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BACTERIOLOGICAL SURVEY OF  
NORTH LAKE PRINCE EDWARD ISLAND  
SHELLFISH GROWING AREA 4

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Atlantic Region

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BACTERIOLOGICAL SURVEY OF NORTH LAKE  
PRINCE EDWARD ISLAND SHELLFISH GROWING AREA 4

by

A.S. MENON AND H.R. VANOTTERLOO  
||

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FOREWORD

This report is the result of a joint investigation conducted by the Environmental Protection Service and the Prince Edward Island Department of the Environment.

Without the exceptional cooperation and assistance provided by the Prince Edward Island Department of Environment, this report would not have been possible. The authors, however, are completely responsible for the interpretation of the data and the conclusions of this report.

ABSTRACT

A bacteriological survey of North Lake, Prince Edward Island, was conducted from May to July, 1975, at a request from the Inspection Branch of Fishery and Marine Service, Maritime Region, because of high coliform counts found in the clam samples taken from a commercial harvest area.

A total of 115 water samples were collected from North Lake and analysed for fecal coliform densities. Fecal coliform densities were generally very low in most stations in North Lake, but periodically high fecal coliform counts exceeding the 43 upper acceptance limits were found in several stations at the eastern channel and in the western end of the lake. The major sources of fecal pollution affecting North Lake were found to be associated with the fishing village situated at the eastern channel and with the stream entering the western end of the lake.

It is recommended that the existing closure (4-5) at the western end of North Lake upstream from Lakeville bridge be retained and a new closure be established at the eastern sector of North Lake between the bridge at the channel and a line drawn from the north shore to the south shore of the lake as indicated in Figure 3.

## RÉSUMÉ

Entre mai et juillet 1975, à la demande de la Direction de l'inspection du Service des pêches et de la mer de la région des provinces maritimes, le lac North, à l'île du Prince-Édouard, a fait l'objet d'une étude bactériologique. L'opportunité de l'enquête venait du nombre élevé de coliformes observés dans des échantillons de palourdes provenant d'une zone commerciale de pêche.

Au total, 115 échantillons d'eau du lac North ont fait l'objet d'une analyse pour déterminer le taux de coliformes fécaux. En général, la concentration était très basse dans la plupart des stations sur le chenal de l'est et à l'extrémité ouest du lac. Les principales sources de pollution fécale ont été attribuées au village de pêcheurs situé sur le chenal de l'est et au ruisseau se déversant dans le lac à son extrémité ouest.

L'étude recommande de maintenir l'interdiction frappant l'extrémité ouest du lac North (4-5) en amont du pont de Lakeville et de fermer à la pêche la zone est entre le pont traversant le chenal et une ligne tracée de la rive nord à la rive sud du lac tel qu'indiqué à la figure 3.

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1 INTRODUCTION

A bacteriological survey of North Lake, Prince Edward Island shellfish area 4 was conducted from May 9 to July 8, 1975. The survey was conducted at a request from the Inspection Branch of Fisheries and Marine Service, Maritime Region, because of high coliform counts found in the clam shellstock (Mya arenaria) samples taken from the commercial harvest area during October, 1974. At present the entire area of North Lake is open to the taking of shellfish with the exception of the waters of the Baltic River upstream from the highway bridge at the westerly end of the lake.

A preliminary bacteriological survey of North Lake was conducted in 1966 by Kindrasky and DeBellefeuille<sup>(4)</sup> who found that the major sources of pollution affecting the lake were from the stream entering the western end of the lake and the fishing village at the eastern end of the lake. They recommended that all the waters upstream from the bridge at the western end of the lake and a portion of the eastern section of North Lake between the bridge and a line drawn from the south shore to the north shore of the lake as indicated in Figure 1 be closed to direct harvesting of shellfish. The clam resource in question falls within the eastern boundaries of the recommended closure. However the recommendation of the closure in the eastern section of the lake was never implemented, and Cullen<sup>(3)</sup> in a 1968 sanitary survey found that a 400 foot wharf closure was adequate for the North Lake entrance to the Gulf of St. Lawrence.

The purpose of the survey was to reassess the adequacy of the existing closures in North Lake.

## 2 MATERIALS AND METHODS

### 2.1 Sampling

Water samples were collected in sterile glass bottles at a depth of approximately one foot by means of a rod sampling device. All samples collected were kept in an insulated cooler and transported to the mobile laboratory for analysis within two hours of collection.

### 2.2 Bacteriological Analyses

All water samples were tested for fecal coliform levels by multiple tube dilution (MPN) method according to the A.P.H.A. "Recommended Procedures for the Bacteriological Examination of Sea Water and Shellfish". (1) Bacto-Lauryl Tryptose Broth was used as the presumptive test medium with incubation at  $35 \pm 0.5^\circ\text{C}$  for 24 and 48 hours, and positive cultures were transferred to Bacto-EC Medium and incubated in a water bath at  $44.5 \pm 0.2^\circ\text{C}$  for 24 hours. The most probable number (MPN) of fecal coliform was derived using a 5-tube decimal dilution MPN table.

The criterion used for the classification of approved shellfish growing waters is a median fecal coliform value of 14 MPN per 100 ml with no more than 10 percent of the samples exceeding an MPN of 43 for a 5-tube decimal

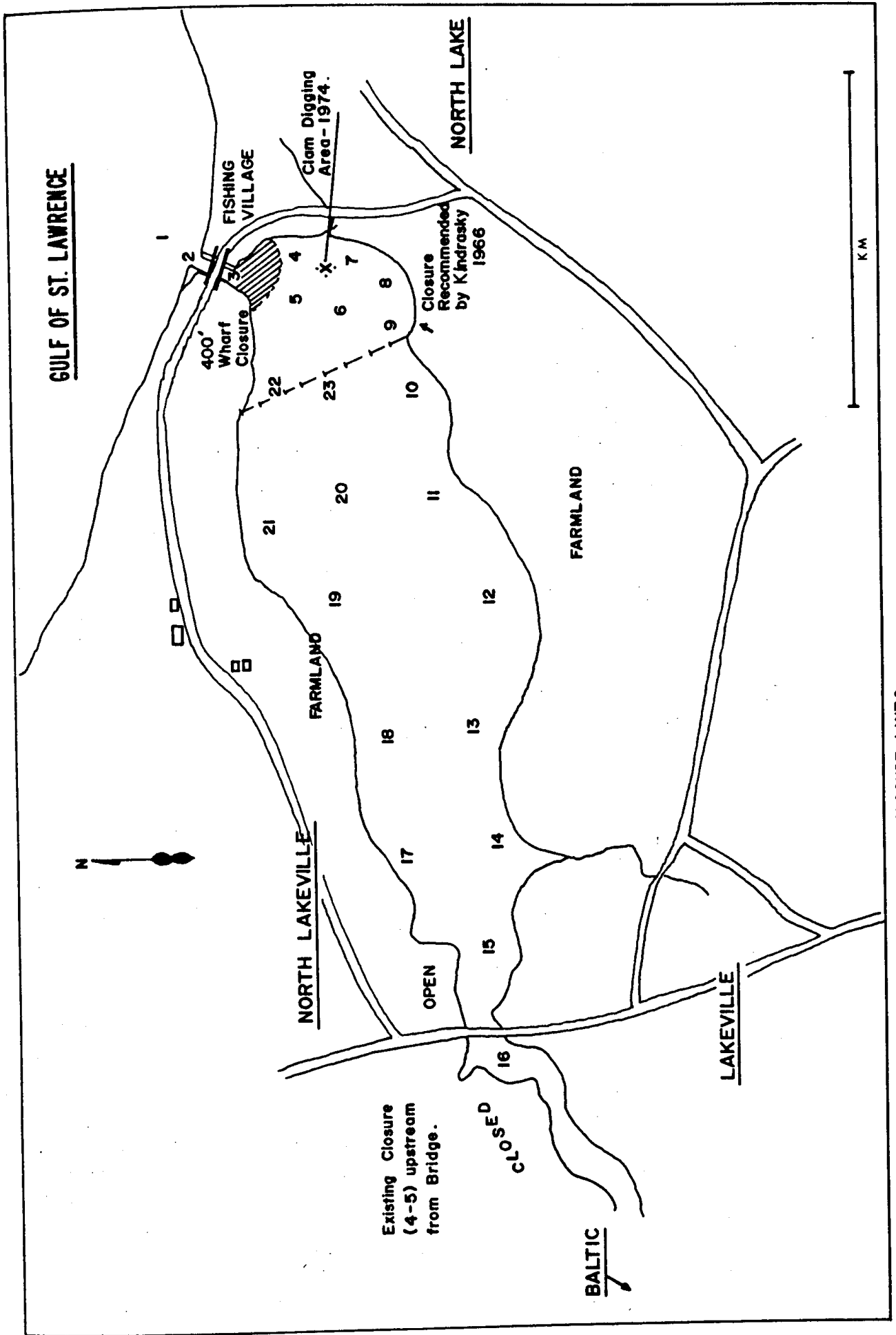


FIGURE 1 - SAMPLING STATIONS AND CLOSURE LINES

dilution test. In addition to bacteriological data, sanitary information of the study area is also included in assessing the closure.

### 2.3 Physical Data

To facilitate the interpretation of bacteriological data, the following physical parameters are also determined:

Salinities (ppt) were determined by the Knudsen Method<sup>(2)</sup> from water samples collected from selected stations. Water temperatures were also recorded at several stations. The tidal stage was estimated and recorded for the time period encompassing the beginning and end of each sampling run. In addition, records of daily precipitation at East Baltic, P.E.I., were provided by the Atmospheric Environment Service, Environment Canada, Atlantic Region.

## 3 AREA DESCRIPTION

North Lake, located on the North Eastern coast of Prince Edward Island, is a shallow embayment about one and a half miles long and half a mile wide. It is connected to the Gulf of St. Lawrence by a narrow boat channel at the eastern end. A small fishing village is located near the channel, with a number of fishing huts and permanent houses. Approximately a hundred fishing vessels are based here. Tuna fishing has become very important recently and North Lake is advertised as the Tuna capital of the world. A fish plant

is located near the channel. Sanitary sewer and processing wastes in the fish plant are separated. Sanitary wastes of the fish plant are contained in a septic tank, while processing wastes are discharged directly to the channel. A small stream approximately six miles in length enters into the western end of North Lake. This stream primarily drains forested land, but it passes through the village of Baltic at approximately four miles upstream from North Lake. All dwellings in the village are provided with septic tanks. A small creek approximately two miles in length drains the wooded area to the south of the lake. The lake itself is surrounded by farming and grazing land, but no farm buildings are close to the water. There are no major livestock operations within the 48 km<sup>2</sup> of the North Lake drainage area.

4

RESULTS AND DISCUSSION

The location of sampling stations established in North Lake is shown in Figure 1. Fecal coliform MPN results for 115 water samples collected from 23 sampling stations on five sampling days in North Lake are presented in Table 1 of the appendix. A record of daily precipitation for the survey period is provided in Table 2. Salinity and temperature data obtained at selected stations are presented in Table 3.

Fecal coliform densities were generally very low in most stations in North Lake. The median fecal coliform values for most stations were less than 14 per 100 ml with the

exception of one station at the eastern channel (Figure 2). But high fecal coliform counts which exceeded the 43 fecal coliform upper acceptance limit were occasionally found at both ends of the lake. Figure 2 presents a comparison of the fecal coliform data collected during this survey to those obtained from 1966 survey. Fecal coliform values exceeding the 43 limit were found in almost identical areas in both surveys. It is clear from Figure 2 that a 400 foot wharf closure at North Lake is not adequate to include all the contaminated areas. Even the closure recommended by Kindrasky and DeBellefeuille<sup>(4)</sup> in 1966 does not adequately encompass the contaminated area as defined by either their recorded data or those obtained during this survey. It is therefore not surprising that the clam samples collected by the Fish Inspection Laboratory just beyond the 400 foot wharf closure contained high coliform counts.

In the western end of North Lake the median fecal coliform value was less than 14 but two stations (15 and 17) had a maximum value of 49 which only slightly exceeded the 43 limit. The sanitary survey revealed no evident source of fecal contamination in this section of the lake. The Baltic River and creek passes through miles of uninhabited woodland and the village of East Baltic before discharging to North Lake. Thus the closure (4-5) currently enforced in this area appears to be adequate.

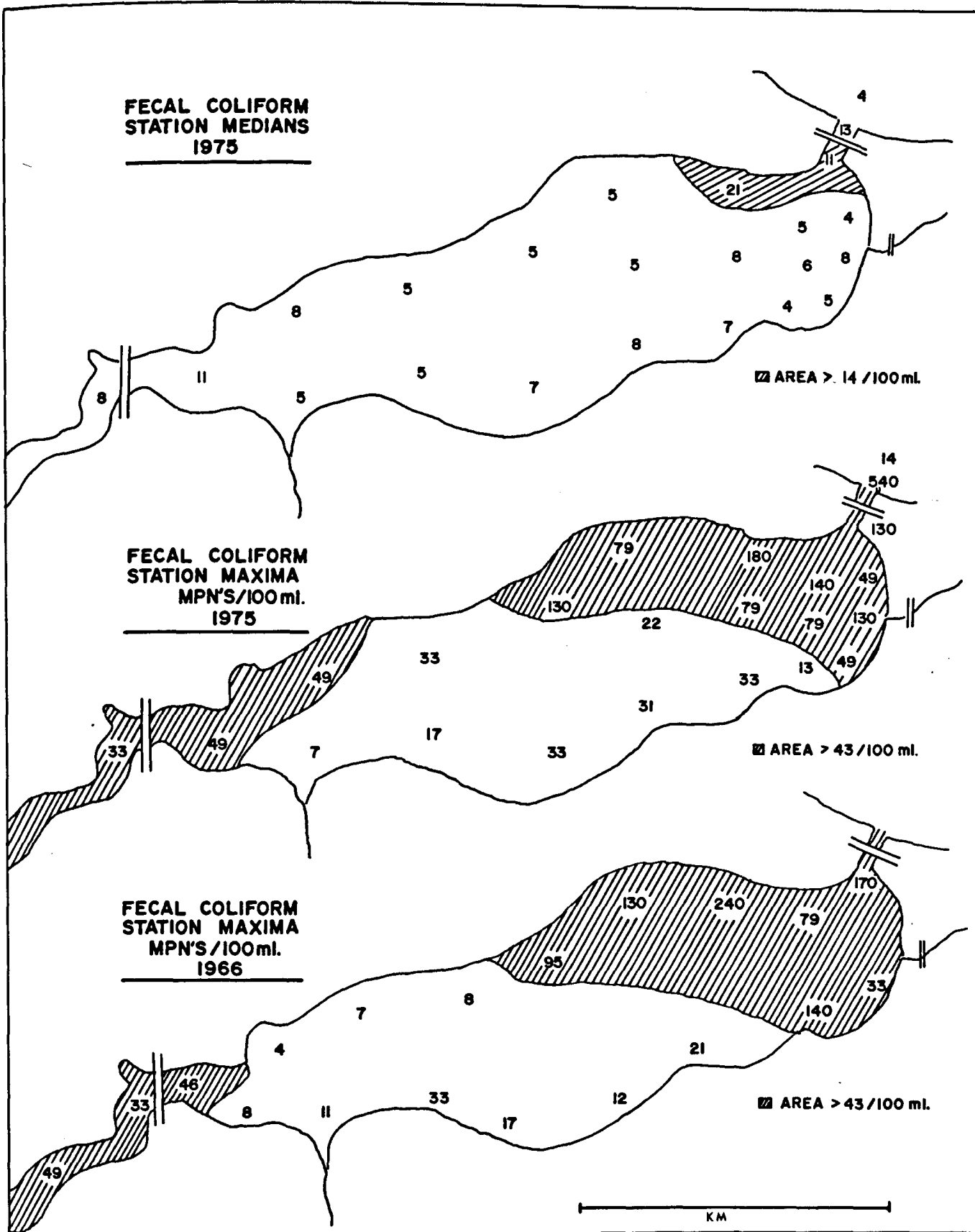


FIGURE 2. SURVEY DATA COMPARISON - 1966 AND 1975.



5 CONCLUSIONS

The bacteriological data obtained from this survey indicate that the major sources of pollution affecting North Lake are associated with the stream entering the western end of the lake and with the fishing village situated at the eastern channel of the lake. Pollution introduced in both ends of the lake do not appear to significantly affect the central portion of North Lake. It is therefore recommended that the existing closure (4-5) at the western end of North Lake upstream from Lakeville bridge be retained and a new closure be established at the eastern sector of North Lake between the bridge at the channel and a line drawn from the north shore to the south shore of the lake as indicated in Figure 3. The exact location of the closure should be defined by monuments.

6 RECOMMENDATIONS OF THE MARITIME STANDING COMMITTEE ON SHELLFISH

The existing closure P.E.1. 4-5, North Lake, is adequate and should remain in effect unchanged.

A new closure should be established on North Lake as shown in Figure 3 of this report.

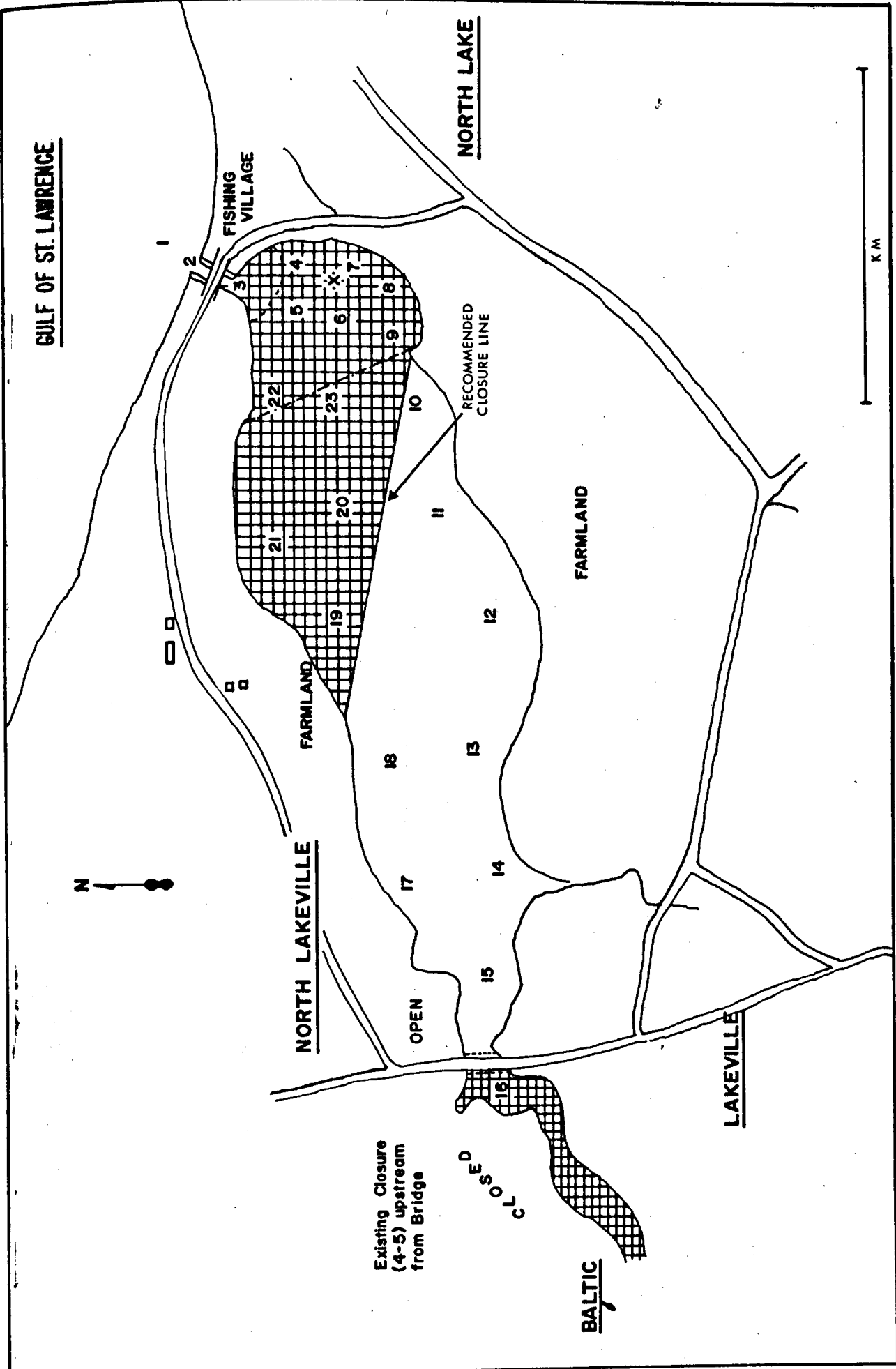


FIGURE 3 - RECOMMENDED CLOSURES IN NORTH LAKE, PRINCE EDWARD ISLAND, 1975.

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- 2 Anon, Determination of Chlorinity by the Knudsen Method, G.M. Manufacturing Company, New York (1962).
- 3 Cullen, D.H. Sanitary Survey of Shellfish Area P.E.I. - 10 - Kings North. Department of National Health and Welfare, Public Health Engineering Division, Manuscript Report 1968.
- 4 Kindrasky, G.A. and M. DeBellefeuille, Bacteriological Survey, North Lake, P.E.I. - 10, Department National Health and Welfare, Public Health Engineering Division, Manuscript Report No. 67-3, 8 pp (1966).

TABLE 1 - FECAL COLIFORM DATA, NORTH LAKE, P.E.I., 1975

STATION	DATE	MAY 9	MAY 13	JUNE 3	JUNE 24	JULY 8	MEDIAN
	TIDE	H.F. <sup>1</sup>	H.F.	H.R. <sup>2</sup>	H.F.	H.F.	
1		-	8	<2	<2	14	4
2		540	13	13	79	5	13
3		130	11	17	2	2	11
4		49	4	8	<2	2	4
5		140	5	<2	5	7	5
6		79	6	<2	<2	79	6
7		130	2	2	23	8	8
8		49	5	2	6	5	5
9		13	9	<2	<2	4	4
10		33	11	<2	7	2	7
11		31	8	<2	<2	11	8
12		33	7	<2	<2	7	7
13		13	17	2	5	5	5
14		<2	7	<2	5	5	5
15		7	49	<2	11	33	11
16		2	<2	8	31	33	8
17		8	49	2	8	2	8
18		13	33	<2	5	5	5
19		9	5	5	<2	130	5
20		22	11	5	5	<2	5
21		79	4	4	5	26	5
22		180	21	4	<2	22	21
23		79	8	<2	4	14	8

<sup>1</sup> H.F. - High-Falling

<sup>2</sup> H.R. - High-Rising

TABLE 2 - DAILY RECORD OF RAINFALL PRECEEDING SAMPLING DAYS  
AT EAST BALTIC, P.E.I., 1975

MAY	RAINFALL (INCHES)	JUNE	RAINFALL (INCHES)	JULY	RAINFALL (INCHES)
3	0.16	1	0.22	1	-
4	0.07	2	-	2	-
5	0.06	3*	-	3	-
6	1.31	4	-	4	-
7	0.20			5	0.03
8	-	19	-	6	0.01
9*	-	20	-	7	0.07
10	-	21	-	8*	-
11	-	22	-		
12	-	23	-		
13*	0.01	24*	-		

\* Sampling Day

TABLE 3 - SALINITY AND WATER TEMPERATURE DATA AT SELECTED STATIONS

SALINITIES (PPT) AND TEMPERATURE C°

DATE	STATION 1		STATION 6		STATION 16		STATION 18	
	°C	ppt	°C	ppt	°C	ppt	°C	ppt
May 9	-	-	3.1	-	3.4	-	3.4	-
May 13	12.1	18.4	9.0	18.0	11.2	0.0	22.0	15.0
June 24	15.1	19.2	17.9	24.0	13.0	7.8	15.8	21.0
July 7	20.0	21.1	24.2	19.5	18.0	5.6	20.9	22.0

#### ACKNOWLEDGEMENTS

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