

SURVEY OF LAKES IN THE PLACER AND OBERON PROSPECTS: 2002

Final Data Report

September 2003



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EXECUTIVE SUMMARY

ConocoPhillips has identified two exploration areas, Placer and Oberon, that lie between the western side of the Kuparuk River Unit and the Colville River – see Figure 1. During review of exploration, and potentially development, permits, information is required on the biological sensitivity of lakes in the region. The study was designed to provide physical and biological information on these lakes to understand their use by various fish species. In addition, results of the survey can be used, in concert with previous surveys within the area, to direct any future investigations that may be needed.

The objectives of the study are to document fish presence and habitat use in lakes that may be used to support exploration activities. These activities include constructing ice roads as well as supporting drilling and camp needs. The region surveyed during 2002 generally lies between the western edge of the Kuparuk River Unit and the Colville River.

The objectives of the survey were to:

- 1) inventory fish species in the various lakes within the project study areas),
- 2) obtain information on relative abundance of species in different water bodies sampled, especially from lakes that may be proposed for water withdrawal during exploration and field development,
- 3) measure lake depths to estimate lake volumes, and
- 4) measure water chemistry parameters to assess suitability of water for potential uses.

Lakes in the area may be needed as sources of freshwater during oil exploration, for ice road and ice pad construction, as well as for short-term potable water supplies. Permitting decisions on water withdrawal will need to consider potential impacts to fish that depend on an adequate water supply for surviving winter. The inventory of fish and fish habitat provides information for assisting permitting decisions regarding water use and ice road routing. The surveys in lakes consisted of short-duration gill net sampling in July and August, supplemented with minnow trap sets and seine hauls.

The biological survey consisted of sampling with gill nets, minnow traps and seine combined with physical measurements. Lakes were sampled with short-duration gill net sets using a multimesh gill net. Since the objective of the gill netting is to document presence/absence, the nets were pulled after fish were detected. Minnow traps and seines were used to identify smaller fish species that may not be detected by gill nets. Water chemistry measurements included surface measures of water temperature, specific conductance, dissolved oxygen, pH, and turbidity.

Bathymetric data were collected to allow estimating lake volume by contour mapping of depth intervals. The amount allowed for winter water withdrawal when sensitive fish species are present is

currently set at 15% of the volume of the lake deeper than 7 feet. When resistant fish species (i.e. ninespine stickleback and Alaska blackfish) are present, the current allocation is 30% of the volume deeper than 5 feet. There is no withdrawal limit if fish are not present.

The area potentially available for ice aggregate was estimated by calculating the area of the lake shallower than 4 feet, assuming that the ice would grow to at least 4 feet prior to the need for aggregate. If the ice is shallower than 4 feet at the time of ice removal, then the area available will be less.

A total of 19 lakes were sampled in the study area in 2002 in connection with potential exploration in the Placer and Oberon regions. Least cisco were captured by gill net in 1 of the lakes, with broad whitefish also caught in 1 lake. Ninespine stickleback were caught or observed in 8 additional lakes.

Mean water temperatures during the survey ranged as follows:

Jul 14 to 16, 2002: 14.2 oC (range: 11.5 to 17.6oC).
Aug 23 to 29, 2002: 7.0 oC (range: 5.0 to 9.5oC).

Dissolved oxygen typical for North Slope surface waters, averaging 100% saturation in July and over 91% in August.

Information from fish sampling and depth measurements was used to evaluate each lake regarding its potential to support fish. Obviously, if fish were captured during gill net sampling, the lake was classified as fish-bearing. Lakes also were assessed for their proximity to fish-bearing streams and their depth. Lakes deeper than 7 feet are likely to retain unfrozen water during winter, thus have potential to overwinter fish. Deep lakes that are near fish-bearing streams and are likely to have a connection with the stream at some point during the year are classified as potential fish-bearing lakes, with additional sampling needed if further clarification of the designation is desired.

Lakes in which fish were verified as present are divided into those lakes containing species sensitive to habitat changes likely to be associated with water withdrawal and those containing species more resistant to such changes. For lakes that do not contain fish, there is currently no limit to the amount taken. For practical reasons, the volume available is limited to the volume of unfrozen water under the ice at the time of withdrawal. In most cases, the withdrawal occurs when the ice is 4 feet thick or greater. In order to provide some estimate of water likely to be available, the volume of water under 4 feet of ice is provided.

Based on the above lake evaluation, 11 lakes were confirmed to contain fish, with 2 containing sensitive species and 9 containing ninespine stickleback.

The following amounts of water are likely to be available for winter use in the areas from lakes surveyed in 2002:

Area	Million Gallons Available
Placer	221.7
Oberon	25.6

The area covered by water less than 4 feet deep, and therefore likely to be suitable for removing ice aggregate, was estimated for each lake. A map of the potential ice aggregate area for each lake is included in the individual lake summaries. The following table summarizes the area available for ice aggregate near each exploration prospect surveyed in 2002:

Area	Acres Available
Placer	1,385.8
Oberon	405.9

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INTRODUCTION

ConocoPhillips has identified two exploration areas, Placer and Oberon, that lie between the western side of the Kuparuk River Unit and the Colville River – see Figure 1. During review of exploration, and potentially development, permits, information is required on the biological sensitivity of lakes in the region. The study was designed to provide physical and biological information on these lakes to understand their use by various fish species. In addition, results of the survey can be used, in concert with previous surveys within the area, to direct any future investigations that may be needed.

The objectives of the study are to document fish presence and habitat use in lakes that may be used to support exploration activities. These activities include constructing ice roads as well as supporting drilling and camp needs. The region surveyed during 2002 generally lies between the western edge of the Kuparuk River Unit and the Colville River.

The objectives of the survey were to:

- 1) inventory fish species in the various lakes within the project study areas (sampling areas identified in Figure 1),
- 2) obtain information on relative abundance of species in different water bodies sampled, especially from lakes that may be proposed for water withdrawal during exploration and field development,
- 3) measure lake depths to estimate lake volumes, and
- 4) measure water chemistry parameters to assess suitability of water for potential uses.

Lakes in the area may be needed as sources of freshwater during oil exploration, for ice road and ice pad construction, as well as for short-term potable water supplies. Permitting decisions on water withdrawal will need to consider potential impacts to fish that depend on an adequate water supply for surviving winter. The inventory of fish and fish habitat provides information for assisting permitting decisions regarding water use and ice road routing. The surveys in lakes consisted of short-duration gill net sampling in July and August, supplemented with minnow trap sets and seine hauls.

Bathymetric and water chemistry data were collected in conjunction with fish sampling. The bathymetric information allows estimating lake volumes. Water chemistry parameters measured include water temperature, specific conductance, dissolved oxygen, pH and turbidity.

METHODS

The biological survey consisted of sampling with gill nets and minnow traps combined with physical measurements. Lakes were sampled with short-duration gill net sets (typically 4 to 6 hours) using a multimesh gill net (120 feet long, six panels of variable mesh, mesh size ranging from 1 to 3.5 inches stretched mesh). These nets have been previously used to collect inventory-level data from North Slope lakes. The sets were kept to a short duration to minimize the chance for entangling waterfowl and to minimize fish mortality. Since the objective of the gill netting is to document presence/absence, the nets were pulled after fish were detected. Fish captured were measured and released if not severely injured. Duration of each set was recorded to allow calculation of catch rates.

In 2002, minnow traps and seines were used to identify smaller fish species that may not be detected by gill nets. Minnow traps baited with preserved salmon eggs were set in pairs at the edge of surveyed lakes. The traps were set and retrieved in concert with the gill net sampling. At lakes where bottom contours allowed, a 20 ft seine was pulled through vegetation beds along the lakeshore to detect small fishes. Where this method was employed, three hauls were made at each lake.

Water chemistry parameters were measured to assess habitat conditions and provide information on the suitability of the water for domestic and industrial uses. Water chemistry measurements included surface measures of water temperature, specific conductance, dissolved oxygen, pH, and turbidity. Temperature, specific conductance and dissolved oxygen were *in situ* surface measurements taken along the edge of each lake with a YSI Model 85 meter. A sample was returned to the field office to measure pH and turbidity. PH was measured with an Oaktron Acorn Series pH5 meter. Turbidity was measured with a LaMotte Model 2020 turbidity meter.

Bathymetric data were collected to allow estimating lake volume. In 2002, location and depth were recorded on a Lowrance Model LCX-15MT integrated GPS/depth sounder. Location and depth were recorded at approximately 1-2 second intervals. The study design was to record at least six to eight depth transects on each lake. Lake volume was estimated by contour mapping of depth intervals. Contour maps were prepared by plotting the position and depth data obtained by GPS on GIS basemaps and plotting the contours in 1 ft intervals on maps of the surveyed lakes. The surface area of each 1 ft contour was obtained, then the volume was estimated using the formula for truncated cones:

$$V = h/3*(A1+A2+(A1*A2) (1/2))$$

Where h = vertical depth of the stratum, A1 = area of the upper surface, and A2 = area of the lower surface of the stratum whose volume is to be determined. The volumes of individual strata are summed to obtain the volume of the desired depth intervals.

The amount allowed for winter water withdrawal when sensitive fish species are present is currently set at 15% of the volume of the lake deeper than 7 feet. When resistant fish species (i.e. ninespine stickleback and Alaska blackfish) are present, the current allocation is 30% of the volume deeper

than 5 feet. There is no withdrawal limit if fish are not present.

The area potentially available for ice aggregate was estimated by calculating the area of the lake shallower than 4 feet, assuming that the ice would grow to at least 4 feet prior to the need for aggregate. If the ice is shallower than 4 feet at the time of ice removal, then the area available will be less

Lake Summaries

This report uses lake numbering based a researcher/year code. The lake number contains several pieces of information, including the code of the sampler and the year of sampling.

Sampler Code:

MC = McElderry and Craig (1981); sampling in 1979

B = Bendock sampling from 1977-1986

L = Lobdell; water chemistry sampling in 1991-1999

M = Moulton; fish sampling in 1995-2002

N = Netsch et al. (1977) NPRA sampling in 1977

First Two Numerals:

Year of Initial Sampling

(if Moulton sampled a lake previously sampled by McElderry and Craig, then the McElderry and Craig lake number is used)

Last Two Numerals:

Numbers from 1 to 99 used to identify the individual lake sampled within a given year

Information contained for each surveyed lake (if measured) includes:

1. A diagram of the lake,
2. Other names utilized for the same lake,
3. Lake location, in latitude/longitude,
4. The USGS quadrangle sheet and the township and range in which the lake is situated
5. Habitat classification,
6. Surface area in acres, obtained from USGS digital maps,
7. Maximum depth in feet,
8. Presence or absence of an outlet,
9. pH,
10. Calculated lake volume and volume of water permitted for winter withdrawal,
11. Area potentially available for ice aggregate
12. Water chemistry measurements,
13. Catch record, including gear used, date sampled, species caught and size range,
14. Where appropriate data exist, the length frequency of dominant species is plotted.

Six different lake types are defined, based primarily on the potential for access by fish. Definitions for the lake types are as follows:

Perched (Frequent Flooding) = Perched lake near a floodplain, but above the water surface elevation of the active channel, with an obvious high water channel. These lakes are likely subject to annual flooding.

Perched (Infrequent Flooding) = Perched lake near a floodplain, but above the water surface elevation of the active channel, with no obvious high water channel. These lakes are likely subject to flooding on an infrequent basis (every five years or more).

Deflation = Deflation lake, a lake formed when sand dunes become revegetated and the basins between the dunes become filled with water. Deflation lakes are typically the deepest coastal plain lakes.

Drainage = Drainage Lake, a lake that is part of a defined drainage system, i.e. there is an active connection to a creek.

Oxbow = Oxbow lake, formed from abandoned river channels.

Tundra = Tundra Lake, a thaw lake not within or connected to a river drainage, little potential for fish access on a regular basis.

RESULTS AND DISCUSSION

Biological Observations

A total of 19 lakes were sampled in the study area in 2002 in connection with potential exploration in the Placer and Oberon region (Table 1). Several of these lakes had previously been sampled, and the original lake name is used for these lakes. Least cisco were captured by gill net in 1 of the lakes, with broad whitefish also caught in 1 lake (Table 2). Ninespine stickleback were caught or observed in 8 additional lakes. Length information on the captured least cisco and broad whitefish is presented for each lake in the Lake Summaries.

Water Chemistry Measurements

Water chemistry parameters measured in the studied lakes are presented Table 3. Mean water temperatures during the survey ranged as follows:

Jul 14 to 16, 2002: 14.2 °C (range: 11.5 to 17.6°C).
Aug 23 to 29, 2002: 7.0 °C (range: 5.0 to 9.5°C).

Dissolved oxygen typical for North Slope surface waters, averaging 100% saturation in July and over 91% in August. The observed frequency of specific conductance and pH values from surveyed lakes are graphed in Figure 4.

Evaluation of Fish Concerns

Information from fish sampling and depth measurements was used to evaluate each lake regarding its potential to support fish. Obviously, if fish were captured during gill net sampling, the lake was classified as fish-bearing. Gill net sets were relatively short, however, so absence of catch does not necessarily mean a lake does not support fish. Lakes also were assessed for their proximity to fish-bearing streams and their depth. Lakes deeper than 7 feet are likely to retain unfrozen water during winter, thus have potential to overwinter fish. Deep lakes that are near fish-bearing streams and are likely to have a connection with the stream at some point during the year are classified as potential fish-bearing lakes, with additional sampling needed if further clarification of the designation is desired. Results of the evaluation are included in Table 4.

Lakes in which fish were verified as present are divided into those lakes containing species sensitive to habitat changes likely to be associated with water withdrawal and those containing species more resistant to such changes. Species sensitive to impacts of water withdrawal (such as reduced dissolved oxygen and increased dissolved solids) include broad whitefish, least cisco and arctic grayling, while the more resistant species are Alaska blackfish and ninespine stickleback. Alaska blackfish are particularly resistant to low dissolved oxygen, being able to breathe atmospheric oxygen (Armstrong 1994). Residents of the Yukon Delta have reported observing Alaska blackfish oriented along cracks in the ice during winter to use oxygen in ponds that have gone anoxic. Ninespine stickleback can also withstand low dissolved oxygen (Lewis et al. 1972), although not the same extent as Alaska blackfish. Ninespine stickleback, however, can withstand higher levels of dissolved solids, and often frequent brackish nearshore waters during summer.

When sensitive fish are present, the amount of water available during winter is limited to 15% of the volume under 7 feet of ice. The water withdrawal criteria are relaxed when only resistant fish species are present because of the greater tolerance to lower dissolved oxygen and higher concentrations of dissolved solids. In this case, up to 30% of the water volume under 5 feet of ice is allowed for winter withdrawal. For lakes that do not contain fish, there is currently no limit to the amount taken. For practical reasons, the volume available is limited to the volume of unfrozen water under the ice at the time of withdrawal. In most cases, the withdrawal occurs when the ice is 4 feet thick or greater. In order to provide some estimate of water likely to be available, the volume of water under 4 feet of ice is provided.

Based on the above lake evaluation, 11 lakes were confirmed to contain fish, with 2 containing sensitive species and 9 containing ninespine stickleback.

Based on the above analysis, the following amounts of water are likely to be available for winter use in the areas from lakes surveyed in 2002:

	Million Gallons
<u>Area</u>	<u>Available</u>
Placer	221.7
Oberon	25.6

The area covered by water less than 4 feet deep, and therefore likely to be suitable for removing ice aggregate, was estimated for each lake (Table 5). A map of the potential ice aggregate area for each lake is included in the individual lake summaries. The following table summarizes the area available for ice aggregate near each exploration prospect surveyed in 2002:

	Acres
<u>Area</u>	<u>Available</u>
Placer	1,385.8
Oberon	405.9

LITERATURE CITED

- Armstrong, R.H. 1994. Alaska blackfish. ADF&G's Wildlife Notebook Series. Alaska Dept. Fish and Game. Juneau, AK.
- Lewis, D.B., M. Walkey, and H.J.G. Dartnall. 1972. Some effects of low oxygen tensions on the distribution of the three-spined stickleback *Gasterosteus aculeatus* L. and the nine-spined stickleback *Pungitius pungitius* (L). J. Fish. Biol. 4: 103-108.

Table 1. Summary of lakes sampled near the Placer and Oberon prospects in 2002.

Area	Lake Name	Latitude (NAD27)	Longitude	Town	Range	Section	Surface Area (acres)	Maximum Depth¹ (feet)	Calculated Volume (mill. gals)
Placer									
	L9117	70.31174	150.30545	11N	7E	14	91.5	3.6	122.12
	L9121	70.28456	150.22309	11N	7E/8E	24/25/19/30	138.8	6.5	167.63
	L9122	70.27183	150.20082	11N	8E	30/31	184.6	5.1	99.01
	L9123	70.26172	150.23081	11N	7E	36	414.0	7.6	604.32
	M0246	70.36984	150.31622	12N	7E	27	drained lake	0.0	0.00
	M0247	70.36463	150.29817	12N	7E	26	drained lake	0.0	0.00
	M0248	70.35813	150.38521	12N	7E	28/33	116.2	3.5	69.56
	M0249	70.33579	150.34459	11N	7E	3	108.5	4.6	92.96
	M0250	70.32647	150.36909	11N	7E	9	43.3	5.5	48.22
	M0251	70.30196	150.32977	11N	7E	15/22	103.3	6.4	122.12
	M0252	70.34757	150.26178	12N	7E	35/36	153.5	less than 2	not calc.
	M0253	70.33792	150.23347	11N/12N	7E/8E	1/36/6/31	754.3	6.2	910.60
	MC7903	70.30639	150.50773	11N	6E	11/12/13/14	1197.3	10.2	2463.77
Oberon									
	M0202	70.23577	150.59207	10N	6E	10	25.2	3.2	13.53
	M0203	70.23924	150.60340	10N	6E	9/10	65.6	6.1	78.21
	M0204	70.23584	150.61686	10N	6E	9	50.4	2.5	23.36
	M9528	70.26133	150.71533	10N/11N	6E	6/31	206.8	5.9	239.44
	M9614	70.25121	150.67672	10N	6E	5	162.6	6.6	217.38
	M9617	70.24969	150.60547	10N	6E	3/4	382.8	6.9	535.98

¹ Maximum depth is the maximum ever recorded for this lake, not necessarily the maximum recorded in 2002 depth surveys.

Table 2. Catches of fish from lakes sampled near the Placer and Oberon prospects.

Area	Lake Name	Sample Date	Gill Nets		Minnow Traps		Seine and Observation	
			Set Duration (hours)	Fish Species ¹	Set Duration (hours)	Fish Species ¹	Number of Hauls	Fish Species ²
Placer								
	L9117	8/27/2002	3.8	None	4.0	None	3	NSSB - 3
	L9121	8/26/2002	4.0	None	6.0	None	3	NSSB (historical)
	L9122	8/25/2002	4.0	None	5.0	None	3	NSSB (historical)
	L9123	8/24/2002	4.3	None	4.5	None	3	None
	M0246	8/30/2002	0.0		0.0		0	
	M0247	8/30/2002	0.0		0.0		0	
	M0248	8/30/2002	4.0	None	5.3	None	3	None
	M0249	8/28/2002	4.2	None	5.2	None	4	None
	M0250	8/28/2002	2.6	2 BDWF	4.7	None	0	
	M0251	8/27/2002	6.7	None	7.7	None	3	NSSB - 2
	M0252	8/29/2002	2.3	None	2.3	None	0	NSSB observed
	M0253	8/29/2002	5.3	None	6.8	None	3	NSSB observed
	MC7903	8/23/2002	5.5	1 LSCS	6.2	None	3	NSSB - 3
	(sampling at this lake in 1979 and 1995 caught broad whitefish, arctic grayling and Alaska blackfish)							
Oberon								
	M0202	7/14/2002	not sampled, too shallow		1.5	None	0	
	M0203	7/14/2002	8.3	None	8.5	None	0	
	M0204	7/14/2002	not sampled, too shallow		0.0		0	
	M9528	7/17/2002	8.4	None	6.5	None	2	NSSB (historical)
	M9614	7/16/2002	5.0	None	5.8	None	2	NSSB observed
	M9617	7/16/2002	8.3	None	4.4	None	0	NSSB observed

¹ BDWF = broad whitefish, LSCS = least cisco, NSSB = ninespine stickleback

² NSSB (historical) = previous sampling in this lake detected ninespine stickleback

Table 3. Water chemistry parameters measured in conjunction with lake sampling in the Placer and Oberon areas, 2002.

Area	Lake	Date	Water Temp (oC)	Dissolved Oxygen (mg/l) (%)		Specific Conductance (microS/cm)	pH	Turbidity (NTU)
Placer								
	L9117	Aug 27 02	9.5	11.1	98	335	8.3	4.9
	L9121	Aug 26 02	6.3	11.7	96	316	8.0	3.3
	L9122	Aug 25 02	5.3	10.7	85	336	7.6	7.6
	L9123	Aug 24 02	5.6	10.6	86	156	7.7	2.0
	M0246	Aug 30 02	no water					
	M0247	Aug 30 02	no water					
	M0248	Aug 30 02	6.6	11.3	93	330	8.2	4.2
	M0249	Aug 28 02	8.4	10.4	88	346	7.8	2.3
	M0250	Aug 28 02	8.2	10.8	91	276	8.1	4.5
	M0251	Aug 27 02	7.6	11.2	99	241	8.1	1.3
	M0252	Aug 29 02	6.8	11.2	92	155	8.1	2.4
	M0253	Aug 29 02	7.4	11.1	92	129	8.1	1.6
	MC7903	Aug 23 02	5.0	11.4	93	235	8.0	4.2
Oberon								
	M0202	7/14/2002	11.5	11.2	103	258	8.1	1.0
	M0203	7/14/2002	12.3	11.0	103	181	8.0	1.0
	M0204	7/14/2002	12.2	11.0	104	318	8.2	3.0
	M9528	7/17/2002	17.6	9.3	97	287	7.9	1.5
	M9614	7/16/2002	16.2	11.1	104	158	7.9	1.0
	M9617	7/16/2002	15.1	10.0	101	137	7.9	1.2

Table 4. Estimated water volumes available for winter withdrawal from surveyed lakes near the Placer and Oberon prospects in 2002

(requested water based on 15% of winter volume deeper than 7 ft when sensitive species are present, 30% of winter volume deeper than 5 ft when resistant fish are present).

Area	Lake	Surface Area (acres)	Max. Depth ¹ (feet)	Calculated Volume (mil. gals)	15% of Winter Volume (mil. gals)	Sensitive Fish Species Present ²	Resistant Fish Species Present ³	Fish Concern ⁴	Available Water (mil. gals)
Placer									
	L9117	92	3.6	122.12		None	NSSB	Yes	ice chips
	L9121	139	6.5	167.63		None	NSSB	Yes	0.29
	L9122	185	5.1	99.01		None	NSSB	Yes	ice chips
	L9123	414	7.6	604.32		None		No	166.0
	M0246	drained lake	0.0	0.00		None			0.0
	M0247	drained lake	0.0	0.00		None			0.0
	M0248	116	3.5	69.56		None		No	ice chips
	M0249	108	4.6	92.96		None		No	0.26
	M0250	43	5.5	48.22		BDWF		Yes	ice chips
	M0251	103	6.4	122.12		None	NSSB	Yes	2.6
	M0252	154	less than 2	not calc.		None	NSSB	Yes	ice chips
	M0253	754	6.2	910.60		None	NSSB	Yes	17.3
	MC7903	1197	10.2	2463.77	35.37	BDWF, LSCS GRAY	BKFH, NSSB	Yes	35.4
Oberon									
	M0202	25	3.2	13.53		None		No	ice chips
	M0203	66	6.1	78.21		None		No	8.4
	M0204	50	2.5	23.36		None		No	ice chips
	M9528	207	5.9	239.44		None	NSSB	Yes	1.1
	M9614	163	6.6	217.38		None	NSSB	Yes	1.8
	M9617	383	6.9	535.98		None	NSSB	Yes	14.38

¹ Maximum depth is the maximum ever recorded for this lake, not necessarily the maximum recorded in 2002 depth surveys.

² Sensitive species include grayling, whitefishes, char, burbot, slimy sculpin, etc.

³ Resistant species are Alaska blackfish (BKFH) and ninespine stickleback (NSSB)

⁴ No = lake does not represent fish habitat, Yes = fish present during survey

Table 5. Estimated area available for removing ice aggregate, based on the area covered by water shallower than 4 feet, for lakes surveyed near the Placer and Oberson prospects, 2002.

Area	Lake Name	Surface Area (acres)	Maximum Depth (feet)	Acres covered by Water shallower than 4 feet
Placer				
	L9117	91.5	3.6	91.5
	L9121	138.8	6.5	54.7
	L9122	184.6	5.1	184.6
	L9123	414.0	7.6	118.5
	M0246	drained lake	0.0	
	M0247	drained lake	0.0	
	M0248	116.2	3.5	116.2
	M0249	108.5	4.6	106.0
	M0250	43.3	5.5	22.0
	M0251	103.3	6.4	45.3
	M0252	153.5	less than 2	153.5
	M0253	754.3	6.2	296.3
	MC7903	1197.3	10.2	197.1
Oberson				
	M0202	25.2	3.2	25.2
	M0203	65.6	6.1	28.2
	M0204	50.4	2.5	50.4
	M9528	206.8	5.9	131.0
	M9614	162.6	6.6	44.0
	M9617	382.8	6.9	127.1

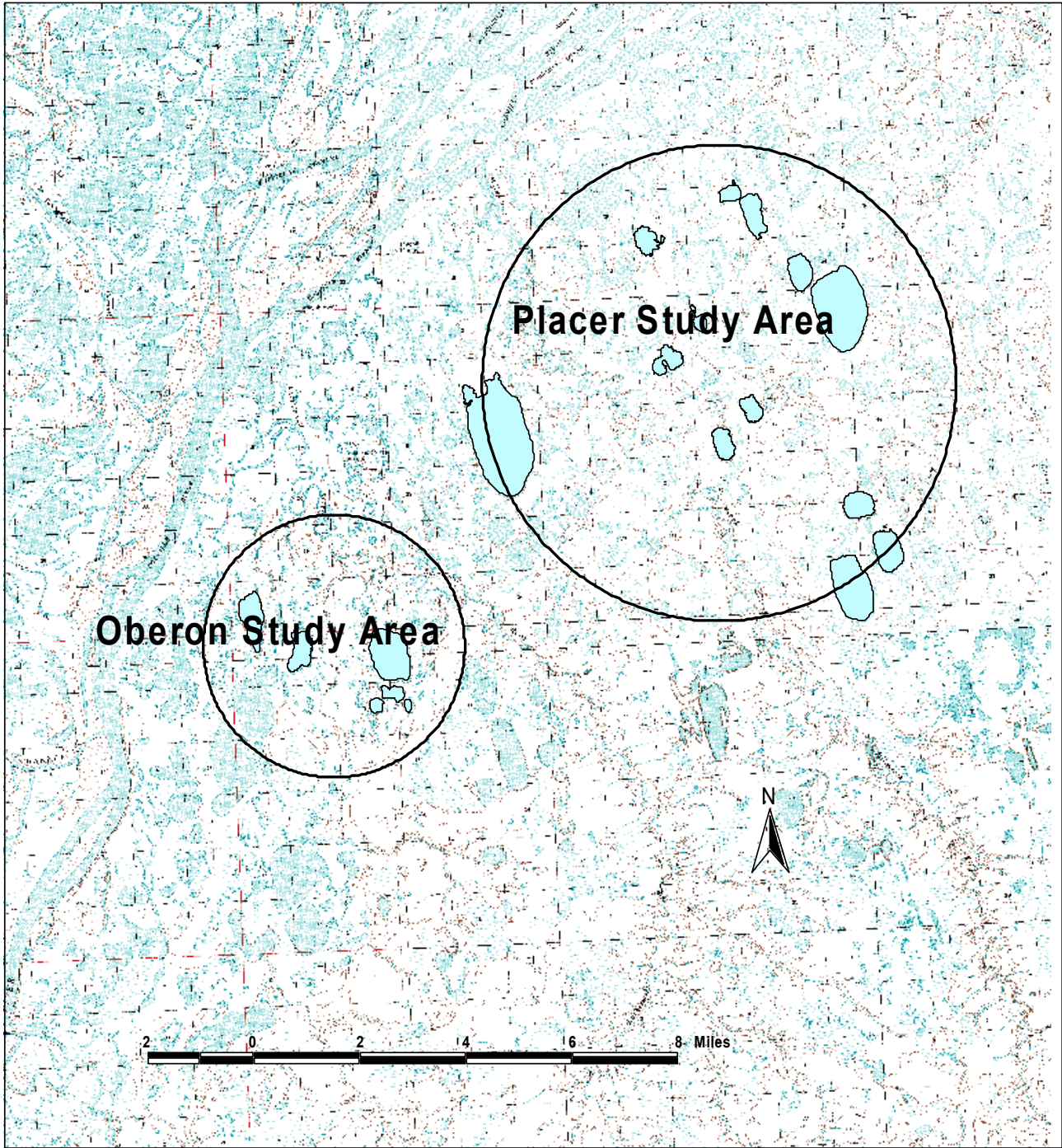


Figure 1. Placer and Oberon study areas surveyed for fish-bearing lakes in 2002.

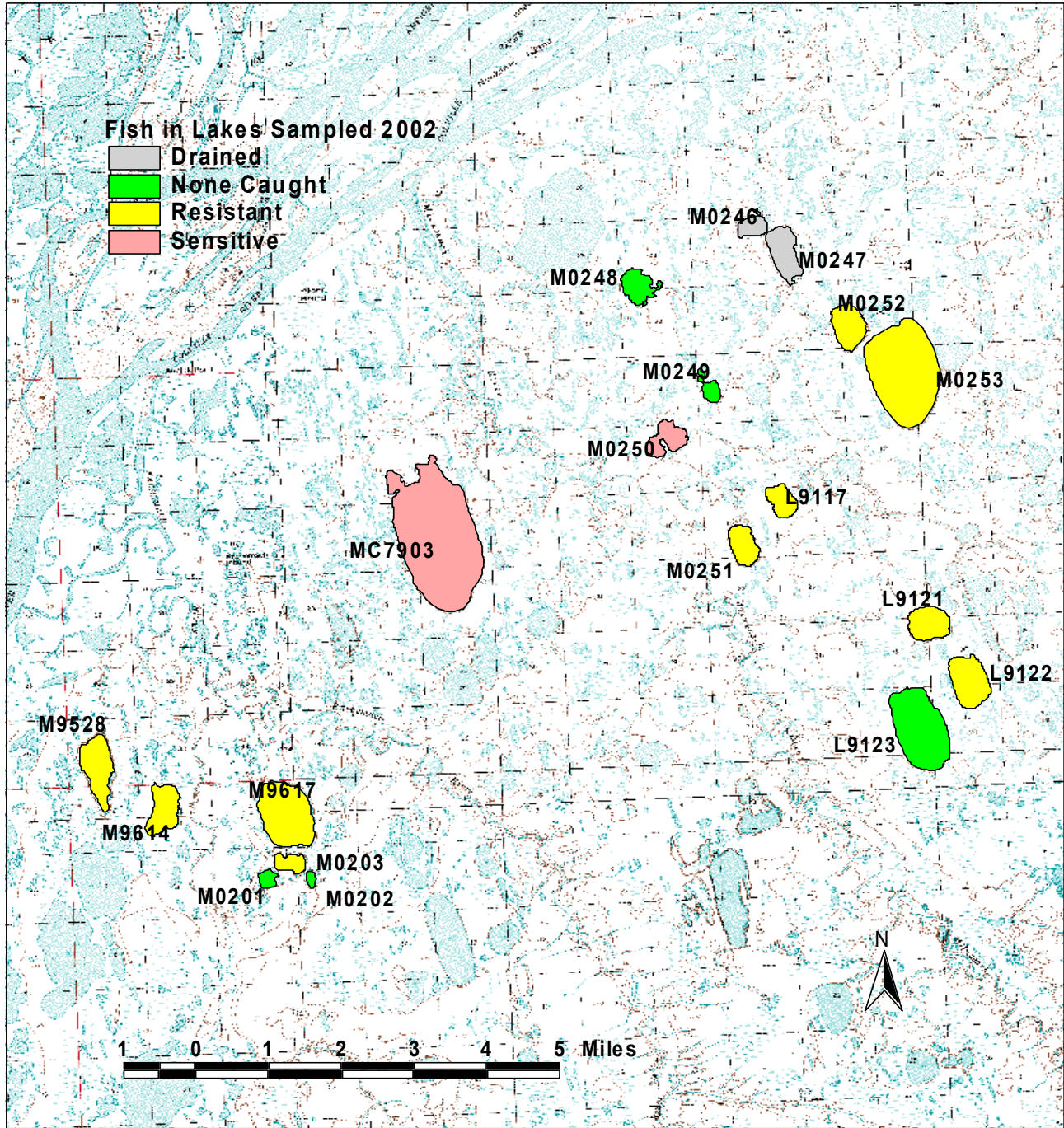


Figure 2. Fish distribution in lakes surveyed in or near the Placer and Oberon prospects during 2002

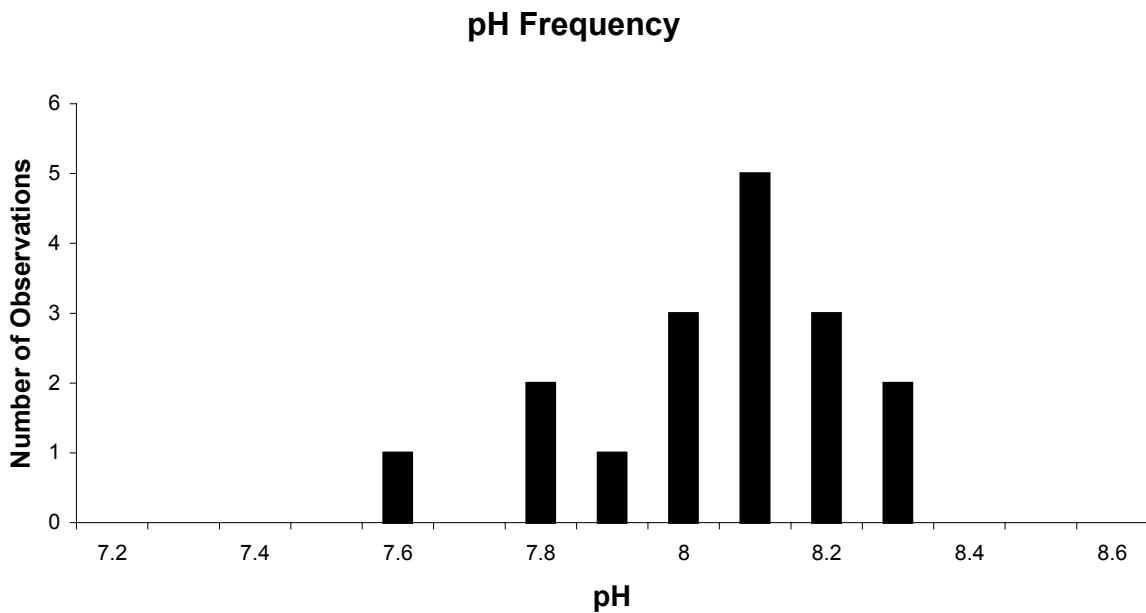
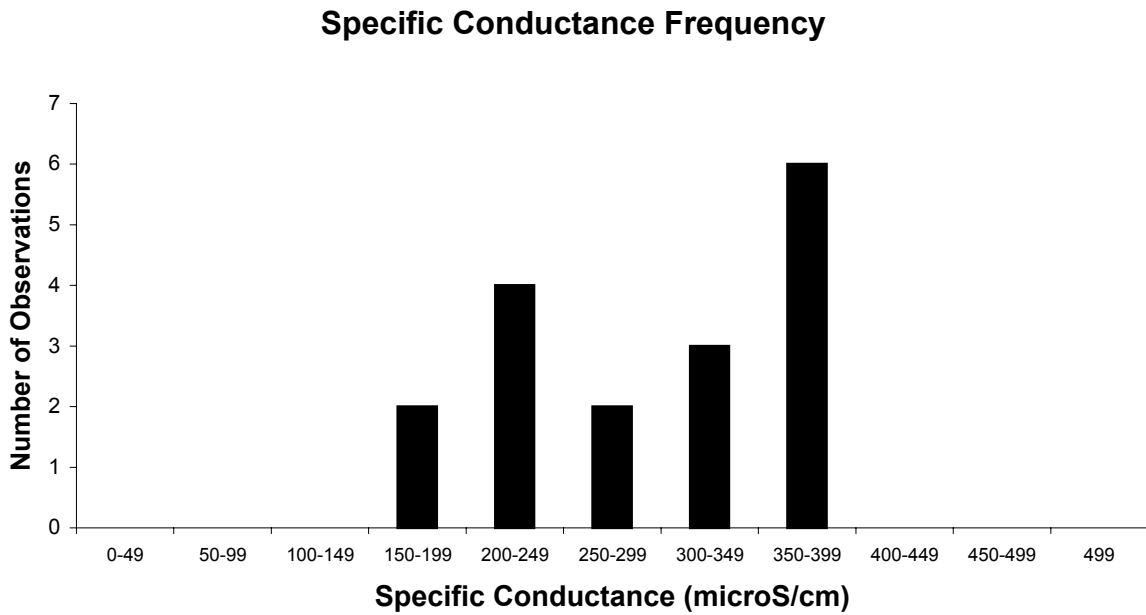


Figure 3. Frequency distribution of specific conductance and pH measurements taken during summer from 17 lakes in the or near the Placer and Oberon prospects, 2002.

LAKE SUMMARIES

Lake L9117

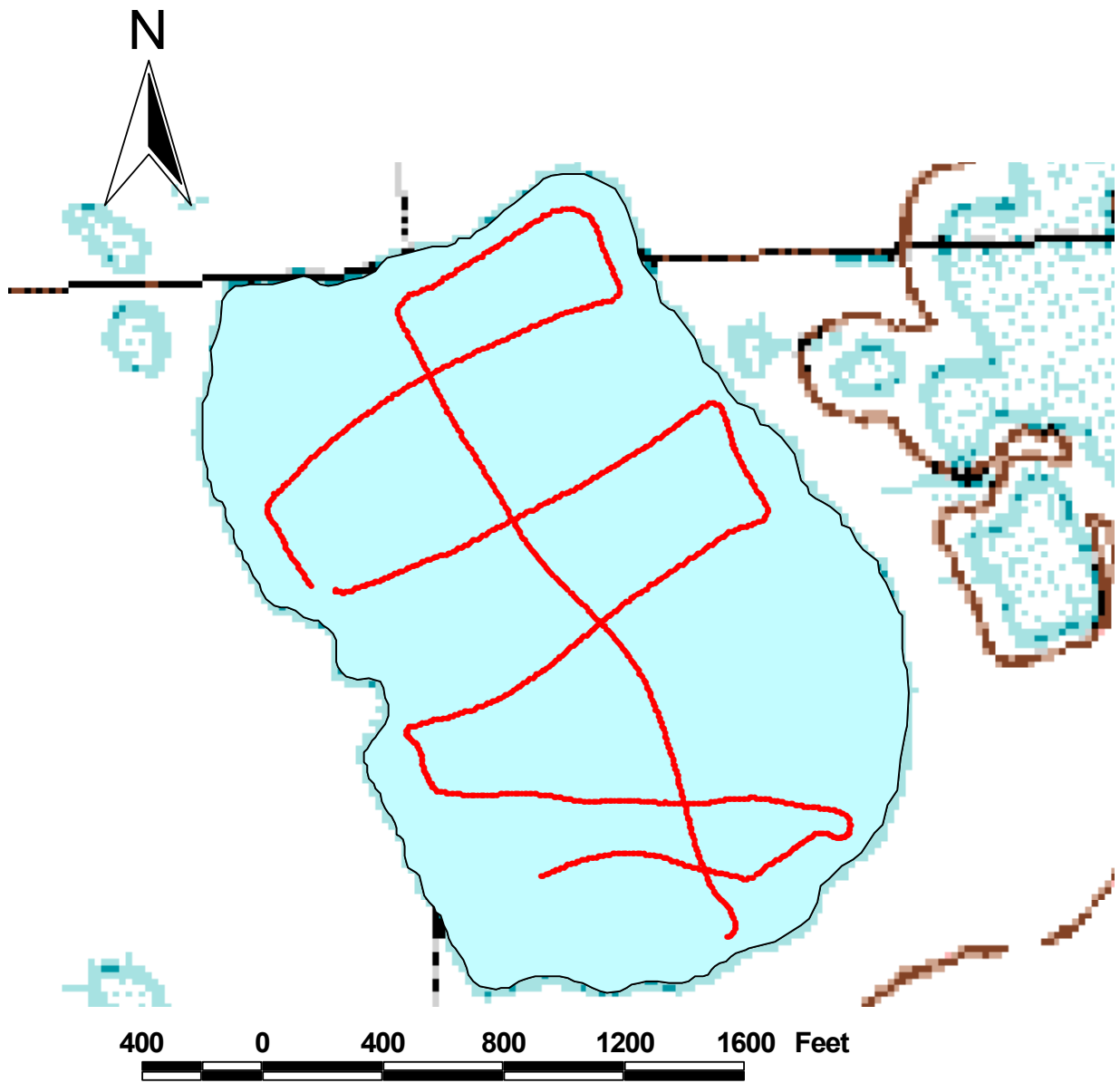
Other Names: V18.3
Location: 70.31174°N 150.30545°W
USGS Quad Sheet: Harrison Bay B-1: T11N R7E Sec. 14/15
Habitat: Tundra Lake
Area: 92 acres
Maximum Depth: 3.6 feet
Active Outlet:
Calculated Volume: 122.1 million gallons
Permittable Volume: too shallow
Potential Aggregate: 92 acres (water depth 4 ft or less)

Water Chemistry:

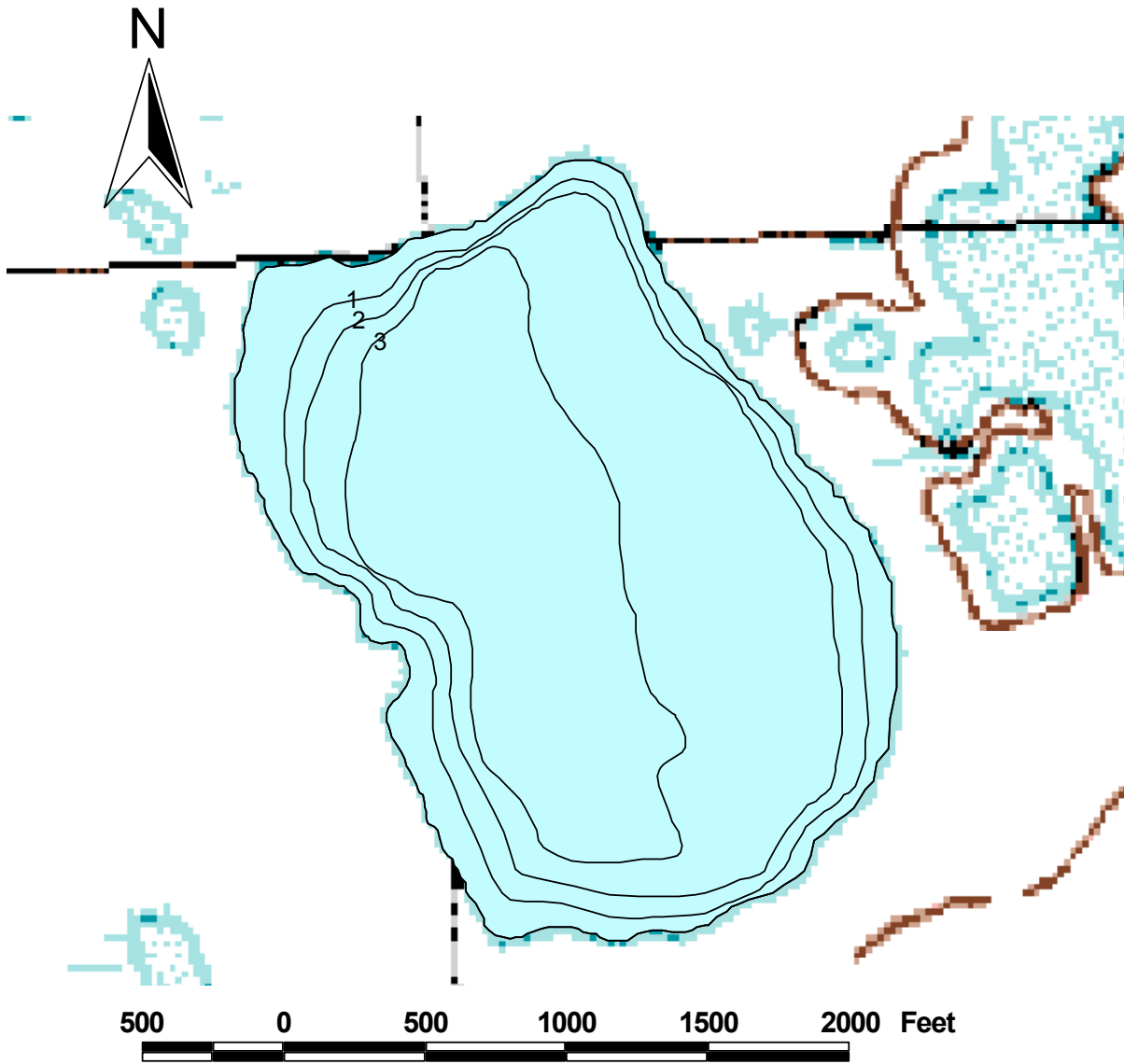
Year of Test	Calcium (mg/l)	Magnesium (mg/l)	Chloride (mg/l)	Sodium (mg/l)	Total Hardness [CaCO ₃] (mg/l)	Specific Conductance (microS/cm)	Turbidity (NTU)	pH	Source
2002	53.5	6.2	10.0	31.6	159.1	335	4.9	8.25	This Study

Catch Record:

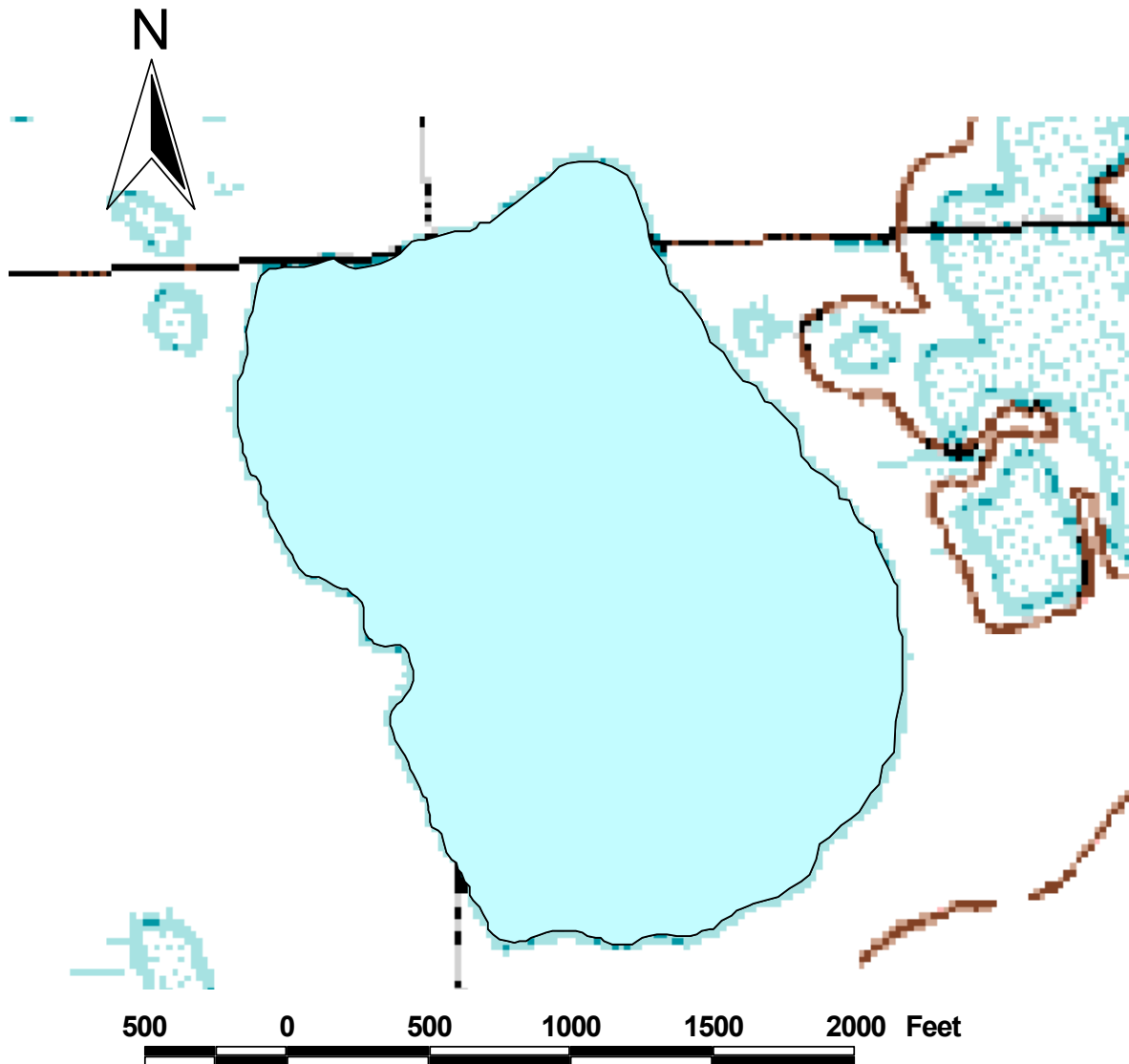
Gear	Date	Effort (hours)	Species	Number Caught
Gill Net	Aug 27 02	3.8	None	0
Minnow Trap	Aug 27 02	4.0	None	0
Seine	Aug 27 02	3 hauls	9spine stickleback	3



Depth transects surveyed on lake L9117 August 27, 2002



Depth contours based on transects surveyed on lake L9117
August 27, 2002 (contours in 1 foot intervals)



Lake L9117 is less than 4 ft deep and likely to be available for ice chips,
based on survey on August 27, 2002.

Lake L9121

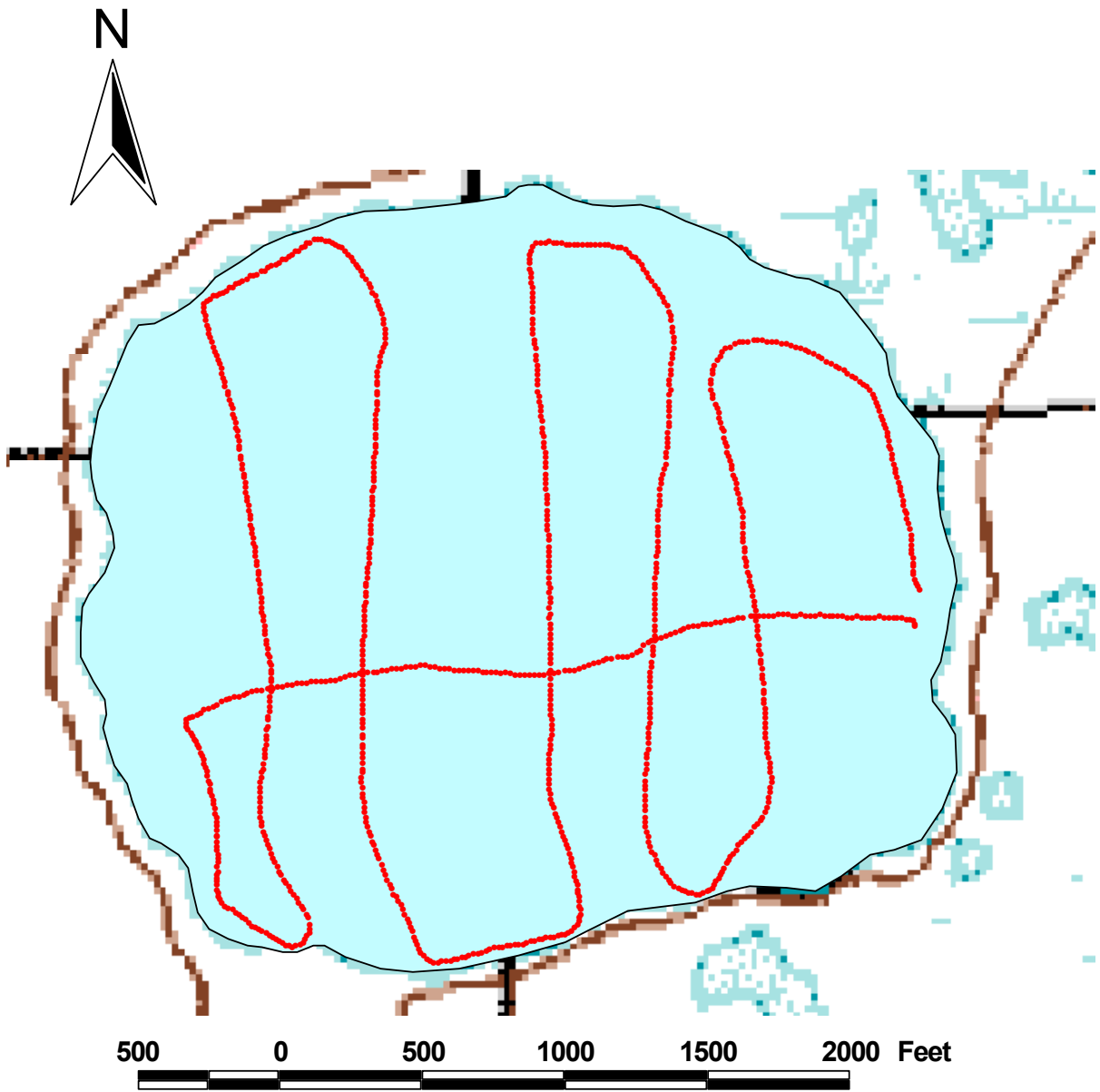
Other Names: W20.1
Location: 70°17.11'N 150°13.40'W
USGS Quad Sheet: Harrison Bay B-1: on border of T11N R7E, Sect 25 and T11N R8E, Sect 30
Habitat: Tundra Lake
Area: 139 acres
Maximum Depth: 6.5 feet
Active Outlet: No
Calculated Volume: 167.6 million gallons
Permittable Volume: 0.29 million gallons
Potential Aggregate 54.7 acres (water depth 4 ft or less)

Water Chemistry:

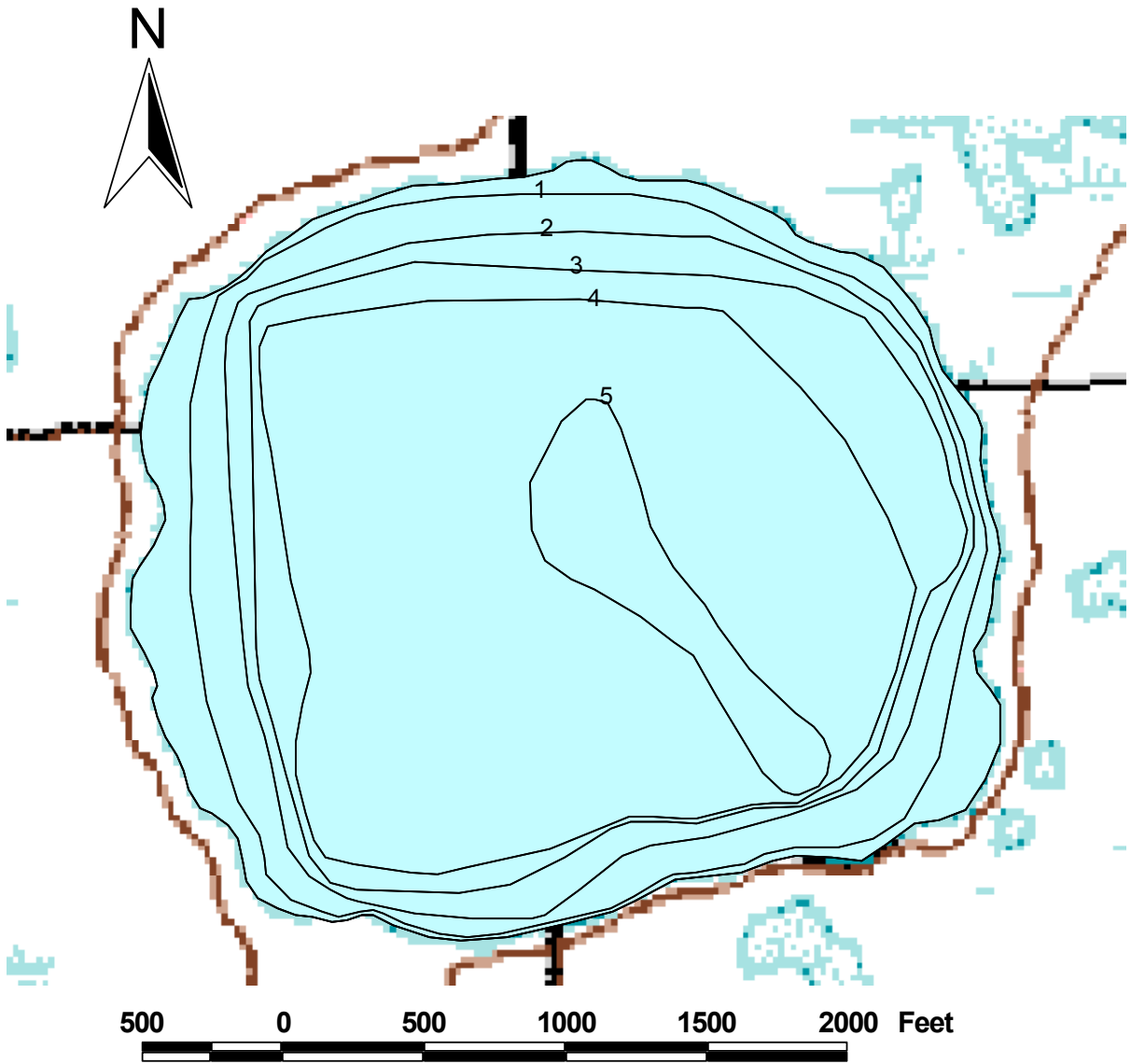
Year of Test	Calcium (mg/l)	Magnesium (mg/l)	Chloride (mg/l)	Sodium (mg/l)	Total Hardness [CaCO3] (mg/l)	Specific Conductance (microS/cm)	Turbidity (NTU)	pH	Source
2002	52.4	5.2	8.6	34.9	152	316	3.3	8.02	This Study

Catch Record:

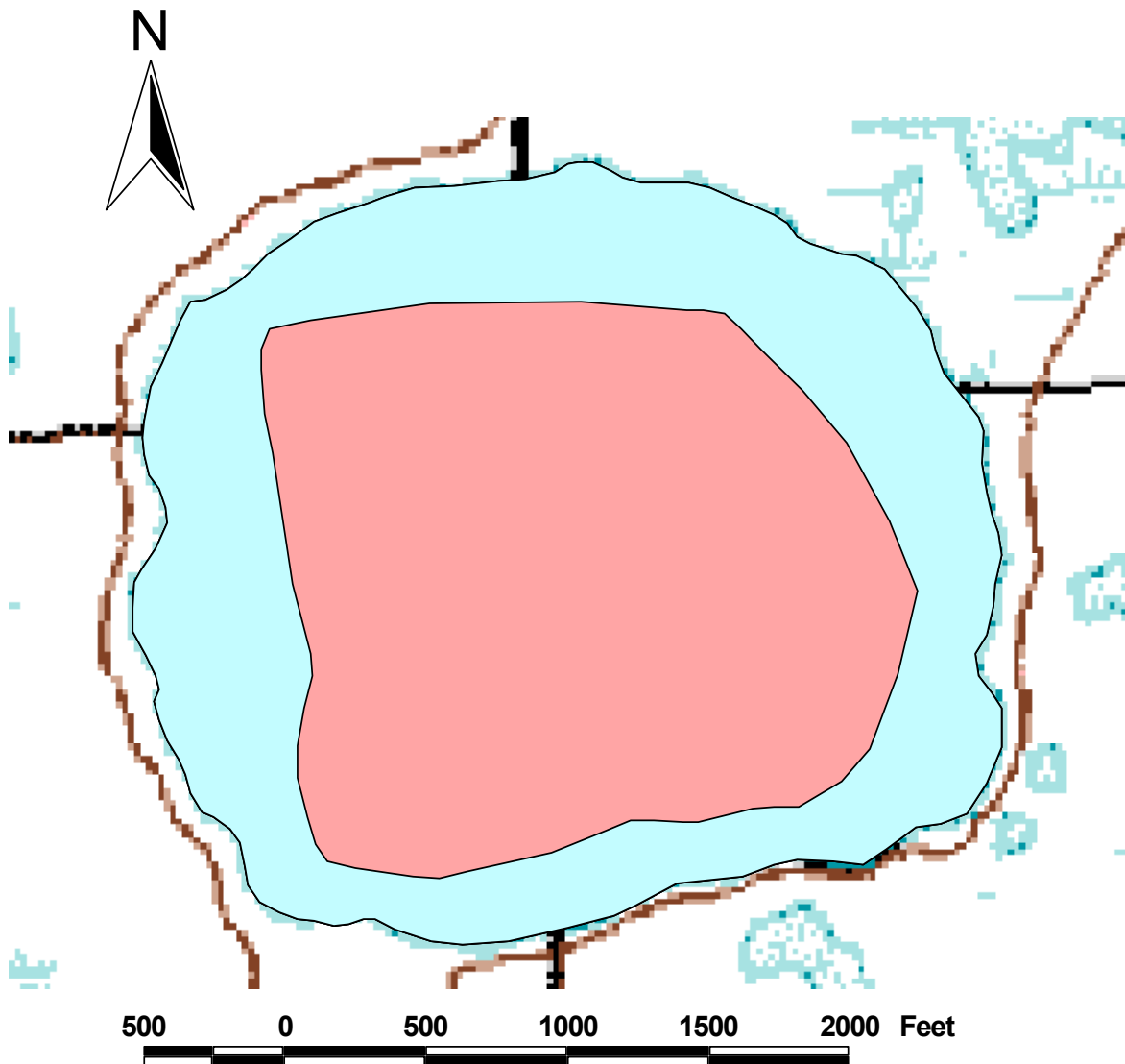
Gear	Date	Effort (hours)	Species	Number Caught
Fyke Net	Jul 31 95	22.3	9spine stickleback	9
Gill Net	Aug 27 02	3.8	None	0
Minnow Trap	Jul 31 95	44.7	None	0
	Aug 27 02	4.0	None	0
Set Line	Jul 31 95	22.1	None	0
Seine	Aug 27 02	3 hauls	None	0



Depth transects surveyed on lake L9121 August 26, 2002



Depth contours based on transects surveyed on lake L9121
August 26, 2002 (contours in 1 foot intervals)



Regions of lake L9121 less than 4 ft deep (light shaded) and likely to be available for ice chips, based on transects surveyed on August 26, 2002.

Lake L9122

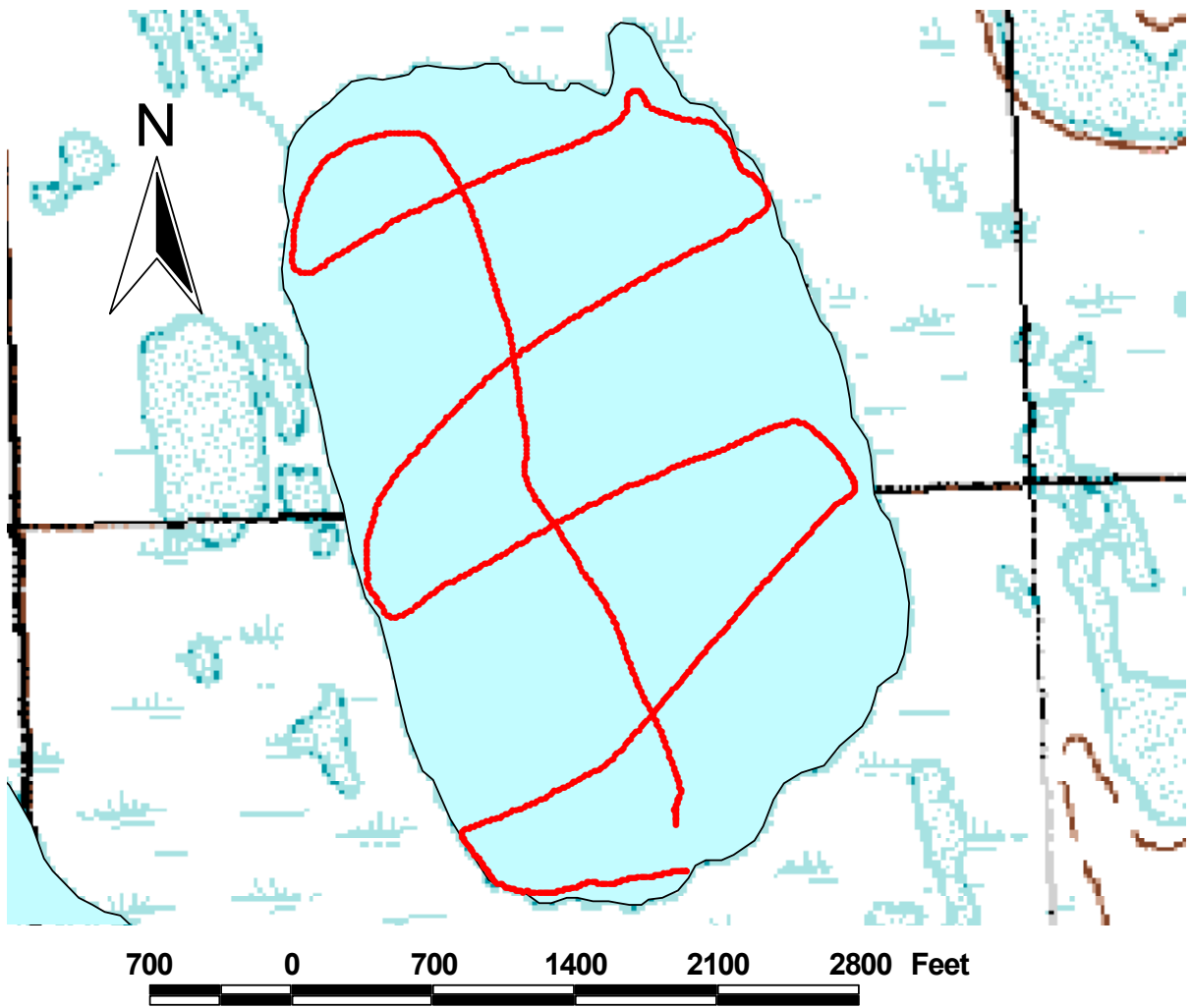
Other Names: X20.1
Location: 70°16.36'N 150°12.08'W
USGS Quad Sheet: Harrison Bay B-1: T11N R8E, Sect 30
Habitat: Tundra Lake
Area: 185 acres
Maximum Depth: 5.1 feet
Active Outlet: No
Calculated Volume: 99.0 million gallons
Permittable Volume: 0.0
Potential Aggregate 184.6 acres (water depth 4 ft or less)

Water Chemistry:

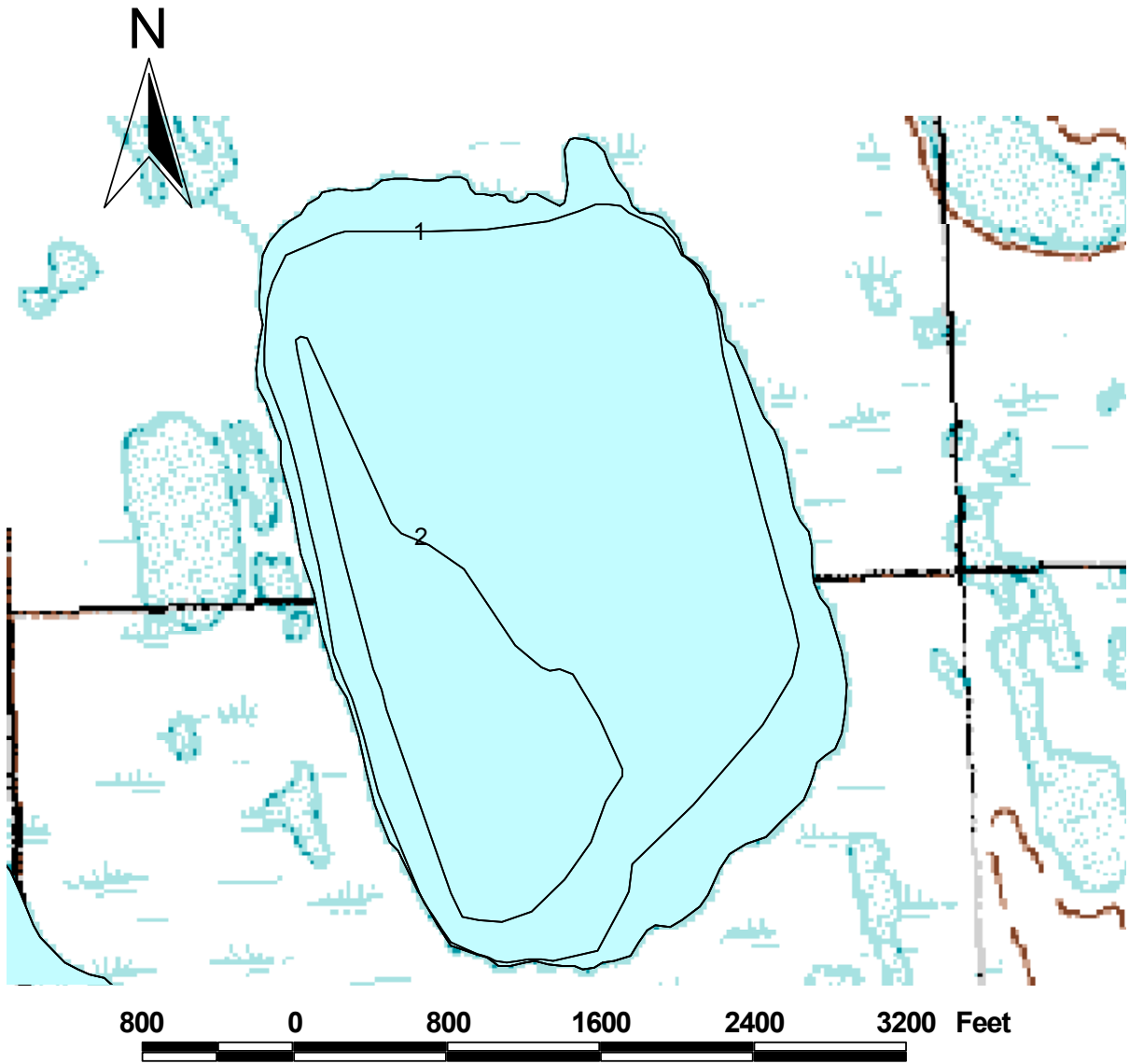
Year of Test	Calcium (mg/l)	Magnesium (mg/l)	Chloride (mg/l)	Sodium (mg/l)	Total Hardness [CaCO ₃] (mg/l)	Specific Conductance (microS/cm)	Turbidity (NTU)	pH	Source
2002	49.6	5.0	10.4	40.5	144.4	336	7.6	7.6	This Study

Catch Record:

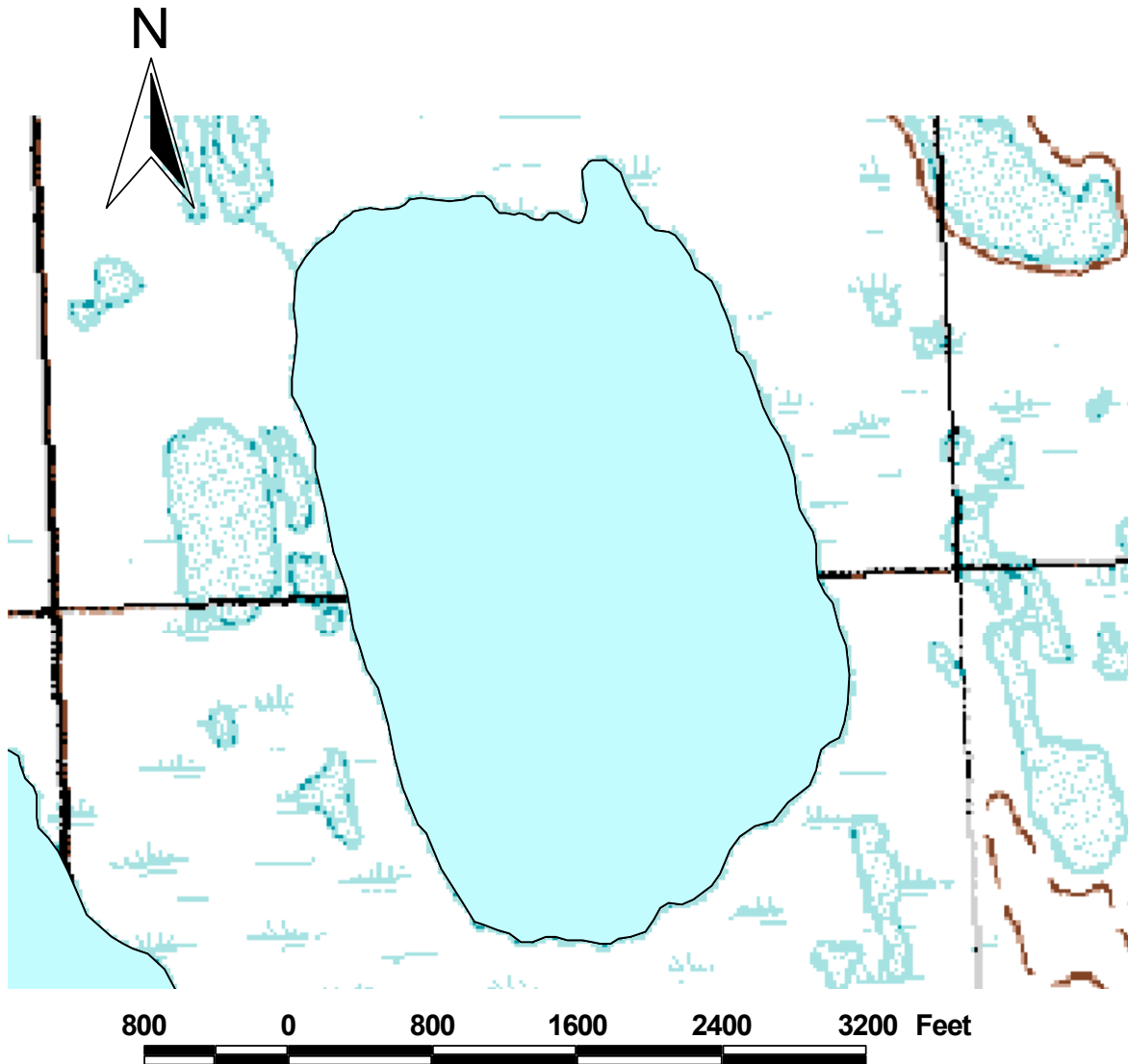
Gear	Date	Effort (hours)	Species	Number Caught
Fyke Net	Jul 30 95	23.1	9spine stickleback	17
Gill Net	Aug 25 03	4.0	None	0
Minnow Trap	Jul 30 95	46.2	None	0
	Aug 25 03	5.0	None	0
Set Line	Jul 30 95	23.0	None	0
Seine	Aug 25 03	3 hauls	None	0



Depth transects surveyed on lake L9122 August 25, 2002



Depth contours based on transects surveyed on lake L9122
August 25, 2002 (contours in 1 foot intervals)



Lake L9122 is less than 4 ft deep and likely to be available for ice chips,
based on survey on August 25, 2002.

Lake L9123

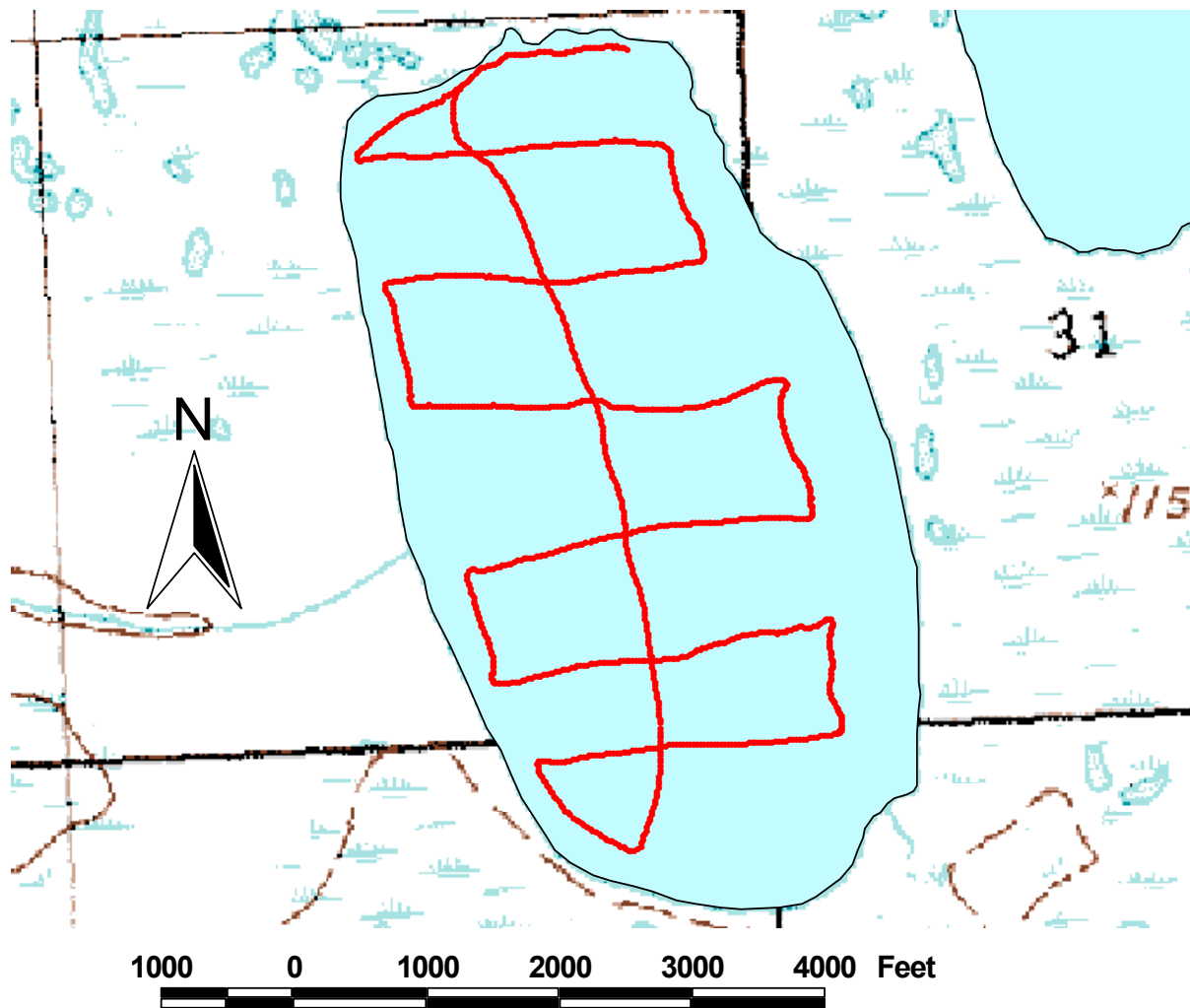
Other Names: Y20.1
Location: 70°15.78'N 150°14.02'W
USGS Quad Sheet: Harrison Bay B-1: T11N R7E, Sect 36
Habitat: Tundra Lake
Area: 414 acres
Maximum Depth: 7.2 feet
Active Outlet: No
Calculated Volume: 320.5 million gallons
Permittable Volume: 166.0 million gallons (No fish concern)
Potential Aggregate: 118.5 acres (water depth 4 ft or less)

Water Chemistry:

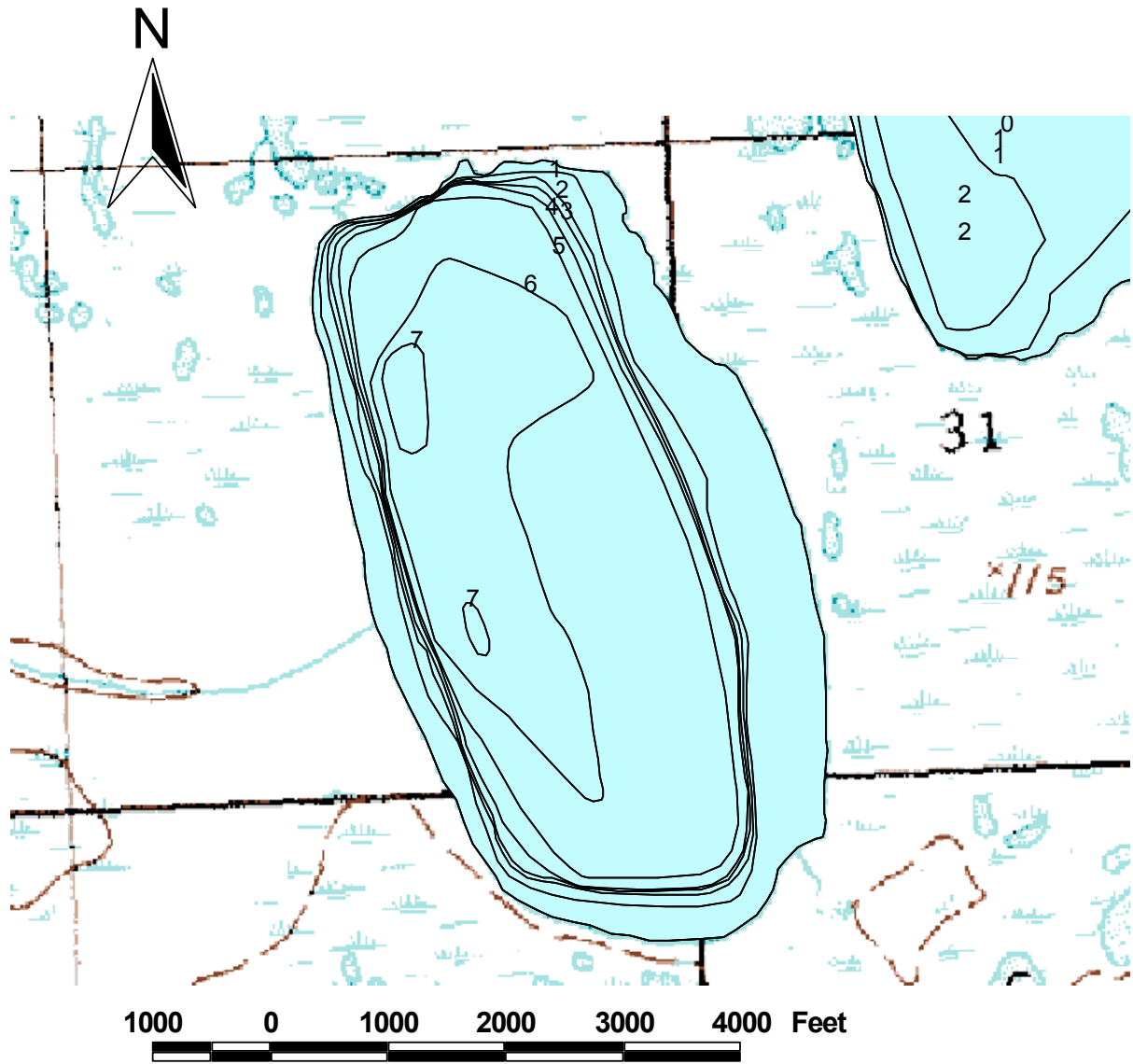
Year of Test	Calcium (mg/l)	Magnesium (mg/l)	Chloride (mg/l)	Sodium (mg/l)	Total Hardness [CaCO ₃] (mg/l)	Specific Conductance (microS/cm)	Turbidity (NTU)	pH	Source
2002	23.2	1.9	3.1	11.3	65.7	137	2.0	7.74	This Study

Catch Record:

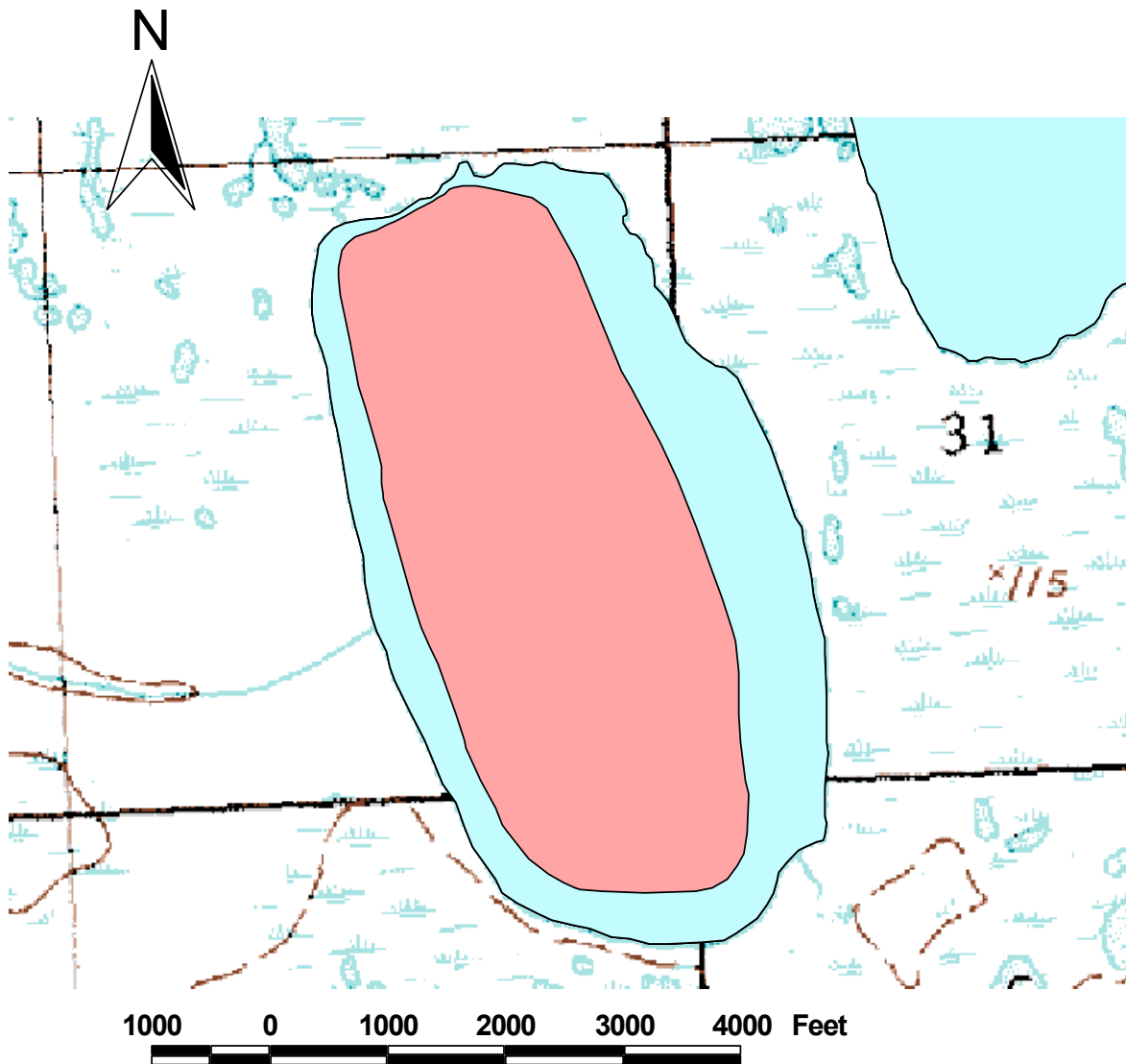
Gear	Date	Effort (hours)	Species	Number Caught
Fyke Net	Jul 31 95	22.4	None	0
Minnow Trap	Jul 31 95	44.7	None	0
Set Line	Jul 31 95	22.1	None	0



Depth transects surveyed on lake L9123 August 24, 2002



Depth contours based on transects surveyed on lake L9123
August 24, 2002 (contours in 1 foot intervals)



Regions of lake L9123 less than 4 ft deep (light shaded) and likely to be available for ice chips, based on transects surveyed on August 24, 2002.

Lake M0202

Other Names:

Location: 70.23577°N 150.59207°W

USGS Quad Sheet: Harrison Bay B-1: T10N R6E Sec. 10

Habitat: Tundra Lake

Area: 25 acres

Maximum Depth: 3.2 feet

Active Outlet:

Calculated Volume: 13.5 million gallons

Permittable Volume: too shallow

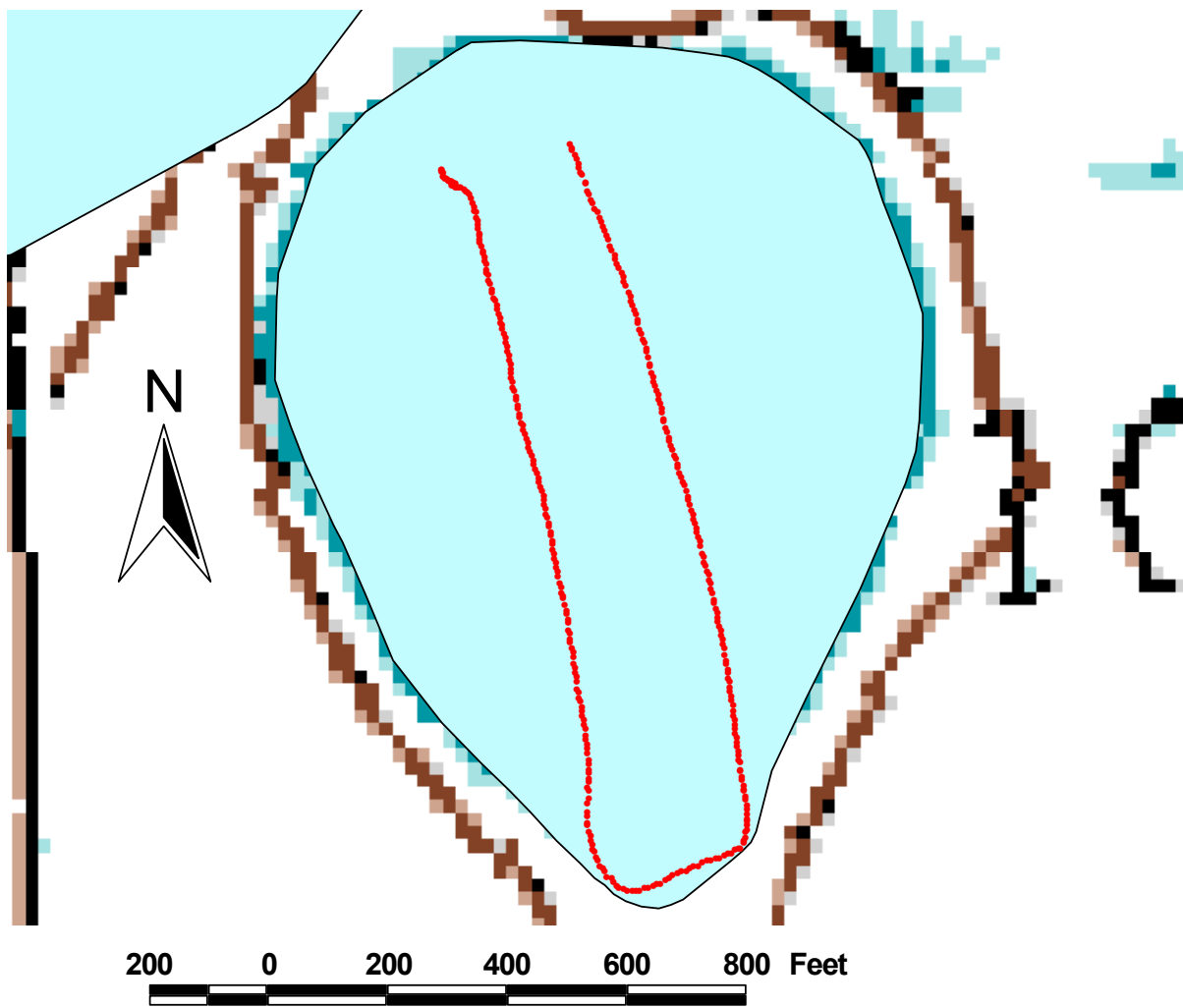
Potential Aggregate 25 acres (water depth 4 ft or less)

Water Chemistry:

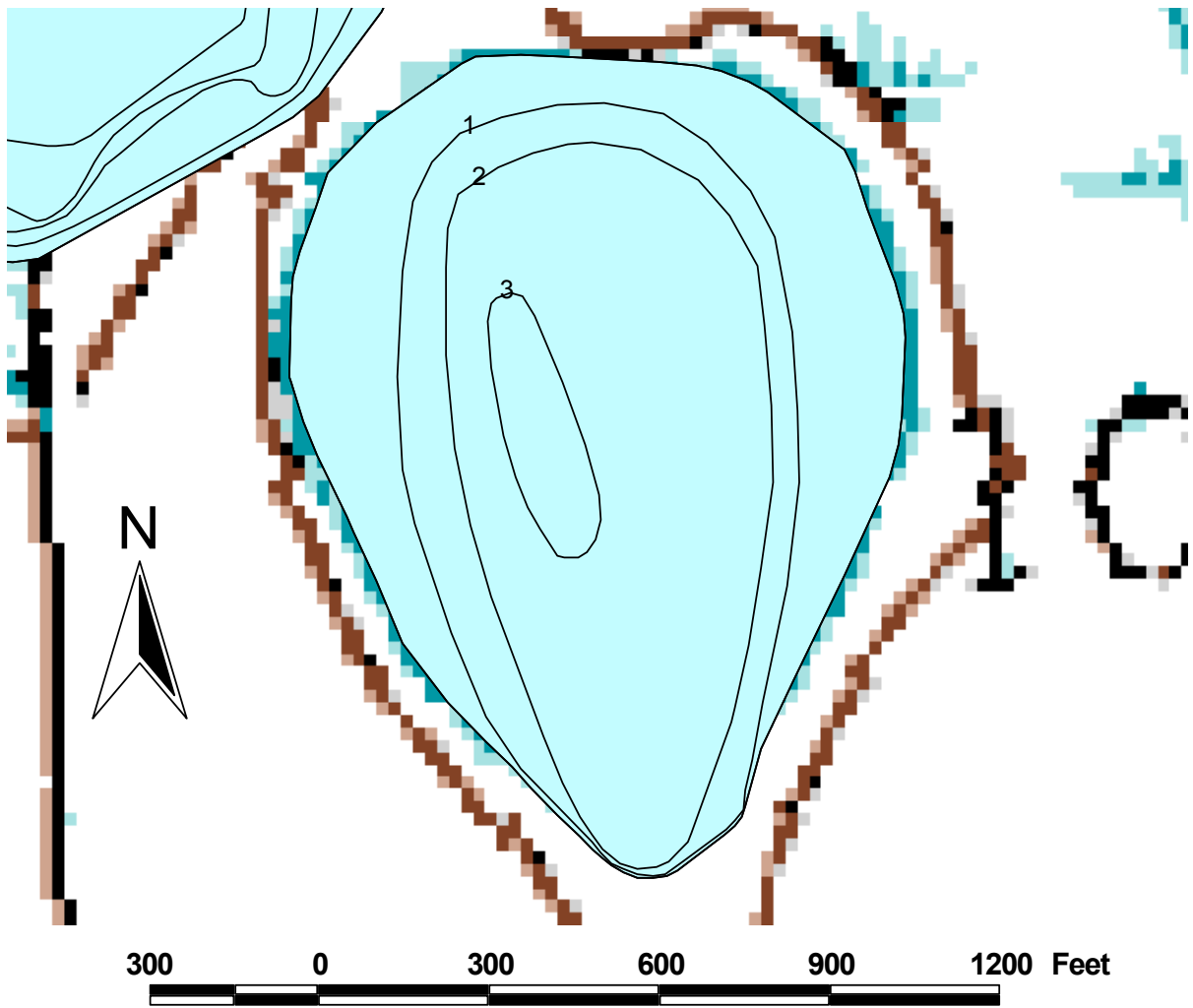
Year of Test	Calcium (mg/l)	Magnesium (mg/l)	Chloride (mg/l)	Sodium (mg/l)	Total Hardness [CaCO ₃] (mg/l)	Specific Conductance (microS/cm)	Turbidity (NTU)	pH	Source
2002						258	1.0	8.12	This Study

Catch Record:

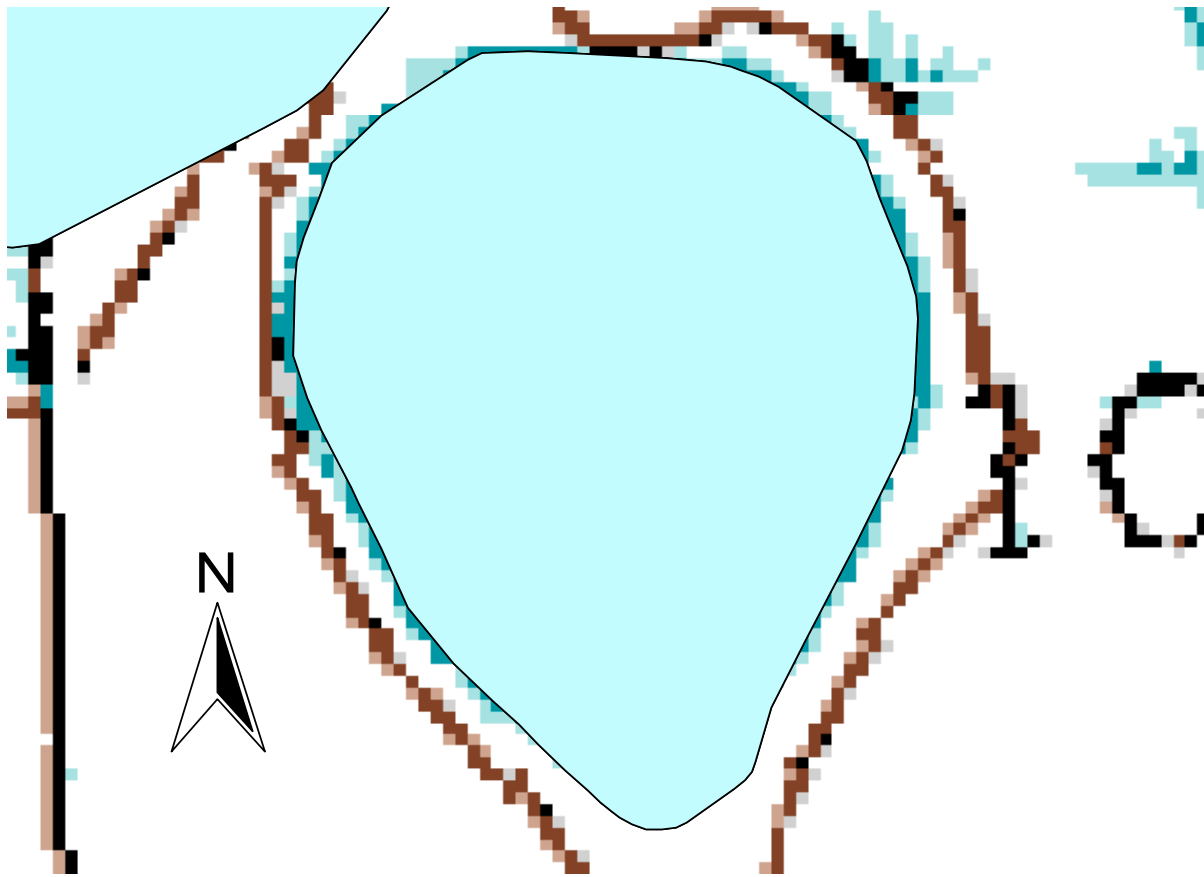
Gear	Date	Effort (hours)	Species	Number Caught
Not sampled, too shallow				



Depth transects surveyed on lake M0202 July 14, 2002



Depth contours based on transects surveyed on lake M0202
July 14, 2002 (contours in 1 foot intervals)



300 0 300 600 900 1200 Feet

Lake M0202 is less than 4 ft deep and likely to be available for ice chips,
based on survey on July 14, 2002.

Lake M0203

Other Names:

Location: 70.23924°N 150.6034°W

USGS Quad Sheet: Harrison Bay B-1: T10N R6E Sec. 9/10

Habitat: Tundra Lake

Area: 66 acres

Maximum Depth: 6.1 feet

Active Outlet:

Calculated Volume: 78.2 million gallons

Permittable Volume: 8.4 million gallons

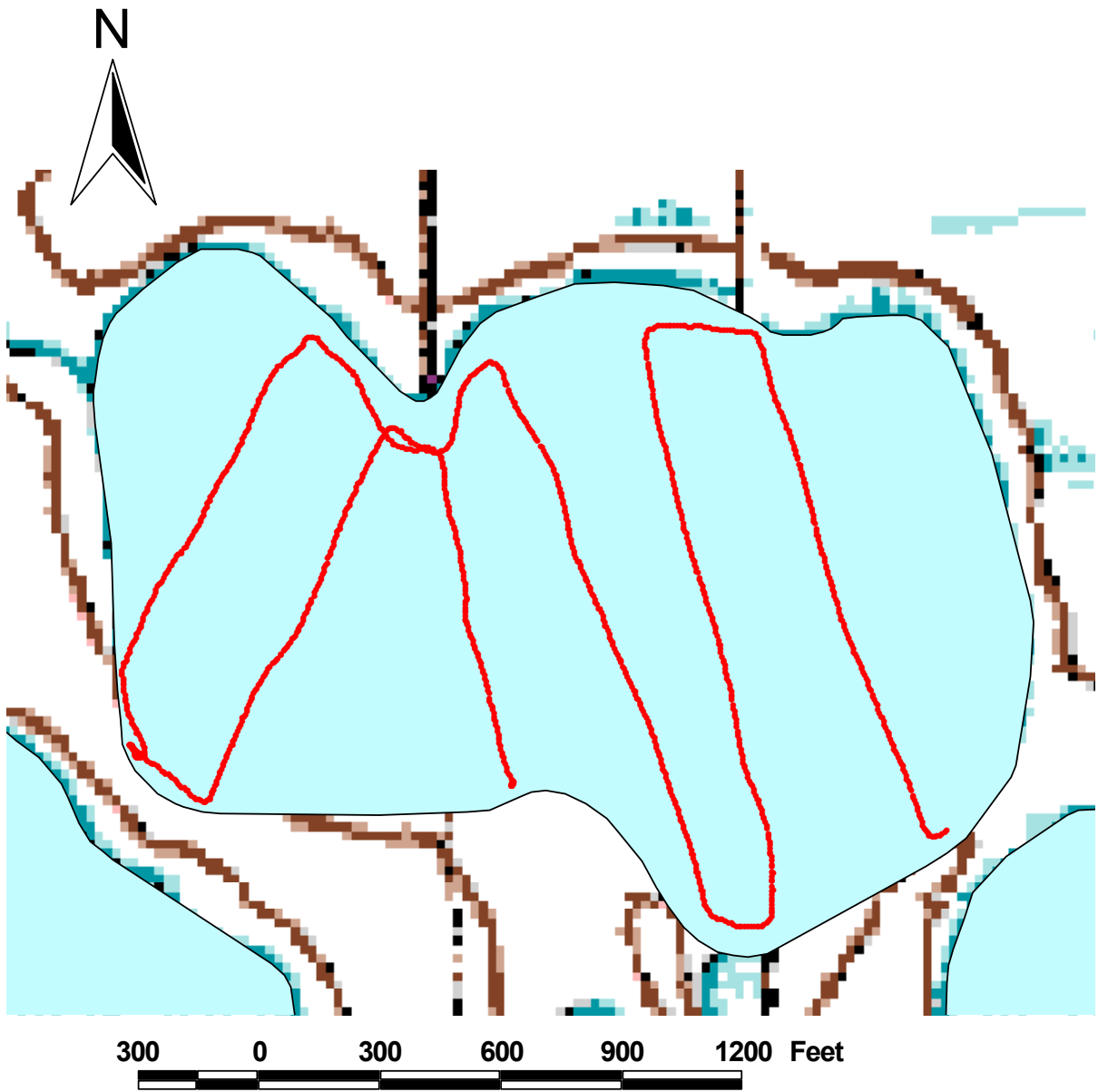
Potential Aggregate 28 acres (water depth 4 ft or less)

Water Chemistry:

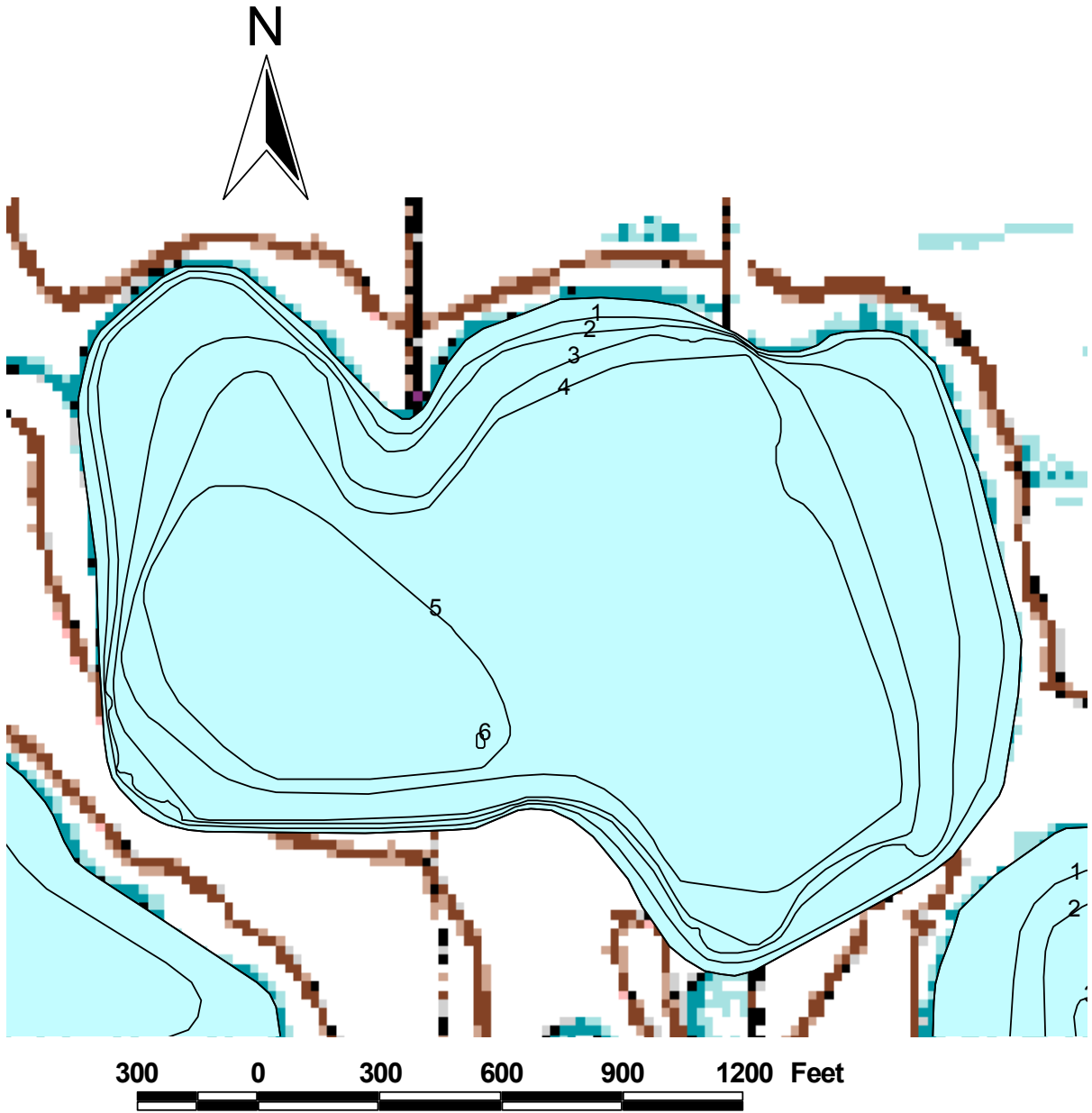
Year of Test	Calcium (mg/l)	Magnesium (mg/l)	Chloride (mg/l)	Sodium (mg/l)	Total Hardness [CaCO ₃] (mg/l)	Specific Conductance (microS/cm)	Turbidity (NTU)	pH	Source
2002						181	1.0	8.02	This Study

Catch Record:

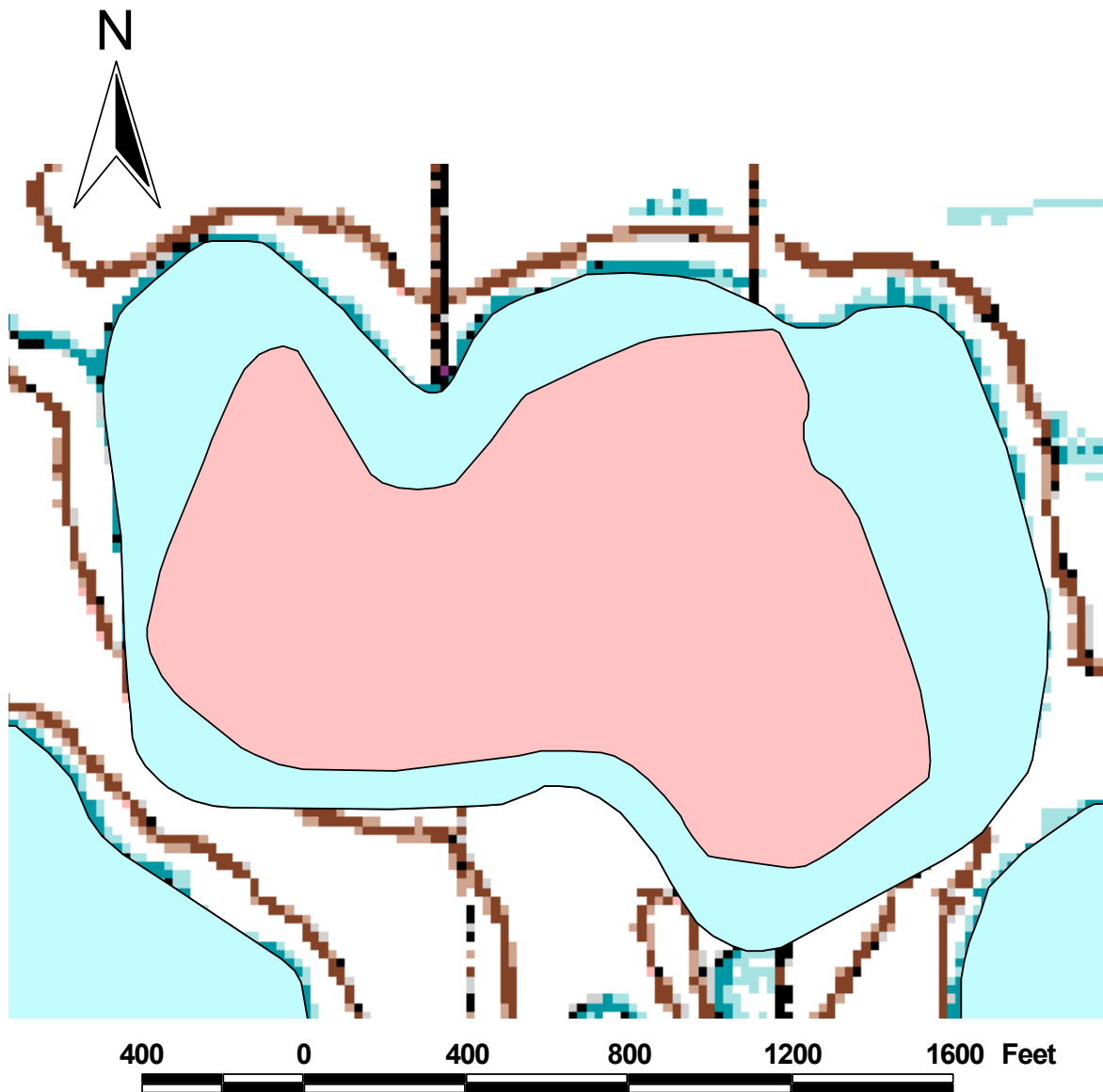
Gear	Date	Effort (hours)	Species	Number Caught
Gill Net	Jul 14 02	8.3	None	0
Minnow Trap	Jul 14 02	8.5	None	0



Depth transects surveyed on lake M0203 July 14, 2002



Depth contours based on transects surveyed on lake M0203
July 14, 2002 (contours in 1 foot intervals)



Regions of lake M0203 less than 4 ft deep (light shaded) and likely to be available for ice chips, based on transects surveyed on July 14, 2002.

Lake M0204

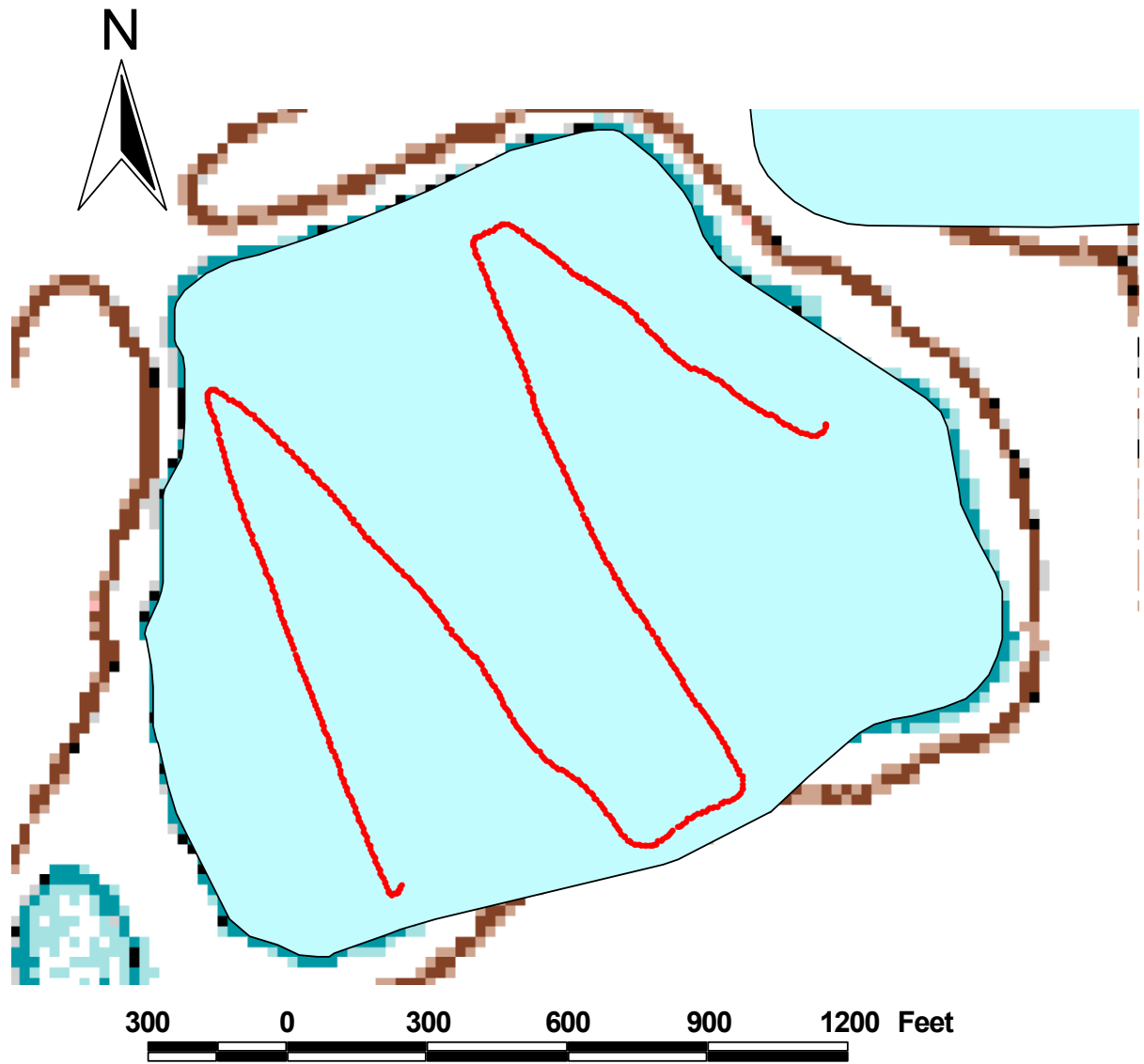
Other Names:
Location: 70.23584°N 150.61686°W
USGS Quad Sheet: Harrison Bay B-1: T10N R6E Sec. 9
Habitat: Tundra Lake
Area: 50 acres
Maximum Depth: 2.5 feet
Active Outlet:
Calculated Volume: 23.4 million gallons
Permittable Volume: too shallow
Potential Aggregate: 50 acres (water depth 4 ft or less)

Water Chemistry:

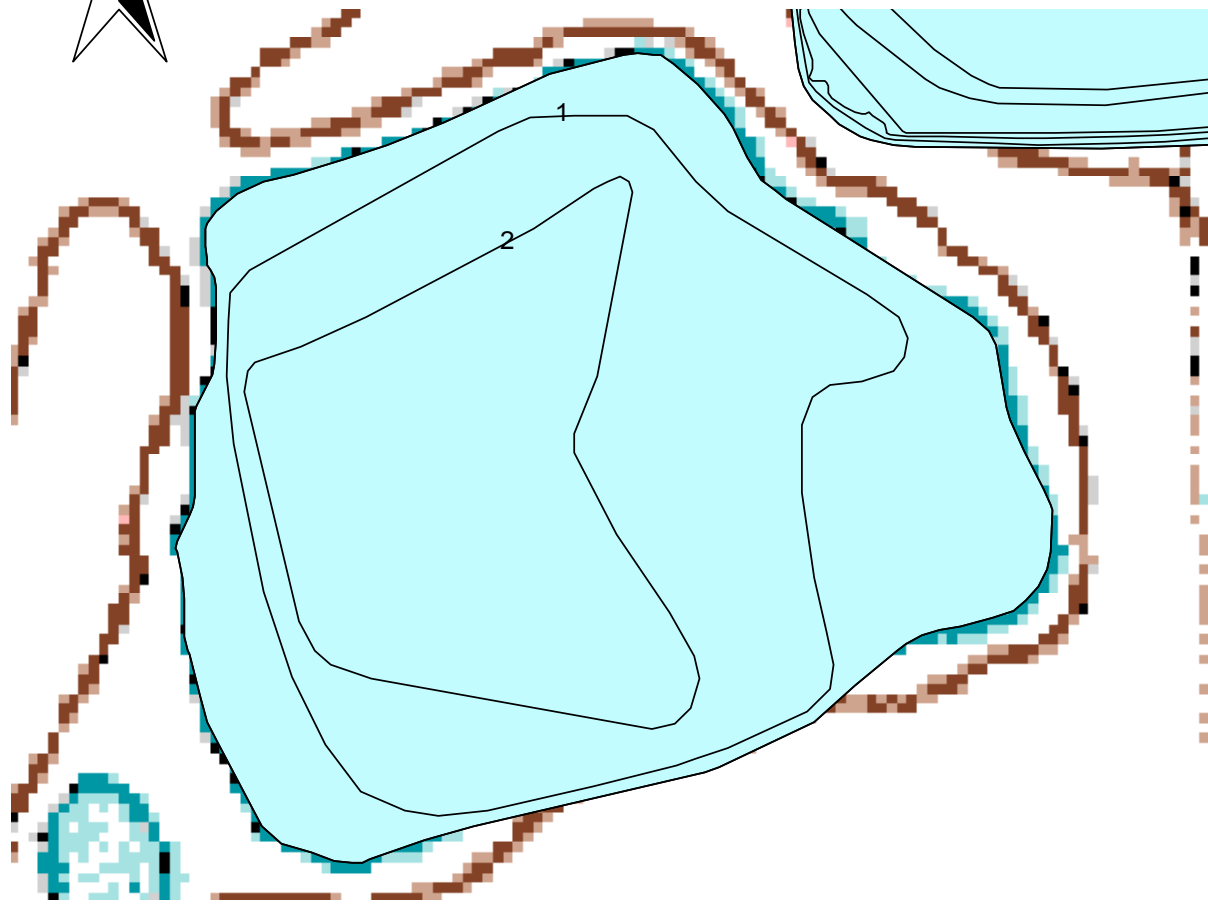
Year of Test	Calcium (mg/l)	Magnesium (mg/l)	Chloride (mg/l)	Sodium (mg/l)	Total Hardness [CaCO ₃] (mg/l)	Specific Conductance (microS/cm)	Turbidity (NTU)	pH	Source
2002						318	3.0	8.15	This Study

Catch Record:

Gear	Date	Effort (hours)	Species	Number Caught
Not sampled, too shallow				

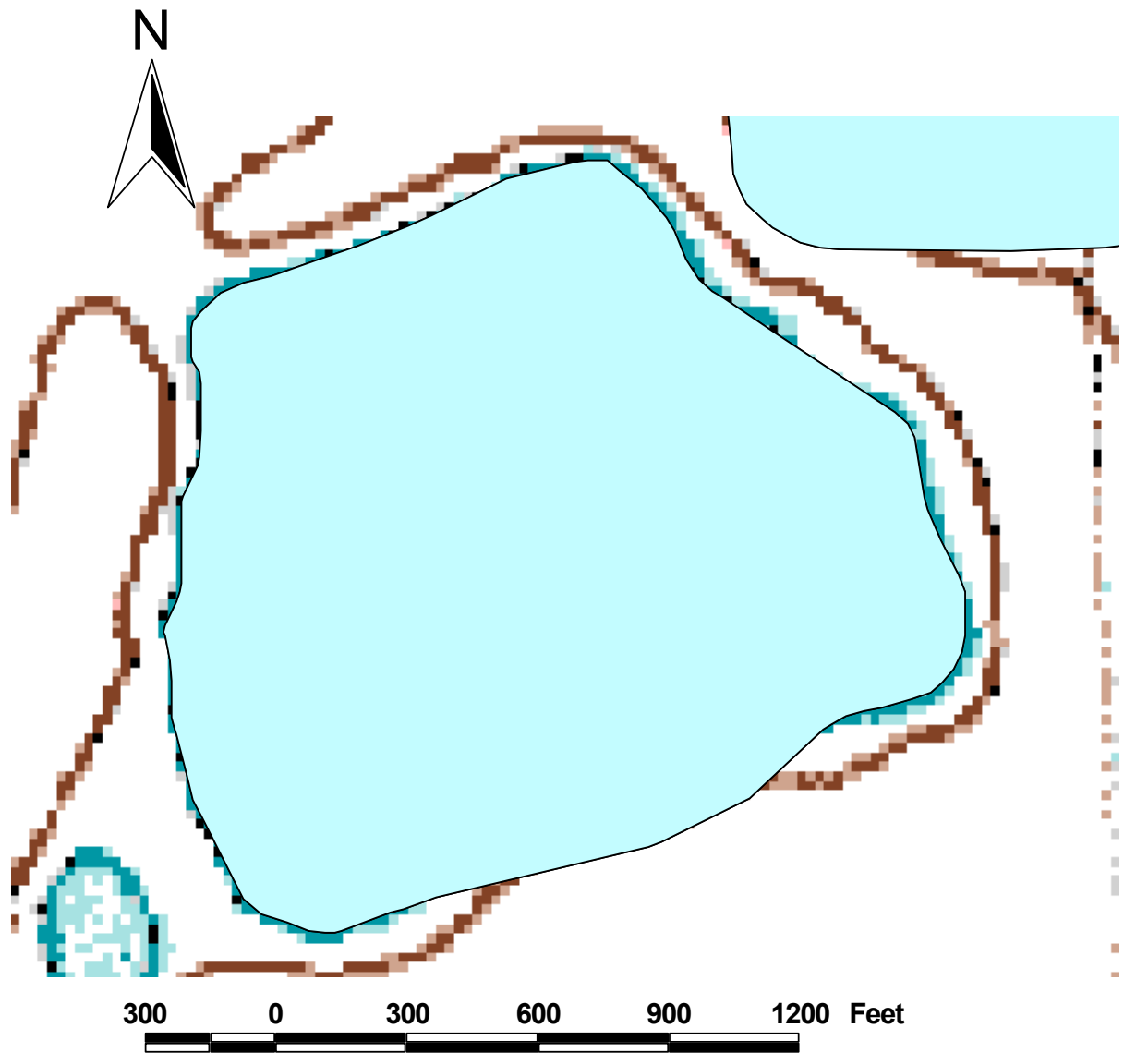


Depth transects surveyed on lake M0204 July 14, 2002



300 0 300 600 900 1200 Feet

Depth contours based on transects surveyed on lake M0204
July 14, 2002 (contours in 1 foot intervals)



Lake M0204 is less than 4 ft deep and likely to be available for ice chips, based on survey on July 14, 2002.

Lake M0246

Other Names:

Location: 70.36984°N 150.31622°W

USGS Quad Sheet: Harrison Bay B-1: T12N R7E Sec. 27

Habitat: Tundra Lake

Area: drained lake

Maximum Depth: 0 feet

Active Outlet:

Calculated Volume: 0.0 million gallons

Permittable Volume: 0.0

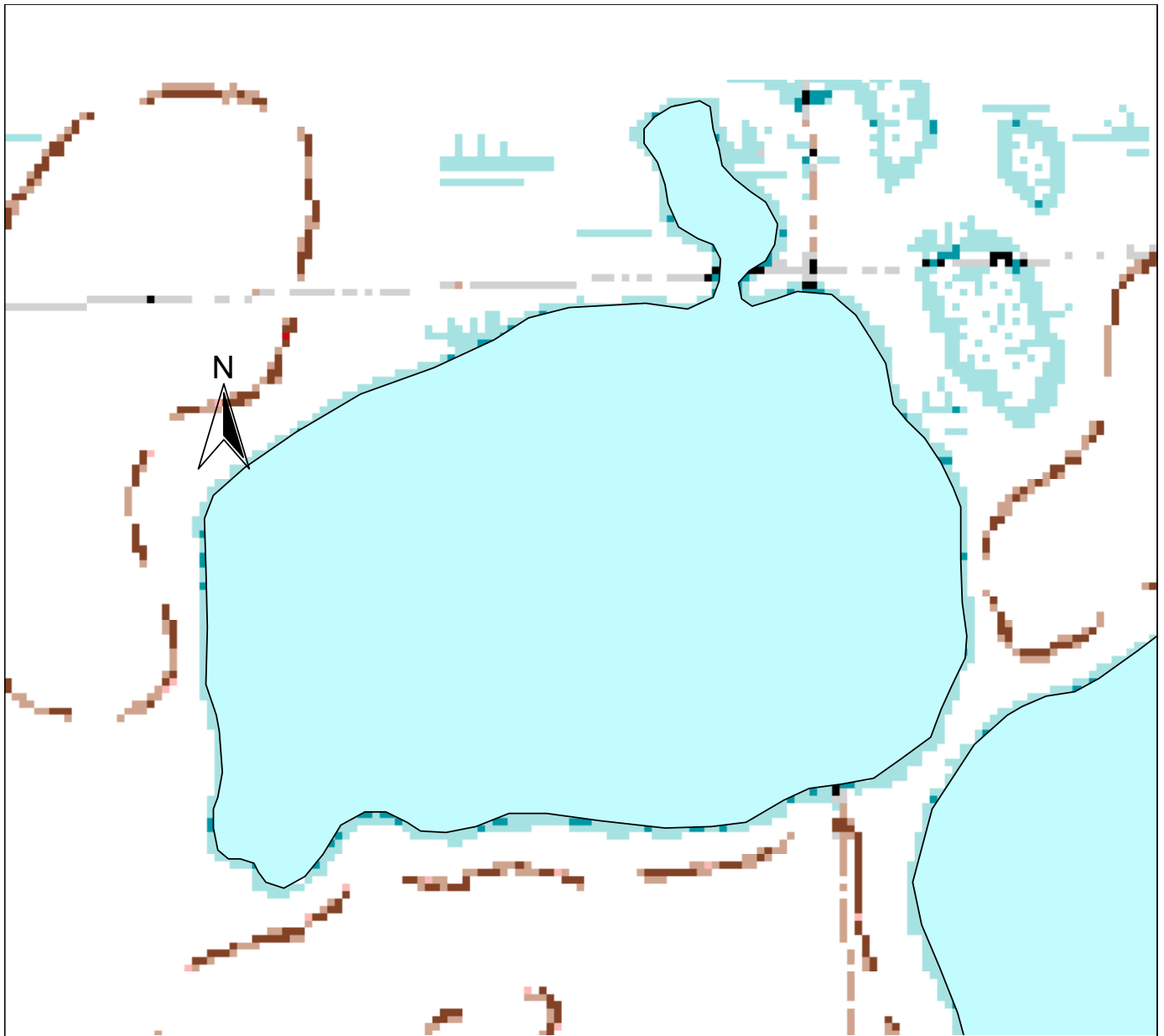
Potential Aggregate: 0 acres (water depth 4 ft or less)

Water Chemistry:

Year of Test	Calcium (mg/l)	Magnesium (mg/l)	Chloride (mg/l)	Sodium (mg/l)	Total Hardness [CaCO3] (mg/l)	Specific Conductance (microS/cm)	Turbidity (NTU)	pH	Source
2002	Not sampled, drained lake								This Study

Catch Record:

Gear	Date	Effort (hours)	Species	Number Caught
Not sampled, drained lake				



500 0 500 1000 Feet

Lake M0246 was drained when visited on August 30, 2002.

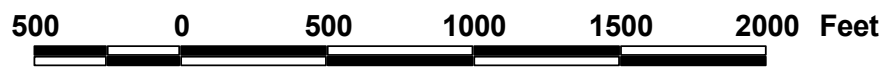
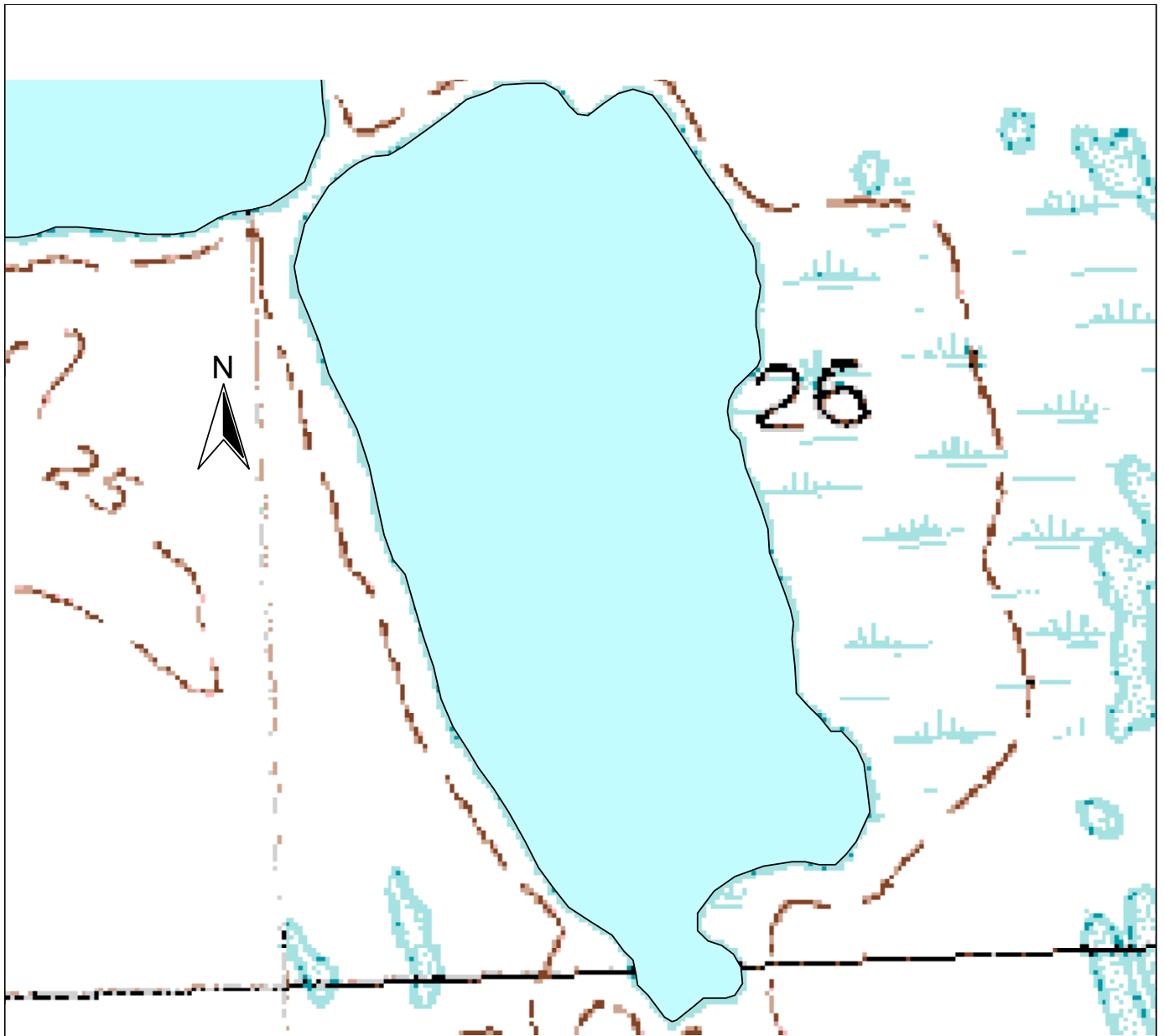
Lake M0247

Other Names:**Location:** 70.36463°N 150.29817°W**USGS Quad Sheet:** Harrison Bay B-1: T12N R7E Sec. 26**Habitat:** Tundra Lake**Area:** drained lake**Maximum Depth:** 0 feet**Active Outlet:****Calculated Volume:** 0.0 million gallons**Permittable Volume:** 0.0**Potential Aggregate:** 0 acres (water depth 4 ft or less)**Water Chemistry:**

Year of Test	Calcium (mg/l)	Magnesium (mg/l)	Chloride (mg/l)	Sodium (mg/l)	Total Hardness [CaCO ₃] (mg/l)	Specific Conductance (microS/cm)	Turbidity (NTU)	pH	Source
2002	Not sampled, drained lake								This Study

Catch Record:

Gear	Date	Effort (hours)	Species	Number Caught
Not sampled, drained lake				



Lake M0247 was drained when visited on August 30, 2002.

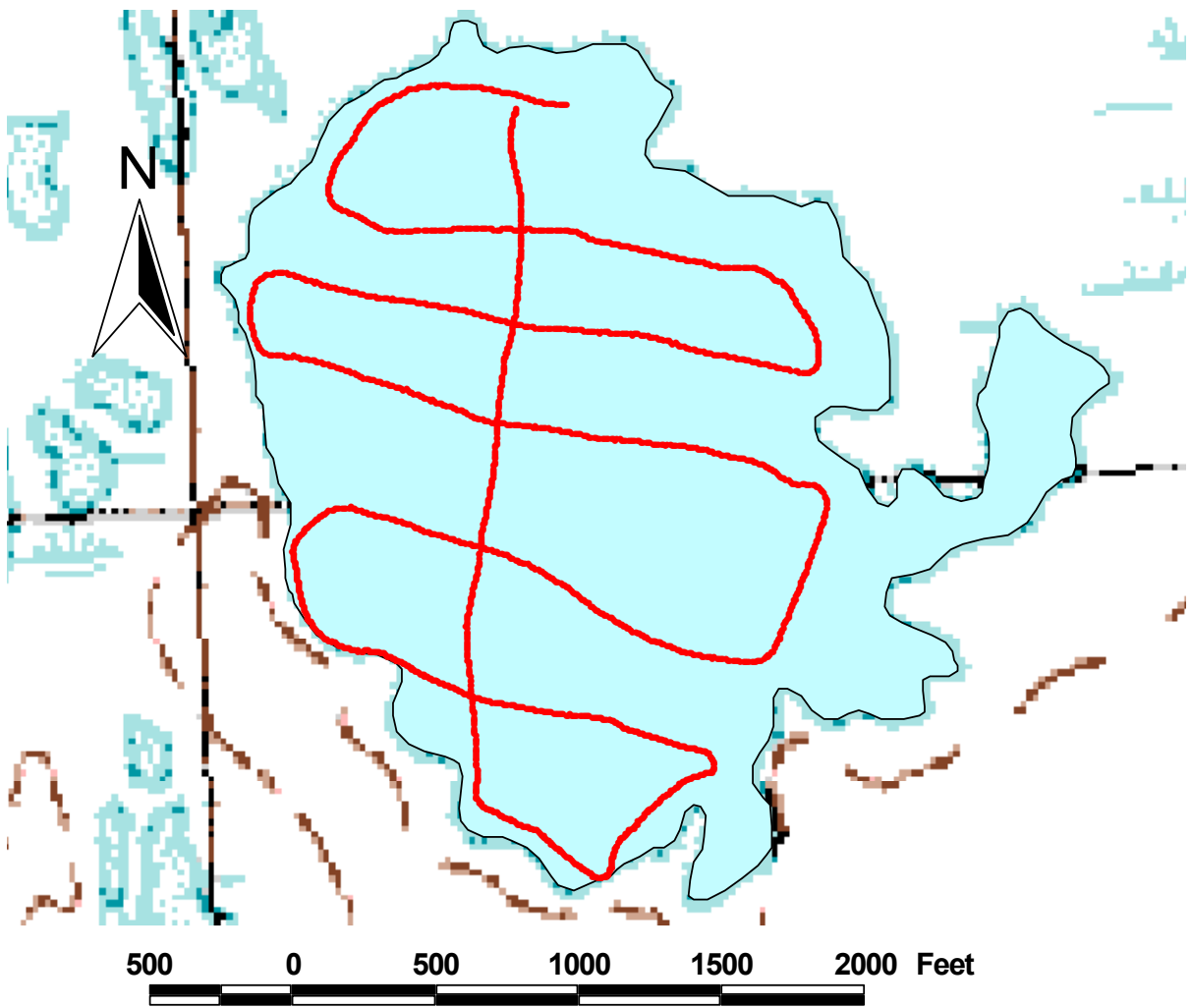
Lake M0248

Other Names:**Location:** 70.35813°N 150.38521°W**USGS Quad Sheet:** Harrison Bay B-1: T12N R7E Sec. 28/33**Habitat:** Tundra Lake**Area:** 116 acres**Maximum Depth:** 3.5 feet**Active Outlet:****Calculated Volume:** 69.6 million gallons**Permittable Volume:** too shallow**Potential Aggregate:** 116 acres (water depth 4 ft or less)**Water Chemistry:**

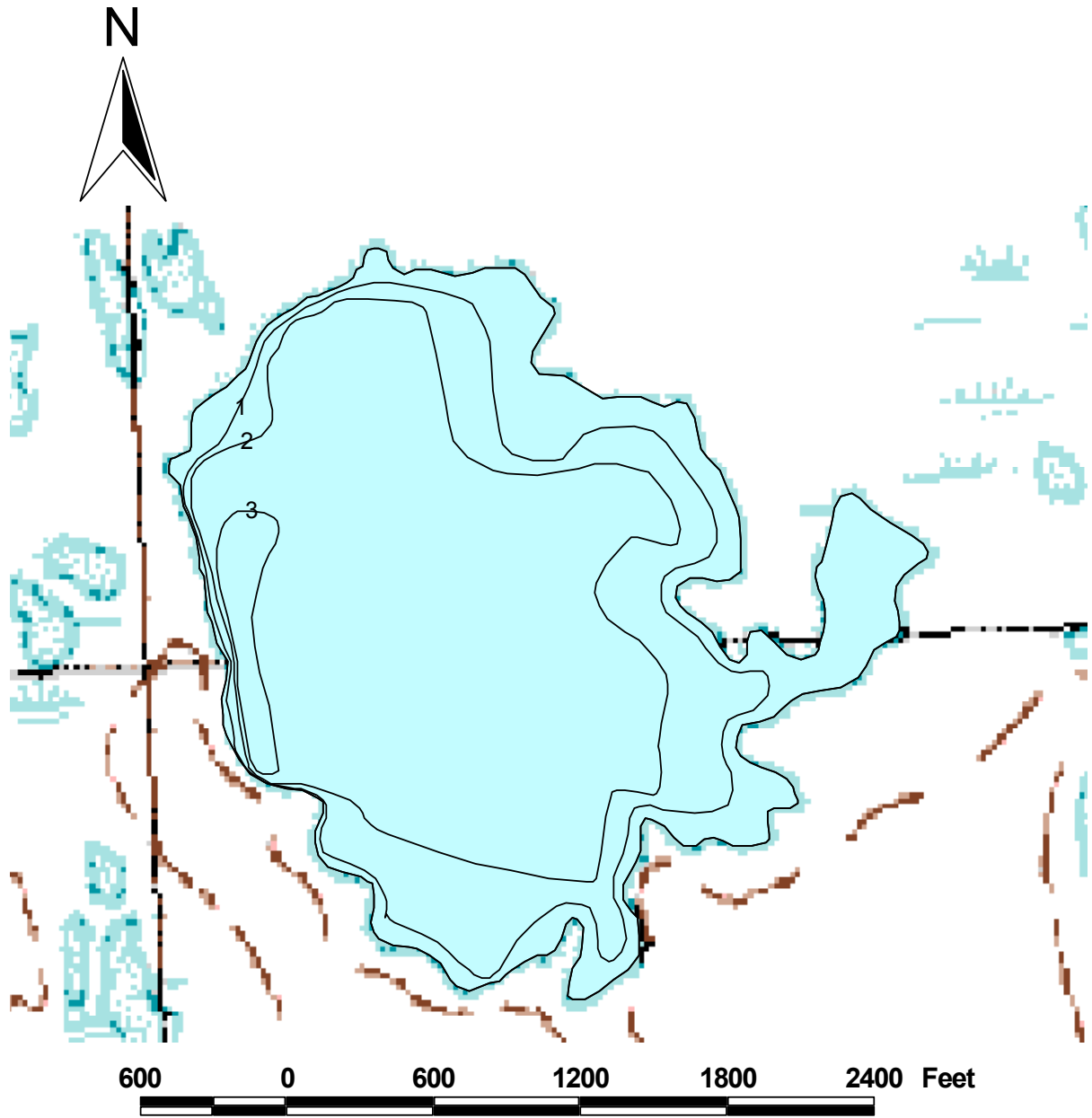
Year of Test	Calcium (mg/l)	Magnesium (mg/l)	Chloride (mg/l)	Sodium (mg/l)	Total Hardness [CaCO ₃] (mg/l)	Specific Conductance (microS/cm)	Turbidity (NTU)	pH	Source
2002	49.6	5.6	10.1	32.7	146.6	330	4.2	8.22	This Study

Catch Record:

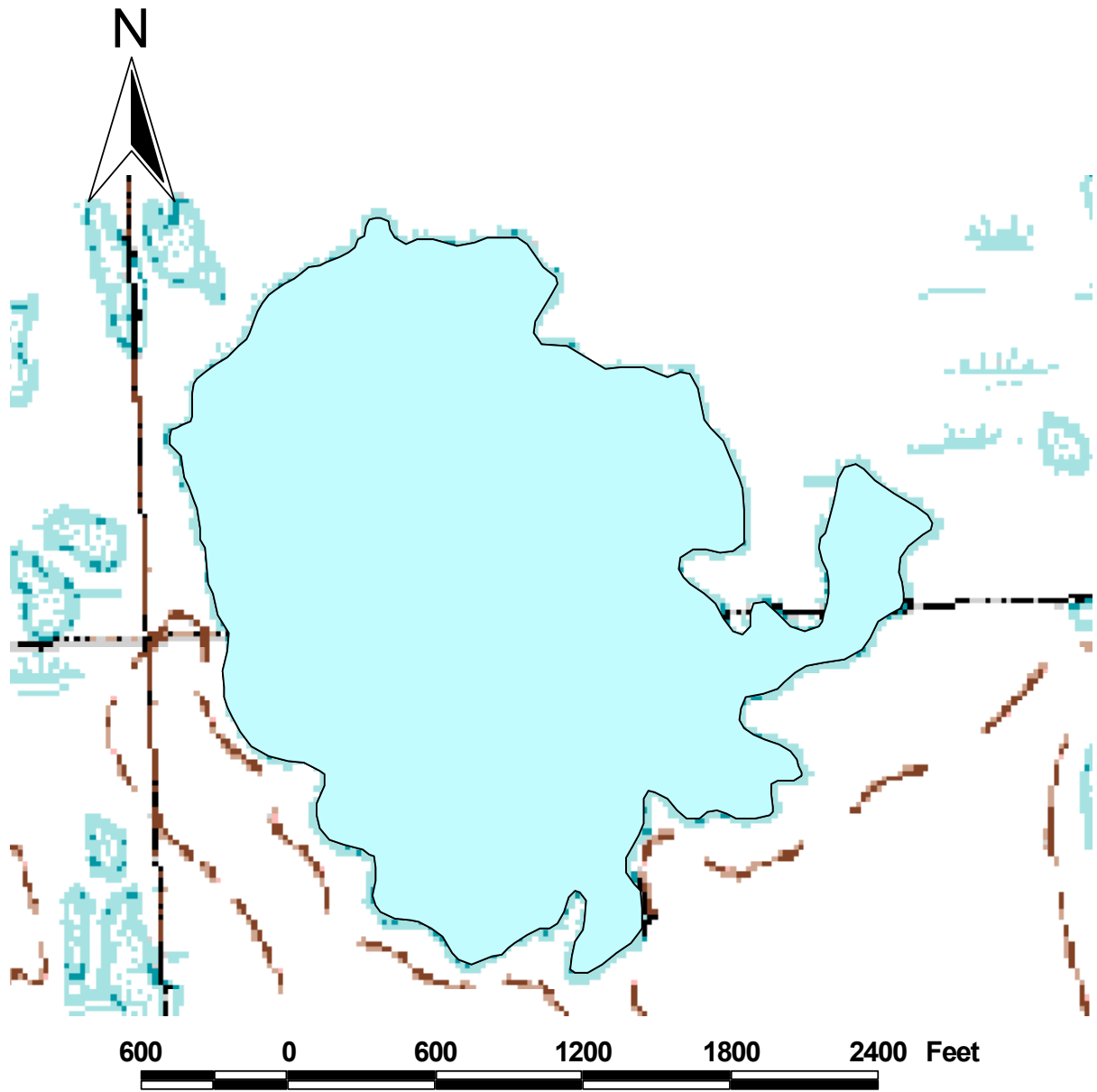
Gear	Date	Effort (hours)	Species	Number Caught
Gill Net	Aug 30 02	4.0	None	0
Minnow Trap	Aug 30 02	5.3	None	0
Seine	Aug 30 02	3 hauls	None	0



Depth transects surveyed on lake M0248 August 30, 2002



Depth contours based on transects surveyed on lake M0248
August 30, 2002 (contours in 1 foot intervals)



Lake M0248 is less than 4 ft deep and likely to be available for ice chips,
based on survey on August 30, 2002

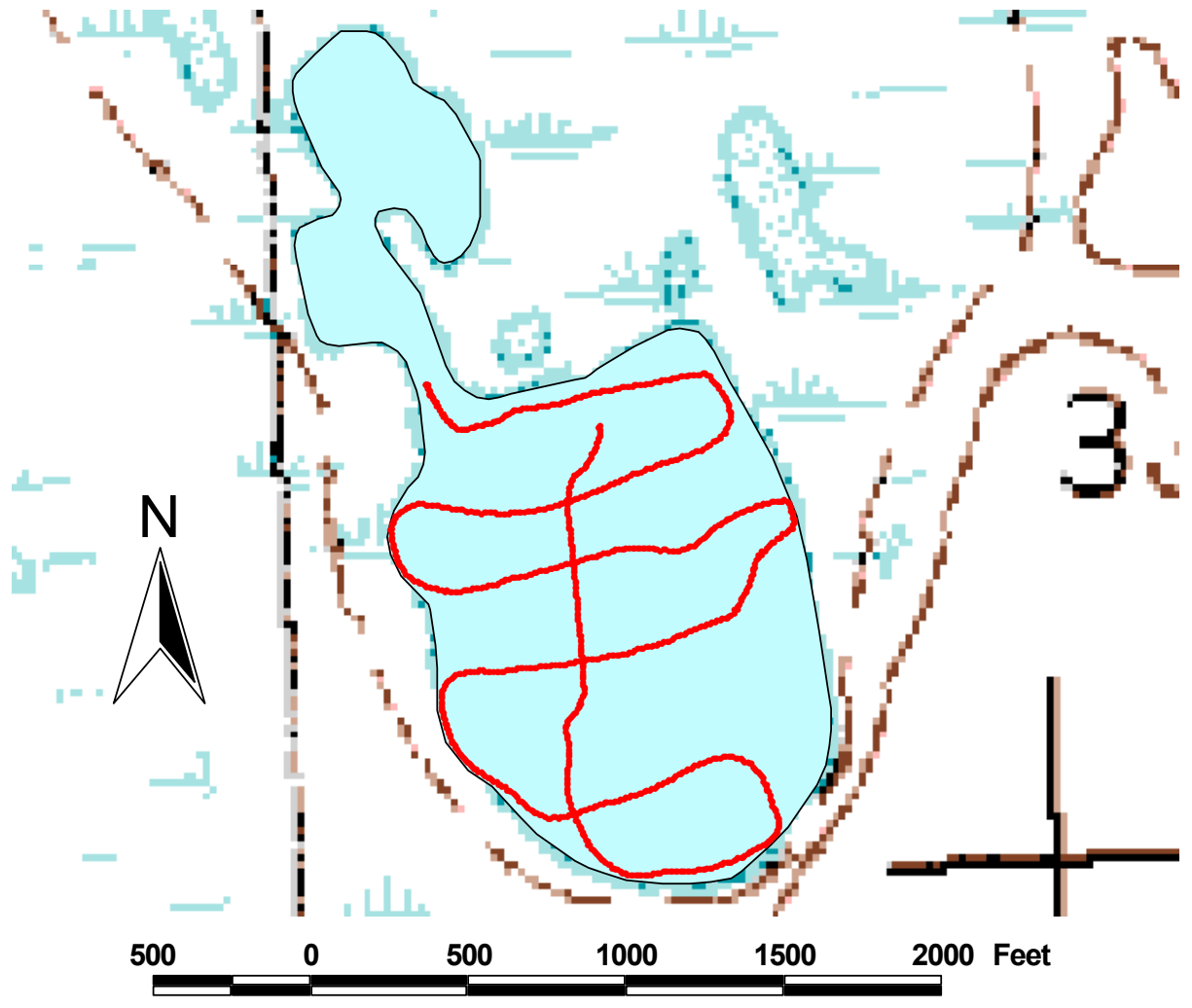
Lake M0249

Other Names:**Location:** 70.33579°N 150.34459°W**USGS Quad Sheet:** Harrison Bay B-1: T11N R7E Sec. 3**Habitat:** Tundra Lake**Area:** 108 acres**Maximum Depth:** 4.6 feet**Active Outlet:****Calculated Volume:** 93.0 million gallons**Permittable Volume:** 0.26 million gallons (No fish concern)**Potential Aggregate:** 106 acres (water depth 4 ft or less)**Water Chemistry:**

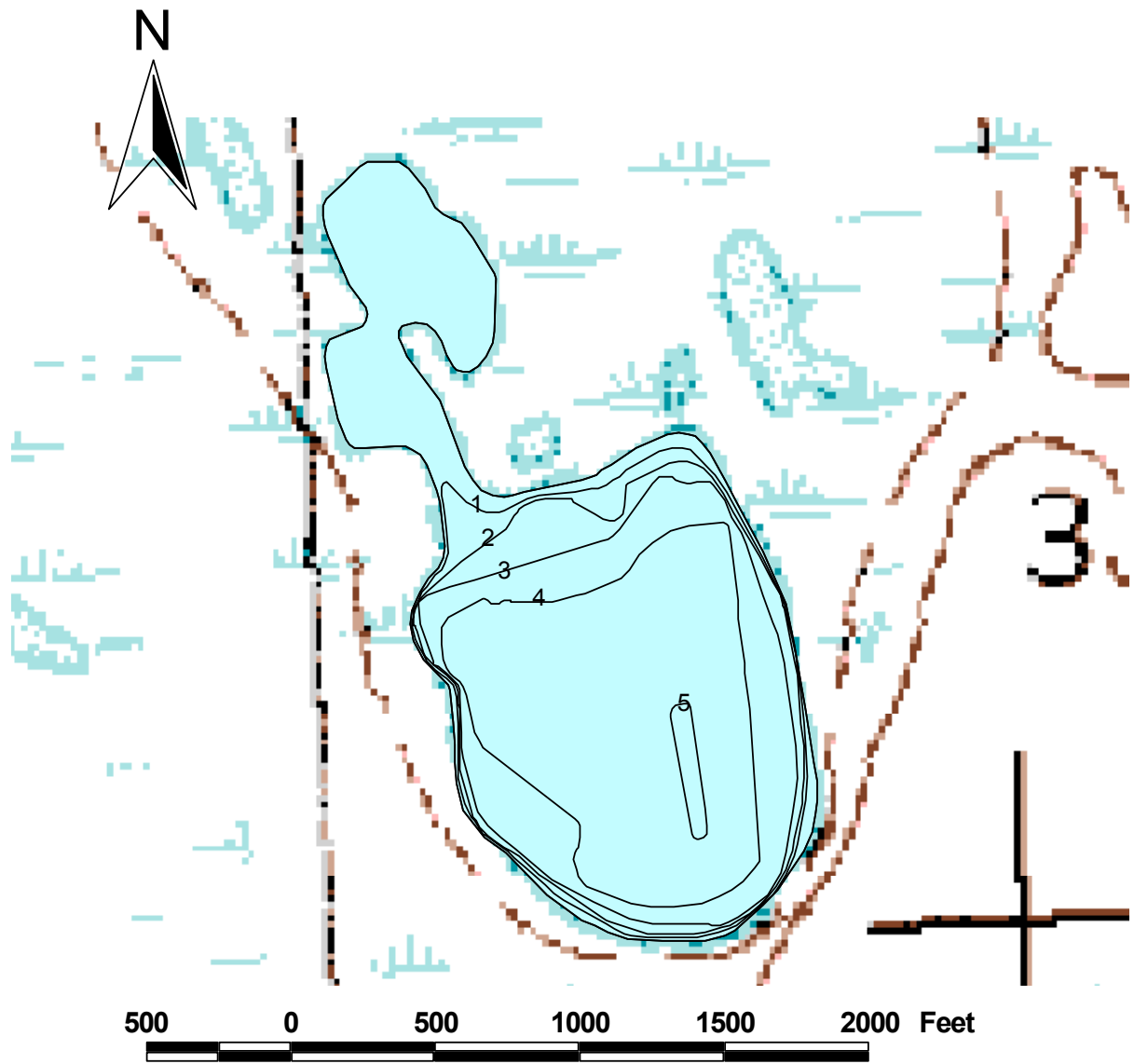
Year of Test	Calcium (mg/l)	Magnesium (mg/l)	Chloride (mg/l)	Sodium (mg/l)	Total Hardness [CaCO ₃] (mg/l)	Specific Conductance (microS/cm)	Turbidity (NTU)	pH	Source
2002	46.3	5.8	14.4	57.1	139.5	346	2.3	7.76	This Study

Catch Record:

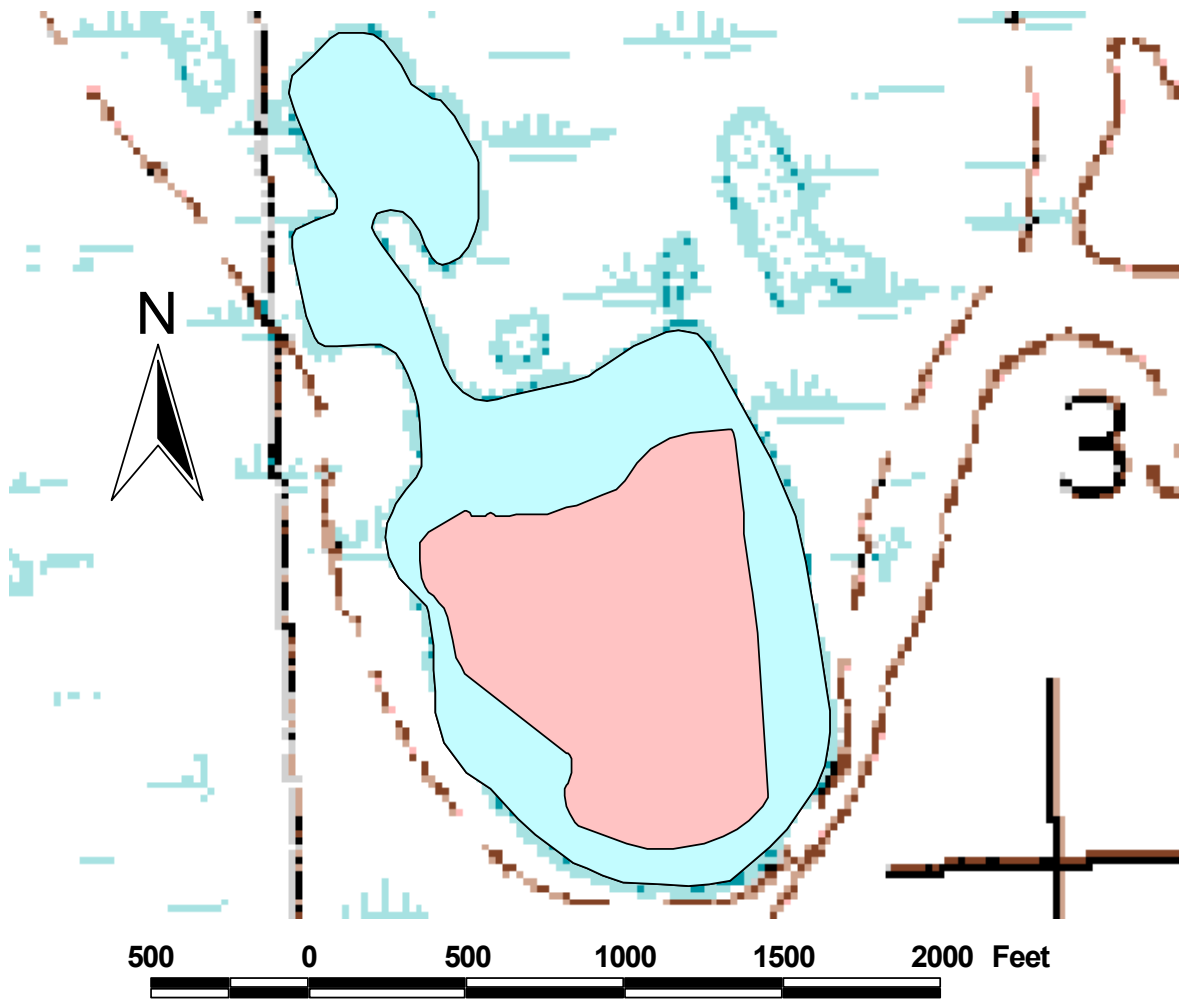
Gear	Date	Effort (hours)	Species	Number Caught
Gill Net	Aug 28 02	4.2	None	0
Minnow Trap	Aug 28 02	5.2	None	0
Seine	Aug 28 02	4 hauls	None	0



Depth transects surveyed on lake M0249 August 28, 2002



Depth contours based on transects surveyed on lake M0249
August 28, 2002 (contours in 1 foot intervals)



Regions of lake M0249 less than 4 ft deep (light shaded) and likely to be available for ice chips, based on transects surveyed on August 28, 2002.

Lake M0250

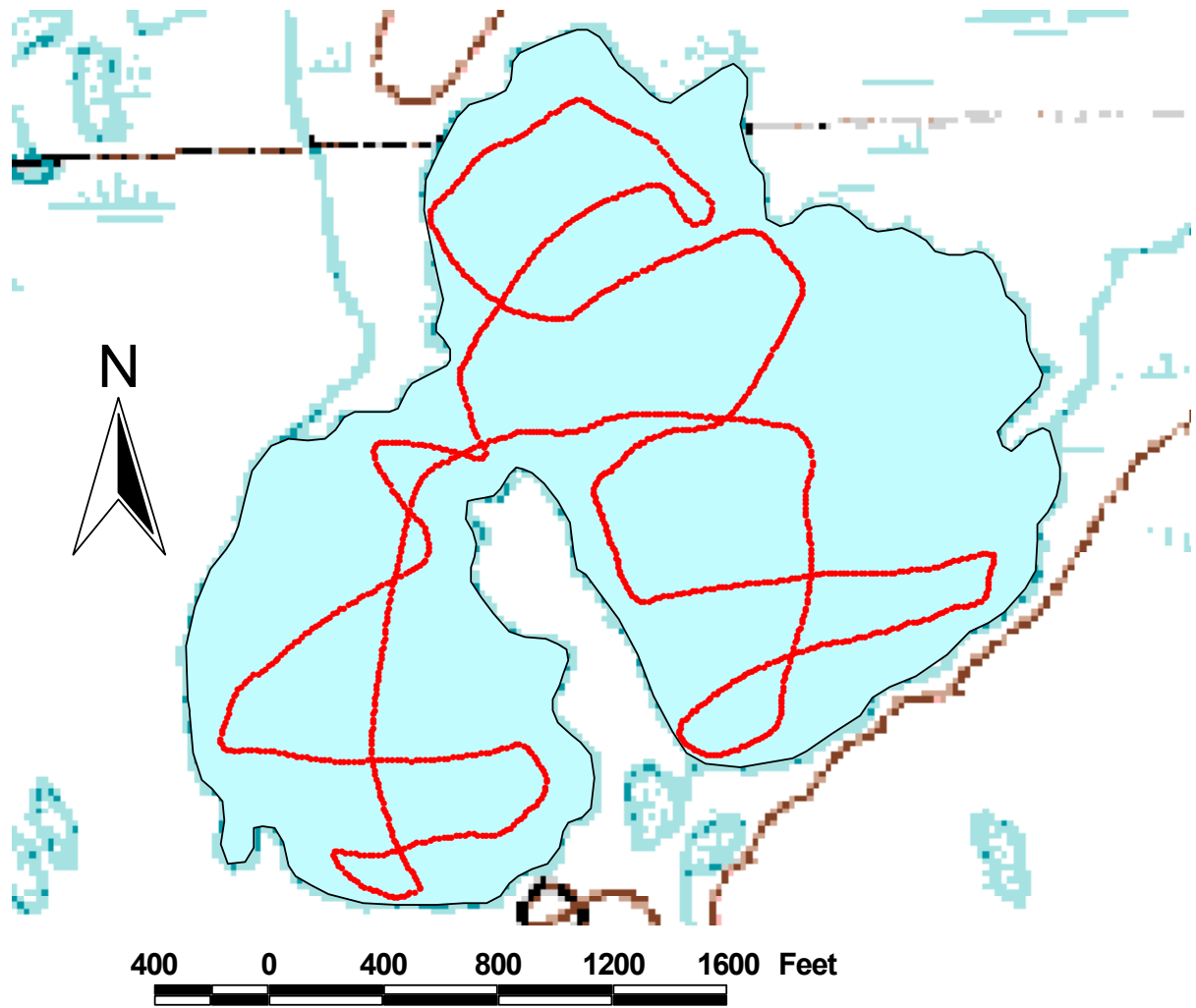
Other Names:
Location: 70.32647°N 150.36909°W
USGS Quad Sheet: Harrison Bay B-1: T11N R7E Sec. 9
Habitat: Drainage Lake
Area: 43 acres
Maximum Depth: 5.5 feet
Active Outlet: Yes
Calculated Volume: 48.2 million gallons
Permittable Volume: 0.0 million gallons
Potential Aggregate: 22 acres (water depth 4 ft or less)

Water Chemistry:

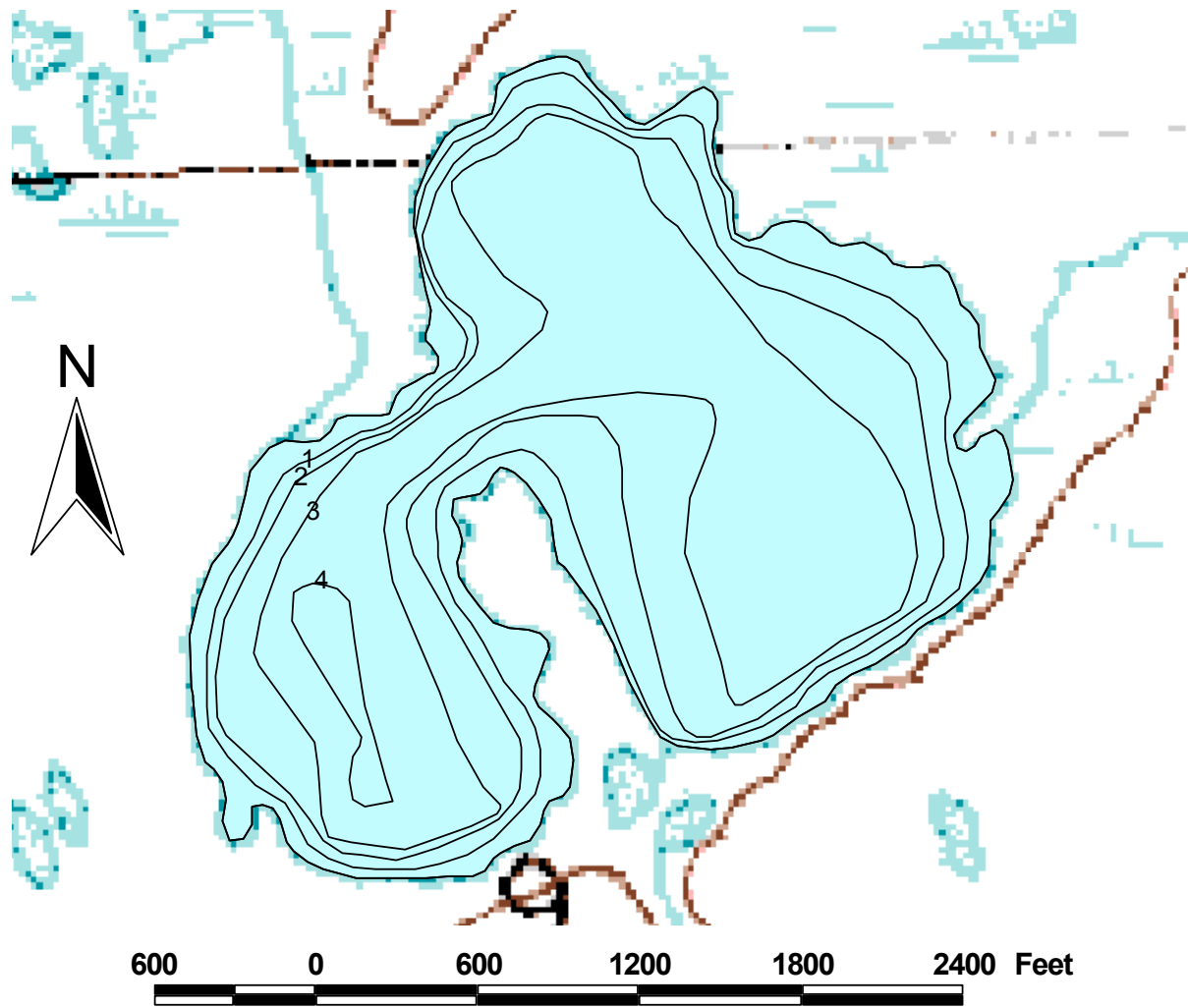
Year of Test	Calcium (mg/l)	Magnesium (mg/l)	Chloride (mg/l)	Sodium (mg/l)	Total Hardness [CaCO ₃] (mg/l)	Specific Conductance (microS/cm)	Turbidity (NTU)	pH	Source
2002	47.3	4.7	6.7	25.8	137.6	276	4.5	8.05	This Study

Catch Record:

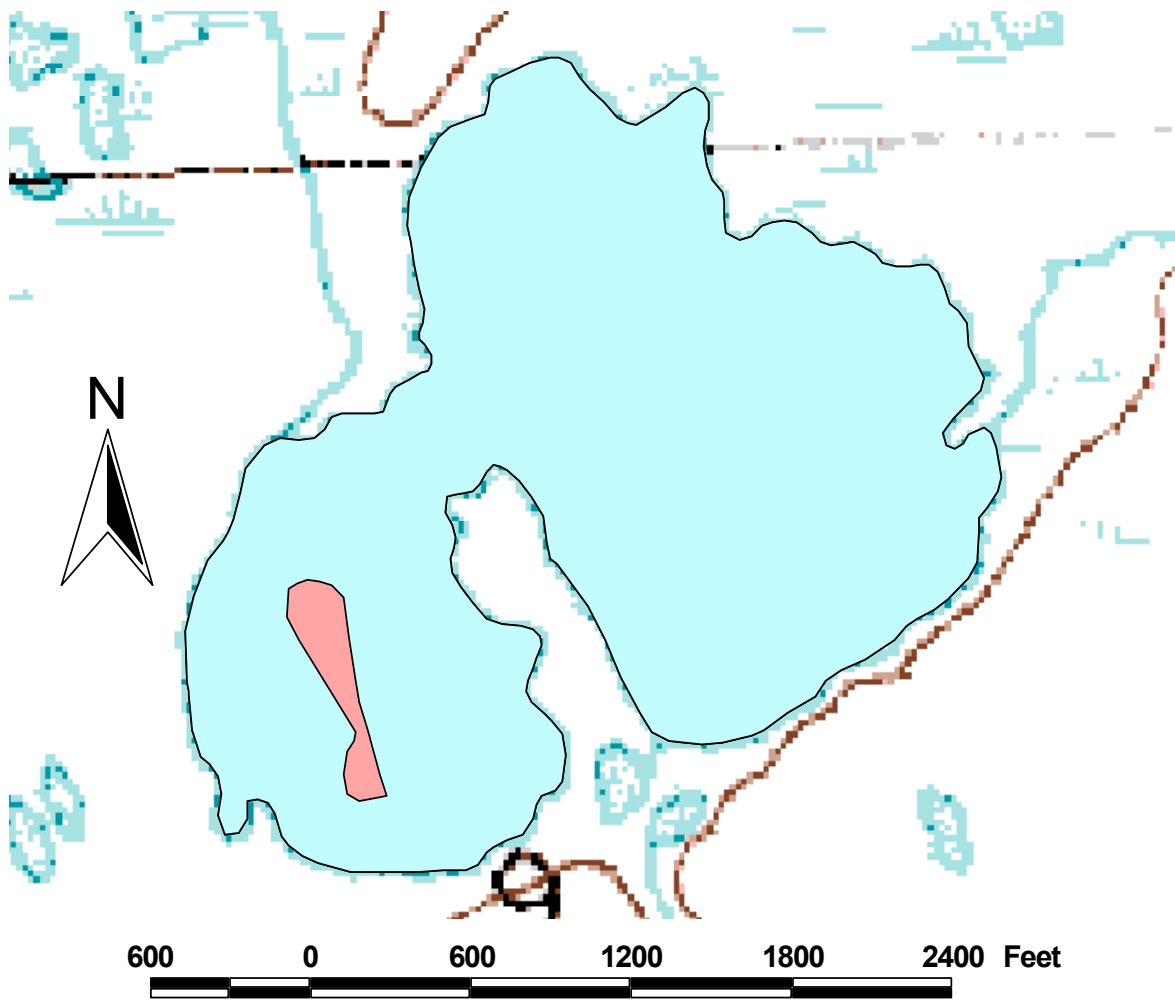
Gear	Date	Effort (hours)	Species	Number Caught	Fork Length (mm)
Gill Net	Aug 28 02	2.6	Broad whitefish	2	215-275
Minnow Trap	Aug 28 02	4.7	None	0	
Seine	Aug 28 02	0 hauls			



Depth transects surveyed on lake M0250 August 28, 2002



Depth contours based on transects surveyed on lake M0250
August 28, 2002 (contours in 1 foot intervals)



Regions of lake M025 less than 4 ft deep (light shaded) and likely to be available for ice chips, based on transects surveyed on August 28, 2002.

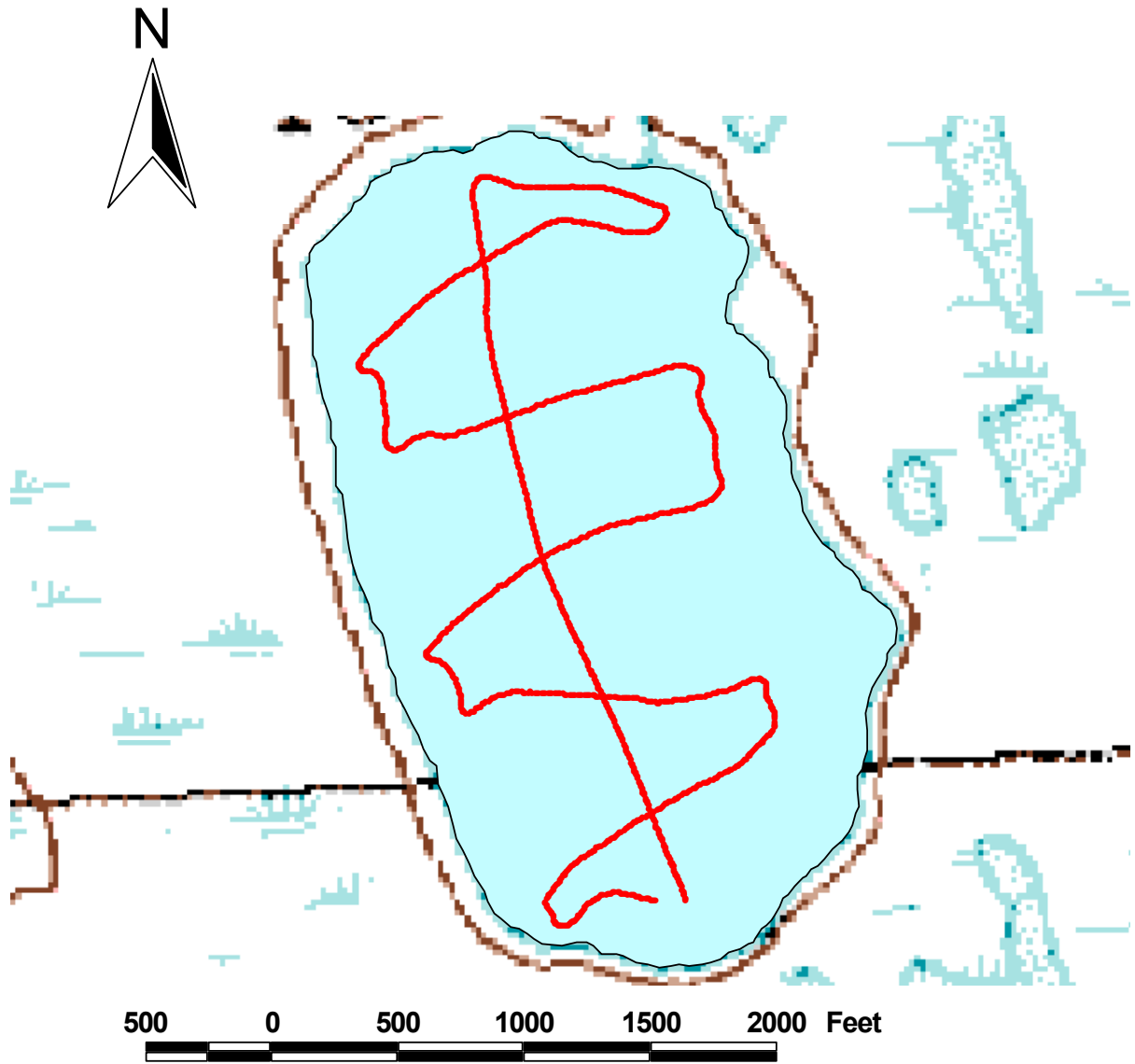
Lake M0251

Other Names:**Location:** 70.30196°N 150.32977°W**USGS Quad Sheet:** Harrison Bay B-1: T11N R7E Sec. 15/22**Habitat:** Tundra Lake**Area:** 103 acres**Maximum Depth:** 6.4 feet**Active Outlet:****Calculated Volume:** 122.1 million gallons**Permittable Volume:** 2.6 million gallons**Potential Aggregate:** 45 acres (water depth 4 ft or less)**Water Chemistry:**

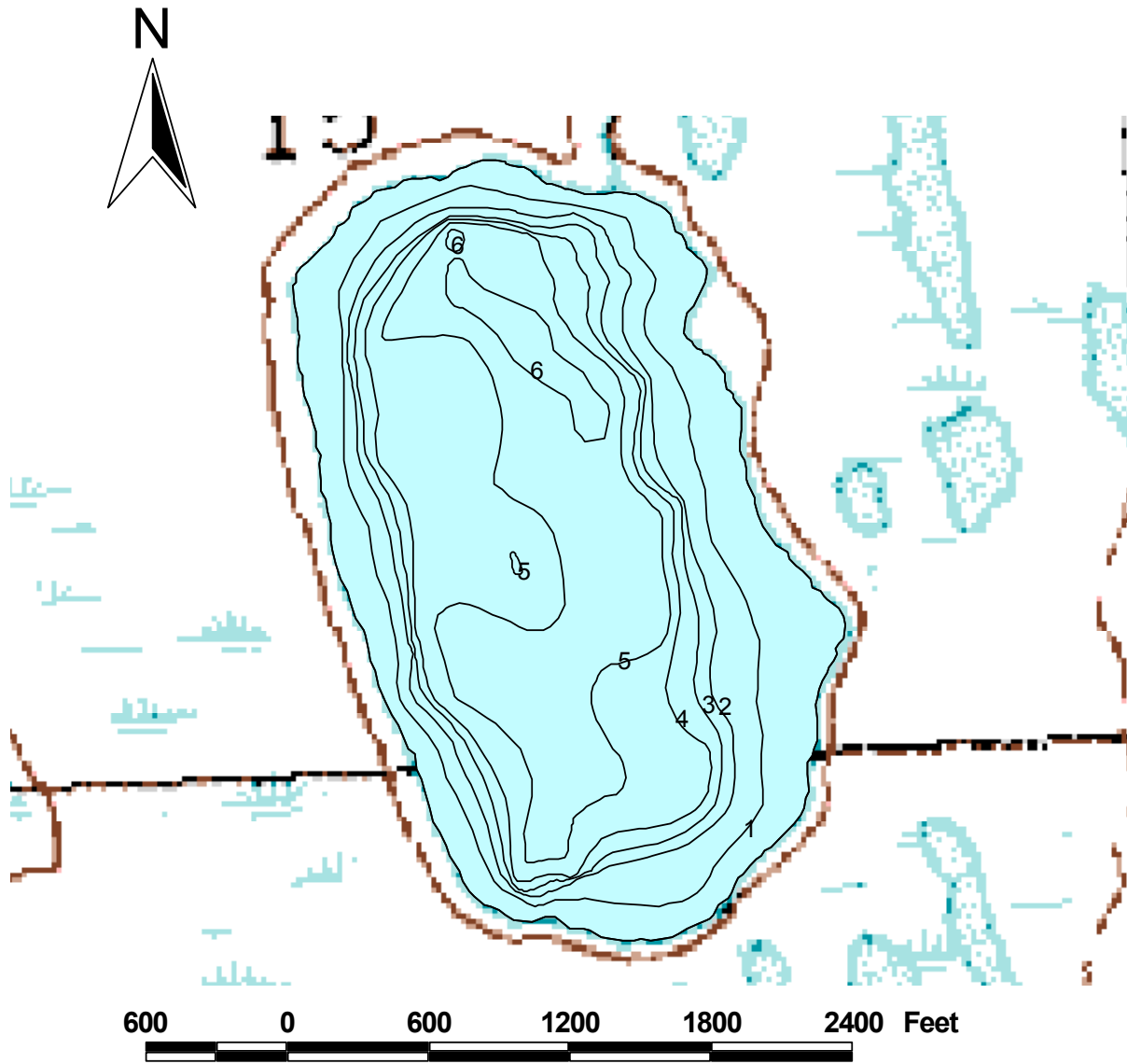
Year of Test	Calcium (mg/l)	Magnesium (mg/l)	Chloride (mg/l)	Sodium (mg/l)	Total Hardness [CaCO ₃] (mg/l)	Specific Conductance (microS/cm)	Turbidity (NTU)	pH	Source
2002	36.2	3.8	8.2	22.4	106.2	241	1.3	8.13	This Study

Catch Record:

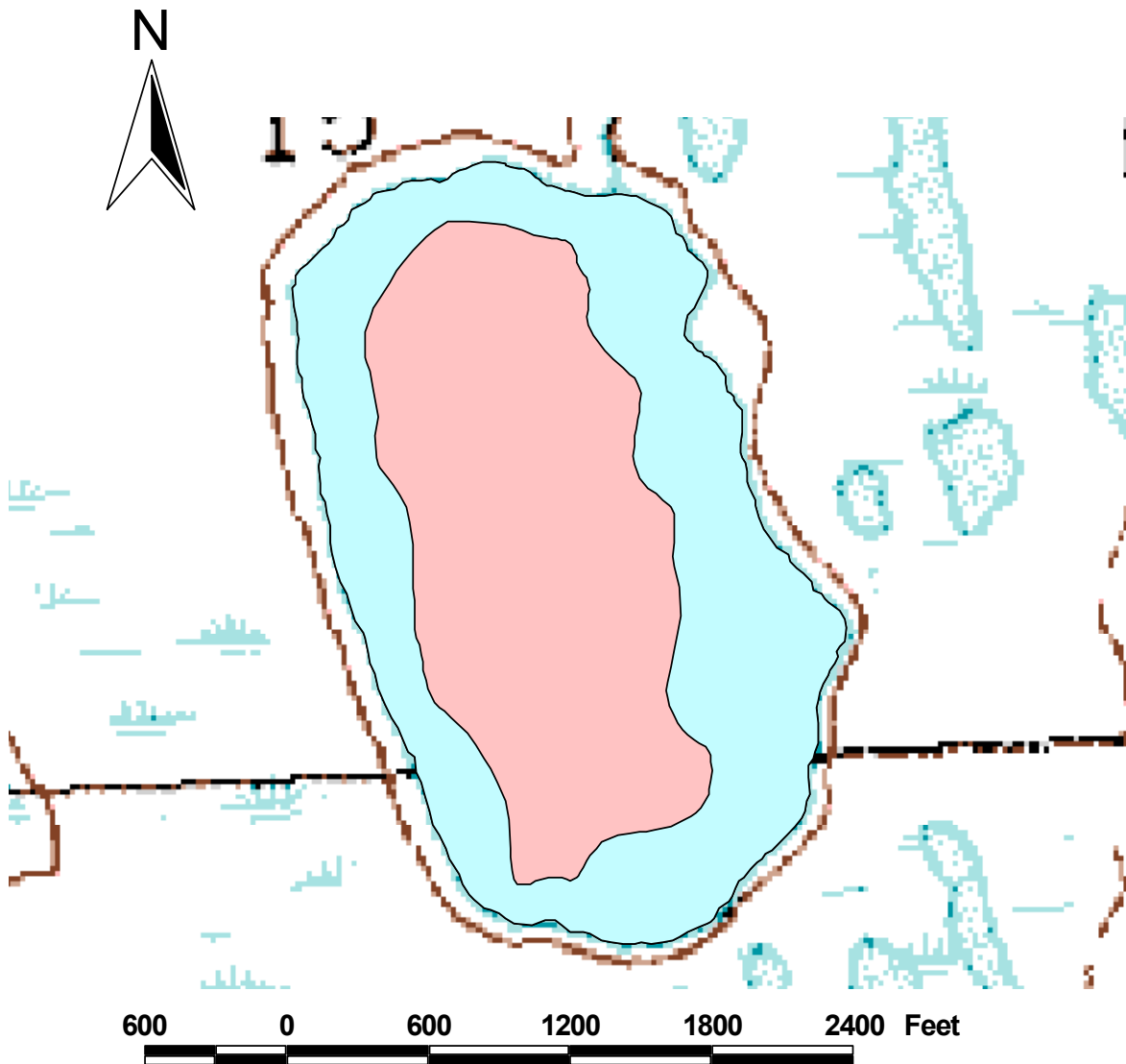
Gear	Date	Effort (hours)	Species	Number Caught
Gill Net	Aug 27 02	6.7	None	0
Minnow Trap	Aug 27 02	7.7	None	0
Seine	Aug 27 02	3 hauls	9spine stickleback	2



Depth transects surveyed on lake M0251 August 27, 2002



Depth contours based on transects surveyed on lake M0251
August 27, 2002 (contours in 1 foot intervals)



Regions of lake M0251 less than 4 ft deep (light shaded) and likely to be available for ice chips, based on transects surveyed on August 27, 2002.

Lake M0252

Other Names:

Location: 70.34757°N 150.26178°W

USGS Quad Sheet: Harrison Bay B-1: T12N R7E Sec. 35/36

Habitat: Tundra Lake

Area: 154 acres

Maximum Depth: less than 2 feet

Active Outlet:

Calculated Volume: not calculated

Permittable Volume: too shallow

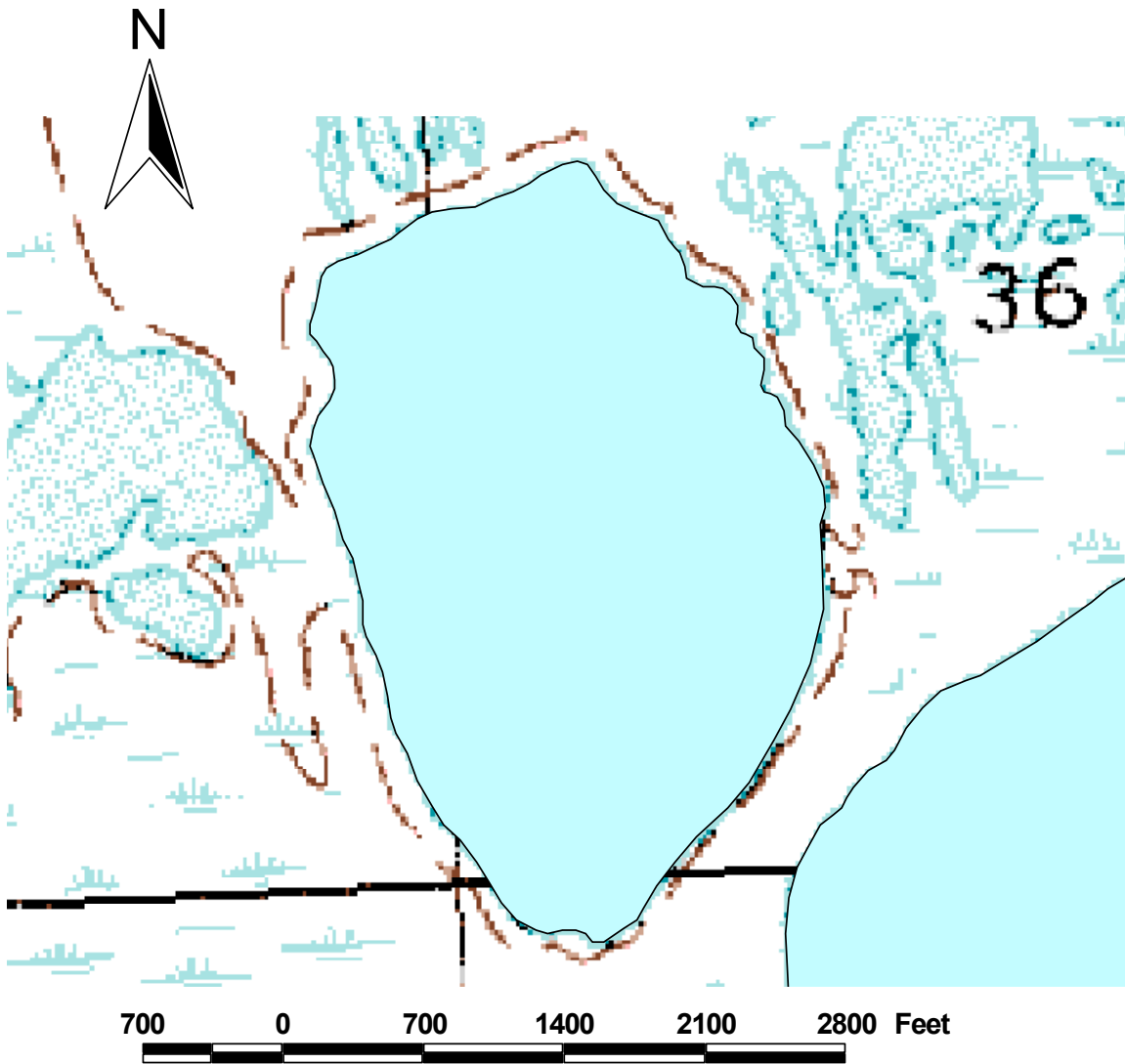
Potential Aggregate 154 acres (water depth 4 ft or less)

Water Chemistry:

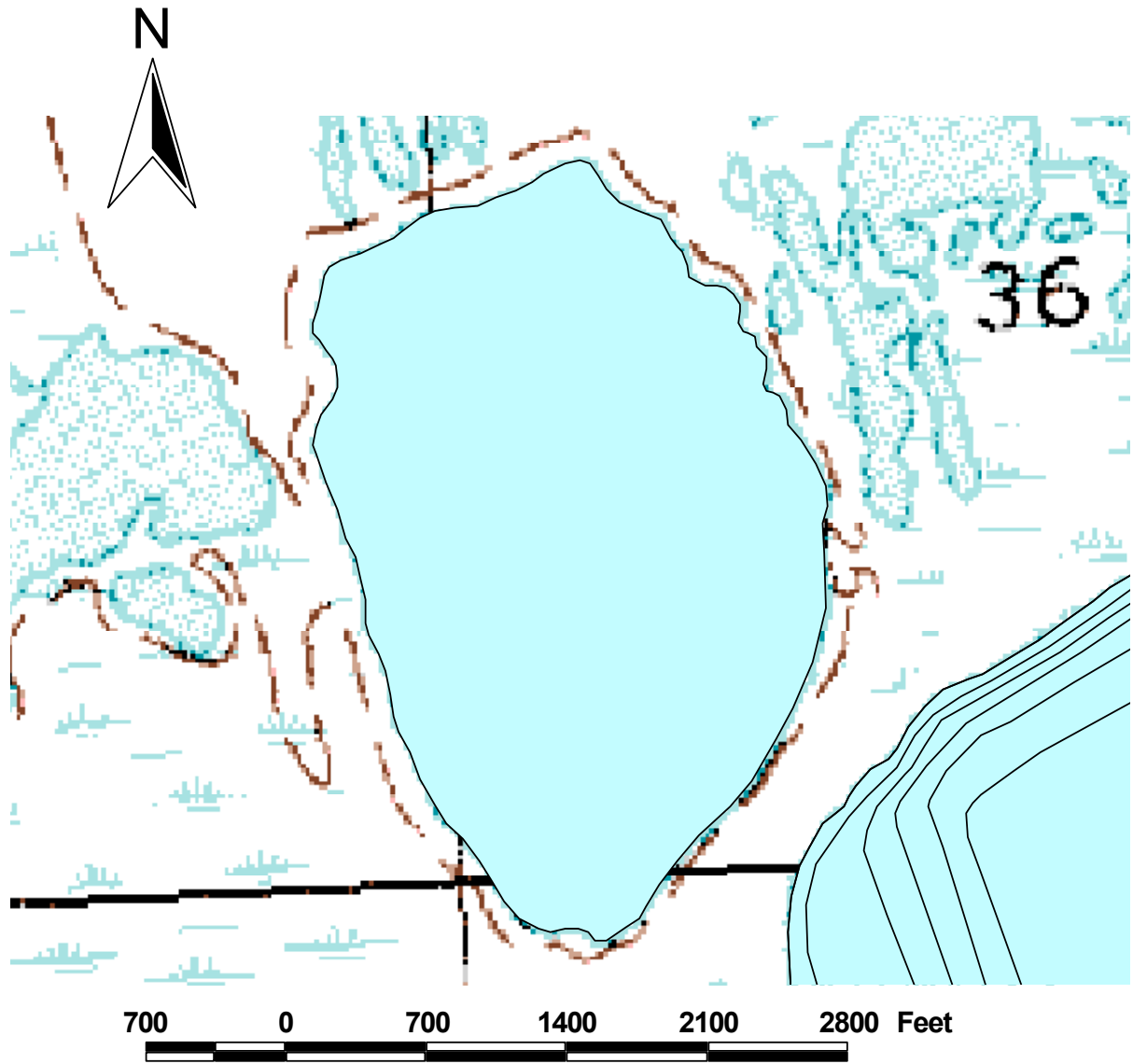
Year of Test	Calcium (mg/l)	Magnesium (mg/l)	Chloride (mg/l)	Sodium (mg/l)	Total Hardness [CaCO ₃] (mg/l)	Specific Conductance (microS/cm)	Turbidity (NTU)	pH	Source
2002	38.3	2.8	4.9	16.7	107.4	155	2.4	8.1	This Study

Catch Record:

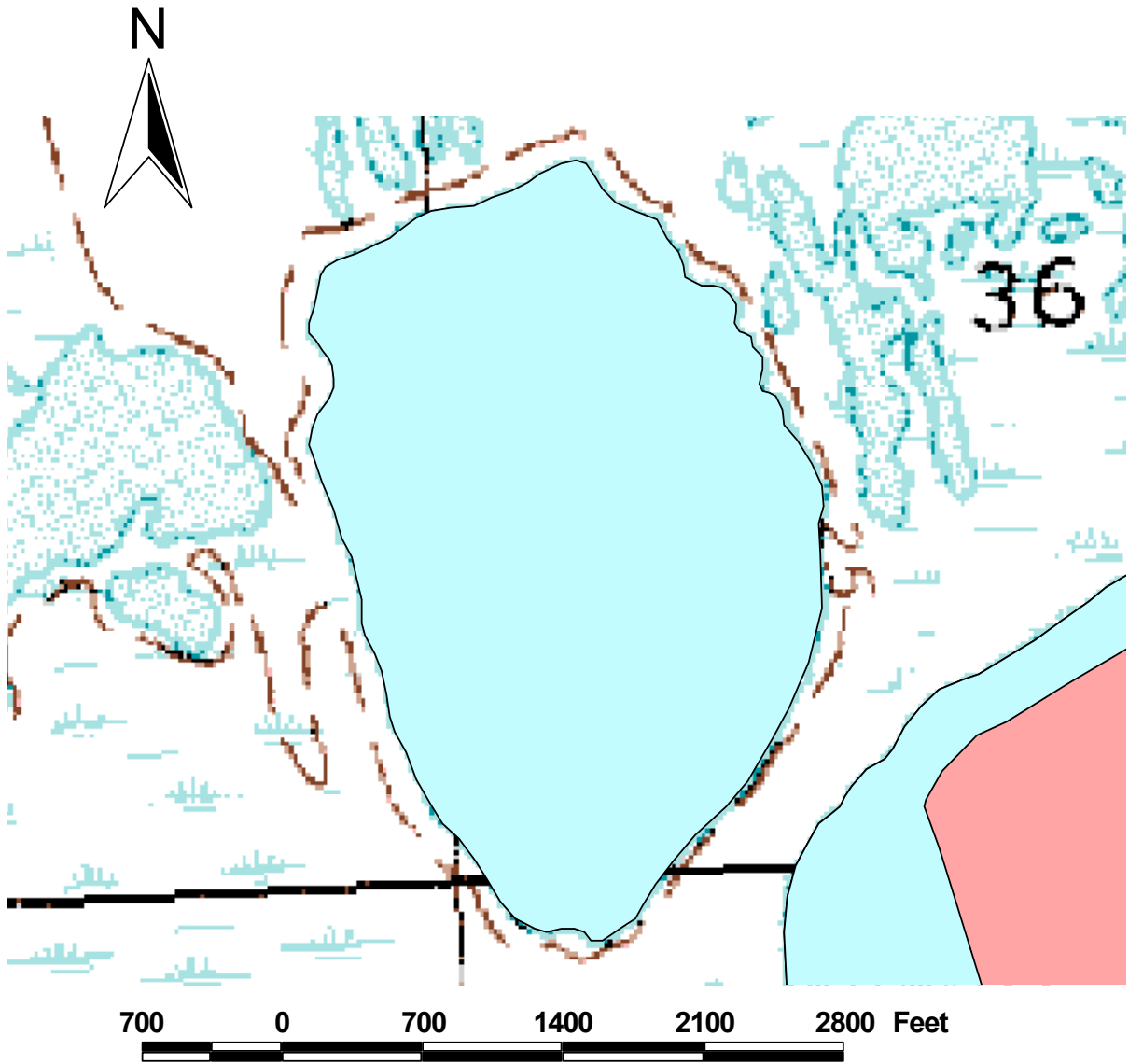
Gear	Date	Effort (hours)	Species	Number Caught
Not sampled, too shallow			9spine stickleback	observed



Lake M0252 was less than 2 feet deep on August 29 and not surveyed.



Lake M0252 visited on August 29, 2002 (not contoured, less than 2 ft deep)



Lake M0252 is less than 4 ft deep and likely to be available for ice chips, based on survey on August 29, 2002.

Lake M0253

Other Names:

Location: 70.33792°N 150.23347°W

USGS Quad Sheet: Harrison Bay B-1: T11N/12N R7E/8E Sec. 1/36/6/31

Habitat: Tundra Lake

Area: 754 acres

Maximum Depth: 6.2 feet

Active Outlet:

Calculated Volume: 910.6 million gallons

Permittable Volume: 17.3 million gallons

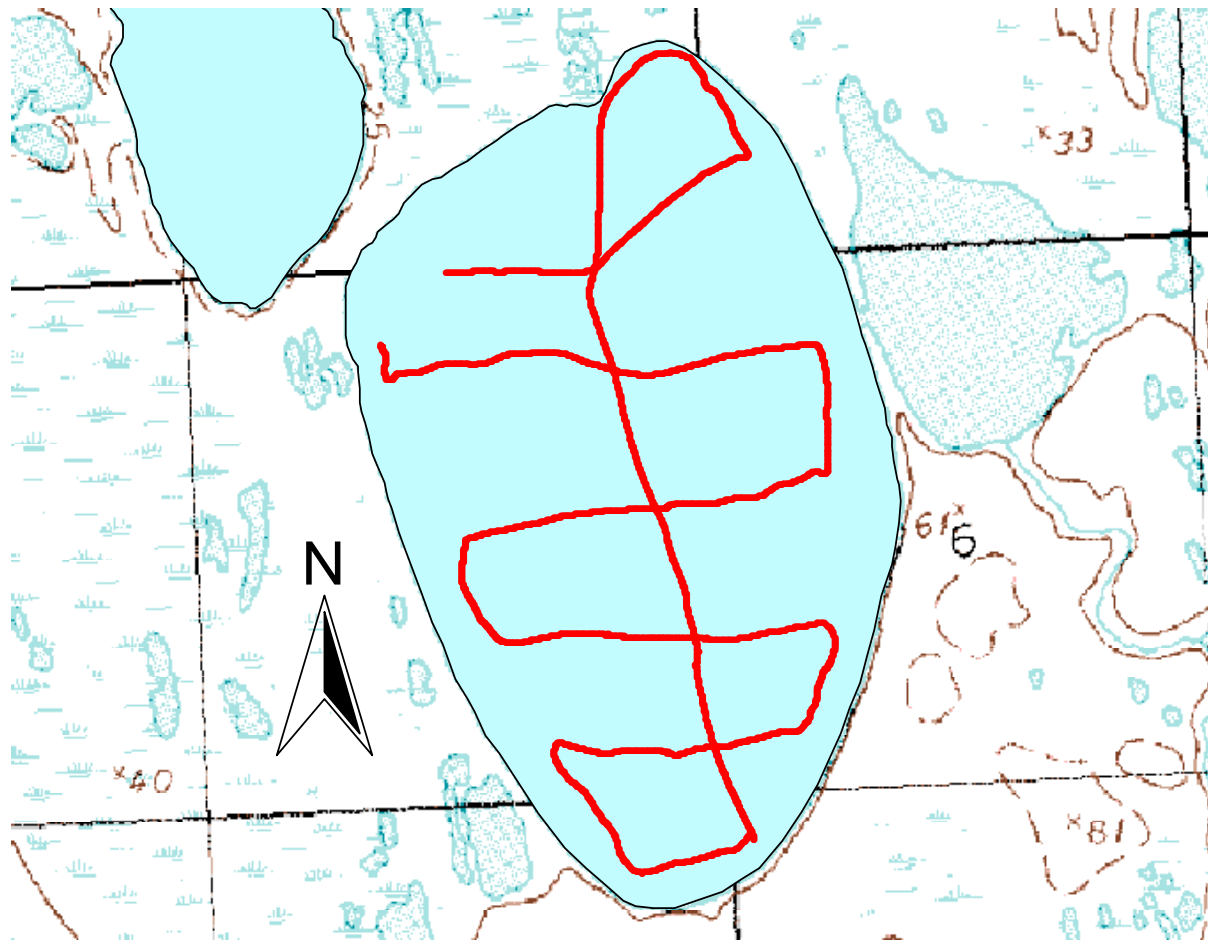
Potential Aggregate: 296 acres (water depth 4 ft or less)

Water Chemistry:

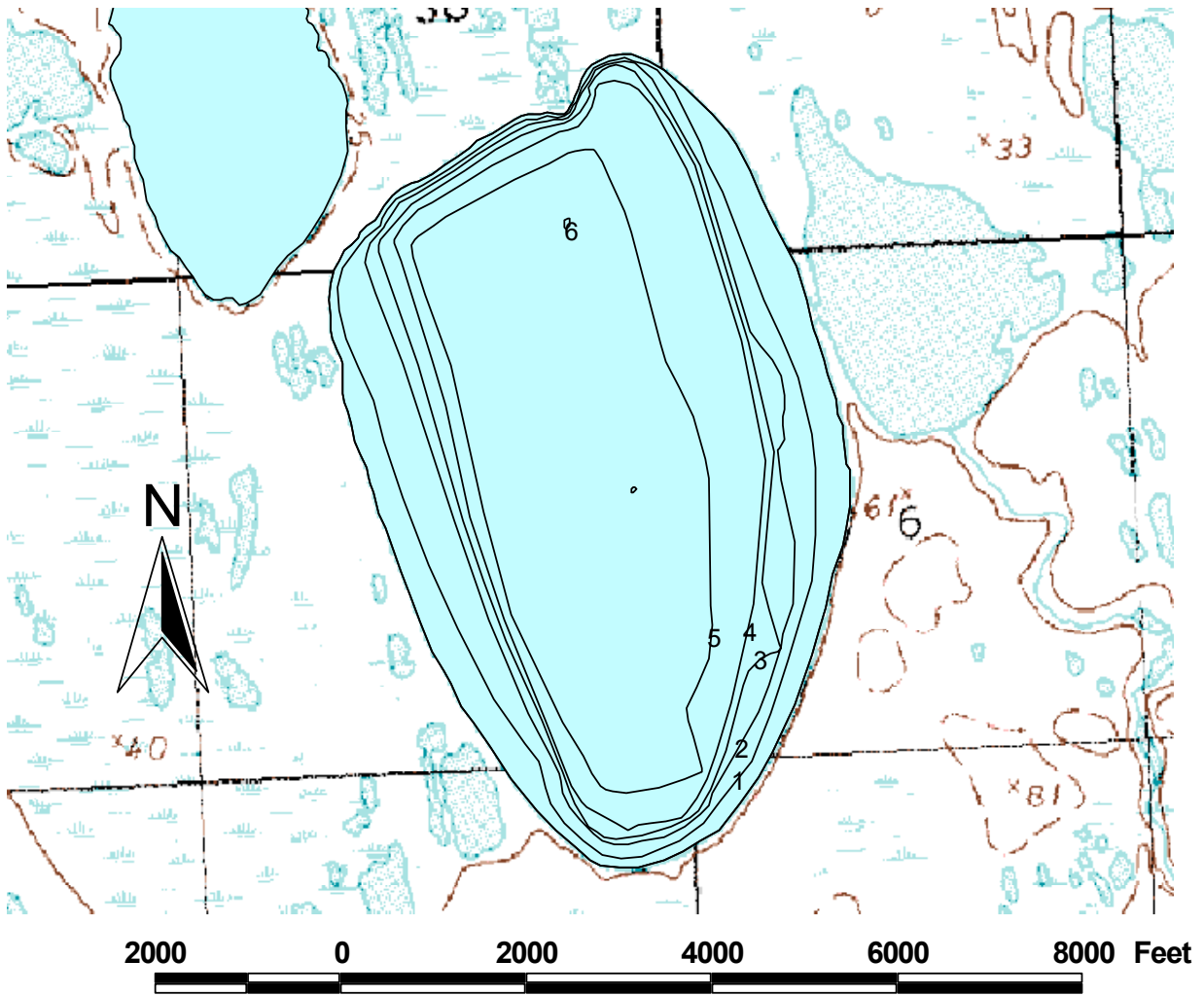
Year of Test	Calcium (mg/l)	Magnesium (mg/l)	Chloride (mg/l)	Sodium (mg/l)	Total Hardness [CaCO ₃] (mg/l)	Specific Conductance (microS/cm)	Turbidity (NTU)	pH	Source
2002	30.8	2.8	5.9	15.2	88.4	129	1.6	8.05	This Study

Catch Record:

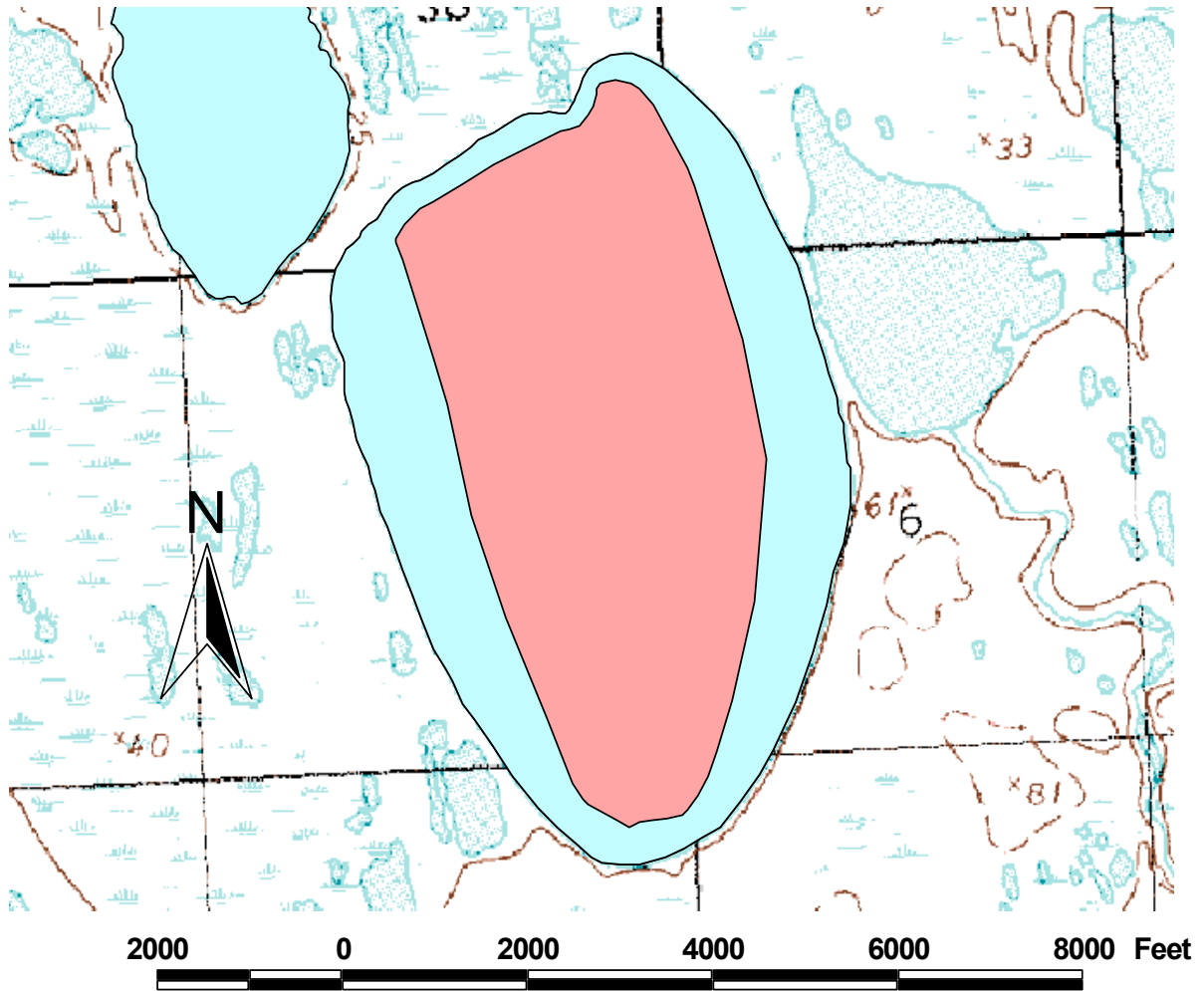
Gear	Date	Effort (hours)	Species	Number Caught
Gill Net	Aug 29 02	5.3	None	0
Minnow Trap	Aug 29 02	6.8	None	0
Seine	Aug 29 02	3 hauls	9spine stickleback	observed



Depth transects surveyed on lake M0253 August 29, 2002



Depth contours based on transects surveyed on lake M0253
August 29, 2002 (contours in 1 foot intervals)



Regions of lake M0253 less than 4 ft deep (light shaded) and likely to be available for ice chips, based on transects surveyed on August 29, 2002.

Lake M9528

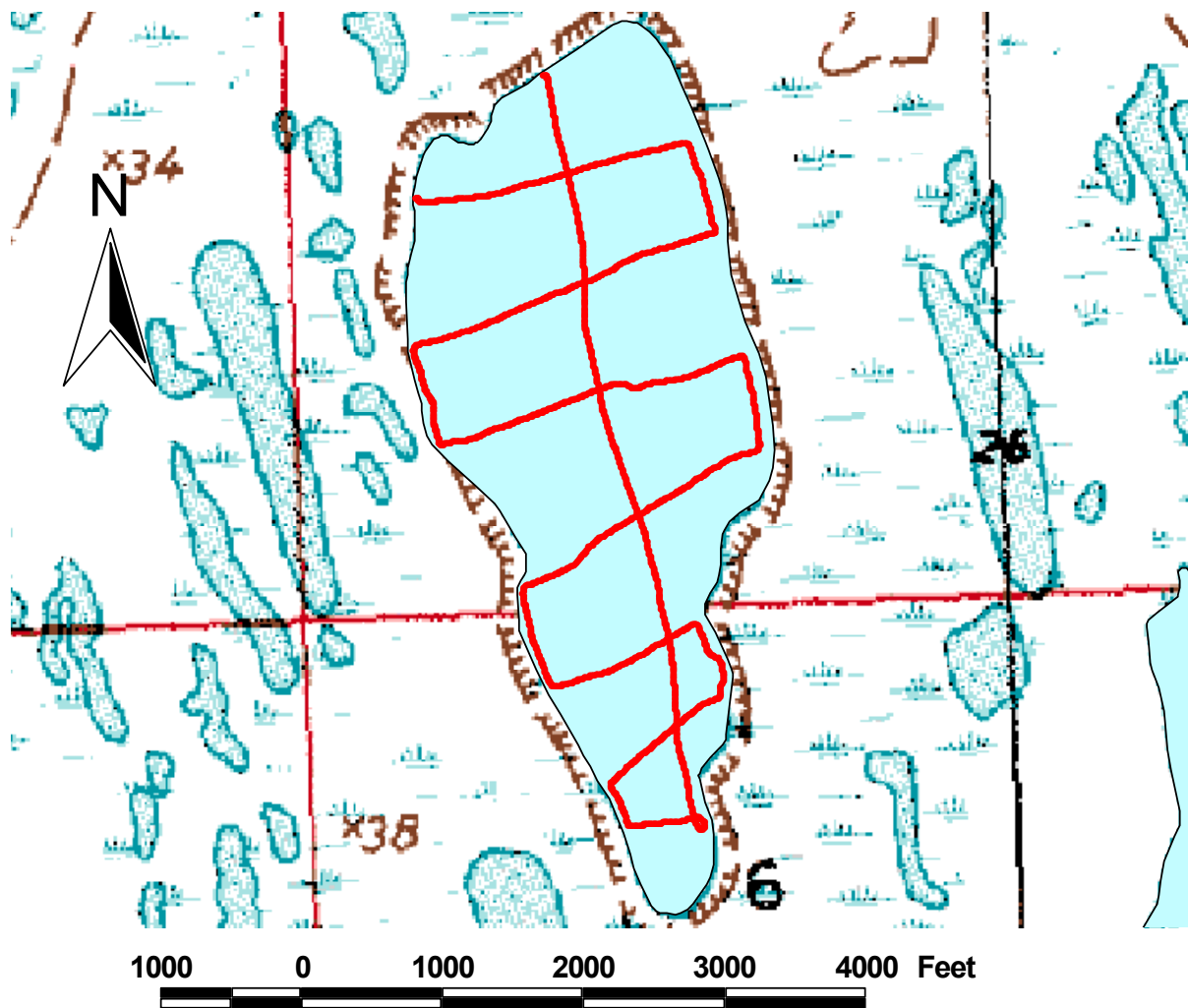
Other Names: Y10.1
Location: 70.26133°N 150.71533°W
USGS Quad Sheet: Harrison Bay B-1: T10N/11N R6E Sec. 6/31
Habitat: Tundra Lake
Area: 207 acres
Maximum Depth: 5.9 feet
Active Outlet: No
Calculated Volume: 239.4 million gallons
Permittable Volume: 1.1 million gallons
Potential Aggregate: 207 acres (water depth 4 ft or less)

Water Chemistry:

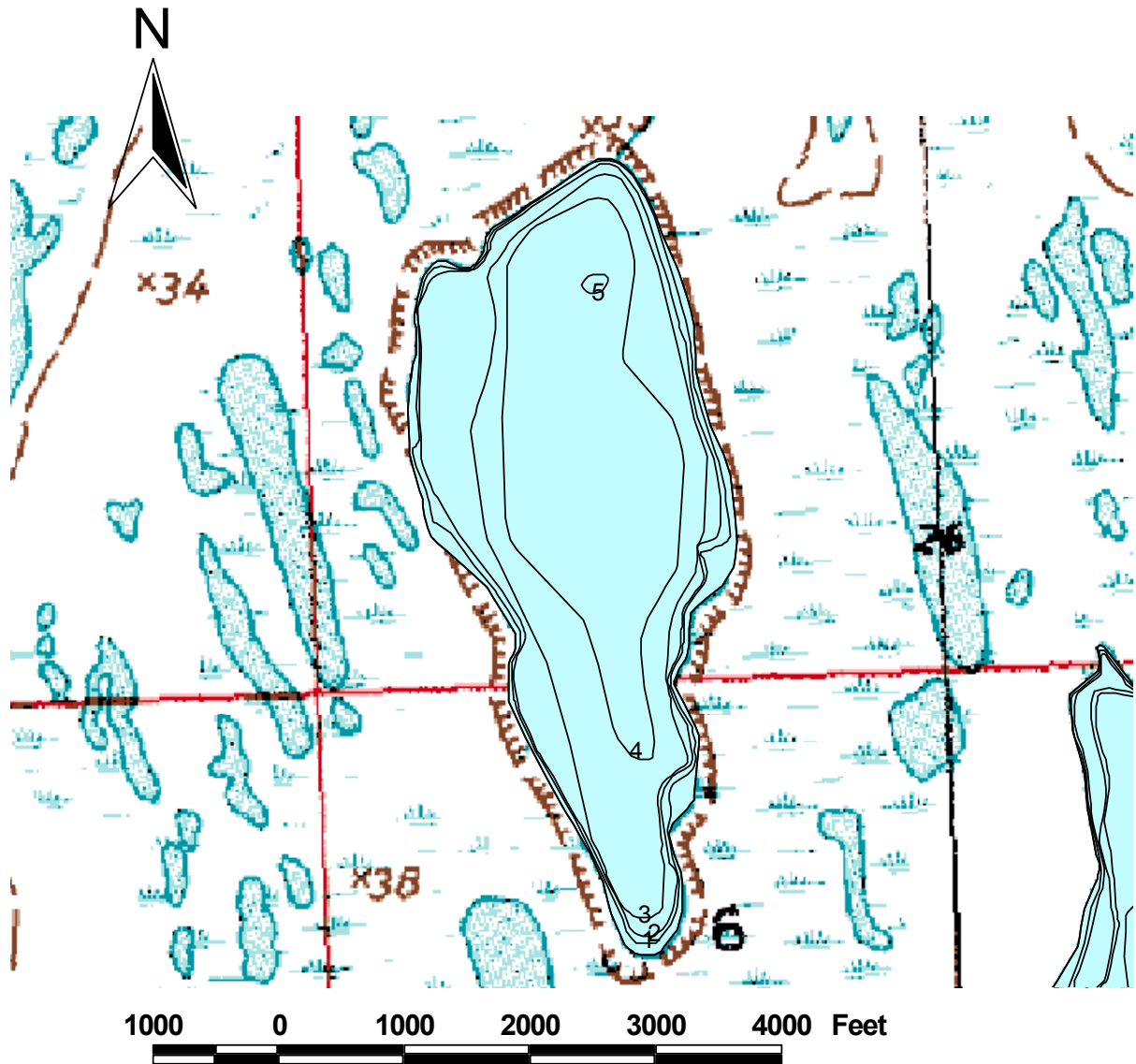
Year of Test	Calcium (mg/l)	Magnesium (mg/l)	Chloride (mg/l)	Sodium (mg/l)	Total Hardness [CaCO3] (mg/l)	Specific Conductance (microS/cm)	Turbidity (NTU)	pH	Source
2002						287	1.5	7.93	This Study

Catch Record:

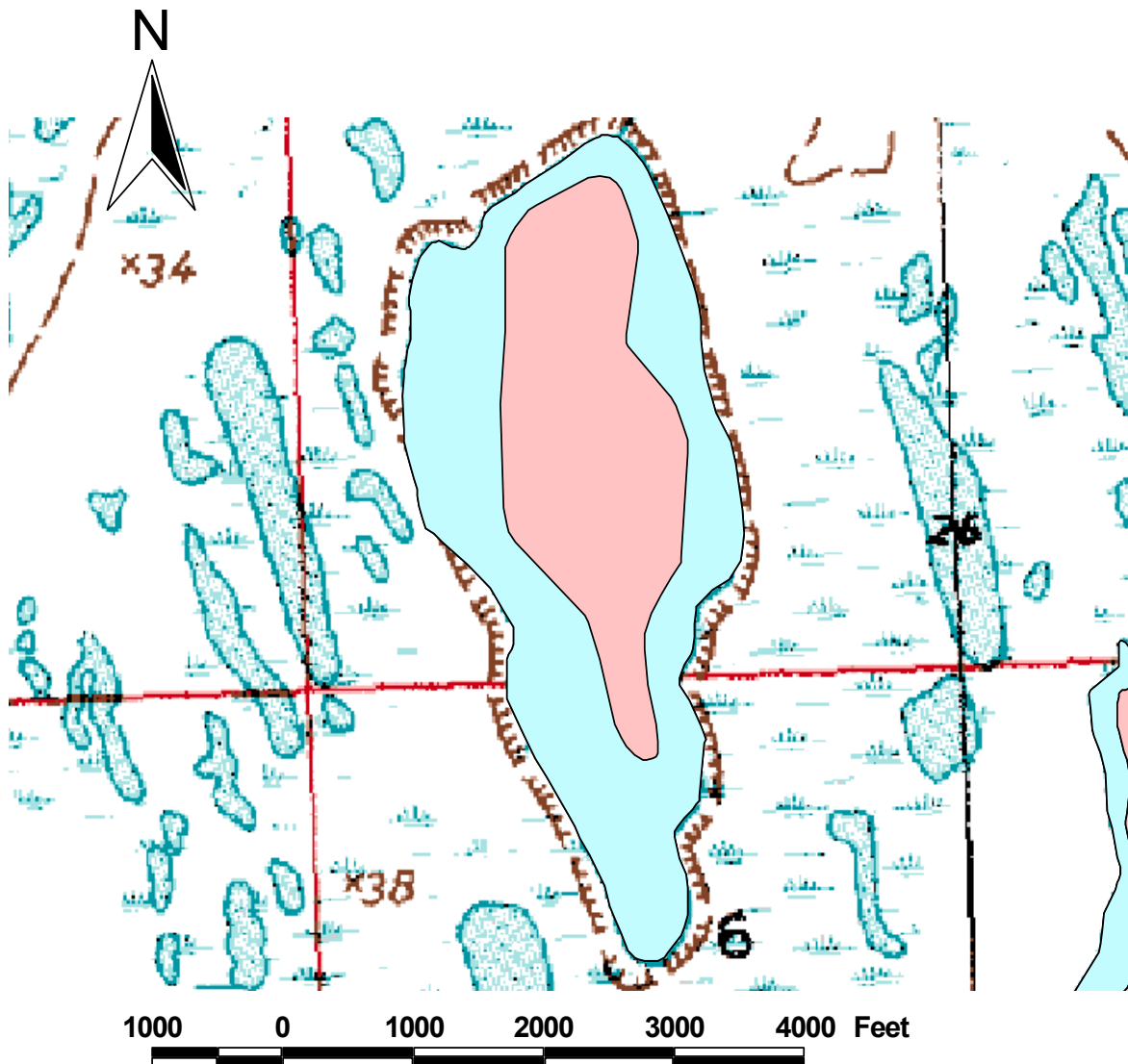
Gear	Date	Effort (hours)	Species	Number Caught
Fyke Net	Aug 4 95	18.5	9spine stickleback	5
Gill Net	Jul 17 02	8.4	None	0
Minnow Trap	Aug 4 95	36.5	None	0
	Jul 17 02	6.5	None	0
Set Line	Aug 4 95	18.1	None	0
Seine	Jul 17 02	2 hauls	None	0



Depth transects surveyed on lake M9528 July 17, 2002



Depth contours based on transects surveyed on lake M9528
July 17, 2002 (contours in 1 foot intervals)



Regions of lake M9528 less than 4 ft deep (light shaded) and likely to be available for ice chips, based on transects surveyed on July 17, 2002.

Lake M9614

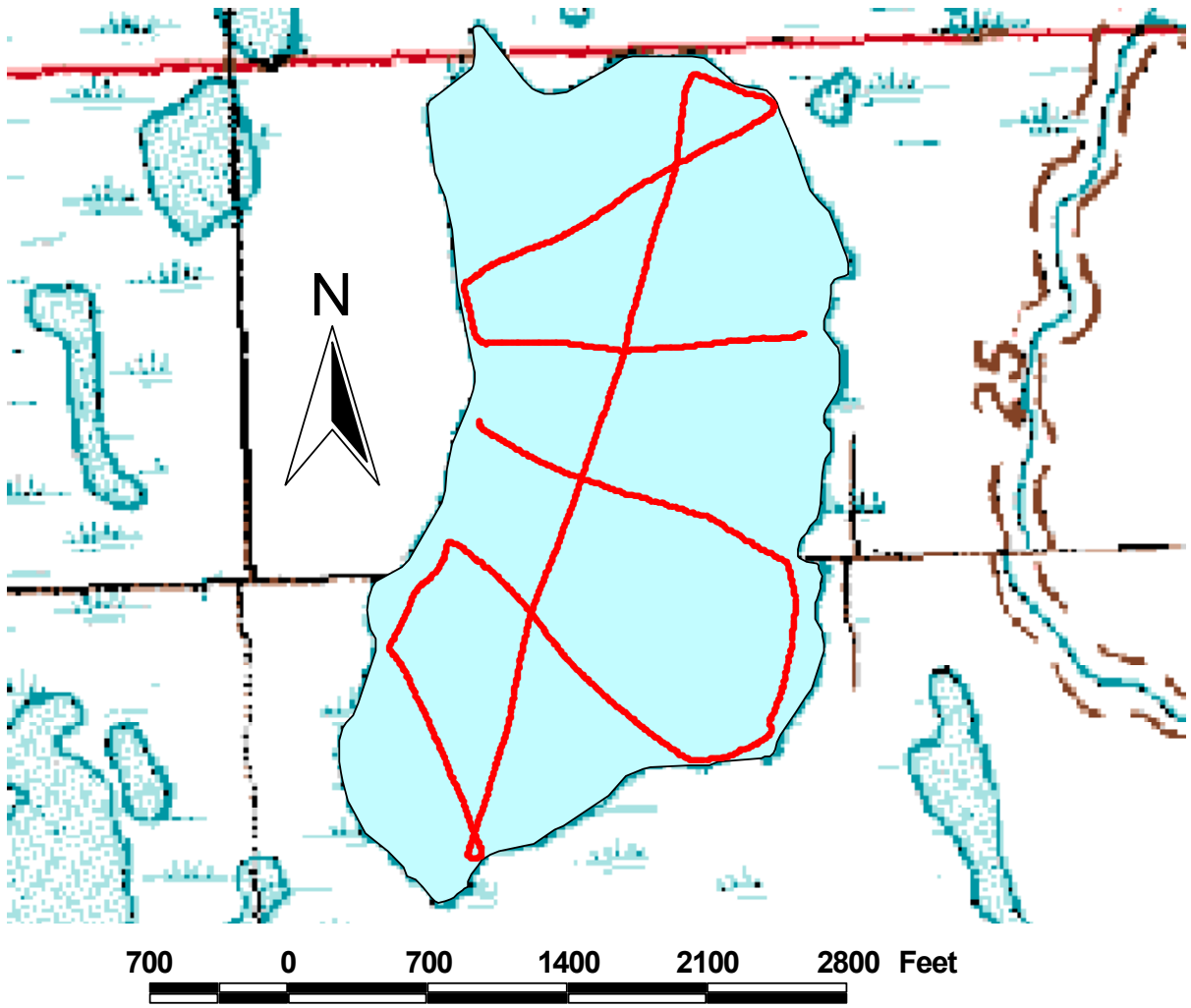
Other Names: Y11.1
Location: 70.25121°N 150.67672°W
USGS Quad Sheet: Harrison Bay B-1: T10N R6E Sec. 5
Habitat: Tundra Lake
Area: 163 acres
Maximum Depth: 6.6 feet
Active Outlet: No
Calculated Volume: 217.4 million gallons
Permittable Volume: 1.8 million gallons
Potential Aggregate 44 acres (water depth 4 ft or less)

Water Chemistry:

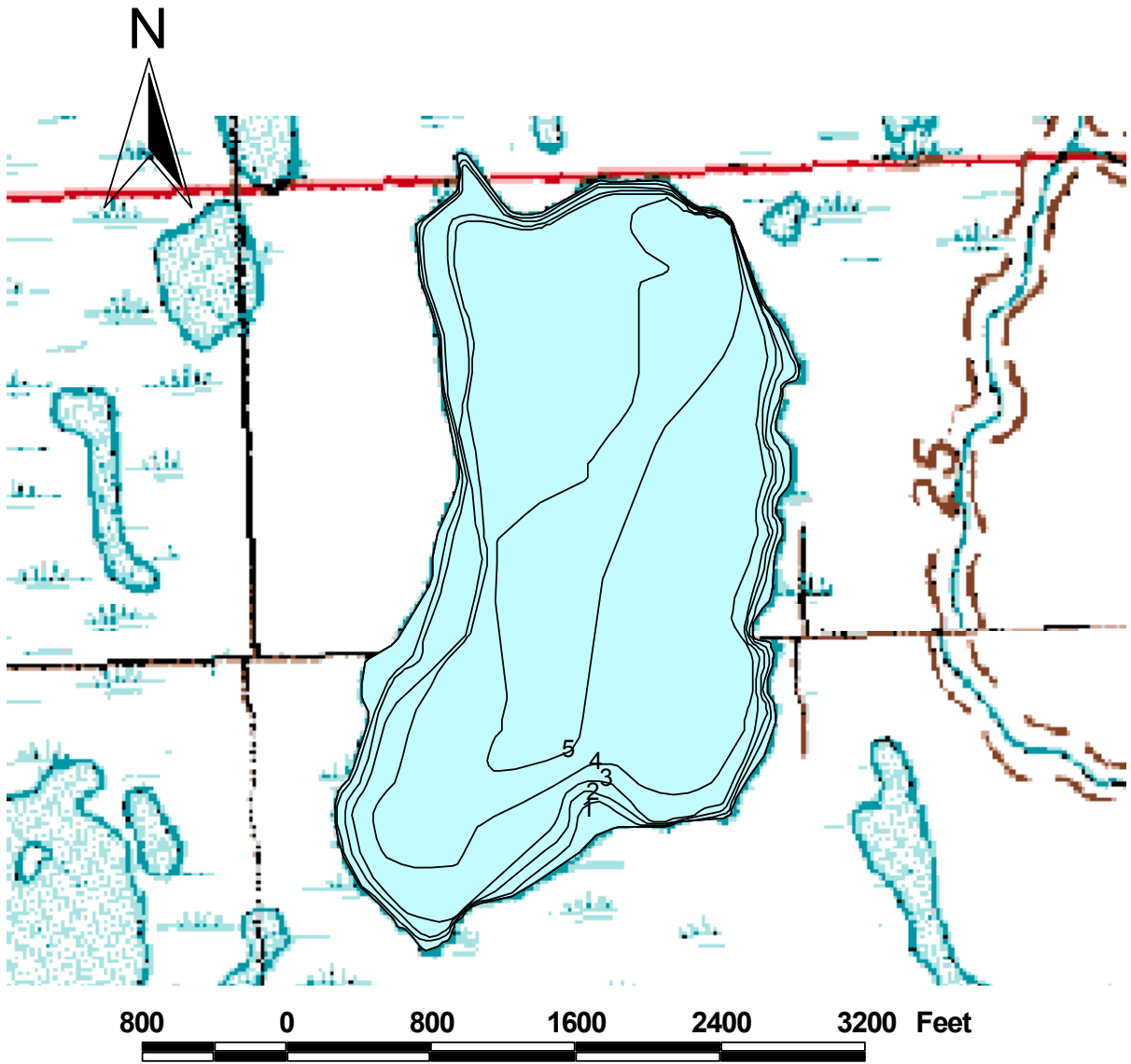
Year of Test	Calcium (mg/l)	Magnesium (mg/l)	Chloride (mg/l)	Sodium (mg/l)	Total Hardness [CaCO3] (mg/l)	Specific Conductance (microS/cm)	Turbidity (NTU)	pH	Source
1996	10.7	10.0	2.6	23.5	69.4				J. Lobdell
2002						158	1.0	7.89	This Study

Catch Record:

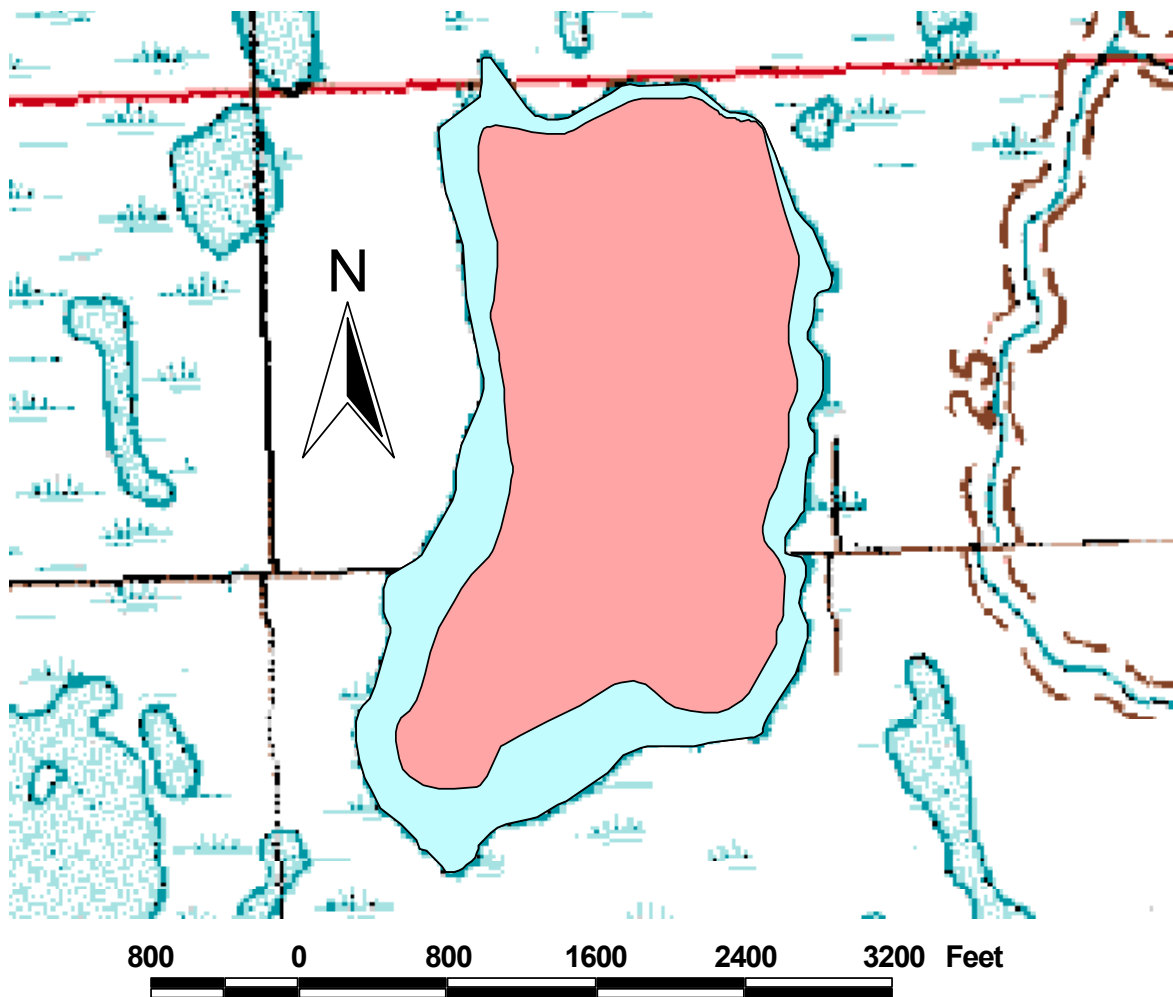
Gear	Date	Effort (hours)	Species	Number Caught
Gill Net	Jul 20 95	12.8	None	0
	Jul 16 02	5.0	None	0
Minnow Trap	Jul 16 02	5.8	None	0
Seine	Jul 16 02	2 hauls	9spine stickleback	observed



Depth transects surveyed on lake M9614 July 16, 2002



Depth contours based on transects surveyed on lake M9614
July 16, 2002 (contours in 1 foot intervals)



Regions of lake M9614 less than 4 ft deep (light shaded) and likely to be available for ice chips, based on transects surveyed on July 16, 2002.

Lake M9617

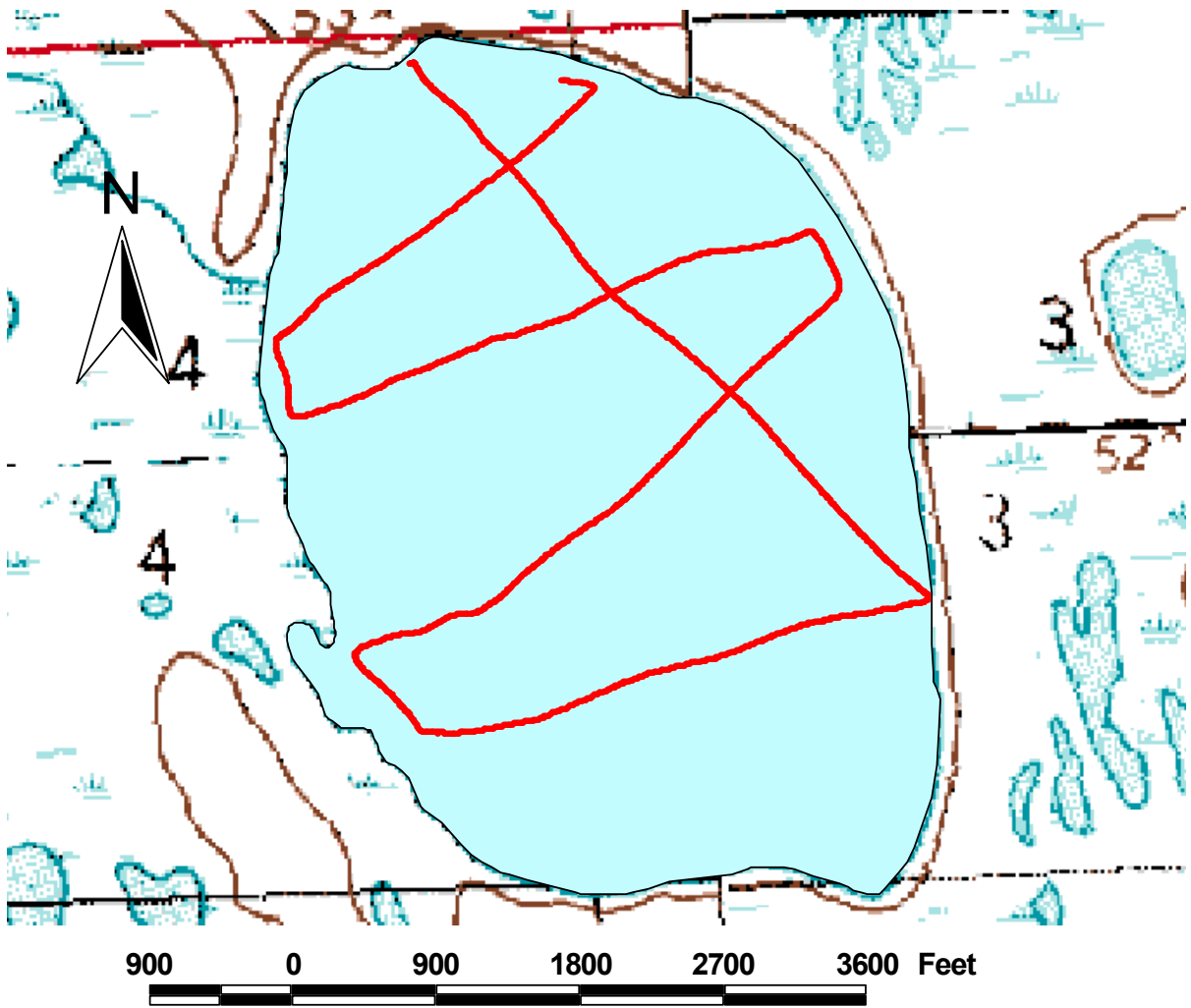
Other Names: Y12.1
Location: 70.24969°N 150.60547°W
USGS Quad Sheet: Harrison Bay B-1: T10N R6E Sec. 3/4
Habitat: Tundra Lake
Area: 383 acres
Maximum Depth: 6.9 feet
Active Outlet: No
Calculated Volume: 536.0 million gallons
Permittable Volume: 14.4 million gallons
Potential Aggregate: 127 acres (water depth 4 ft or less)

Water Chemistry:

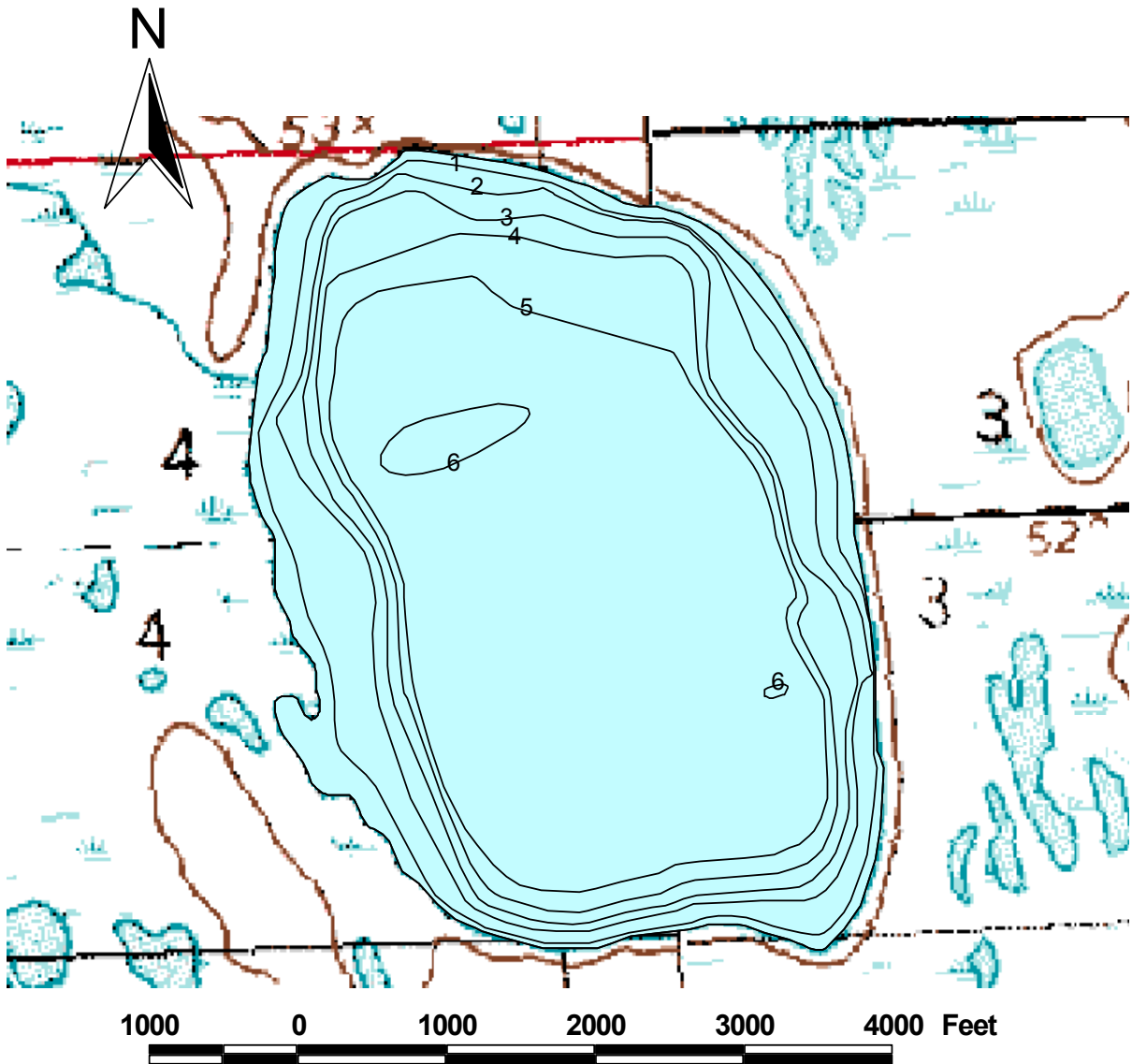
Year of Test	Calcium (mg/l)	Magnesium (mg/l)	Chloride (mg/l)	Sodium (mg/l)	Total Hardness [CaCO ₃] (mg/l)	Specific Conductance (microS/cm)	Turbidity (NTU)	pH	Source
1996	6.49	6.7	2.08	23.7	67.7	104			J. Lobdell
2002						137	1.2	7.93	This Study

Catch Record:

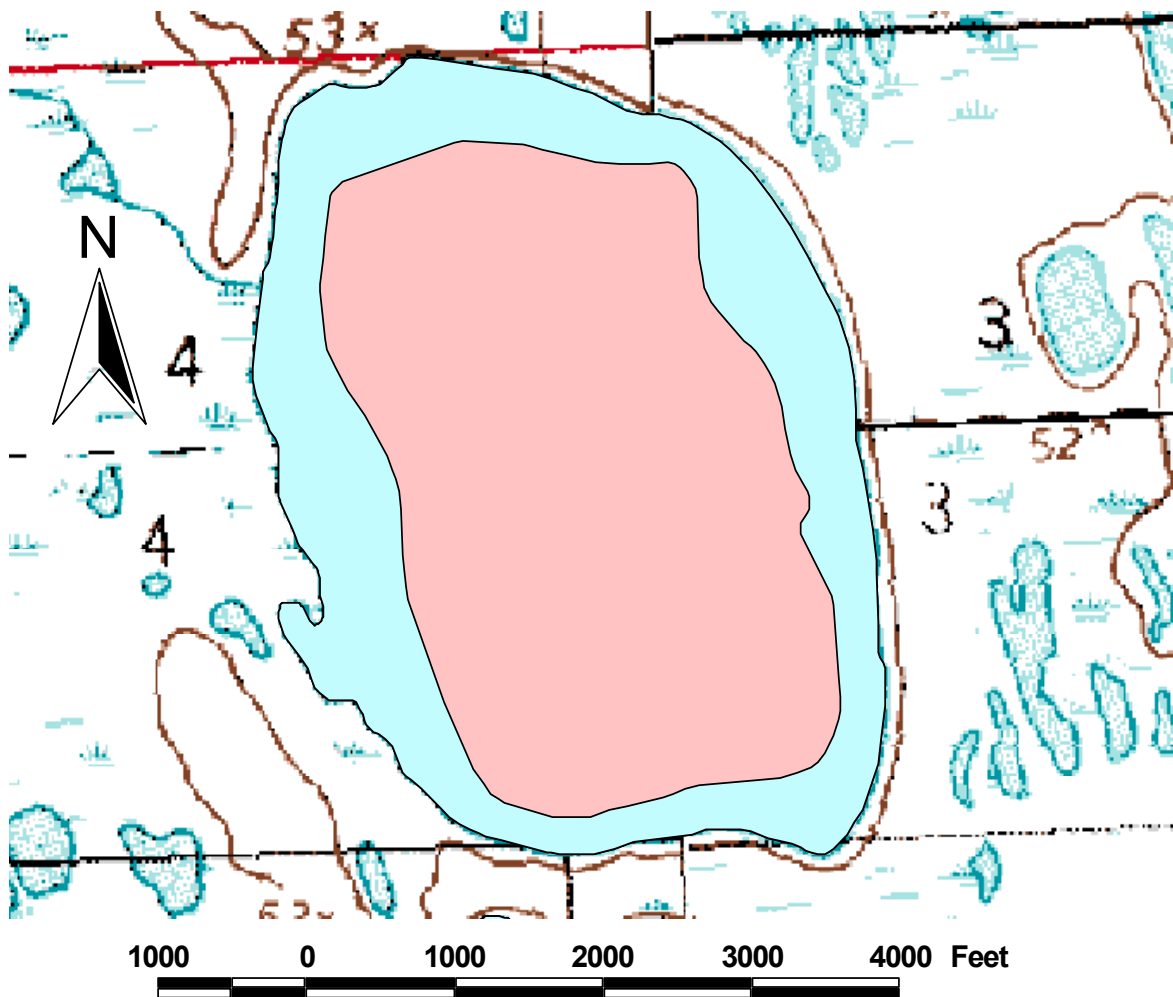
Gear	Date	Effort (hours)	Species	Number Caught
Gill Net	Jul 29 96	11.1	None	0
	Jul 16 02	8.3	None	
Minnow Trap	Jul 16 02	4.4	9spine stickleback	observed



Depth transects surveyed on lake M9617 July 16, 2002



Depth contours based on transects surveyed on lake M9617
July 16, 2002 (contours in 1 foot intervals)



Regions of lake M9617 less than 4 ft deep (light shaded) and likely to be available for ice chips, based on transects surveyed on July 16, 2002.

Lake MC7903

Other Names: V14.1; L9116
Location: 70.30639°N 150.50773°W
USGS Quad Sheet: Harrison Bay B-1: T11N R6E Sec. 11/12/13/14
Habitat: Drainage Lake
Area: 1,197 acres
Maximum Depth: 10.2 feet
Active Outlet: Yes
Calculated Volume: 2,463.8 million gallons
Permittable Volume: 35.4 million gallons
Potential Aggregate: 197 acres (water depth 4 ft or less)

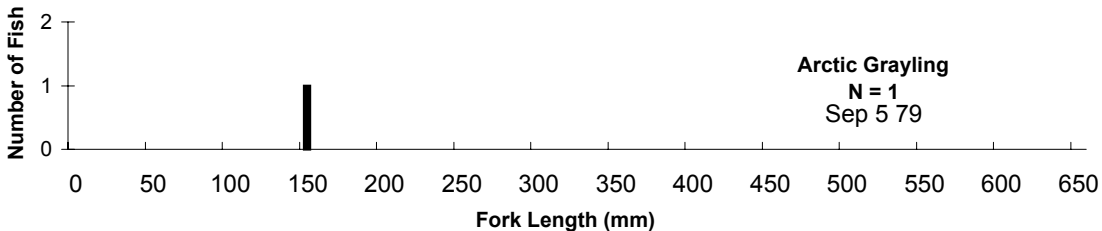
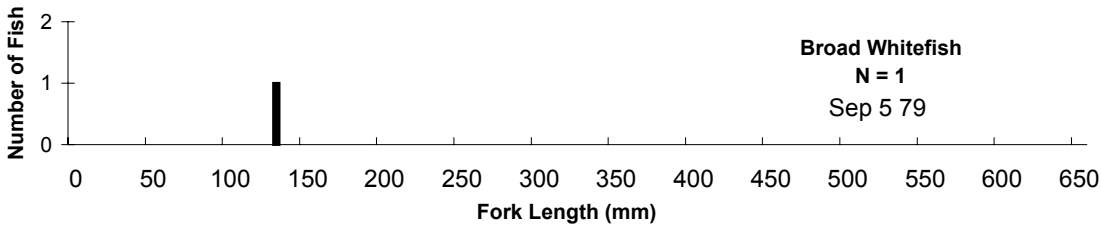
Water Chemistry:

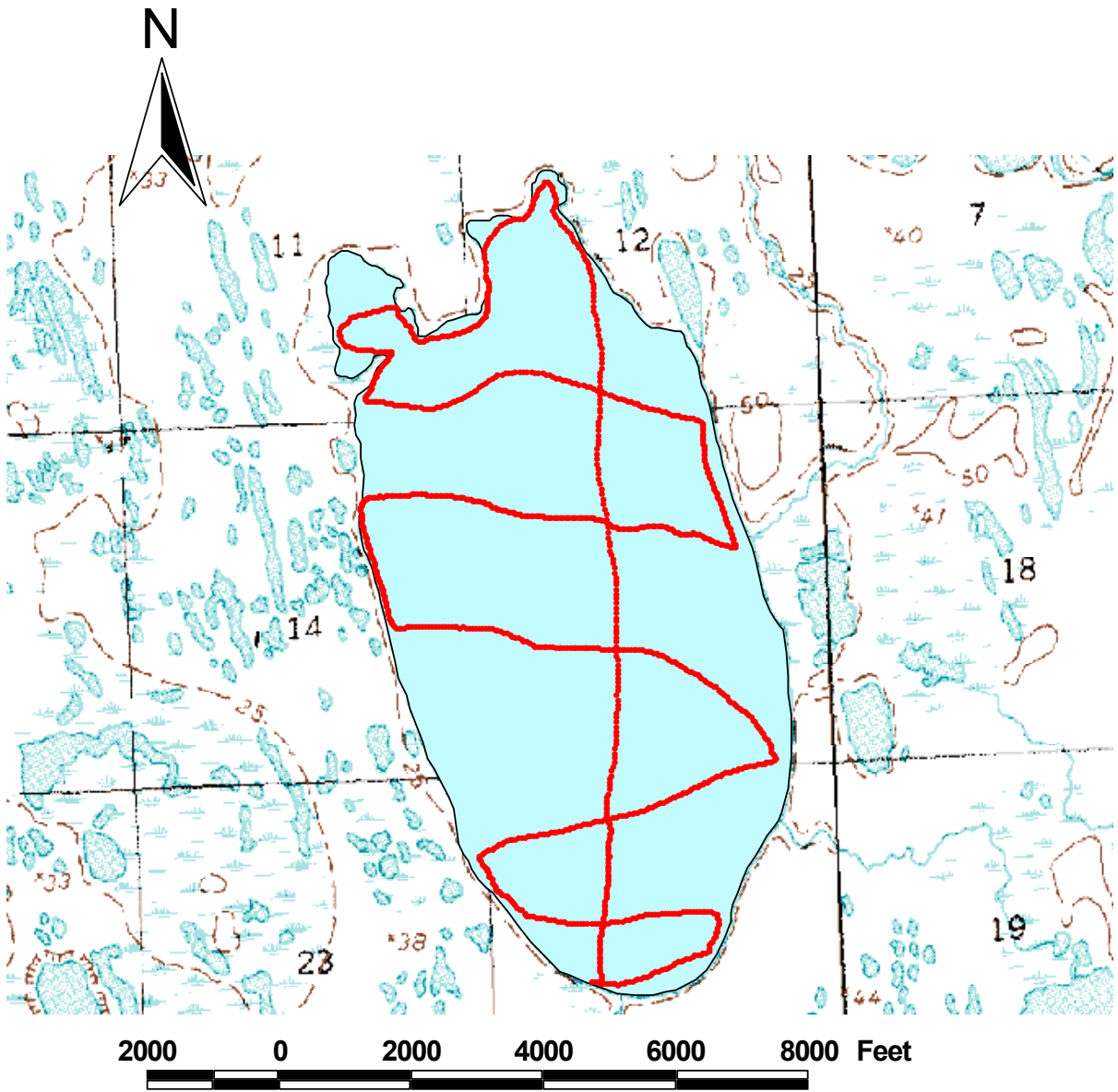
Year of Test	Calcium (mg/l)	Magnesium (mg/l)	Chloride (mg/l)	Sodium (mg/l)	Total Hardness [CaCO3] (mg/l)	Specific Conductance (microS/cm)	Turbidity (NTU)	pH	Source
1991	10.0	3.9	2.0	25.0	70				J. Lobdell
2002	36.0	3.1	6.5	20.6	102.4	235	4.2	7.98	This Study

Catch Record:

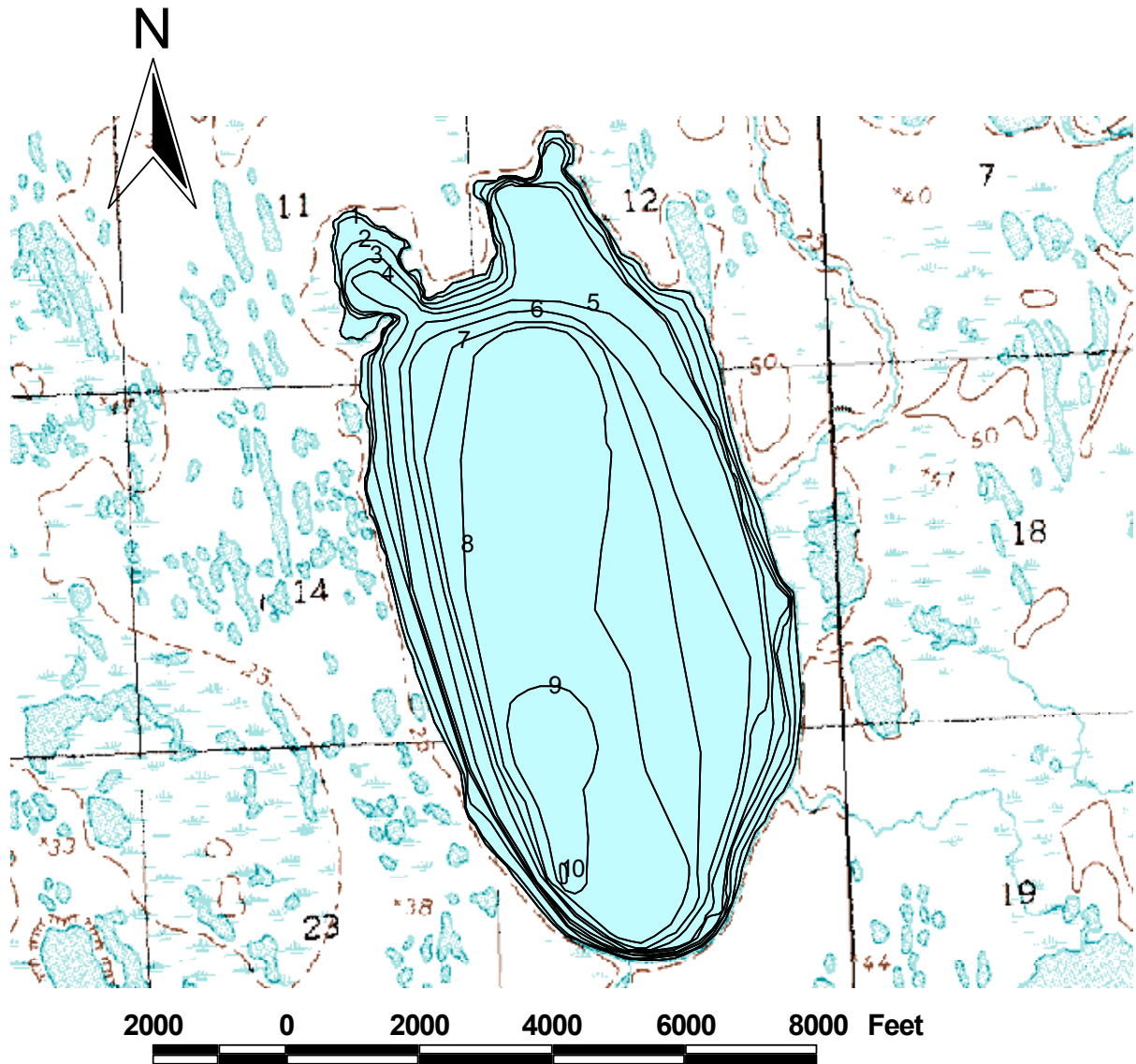
Gear	Date	Effort (hours)	Species	Number Caught	Fork Length (mm)
Gill Net	Sep 5 79	100.0	Broad whitefish	1	137
			Arctic grayling	1	150
	Aug 23 02	5.5	Least cisco	1	140
Fyke Net	Jul 29 95	42.2	Alaska blackfish	9	
			9spine stickleback	11	
Minnow Traps	Jul 29 95	84.9	Alaska blackfish	3	
	Aug 23 02	6.2	None	0	
Set Line (N)	Jul 29 95	42.0	None	0	
Seine	Aug 23 02	3 hauls	9spine stickleback	3	

Source of 1979 data: McElderry & Craig 1981

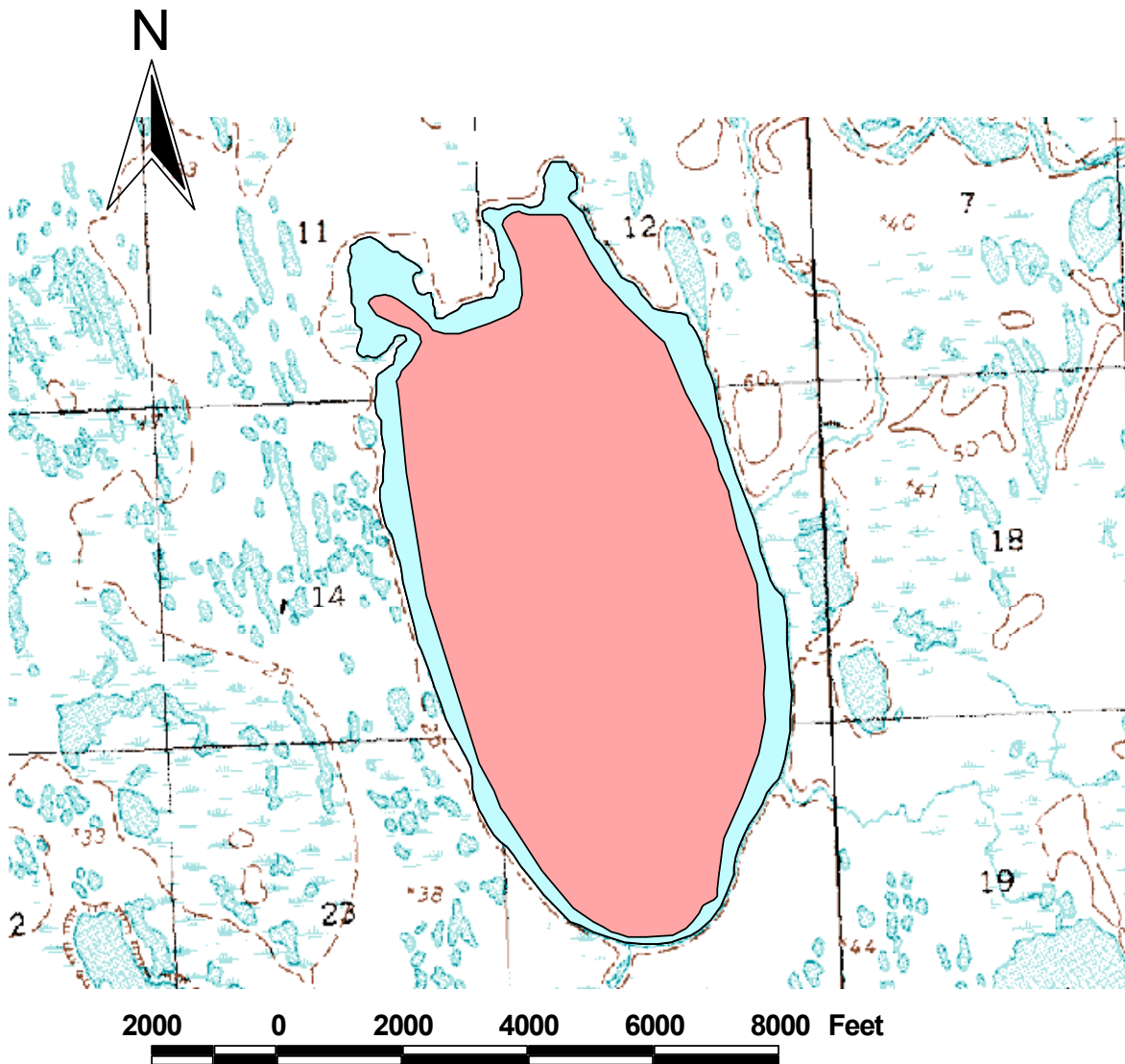




Depth transects surveyed on lake MC7903 August 23, 2002



Depth contours based on transects surveyed on lake MC7903
August 23, 2002 (contours in 1 foot intervals)



Regions of lake MC7903 less than 4 ft deep (light shaded) and likely to be available for ice chips, based on transects surveyed on August 23, 2002.