STATE OF ALASKA

Bill Sheffield, Governor

Annual Performance Report for

GLENNALLEN LAKE AND STREAM EVALUATIONS

by

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Volume 27 Study T-2

RESEARCH PROJECT SEGMENT

State: Alaska Name: Sport Fish Investigations of Alaska

Project: F-9-18

Study: T-2 Study Title: COPPER RIVER TROUT STUDIES

Job: T-2-1 Job Title: Glennallen Lake and Stream Evaluations

Cooperators: Fred T. Williams and Wilson D. Potterville

Period Covered: July 1, 1985 to June 30, 1986

ABSTRACT

Volumetric surveys were conducted on four lakes in the Glennallen area; the largest one, Lake Louise, has a surface area of 16,109 acres and a maximal depth of 148 feet. Buffalo Lake was the smallest lake surveyed, having a surface area of 3.31 acres and a maximal depth of 18 feet. Conductivity of the lakes ranged from 75 micromohs per centimeter in Buffalo Lake to 273 in Sculpin Lake. The morphoedaphic index varied from 2.0 in Lake Louise to 19.5 in Sculpin Lake.

Water samples were taken from 40 area lakes to determine total alkalinity, total hardness, pH, conductivity, and dissolved oxygen. Dissolved-oxygen levels, taken during the winter months, ranged from 1 part per million to 13 parts per million at a depth of 5 feet. Stocked rainbow trout, *Salmo gairdneri* Richardson, in Sculpin Lake sustained an apparently normal survival rate where the dissolved-oxygen level was only 3.9 parts per million. Arctic grayling, *Thymallus arcticus* (Pallas), are abundant in Tahneta Lake where the dissolved-oxygen concentration was only 1.0 part per million.

Specific conductance values in the 40 lakes ranged from a high of 667 in Tolsona Lake to 50 in Scenic 2 Lake. Survival, growth, and fish biomass were generally higher in lakes with conductivity values of 100 micromohs per centimeter or higher.

A population estimate of chinook salmon, *Oncorhynchus tshawytscha* (Walbaum), stocked in Strelna Lake in 1984 was not possible, since only nine of these fish were captured. It is suspected that predation by an existing population of coho salmon, *Oncorhynchus kisutch* (Walbaum), stocked in 1982 was partially responsible for the apparently low survival.

The survival estimate for rainbow trout stocked in Sculpin Lake in 1984 was 13 percent (95 percent confidence interval of 11 to 16 percent).

A survival estimate for David Lake Arctic grayling stocked as fingerling in 1984 was 18 percent (95 percent confidence interval of 11 to 34 percent).

Five previously unsurveyed lakes were investigated to determine their fisheries potential. All these lakes contained fish, and species captured included Arctic grayling, rainbow trout, round whitefish, *Prosopium cylindraceum* (Pallas), burbot, *Lota lota* (Linnaeus), and longnose suckers, *Catostomus catostomus* Forster. Because of the presence of outlets and distance from the road system only Dora Jene Lake will be considered for stocking.

KEY WORDS

Arctic grayling, rainbow trout, chinook salmon, bathymetric surveys, conductivity, morphoedaphic index, population estimate, Copper River, coho salmon.

BACKGROUND

The study area, which includes the Copper River Basin, upper Susitna River Basin, Cordova, eastern Prince William Sound, and Valdez, has over 650 miles of the Alaska Highway System within its borders. A map of the study area is presented in Figure 1.

Recreational fishing opportunities in the Copper River drainage, upper Susitna River drainage, and northeastern Prince William Sound area are provided by anadromous, indigenous, and stocked fish species.

Lake-dwelling species caught by recreational anglers in the Copper River Basin are the indigenous species (burbot, lake trout, Arctic grayling, and whitefish) and the introduced species (coho and chinook salmon, Arctic grayling, and rainbow trout). The stream-dwelling species most often taken by sport anglers are Arctic grayling, Dolly Varden, rainbow-steelhead trout, whitefish, and chinook and sockeye salmon.

In Prince William Sound, all five species of salmon, Dolly Varden, and bottom fish such as halibut are taken by sport anglers. Grayling and rainbow trout are taken from several lakes stocked in the Valdez and Cordova areas.

Fishing within the Cordova (Prince William Sound) area is primarily commercially oriented, and access is only by boat or aircraft. Sport fishing effort in salt water is primarily for coho salmon, chinook salmon, pink salmon, and halibut. Freshwater angling is directed toward coho salmon, cutthroat trout, sockeye salmon, Dolly Varden, and stocked grayling. A significant increase in sport fishing effort is not anticipated until access to and within the area improves. The limited Cordova

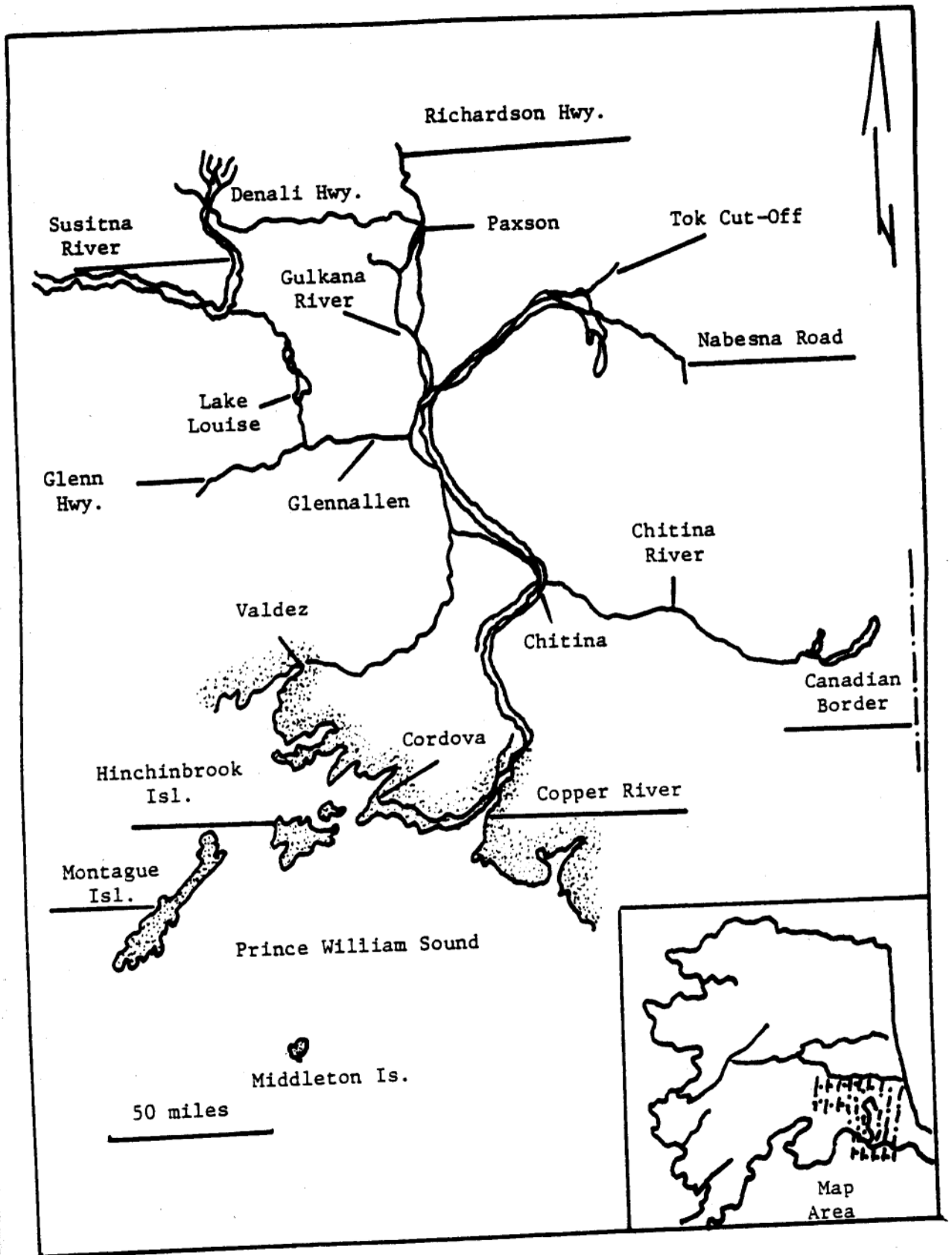

Figure 1. Map of the Study Area.

road system (approximately 60 miles in length) affords access to several lakes and streams with grayling, cutthroat trout, and coho salmon populations.

Most of the recreational angling opportunities in the Valdez area are provided by saltwater fisheries directed toward bottom fish and anadromous species, including pink, chum, and coho salmon. All freshwater drainages into Valdez Arm are closed to salmon fishing, with the exception of a special salmon season on the Robe River; however, Dolly Varden are taken in fair numbers.

The fishing effort in the upper Copper/Susitna River area increased from 1977 to 1984 by less than 1%. The reason(s) for this low increase is not fully understood, in light of a general statewide increase in angler fishing effort. We expect an increase in effort as the more popular areas such as the Kenai become saturated with anglers.

Angler participation in the Prince William Sound area has increased approximately 9% from 1977 to 1984. This is expected to increase in the Valdez Bay area because of salmon production by the Solomon Gulch Hatchery.

Development of the Solomon Gulch private non-profit fish hatchery by the Valdez Fisheries Development Association has resulted in large numbers of pink salmon returning to Valdez Bay. This catch trend is expected to increase as the hatchery increases their output; however, the effects of the expected increase in harvest and effort may impact other species of salmon in Valdez Bay and may require more precise surveillance.

The present population of Valdez is estimated to be 3,000 people. The construction of at least three refineries has been proposed for Valdez. If these refineries are built, the population of the City of Valdez is estimated to increase to 6,500-7,000 people by 1990. If no refineries are constructed, the population in 1990 is estimated to be 4,450.

This potential growth is expected to have a detrimental effect on fish resources. Suitable land for homes and businesses is limited in the Valdez area, and already there are trailer courts, housing projects, and dock facilities adjacent to or bisected by salmon spawning streams. Spawning and rearing areas for fish may be reduced or polluted, and the ground-water supplies may be adversely affected. Increases in human population often result in additional harassment of spawning salmon, and increased monitoring of the fish stocks may become necessary.

Growth in the Copper River Basin area and Cordova will probably be much slower. The population in the Basin is estimated to increase from 2,700 in 1985 to 3,100 by 1990. Cordova's population is expected to grow from 2,600 to 2,900 during the same period.

The land-disposal program conducted by the Alaska Department of Natural Resources made large tracts of land in the study area available for private ownership. Much of this land borders lakes and streams that

support or have the potential to support fish. Retention of lands for public recreation and access is a very important facet of fisheries investigations in the area.

Presently, fish stocks in the study area are in good condition, and there appears to be no need for major restrictive regulations at this time. If some of the development contemplated for Valdez occurs, adjustments may become necessary.

Activities reported in the following sections are directed toward the establishment of a data base upon which management of area fish species can be conducted to maintain desirable levels of angler utilization. The species of fish discussed in this report are listed in Table 1.

RECOMMENDATIONS

1. Determine the status of burbot populations in Tyone, Susitna, Louise, Paxson, Summit, and Moose Lakes.

2. Determine the status of grayling and chinook salmon populations in the Gulkana River and the catch-per-unit effort for these species.

3. Determine the incidental fishwheel and dip-net catch of steelhead trout during September.

4. Determine the survival rate of grayling stocked as fry and fingerlings in Buffalo, Kettle, Junction, and Squirrel Creek Gravel Pit Lakes.

OBJECTIVES

1. Conduct volumetric surveys on Lake Louise, Mirror, Buffalo and Sculpin Lakes from July 1985 through June 1986.

2. Conduct water quality sampling on Lake Louise, Mirror, Buffalo and Sculpin Lakes to obtain dissolved oxygen profiles, specific conductance, pH, alkalinity and hardness between February 15 and April 15.

3. To determine survival and growth of Age I chinook salmon stocked as fingerling in Strelna Lake in 1984.

4. To determine survival and growth of Age I Swanson strain rainbow trout stocked as fingerling in Sculpin Lake in 1984.

5. To determine survival and growth of Age I Arctic grayling stocked as fingerling in David Lake in 1984.

6. To determine sport fishing potential in five unnamed lakes near Lake Louise.

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

Common Name	Scientific Name and Author	Abbreviation
Arctic grayling	*Thymallus arcticus* (Pallas)	GR
Burbot	*Lota lota* (Linnaeus)	BB
Chinook salmon	*Oncorhynchus tshawytscha* (Walbaum)	KS
Chum salmon	*Oncorhynchus keta* (Walbaum)	CS
Coho salmon	*Oncorhynchus kisutch* (Walbaum)	SS
Cutthroat trout	*Salmo clarki* Richardson	CT
Dolly Varden	*Salvelinus malmo* (Walbaum)	DV
Humpback whitefish	*Coregonus pidschiam* (Gmelin)	HF
Lake trout	*Salvelinus namaycush* (Walbaum)	LT
Longnose sucker	*Catostomus catostomus* Forster	LNS
Pacific halibut	*Hippoglossus stenolepis* Schmidt	H
Pink salmon	*Oncorhynchus gorbuscha* (Walbaum)	PS
Rainbow trout	*Salmo gairdneri* Richardson	RT
Round whitefish	*Prosopium cylindraceum* (Pallas)	RWF
Sockeye salmon	*Oncorhynchus nerka* (Walbaum)	RS

TECHNIQUES USED

A "SIMRAD" recording fathometer was used to determine water depths. Bathymetric maps were prepared and evaluated for each of the four lakes. Depth contours were in 5- or 10-ft intervals. Standard morphometric parameters calculated included maximal depth, mean depth, surface area, total volume, volume of littoral and lentic zones, and shoreline length. The morphoedaphic index was calculated by dividing specific conductance (μmohs/cm) by the mean lake depth to provide a measure of relative productivity.

Dissolved oxygen concentration determinations were taken between February 15 and April 15 over the deepest portion of the various lakes. Water samples for specific conductance were taken 1 m below the bottom of the ice over the deepest part of the lakes. Water samples collected were also analyzed for pH, alkalinity, and hardness. Hach kit and Cole-Parmer 1481-50 Digital conductivity meters were used to make these tests. A gasoline-engine-powered auger with a 9-in bit was used to drill holes through the ice for winter water samples.

Chinook salmon, rainbow trout, and Arctic grayling were captured for initial marking and length and weight measurements by use of fyke nets. Fyke nets baited with salmon eggs were 9 ft in length and 30 in in diameter and had two 3- x 20-ft wings (two square aluminum frames and six steel or aluminum hoops support the entrance and the body of the fyke net). Internal throats, body, and wings were covered with 3/16-in square-mesh knotless nylon. Fyke nets were set parallel to the shoreline.

All salmon, trout, and grayling captured for the purpose of estimating populations were held in a tub and anesthetized with MS-222. Fish were enumerated, measured fork length to the nearest mm, weighed, marked by removal of the adipose fin, and released.

Salmon, trout and grayling were recaptured by use of fyke nets, gill nets, or both. Recapture efforts did not commence for at least 6 days after marking to allow for the dispersement of marked fish randomly throughout the lake. Gill nets were set perpendicular to the shoreline. All captured fish were examined for marks, and the ratio of tagged to untagged fish was recorded prior to the fish being released.

Population levels were determined by Chapman's adjustment of the Schnabel multiple censuses population estimator (Ricker 1975):

$$N = \frac{\Sigma(C_t + M_t)}{R+1}$$

M_t = Total marked fish at large at the start of the t-th day; i.e., the number previously marked, less any accidentally killed at previous recaptures.

$M = \Sigma M_t$; total number marked.

C_t = Total sample taken on day $\underline{t}$.

R_t = Number of recaptures in the sample C .

$R = \sum R_t$, total recaptures during the experiment.

Gill nets used to sample the lakes consisted of 25-ft panels of the following mesh and strand sizes: 1/2 in, 0.20 mm; 3/4 in, 0.25 mm; 1 in, 0.30 mm; 1 1/2 in, 0.30mm; and 2 in, 0.30mm. All mesh sizes were square measures. Nets were hung with green 3/8-in lead-core sink line (approximately 30 lb per 100 fathom) and green polycore float line; mesh colors were green or white.

Standard techniques described by Williams (1971) were used in lake and stream surveys and for collecting fish samples. Test-netting was conducted for a minimum of 16 hours, including one overnight period. In addition, fyke nets, minnow traps, weirs, and rods-and-reels were used for fish collections. All measurements of fish lengths were from snout to fork of tail.

United States Geodetic Survey (USGS) topographic maps (scale 1:63,360) and an overlay grid were used to estimate surface acres. Depths were determined by the use of a 1966 Ross P-100 portable depth finder.

Water temperatures were taken with a pocket-model Fahrenheit thermometer and a 1961 model-TFB battery-operated direct-reading electronic thermometer.

All fish caught were measured to fork length with a standard metric tape. A cursory examination was made of the internal organs including stomach contents. Any scales collected for aging were extracted with an ordinary pocket knife and stored in a fold of notebook paper within a 2 7/8-in x 5 1/4-in coin envelope. These scales were examined with a C.O.M. 1200 micro-design dual-lens scale projector.

When the initial survey indicated that the lake(s) had potential for establishing or maintaining a sport fish population, winter dissolved-oxygen determinations were made with a Hach kit, and conductivities were measured with a Cole-Parmer Digital handheld conductivity meter, model 1481-50.

FINDINGS

Volumetric Surveys

During 1985 volumetric surveys were conducted on Sculpin, Mirror, Buffalo, and Louise Lakes. Physical and morphoedaphic characteristics of these lakes are shown in Table 2.

These lakes were selected because they are considered representative of the lentic environments in this area (3.31 to 16,109 surface acres; conductivity, 75 to 273 µmohs/cm; maximal depth, 13 to 148 feet) and accessible by road. Lake Louise is the most important burbot and lake trout fishery in the area in terms of angler use and harvest. Sculpin,

Table 2. Morphometric Characteristics of Four Glennallen Area Lakes.

Lake	Buffalo	Louise	Mirror	Sculpin
Maximum depth (feet)	18	148	13	35
Mean depth (feet)	11	65	6	14
Surface area (acres)	3.31	16,109	25.3	117
Total volume (acre-feet)	28.4	1,047,085	155	1,677
Littoral zone (acre-feet)	14.7	27,970	155	562
Limnetic zone (acre-feet)	13.7	1,019,115	155	1,115
Shoreline length (feet)	1,620	171,336	4,274	8,976
Morphoedaphic index	6.8	2.0	12.6	19.5
Conductivity (micromohs/cm)	75	130	76	273

Mirror, and Buffalo Lakes are stocked biennially with rainbow trout and provide prominent fisheries in this area. Bathymetric maps of these lakes are shown in Figures 2, 3, 4, and 5.

Water Quality Determinations

During 1985 water samples were taken from 40 area lakes to determine total alkalinity, total hardness, pH, specific conductivity, and dissolved-oxygen concentrations. Sculpin, Mirror, Buffalo, and Louise Lakes were selected for volumetric surveys, and five previously unsurveyed lakes were sampled: Bacon, Hiccup, Dora Jene, Jane, and Julie. Sampling results are shown in Table 3. All water samples prior to July were taken when the lakes still had ice cover.

A review of the data shows considerable variation in various water quality parameters. Specific conductivity ranged from a high of 667 µmohs/cm in Tolsona Lake to a low of 50 µmohs in Scenic 2 Lake. Winter dissolved-oxygen concentrations varied from 1 ppm to 13 ppm at a depth of 5 feet and from 0 ppm to 12 ppm at a depth of 10 feet.

Tahneta Lake had 1 ppm of dissolved oxygen at 5 feet and overwintered a good grayling population. The dissolved-oxygen concentration at a depth of 5 feet in Sculpin Lake was 3.9 ppm. This lake is stocked with Swanson strain rainbow trout, and a winter kill has never been observed.

Conductivity values are considered a rough measure of lake productivity. Generally those lakes with a specific conductivity value of over 100 µmohs/cm are considered capable of sustaining good fish populations. Conversely, Mirror, Buffalo, and Tolsona Mountain Lakes have conductivity values of less than 100 µmohs/cm and are stocked regularly with rainbow trout, and demonstrate good survival. Katherine Lake has a conductivity value of 142 µmohs/cm and two plants of rainbow trout have failed, presumably because of low productivity.

Strelna Lake Chinook Salmon Studies

Strelna Lake is located approximately 11 miles from Chitina on the McCarthy Road and is 3/8 mile by trail from the road. This lake is landlocked and has a surface area of 290 acres and a maximal depth of 60 feet.

The lake was stocked by an aerial drop in June 1984 with 70,000 chinook salmon, which were approximately 22 g in weight and averaged 60 mm in length. The lake has been stocked with rainbow trout and coho salmon since 1969. Prior to the introduction of chinook salmon, the last planting consisted of 85,000 coho salmon fingerlings that were stocked by aerial drop in 1982.

Sampling was conducted in mid-August 1984. Four fyke traps were fished a total of 145 hours, and 595 coho and 50 chinook salmon were taken.

The lake was test-netted in July 1985. Four nets were fished 60 hours, and 36 coho and 9 chinook salmon were caught. These chinook salmon ranged in fork length from 156 to 187 mm and averaged 172 mm. Havens

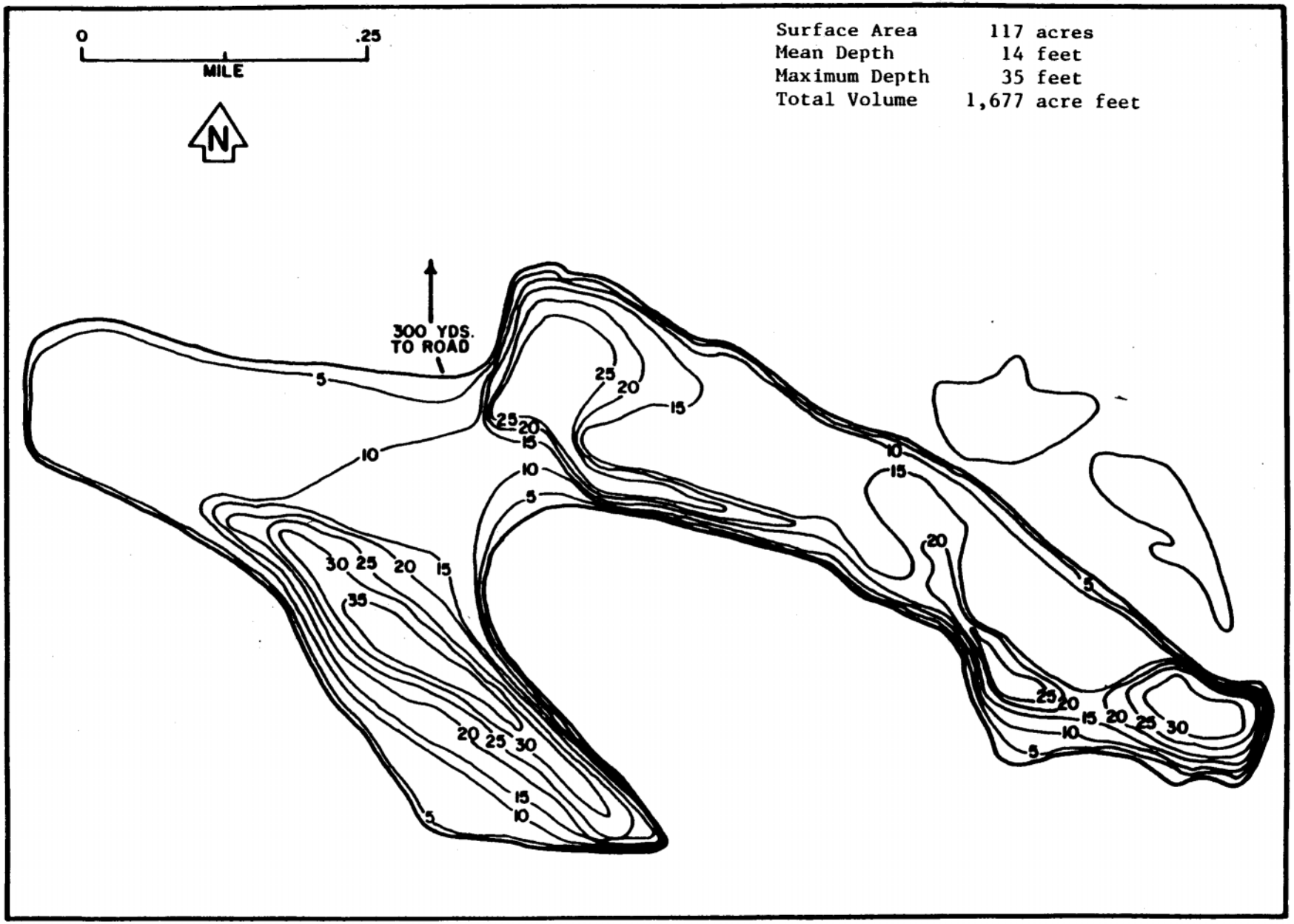

Figure 2. Sculpin Lake

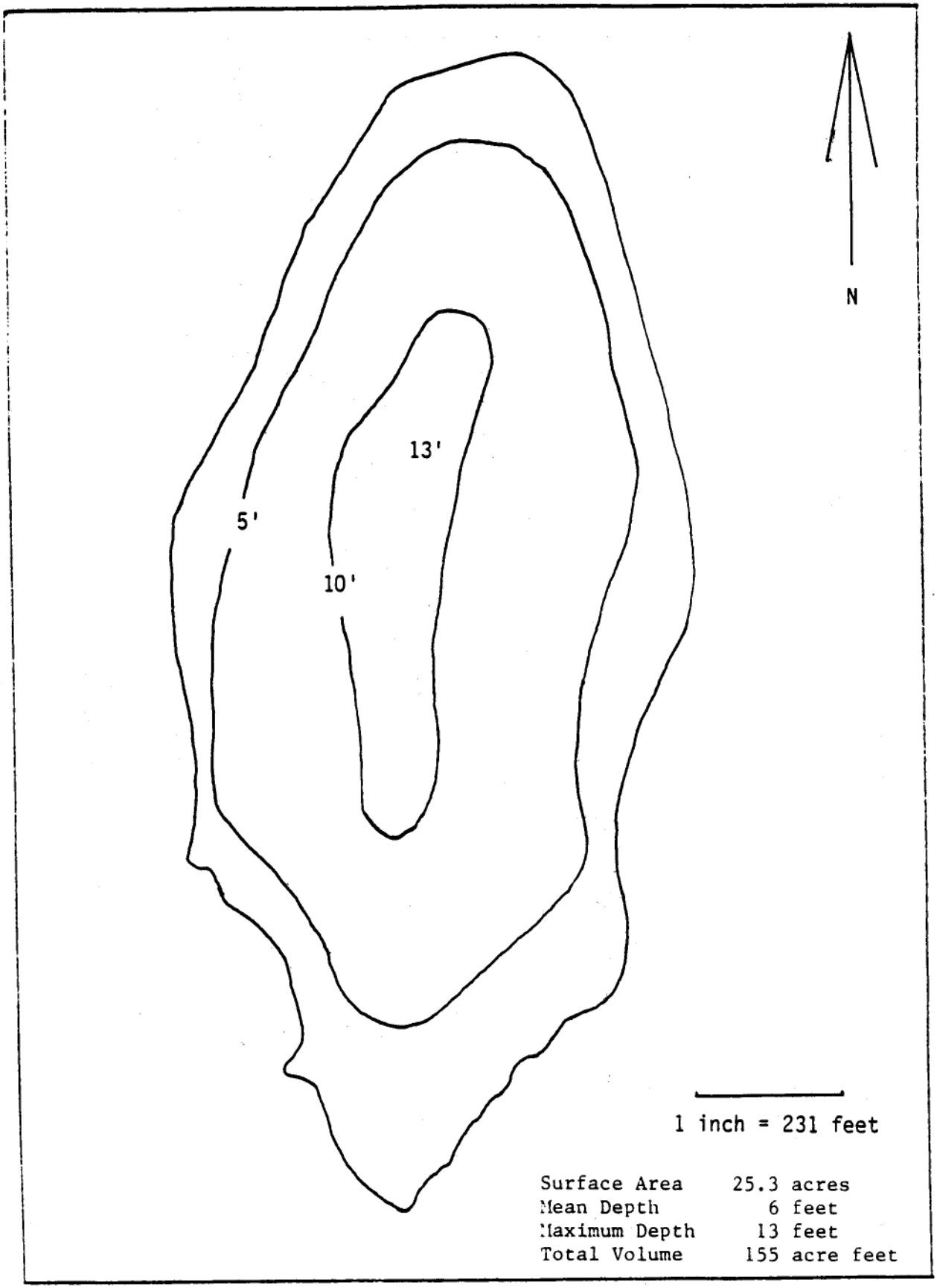

Figure 3. Mirror Lake.

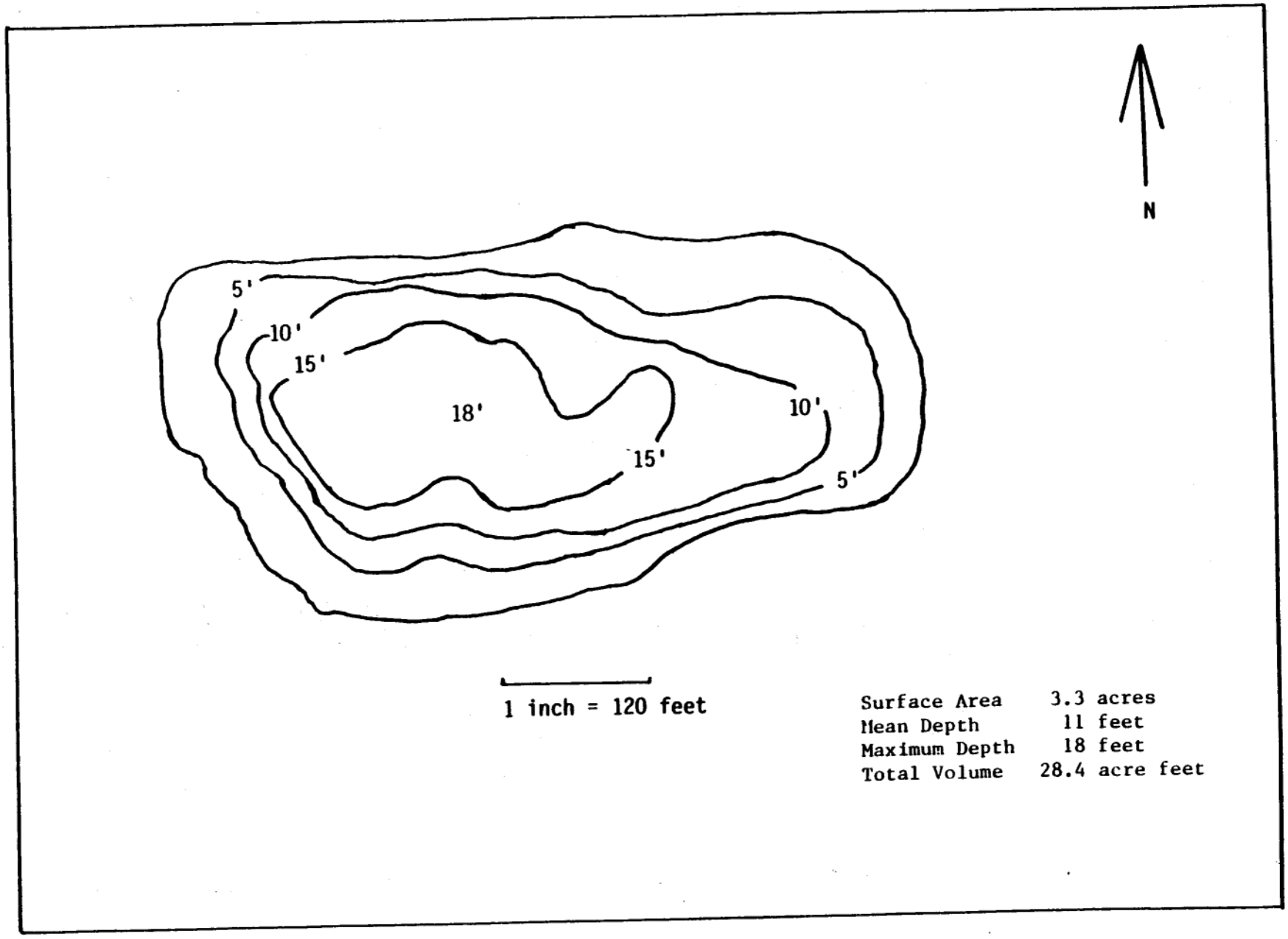

Figure 4. Buffalo Lake.

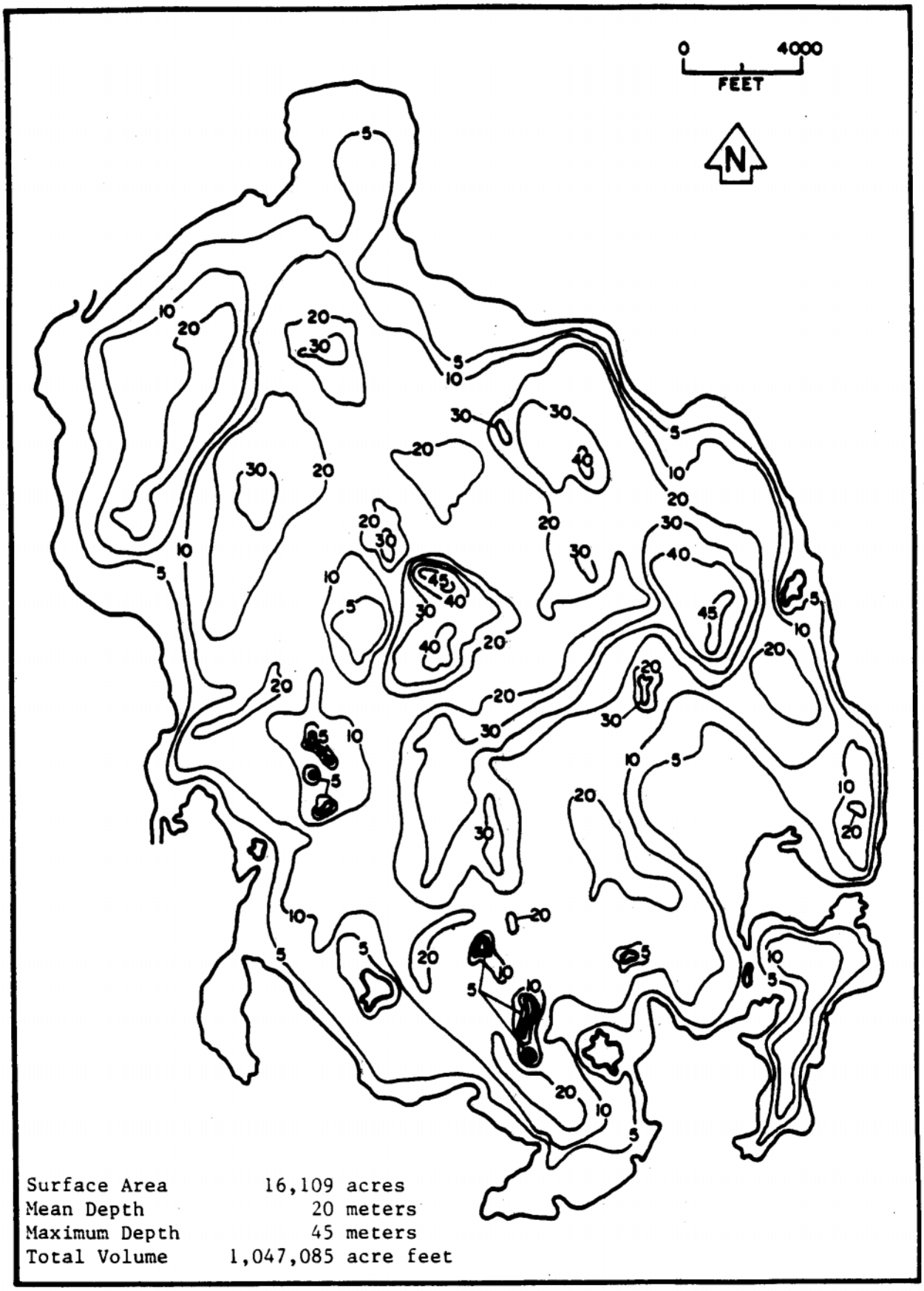

Figure 5. Lake Louise

Table 3. Summary of Water Quality Parameters of Selected Lakes in the Copper River and Susitna River Drainages, 1985.

Name	Date*	Total Alkalinity (ppm)	Total Hardness (ppm)	pH	Conductivity (µmohs/cm)	Dissolved Oxygen (ppm)** 5'	Dissolved Oxygen (ppm)** 10'
Tolsona	3/21	137	223	8.0	667	5	2
Moose	3/22	120	205	8.0	401	4	1
Tex Smith	3/22	69	205	8.0	324	8	6
Mirror	3/28	51	103	6.5	102	9	0
	4/11	68	51	7.5	71	6	0.5
Buffalo	4/01	17	51	7.5	81	8	3
	4/11	51	51	7.0	69	7	2.9
Tiny	4/02	0	120	8.0	143	9	0
Hudson	4/03	137	188	9.0	322	13	11
Lower Kiana	4/03	51	86	8.0	135	13	13
South Jans	4/03	34	68	7.5	107	7	4
Van	4/04	120	137	8.5	245	12	12
	4/12	103	136	9.0	222	8	7.5
Sculpin	4/04	137	154	8.0	277	5	5
	4/12	120	154	8.0	270	3.9	3.2
Gergie	4/09	103	86	8.0	163	6	1
Strelna	4/12	136	154	9.0	256	8	7.7
Two Mile	4/15	137	171	8.5	298	8	7
Three Mile	4/15	188	222	8.0	468	6	4
Pippin	4/15	120	154	7.5	270	1	0
Tolsona Mtn.	4/17	34	68	7.5	71	7	3
Tower I	4/17	86	68	7.5	110	4	...
Tower II	4/17	51	103	7.5	72	7	...
Tahneta	4/18	77	85	7.0	212	1	0
Little Crater	4/18	171	205	8.0	345	5	4
Crater	4/18	171	205	8.0	351	10	9
David	4/19	51	51	8.0	71	12	12
Mary Lou	4/19	51	51	7.5	94	9	8
Dick	4/30	17	17	7.0	...	10	6
Katherine	5/02	51	51	7.5	142	11	8
Wrong	5/02	68	68	7.5	115	8	7
Scenic 1	5/07	68	85	6.5	167	1	0
Scenic 2	5/07	51	34	7.5	50	7	8
Scenic 3	5/07	86	51	6.5	123	4	0
Lake Louise	5/08	86	86	8.0	143	8	6
	7/24	68	68	...	117	...	...
Thompson	5/09	68	68	7.0	139	7	...
Blueberry	5/09	51	51	7.0	78	6	7
Jane	8/20	119	85	8.8	149	...	...
Julie	8/21	102	51	8.5	70	...	...

Table 3. (Cont.) Summary of Water Quality Parameters of Selected Lakes in the Copper River and Susitna River Drainages, 1985.

Name	Date*	Total Alkalinity (ppm)	Total Hardness (ppm)	pH	Conductivity (µmohs/cm)	Dissolved Oxygen (ppm)** 5'	10'
Summit (Wrangell Mtns)	9/05	68	68	8.0	120	11	...
Bacon	9/10	51	51	8.0	82	12	...
Hiccup	9/10	68	51	8.5	83	10	...
North Jans	9/11	86	68	8.0	110	...	...
Dora Jene	9/17	103	137	8.5	254	10	...

* All samples collected after May 9 are open-water samples.
** Open water dissolved oxygen samples taken at a depth of 1 meter.

(1985) reports his best growth of chinook salmon from the same lot, and for the same period of time, they averaged 155 mm fork length. Although we are not familiar with growth of chinook salmon in freshwater lakes, the growth of these fish appears to be good.

Trapping was discontinued because of the low catch. A population estimate based on the nine chinook salmon taken was not done, because it would not have been meaningful. The reason for the apparently low survival of the chinook salmon plant may have been due to predation by the existing coho salmon population. Havens (1985) reports low survival for chinook salmon plants in the Palmer area.

Sculpin Lake Rainbow Trout Studies

Sculpin Lake (Figure 2) has a surface area of 117 acres, a maximal depth of 35 ft, and an average depth of 14 ft (Table 2). This lake is located adjacent to Mile 12 on the Chitina-McCarthy Road. The conductivity of the lake is 277 µmohs/cm, and the morphoedaphic index is 19.5. This lake has no defined inlets or outlets.

Sculpin Lake has been stocked since 1968 with rainbow trout. On July 19, 1984, 29,000 Swanson strain rainbow trout were stocked in the lake. The fish averaged 40 mm in fork length and 1.2 g (378/lb) in weight at the time of stocking. The stocking rate was 242 per surface acre.

One year later, seven fyke nets were fished for 140 net-hours, capturing 825 rainbow trout from the 1984 plant. The fish averaged 147 mm in fork length and 40 g in weight. All fish were marked with an adipose fin clip and released. One week later the lake was fished again with seven fyke nets for a total of 122 net-hours, and 533 rainbow trout were captured. Chapman's adjustment of the Schnabel multiple census estimate of population size (Ricker 1975) was used to determine a population estimate. The survival estimate for the 1984 rainbow trout plant was 13% (95% confidence interval of 11% to 16%).

Because of the relatively high productivity of this lake, a higher survival of Age I rainbow trout was expected. Rainbow trout that have stocked in 20 lakes in the Palmer area at a rate of 200 per surface acre have had survival rates at Age I of 20% to 83%, averaging 50% (Havens 1984). The reason(s) for the relatively low survival of rainbow trout is not apparent at this time.

David Lake Arctic Grayling Studies

David Lake has a surface area of 40 acres and is located 3/4 mile east of Lake Louise at an altitude of 2,400 feet. This lake has a maximal depth of 35 feet, with approximately 10% shoal (less than 15 feet) area. The conductivity of the lake is 71 µmohs/cm which is indicative of low productivity. Conductivity tests conducted on 40 lakes in this area revealed that only two lakes were lower than 71 µmohs/cm. The morpho-edaphic index for David Lake is 3.2. According to Watsjold (1976), lakes with a conductance value of less than 100 µmohs/cm have low levels of productivity, regardless of the extent of the littoral area.

The lake was surveyed in 1981, and only a small population of whitefish were present. In later test netting, burbot were also captured. David Lake was stocked in 1982 and 1983 with a total of 20,000 rainbow trout. Subsequent test netting and trapping conducted in 1983, 1984, and 1985 resulted in a total capture of only four rainbow trout.

On August 30, 1984, 8,000 fingerling grayling were stocked in David Lake. These fish averaged 2.7 g in weight. Trapping was conducted in June 1985 to estimate survival. This resulted in a population estimate of 1,447 grayling and a survival rate of 18% (95% confidence interval of 11% to 34%). The grayling averaged 6.94 g when captured, and the growth was 0.47 g per month from the time of stocking to recapture.

This is the first time we have stocked fingerling grayling, so we have no experience to determine if 18% survival is considered good. It should be noted that these fish were stocked approximately 1 month prior to freeze-up, which didn't give the fish very much time to adapt to their new environment.

Lake Surveys

In 1985 five previously unsurveyed lakes were investigated for their fisheries potential. Test nets were set to determine existing fish populations (Table 4). The lakes were sounded and mapped, their outlets and inlets measured for flow and spawning potential, and temperatures and water quality data collected (Table 5).

Bacon Lake (Figure 6) is a 50-acre lake located about 5 miles east of the Lake Louise Road. The lake has a maximal depth of 38 feet and supports a population of grayling, burbot, whitefish, and longnose suckers. The conductivity of Bacon Lake is 82 µmohs.

Hiccup Lake (Figure 7) is fed by the outlet of Bacon Lake. Hiccup Lake has a surface area of 65 acres and a maximal depth of only 11 ft. Shallow lakes are usually associated with low dissolved-oxygen concentrations during the winter; however, there are valid reports of burbot catches during the winter months. Not surprisingly, the conductivity of this lake at 83 µmohs is very similar to Bacon Lake. Hiccup Lake is approximately 5 miles east of the Lake Louise Road. Some Hiccup Lake fish may overwinter in Bacon Lake.

Dora Jene Lake (Figure 8) is small (four acres) and has a maximal depth of 15 feet. The lake is located 1/2 mile south of Mile 155 Glenn Highway. A test net set overnight did not catch any fish. Observations indicated large numbers of crustaceans in the lake; this may be a reflection of the conductivity, which was 254 µmohs. The outlet was running approximately 2 gallons per minute, and during normal or dry years may not run at all. No inlet was found, so the incoming water is apparently seepage from the surrounding terrain. This lake was checked in late winter for dissolved-oxygen concentrations; it has 10 ppm at 5 feet. This lake will be stocked in 1986 with rainbow trout.

Table 4. Gill Net Summary of Previously Unsurveyed Lakes and Copper and Susitna River Drainages, 1985.

Name	Location	Number of Fish	Species*	Length Range (mm)	Mean Length (mm)	Frequency**	Percent Composition
Bacon	T6N R6W S31, 32	23	GR	140-330	261	0.51	29.0
		2	BB	490-570	530	0.04	2.5
		22	WF	230-365	290	0.49	27.5
		33	LNS	105-485	397	0.73	41.0
D.J.	T3N R7W S1	1	RT	0	504	0.04	100.0
Hiccup	T6N R6W S32, 33	15	GR	200-295	244	0.41	29.0
		5	WF	250-340	276	0.14	10.0
		2	BB	315-585	450	0.05	3.0
		30	LNS	200-465	372	0.81	58.0
Julie	T5N R6W S28, 33	46	GR	130-345	253	1.19	92.0
		4	BB	220-400	315	0.10	8.0
Jane	T4N R6W S15, 22	53	GR	135-350	242	1.31	65.0
		11	LNS	105-440	342	0.27	13.0
		18	WF	195-395	325	0.44	22.0

* Species
GR - Grayling
BB - Burbot
WF - Whitefish
LNS - Sucker
RT - Rainbow trout

** Frequency is the number of fish per net hour.

Table 5. Physical and Biological Data from Previously Unsurveyed Lakes in the Copper and Susitna River Drainages, 1985.

Name	Surface Area (acres)	Maximum Depth (ft)	Percent of Shoal Area**	Fish Species* Present	Location by Drainage	U.S.G.S. Map Reference
Bacon	50	38	50	GR, BB, WF, LNS	Unnamed creek to Tolsona Creek to Tazlina River	Gulkana B-5
Dora Jene	4	15	100	None	Tazlina River	Gulkana A-5
Hiccup	65	11	100	GR, BB, WF, LNS	Unnamed creek to Tolsona Creek to Tazlina River	Gulkana B-5
Jane	40	30	60	GR, WF, LNS	Unnamed creek to Tolsona Creek to Tazlina River	Gulkana A-5
Julie	41	24	75	GR, BB	Unnamed creek to Tolsona Creek to Tazlina River	Gulkana A-5

* Species: GR = Grayling WF = Whitefish
LNS = Suckers BB = Burbot

** Shoal area includes those areas less than 15 feet deep.

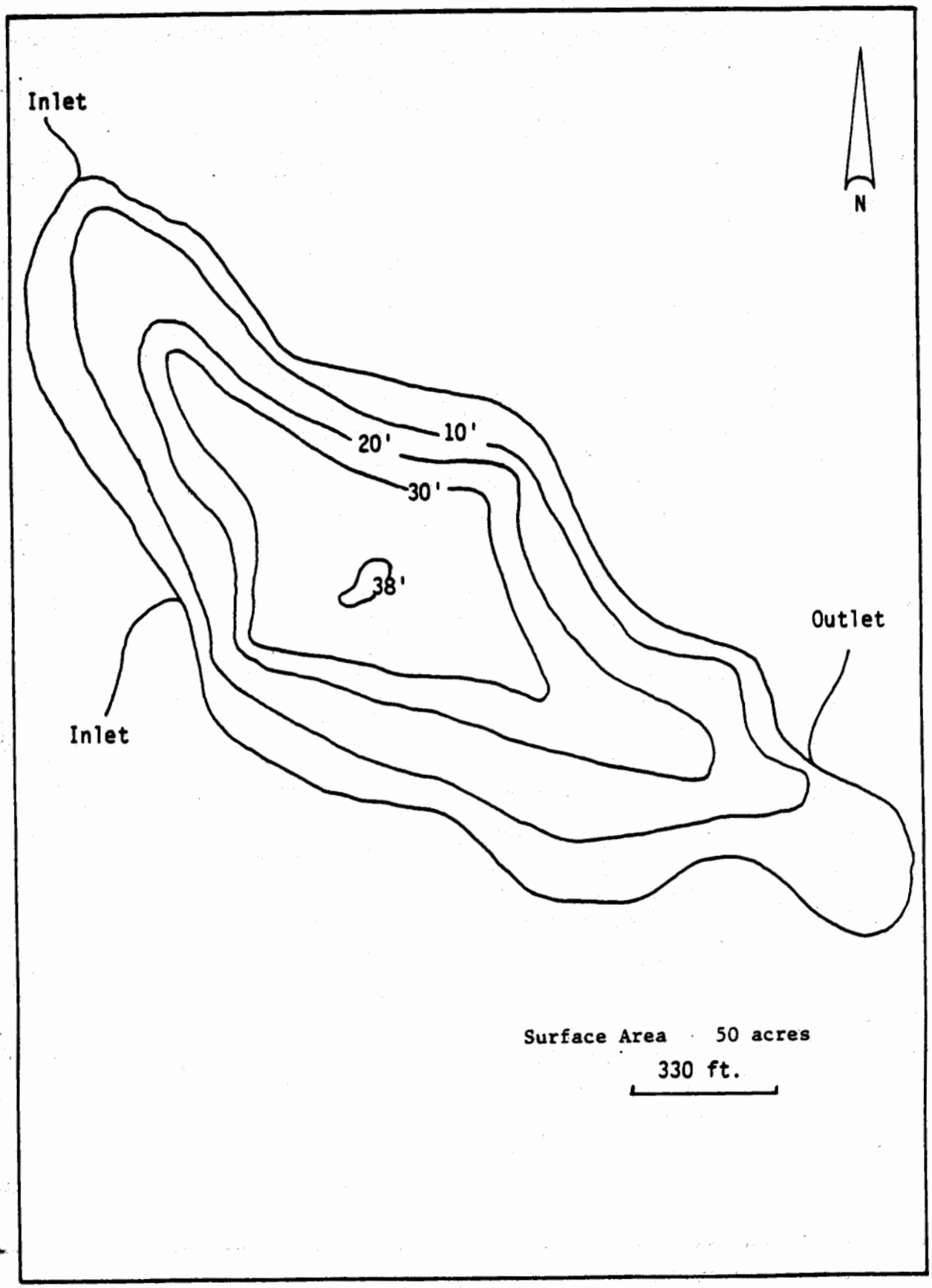

Figure 6. Bacon Lake.

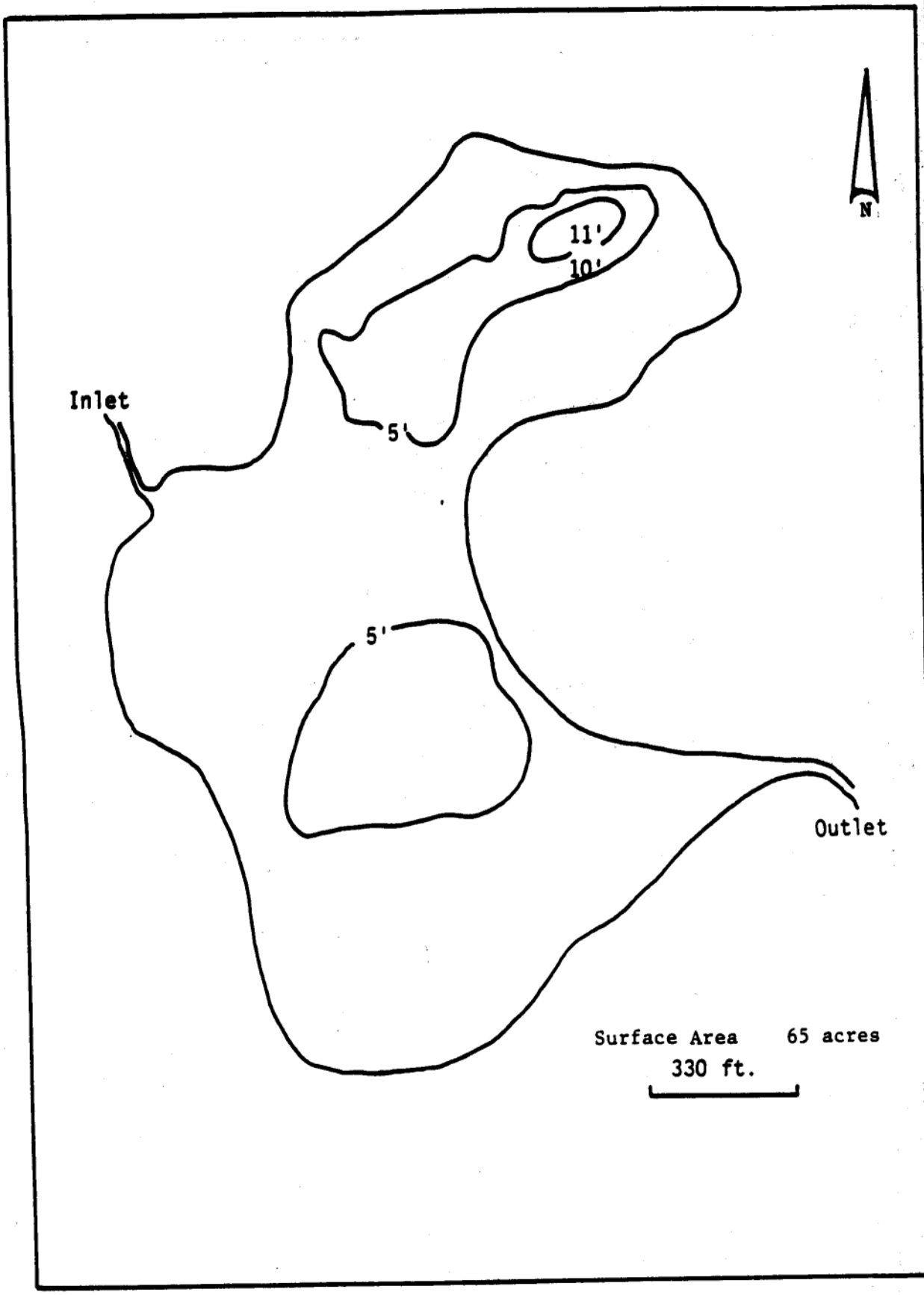

Figure 7. Hiccup Lake.

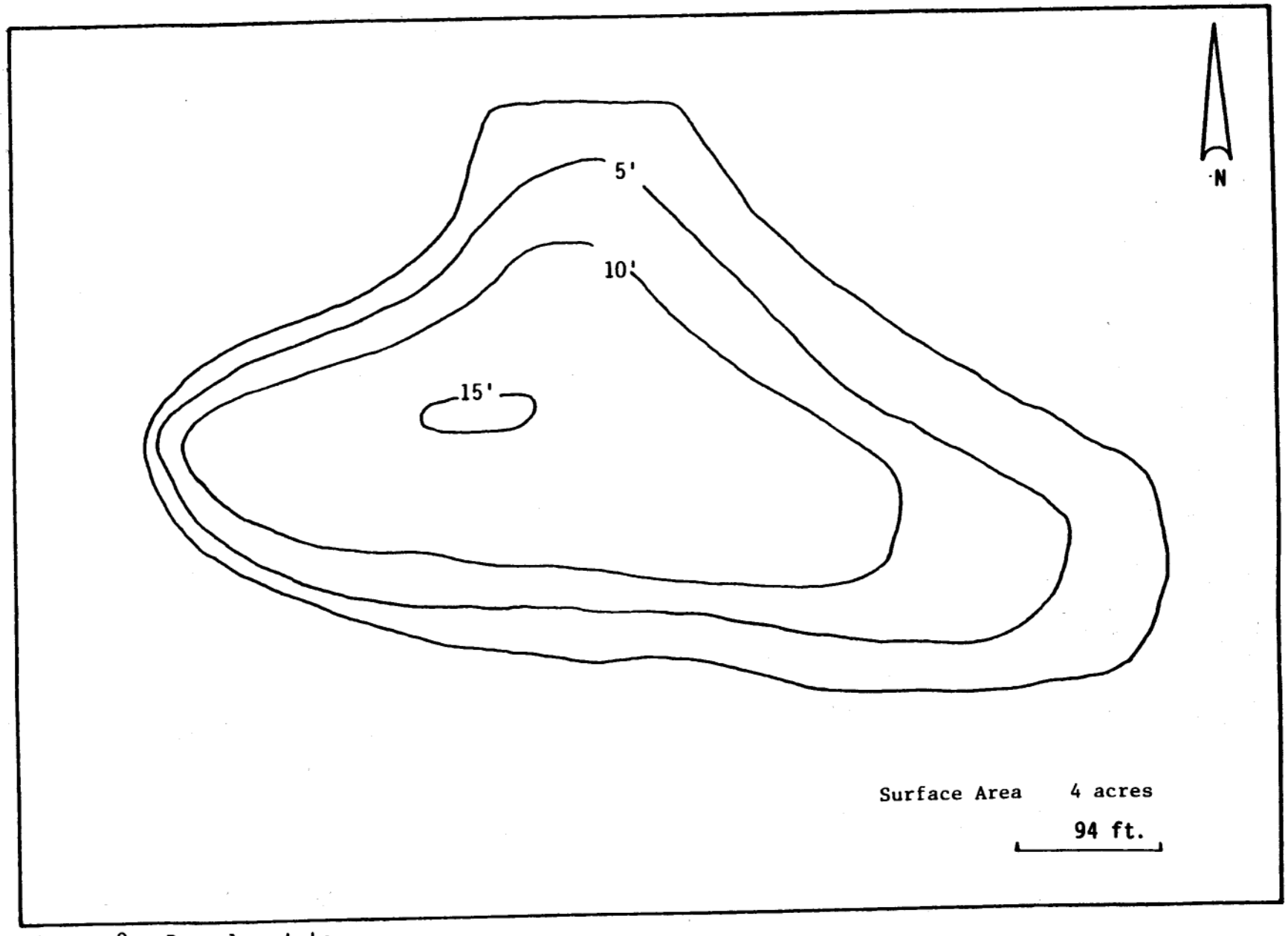

Figure 8. Dora Jene Lake.

Jane Lake (Figure 9) is located approximately 2 1/2 miles northwest of the Lake Louise Road and is accessible via an all-terrain-vehicle (ATV) trail or aircraft. The lake is 40 acres in surface area and has a maximal depth of 30 feet. Test netting captured grayling, whitefish, and longnose suckers. The net frequency for grayling was 1.31 fish/hour, which was the highest of the five lakes surveyed. The relatively high conductivity (149 µmohs) would lend credence to this lake as a potential site for a rainbow trout fishery. However, the presence of a free-flowing outlet, estimated at 4 cfs, could make egress of stocked fish from the lake very easy.

Julie Lake (Figure 10) is situated 6 1/4 miles north of the Lake Louise Road and accessible by an ATV trail or aircraft. This 41-acre lake has a maximal depth of 24 feet and no defined inlet or outlet. The lake is typical of many in this area; it has a population of grayling and burbot and low conductivity (70 µmohs). Because the lake has no outlet, it could be considered a candidate for the stocking program; however, the distance from the road system and apparently low productivity precludes any development at this time.

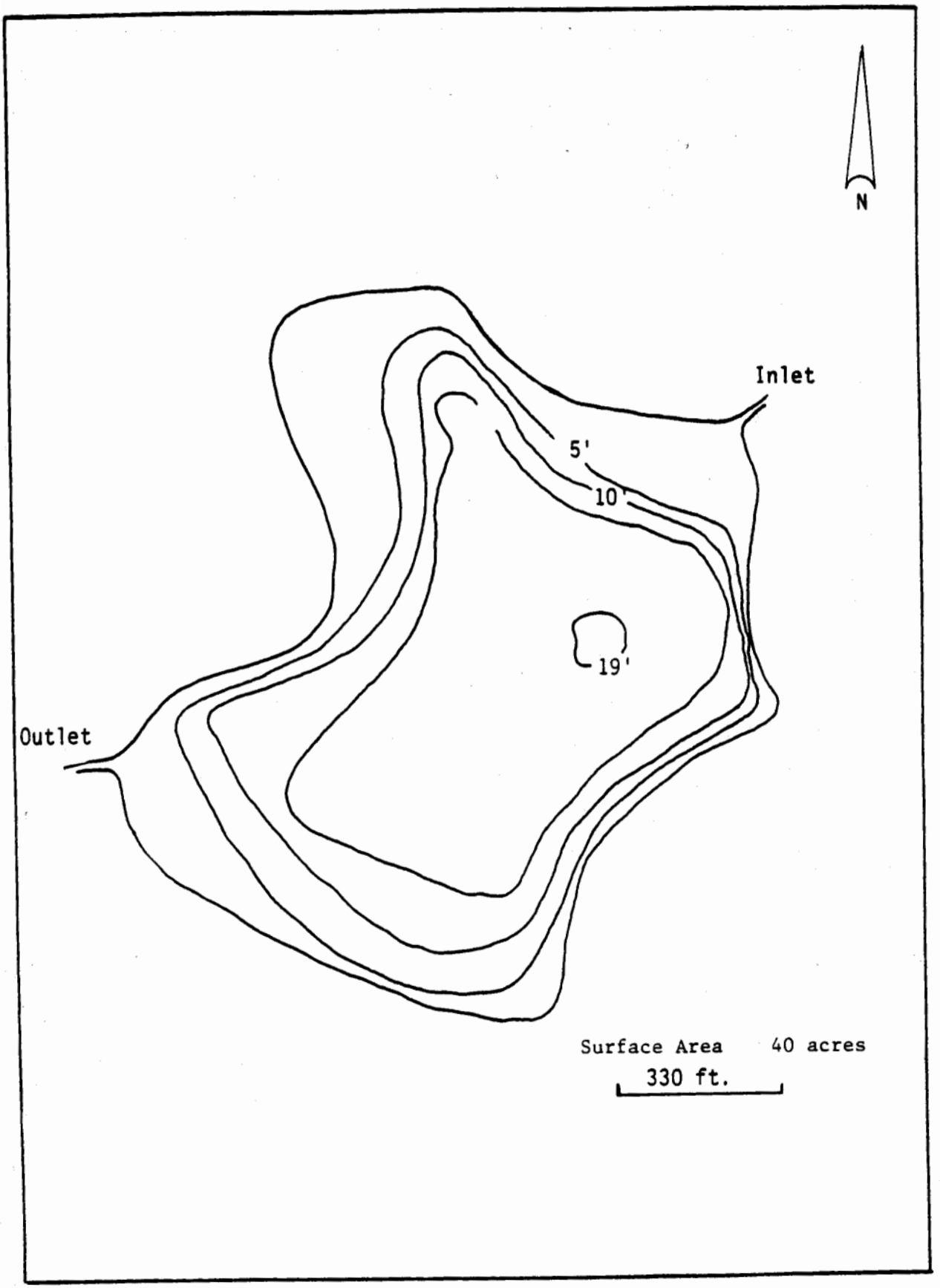

Figure 9. Jane Lake.

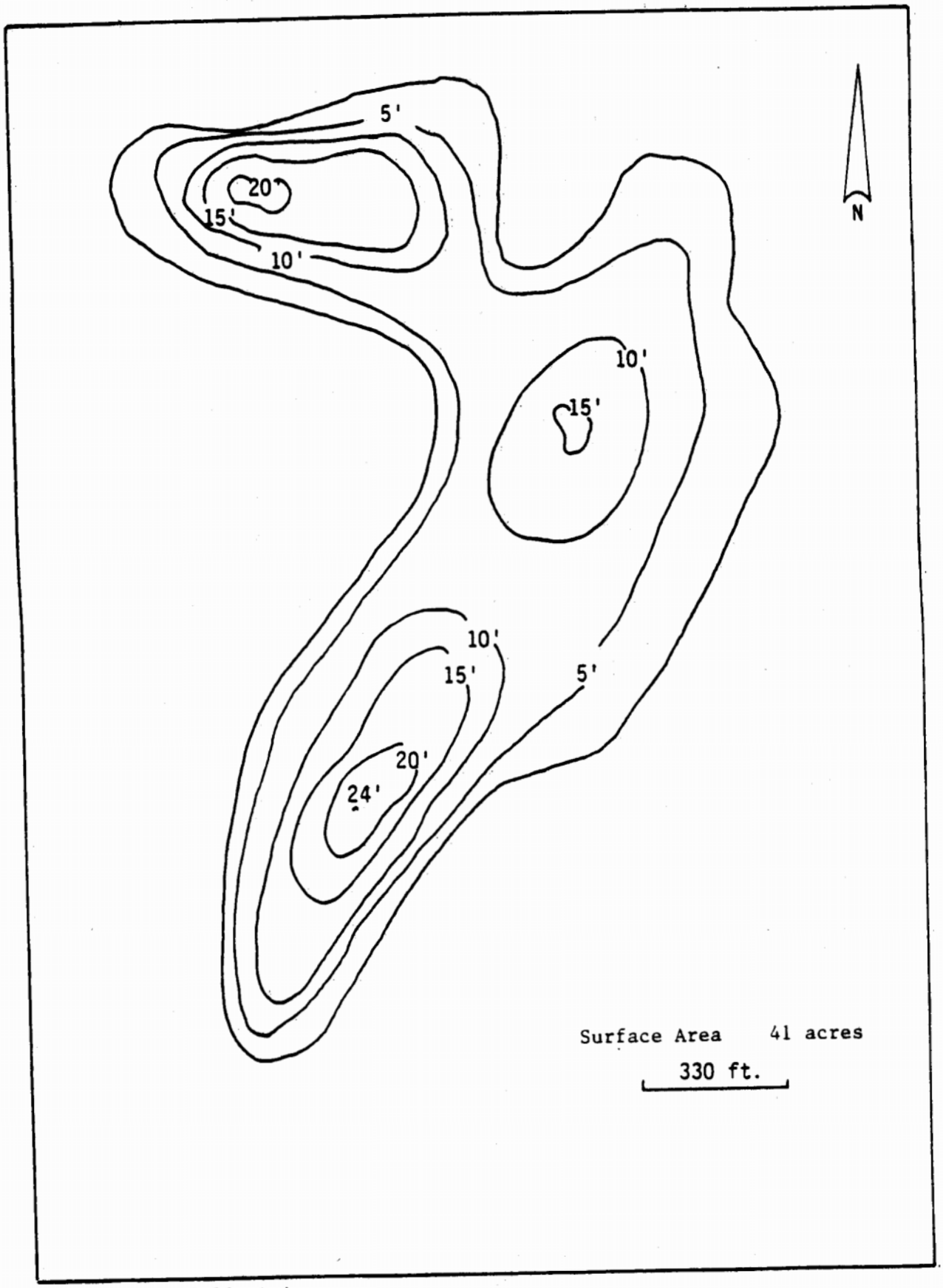

Figure 10. Julie Lake.

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