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FEDERAL AID IN FISH RESTORATION
AND
ANADROMOUS FISH STUDIES

INVENTORY OF HIGH QUALITY

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TABLE OF CONTENTS

STUDY NO. G-I INVENTORY AND CATALOGING Page

Job No. G-I-R Inventory of High Quality Recreational Fishing Waters in Southeast Alaska
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Abstract 1
Key Words 1
Background 1
Recommendations 2
Davidof Lake 2
Plotnikof Lake 2
Plotnikof River 2
Salmon River 2
Objectives 2
Techniques Used 5
Relationship of Limnological Characteristics to Fish Production 5
Evaluation of Recreational Fishing Waters 10
Findings 10
Relationship of Limnological Characteristics to Fish Production 10
Physical and Chemical Considerations 10
Literature Cited 35

LIST OF TABLES AND FIGURES

Figure 1. Location of Lakes Studied in Sitka Area, 1982 3
Table 1. List of Common Names, Scientific Names, and Abbreviations 4
Figure 2. Location of Sampling Stations, Davidof Lake, 1982 . . . 6
Figure 3. Location of Sampling Stations, Plotnikof Lake, 1982 . . 7
Figure 4. Location of Sampling Stations, Salmon Lake, 1982 8
Figure 5. Plotnikof River Sampling Locations, 1982 9
Figure 6. Bathymetric Map of Davidof Lake 11
Figure 7. Bathymetric Map of Plotnikof Lake 12
Figure 8. Bathymetric Map of Salmon Lake 13
Table 2. Morphometry of Salmon lake 14
Table 3. Thermal Data (°C) From Lakes Studies, 1983 15
Table 4. Alkalinity, Conductivity, Dissolved Oxygen, Hardness, pH, Secchi Disc Visibility, and Water Temperature for Lakes Studied, 1982 16
Table 5. Water Quality Analysis of Davidof, Plotnikof, and Salmon Lakes, 1982 17
Table 6. Morphoedaphic Index of 36 Lakes in Southeast Alaska . . 19
Table 7. Plankton Composition, Density (Organisms per Square Meter), and Weight (Milligrams per Square Meter) as Collected With No. 153 Nitex Plankton Net, Davidof, Salmon, and Plotnikof Lakes, 1982 20

TABLE OF CONTENTS (Cont'd.)

			Page
Table	8.	Identification and Enumeration (Organisms per Square Meter) of Benthic Organisms From Plotnikof and Salmon Lakes, 1982	22
Table	9.	Identification and Enumeration of Stream Drift Organisms From Plotnikof and Salmon Lakes, 1982	23
Table	10.	Summary of Fish Sampling Effort and Catch Data From Lakes Studied, 1982	24
Table	11.	Plotnikof River Fish Sampling Effort and Catch by Area, 1982	25
Figure	9.	Length-Weight Relationships of Rainbow Trout From Davidof and Plotnikof Lakes, 1982	27
Table	12.	Age and Length (mm) Relationships of Fish From Lakes Studied, 1982	28
Table	13.	Condition Factors (K) of Fish Sampled, 1982	29
Table	14.	Age, Length, Weight, Sex, and Fecundity of Kokanee, Plotnikof Lake, September 17-25, 1982	31
Table	15.	Age Analysis of Plotnikof River Steelhead, 1982	36

Volume 24 Study No. G-I

STATE OF ALASKA

Bill Sheffield, 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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Study No.: G-I Study Title: INVENTORY AND CATALOGING

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, 1982 to June 30, 1983

ABSTRACT

Limnological investigations were conducted on three recreational-use lakes and one river.

Population estimates of resident salmonids were attempted and recreational analyses were conducted for all three lakes. Recommendations for further study was made on one lake and one river system.

KEY WORDS

Southeast Alaska, Limnology, productivity, populations, recreation, steelhead, coho salmon, Dolly Varden char, cutthroat trout, kokanee, rainbow trout.

BACKGROUND

Limnological investigations have been conducted in several lakes in Southeast Alaska (Schmidt, 1974; Schmidt and Robards, 1975; Schmidt, 1976-1982). One continuing objective of this project has been to determine the relationship of the physical, chemical, and biological characteristics of these lakes 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 Davidof, Plotnikof, and Salmon (Figure 1). Plotnikof River, to the outlet of Plotnikof Lake, was evaluated.

Table 1 lists the common name, scientific name, and abbreviation of each fish mentioned in this report.

RECOMMENDATIONS

Davidof Lake

None.

Plotnikof Lake

None.

Plotnikof River

Work should be continued on Plotnikof River to determine the run timing, overwintering areas, spawning areas, and numbers of spring-run and summer-run steelhead. Further work should be done to determine the numbers and timing of the coho salmon entering the Plotnikof system. Then, if necessary, a management program could be implemented to restore the runs to historic levels.

Salmon Lake

The Salmon Lake system is very important to the Sitka area. It is the only system close to town with four species of salmon (coho, sockeye, pink, and chum), steelhead trout, resident rainbow trout, cutthroat trout, and Dolly Varden char. The system is also an important spawning and overwintering area for anadromous Dolly Varden. Many local people hunt, fish, and camp in the area.

The Salmon Lake watershed is mainly old-growth spruce and hemlock. An easy access area such as this is a prime area for logging. However, the importance of the area for recreation and fish and wildlife resources should be stressed before any development on logging plans for the area are given serious thought.

OBJECTIVES

1. To determine the limnological relationships and fish populations existing in two high-quality recreation areas. The lakes that will be studied include Davidof and Plotnikof Lakes in the South Baranof Wilderness Area and Salmon Lake near Sitka. The river below Plotnikof Lake to Port Banks will be studied for rearing fish populations and spawning habitat.

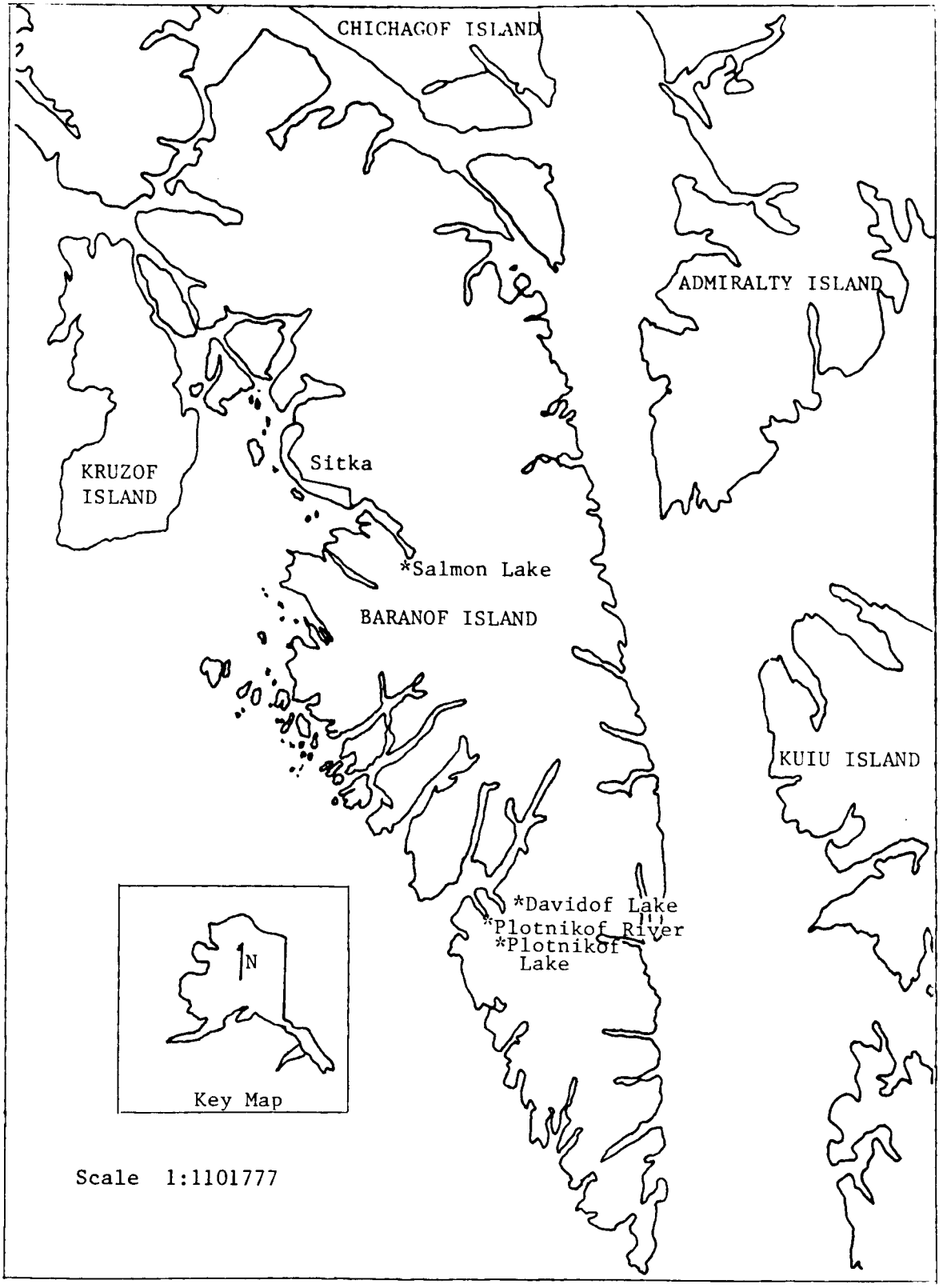

Fig. 1. Location of Lakes Studied in Sitka Area, 1982.

Table 1. List of Common Names, Scientific Names, and Abbreviations.

Common Name	Scientific Name and Author	Abbreviation
Coho salmon	*Oncorhynchus kisutch* (Walbaum)	SS
Sockeye salmon	*Oncorhynchus nerka* (Walbaum)	RS
Kokanee	*Oncorhynchus nerka* (Walbaum)	KOK
Pink salmon	*Oncorhynchus gorbuscha* (Walbaum)	PS
Chum salmon	*Oncorhynchus keta* (Walbaum)	CS
Steelhead	*Salmo gairdneri* Richardson	SH
Rainbow trout	*Salmo gairdneri* Richardson	RT
Cutthroat trout	*Salmo clarki* Richardson	CT
Dolly Varden	*Salvelinus malma* (Walbaum)	DV
Threespine stickleback	*Gasterosteus aculeatus* (Linnaeus)	TS
Cottids	*Cottidae Sp*	Sc

TECHNIQUES USED

Relationship of Limnological Characteristics to Fish Production

Limnological relationships existing in three lakes were investigated. The three lakes are Davidof (Figure 2), Plotnikof (Figure 3), and Salmon (Figure 4). The Plotnikof River, Plotnikof Lake to Port Banks (Figure 5), was studied for rearing fish distribution and spawning habitat.

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.

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.

Zooplankton were collected periodically throughout the summer from all lakes. Two vertical tows of 50 m were made on 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. Efficiency of 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 nets in lake inlets. 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, and fyke nets. The fyke nets used have 0.91-m x 0.91-m square frames with two 0.91-m x 12.2-m leads. The fyke nets were usually fished baited with salmon eggs in the cod end of the net. The fyke nets were allowed to fish overnight between checks.

Age, growth, and condition factors of fish in the lakes were determined from fish collected throughout the study period. Fish were measured to the nearest millimeter from the tip of the snout to the tip of the tail.

When samples were collected for paired length and weight measurements, individuals were measured for fork length, blotted to remove excess surface water, and then weighted to the nearest 0.1 g. Samples for length-weight

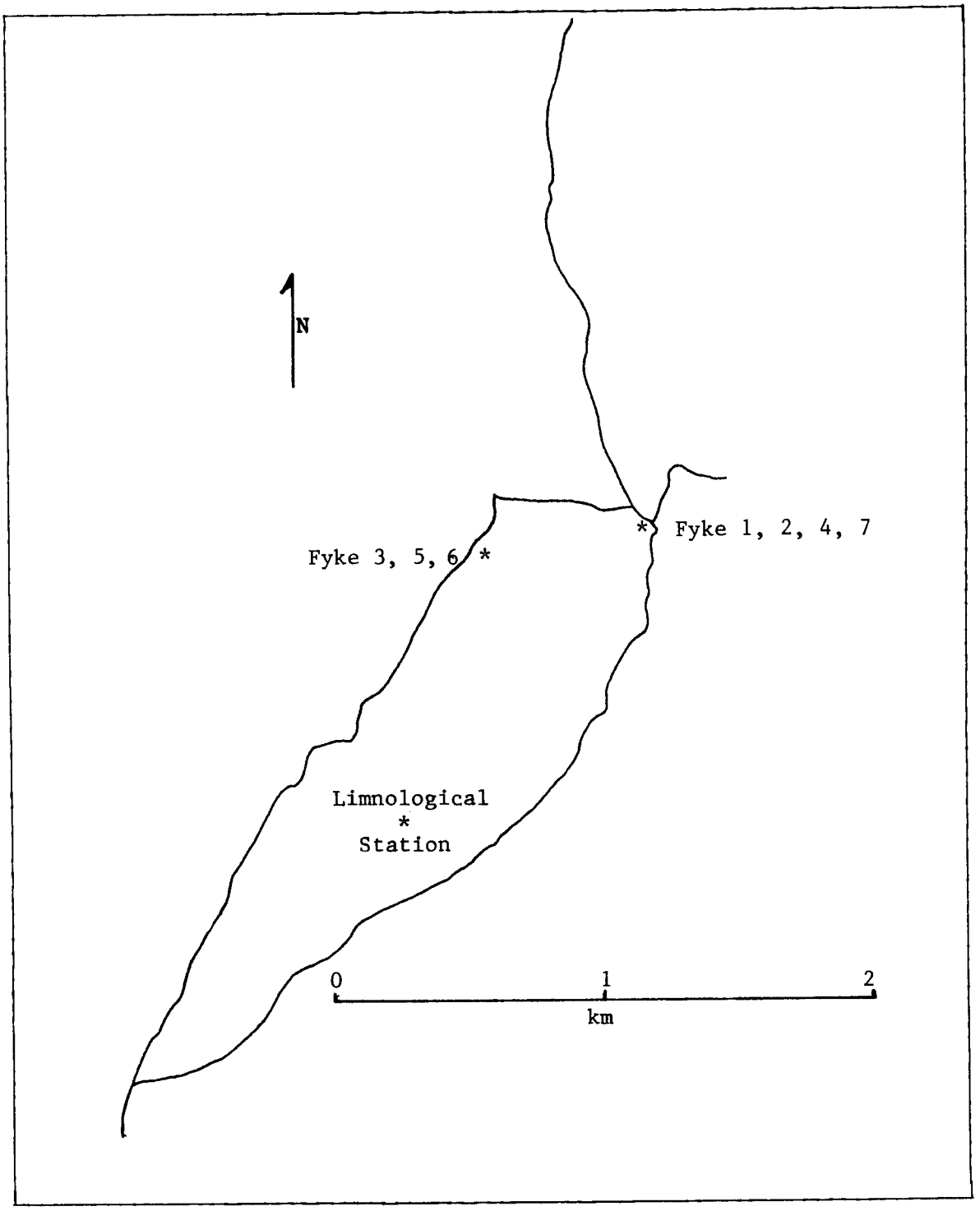

Fig. 2. Map Showing Location of Sampling Stations, Davidof Lake, 1982.

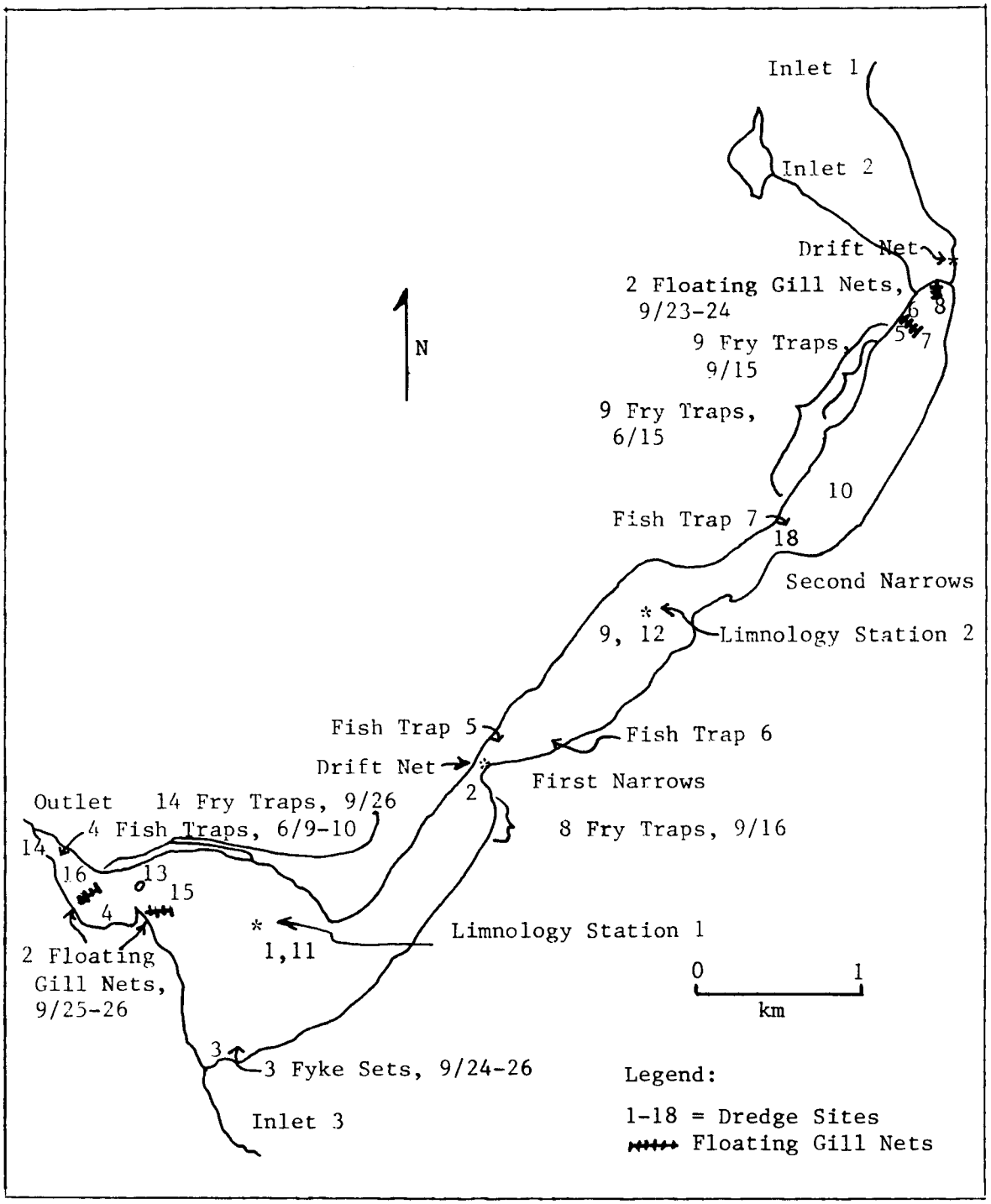

Fig. 3. Map Showing Location of Sampling Stations, Plotnikof Lake, 1982.

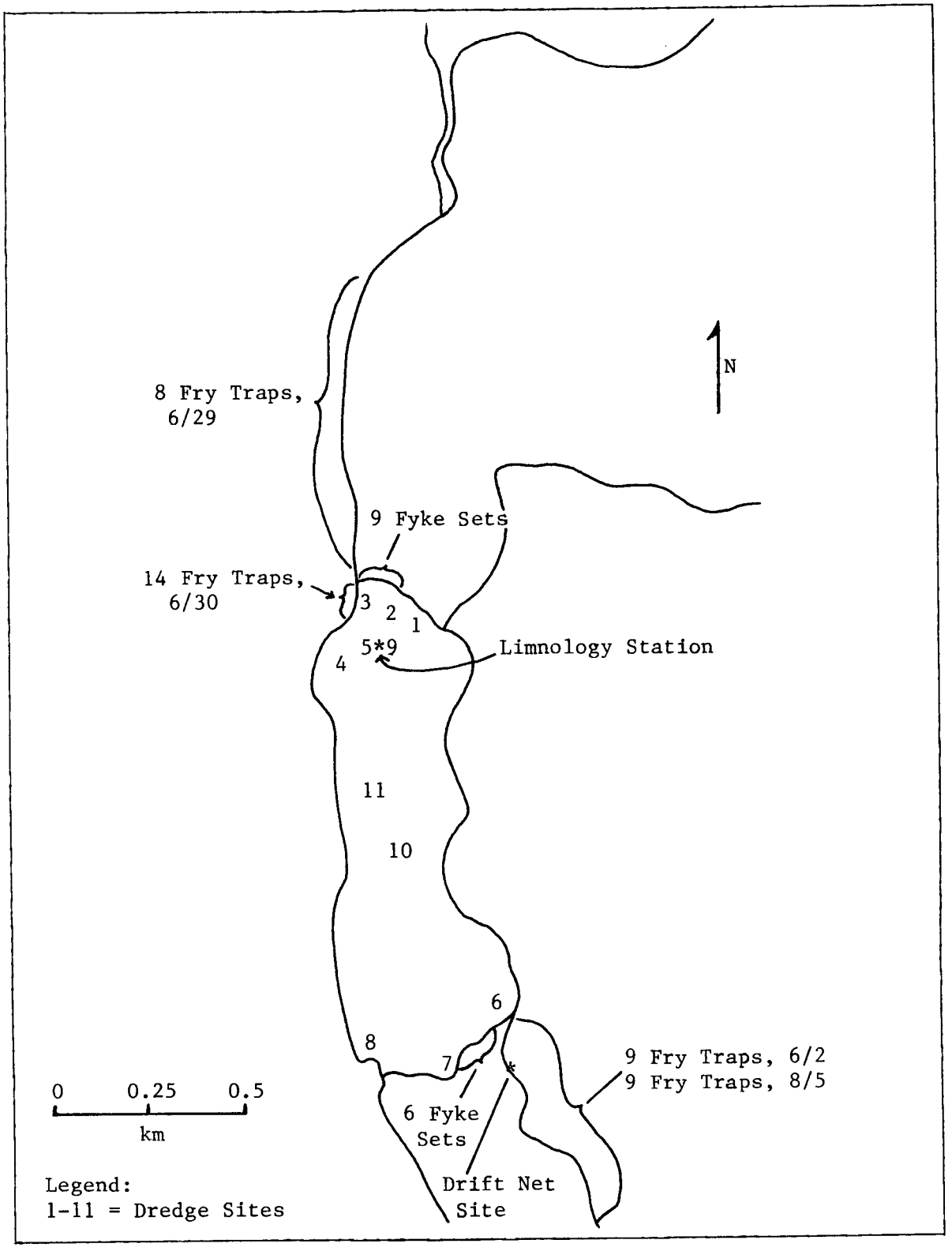

Fig. 4. Map Showing Location of Sampling Stations, Salmon Lake, 1982.

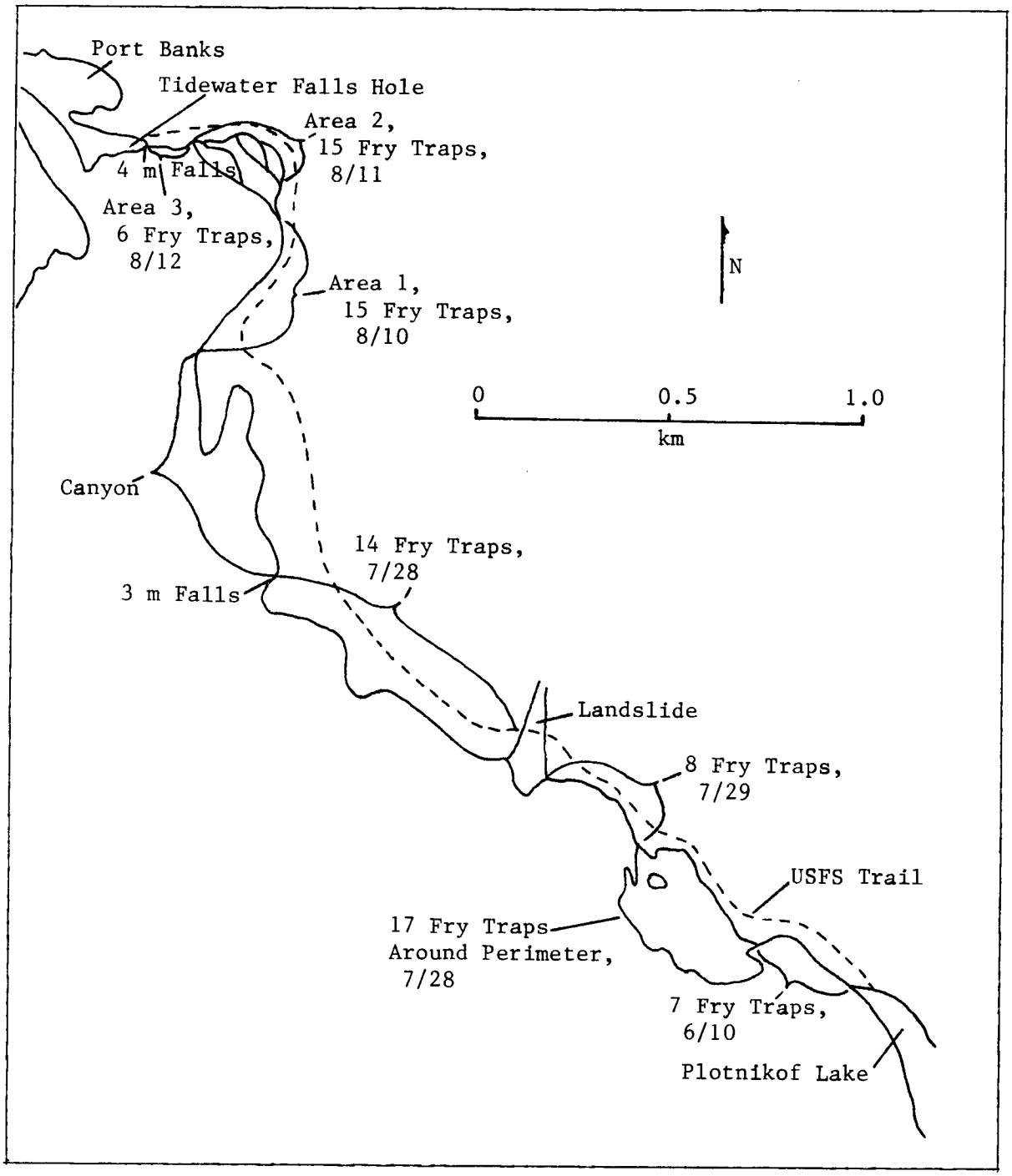

Fig. 5. Plotnikof River Sampling Locations, 1982.

processing usually were not chosen randomly but were selected to ensure spread over the largest range in length.

Paired length and weight data were used also to estimate the relative condition of the population at the time of the sample. The coefficient of condition was calculated from:

$$K = \frac{100 \times \text{Weight (gm)}}{\text{Fork Length (cm)}^3}$$

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.

Evaluation of Recreational Fishing Waters

The recreational potential of Davidof, Plotnikof, and Salmon Lakes and Plotnikof River was evaluated. Information evaluated included the ability of the area to support a viable sport fishery, uniqueness of the area, aesthetics, recreational opportunities available at the lake, present-use patterns, accessibility, accommodations, and 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 the physical and chemical parameters limit the species composition and abundance of organisms, it is essential to study the morphometric features of lakes. Bathymetric maps of Davidof (Figure 6), Plotnikof (Figure 7), and Salmon Lakes (Figure 8) were prepared from sounding data. Morphometric data for Salmon Lake is presented in Table 2.

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 Davidof, Plotnikof, and Salmon Lakes are presented in Table 3. Alkalinity, conductivity, dissolved oxygen, hardness, pH, Secchi disc visibility, and water temperature for the three lakes studied are presented in Table 4. Water quality analyses of the lakes are presented in Table 5.

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, e.g., Jenkins (1967), Regier et al. (1971), and

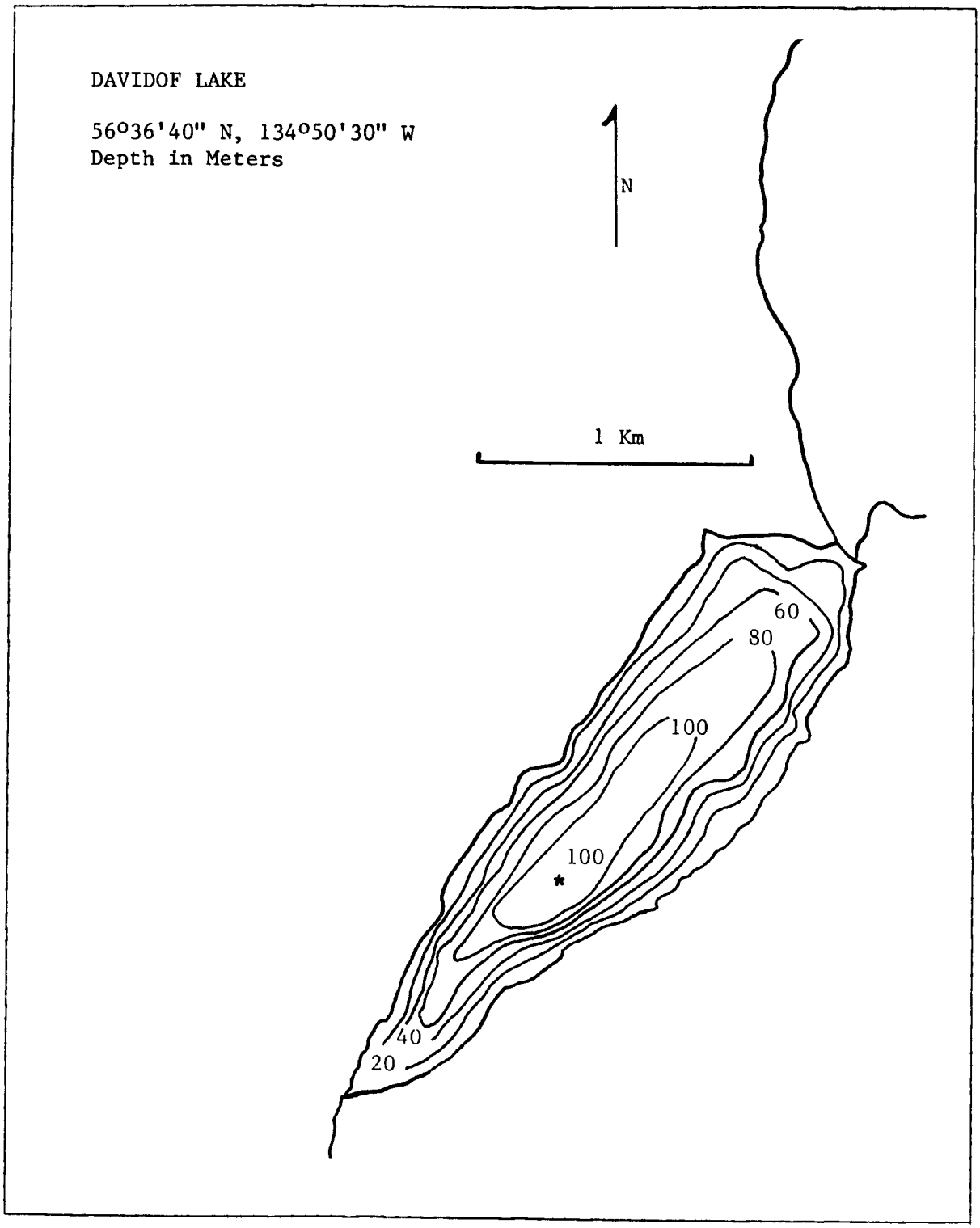

Fig. 6. Bathymetric Map of Davidof Lake.

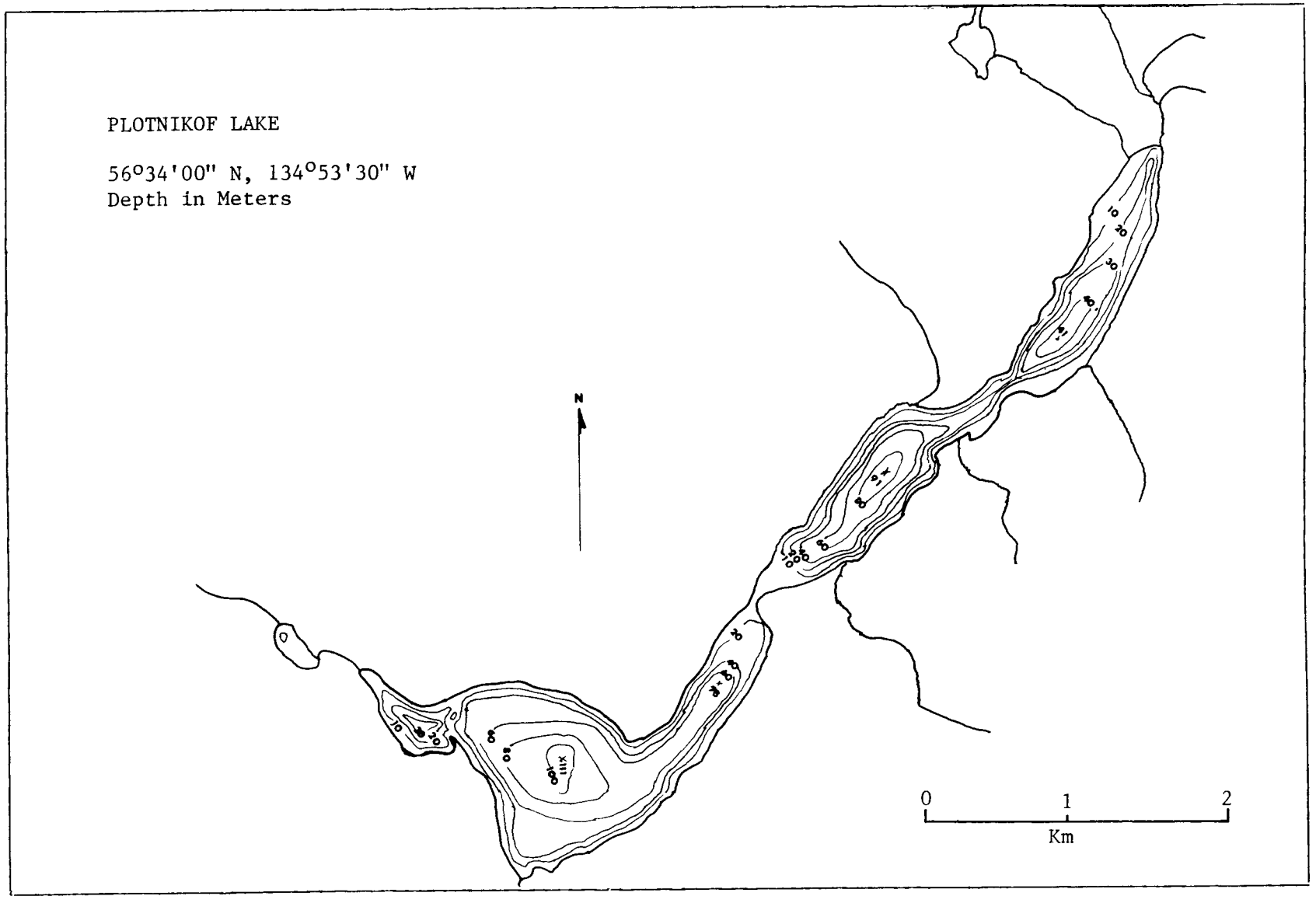

Fig. 7. Bathymetric Map of Plotnikof Lake.

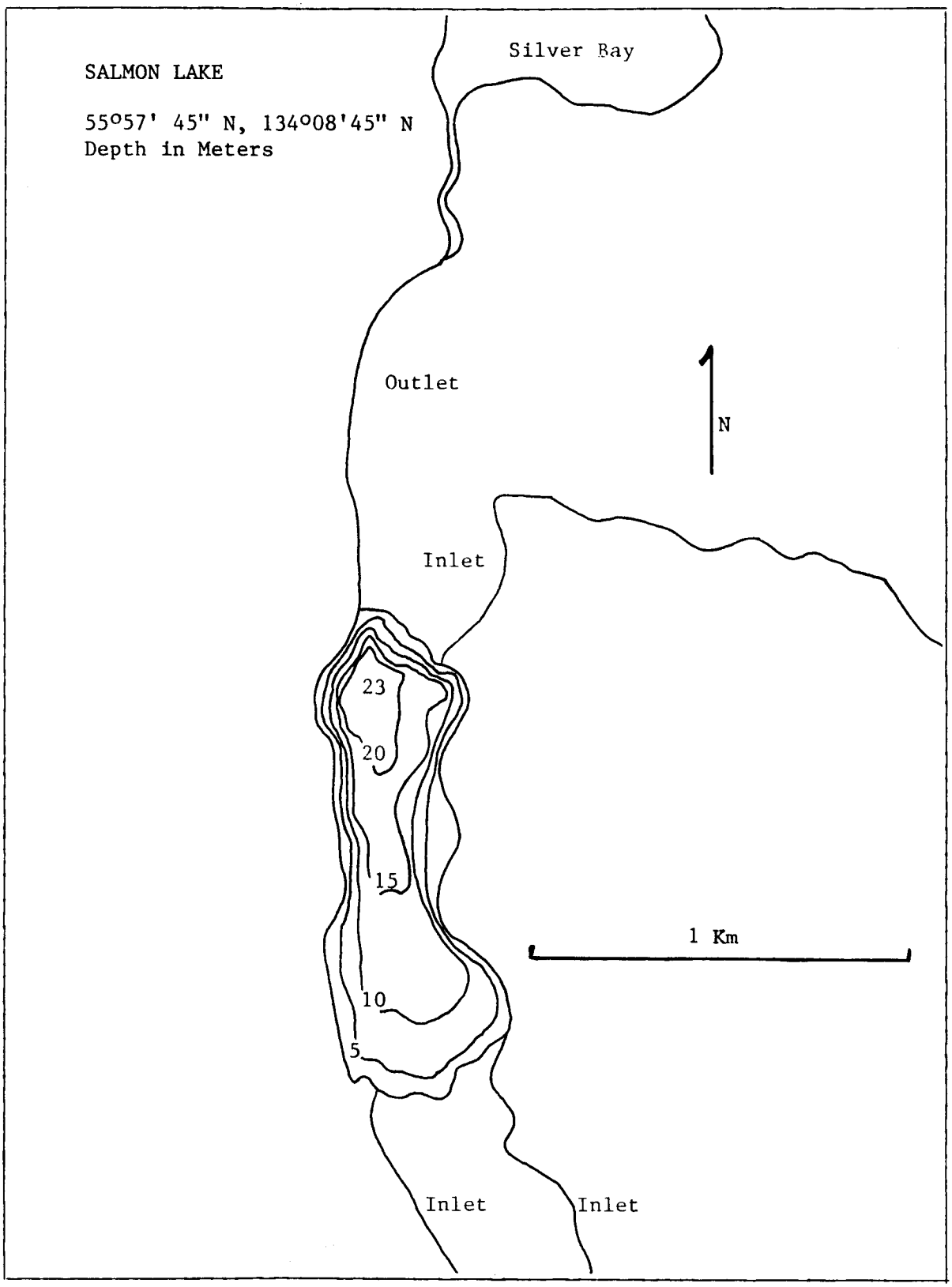

Fig. 8. Bathymetric Map of Salmon Lake.

Table 2. Morphometry of Salmon Lake.

Water Area 410,765 m^2

Area by Depth Zone

Depth Zone (m)	Area (m^2)	Percent of Total Area
0- 5	94,530	23.0
5-10	95,212	23.1
10-15	119,012	29.0
15-20	71,408	17.3
20+	30,603	7.4

Water Volume 4,304,778 m^3

Acre Feet 3,489

Volume by Depth Zone

Depth Zone (m)	Volume (m^3)	Percent of Total Volume
0- 5	1,812,359	41.9
5-10	1,336,063	30.9
10-15	788,654	18.2
15-20	314,148	7.2
20-23	53,554	1.9

Maximum Depth = 23.0 m

Mean Depth = 10.4 m

Shoreline Length = 3,139.1 m

Shoreline Development = 1.3

Table 3. Thermal Data (°C) From Lakes Studied, 1983.

	Davidof			Plotnikof				Salmon				
Depth (m)	June 18	Sept. 8	Oct. 21	June 12	June 18	July 27	Sept. 8	June 3	June 18	June 29	Aug. 4	Sept. 8
S	4.0	10.2	4.5	6.8	8.0	. . .	11.6	9.0	11.5	15.5	14.1	10.9
1	3.8	10.2	6.7	6.5	8.0	11.8	11.8	8.0	11.0	14.5	14.2	10.2
2	3.7	10.3	6.8	6.0	8.0	11.5	11.8	7.8	10.0	12.0	14.0	10.1
3	3.7	10.3	7.0	5.9	7.5	11.2	11.7	7.0	9.0	11.2	13.0	10.1
4	3.5	10.2	7.0	5.8	7.5	11.1	11.5	6.4	8.5	10.1	11.5	10.0
5	3.5	10.2	7.0	5.8	7.1	11.0	11.3	5.6	7.5	9.0	10.9	10.0
6	. . .	10.1	7.0	5.7	7.0	10.9	. . .	5.1	6.5	7.8	10.2	9.9
7	. . .	10.1	7.0	5.5	7.0	10.1	. . .	5.0	6.0	6.7	8.5	9.8
8	. . .	10.0	7.0	5.4	6.5	9.6	. . .	4.9	5.5	6.0	6.9	9.5
9	. . .	10.0	7.0	5.3	6.0	9.2	. . .	4.7	5.0	5.1	6.2	9.2
10	3.5	10.0	7.0	5.1	6.0	9.0	10.9	4.3	4.8	5.0	5.5	8.9
11	. . .	9.9	7.0	5.0	. . .	8.9	. . .	4.1	. . .	4.8	5.0	7.5
12	. . .	9.8	. . .	5.0	. . .	8.5	. . .	4.0	. . .	4.4	4.9	6.1
13	. . .	9.4	. . .	4.9	. . .	8.0	. . .	4.0	. . .	4.2	4.9	5.5
14	. . .	9.7	. . .	4.8	. . .	7.1	. . .	4.0	. . .	4.2	4.9	5.0
15	3.5	. . .	. . .	4.5	5.2	6.9	7.0	4.0	4.0	4.1	4.9	4.9
20	3.5	. . .	. . .	4.1	4.8	4.9	. . .	3.5	. . .	4.0	4.0	4.2
25	3.5	. . .	. . .	3.9	4.0	4.0	. . .	3.4	. . .	. . .	. . .	4.0
29	3.4	. . .	. . .	. . .	4.0	. . .	. . .	3.3	. . .	. . .	. . .	. . .
30	. . .	. . .	. . .	3.8	. . .	3.9	. . .	. . .	. . .	. . .	. . .	. . .

Table 4. Alkalinity, Conductivity, Dissolved Oxygen, Hardness, pH, Secchi Disc Visibility, and Water Temperature for Lakes Studied, 1982.

Lake and Date	Alkalinity (mg/l)	Conductivity (µ mhos)	Dissolved Oxygen (mg/l)	Hardness		pH	Secchi Disc Visibility (m)	Surface Temperature (°C)
				Calcium	Total			
Plotnikof,								
June 12								
Station 1	4.0	19	13	3.2	5.4	6.3	11.5	6.8
Station 2	7.0	18	12	3.6	4.4	6.5	12.0	7.4
June 18								
Station 1	3.0	3	. . .	. . .	2.7	6.4	. . .	8.0
July 27								
Station 2	4.1	1	11	. . .	4.2	6.5	12.5	12.0
July 30								
Station 1	3.3	5	11	. . .	2.4	6.7	12.0	12.0
September 8								
Station 1	. . .	8	. . .	. . .	. . .	. . .	. . .	12.0
Station 2	. . .	7	. . .	. . .	. . .	. . .	. . .	11.6
Salmon,								
June 3	14.0	23	11	18.0	. . .	6.6	5.5	9.0
June 18	10.5	15	. . .	. . .	9.4	6.6	. . .	11.5
June 29	10.9	28	11	11.4	13.2	6.7	10.0	15.5
August 4	14.0	34	10	11.8	14.2	6.8	7.0	14.1
September 8	10.5	30	9	. . .	16.8	6.7	3.5	10.9
Davidof,								
June 18	3.0	4	. . .	. . .	2.0	6.4	12.0	4.0

Table 5. Water Quality Analysis* of Davidof, Plotnikof, and Salmon Lakes, 1982.

Parameter, Unit	Davidof Lake June 18 1 m	Plotnikof Lake June 18 1 m	Salmon Lake June 18 1 m
Specific Conductance, µ mhos/cm	12.0	14.0	26.0
pH	6.3	6.4	7.0
Alkalinity, mg/l	3.0	4.0	11.0
Calcium, mg/l	0.9	1.3	4.0
Magnesium, mg/l	0.3	0.3	0.3
Total Phosphorus, ug/l as P	4.0, 6.1, 4.6, 4.4	7.2, 4.5, 4.4, 4.9	7.0, 6.8, 8.7
Total Filterable Phosphorus,** ug/l as P	9.3, 9.3, 10.2, 10.2	9.3, 9.7, 9.8, 10.2	9.7, 8.0, 8.5
Filterable Reactive Phosphorus, ug/l as P	1.5, 1.2	1.9, 1.9	2.9, 2.9
Nitrate + Nitrite, ug/l as N	51.0, 49.0	46.0, 47.0	9.0, 0.5
Ammonium, ug/l as N	3.0, 2.0	3.0, 2.0	5.0, 3.0
Kjeldahl Nitrogen (ug/l)	40.0, 40.0, 40.0	75.0, 85.0, 75.0	53.0, 49.0, 59.0
Reactive Silica, ug/l as Si	719.0, 694.0	754.0, 754.0	943.0, 931.0
Iron	26.0, 19.0	69.0, 35.0, 62.0, 65.0	57.0, 50.0

*Multiple data entries indicate multiple analyses on same sample.
**These analysis should not exceed total phosphorus, thus some form of contamination is indicated.

Henderson et al. (1973), and have extended the application of this index to other climatic systems.

The MEI for 36 lakes studied so far in southeast Alaska are presented in Table 6.

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 moderately eutrophic lakes have up to 100 kg/ha.

Plankton composition and density from Davidof, Plotnikof, and Salmon Lakes are presented in Table 7.

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: Davidof Lake, 17.7; Plotnikof Lake, 8.5; and Salmon Lake, 3.5. This shows all three lakes to be in the oligotrophic category.

Bottom Fauna:

Bottom fauna collected by dredging and screening benthic material from Plotnikof and Salmon Lakes are identified and enumerated in Table 8.

Stream Drift Organisms:

Analysis of stream drift organisms from these lakes (Table 9) shows poor productivity of the inlet streams.

Fish:

A summary of fish catch and effort information for lakes studied is presented in Table 10. Fish catch and sampling effort for Plotnikof River is shown in Table 11. A discussion of the limnology, fishery, and recreational potential of each system follows.

Davidof Lake. Davidof Lake (lat. 56°36'40" N, long. 134°50'30" W) is located 58 km southeast of Sitka on Baranof Island. This lake is isolated by a series of falls and drains to Plotnikof Lake. At elevation 209 m, this lake is higher and colder than Plotnikof.

Access to Davidof Lake is by floatplane or a 1.6 km trail from the head of Plotnikof Lake. The USFS maintains a recreational cabin at the head of the lake. The cabin has a wood stove. A poor-quality skiff is provided.

The only fish present in Davidof Lake are rainbow trout which were planted in 1938 from Sashin Lake. This original introduction of rainbow resulted in a self-sustaining population of rainbow which are not always easy for the angler to catch.

Table 6. Morphoedaphic Index of 36 Lakes in Southeast Alaska.

Lake	Specific Conductance (μ mhos)	Residue Dissolved Calculated Sum (mg/l)	Surface Area (ha)	x̄ 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
Salmon	26	18	41.1	10.4	1.75	1.28
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
Plotnikof	14	10	. . .	. . .	. . .	. . .
Davidof	12	8	. . .	. . .	. . .	. . .
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 = $\frac{\text{Total Dissolved Solids (TDS)}}{\text{Mean Depth } (\bar{z})}$ (Ryder, 1965)

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

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

Table 7. Plankton Composition, Density (Organisms per Square Meter), and Weight (Milligrams per Square Meter) as Collected With No. 153 Nitex Plankton Net, Davidof, Salmon, and Plotnikof Lakes, 1982.

Lake	Davidof		Salmon				
Date	Sept. 8	Oct. 21	June 3	June 29	July 15	Aug. 6	Sept. 8
Depth of Tow (m)	50	50	25	20	20	20	20
Cladocera							
Bosmina longirostris	17,830	16,302	1,095	2,203	73,586	157,539	91,696
Daphnia longiremis	34,004	63,474	0	0	0	0	0
Holopedium gibberum	1,274	713	0	0	0	0	0
Chydorinae	0	0	76	0	0	0	0
Polyphemus pediculus	0	0	0	0	0	0	0
Cladocera eggs	6,368	7,438	76	637	99,567	56,037	3,821
Copepoda							
Cyclops vernalis	14,901	7,845	2,878	2,840	2,292	11,080	14,901
Diaptomus sp.	15,283	5,094	0	0	0	0	0
Nauplii	891	7,845	2,038	1,872	764	0	891
Copepod eggs	1,274	306	0	0	0	0	0
Rotifera							
Kellicottia longispina	5,986	26,184	1,605	891	5,884	1,274	1,274
Asplancha sp.	0	0	0	0	0	0	0
Conochilus sp.	0	0	0	0	0	5,476	0
Conochiloides sp.	0	61,131	0	0	993	27,127	7,641
Other	0	0	54,865	3,732	1,299	9,297	1,656
Dry Weight	665.8	284.5	15.8	20.4	76.9	154.7	96.7
Organic Weight	623.0	263.7	10.7	13.2	65.1	137.4	60.5
Ash Weight	42.8	20.8	5.1	7.2	11.8	17.3	36.1

Table 7. (cont'd) Plankton Composition, Density (Organisms per Square Meter), and Weight (Milligrams per Square Meter) as Collected With No. 153 Nitex Plankton Net, Davidof, Salmon, and Plotnikof Lakes, 1982.

Lake	Plotnikof, Station 1				Plotnikof, Station 2		
Date	June 10	July 15	July 30	Sept. 8	June 12	July 30	Sept. 8
Depth of Tow (m)	50	50	50	50	50	50	50
Cladocera							
Bosmina longirostris	993	60,087	60,622	54,381	9,170	18,874	174,733
Daphnia longiremis	229	4,101	2,496	3,821	4,381	4,585	4,101
Holopedium gibberum	0	0	0	0	0	0	0
Chydorinae	0	0	0	0	0	0	0
Polyphemus pediculus	0	0	Rare	0	0	0	0
Cladocera eggs	0	83,800	57,056	8,533	3,770	12,226	36,195
Copepoda							
Cyclops vernalis	25,446	61,870	74,885	29,674	39,735	12,761	17,295
Diaptomus sp.	229	0	0	0	0	0	250
Nauplii	59,373	2,318	0	0	0	2,292	535
Copepod eggs	0	0	0	0	65,920	0	0
Rotifera							
Kellicottia longispina	7,871	13,016	20,326	19,995	8,150	41,034	19,613
Asplancha sp.	2,292	55,807	168,670	6,368	0	0	0
Conochilus sp.	0	0	21,396	0	0	764	0
Conochiloides sp.	0	0	49,924	0	1,019	3,821	0
Other	0	0	0	0	0	0	0
Dry Weight	80.4	292.2	243.8	161.9	50.4	59.0	232.1
Organic Weight	45.8	273.3	222.4	145.6	37.7	47.3	208.2
Ash Weight	34.6	18.9	21.4	16.3	12.7	11.7	23.9

Table 8. Identification and Enumeration (Organisms per Square Meter) of Benthic Organisms From Plotnikof and Salmon Lakes, 1982.

Lake	Plotnikof	Salmon
Depth Range	2.2-93.0 m	3.0-24.0 m
Number of Samples	18	13
Oligochaeta	144	83
Hirudinea	36	0
Dicranota	0	3
Chironomidae	533	325
Gastropoda	0	3
Sphaeridae	33	179

Table 9. Identification and Enumeration of Stream Drift Organisms From Plotnikof and Salmon Lakes, 1982.

Lake	Plotnikof							Salmon		
Location	Inlet 1			First Narrows	Inlet 2			Main Inlet		
Date	June 6	July 30	Sept. 24	June 11	June 16	July 27	Sept. 23	June 3	July 1	Sept. 5
Oligochaeta	4	0	0	0	1	0	0	0	0	0
Amphipoda	0	0	0	0	2	0	1	0	0	0
Acari	9	0	0	0	0	0	0	5	2	2
Ephemeroptera	0	6	0	0	0	4	0	2	2	0
Ameletus sparsatus	1	0	0	0	0	0	0	15	0	0
Baetis bicaudatus	31	19	0	0	34	29	0	5	3	0
Cinygmula sp.	5	0	0	0	4	0	0	6	0	1
Epeorus sp.	1	0	0	0	0	0	2	0	0	0
E. deceptivus	0	1	0	0	0	0	0	0	0	0
E. grandis	0	1	0	0	3	1	0	0	0	0
Rithrogena sp.	0	0	0	0	1	0	0	0	0	0
R. robusta	0	3	0	0	0	0	0	0	0	0
Paraleptophlebia temporalis	21	12	0	0	5	79	0	0	0	0
Ephemerella sp.	0	0	0	0	3	0	0	0	3	1
E. grandi	0	1	0	0	0	0	0	0	0	0
E. doddsi	0	0	0	0	2	0	0	0	0	0
Chloroperlinae	21	3	0	0	34	3	3	0	0	4
Sweltza sp.	0	0	0	9	0	0	1	2	2	0
S. oregonensis	0	0	0	0	0	0	0	2	0	0
S. exquisita	0	1	0	0	42	2	0	0	0	0
Kathoperla sp.	0	1	0	0	0	0	0	0	0	0
Suwallia sp.	1	0	0	0	0	0	0	0	0	0
Nemouridae	8	0	0	0	0	0	0	0	0	0
Zapada sp.	0	2	0	0	0	3	2	0	0	0
Z. cinctipes	0	0	0	0	69	0	0	0	0	0
Capniidae	2	0	0	0	0	0	0	0	0	0
Capnia sp.	0	0	0	0	0	0	0	3	0	0
C. excavata	11	0	0	0	37	0	0	0	0	0
Leuctridae	17	0	0	0	0	32	0	0	0	0
Despaxia augusta	0	3	2	0	0	0	13	0	0	1
Dicosmoecus sp.	0	0	0	1	0	0	0	0	0	0
Paraleuctia sp.	0	0	0	0	21	0	0	0	0	0
P. foreiputa	1	0	0	0	0	0	0	0	0	0
P. occidentalis	0	0	0	0	15	0	0	0	0	0
Rhyacophila	2	1	0	0	4	1	0	0	0	0
Micrasema	5	0	0	0	5	2	0	1	0	0
Amphizoa	0	0	0	0	1	0	0	0	0	0
Limnephilidae	0	0	0	0	0	0	0	1	1	0
Dicranota sp.	2	7	0	0	3	0	0	1	0	0
Tipulidae sp.	0	0	0	0	11	0	0	0	0	0
Hexatoma sp.	0	1	0	0	0	0	0	0	0	0
Chironomidae	33	40	18	28	43	4	7	5	1	1
Dytiscidae	0	0	0	3	0	0	0	0	0	0
Prosimuliam sp.	6	7	8	0	7	7	0	0	0	0
Atherix sp.	1	0	0	0	0	0	0	0	0	0
Terrestrials										
Arachnida	3	0	0	0	3	0	1	0	0	0
Lepidoptera	0	1	1	0	0	0	0	0	0	0
Coleoptera	4	0	0	0	4	0	0	0	0	0
Ichneumonidae	0	2	6	3	1	0	3	0	0	0
Formicidae	1	0	0	0	0	0	0	0	0	0
Muscoidea	0	2	2	0	0	0	0	0	0	0
Scolytidae	0	0	0	2	0	0	0	0	0	0
Mycetophilidae	0	0	0	0	0	0	0	0	2	0
Empididae	0	3	1	0	2	0	0	1	3	2
Sminthuridae	0	0	0	0	1	0	0	0	0	0
Millipedes	0	0	0	0	3	0	0	0	0	0

Table 10. Summary of Fish Sampling Effort and Catch Data From Lakes Studied, 1982.

Date	Location	Gear Type	Time Fished Hours/Minutes	Catch
			Plotnikof Lake	
May 27	Outlet	Hook and line	3:00	7 RT-SH (400-685 mm)
June 7	Outlet	Hook and line	. . .	3 SH
June 9-10	Lake	4 large traps	41:04	7 RT (97-170 mm)
June 10	Lake	Hook and line	1:20	8 RT
June 14	Pond to tidewater	Hook and line	3:00	1 RT (324 mm)
June 15	Lake	3 large traps	5:17	0
June 15	Lake	9 fry traps	15:33	6 SS (<60 mm)
Sept. 15	Lake	3-lead fyke net	42:06	2 RT (210-333 mm), 3 DV (105-158 mm), 3 SS (97-110 mm)
Sept. 15	Lake	2 large traps	4:49	38 SS, 1 DV
Sept. 15	Lake	8 fry traps	17:25	115 SS, 1 DV
Sept. 16	Lake	2 large traps	42:42	12 SS, 1 DV
Sept. 16	Lake	8 fry traps	173:18	74 SS, 3 DV (115-145 mm), 1 RT (165 mm)
Sept. 22-26	Lake	Floating gill net, small-2 meshes only	4 nights	2 RT (231, 245 mm), 2 SS (adult), 2 SS (rearing), 2 DV (111, 118 mm)
Sept. 23	Lake-outlet area	Hook and line	1:30	5 RT (131-236 mm)
Sept. 24-26	Lake-Inlet 3	3 fyke nets	63:52	19 RT (112-241 mm), 1,337 SS (rearing), 10 DV (59-140 mm), 3 KOK (101-114 mm)
Sept. 24	Inlet 1	Hook and line	1:00	3 RT (179-412 mm)
Sept. 25	River-lake to canyon	Hook and line	3:00	30 RT (130-248 mm)
Sept. 26	Lake-outlet area	Hook and line	. . .	8 RT (223-398 mm)
Sept. 26	Lake	14 fry traps	35:07	304 SS (rearing), 1 DV
			Salmon Lake	
May 20	Salmon Lake outlet	Hook and line	3:00	2 SH (721, 820 mm)
June 2	Inlet 1	9 fry traps	19:35	0
June 2-5	Lake	Hook and line	. . .	19 DV (218-382 mm), 8 CT (251-391 mm), 2 RT (215, 246 mm), 1 SH (721 mm)
June 28	Lake	Hook and line	. . .	12 DV (201-483 mm), 3 CT (239-390 mm), 1 RT (290 mm)
June 29	Outlet	8 fry traps	14:47	13 SS (rearing), 1 RT (105 mm), 1 DV (84 mm)
June 29	Lake	Hook and line	. . .	5 DV (304-412 mm), 4 CT (211-308 mm), 3 RT (237-324 mm)
June 29	Lake	1 fyke nets, inlet end	18:50	19 DV (122-217 mm), 1 CT (316 mm), 12 SS (rearing), 7 TSB
June 30	Inlet end	1 fyke net	24:10	301 SS, 5 CT (136-195 mm), 16 DV (65-299 mm)
June 30	Outlet end	1 fyke net	24:10	289 SS, 9 CT (142-323 mm), 44 DV (88-267 mm), 7 RT (77-137 mm)
July 1	Inlet end	1 fyke net	24:00	21 SS, 2 CT (272, 322 mm), 5 DV (111-280 mm), 1 RT (118 mm)
July 1	Outlet end	1 fyke net	22:50	130 SS, 7 CT (142-274 mm), 14 DV (115-270 mm), 5 RT (137-250 mm)
July 2	Inlet end	1 fyke net	22:05	109 SS, 4 CT (155-234 mm), 2 DV (97, 150 mm)
July 2	Outlet end	1 fyke net	21:40	179 SS, 5 CT (105-320 mm), 11 DV (102-375 mm), 3 RT (78-139 mm)
Aug. 4	Inlet end	1 fyke net	20:30	35 SS, 8 CT (164-326 mm), 46 DV (128-476 mm), 31 TSB
Aug. 4	Outlet end	1 fyke net	18:40	90 SS, 9 CT (159-331 mm), 10 DV (168-282 mm), 9 RT (121-241 mm), 1 CS (adult)
Aug. 4	Lake	Hook and line	2:30	6 SS (rearing), 9 CT (162-345 mm), 1 DV (348 mm), 1 RT (124 mm)
Aug. 5	Outlet end	1 fyke net	27:26	63 SS, 8 CT (127-235 mm), 9 DV (142-278 mm), 1 RT (131 mm), 40 TSB, 6 Sc
Aug. 5	Inlet end	1 fyke net	26:15	10 SS, 4 CT (152-271 mm), 8 DV (139-387 mm), 28 TSB, 2 Sc
Aug. 5	Main inlet	9 fry traps	24:22	127 SS, 15 DV (58-122 mm), 1 Sc
Aug. 5	Outlet	7 fry traps	15:23	46 SS, 17 RT (85-174 mm), 6 Sc
Aug. 5	Outlet end	Hook and line	2:15	5 SS (rearing), 13 CT (158-346 mm), 3 DV (225-310 mm), 1 RT (272 mm)
Aug. 6	Inlet end	1 fyke net	17:07	10 SS, 5 DV (232-335 mm), 1 CT (152 mm), 30 TSB, 1 Sc
Aug. 6	Outlet end	1 fyke net	17:26	23 SS, 5 CT (152-332 mm), 4 DV (118-238 mm), 15 TSB, 10 Sc
Sept. 8	Inlet end	1 fyke net	18:38	14 SS, 54 DV (114-532 mm), 2 CT (186, 189 mm)
Sept. 9	Inlet end	1 fyke net	22:06	130 SS, 31 DV (213-619 mm), 5 CT (147-291 mm), 3 TSB, 1 Sc
Sept. 9	Outlet end	Hook and line	3:00	4 SS (adults), 12 DV (unmeasured)

Table 11. Plotnikof River Fish Sampling Effort and Catch by Area, 1982.

Location	Date	Gear Type	Time Fished Hours & Minutes	Catch
Lake outlet to pond	June 10	7 fry traps	14:57	1 RT, 2 SS
Pond	July 28	17 fry traps	45:13	7 RT, 301 SS, 26 DV
Pond outlet to slide	July 29	8 fry traps	13:46	24 RT, 29 SS, 1 DV
Slide to top of canyon	July 29	14 fry traps	30:27	147 RT, 72 SS, 17 DV
Lower river (Area 1)	Aug. 10	15 fry traps	37:16	231 RT, 43 SS, 33 DV
Lower river (Area 2)	Aug. 11	15 fry traps	35:55	176 RT, 85 SS, 71 DV
Lower river (Area 3)	Aug. 12	6 fry traps	12:17	33 RT, 18 SS, 7 DV
Tidewater falls hole	July 22	Hook and line	2:30	9 SH
Tidewater falls hole	Aug. 10	Hook and line	8:38	61 RT, 9 DV, 5 SS, 59 Sc
Tidewater falls hole	Aug. 9	Hook and line	1:00	3 SH

During the period June 22-25, an effort was made to mark a large number of fish for a population estimate. A total of 53 fish were marked after capture by fyke nets and hook and line. Length-weight relationship of these fish is shown in Figure 9. Age-length relationships (Table 12) and condition factors (Table 13) show these rainbow are slower growing and have lower condition factors than do the rainbow in Plotnikof Lake. The largest fish captured in Davidof Lake was 370 mm long and weighed 495 gm.

A recapture effort to complete the population estimate was completed October 20-22, 1982. Only one marked fish was captured of 12 total recaptures. This yields an unreliable population estimate of 636 fish.

The main inlet to Davidof Lake has good spawning habitat, but it is quite braided and appears to be unstable. This may result in limited production in the inlet in some years.

The Davidof Lake area is very scenic and, although the fishing is not the best, the cabin receives a fair amount of use. Hunters probably use the cabin more than sport fishermen.

Plotnikof Lake. Plotnikof Lake (lat. 56°35'00" N, long. 134°53'30" W) is a large, oligotrophic lake located 60 km south southeast of Sitka on the west side of Baranof Island. The surface elevation of Plotnikof Lake is 84 m. Plotnikof Lake is one of the highest lakes in southeast Alaska accessible to anadromous fish.

Access to Plotnikof Lake is by floatplane or by a 4-km trail from Port Banks. The trail is poorly maintained and its terminus at the outlet of Plotnikof Lake affords little access to the lake due to the steep shoreline. The USFS maintains a recreational-use cabin at the east end of the lake. A skiff is provided for the use of people staying at the cabin. There are several good campsites along the perimeter of the lake, but a boat is needed to move about the lake.

Recreational use of Plotnikof Lake is mainly directed toward fishing for rainbow trout. Many people also venture to the lake for the spectacular scenery typical of southeast Alaska's mountain lakes. Later season visitors can combine rainbow trout fishing with fishing for coho salmon adults and deer hunting. Plotnikof Lake provides a good opportunity to enjoy quality angling with a good chance of landing a large rainbow trout.

The lake is large (7.2 km long) and drains into Port Banks on the south side of Whale Bay via Plotnikof River. Plotnikof Lake is separated into two separate basins by a 75-m long stream 3.2 km east of the outlet. Steep slopes dominate most of the lake's circumference.

There are two major inlets at the northeast end of the lake. Inlet No. 1 originates in Davidof Lake and is about 1.6 km long. Inlet No. 2 is short and steep, draining a small lake in a cirque about 396 m above Plotnikof Lake. There are numerous other small inlets feeding Plotnikof Lake.

Surveys conducted on Inlets Nos. 1, 2, and 3 (Figure 2) indicated limited spawning area for the fish in Plotnikof Lake. The outlet of Plotnikof Lake has some spawning area near the lake and large spawning rainbow trout were

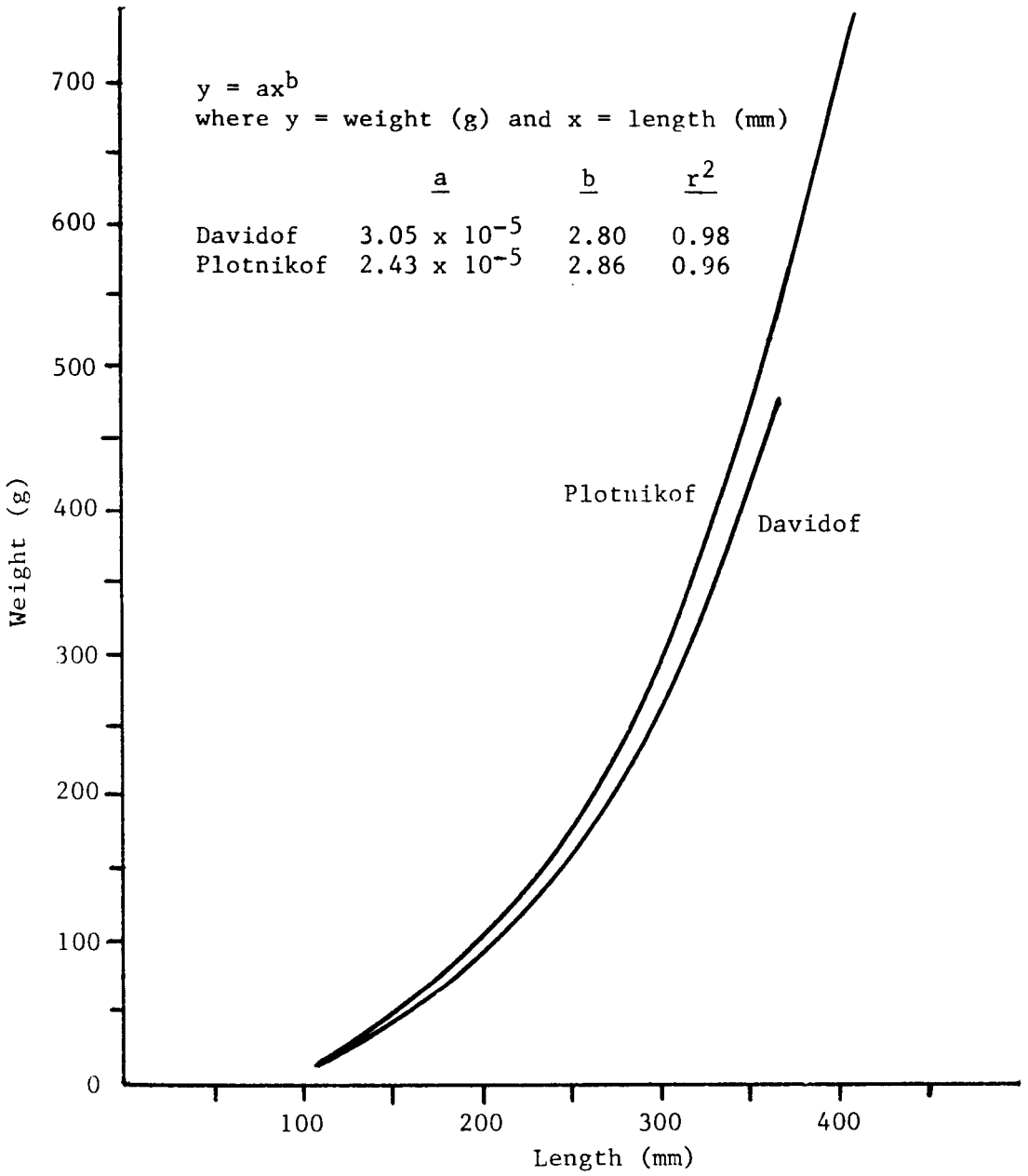

Fig. 9. Length-Weight Relationships of Rainbow Trout From Davidof and Plotnikof Lakes, 1982.

Table 12. Age and Length (mm) Relationships* of Fish From Lakes Studied, 1982.

Lake	Plotnikof	Davidof	Salmon	Plotnikof
Species	Rainbow Trout	Rainbow Trout	Rainbow Trout	Dolly Varden
a =	-64.43	-115.13	-8.85	31.70
b =	211.30	214.35	152.95	51.31
r^2 =	0.53	0.60	0.86	0.62
N =	64	49	33	24
Age				
1	. . .	. . .	. . .	. . .
2	82	. . .	97	. . .
3	168	120	159	88
4	228	182	203	103
5	275	229	237	114
6	314	268	265	124
7	347	302	. . .	131
8	377	331	309	138
9	400	. . .	. . .	. . .
10	. . .	. . .	. . .	150
11	442	. . .	. . .	154

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

Table 13. Condition Factors (K)* of Fish Sampled, 1982.

Lake	Species	Number	Condition Factor $\bar{x}$	Condition Factor Range	Standard Deviation
Davidof	Rainbow trout	37	1.09	0.78-1.72	0.17
Plotnikof	Rainbow trout	46	1.18	0.87-1.82	0.32
Plotnikof	Dolly Varden	15	0.97	0.79-1.42	0.04
Plotnikof	Kokanee	5	1.03	0.89-1.17	0.06

$$*K = \frac{100 \times \text{Weight (gm)}}{\text{Fork Length (cm)}^3}$$

sampled in this area, along with spawning steelhead. The short river between the two major basins of the lake has some spawning area and the presence of post-spawning rainbow trout in this area indicates that it is being utilized by spawning trout and possibly salmon. The upstream end of this river and the outlet end of the lake have an abundance of logs which are utilized by rearing rainbow trout. The inlets had few rearing fish.

Fish sampled in Plotnikof Lake included coho salmon, rainbow trout, Dolly Varden, and kokanee salmon. Adult steelhead probably overwinter in the lake.

The rainbow trout population in Plotnikof Lake and the upper river is healthy, but not overly large. Fishing fry traps was the most successful method of catching rearing fish (under 150 mm) and hook-and-line sampling was most effective on larger rainbow trout (up to 629-mm fork length). Age-length data are presented in Table 12. The length-weight relationship of these rainbow is presented in Figure 9. Condition factors for fish sampled are presented in Table 13. A population estimate was attempted on the rainbow trout in Plotnikof Lake, but due to the lake's large size and an inadequate sample size, a population estimate was not possible.

Rearing coho salmon are abundant in Plotnikof Lake. Shallow, debris-filled areas and steep, rocky shorelines were productive sampling locations. Early season catches (June 15) were low, with only six rearing coho taken in nine fry traps fished around the lake perimeter. In September, individual fry traps caught up to 71 rearing coho and fyke nets up to 611 coho per trap. This very seasonal nature of trapping success may be related to food supply.

Adult coho salmon enter Plotnikof Lake from late July through September. Escapement estimates for the Plotnikof system have averaged 2,000-4,000 cohos the last few years.

One interesting species of salmonid sampled that was not previously recorded in the Plotnikof system is kokanee salmon. Five kokanee were sampled in September while fishing fyke nets off the mouths of Inlets Nos. 1 and 3. Four of these were mature fish. Age, weight, length, and fecundity data for the kokanee are presented in Table 14. Condition factor data are presented in Table 13.

The Dolly Varden in Plotnikof Lake are small fish. Mature Dolly Varden from 102-143 mm were sampled in September using fyke nets fished off the inlets to the lake. The largest Dolly Varden sampled during our investigations was only 178 mm fork length. Age-length data for Plotnikof Lake Dolly Varden are presented in Table 12. Condition factor data are presented in Table 13.

Salmon Lake. Salmon Lake (lat. 56°58' N, long. 135°09' W) is a small lake 14.5 km southeast of Sitka at the head of Silver Bay. The lake is 1.6 km long and 0.4 km wide. It is a shallow lake by Southeast standards (23 m maximum depth) and has a relatively high proportion of littoral area. There is one major inlet in the southeast corner of the lake and a 1.2 km outlet at the north end that empties into Silver Bay.

Table 14. Age, Length, Weight, Sex, and Fecundity of Kokanee, Plotnikof Lake, September 17-25, 1982.

Age	Length (mm)	Weight (gm)	Sex	Fecundity
3+	101	9.9	♂ Mature	. . .
3+	104	10.0	♀ Immature	. . .
4+	108	14.7	♀ Mature	31 + 26 = (57)
5+	114	17.2	♂ Mature	. . .
4+	114	14.3	♀ Mature	25 + 19 = (44)

Access to Salmon Lake is primarily by a USFS trail 1.2 km from the head of Silver Bay to the outlet end of the lake. The trail skirts the east shore of the lake and continues to the head end of Redoubt Lake, a total distance of 7.4 km from Silver Bay.

The Salmon Lake watershed is one of the more popular recreational use areas close to Sitka. Its closeness to town and the relatively sheltered route to it make the area easily accessible to people with small boats.

There is no USFS cabin on Salmon Lake. This probably accounts for the recreational use being almost exclusively by local people. The primary recreational uses of the Salmon Lake system are deer hunting, fishing, and hiking. There are a couple of good campsites near the outlet of Salmon Lake.

The Salmon Lake system contains a good variety of salmonids. Coho, pink, chum, and sockeye salmon utilize the system, as well as steelhead, cutthroat, and resident rainbow trout. Anadromous and resident Dolly Varden were also sampled. Additional species include threespine stickleback and cottids. Fish sampling locations and effort and catch information are shown in Figure 3 and Table 10.

The most abundant species of salmonid in Salmon Lake is Dolly Varden. Salmon Lake is a major overwintering area for anadromous Dolly Varden and, starting in July, large numbers of Dolly Varden move into the system to spawn. One school of 2,000 Dolly Varden was reported just off the main inlet (Andrews, 1964). The main inlet is the major spawning area utilized by Dolly Varden. Dolly Varden up to 619 mm fork length were sampled during our investigations. An incomplete population estimate ranged between 3,181 and 14,020 at the 95% confidence level.

Coho salmon first enter Salmon Lake in late August or early September. Most of the spawning takes place in the main inlet. Escapement estimates for coho salmon in Salmon Lake have averaged 500-1,000 fish the last few years (DeJong, pers. comm.). Most of the rearing takes place in the lake proper, with the shallow inlet and outlet areas being the most heavily utilized. A population estimate of age 1+ and 2+ coho salmon was between 3,700 and 7,700.

Pink and chum salmon spawn mainly in the outlet of Salmon Lake, although a few chum were observed holding off the main inlet.

There is a small sockeye salmon run in Salmon Lake. The majority of the spawners were observed in the main inlet. A few sockeye were also observed along the northwest shoreline.

Steelhead numbers are very low for the Salmon Lake system. A foot survey on May 20 accounted for nine steelhead in the outlet stream. Six redds were also observed during these surveys. The redds were all concentrated in the upper one-third of the outlet. A foot survey of the main inlet on June 2 accounted for two steelhead, but no redds were observed.

Fry trapping in the main inlet yielded no rearing rainbow trout. The outlet end of the lake and the outlet stream were the only areas where rearing rainbow trout were captured.

Resident rainbow trout up to 324 mm fork length were sampled from Salmon Lake during our investigations. There does not seem to be a large population of resident rainbow trout in Salmon Lake.

Cutthroat trout are fairly abundant in Salmon Lake and provide a good fishery for fish 200-390 mm fork length. A population estimate was attempted on cutthroat trout in Salmon Lake, but only five recaptures were recorded out of 104 marked cutthroat trout at large in Salmon Lake. The population estimate ranged between 483 and 2,706 at the 95% confidence level. The cutthroat trout were mainly concentrated near the main inlet and the outlet to Salmon Lake. Rearing takes place mainly in Salmon Lake. Extensive fry trapping of the main inlet and outlet yielded no rearing cutthroat trout.

The main inlet to Salmon Lake was foot-surveyed on three occasions during our investigation of the Salmon Lake system. Fry trapping was conducted on two of these surveys. Nine fry traps fished on June 2 yielded no fish, while nine fry traps fished August 5 yielded 124 rearing coho salmon, 15 rearing Dolly Varden (58 mm to 122 mm), and one cottid.

The main inlet was surveyed for approximately 2 km above the lake. It contains good spawning gravel throughout this section. The upper half of this section becomes braided and much of the flow comes out of muskegs.

The outlet to Salmon Lake was fry trapped on two occasions. On June 29, eight fry traps accounted for 13 rearing coho salmon, 1 rearing rainbow trout, and 1 Dolly Varden. On August 5, seven fry traps yielded 17 rearing rainbow trout, 46 rearing coho salmon, and 6 cottids.

The outlet stream is shallow and riffly with shallow runs and pools scattered throughout its length. The lower half has a lot of good spawning area, while the upper half has a few scattered pockets of good gravel.

Plotnikof River. Plotnikof River is a large river (approximately 20 m wide) flowing northwesterly 4 km from Plotnikof Lake to Port Banks. The river is located on the south side of Whale Bay, approximately 57 km south-southeast of Sitka on Baranof Island. The river is well known in the Sitka area for its early run of coho salmon (late July-early August). The intertidal area and lower river normally receive a fair amount of fishing pressure. A 5-m waterfall at tidewater seems to exclude all anadromous fish except coho salmon and steelhead from the Plotnikof system. Resident rainbow trout, Dolly Varden, and kokanee salmon are the only other fish species known to exist in the Plotnikof system above the tidewater fall.

Access to Plotnikof River is mainly by boat or floatplane from Sitka. There is a popular campsite just to the left of the tidewater falls used by anglers and hunters in the area. A poorly maintained USFS trail roughly parallels Plotnikof River to the outlet of Plotnikof Lake. Plotnikof River is a steep, fast river. There are many falls, rapids, and riffles throughout its length. The only exception is a large 6.4-ha pond about 0.6-km

downstream from Plotnikof Lake. The pond is shallow, log covered, and mud bottomed. The pond is excellent rearing area for coho salmon and Dolly Varden. Very few rearing rainbow trout were sampled in the pond.

Plotnikof River was sampled throughout its accessible length with baited fry traps and hook and line. Sampling effort was conducted from Plotnikof Lake to a canyon stretch approximately 1.7-km downriver and from tidewater upriver to the bottom of the canyon stretch approximately 1.2 km (Figure 5).

The section from Plotnikof Lake to the pond is mainly a high gradient, large rock and bedrock area with some canyon area. Hook and line sampling revealed a healthy population of resident rainbow trout. Some of these fish may migrate back and forth from the lake. Although 97 rainbow were marked in the upper river, only one was ever recaptured. Rainbow trout up to 628 mm and several spawning steelhead were sampled in this stretch. Spawning area is limited but is well utilized by steelhead and resident rainbow. Fry trapping was very poor in this area (Table 7), but this may have been due to the seasonal nature of trapping success we encountered.

Hook and line sampling revealed few resident rainbow trout below the pond area of the upper river. Rearing rainbow trout (under 160 mm) are present throughout the flowing parts of the river.

Plotnikof River, from the pond to the canyon (approximately 1.0 km), is a fast, rocky river throughout the upper half. Several small falls (1-2 m) occur and most of the pools are small. The lower half tends to flatten out with an appropriate decrease in substrate size and water velocity. Fry trap catches were good for rainbow trout and coho salmon in this area, but poor for Dolly Varden. Rainbow trout averaged 7.8 per trap, coho salmon averaged 5.2 per trap, and Dolly Varden averaged 0.8 per trap for 22 traps.

The canyon stretch is narrow, steep-walled, very fast, and the substrate is mostly large rock and bedrock. Deep protected pools in this stretch are probably major holding areas for summer-run steelhead. The canyon stretch was not sampled for fish because of the extreme difficulty in negotiating most of its length.

The river, from the canyon to the tidewater fall, was divided into three sections for fry trapping (Figure 5). Area 1, from the bottom of the canyon to the braided area, is about 20 m wide and 0.7-1.0 m deep. It is mostly riffle area with a cobblestone substrate. Fry trap success was very good in this stretch of river. Rainbow trout catches averaged 15.4 per trap, coho salmon catches averaged 2.9 per trap, and Dolly Varden catches averaged 2.2 per trap.

Area 2, comprised of the braided stretch, is dominated by two main channels. These channels are fast, narrow, and gravelly. Also, they contain quite a few logs. Rainbow trout catches averaged 11.7 per trap, coho salmon catches averaged 5.7 per trap, and Dolly Varden catches averaged 4.7 per trap.

Area 3 extends from the confluence of the braided section to the tidewater falls. It is wide and shallow with large rock and bedrock substrate. Trap

catches for rainbow trout averaged 5.5 per trap, coho salmon catches averaged 3.0 per trap, and Dolly Varden catches averaged 1.2 per trap.

Age analysis of 85 rainbow trout fry trapped in lower Plotnikof River showed the fish from 63-157 mm fork length to be age 1+ to age 3+. Age-length relationship of these rearing fish follows: Age 1 = 78 mm, Age 2 = 120 mm, and Age 3 = 145 mm.

A population estimate was carried out on rearing rainbow trout in the tidewater Falls Hole at Port Banks from August 10-13. Of 275 rainbow trout marked with dorsal caudal clips, 53 were recaptured. A population estimate of 670 rainbow trout, with a 95% confidence interval of 514-871 rainbow trout, was determined by using a modified Schnabel method.

The Plotnikof River steelhead population seems to be larger than previous investigations have indicated. The number of adults is hard to enumerate without a weir because of the size of the river, inaccessibility of some areas, and the presence of large numbers of coho salmon in the river during July and August. The lack of larger, older rainbow trout in most of Plotnikof River indicates that the vast majority of the rainbow trout are rearing steelhead.

The Plotnikof River steelhead population is comprised of both spring-run and summer-run components. Both races spawn in May and June. The number of spawners of each race is unknown.

Most of the steelhead spent 4 winters rearing in fresh water and then spent two winters in salt water before beginning their spawning migration up Plotnikof River. Eight of the 30 steelhead sampled (26.7%) were repeat spawners (Table 15).

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Table 15. Age Analysis of Plotnikof River Steelhead, 1982.

Length	Sex*	Date	Age**
	Spawning Fish From Upper River		
490	♂	June 10	R.1FS
632	♀	May 27	4.2FS
640	♀	June 11	R.2FS
655	♀	June 7	4.2FS
659	♀	May 27	3.2FS
676	♀	June 11	R.2FS
685	♀	May 27	4.2FS
707	♀	June 10	4.2FS
720	♀	June 8	4.2FS1FS
780	♀	June 7	4.2FS1FS
	Summer-Run From Tidewater Falls Hole		
574	♀	Aug. 10	4.1+
582	♂	Aug. 10	5.1+
650	♂	Aug. 9	4.2
650	♂	Aug. 10	3.2
658	. . .	July 22	4.2
674	. . .	July 22	4.2FS1
674	. . .	Aug. 12	4.2
679	. . .	July 22	3.2
684	♀	Aug. 9	3.1FS1
687	♂	Aug. 10	4.2
693	♀	July 23	4.2
696	. . .	July 22	4.2
708	. . .	July 22	4.2
714	. . .	July 21	3.2
719	♂	July 22	4.2
728	♀	July 23	3.3FS1
734	. . .	July 22	3.1FS1
751	♂	Aug. 10	4.3
766	♂	Aug. 11	4.3
781	♂	Aug. 9	4.3

*The immature condition of some fish prevented sex determination by external characteristics.
**F indicates overwintering in fresh water.

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