765	4,449	8	494*

M_t The number of marked fish in the lake when the t^{th} sample is drawn

C_t The total sample taken on day t

R_t The number of recaptures in the sample C_t

M The number of fish marked from the sample C_t

$\hat{}$ The population present throughout the experiment

*Range of 265 to 1,011 at the 95% confidence level

Table 14. Age and length (mm) relationships* of fish from Avoss and Sitkoh Lakes, 1981.

Age	Avoss Lake Rainbow Trout a = 103.41 b = 92.71 r^2 = 0.59 N = 52	Sitkoh Lake Cutthroat Trout a = -48.76 b = 173.06 r^2 = 0.96 N = 11
0	...	...
1	103.41	...
2	167.67	...
3	205.26	141.36
4	231.93	191.15
5	252.62	229.77
6	269.52	261.32
7	...	288.00
8	296.19	311.00
9	307.11	331.49
10	...	349.72
11	...	366.22

*y = a + b ln x, where y = length (mm) and x = age (years)

Table 15. Stomach contents of fish, Avoss, Baranof, and Sitkoh Lakes.

	Avoss Lake Rainbow Trout Sample Size=11 3 Empty N = 8 % Occurrence	Baranof Lake Cutthroat Trout Sample Size=6 1 Empty N = 5 % Occurrence	Sitkoh Lake Cutthroat Trout Sample Size=6 1 Empty N = 5 % Occurrence
Hirudinea	0	0	40
Crustacea			
Amphipoda			
Gammarus sp.	12.5	0	0
Ephemeroptera	37.5	20	0
Baetidae	25.0	40	0
Tricorythodidae	0	60	0
Plecoptera	12.5	40	0
Homoptera			
Cicadellidae	25.0	0	0
Hymenoptera	25.0	0	0
Coleoptera	25.0	20	0
Elateridae	0	0	20
Diptera	25.0	0	0
Chironomidae	62.5	60	40
Simuliidae	25.0	20	0
Tricoptera	37.5	40	60
Phryganeidae	0	0	20
Osteichthyes			
Eggs	25.0	0	0

and 1920. The salmon evidently dropped out of the system, and the returning adults were unable to negotiate the 28-m falls at tidewater on the outlet stream.

A survey of the lower 5 km of the main inlet, Baranof River, was conducted during this study.

This stream has several good gravel areas for cutthroat trout spawning, but rearing habitat is scarce. Attempts to capture rearing cutthroats in baited traps confirmed that few rearing fish are utilizing the inlet. Some small inlets to Baranof Lake were also trapped, and few rearing cutthroats were noted.

The outlet to Baranof Lake was also surveyed. Although the utilizable area is very short (approximately 150 m), it has excellent spawning gravel. Over 40 post-spawning cutthroat trout were sampled there from June 8-12. This area, however, does not have much rearing habitat. Baited traps set along the shoreline of Baranof Lake produced fair numbers of small fish and indicate that this is the major rearing area for cutthroat trout in the Baranof Lake system.

In addition to numerous rearing fish, Baranof Lake contains a fair population of larger cutthroat trout. Fish up to 500 mm were sampled. These fish provide a high-quality fishery. They average about 350-mm fork length, are heavy-bodied, have orange-red flesh, and most of the fish have a silvery coloration, indicative of a pelagic existence.

A population estimate of cutthroat trout in Baranof Lake was attempted but was not successful. The lake's size and an inadequate number of fish sampled were the main problems.

Only two fish were recaptured during the study, although 101 were marked.

Growth rates of the cutthroat trout in Baranof Lake were not determined due to the detrimental effect that killing the fish would have had on the population estimate work. The physical condition of the fish and the age of a few fish collected indicate that they are fairly fast growing.

Stomach contents of six cutthroat trout from Baranof Lake were analyzed, Table 15. These figures may be deceiving due to the small sampling size. The larger fish must be piscivorous in their feeding habits although no fish remains were found in our samples. Minnow-shaped lures were very effective in catching Baranof Lake cutthroats.

Baranof Lake receives a fair amount of recreational use. In addition to fishing, other major recreational uses of the area are wildlife observation, sightseeing, and trips to the warm springs. Observations of deer and their sign around Baranof Lake indicate a healthy deer population, but the area receives little hunting pressure.

Sitkoh Recreational Use. Sitkoh Lake (lat. 57°30'30" N, long. 135°05' W) is a 209.5-ha lake located on the southeast end of Chichagof Island, 53 km northeast of Sitka. The lake is 4.1 km long and about 0.6 km wide. The maximum depth of Sitkoh Lake is 66 m and its average depth is 35 m. The

surface elevation of Sitkoh Lake is 59 m. Cutthroat and rainbow-steelhead trout, Dolly Varden char, sockeye, coho, chum, and pink salmon, and prickly sculpin were noted in the Sitkoh system. Other fish species may be present but were not sampled.

Access to Sitkoh Lake is mainly by floatplane. Many people drive or hike to the lake from False Island or hike up to the lake from Sitkoh Bay along the trail paralleling Sitkoh Creek.

There are two USFS cabins on Sitkoh Lake. One is a USFS work cabin and the other is a recreational-use cabin. The recreation-use cabin is located next to inlet No. 1. It has an oil stove and a skiff available for public use.

The Sitkoh Lake system receives heavy public use from early April through October. The primary objective of most visitors is fishing. Hiking and hunting are also typical user activities. Much of the surrounding area has been clear-cut and definitely detracts from the aesthetic value sought by many visitors.

One negative impact that probably will occur on the Sitkoh Lake area in 1983 or 1984 is a USFS blowdown salvage sale. Approximately 1 million board feet of wood will be removed from the immediate area of the lake. This includes three patches and some picking of individual trees along the beach fringe. This will further detract from the already dismal scenery around Sitkoh Lake.

There are no large streams flowing into Sitkoh Lake; but inlet No. 1, Figure 4, although small, is accessible to fish for several kilometers and has some good rearing and spawning habitat. Sampling inlet No. 1 with baited traps revealed that it has a lot of young-of-the-year coho salmon and a few rearing Dolly Varden char and cutthroat trout. Inlet No. 2 was also surveyed and trapped. It has about 1 km of accessible water and has some good spawning and rearing areas. Inlet No. 3 was surveyed and trapped for 0.3-0.5 km. It is very small with steep gradient. However, it was the only inlet where rearing rainbow trout were found.

Sitkoh Creek, the outlet to Sitkoh Lake, flows 5.6 km from Sitkoh Lake to Sitkoh Bay. The upper 1.0-1.5 km of the stream is excellent spawning and rearing area. The upper part of the outlet is probably heavily utilized, as such, by the resident cutthroat and rainbow trout of Sitkoh Lake.

Sitkoh Lake itself is an important rearing area for sockeye and coho salmon and cutthroat and rainbow trout. The lake is also a major overwintering area for sea-run Dolly Varden. Prickly sculpin were also sampled in Sitkoh Lake.

Sitkoh Lake has a healthy population of resident cutthroat trout and small populations of rainbow trout and nonanadromous Dolly Varden. Cutthroat trout up to 375-mm fork length were sampled. The cutthroat trout in Sitkoh Lake are easy to catch. Catch rates of 10 per hour are not unusual.

A population estimate of cutthroat trout in Sitkoh Lake was attempted, but no conclusive results were obtained. A total of 197 cutthroat trout 180 mm

or larger were marked and released but only two were recaptured. This could be due to (1) a large population of fish or, (2) a high mortality rate on marked fish. Another factor we could not control was the possibility of fish moving into or out of Sitkoh Lake from Sitkoh Creek.

Sitkoh Lake cutthroat trout are typical of southeast Alaska. They are slow growing and enter the catchable population at 4 to 5 years of age. Table 14 presents age-length data on Sitkoh Lake cutthroats. No really large cutthroat trout were sampled from Sitkoh Lake. The Sitkoh Lake cutthroats are not heavy-bodied like the cutthroat trout from Baranof Lake.

Only six cutthroat trout from Sitkoh Lake were sampled for stomach analyses. As on Baranof Lake, killing fish for age and stomach analyses was counter-productive to our population estimation work.

LITERATURE CITED

Henderson, H. F., R. A. Ryder, and A. W. Kudhongania. 1973. Assessing fishery potentials of lakes and reservoirs. J. Fish Res. Bd. Can. 30: 2000-2009.

Jenkins, R. M. 1967. The influence of some environmental factors on standing crop and harvest of fishes in U.S. reservoirs. Pages 298-321 In Proc. Res. Fish. Symp. Southern Div. Am. Fish. Soc.

Rawson, D. S. 1953. The standing crop of net plankton in lakes. J. Fish Res. Bd. Can. 10(5):237-244.

Regier, H. A., A. J. Cordone, and R. A. Ryder. 1971. Total fish landings from fresh waters as a function of limnological variables, with special reference to lakes on east-central Africa. FAO Fish Stock Assess. Work. Pap. No. 3. 13 pp.

Ryder, R. A. 1964. Chemical characteristics of Ontario lakes with reference to a method for estimating fish production. Ont. Dept. Lands For. Sect. Rep. (Fish.) No. 38. 75 pp.

_____. 1965. A method for estimating the potential fish production of north-temperate lakes. Trans. Am. Fish. Soc. 94:214-218.

Schmidt, A. E. 1974. Inventory and cataloging of the sport fish and sport fish waters in southeast Alaska. Alaska Dept. of Fish and Game. Fed. Aid in Fish Rest., Annu. Rep. of Prog., 1973-1974, Proj. F-9-6, 15(G-I-A). 125 pp.

_____. 1976. Inventory and cataloging of the sport fish and sport fish waters in southeast Alaska. Alaska Dept. of Fish and Game. Fed. Aid in Fish Rest., Annu. Rep. of Performance, 1975-1976, Proj. F-9-8, 17(G-I-R). 48 pp.

_____. 1977. Inventory and cataloging of the sport fish and sport fish waters in southeast Alaska. Alaska Dept. of Fish and Game. Fed. Aid in Fish Rest., Annu. Rep. of Performance, 1976-1977, Proj. F-9-9, 18(G-I-R). 60 pp.

_____. 1978. Inventory and cataloging of the sport fish and sport fish waters in southeast Alaska. Alaska Dept. of Fish and Game. Fed. Aid in Fish Rest., Annu. Rep. of Performance, 1977-1978, Proj. F-9-10, 19(G-I-R). 64 pp.

_____. 1979. Inventory and cataloging of the sport fish and sport fish waters in southeast Alaska. Alaska Dept. of Fish and Game. Fed. Aid in Fish Rest., Annu. Rep. of Performance, 1978-1979, Proj. F-9-11, 20(G-I-R). pp 59-132.

_____. 1980. Inventory and cataloging of the sport fish and sport fish waters in southeast Alaska. Alaska Dept. of Fish and Game. Fed. Aid in Fish Rest., Annu. Rep. of Performance, 1979-1980, Proj. F-9-12, 21(G-I-R). 49 pp.

Schmidt, A. E. and F. S. Robards. 1975. Inventory and cataloging of the sport fish and sport fish waters in southeast Alaska. Alaska Dept. of Fish and Game. Fed. Aid in Fish Rest., Annu. Rep. of Performance, 1974-1975, Proj. F-9-7, 16(G-I-A). 111 pp.

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