A MORPHOMETRIC ATLAS of ALASKAN LAKES: COOK INLET, PRINCE WILLIAM SOUND, and BRISTOL BAY AREAS

by

Marsha A. Spafard and Jim A. Edmundson

Regional Information Report[1] No. 2A00-23

Alaska Department of Fish and Game

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ACKNOWLEDGEMENTS

We are grateful to Cook Inlet Aquaculture Association and Prince William Sound Aquaculture Corporation for producing many of the original maps and their morphometric data presented in this report. Carol Schneiderhan (ADF&G, retired) deserves special thanks for drafting hard-copy reproductions of several lake maps. We would also like to express our appreciation to all the individual technicians, biologists, and pilots associated with various state, federal, and private agencies that routinely ventured to help gather the most fundamental and necessary information about lakes. Their names would easily fill a book.

ABSTRACT

Spafard, M. A. and J. A. Edmundson. 2000. A morphometric atlas of Alaskan lakes: Cook Inlet, Prince William Sound, and Bristol Bay areas. Alaska Department of Fish and Game, Commercial Fisheries Division, Regional Information Report No. 2A00-23, 13p. + 82 maps.

Bathymetric maps and their data are presented for 82 lakes in southcentral Alaska, including Cook Inlet, (e.g., Kenai Peninsula and Matanuska-Susitna Boroughs), Prince William Sound (e.g. Copper River valley), and Bristol Bay (e.g., Kvicahk River and Alaska Peninsula) areas. The maps originated from a variety of published and unpublished sources and have been edited and formatted to a consistent style. The principal source of the bathymetric map and its morphometric data used in this report are cited when known, while others are of an anonymous origin. Lakes included in this atlas range in size from less than 100,000 m^2 such as Arc Lake to 2,622 km^2 for Lake Iliamna, the largest lake in Alaska. All of the lakes selected have either a historical or current limnological database (physical profiles, water chemistry and nutrient data, and biological information) from various limnological and fisheries investigations carried out by the Alaska Department of Fish and Game (ADF&G) or ADF&G cooperative research endeavors.

KEY WORDS: Alaskan lakes, bathymetric maps, morphometry, limnology, Cook Inlet, Prince William Sound, Bristol Bay

INTRODUCTION

Limnological analyses require a detailed knowledge of the morphology of a lake basin, which is best described by a bathymetric map (Wetzel 1975). The most common morphometric parameters measured are surface area, mean depth, maximum depth, volume, maximum length, and shoreline length (Hutchinson 1957). In addition, various ratios of these parameters (e.g., shoreline development) have been used to classify or inventory lakes (Hutchinson 1957; Hersendorf 1982). The importance of size and shape of a lake's basin on its productivity has been recognized by biologists for years (e.g., Rawson 1952; Rawson 1955; Northcote and Larkin 1956). In particular, lake productivity is generally negatively correlated with mean depth. Ryder (1965) later devised the morphoedaphic index (MEI) or the ratio of dissolved solids concentration to mean depth as a descriptor of fish habitat and found a direct relationship between MEI and fish yield. Hydraulic variables (e.g., flushing rate and water retention time) in many empirical formulations require incorporation of morphometric data to determine nutrient budgets and loading capacities (Vollenweider 1976).

A lake manager must also have morphometric information to diagnose a lake's water quality problems and determine an appropriate restoration plan to achieve a desired water quality or trophic state (Cooke et al. 1993). Nutrient enrichment programs for the enhancement of salmon routinely use morphometric data when selecting potential candidate lakes for further study and in the calculation of fertilizer dosages and application rates to increase nutrient concentrations (Stockner and Macissac 1996; Edmundson et al. 1999). Morphometric data are also used by biologists to express the amount (density or biomass) of plants and animals either on an areal (e.g., per square kilometer) or volumetric (e.g., per cubic meter) basis. In addition, area and volumes of different water strata are used to determine other limnological features including heat content, volumes of the epilimnion and hypolimnion, and photosynthetic capacity (Wetzel and Likens 1991). Thus, the bathymetric map and its data are critical to analyses of physical, chemical, and biological properties of lakes.

There are many excellent texts that describe methods for constructing bathymetric maps and calculations of morphometric data (e.g., Wetzel and Likens 1991). Therefore, we have not reiterated such construction and computation techniques here. Our objective of this project was to compile bathymetric maps of Alaskan lakes and present them along with their salient morphometric data. There are an estimated 3 million lakes in excess of 25 km^2 in Alaska (Milner et al. 1997), but because of the obvious and practical problems associated with logistics and funding, detailed bathymetric maps exist for only a few. Included here are a set of lakes within the Upper and Lower Cook Inlet, Prince William Sound, and Bristol Bay areas that are of particular interest. The 82 bathymetric maps contained in this atlas are those in which ADF&G Central Region Limnology has either published information on aspects of their ecology, or has collected synoptic or multi-year information on their limnology (e.g., transparency, temperature, water chemistry, nutrients, and plankton data) or fish populations. We hope that limnologists, fishery

biologists, resource managers or anyone else interested in lakes will find this to be a handy reference for their particular needs.

DATA SOURCES and METHODS

Several of the maps in this atlas have been previously published in technical or annual data reports by the Alaska Department of Fish and Game, Cook Inlet Aquaculture Association, and Prince William Sound Aquaculture Corporation and the principal or original source of these bathymetric maps and their morphometric data that we used are provided in Table 1. However, many of the sources of this information are from anonymous agency personnel or simply unknown to us. As editors, our role in preparing this document was limited to compiling, editing, and formatting these existing bathymetric maps to a reasonably consistent style, and in some instances computing lake morphometrics when this information was previously lacking or ambiguous. In most cases, the original bathymetric map was unavailable to us so we worked from the best reproduction we could locate. Map drawings were scanned and the images edited and formatted using Photo-Paint[a] (version 7) graphics software (Huss 1997). All morphometric data presented here have been converted to metric units; however, to avoid reporting depths in decimal format as a result of the metric conversion, we have left the depth contour measurements as given on the original or reproduced bathymetric map. The information presented in Table 2 is a summary of all of the morphometric data and the geographical coordinates of each lake. We have also provided a brief table of English-metric equivalents (Table 3). Individual bathymetric maps follow in alphabetical order. The choice of the single-sided format, omission of page numbers, and spiral binding is to facilitate inclusion of additional maps in proper order, as they become available.

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Table 1. Principal source of bathymetric maps and their morphometric data.

Lake	Data Source
ANDERSON	Lebida (1983)
ARC	Anonynmous (ADF&G)
BEAR	Map and data by Logan (ADF&G) 1962; Kyle and Koenings (1983)
BECHAROF	Map by Mathisen (1996); data by authors
BIG	Lebida (1983)
BRUIN	CIAA[1]
BUTTERFLY	LeBida (1983)
BYERS	Map by Bradley and Wilson (ADF&G) 1975; data by Lebida (1983)
CARIBOU	Whitmore et al. (1979)
CASWELL	Lebida (1983)
CHELATNA	CIAA; Kyle et al. (1994)
CHENIK	Anonymous
COGHILL	PWSAC[2] (1984)
COLUMBIA	Pellissier and Somerville (1987)
COOPER	Anonymous (ADF&G)
CORNELIUS	Lebida (1983)
COTTONWOOD	Lebida (1983)
CRESCENT	Koenings et al. (1985a)
CROSSWIND	Map by Anonymous; data by Roberson et. al. (1978)
DELIGHT	Edmundson et al. (1998)
DELYNDIA	Lebida (1983)[1]
DESIRE	Edmundson et al. (1998)
DICKEY	Koenings and McDaniel (1983)
ENGLISH BAY 2	Edmundson et al. (1992)
ENGLISH BAY 3	Edmundson et al. (1992)
ESHAMY	Anonymous
ESTHER PASS	PWSAC (1983); Edmundson et al. (1993)
FINGER	Edmundson et al. (1989)
GRANT	Ebasco Services (1984)
HAZEL	Anonymous (ADF&G)
HEWITT	CIAA; Kyle et al. (1994)
HIDDEN	Anonymous (ADF&G)
ILIAMNA	Map by UW-FRI[3]; data by Burgner et al. (1969)
ISLAND	Map by Anonymous (ADF&G); data by authors
JEAN	Anonymous (ADF&G)
KENAI	Map by McCulloch (1966); data by Anonymous (ADF&G)
KIRSCHNER	CIAA
KLUTINA	Pellissier and Somerville (1985)
LARSON	Lebida (1983)
LEISURE	Bechtol and Dudiak (1983)
MACKEY, EAST	Anonymous (ADF&G)
MACKEY, WEST	Anonymous (ADF&G)
MINERS	PWSAC (1982)
MONSOON	Koenings and McDaniel (1983)
MOUNTAIN	Map by Anonymous (ADF&G); data by authors
MUD	Lebida (1983)
NANCY	Lebida (1983)
NICKLASON	Lebida (1983)
NUNAVAUGALUK	Map by UW-FRI; data by authors

Table 1. (Continued)

Lake	Data Source
PACKERS	Koenings et al. (1985b)
PAINT, LOWER	CIAA
PAINT, UPPER	CIAA
PASS	PWSAC (1982); Edmundson et al. (1993)
PAXSON	Van Whye and Peck (1968)
PORT DICK	CIAA
PTARMIGAN	Plafker (1955)
RED SHIRT	Map by Anonymous; data by Kyle et al. (1994)
ROBE	Koenings et al. (1987)
RUSSIAN, LOWER	Map by Anonymous (ADF&G); data by authors
RUSSIAN, UPPER	Anonymous (ADF&G)
SELDOVIA	Whitmore et al. (1979)
SHELL	Map by Lebida (ADF&G) 1981; data by Kyle et al. (1994)
SILVER	PWSAC (1982)
SITUK	Map by Anonymous (ADF&G); data by authors
SKILAK	Map by USGS[4]; data by Anonymous (ADF&G)
SOLF	PWSAC (1982)
SPORTS	Anonymous (ADF&G)
STEPHAN	Map by Anonymous; data by Kyle et al. (1994)
SUMMIT	Van Whye and Peck (1968)
SUMMIT, LOWER	Anonymous (ADF&G)
SUMMIT, UPPER	Anonymous (ADF&G)
SWEDE	PWSAC (1983)
TAZLINA	Pellissier and Somerville (1985)
TOKUN	PWSAC (1982); Koenings et al. (1985c)
TONSINA	Pellissier and Somerville (1985)
TRAIL, LOWER	Map and data by Todd and Litchfield (ADF&G) 1979
TRAIL, UPPER	Map and data by Todd and Litchfield (ADF&G) 1979
TUSTUMENA	Anonymous (ADF&G)
UGASHIK, LOWER	Map by Mathisen (1996); data by authors
UGASHIK, UPPER	Map by Mathisen (1996); data by authors
URSUS	CIAA
WASILLA	Map and data by Lebida and Probasco 1980; LeBida (1983)

1/ Cook Inlet Aquaculture Association
2/ Prince William Sound Aquaculture Corporation
3/ University of Washington, Fisheries Research Institute
4/ U. S. Geological Survey

Table 2. Summary of morphometrics for selected lakes in the Cook Inlet, Prince William Sound, and Bristol Bay areas.

Lake	Latitude (°N)	Longitude (°W)	Elevation (m)	Maximum length (km)	Surface area (x $10^6 m^2$)	Mean depth (m)	Maximum depth (m)	Volume (x $10^6 m^3$)
ANDERSON	61 37	149 20	137	1.1	0.5	3.2	8.5	1.7
ARC	60 27	151 06	46	0.5	0.1	2.6	4.6	0.2
BEAR	60 14	149 20	10	1.2	1.8	10.5	20.0	18.9
BECHAROF	57 53	156 30	15	61.6	1,142.7	56.7	181.0	64,795.0
BIG	61 31	149 59	43	6.6	12.1	9.0	27.0	111.9
BRUIN	59 23	154 00	229	1.7	0.9	5.2	20.0	4.8
BUTTERFLY	61 35	150 07	61	2.0	1.2	6.5	22.9	7.6
BYERS	62 44	150 06	249	2.7	1.3	20.0	54.0	26.7
CARIBOU	59 53	151 05	396	3.6	2.7	2.6	10.0	7.2
CASWELL	62 01	149 57	92	1.4	0.4	4.0	8.2	1.8
CHELATNA	62 29	151 27	422	12.2	15,8	61.0	125.0	970.5
CHENIK	59 10	154 10	46	2.5	1.2	28.7	57.0	33.9
COGHILL	61 04	147 29	18	7.4	12.7	46.3	78.0	587.5
COLUMBIA	61 02	146 58	7	3.7	1.3	6.0	15.2	1.9
COOPER	60 23	149 45	356	10.1	8.9	57.0	145.0	504.9
CORNELIUS	61 37	149 15	122	0.7	0.2	6.9	16.5	1.3
COTTONWOOD	61 35	149 19	100	2.1	1.1	3.3	12.0	3.5
CRESCENT	60 22	152 56	183	9.4	16.5	23.0	30.5	378.7
CROSSWIND	62 20	146 00	644	13.3	38.2	16.4	39.0	625.9
DELIGHT	59 34	150 15	15	5.1	2.8	22.0	39.5	60.2
DELYNDIA	61 36	150 05	61	1.9	1.2	6.5	22.8	7.7
DESIRE	59 35	150 15	15	2.5	1.8	14.0	27.4	24.8
DICKEY	62 55	140 08	875	1.8	3.1	14.6	25.0	45.7
ENGLISH BAY 2	59 20	151 50	12	1.8	0.7	10.9	25.9	7.6
ENGLISH BAY 3	59 20	151 50	12	0.8	0.7	14.7	29.0	10.6
ESHAMY	60 26	147 57	143	7.9	3.6	33.5	76.2	122.0
ESTHER PASS	60 52	147 55	22	2.6	0.2	13.2	27.0	2.5
FINGER	61 37	149 15	337	2.8	1.5	4.7	13.4	6.9
GRANT	60 30	149 15	213	7.6	6.5	43.0	95.0	275.7
HAZEL	59 30	151 15	96	1.9	0.9	18.0	26.0	17.4
HEWITT	62 00	151 21	44	4.5	2.3	13.5	34.0	38.0
HIDDEN	60 29	150 15	86	9.1	6.8	20.1	45.1	138.1
ILIAMNA	59 30	155 00	15	127.7	2,622.0	44.0	301.0	115,310.0
ISLAND	60 42	151 18	43	1.8	1.2	4.8	11.3	5.8
JEAN	60 30	150 09	120	1.8	0.5	11.6	21.3	5.3
KENAI	60 25	149 35	133	31.3	55.9	90.7	165.0	5,086.9
KIRSCHNER	59 22	154 00	20	1.9	1.3	17.0	37.0	22.3
KLUTINA	61 44	145 43	524	22.5	67.1	45.0	90.0	3,019.8
LARSON	62 20	149 53	186	4.0	1.8	16.4	42.6	29.1
LEISURE	59 35	151 19	51	2.3	1.1	22.0	68.0	23.6
MACKEY, EAST	60 31	150 59	53	1.2	0.4	2.6	7.3	1.0
MACKEY, WEST	60 31	151 00	53	1.7	0.7	2.0	5.5	1.3
MINERS	61 04	147 29	9	3.8	3.1	41.3	62.0	129.7
MONSOON	62 39	146 49	913	2.8	0.3	8.5	19.0	2.6
MOUNTAIN	59 39	139 20	58	3.0	0.9	23.0	50.0	19.2
MUD	61 35	149 20	100	0.8	0.2	1.0	5.2	0.2
NANCY	61 41	150 00	77	3.9	3.1	7.7	19.8	23.6
NICKLASON	61 37	149 16	122	0.9	0.3	4.8	17.3	1.4

Table 2. (Continued)

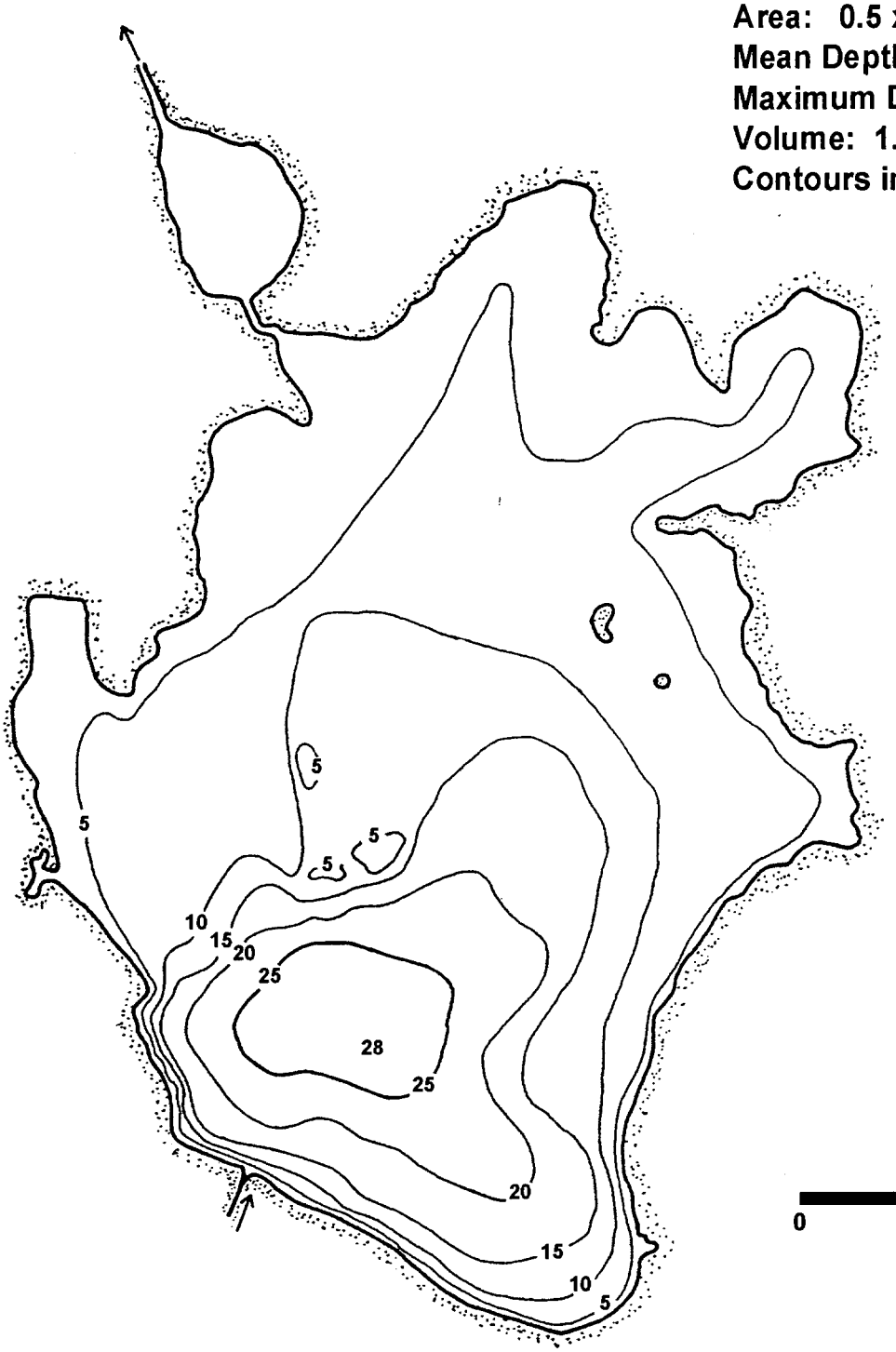
Lake	Latitude (°N)	Longitude (°W)	Elevation (m)	Maximum length (km)	Surface area (x $10^6 m^2$)	Mean depth (m)	Maximum depth (m)	Volume (x $10^6 m^3$)
NUNAVAUGALUK	59 15	158 55	10	21.7	74.8	56.8	160.0	4,251.8
PACKERS	60 28	151 55	15	3.6	2.1	12.2	30.5	24.9
PAINT, LOWER	59 13	154 31	154	2.2	0.6	2.5	12.2	1.4
PAINT, UPPER	59 14	154 20	153	2.0	1.0	16.7	36.6	17.1
PASS	60 55	148 03	24	2.9	0.5	11.7	31.0	5.8
PAXSON	62 55	145 30	778	15.3	15.7	11.0	27.0	168.0
PORT DICK	59 15	151 15	144	2.5	1.0	21.0	45.0	19.5
PTARMIGAN	60 25	149 15	230	5.7	3.0	35.7	75.0	107.0
RED SHIRT	61 37	150 10	37	5.6	5.5	5.3	15.2	28.8
ROBE	61 05	146 08	7	3.6	2.8	3.1	5.0	8.6
RUSSIAN, LOWER	60 26	149 55	152	2.2	0.7	3.5	7.9	2.6
RUSSIAN, UPPER	60 20	149 50	210	4.7	4.6	26.8	79.3	122.2
SELDOVIA	59 20	151 35	130	2.0	0.5	10,5	25.9	5.7
SHELL	61 58	151 33	123	7.8	5.2	11.9	28.7	62.3
SILVER	60 57	146 33	107	5.0	4.5	56.4	99.0	251.9
SITUK	59 38	139 24	42	2.9	4.1	14.0	21.0	56.1
SKILAK	60 24	150 15	63	24.5	99.0	73.0	160.0	7,212.5
SOLF	60 26	147 42	8	1.8	0.6	42.5	96.0	25.8
SPORT	60 30	151 03	53	0.8	0.3	3.3	6.1	1.0
STEPHAN	62 42	148 54	568	5.1	4.0	7.0	27.7	33.7
SUMMIT	63 06	145 29	1,006	11.4	16.5	21.3	65.2	352.6
SUMMIT, LOWER	60 40	149 28	381	0.8	0.2	1.6	3.7	0.4
SUMMIT, UPPER	60 38	149 30	411	2.2	1.0	12.7	21.3	13.2
SWEDE	54 44	163 16	61	3.2	3.9	2.1	4.0	8.1
TAZLINA	62 00	148 13	544	46.7	156.1	67.9	110.0	10,583.8
TOKUN	60 24	144 17	54	2.8	1.8	21.0	32.0	38.0
TONSINA	61 31	145 29	575	10.4	13.7	52.9	90.0	726.3
TRAIL, LOWER	60 30	149 20	143	2.5	1.1	7.6	12.8	8.4
TRAIL, UPPER	60 32	149 20	144	8.5	7.1	16.4	44.5	116.6
TUSTUMENA	60 10	150 55	33	35.7	294.5	124.3	290.0	36,600.0
UGASHIK, LOWER	57 30	157 08	3	20.2	182.3	35.7	120.0	6,484.0
UGASHIK, UPPER	57 40	156 40	3	25.8	199.4	28.6	150.0	5,704.1
URSUS	59 30	153 55	213	1.5	0.7	9.0	22.0	6.6
WASILLA	61 35	149 24	98	3.4	1.5	5.2	14.6	7.9

Table 3. Some common values that enable conversion between English and metric units of measurement. The proper conversion procedure is to multiply the specified value in English units on the left by the conversion factor on the right and then round to the appropriate number of significant digits desired. For example, to convert 25.2 ft to meters: 25.2 x 0.3048 = 7.68096, which rounds to 7.7 meters. To convert from metric to English units, multiply the specified value in metric units by the reciprocal of the conversion factor.

To convert from English units:	To Metric units:	Multiply by:
inch	centimeters (cm)	2.54
foot	meter (m)	0.3048
mile	kilometer (km)	1.6093
acre	square meter (m^2)	4,047
acre	hectare (ha)	0.4047
square mile	square kilometer (km^2)	2.590
cubic foot	liter (l)	28.32
cubic foot	cubic meter (m^3)	0.0283
gallon	liter (l)	3.785
gallon	cubic meter (m^3)	0.0037
acre foot	cubic meter (m^3)	1,233

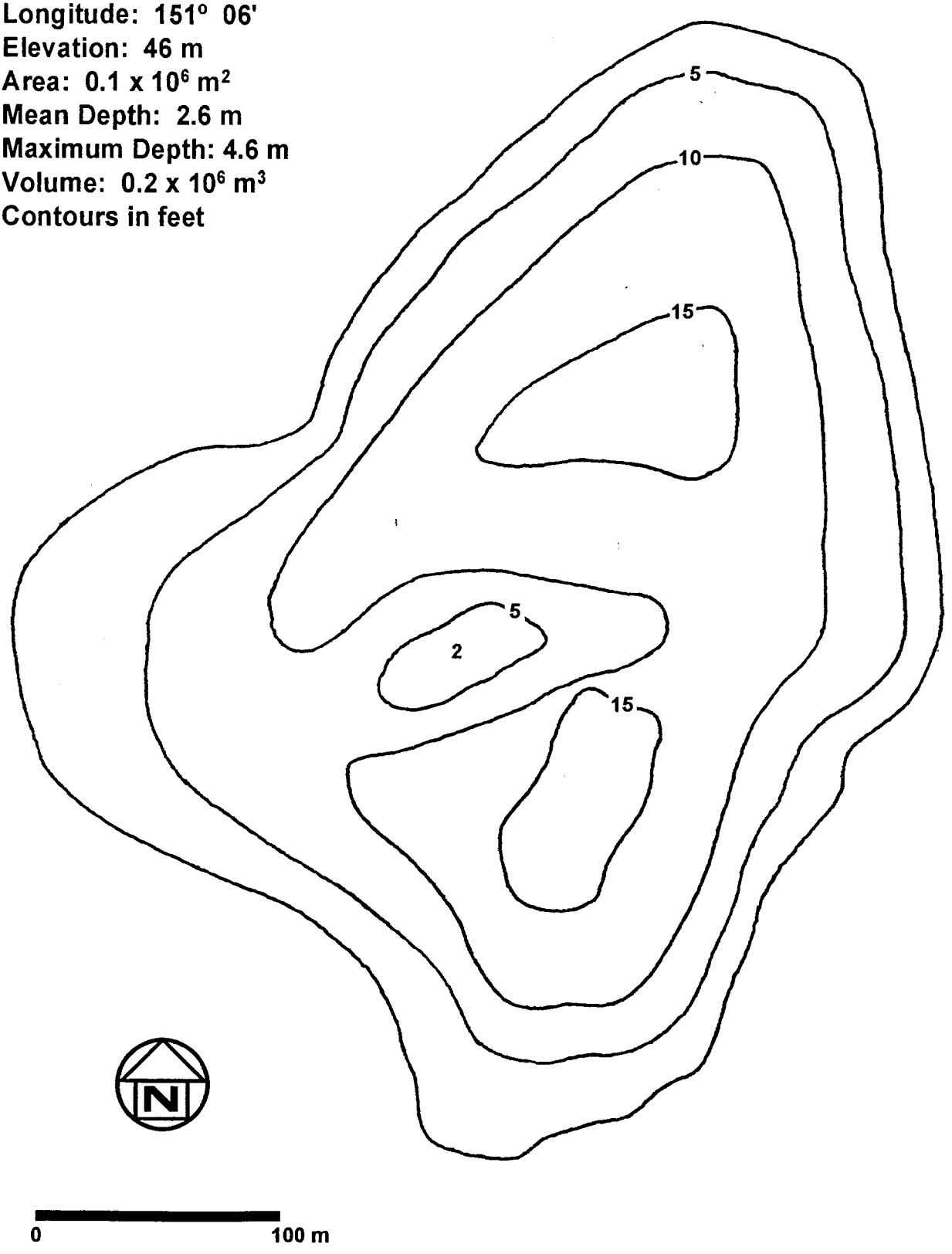
ANDERSON LAKE

Latitude: 61° 37'
Longitude: 149° 20'
Elevation: 137 m
Area: 0.5×10^6 m^2
Mean Depth: 3.2 m
Maximum Depth: 8.5 m
Volume: 1.7×10^6 m^3
Contours in feet



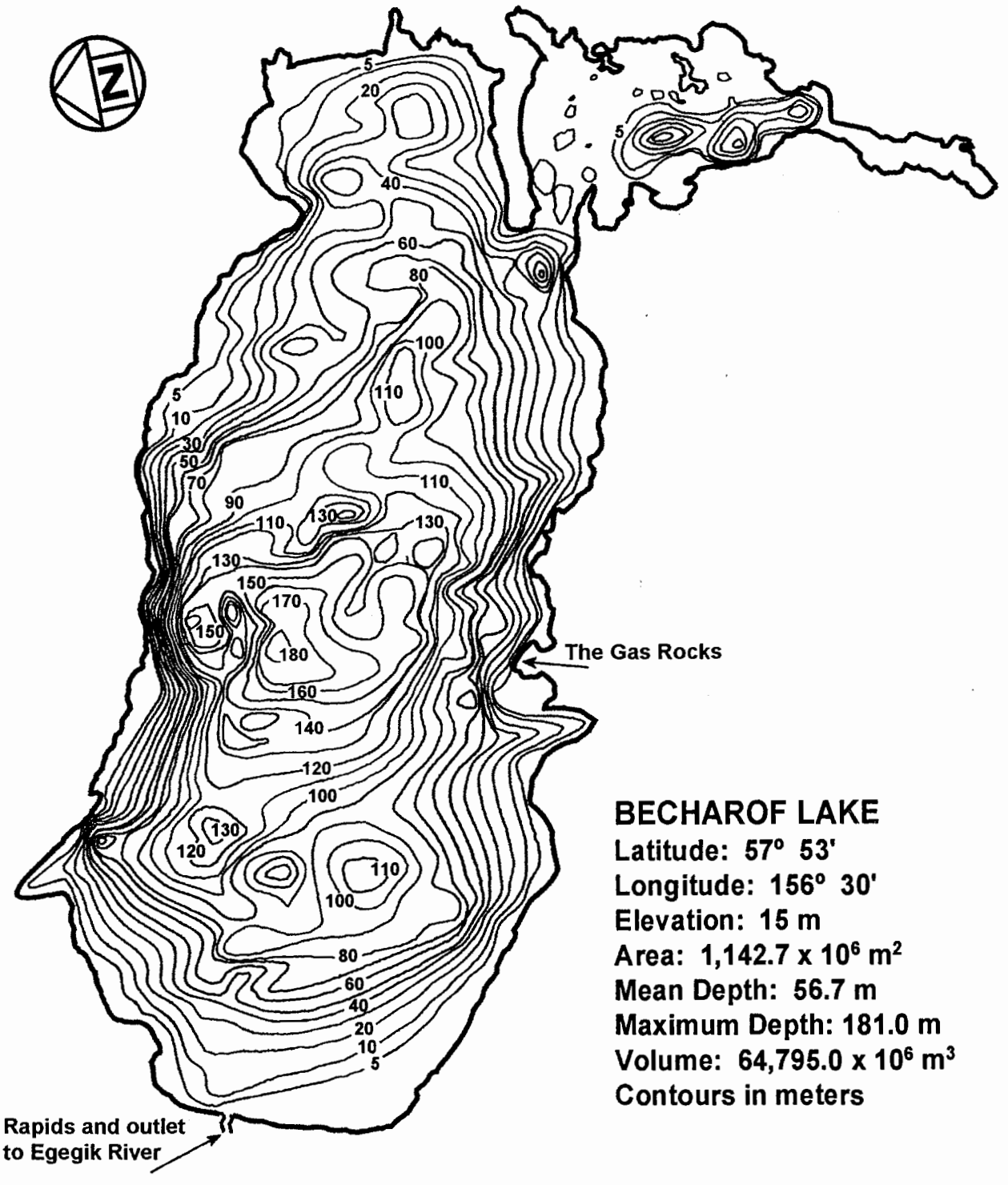
ARC LAKE

Latitude: 60° 27'
Longitude: 151° 06'
Elevation: 46 m
Area: 0.1 x 10^6 m^2
Mean Depth: 2.6 m
Maximum Depth: 4.6 m
Volume: 0.2 x 10^6 m^3
Contours in feet



BEAR LAKE

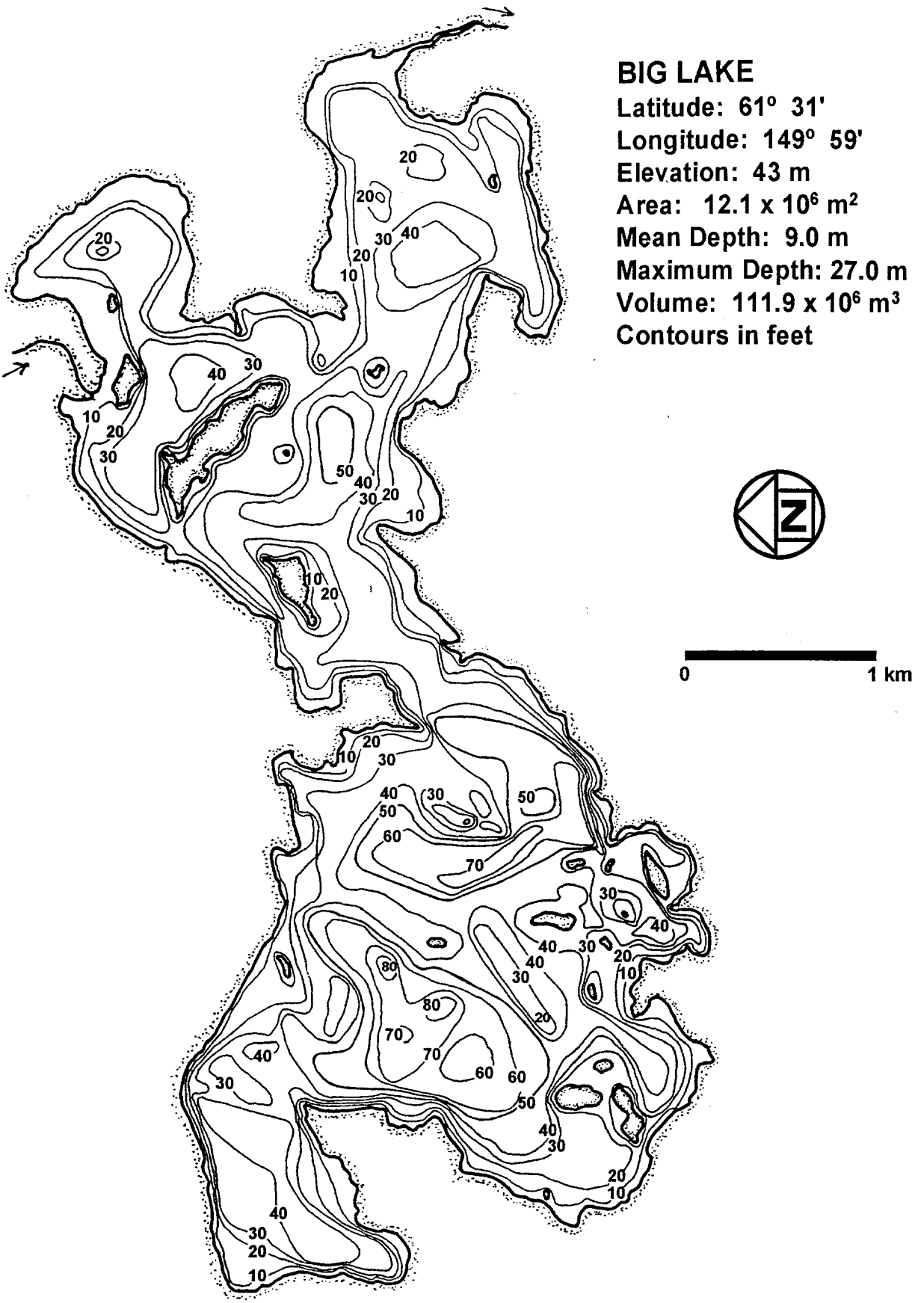
Latitude: 60° 14'
Longitude: 149° 20'
Elevation: 10 m
Area: 1.8 x 10^6 m^2
Mean Depth: 10.5 m
Maximum Depth: 20.0 m
Volume: 18.9 x 10^6 m^3
Contours in feet



BECHAROF LAKE

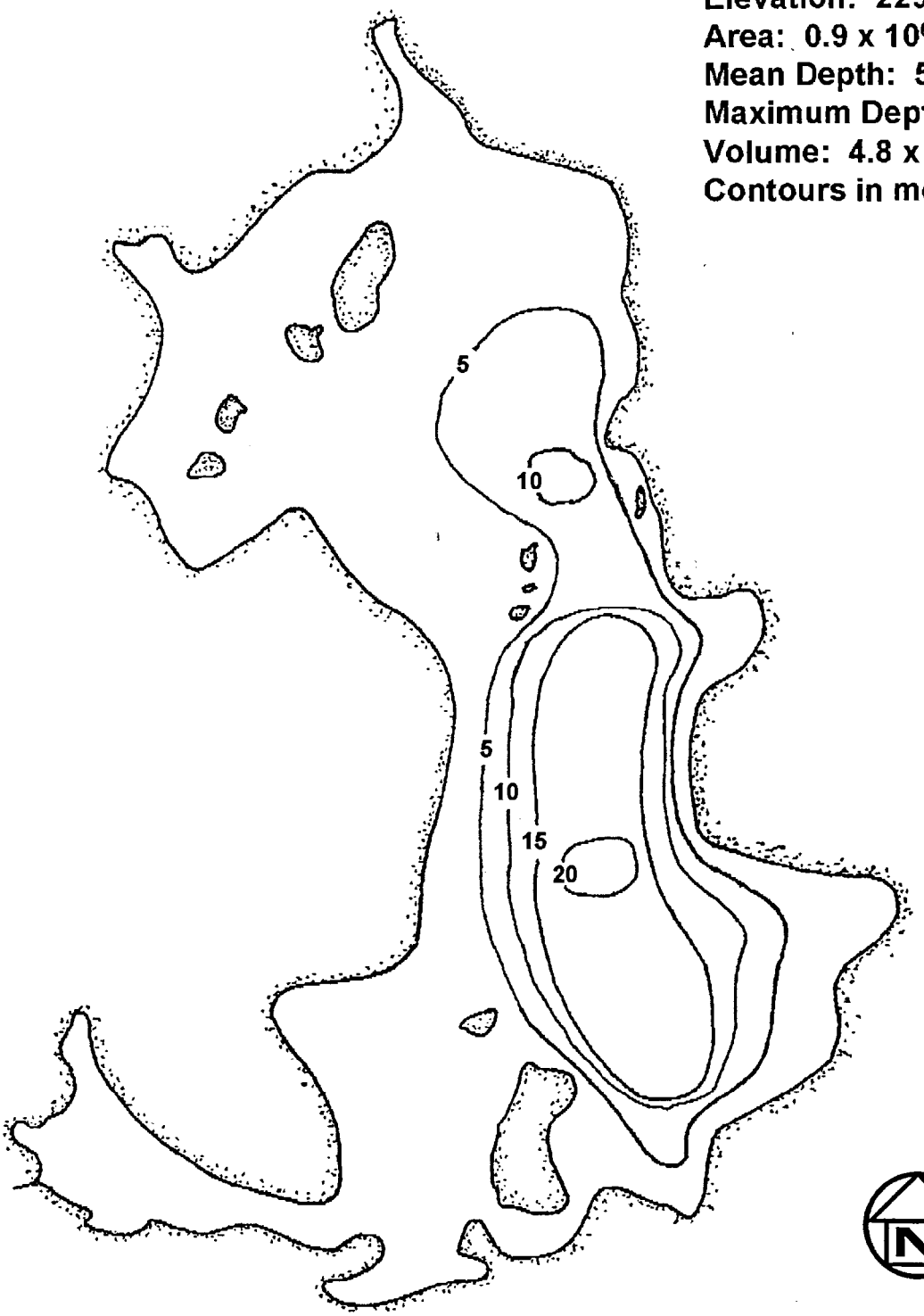
Latitude: 57° 53'
Longitude: 156° 30'
Elevation: 15 m
Area: 1,142.7 x 10^6 m^2
Mean Depth: 56.7 m
Maximum Depth: 181.0 m
Volume: 64,795.0 x 10^6 m^3
Contours in meters

0 10 km


BIG LAKE
Latitude: 61° 31'
Longitude: 149° 59'
Elevation: 43 m
Area: 12.1 x 10⁶ m²
Mean Depth: 9.0 m
Maximum Depth: 27.0 m
Volume: 111.9 x 10⁶ m³
Contours in feet
N
0
1 km

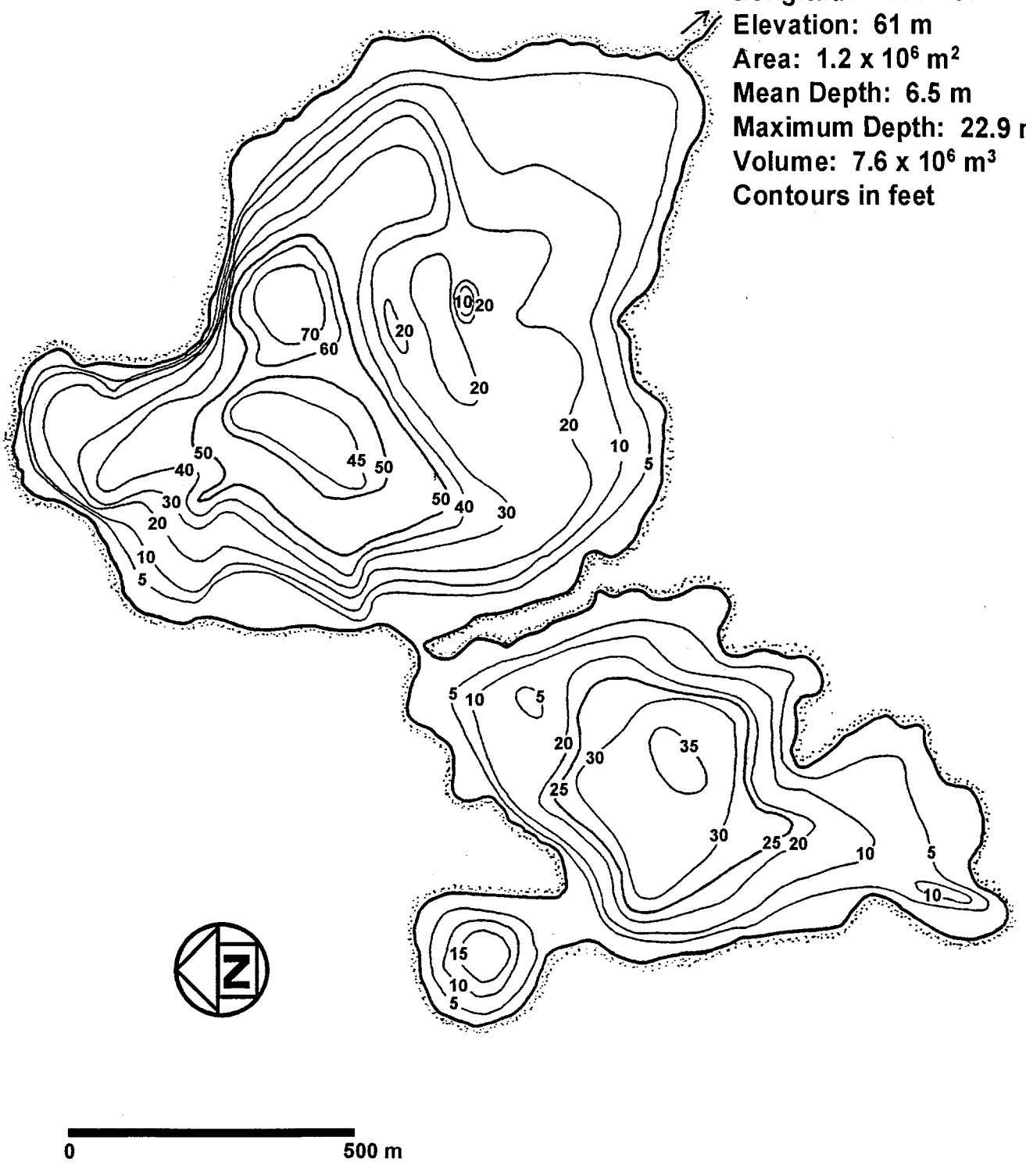
BRUIN LAKE

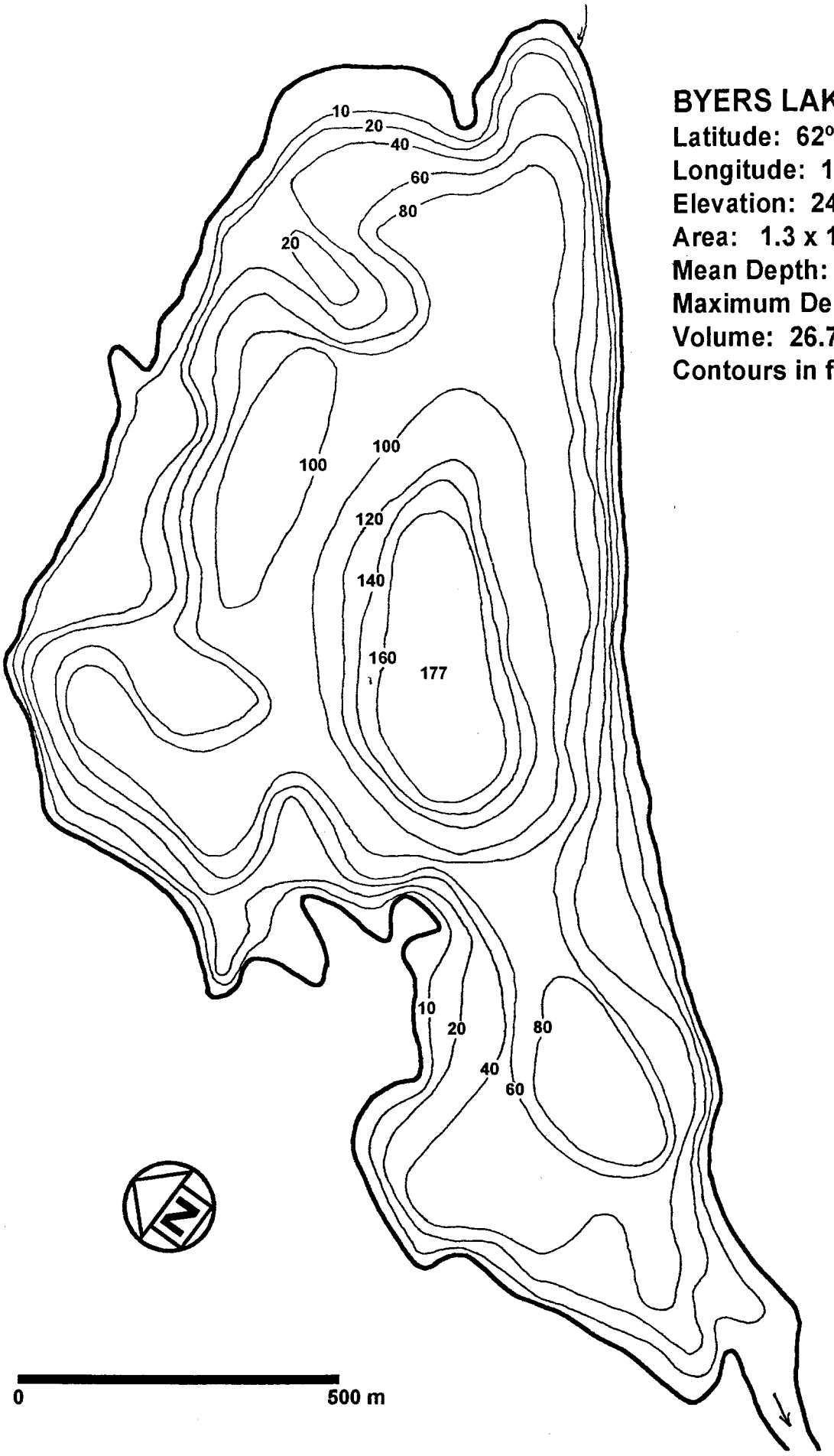
Latitude: 59° 23'
Longitude: 154° 00'
Elevation: 229 m
Area: 0.9 x 10^6 m^2
Mean Depth: 5.2 m
Maximum Depth: 20.0 m
Volume: 4.8 x 10^6 m^3
Contours in meters



BUTTERFLY LAKE

Latitude: 61° 35'
Longitude: 150° 07'
Elevation: 61 m
Area: 1.2 x 10^6 m^2
Mean Depth: 6.5 m
Maximum Depth: 22.9 m
Volume: 7.6 x 10^6 m^3
Contours in feet

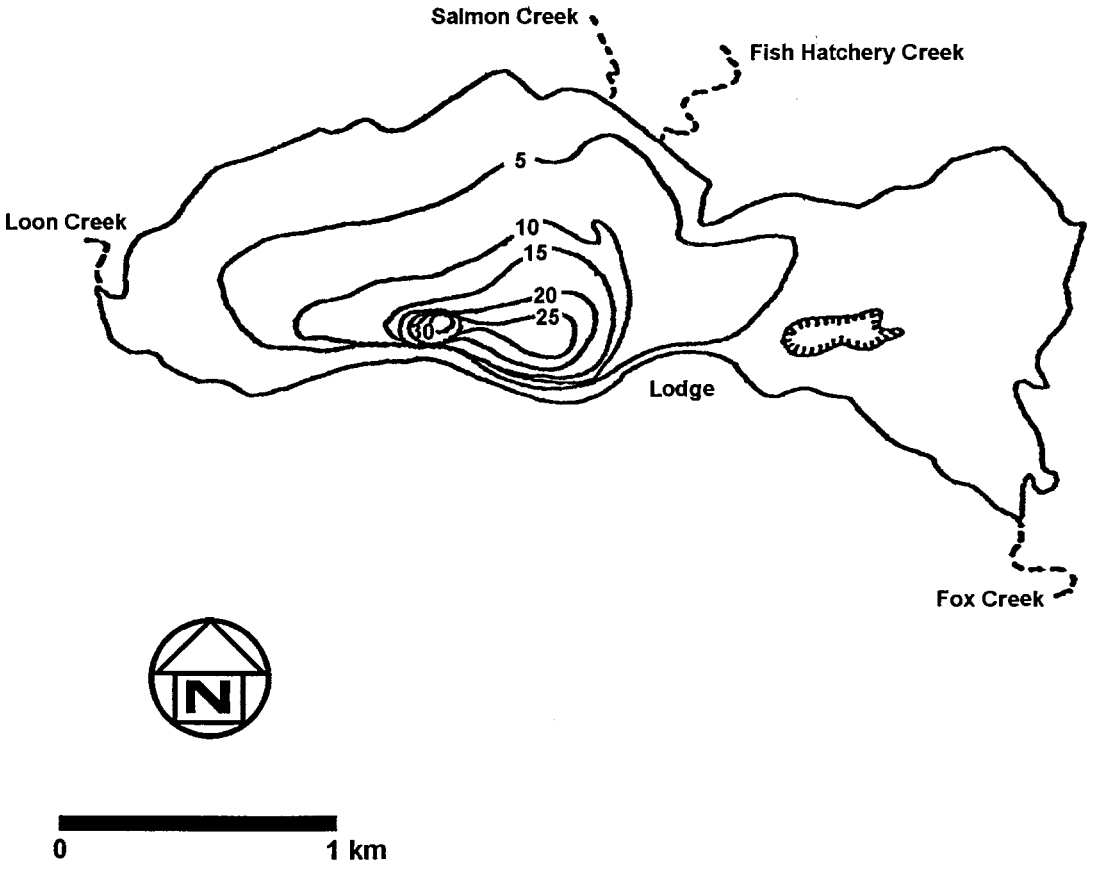


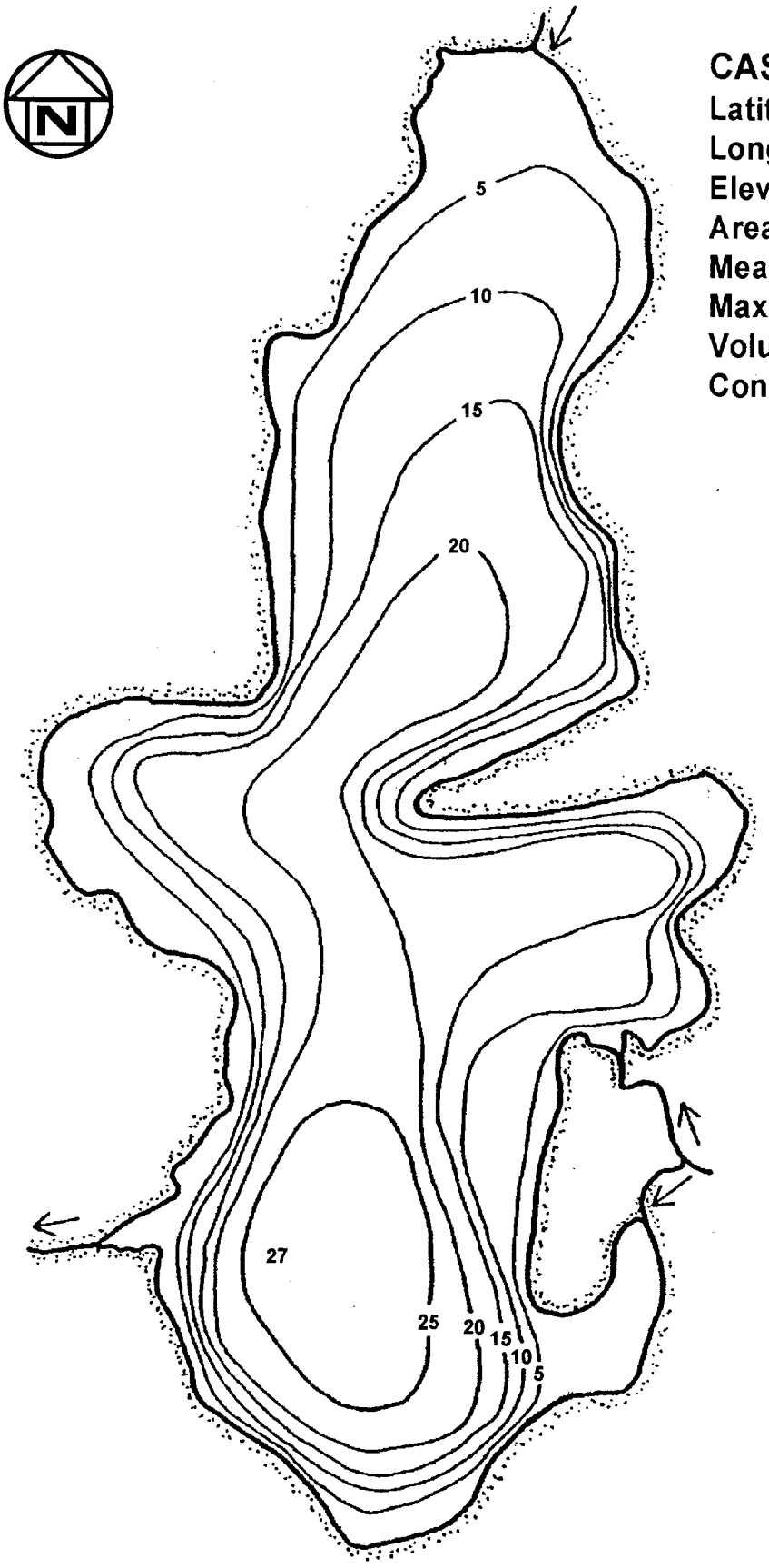


BYERS LAKE
Latitude: 62° 44'
Longitude: 150° 06'
Elevation: 249 m
Area: 1.3 x 10^6 m^2
Mean Depth: 20.0 m
Maximum Depth: 54.0 m
Volume: 26.7 x 10^6 m^3
Contours in feet

CARIBOU LAKE

Latitude: 59° 53'
Longitude: 151° 05'
Elevation: 396 m
Area: 2.7 x 10^6 m^2
Mean Depth: 2.6 m
Maximum Depth: 10.0 m
Volume: 7.2 x 10^6 m^3
Contours in feet

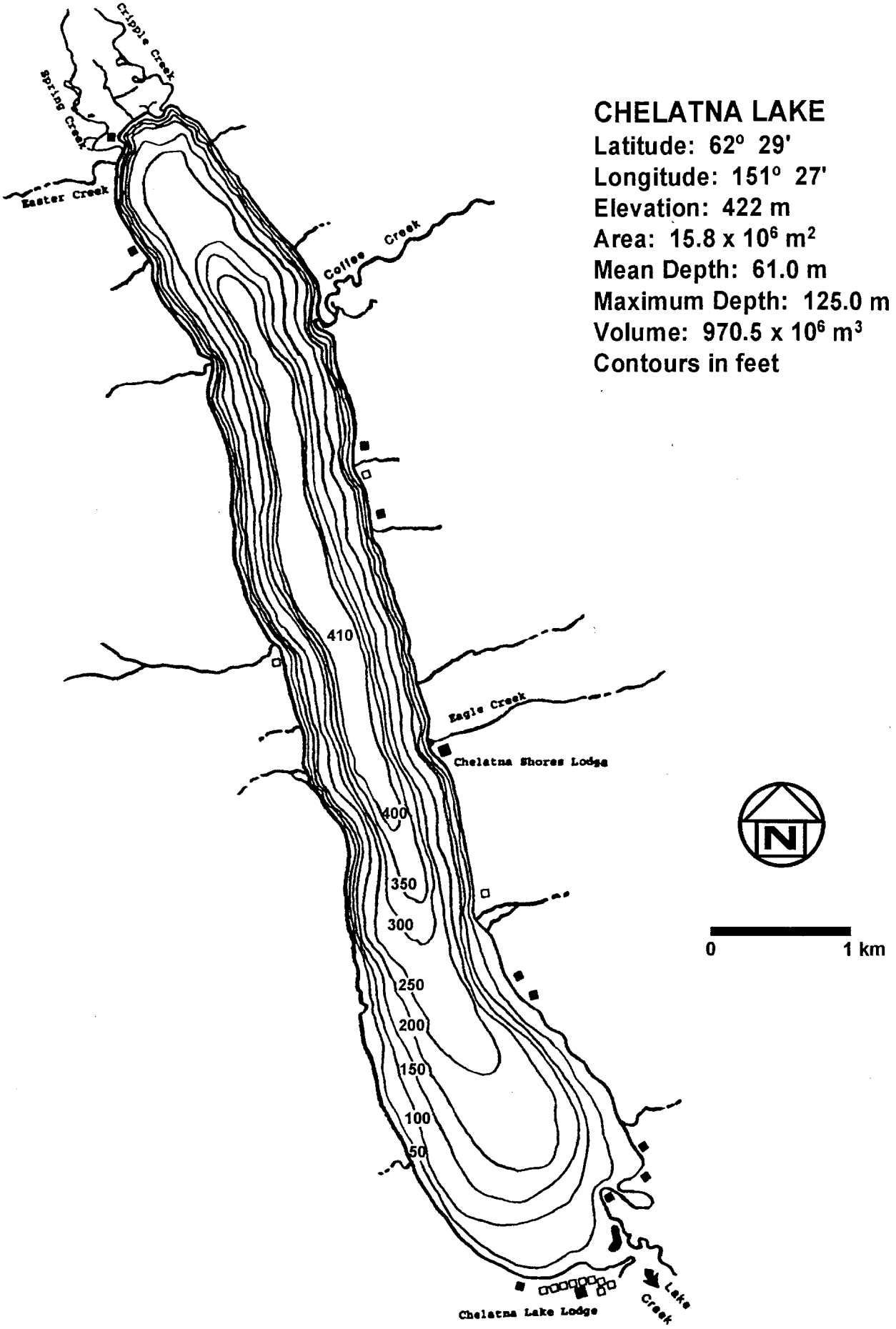




CASWELL LAKE

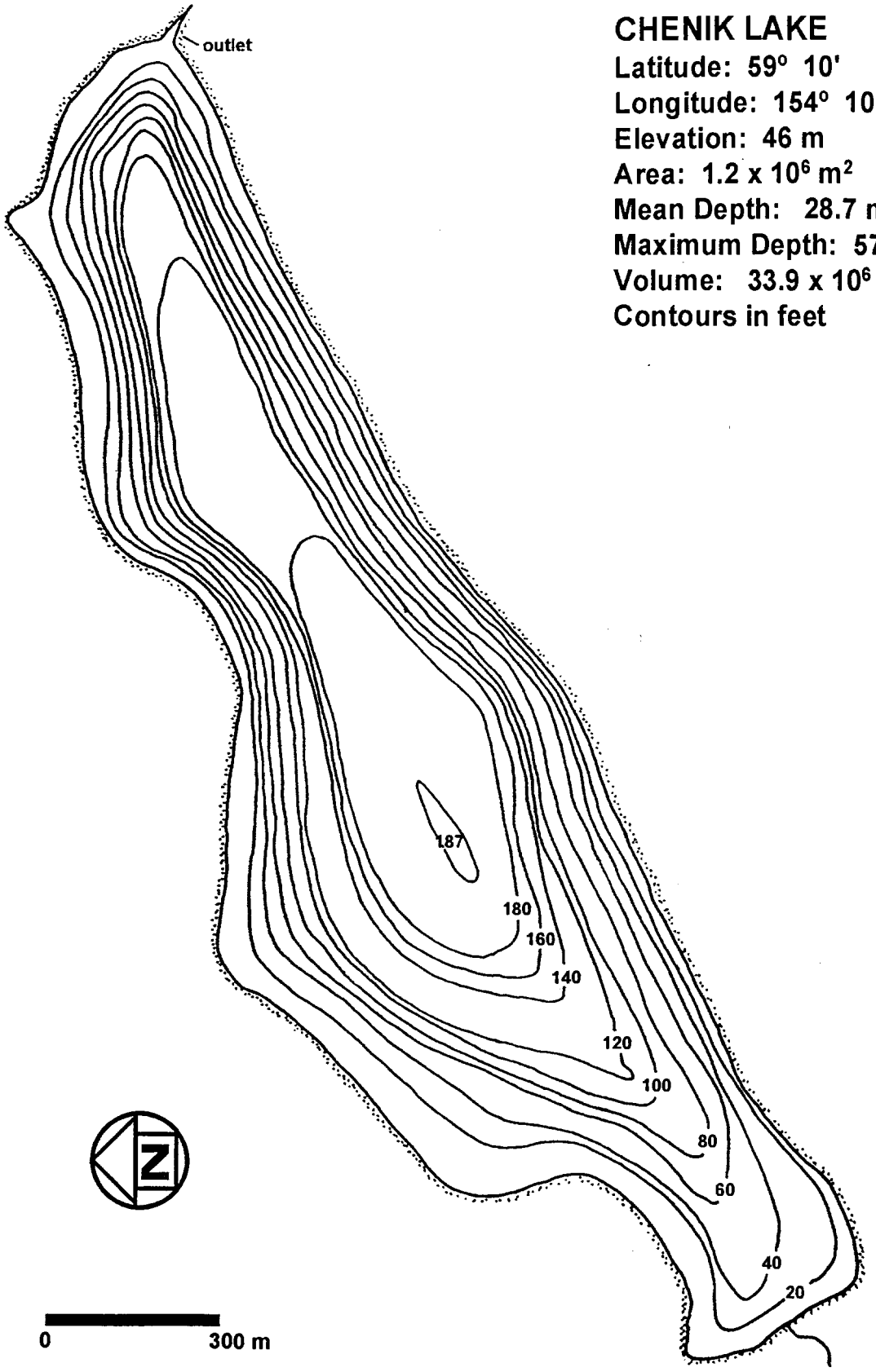
Latitude: 62° 01'
Longitude: 149° 57'
Elevation: 92 m
Area: 0.4×10^6 m^2
Mean Depth: 4.0 m
Maximum Depth: 8.2 m
Volume: 1.8×10^6 m^3
Contours in feet

0 500 m



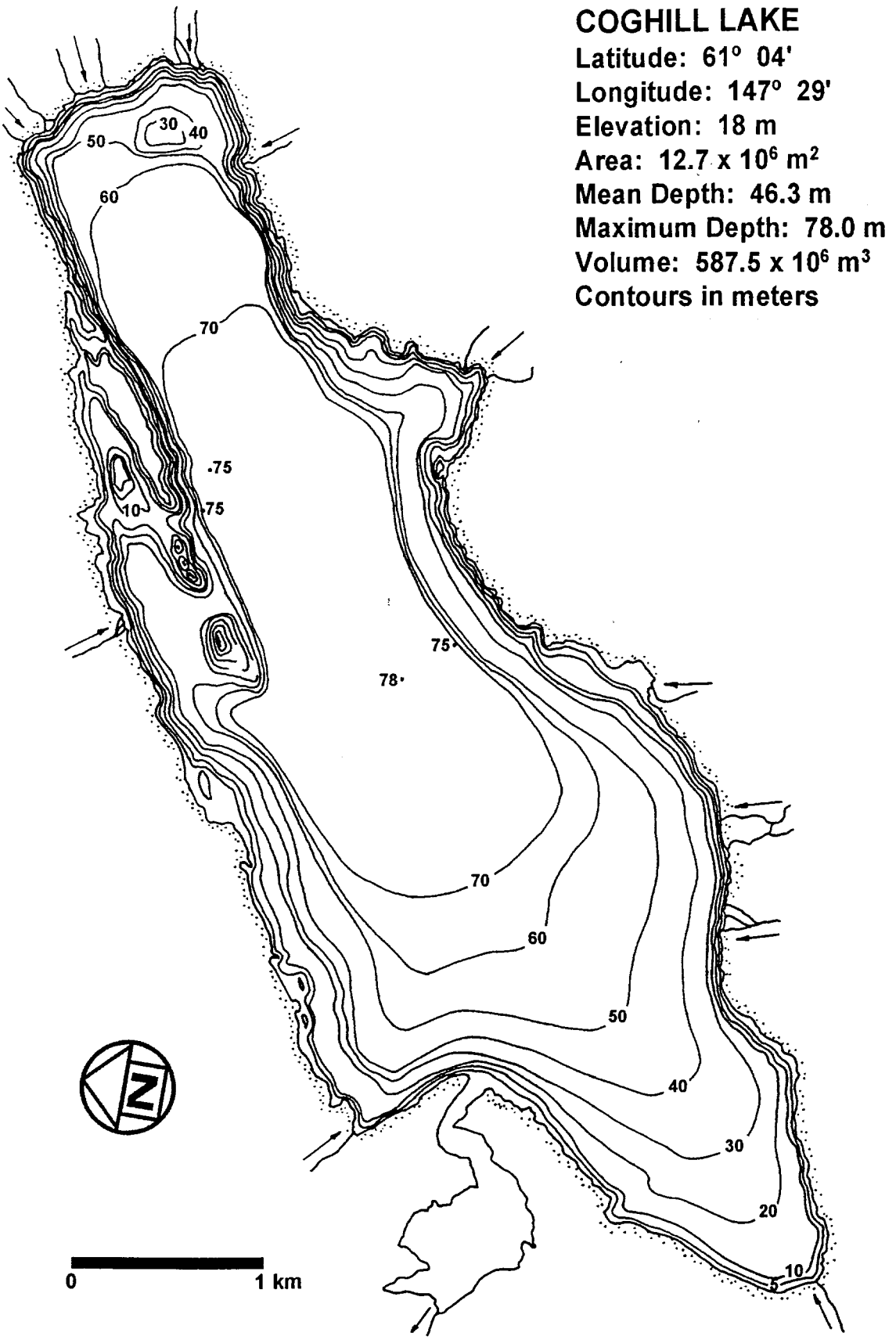
CHELATNA LAKE

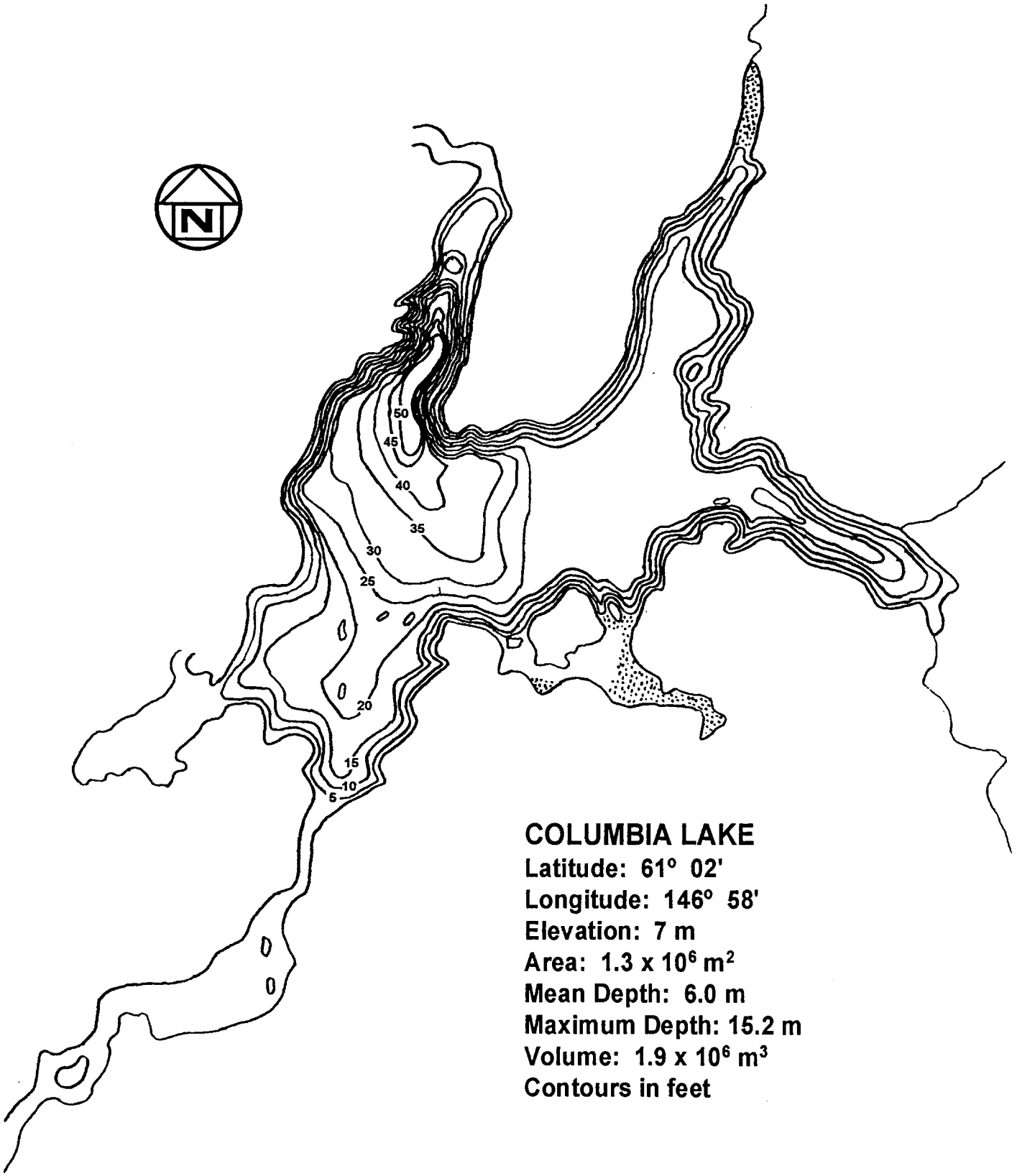
Latitude: 62° 29'
Longitude: 151° 27'
Elevation: 422 m
Area: 15.8×10^6 m^2
Mean Depth: 61.0 m
Maximum Depth: 125.0 m
Volume: 970.5×10^6 m^3
Contours in feet



CHENIK LAKE

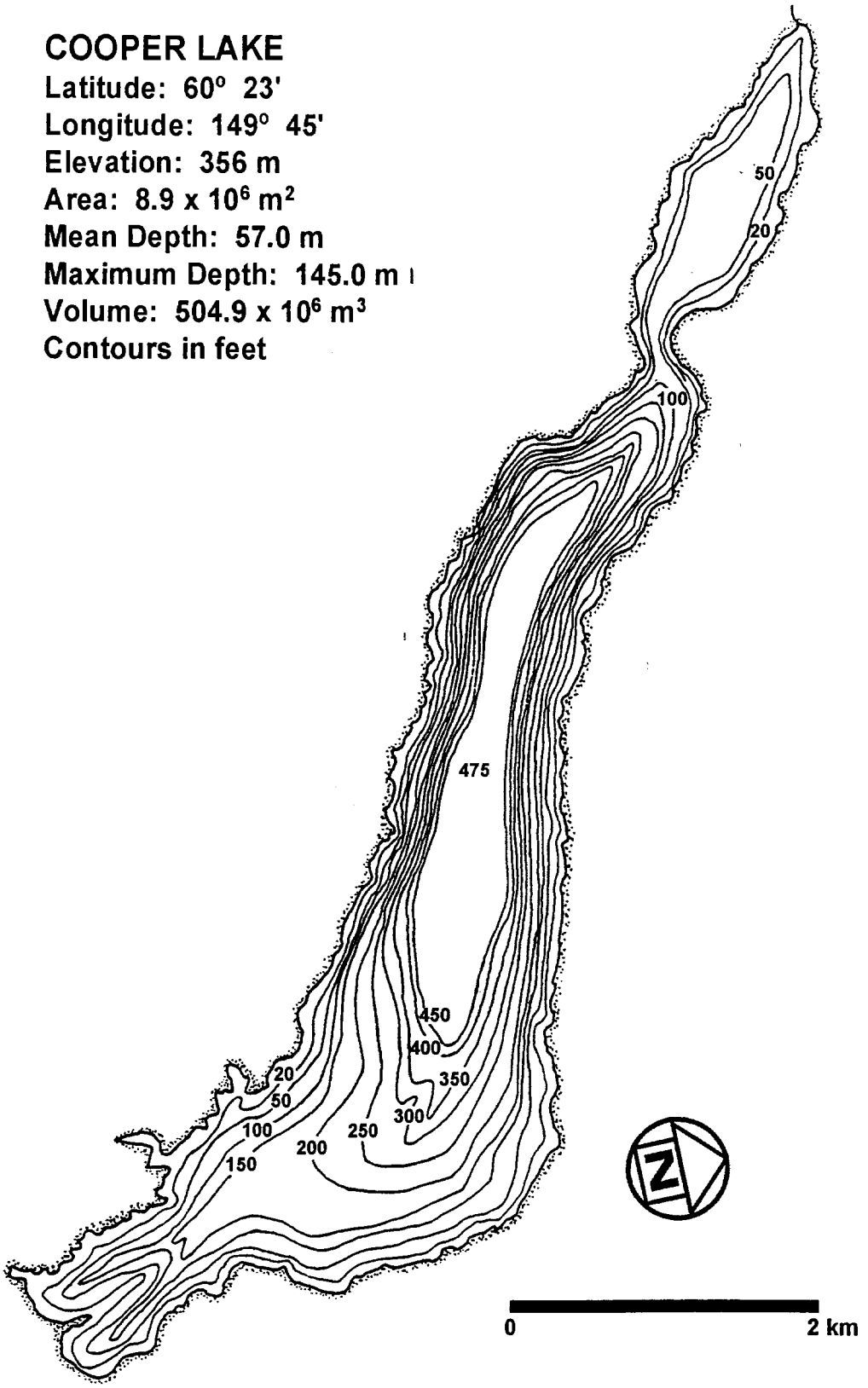
Latitude: 59° 10'
Longitude: 154° 10'
Elevation: 46 m
Area: 1.2×10^6 m^2
Mean Depth: 28.7 m
Maximum Depth: 57.0 m
Volume: 33.9×10^6 m^3
Contours in feet


COGHILL LAKE
Latitude: 61° 04'
Longitude: 147° 29'
Elevation: 18 m
Area: 12.7 x 10^6 m^2
Mean Depth: 46.3 m
Maximum Depth: 78.0 m
Volume: 587.5 x 10^6 m^3
Contours in meters
30
40
50
60
70
75
10
75
75
78
70
60
50
40
30
20
10
N
0
1 km

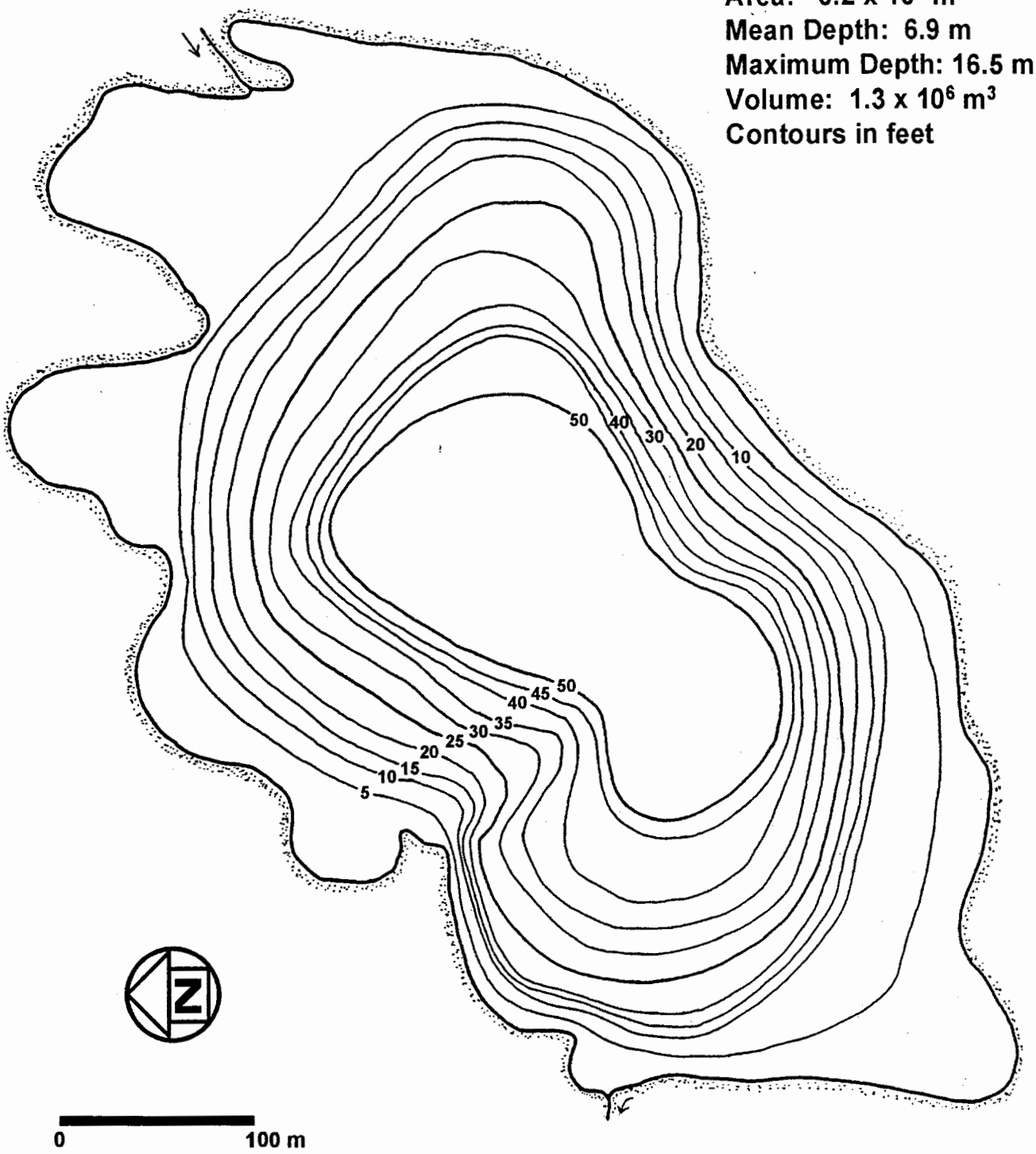

N
50
45
40
35
30
25
20
15
10
5
0
0
COLUMBIA LAKE
Latitude: 61° 02'
Longitude: 146° 58'
Elevation: 7 m
Area: 1.3 x 10^6 m^2
Mean Depth: 6.0 m
Maximum Depth: 15.2 m
Volume: 1.9 x 10^6 m^3
Contours in feet
0
1 km

COOPER LAKE

Latitude: 60° 23'
Longitude: 149° 45'
Elevation: 356 m
Area: 8.9 x 10^6 m^2
Mean Depth: 57.0 m
Maximum Depth: 145.0 m
Volume: 504.9 x 10^6 m^3
Contours in feet

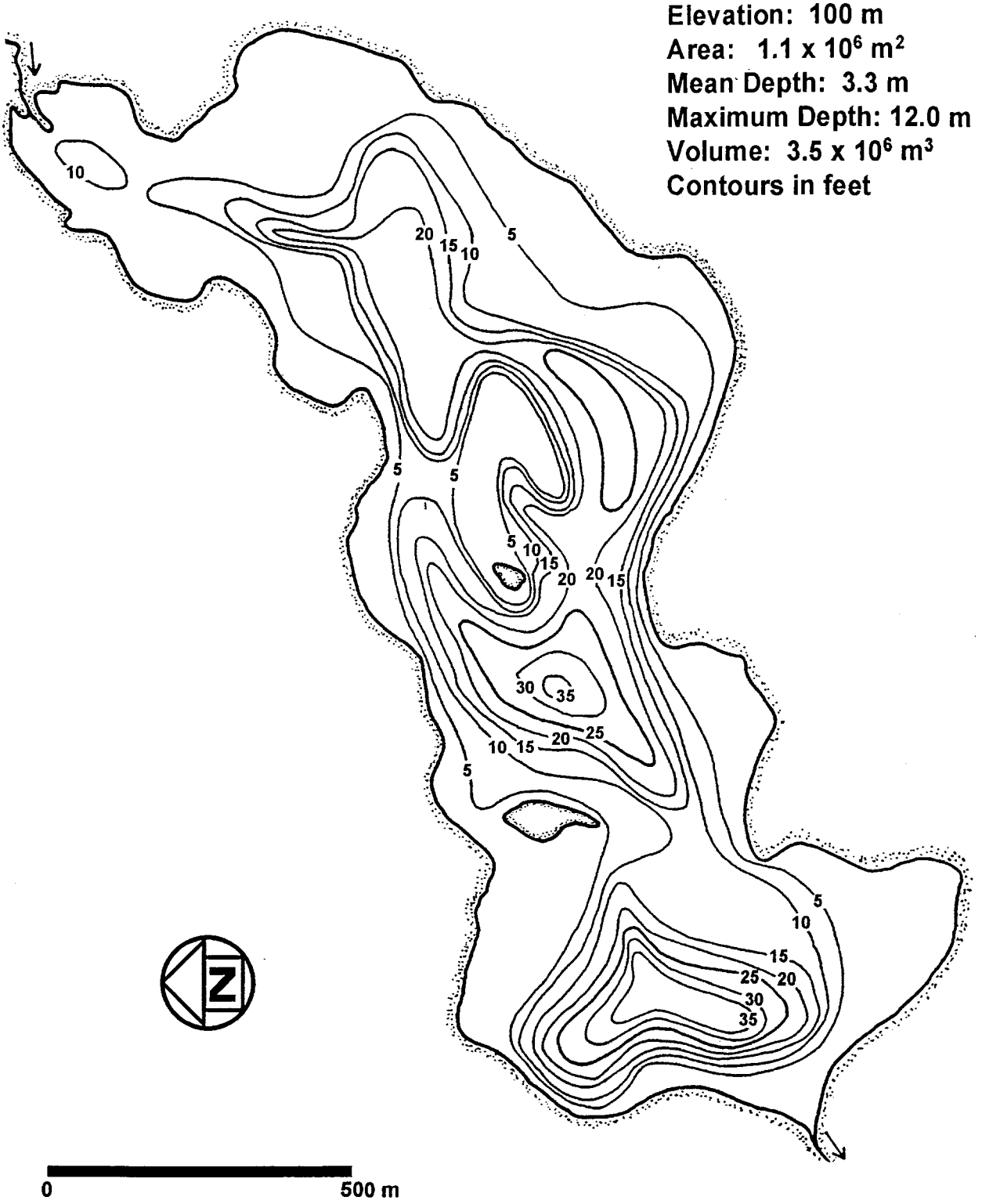


CORNELIUS LAKE
Latitude: 61° 37'
Longitude: 149° 15'
Elevation: 122 m
Area: 0.2 x 10^6 m^2
Mean Depth: 6.9 m
Maximum Depth: 16.5 m
Volume: 1.3 x 10^6 m^3
Contours in feet



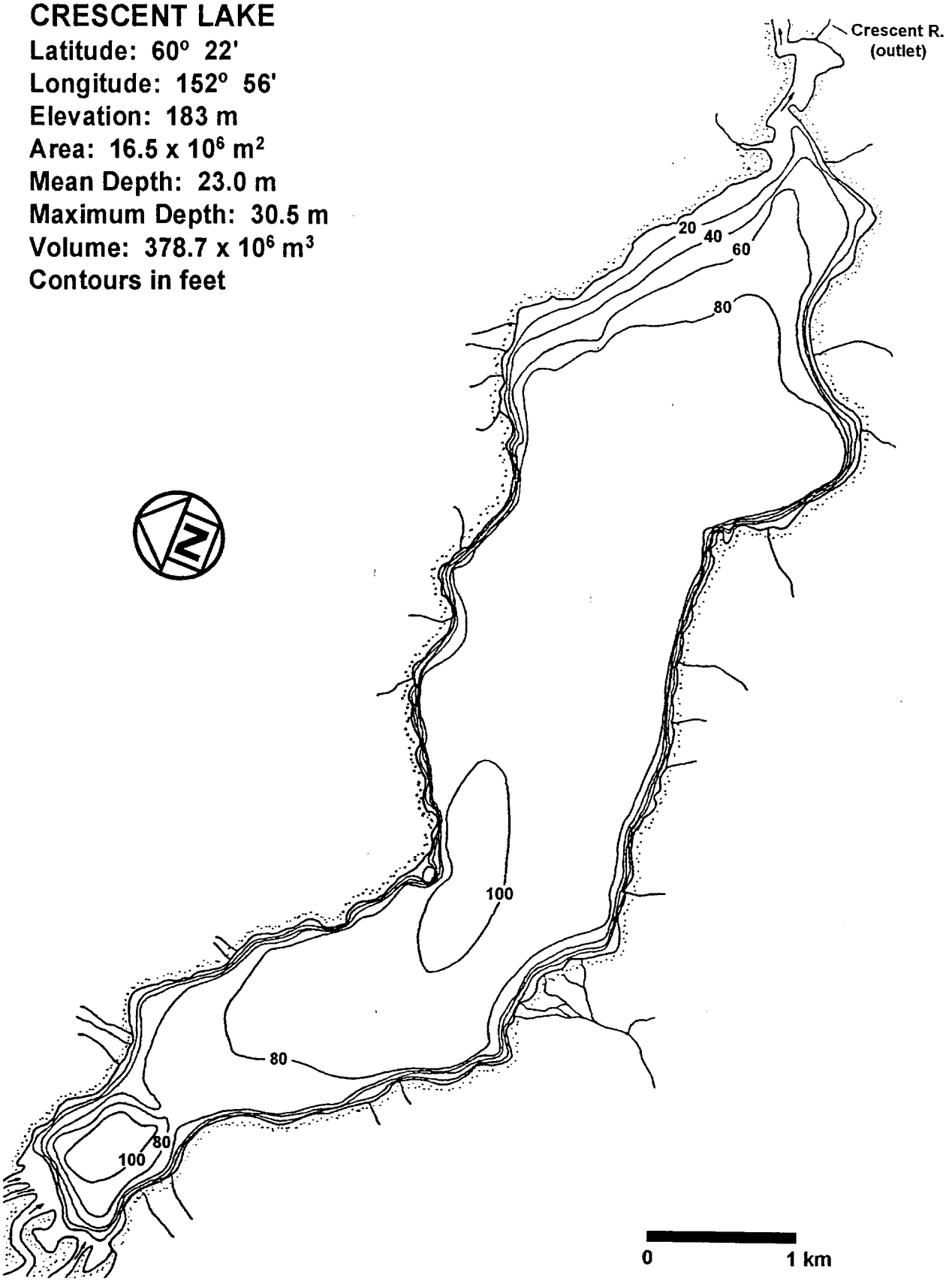
COTTONWOOD LAKE

Latitude: 61° 35'
Longitude: 149° 19'
Elevation: 100 m
Area: 1.1 x 10^6 m^2
Mean Depth: 3.3 m
Maximum Depth: 12.0 m
Volume: 3.5 x 10^6 m^3
Contours in feet



CRESCENT LAKE

Latitude: 60° 22'
Longitude: 152° 56'
Elevation: 183 m
Area: 16.5 x 10^6 m^2
Mean Depth: 23.0 m
Maximum Depth: 30.5 m
Volume: 378.7 x 10^6 m^3
Contours in feet

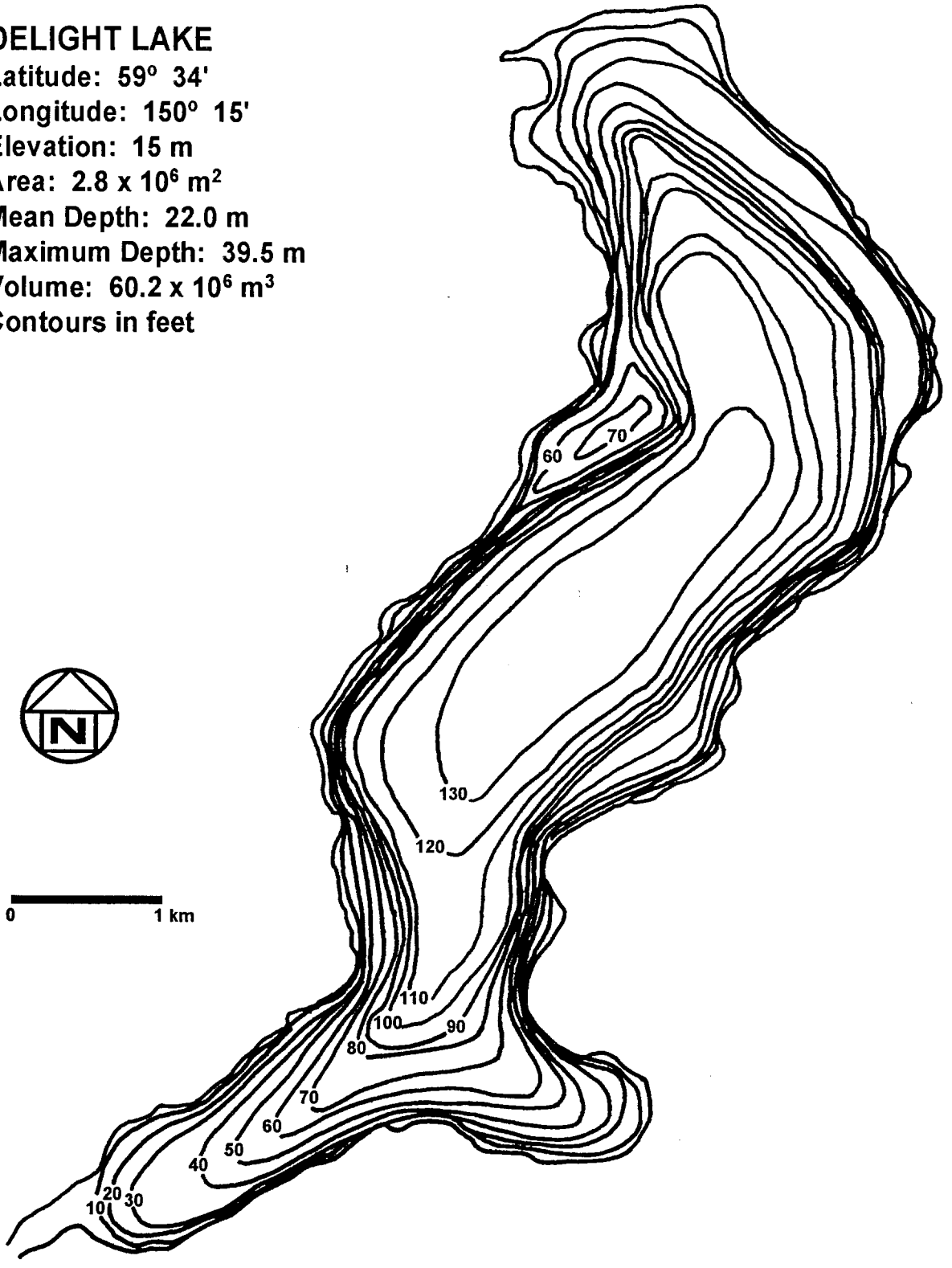


CROSSWIND LAKE

Latitude: 62° 20'
Longitude: 146° 00'
Elevation: 644 m
Area: 38.2 x 10^6 m^2
Mean Depth: 16.4 m
Maximum Depth: 39.0 m
Volume: 625.9 x 10^6 m^3
Contours in meters

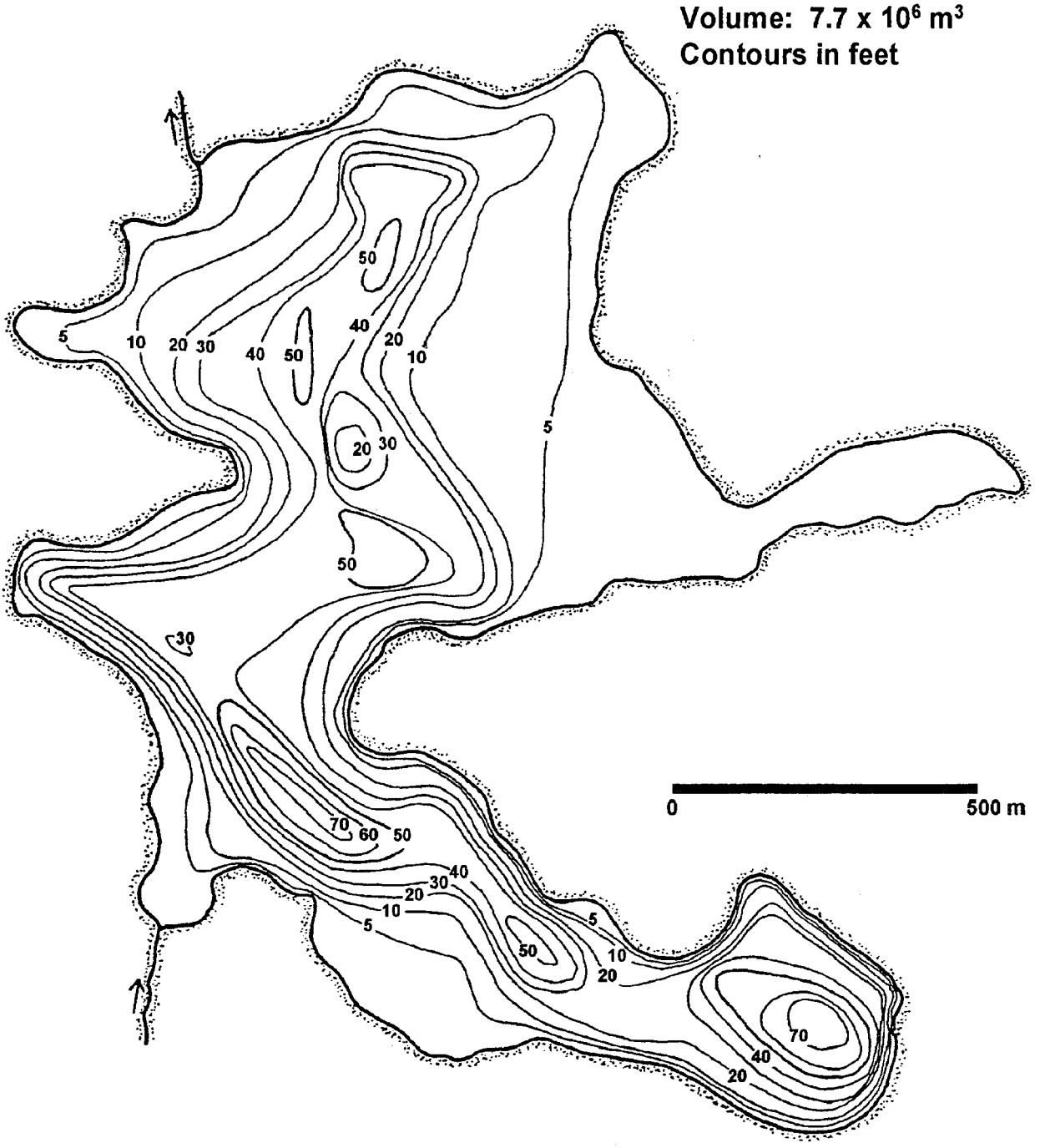
DELIGHT LAKE

Latitude: 59° 34'
Longitude: 150° 15'
Elevation: 15 m
Area: 2.8 x 10^6 m^2
Mean Depth: 22.0 m
Maximum Depth: 39.5 m
Volume: 60.2 x 10^6 m^3
Contours in feet



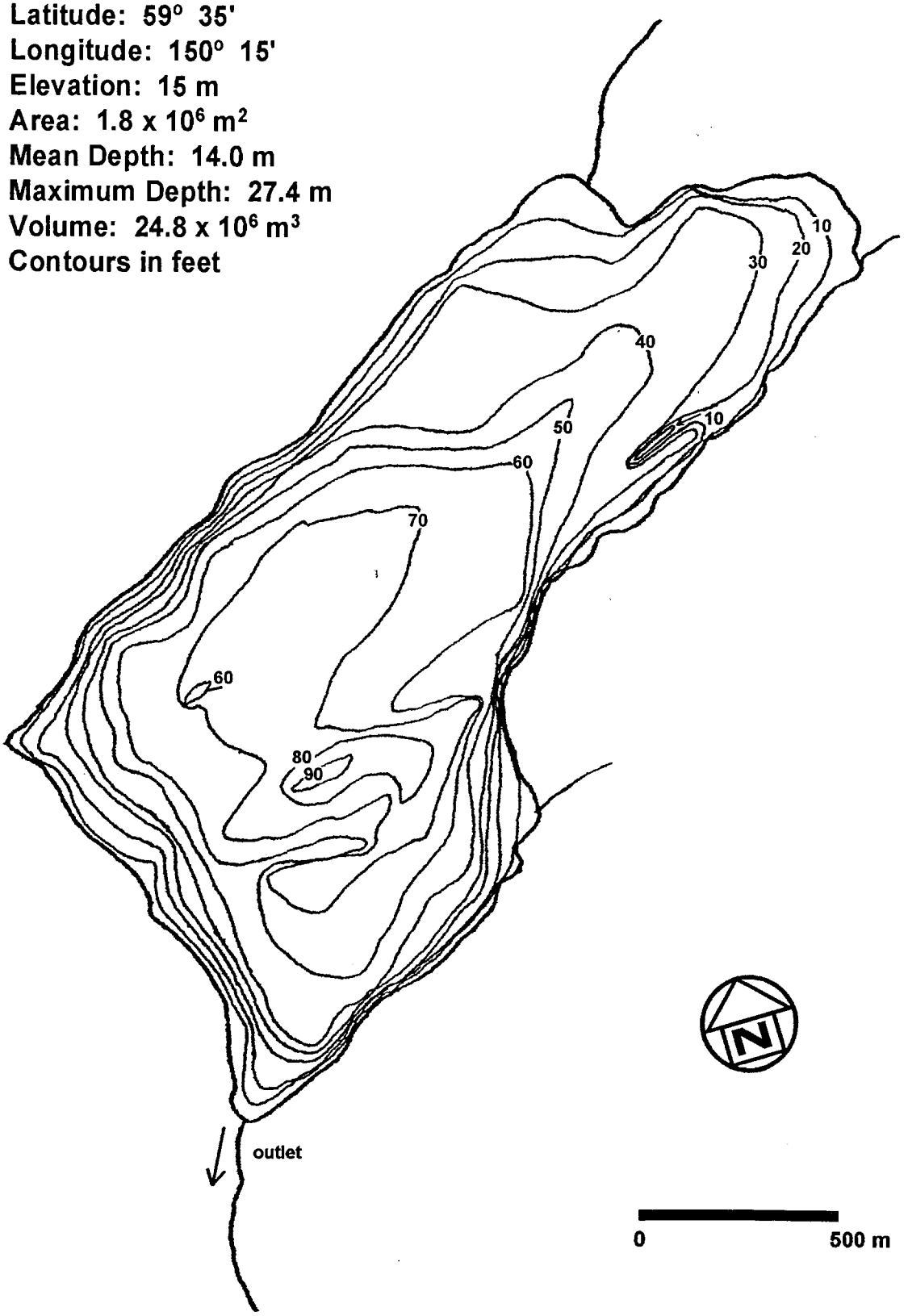
DELYNDIA LAKE

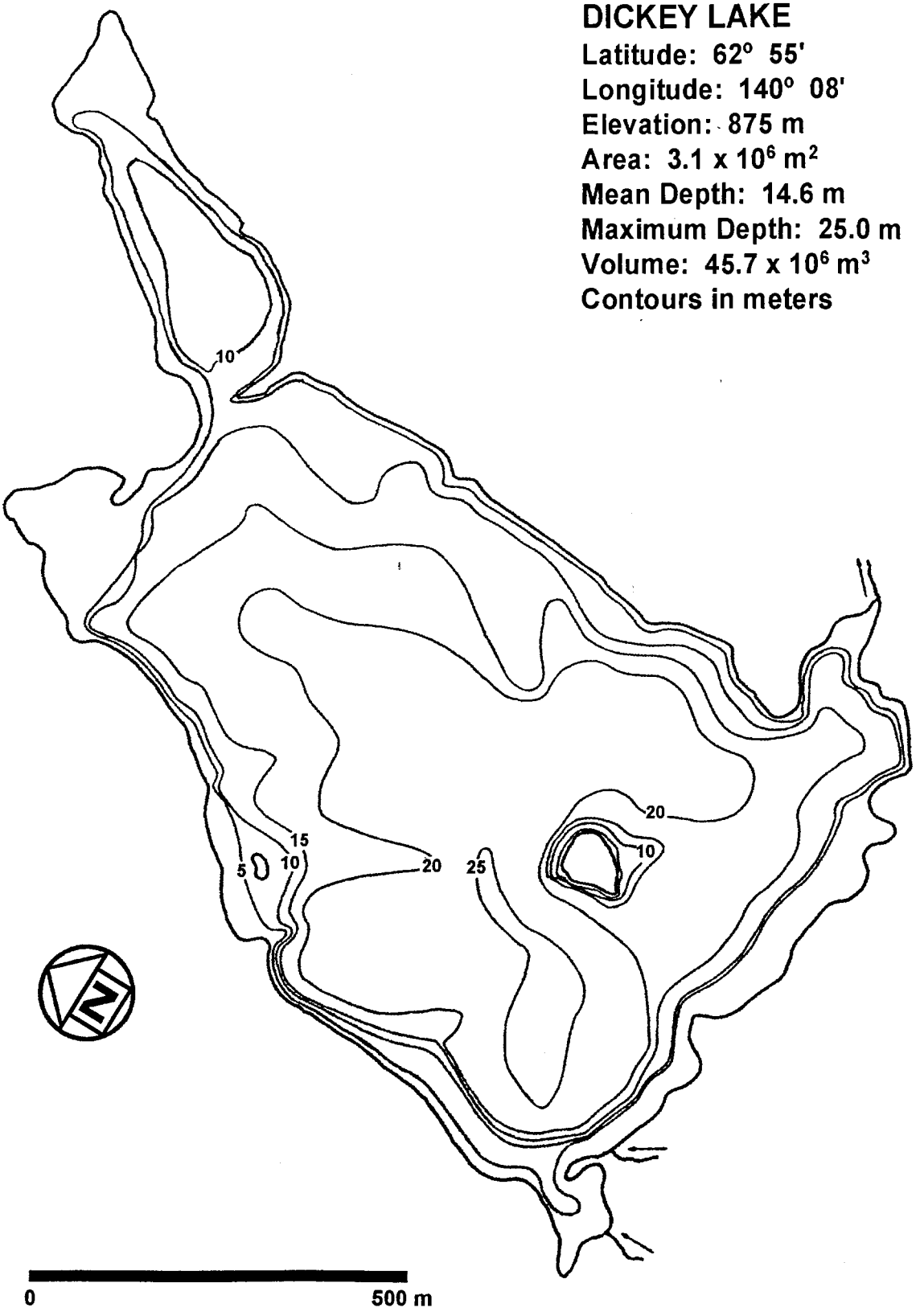
Latitude: 61° 36'
Longitude: 150° 05'
Elevation: 61 m
Area: 1.2 x 10^6 m^2
Mean Depth: 6.5 m
Maximum Depth: 22.8 m
Volume: 7.7 x 10^6 m^3
Contours in feet



DESIRE LAKE

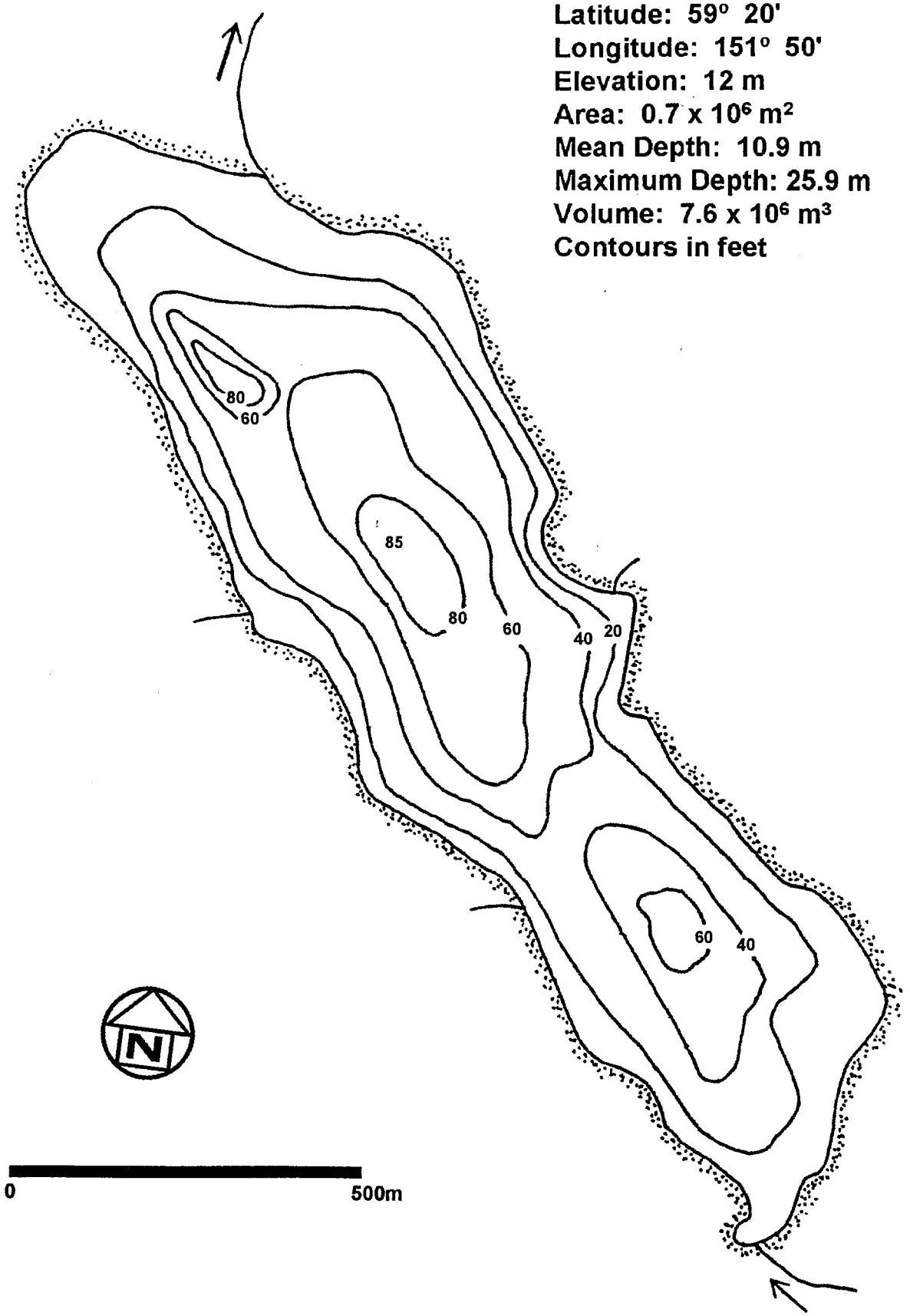
Latitude: 59° 35'
Longitude: 150° 15'
Elevation: 15 m
Area: 1.8 x 10^6 m^2
Mean Depth: 14.0 m
Maximum Depth: 27.4 m
Volume: 24.8 x 10^6 m^3
Contours in feet




DICKEY LAKE
Latitude: 62° 55'
Longitude: 140° 08'
Elevation: 875 m
Area: 3.1 x 10^6 m^2
Mean Depth: 14.6 m
Maximum Depth: 25.0 m
Volume: 45.7 x 10^6 m^3
Contours in meters
10
5
15
10
20
25
20
10
N
0
500 m

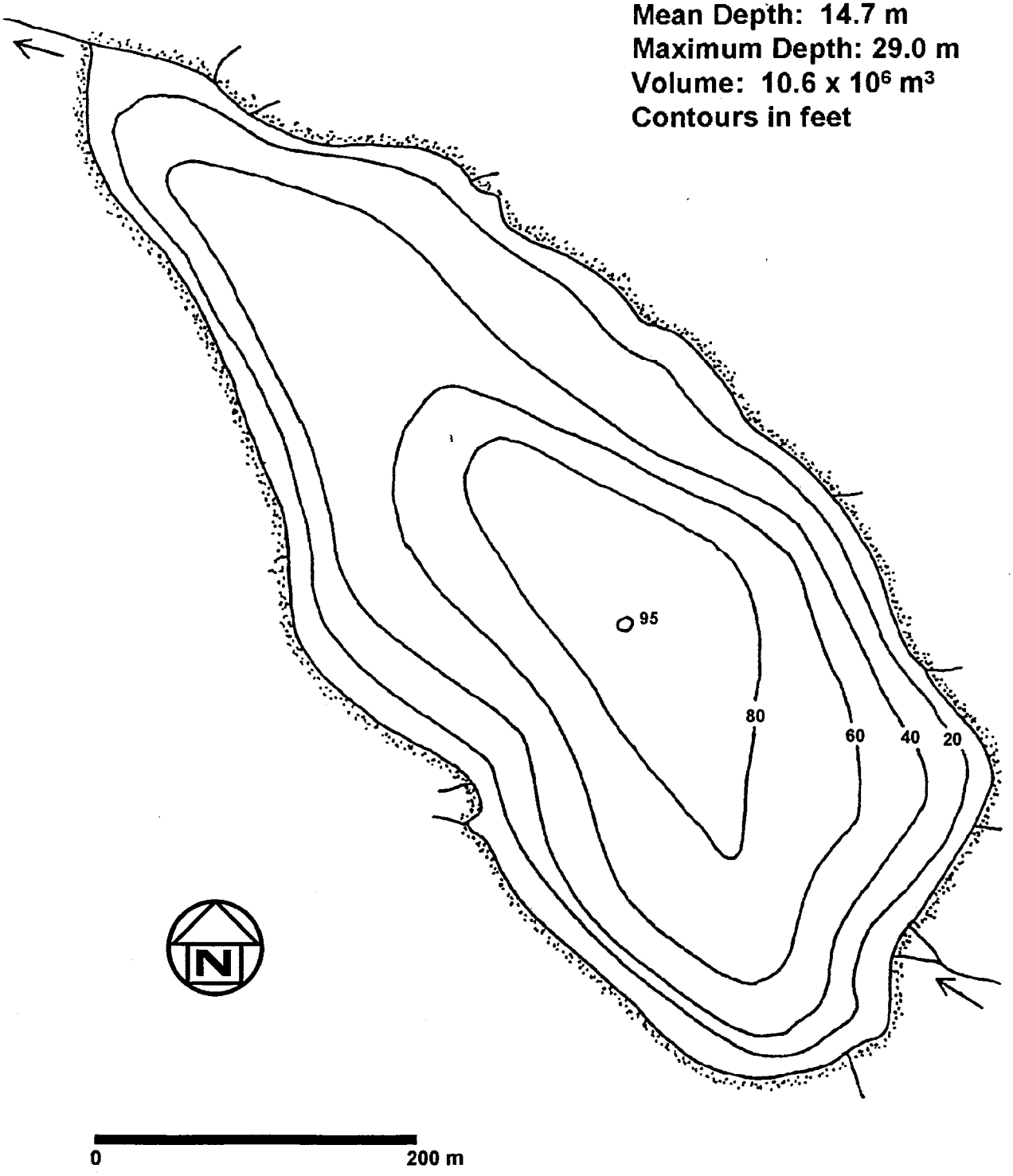
ENGLISH BAY 2 LAKE

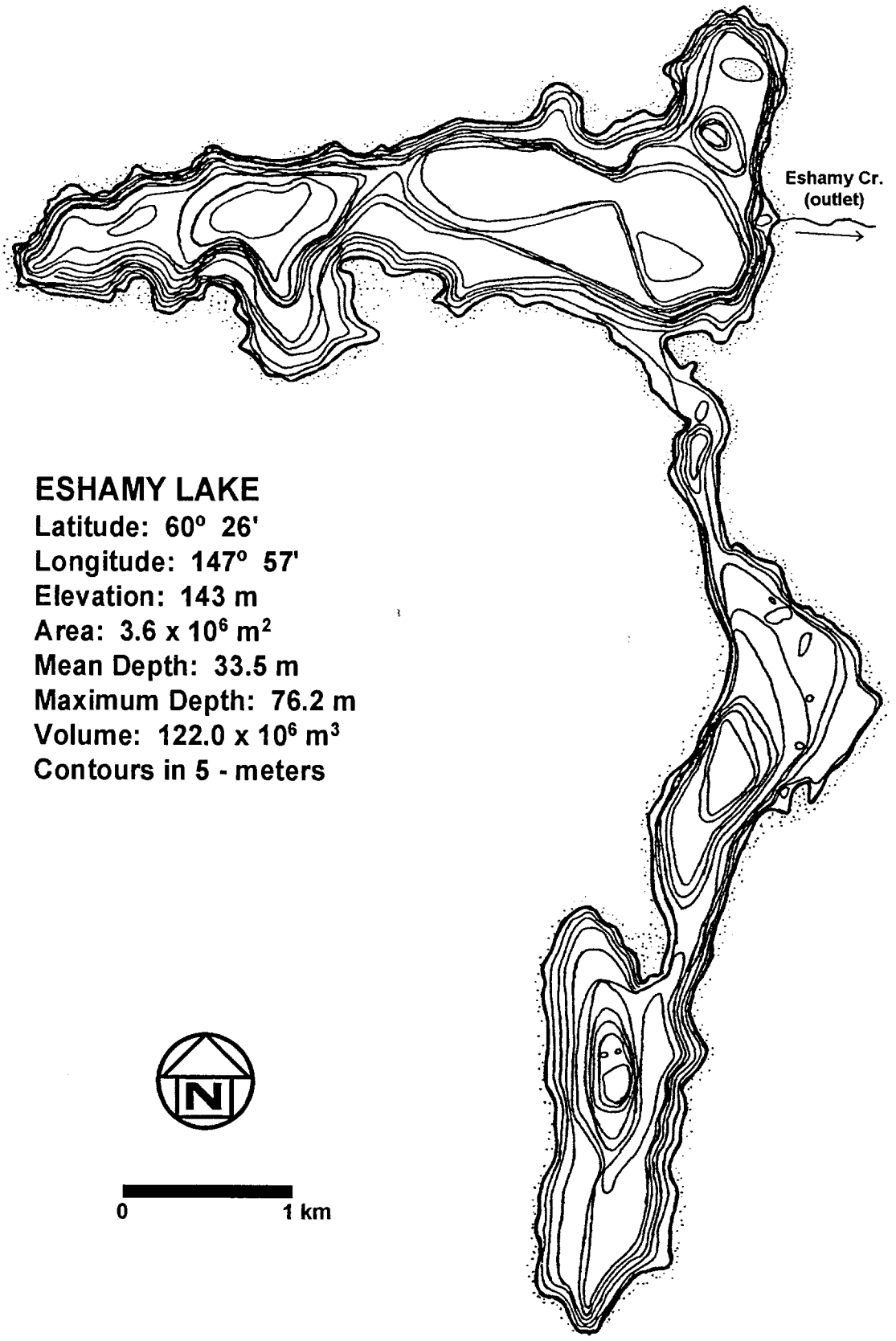
Latitude: 59° 20'
Longitude: 151° 50'
Elevation: 12 m
Area: 0.7 x 10^6 m^2
Mean Depth: 10.9 m
Maximum Depth: 25.9 m
Volume: 7.6 x 10^6 m^3
Contours in feet



ENGLISH BAY 3 LAKE

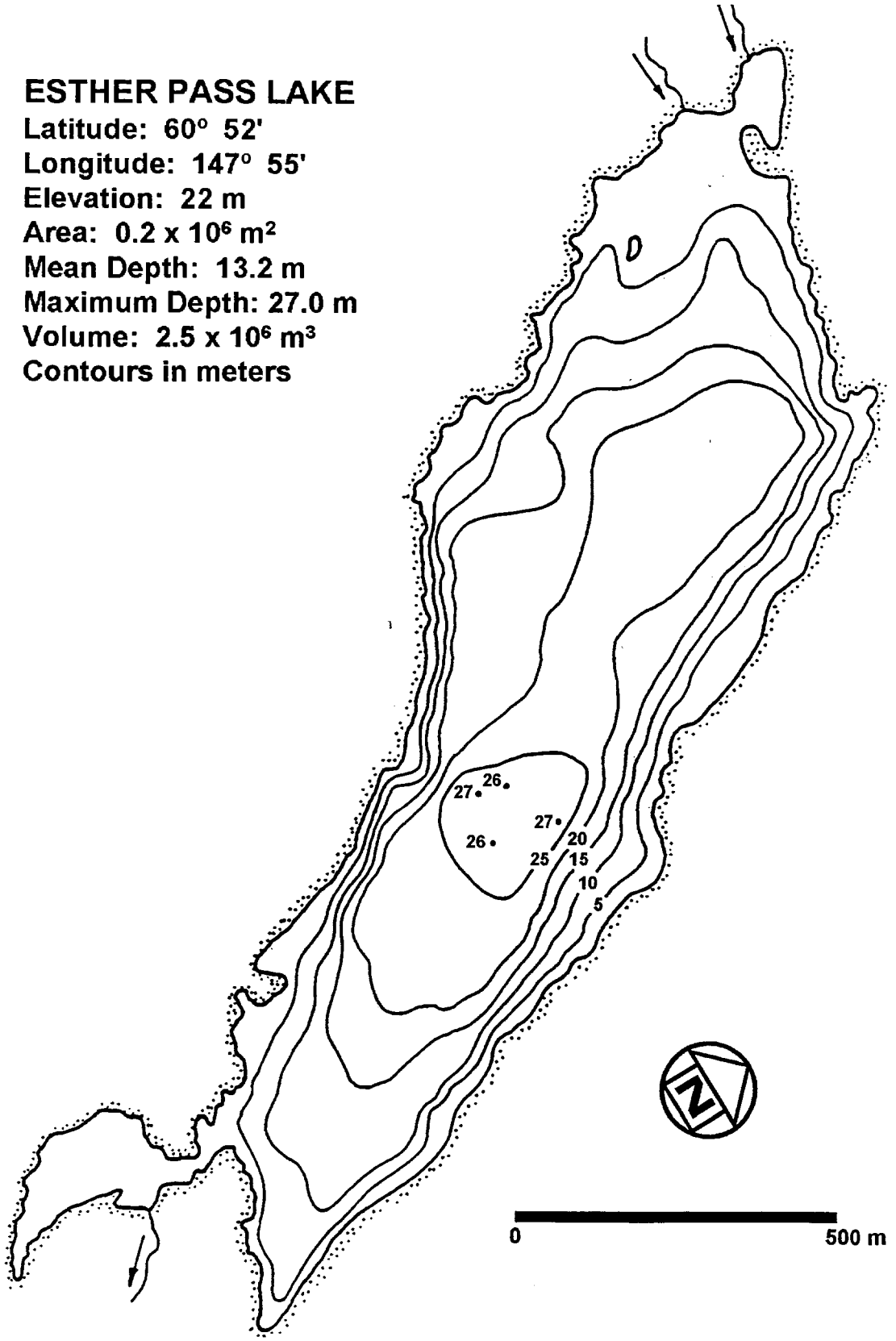
Latitude: 59° 20'
Longitude: 151° 50'
Elevation: 12 m
Area: 0.7 x 10^6 m^2
Mean Depth: 14.7 m
Maximum Depth: 29.0 m
Volume: 10.6 x 10^6 m^3
Contours in feet

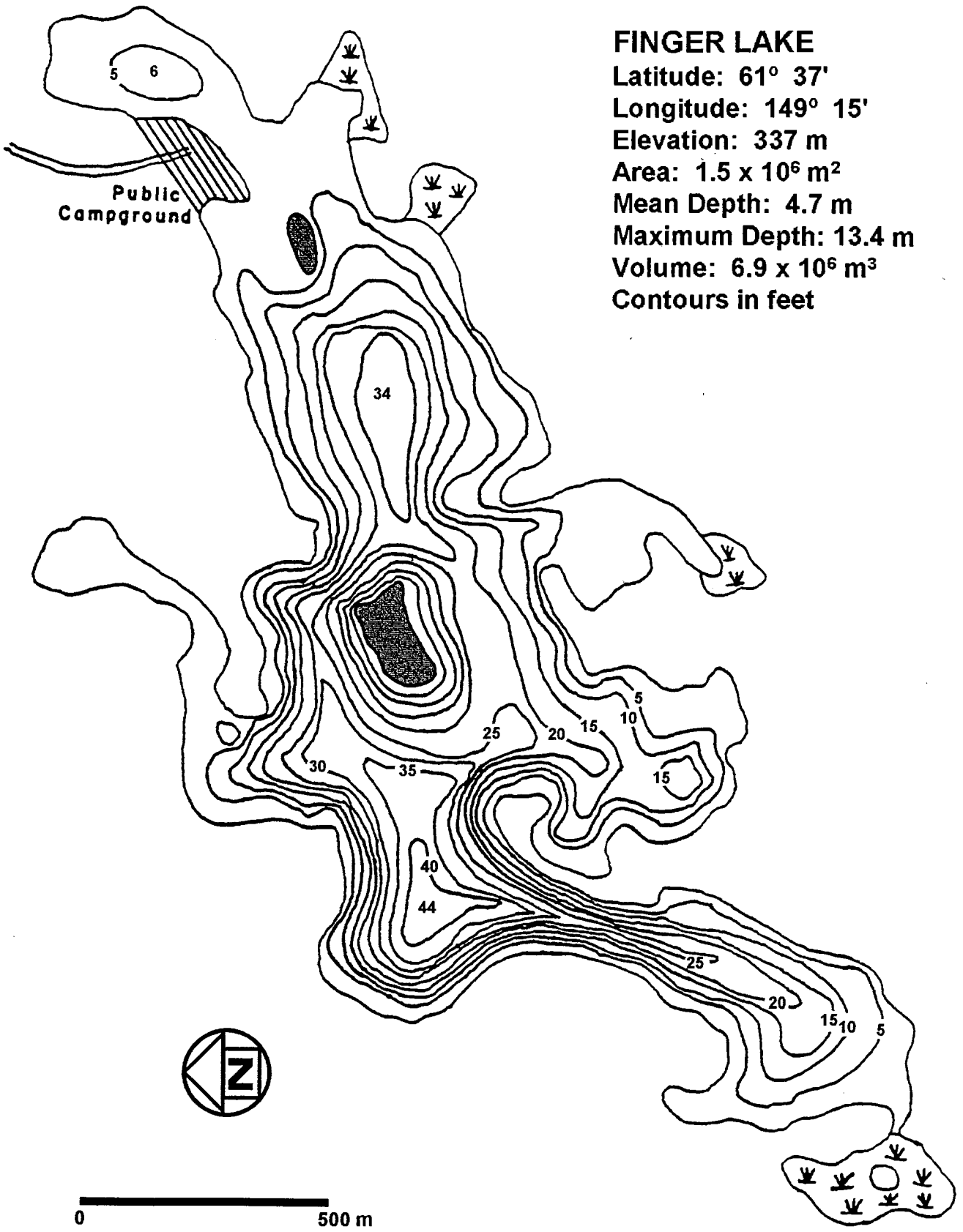



Eshamy Cr.
(outlet)
ESHAMY LAKE
Latitude: 60° 26'
Longitude: 147° 57'
Elevation: 143 m
Area: 3.6 x 10^6 m^2
Mean Depth: 33.5 m
Maximum Depth: 76.2 m
Volume: 122.0 x 10^6 m^3
Contours in 5 - meters
N
0
1 km

ESTHER PASS LAKE

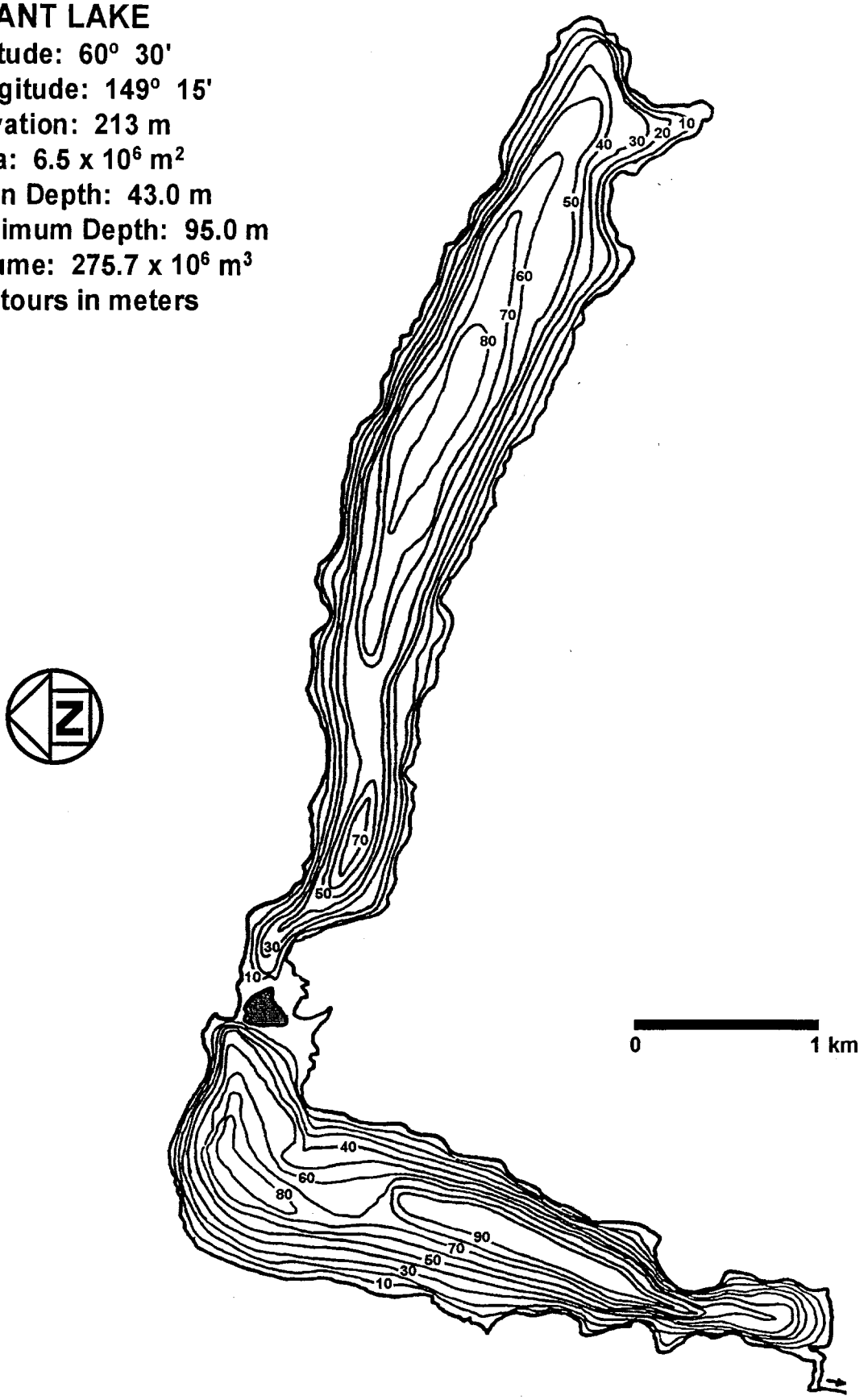
Latitude: 60° 52'
Longitude: 147° 55'
Elevation: 22 m
Area: 0.2 x 10^6 m^2
Mean Depth: 13.2 m
Maximum Depth: 27.0 m
Volume: 2.5 x 10^6 m^3
Contours in meters

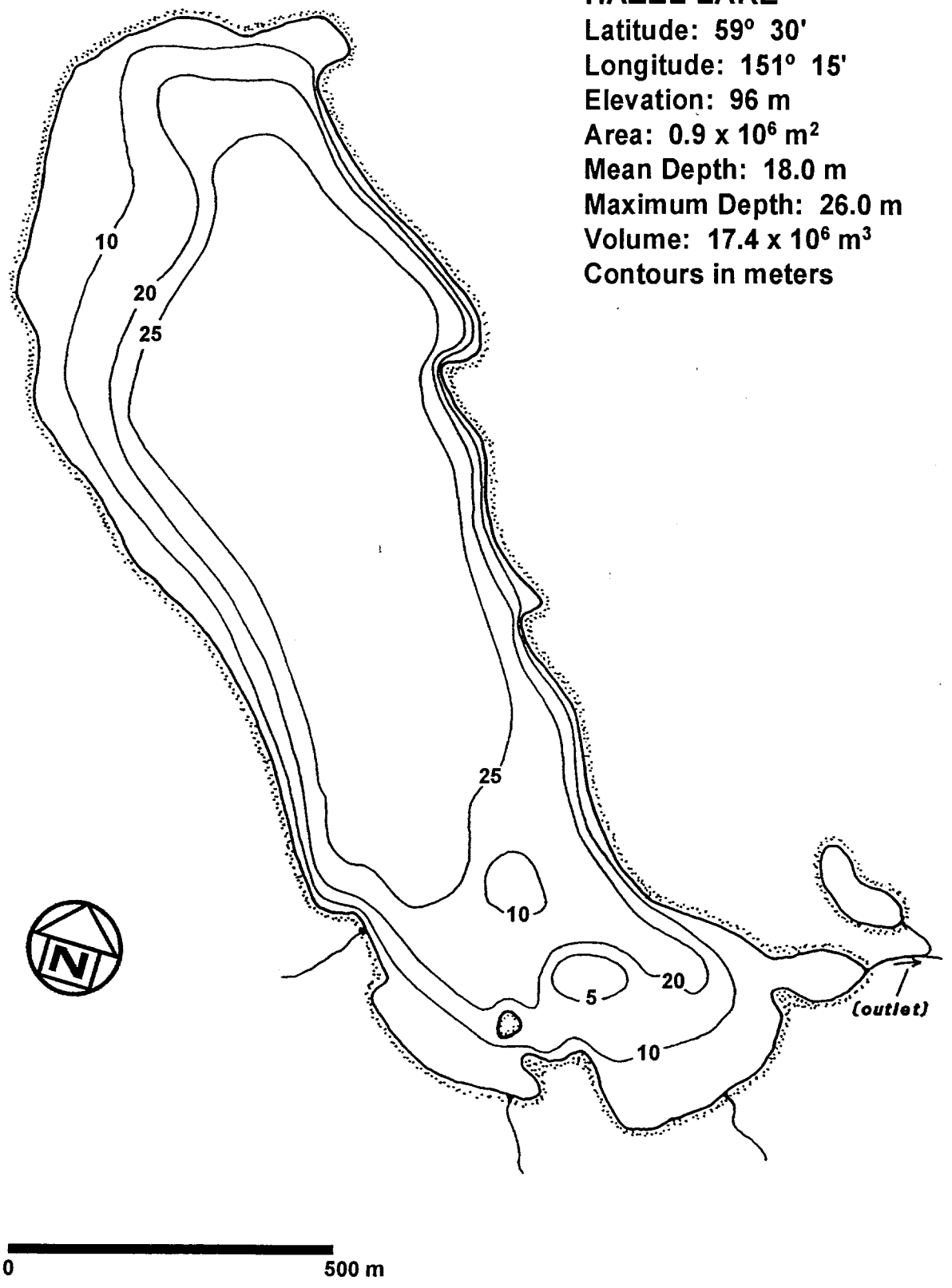


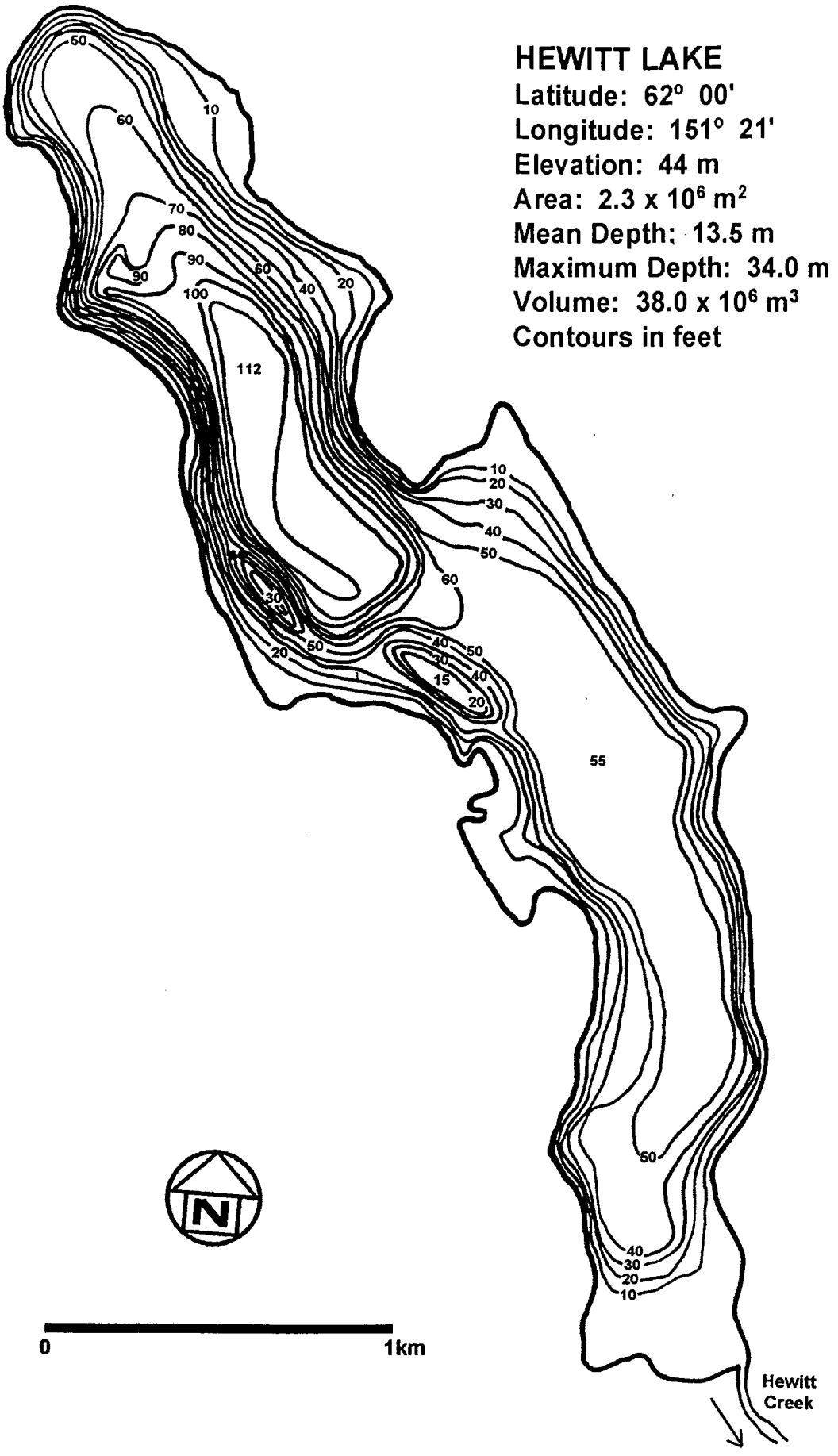

FINGER LAKE
Latitude: 61° 37'
Longitude: 149° 15'
Elevation: 337 m
Area: 1.5 x 10⁶ m²
Mean Depth: 4.7 m
Maximum Depth: 13.4 m
Volume: 6.9 x 10⁶ m³
Contours in feet
Public Campground
5
6
34
5
10
15
20
25
30
35
40
44
15
25
20
15
10
5
N
0
500 m

GRANT LAKE

Latitude: 60° 30'
Longitude: 149° 15'
Elevation: 213 m
Area: 6.5 x 10^6 m^2
Mean Depth: 43.0 m
Maximum Depth: 95.0 m
Volume: 275.7 x 10^6 m^3
Contours in meters

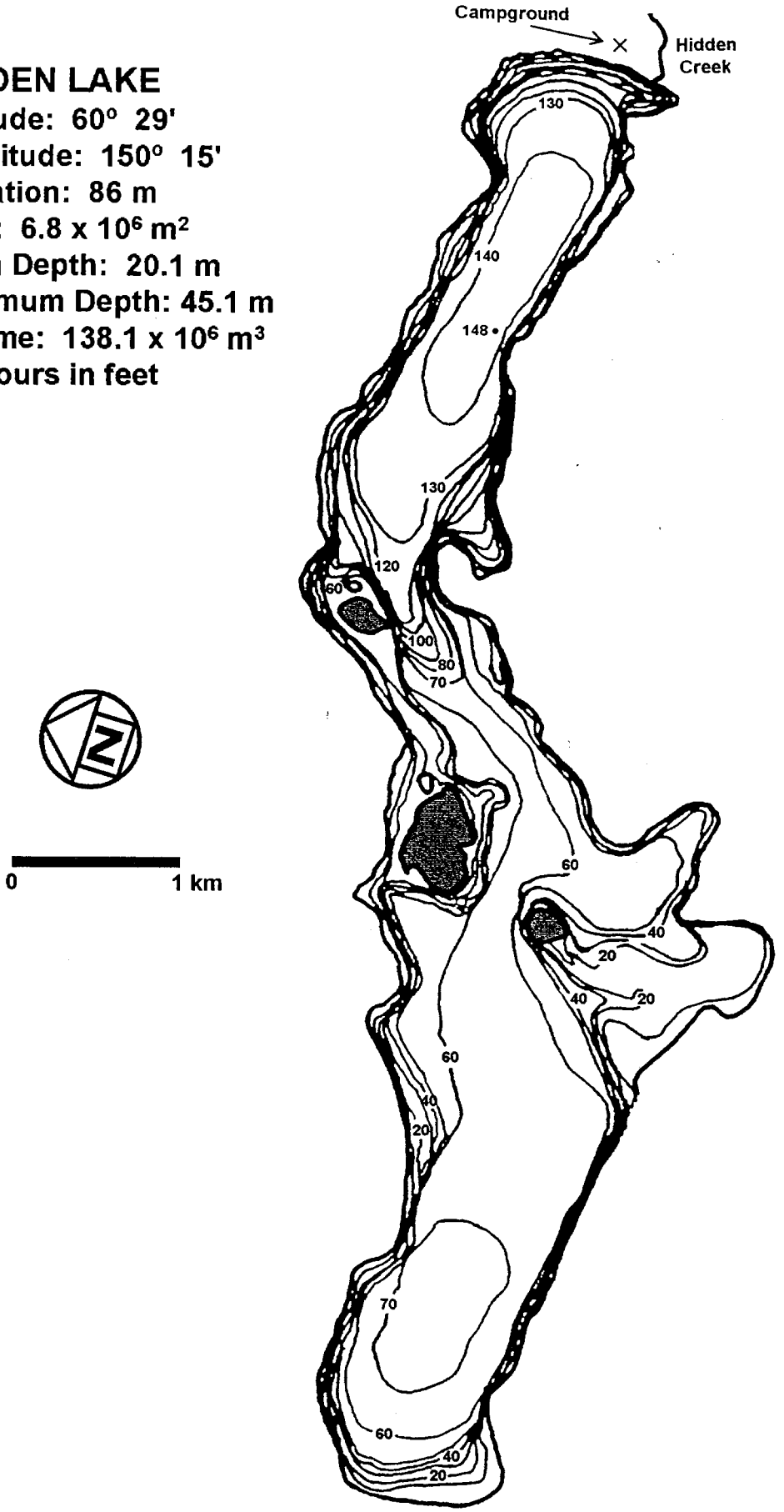


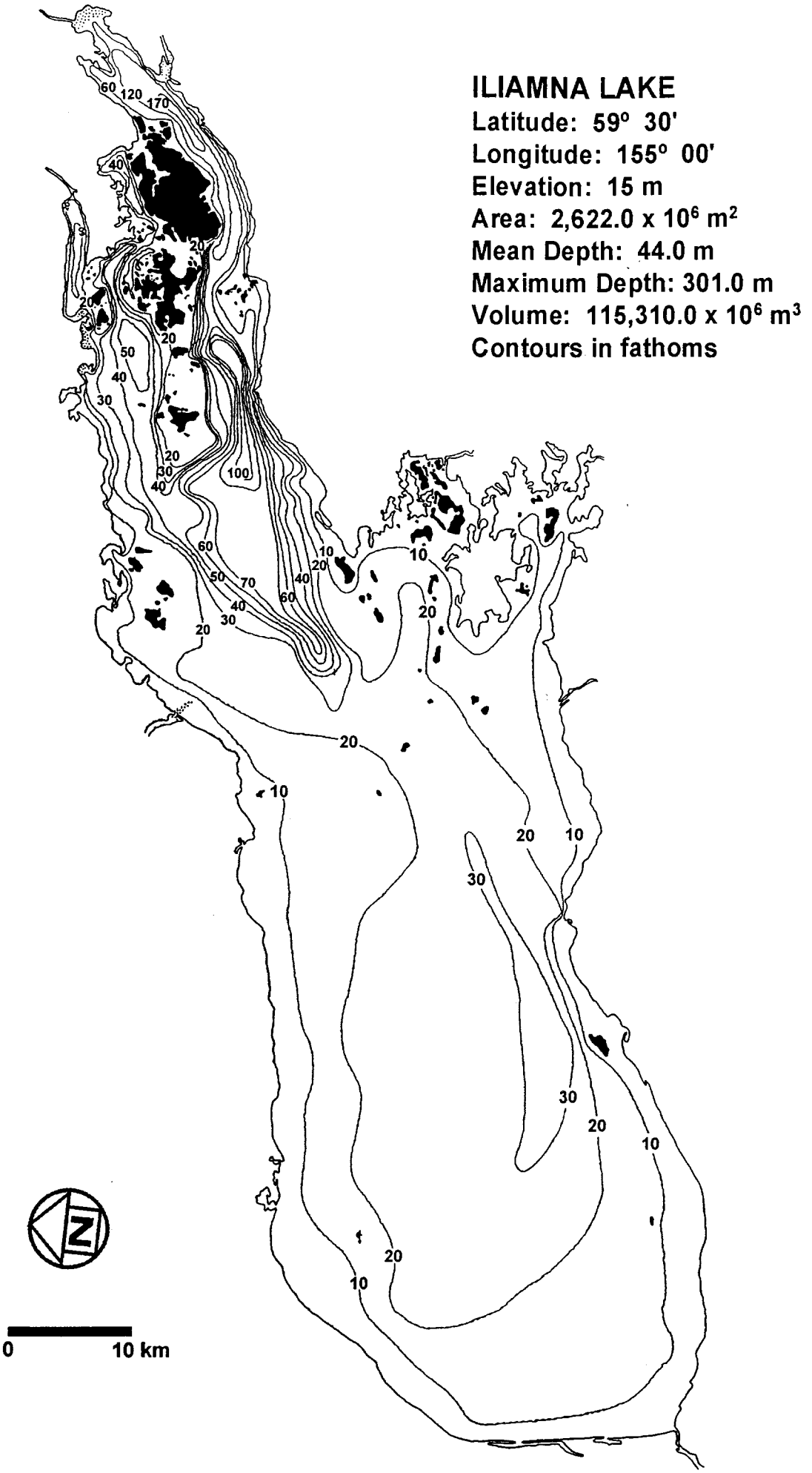

HAZEL LAKE
Latitude: 59° 30'
Longitude: 151° 15'
Elevation: 96 m
Area: 0.9 x 10^6 m^2
Mean Depth: 18.0 m
Maximum Depth: 26.0 m
Volume: 17.4 x 10^6 m^3
Contours in meters
10
20
25
25
10
5
20
10
(outlet)
N
0
500 m

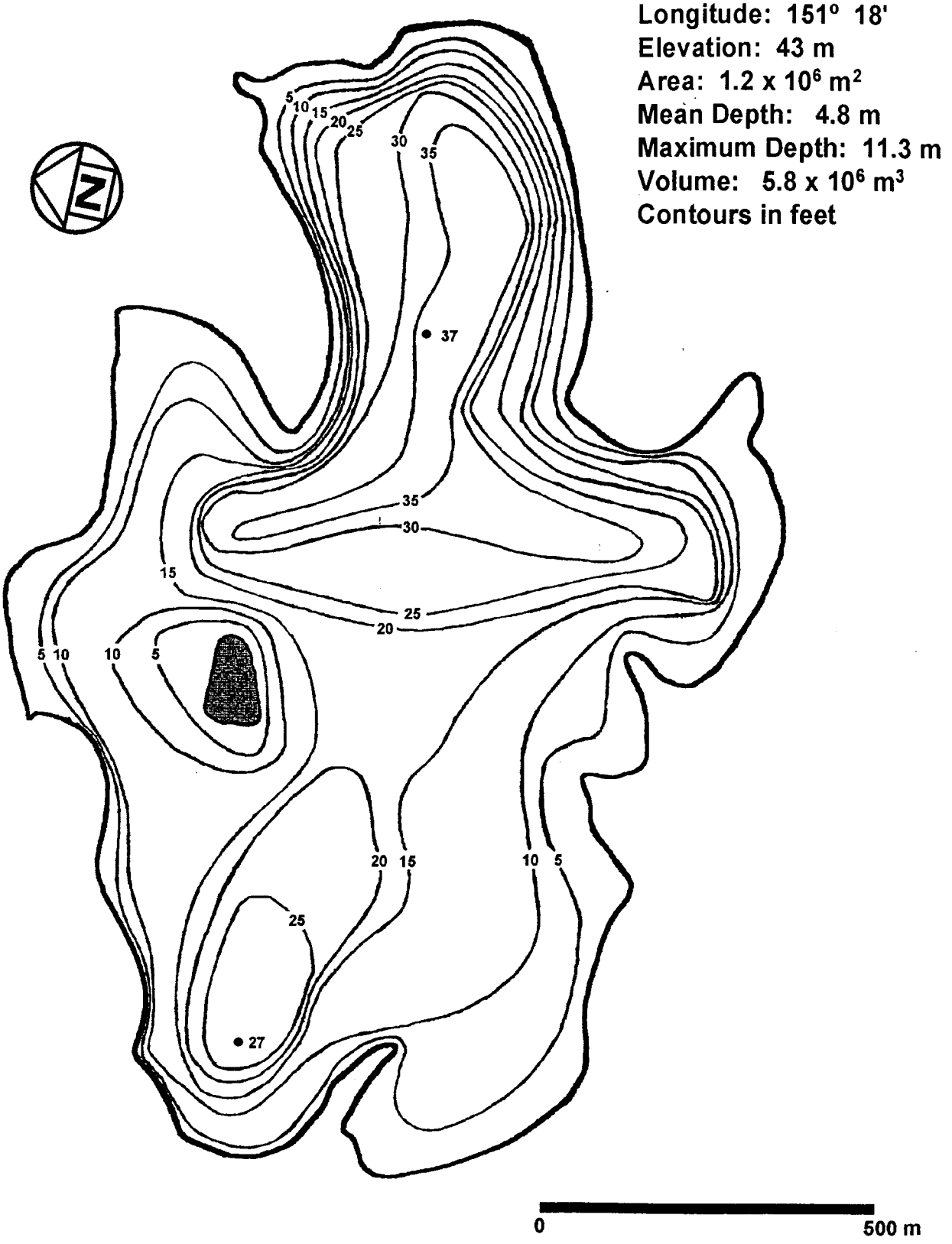

HEWITT LAKE
Latitude: 62° 00'
Longitude: 151° 21'
Elevation: 44 m
Area: 2.3 x 10^6 m^2
Mean Depth: 13.5 m
Maximum Depth: 34.0 m
Volume: 38.0 x 10^6 m^3
Contours in feet
112
55
N
0
1km
Hewitt
Creek

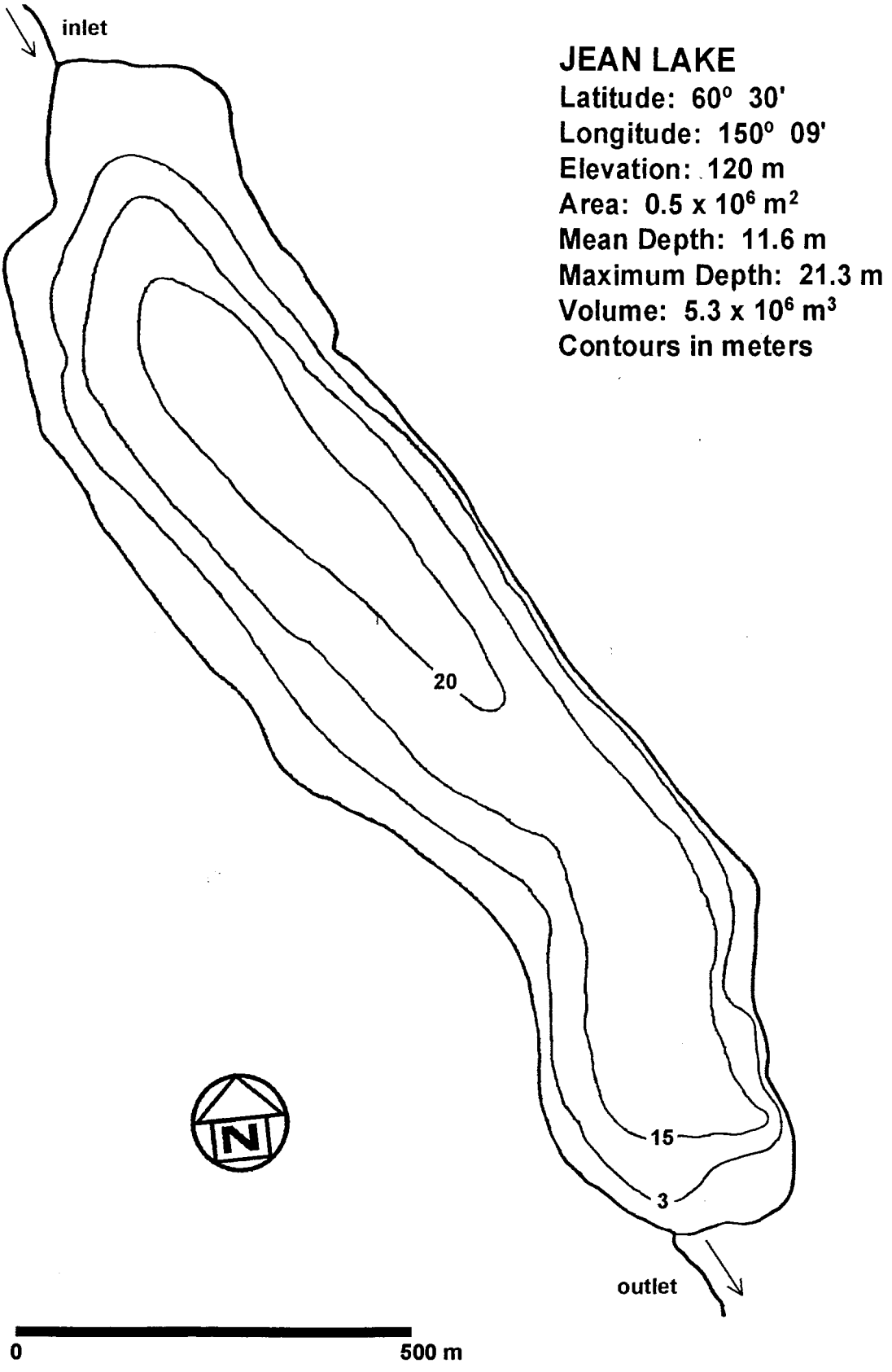
HIDDEN LAKE

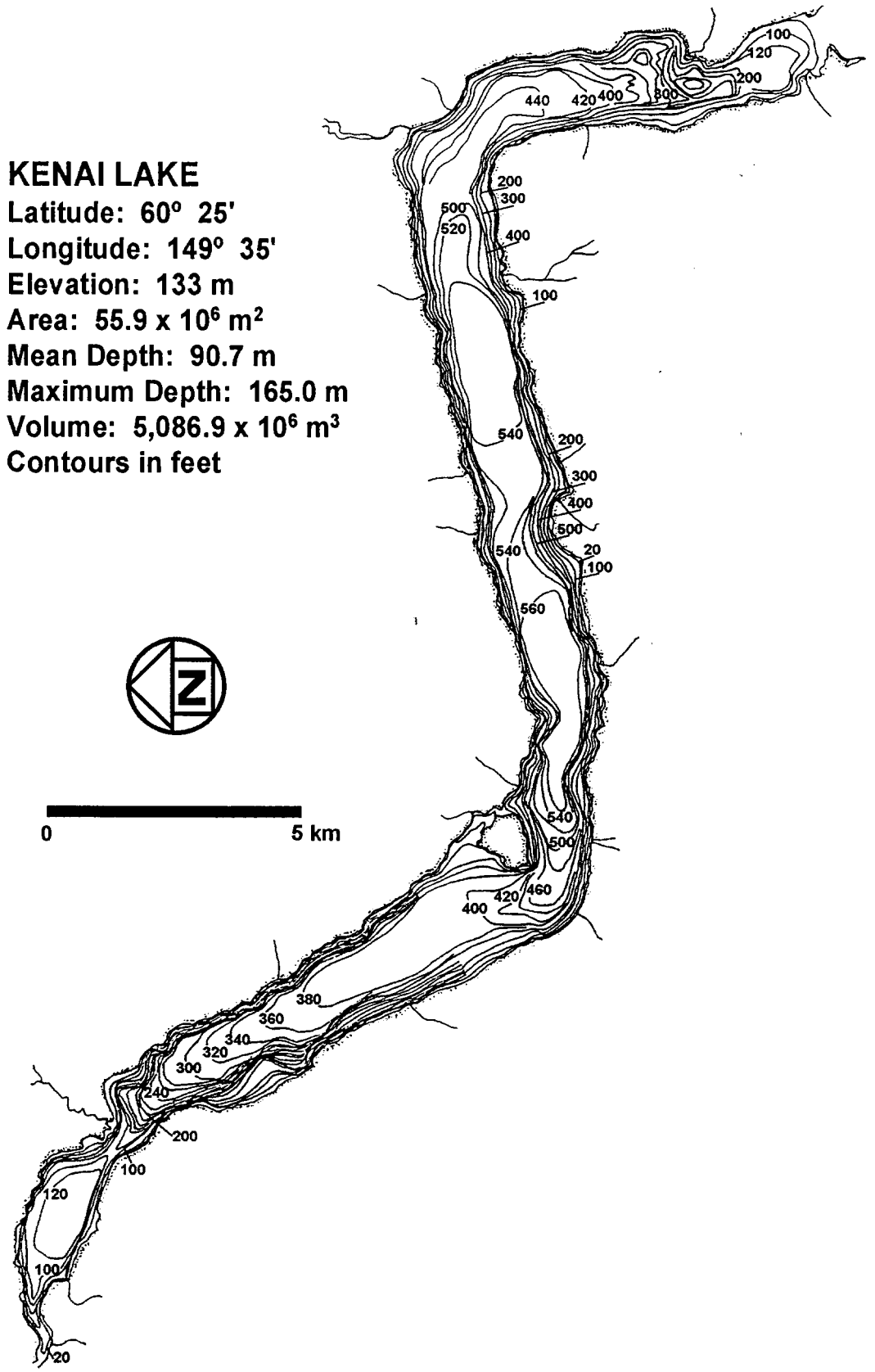
Latitude: 60° 29'
Longitude: 150° 15'
Elevation: 86 m
Area: 6.8 x 10^6 m^2
Mean Depth: 20.1 m
Maximum Depth: 45.1 m
Volume: 138.1 x 10^6 m^3
Contours in feet

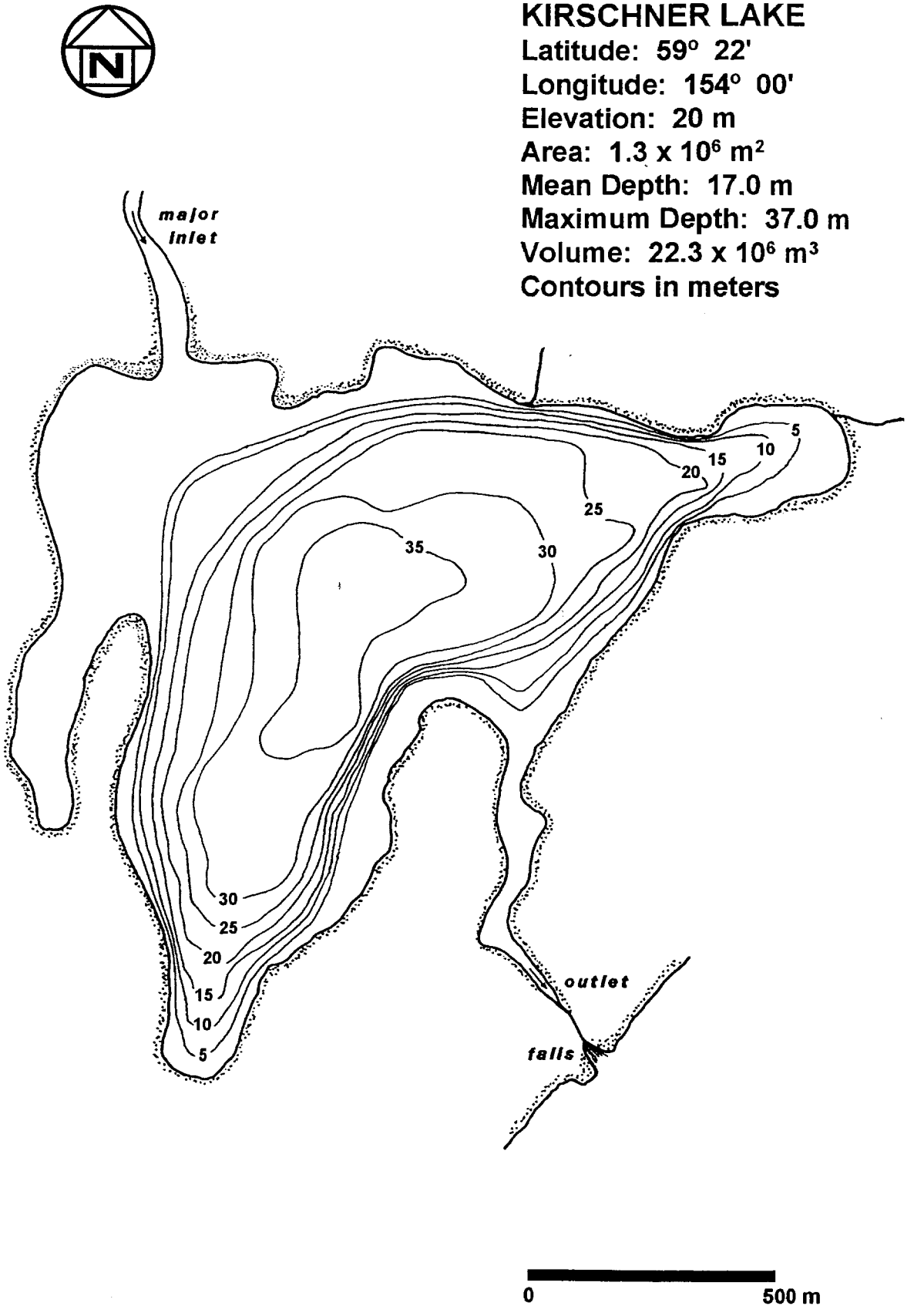



ILIAMNA LAKE
Latitude: 59° 30'
Longitude: 155° 00'
Elevation: 15 m
Area: 2,622.0 x 10^6 m^2
Mean Depth: 44.0 m
Maximum Depth: 301.0 m
Volume: 115,310.0 x 10^6 m^3
Contours in fathoms
N
0
10 km


ISLAND LAKE
Latitude: 60° 42'
Longitude: 151° 18'
Elevation: 43 m
Area: 1.2 x 10^6 m^2
Mean Depth: 4.8 m
Maximum Depth: 11.3 m
Volume: 5.8 x 10^6 m^3
Contours in feet
N
5
10
15
20
25
30
35
37
35
30
15
25
20
5
10
10
5
20
15
10
5
25
27
0
500 m

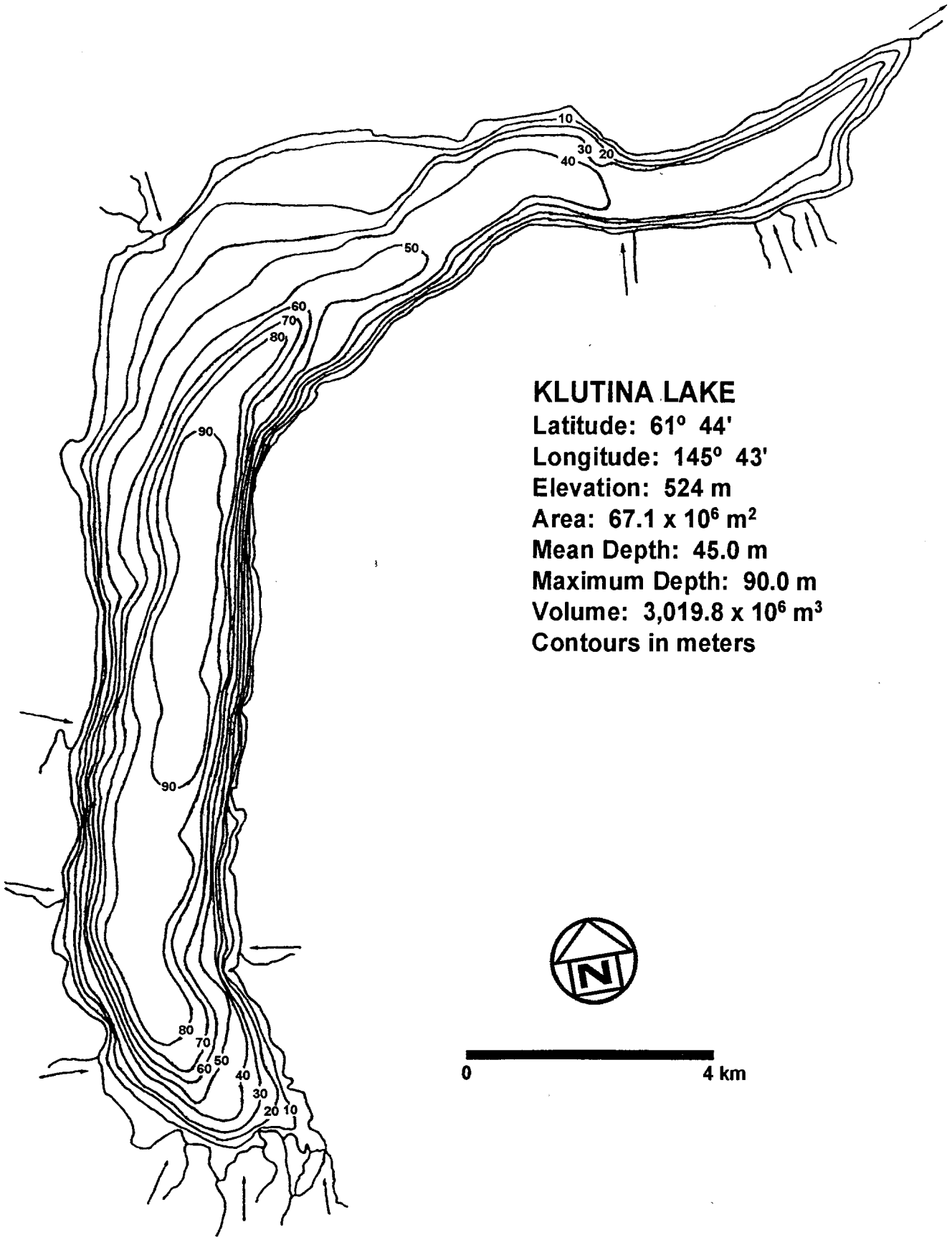

inlet
JEAN LAKE
Latitude: 60° 30'
Longitude: 150° 09'
Elevation: 120 m
Area: 0.5 x 10^6 m^2
Mean Depth: 11.6 m
Maximum Depth: 21.3 m
Volume: 5.3 x 10^6 m^3
Contours in meters
20
15
3
N
outlet
0
500 m

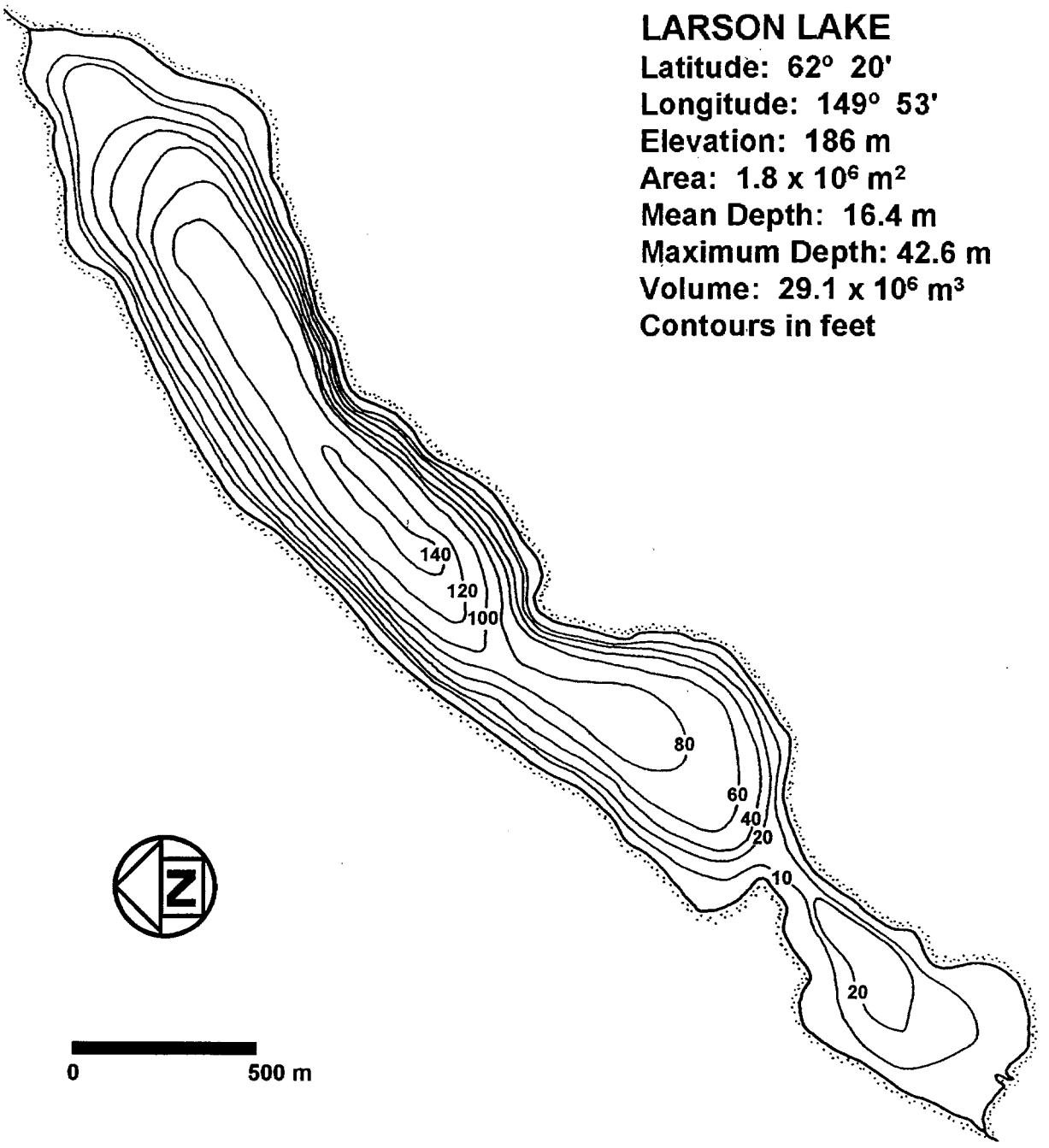

KENAI LAKE
Latitude: 60° 25'
Longitude: 149° 35'
Elevation: 133 m
Area: 55.9 x 10⁶ m²
Mean Depth: 90.7 m
Maximum Depth: 165.0 m
Volume: 5,086.9 x 10⁶ m³
Contours in feet
N
0
5 km
100
120
200
440
420
400
300
200
300
500
520
400
100
540
200
300
400
500
540
20
100
560
540
500
420
460
400
380
360
340
320
300
240
200
100
120
100
20

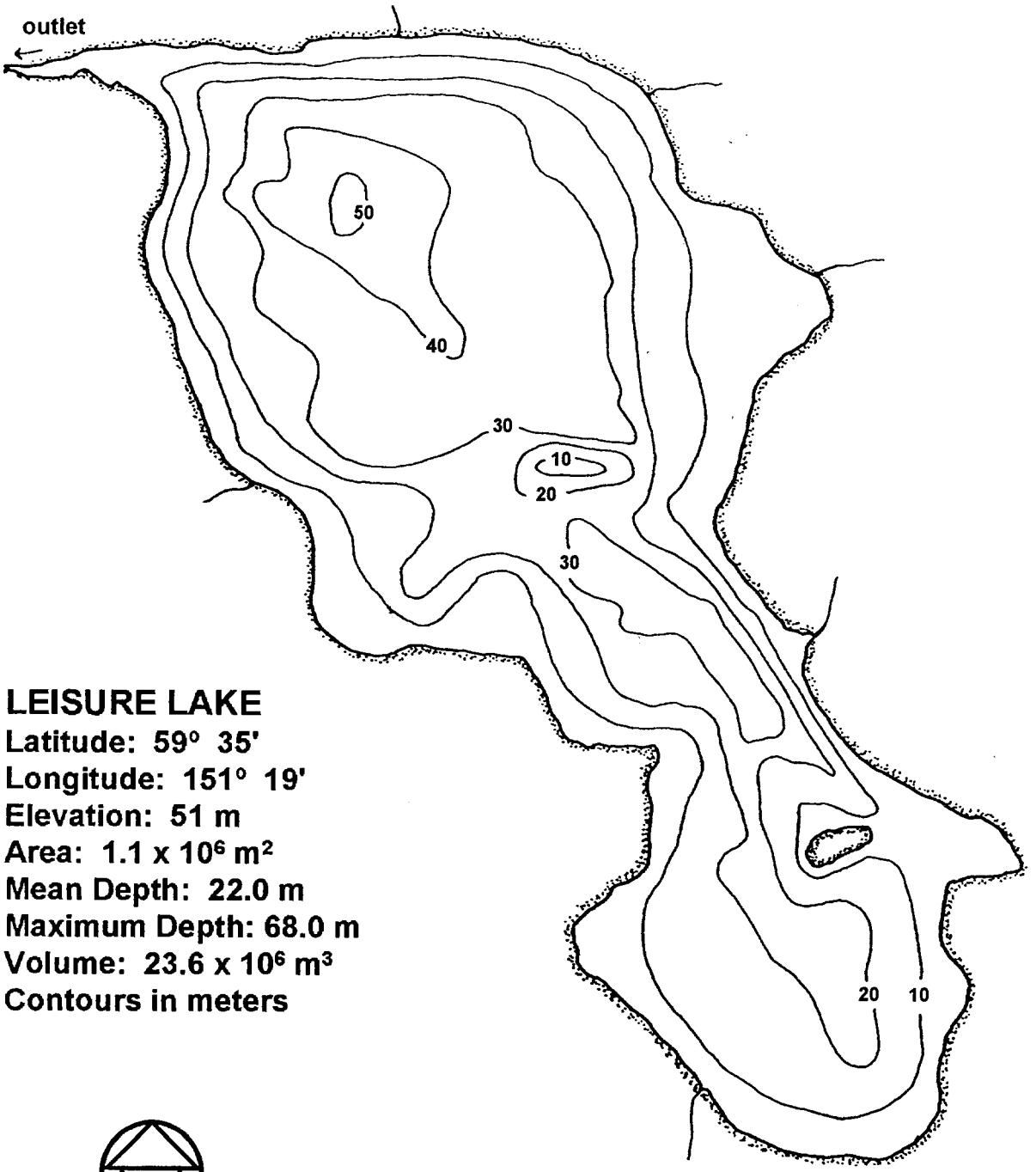


KIRSCHNER LAKE

Latitude: 59° 22'
Longitude: 154° 00'
Elevation: 20 m
Area: 1.3 x 10^6 m^2
Mean Depth: 17.0 m
Maximum Depth: 37.0 m
Volume: 22.3 x 10^6 m^3
Contours in meters


10
30
20
40
50
60
70
80
90
90
80
70
60
50
40
30
20
10
KLUTINA LAKE
Latitude: 61° 44'
Longitude: 145° 43'
Elevation: 524 m
Area: 67.1 x 10⁶ m²
Mean Depth: 45.0 m
Maximum Depth: 90.0 m
Volume: 3,019.8 x 10⁶ m³
Contours in meters
N
0
4 km

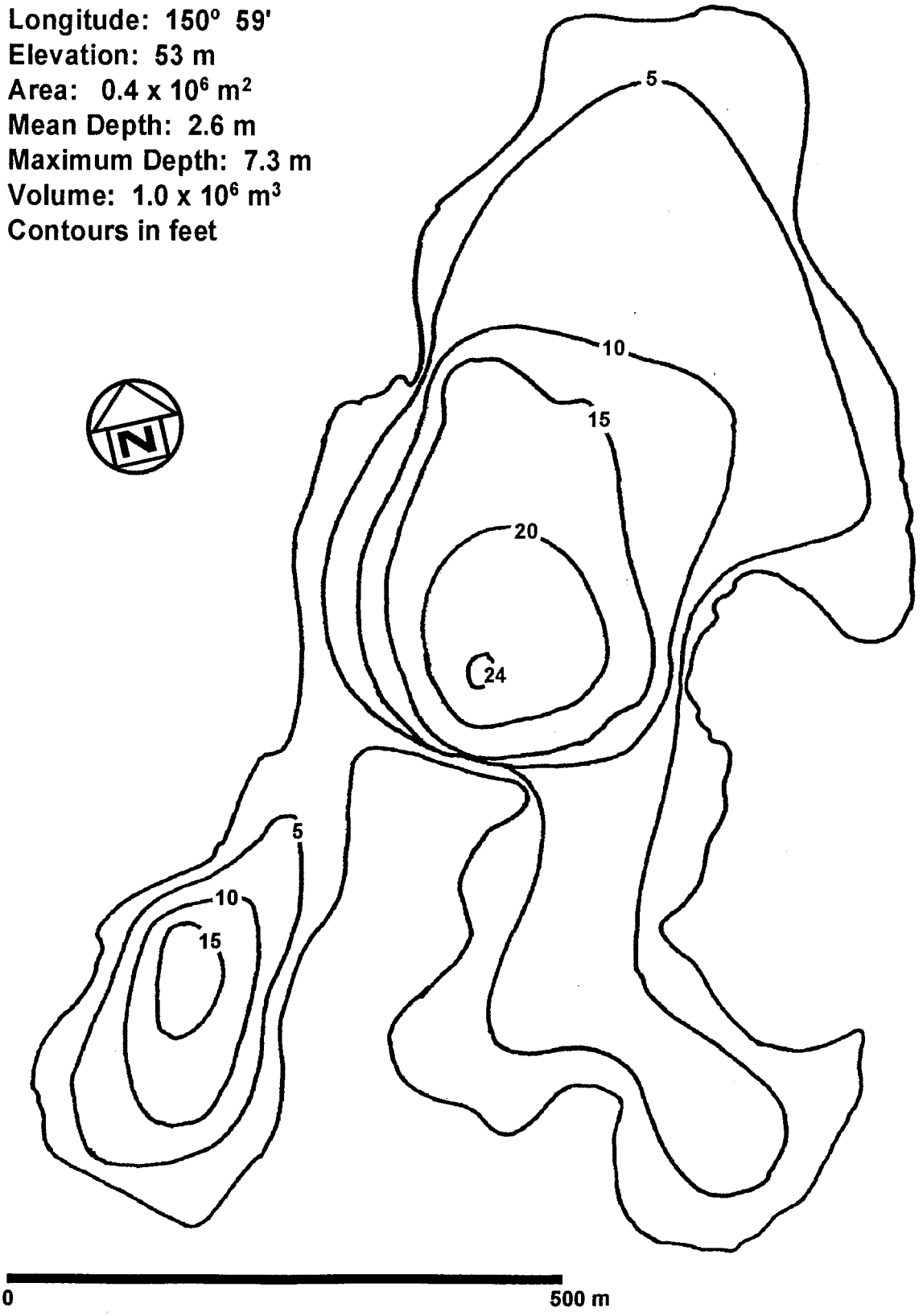

LARSON LAKE
Latitude: 62° 20'
Longitude: 149° 53'
Elevation: 186 m
Area: 1.8 x 10⁶ m²
Mean Depth: 16.4 m
Maximum Depth: 42.6 m
Volume: 29.1 x 10⁶ m³
Contours in feet
140
120
100
80
60
40
20
10
20
N
0
500 m



LEISURE LAKE
Latitude: 59° 35'
Longitude: 151° 19'
Elevation: 51 m
Area: 1.1 x 10^6 m^2
Mean Depth: 22.0 m
Maximum Depth: 68.0 m
Volume: 23.6 x 10^6 m^3
Contours in meters

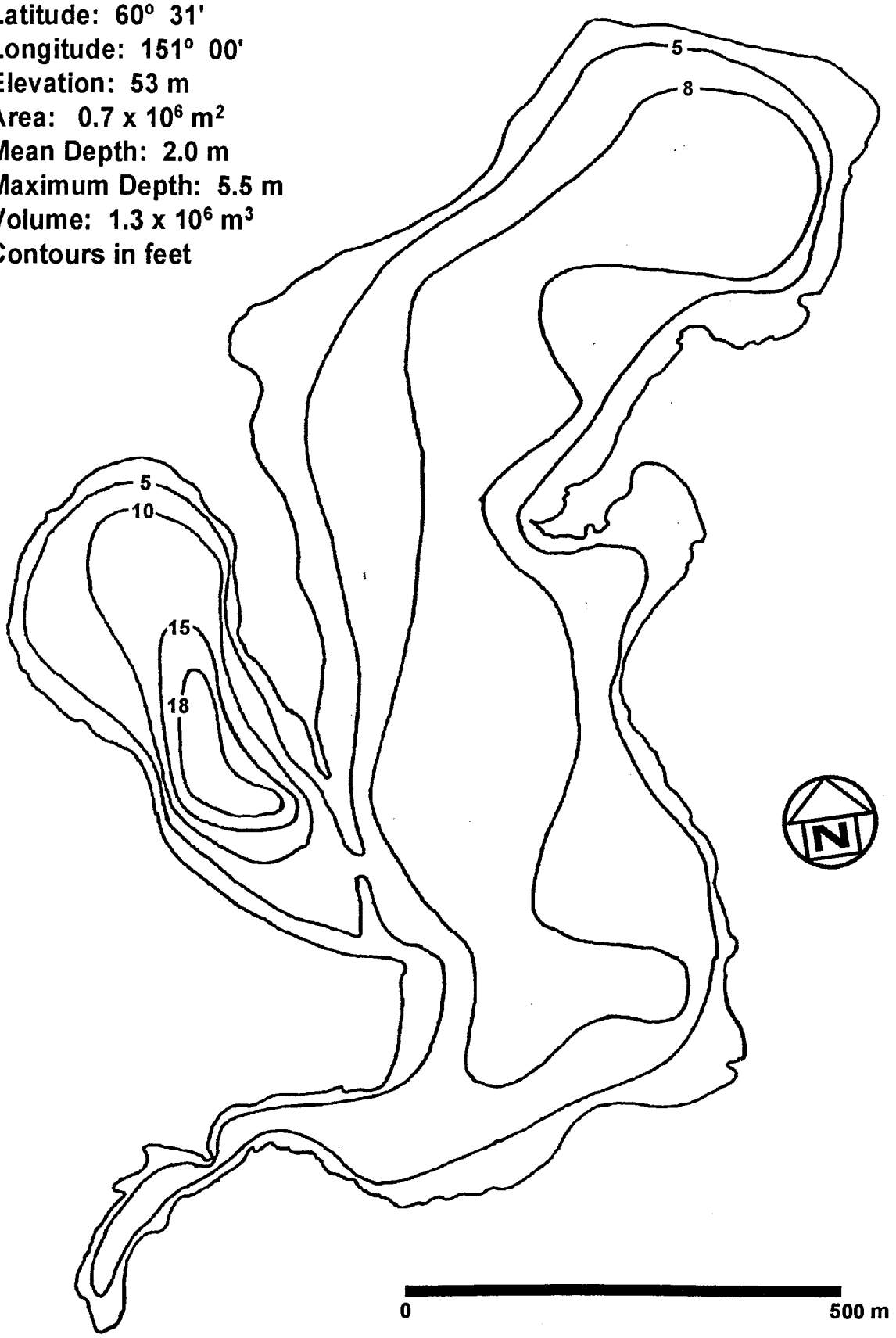
EAST MACKEY LAKE

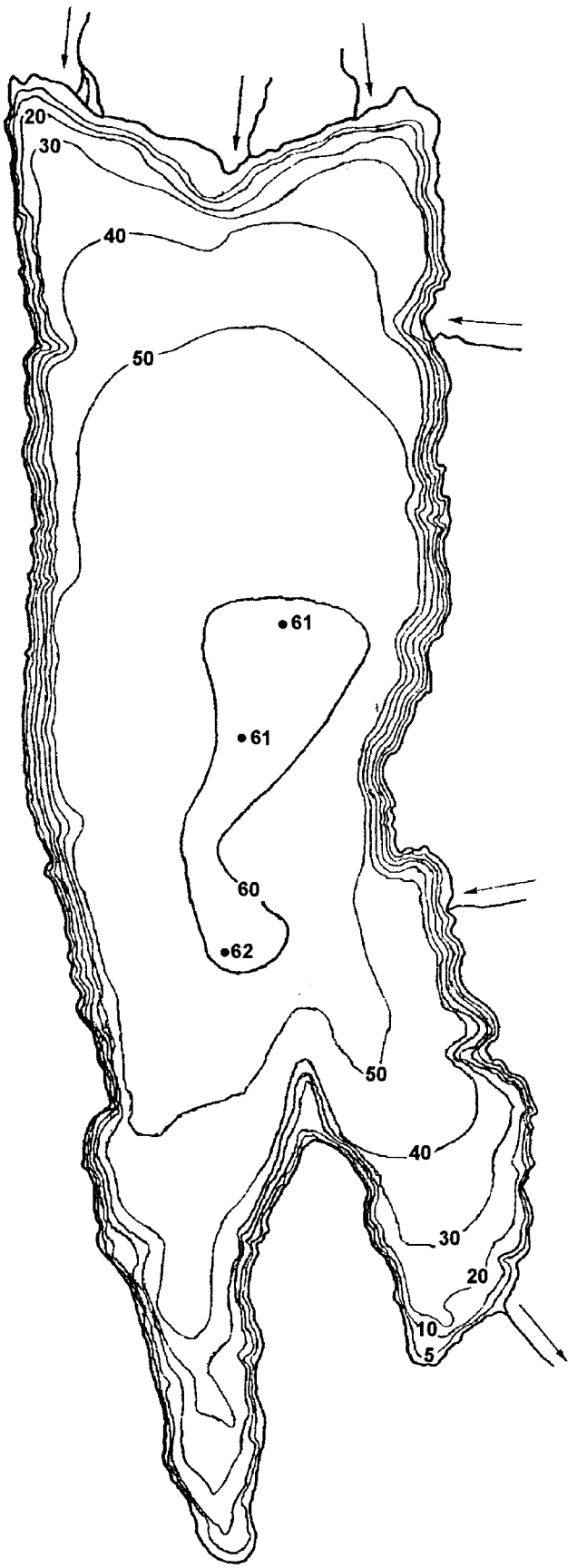
Latitude: 60° 31'
Longitude: 150° 59'
Elevation: 53 m
Area: 0.4×10^6 m^2
Mean Depth: 2.6 m
Maximum Depth: 7.3 m
Volume: 1.0×10^6 m^3
Contours in feet



WEST MACKEY LAKE

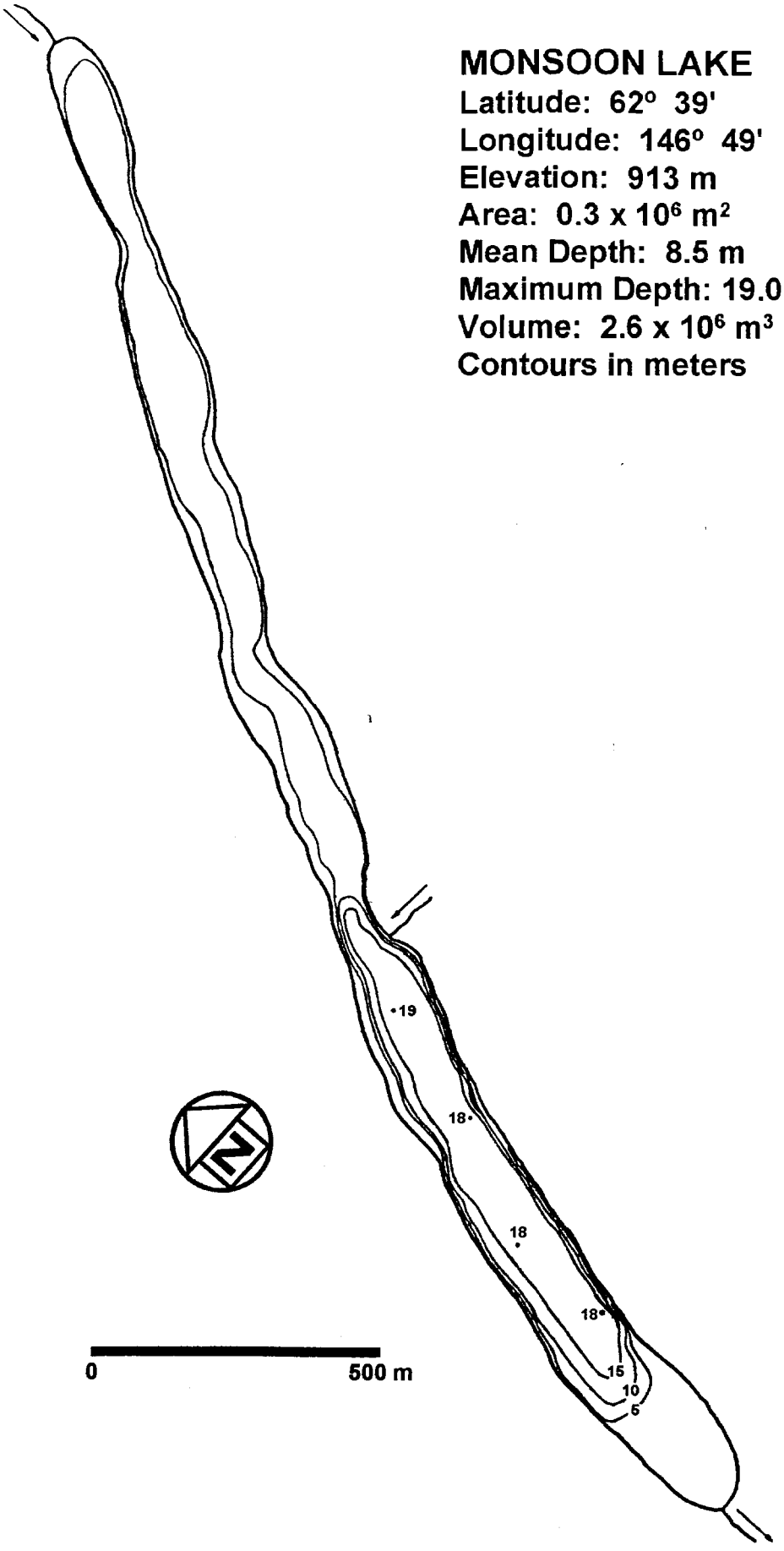
Latitude: 60° 31'
Longitude: 151° 00'
Elevation: 53 m
Area: 0.7 x 10^6 m^2
Mean Depth: 2.0 m
Maximum Depth: 5.5 m
Volume: 1.3 x 10^6 m^3
Contours in feet

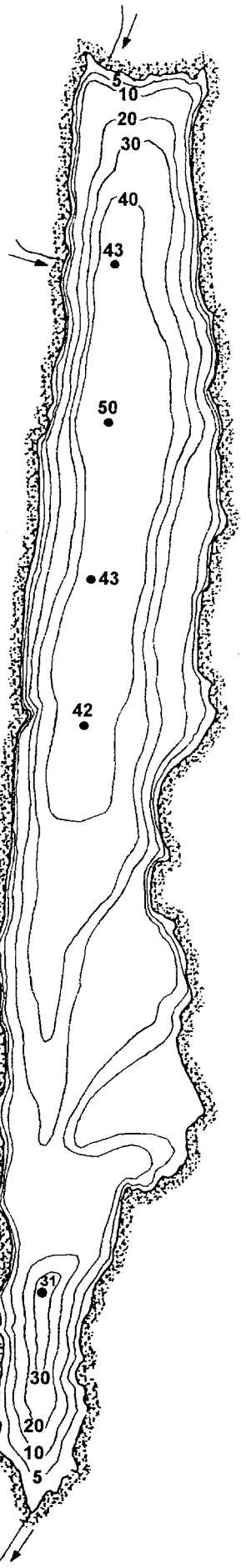




MINERS LAKE

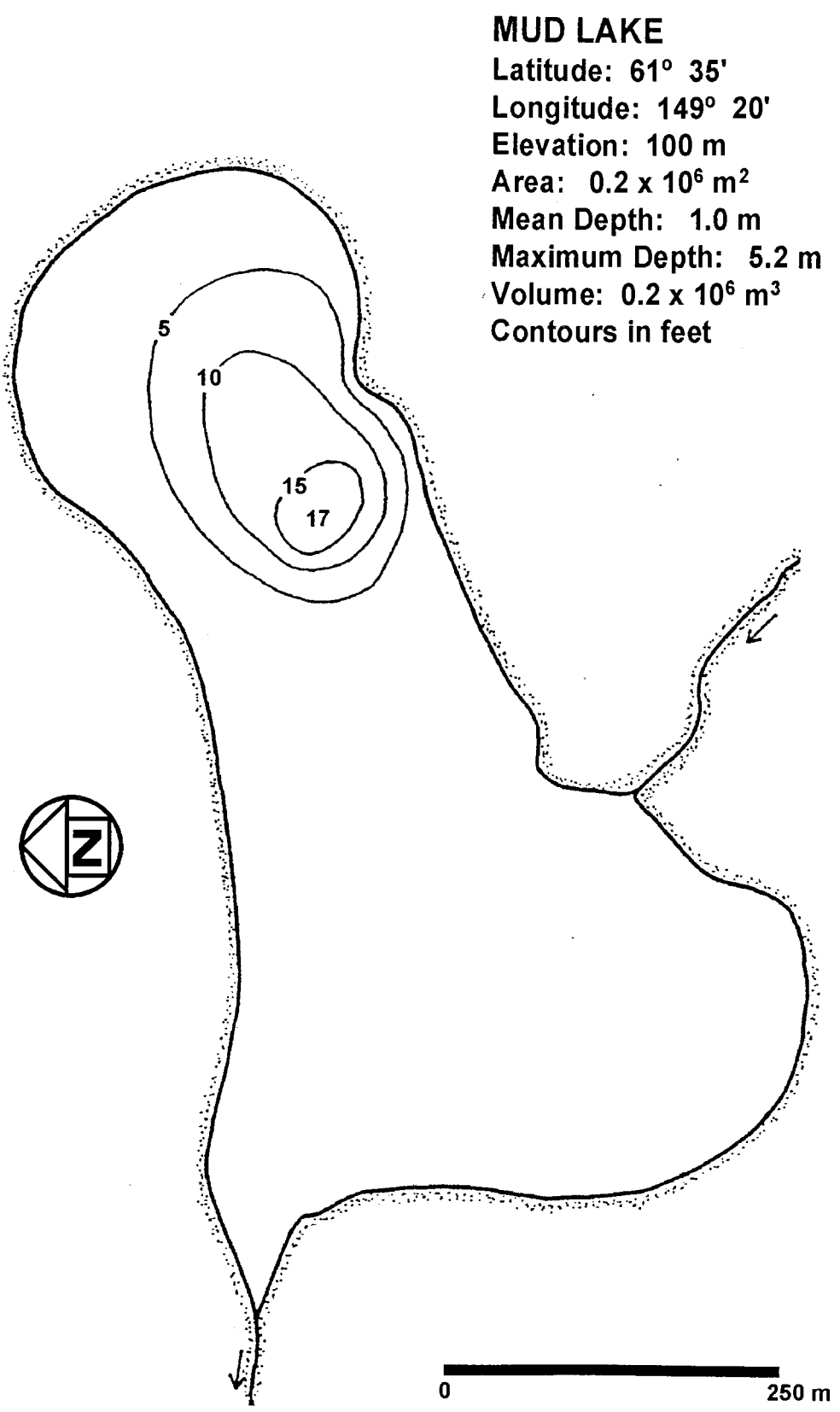
Latitude: 61° 04'
Longitude: 147° 29'
Elevation: 9 m
Area: 3.1 x 10^6 m^2
Mean Depth: 41.3 m
Maximum Depth: 62.0 m
Volume: 129.7 x 10^6 m^3
Contours in meters


MONSOON LAKE
Latitude: 62° 39'
Longitude: 146° 49'
Elevation: 913 m
Area: 0.3 x 10⁶ m²
Mean Depth: 8.5 m
Maximum Depth: 19.0 m
Volume: 2.6 x 10⁶ m³
Contours in meters
19
18
18
18
15
10
5
N
0
500 m



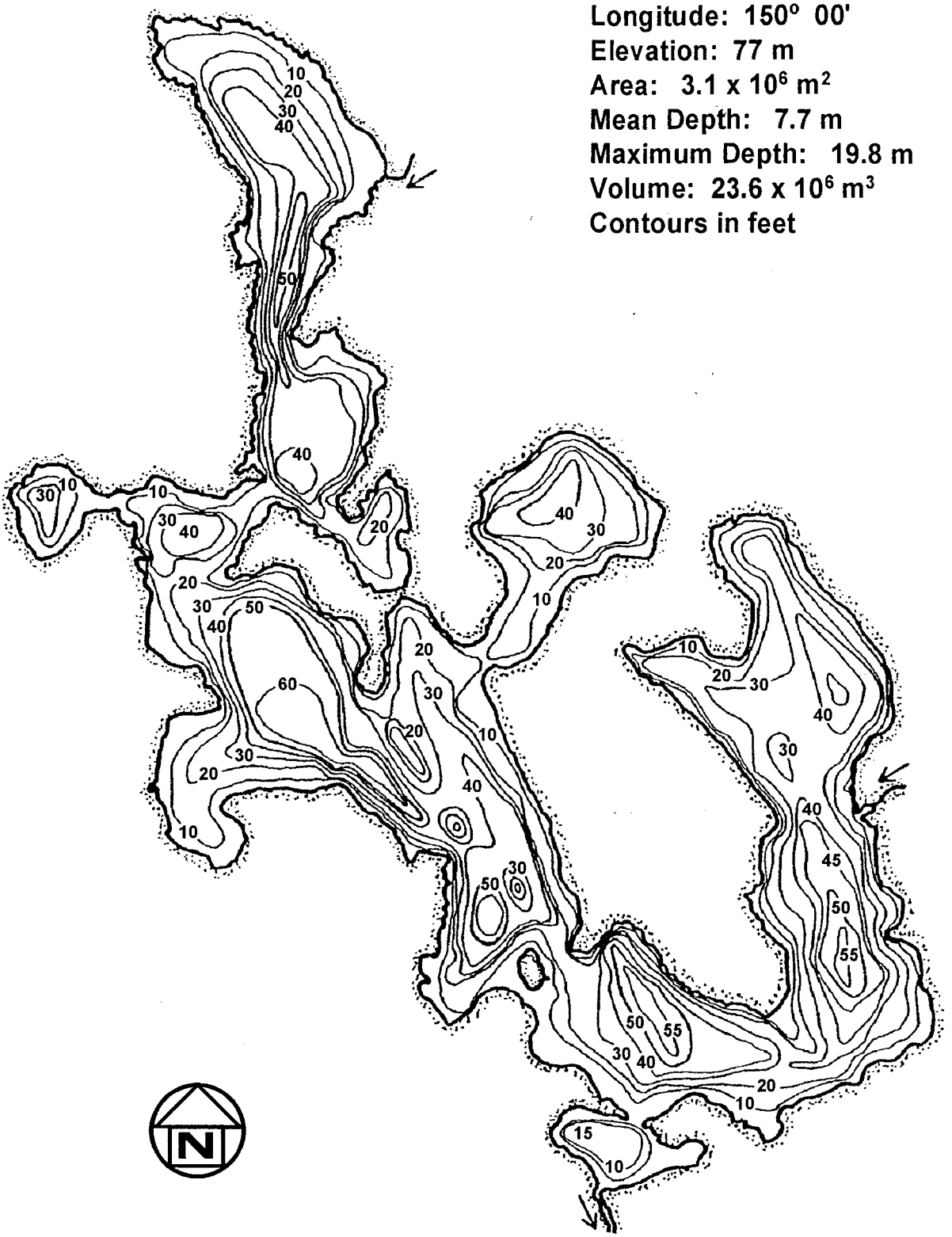
MOUNTAIN LAKE

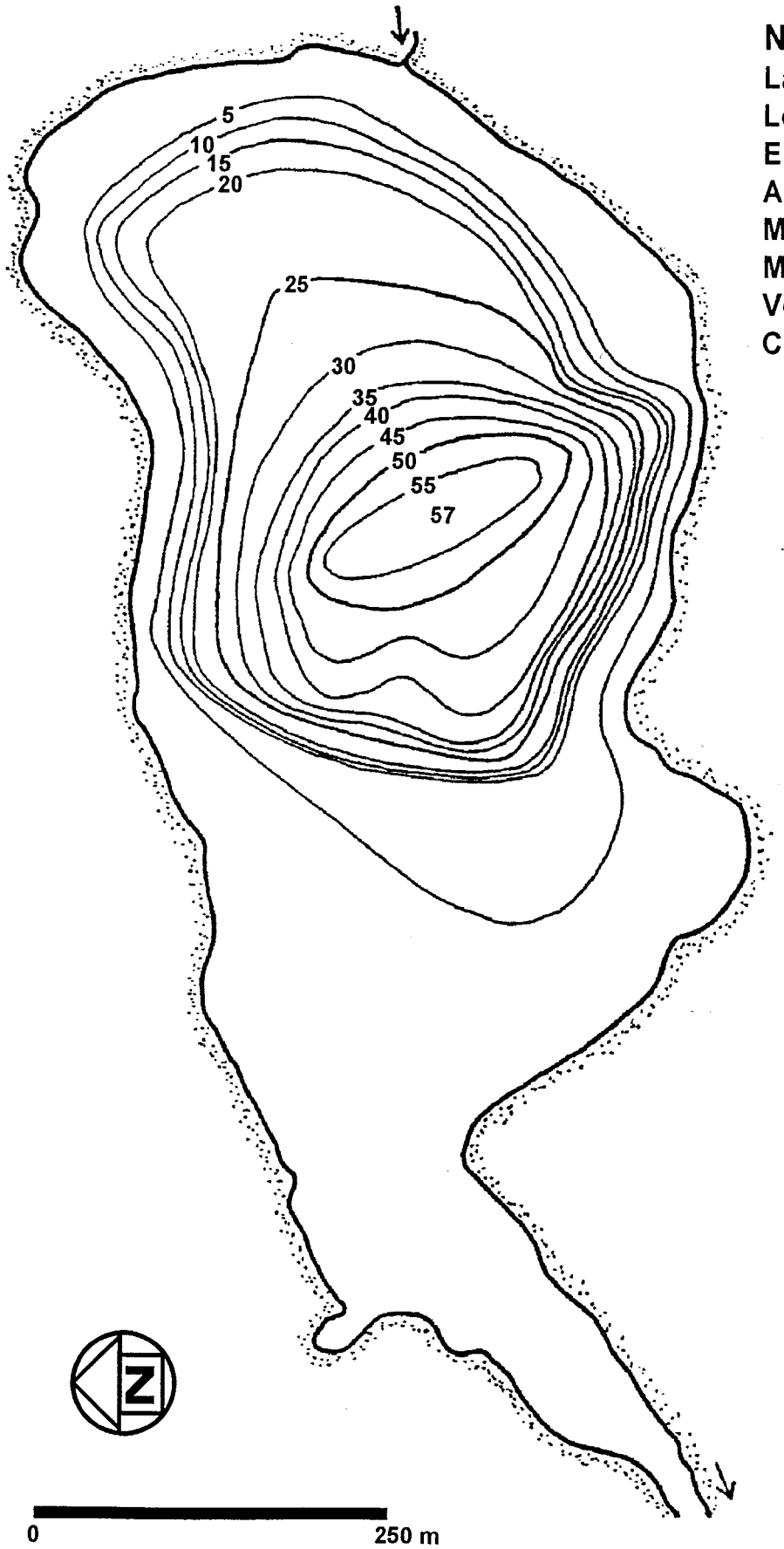
Latitude: 59° 39'
Longitude: 139° 20'
Elevation: 58 m
Area: 0.9 x 10^6 m^2
Mean Depth: 23.0 m
Maximum Depth: 50.0 m
Volume: 19.2 x 10^6 m^3
Contours in meters


MUD LAKE
Latitude: 61° 35'
Longitude: 149° 20'
Elevation: 100 m
Area: 0.2 x 10⁶ m²
Mean Depth: 1.0 m
Maximum Depth: 5.2 m
Volume: 0.2 x 10⁶ m³
Contours in feet
5
10
15
17
N
0
250 m

NANCY LAKE

Latitude: 61° 41'
Longitude: 150° 00'
Elevation: 77 m
Area: 3.1 x 10^6 m^2
Mean Depth: 7.7 m
Maximum Depth: 19.8 m
Volume: 23.6 x 10^6 m^3
Contours in feet



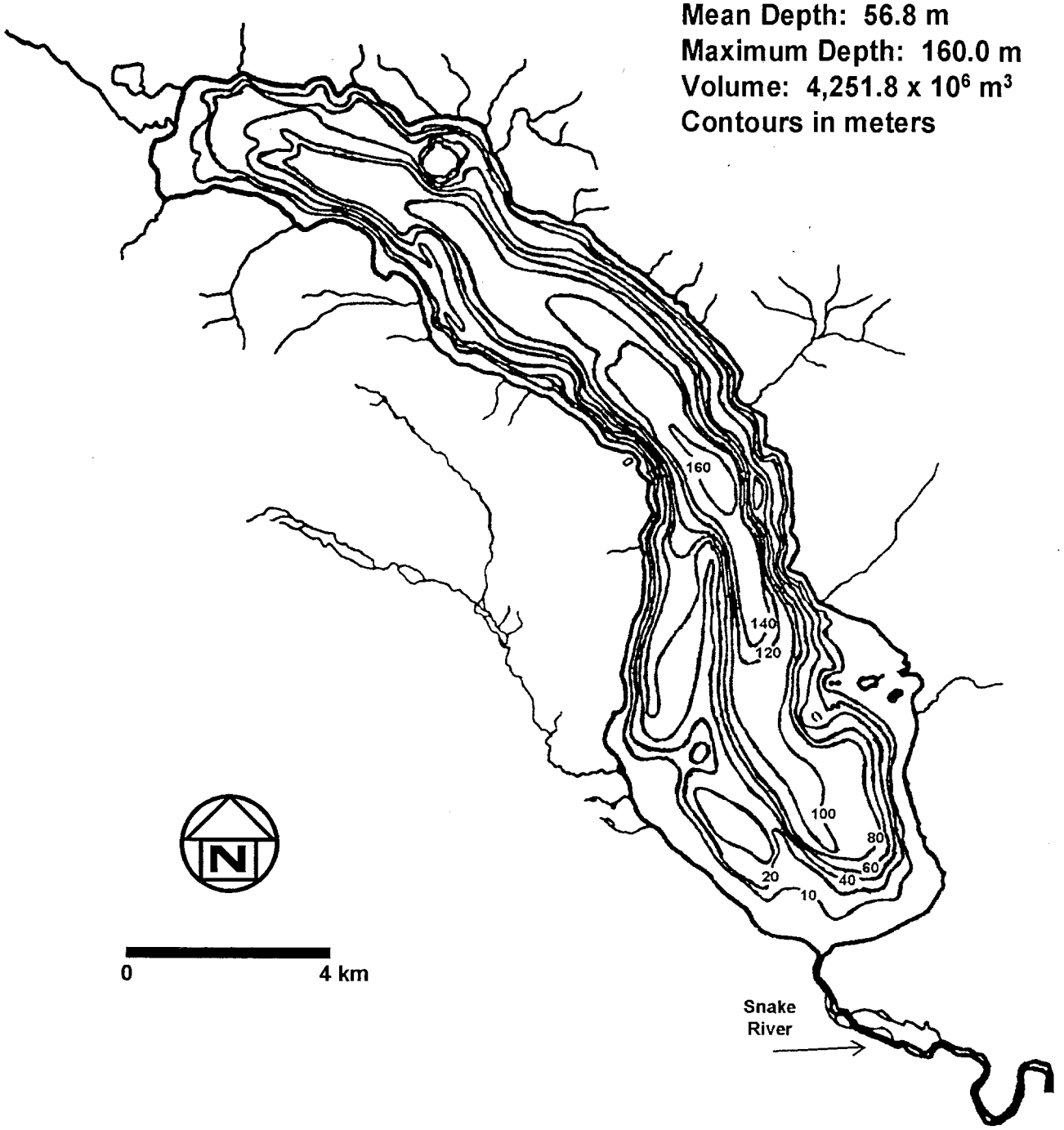


NICKLASON LAKE

Latitude: 61° 37'
Longitude: 149° 16'
Elevation: 122 m
Area: 0.3 x 10^6 m^2
Mean Depth: 4.8 m
Maximum Depth: 17.3 m
Volume: 1.4 x 10^6 m^3
Contours in feet

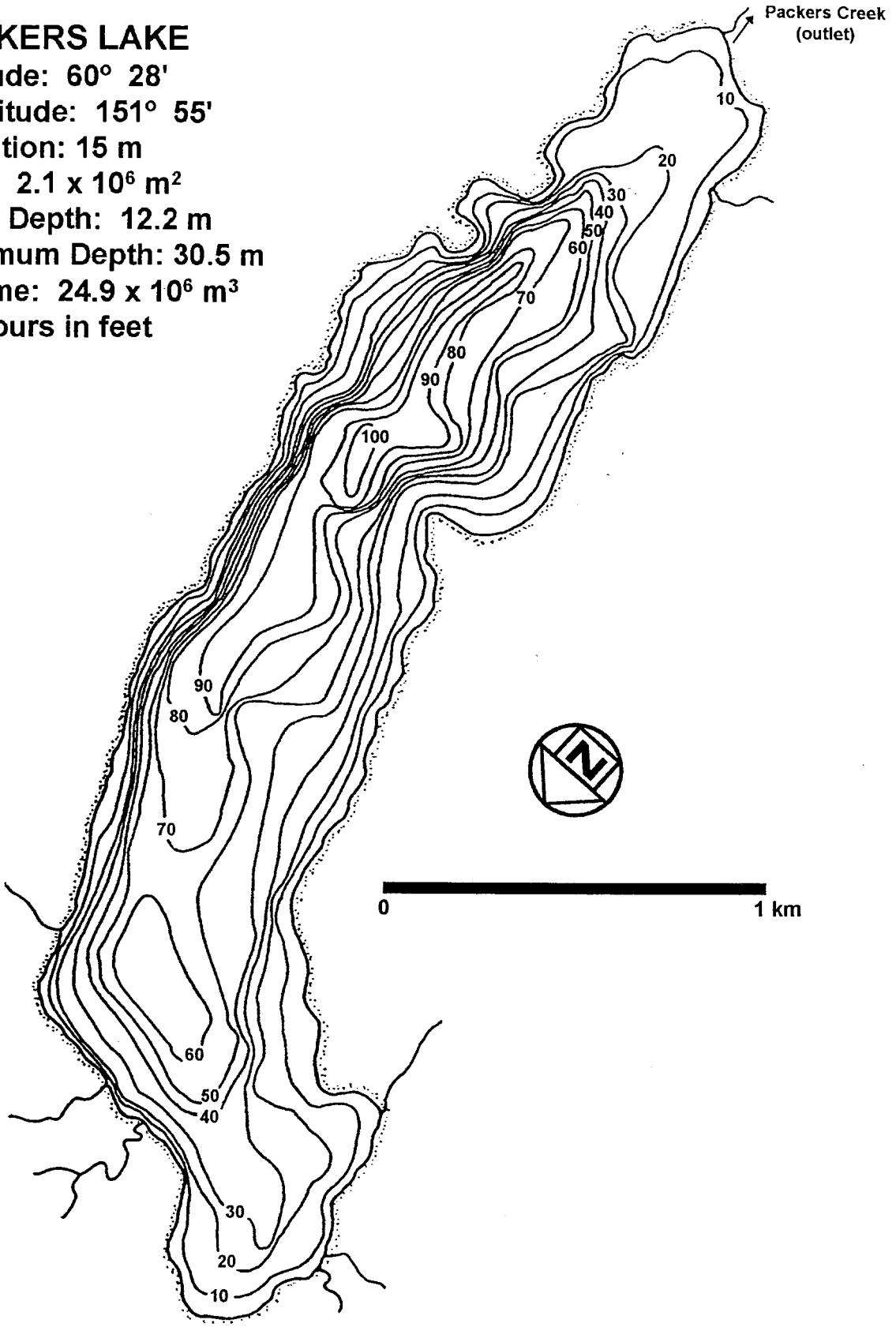
NUNAVAUGALUK LAKE

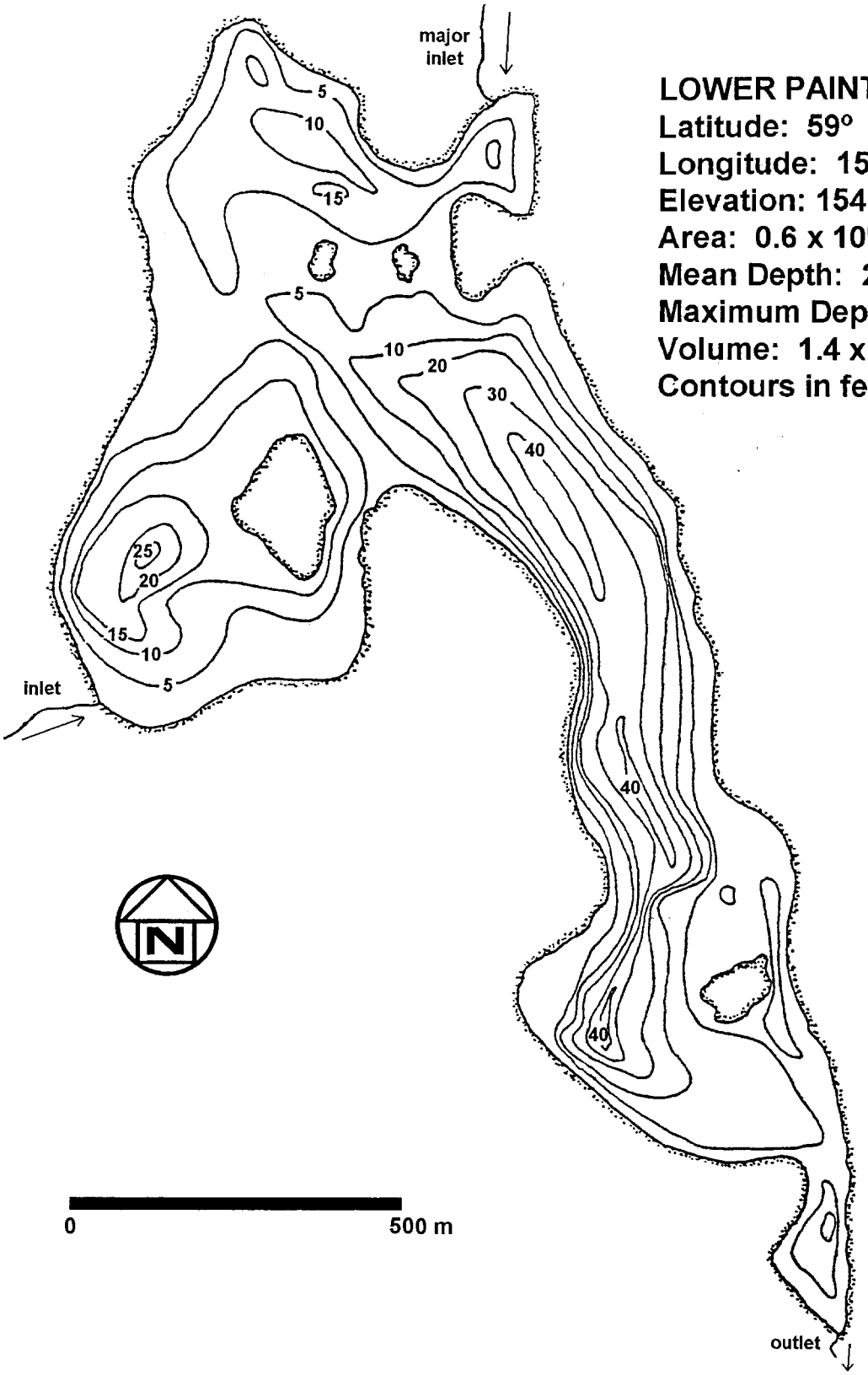
Latitude: 59° 15'
Longitude: 158° 55'
Elevation: 10 m
Area: 74.8 x 10^6 m^2
Mean Depth: 56.8 m
Maximum Depth: 160.0 m
Volume: 4,251.8 x 10^6 m^3
Contours in meters



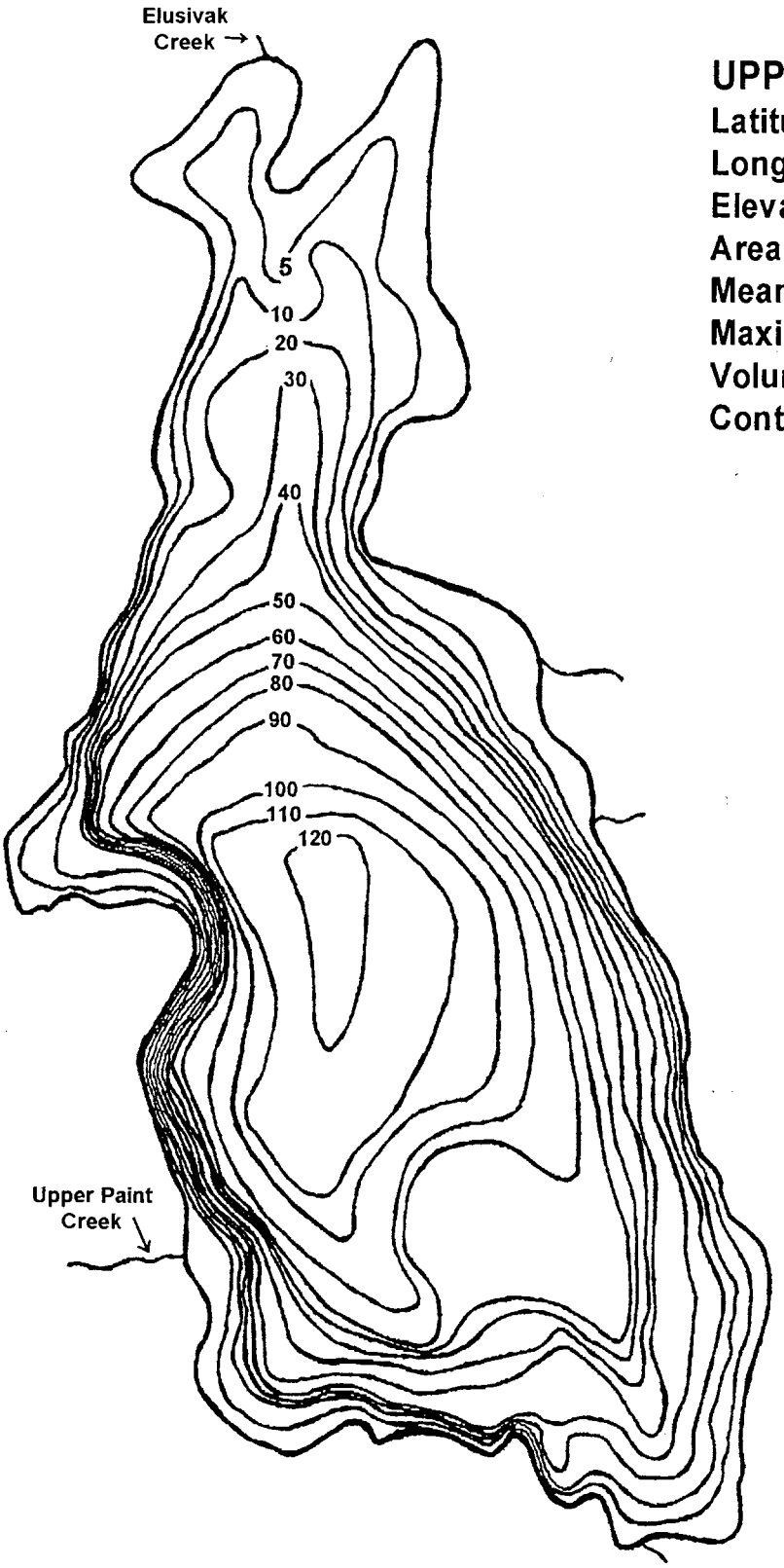
PACKERS LAKE

Latitude: 60° 28'
Longitude: 151° 55'
Elevation: 15 m
Area: 2.1 x 10^6 m^2
Mean Depth: 12.2 m
Maximum Depth: 30.5 m
Volume: 24.9 x 10^6 m^3
Contours in feet





LOWER PAINT LAKE
Latitude: 59° 13'
Longitude: 154° 31'
Elevation: 154 m
Area: 0.6 x 10^6 m^2
Mean Depth: 2.5 m
Maximum Depth: 12.2 m
Volume: 1.4 x 10^6 m^3
Contours in feet



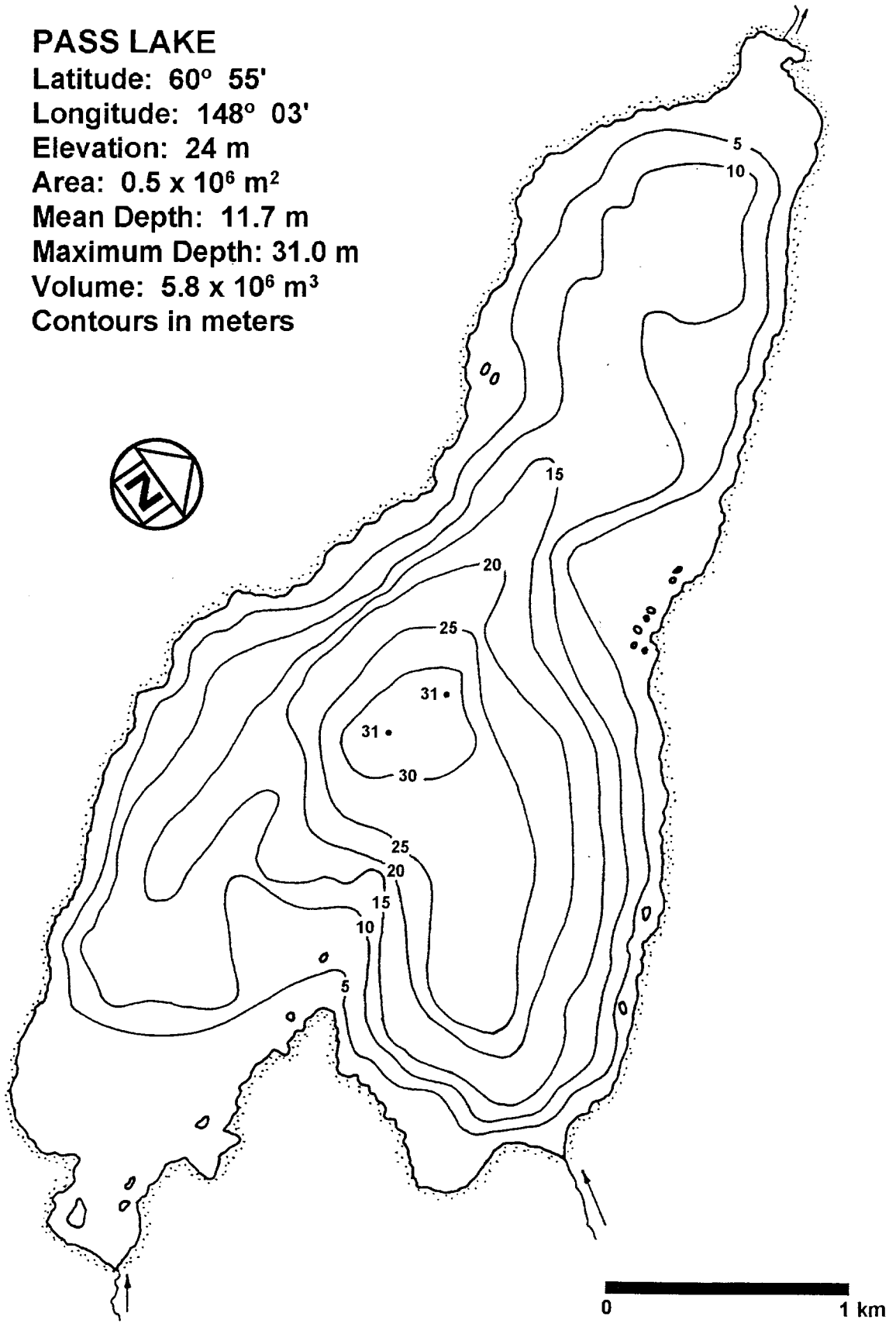
UPPER PAINT LAKE

Latitude: 59° 14'
Longitude: 154° 20'
Elevation: 153 m
Area: 1.0 x 10^6 m^2
Mean Depth: 16.7 m
Maximum Depth: 36.6 m
Volume: 17.1 x 10^6 m^3
Contours in feet

N

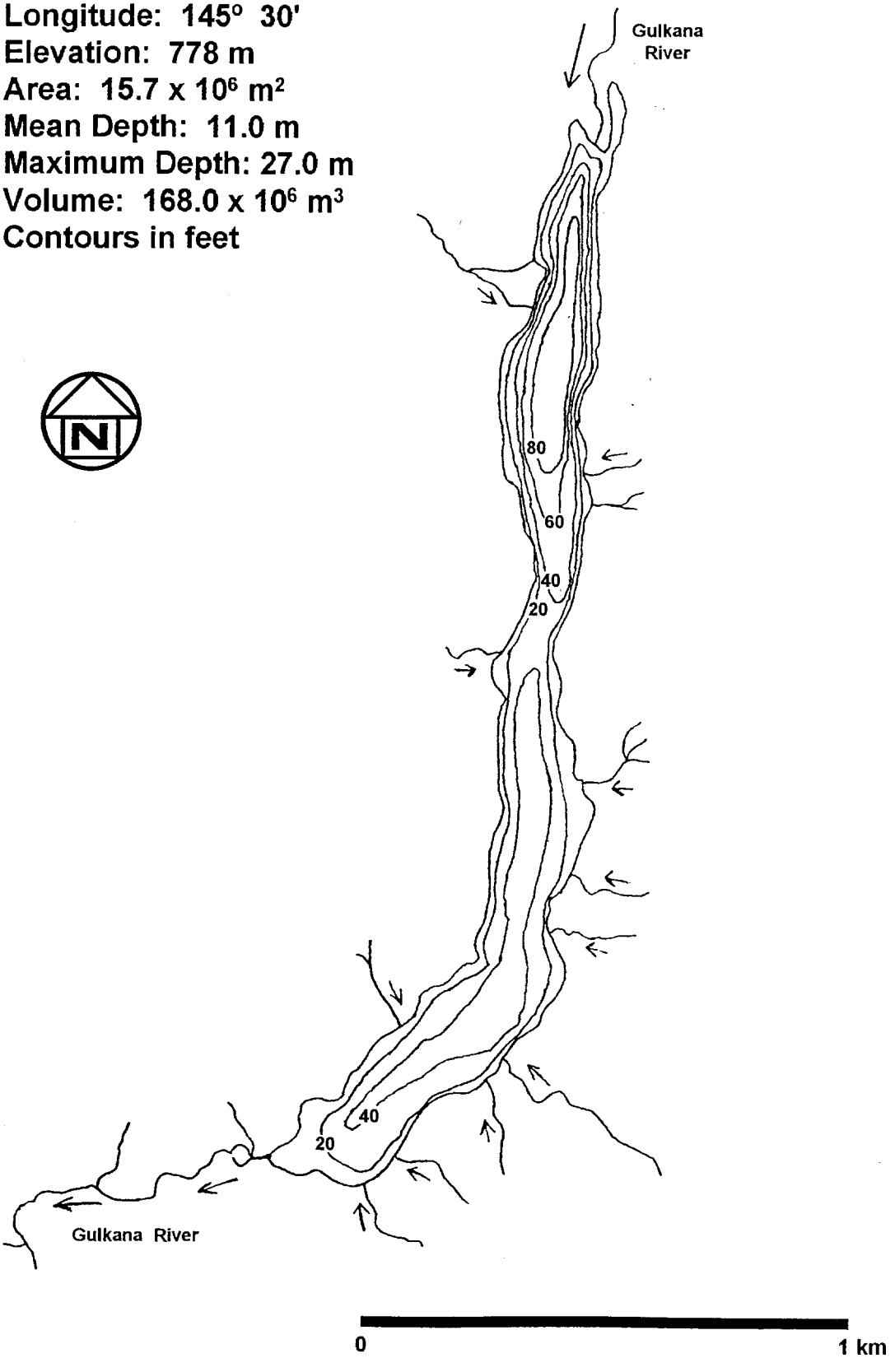
PASS LAKE

Latitude: 60° 55'
Longitude: 148° 03'
Elevation: 24 m
Area: 0.5 x 10^6 m^2
Mean Depth: 11.7 m
Maximum Depth: 31.0 m
Volume: 5.8 x 10^6 m^3
Contours in meters



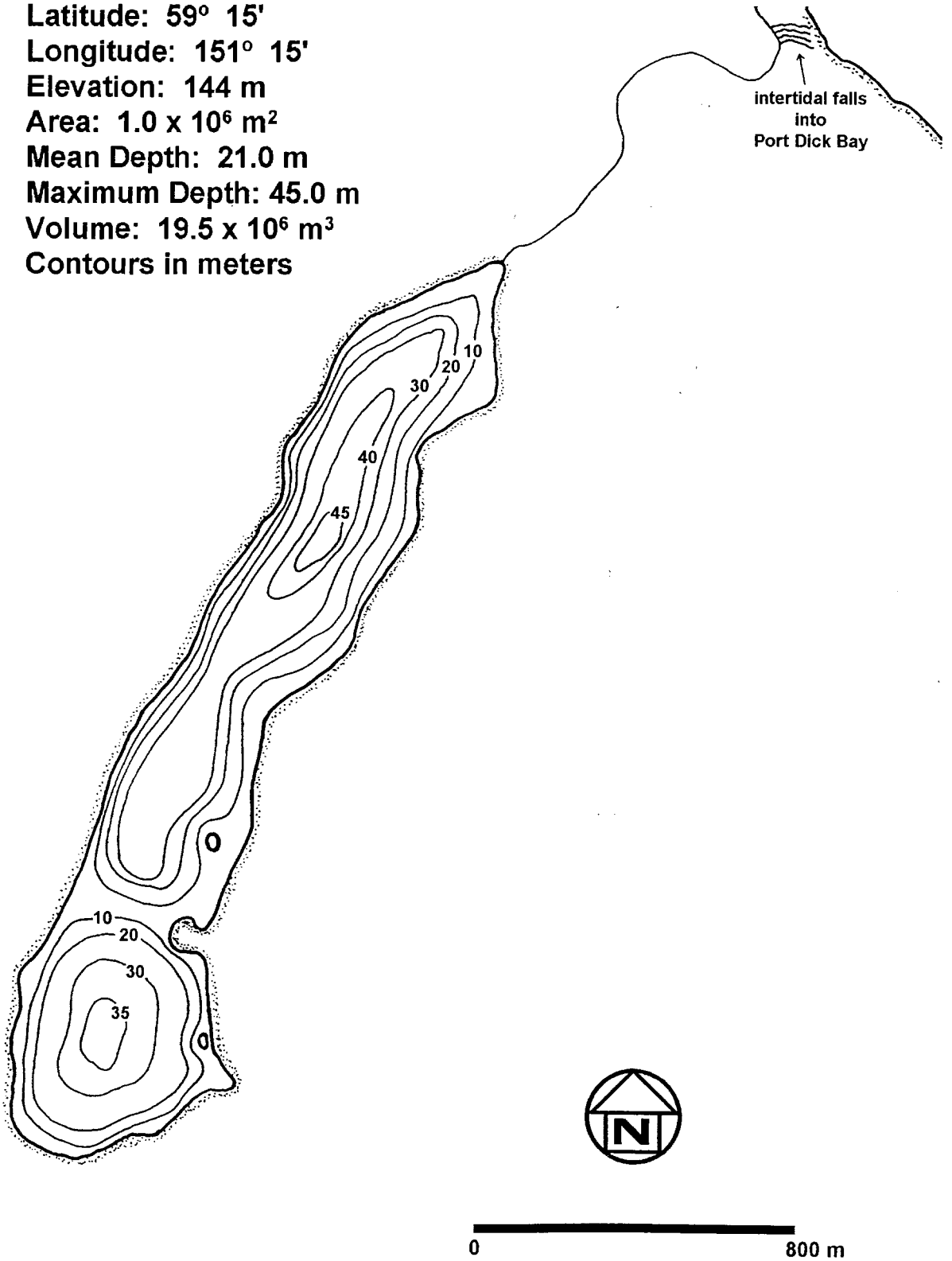
PAXSON LAKE

Latitude: 62° 55'
Longitude: 145° 30'
Elevation: 778 m
Area: 15.7 x 10^6 m^2
Mean Depth: 11.0 m
Maximum Depth: 27.0 m
Volume: 168.0 x 10^6 m^3
Contours in feet



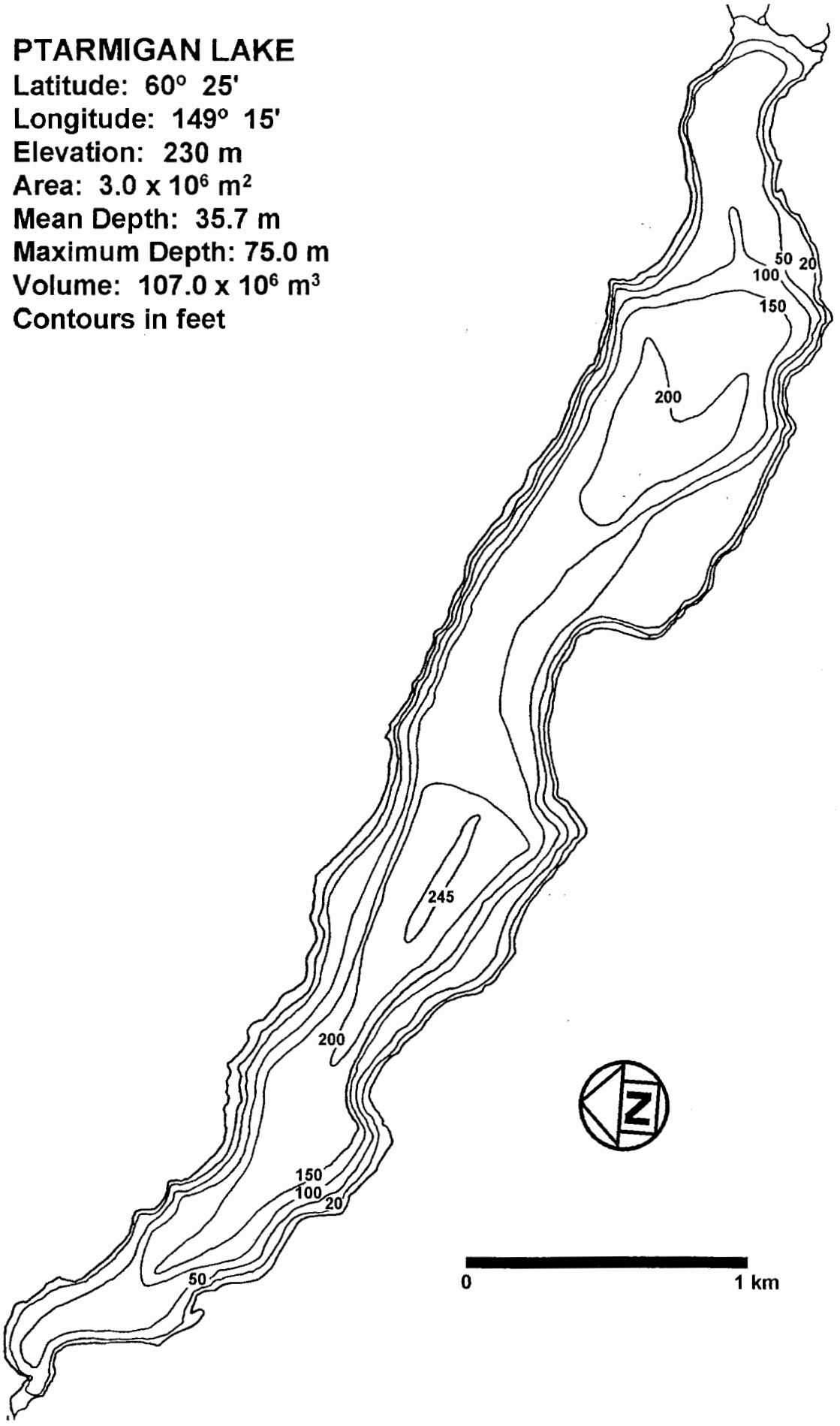
PORT DICK LAKE

Latitude: 59° 15'
Longitude: 151° 15'
Elevation: 144 m
Area: 1.0 x 10^6 m^2
Mean Depth: 21.0 m
Maximum Depth: 45.0 m
Volume: 19.5 x 10^6 m^3
Contours in meters



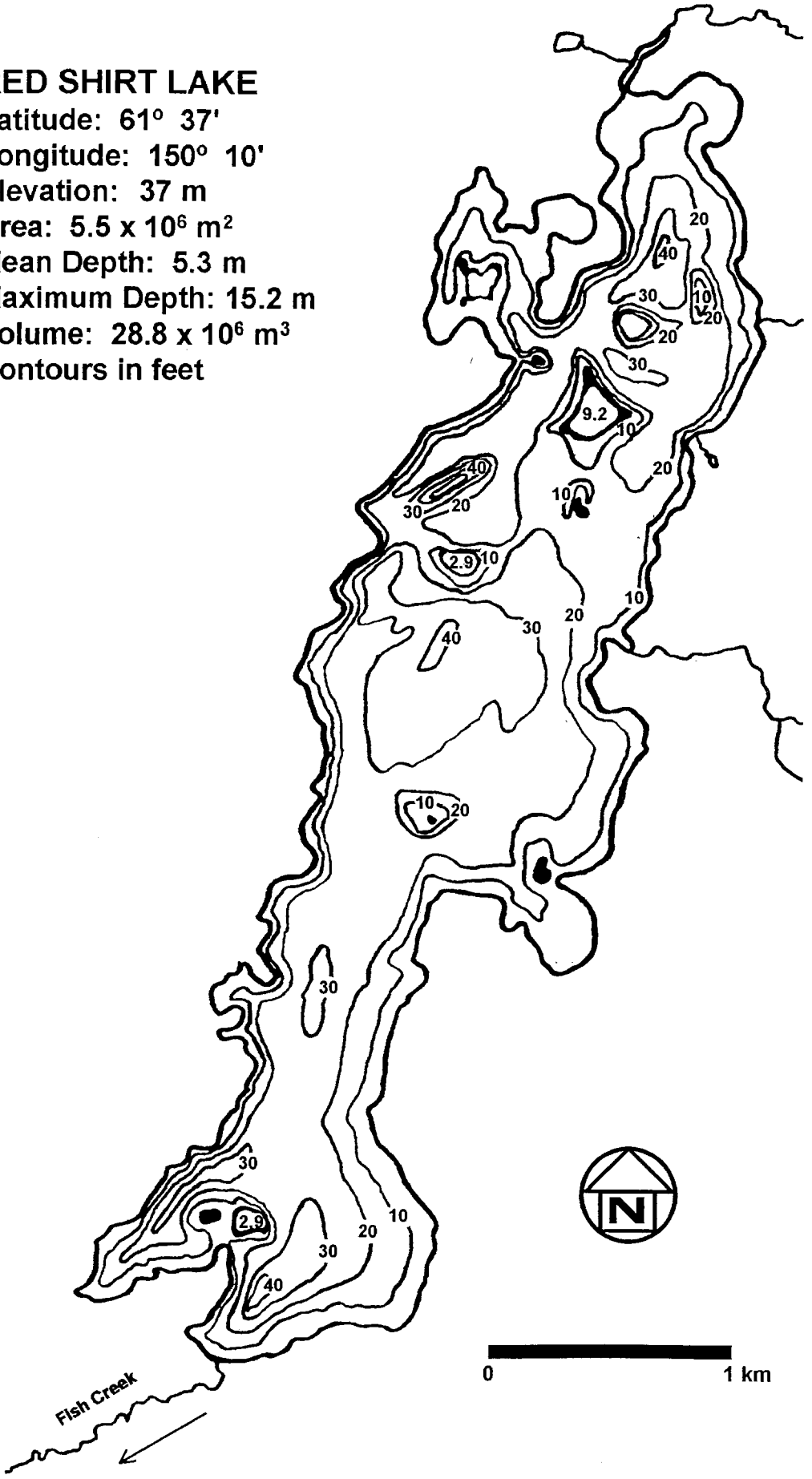
PTARMIGAN LAKE

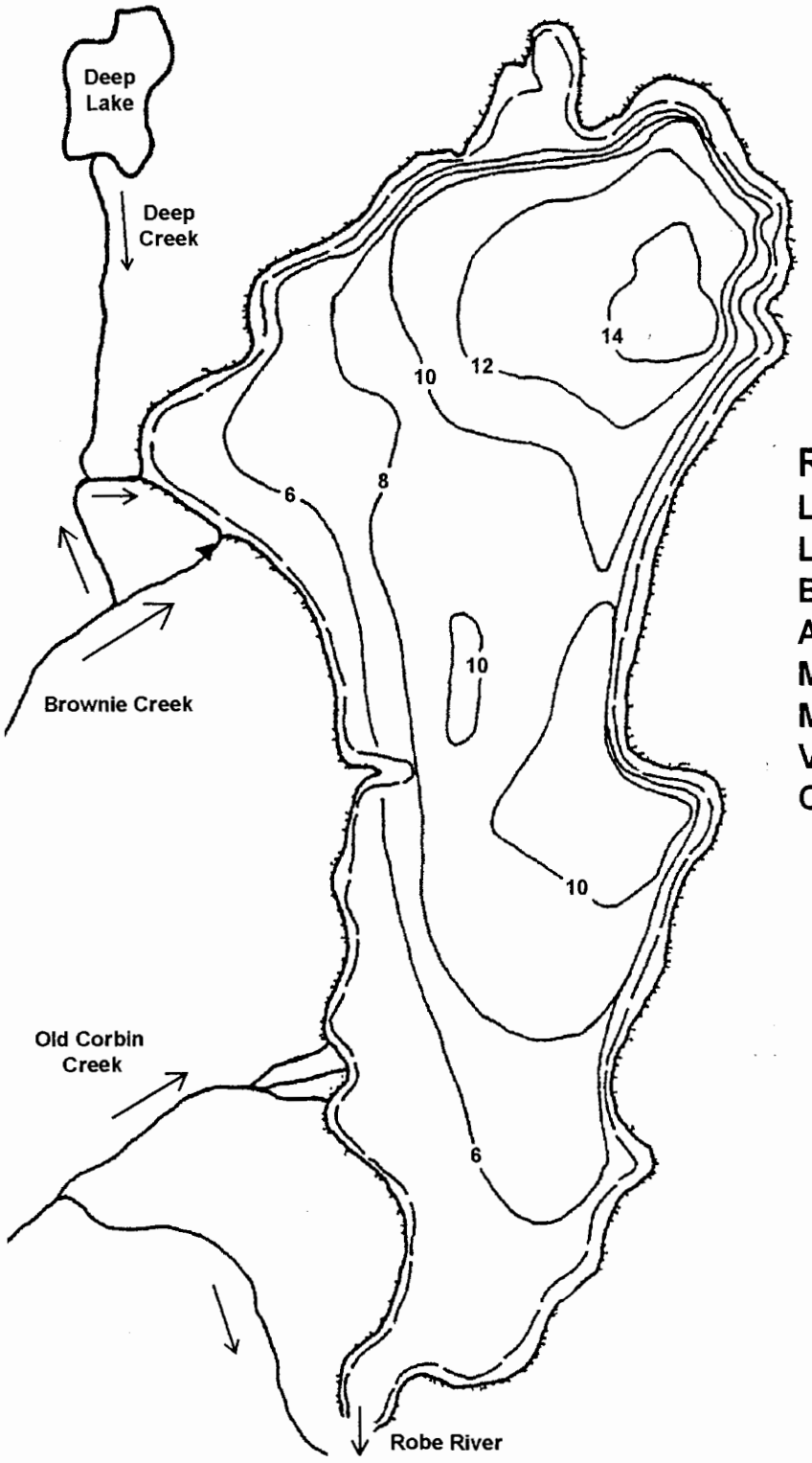
Latitude: 60° 25'
Longitude: 149° 15'
Elevation: 230 m
Area: 3.0×10^6 m^2
Mean Depth: 35.7 m
Maximum Depth: 75.0 m
Volume: 107.0×10^6 m^3
Contours in feet



RED SHIRT LAKE

Latitude: 61° 37'
Longitude: 150° 10'
Elevation: 37 m
Area: 5.5 x 10^6 m^2
Mean Depth: 5.3 m
Maximum Depth: 15.2 m
Volume: 28.8 x 10^6 m^3
Contours in feet

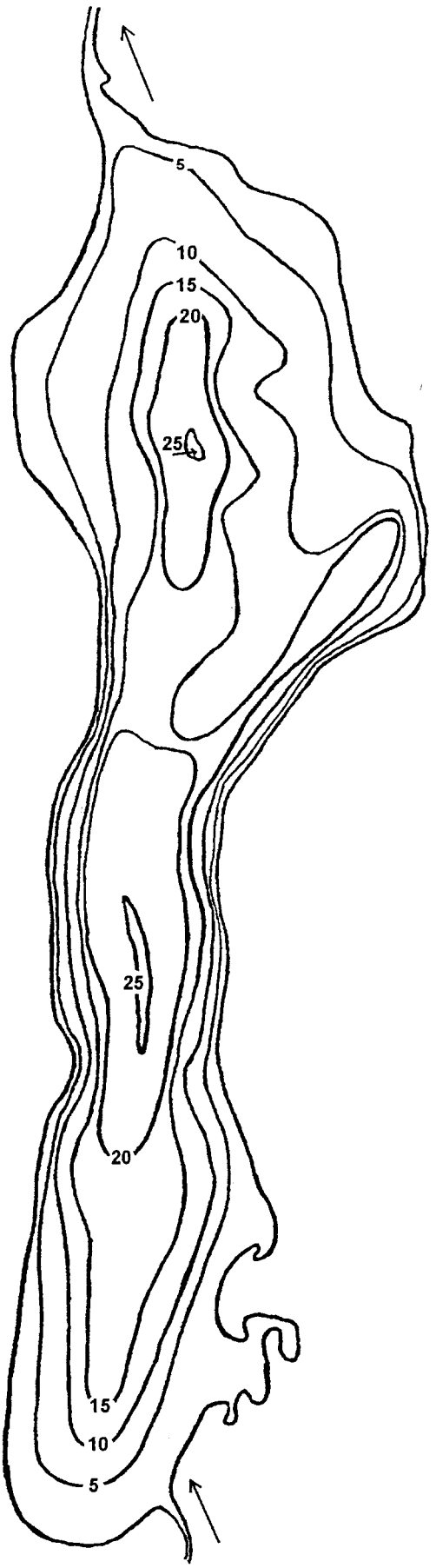




ROBE LAKE

Latitude: 61° 05'
Longitude: 146° 08'
Elevation: 7 m
Area: 2.8 x 10^6 m^2
Mean Depth: 3.1 m
Maximum Depth: 5.0 m
Volume: 8.6 x 10^6 m^3
Contours in feet

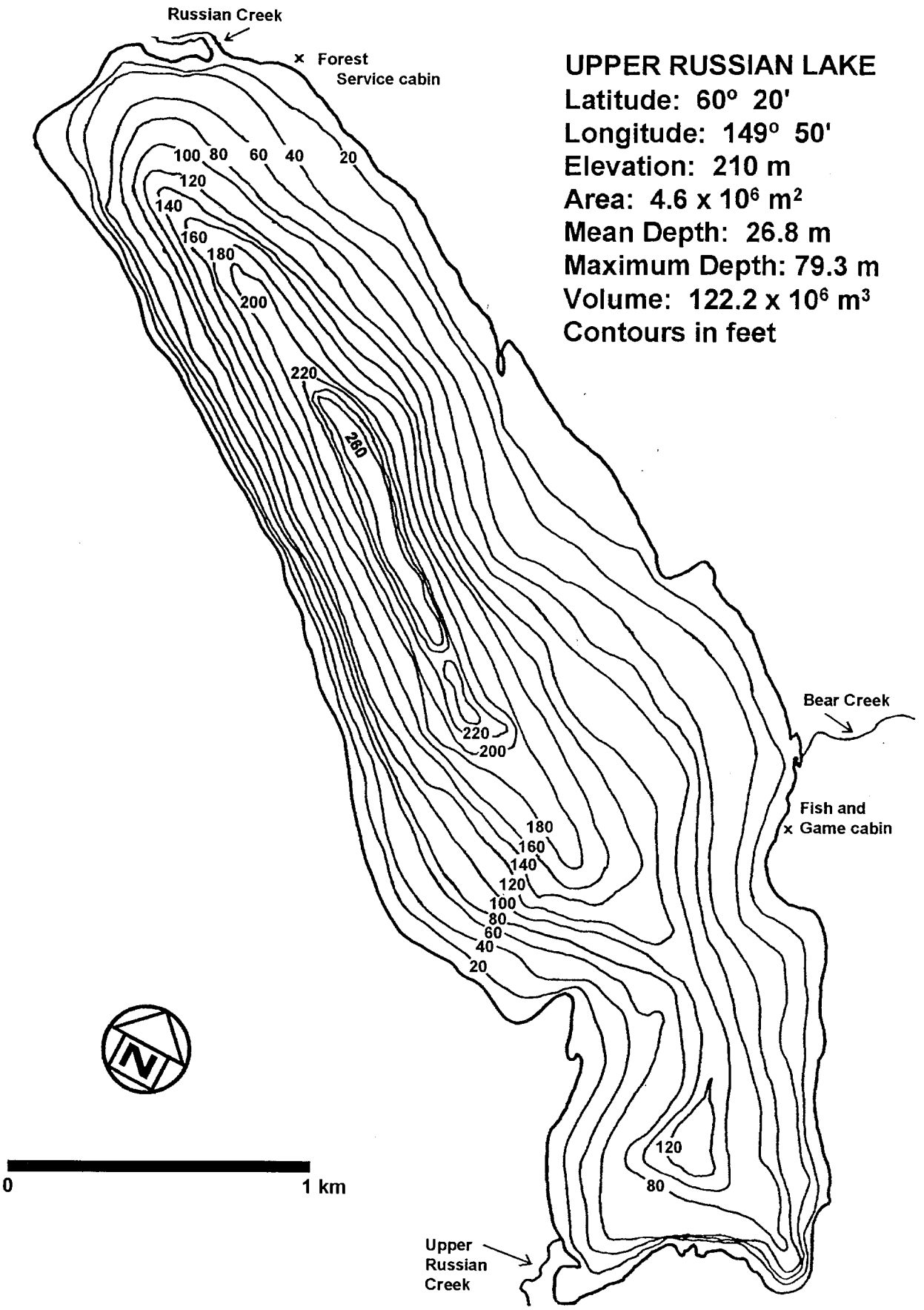
0 1 km



LOWER RUSSIAN LAKE
Latitude: 60° 26'
Longitude: 149° 55'
Elevation: 152 m
Area: 0.7 x 10^6 m^2
Mean Depth: 3.5 m
Maximum Depth: 7.9 m
Volume: 2.6 x 10^6 m^3
Contours in feet

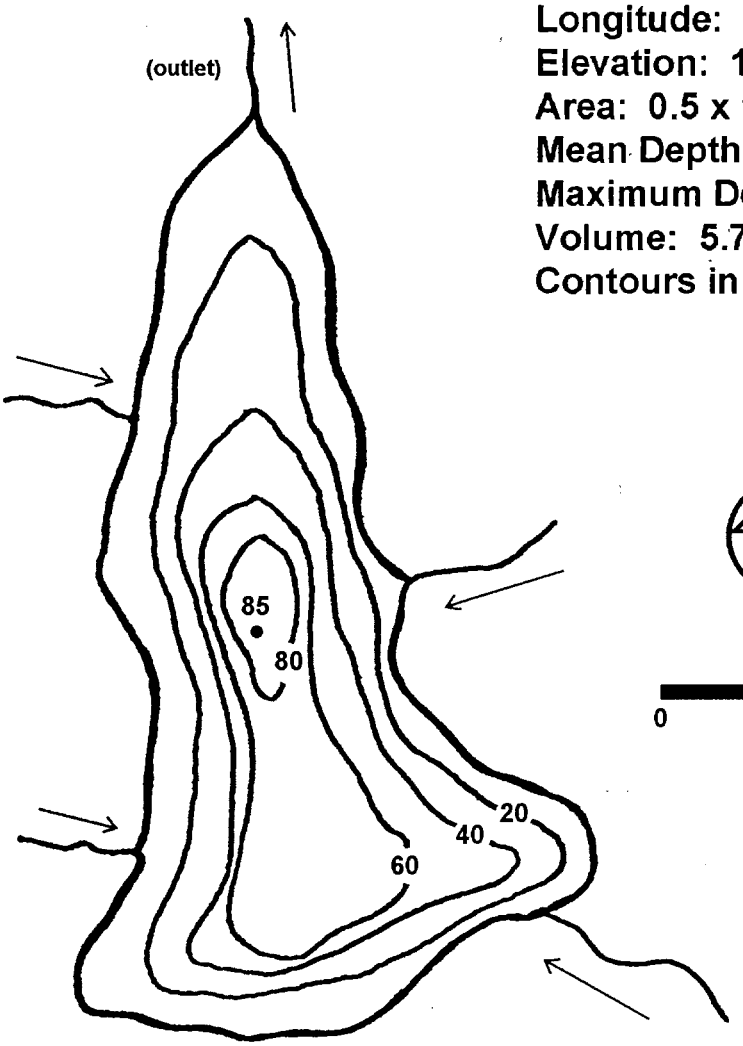
N

0 500 m


Russian Creek
Forest Service cabin
UPPER RUSSIAN LAKE
Latitude: 60° 20'
Longitude: 149° 50'
Elevation: 210 m
Area: 4.6 x 10⁶ m²
Mean Depth: 26.8 m
Maximum Depth: 79.3 m
Volume: 122.2 x 10⁶ m³
Contours in feet
100
80
60
40
20
120
140
160
180
200
220
260
Bear Creek
Fish and Game cabin
N
0
1 km
Upper Russian Creek

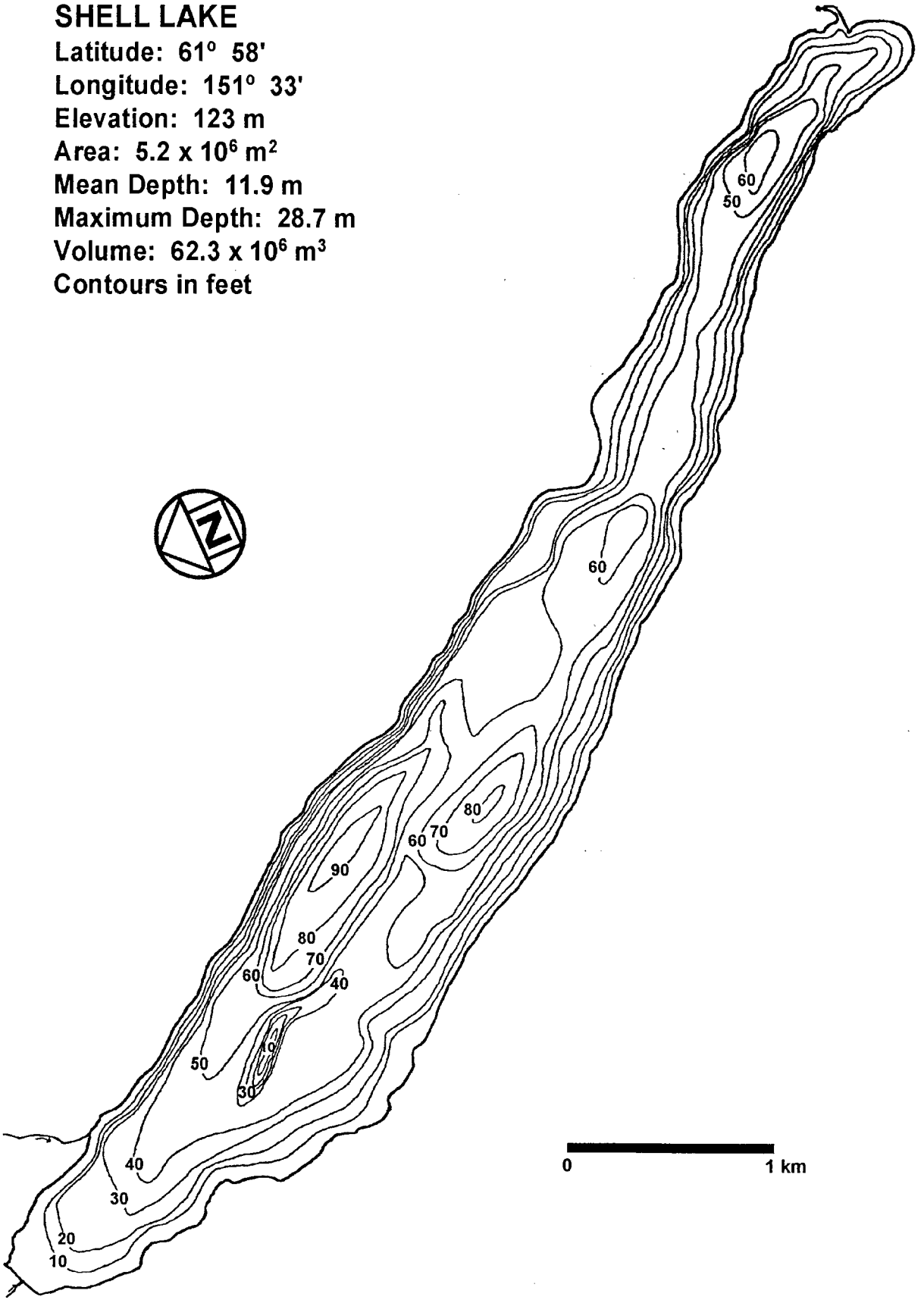
SELDOVIA LAKE

Latitude: 59° 20'
Longitude: 151° 35'
Elevation: 130 m
Area: 0.5×10^6 m^2
Mean Depth: 10.5 m
Maximum Depth: 25.9 m
Volume: 5.7×10^6 m^3
Contours in feet



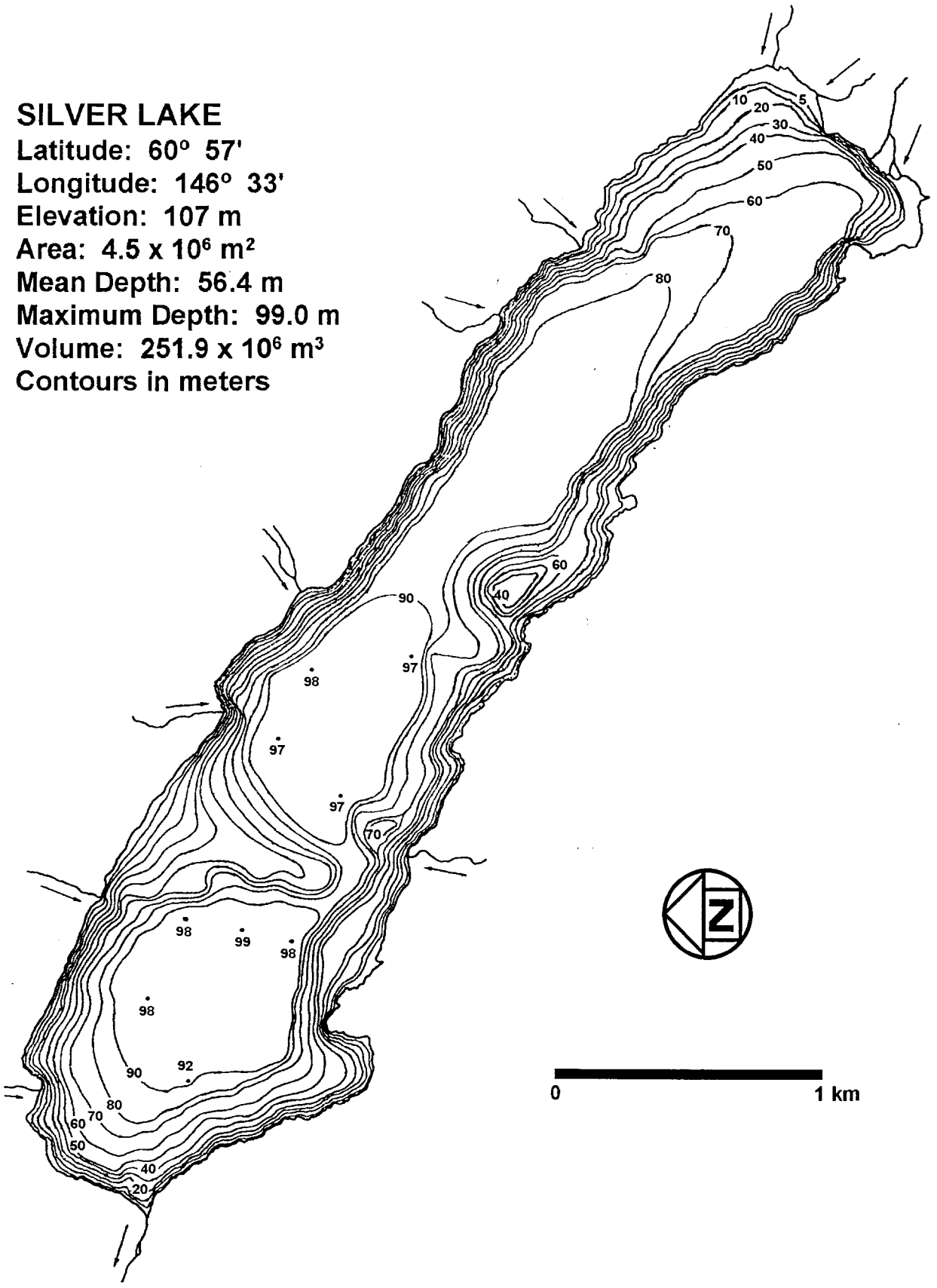
SHELL LAKE

Latitude: 61° 58'
Longitude: 151° 33'
Elevation: 123 m
Area: 5.2 x 10^6 m^2
Mean Depth: 11.9 m
Maximum Depth: 28.7 m
Volume: 62.3 x 10^6 m^3
Contours in feet



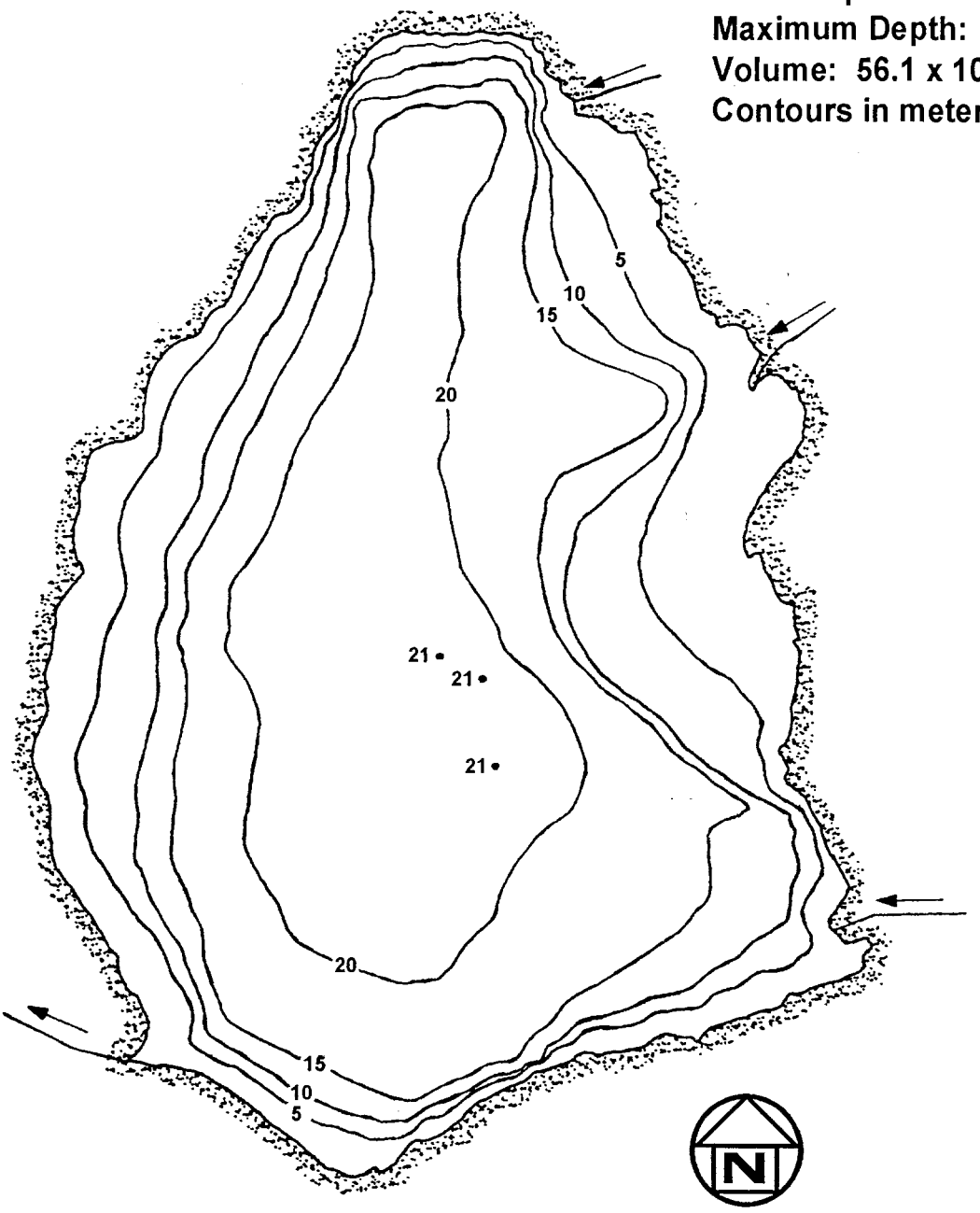
SILVER LAKE

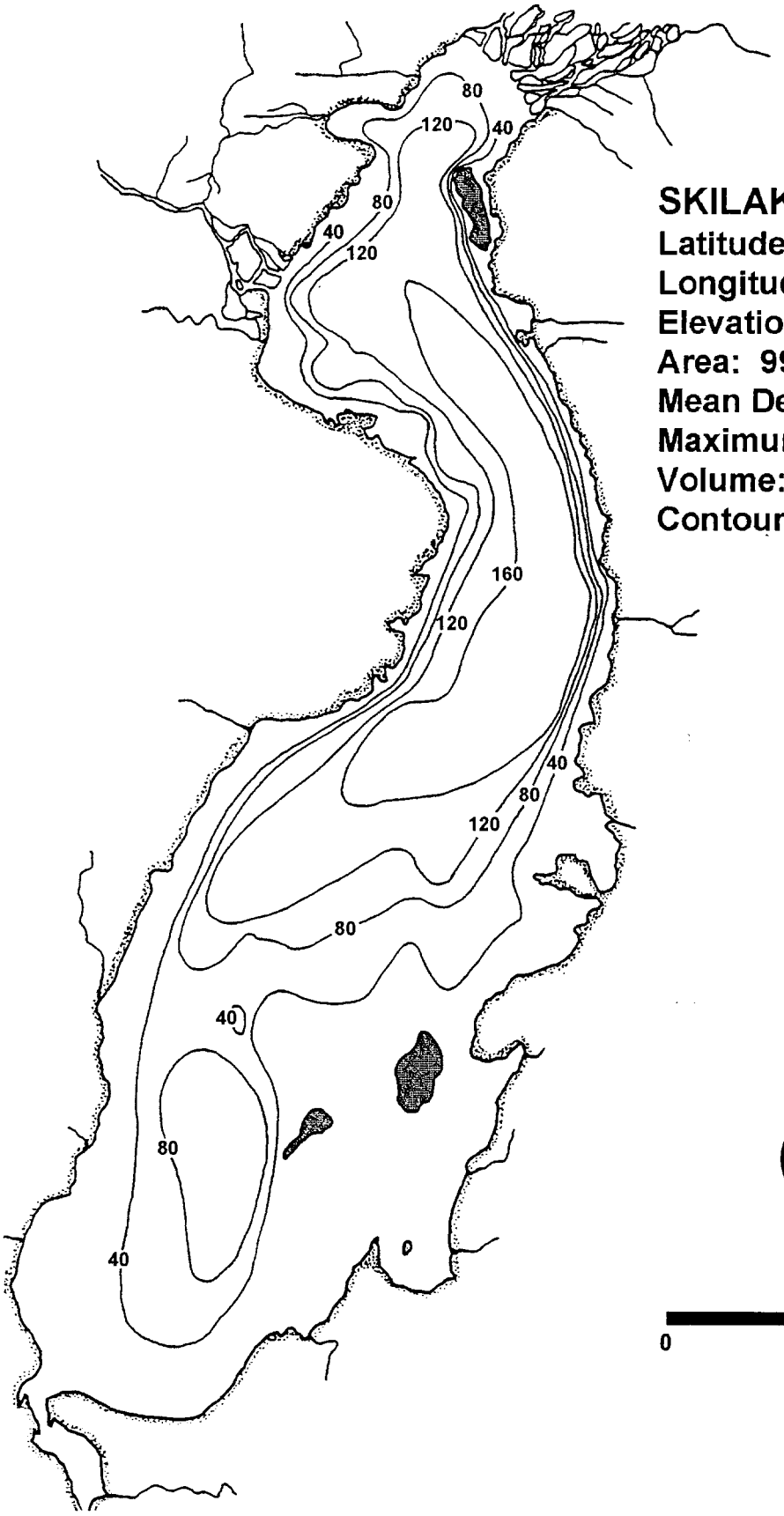
Latitude: 60° 57'
Longitude: 146° 33'
Elevation: 107 m
Area: 4.5 x 10^6 m^2
Mean Depth: 56.4 m
Maximum Depth: 99.0 m
Volume: 251.9 x 10^6 m^3
Contours in meters



SITUK LAKE

Latitude: 59° 38'
Longitude: 139° 24'
Elevation: 42 m
Area: 4.1 x 10^6 m^2
Mean Depth: 14.0 m
Maximum Depth: 21.0 m
Volume: 56.1 x 10^6 m^3
Contours in meters





SKILAK LAKE

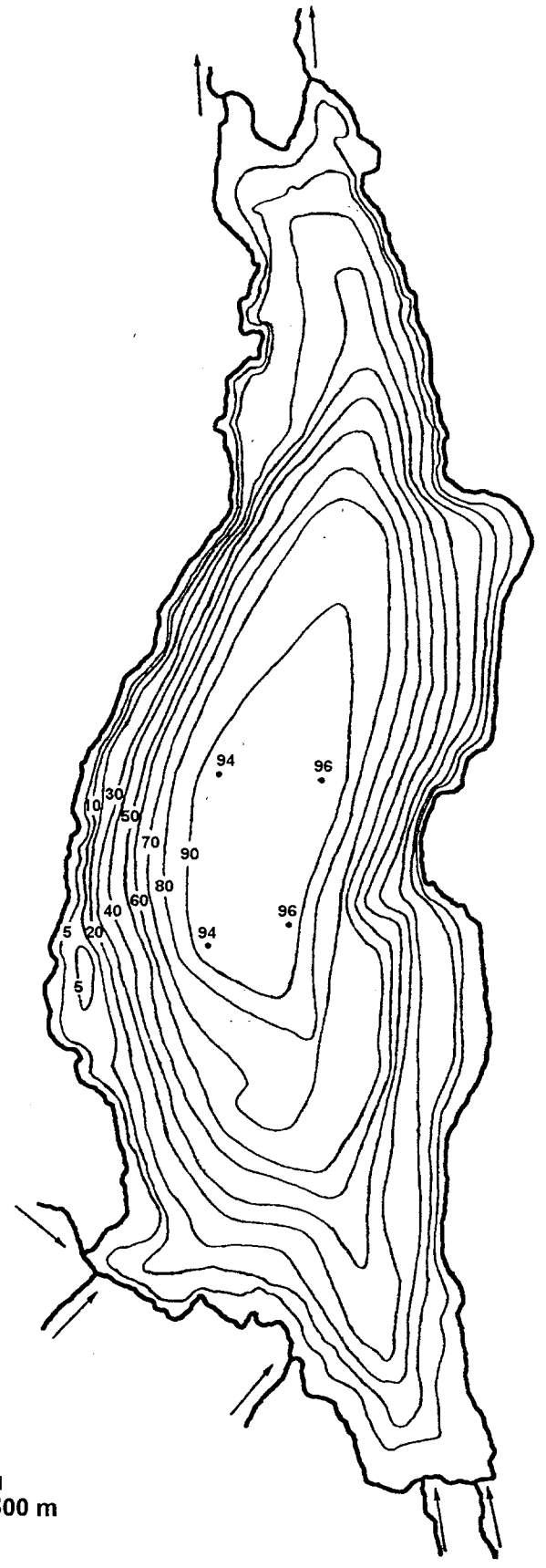
Latitude: 60° 24'
Longitude: 150° 15'
Elevation: 63 m
Area: 99.0 x 10^6 m^2
Mean Depth: 73.0 m
Maximum Depth: 160.0 m
Volume: 7,212.5 x 10^6 m^3
Contours in meters

N

0 5 km

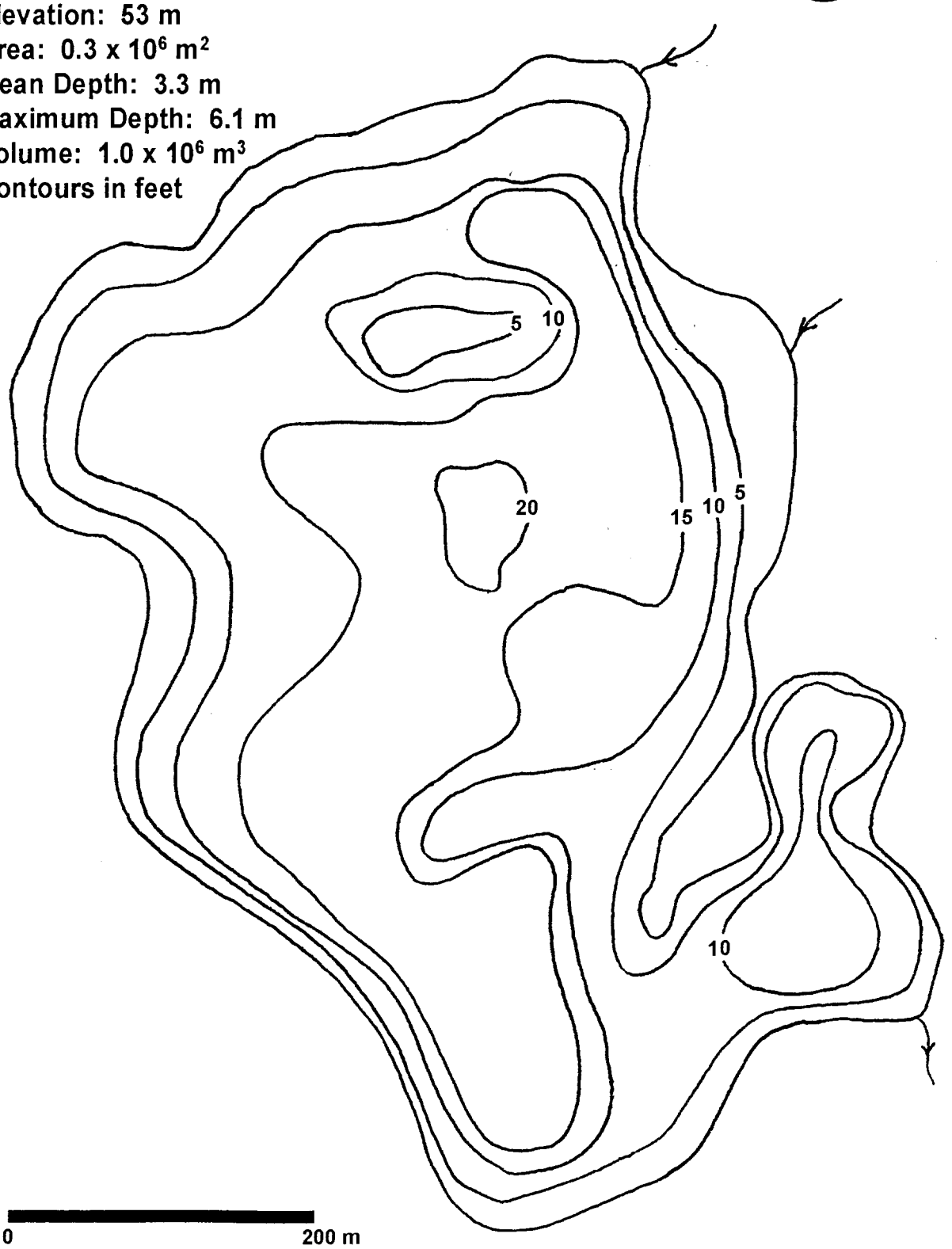
SOLF LAKE

Latitude: 60° 26'
Longitude: 147° 42'
Elevation: 8 m
Area: 0.6 x 10^6 m^2
Mean Depth: 42.5 m
Maximum Depth: 96.0 m
Volume: 25.8 x 10^6 m^3
Contours in meters



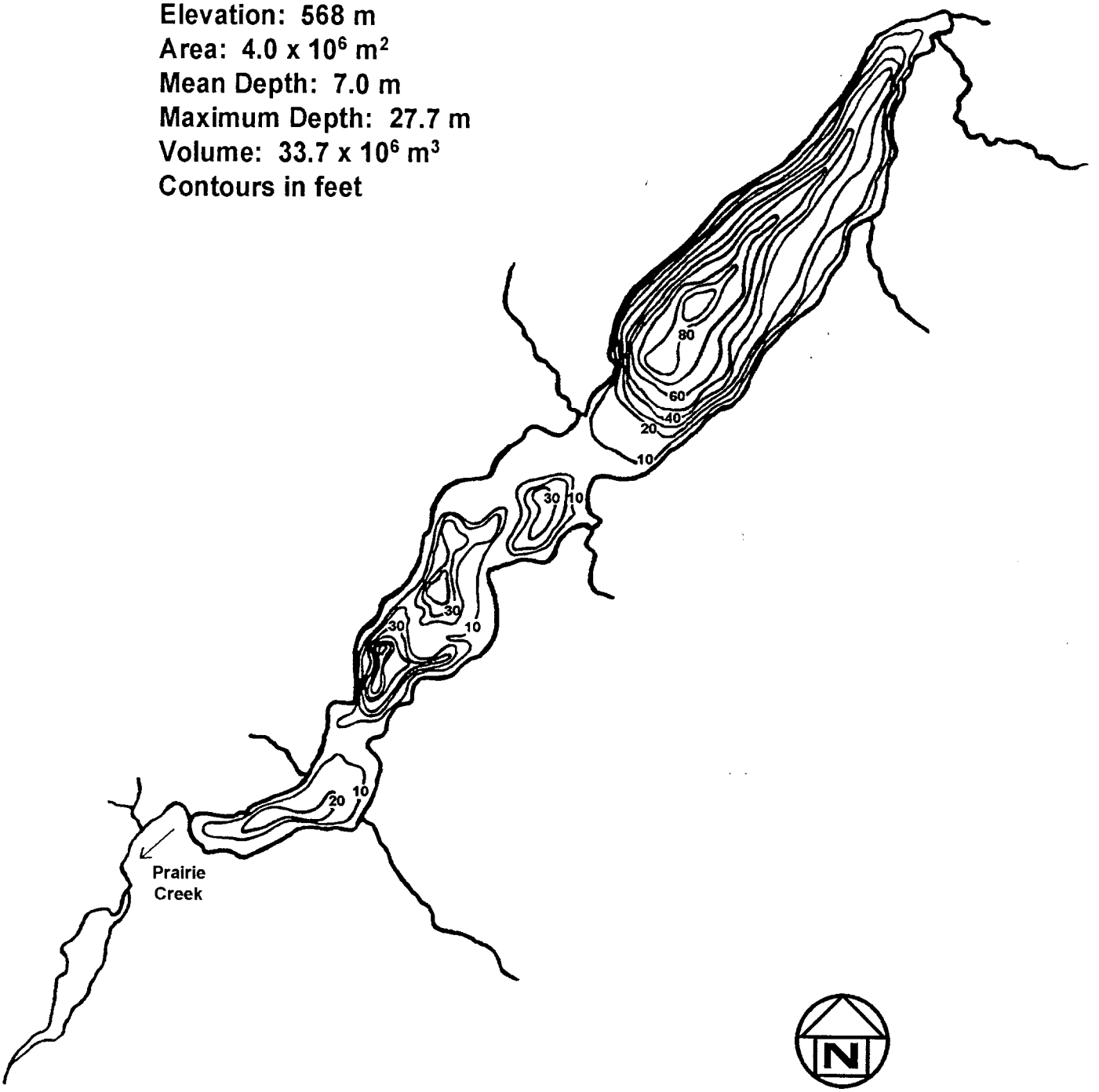
SPORT LAKE

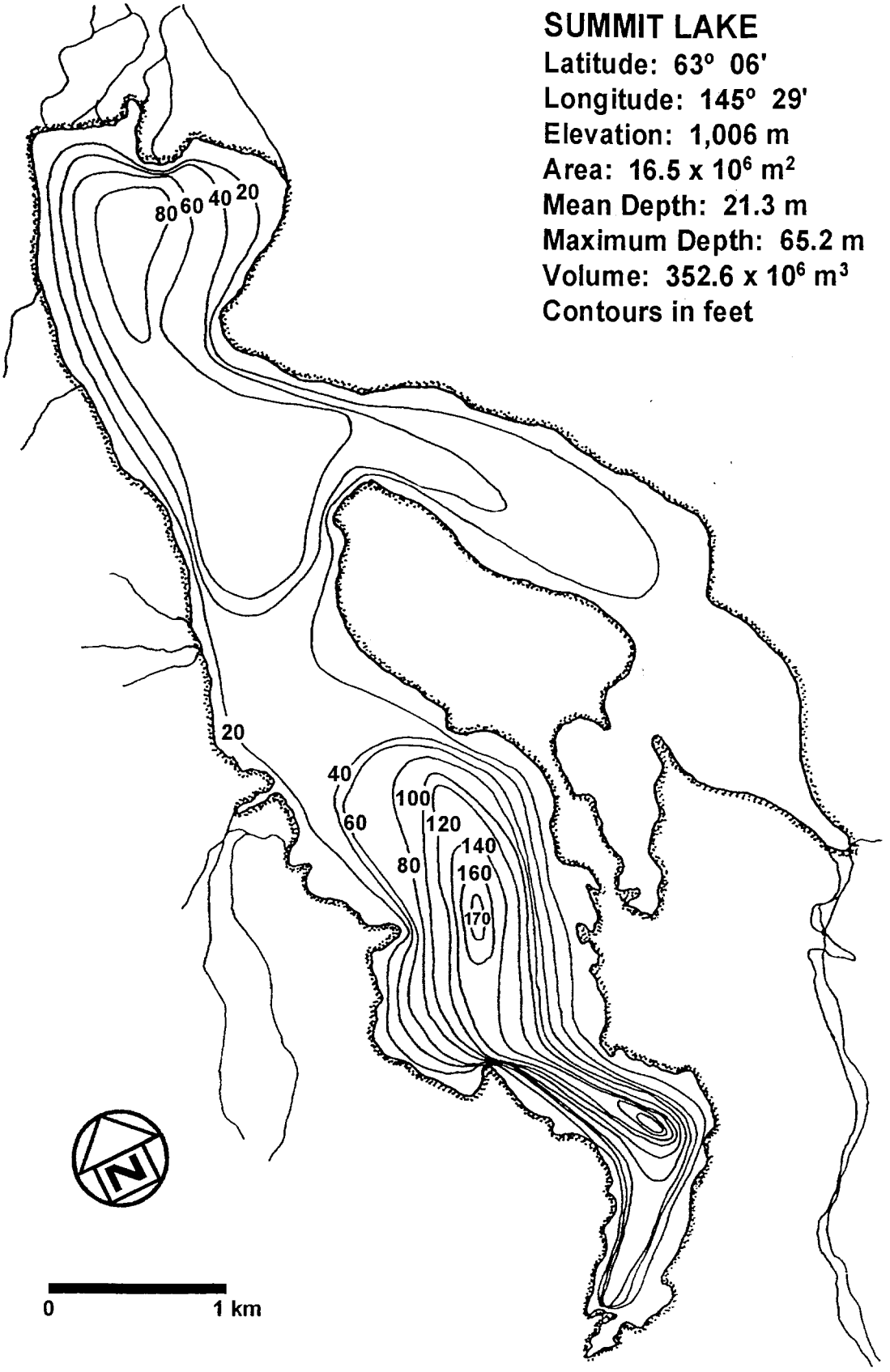
Latitude: 60° 30'
Longitude: 151° 03'
Elevation: 53 m
Area: 0.3×10^6 m^2
Mean Depth: 3.3 m
Maximum Depth: 6.1 m
Volume: 1.0×10^6 m^3
Contours in feet



STEPHAN LAKE

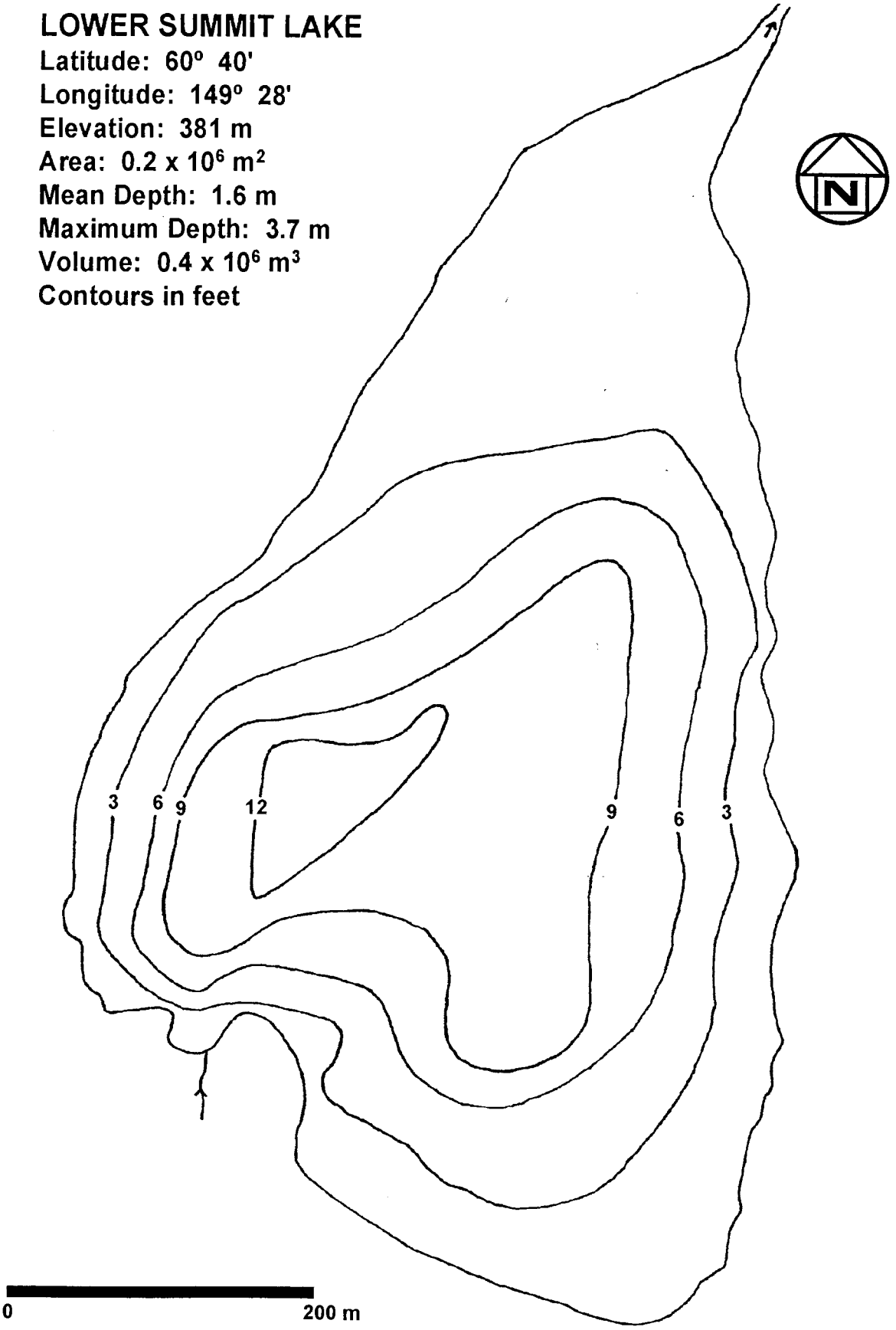
Latitude: 62° 42'
Longitude: 148° 54'
Elevation: 568 m
Area: 4.0×10^6 m^2
Mean Depth: 7.0 m
Maximum Depth: 27.7 m
Volume: 33.7×10^6 m^3
Contours in feet




SUMMIT LAKE
Latitude: 63° 06'
Longitude: 145° 29'
Elevation: 1,006 m
Area: 16.5 x 10^6 m^2
Mean Depth: 21.3 m
Maximum Depth: 65.2 m
Volume: 352.6 x 10^6 m^3
Contours in feet
80
60
40
20
20
40
60
80
100
120
140
160
170
N
0
1 km

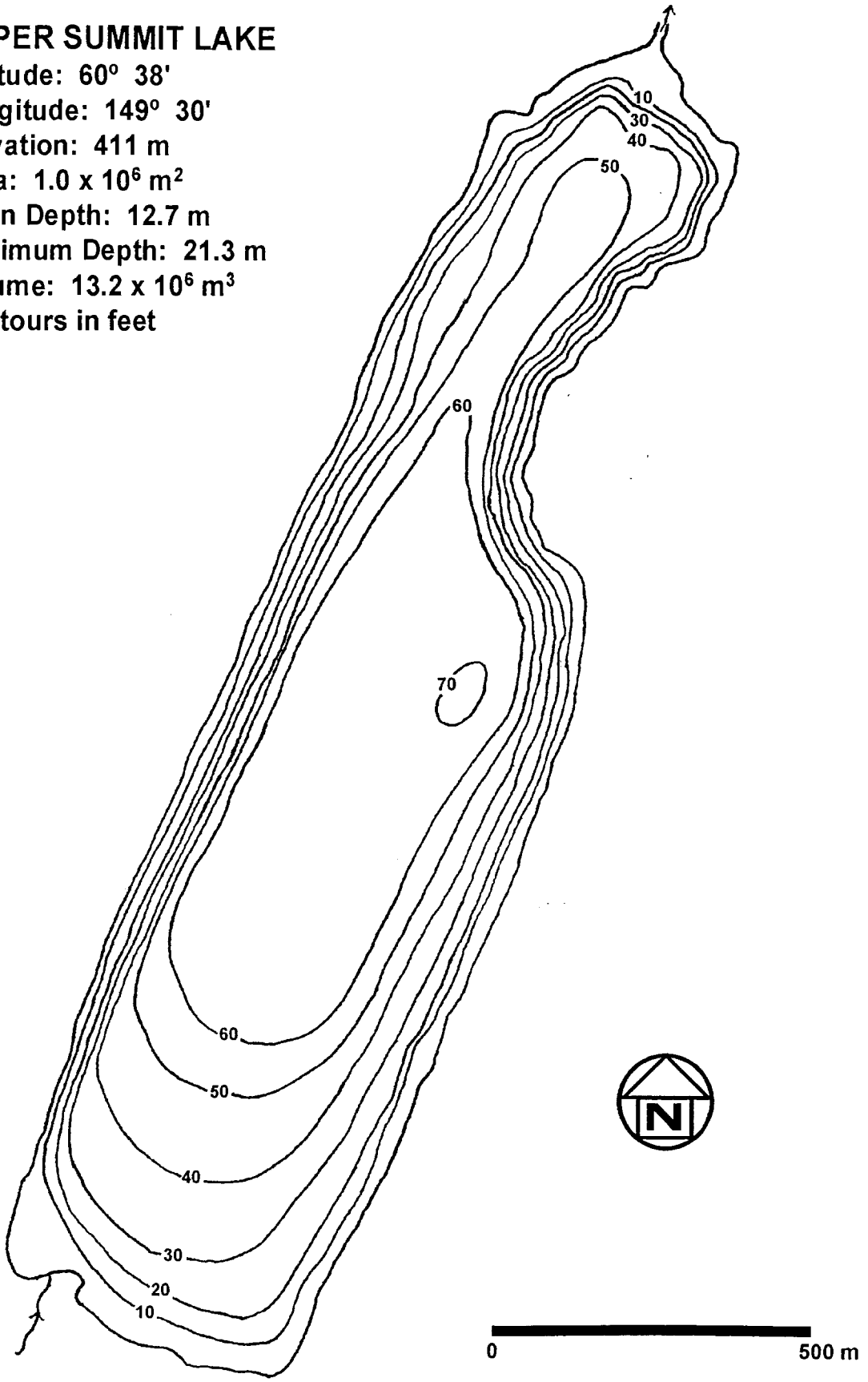
LOWER SUMMIT LAKE

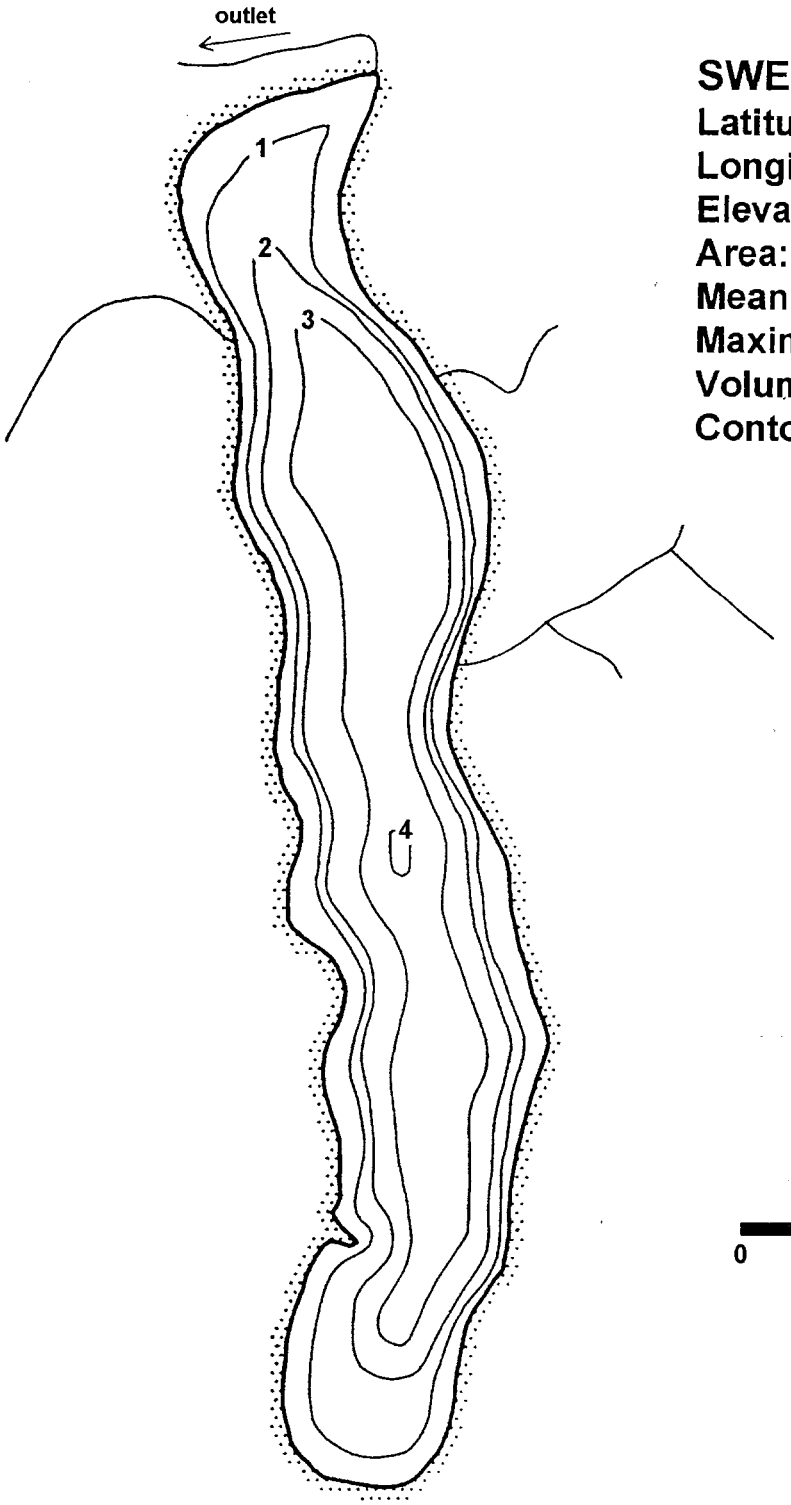
Latitude: 60° 40'
Longitude: 149° 28'
Elevation: 381 m
Area: 0.2 x 10^6 m^2
Mean Depth: 1.6 m
Maximum Depth: 3.7 m
Volume: 0.4 x 10^6 m^3
Contours in feet



UPPER SUMMIT LAKE

Latitude: 60° 38'
Longitude: 149° 30'
Elevation: 411 m
Area: 1.0 x 10^6 m^2
Mean Depth: 12.7 m
Maximum Depth: 21.3 m
Volume: 13.2 x 10^6 m^3
Contours in feet



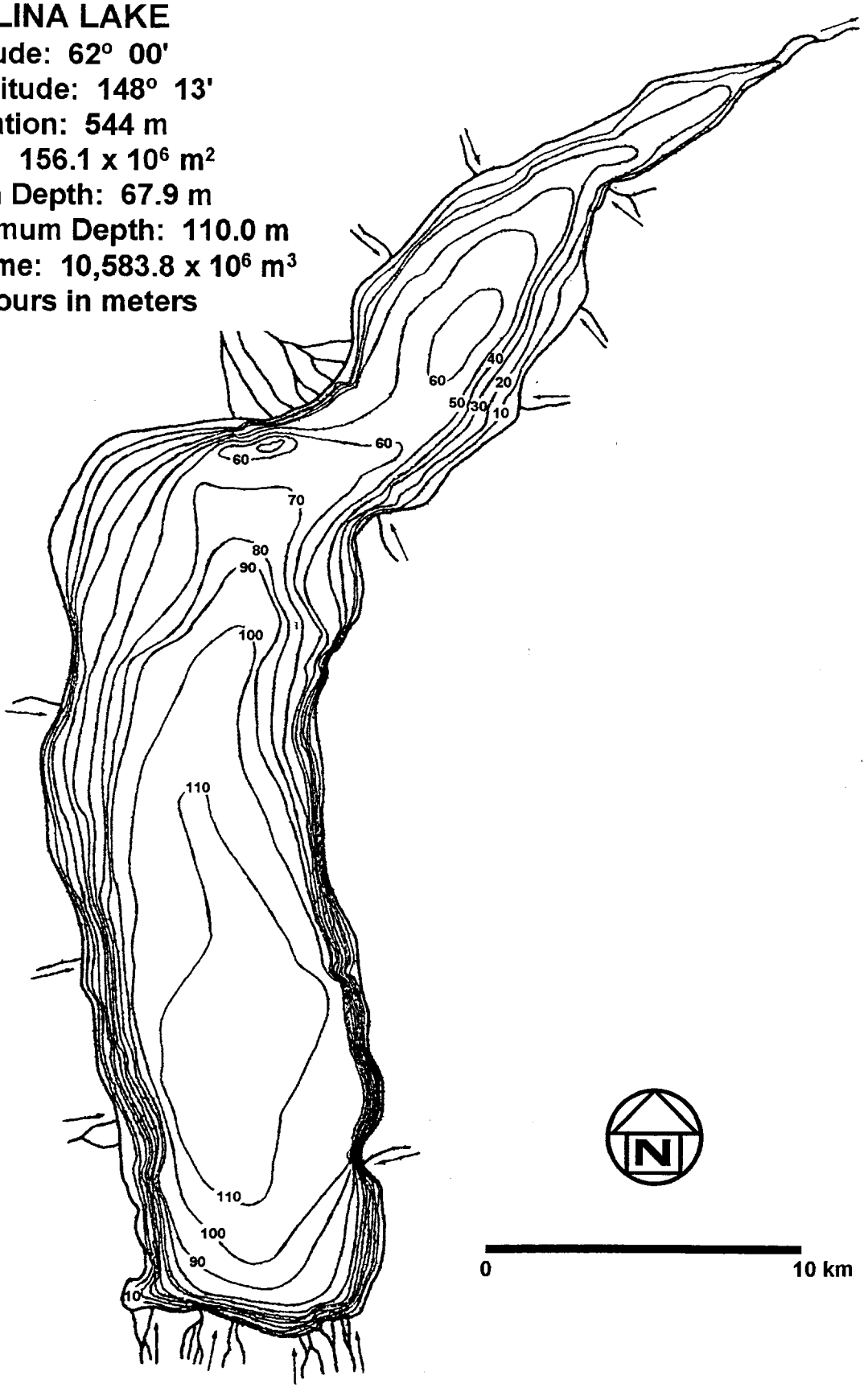


SWEDE LAKE

Latitude: 54° 44'
Longitude: 163° 16'
Elevation: 61 m
Area: 3.9×10^6 m^2
Mean Depth: 2.1 m
Maximum Depth: 4.0 m
Volume: 8.1×10^6 m^3
Contours in meters

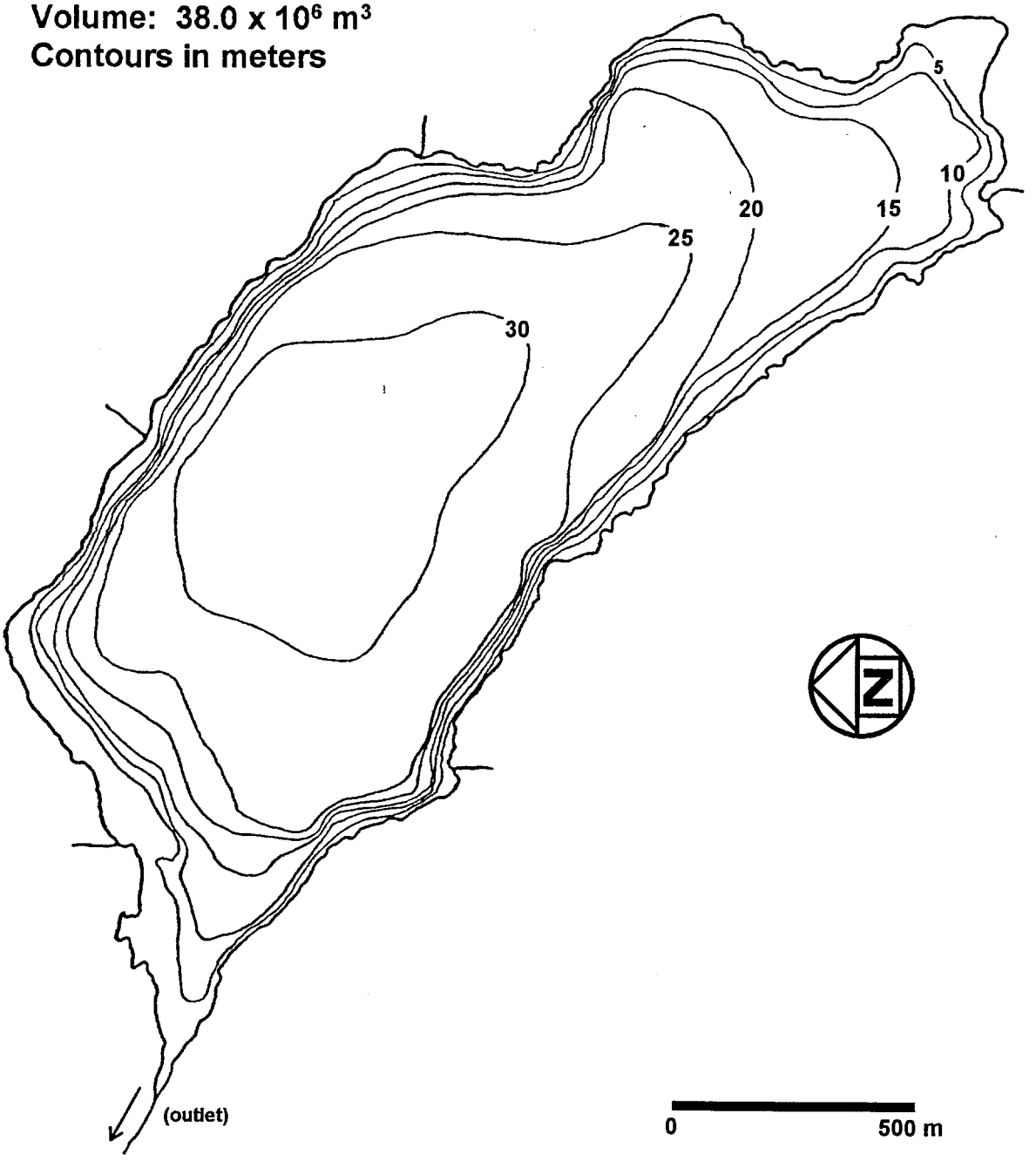
TAZLINA LAKE

Latitude: 62° 00'
Longitude: 148° 13'
Elevation: 544 m
Area: 156.1 x 10^6 m^2
Mean Depth: 67.9 m
Maximum Depth: 110.0 m
Volume: 10,583.8 x 10^6 m^3
Contours in meters



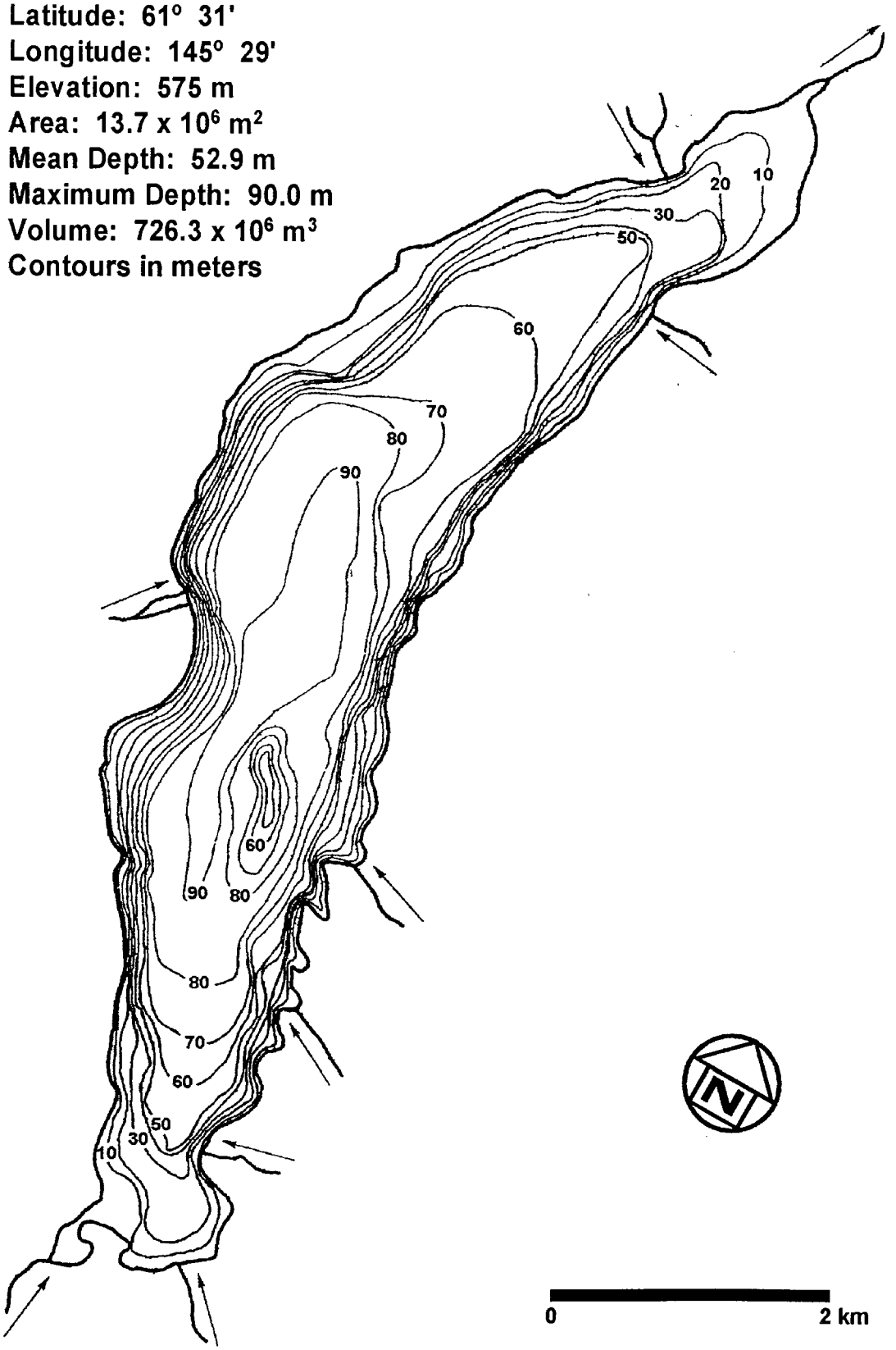
TOKUN LAKE

Latitude: 60° 24'
Longitude: 144° 17'
Elevation: 54 m
Area: 1.8 x 10^6 m^2
Mean Depth: 21.0 m
Maximum Depth: 32.0 m
Volume: 38.0 x 10^6 m^3
Contours in meters



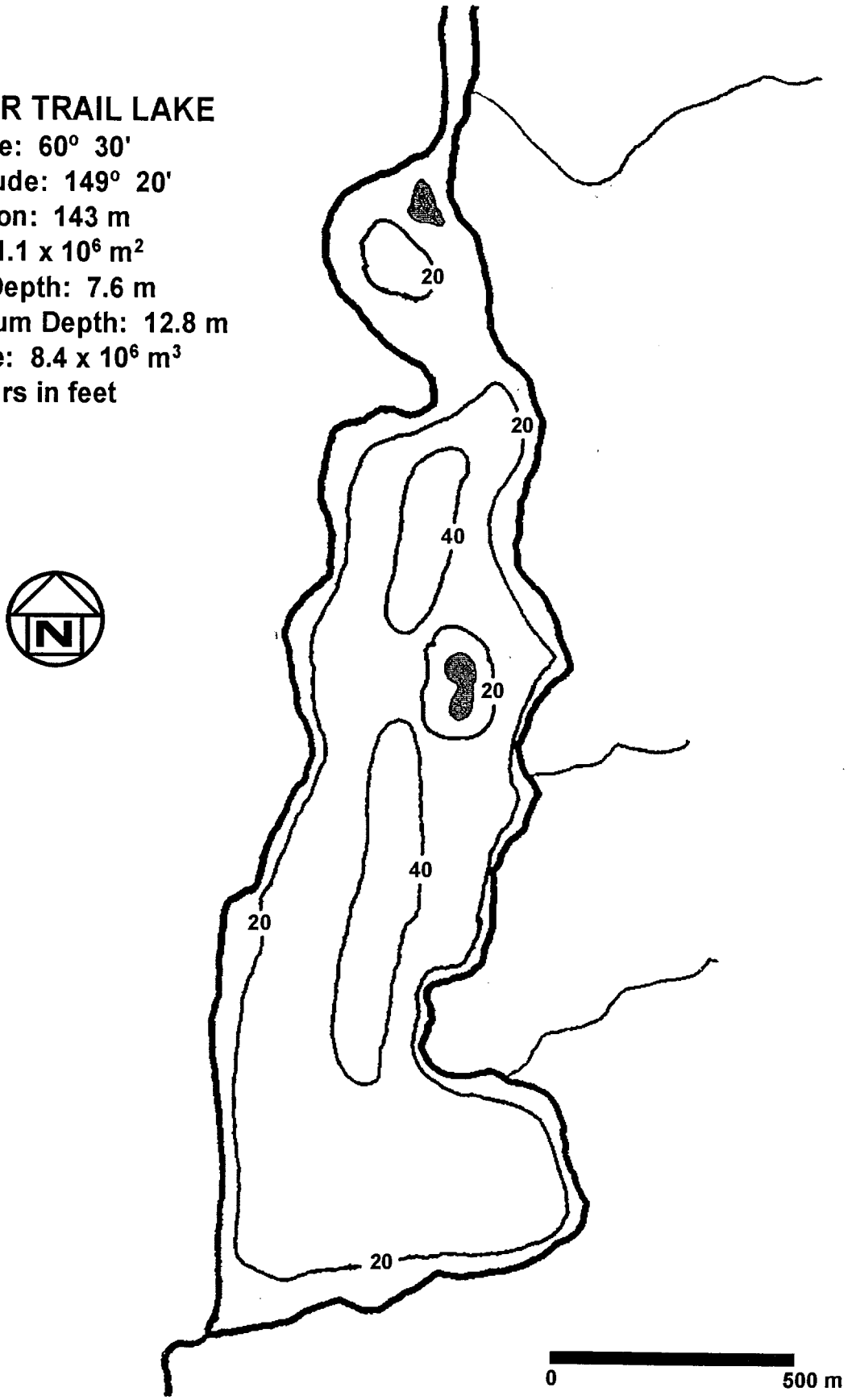
TONSINA LAKE

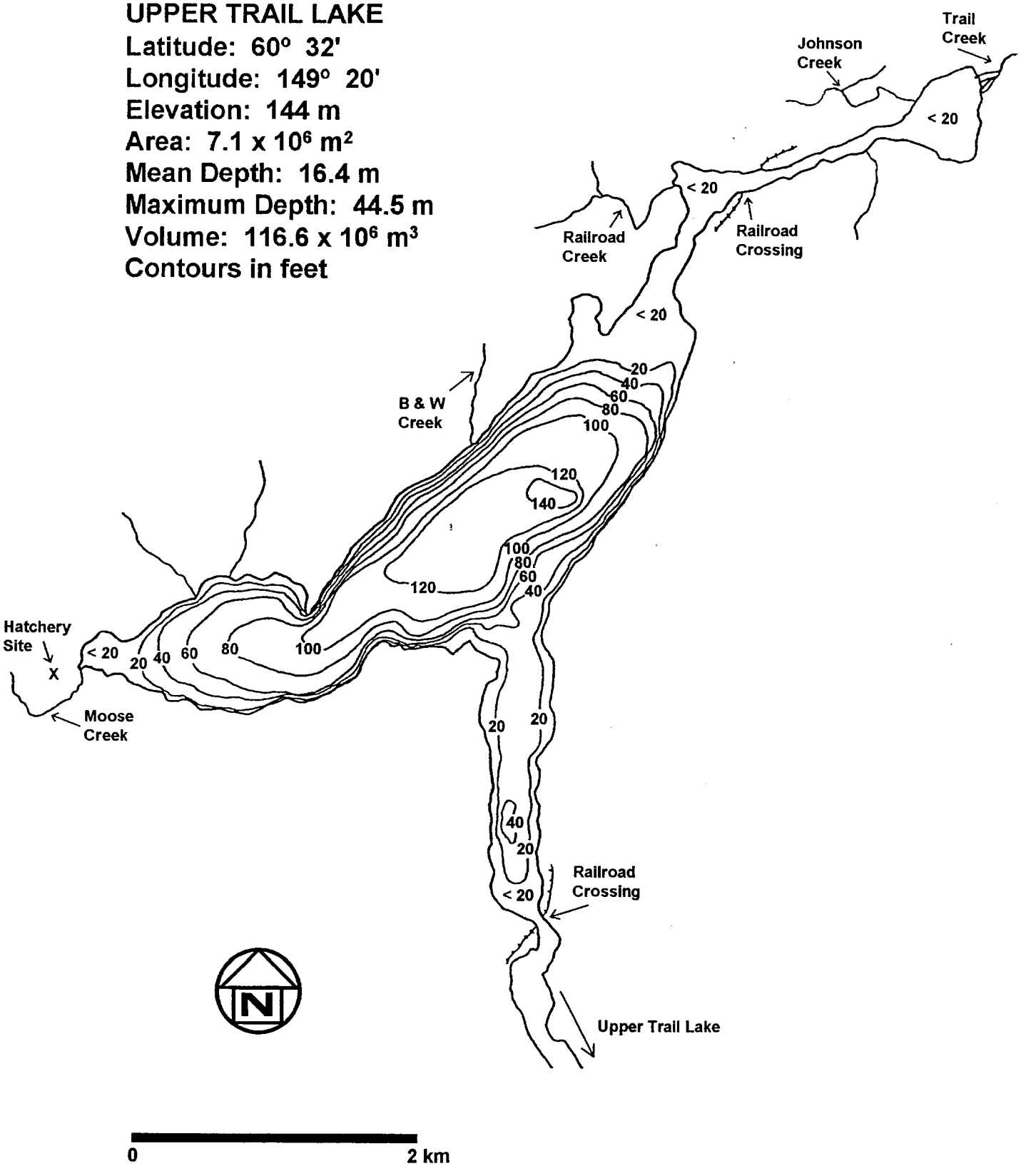
Latitude: 61° 31'
Longitude: 145° 29'
Elevation: 575 m
Area: 13.7 x 10^6 m^2
Mean Depth: 52.9 m
Maximum Depth: 90.0 m
Volume: 726.3 x 10^6 m^3
Contours in meters



LOWER TRAIL LAKE

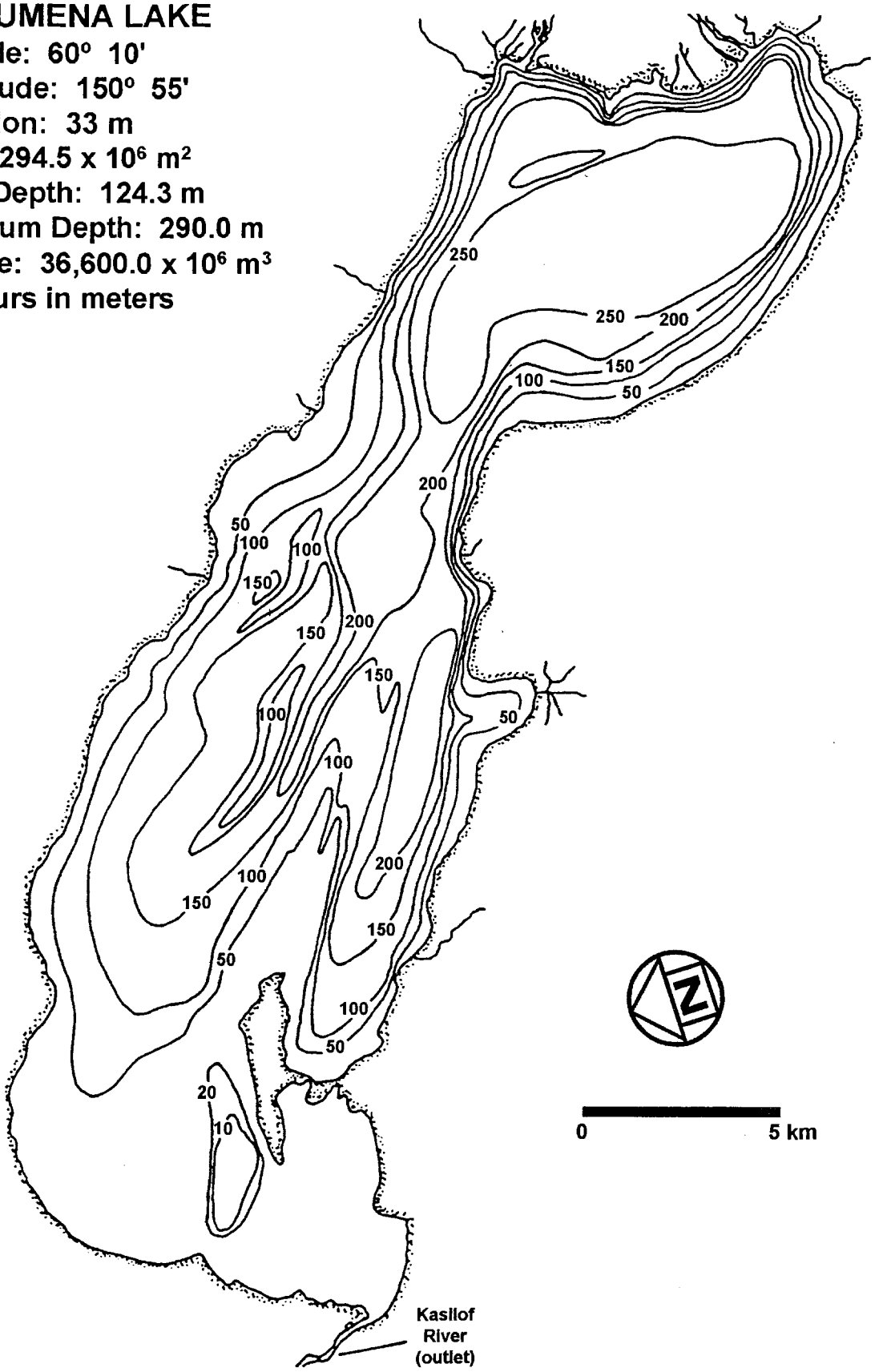
Latitude: 60° 30'
Longitude: 149° 20'
Elevation: 143 m
Area: 1.1 x 10^6 m^2
Mean Depth: 7.6 m
Maximum Depth: 12.8 m
Volume: 8.4 x 10^6 m^3
Contours in feet

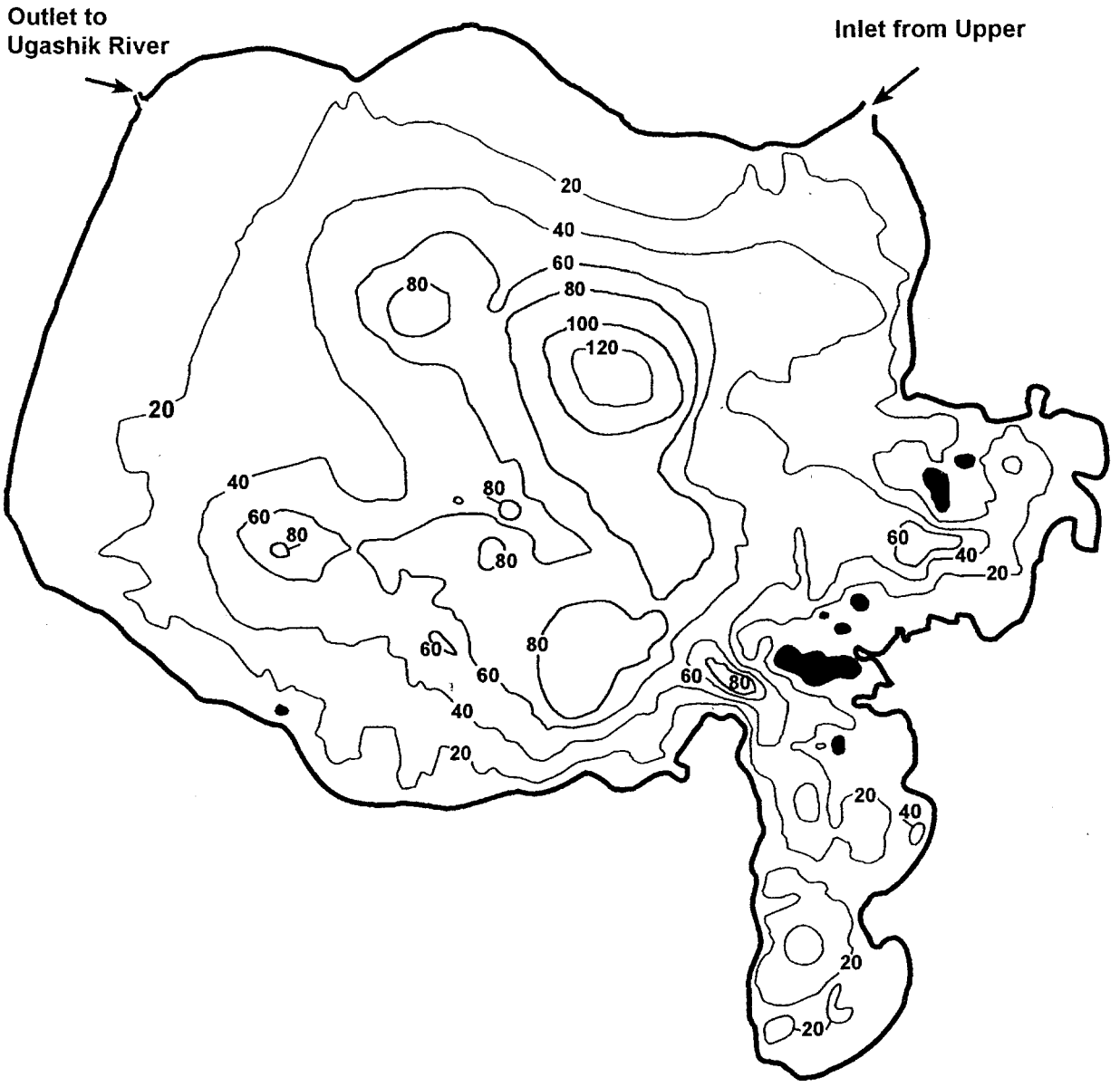



UPPER TRAIL LAKE
Latitude: 60° 32'
Longitude: 149° 20'
Elevation: 144 m
Area: 7.1 x 10⁶ m²
Mean Depth: 16.4 m
Maximum Depth: 44.5 m
Volume: 116.6 x 10⁶ m³
Contours in feet
Trail Creek
Johnson Creek
< 20
Railroad Creek
Railroad Crossing
B & W Creek
20
40
60
80
100
120
140
Hatchery Site
X
Moose Creek
Railroad Crossing
N
Upper Trail Lake
0
2 km

TUSTUMENA LAKE

Latitude: 60° 10'
Longitude: 150° 55'
Elevation: 33 m
Area: 294.5 x 10^6 m^2
Mean Depth: 124.3 m
Maximum Depth: 290.0 m
Volume: 36,600.0 x 10^6 m^3
Contours in meters



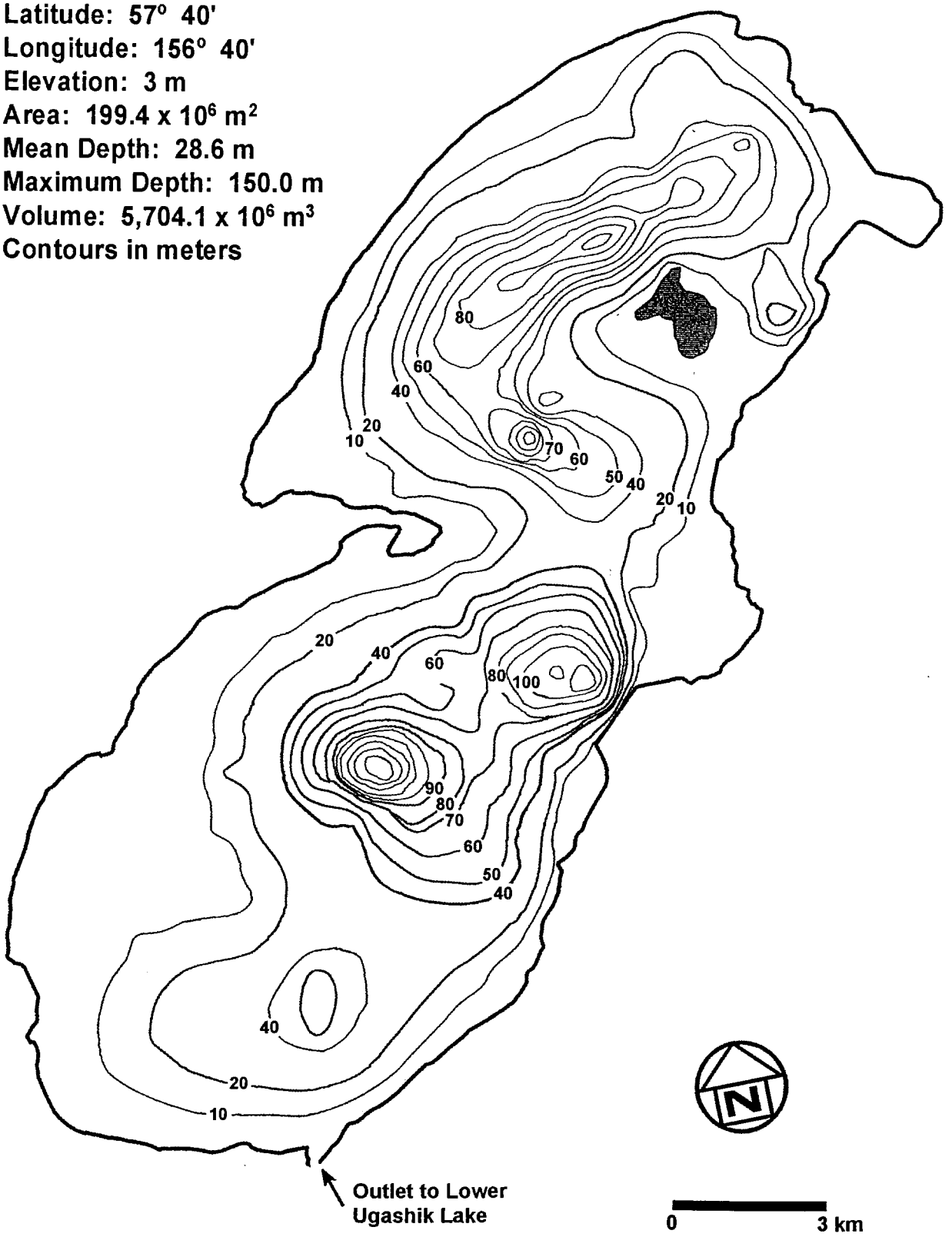


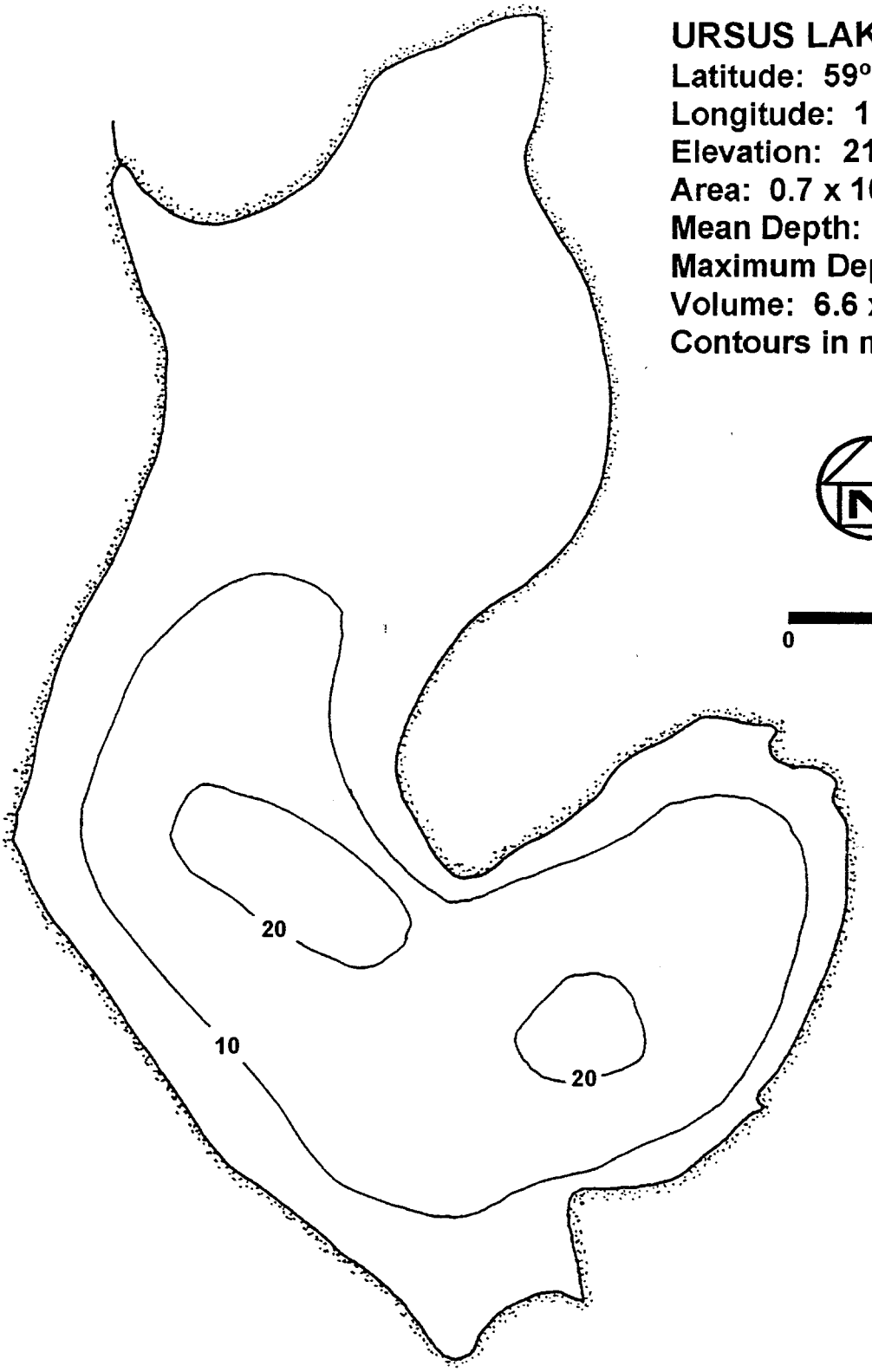
LOWER UGASHIK LAKE

Latitude: 57° 30'
Longitude: 157° 08'
Elevation: 3 m
Area: 182.3 x 10^6 m^2
Mean Depth: 35.7 m
Maximum Depth: 120.0 m
Volume: 6,484.0 x 10^6 m^3
Contours in meters

UPPER UGASHIK LAKE

Latitude: 57° 40'
Longitude: 156° 40'
Elevation: 3 m
Area: 199.4 x 10^6 m^2
Mean Depth: 28.6 m
Maximum Depth: 150.0 m
Volume: 5,704.1 x 10^6 m^3
Contours in meters



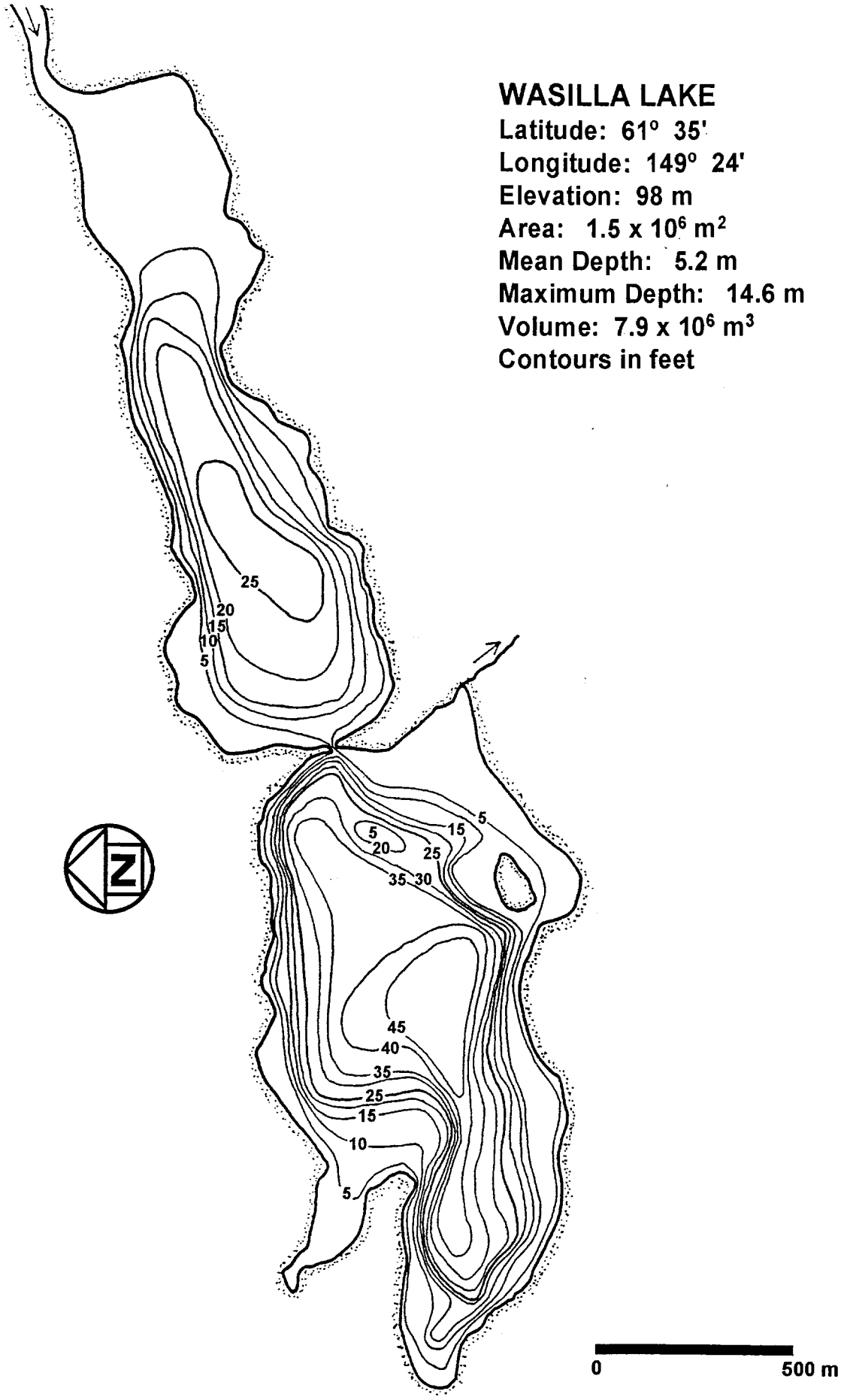


URSUS LAKE

Latitude: 59° 30'
Longitude: 153° 55'
Elevation: 213 m
Area: 0.7 x 10^6 m^2
Mean Depth: 9.0 m
Maximum Depth: 22.0 m
Volume: 6.6 x 10^6 m^3
Contours in meters

N

0 200 m


WASILLA LAKE
Latitude: 61° 35'
Longitude: 149° 24'
Elevation: 98 m
Area: 1.5 x 10⁶ m²
Mean Depth: 5.2 m
Maximum Depth: 14.6 m
Volume: 7.9 x 10⁶ m³
Contours in feet
N
25
20
15
10
5
5
20
25
15
5
35
30
45
40
35
25
15
10
5
0
500 m