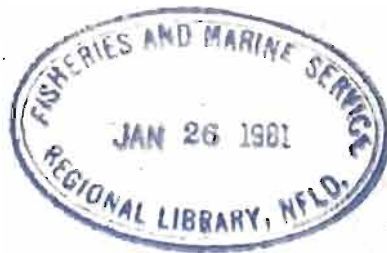


**Surveys of Ten Lakes in
Guysborough, Halifax, Hants and
Lunenburg Counties,
Nova Scotia, 1978**



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Freshwater and Anadromous Division
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March, 1980

**Canadian Data Report of
Fisheries and Aquatic Sciences No. 192**



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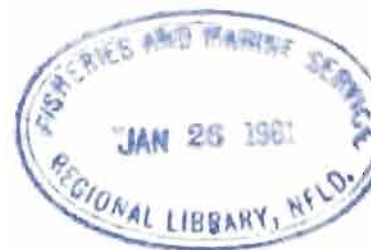
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IN GUYSBOROUGH, HALIFAX, HANTS AND LUNENBURG
COUNTIES, NOVA SCOTIA, 1978

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CONTENTS

ABSTRACT/RÉSUMÉ	v
INTRODUCTION	1
METHODS AND MATERIALS	1
RESULTS	2
Beaver Lake	5
Beaver Dam Lake (No. 2)	7
Cockscomb Lake	9
Feely Lake	13
Fox Point Lake	15
Halfway Lake	18
Lewis Lake	20
Little Springfield Lake	22
Pentz Lake	24
Tomahawk Lake	26
APPENDIX A - LIST OF COMMON AND SCIENTIFIC NAMES OF FISH SPECIES CAPTURED DURING LAKE SURVEYS	29
APPENDIX B - LIST OF CODES AND ABBREVIATIONS USED IN REFERENCE TO HATCHERY-PRODUCED TROUT	29
APPENDIX C - COMPONENT DATA AND RESULTANT PRODUCTIVITY ESTIMATES FOR TEN NOVA SCOTIAN LAKES SURVEYED DURING 1978	29
APPENDIX D - ANGLING YIELD RELATED TO THE MORPHOEDAPHIC INDEX	30
APPENDIX E - NUMBERS AND SPECIES OF FISH COLLECTED BY GILLNET FROM TEN NOVA SCOTIAN LAKES SURVEYED DURING 1978	30
REFERENCES	31

ABSTRACT

Beanlands, D.I. 1980. Surveys of ten lakes in Guysborough, Halifax, Hants and Lunenburg counties, Nova Scotia, 1978. Can. Data Rep. Fish. Aquat. Sci. No. 192. v + 31 p.

In 1978, ten Nova Scotia lakes, including seven on the Sackville River system, were surveyed as part of an ongoing lake-inventory program in the Maritimes Region. Data recorded for each of the lakes include a bathymetric map and calculated physical parameters, such as area, shoreline length, volume and mean depth. Water analyses were conducted and resulting values were recorded for turbidity, temperature, dissolved oxygen, pH and conductivity. Mean depth and conductivity were used to calculate the morphoedaphic index (MEI) as an indicator of productivity. Values for the MEI ranged from 1.4 to 95.1, with a mean of 17.7; however, the highest value recorded was concluded to be an indication of ecological stress rather than high productivity. A discussion, including information on oxygen, pH and temperature levels, and comments on potential salmonid rearing areas, is given for each stream examined.

A total of 578 fish of eight species was captured by gillnet. All salmonids were measured, weighed, sexed and scale sampled, while other species were counted and representative samples were measured and weighed. Kidney smears for all salmonids captured were submitted for laboratory examination to determine if Bacterial Kidney Disease was present. Tests proved all smears to be negative.

Key words: Lake survey, conductivity, morphoedaphic index, potential fish yield, potential angling yield, dissolved oxygen, temperature, pH.

RÉSUMÉ

Beanlands, D.I. 1980. Surveys of ten lakes in Guysborough, Halifax, Hants and Lunenburg counties, Nova Scotia, 1978. Can. Data Rep. Fish. Aquat. Sci. No. 192. v + 31 p.

En 1978, on a procédé à l'étude de dix lacs de la Nouvelle-Écosse, dont sept font partie du réseau de la rivière Sackville, dans le cadre d'un programme continu d'inventaire des lacs de la région des Maritimes. Les données recueillies sur chacun des lacs comprennent une carte bathymétrique et des paramètres physiques calculés tels que l'aire, la longueur du littoral, le volume et la profondeur moyenne. On a effectué des analyses de l'eau et pris note des valeurs relatives à la turbidité, à la température, à la quantité d'oxygène dissous, au pH et à la conductivité. En utilisant les chiffres relatifs à la profondeur moyenne et à la conductivité, on a calculé l'index morphoédaphique en tant qu'indice de productivité. Les valeurs de l'index morphoédaphique vont de 1.4 à 95.1, la moyenne étant de 17.7. On a cependant conclu que la valeur la plus élevée constatée représente une indication du stress écologique plutôt qu'une indication d'un degré de productivité élevé. On présente un exposé sur chaque cours d'eau étudié, y compris des renseignements concernant l'oxygène, le pH et les niveaux de température ainsi que des commentaires portant sur les secteurs possibles d'élevage de salmonidés.

On a capturé à l'aide de filets maillants un total de 578 poissons appartenant à huit espèces. On a déterminé la taille, le poids et le sexe de tous les salmonidés de même que prelevés des échantillons d'écaillés. Les poissons capturés appartenant aux autres espèces, on été comptés et on en a mesuré et pesé des échantillons représentatifs. Des frottis rénaux de tous les salmonidés capturés on été analysés en laboratoire afin de déterminer s'ils étaient atteints de maladies rénales bactériennes. Tous les tests ont donné des résultats négatifs.

Mots clés: Etude des lacs, conductivité, index morphoédaphique, possibilité de production de poissons, possibilité de rendement de la pêche à la ligne, oxygène dissous, température, pH.

INTRODUCTION

The lake-inventory program of the Freshwater and Anadromous Division, Resource Branch, was continued in 1978 by surveying ten lakes in Guysborough, Halifax, Hants and Lunenburg counties, Nova Scotia. Survey results are summarized in this report.

Seven of the ten lakes surveyed were selected to provide additional information for a study of the Sackville River system being conducted by the Freshwater and Anadromous Division. These seven lakes were chosen partly because of their easy accessibility and partly because no information had ever been collected from them. Two of the remaining three lakes, Cockscomb and Fox Point, were chosen because stocking requests had been received for them. (It is now the policy of the Resource Branch to first survey any new lakes that are proposed for hatchery stocking.) The tenth lake, Beaver Dam Lake (No. 2), was surveyed to provide needed information for a possible reclamation of Duggan's Lake, from which a tributary flows to Beaver Dam Lake.

METHODS AND MATERIALS

Many of the methods used in these surveys were used previously (Richard 1977). For each lake surveyed, a shoreline map, including stream designations, suitable for both field work and report purposes, was produced by enlarging existing outline maps (N.S. Dept. of Lands and Forests, Crown Land Forestry Series, 1964; 1:1320 scale). Suitable enlargement was achieved using a "Map-O-Graph" machine.

The lakes were then categorized by stocking number, stream inventory number and status. Stocking numbers, their assignment and use, have been described by Alexander (1975). In cases where no stocking number has been assigned, the designation "n/a" is shown. Stream inventory numbers were taken from the Freshwater and Anadromous Division's Stream Inventory File, which was set up to categorize the continuous influx of information being collected on the streams of the Maritime Provinces. Each lake and stream has been given a code number, which designates the major watershed area and drainage system in which it is contained. The category of status is used to determine if the lake is a headwater. If not a headwater, the lake is designated as "n/a".

Many of the physical parameters recorded for each lake - including maximum length, maximum effective length, maximum width and maximum effective width - were determined by direct measurement from the enlarged maps. Area values were determined by planimetry and shoreline lengths by using a map measurer. Shoreline development (degree of irregularity of shoreline) was calculated by the following formula:

$$\frac{S}{2\sqrt{a\pi}}, \text{ (Welsh 1948),}$$

where S = shoreline length
and a = area of lake.

It is apparent that the precision of the physical parameters recorded is limited by both the method of map enlargement and by the mechanical measurements. Subsequent calculations, such as volume, are further limited by the precision of field instruments such as the echo sounder. Consequently, the values recorded have been rounded off to reduce exaggeration of significant digits to a level that was judged to be within reasonable limits for the instrument precision.

Field activities included depth determination for each lake, by using a Furuno Mark II echo sounder. Depth soundings were recorded along transects run by an outboard motor boat moving at slow and reasonably constant speed between identifiable points on opposite shores of the lake. Recorded depths were subsequently transferred to the transects drawn on the map enlargements, and contours were drawn at one-meter or other appropriate intervals to produce a bathymetric map.

Lake volume was taken as the sum of the volumes of all horizontal strata between contours on the bathymetric map. Volume of each stratum was calculated by using the planimeter to determine area, and by inserting these values in the formula provided by Welsh (1948):

$$V = \frac{h}{3} (a_1 + a_2 + \sqrt{a_1 a_2}),$$

where V = volume
h = vertical depth of each horizontal stratum
a₁ = area of stratum upper surface, and
a₂ = area of stratum lower surface

Mean depth was calculated by dividing volume of the lake by water surface area.

Several characteristics of the water column were determined at one or more locations on each lake surveyed. One water sample location was selected in a relatively deep area, as determined by the raw data available from depth sounding. The location of each sample station is indicated by a triangular-shaped symbol (Fig.) on the bathymetric maps.

At each sample station, turbidity (light penetration) was determined with a secchi disk (Lagler 1956). Although much of the variation in secchi disk readings between lakes is undoubtedly a result of the variable wind and light conditions encountered, this should still be considered a useful parameter for Maritime lakes, where water varies from very clear to water that appears almost black in color.

Water temperature and dissolved oxygen content were determined at one-meter vertical intervals by using a YSI Model 51A dissolved oxygen/temperature meter. Determinations of pH were made by using a

color comparator from a Hach kit for water samples from several depths, including one in each thermal layer when stratified lakes were encountered. Sub-surface samples were collected by using a one-litre Kemmerer sample bottle. Surface conductivity values were determined by using a YSI Model 9-325 conductivity/salinity/temperature meter.

Total dissolved solids (TDS) were calculated by conversion from the average conductivity of all surface-water samples collected for a given lake. Where conductivity was within the range 15-50 $\mu\text{mhos/cm}$, a conversion formula provided by Kerekes (1973) was used:

$$Y = -1.262 + 0.603X$$

where Y = TDS = salinity and
X = conductivity.

Where conductivity was greater than 50 $\mu\text{mhos/cm}$, conversion was made by using a formula derived from data provided by Hayes (1963):

$$\log \text{TDS} = 1.091 \log \text{conductivity} - 0.252$$

Dividing TDS by mean depth produces a morphoedaphic index (MEI) used as an indicator of productivity (Ryder 1965). In this report, MEI has been modified by using a mean depth of not less than two meters. This modification has been suggested by Kerekes (pers. comm.) in order to avoid artificially high productivity values in shallow lakes.

The formula,

$$\text{Yield} = 0.966 \sqrt{\text{MEI}} \quad (\text{Ryder et al. 1974}),$$

provides an estimate of potential fish yield in an opportunistic fishery. However, because sport fisheries in Nova Scotia are highly selective for salmonids, "potential yield to angling" has been determined by comparison with trout waters in Ontario (Ryder et al. 1974) by using a graphical method (Appendix D - modified from work by Ryder et al. 1974). Both values are recorded in this report. Although the MEI is considered to be a good indicator of yield to angling, the yield realized has been shown to deviate as much as tenfold from the calculated potential (Ryder et al. 1974).

The fish population of each lake was sampled by using experimental, monofilament gill nets set on bottom. Two net lengths were available. The nets used most commonly measured 106.7 m on the float line, 1.8 m in depth and incorporated seven panels of equal length. Square mesh sizes of the seven panels were 1.3 cm, 1.9 cm, 2.5 cm, 3.2 cm, 3.8 cm, 5.1 cm and 7.6 cm, with mesh size increasing progressively from one end of the net. Three shorter nets, measuring 30.5 m on the float line and 1.8 m in depth and each incorporating two panels of equal length, were also employed. These three separate nets included square mesh sizes joined as follows: 1.3 cm to 1.9 cm,

2.5 cm to 3.2 cm, and 3.8 cm to 5.1 cm. All nets were equipped with polycore float line and lead-core bottom line.

Length of each fish collected from one or more nets (depending on sample size) was recorded for each lake. Weight was also recorded for each salmonid collected and a scale sample was collected for age determination at a later date. Kidney smears were also taken to determine if bacterial kidney disease was present.

In this report, fish species are referred to by common name. A list of corresponding scientific names is provided (Appendix A).

Stocking History was summarized from the records of distribution from federal hatcheries. Abbreviations or codes used (Appendix B) are those commonly used by the hatcheries.

RESULTS

For six of the seven lakes surveyed on the Sackville River system, potential productivity in an opportunistic fishery averaged 3.2 kg/ha/yr, with a range of 1.9 kg/ha/yr at Halfway Lake to 4.7 kg/ha/yr at Lewis Lake. Potential yield in a more selective salmonid fishery on these lakes ranged from 0.5 kg/ha/yr at Halfway and Tomahawk lakes to 3.1 kg/ha/yr on Pentz Lake. Little Springfield Lake is omitted from the comparison because the high MEI is considered to be an indication of ecological stress rather than high productivity.

Cockscomb Lake, on the Avon River, was the deepest lake surveyed (33 m). Potential productivity here in an opportunistic fishery was 1.9 kg/ha/yr and 0.5 kg/ha/yr in a selective salmonid fishery. Fox Point Lake and Beaver Dam Lake were 1.9 kg/ha/yr and 2.1 kg/ha/yr respectively, for an opportunistic fishery and 0.2 kg/ha/yr and 0.6 kg/ha/yr for a salmonid fishery. Further details on the productivity of the above lakes are given in Appendix C.

Eight species of fish were netted from the 10 lakes surveyed in 1979. The most common species of fish caught, both in terms of total numbers and in incidence by lake, were yellow perch, with a total of 251 from seven lakes, and common sucker, with a total of 176 from six lakes. Sixty brook trout were caught in three lakes and 58 golden shiner were caught in four lakes. Further information on numbers and species caught are given in Appendix E.

Kidney smears taken from all brook trout netted were sent to the Fisheries Laboratory, where they were checked for bacterial kidney disease. No trace of the disease was found.

Detailed survey results including a bathymetric map for each of the 10 lakes are provided in alphabetical order.


Water sample stations	▲
Gill net, 30 m	● - - - ●
Gill net, 107 m	● - - - - ●
Emergent vegetation	
Rocks	
- submerged	+
- emerged	*
Beach area	
Boat launch site	■
Main highway (paved)	—————
Secondary highway	- . - . - .
Logging road or trail	- - - - -

FIG. Map reference, common to all maps in this report.

Beaver LakeCounty: HalifaxDrainage System: Sackville RiverCoordinates: 44°45'N; 63°47'WTopographic Map Number: 11D/13 West HalfLands and Forests Map Number: K-22Stocking Number: n/aStream Inventory Number: SS1E3Status: n/aSurvey Date: July 31, Aug 1 and 2, 1978Survey Agency: Freshwater and Anadromous DivisionSurface Elevation (m): 107Lake Surface Area (ha): 17.0Number of Islands: 0Total Island Area (ha): 0Water Surface Area (ha): 17.0Maximum Length (m): 1,040Maximum Effective Length (m): 750Maximum Width (m): 500Maximum Effective Width (m): 500Maximum Depth (m): 4Mean Depth (m): 1.5Volume of Lake (m³): 2.5 x 10⁵Shoreline Length (m): 3,400Shoreline Development: 2.3Conductivity (µmhos/cm): 50Secchi Disk Reading (m): 2.5Morphoedaphic Index: 14.5Potential Fish Yield (kg/ha/yr): 3.7Potential Angling Yield (kg/ha/yr): 2.4

Access: Although Beaver Lake is not a water-supply lake, the only access is via a road owned by the Public Service Commission of Halifax, from which permission and a key must be obtained before entry. This road runs to within a few hundred meters of the lake near Inlet 2. From there, it was necessary to carry all equipment through the surrounding woods to the lake.

Use: Because of its inaccessibility, it is probable that Beaver Lake gets no recreational use.

Physical Characteristics: Beaver Lake is

divided into two bays joined by a narrow channel not passable by boat. It is entirely surrounded by a dense forest of hardwoods and softwoods. Abundant emergent vegetation covers most of the lake surface and the bottom appears to be covered in a thick layer of detritus, especially near Inlet 2. The northern end of the main bay, near Inlet 1, is extremely rocky.

The smaller of the two bays is almost entirely covered by a floating mat of vegetation. A narrow channel near the shoreline barely allowed a canoe to pass through to the outlet, at the time of the survey.

Streams: Although the lake water was clear at the time of the survey, water from Inlet 1 was brown. The stream bed was filled in with larger boulders covered in a thick algal slime. Water flowed at a good rate through the rocks. Upstream, large amounts of deadfall could be a barrier to fish passage.

Temperature at Inlet 1, near the lake, was 16°C and dropped to 14°C about 50 m upstream. Oxygen and pH were recorded at 6.2 mg/l and 5.5 respectively. Inlet 2, tributary from Halfway Lake (survey results in this report), flowed over a gently sloping, wooded area. The stream averaged about 1.5 m wide and 10 cm deep, until it opened into a small pool just before entering Beaver Lake. Temperature ranged from 20°C at its origin to 21°C at its mouth. Oxygen was measured at 7.3 mg/l and pH was recorded at 5.5.

The stream bed of Inlet 2 was made up of large rocks and gravel, also covered in thick algal slime. Overhanging trees have resulted in some deadfall, none of which is a barrier to fish migration, but provides good shelter.

Inlet 3 also flows through gently sloping woods, but just before entering the lake, it cuts through a marshy area. At this point, the stream measured about 30 cm deep and almost 2 m wide. Before this, it measured about 5 cm deep and 0.5 m wide.

Stream flow through the woods was good but decreased as it entered the marsh. Oxygen and pH (taken just below the point where the stream enters the marsh) were recorded at 11.4 mg/l and 6.5, respectively. In general, good fish shelter was provided by overhanging banks, large rocks, and deadfall. The stream bed, other than in the marsh, was composed mostly of small rocks and gravel. A few riffle areas were noted, but no pools were seen in the section examined.

The outlet from Beaver Lake was dammed by deadfall at the lake shore. There was a good flow of water through the debris but it would be a definite barrier to fish passage. Beyond the dam, the stream dropped slightly and continued at a very gentle slope through the woods.

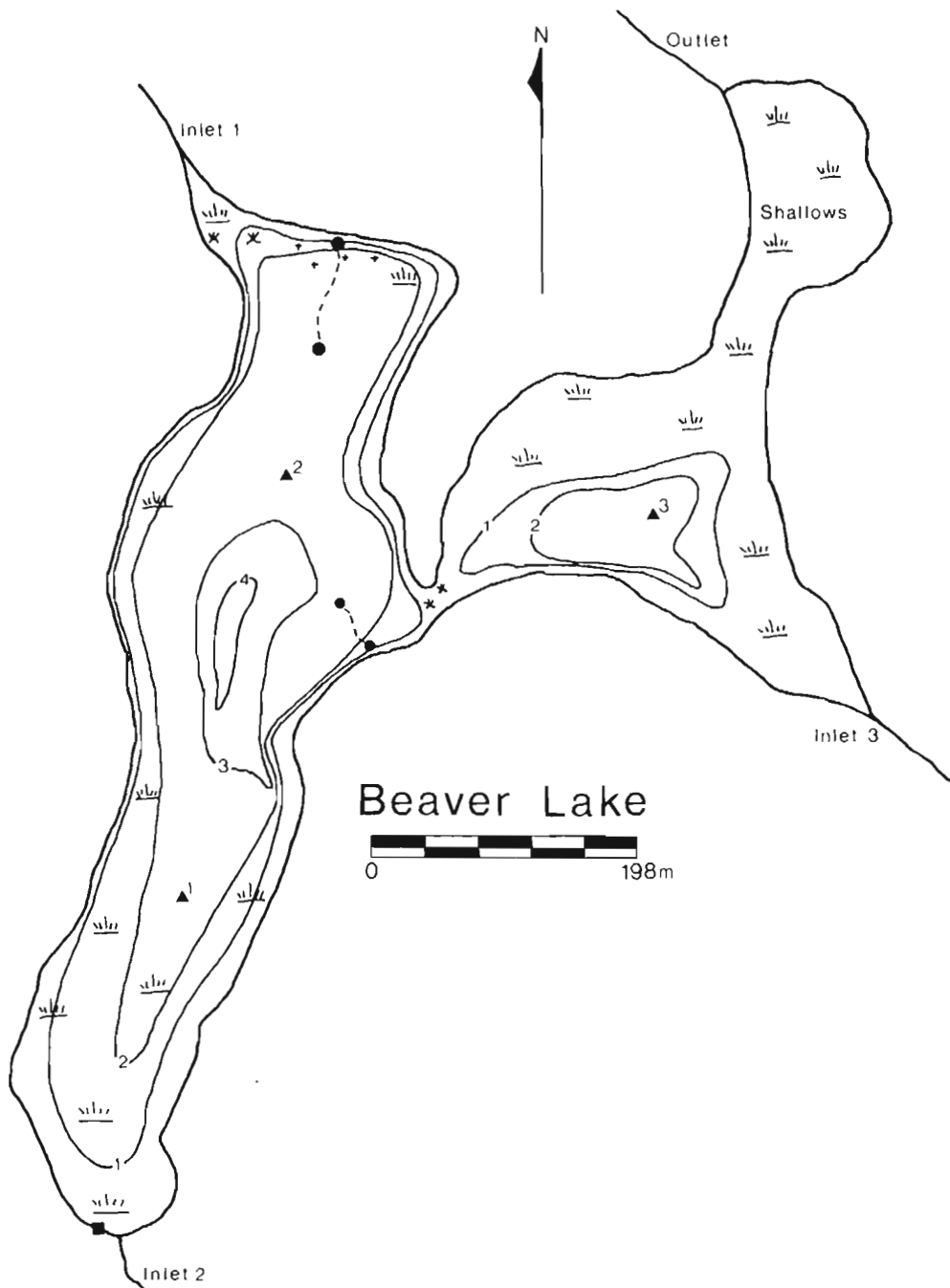
The outlet averaged from 2.5 to 3 m wide and from 10 to 15 cm deep. Flow was good and a number of riffle areas and pools were noted. Oxygen and pH were recorded at 7.5 mg/l and 5.5 respectively. The stream bed was composed mainly of rock and coarse gravel. The surrounding area was open and provided little cover.

Lake Water Characteristics: Water analyses were carried out at three stations. Water sampled at all sites showed very little change in temperature from 21.5°C at the surface to 21.0°C at the bottom. Dissolved oxygen varied little from 6.0 mg/l at the surface of Station 3, 1 to 6.4 mg/l at the surface of Station 3, with the same variation near the bottom.

Values for pH showed little change from 5.0 at the surface of Stations 1 and 2, to 5.5 at the surface of Station 3. At the bottom, pH remained at 5.5 for all stations. Conductivity was recorded at 50 μ mhos/cm.

Fish Collection: A 30-metre gill net was set for one night and caught no fish. A 107-metre gill net was set for the same time period and caught 142 yellow perch. Maximum fork length for this species was 17.1 cm and minimum fork length was 13.2 cm, with a mean of 15.5 cm. Standard deviation was 1.2 cm. Mean weight was 52.1 g. No other species of fish was caught.

Stocking History: None.



Beaver Dam Lake (No. 2)County: GuysboroughDrainage System: Salmon RiverCoordinates: 45°20'N; 61°47'WTopographic Map Number: 11F/5 West HalfLands and Forests Map Number: G-38Stocking Number: 13078Stream Inventory Number: ES29S4Status: n/aSurvey Date: July 11 and 12, 1978Survey Agency: Freshwater and Anadromous DivisionSurface Elevation (m): 107Lake Surface Area (ha): 8.5Number of Islands: 0Total Island Area (ha): 0Water Surface Area (ha): 8.5Maximum Length (m): 780Maximum Effective Length (m): 570Maximum Width (m): 390Maximum Effective Width (m): 390Maximum Depth (m): 6.0Mean Depth (m): 2.3Volume of Lake (m³): 2.0 x 10⁵Shoreline Length (m): 2,200Shoreline Development: 2.1Conductivity (µmhos/cm): 20.0Secchi Disk Reading (m): 0.6Morphoedaphic Index: 4.7Potential Fish Yield (kg/ha/yr): 2.1Potential Angling Yield (kg/ha/yr): 0.6

Access: There is no proper boat-launch site for Beaver Dam Lake. A secondary dirt road from Salmon River to Country Harbour crosses the outlet, at which point a boat was lowered down an embankment to the stream. Water was deep enough, at the time, to motor up to the lake.

Use: Due to the inaccessibility of Beaver Dam Lake, it is probable that it gets very little recreational use.

Physical Characteristics: Beaver Dam Lake is almost surrounded by a mixture of hardwoods and softwoods, except for marshy areas

near Inlets 1 and 3. Emergent vegetation was noted in several areas of the lake, especially in the shallow areas of the western and southeastern ends of the lake. The bottom appeared to be generally muddy, with some gravel areas around the shoreline.

Streams: Inlet 1 cut a channel through marshy area near the southeastern end of the lake. Width of the inlet near the lake was approximately 4.5 m, with an average depth of 0.75 m. Water temperature at this point was 19.5°C. Dissolved oxygen was measured at 2.2 mg/l and pH was recorded at 6.3. Approximately 100 m upstream, the inlet flowed through a wooded area, where average width was 2.5 m and depth was about 20 cm. Temperature here was 20.5°C and the amount of dissolved oxygen increased to 7.2 mg/l.

The stream bed near the lake consisted generally of mud and small amounts of gravel. Flow was slow and the only shelter was gained from aquatic vegetation. Upstream, the mud bottom gave way to gravel beds. Flow became much faster and the amount of shelter was increased by overhanging branches and deadfall. Small fish were seen in the stream but were not identified.

Inlet 2 flowed through gently sloping woods. Average width at the lake was 0.75 m and depth was approximately 10 cm. Water temperature was recorded at 15°C. About 100 m from the lake, the stream width remained the same but average depth decreased to 7 cm. Temperature remained steady.

The stream bed, generally, was composed of equal amounts of rock and gravel. Good cover was obtained from overhanging trees and branches. Logs and other deadfall provided good shelter for fish. Flow was slow. Dissolved oxygen and pH was recorded at 4.0 mg/l and 6.4 respectively.

Inlet 3 flowed through a wide marshy area which made it difficult to find the stream. Near the lake, average width was about 2 m and depth was approximately 3 cm. Water temperature here was 20°C. About 100 m upstream, the inlet flowed through dense woods. Average width here was 1.5 m and depth decreased to 1 cm. Water temperature remained the same.

The stream bed near the lake was generally muddy, but changed to rock and gravel as it flowed through the woods. Cover from overhanging alders and bushes was greater in the woods than in the open area of the marsh. Dissolved oxygen was measured at 5.5 mg/l and pH was recorded at 6.0.

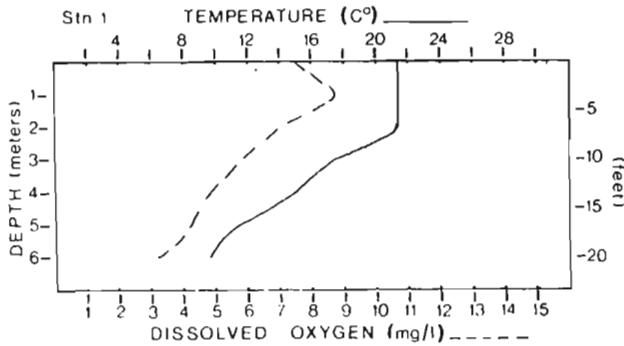
The outlet from Beaver Dam Lake was wide and deep. All along the area tested, eel grass was noted growing in the stream. Near the lake, the average width of the outlet was 27 m, with an average depth of about 1 m. Temperature was recorded at 22°C.

Approximately 100 m from the lake, the stream width decreased to about 15 m and average depth became 0.5 m. Temperature

remained steady.

The stream bed, for most of the area examined, appeared to be comprised of mud, with small amounts of rock and gravel along the edges. Banks were covered in low bushes and various aquatic plants which provided almost no cover. Instream vegetation provided some shelter for fish. Dissolved oxygen was recorded at 4.6 mg/l and pH was 6.3.

Lake Water Characteristics: Water analysis was completed at two stations on Beaver Dam Lake. The following graph shows that the lake was thermally stratified at the time of the survey, with a temperature of 21.5°C at the surface and 9.5°C at 6 m.



Station 2 was located in a shallow area, so no thermocline was evident. Temperature at the surface here was 21°C and dropped to 20.5°C at the bottom (2 m). Dissolved oxygen ranged from 8.2 mg/l to 2.4

mg/l at 2 m. Values for pH varied from 6.5 at the surface to 6.3 at 2 m. At Station 1, pH ranged from 6.5 at the surface to 5.5 at 6 m. Conductivity was recorded at 21.5 μ mhos/cm. Water color was brown.

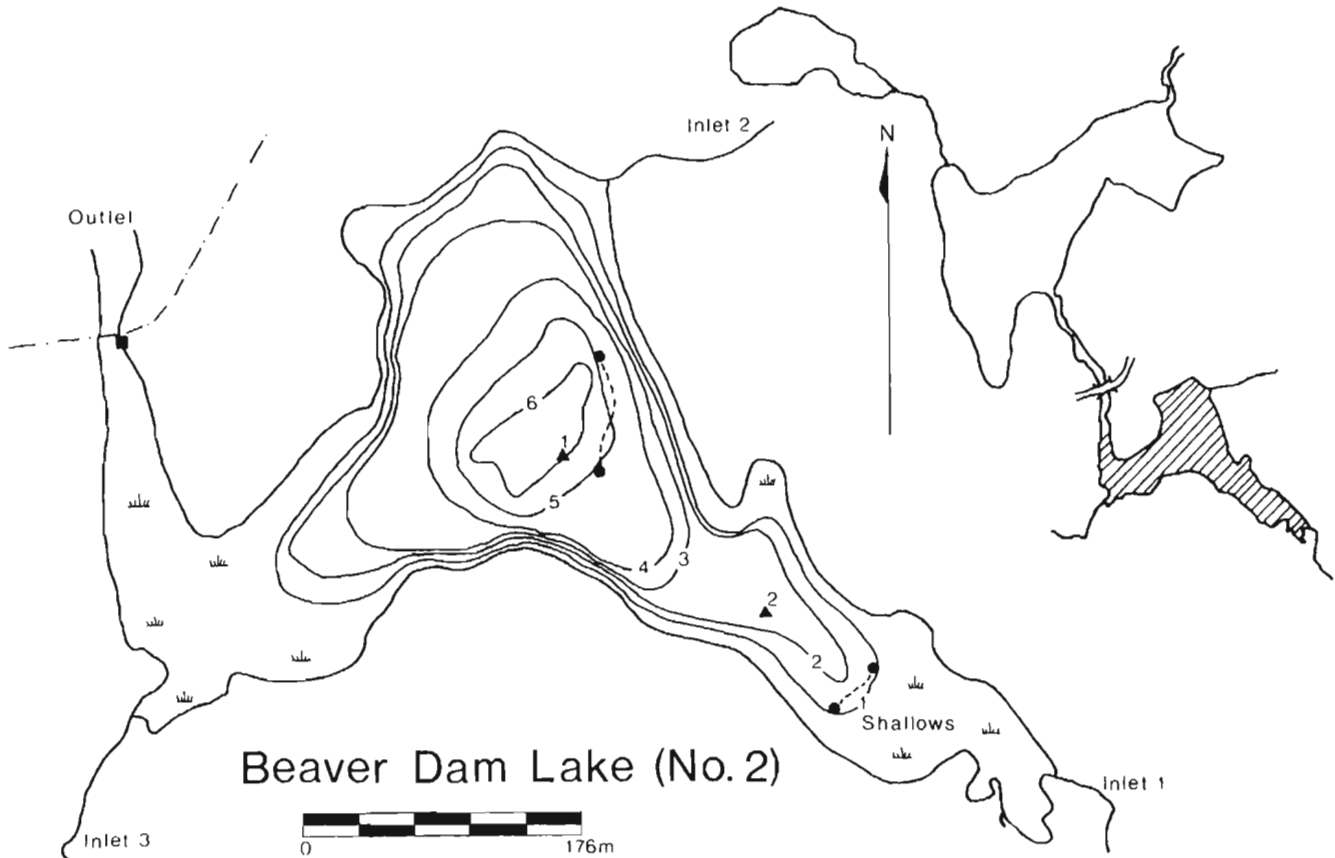
Fish Collection: A 30-m gill net, set for one night, caught 40 common sucker, seven brown bullhead, three gaspereau and four yellow perch.

A 107-m gill net, set for the same period, captured 55 yellow perch, 31 common sucker, 10 gaspereau, 13 golden shiner and eight rainbow smelt.

Species	No.	Total length (cm)				Mean weight (g)
		Max	Min	Mean	SD	
Brown bullhead	7	21.0	17.2	19.8	1.3	100.0
Common sucker ¹	71	39.3	16.4	25.4	7.6	255.6
Gaspereau	13	25.0	28.2	29.9	1.5	194.2
Golden shiner	13	12.1	10.2	11.0	0.5	11.5
Rainbow smelt	8	25.0	21.3	23.8	1.2	93.8
Yellow perch ¹	59	23.0	9.2	15.1	5.1	25.4

¹Statistics given are for fork lengths.

Stocking History:	1972	800 Sf
	1974	509 Sf
	1975	809 Sf
	1976	799 Sf, 3,004 S3
	1977	1,376 Sf, 3,004 S3



Cockscomb LakeCounty: WabigoonDrainage System: Avon River (St. Croix)Coordinates: 44°56'N; 63°51'WTopographic Map Number: 11D/13 West HalfLands and Forests Map Number: J-22Stocking Number: 8007Stream Inventory Number: MB54K5NStatus: HeadwaterSurvey Date: July 5-7, 1978Survey Agency: Freshwater and Anadromous DivisionSurface Elevation (m): 152Lake Surface Area (ha): 145.5Number of Islands: 5Total Island Area (ha): 1.5Total Water Surface Area (ha): 144.0Maximum Length (m): 3,500Maximum Effective Length (m): 2,900Maximum Width (m): 900Maximum Effective Width (m): 900Maximum Depth (m): 33Mean Depth (m): 11.5Volume of Lake (m³): 1.7 x 10⁷Shoreline Length (m): 13,000Shoreline Development: 3.1Conductivity (µmhos/cm): 29Secchi Disk Reading (m): 4.5Morphoedaphic Index: 1.4Potential Fish Yield (kg/ha/yr): 1.2Potential Angling Yield (kg/ha/yr): 0.2

Access: There are two access points to Cockscomb Lake, but only one public boat-launch area was found near the southern end. A secondary dirt road at Pigott Lake, off Highway #1, leads in to several cottages at the northwestern end of the lake. At the southern end, access is gained by the Mines Road, which exits off Highway #1 at Uniacke Mines. This road parallels the west side of the lake, providing access to numerous cottages along this shoreline. It was off this road that the boat-launch site was found.

Use: Numerous cottages have been built along the shoreline of Cockscomb Lake and a number of swimmers and boaters were seen during the survey. Residents interviewed indicated that most of the recreational fishing goes on during the spring and fall.

Physical Characteristics: Cockscomb Lake was an extremely deep lake, with a shoreline that dropped off sharply. The east side of the lake was very rocky and covered with low bushes, as opposed to the forest of hardwood and softwood on the west side. The lane around the boat launch was very flat but climbed steeply towards the upper end of the lake before dropping near the outlet.

Emergent vegetation was scarce except for a few shallow areas near the boat launch and the streams. The shoreline generally appeared to be composed of gravel and rock. At the northwestern end of the lake is a breached dam, behind which is a small pond. The outlet flows from this pond.

Streams: At the time of the survey, Inlet 1 was dry. It was situated in dense woods and appeared to be approximately 1.5 m wide. The stream bed was composed of rock, gravel and rubble. Source of the stream was a marsh about 75 m upstream, from which the inlet drains during periods of high water.

Inlet 2 was also dry except for a few small pools. It was situated in a dense growth of alders which inhibited stream exploration beyond 10 m from the lake. Area around the mouth of the inlet was very marshy. Average width appeared to be 1.5 m. The stream bed was composed of rock and rubble. A pH reading of 6 was taken but no clear water could be obtained for a measurement of dissolved oxygen.

Inlet 3 was not explored, as a large swamp surrounded by rock cliffs inhibited access to the stream.

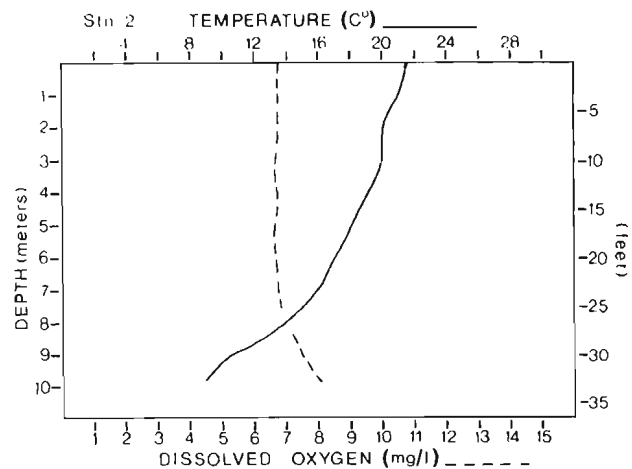
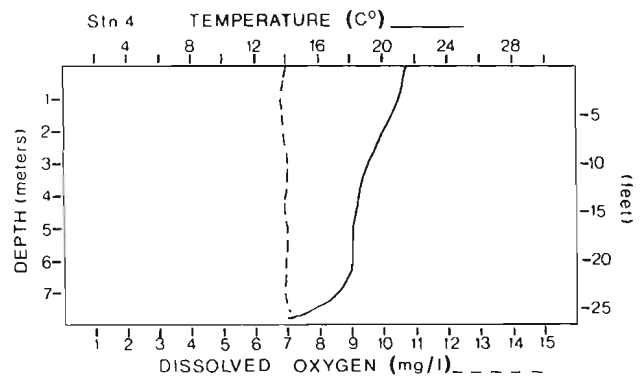
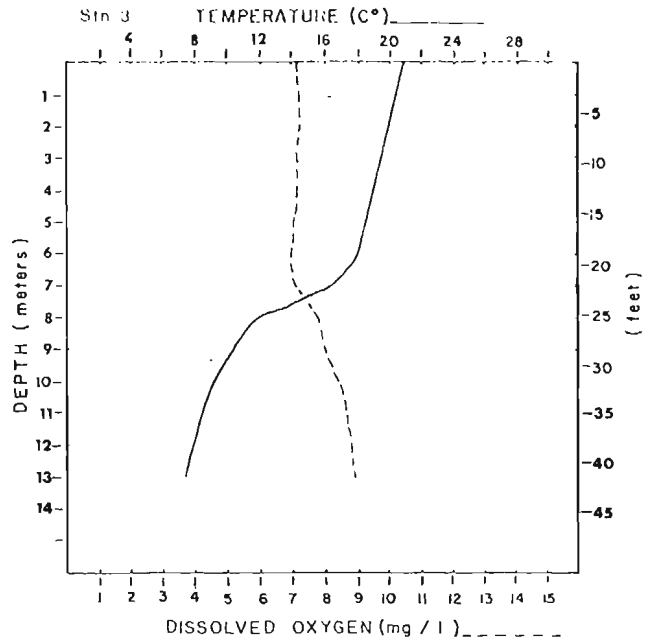
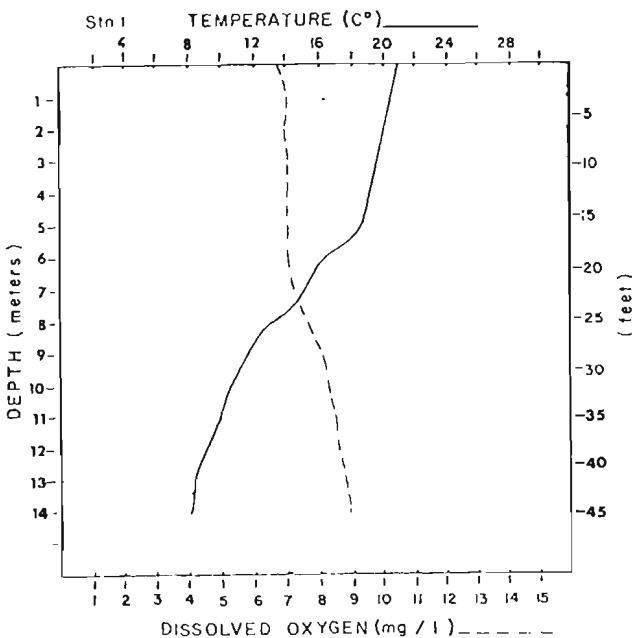
Inlet 4 flowed through an open wooded area. Water level in this inlet was extremely low, with almost no flow. The width of the stream bed was approximately three metres but only 2-3 cm of water was present. About 30 m upstream, a new bridge has been constructed across the inlet and residents have been complaining that fill from this construction has washed downstream, causing a buildup of sediment at the mouth. This buildup was observed by the survey crew, and it was concluded to constitute a barrier to fish migration except during high-water periods.

The outlet was not observed until early in September. At this time, water depth was approximately 6-8 cm, and flow was slow. Width of the outlet near the lake was 1.5 m, which increased to about 2 m about 100 m downstream. Temperature was constant at 19°C.

The stream bed consisted generally of moss-covered rocks and gravel until it

flowed through a swampy area approximately 100 m downstream, where it became soft and muddy. The small shrubs and bushes of the surrounding area provided little cover and fish shelter was limited to rocks and small amounts of deadfall. Killifish and probable lake chub were noted in the stream. Dissolved oxygen and pH values were recorded at 8.8 mg/l and 6.5, respectively.

Lake Water Characteristics: Due to the size of Cockscomb Lake, four stations were selected for water analysis. At all four stations, water was found to be thermally stratified. The following graphs represent this thermal stratification. At Station 1, temperature and dissolved oxygen values to 14 m were measured with a battery-operated oxygen meter. Samples brought from the bottom at 30 m were analysed with a Hach Kit and dissolved oxygen was measured at 10 mg/l.



Values for pH at Station 1 varied from 6.3 at the surface to 5.9 at 30 m. At Station 2, pH values ranged from 6.5 to 6.0 at 9.75 m. At the surface of Station 3, pH was measured at 6.5, and decreased to 5.8 at 12 m. At Station 4, pH varied little from 6.4 at the surface to 6.3 at the bottom. Conductivity was recorded at 29 μ mhos/cm and water color was clear.

Fish Collection: A 30-m and a 107-m gill net were set for two nights in Cockscomb Lake on July 5. The 30-m net captured one common sucker which was mutilated by eels. The 107-m net caught three common sucker and one brook trout.

On September 6, both nets were again set in Cockscomb Lake for one night only. The 30-m gill net captured 14 common sucker, one brook trout, mutilated by eels, two yellow perch and one golden shiner. The 107-m gill net captured 39 common sucker and two brook trout.

Species	No.	Total length (cm)				Mean weight (g)
		Min	Max	Mean	SD	
Common sucker	57 ¹	21.2	33.3	21.2	4.8	69.9
Brook trout	4 ²	22.0	26.6	23.7	2.5	124.3
Golden shiner	1					
Yellow perch	2 ³					

¹15 mutilated by eels.

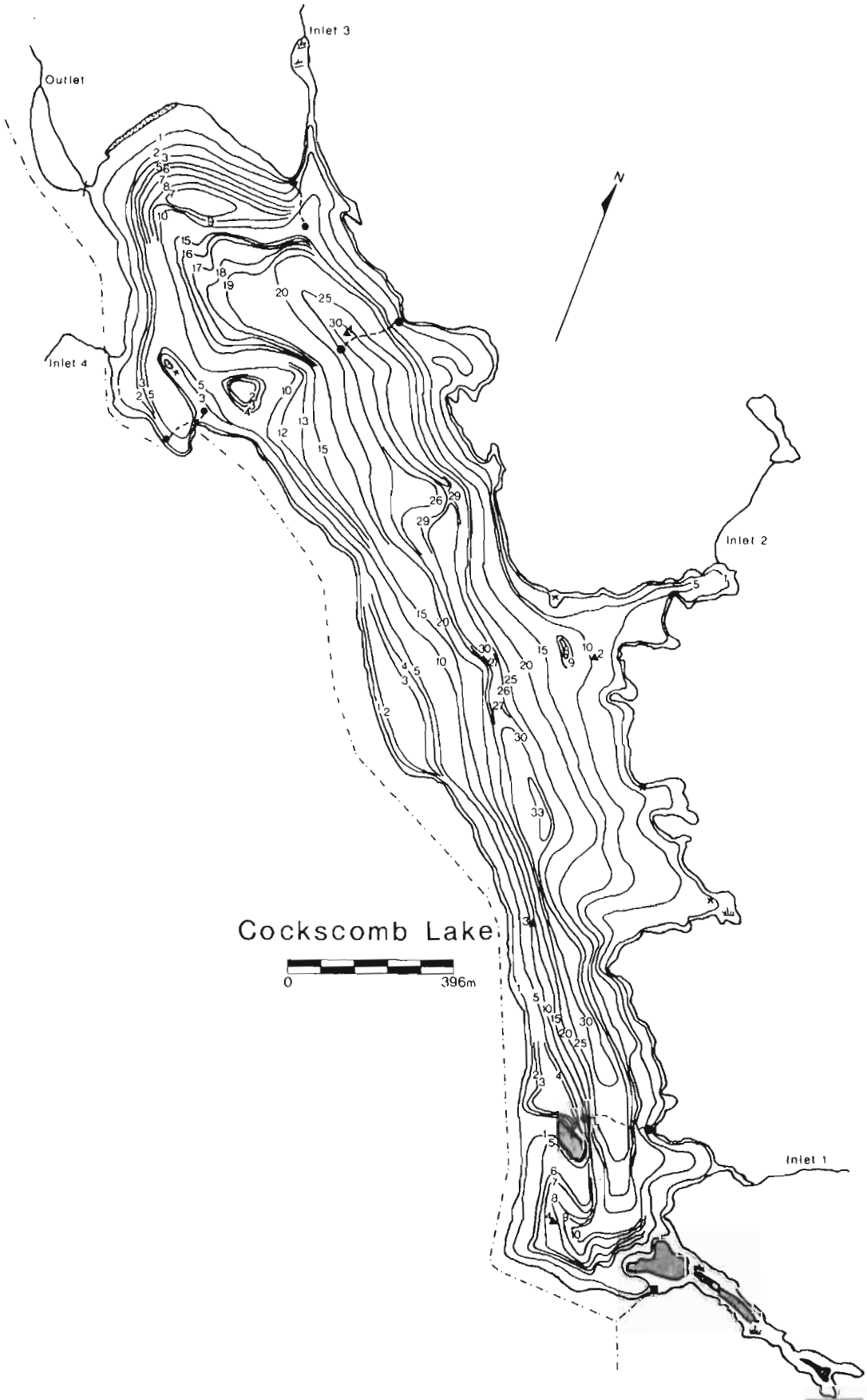
²1 mutilated by eels.

³2 mutilated by eels.

Further information on brook trout and golden shiner captured is given below.

Species	Length (cm)		Weight (g)	Sex
	Fork	Total		
Brook trout	20.8	22.0	93	?
	21.1	22.5	100	M
	25.0	26.6	180	F
Golden shiner	10.1	11.2		

Stocking History: 1973 2,000 Sf
1977 200 Sf, 1,000 S4



Feely LakeCounty: HalifaxDrainage System: Sackville RiverCoordinates: 44°48'N; 63°42'WTopographic Map Number: 11D/13 East HalfLands and Forests Map Number: K-23Stocking Number: n/aStream Inventory Number: SS1A5Status: n/aSurvey Date: July 26, 27, 1978Survey Agency: Freshwater and Anadromous DivisionSurface Elevation (m): 76.2Lake Surface Area (ha): 10.5Number of Islands: 0Total Island Area (ha): 0Total Water Surface Area (ha): 10.5Maximum Length (m): 550Maximum Effective Length (m): 530Maximum Width (m): 430Maximum Effective Width (m): 430Maximum Depth (m): 6Mean Depth (m): 2.6Volume of Lake (m³): 2.8 x 10⁵Shoreline Length (m): 1,600Shoreline Development: 1.4Conductivity (umhos/cm): 28Secchi Disk Reading (m): 3.1Morphoedaphic Index: 6.0Potential Fish Yield (kg/ha/yr): 2.4Potential Angling Yield (kg/ha/yr): 0.8

Access: Feely Lake is accessible by a logging trail, which exits from the Beaverbank Road, near Heffler's Sawmill. Due to the poor condition of the road, it is passable only by a 4-wheel-drive vehicle.

Use: A number of children were seen swimming at the lake during the time of the survey. It may also be used for some recreational fishing.

Physical Characteristics: Feely Lake is almost completely surrounded by a dense forest of hardwoods and softwoods, except for a marshy area near the middle of the west side. The northern tip, especially

near the inlet, is covered with lily pads and eel grass. The bottom generally appears to be soft and muddy. Marsh gases were seen bubbling to the surface in several areas.

Streams: The inlet to Feely Lake flowed through dense woods until it neared the lake, where it then cut a two-foot wide channel through tall manna grass for approximately 50 m. Depth in this area was 0.5-0.75 m. Temperature was 22°C. Very little flow was discernable at this point.

At 100 metres from the lake, the stream flowed through dense woodlands, where deadfall and overhanging trees provided good cover. Flow here was good and a number of riffle areas were noted. Depth of the stream in this area was 8-10 cm. Average width was 1.5 m. Temperature dropped to 11°C.

The stream bed was very soft and muddy near the mouth of the inlet, but where it flowed through the woods, rock and gravel became more predominant. Dissolved oxygen and pH were recorded at 9.0 mg/l and 6.3 respectively.

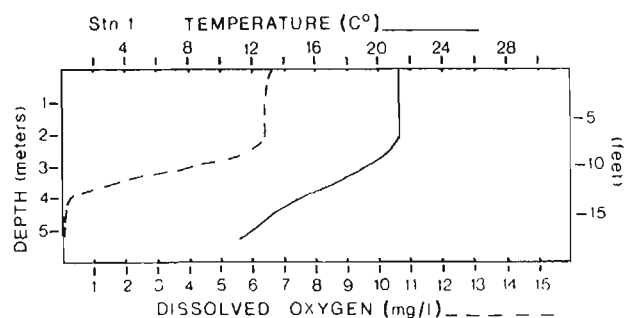
The outlet to Feely Lake was found to have a dam of log-crib construction built at the point where it exits the lake. This dam allowed water flow by percolation to the outlet and was therefore a barrier to fish migration at that water level.

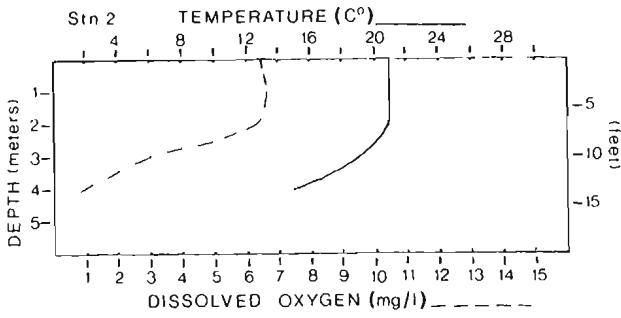
Just below the dam, the stream width was approximately 2 m and the average depth was 12 cm. Temperature here was 26°C. About 100 m downstream, the average width narrowed to 1 m. Depth was about 10 cm. Temperature remained constant.

The stream bed consisted mainly of a mixture of rock and gravel, with small amounts of sand and mud. The surrounding wooded area was fairly open, so cover was poor. Some good riffle areas over gravel beds were noted, but no pools were seen in the stream section examined.

Dissolved oxygen and pH were measured at 7.8 mg/l and 6.3 respectively.

Lake Water Characteristics: Water analyses were completed at two stations for Feely Lake. At the time of the survey, water was found to be thermally stratified (21.5°C at the surface and 11°C at the bottom).





Fish Collection Data: A 30-m gill net was set for a period of one night. The net caught three common sucker, two of which were mutilated by eels. Fork length of the remaining fish was 18.6 cm. Weight was 50 g.

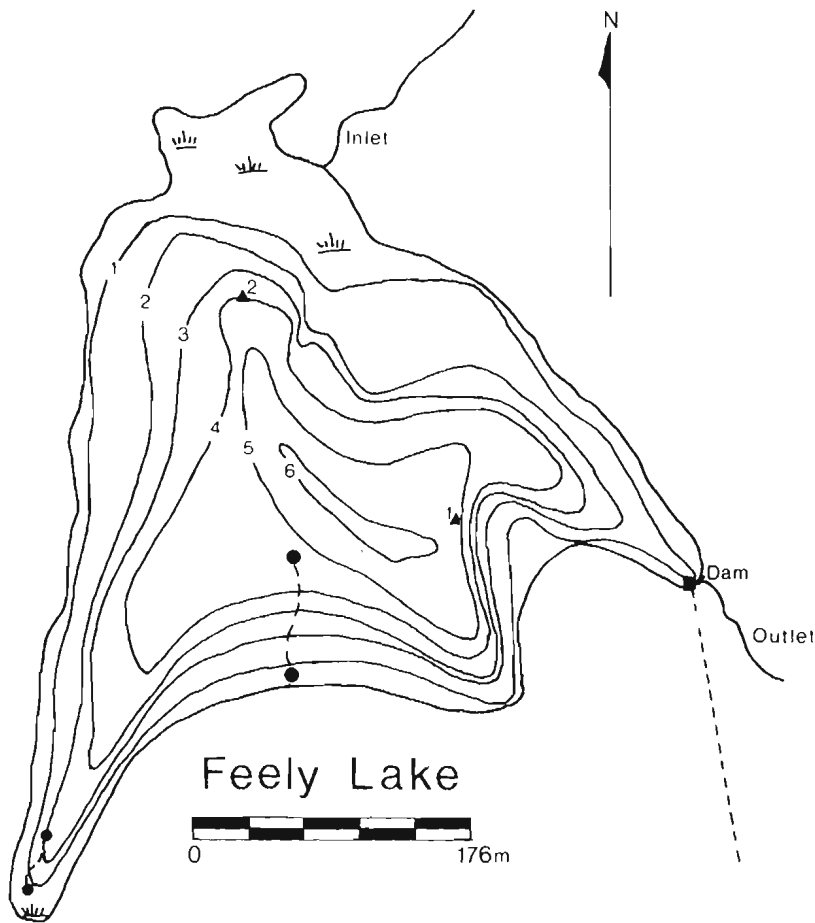
A 107-m gill net was set for the same period and four common sucker were captured. Of these, two were mutilated by eels. The remaining two had fork lengths of 24.5 cm and 22.5 cm. Weights were 110 g and 90 g, respectively.

Values for pH at Station 1 ranged from 6.3 at the surface to 6.0 at the bottom. At Station 2, pH values ranged from 6.0 at the surface to 5.5 at the bottom.

No other species of fish were collected in the nets. However, schools of killifish and possible lake chub were seen along the shore and in the inlet.

Conductivity was recorded at 28 μ hos/cm. Water color was brown.

Stocking History: None.



Fox Point LakeCounty: LunenburgDrainage System: Fox Point BrookCoordinates: 44°36'N; 64°05'WTopographic Map Number: 21A/9 East HalfLands and Forests Map Number: M-20Stocking Number: 1015Stream Inventory Number: SS58AStatus: HeadwaterSurvey Date: Sept. 11-13, 1978Survey Agency: Freshwater and Anadromous DivisionSurface Elevation (m): 30.5Lake Surface Area (ha): 137.5Number of Islands: 11Total Island Area (ha): 1.5Total Water Surface Area (ha): 136.0Maximum Length (m): 2,500Maximum Effective Length (m): 2,100Maximum Width (m): 1,100Maximum Effective Width (m): 1,100Maximum Depth (m): 19Mean Depth (m): 4.9Volume of Lake (m³): 6.6 x 10⁶Shoreline Length (m): 10,000Shoreline Development: 2.4Conductivity (µmhos/cm): 35Socchi Disk Reading (m): 4.1Morphoedaphic Index: 4.0Potential Fish Yield (kg/ha/yr): 1.9Potential Angling Yield (kg/ha/yr): 0.2

Access: Fox Point Lake is accessible at two points. At the northwestern tip, a dirt road leads directly off Highway 3, near Hubbards, to several cottages along the shoreline. At the southern end, another dirt road, leading into more cottages, exits off the Blandford Road about one mile above CFS Mill Cove. It was this access that was chosen by the survey crew.

Use: Due to the presence of a number of summer cottages and boating facilities, it was assumed that Fox Point Lake was used heavily for recreational swimming, boating

and fishing. (One member of the survey crew had fished here on occasion and remarked at the large numbers of fishermen seen.)

Physical Characteristics: Fox Point Lake was extremely rocky and, although deep in spots, shoals and islands made depth soundings very difficult. Therefore, errors in the contour map may have resulted.

Bordering land on the lake was generally flat and forested, with a mixture of hardwoods and softwoods. Cottages were confined to the southern and northwestern ends of the lake. Emergent vegetation was seen in several places, mostly along the shoreline. In these areas, the bottom tended to be muddy but otherwise was covered in large granite boulders which often protruded above the surface of the water. Some gravel areas were found along the shoreline.

Streams: Inlet 1, at the southern end of the lake, flowed through a gently sloping wooded area. Average width of the stream near the lake was 2 m and widened to approximately 2.5 m upstream. Depth decreased from 15 cm near the lake shore to 10 cm upstream about 50 m. Temperature was steady at 10°C.

The stream bed at the lake was filled in with large boulders, which gave way to a mixture of gravel and rubble 10 m upstream. Overhanging trees and banks provided good cover, while rocks and deadfall gave adequate fish shelter. Good water flow was observed all along the area observed and a number of riffle areas and small pools were seen. Dissolved oxygen was measured at 8.5 mg/l and pH was 5.0.

Inlet 2, at the northern end of the lake averaged 3 m wide and 1.3 m deep along the 100 m of stream observed. Temperature remained steady at 11°C.

The stream bed appeared to be generally made up of large rocks and boulders, with gravel areas along the banks. It was, however, deep enough to motor well beyond 100 m from the lake. The surrounding area was open, while overhanging, grass-covered banks provided little cover. Rocks, logs and deadfall provided some instream fish shelter. Dark brown water color made it very difficult to see to the bottom of the stream. Dissolved oxygen and pH values were recorded at 5.6 mg/l and 5.5 respectively.

The outlet from Fox Point Lake was approximately 2.5 m wide with an average depth of 13 cm. Just below the lake, the stream formed a large pool with an average depth of about 20 cm. From this pool, the stream flows swiftly for approximately 50 m, at which point it floods a large area covered in dead trees and large granite boulders. From then on, the stream is no longer discernable.

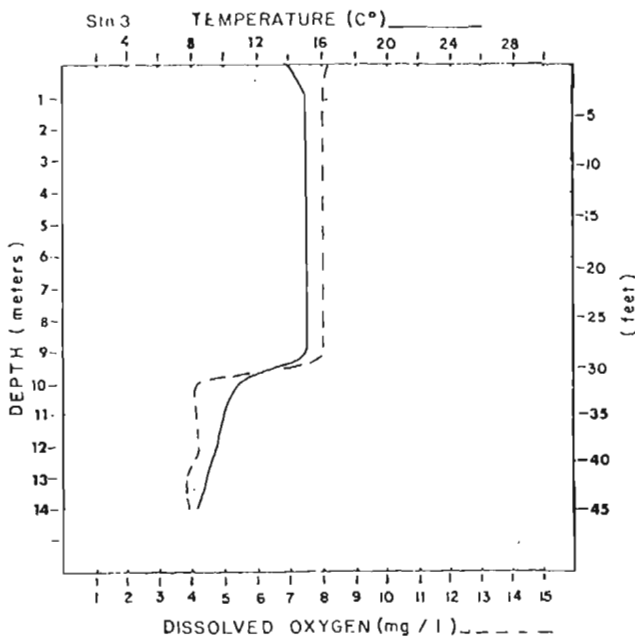
For the first 100 m, the stream bed generally consisted of large rocks and

gravel, except for the area just before the pool which was soft and muddy. The surrounding woods gave good cover, and rocks and deadfall provided adequate fish shelter. Oxygen was measured at 7.6 mg/l and pH was 6.0.

Lake Water Characteristics: Water analyses were completed at three stations on Fox Point Lake. Only Station 3 showed the lake to be thermally stratified at the time of the survey. The following graph represents this thermocline. Temperature and oxygen profiles were done only to a depth of 14 m at this station. Samples at the bottom (19 m) were not taken.

At Station 1, temperature varied from 14.0°C at the surface to 14.5°C at 3.75 m. Dissolved oxygen decreased from 7.6 mg/l at the surface to 7.5 mg/l at the bottom. Temperature at Station 2 ranged from 14.5°C at the surface to 15°C at the bottom (7 m). Dissolved oxygen varied from 8.0 mg/l at the surface to 7.9 mg/l at 7 m.

Values for pH remained steady for all three stations at 6.5. Conductivity was 35 µmhos/cm. Water color was brown.



Fish Collection: A 30-m gill net was set for one night and captured 15 brook trout, of which two were mutilated by eels.

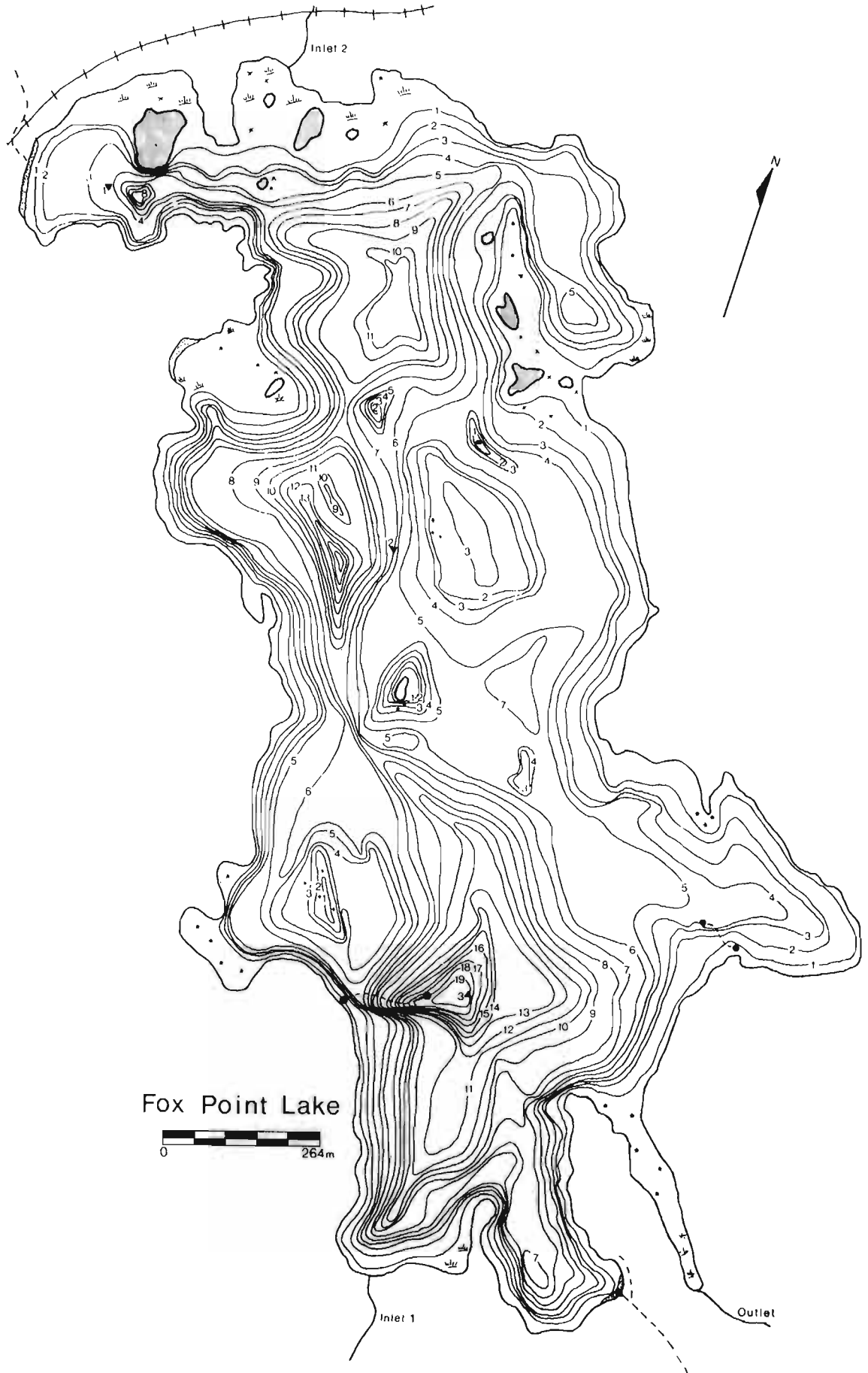
A 107-m gill net was set for the same period and captured 35 brook trout, of which two were released and 10 were mutilated by eels. No other species of fish was caught in either net. Length, weight and sex data for the trout are given in the following table.

Length (cm)		Weight (g)	Sex
Fork	Total		
23.4	24.8	150	M
23.3	24.6	140	M
29.0	30.5	260	F
23.4 ¹	24.5	140	F
25.2	26.8	175	M
23.8	25.5	140	M
30.5	31.8	350	M
25.8	28.3	225	M
27.7	29.0	220	F
23.5	25.7	guts eaten by eels	
23.6 ¹	25.0	125	- ²
28.0 ¹	29.5	230	F
21.9 ¹	23.0	105	F
31.3	33.7	340	F
26.5	27.7	220	M
27.5	28.7	200	F
30.9	32.0	320	F
31.3	32.9	320	M
20.7	21.9	90	F
25.8	27.2	guts eaten by eels	
21.5	22.7	100	F
19.8	20.9	80	M
22.0	23.4	115	F
19.5	20.4	80	M
19.3	20.3	60	M
18.9	20.1	70	M
16.3	17.4	40	M
18.7 ¹	20.2	60	M
16.5 ¹	17.8	40	M
17.6	18.7	50	M
17.5	18.5	50	M
15.8	16.8	40	M
17.6 ¹	18.8	50	M
18.0	19.3	55	M
16.8	17.9	40	M
31.6	32.9	400	F

¹Copepods on fins and gills.

²Whole fish sent to lab.

<u>Stocking History:</u>	1972	996 Sf, 1,008 S5
	1974	702 Sf
	1975	993 Sf
	1976	700 Sf
	1977	1,100 Sf



Fox Point Lake



Halfway LakeCounty: HalifaxDrainage System: Sackville RiverCoordinates: 44°45'N; 63°47'WTopographic Map Number: 11D/12 West HalfLands and Forests Map Number: L-22Stocking Number: n/aStream Inventory Number: SS1E5Status: HeadwaterSurvey Date: July 21, 25, 26, 1978Survey Agency: Freshwater and Anadromous DivisionSurface Elevation (m): 107Lake Surface Area (ha): 14.0Number of Islands: 0Total Island Area (ha): 0Total Water Surface Area (ha): 14.0Maximum Length (m): 530Maximum Effective Length (m): 530Maximum Width (m): 490Maximum Effective Width (m): 490Maximum Depth (m): 16Mean Depth (m): 7.4Volume of Lake (m³): 1.0 x 10⁶Shoreline Length (m): 1,600Shoreline Development: 1.2Conductivity (µmhos/cm): 50Secchi Disk Reading (m): 4.9Morphoedaphic Index: 3.9Potential Fish Yield (kg/ha/yr): 1.9Potential Angling Yield (kg/ha/yr): 0.5

Access: Access to Halfway Lake is via a road owned by the Public Service Commission of Halifax. Although it is not a water supply lake, permission and a key must be obtained to gain access to this road.

Use: At the time of the survey, children were seen swimming in the lake. Local residents may also use it for fishing.

A subdivision is now being built near the lake and is scheduled to eventually move in around the shores at the western end. Consequently, there may be greater potential for recreational fishing, swim-

ming and boating.

Physical Characteristics: Although small, Halfway Lake was deep, with a shoreline which dropped off sharply most of the way around the lake. Some emergent vegetation was noted in a shallow area at the north-western tip. It was along the shoreline in this area that springs were noted percolating up through the gravel and flowing into the lake. Temperature of the spring water was 15.0°C. Dissolved oxygen was measured at 6.8 mg/l and pH was 6.0.

The shoreline and bottom were composed of gravel, sand and rock. The lake was surrounded by a forest of hardwoods and softwoods.

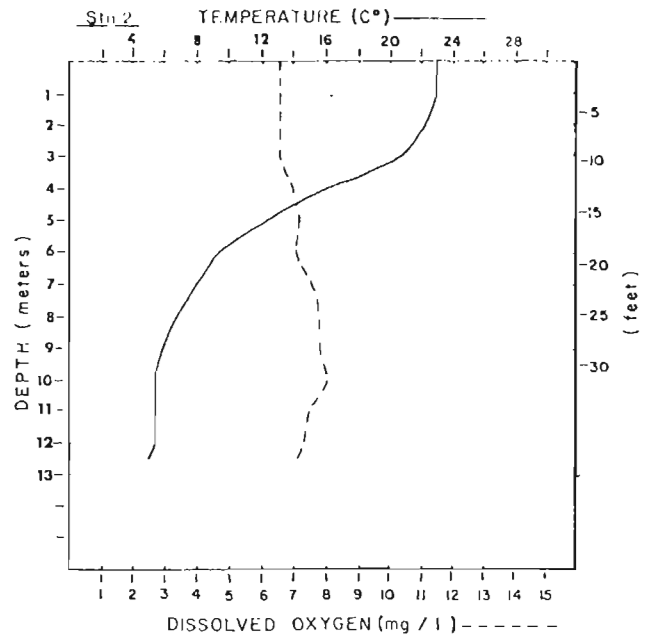
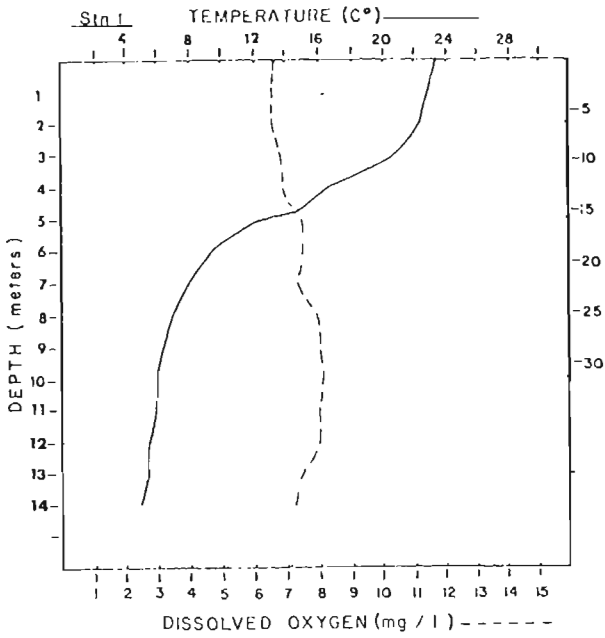
Streams: Although not marked on any of the topographic maps that were studied prior to this survey, an inlet was located at the western end of Halfway Lake. Average width of this stream at the lake was 1.5 m, with an average depth of 10 cm. Temperature at this point was 17.0°C. Approximately 100 m upstream, average width remained at 1.5, but average depth increased to 15-20 cm. Temperature remained constant.

The stream bed was composed mainly of gravel and moss-covered rocks. Good water flow resulted in a number of riffle areas but no major pools were noted. Overhanging trees and banks provided good cover. Dissolved oxygen and pH were recorded at 9.4 mg/l and 5.5 respectively.

The outlet passed under the road through two small culverts. It then flowed across a cleared area and then down through the woods at a gentle slope to Beaver Lake. The average width of the outlet was 1 m, with an average depth of approximately 18 cm. Temperature remained constant along the stream at 21.0°C.

The stream bed consisted mainly of gravel and smaller amounts of rock and mud. There was very little cover until the stream entered woods where deadfall, overhanging trees and banks provided good shelter. Water flow was good and a few riffle areas were noted. Only one pool was seen, just before the outlet entered Beaver Lake. Dissolved oxygen was measured at 8.6 mg/l and pH was recorded at 6.0.

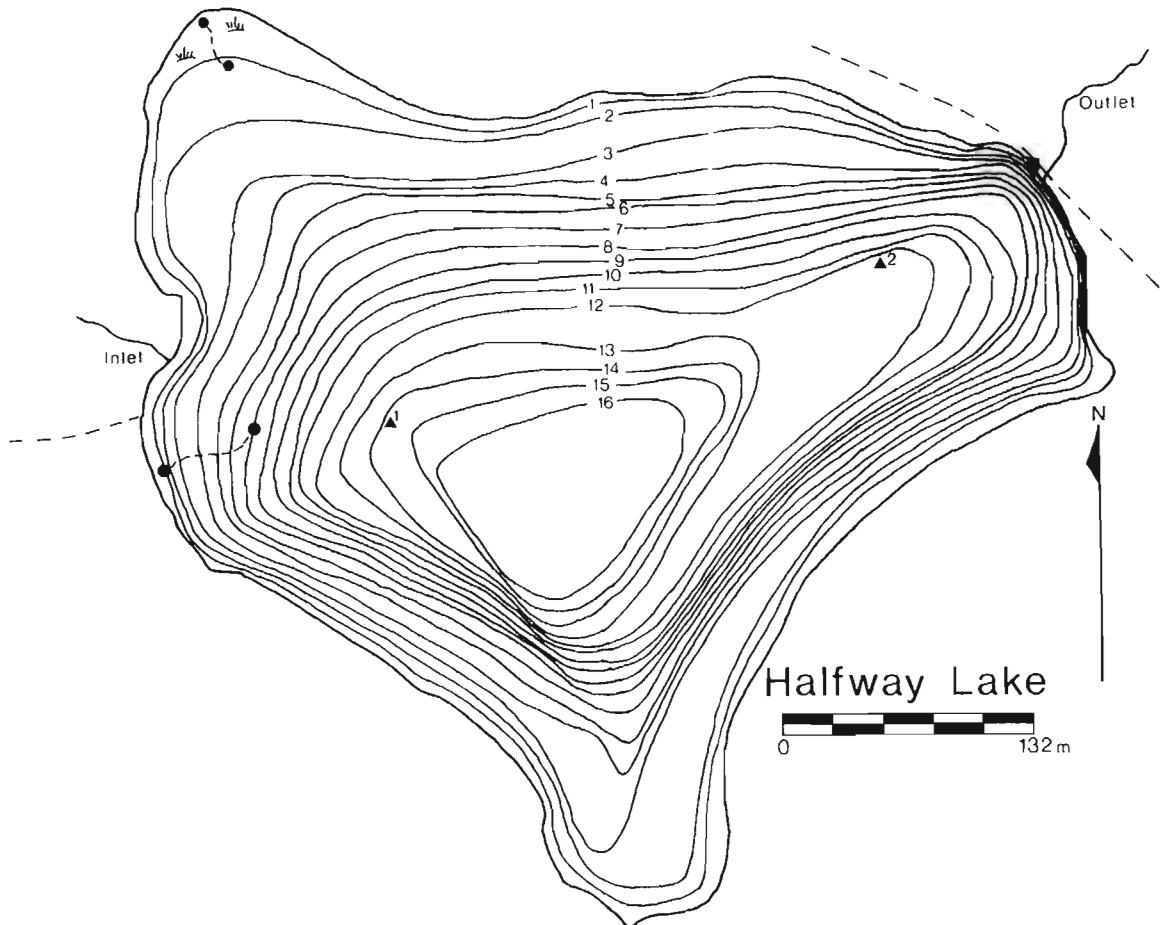
Lake Water Characteristics: Two stations for water analyses were selected on Halfway Lake. The results show that in July the water was thermally stratified (23.5°C at the surface and 5.0°C at 14 m). Dissolved oxygen levels ranged from 6.7 mg/l at the surface to 7.1 mg/l near the bottom. Values for pH varied from 6.0 at the surface of Station 1 to 5.5 near the bottom. At Station 2, pH values ranged from 6.6 at the surface to 7.1 near the bottom. Conductivity was recorded at 50 µmhos/cm near the surface and 40 µmhos/cm at the bottom. Water color was clear.



Fish Collection: A 30-m gill net was set for one night and caught no fish. A 107-m gill net was set for the same period and caught 47 yellow perch. Maximum and minimum fork lengths for the perch were 17.2

cm and 10.3 cm, respectively. Mean fork length was 12.2 cm. Standard deviation is 2.5. Mean weight was 14.6 g. No other species of fish was captured.

Stocking History: None.



Lewis LakeCounty: HalifaxDrainage System: Sackville RiverCoordinates: 44°49'N; 63°47'WTopographic Map Number: 11D/13 West HalfLands and Forests Map Number: K-22Stocking Number: 14085Stream Inventory Number: SSLH1Status: n/aSurvey Date: July 12, 13 and 25, 1978Survey Agency: Freshwater and Anadromous DivisionSurface Elevation (m): 107Lake Surface Area (ha): 21.7Number of Islands: 0Total Island Area (ha): 0Total Water Surface Area (ha): 21.0Maximum Length (m): 910Maximum Effective Length (m): 910Maximum Width (m): 600Maximum Effective Width (m): 550Maximum Depth (m): 2Mean Depth (m): 0.9Volume of Lake (m³): 1.8 x 10⁵Shoreline Length (m): 3,100Shoreline Development: 1.9Conductivity (µmhos/cm): 60Secchi Disk Reading (m): 1.5Morphoedaphic Index: 24.4Potential Fish Yield (kg/ha/yr): 4.7Potential Angling Yield (kg/ha/yr): 2.0

Access: Highway 1 parallels the western shore of Lewis Lake. A short dirt road leads to the boat-launch area.

Use: The existence of a number of year-round homes on the lake suggests that it is used for recreational fishing, boating and swimming. A private float plane was also seen docked near the northwestern corner of the lake.

Physical Characteristics: The western shore of Lewis Lake has been cleared for housing purposes. The remainder of the surrounding area is made up mainly of

softwoods and hardwoods.

The lake is very shallow, the deepest point being 2 m. It is also extremely rocky, especially along the shoreline. Consequently, conducting depth soundings was difficult and this may have resulted in errors in the contour map.

Streams: Inlet 1 was a wide, deep stream which flowed very slowly. It averaged approximately 20 m wide for the first 200 m and then narrowed to 1 or 2 m wide. The soft bottom prevented a measurement of stream depth. Stream banks were covered in alders and various other bushes. Very soft mud, silt and sand was the basis of the stream bed. Oxygen and pH were recorded at 7.6 mg/l and 6, respectively.

Inlet 2 was not flowing at the time of the survey. However, just behind a small bank at the lakeshore was a swamp from which the stream would flow in times of high water. Oxygen and pH, taken at the shoreline, were recorded at 8.4 mg/l and 6.2, respectively.

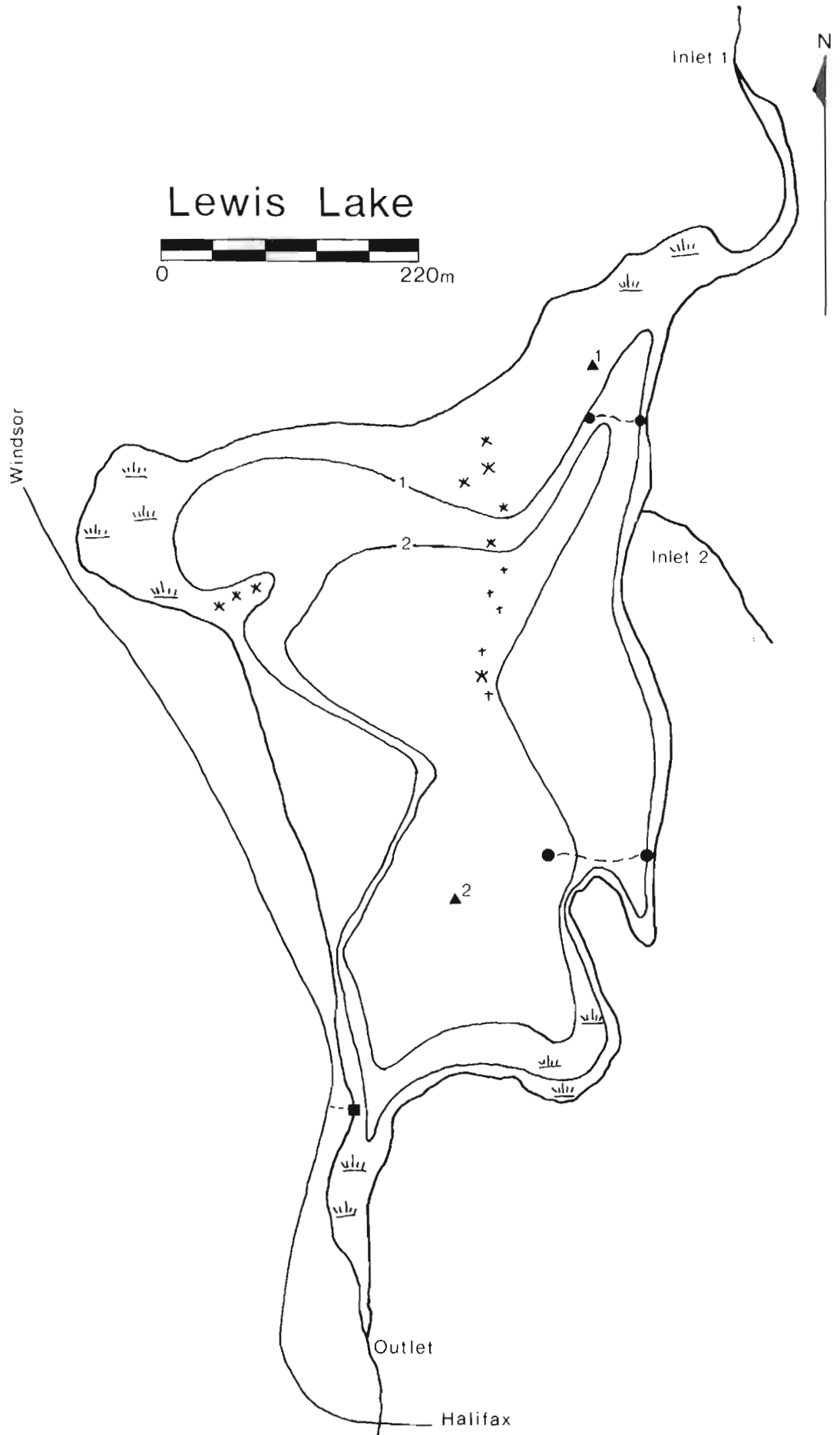
The outlet from Lewis Lake split into two channels just after exiting the lake but converged near the bridge crossing on Highway 1. The width near the lake was approximately 15 m before it split. Average depth was about 15 cm. Just below the bridge, where the channels joined, the stream narrowed to about 2 m and the depth averaged 8-10 cm. Flow became faster at this point. The stream bed was composed mainly of rock and a mixture of mud and gravel. The outlet flowed through fairly open area, so there was little cover. A few riffle areas were noted downstream, but no pools were seen. Oxygen was measured at 8.2 mg/l and pH was recorded at 6.5.

Lake Water Characteristics: Two stations on Lewis Lake were selected for water analyses. Station 1 was located near the mouth of Inlet 1. At this point, temperature ranged from 23.5°C at the surface to 23.0°C at the bottom. Oxygen varied from 7.0 mg/l at the surface to 6.5 mg/l at the bottom, and pH remained constant at 6.0.

Temperature at Station 2 varied from 22.0°C at the surface to 22.5°C at the bottom. Dissolved oxygen was constant at 6.0 mg/l, as was pH, at 6.0. Conductivity was recorded at 60 µmhos/cm. Water color was brown.

Fish Collection: A 107-m and a 30-m gill net were set for one night only. The nets caught 15 common sucker, eight yellow perch and two golden shiner (length and weight statistics are not available).

Stocking History: 1974 1,050 Sf, 4,120 S4
1975 1,050 Sf, 4,120 S4



Little Springfield LakeCounty: HalifaxDrainage System: Sackville RiverCoordinates: 44°48'N; 63°45'WTopographic Map Number: 11D/13 West HalfLands and Forests Map Number: K-22Stocking Number: n/aStream Inventory Number: SS1F2Status: HeadwaterSurvey Date: July 25 and 26, 1978Survey Agency: Freshwater and Anadromous DivisionSurface Elevation (m): 107Lake Surface Area (ha): 8.0Number of Islands: 0Total Island Area (ha): 0Total Water Surface Area (ha): 8.0Maximum Length (m): 490Maximum Effective Length (m): 460Maximum Width (m): 280Maximum Effective Width (m): 280Maximum Depth (m): 7Mean Depth (m): 3.4Volume of Lake (m³): 2.6 × 10⁵Shoreline Length (m): 1,200Shoreline Development: 1.3Conductivity (µmhos/cm): 340Secchi Disk Reading (m): 3.6Morphoedaphic Index: 95.1Potential Fish Yield (kg/ha/yr): n/aPotential Angling Yield (kg/ha/yr): n/a

Access: Little Springfield Lake is accessible via Highway 101, which passes near the southwestern tip of the lake. Although no proper exit exists from the highway, it is possible to drive down an embankment to reach the lakeshore.

Use: Children were seen swimming in the lake during the survey. Although there are no restrictions to public use of the lake, it may be used as a water supply for a nearby trailer court.

Physical Characteristics: The most distinct physical characteristics of Little

Springfield Lake was the green water color, and the rust-colored coating that covered all the rocks and shrubs along the lake-shore. The same coating covered the gill nets after one night's fishing, and bottom debris brought up with the nets was covered in thick rust-colored mud.

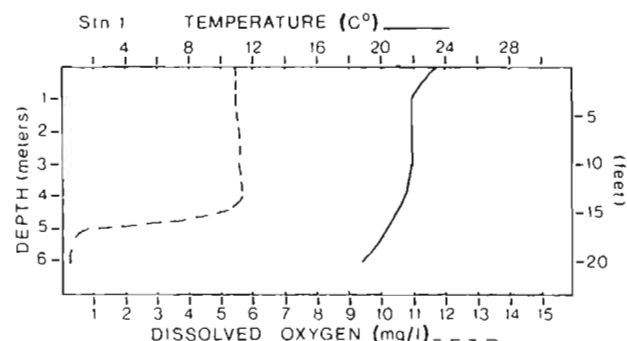
Most of the lake was surrounded in softwoods, except for cleared areas near the highway and where a few houses were built near the inlet. The western end was covered in lily pads and eel grass. A small beach area was located near the outlet.

Streams: At the time of the survey, the inlet, as designated by the Lands and Forests base map, could not be found; and it was assumed that, due to hot weather, the stream had become dry. In September, the survey crew again attempted to locate the stream, but none was found.

The outlet from Springfield Lake passed through a culvert under the road and emptied into Drain Lake. At the lake-shore, stream color was orange. At the other end of the culvert, stream water became grey and foamy. Upon inspection, another stream, carrying raw sewage, was seen entering the same culvert a few metres from Springfield Lake. Dissolved oxygen was recorded at 8.8 mg/l near the shore and pH was 4.5. At the other side of the road, dissolved oxygen decreased to 6.6 mg/l and pH increased to 6.5.

Width of the outlet was approximately 1 m, with an average depth of 10 cm. The stream bed was composed generally of mud with some gravel and rock. Alders formed good cover for most of the way to Drain Lake.

Lake Water Characteristics: Water analyses were completed at three stations on Little Springfield Lake. The following graph of Station 1 shows a thermocline. Stations 2 and 3 were done in shallow areas where no thermocline was evident. At Station 2, temperature was constant from surface to 2 m at 21.5°C, as was dissolved oxygen at 7 mg/l and pH at 4.5. Station 3 had a surface temperature of 22.0°C, which dropped to 21.0°C at 1.25 m. Dissolved oxygen varied from 4.3 mg/l at the surface to 4.9 mg/l at the bottom. Values for pH remained constant at 4.5. Conductivity was 340 µmhos/cm. Using this value for conductivity, MEI was calculated to be 95.1.

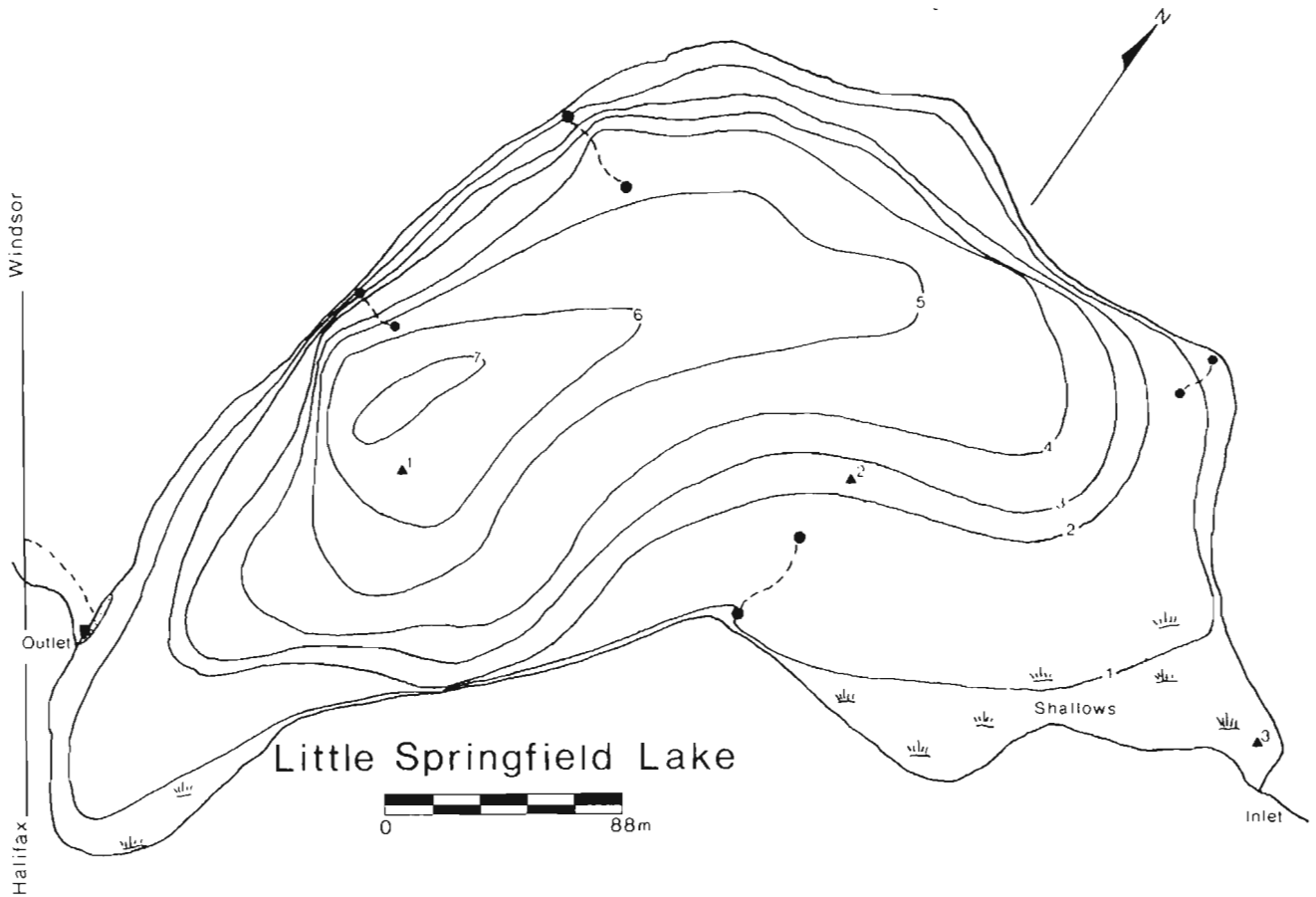


Exceptionally high values for MEI can be an indication of ecological stress (Ryder et al. 1974). Since oxygen and temperature values show high stress conditions, and raw sewage reportedly ran into the lake until a few years ago, it is assumed that MEI, in this case is an indication of ecological

stress rather than high productivity.

Fish Collection Data: On July 25, a 30-m and a 107-m gill net were set for one night. No fish were caught. On September 6, the same two nets were again set for one night. No fish were caught.

Stocking History: None.



Pentz LakeCounty: HantsDrainage System: Sackville RiverCoordinates: 44°53'N; 63°49'WTopographic Map Number: 11D/13 West HalfLands and Forests Map Number: J-22Stocking Number: n/aStream Inventory Number: SS111Status: HeadwaterSurvey Date: July 10 and 11, 1978Survey Agency: Freshwater and Anadromous DivisionSurface Elevation (m): 152Lake Surface Area (ha): 36.5Number of Islands: 0Total Island Area (ha): 0Total Water Surface Area (ha): 36.5Maximum Length (m): 1,270Maximum Effective Length (m): 1,270Maximum Width (m): 560Maximum Effective Width (m): 560Maximum Depth (m): 5Mean Depth (m): 2.5Volume of Lake (m³): 9.0 x 10⁵Shoreline Length (m): 3,400Shoreline Development: 1.6Conductivity (µmhos/cm): 58Secchi Disk Reading (m): 5Morphoedaphic Index: 18.7Potential Fish Yield (kg/ha/yr): 4.2Potential Angling Yield (kg/ha/yr): 3.2

Access: Pentz Lake is accessible via Highway 1, from which a dirt road parallels the western end of the lake. Most of this area is developed for housing, except for a piece of land near the inlet that has been left for public access to the lake.

Use: Due to the presence of homes with boat-docking facilities, it is assumed that Pentz Lake is used for recreational fishing, swimming and boating.

Physical Characteristics: Pentz Lake is situated in a fairly developed area, even though most of the lake shore is forested.

The western end of the lake has been developed with a number of year round homes covering most of the shoreline. A railway runs along the northern end of the lake.

The lakeshore in general is rocky, with emergent vegetation prevalent. The eastern end of the lake, in particular, becomes very shallow and rocky and covered with a mixture of lilies and eel grass.

Streams: The inlet at the time of the survey was not flowing. A little water lay in the stream bed near the lake, but a few metres upstream no water was visible. The width of the inlet at the lake was approximately one metre and narrowed to about one-half metre farther upstream. Temperature (where there was water) was 19.0°C. Oxygen and pH were recorded at 7.6 mg/l and 6.0, respectively.

The outlet passed through a culvert into a small shallow pond, which was completely covered in weeds and grass. At the time of the survey, there was no flow through the culvert. Where the outlet left the pond, a large pile of logs formed a barrier to fish passage.

Width of the outlet near the lake was about 3 m and averaged 10-15 cm deep. Temperature at this point was 18.0°C. Beyond the logs, the stream narrowed to approximately 2.5 m and depth increased to about 15 cm. Temperature at this point was also 18.0°C. At no point along the stream was there a detectable flow.

The stream bed was composed mainly of mud and silt. Stream-side, in approximately the first 100 m, was open, with grass vegetation giving way to dense woods downstream. No riffle areas or pools were noted.

Lake Water Characteristics: Water analyses were carried out in shallow areas only. Temperature at Station 1 ranged from 23.0°C at the surface to 22.0°C at 2.5 m. Dissolved oxygen varied from 6.7 mg/l at the surface to 6.8 mg/l near the bottom and pH was measured at 7.0.

At Station 2, temperature was constant from surface to bottom (at 2 m) at 23.0°C. Dissolved oxygen was also constant at 6.8 mg/l and pH was recorded at 6.5. Conductivity was measured at 58 µmhos/cm. Water color was clear.

Fish Collection: A 30-m and a 107-m gill net were set for a period of one night. The following table shows total catch statistics for these nets. (Individual net statistics are not available.)

Species	No.	Total length (cm)				Mean weight (g)
		Max	Min	Mean	SD	
White perch	5	-	-	-	-	-
Yellow perch	33 ¹	24.2	9.5	14.4	4.5	38.5
Common sucker	20 ²	29.6	16.4	19.4	4.1	82.5
Golden shiner	42	-	-	-	-	13.5
Brook trout	6 ³	26.2	17.1	21.3	4.8	73.8

More detailed statistics for four of the six brook trout are as follows:

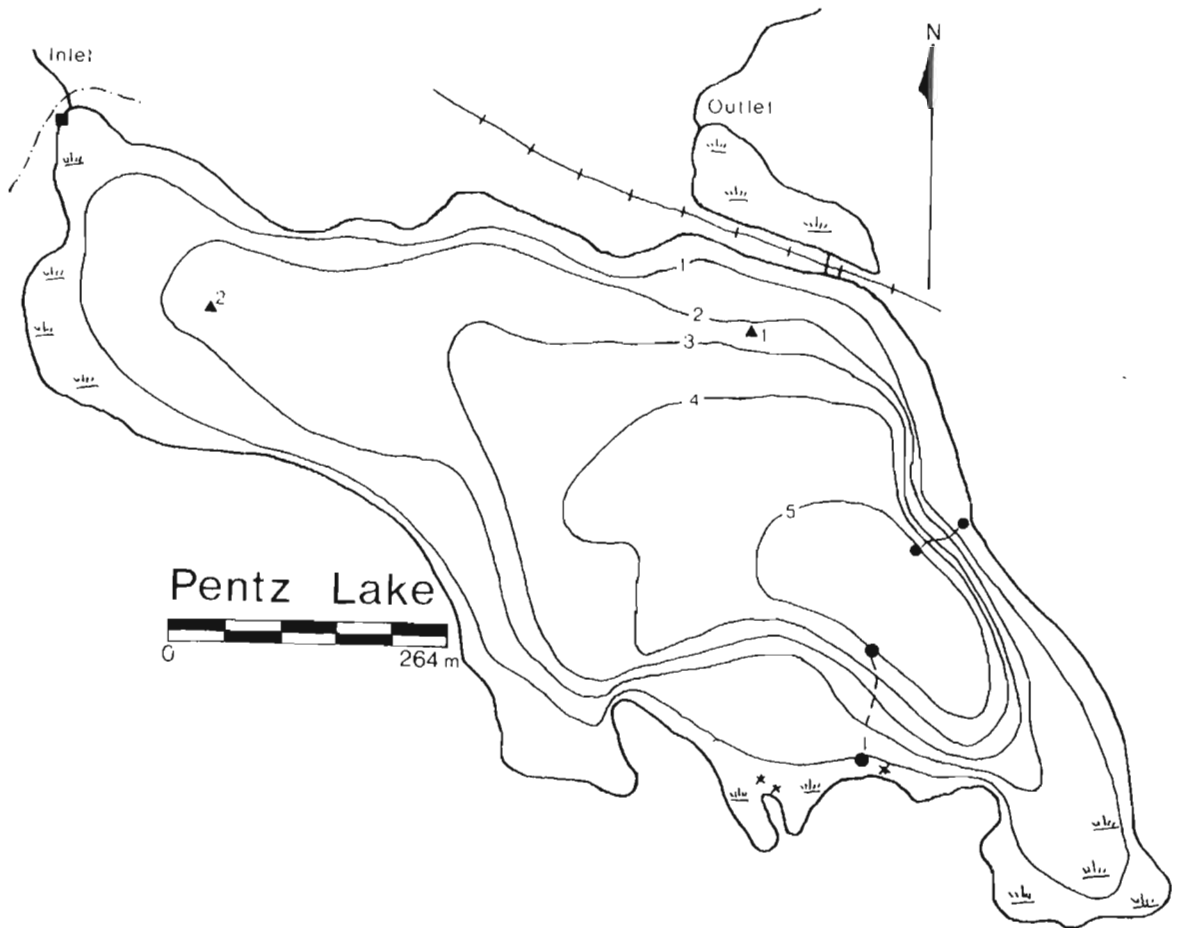
Fork	Length (cm)		Weight (g)	Sex
	Fork	Total		
23.9	24.7	125	F	
16.0	17.1	50	F	
16.4	17.3	40	F	
24.5	26.2	180	M	

¹Six mutilated by eels.

²Ten mutilated by eels.

³Two mutilated by eels.

Stocking History: None.



Tomahawk LakeCounty: HalifaxDrainage System: Sackville RiverCoordinates: 44°47'N; 63°48'WTopographic Map Number: 11D/13 West HalfLands and Forests Map Number: K-22Stocking Number: n/aStream Inventory Number: S5161Status: n/aSurvey Date: July 19 and 20, 1978Survey Agency: Freshwater and Anadromous DivisionSurface Elevation (m): 107Lake Surface Area (ha): 127.0Number of Islands: 3Total Island Area (ha): 2.5Total Water Surface Area (ha): 124.5Maximum Length (m): 3,100Maximum Effective Length (m): 1,980Maximum Width (m): 1,300Maximum Effective Width (m): 1,300Maximum Depth (m): 9.3Mean Depth (m): 3.8Volume of Lake (m³): 4.7 x 10⁶Shoreline Length (m): 12,000Shoreline Development: 3.1Conductivity (µmhos/cm): 28Secchi Disk Reading (m): 3.9Morphoedaphic Index: 4.1Potential Fish Yield (kg/ha/yr): 2.0Potential Angling Yield (kg/ha/yr): 0.5

Access: Access to Tomahawk Lake is via a logging road which exits the Hammonds Plains Road at English Corner. The road is in good condition and leads directly to a beach area near the outlet, where a boat can easily be launched.

Physical Characteristics: Tomahawk Lake was completely surrounded by a forest of hardwoods and softwoods. Emergent vegetation was noted in several areas, especially near the outlet which was almost entirely covered by lily pads. Except in these areas, where the bottom was soft and muddy, large granite rocks were predominant and, in many cases, broke the surface of the

water. Piles of logs were noted along the shoreline near the outlet and have dammed the outlet at the edge of the lake.

Streams: Inlet 1 appears to drain from a swamp about 50 m from the shore. Large boulders in the stream bed form a probable barrier to fish migration, especially in times of low water. Flow was good and water depth near the lake was 15 cm. Temperature was 23.0°C. Dissolved oxygen and pH were recorded at 6.2 mg/l and 6.4, respectively. The surrounding area at this inlet was open, and fish shelter was provided by large granite rocks and in-stream vegetation.

Access to Inlet 2 was difficult due to the surrounding shallow, rocky area. Average width of the stream was 1 m, and average depth was 10 cm. Flow was barely detectable and temperature was recorded at 18.5°C. Upstream, temperature dropped to 13.0°C. The stream bed consisted of large rocks and rubble, which at times of low water could prevent fish migration. The surrounding area consisted of larger granite boulders and small shrubs which provided little cover. Fish shelter was made available by overhanging banks, rocks and in-stream vegetation. Dissolved oxygen was recorded at 7.6 mg/l and pH was measured at 6.0.

Inlet 3, tributary from Beaver Lake, was the major inlet for Tomahawk Lake. Width near the lake was approximately 7 m and average depth was 15 cm, although a number of deeper pools were noticed. Temperature here was 19°C. Upstream about 75 m, average width and depth decreased to 6 m and 10 cm, respectively. Temperature remained the same.

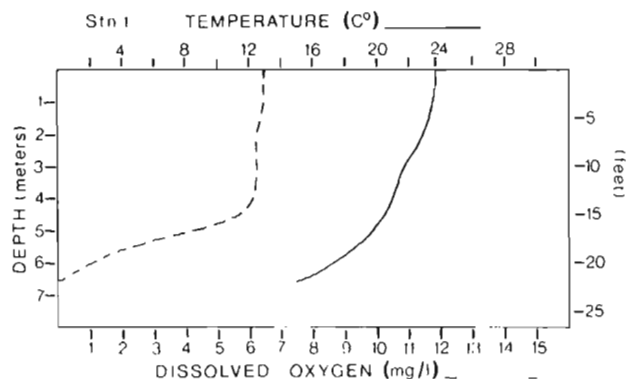
This inlet flowed swiftly through gently sloping woodlands over a stream bed of boulders, rocks and gravel. Pools and riffle areas were abundant. Overhanging trees and banks provided good cover, and adequate fish shelter was supplied by boulders and aquatic vegetation. Dissolved oxygen and pH were recorded at 7.7 mg/l and 5.6, respectively. Above the 75 m of stream surveyed, the water appeared to be flowing through a marshy area, which may account for low pH values.

At the time of the survey, Inlet 4 was dry except for a small section near the lakeshore, in which lay approximately 15 cm of water. Temperature here was 26.0°C. Dissolved oxygen was recorded at 6.6 mg/l and pH was 6.0. The area around the stream was boggy and provided little cover. However, deadfall, rocks and aquatic vegetation would provide some instream fish shelter when water levels are high. The bottom was generally composed of mud, with small amounts of gravel and rock.

The outlet is a major stream, with an average width of approximately 12 m and an average depth of 0.5 m. A pile of logs which has formed a barrier across the outlet at the lakeshore restricts fish migration but allows good water flow. Just behind the logs, the stream drops about 1.5

m over large boulders and then continues to flow swiftly at a gradual slope. High banks on either side of the stream made access difficult, so tests were done near the barrier. At this point average depth was 8-10 cm and width was approximately 8 m. Dissolved oxygen and pH were recorded at 7.8 mg/l and 6.0, respectively. The stream bed appeared to be generally composed of gravel and rubble. Due to its width, overhanging trees and banks provided little cover. Limited fish shelter was generally provided by boulders and deadfall.

Lake Water Characteristics: Water analyses were completed at four stations on Tomahawk Lake. Although all stations showed a thermal gradient, only water at Station 1 showed a thermocline, with a surface temperature of 24.0°C and a bottom temperature of 15.0°C at 6.5 m. Surface to bottom values for pH were 6.3 and 6.0, respectively.



Temperatures at Station 2 varied from 23.5°C at the surface to 21.0°C at 4.5 m. Dissolved oxygen values were slightly erratic, with a surface reading of 6.5 mg/l, a bottom reading of 6.4 mg/l and values of 6.6 mg/l at 2 m and 4 m. Values for pH were recorded at 6.0 at the surface and 6.3 at the bottom.

Station 3 was located over 2 m of water. Temperature at the surface was 23.0°C and dropped to 21.5°C at the bottom. Dissolved oxygen decreased from 7.6 mg/l at the surface to 7.4 mg/l at 2 m. Surface and bottom values for pH were 6.1 and 6.4, respectively.

Water analysis at Station 4 was taken over 5.5 m of water. Temperature here ranged from 23.5°C at the surface to 19.0°C at the bottom. Dissolved oxygen ranged from 6.8 mg/l at the surface to 3.8 mg/l at the bottom. Values for pH ranged from 6.1 to 5.9.

Conductivity was recorded at 28 μ mhos/cm and water color was clear.

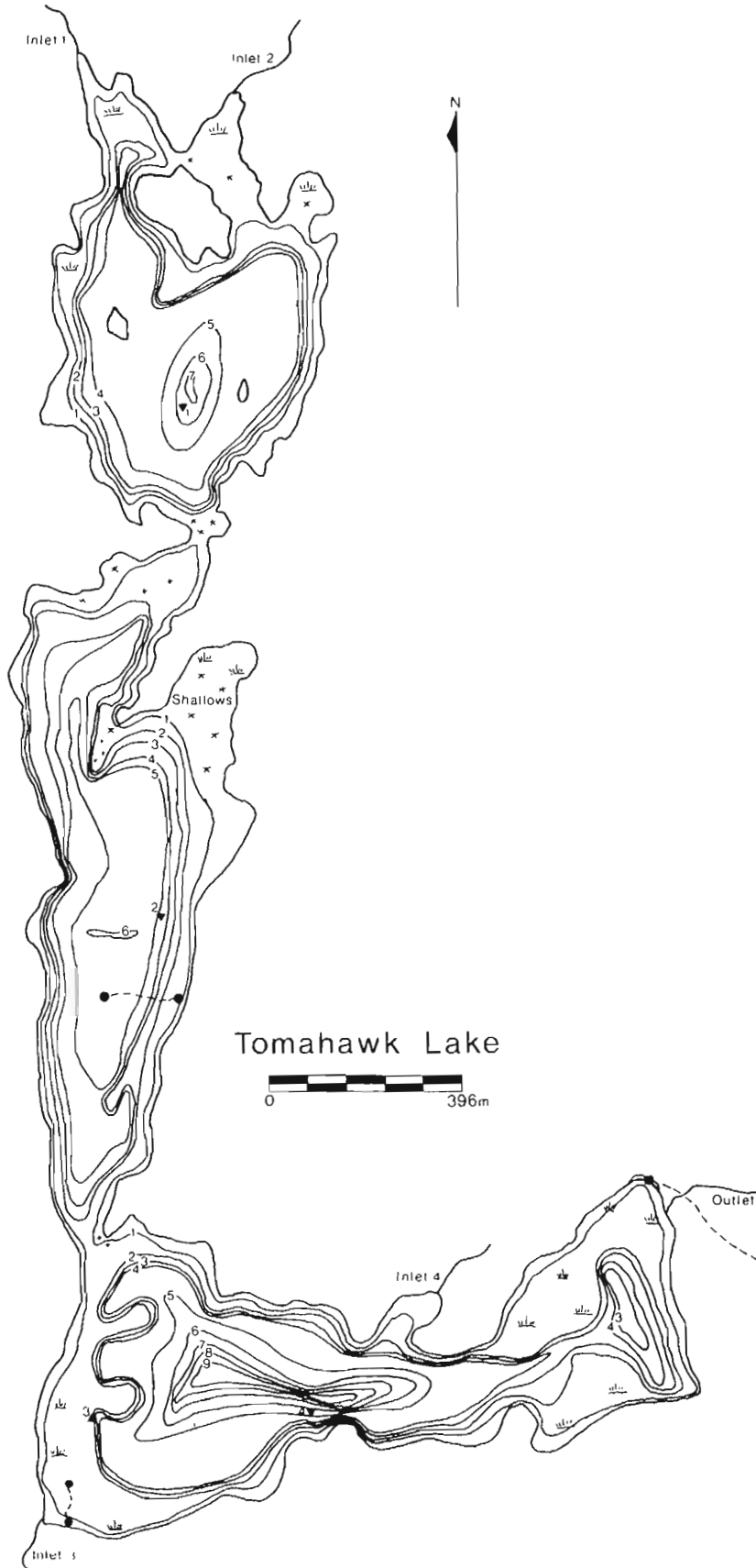
Fish Collection: A 30-m and a 107-m gill net were set for one night. The 30-m gill net captured four sucker and 11 yellow perch. The 107-m gill net captured two sucker and six yellow perch. No other species of fish were caught.

Species	No.	Total length (cm)				Mean weight (g)
		Min	Max	Mean	SD	
Common sucker	6 ¹	20.8	35.8	27.7	7.6	237
Yellow perch	17 ²	10.1	16.4	11.8	2.0	35.4

¹Two mutilated by eels.

²Five mutilated by eels.

Stocking History: None.



APPENDIX A

LIST OF COMMON AND SCIENTIFIC NAMES OF
FISH SPECIES CAPTURED DURING LAKE SURVEYS

Common name	Scientific name
American eel	<i>Anguilla rostrata</i> (LeSueur)
Banded killifish	<i>Fundulus diaphanus</i> (LeSueur)
Brown bullhead	<i>Ictalurus nebulosus</i> (LeSueur)
Common (white) sucker	<i>Catostomus commersoni</i> (Lacépède)
Eastern brook trout (Speckled trout)	<i>Salvelinus fontinalis</i> (Mitchill)
Gaspereau	<i>Alosa pseudoharengus</i> (Wilson)
Colden shiner	<i>Notemigonus crysoleucas</i> (Mitchill)
Lake chub	<i>Couesius plumbeus</i> (Agassiz)
Rainbow smelt	<i>Osmerus mordax</i> (Mitchill)
White perch	<i>Morone americana</i> (Gmelin)
Yellow perch	<i>Perca flavescens</i> (Mitchill)

APPENDIX B

LIST OF CODES AND ABBREVIATIONS USED IN
REFERENCE TO HATCHERY-PRODUCED TROUT

Code or abbreviation	
	<u>Species</u>
S	Brook (speckled) trout
	<u>Stage of Development</u>
c	Fry
d	Advanced fry (first 2 weeks after absorption of yolk sac)
1	#1 fingerlings (2-8 weeks after absorption of yolk sac)
2	#2 fingerlings (8-14 weeks after absorption of yolk sac)
3	#3 fingerlings (14-20 weeks after absorption of yolk sac)
4	#4 fingerlings (20-26 weeks after absorption of yolk sac)
5	#5 fingerlings (26-52 weeks after absorption of yolk sac)
f	Yearlings (1-2 years from hatching)
g	Two to three years from hatching
h	Three or more years from hatching

APPENDIX C

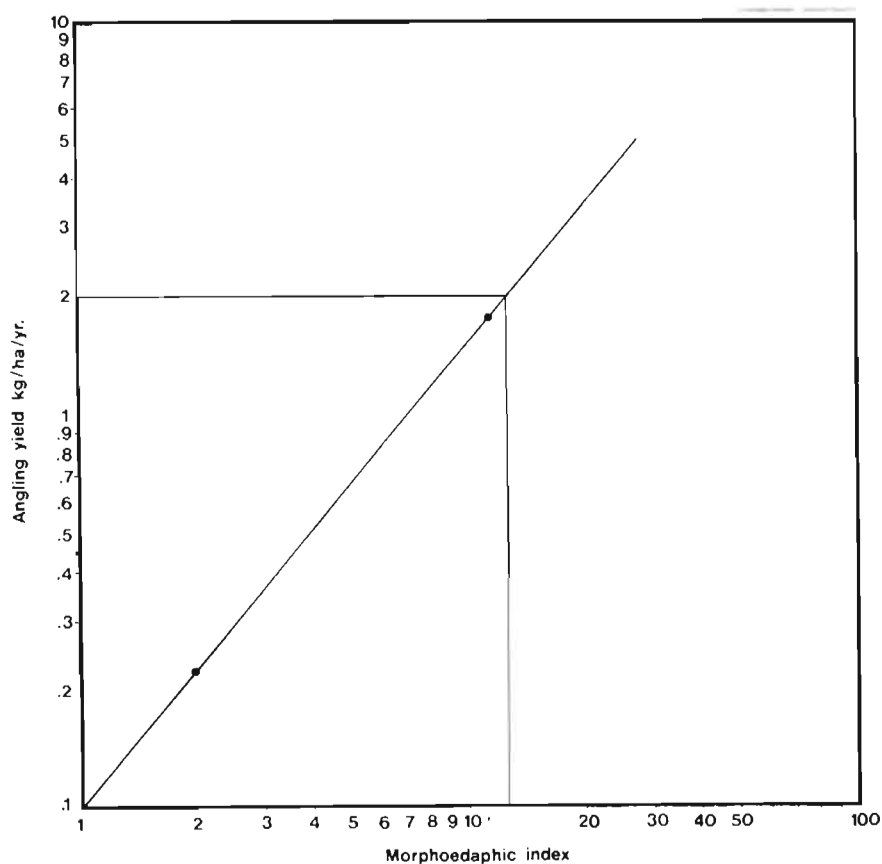
COMPONENT DATA AND RESULTANT PRODUCTIVITY ESTIMATES
FOR TEN NOVA SCOTIAN LAKES SURVEYED DURING 1978

Lake	Water area (ha)	Mean depth (m)	MEI	Conductivity (µmhos/cm)	Potential fish yield			
					Total (kg/ha/yr)		Angling (kg/yr)	
Beaver	17.0	1.5 ¹	14.5	50	3.7	62.9	2.4	40.8
Beaver Dam (No. 2)	8.5	2.3	4.7	20	2.1	17.9	0.6	5.1
Cockscomb	144.0	11.5	1.4	29	1.2	172.8	0.2	28.8
Feely	10.5	2.6	6.0	28	2.4	25.2	0.8	8.4
Fox Point	136.0	4.9	4.0	35	1.9	258.4	0.2	27.2
Halfway	14.0	7.4	3.9	50	1.9	26.6	0.5	7.0
Lewis	21.0	0.9 ¹	24.4	60	4.7	98.7	2.0	42.0
Little Springfield	8.0	3.4	95.1	340	-	-	-	-
Pentz	36.5	2.5	18.7	58	4.2	153.3	3.2	116.8
Tomahawk	124.5	3.8	4.1	28	2.0	245.3	0.5	66.0

¹Mean depth of 2.0 m used in productivity calculations.

APPENDIX D

ANGLING YIELD RELATED TO THE MORPHOEDAPHIC INDEX



APPENDIX E

NUMBERS AND SPECIES OF FISH COLLECTED BY GILLNET
FROM TEN NOVA SCOTIAN LAKES SURVEYED DURING 1978

Lake	Brook trout	Brown bullhead	Common sucker	Gaspereau	Golden shiner	Rainbow smelt	White perch	Yellow perch
Beaver								142
Beaver Dam (No. 2)		7	71	13	13	8		2
Cockscomb	4		57		1			2
Halfway								47
Lewis			15		2			8
Little Springfield								
Feely			7					
Fox Point	50							
Pentz	6		20		42		5	33
Tomahawk			6					17

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